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From the Oldowan to the Middle Stone Age at Melka-Kunturé (Ethiopia). Understanding Cultural Changes.

This paper presents some problems and comments regarding our field research at Melka-Kunturé⁽¹⁾. In order to allow a better understanding of our approach, we will begin with a brief description of this typically african site which extends on either side of the Awash river for five to six kilometers, 50 Km distant from the source of the river and about the same distance south of Adis-Abeba (fig. 1).

Geologically (Chavaillon J., Taieb M., 1968; Taieb, 1971, 1974; Chavaillon, 1973, 1978), Melka-Kunturé is a river-valley site, with fluvial deposits (pebbles, sands, clays) most of which have survived numerous erosion phases linked to sedimentary cycles (fig. 2) at least partly due to climatic changes. Aspects of these climatic changes are revealed by palynological studies (Bonnefille, 1972, 1976). Successive formations of different age are apparent over a thickness of some thirty metres; the actual thickness would be much greater if one added the levels lost due to erosion (fig. 3). Fortunately these fluvial deposits are interspersed with volcanic tuffs or cinerites which form excellent marker beds, linking one site to another, and permitting absolute dating (Schmitt *et alii*, 1977; Wesphale *et alii*, 1978).

These various deposits, from the earliest (i.e. before 1.5 million years ago), to the latest, contain traces of human activity consisting mainly of living-floors rich in lithic and bone remains, with often other well preserved man-made features. More than fifty archaeological levels have been identified during thirteen campaigns and about thirty living-floors have been excavated or sounded⁽²⁾.

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(1) Since the various localities of Melka-Kunturé have not always been referred to pertinently in some recent publications (Isaac and MacCown, 1976 for example) it seems to us advisable to provide a complete bibliography at the end of this paper.

(2) The excavations of Melka-Kunturé are subsidized by the Cultural and Sports Offices of the Socialist Ethiopian Government and by the D.G.R.C.S.T., the French Foreign

The various identifiable levels, from Oldowan to Final Acheulean, are indicated in the following table (see map, fig. 1):

| | | | | |
|------------------|---------------|---|-----------------------------|---|
| Final Acheulean | — Garba III | B | | C |
| | | C | | D |
| Upper Acheulean | — Garba VI | | | E |
| | Garba VIII | B | Early Acheulean — Garba XII | I |
| | Garba I | C | | J |
| Middle Acheulean | — Gomboré III | | Oldowan — Gomboré I | Y |
| | Garba III | E | Karre I | |
| | Gomboré II | A | » II | |
| | | B | Garba IV | C |
| | | C | | D |
| | Garba XII | D | Gomboré I | B |
| | | H | | C |
| | Simbirro III | A | | D |
| | | B | | |

The present observations are based on the latest findings and on discussions that took place either in the field during the last campaigns or in France.

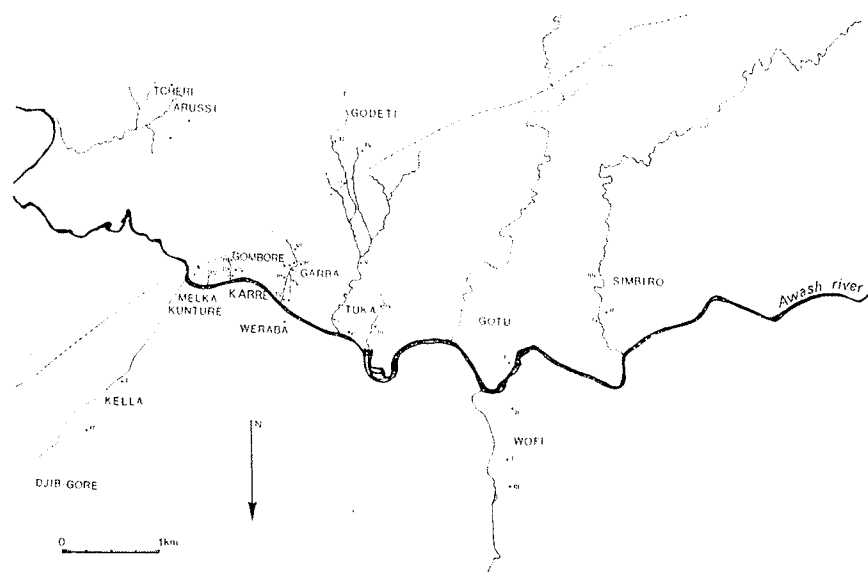


FIG. 1. — Map of the sites of Melka-Kunturé.

Office and the C.N.R.S. These excavations have been carried out since 1965 by J. Chavaillon and his collaborators. We may mention among these, as prehistorians and field work directors: Jean Luc Boisaubert (Gomboré IY), Claude Brahimi, (Gomboré II) Jean and Nicole Chavaillon (Gomboré I B, Garba XII, Garba I), Françoise Hivernel (Kella I, Wofi III), Francis Hours (Garba III), Ouardya Oussedik (Simbirro III), Grazia and Marcello Piperno (Garba IV). Bernard Aubineau, Lionel and Marie Thérèse Colbère, Marie-Dominique Fallet, Sami Karkabi, Jean-Noël Le Borgne, Pierre Marchal, Philippe Nadaillac, Joëlle and Philippe Soulier also participated. The other collaborators: geologists, paleontologists, topographers and draughtsmen are mentioned in « L'Ethiopie avant l'Histoire », n. 1 1976, C.N.R.S. As mentioned above a bibliography concerning the various excavations is provided under the names of the respective directors.

We had the good fortune, during the 1977 campaign, to have been able to study, among others, two sites where the Acheulean was in contact with other cultures: Oldowan at Garba XII and Middle Stone Age at Garba III. We had thus the opportunity to see what those contacts entailed and how the three cultural traditions were related, a subject which has already attracted the attention of many prehistorians.

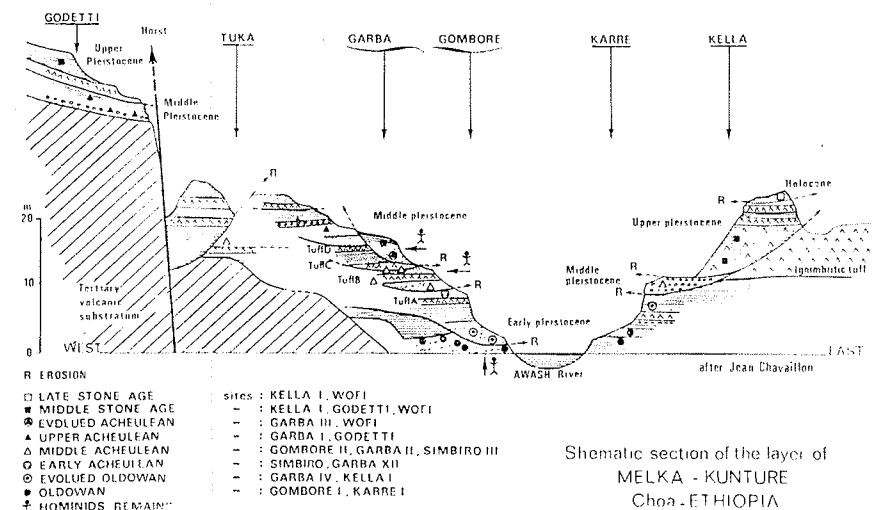


FIG. 2. — Section of the Awash Valley at Melka-Kunturé.

Our arguments are based on what seems to us to be scientifically valid evidence; as an example of our data-base, we are giving below some detailed information from sites extensively quoted in this article:

| Site | Excavated surface | Approximate number of artefacts registered up to the present |
|-------------|--------------------|--|
| Garba III B | 25 m ² | 2.000 |
| C | 30 m ² | 2.000 |
| Garba IB | 240 m ² | 12.000 |
| Garba XII J | 50 m ² | 3.500 |
| Garba IV D | 100 m ² | 8.000 |
| Gomboré I B | 200 m ² | 8.000 |

The problem: — The problem discussed concerns the limits of a culture and what should be considered cultural changes, as well as the question of which name should be assigned to a particular level such as Oldowan, Evolved Oldowan, Acheulean, Middle Stone Age, etc.

It is not a new problem and it has usually been solved by applying rigid and univocal labels, but, particularly in East Africa, this has sometimes led to

an impasse and has brought more confusion than light. One has only to consider how the cultural appellation of certain sites at Olduvai have changed over the years, or to remember the complex succession of facies in the French Mousterian, to see that the solutions advanced up till now are unsatisfactory (Bordes, 1973; Leakey M., 1976).

For example, the term « Developed Oldowan », used concurrently with the term « Acheulean » up to bed IV in Olduvai, seems to suggest a strange parallelism between two cultures at the same site, not to mention the question of the links between those cultures and the types of hominids. Perhaps this is the result of too-narrow conception of what constitutes a prehistoric culture. Most of the time, the idea of an « Oldowan » or an « Acheulean » culture has taken only one factor into account: the lithic typology. But a culture is not just a pile of stones however well classified.

If we want to escape from this « cul-de-sac », others factors, well-known to prehistorians, need to be taken into consideration, such as living-floor organization, economy and way of life; in other word, not only objects but also their interrelationships. For us, as for many other research workers, the whole environment of the lithic tools (sedimentology, site stratigraphy, fauna, flora etc...) must be examined.

Furthermore, the full understanding of a prehistoric culture, as we understand it, would involve some palethnological interpretations. These are only reliable when based on study of living-floors which were identified by sufficiently wide exposures, so as to exclude the chance of bias (a small area might represent some specialised activity). Such a living-floor must also have secure stratigraphy, and must have produced some interesting artefacts. These ideas correspond with those of the modern archaeological school, for whom spatial analysis of the material is of paramount importance (Hodder, 1977).

Melka-Kunturé seems to be a place where the study of these problems is particularly appropriate, since it has produced a succession of Lower Palaeolithic sites securely placed stratigraphically, within a sufficiently long sequence from 1.8 million to 250,000 years. This sequence, moreover, would seem to have an adequate number of living-floors (about thirty) of different ages, which have furnished sufficiently rich assemblages of artefacts (from 2.000 to 12.000 pieces), and which have been excavated over significantly large areas (up to 240 square metres) ⁽³⁾.

Surface collections, and pieces collected from stratigraphically dated fluviatile deposits, as well as the results of excavation of non-living-floor sites are very useful, but they only furnish incomplete information. For the same reason

⁽³⁾ This alone demonstrates that Melka-Kunturé cannot be studied as a single whole, without considering in detail differences between sites and levels. Hence, we do not understand the single citation in the lists of J. D. Clark, 1976, p. 194.

we will not be considering here living-floors whose excavated surfaces are too small, or whose material has not been sufficiently studied. In figure 3 a heavy horizontal line indicates occupation floors, and a light horizontal line indicates floors yet to be studied.

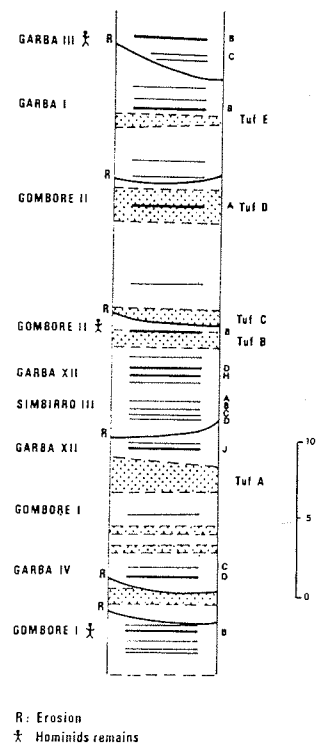


FIG. 3. — Schematized stratigraphy of sedimentary and volcanic deposits at Melka-Kunturé and chronological location of the most important layers studied.

By « occupation floors » (*sol d'occupation*) we mean all areas which represent some kind of trace of human activity, whether temporary (such as hunter's halts, butchery camps, flaking places etc.) or longer range (such as base camps). However, the term « living-floor » (*sol d'habitat*) is restricted to sites with evidence of several specialised activities, suggesting that they have been occupied continuously for a certain period.

Methodology, based on a conception of what constitutes a prehistoric culture.

As mentioned above, the notion of a culture comprises many components: physical, biological, cultural evidenced among others such factors as the lithic technology, the organisation of the living-floor, the kind of faunal remains, etc.

These components are organically interconnected and evolve each at their own rate, i.e. not necessarily synchronously. Together, they form « systems » whose interactions constitute a culture. The variation of any one component entails the variation of all the others by feed-back. As long as the system is flexible enough to compensate for the variations of one of the components, it remains homogeneous and the culture, though evolving, retains its identity. When the variations are too great for the system to sustain, it passes on to a new organization or state - i.e. to another culture (Clarke, 1968).



FIG. 4. — General view of Garba IV D (Evolved Oldowan).

When we evaluate a culture using its living-floor as evidence, all possible aspects should be taken into account, not only in a static, but also in a dynamic way. We have tried to follow the development through time of each component as it occurs in each of the significant levels excavated up to the present.

We are well aware that some limitations oblige us to be cautious in our interpretations. Although the methodology must include consideration of ethnological evidence, even the most backward modern hunter-gatherers are much more developed, physiologically and intellectually, than the most developed Australopithecine, even if he were *Homo habilis*. In the same way our idea of Austra-

lopitecine knapping techniques is strongly dependent on the results of experiments in reproducing their tools, made by *Homo sapiens* who are the modern prehistorians. Even though the reproductions are sometimes remarkably close to the originals, the modern prehistorian will never really be able to get under the skin of an Australopithecine...

Moreover, from the practical point of view, regardless of the size of the excavated area, one is never sure if one is not excavating the part of the living-floor where a particular task was carried out (butchery, knapping, etc.) so that the comparison of one living-floor with another is very risky.

The living-floors at Melka-Kunturé are so extensive that they cannot be entirely excavated, but when an area of about 100 square metres has been exposed, and has produced more than a thousand pieces, the risk can be regarded as acceptable.

Without implying that one is of more importance than another, we will discuss in turn certain elements which, when grouped together, characterise the culture as a system:

- 1) the organization of the living-floor (location, activity areas etc.)
- 2) the technical equipment (debitage, stone tools, bone tools)
- 3) the economy (food acquisition and consumption, hunting and kill use).

The period considered here (1.8 million to 0.2 million years) does not allow us to consider such cultural elements as burial customs, art, etc., which, if we were dealing with more recent periods and using the same methods, would have to be taken into account. In this paper the choice of elements may seem limited, but we have deliberately selected the variables most pertinent for the study of our problem, i.e. the beginning and the end of the Acheulean at Melka-Kunturé. The same method, applied to other sites or to other periods, would probably have entailed a different choice.

1: LIVING-FLOOR ORGANIZATION

The most significant criteria applicable at Melka-Kunturé are:

a) Location of the settlement

Like most of the Lower Palaeolithic settlements, the occupation floors of Melka-Kunturé were located close to a water source: the Awash River. At the same time, changes through time in the use of the riverine topogeography are seen in the Palaeolithic sequence, from the broad beaches along the main river bed to the narrower and more deeply cut channels of secondary branches.

We fully agree with Mary Leakey on the definition of a channel: « river-bed, either large or small » (Leakey M., 1971, p. 258), but, while she feels that both the sites in the main bed and those in side channels must have had their

material redistributed, we only apply the term «channel» to a settlement in a dry bed. In our case the term refers most often to a narrow tributary of the Awash in which neither the general features of the site nor the artefacts appear to have been disturbed by their burial in the soil, as is also the case at

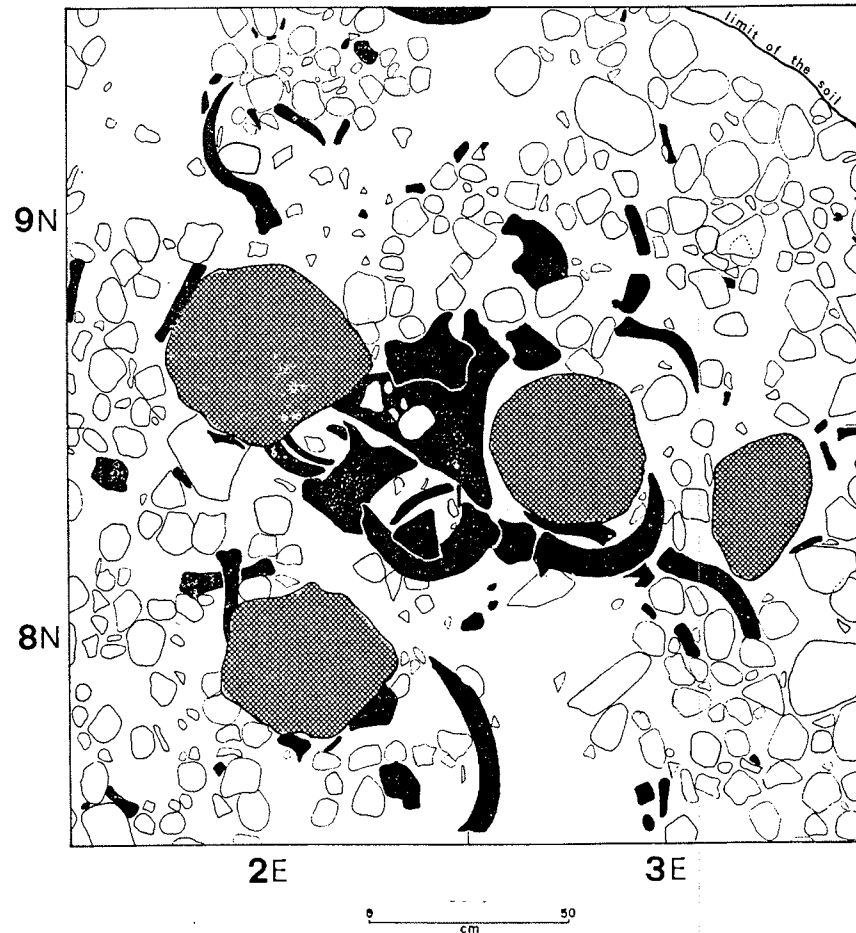


FIG. 5. — Plan of Garba IV D (Evolved Oldowan): large cobbles.

Olorgesaille. On the other hand, the kind of substratum (clay, sand or pebbles) does not appear to have been the criteria upon which a choice of settlement-place depended at Melka-Kunturé, and in this respect the site seems to differ from Olduvai (Leakey M., 1971, p. 259). In any case, the Oldowan sites of Gomboré

IB, Garba IVC and D, and Gomboré I succeed each other along the banks of the Paleo-Awash, while the Acheulean sites of Garba XII D and H, Garba I, Garba III are located in more or less deeply embedded channels, which recall the situation of the Olorgesaille sites, those of the Upper Bed II of Olduvai and those of Gadeb 8 A in Ethiopia, all Acheulean.

It is interesting to note that Garba XII J, which seems to represent an early Acheulean living-floor even though the industry is not far from that of Oldowan sites (see our conclusions), is still located on a large clayey beach.

Another criterion which may have influenced the location of the settlement is the strategy of the inhabitants regarding their source of raw material. While the Oldowans preferred to settle on or near pebble beaches, from which they extracted the basalt for their artefacts, the tools of Gomboré II and more especially of Garba I and III show that most of the knapping took place away from the site: at Garba I, cleavers and hand-axes had been fashioned somewhere else, and the same can be said for the Heavy Duty tools of Garba III. This seems to suggest that the Acheuleans were less dependent than the Oldowans on the close proximity of their sources of raw material.

b) Features at the occupation sites

For each phase of the sites at Melka-Kunturé it is possible to identify some kind of non-natural features. Some of them seem to correspond to shelters, for example the raised area, denuded of stones and surrounded by small stone circles, discovered at the Oldowan site of Gomboré IB, or the post-holes identified at Garba I in the Upper Acheulean.

We had already suspected that such features occurred at Garba I, but thanks to the application of the special methods of Jean-Luc Boisubert (previously employed with interesting results in Switzerland at the Auvignier excavations and consisting of the recording systematically of innumerable altimetric measurements), details of the post-holes invisible from the surface appeared, and concealed features, not at first observable, were further revealed.

Other observed non-natural features suggest specialised tasks. Specifically, in the Oldowan, one often observes assemblages of large stones, 40 to 50 cms in diameter, and up to 50 Kg in weight, around which are accumulated faunal remains bones, teeth, and horns. Such a feature is usually associated with an exceptional concentration of tools and manuports. Often, too, when the density of remains is very high it is possible to observe near-by a strikingly bare area, with no remains at all. This kind of feature has been found on six occasions in the exposed part of Garba IV (figs. 4, 5, 6) and can be observed at Gomboré I (fig. 7). Something analogous is also to be found at Garba XII J (figs. 8, 9), which, together with the location of the living-floor on the river beach, suggests a similarity between this level and the Oldowan floors.

Empty areas, not associated with large blocks of stones, are also found in the Oldowan of Gomboré I and Garba IV, as well as at Garba XII J.

In contrast, another type of feature is less complex, but somewhat enigmatic; it is found exclusively in the Upper Acheulean. It consists of depressions: the larger one, at Garba I, is natural, and seems to have been used «as is», but others are smaller (about 50 cms in diameter) and have been hollowed out by man, at least in the case of Garba III.

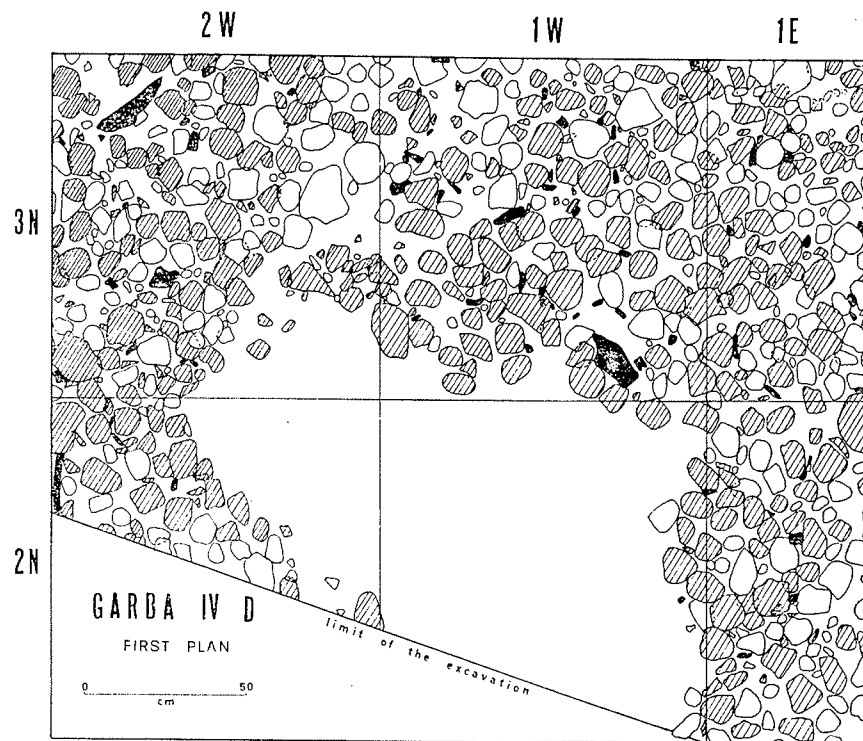


FIG. 6. — Plan of Garba IV D (Evolved Oldowan): bare areas. Dashed pieces: artefacts; white pieces: manuports; black: bones, horns, teeth.

More clearly-defined activity areas can be found from the Oldowan onwards: bone fragments, battering and hammering areas, and cutting tools at Gomboré I, stone chipping areas at Garba IV and a concentration of choppers at Garba IV. Battering and hammering areas also exist in the Acheulean (fig. 10). See for example the concentrations of broken pebbles with hand-axes and cleavers at Garba I and Garba III. Once more the site of Garba XII J occupies an ambiguous place with concentrations of hammerstones and tools, reminding us rather of the Oldowan.

Places where specialised activities took place seem to be typical of the Acheulean. Some of these are located on living-floors: knapping areas at Garba I, meat-slicing area (small side-scrapers, retouched flakes, very small bone

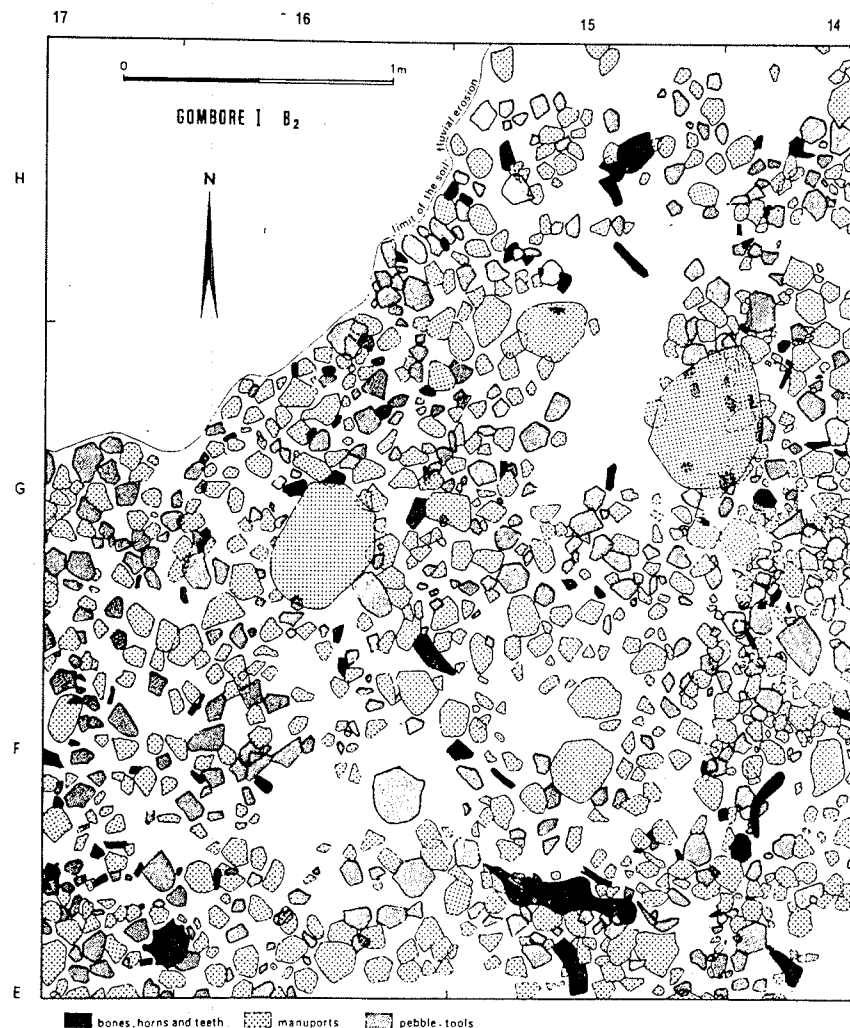


FIG. 7. — Plan of Gomboré I B (Oldowan): large cobbles.

fragments) at Garba I and more especially at Garba III. Others are located outside the settlements, i.e. an isolated butchery site at Gomboré II, and the knapping area which constitutes the site of Gonja (Upper Acheulean). Acheulean



FIG. 8. — General views of the floor of Garba XII J (Early Acheulean).

living-floors are also often flatter and have a more uniform surface than Oldowan ones (fig. 11).

To sum up, the existence of a constructed, non natural feature, probably a shelter, is attested since the earliest Oldowan times at Melka-Kunturé and also in Bed I of Olduvai. Areas of task-specific activities also appear from the beginning, but they remain complex at first, somewhat indistinctly defined and thus a little puzzling. As the acheulean culture develops, the activities become differentiated and the space in which they are carried out more readily recognizable.

2: TECHNICAL EQUIPMENT

Under this heading we include all objects that have been brought in, used, or shaped by the inhabitants of Melka-Kunturé. In each assemblage we discuss only the material useful as indicator of cultural change.

a) *Manuports*

They differ from the shaped artefacts in that they do not bear any mark of utilization (the mark of percussion, fractures, shaping). Oldowan is characterized by a particularly large number of manuports, even though they continue to exist until the end of the Acheulean. Once more, the transitional level of Garba XII J suggests rather an Oldowan level.

b) *Percussion material*

This includes anvils, hammerstones, broken and battered pebbles, split cobbles, stones with cup-marks, etc. They represent an activity which was frequent throughout all the periods at Melka-Kunturé. This kind of material, which makes up almost half the artefacts in the Oldowan, decreased in quantity in the Acheulean. The most significant fact, however, is surely the variation in the proportions of the different types as the Acheulean evolves (*).

c) *Flakes*

We do not include here the very large flakes which have been used in the Acheulean as blanks for the fashioning of hand-axes and cleavers.

The quantity of knapping-waste, fractured beyond recognition, is still important. Flakes from primary preparation (with traces of cortex) are more abundant in the Oldowan, a fact which, given the more elaborate core types found

(*) Though the level of Garba XII-J is still related to the Oldowan by the amount of hammerstones, the more elaborate shape of the latter already suggests Acheulean levels.

in the Acheulean seems to suggest the acquisition of more economical knapping skills from Garba III J on. A special type of striking platform, so crushed as to be hardly discernable, may be related to the debitage of the obsidian raw material. It occurs from Garba XII J on, and becomes very important in the Final Acheulean of Garba III. The platforms are usually plain or linear, and are hardly ever faceted except in the Final Acheulean, and this probably has to do with the Levallois debitage method in use by then.

Another feature which seems peculiar to the Acheulean is the intensive use of the flakes, which are re-sharpened and reworked often modifying completely the shape of the cutting edge. At Melka-Kunturé the Oldowan levels of Gomboré I and Garba IV actually contain a majority of unretouched flakes, while in the Upper and Final Acheulean the reverse is the case. At least in the Upper Acheulean of Garba I, the systematic use of biface preparation-flakes seems to be a standard characteristic, and this is not found in the Final Acheulean of Garba III - since the bifaces themselves have become scarce by then.

d) Debitage

Cores are commonly found from the oldest level onward, but their shape is more elaborate in the Acheulean and develops towards specific types. In this respect Garba XII J is related to the Acheulean, while at the other end of the sequence the Final Acheulean of Garba III marks a new departure, with the first occurrence of the Levallois core.

e) Lithic Tools

Choppers: Following Mary Leakey, we mean by this term both the unifacial « choppers » and bifacial « chopping tools » (Leakey M., 1971). The proportion of choppers is, of course, higher in the Oldowan than in the Acheulean. They are also more standardized in the former culture, in which distinct sub-types, having virtually identical attributes, can be observed. However, in the Acheulean, a certain degeneration is noted, in particular at the Upper Acheulean site of Garba I, while at Garba III, in the Final Acheulean, their number has substantially decreased. Another characteristic of the evolution of the choppers is the angle of the surfaces forming the cutting edge: it is wide in the Oldowan and more acute in the Acheulean, becoming similar to the angle formed by the two faces of a hand-axe. A peculiarity of Garba XII J is that, although the typology of this level reminds us the Oldowan, the acute angle between the two faces of the chopping edge is instead typical of the Acheulean.

Thick scrapers and Rabots: When present in quantity, these types are characteristic of the Oldowan. They are also found throughout the Acheulean, but in smaller amounts. At Garba XII, the rabots, while fewer, are still made in

the Oldowan tradition while the thick scrapers give place to end scrapers, marking the start of the Acheulean. They still occur in the Upper Acheulean of Garba I, but disappear in the Final Acheulean at Garba III.

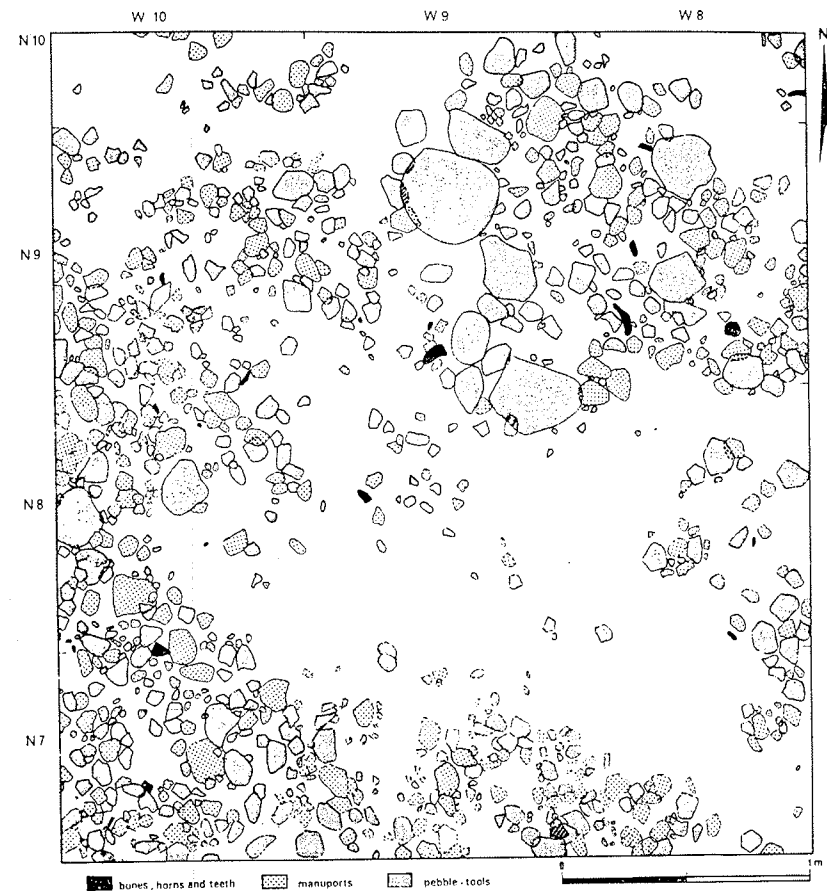


FIG. 9. — Plan of Garba XII J (Early Acheulean): large cobbles and bare areas.

Cleavers: Cleavers make a very rare appearance at Garba IV, irregularly shaped, narrow and thick. The type becomes a little more abundant at Garba XII J, but specimens are still thick. They take on a classical shape at Gomboré II, and attain true aesthetic perfection at Garba I, where they are more numerous than hand-axes. They become scarce in the Final Acheulean of Garba III.

Hand-axes: The Oldowan levels at Gomboré I and Garba IV produced rare cases of proto-bifaces, thick, irregular pieces which form 0.1% of the artefacts.

True hand-axes, with symmetrical outline, appear in Garba XII J, but are still thick (0.25% of the artefacts).

From Simbirro III on, they become the characteristic type of tool, known throughout the Acheulean. Gradually, they attain their truly perfect form and become abundant, with oval shapes predominating in the Upper Acheulean at

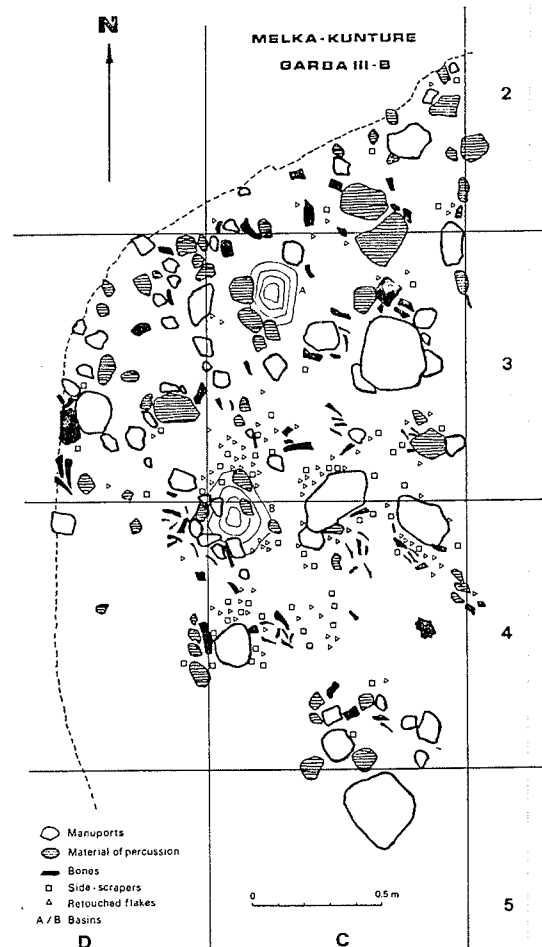


FIG. 10. — Plan of Garba III (Final Acheulean): artificial depression.

Garba I; They finally disappear almost entirely (1.0% of the registered pieces) in the Final Acheulean at Garba III. One can note that hand-axes made on flakes, present at Simbirro III and Gomboré II, become the rule at Garba I. Small obsidian hand-axes must be studied separately, owing not only to their

small size (5-10 cm) and their shape, with often twisted edges, but also to the raw material. They occur from Gomboré II onward.

Notches and Denticulates: These tools are found from the Oldowan of Gomboré I to the Final Acheulean. They increase numerically through time from the earliest to the latest levels. The blank form also varies through time: a third of them are made on pebbles at Gomboré I, but, starting from Garba IV, they are mostly made on flakes. From the Upper Acheulean they are almost exclusively made of obsidian. They are the most common tools of the Final Acheulean. Despite an inner evolution, also noticeable in the attribute distribution, these types cannot be considered to mark the borderline between the Oldowan and the Acheulean, or between the latter and Middle Stone Age; rather, they suggest a continuity in the tradition, already observed in some other tools.

Side-scrappers: These exist in small number in the Oldowan. They are of small size, (less than 10 cm). They become increasingly numerous in the assemblages as the Acheulean evolves. Mostly made of basalt at Gomboré I, they are often made of obsidian from Garba IV on. The small transverse side-scraper is a traditional type, which is to be found all through the site of Melka-Kunturé. From Garba XII, this type of tool takes on a standardized shape with somewhat scalariform retouch and is found until the Final Acheulean.

One of the characteristics of the Middle, and more especially of the Upper Acheulean, is the practice of re-utilization of the lateral edges of cleavers to produce large, rectilinear or convex-edged side-scrappers. The importance of this type in the Upper Acheulean coincides with the high frequency of very small side-scrappers, made on chips of knapping-wastes. Like notches and denticulates, the side-scrappers suggest a continuity in the technological tradition of Melka-Kunturé, but this only applies to the standardised shapes which occur from Garba XII J on; the Oldowan levels of Gomboré I and Garba IV are somewhat different.

Backed knives: These are always rare, but do occur in all levels at Melka-Kunturé. Typical specimens, with an abrupt retouch, occur since the Oldowan of Garba IV. Those with a natural back, probably resulting from a special technique of debitage, are well-represented in the transitional level of Garba XII J. Surprisingly, pieces with bluntly retouched back, so commonly found in the Middle Stone Age, do not yet exist in the Final Acheulean of Garba III.

End-scrappers and Burins: Typical specimens appear in the Oldowan, but they are never very numerous in any phase. The burins, sometimes made on pebbles in the oldest level at Gomboré I B, are also sometimes made on the rare jasper fragments which are present in the Final Acheulean level of Garba III.

Borers: Very rare in the Oldowan of Garba IV, they are present in Garba

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We are well aware that some limitations oblige us to be cautious in our interpretations. Although the methodology must include consideration of ethnological evidence, even the most backward modern hunter-gatherers are much more developed, physiologically and intellectually, than the most developed Australopithecine, even if he were *Homo habilis*. In the same way our idea of Austra-

lopithecine knapping techniques is strongly dependent on the results of experiments in reproducing their tools, made by *Homo sapiens* who are the modern prehistorians. Even though the reproductions are sometimes remarkably close to the originals, the modern prehistorian will never really be able to get under the skin of an Australopithecine...

Moreover, from the practical point of view, regardless of the size of the excavated area, one is never sure if one is not excavating the part of the living-floor where a particular task was carried out (butchery, knapping, etc.) so that the comparison of one living-floor with another is very risky.

The living-floors at Melka-Kunturé are so extensive that they cannot be entirely excavated, but when an area of about 100 square metres has been exposed, and has produced more than a thousand pieces, the risk can be regarded as acceptable.

Without implying that one is of more importance than another, we will discuss in turn certain elements which, when grouped together, characterise the culture as a system:

- 1) the organization of the living-floor (location, activity areas etc.)
- 2) the technical equipment (debitage, stone tools, bone tools)
- 3) the economy (food acquisition and consumption, hunting and kill use).

The period considered here (1.8 million to 0.2 million years) does not allow us to consider such cultural elements as burial customs, art, etc., which, if we were dealing with more recent periods and using the same methods, would have to be taken into account. In this paper the choice of elements may seem limited, but we have deliberately selected the variables most pertinent for the study of our problem, i.e. the beginning and the end of the Acheulean at Melka-Kunturé. The same method, applied to other sites or to other periods, would probably have entailed a different choice.

1: LIVING-FLOOR ORGANIZATION

The most significant criteria applicable at Melka-Kunturé are:

a) *Location of the settlement*

Like most of the Lower Palaeolithic settlements, the occupation floors of Melka-Kunturé were located close to a water source: the Awash River. At the same time, changes through time in the use of the riverine topogeography are seen in the Palaeolithic sequence, from the broad beaches along the main river bed to the narrower and more deeply cut channels of secondary branches.

We fully agree with Mary Leakey on the definition of a channel: « river-bed, either large or small » (Leakey M., 1971, p. 258), but, while she feels that both the sites in the main bed and those in side channels must have had their

are scarce, though their existence is known during the entire Pleistocene. Moreover, the abundance of antelope horns at Garba IV seems to result not only from the animal environment but also from deliberate human choice of both preferred species and specific animal parts. Similarly, the above mentioned comparison between the fauna at Gomboré I and Gomboré II suggest a hunting strategy in the Oldowan different from that in the Acheulean.

above, concerning both the distance from sources of raw material and the lithic tools, suggesting that the Acheuleans had already acquired a certain independence from their environment, not yet attained by the Oldowans.

4. VARIOUS CULTURAL ASPECTS

Some manifestations at Melka-Kunturé seem to indicate additional types of activities in the Upper Acheulean. Over the whole occupation-floor of Garba I, ochre fragments were found, indicating its fairly general use. The same level produced the first evidence of the use of fire at Melka-Kunturé thanks to the finding of burnt stones.

CONCLUSIONS

Our conclusions are summarised in the table in fig. 12, where we have tried to note, site by site, the evolution of the criteria which, we think, reflect cultural change. We mention these criteria in the same order in which they were discussed in this paper, and not by order of importance.

The first conclusion is that, fundamentally, Melka-Kunturé exhibits a dynamic continuity. For instance, in the debitage, we can see the proportion of cortical flakes decreasing in accordance with the evolution of the Oldowan and the Acheulean. At the same time, in the tool-kit, there is a progressive decrease in the number of choppers and core-scrapers while the number of side-scrapers and borers increases. This continuity is more noticeable in the technical aspects of the considered cultures.

On the other hand, not all the components of this dynamic evolution advance at a fixed rate. There are leaps forward, or sudden slackenings off in the importance of certain criteria. A case point is the location of the settlements, where those on beaches are replaced by settlements in channels, or another case would concern the distance from raw material sources. Similar variations are observed in the organization of living-floors with the disappearance of peculiar or complex features, like the piles of big boulders surrounded by bones and artefacts, in the denuded areas in the Oldowan living-floors. Conversely, in the Upper Acheulean new forms, such as depressions (basins) appear. Again, the accumulation of manuports disappears at a certain period in time, and specialised sites start to appear: butchering sites or stone-working factories. In terms of the technological equipment sudden changes also take place; for example the appearance of Levallois debitage; the appearance and quasi-disappearance of cleavers and hand-axes; the appearance of bolas and small bifacial pieces.

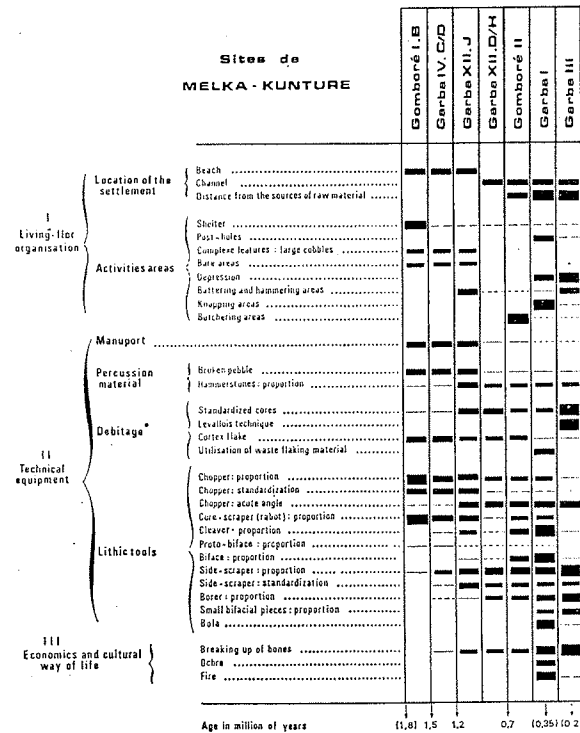


FIG. 12. — Table showing the evolution and the changes of some cultural attributes from the Oldowan till to the Final Acheulean at Melka-Kunturé.

The same difference is noted in the degree of domestic utilization of carcasses from kills. The breaking up of bones, which is still very roughly done at Gomboré I and Garba IV, where large bone fragments often occur, is carried to much finer lengths in the Acheulean. This results at Garba I and Garba III in an increased amount of very small splinters, and this tendency is already clearly visible in the upper levels of Garba XII and at Gomboré II. The more diversified game composition in the Acheulean seems to confirm a remark made

These changes are observed not only in techniques of tool-production but also in those remains closely related to the organization of the way of life — a fact which is something more novel.

The data provide observed facts which cannot be questioned. Can we go further and risk interpretations? We mentioned at the beginning that our conception of a prehistoric culture could be expressed in the language of modern mathematics, as a group of systems, whose elements, though bound together, evolved each at their own rhythm; this is sometimes referred to as a « mosaic evolution ». The essential point here is that, throughout all the changes, there exists a *continuum*, within which the parameters of the components vary, become more difficult to define and differ according to chosen criteria.

However, one could, if one wished, establish divisions in this continuous sequence, and it would be useful to do so if only to allow comparisons with similar divisions established by others. We would ascertain, for Melka-Kunturé, the following divisions. At the base of the sequence we found the *Oldowan* (1.7-1.3 million years) characterised by the occupation of the banks of the Awash, by complex features as described above (boulder piles, bone accumulations, denuded areas), by a considerable amount of manuports and choppers, and by the coarse breakage of the bone remains. It is well represented at Gomboré I B and Garba IV D.

From the Oldowan of Gomboré I B onward, an evolution is shown by the increase of discoidal choppers and more elaborate debitage methods such as more flakes, use of more obsidian, more retouched flakes, etc. Bones are more finely broken, and have sometimes been utilised. This *Evolved Oldowan*, already perceptible at Garba IV, is perhaps represented at Gomboré I γ.

Then comes the *Early Acheulean*, dated to about one million years. The way of life, i.e. the location and the organization of the occupation-floors, remains in the Oldowan tradition, but the choppers change: their angle of utilization becomes acute; hand-axes, cleavers and standardized scrapers appear. This period is represented by the level J of Garba XII.

In the *Middle Acheulean*, the Oldowan organization of the occupation-floors disappears. The settlements are located in a channel, the complex features mentioned above disappear, specialised work areas such as butchering sites appear instead, tools become diversified and there is an increase in the number of hand-axes, cleavers and end-scrapers. The most representative site at Melka-Kunturé is Gomboré II.

In the *Late Acheulean* a new factor is introduced in the choice of site-location, i.e. independence from raw material sources, which consequently leads to the use of specialised working sites. The organization of the living-floor becomes more sophisticated with the appearance of basins. Cleavers and hand-axes, with forms standardized to the point of monotony, outnumber the rest of the tools. New types, such as small bifacial pieces and bolas appear. The

use of fire and of ochre suggests a more complex way of life at this time. The most typical example is Garba I.

In the *Final Acheulean* the organization of the floors is even more diversified. We have more basins, in specialised working areas. We see the meat-slicing tasks taking place in areas separated from those of rough butchering activities. As to the lithic equipment, the big innovation is the appearance of the Levallois technique. The number of cleavers and hand-axes suddenly decreases and the small bifacial pieces increase, often being used in different ways. Here, the best evidence comes from the site of Garba III.

For us the above-mentioned labeling is not of primary importance. The most significant information provided by the sites at Melka-Kunturé is the evidence of transitions and cultural changes. From the Oldowan to the Acheulean one can see a turning-point, represented at the site of Garba XII, where there is coexistence of Oldowan and Acheulean attributes. At the other hand of the sequence, one can note the transition from Acheulean to Middle Stone Age. We are less informed about the latter period, since no occupation-sites of that period could be found, though in many places Middle Stone Age surface materials has been collected. However, Garba III demonstrates the persistence of Acheulean features concurring with the emergence of the Levallois technique and other innovations.

All these observations have affected our idea of culture change. There is here no unilinear evolution, but, as mentioned, a mosaic evolution. Only when a sufficient number of factors such as techniques, way of life, etc., have changed enough to upset the equilibrium of the system, a total change will be achieved.

To employ the fashionable jargon, our point of view is opposed to that of uniformitarianism (Hole, Heizer, 1973, p. 75), for the reason that we do not consider a culture as a closed system, in which the components are rigidly bound together and evolve simultaneously; in this case the chopper would correspond to the Oldowan, the biface to the Acheulean, the leaf-shaped point to the Middle Stone Age, and even further only, the Australopithecine would be directly responsible for the Oldowan tools, the *Homo erectus* for the Acheulean and the Neanderthal for the Middle Stone Age tool-kits. We have to stress that the human fossils found at Melka-Kunturé oblige us to proceed beyond this viewpoint, since it is in the Oldowan of Gomboré I, contemporaneous with the top of Bed I at Olduvai, that a humerus with both archaic and evolved traits has been found, suggesting both a robust Australopithecine and an early *Homo erectus* (Chavaillon *et alii*, 1977). In the Middle Acheulean (dated to around the magnetic reversal of Matuyama-Brunhes) the site of Gomboré II furnished two cranial fragments of an archaic *Homo erectus*, while the Final Acheulean of Garba III is associated with fragments of a man with clearly more evolved characteristics.

This demonstrates that our interpretation of the material of Melka-Kunturé

differs in two ways from the Olduvai model: first, we have not the same interdigitation of two cultural traditions, which is seen at Olduvai in the resurgence of an Oldowan in an evolved form up to Bed IV, contemporary with Gomboré II. Secondly, and in consequence, nothing suggests the existence of two parallel lines which would have coexisted for more than one million years on the Ethiopian high plateaux.

We repeat that we do not conceive of the continuous evolution as being linear, i.e. the same human group which has changed *in situ* in this part of the Awash Valley. Rather, for us, all the attributes (living-floor organization, tools, fauna, human fossils, etc.) whose interaction constitutes a culture, must be simultaneously considered. Cultural changes are the manifestations of changes in all the attributes and their interaction. At Melka-Kunturé, it is the technical equipment which changes first, transformation in the way of life occurring only later on. This order of priority seems to us to be of fundamental importance, and its logic could be the starting point for a fuller understanding of the processual mechanisms at work at the beginning and the end of the Acheulean in the site of Melka-Kunturé. Of course this view is contrary to the conceptions of those for whom it is economic pressures which are the prime cause of any change in a culture.

The idea raises new questions at once: why does technological progress occur? What is the role played by the human, or the sociological, factors when innovations occur? Even more important, is the order of succession observed at Melka-Kunturé to be regarded as a general law? In that case, research work would have to be undertaken oriented toward the testing of its validity.

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RIASSUNTO

Le ricerche della Missione Franco-etioptica diretta da Jean Chavaillon a Melka Kunturé (Etiopia) hanno consentito l'esplorazione di numerosi suoli di abitato Olduvaiani, Acheuleani e del Middle Stone Age, che si estendono per superfici assai vaste e sono caratterizzati da una notevole concentrazione di resti litici e faunistici.

In questo lavoro si presenta una sintesi dei risultati finora acquisiti e si propone un inquadramento della sequenza culturale del Paleolitico di Melka Kunturé.

La metodologia seguita mette in evidenza non solo gli aspetti tecnologici delle culture esaminate ma anche l'organizzazione dei suoli di abitato ed altri elementi economici e culturali del modo di vita dei gruppi umani che frequentarono la valle dell'Awash.

Viene sottolineata la stretta correlazione e interdipendenza di questi vari fattori e se ne segue per ciascuno l'evoluzione e lo sviluppo dai suoli di abitato più antichi a quelli più recenti.

Risulta evidente l'impossibilità di stabilire cesure nette tra le diverse culture e di conseguenza la difficoltà di attribuire rigide « etichette » culturali all'una o all'altra.

L'evidenza archeologica di Melka Kunturé suggerisce piuttosto un « continuum » evolutivo articolato in diversi parametri ciascuno dei quali, anche se evidentemente collegato agli altri, segue un proprio ritmo, dando luogo a un modello di evoluzione che, in contrapposizione a quella unilineare, può essere definita « a mosaico ».

Solo quando un numero sufficiente di caratteri di una determinata cultura ha subito una trasformazione tale da modificare il « sistema » nel suo insieme si ha il definitivo mutamento verso un diverso modello culturale.

RESUME

Les recherches de la Mission Archéologique franco-ethiopienne à Melka Kunturé, dirigée par Jean Chavaillon ont permis l'exploration de nombreux sols d'habitat Oldowayens, Acheuléens et du Middle Stone Age qui s'étendent, sur des surfaces très vastes et qui sont caractérisés par une très forte concentration de vestiges lithiques et de fragments de faune.

Dans cet article on présente une synthèse des résultats qu'on a jusqu'à présent acquis et on propose une interprétation de la séquence culturelle du Paléolithique de Melka Kunturé.

La méthodologie qu'on a choisi essaye de mettre en évidence non seulement les aspects technologiques des différentes civilisations mais aussi l'organisation des sols d'habitats et les autres manifestations de la vie économique et culturelle.

On souligne la corrélation et l'interdépendance de tous ces attributs dont l'évolution est suivie à partir des sols les plus anciens jusqu'aux plus récents.

Il est évident qu'on ne peut pas établir des coupures rigides parmi les différents civi-

lisations et par conséquence qu'on doit limiter l'apposition d'étiquettes univoques telles que Oldowayen, O. évolué, Acheuléen, etc., surtout lorsqu'on veut étudier les problèmes des limites ou des changements de civilisations préhistoriques.

L'évidence archéologique de Melka Kunturé suggère plutôt un « continuum » évolutif articulé en plusieurs attributs qui, bien que reliés entre eux de façon organique, évoluent chacun suivant son propre rythme et d'une façon qui n'est pas forcément synchrone, donnant lieu à une évolution culturelle qui n'est pas unilinéaire mais qui est plutôt caractérisée par des changements en mosaïque.

C'est seulement lorsqu'un nombre suffisant d'éléments se sont transformés au point de déséquilibrer l'ensemble que le changement est réalisé et on est en présence d'un nouveau modèle culturel.