ETHIOPIA

Observations on Buildings Made of Perishable Materials: Archaeological Traces of Demolition and Restoration of *Tukuls* at the Archaeological Field Camp at Melka Kunture, Ethiopia

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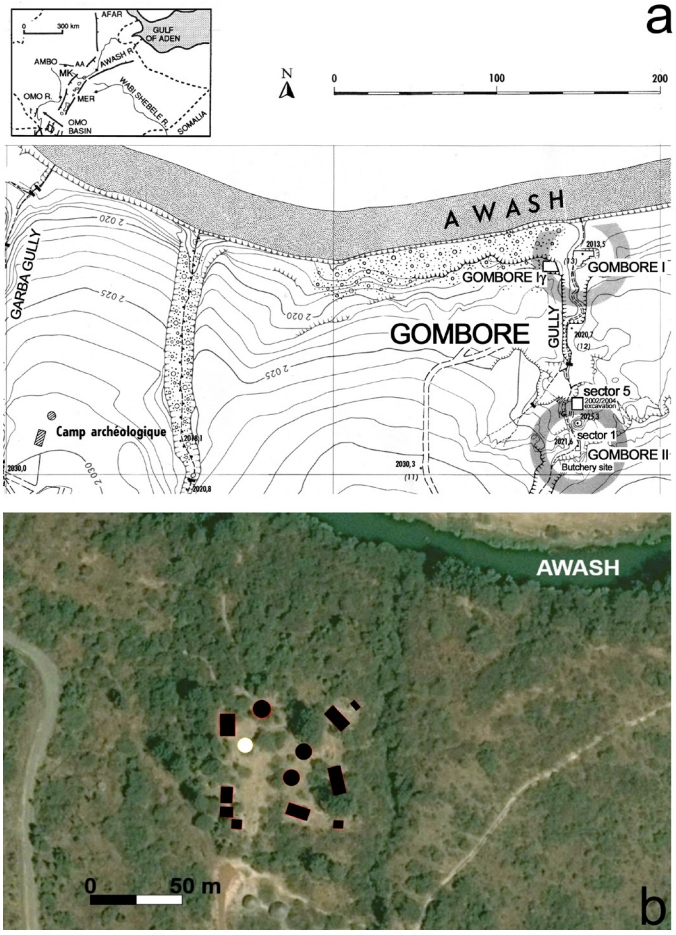

Figure 1: The archaeological camp at Melka Kunture: a) The camp's location in 1970, based on Egels' 1971 topographic map; b) satellite photo of the camp (based on Google Earth), showing the area of the present-day buildings (in black) and of the old *tukul* (in white).

Introduction

The Melka Kunture archaeological site is located on the Ethiopian plateau, 2000 meters above sea level, in the upper Awash River basin, some 60 km south of Addis Ababa (Figure 1a). The archaeological investigation that began in 1963 and is still in progress has brought to light important evidence that the area was frequented by humans intensively and at length during the Pleistocene. The archaeological sequence is documented by dozens of sites dating from around 1.8 Ma. These sites have yielded finds from Oldowan, Acheulean, Middle Stone Age (MSA) and Late Stone Age (LSA) techno-complexes associated with faunal and hominin remains (Berthelet and Chavaillon 2004; Morgan et al. 2012; Mussi et al. 2014, 2016). Many Pleistocene horizons containing fossil footprints have been identified recently (Mussi et al. 2016; Altamura et al. 2017; Altamura and Mussi forthcoming). From 1965 to 1999, the investigations were conducted by a French mission led by Jean Chavaillon; thereafter, the work was carried on by the Italian Archaeological Mission at Melka Kunture and Balchit, now directed by Margherita Mussi (Chavaillon and Piperno 2004; Mussi et al. 2016).

Figure 2: *Tukul* in the Melka Kunture area (Kella district): view of the outside and detail of the interior.

Collaboration between the European research organizations and the Ethiopian authorities led to the establishment of a permanent camp at the center of the archaeological area, between Garba and Gombore (Figure 1a). Construction of the buildings that were to replace the camp's tents began in the 1970s, and was done by local workers in the traditional style (Chavaillon and Piperno 2004). The camp was gradually expanded with other structures; some accommodated researchers and camp staff, others served as storerooms, laboratories and display areas (Figure 1b). At present the camp has 12 buildings: three round *tukuls* with straw-thatched roofs, 7 rectangular buildings roofed with sheet metal, and two latrines.

In the past, other buildings stood at the campsite. Today they no longer exist, but their presence is documented and their history fairly well known. They include the first two buildings to be erected, and shown on the first topographic map of the area made by Y. Egels (Egels 1971). One was rectangular, and the other a round *tukul* (Figure 1a).

The remains of the very first round *tukul* built at the camp were identified in 2013. The site was investigated by means of a test trench in order to document the stratigraphic evidence and the materials remaining from a traditional-style building that had been demolished intentionally. We also documented the maintenance and restoration work done on a hut that continues to be used as a common room. This work left particular traces that might be identified in archaeological contexts as well.

The data thus gathered may prove useful in making comparisons and observations of similar residential areas investigated in Africa (e.g., McIntosh 1974, 1977; Agorsah 1985; Badey 2001), and for suggesting ways to interpret other kinds of structures made of perishable materials and found in different chronological and geographic contexts (e.g., dwellings dating from late prehistoric and protohistoric times).

Traditional Dwellings in Ethiopia

Tukuls are traditional dwellings in East Africa and and similar constructions are common in many other African regions. In Ethiopia (Gebremedhin 1971), most *tukuls* are round and have conical roofs (Figure 2). The circular wall consists of a clay-and-straw mixture (daub) spread over a frame made of upright poles set close to each other and interwoven with branches. The roof is made of poles and canes running radially from the top of

Figure 3: The Melka Kunture archaeological camp. In the foreground is the mound left from the decay of the old *tukul*; in the background is the restored *tukul.*

the roof and bound with concentric lengths of rope. Inside the hut, the roof is braced by a central upright wooden post and a small circular frame of slanted poles that discharge part of the roof's weight to the floor (Figure 2). The roof is thatched with bundles of dry grass arranged starting from the base, and it is usually topped by a curved terracotta tile. The roof extends about 50 cm beyond the clay-covered wall so as to protect it from the weather. The floor is of packed earth, sometimes covered with mats made of plant materials.

This type of dwelling is highly functional and economical. The raw materials are available locally at low cost. Considering the large daily temperature range on the Ethiopian plateau, *tukuls*, being made of transpiring substances such as plant materials and clay, are well suited to mitigate the heat of the day and insulate from the night-time cold (night temperatures can drop to 0°C). Structures of this kind also lend themselves well to maintenance work, which becomes necessary after a few years, especially after the heavy seasonal rains. However, traditional building materials and techniques are now being replaced by industrial products such as corrugated sheet metal and plastic, which are more durable and are readily available in local markets, but are not very effective from the standpoint of insulation.

Today, the rural landscape in the Melka Kunture area is characterized by scattered settlements that sprang up after 1974, when Ethiopia nationalized land ownership (Salvini et al. 2012; Chavaillon and Piperno 2004). Families live in small compounds surrounded by farmland, where they raise livestock and practice subsistence agriculture. These compounds are often fenced, and usually contain several *tukuls* and other structures that can be used as dwellings, reception rooms, kitchens or storerooms, each one fitted with appropriate equipment (ovens, grindstones, food containers, etc.). As has been documented elsewhere (e.g., David 1971; Lyons 1996, 2007, 2009), the layout and size of a *tukul* depend on its function, but these features also have social and political implications for the community as a whole. *Tukuls* are often built or restored as community projects. When a *tukul* is inaugurated (or re-inaugurated) special ceremonies are held, for instance the blessing of the central post inside, which is covered with the entrails of an animal sacrificed for this purpose and eaten at a community banquet.

The Abandoned *Tukul*

During the 2013 excavation season, in the central-western part of the camp we noticed a flat circular rise of the ground, around 15-30 cm high, about 7.5 m in diameter, and slanting slightly to the north (Figures 3 and 4). A concentric depression ran along the inside of the perimeter, forming a furrow about 1.2 meters wide and about 10 cm deep.

The older Ethiopian workers who had been employed by the Mission for decades explained that the mound was all that remained of an old hut, most likely the one that Egels had seen in the winter of 1970 and included on the map he made the next year.

Dr. Solomon Degheffa, who has participated in the archaeological mission since the 1990s as the Oromia region's commissioner, provided us with precious details about the abandoned *tukul*. As he recollected, it was the one that Chavaillon had commissioned from a carpenter who lived in the nearby village of Awash. It was used throughout the 1970s for different purposes: mostly as a dwelling and common dining room but sometimes as a kitchen. After the advent of the Derg regime, between 1982 and 1993 the Ethiopian government prohibited all archaeological investigations by foreign institutions, and the Melka Kunture camp fell into disuse (Chavaillon and Piperno 2004). By 1993, when the researchers returned, the building was in terrible condition. It was torn down in

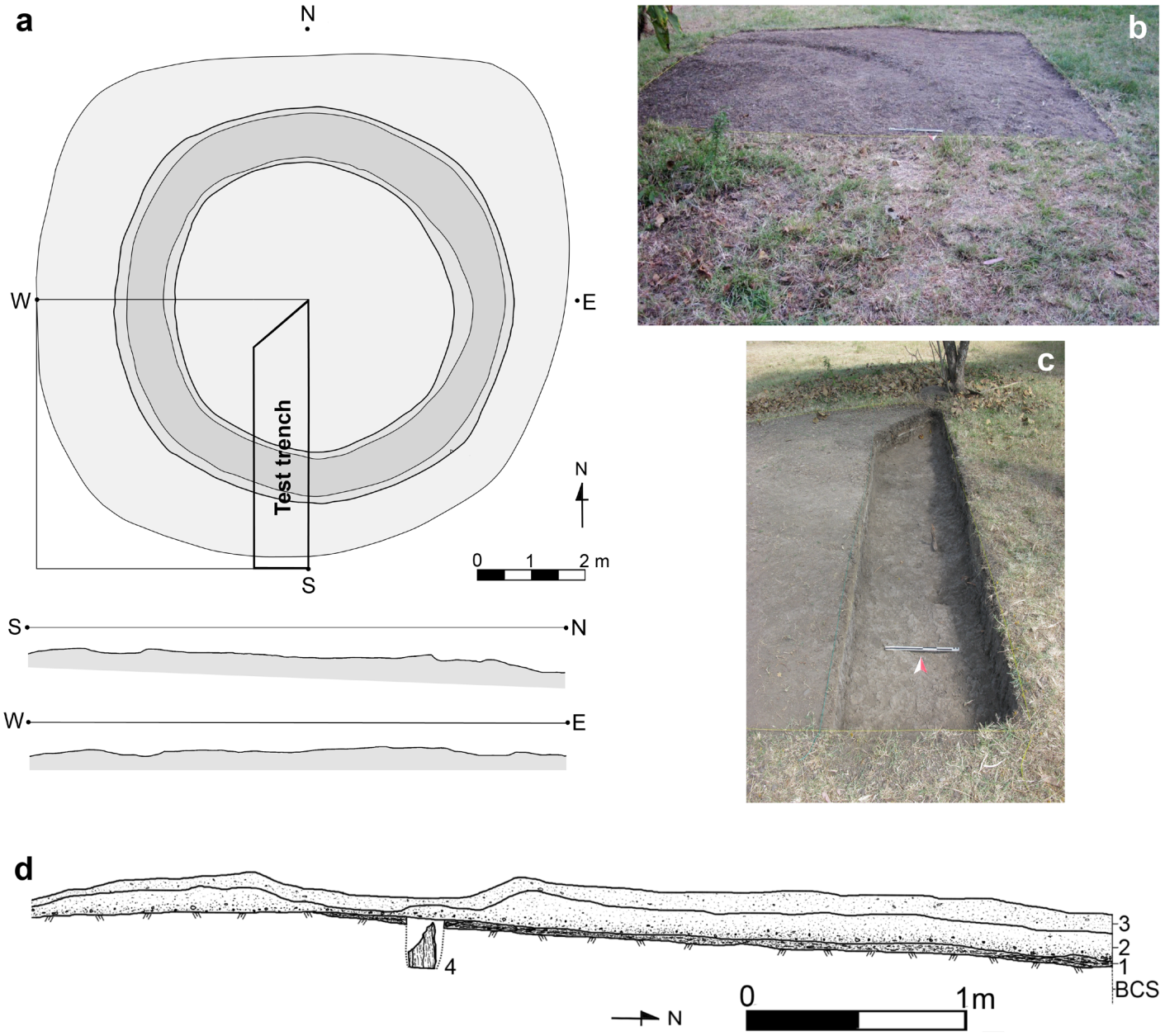

Figure 4: Archaeological investigations of the old *tukul*: a) planimetric map showing the location of the dig and the elevation profiles (S-N, W-E); b) view of the mound's quadrant from the north after the ground was cleared; c) view of the excavated trench from the south; d) stratigraphic profile of the sequence identified on the west side of the trench.

1994, the wooden materials were retrieved and grass grew back over the site.

We decided upon an archaeological investigation of the *tukul*'s remains. We drew a planimetric map of the site and divided it into four quadrants (Figure 4a). We then removed the vegetation in the SW sector, clearing the circular depression (Figure 4b). On the eastern side of this sector, we dug a stratigraphic trench one meter wide that exposed the sequence of levels along a radial axis (Figure 4c).

The quite simple stratigraphic sequence consists of four superimposed levels and is characterized by the presence of a series of furrows (Figure 4d). The mound lies above a dark brown clayey-sandy Holocene layer that is found throughout the Melka Kunture area. This layer, known as Black Cotton Soil (BCS, Figure 4d), was

evidently the original ground level prior to the *tukul*'s construction.

On top of the BCS is a layer of compacted earth (Figure 4d:1), only a few centimeters thick, consisting of clay mixed with volcanic tuff (which outcrops a few dozen meters away). It was probably spread (perhaps after smoothing out the BCS surface) to strengthen the *tukul*'s floor. It is also possible, though, that it was formed accidentally. The inert materials needed for the daub would have been piled up on the site and later mixed and spread on the hut's wall: part of them may have scattered and formed this layer. Based on the stratigraphic evidence, this layer precedes the building of the wall, because it contains holes in which the wall poles would have been inserted. In fact, we found a curved row of stratigraphic disturbances beneath the circular depression on the surface of the mound. They were certainly created when the upright wall poles were sunk into the ground. At the bottom of the excavation trench, we also found a pole stump still in place (Figure 4d:4).

Above the packed-earth layer is a clayey-sandy layer containing fairly large amounts of gravel and ignimbrite sediment (Figure 4d:2). The surface of this layer is marked by the circular furrow corresponding to the line of the old wall. This layer is most likely what remains of the daub used to coat the wooden structure. Part of this clay would have been deposited due to the deterioration of the *tukul* after it was abandoned (cf. the observations in McIntosh 1974, 1977; Badey 2001), but most of it would have accumulated when the building was torn down, in 1994; in fact, this layer is thicker along both sides of where the old wall stood. A depression corresponding to the line along which the wall poles were is probably where workers dug to retrieve the wooden reusable poles; it was later filled up with material left over after the hut was demolished.

This level, which we could call the "destruction level," is topped by the highest layer: a clayey pedogenized low mound (Figure 4d:3) that was probably a natural deposit of sediment that buried what was left of the old structure but followed its morphology.

The materials found in our cleaning and trench-digging operations show a clear preponderance of prehistoric items that had been included by chance in the clay and ignimbrite used as inert construction materials. We found 56 obsidian artifacts (Figure 5a), most of them tools produced in the MSA, the LSA and historical times; and 101 fragments of other volcanic rocks, 70 of them showing traces of human intervention in the Acheulean period and later. Only a few of the materials we gathered can be rightly attributed to the "historical" part of the *tukul*'s lifetime: two fragments of glazed tiles, six metal bottle caps (Figure 5b), eight iron nails (Figure 5d) and some wooden fragments, most likely from the building's frame. Three coarse potshards (one rim fragment and two side fragments, Figure 5c) are not diagnostic, hence they may date from before the camp was first built.

Restoration of the Main *Tukul*

During the 2013 excavation season, we were able to watch local workmen restoring one of the buildings currently in use. It stands around 15 meters NE from where the old *tukul* stood, is used as a common dining and social room, and has the same features as the traditional hut described above (Figure 6a).

Besides the normal deterioration processes to which buildings of this kind are subject (McIntosh 1974; Badey 2001), in this case the wooden wall frame had been attacked by termites. It was thus necessary to renovate the whole wall by replacing the poles and replastering the wall with the clay and straw mixture. Though these highly invasive operations involved an essential part of the *tukul*, they did not require tearing down the whole building, nor did they damage the roof.

First of all, the wall had to be freed of the roof's bulk and weight. To do so, a narrow and shallow furrow was dug along the outside wall to expose its base. Next, round holes (15 to 20 cm in diameter) were dug at more or less regular intervals both inside and just outside the trench and poles were set upright in them, under the overhang of the roof. Because these poles were slightly longer than the ones that had been used to build the wall they raised the roof only a little, without detaching it from the central post inside the hut, thus serving as a temporary support structure (Figure 6b). One portion of the wall at a time, the thick daub layer was removed from both sides of the wall and the old frame replaced with a new one. The new frame was made of split poles about 20 cm in diameter (Figure 6e); these split poles were set upright along a furrow dug around the perimeter of the hut.

Figure 5: Materials recovered during our investigation: a) obsidian tools; b) metal bottle caps; c) potshards; d) iron nails.

The next step was to spread over the wooden frame a thick coating made of clay, tuff, straw and the old daub, ground up (cf. the reuse of inert materials described in Bedey 2001). The temporary external poles were then removed to lower the roof back onto the wall.

The restoration work led to the rapid buildup of a low ring of earth just outside the *tukul* (Figure 6c). The ring consists of sediment that had been dug up and fragments of the daub that had been detached from the wall. In some cases, the facing detached from the wall was used to fill the holes in which the temporary poles had stood. Inside the hut, the piling up of fragments of the old daub and the residue resulting from their grinding up for reuse and the spreading of the new daub on the wall resulted in the formation of a thin new layer of earth spread unevenly over the floor (Figure 6d).

Conclusion

Our stratigraphic investigation of a *tukul* that was intentionally demolished around 20 years ago, together with our direct observation of the restoration of a similar building that is still being used, enabled us to document the types and entity of these operations from a stratigraphic and archaeological perspective.

In the case of the demolished *tukul*, we were also able to verify the extent to which the type and uses of a dwelling can be reconstructed on the basis of the stratigraphy and the materials found in it. All that was left of the *tukul* demolished in the 1990s was a low pile of sediments that followed the hut's original shape. Such remains are typical of mud structures (McIntosh 1974, 1977). From the stratigraphic standpoint, we were able to identify the trench that was dug to retrieve the building's poles for future reuse, as documented in other cases (McIntosh 1974; Badey 2001). This trench ran all around

Figure 6: a) The camp's main tukul (used as a dining room); b) the tukul during the initial stages of restoration, showing the temporary roof support, the detached daub and the wooden framework of the wall; c) detail of the temporary roof supports, showing the holes in which the poles were sunk and the ring of earth that accumulated around the base of the wall; d) the interior of the tukul, showing how fragments of the old daub accumulated on the floor; e) splitting poles for the new wall.

the hut's perimeter, showing that the building's inner diameter was around 6.5 meters.

The stratigraphic sequence indicated that there had been only one occupation phase, which occurred on the packed earth floor (1) and was already established during the building of the hut. There is no trace (such as the raising of the floor level) of any significant intermediate phase (e.g., a change in the building's use) having occurred before the hut was abandoned. There is only one destruction level (2), which corresponds to the wall being pulled down and the resulting decay of the inert materials used to build it.

Our observations during the restoration of the camp's main *tukul* enable us to point out other aspects useful for interpreting buried evidence from comparable structures. This type of restoration work leaves traces that can be identified by archaeological procedures. An especially interesting aspect is the row of holes dug outside the *tukul*'s wall, which have no structural use: they only serve to hold the temporary roof supports. Moreover, the *tukul*'s structural perimeter is outlined in the ground by the superimposition of multiple phases in the building of the hut's wall, whereby poles were set in place and, over time, removed and replaced more than once.

The restoration work also led, unintentionally, to the formation of structural elements such as the ring of

earth that runs outside the *tukul*'s wall, and the layer of packed earth inside the hut, which we know was the level on which the structure was built.

Regarding the possibility of reconstructing the intended function of the structures we studied on the basis of the materials we documented, there is a striking disproportion between the small amount of materials found in the mound and dating from the time when the *tukul* was frequented, and the abundant residual archaeological materials found both in the present-day soil and in the older deposits (cf. finds reported in Chavaillon and Berthelet 2004). The scarcity of materials contemporary to the period when this *tukul* was in use (around 1970-1980), whether functional artifacts or discarded objects, might be explained by the floor's having been cleaned repeatedly when the *tukul* was occupied or when its use changed, or by their being removed when the hut was abandoned and demolished. At any rate, neither the quantity nor the quality of the materials we found (all of them generic, not diagnostic) can suggest in any way how long the *tukul* was used and what for. However, this information can be reconstructed from oral accounts.

This suggests that repeated utilization of a building used for various purposes over a decade may leave only few material traces, for the most part of little significance from an archaeological and stratigraphic standpoint. It also conveys what has been noted in other contexts (e.g., Badey 2001) regarding the caution with which one must consider the chronological indications inferred from materials found in decayed unfired earth; they might have come from the reuse of inert building materials used in older structures or have been in the materials in the places where they were collected.

Another interesting observation concerns the length of time during which a structure built with perishable materials can be used. Only ten years after this *tukul* was abandoned, it had deteriorated so badly that it was decided to tear it down rather than restore it. Resistance and durability are estimated to persist for 10 years in similar ethnographic contexts (according to David 1971), but with adequate maintenance a *tukul* can remain functional for decades (McIntosh 1974).

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