PRELIMINARY VISUAL SURVEY OF SEVERAL SITES OF POTENTIAL ARCHAEOLOGICAL INTEREST AT OL ARI NYIRO RANCH, LAIKIPIA NATURE CONSERVANCY, THE GALLMANN MEMORIAL FOUNDATION

OL ARI NYIRO ARCHAEOLOGICAL PROJECT
GALLMANN MEMORIAL FOUNDATION

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METHODS FOR A SURVEY OF ARCHAEOLOGICAL SIES AND POTENTIAL AT OLD ARI NYIRO

This project started when I met Sveva Gallman at L. Singh's house in Dallas last spring. We then spoke about the possibility of carrying out together a preliminary survey of the Ol Ari Nyiro ranch, and the document "Things a Girl Needs To Go A-Surveying" (See Annex I) was produced.

The spirit and methods of the survey has very much kept to that of that document. Kuki and Sveva Gallman know their land by heart, and they led me to discrete locations within the ranch of assessed or potential archaeological interest, because of observed landscape features or recorded chance archaeological findings.

Once in these locations, I limited my task to visual observation and mapping of surface features, with the aim of producing a comprehensive Catalogue and Map of Sites of Archaeological Interest within the Ranch to eventually assess the possibility of carrying out more detailed research in the ones perceived as most interesting.

No excavation or physical prospection or any further type has been carried out at this stage, for which an official authorization will be sought in due time. Some materials collected in surface with the objective of documenting the observed sites, have been inventoried –see Annexes, labeled, boxed and stored at the Laboratory of the Centre in the Laikipia Nature Conservancy.

It is the stated aim of the Gallman Memorial Foundation to build a Museum and Research Centre where archaeological finds and research will develop and find expression of value to shed further light on the understanding of the Prehistory of the Laikipia area, its culture and populations.

In the present report we include first, a general overview of current state of knowledge of Human Prehistory in the world and in Africa, to serve as rough background and framework, followed by explanation and map of the main sites observed. Included as Annexes are the UTM geographical locations of the sites, list of pictures taken at each of these and also of materials both collected or left *in situ*, and inventory of materials.

Given the relevance of the nearby Tungen Hills where many fossils relevant to Human evolution have been unearthed (Chesawanja site, Millenium Man site), it is to be hoped that a more detailed survey of the SW area of the Ranch will yield fossils relevant to that subject. With this perspective, and because of its intrinsic interest, specially in an area such as that of the Laikipia Nature Conservancy where wildlife is still rich and ever present, I esteem desirable the compillation of an Anatomical Collection of Reference of vertebrates, which has been started with bone specimens collected on surface in the immediacy of the Main Camp, inventoried (See Annexes) and stored at the Laboratory of the Centre.

The sites documented below are thought to belong roughly to the African Iron Age, Palaeolithic undetermined and one of them, Poromoko, to the Acheulean culture.

SOME FEEDBACK: WHAT IS THE STONE AGE?

I. INTRODUCTION

Stone Age, period of human technological development characterized by the use of stone as the principal raw material for tools. In a given geographic region, the Stone Age normally predated the invention or spread of metalworking technology. Human groups in different parts of the world began using stone tools at different times and abandoned stone for metal tools at different times. Broadly speaking, however, the Stone Age began roughly 2.5 million years ago, ended in some parts of the world 5,000 years ago, and ended in other regions much more recently. Today only a few isolated human populations rely largely on stone for their technologies, and that reliance is rapidly vanishing with the introduction of tools from the modern industrialized world.

Human ancestors living before the Stone Age likely used objects as tools, a behavior that scientists find today among chimpanzees. Wild chimpanzees in Africa exhibit a range of tool-using behaviors. For example, they use bent twigs to fish for termites, chewed wads of leaves to soak up liquid, and branches and stones as hammers, anvils, missiles, or clubs. However, when prehistoric humans began to make stone tools they became dramatically distinct from the rest of the animal world. Although other animals may use stone objects as simple tools, the intentional modification of stone into tools, as well as using tools to make other tools, appear to be behaviors unique to humans. This stone toolmaking and tool-using behavior became central to the way early humans adapted to their environment and almost certainly had a profound effect on human evolution.

Archaeologists believe the Stone Age began about 2.5 million years ago because that marks the age of the earliest stone tool remnants ever discovered. The earliest recognizable stone artifacts mark the beginnings of the archaeological record—that is, the sum total of material remnants of ancient human activities. As recently as 5,000 years ago all human societies on the face of the earth were essentially still living in the Stone Age. Therefore, over 99.8 percent of humans' time as toolmakers—from 2.5 million years ago to 5,000 years ago—took place during the Stone Age. During the Stone Age our ancestors went through many different stages of biological and cultural evolution. It was long after our lineage became anatomically modern that we began to experiment with new innovations such as metallurgy, heralding the end of the Stone Age.

II. STUDY OF THE STONE AGE

The term Stone Age has been used since the early 1800s as a designation for an earlier, prehistoric stage of human culture, one in which stone rather than metal tools were used. By the early 1800s various archaeological sites had been found in Europe that contained mysterious items from evidently earlier, prehistoric times. Christian Thomsen, curator of the National Museum in Copenhagen, Denmark, developed a classification scheme to organize the museum's growing collections into three successive technological stages in the human past: Stone Age, Bronze Age, and Iron Age. This three-age classification was quickly adopted and spread not only among museums in Europe but also among excavators, who were able to identify Stone Age remnants that were found below

Bronze Age remnants, which were in turn found below Iron Age remnants as they dug down through layers of deposits at their sites. The fact that Stone Age remnants were found at the bottom layers indicated that they were the oldest.

General Concepts

The study of the Stone Age falls under the fields of anthropology, which is the study of human life and culture from the origins of human life up to the present, and archaeology, which is the study of the material remains of humans and human ancestors. Archaeologists seek out, explore, and study archaeological sites, locations around the world where historic or prehistoric people left behind traces of their activities. Archaeologists use the data collected to make theories about how human ancestors lived.

Archaeologists normally use the term artifact to refer to objects that have been modified by human action, either intentionally or unintentionally. The term tool is used to refer to something that has been used by a human or a human ancestor for some purpose and may be modified or not. For instance, a thrown rock is a tool, even if it was not modified. It is usually difficult to demonstrate that a particular stone artifact was used as a tool prehistorically, so in practice, archaeologists prefer to use the term artifact instead, especially in relation to the earlier stages of the Stone Age. Unused debris or waste from the manufacture of stone tools is also considered artifactual.

Stone artifacts are of great importance to archaeologists who study prehistoric humans, because they can yield a wide range of information about ancient peoples and their activities. Stone artifacts are, in fact, often the principal archaeological remnants that persist after the passage of time and as such can give important clues as to the presence or absence of ancient human populations in any given region or environment. Careful analysis of Stone Age sites can yield crucial information regarding the technology of prehistoric toolmakers, which in turn gives anthropologists insight into the levels of cognitive (thinking) ability at different stages of human evolution.

Human Evolution

Before the Stone Age, early human ancestors—called hominids—had already become bipedal, meaning that they walked upright on two legs. At the dawn of the Stone Age, there were two types of hominids: those who belonged to genus Homo and those who belonged to genus Australopithecus (called australopithecines). Over the course of the Stone Age, both evolved into new and different species. Early Homos evolved into forms such as Homo habilis, Homo rudolfensis, Homo erectus, Homo neanderthalensis (also called Neandertals), and, finally, Homo sapiens—modern humans (Human Evolution).

Geologic Epochs of the Stone Age

During the Stone Age, Earth experienced the most recent in a succession of ice ages, in which glaciers and sea ice covered a large portion of Earth's surface. The most recent ice age period lasted from 1.8 million to 11,500 years ago, a period of glacial and warmer interglacial stages that is known as the Pleistocene Epoch. The Holocene Epoch began at the end of the ice age 11,500 years ago and continues to the present. Geologic Time.

Stone Age Toolmaking Technology

Early hominids made stone artifacts either by smashing rocks between a hammer and anvil (known as the bipolar technique) to produce usable pieces or by a more controlled process termed flaking, in which stone chips were fractured away from a larger rock by striking it with a hammer of stone or other hard material. Later, especially during the last 10,000 years, other techniques of producing stone artifacts—including pecking, grinding, sawing, and boring—became more common. The best rocks for flaking tended to be hard, fine-grained, or amorphous (having no crystal structure) rocks, including lava, obsidian, ignimbrite, flint, chert, quartz, silicified limestone, quartzite, and indurated shale. Ground stone tools could be made on a wider range of raw material types, including coarser grained rock such as granite.

Flaking produces several different types of stone artifacts, which archaeologists look for at prehistoric sites. The parent pieces of rock from which chips have been detached are called cores, and the chips that have been removed from cores are called flakes. A flake that has had yet smaller flakes removed from one or more edges in order to sharpen or shape it is known as a retouched piece. The stone used to knock flakes from cores is called a hammerstone or a percussor. Other flaking artifacts include fragments and chunks, most of which are broken cores and flakes.

The terms culture and industry both refer to a system of technology (toolmaking technique, for example) shared by different Stone Age sites of the same broad time period. Experts now prefer to use the term industry instead of culture to refer to these shared Stone Age systems.

III. DIVISIONS OF THE STONE AGE

Archaeologists have divided the Stone Age into different stages, each characterized by different types of tools or tool-manufacturing techniques. The stages also imply broad time frames and are perceived as stages of human cultural development. The most widely used designations for the successive stages are Paleolithic (Old Stone Age), Mesolithic (Middle Stone Age), and Neolithic (New Stone Age). British naturalist Sir John Lubbock in 1865 defined the Paleolithic stage as the period in which stone tools were chipped or flaked. He defined the Neolithic as the stage in which ground and polished stone axes became prevalent. These two stages also were associated with different economic and subsistence strategies: Paleolithic peoples were hunter-gatherers while Neolithic peoples were farmers. Archaeologists subsequently identified a separate stage of stone tool working in Eurasia and Africa between the Paleolithic and the Neolithic, called the Mesolithic. This period is characterized by the creation of microliths, small, geometric-shaped stone artifacts that were attached to wood, antler, or bone to form implements such as arrows, spears, or scythes. Microliths began appearing between 15,000 and 10,000 years ago at the end of the Pleistocene Ice Age.

The Paleolithic/Mesolithic/Neolithic division system was first applied only to sites in Europe, but is now widely used (with some modification) to refer to prehistoric human development in much of Asia, Africa, and Australasia. Different terminology is often used to describe the cultural-historical chronology of the Americas, which humans did not reach until some point between 20,000 and 12,000 years ago. However, there is a

general similarity in the transition from flaked stone tools associated with prehistoric hunter-gatherers to both flaked and ground stone tools associated with the rise of early farming communities. The period in the Americas up to the end of the Pleistocene Ice Age about 10,000 years ago, when most humans were hunter-gatherers, is called Paleo-Indian and the subsequent, postglacial period is known as Archaic.

Paleolithic

Archaeologists subdivide the Paleolithic into the Lower Paleolithic (the earliest phase), Middle Paleolithic, and Upper Paleolithic (the later phase), based upon the presence or absence of certain classes of stone artifacts.

Lower Paleolithic

The Lower Paleolithic dates from approximately 2.5 million years ago until about 200,000 years ago. It includes the earliest record of human toolmaking and documents much of the evolutionary history of the genus Homo from its origins in Africa to its spread into Eurasia. Two successive toolmaking industries characterize the Lower Paleolithic: the Oldowan and the Acheulean.

Oldowan Industry

The Oldowan industry was named by British Kenyan anthropologists Louis Leakey and Mary Leakey for early archaeological sites found at Olduvai Gorge in northern Tanzania. It is also sometimes referred to as the chopper-core or pebble-tool industry. Simple stone artifacts made from small stones or blocks of stone characterize the Oldowan industry. Mary Leakey classified Oldowan artifacts as either heavy-duty tools or light-duty tools. In this classification, heavy-duty tools include core types such as choppers, discoids, polyhedrons, and heavy-duty scrapers. Many of these cores may have been produced to generate sharp-edged flakes, but some could have been used for chopping or scraping activities as well. Light-duty tools include retouched forms such as smaller scrapers, awls (sharp, pointed tools for punching holes in animal hides or wood), and burins (chisel-like flint tools used for engraving and cutting). Oldowan techniques of manufacture included hard-hammer percussion, or detaching flakes from cores with a stone hammer; the anvil technique, striking a core on a stationary anvil to detach flakes; and bipolar technique, detaching flakes by placing the core between an anvil and the hammerstone.

Early humans probably also made tools from a wide range of materials other than stone. For example, they probably used wood for simple digging sticks, spears, clubs, or probes, and they probably used shell, hide, bark, or horn to fashion containers. Unfortunately, organic materials such as these do not normally survive from earlier Stone Age times, so archaeologists can only speculate about whether such tools were used.

Two of the oldest Oldowan sites are in Ethiopia: Gona (occupied 2.5 million years ago) and Omo (2.3 million years ago). Other well-studied Oldowan sites include Lokalalei (2.3 million years ago) and Koobi Fora (1.9 million to 1.4 million years ago), in Kenya; Olduvai Gorge (1.9 million to 1.2 million years ago), in Tanzania; Ain Hanech (perhaps 1.7 million years ago), in Algeria; and the cave deposits at Sterkfontein and Swartkrans (estimated to be from 2.0 million to 1.5 million years ago), in South Africa.

Hominids that were contemporary with Oldowan sites include two major lineages. One is the robust australopithecines (so called because their cheek teeth were larger than those of other australopithecines). These robust australopithecines—such as Australopithecus aethiopicus and Australopithecus boisei in East Africa, and Australopithecus robustus in South Africa—were bipedal and had small brains, large jaws, and large molars. The other lineage is made up of bipedal, larger-brained, and smaller-toothed early members of the genus Homo, such as Homo habilis, Homo rudolfensis, and early Homo erectus. The oldest fossils of Homo erectus (sometimes called Homo ergaster) found in Africa date back to about 1.85 million years ago. This species is characterized by an even larger brain and smaller teeth than earlier hominids and by a larger body size. (In 1984 anthropologists in Kenya found a nearly complete skeleton of an adolescent Homo erectus who would have been 1.8 m (6 ft) tall as an adult.)

Experts do not know for certain which of these species was responsible for individual Oldowan sites. All of these species may have made and used Oldowan-style stone tools to varying degrees. However, anthropologists have long suspected that the larger-brained and smaller-toothed Homo was probably a more habitual toolmaker. It is likely that Homo erectus was responsible for many of the Oldowan sites more recent than 1.85 million years ago. In any case, by 1 million years ago, all of these species except Homo erectus had gone extinct, so researchers can be certain that at least the Homo lineage was involved in using and making stone tools. Homo erectus appears to have moved out of Africa and into Eurasia sometime before 1 million years ago, although some anthropologists think this geographic spread of hominids may have occurred nearly 2 million years ago.

The everyday life of Oldowan hominids is largely a matter of archaeological conjecture. Most sites in East Africa are found near lakes or along streams, suggesting that they preferred to live near water sources. Studies of rock sources suggest that Oldowan hominids sometimes transported stone several kilometers to the sites where stone artifacts are found. Well-preserved sites often have collections of stone artifacts and fragmented fossil animal bones associated together, often in dense concentrations of several thousand specimens. Scholars disagree regarding the nature of these sites. Some archaeologists interpret them as camps, home bases, or central foraging places, similar to those formed by modern hunter-gatherers during their daily activities. Others think that such sites represent scavenging stations where hominids were primarily involved in processing and consuming animal carcasses. Still others view these accumulations as stone caches where hominids collected stone in areas where such raw materials did not occur naturally.

Fossil remains from some Oldowan sites suggest that Oldowan hominids used stone tools to process meat and marrow from animal carcasses, some weighing several hundred pounds. Although some archaeologists have argued that large game hunting may have occurred in the Oldowan, many Oldowan specialists believe these early Stone Age hominids likely obtained most of their meat from large animals primarily through scavenging. The early hominids may have hunted smaller animals opportunistically, however. Modern experiments have shown that sharp Oldowan flakes are especially useful for the processing of animal carcasses—for example, skinning, dismembering, and defleshing. The bulk of early hominid diet likely consisted of a variety of plant

foods, such as berries, fruits, nuts, leaves, flowers, roots, and tubers, but there is little archaeological record of such perishable foodstuffs.

Acheulean Industry

The term Acheulean was first used by 19th-century French archaeologist Gabriel de Mortillet to refer to remnants of a prehistoric industry found near the town of Saint-Acheul in northern France. The distinguishing feature of this site is an abundance of stone hand axes, tools more sophisticated than those found at Oldowan sites. The term Acheulean is now used to refer to hand axe industries in Africa, the Near East, Europe, and Asia dating from 1.5 million years ago to 200,000 years ago and spanning human evolution from Homo erectus to early archaic Homo sapiens.

The characteristic Acheulean hand axe is a large, pointed or oval-shaped form. These hand axes were often made by striking a blank (a rough chunk of rock) from a larger stone and then shaping the blank by carefully removing flakes around its perimeter. Usually, both sides, or faces, of the blank were flaked, a process called bifacial flaking. Later Acheulean hand axes may have been produced by the soft-hammer technique, in which a softer hammer of stone, bone, or antler produced thinner, more carefully shaped forms. Other associated forms include cleavers, bifacial artifacts with a sharp, guillotine-like bit at one end; and thick, pointed artifacts known as picks. Simpler, typical Oldowan artifacts are usually also found at Acheulean sites, as well as a range of retouched flake tools such as scrapers. Experiments have demonstrated that Acheulean hand axes and cleavers are excellent tools for heavy-duty butchery activities, such as severing animal limbs. Some archaeologists, however, believe they may have served other functions, or perhaps were general, all-purpose tools.

Acheulean tools did not entirely replace Oldowan tools. Archaeologists have discovered numerous sites where Oldowan tools were used throughout the Acheulean time period, sometimes in the same geographic region as Acheulean industries. Interestingly, the Acheulean seems to be especially restricted to Africa, Europe, and western Asia, with few sites in East Asia of stone industries with typical Acheulean hand axes and cleavers during the Lower Paleolithic. Most of the industries found in East Asia tend to be simpler, Oldowan-like technologies that can be seen at sites at Nihewan and the cave of Zhoukoudian in northern China.

Well-studied Acheulean sites include those at Olduvai Gorge and Isimila, in Tanzania; Olorgesailie, in Kenya; Konso Gardula and Melka Kunture, in Ethiopia; Kalambo Falls, in Zambia; Montagu Cave, in South Africa; Tabun and Gesher Benot Ya'aqov, in Israel; Abbeville and Saint-Acheul, in France; Swanscombe and Boxgrove, in England; and Torralba and Ambrona, in Spain.

Most anthropologists think that Acheulean populations of Homo erectus and early Homo sapiens were probably more efficient hunters than Oldowan hominids. Recently discovered wooden spears from about 400,000 years ago at Schöningen, Germany, as well as a 300,000-year-old wooden spear tip from Clacton, England, suggest that the hominids who made these implements may have hunted game extensively.

Experts disagree as to whether Acheulean hominids and their contemporaries harnessed the use of fire. Archaeologists have found evidence such as apparent burnt bone and stone, discolored sediment, and the presence of charcoal or ash at a number of sites,

including Cave of Hearths, in South Africa; Zhoukoudian, in China; and Terra Amata, in France. Discrete fireplaces (hearths), however, appear to be quite rare. Similarly, there is only questionable evidence of huts or other architectural features.

Middle Paleolithic

The Middle Paleolithic extends from around 200,000 years ago until about 30,000 years ago. It is also called the Mousterian Industry in Europe, the Near East, and North Africa and called the Middle Stone Age in sub-Saharan Africa.

Innovations of the Middle Paleolithic

Toolmakers in the Middle Paleolithic used a range of retouched flake tools, especially side-scrapers, serrated scrapers, backed knives (blade tools with the nonblade side dulled to fit comfortably in the hand), and points. Experts believe these tools were used to work animal hides, to shape wood implements, and as projectile points. This period is also characterized by the use of specially prepared cores. Using the disc core method, a circular core could produce numerous flakes to serve as blanks for retouched tools. With the Levallois method (named after a suburb of Paris, France, where the first such artifacts were discovered), flakes of a predetermined shape were removed from specially prepared cores. This process resulted in oval-shaped flakes or large, triangular points, depending on the type of Levallois core. Levallois cores and flakes are first seen at some late Acheulean sites but become much more common in the Middle Paleolithic/Middle Stone Age.

Some regional variation can be seen among Middle Paleolithic industries. A North African variant known as Aterian produced tools and points characterized by tangs (stems projecting from the base of the tool or point, to allow the tool to be attached to a handle or shaft). In Eastern Europe, a variant called Szeletian produced two-sided, leaf-shaped points, a style not usually seen elsewhere until the Upper Paleolithic. In Central Africa, a variant called the Sangoan produced a range of heavy-duty picks and axes.

Middle Paleolithic/Middle Stone Age archaeological sites are often found in the deposits of caves and rock shelters. Well-studied caves include Pech de l'Aze, Combe Grenal, La Ferrassie, La Quina, and Combe Capelle, in France; Tabun, Kebara, Qafzeh, and Skhūl, in Israel; Shānidār, in Iraq; Haua Fteah, in Libya; and Klasies River Mouth, in South Africa. In East Asia, sites that are contemporary with the Middle Paleolithic often exhibit a simpler toolmaking technology, without as much standardization of the flake tool forms as in much of the rest of Eurasia and Africa.

Middle Paleolithic Humans

Hominids associated with the Middle Paleolithic include Neandertals and other archaic Homo sapiens (Homo sapiens predating anatomically modern humans, who lived from about 200,000 to 35,000 years ago). In Europe, the Middle Paleolithic is associated with Homo sapiens neanderthalensis, or Neandertals, who lived from about 200,000 to 35,000 years ago. Neandertals were short, robust humans with fully modern cranial capacity. They had more jutting faces, more prominent brow ridges, thicker cranial bones, and larger nose cavities than modern humans. Skeletal remains show that Neandertals were very robust and muscular. Healed injuries to some skeletons suggest that Neandertals led stressful, rigorous lives. Famous Neandertal discoveries include Neander Valley, in Germany; La Chapelle-aux-Saints and La Ferrassie, in France;

Krapina, in Croatia; Monte Circeo and Saccopastore, in Italy; Shānidār, in Iraq; and Tabun and Amud, in Israel. Fossils of archaic Homo sapiens from this time period have been found at sites such as Dali and Maba, in China and at Florisbad, in South Africa, and Ngaloba, in Tanzania. In addition, fossils that have been interpreted as early anatomically modern humans have been found at some Middle Paleolithic/Middle Stone Age sites in parts of Africa and the Near East, such as at Qafzeh and Skhūl, in Israel, and Klasies River Mouth, in South Africa.

Middle Paleolithic hominids appear to have been more successful hunters than their predecessors. Abundant animal remains suggest that these hominids ate many kinds of large mammals. It is unknown, however, how much of the meat consumed was obtained through hunting, as opposed to scavenging. Accumulations of remains at some sites show that a high percentage of the animals were of a common species and were adults in their prime, which some researchers suggest is an indication of efficient hunting behavior. Several sites in Europe that contain the carcass of one or more large animals are believed to be butchery sites, where early humans processed the spoils of kills. Some archaeologists have also argued that some Middle Paleolithic stone points were probably attached to spears, a new development in hunting technology. At Klasies River Mouth Cave in South Africa, archaeologists discovered a buffalo vertebra with a broken tip of what was probably a spearhead embedded in it, which could be evidence that the large mammal was hunted or trapped by hominids.

Middle Paleolithic hominids tend to show more behavioral complexity than their predecessors. For example, although the majority of the stone found at most Middle Paleolithic sites is local—its source within a few kilometers of a site—an increasing percentage is exotic stone, transported from its sources tens of kilometers away. Simple hearths at many Middle Paleolithic sites suggest habitual fire use and possible fire-making as well. Evidence of housing is still quite uncommon, but is present at some sites. For example, at Molodovo, Ukraine, a circle of mammoth bones has been interpreted as a hut structure. Microscopic studies of residues on Middle Paleolithic scraper tools suggest that they may have been used for woodworking and to work animal hides for use as clothing or in shelters.

Over the course of the Middle Paleolithic, hominids spread across much of Eurasia. The use of fire and clothing and the ability to build more substantial shelters may have helped them survive in cold regions, such as the central Asian steppe. By 40,000 years ago, near the end of the Middle Paleolithic, humans entered Australia, which apparently would have required traversing some distance of open ocean, probably in some form of craft. Some Middle Paleolithic sites have skeletal remains that are interpreted as simple burials. No representational art is known from this period, although occasional ornaments such as beads have been found at late Middle Paleolithic/Middle Stone Age sites.

Opinion is divided among anthropologists as to whether Neandertals and other archaic Homo sapiens had fully modern cognitive abilities, particularly the ability to recognize and communicate with symbols, a skill required to form modern languages. On one hand, the large cranial capacities of these populations might suggest modern human cognitive and behavioral capabilities. On the other hand, their technological development was very slow, and they left behind no trace of the use of symbols, such as

representational cave paintings. Archaeologists have found much greater evidence of symbolism and cultural complexity during the Upper Paleolithic.

Upper Paleolithic

The Upper Paleolithic extends from approximately 40,000 years ago until the end of the last ice age, about 10,000 years ago. This era is known as the Paleo-Indian period in the Americas, and as the Later Stone Age in sub-Saharan Africa, where it extended much longer, even to historical times in parts of the continent. In the Upper Paleolithic, standardized blade industries appear and become much more widespread than in previous times. The first of these industries to appear in the Near East and Europe is known as Aurignacian. Later Upper Paleolithic industries include the Perigordian, Solutrean, and Magdalenian. The Upper Paleolithic is usually characterized by specially prepared cores from which blades (flakes at least twice as long as they are wide) were struck off with a bone or antler punch. Upper Paleolithic humans also developed new forms of scrapers, backed knives, burins, and points. Beautifully made, two-sided, leaf-shaped points are also common in some Upper Paleolithic industries. Toward the end of the Upper Paleolithic, microliths (small, geometric-shaped blade segments) became increasingly common in many areas.

By the end of the Upper Paleolithic period and the end of the last ice age about 10,000 years ago, human populations had spread to every continent except Antarctica. Humans had effectively adapted to the northern latitudes of Eurasia and had dispersed into the American continents. The earliest well-documented occupation of the Americas appears to have been during the late ice age, about 12,000 to 10,000 years ago. The first recognized Paleo-Indian industry is known as Clovis, which was followed by Folsom. These industries produced delicately crafted, bifacial points that are fluted, meaning that the base of the point is thinned by removing a large flake from one or both sides. Fluted Clovis points have been found at mammoth kill sites, while Folsom points are associated with bison kills, mammoths being extinct by that time.

Famous Upper Paleolithic occupation sites include Laugerie Haute, La Madeleine, Abri Pataud, and Pincevent, in France; Castillo, Altamira, and El Juyo, in Spain; Dolní Věstonice, in the Czech Republic; Mezhirich, in Ukraine; Sungir and Kostenki, in Russia; Ksār Akil, in Lebanon; Kebara, in Israel; Zhoukoudian Upper Cave, in China; Haua Fteah, in Libya; and Taforalt, in Morocco. Well-known Later Stone Age sites in sub-Saharan Africa include Lukenya Hill, in Kenya; Kalemba, in Zambia; and Rose Cottage Cave, Wilton Cave, Nelson Bay Cave, and Boomplaas in South Africa. The most famous Paleo-Indian sites are those located in the United States near the eastern New Mexico towns of Clovis and Folsom, which gave the industries their names.

Human fossils associated with the Upper Paleolithic, Paleo-Indian, and Later Stone Age are almost always those of anatomically modern humans, or Homo sapiens sapiens. In the 19th century, Homo sapiens sapiens skeletal remains were found associated with early Upper Paleolithic artifacts at the rock shelter of Cro-Magnon in southern France. The term Cro-Magnon Man has thus sometimes been used to refer to anatomically modern humans in the context of the Upper Paleolithic. Not all humans were anatomically modern in this period, however. In the early stages of the Upper Paleolithic, the sites that make up the Chatelperronian industry appear to be associated with late Neandertals, possibly influenced by modern humans arriving with Aurignacian technology.

Innovations of the Upper Paleolithic

During the Upper Paleolithic, tools of bone, antler, and ivory become common for the first time. These tools include points, barbed harpoons, spear throwers, awls, needles, and tools that have been interpreted as spear-shaft straighteners. The presence of eyed needles indicates the use of sewn clothing (presumably of hide and possibly early textiles) or hide coverings for tents or shelters. In some carvings from this period, human figures are depicted wearing hooded parkas or other vestments. Other technological innovations include lamps (in the form of hollowed out stones filled with flammable substances such as oil or animal fat) and probably the bow and arrow (small projectile points have been interpreted as arrowheads). Many Upper Paleolithic artifacts appear to be evidence of composite technology, in which multiple components were combined together to form one tool or process. For example, spear tips were attached with binding material to spear shafts, which were flung using spear throwers (sometimes called atlatls). A spear thrower usually took the form of a length of wood or bone with a handle on one end and a peg or socket at the other to hold the butt of a spear or dart. When swung overhand together, the spear thrower provided greater thrust on the spear.

Upper Paleolithic populations appear to have been competent hunter-gatherers. The use of mechanical devices such as spear throwers and, probably, bow and arrows allowed them to increase the velocity, penetrating force, and distance of projectiles. Many Upper Paleolithic sites contain large quantities of mammal bones, often with one species predominating, such as red deer, reindeer, or horse. It is believed that many of these Upper Paleolithic hunter-gatherers could effectively predict the timing and location of seasonal resources, such as reindeer migrations or salmon runs.

Upper Paleolithic Culture

Many Upper Paleolithic sites feature elements that have been interpreted as evidence of housing. These are commonly patterns of bone or stone concentrations that seem to delineate hut or tent structures. At the sites of Étiolles and Pincevent, in France, the distribution of stone artifacts, animal bones, hearths, and postholes has been interpreted as evidence of clearly defined huts. At Mezhirich, in the Ukraine, and Kostenki, in Russia, hut structures were found made of stacked or aligned mammoth bones. Distinctive hearths, often lined or ringed with rocks, are much more common in the Upper Paleolithic than in earlier times.

Stone for tools was often obtained from more distant sources, sometimes in larger quantities than seen previously in the Stone Age. Occasionally, stone was traded or carried over several hundred kilometers. It seems likely, therefore, that trade and transport routes were more formalized than they had been in earlier times. The Upper Paleolithic also documents the trade of exotic materials—such as marine shells or semiprecious stones—for personal ornamentation as beads or on necklaces.

In the Upper Paleolithic, evidence of human burial is much more common. In addition, burials tend to be more elaborate than in Neandertal times, often associated with rich grave goods. For example, at Sungir, in Russia, three individuals were buried with ivory spears, pendants and necklaces of shells and animal teeth, and thousands of ivory beads that had apparently been sewn into their clothing.

Upper Paleolithic Art

The earliest representational art—in the form of painting, sculpture, and engraving—dates back to approximately 32,000 years ago. Sites in Europe are famous for their artwork, but prehistoric Stone Age art has also been richly documented in Africa, Australia, and other parts of the world. Animals are common subjects of Upper Paleolithic art, and human figures and abstract elements such as lines, dots, chevrons, and other geometric designs are also found.

Early humans around the world used natural materials such as red and yellow ochre, manganese, and charcoal to create cave art. Among the hundreds of European sites with Upper Paleolithic cave paintings, some of the best known are Altamira, in Spain, and Lascaux and the more recently discovered (and archaeologically oldest) Chauvet, in France. Animals such as bison, wild cattle, horses, deer, mammoths, and woolly rhinoceroses are represented in European Upper Paleolithic cave art, with human figures relatively uncommon. Later Stone Age paintings of animals have been found at sites such as in Apollo 11 Cave, in Namibia; and stylized engravings and paintings of circles, animal tracks, and meandering patterns have been found in Australia's Koonalda Cave and Early Man Shelter.

A number of small sculptures of human female forms (often called Venus figurines) have been found in numerous sites in Europe and Asia. Small, stylized ivory animal figures made more than 30,000 years ago were discovered in Vogelherd, Germany, and clay sculptures of bison were found in Le Tuc d'Audoubert, in the French Pyrenees. In addition, many utilitarian objects—such as spear throwers and batons—were superbly decorated with engravings, sculptures of animals, and other motifs.

The earliest known musical instruments also come from the Upper Paleolithic. Flutes made from long bones and whistles made from deer foot bones have been found at a number of sites. Some experts believe that Upper Paleolithic people may have used large bones or drums with skin heads as percussion instruments.

The archaeological record of the Upper Paleolithic shows a creative explosion of new technological, artistic, and symbolic innovations. There is little doubt that these populations were essentially modern in their biology and cognitive abilities and had fully developed language capabilities. There is a much greater degree of stylistic variation geographically (some archaeologists have suggested that this is evidence of the emergence of ethnicity) and a more rapid developmental pace during the Upper Paleolithic than in any previous archaeological period. Anthropologists hotly debate whether these new Upper Paleolithic patterns are due to biological transition or whether they are simply the products of accumulated cultural knowledge and complexity through time.

Mesolithic

The Mesolithic (also known as the Epipaleolithic) extends from the end of the Pleistocene Ice Age, about 10,000 years ago, until the period when farming became central to a peoples' livelihood, which occurred at different times around the world. The term Mesolithic is generally applied to the period of post-Pleistocene hunting and gathering in Europe and, sometimes, parts of Africa and Asia. In the Americas, the post-glacial hunter-gatherer stage that predates the dominance of agriculture is usually called the Archaic. In the rest of the world, Mesolithic sites are usually characterized by

microliths. Microlithic blade segments were commonly retouched into a range of shapes, including crescents, triangles, rectangles, trapezoids, and rhomboids, and thus the tools are often called geometric microliths. These forms often have multiple sharp edges. Many of these microliths probably served as elements of composite tools, such as barbed or blade-tipped spears or arrows, or wooden-handled knives. The microliths were likely inserted into shafts or handles of wood or antler and reinforced with some type of adhesive.

The end of the ice age brought fairly rapid environmental change in much of the world. With the warmer, post-glacial conditions of the Holocene Epoch, ice sheets retreated and sea levels rose, inundating coastal areas worldwide. Temperate forests spread in many parts of Europe and Asia. As these climatic and vegetative changes occurred, large herds of mammals, such as reindeer, were replaced by more solitary animals, such as red deer, roe deer, and wild pig. Cold-adapted animals, such as the reindeer, elk, and bison, retreated to the north, while others, such as the mammoth, giant deer, and woolly rhinoceros, went extinct. The rich artistic traditions of Upper Paleolithic Western Europe declined markedly after the end of the ice age. This may in part be because the changing environment made the availability of food and other resources less predictable, requiring populations to spend more time searching for resources, leaving less time to maintain the artistic traditions.

Well-studied Mesolithic/Archaic sites include Star Carr, in England; Mount Sandel, in Ireland; Skara Brae, in Britain's Orkney Islands; Vedbæk, in Denmark; Lepenski Vir, in Serbia; Jericho, in the West Bank; Nittano, in Japan; Carrier Mills, in Illinois; and Gatecliff Rockshelter, in Nevada. In sub-Saharan Africa, many Later Stone Age sites of the Holocene Epoch could broadly be termed Mesolithic, due to their geometric microliths and bow and arrow technology.

During the Mesolithic, human populations in many areas began to exploit a much wider range of foodstuffs, a pattern of exploitation known as broad spectrum economy. Intensively exploited foods included wild cereals, seeds and nuts, fruits, small game, fish, shellfish, aquatic mammals and birds, tortoises, and invertebrates such as snails. Dogs were domesticated in this period, probably for use in hunting. Some Mesolithic hunter-gatherers, such as the Natufian of the Near East, appear to have lived in small settlements based on an economy involving gazelle hunting and the harvesting of wild cereals using sickles with flint blade segments inset in bone handles. In the Near East and North Africa, Mesolithic populations processed wild plant foods using grinding stones.

Other Mesolithic technological innovations include the adz and axe (woodworking tools consisting of flaked stone blades set in bored antler sleeves and fastened to wooden handles), fishing weirs and traps, fishhooks, the first preserved bows and arrows, baskets, textiles, sickles, dugout canoes and paddles, sledges, and early skis. The Jōmon culture of Japan produced pottery by 10,000 years ago, as did the Ertebølle culture of Scandinavia somewhat later.

The development of broad spectrum economies in the post-glacial Mesolithic/Archaic period laid the foundations for the domestication of plants and animals, which in turn led to the rise of farming communities in some parts of the world. This development marked the beginning of the Neolithic.

Neolithic

Farming originated at different times in different places—as early as about 9,000 years ago in some parts of the world. In some regions, farming arose through indigenous developments, and in others it spread from other areas. Most archaeologists believe that the development of farming in the Neolithic was one of the most important and revolutionary innovations in the history of the human species. It allowed more permanent settlements, much larger and denser populations, the accumulation of surpluses and wealth, the development of more profound status and rank differences within populations, and the rise of specialized crafts.

Neolithic toolmaking generally shows a great deal of technological continuity with the Mesolithic. Neolithic industries often include blade and bladelet (small blade) technologies, sometimes with microliths, and a wide range of retouched tools, including endscrapers (narrower scrapers for working hides), backed blades or bladelets (some of which were set into handles and used as sickles), and a wide range of projectile points. In addition, ground and polished axes and adzes—which would have been used for forest clearance to plant crops, as well as for woodworking activities—are characteristic of the Neolithic. Such tools, although labor-intensive to manufacture, tended to last a long time without requiring resharpening and consequently were highly prized by these early farmers. Large-scale trade networks of axes and stone are documented in the Neolithic, with artifacts sometimes found hundreds of miles from their sources. Other technological developments in the Neolithic include grinding stones, such as mortars and pestles, for the processing of cereal foods, the widespread use of pottery for surplus food storage and cooking, the construction of granaries for storage of grains, the use of domesticated plant fibers for textiles, and weaving technology.

The Rise of Farming

Archaeologists have a number of theories to explain why humans began farming. The reasons probably differed somewhat from one region to another. Some theories maintain that population pressure or changes in environment may have forced humans to find new economic strategies, which led to farming. Another theory maintains that a population of humans may have lived in a region where it was relatively easy to domesticate wild plants and animals, making the development of agriculture essentially a historical accident. Still another theory proposes that the rise of farming may have been a function of social change, as individuals began to use agriculture as a means to acquire wealth in the form of food surpluses.

Different plant crops were cultivated in different places, depending on what wild plants grew naturally and how well they responded to cultivation. In the Near East, important crops included wheat, barley, rye, legumes, walnuts, pistachios, grapes, and olives. In China, millet and rice predominated. In Africa, millet, sorghum, African rice, and yams were commonly grown. Rice, plantains, bananas, coconuts, and yams were important in Southeast Asia. Finally, in the Americas, corn, squash, beans, potatoes, peppers, sunflowers, amaranths, and goosefoots were commonly grown.

Domesticated animals also varied from one region to another according, again, to availability and their potential to be domesticated. In Eurasia, Neolithic people domesticated dogs, sheep, goats, cattle, pigs, chickens, ducks, and water buffalo. In the Americas, domesticated animals included dogs, turkeys, llamas, alpacas, and guinea

pigs. In Africa, the primary domesticated animals—cattle, sheep, and goats—probably spread from the Near East.

Well-studied early farming sites in Eurasia include Jericho, in the West Bank; Ain Ghazal, in Jordan; Ali Kosh, in Iran; Mehrgarh, in Pakistan; Banpocun (Pan-p'o-ts'un), in China; and Spirit Cave, in Thailand. Important African sites include Adrar Bous in Niger, Iwo Eleru in Nigeria, and Hyrax Hill and Lukenya Hill in Kenya. In the Americas, sites showing early plant domestication include Guila Naquitz, in Mexico, and Guitarrero Cave, in Peru.

Larger Neolithic settlements show a wide variety of new architectural developments. For instance, in the Near East, conical beehive-shaped houses or rambling, connected apartment-style housing were often constructed with mud bricks. In Eastern Europe, houses were made with wattle and daub (interwoven twigs plastered with clay) walls, and, in later times, longhouses were constructed with massive timbers. In China, some settlements contain semisubterranean houses dug into clay, with evidence of walls and roofs made out of thatch or other materials and supported by poles.

Neolithic Social Change

The domestication of plants and animals led to profound social change during the Neolithic. Surpluses of food, such as stored grain or herds of livestock, could become commodities of wealth for some individuals, leading to social differentiation within farming communities. Trade of raw materials and manufactured products between different areas increased markedly during the Neolithic, and many foreign or exotic goods appear to have developed special symbolic value or status. Some Neolithic graves contain rich stores of goods or exotic materials, revealing differentiations in terms of wealth, rank, or power.

In certain areas, notably parts of the Near East and Western Europe, Neolithic peoples erected massive ceremonial complexes, efforts that would have required extensive, dedicated work forces. Large earthworks and megalithic ("giant stone") monuments from the Neolithic (including the Avebury stone circle and the earliest stages of Stonehenge, in England, and the monuments of Carnac, in France), suggest more highly organized political structures and more complex social organization than among most hunter-gatherer populations. In the Americas, sites such as the mounds of Cahokia, in Illinois, also indicate a more complex, organized political and social order. The technological innovations and economic basis established and spread by Neolithic communities ultimately set the stage for the development of complex societies and civilizations around the world.

IV.- THE END OF THE STONE AGE

Humans produced metal tools and ornaments from beaten copper as early as 12,000 years ago in some parts of the world. By about 6,000 years ago, early experiments in metallurgy, particularly extracting metals from copper ore (smelting), were being conducted in some parts of Eurasia, notably in Eastern Europe and the Near East. By 5,000 years ago, copper and tin ores were being smelted and alloyed in some regions, marking the dawn of the Bronze Age. Casting of bronze tools—such as axes, knives,

swords, spearheads, and arrowheads—became increasingly common over time. At first, copper and bronze tools were rare and stone tools were still very common, but as time went on, metal tools gradually replaced stone as the principal raw material for edged tools and weapons.

In Eurasia and parts of Africa, the rise of metallurgical societies appears to coincide with the rise of the earliest state societies and civilizations, such as ancient Egypt, Sumer, Minoan Culture, Mycenae, and China. In the Americas, parts of sub-Saharan Africa, Australia, and the Pacific Islands, societies continued to use stone and other nonmetal materials as the principal raw materials for tools up to the time of European contact, starting in the 15th century ad. Although, technically, populations in these areas could have been said to be Stone Age groups, many had become agricultural societies and had formed flourishing civilizations.
Stone technology enjoyed a brief resurgence within iron-using societies with the advent of flintlock firearms, beginning in the 17th century. Carefully shaped flints—reminiscent of the geometric microliths of the Mesolithic and early Neolithic—were struck against steel to create a spark to ignite the firearm. By the end of the 20th century few human groups had a traditional stone technology, although a few groups on the island of New Guinea still relied on the use of stone adzes. Tools of metal, plastic, and other materials had replaced stone technologies virtually everywhere.

V.- SOME ARCHAEOLOGICAL SITES OF KENYA

Lake Turkana, formerly known as Lake Rudolf, is a lake in the Great Rift Valley in Kenya (although the far northern end of the lake crosses into Ethiopia), which covers a surface area of 6405 km² (2473 mi²), making it the world's largest permanent desert lake. It is also the world's largest alkaline lake. The area is hot and very dry. The rocks of the surrounding area are predominantly volcanic. On-shore and off-shore winds can be extremely strong as the lake warms and cools more slowly than the land. Three rivers (the Omo, Turkwel and Kerio) flow into the lake, but lacking outflow, the only water loss is by evaporation. Despite this, the water level of the lake fell by 10 meters between 1975 and 1993. The presence of water in such an arid area makes the region internationally important as a staging post for migrating birds. Lions, cheetah and giraffe as well as many other species of mammal live in the area. Elephants and rhinoceros are no longer seen, although Teleki reported seeing (and shot) many. Lake Turkana National Parks are now listed as a UNESCO World Heritage Site.

Richard Leakey has led numerous anthropological digs in the area which have led to many important discoveries of hominin remains. The two-million-year-old Skull 1470 was found in 1972. It was originally thought to be *Homo habilis*, but some anthropologists have assigned it to a new species, *Homo rudolfensis*, named after the lake. In 1984, the Turkana Boy, a nearly complete skeleton of a *Homo erectus* boy was discovered by Kamoya Kimeu. More recently, Meave Leakey discovered a 3,500,000-year-old skull there, named *Kenyanthropus platyops*, which means "The Flat-Faced Man of Kenya". The Kapthurin formation is a basalt outcrop in Kenya near Lake Bogoria and Lake Baringo.

Part of the East African Rift System, it is also an important archaeological site in the study of early humans who occupied the area and left Acheulean stone tools and animal bones behind. Argon argon dating of volcanic ash overlying ochre fragments found

there has dated what may represent some of the earliest human aesthetic sensibility to 285,000 years ago. The ochre fragments must have been brought to the site by human agency and may have been used as body adornment.

Koobi Fora is an archeological site on the east side of Lake Turkana in Eastern Africa. Richard Leakey was the first to excavate this site, and he found over four hundred fossils there. Among those found were *Australopithecus* and early *Homo* remains. This site has the most varied human remains anywhere in the world. The remains found include a complete skeleton, skulls, lower jaw bones, leg and arm fragments, and many teeth. Many stone tools that were used to cut the meat off of bones were also found at this site. The most notorious of the finds was the fossil of the *Homo habilis* which is thought to be a direct ancestor of man, living over two million years ago.

Worth mentioning is the recent discovery in 2000 of the fossil remains of the nicknamed "Millenium man" *Orrorin tungenensis* by Martin Pickford and Brigitte Senut near the village of Rondinin in the Tungen Hills. The Tungen Hills are a rare spot in the Great Rifht Valley, whre a giant block of land, called a *tilt block*, was pushed up to expose layers and layers of ancient sediments. These exposed layers are a time machine for geological, archaeological and palaeoanthropological research, opening a window into the past from 16 Million years ago to modern times, a time span never seen before in the fossil record of Africa. In the same area is also worth mentioning the Chesawanja site with abounding blade stone tools. A Museum has been build in Kabernet that offers specialized analyses and interpretations of these sites. The femur of Orrorin tungenensis suggest to their discoverers that the biomechanics of walking where closer in that 6 million year old specimen to ours that these of *Australopithecus*, and the reduced size of their teeth seems to point in the same direction, the conclusion offered being that *Orrorin* is a more likely ancestor of the genus *Homo* than *Australopithecus*. These paradigm-shattering suggestions did not come however without a great deal of controversy.

Extracted from Tryon, CA and McBrearty, S, 2002, Tephrostatigraphy and the Acheulean to Middle Stone Age transition in the Kapthurin Formation, Kenya, Journal of Human Evolution 42, 211-35, qtd in Scarre, C (ed.) (2005). Thames and Hudson. Also from Ann Gibbons, Banishment, Chapter 7; L. BALOUT, Prehistoire de 1'Afrique du Nord; París 1955; H. ALIMEN, Prehistoire de l'Afrique, París 1958; M. ALMAGRO, Prehistoria del Norte de África y del Sahara español, Barcelona 1946; S. COLE, The Prehistory of East Africa, Londres 1954; R. VAuFREY, Prehistoire de l'Afrique (Maghreb), Túnez 1955; BRIAM M. FAGAN, Southern Africa, Londres 1965; L. S. LEA"Y, Stone Age África, Londres 1936; 1. DESMOND CLARx, The Prehistory of the Southern Africa, Londres 1959; H. BAumANN y WESTERMANN, Les peuples et les civilisations de l'Afrique, 2 ed. París 1967; L. FROSENIUS, Kulturgeschichte Afrikas, Zurich 1933; D. FORDE, Mundos africanos, México 1959; H. A. BERNATzix, Afrika. Handbuch der angewandten Válkerkunde, Viena 1947; íD, Razas y pueblos del mundo, I, Barcelona 1967; P. V. TOBÍAS, Olduwai Gorge. The cranium of Australopithecus (Zinjanthropus) boisei, Cambridge 1967. Also from http://encarta.msn.com, http://en.wikipedia.org and other sources.

VI.- SOME SITES OF ARCHAEOLOGICAL RELEVANCE AT OL ARI NYIRO

SAMBARA CAVE (I) AND SAMBARA CAVE (II)

To go: Magnetic route is 283° from the top of Kurmakine (altitude 2045 m.). Altitude of the cave is of 1800 m., and some 100 m. over the lower valley.
Lat N 0°32'25'' Long E 36°15'53'' from Map Series Y731CD.O.S.423 Sheet 91 Edition 3-DOS-1982 Ed. Survey of Kenya. To check against UTM.

The Sambara caves are west of Kurmakini, near the base and at the start of a deep gully where runs a ravine, small water stream tributary to the Mukutan river. The place is relatively high when compared to the base of the river Mukutan, but very sheltered. Given the nearness of the water stream I do not believe that there could be there sediments of very great antiquity, but this can only be assessed by carrying out some test excavations.

Sambara cave I appears as a rock-shelter almost completely infilled with sediments, and it is apparent that the original rock cave must be deeper and wider. It opens almost dead North in an angle of volcanic rock at the beginning of a ravine underneath. This ravine carries some water during the rainy season, and is at a distance of some 12 m. from the cave, and some 7,5 m. below it.

Potentially there could be here an archaeological stratigraphy of up to some 7 m. Indeed, at point A (see map below) the sediments dip into a gallery. The exploration of this gallery would need prior de-obstruction, being now too shallow to allow further passage.

Figure 1.- A view of the entrance to Sambara Cave 1 from the west. The cave has resulted carved probably by the water action of the ravine now under it, in the softer materials of a layer of volcanic materials under other of harder ones.

Figure 2.- View of Sambara Cave 1 from the east. The original rock floor seems to surface near the entrance.

No archaeological artifact has been observed in this visit, other than one probable flake, far too scarce an evidence. Reported materials recovered at this cave include pottery fragments, in appearance at least purely hand made and that could be of considerable relative antiquity. Pottery fragments in cave have been observed in Tanzania to be linked to ritual behaviors rather that to actual inhabitation.

Fauna that was present or left imprint of their use of this cave include swallows (active nests), baboons (abounding rock polishings and fresh droppings nearby), leopard, duiker (fresh droppings), bats actually living there in numbers around may be 50, porcupine (porcupine transported and chewed antelope hip bone), bushbuck, bees, burrowing insects and probably others.

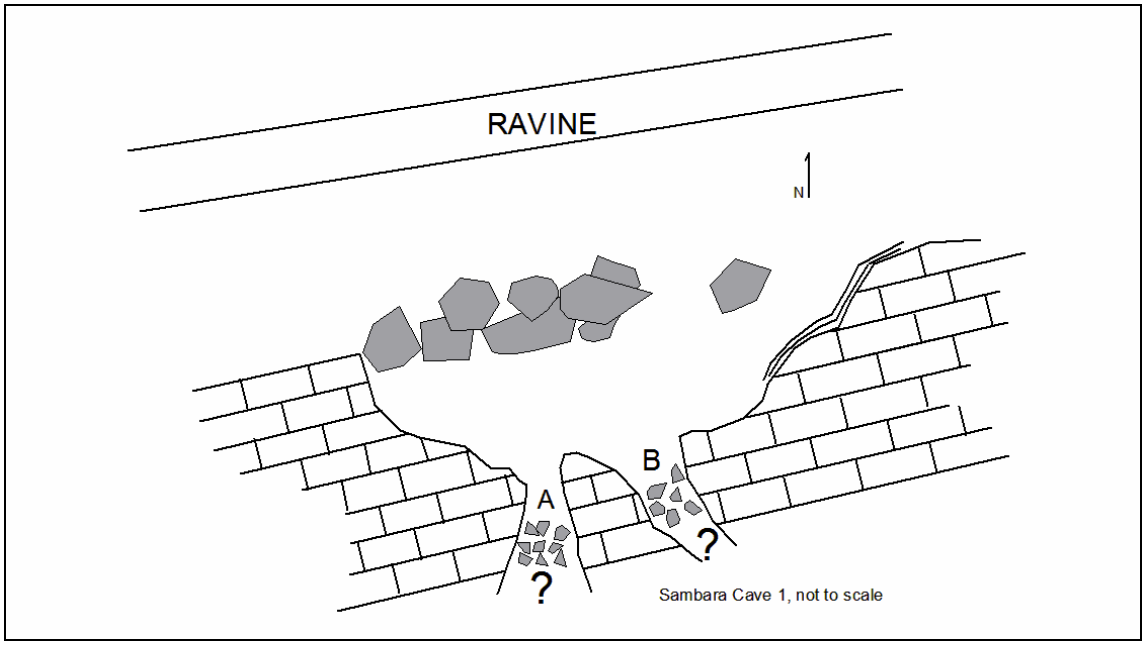

Figure 3.- Sketch map of Sambara Cave I, showing the probable continuation of the cave through galleries A and B, pending de-obstruction and exploration. The opening of the cave is some 7 m. long and its depth is of some 4 m. A and B point to galleries that require prior de-obstruction to allow further exploration.

Sambara cave II opens also to the north (330°), some 20 m. to the west of Sambara I in its immediacy. It is likely that both are connected through passages now infilled with sediments. This is also a small rock-shelter, some 6 m. deep, forming near the entrance a sub-circular chamber 2.2 m. high and 4 m. wide. Sediment and faunal traits are similar to Sambara I, but Sambara II is somewhat lower and nearer the base of the ravine and surface sediments seem somewhat more compact, may be as result of inundation events, although the cave seemed also very dry during our visit. Concave morphologies in the ceiling of Sambara II have likely been produced by water with more energy than currently during the formation of these cavities.

The very first and observable layer of floor sediments consists of very loose and fine dust, containing a significant proportion of bat guano and probably also pulverized baboon droppings. I do not believe this layer of bat guano to be very deep, but this remains to be assessed by further exploration. Angular and sub-angular fragments of roof spall 10 to 35 cm. maximum measure are frequent. At the entrance there are large boulders probably fallen from the roof of the cave and from the cornice.

The shelter is carved on a softer volcanic material under a harder layer of the similar origin but different composition, probably two different volcanic episodes. It is very dry and seems suitable for human occupation.

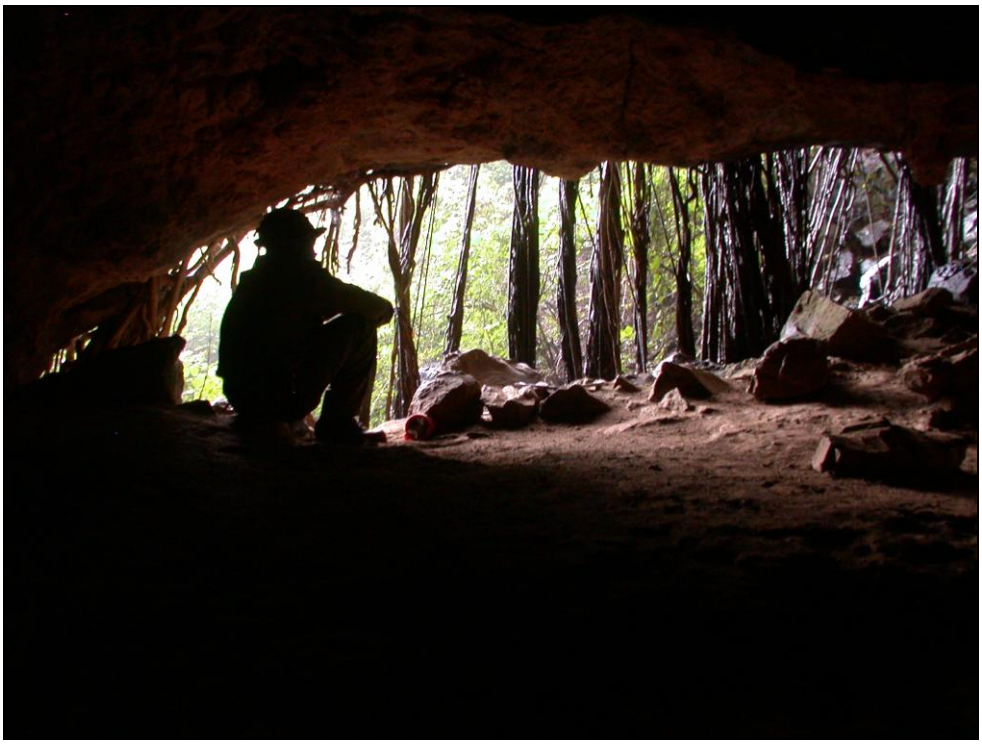

Figure 4.- Ranger Jeremy Rugendo at Sambara II. The entrance of the cave is partially covered by the dangling roots of the trees above.

JANGILI CAVE (Bandit Cave)

UTM 37 N 66262.411
E 206662.386
Alt. 1766.05 m.

The place is named Lugga ya Nyumba ya Jangili, that is The Valley of the House of the Bandit. Reportedly, a team from Pennsylvania University under the direction of Dr. K. Munene (KNM) dug a test excavation at its entrance (2 m. long x 0.7 m. wide x 0,5 m. deep) in 2003, that recovered Iron Age materials (probably pottery fragments). According to reports, hand axes and other lithic tools have been recovered here. The excavation was carried out respecting the layers according to reports by Philip Ochieng, and the materials are currently cured at the Kenya National Museum in Nairobi.

The cave opens on the eastern slopes of the hill of Nangolia (see annexes for UTM location and altitude). It appears as a single gallery that opens up to the valley to the north-west (110º). The bedrock is immediately apparent below the entrance, and the floor of the cave rises steadily with an inclination of 10º; the roof is some 5 m. high at the entrance and only about 1.5 about the end. While that it is possible that the bedrock has the same inclination, I rather believe that it is the sediments inside the cave what makes up for the inclination; therefore we can expect that the sediments are several meters deep at the back of the cave, and only a few centimeters at the entrance. The spoil from the test excavation is observable at the entrance of the cave, as stains of darker color, suggesting the presence of hearts in the underlying layers. It contains angular fragments from 4 to 10 cm., no formal tools observed, although some non-retouched obsidian bladelet have been noticed, also probable knapping debris, burnt obsidian and roof spall are present in the spoil, charcoal, burnt and calcinated bone, bovid or antelope teeth, some small fragments of undecorated pottery suggesting an Iron Age occupational episode, charcoal, some decortication flake.

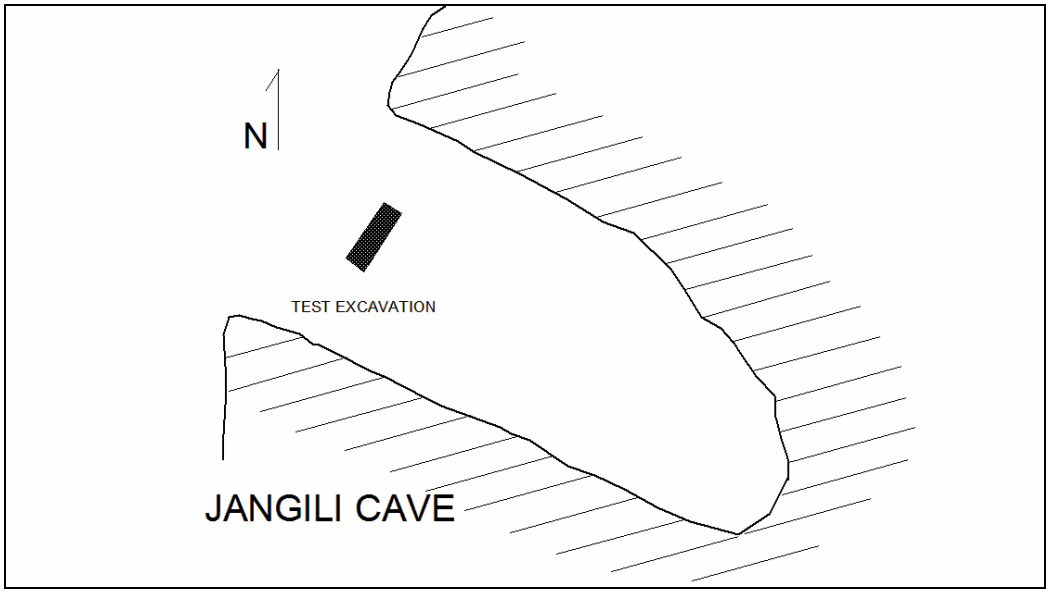

Figure 5.- Sketch of Jangili cave. At the entrance is the test excavation. The roof is quite high at the entrance but much lower towards the end, matching the inclination of the sediments. The bedrock is readily apparent at the entrance floor.

On the whole it is likely that the cave was episodically occupied at some stages of the Later Stone Age and also in the Iron age. The surface sediment is quite loose containing bat guano. Microfaunal remains of insectivors abound and may be linked to white stains on the walls, thought to be the droppings of some birds of prey or owls that may have roosted in the cave, dropping their pellets with the bones of their prey on the floor of the cave. The volcanic rock in which the cave is formed seems to be rather hard.

In my view the most interesting aspect of this cave is that it contains bone and teeth in good state of preservation, possibilitating the obtention of a C14 chronology for the prehistoric occupations of the cave, provided that it contains an intact stratigraphic sequence.

Figure 6.- A view of Jangili cave from inside. Test excavation signaled.

IRON SMELTING SITES A AND B

Site A
UTM 37 N Lat 00º 33.937'
Long 036º 23.979
Alt. 6214 ft

Both these sites appear in the landscape as half circle shaes slightly raised over the ground, forming mounds of smelting debris. If framed in a circle, this would be 11 m. diameter. The northern portion of the circle forms a higher mound of iron smelting debris in both cases, raised some 30 to 40 cm. the debris is therefore much more abounding in this portion than in the southern one. One obsidian flake has been observed, of some 2 cm. Also burnt obsidian, and very small fragments of undecorated red pottery, some bicolor being grey inside and reddish outside, and charcoal fragments. From the smelting area A to area B there are some 41 m. at 244º.

Site B
UTM 37 N Lat 00º 33.926'
Long 036º 23.963
Alt. 6241 ft

Again a semi-circle of smelting debris, amound raised some 15 to 20 cm., detectable in the landscape, the northern area is most prominent. Diameter is 9.9 m, transversal measure of the mound is 3.2 m.

At a distance of 18,5 m. from Site B and at an angle of 278º is an oval area covered with regularly sized volcanic boulders (some 15 cm. average maximum size). I believe this to be a human produced structure, maybe related to the smelting area. This structure is raised over the ground in its higher part some 15 cm. Some smelting debris has been found here, as well as the remains of some mould cylinders similar to the ones recovered from site B. On the other hand these may be remains washed down by rainwater from site B.

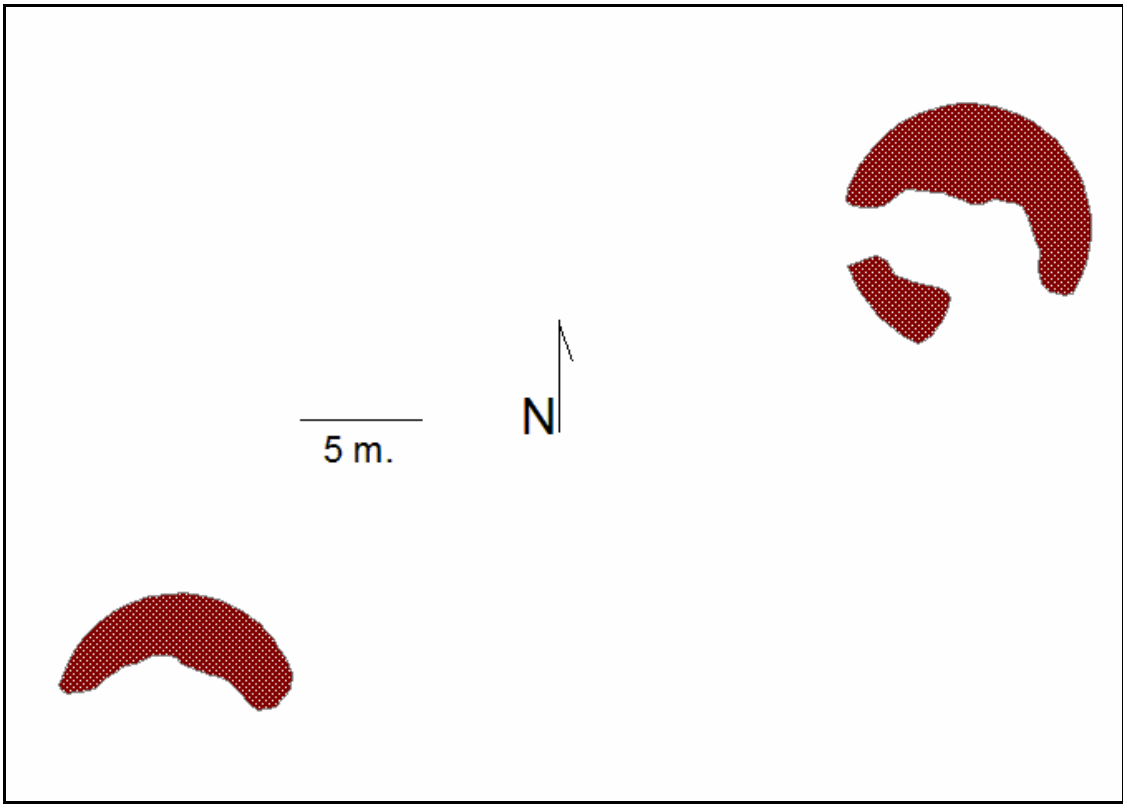

Figure 7.- Iron Smelting sites A and B. Scale is 5 meters. These appear in the landscape as broad half-circle mounds of smelting debris.

Figure 8.- Iron smelting debris

Figure 9.- Iron smelting site as seen in the landscape

BOGANI YA DUME YA JUU IRON AGE SETTLEMENT

UTM 37 N 60125.464
E 211237.3111
Alt. 1955 m.

Translates as “zone above the open area for cattle”. A team from the KNM, under the direction of Dr. Karega and with collaboration of Pennsylvania University carried out some excavations here, that are not detectable in the landscape.

We took GPS positions on the center of each of the mounds remaining from the settlement, and measured maximum length and width of each. The map resulting can be seen below.

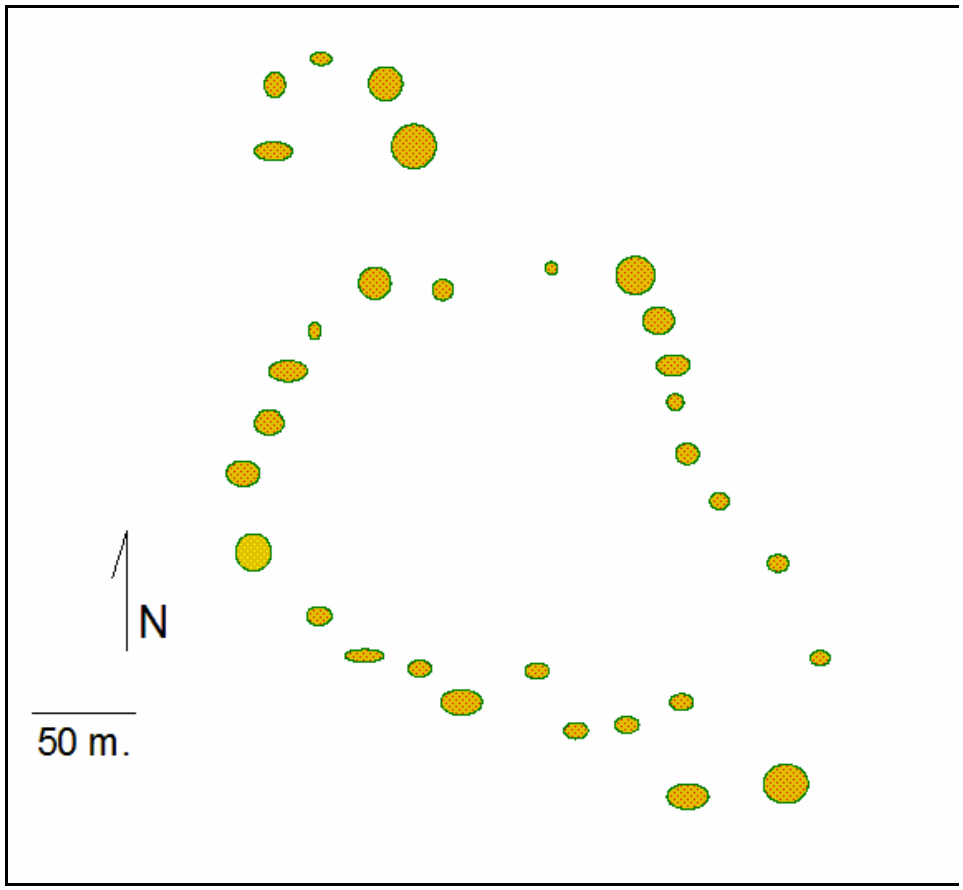

Figure 10.- Iron age settlement, disposition of detected households.

On surface in almost each of these mounds, corresponding presumably to Iron Age households, were detected minuscule fragments of ochre, fragments of large bovid teeth suggesting pastoralism, fragments of pottery, some plain orangeish in the outside and pale grown in the inside, or black, some rather fine and with incised decoration. The pottery was produced by rotating devices, some is polished inside and outside. Also fragments of obsidian, burnt obsidian and obsidian microliths.

There are several of these settlements at Ol Ari Nyiro, and the materials are in diverse state of preservation. Aerial views show that they are framed by large circles devoid of vegetation, plainly visible.

Figure 11.- Aerial view of settlement near Ochre Hill

Figure 12.- Aerial view of settlement near an artificial dam.

Figure 13.- Fragment of decorated pottery from Bogani Iron Age settlement

Figure 14.- Fragment of decorated pottery from Bogani settlement. Scale is 5 cm

IRON AGE SETTLEMENT MLIMA UNDONGO NEAR OCHRE HILL

UTM 37 N 60125.464
E 211237.3111
Alt. 1955 m.

Similar to the one described above, only some 10 mounds corresponding presumably to households could be mapped and detected in this settlement. It did produce pottery fragments on surface, but it did not produce any that showed decoration. Bovid teeth are rarer ando obsidian is also less frequent, but in almost every one of these were found quartz fragments of an average 3 cm.

Figure 11 shows an aerial view of this settlement, that seems to be of significant size, and below is the map of the few households detected.

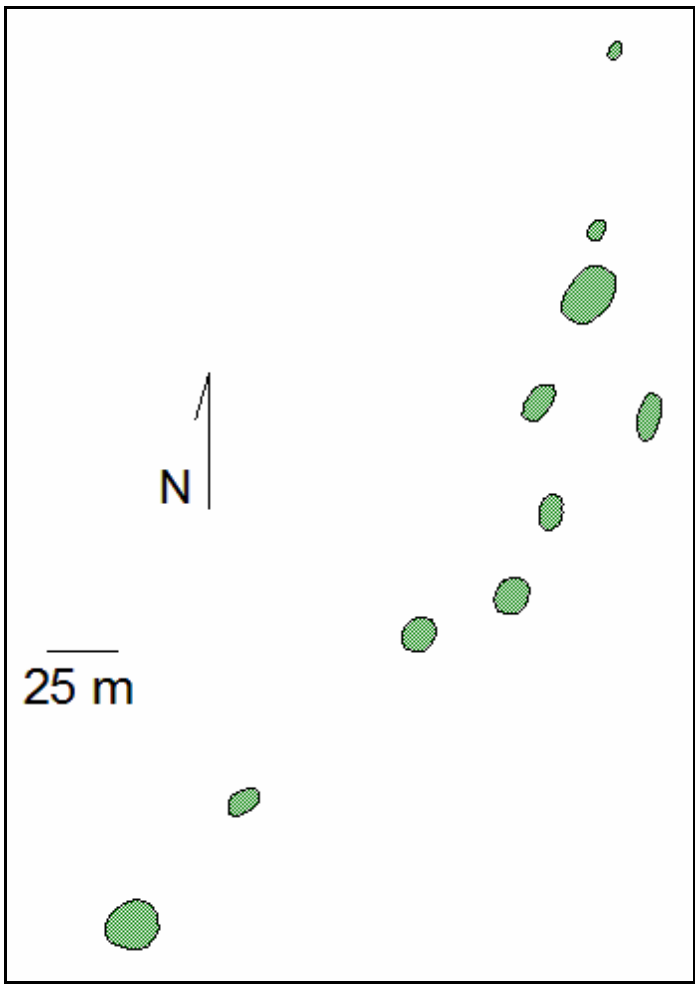

Figure 15.- Settlement near Ochre Hill, only a few households could be detected and mapped. See GPS coordinates in the annexes.

MEGALITHS AT OL ARI NYIRO ¿AN ANCIENT BURIAL GROUND?

UTM 37 N 63137.952
E 211975.77
Alt. 1976.34 m.

To the NE of the Iron smelting areas, and to the SW of the central camp, just off the road can be observed some large rocks forming what appears as dolmenic structures.

Two of these are outstanding: one is a proper dolmen, this is a large slab of rock which is held table-wise by other smaller rocks under it; other is an "standing-stone" or obelisk. Similar structures are noted in literature on west Africa as associated to burial grounds, with dates from the second half of the first millennium AD, broadly synchronous with the African Iron age.

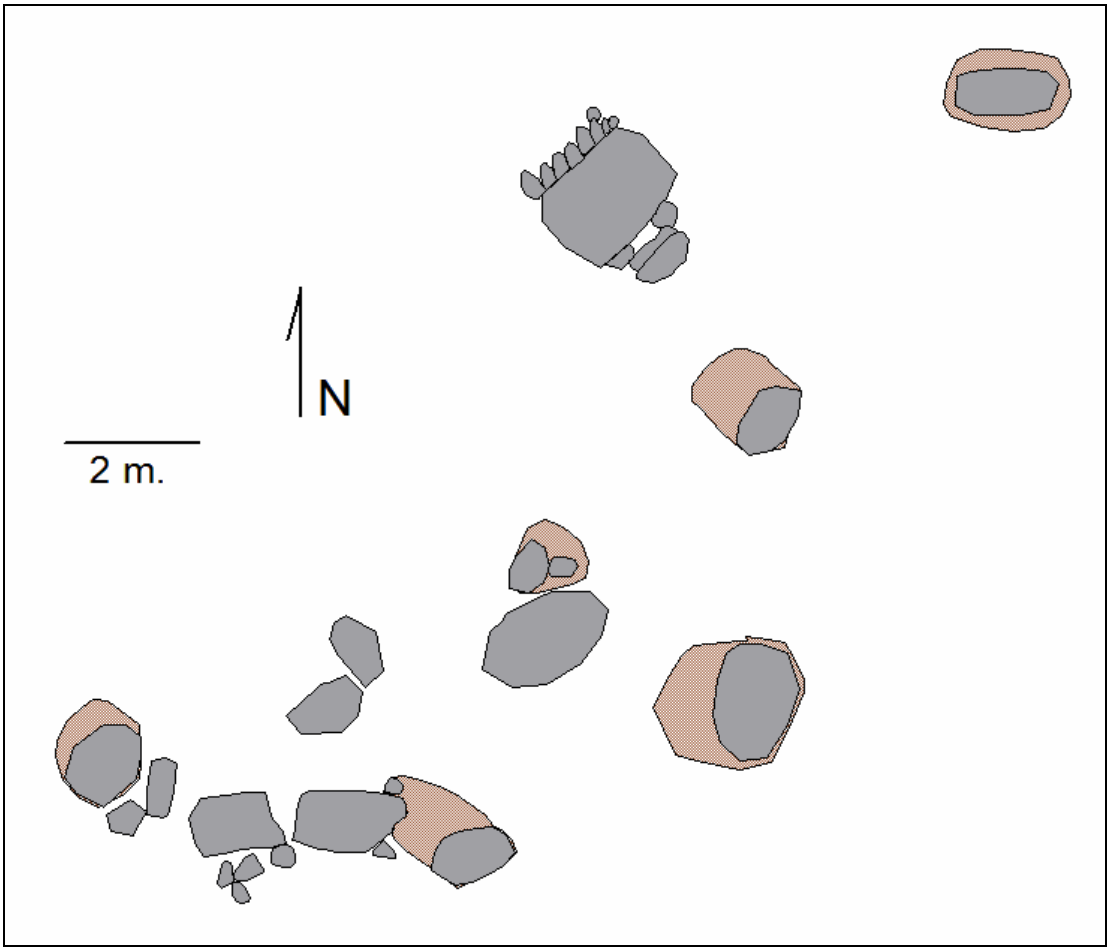

Figure 16.- Some of the main structures at the megalith area. Top, centre,(A) the dolmen, and south of it, (B) the obelisk.

Many other structures on sizeable rocks surround these two, and are also suggestive of human action and purpose. We mapped many of these in a large area, that is crossed by the main dirt track. It could be expected that soil movements during construction of the track would have exposed some archaeological materials.

Despite detailed search, we failed to observe any significant archaeological remain: fragments of pottery, ochre or tools were apparently absent. Only two obsidian microliths and one small flint flake were found in the surrounding area. This apparent lack of archaeological materials on surface makes me doubt of the burial function of these stone arrangements. However nothing can be assured unless further research is carried out. I do not believe that there can be any doubt as to the human agency of the dolmen and monolith, see pictures below.

Figure 17.- Dolmen type structure (A). A large slab of volcanic rock resting table-wise on some largish boulders.

The measures of the dolmen above are maximum length 1,50 m. max. width 1,27 m and maximum eight 0,96 m. Part of the surface shows alterations reportedly produced by elephant and buffaly rubbing. It is to be expected that if there were any other similar structures in the surrounding area, these may have been dismantled by this rubbing.

The measures of the obelisk next page are max. length 1,75 m, width 1,27 m and height 1.73 m. Its surface shows also elephant rubbing.

Both structures, as well as a smaller boulder amongst them, pictured in the map as (C) have what I can only describe as engravings. I have wondered about the human or animal agency producing these, but I am told that neither elephants nor buffalo would produce such grooves. Figures 19 and 20 are views of these grooves, that have been highlighted with chalk for the picture.

Figure 18.- A view of the obelisk (B), near other structures made of large volcanic boulders.

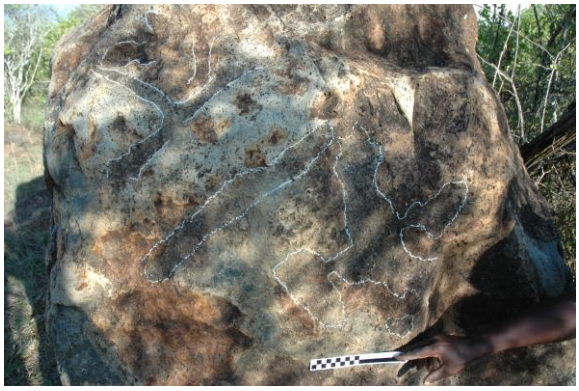

Figure 19.- Grooves or engraving-like features on dolmen A.

Figure 20.- Grooves on boulder C.

More research and possibly excavations would be needed to ascertain if there is was a burial ground function of this megalithic site. Groupings of largish boulders in apparently intentional arrangements are observable in other parts at the Ranch and also in Laikipia, although not as clearly assimilable to the megalithic cultura as these two. It remains to be ascertained the natural or human agency of similar features elsewhere.

RED OCHRE HILL AND OBSIDIAN PLAN

To the NW of Ol Ari Nyiro is an area known as “ochre hill”. It is a small prominence, flat on top, made of red and dark orange materials. Kuki Gallman reports on knowing of locals exploiting this hill for ochre in times past; they would come with a donkey and carry some sack of it. Nobody owned it and anybody could take what they needed. It is likely that it as been so exploited since the earliest antiquity, and consequently the area of the “hill” has diminished accordingly.

Currently the hill is a raised polygon of some 100 to 150 m. maximum measure, with an eigth of some 10 m.; plus a flat area around it of some 150 m. more. I did not observe any concentration of structures or stone tools suggestive of mining around what is the “hill” nowadays, although it is probable that more careful searches would find remains of such past exploitation.

A large concentration of small obsidian microliths has been noted to the south of the hill, in a large flat area bordering it, which we named “Obsidian flat”. Quartz fragments appear frequently, and some flint. No other archaeological artifacts have been observed in the area. The picture below shows some of these small lithic tools.

Figure 21.- Volunteers spread out to check for obsidian microliths at Obsidian Flat by Ochre Hill.

Figure 22.- Retouched obsidian scrapers, microliths and knapping debris on obsidian. Left, quartz fragments. Top right, flint core. From Obsidian Flat by Ochre Hill.

A NEW *HOMO ERECTUS* SITE: POROMOKO

I understand that Poromoko in Kiswahili means "landslide" thus this is a name very accurate to describe this site. I believe that Poromoko is a longitudinal fault, that runs N-S and is perhaps related with the geological uplift that produced the Tugen Hills (where sediments are exposed of ages from 16 Million years to the present). At Poromoko, the fault acts as an elongated "sinkhole" of sorts, where the sediments transported by the rain are deposited. The feature is quite long, over one km., and is observable even by satellite photo.

ANNEX I

THINGS A GIRL NEEDS TO GO A-SURVEYING

by Ana Pinto* (acpinto@las.es) for Sveva Gallmann, with warmest regards

Drawing left: Famous world explorer Dora La Exploradora

1.- A **geologic map** of the area. This is *basic and fundamental*. The best caves are in limestone areas (karst). River terrace sediments are also good. For palaeolithic settlements I mean. Places with a good outlook can be promising. In a dream world you could have one scaled to 1:50.000 and a set of 1:10.000. In real life you get what you can. You make some photocopy to not to spoil the original.

2.- A **topographic map** of the area. Also is a *must have*. Same as above with scales. So you will know where is exactly this kopje and whether there is any ancient dry creek that used to have water. Stick a photocopy of it in your notebook and put little numbers marking the positions of the interesting places you explore, then in the notebook you write (location #) all your observations and thoughts when you are in that place, better do it right there.

(1, 2).- Is possible that a GIS software (Geographic Information Systems) version of these, or at least of the topographic map exists. I personally love technology, but you can also draw your findings on your paper map or photocopy with a pen and is just perfect.

3.- A **GPS** (Global Position System by satellite) The newer models come with the topographic maps already scanned in, have lovely colour screens and you can save your positions directly on these maps, then download on to your software in your computer. Neat (I never had one, only seen them, but surely piece of cake to manage)

4.- A **Compass**. Mind you, European and American compasses will not work everywhere. There are magnetic zones in the world and you need to get compasses that are adapted to the area that you are surveying. There are rather affordable universal compasses.

5.- A **Clinometer** is always nice having around, to measure angles.

6.- **A 50 m**. roll of **tape measure**. Some people tries to convince me that 25 m. is just as good, but with 50 m. you go faster in a wider landscape. Also a couple of automatic **3 m**. steel tape measure –to measure the thickness of walls etc, that is, smaller things. I mean a couple or three because if may so happen that you forget it on top of a wall and never find it again, so next day you would not have one.

(6).- Additionally, it would be nice having one of these devices (forget what are they called) that have a little lcd screen, then you point to that tree, a laser ray comes out as in a laser pointer, and the screen tells you the distance from you to the tree. So you do not have to walk to the tree.

7.- Nothing wrong with having some 20 m. of rope (11 mm., caving not climbing) available. Will help get into crevices etc. and out more comfortably.

8.- Always good to carry flashlights with batteries, better if can be recharged thus we don't contaminate so much and also works out cheaper. There are battery-less flashlights, you shake them vigorously and they will work for a while, but I am not sure how good they are in practical terms. In case that you find the odd cave and you are dying to see what's inside.

9.- Photographic camera. Always, do plenty of pictures, as well as drawings. (alternatively you can take Lekha Singh). All pictures need always to be **scaled** –I just print out my own scales with a laser printer and always carry a handful in some pocket of the camera. So when looking at the picture you will know that this lizard is not a crocodile. For *each* picture you make a little entry in your notebook –the way I do is I reverse the notebook and do that list starting from the back so the info on all pictures is all together. There you produce a little table, with the following or similar headings: DATE, LOCATION #, PICTURE NUMBER, FROM (north, s, e, w), SUBJECT .

Each day that you go out you make a dated entry on your notebook, then you can write by the date (12-07-2006, Pictures 234 to 320).

10.- Graph paper in a stiff folder, pencils, eraser, a good **sewn** notebook. A little pocket calculator helps calculate the scale of things to draw in the graph paper (walls, structures etc) so you do not have to make the calculations inside of your head –and get it wrong now and then as may or may not be the case depending on your QI.

Of course, 2 l. of water per person, some food, waterproof mountain boots, a little warm cloths and raingear and if it is cold I would advice to get one of these plastic-silver-foil emergence blankets just in case (dirty cheap and work amazingly), a hat to keep the sunshine off your eyes, at least a couple of fingers crossed for luck and also safety, and I can't think of anything else now, which may mean that I am leaving something important out, have to keep thinking.

Headings of notes in the notebook:
Date:
Area explored: (You divide your map in a grid of squares, above A, B, C, and on the side 1, 2, 3, so your area will be A1, or C3 etc)
Explorers: (the names of the people that came with you in that day)
Pictures taken: (see above)

ANNEX II

GPS MISCELLANEA AND JANGILI CAVE

Sequence	Name	ZoneNum	ZoneChar	Easting	Northing	Altitude (Meters)
1	CENTER	37	N	211106.139	64183.035	1894.38916
2	MAIN CAMP	37	N	211247.937	63857.319	1899.1958
3	KALENGE	37	N	207566.897	55408.589	1959.037
4	KUTI	37	N	213628.361	70795.625	1878.287
5	LODGE	37	N	207384.199	67840.449	1779.512
6	LOKWAKIPI	37	N	207866.294	55279.382	1926.593
7	HOT SPRINGS	37	N	207325.594	67581.747	1713.663
8	HOT SPRING SURGENCIA 1	37	N	207278.437	67575.316	1712.942
9	JANGILI CAVE	37	N	206662.386	66262.411	1766.054

GPS IRON SMELTING SITES

Sequence	Name	ZoneNum	ZoneChar	Easting	Northing	Altitude (Meters)
1	IRON A	37	N	210560.928	62582.086	1893.908691
2	IRON B	37	N	210529.419	62562.485	1902.320068

BOGADI IRON AGE SETTLEMENT

Sequence	Name	ZoneNum	ZoneChar	Easting	Northing	Altitude (Meters)
1	BOGANI A	37	N	211237.311	60125.464	1955.67285
2	BOGANI B	37	N	211258.402	60105.692	1955.67285
3	BOGANI C	37	N	211283.729	60099.884	1956.3938
4	BOGANI D	37	N	211304.477	60084.156	1955.43262
5	BOGANI E	37	N	211340.268	60098.599	1957.83594
6	BOGANI F	37	N	211359.246	60070.481	1957.35523
7	BOGANI G	37	N	211383.008	60073.485	1957.59546
8	BOGANI H	37	N	211408.836	60084.371	1957.83594
9	BOGANI I	37	N	211411.655	60039.066	1955.19214
10	BOGANI J	37	N	211459.281	60045.101	1957.35523
11	BOGANI K	37	N	211474.899	60105.293	1957.59546
12	BOGANI L	37	N	211454.901	60149.808	1955.43262
13	BOGANI M	37	N	211426.737	60179.691	1953.99072
14	BOGANI N	37	N	211411.772	60202.438	1952.30835
15	BOGANI O	37	N	211405.564	60225.654	1945.33887
16	BOGANI P	37	N	211405.441	60244.332	1959.03735
17	BOGANI Q	37	N	211398.271	60264.552	1953.51001
18	BOGANI R	37	N	211386.834	60286.945	1952.06787
19	BOGANI S	37	N	211347.372	60290.31	1952.78906
20	BOGANI T	37	N	211295.187	60280.196	1957.35523
21	BOGANI U	37	N	211262.914	60283.456	1957.83594
22	BOGANI V	37	N	211280.811	60348.357	1954.71167
23	BOGANI W	37	N	211268.211	60378.374	1957.83594
24	BOGANI X	37	N	211237.64	60389.581	1955.19214
25	BOGANI Y	37	N	211215.647	60376.532	1952.54858
26	BOGANI Z	37	N	211214.607	60345.743	1956.3938
27	BOGANI AA	37	N	211234.671	60259.902	1961.20044
28	BOGANI AB	37	N	211222.348	60240.738	1960.71973
29	BOGANI AC	37	N	211213.254	60217.121	1960.23901
30	BOGANI AD	37	N	211200.854	60192.967	1958.79712
31	BOGANI AE	37	N	211205.973	60155.136	1959.99878

GPS MEGALITH AREA

Sequence	Name	ZoneNum	ZoneChar	Easting	Northing	Altitude (Meters)
1	MEGALITH A	37	N	211975.771	63137.952	1976.341064
2	MEGALITH B	37	N	211978.733	63123.363	1966.968262
3	MEGALITH C	37	N	211972.02	63121.9	1969.371582
4	MEGALITH D	37	N	211974.296	63117.67	1963.843994
5	MEGALITH E	37	N	211974.445	63118.208	1962.4021
6	MEGALITH F	37	N	211974.401	63122.4	1967.44873
7	MEGALITH G	37	N	211980.703	63124.159	1964.564941
8	MEGALITH H	37	N	211981.677	63109.951	1965.285889
9	MEGALITH I	37	N	211974.668	63114.415	1964.324707
10	MEGALITH J	37	N	211985.754	63125.103	1968.650391
11	MEGALITH K	37	N	211985.447	63125.808	1973.217041
12	MEGALITH L	37	N	211983.349	63132.171	1966.727783
13	MEGALITH M	37	N	211987.307	63130.259	1966.727783
14	MEGALITH N	37	N	211987.542	63135.433	1967.208496
15	MEGALITH O	37	N	211988.56	63135.47	1965.766602
16	MEGALITH P	37	N	211964.262	63123.388	1966.006836
17	MEGALITH Q	37	N	211959.624	63127.025	1960.479492
18	MEGALITH R	37	N	211964.228	63131.706	1963.843994
19	MEGALITH S	37	N	211960.727	63130.985	1964.324707
20	MEGALITH T	37	N	211970.019	63137.547	1965.285889
21	MEGALITH U	37	N	211975.16	63170.551	1984.271973
22	MEGALITH V	37	N	211970.284	63144.177	1966.727783
23	MEGALITH W	37	N	211972.404	63146.866	1961.200439
24	MEGALITH X	37	N	211980.87	63141.965	1966.006836
25	MEGALITH Y	37	N	211981.934	63141.102	1967.929443
26	MEGALITH Z	37	N	211994.293	63136.784	1958.316406
27	MEGALITH AA	37	N	211991.112	63143.185	1958.316406
28	MEGALITHL AB	37	N	211991.345	63142.007	1959.037354
29	MEGALITH AC	37	N	211994.986	63140.772	1958.797119
30	MEGALITH AD	37	N	211980.893	63150.739	1966.247314
31	MEGALITH AE	37	N	211976.871	63155.591	1962.161621
32	MEGALITH AF	37	N	211973.957	63152.661	1968.890869
33	MEGALITH AG	37	N	211983.332	63156.191	1964.084229
34	MEGALITH AH	37	N	211981.022	63147.261	1974.178223
35	MEGALITH AI	37	N	211983.353	63160.883	1958.316406
36	MEGALITH AJ	37	N	211976.14	63170.022	1962.161621
37	MEGALITH AK	37	N	211973.185	63160.786	1965.766602

GPS OCHRE HILL

Sequential	Name	ZoneNum	ZoneChar	Easting	Northing	Altitude (Meters)
1	OCHRE HILL 1	37	N	215402.837	66575.625	1970.813
2	OCHRE HILL 2	37	N	215393.546	66556.267	1980.427
3	OCHRE HILL 3 QUARRY	37	N	215381.286	66540.045	1974.178
4	OCHRE HILL 4	37	N	215369.016	66501.326	1975.139
5	OCHRE HILL 5	37	N	215336.893	66481.979	1974.418
6	OCHRE HILL 6	37	N	215314.64	66531.963	1974.899
7	OCHRE HILL OBSIDIAN PLAIN	37	N	215263.984	66578.271	1967.929
8	OCHRE HILL 7	37	N	215331.545	66558.324	1975.380
9	OCHRE HILL 8	37	N	215355.324	66596.484	1980.427
10	OCHRE HILL 9	37	N	215384.28	66589.647	1966.968
11	OCHRE HILL LIMIT 1	37	N	215421.795	66624.298	1973.698
12	OCHRE HILL LIMIT 2	37	N	215378.75	66673	1973.457
13	OCHRE HILL LIMIT 3	37	N	215323.999	66697.735	1974.178
14	OCHRE HILL LIMIT 4	37	N	215281.858	66692.591	1970.333
15	OCHRE HILL LIMIT 5	37	N	215224.303	66676.207	1963.363
16	OCHRE HILL LIMIT 6	37	N	215175.462	66633.818	1969.612
17	OCHRE HILL LIMIT 7	37	N	215209.772	66565.941	1966.728
18	OCHRE HILL LIMIT 8	37	N	215092.044	66487.626	1966.247
19	OCHRE HILL ROAD	37	N	216374.91	65983.797	1997.970
20	OCHRE HILL TOP	37	N	215350.085	66509.08	1975.861

GPS MANYATTAS OCHRE HILL SETTLEMENT

Type	Name	ZoneNum	ZoneChar	Easting	Northing	Altitude (Meters)
1	UNDONGOA	37	N	216564.219	66305.487	2004.459
2	UNDONGOB	37	N	216580.944	66344.019	1997.970
3	UNDONGOC	37	N	216584.108	66363.564	2012.390
4	UNDONGOD	37	N	216590.635	66425.888	2005.661
5	UNDONGOE	37	N	216602.085	66298.278	2004.700
6	UNDONGOF	37	N	216567.543	66266.947	2003.738
7	UNDONGOG	37	N	216554.163	66235.974	2003.498
8	UNDONGOH	37	N	216523.157	66224.739	2003.498
9	UNDONGOI	37	N	216462.427	66165.022	2000.134
10	UNDONGOJ	37	N	216423.053	66122.812	1996.529

GPS POROMOKO

Sequential	Name	ZoneNum	ZoneChar	Easting	Northing	Altitude (Meters)
1	PO POROMOKO	37	N	203978.463	54009.76	1771.822
2	PO SITE1	37	N	204021.77	54139.02	1971.775
3	PO SITE2	37	N	204078.047	54199.485	1966.488
4	PO SITE4	37	N	203988.647	54411.785	1970.813
5	PO SITE5	37	N	203962.598	54730.098	1963.363
6	PO COLORFUL POINT	37	N	204055.711	54053.068	1965.286
7	PO S1 BIF1	37	N	204029.198	54141.045	1966.728
8	PO S1 BIF2	37	N	204035.891	54165.939	1969.131
9	PO S1 BIF3	37	N	204025.124	54167.787	1973.457
10	PO S1 TOOL	37	N	204035.338	54175.159	1970.813

ANNEX III

DATE	PIC. NUM.	SUBJECT	FLASH?	NOTES
6-Aug-06	6222	Fresh Papio droppings	n	
6-Aug-06	6223	Fresh papio droppings	y	
6-Aug-06	6224	Papio eating hole	n	
6-Aug-06	6225	Papio eating hole	y	
6-Aug-06	6226	Papio eating hole	n	
6-Aug-06	6227	Papio eating hole	n	
6-Aug-06	6228	Papio eating hole	n	
6-Aug-06	6229	Papio eating hole	n	
6-Aug-06	6230	Papio stone turned	n	
6-Aug-06	6231	Open landscape and Rugendo	n	
6-Aug-06	6232	Aardvark termite hole	n	
6-Aug-06	6233	Baboon track	n	
6-Aug-06	6234	Dviker and Baboon tracks travel together	n	
6-Aug-06	6235	Fresh elephant trail (todays)	n	
6-Aug-06	6236	Termite hill	n	
6-Aug-06	6237	Rugendo at termite hill	n	
6-Aug-06	6238	Anthill poked at termites	n	
6-Aug-06	6239	View opposing hills and lava layer black and outcrops	n	
6-Aug-06	6240	APP. Cave from southwest	n	
6-Aug-06	6241	Approaching Sambara Cave	n	
6-Aug-06	6242	Bushpig droppings - old (4 days)	n	
6-Aug-06	6243	Bushpig droppings - old (4 days)	n	
6-Aug-06	6244	Rhino leading to Sambara cave	n	
6-Aug-06	6245	Freshly broken fragment of local volcanic rock	n	
6-Aug-06	6246	Freshly broken fragment of local volcanic rock	n	
6-Aug-06	6247	Freshly broken fragment of local volcanic rock	y	
6-Aug-06	6248	Water droppingsl at the Sambara cave	n	
6-Aug-06	6249	Harder volcanic rock		
6-Aug-06	6250	Harder volcanic rock details	y	
6-Aug-06	6251	Detail without flash	n	
6-Aug-06	6252	Detail with flash	y	
6-Aug-06	6253	Approaching Sambara Cave		
6-Aug-06	6254	Sambara Cave		
6-Aug-06	6255	Waterfall area by Sambara cave		
6-Aug-06	6256	Cave site		
6-Aug-06	6257	Cave site		
6-Aug-06	6258	P16 tree - room		
6-Aug-06	6259	Male baboon droppings - smells like 006 droppings		
6-Aug-06	6260	Bat droppings and crouton fruit - crushed bybaboon		
6-Aug-06	6261	Polished rock by baboon - reported sighting by Rogendo	n	
6-Aug-06	6262	Polished rock by baboon - reported sighting by Rogendo	y	
6-Aug-06	6263	Cover where baboons sleep		
6-Aug-06	6264	Leopard droppings - 1 week old		
6-Aug-06	6265	Leopard droppings - 1 week old (with white balance to fix)		
6-Aug-06	6266	Leopard droppings - 1 week old (with white balance to fix)		
6-Aug-06	6267	holes on cave dust floor made by insects		
6-Aug-06	6268	Hip bone of mid mited - maybe bush buck		
6-Aug-06	6269	Hip bone of mid mited - maybe bush buck		
6-Aug-06	6270	Hip bone of mid mited - maybe bush buck, View of position		
6-Aug-06	6271	Hip bone of mid mited - maybe bush buck, chewed probably by porcipine		
6-Aug-06	6272	Hip bone of mid mited - maybe bush buck, chewed probably by porcipine		

6-Aug-06	6273	Hip bone of mid mited - maybe bush buck, chewed probably by porcipine
6-Aug-06	6274	Unknown insect nest
6-Aug-06	6275	The roots of the Pig tree
6-Aug-06	6276	Point wall of cave - volcanic rock
6-Aug-06	6277	Detail root of Pig tree and small leaves of it
6-Aug-06	6278	The floor
6-Aug-06	6279	Point of the cave - volcanic hard rock
6-Aug-06	6282	Papio hand prints
6-Aug-06	6283	Papio foot prints
6-Aug-06	6284	Donkey droppings
6-Aug-06	6290	Insect responsible for hole
6-Aug-06	6291	Point B
6-Aug-06	6293	The little hole
6-Aug-06	6294	Rugendo points to point B
6-Aug-06	6295	Rugendo at point A
6-Aug-06	6296	Rugendo points at A
6-Aug-06	6297	View of A while laying on the floor
6-Aug-06	6298	View of A while laying on the floor
6-Aug-06	6299	View of A while laying on the floor
6-Aug-06	6300	View of A while laying on the floor
6-Aug-06	6301	Flake
6-Aug-06	6302	FD
6-Aug-06	6303	Distinct layer of lava make the cave.
6-Aug-06	6304	Lava layers
6-Aug-06	6305	Harder rock - volcanic
6-Aug-06	6306	Harder rock suitable for flakes - volcanic
6-Aug-06	6307	Harder rock suitable for flakes - volcanic
6-Aug-06	6308	The explorers Rugendo and Ana
6-Aug-06	6309	Sambara 1 from the west
6-Aug-06	6310	Sambara 2
6-Aug-06	6311	Sambara 2
6-Aug-06	6312	Sambara 2
6-Aug-06	6313	Sambara 2
6-Aug-06	6314	Sambara 2
6-Aug-06	6315	?
6-Aug-06	6316	?
6-Aug-06	6317	View of Sambara and wall face and roots of Pig tree
6-Aug-06	62318	Sambara 2
6-Aug-06	6319	Sambara 2
7-Aug-06	6338	Mukutan River from Mukutan lodge
7-Aug-06	6339	Mukutan River from Mukutan lodge
7-Aug-06	6340	Mukutan Lodge
7-Aug-06	6341	Mukutan River
7-Aug-06	6342	Mukutan River
7-Aug-06	6343	BuffaloVastella Moth eaten - lay eggsd on horns, when hatched, eat horns
7-Aug-06	6344	BuffaloVastella Moth eaten - lay eggsd on horns, when hatched, eat horns
7-Aug-06	6345	BuffaloVastella Moth eaten - lay eggsd on horns, when hatched, eat horns
7-Aug-06	6346	Ant eaten hole under ant hill
7-Aug-06	6347	Dung beetle
7-Aug-06	6348	Nice quality rock along the river course - hand, fit for tools
7-Aug-06	6349	View of the cave
7-Aug-06	6350	View of the cave

7-Aug-06	6351	View of the cave		
7-Aug-06	6352	Approach to the cave		
7-Aug-06	6353	Approach to the cave		
7-Aug-06	6354	View from inside the cave		
7-Aug-06	6355	View from inside the cave		
7-Aug-06	6356	View from inside the cave		
7-Aug-06	6357	View from inside the cave		
7-Aug-06	6358	Angular rock fragment and bat droppings		
7-Aug-06	6359	Angular rock fragment - roof space detaching from wall		
7-Aug-06	6360	Angular rock fragment - roof space detaching from wall		
7-Aug-06	6361	View of the sediment		
7-Aug-06	6362	View from the cave		
7-Aug-06	6363	View from the cave		
7-Aug-06	6364	The test excavation transferal to the main axis of cave	n	
7-Aug-06	6365	The test excavation transferal to the main axis of cave	y	
7-Aug-06	6366	Spoil heaps		
7-Aug-06	6367	Spoil heaps		
7-Aug-06	6368	Spoil heaps		
7-Aug-06	6369	Spoil heaps		
7-Aug-06	6370	Spoil heaps and test excavation		
7-Aug-06	6371	drying - in the heap		
7-Aug-06	6372	Towards inside		
7-Aug-06	6373	Towards inside		
7-Aug-06	6374	View from cave		
7-Aug-06	6375	Spoil heaps		
7-Aug-06	6376	Idem.		
7-Aug-06	6377	Baboon polishing		
7-Aug-06	6378	View from the cave		
7-Aug-06	6379	View from the cave		
7-Aug-06	6380	Test excavation		
7-Aug-06	6381	idem.		
7-Aug-06	6382	Idem.		
7-Aug-06	6383	Test and spoil		
8-Aug-06	6439	A smelting derbis	n	
8-Aug-06	6440	A smelting derbis	y	A
8-Aug-06	6441	A smelting derbis - with scale	n	A
8-Aug-06	6442	A smelting derbis - with scale	y	A
8-Aug-06	6443	A derbis and obsdian flake		A
8-Aug-06	6444	A general View from the south		A
8-Aug-06	6445	A general View from the east		A
8-Aug-06	6446	A general View from the east		A
8-Aug-06	6447	A general View from the west		A
8-Aug-06	6448	A general View from the north		A
8-Aug-06	6449	Bits of pottery	n	A
8-Aug-06	6450	Bits of pottery	y	A
8-Aug-06	6451	Pottery (other side)	y	A
8-Aug-06	6452	Pottery (other side)	n	A
8-Aug-06	6453	Black 'glass'		A
8-Aug-06	6454	Black 'glass' - on other side		A
8-Aug-06	6455	Small fragments of red ochre, obsidian flake, and pottery (orange)	n	B
8-Aug-06	6456	Small fragments of red ochre, obsidian flake, and pottery (orange)	y	B
8-Aug-06	6457	cilindric fragments - derbis?	n	B
8-Aug-06	6458	cilindric fragments - derbis?	y	B
8-Aug-06	6459	Site B from the south		B
8-Aug-06	6460	Beautiful sky		B

8-Aug-06	6461	Site B from the East	B
8-Aug-06	6462	Site B from the West	B
8-Aug-06	6463	Site B from the North	B
8-Aug-06	6464	View of derbis	B
	6465	Ana Working	B
	6466	Rugendo under sky	B
8-Aug-06	6467	View of site C from North	C
8-Aug-06	6468	View of site C from South	C
8-Aug-06	6469	View of site C from East	C
8-Aug-06	6470	View of site C from West	C
8-Aug-06	6471	Closer View of the ruins	C
8-Aug-06	6472	Old earth	C
8-Aug-06	6473	Group of larger rocks (35 - 40cm)	C
8-Aug-06	6474	Group of larger rocks (35 - 40cm)	C
8-Aug-06	6475	Group of larger rocks (35 - 40cm) - detail	C
8-Aug-06	6476	Sky	C
8-Aug-06	6477	plain and polished pottery	C
8-Aug-06	6478	idem. In the flesh	C
8-Aug-06	6479	Black decorated pottery	C
8-Aug-06	6480	Black decorated pottery - profile	C
8-Aug-06	6481	Black decorated pottery	C
8-Aug-06	6482	?	C
8-Aug-06	6483	?	C
8-Aug-06	6484	Plain pottery	C
8-Aug-06	6485	Plain pottery	C
8-Aug-06	6486	Plain pottery	C
8-Aug-06	6487	Plain pottery	C
8-Aug-06	6488	Black decorated pottery	C
8-Aug-06	6489	Black decorated pottery - profile	C
8-Aug-06	6490	Black decorated pottery - profile	C
8-Aug-06	6491	Ana at work	
8-Aug-06	6492	Ana at work	
8-Aug-06	6493	Ana at work	
8-Aug-06	6494	B general View	
8-Aug-06	6495	From B	
8-Aug-06	6496	From C - obsidian, pottery	
8-Aug-06	6497	Dung beetles	
8-Aug-06	6498	Dung beetles	
8-Aug-06	6499	Decorated pottery and large antelope - collected both, Bg. H	
8-Aug-06	6500	Decorated pottery and large antelope - collected both, Bg. H	
8-Aug-06	6501	Decorated pottery and large antelope - collected both, Bg. F	
8-Aug-06	6502	Decorated pottery and large antelope - collected both	
8-Aug-06	6503	Decorated pottery and large antelope - collected both	
8-Aug-06	6504	Decorated pottery and large antelope - collected both	
8-Aug-06	6505	Decorated pottery and large antelope - collected both	
8-Aug-06	6506	Decorated pottery Bg. I	
8-Aug-06	6507	Brownish decorated pottery Bg. J (in situ)	
8-Aug-06	6508	Deorated pottery Bg. J	
8-Aug-06	6509	Zebra	
8-Aug-06	6510	Buffalo	
8-Aug-06	6511	Impala	
8-Aug-06	6512	Volcanic rock, large size, red outside, possible extract	
8-Aug-06	6513	Pyramydic stone tool from Bg P	
8-Aug-06	6514	Burnt volcanic rock from Bg. P	
8-Aug-06	6515	Possibly polished stone from the same place	

8-Aug-06	6516	Cheetah tracks	
8-Aug-06	6517	Cheetah tracks	
8-Aug-06	6518	Old dik dik droppings	
8-Aug-06	6519	Bg. AE - decorated light coloured pottery	n
8-Aug-06	6520	Bg. AE - decorated light coloured pottery	y
8-Aug-06	6521	General View	
8-Aug-06	6522	General View	
8-Aug-06	6523	General View	
8-Aug-06	6524	General View	
8-Aug-06	6525	General View	
8-Aug-06	6526	One Bg.	
8-Aug-06	6527	One Bg.	
8-Aug-06	6528	Sky	
8-Aug-06	6529	The explorers.	
14-Aug-06	6730	Ochre Hill	
14-Aug-06	6731	View of Ochre Hill	
14-Aug-06	6732	Kuki's quarry	
14-Aug-06	6733	Kuki's quarry - View down; ochre	
14-Aug-06	6734	Kuki's quarry	
14-Aug-06	6735	Ochre detail	
14-Aug-06	6736	Ochre detail	
14-Aug-06	6737	Ochre detail	
14-Aug-06	6738	Ochre detail	
14-Aug-06	6739	Volcanic rock layers, detail	
14-Aug-06	6740	Volcanic rock layers, detail	
14-Aug-06	6741	Volcanic rock layers, detail	
14-Aug-06	6742	Rugendo	
14-Aug-06	6743	Plant producing red dye	
14-Aug-06	6744	Obsidian and tools	
16-Aug-06	2326	idem.	
17-Aug-06	2327	po-06-CP-006 (apparently level 3)	
18-Aug-06	2328	Tool like rocks appears in the contact between orange and brown orange (level 4- 5) po-06-cp-oo7	
18-Aug-06	2329	Tool like rocks appears in the contact between orange and brown orange (level 4- 5) po-06-cp-oo8	
18-Aug-06	2330	Ana Working	
18-Aug-06	2331	Cone on top of level 5	
18-Aug-06	2332	Colourful point	
18-Aug-06	2333	Rugendo and Flvia point at 4b SW of CP	
18-Aug-06	2334	Rugendo and Flvia point at 4b SW of CP	
18-Aug-06	2335	Tool on level 4	
18-Aug-06	2336	Rugendo	
18-Aug-06	2337	Rugendo	
18-Aug-06	2338	Anna and Flavia working at site 4	
18-Aug-06	2339	Flavia sitting in a carbonated layer at site 4	
18-Aug-06	2340	Flavia and Rugendo working in a carbonated layer at site 5	
18-Aug-06	2341	Fragment of a carbonated layer	
18-Aug-06	2342	Carbonated layer	
18-Aug-06	2343	General View of site 4	
18-Aug-06	2344	Track of leapord	
18-Aug-06	2345	Track of leapord	
18-Aug-06	2346	General View of site 5	
18-Aug-06	2347	Tool in site 5	
18-Aug-06	2348	Stones; site 5 level 5	
18-Aug-06	2349	Specimen CP 001	

8/23/2006	2434	Specimen CP 001
8/23/2006	2435	Specimen CP 002
8/23/2006	2436	Specimen CP 002
8/23/2006	2116	Specimen CP 001
8/23/2006	2117	Specimen CP 001
8/23/2006	2118	Specimen CP 002
8/23/2006	2119	Specimen CP 002
8/23/2006	2120	Specimen CP 003
8/23/2006	2121	Specimen CP 003
8/23/2006	2122	Specimen CP 004
8/23/2006	2123	Specimen CP 004
8/23/2006	2124	Specimen CP 005
8/23/2006	2125	Specimen CP 005
8/23/2006	2126	Specimen CP 006
8/23/2006	2127	Specimen CP 006
8/23/2006	2128	Specimen CP 007
8/23/2006	2129	Specimen CP 007
8/23/2006	2130	Specimen CP 008
8/23/2006	2131	Specimen CP 008
8/23/2006	2132	Specimen CP 009
8/23/2006	2133	Specimen CP 009
8/23/2006	2134	Specimen CP 010
8/23/2006	2135	Specimen CP 010
8/23/2006	2136	Specimen CP 011
8/23/2006	2137	Specimen CP 011
8/23/2006	2138	Specimen CP 012
8/23/2006	2139	Specimen CP 012
8/23/2006	2140	Specimen CP 013
8/23/2006	2141	Specimen CP 013
8/23/2006	2142	Specimen CP 014
8/23/2006	2143	Specimen CP 014
8/23/2006	2144	Specimen CP 015
8/23/2006	2145	Specimen CP 015
8/23/2006	2146	Specimen CP 016
8/23/2006	2147	Specimen CP 016
8/23/2006	2148	Specimen CP 017
8/23/2006	2149	Specimen CP 017
8/23/2006	2150	Specimen CP 018
8/23/2006	2151	Specimen CP 018
8/23/2006	2152	Specimen CP 019
8/23/2006	2153	Specimen CP 019
8/23/2006	2154	Specimen CP 020
8/23/2006	2155	Specimen CP 020
8/23/2006	2156	Specimen CP 021
8/23/2006	2157	Specimen CP 021
8/23/2006	2158	Specimen CP 022
8/23/2006	2159	Specimen CP 022
8/23/2006	2160	Specimen CP 023
8/23/2006	2161	Specimen CP 023
8/23/2006	2162	Specimen CP 024
8/23/2006	2163	Specimen CP 024
8/23/2006	2164	Specimen CP 025
8/23/2006	2165	Specimen CP 025
8/23/2006	2166	Specimen CP 026
8/23/2006	2167	Specimen CP 026

8/23/2006	2168	Specimen CP 027
8/23/2006	2169	Specimen CP 027
8/23/2006	2170	Specimen CP 028
8/23/2006	2171	Specimen CP 028
8/23/2006	2172	Specimen CP 029
8/23/2006	2173	Specimen CP 029
8/23/2006	2174	Specimen CP 030
8/23/2006	2175	Specimen CP 030
8/23/2006	2176	Specimen CP 031
8/23/2006	2177	Specimen CP 031
8/23/2006	2178	Specimen CP 032
8/23/2006	2179	Specimen CP 032
8/23/2006	2180	Specimen CP 033
8/23/2006	2181	Specimen CP 033
8/23/2006	2182	Specimen CP 034
8/23/2006	2183	Specimen CP 034
8/23/2006	2184	Specimen CP 035
8/23/2006	2185	Specimen CP 035
8/23/2006	2186	Specimen CP 036
8/23/2006	2187	Specimen CP 036
8/23/2006	2188	Specimen CP 037
8/23/2006	2189	Specimen CP 037
8/23/2006	2190	Specimen CP 038
8/23/2006	2191	Specimen CP 038
8/23/2006	2192	Specimen CP 039
8/23/2006	2193	Specimen CP 039
8/23/2006	2194	Specimen CP 040
8/23/2006	2195	Specimen CP 040
8/23/2006	2196	Specimen CP 041
8/23/2006	2197	Specimen CP 041
8/23/2006	2198	Specimen CP 042
8/23/2006	2199	Specimen CP 042
8/23/2006	2200	Specimen CP 043
8/23/2006	2201	Specimen CP 043

ANNEX 4

Poromoko sites are: CP is Colourful Point, CPSW is Colorful Point South West, C1 is Corridor 1, Site 1, Site 2 blackened crust, Site 3 r
5 similar stratigaphy as CP and CPSW - see maps

Poromoko Site	Specimen #	Max length cm	Max width cm	Description	Raw material
CP	1	8.50	6.30	tool/core	Volcanic
CP	2	10.40	3.60	tool/core	Volcanic
CP	3	10.00	8.00	core	Volcanic
CP	4	5.60	5.40	tool/core	Volcanic
CP	5	8.20	7.50	flake possible Levallois	Volcanic
CP	6	8.30	7.00	primary decortication flake	Volcanic
CP	7	6.80	4.30	flake possible Levallois	Volcanic
CP	8	15.00	13.00	chopping tool	Volcanic
C1	9	11.00	7.90	flake/tool	Volcanic
C1	10	8.10	8.00	tool/core	Volcanic
C1	11	6.20	4.00	flake/tool	Volcanic
C1	12	7.40	5.00	flake/tool	Volcanic
C1	13	9.20	7.00	flake/tool	Volcanic
C1	14	7.70	6.30	core	Volcanic
S4	15	3.20	3.00	flake tool retouched	Obsidian
S5	16	4.30	3.40	flake tool retouched	Obsidian
S2	17	6.30	4.60	plain flake	Volcanic
S2	18	4.20	3.40	plain flake	Volcanic
S2	19	3.80	2.70	flake	Volcanic
S2	20	10.70	7.40	plain flake	Volcanic
S2	21	9.50	5.90	core/tool	Volcanic
S2	22	13.20	9.70	bifaz/chopping tool	Volcanic
S2	23	7.40	4.80	core/tool	Volcanic
S1	24	7.00	6.00	flake possible Levallois	Volcanic
S1	25	6.30	5.20	flake/tool	Volcanic
S1	26	6.30	4.80	flake tool, possible Levallois	Volcanic
S1	27	13.30	7.50	acheulean handaxe bifaz achelense clasico	Volcanic
S1	28	11.70	8.30	tool/core	Volcanic
S1	29	12.40	10.30	plain flake	Volcanic
S1	30	5.00	3.70	flake fragment	Volcanic
S3	31	7.00	3.70	tool/core	Volcanic
S3	32	6.40	6.70	plain flake	Volcanic
S3	33	5.10	5.00	core	Volcanic
S3	34	6.10	4.20	flake	Volcanic
CPSW	35	2.00	1.70	flake fragment	Volcanic
CPSW	36	6.60	6.20	retouched tool	Volcanic
CPSW	37	3.30	2.50	flake	Volcanic
CPSW	38	4.40	3.60	retouched flake	Volcanic
CPSW	39	9.00	7.80	core/tool	Volcanic
CPSW	40	6.40	4.50	retouched tool	Volcanic

CPSW	41	7.50	7.50	undetermined with extractions	Volcanic
CPSW	42	5.30	4.20	retouched flake possible Levallois	Volcanic
CPSW	43	8.50	7.40	retouched tool possible sidescrapper	Volcanic

ANNEX V

Ol Ary Nyiro Archaeological Project
Anatomical Collection Of Reference.
Felis panthera leo

Number	BOX	Part	Side	Size cm	Sex	Age
1	1	Skull	~	34.5	Female?	Prime adult
2	2	Humerus	Left	30	Female?	Prime adult
3	2	Humerus	Right	30	Female?	Prime adult
4	2	Ulna	Right	31.6	Female?	Prime adult
5	2	Ulna	Left	31.6	Female?	Prime adult
6	2	Radius	Left	27	Female?	Prime adult
7	2	Radius	Right	27	Female?	Prime adult
8	2	Metapodial	undet.	10.3	Female?	Prime adult
9	2	Metapodial	undet.	11.8	Female?	Prime adult
10	2	Metapodial	undet.	11.9	Female?	Prime adult
11	2	Metapodial	undet.	10.3	Female?	Prime adult
12	2	Metapodial	undet.	10.3	Female?	Prime adult
13	2	Metapodial	undet.	9.2	Female?	Prime adult
14	2	Metapodial	undet.	9.2	Female?	Prime adult
15	2	Metapodial	undet.	10.3	Female?	Prime adult
16	2	Metapodial	undet.	10.9	Female?	Prime adult
17	2	Metapodial	undet.	8.7	Female?	Prime adult
18	2	Astragalus	Left	5.4	Female?	Prime adult
19	2	Astragalus	Right	5.4	Female?	Prime adult
20	2	Astragalus	Right	6	Male?	Prime adult
21	2	Calcaneum	Left	9.3	Female?	Prime adult
22	2	Calcaneum	Right	10.5	Male?	Prime adult
23	2	Carpals or Tarsals	undet.	4.2	Undet.	Prime adult
24	2	Carpals or Tarsals	undet.	4.3	Undet.	Prime adult
25	2	Carpals or Tarsals	undet.	4.2	Undet.	Prime adult
26	2	Carpals or Tarsals	undet.	3.2	Undet.	Prime adult
27	2	Carpals or Tarsals	undet.	3.3	Undet.	Prime adult
28	2	Carpals or Tarsals	undet.	2.8	Undet.	Prime adult
29	2	Carpals or Tarsals	undet.	3.7	Undet.	Prime adult
30	2	Carpals or Tarsals	undet.	2.7	Undet.	Prime adult
31	2	Carpals or Tarsals	undet.	2.3	Undet.	Prime adult
32	2	Carpals or Tarsals	undet.	2.3	Undet.	Prime adult
33	2	Carpals or Tarsals	undet.	2.4	Undet.	Prime adult
34	2	Carpals or Tarsals	undet.	3.3	Undet.	Prime adult
35	2	Carpals or Tarsals	undet.	2.5	Undet.	Prime adult
36	2	Carpals or Tarsals	undet.	1.8	Undet.	Prime adult
37	2	Sesamoid	undet.	1.83	Female?	Prime adult
38	2	Sesamoid	undet.	1.4	Female?	Prime adult
39	2	Sesamoid	undet.	1.95	Female?	Prime adult
40	2	Sesamoid	undet.	1.73	Female?	Prime adult
41	2	Phalanx	Undet.	5.2	Undet.	Prime adult
42	2	Phalanx	Undet.	5.2	Undet.	Prime adult
43	2	Phalanx	Undet.	4.9	Undet.	Prime adult
44	2	Phalanx	Undet.	4.8	Undet.	Prime adult
45	2	Phalanx	Undet.	4.55	Undet.	Prime adult
46	2	Phalanx	Undet.	4.1	Undet.	Prime adult
47	2	Phalanx	Undet.	3.9	Undet.	Prime adult
48	2	Phalanx	Undet.	3.4	Undet.	Prime adult
49	2	Phalanx	Undet.	3	Undet.	Prime adult

50	2	Phalanx	Undet.	2.7	Undet.	Prime adult
51	2	Phalanx	Undet.	2.9	Undet.	Prime adult
52	2	Patella	undet.	4.8	Undet.	Prime adult
53	3	Rib	undet.	20.7	Undet.	Prime adult
54	3	Rib	undet.	27.3	Undet.	Prime adult
55	3	Rib	undet.	27.5	Undet.	Prime adult
56	3	Rib	undet.	26.7	Undet.	Prime adult
57	3	Rib	undet.	22	Undet.	Prime adult
58	3	Rib	undet.	22	Undet.	Prime adult
59	3	Rib	undet.	22.3	Undet.	Prime adult
60	3	Rib	undet.	24.8	Undet.	Prime adult
61	3	Rib	undet.	20.5	Undet.	Prime adult
62	3	Rib	undet.	21.2	Undet.	Prime adult
63	3	Rib	undet.	20.8	Undet.	Prime adult
64	3	Rib	undet.	19.2	Undet.	Prime adult
65	3	Rib	undet.	18.5	Undet.	Prime adult
66	3	Rib	undet.	16	Undet.	Prime adult
67	3	Rib	undet.	18.5	Undet.	Prime adult
68	3	Rib	undet.	17.8	Undet.	Prime adult
69	3	Rib	undet.	16	Undet.	Prime adult
70	3	Rib	undet.	14.5	Undet.	Prime adult
71	3	Rib	undet.	11.7	Undet.	Prime adult
72	3	Rib	undet.	12.3	Undet.	Prime adult
73	3	Rib	undet.	12.2	Undet.	Prime adult
74	3	Vertebra, atlas	Not relevant	12.8	Female?	Prime adult
75	3	Vertebra, atlas	Not relevant	15.3	Male?	Prime adult
76	3	Vertebra, axis	Not relevant	10	Female?	Prime adult
77	3	Vertebra, cervical	Not relevant	9	Undet.	Prime adult
78	3	Vertebra, cervical	Not relevant	8.6	Undet.	Prime adult
79	3	Vertebra, cervical	Not relevant	8.6	Undet.	Prime adult
80	3	Vertebra, cervical	Not relevant	3.8	Undet.	Prime adult
81	3	Vertebra, thoracic	Not relevant	11.6	Undet.	Prime adult
82	3	Vertebra, thoracic	Not relevant	12.8	Undet.	Prime adult
83	3	Vertebra, thoracic	Not relevant	13.5	Undet.	Prime adult
84	3	Vertebra, thoracic	Not relevant	13.7	Undet.	Prime adult
85	3	Vertebra, thoracic	Not relevant	11.2	Undet.	Prime adult
86	3	Vertebra, thoracic	Not relevant	9.8	Undet.	Prime adult
87	3	Vertebra, thoracic	Not relevant	6.7	Undet.	Prime adult
88	3	Vertebra, thoracic	Not relevant	5.5	Undet.	Prime adult
89	3	Vertebra, thoracic	Not relevant	6.3	Undet.	Prime adult
90	3	Vertebra, thoracic	Not relevant	5.7	Undet.	Prime adult
91	3	Vertebra, lumbar	Not relevant	6	Undet.	Prime adult
92	3	Vertebra, lumbar	Not relevant	5.8	Undet.	Prime adult
93	3	Vertebra, lumbar	Not relevant	5.8	Undet.	Prime adult
94	3	Vertebra, lumbar	Not relevant	4.8	Undet.	Prime adult
95	3	Vertebra, sacral	Not relevant	7.3	Undet.	Prime adult
96	3	Vertebra, codal	Not relevant	5.2	Undet.	Prime adult
97	3	Sternebra	Not relevant	8.5	Undet.	Prime adult
98	4	Sacrum	Not relevant	12	Female?	Prime adult
99	4	Hemi pelvis	Left	27	Female?	Prime adult
100	4	Hemi pelvis	Right	27	Female?	Prime adult
101	4	Hemi pelvis	Right	28	Male?	Prime adult
102	4	Femur	Right	33	Female?	Prime adult
103	4	Tibia	Right	32.5	Male?	Prime adult

104	4	Tibia	Right	29	Female?	Prime adult
105	4	Tibia	Left	29	Female?	Prime adult
106	4	Fibulae	Right	25.6	Female?	Prime adult
107	4	Fibulae	Left	28.8	Male?	Prime adult
108	4	Tooth upper canine	Right	6	Female?	Prime adult
109	1	Tooth Incissor 3 upper	Right	3.7	Female?	Prime adult
110	1	Tooth Incissor 1 or 2 lower	undet.	2.4	Female?	Prime adult
111	1	Tooth incissor 1 or 2 lower	undet.	2.1	Female?	Prime adult

ANNEX VI – DR. PINTO'S FLIGHT TICKET

TST 00001 OVDI12193 AC/13JUL I 0 LD 16JUL06 OD MADMAD SI .... T- . AL SN.

1.PINTO/ANA

CTY CR FLT/CLS DATE TIME ST PC F/B TKT/D NVB NVA BG

1 . MAD SN 3732 H 04AUG FLWN OK HHPX6MES..... ..... 04FEB 20K

2 X BRU SN 481 H 04AUG FLWN OK HHPX6MES..... ..... 04FEB 30K

3 O NBO SN 463 H 02SEP 2330 NO HHPX6MES..... ..... 04FEB 30K

4 X BRU SN 5253 H 03SEP 0810 OK HHPX6MES..... ..... 04FEB 20K

. MAD ....

FARE F EUR 1140.00 EQUIV ..... TX001 X EUR 90.00YQA

) TX002 X EUR 4.19RSAE TX003 X EUR 1.42QVDP TX004 X EUR 28.16BEE

TOTAL EUR **1279.46** BR .... NF .....

COMMISSION 1.00..... TOUR CODE .....

FORM OF PAYMENT CASH,+SFCA,/**EUR57.00.....**

Importe total es de 1.336,46