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## ON THE PRE-OLDOWAN DEVELOPMENT STAGE OF THE SOCIETY

TO THE MEMORY OF GLYNN ISAAC — OUTSTANDING INVESTIGATOR  
IN AFRICAN PREHISTORY

**ABSTRACT** — The Oldowan stage of the earliest Palaeolithic defined on the basis of artifacts found in East Africa some time ago is regarded as the earliest, initial stage of the human society. Oldowan is characterized by a large number of choppers, without cleavers and hand-axes, and with few, usually atypical flake tools.

A detailed analysis of the earliest Palaeolithic finds from East Africa suggests that the Oldowan stage is not the initial stage of the development of the human society, the finds typical of this period must have been preceded, and in fact had been preceded, by earlier assemblages, with quite different composition of the industries. Here belong the localities in Shungura, Omo and Gona in Ethiopia whose age is estimated at more than two million years. The industries of these localities are in fact artifacts processed with extraordinarily primitive technique of primary working (through the technology of breaking the initial raw material). The products of this technology are angular fragments and splinters, rarely also real flakes. These artifacts are of relatively small dimensions (up to 5 cm). Choppers and other tools made of flakes, typical of the Oldowan proper, are completely missing. In this connection we regard it as correct to define the earliest period of the Palaeolithic as pre-Oldowan, and it could be called also Shungura stage according to Shungura, the most typical site belonging to this epoch. It cannot be excluded that the pre-Oldowan industry was made by a being close to Hadar hominid.

The assemblages of the pre-Oldowan (Shunguran) stage evidently forms the genetic basis for the further development of the Oldowan microlithic industries (Koobi Fora, Vallonnet), and of the later Acheulian and Mousterian in Europe.

**KEY WORDS:** Pre-oldowan — East Africa — Stone tool technology.

The Chellean stage of the Early Palaeolithic determined by G. de Mortillet in the mid-nineteenth century was for a long period considered the earliest and initial stage of the history of mankind. These views survived even when Chelles, the eponymous site had lost its stratotypical importance following the discovery of a new stratotype — Abbeville, with tools identical to those of the Chellean, but embedded in

A paper read at the Palaeolithic Dept. of the Leningrad branch of the Archaeological Institute of the Academy of Sciences of the USSR in the year 1982 at a working session on the topic "The Formation of Man and Society", Leningrad, 1983.

clearer stratigraphic conditions. First they were defined as pre-Chellean tools, but later the whole thing was reevaluated and the new term was introduced. In 1932 H. Breuil put forward a suggestion to rename the Chellean stage Abbevillian, and since then the two terms have been synonymous for the initial period of the formation of the human society.

If we look back at the above development, we should realize that the forecasts of the pre-Chellean stage were logical. It was impossible not to see the gigantic leap in the physical development of the Pithecanthropus — the oldest human being known at that epoch — from the initial species of the fossil ape

(from the viewpoint of anthropogenesis). Naturally the scholars expected the existence of a transitional form, of the so-called "missing-link", between man and the animal kingdom. The view of certain scholars that the missing-link could be bridged-over with a fossil sub-family of hominids, of Australopithecinae, showing traces of the manufacture of tools, was refuted. On the other hand the development of stone tools in the Chellean stage — whose main tool was the hand-axe — seemed to be one of the proofs of the transition from ape to man. In spite of all the primitivity of the Chellean hand-axe, there is one undisputable thing. The manufacture of such a tool required a lot of experience and the corresponding level of abstract thinking, requirements that could not be reached at once in their final form. Exactly these facts prompted some scholars to assume the existence of an earlier and more primitive stage than the Chellean (Abbevillian) (Mortillet, 1903, p. 74; Gorodtsov, 1923, pp 94—99).

Already P. P. Yefimenko wrote on these problems: "... on the basis of general consideration similar

gross flakes can be viewed as a most simple cutting tool, whose need was felt by the primitive man very soon. It is very probable that the separation of blades and flakes brought him to the idea to use the remaining pointed flint core as a hammerstone, more efficient than a stone fragment picked-up accidentally. The cutting tool, a simple and shapeless flake separated from a flint nodule, is a very old tool, perhaps it was the very first stone tool made by man intentionally" (Yefimenko, 1953, p. 109). These conclusions of P. P. Yefimenko were based on materials found in the sediments of the River Somme, not far from Amiens, where the coarse flakes lay under strata containing Chellean hand-axes. These finds are called pre-Chellean (Yefimenko, 1953, p. 109). These observation had necessarily led to the assumption of the existence of a long period, of a special epoch preceding the epoch of the origin of hand-axes (o.c. 109—110). However, prehistorians did not accept the idea. P. P. Yefimenko also concludes: "... a more thorough study of the condition of the deposition of the so-called pre-Chellean tools can form the necessary base for conclusions;

although the flint flake played a much more important role in the initial phases of the Palaeolithic culture than thought by older researchers, nevertheless hammer-stones appeared in their primary form already in this early period" (o.c. p. 110).

No matter of how speculative character some of these ideas, concerning the manufacture of stone tools in the earliest phases of the formation of human society were, they did not fall into oblivion after the discovery of the Olduvai finds. The first step was to determine the earliest epoch in the history of mankind according to the respective stone tools, i.e. the stage of culture called Oldowan, and soon afterwards the being who manufactured these tools — *Homo habilis* — was also discovered.

The term "Oldowan" was introduced by L. Leakey in the fifties and is referring to the culture preceding the Chellean (Leakey, 1951). All artifacts found at the Olduvai sites were identified and described and on the basis of these collections a classification of stone artifacts was realized. The classification took place mainly according to L. Leakey's typological scheme in which the author tried to determine the characteristic features of the Oldowan stage (Leakey, 1966, p. 463). It has been pointed out that the most characteristic stone tools of Oldowan are choppers and chopping-tools. The special literature focuses considerable attention on the description of Oldowan artifacts and on statistics, but failed to define the exact characteristics of the Oldowan industry, and the features differentiating it from the assemblages of the following Palaeolithic stages, and this happened in spite of the fact that the scholars intuitively felt that the main difference between Oldowan and Acheulian is the presence of hand-axes and cleavers in the latter. This is an important criterion, but not the only one! Generally the characteristic features of the Oldowan can be stated as follows:

1. Presence of a profusion of choppers and chopping-tools (in the classical Oldowan assemblages these tools make up more than 50 per cent of the total artifacts with secondary processing). The number of choppers and chopping-tools will result even higher if we exclude from the category of working tools the polyheders, discs, spheroids that basically served as cores. Bifaces and cleavers are missing.

2. Occurance of a large number of polyheders, discs, spheroids, some of them being cores.

3. The technique of primitive flaking prevails. The flakes were obtained from polyhedral, disc-shaped and cubic cores. Cores with parallel principle of flaking and respective flakes are rare: the Levalloisian technique of flaking is missing.

4. In the secondary processing prevails coarse flaking along the circumference. The retouch is irregular, limited, not too clear-out, not changing the shape of the semi-finished product.

5. Manufacture of primitive and coarse side-scrapers, very similar to choppers. Oldowan side-scrapers and other tools made of flakes are very primitive. Their primitivism consists in poor and irregular secondary processing, the blade is inaccurate, retouch can be found on various sides, almost along the entire circumference of the semi-finished product, the handle,

or anything reminding of it is also missing. Many tools cannot be distinguished from flakes used without any secondary processing for various uses.

6. Medium-sized and large dimensions of most tools (exceeding 5 cm).

The discovery of the Oldowan assemblages made the assumed pre-Chellean stage a fact, although it lacks some of the most characteristic features which were earlier presumed. Does it mean that the question concerning the existence of a special stage in the history of mankind characterized by primitive fragmented and flake tools, as suggested in the twenties and thirties of this century should be totally dismissed? In other words does the Oldowan stage represent the initial period of the human society, or is it a very early, but not the initial stage of human development? We should not overlook the fact that in spite of its archaic features the Oldowan industry should not be regarded as a very primitive one. But even if we were inclined to simplify the "Oldowan phenomenon", it is already at such a developed stage that it cannot be regarded as the initial form of the development of the production forces of primitive man. The epoch is characterized by the standardization of the choppers, by a broad assortment of tools; the Oldowan inventory can be described as "a primitive versatility", documenting the sufficiently high level of abstract thinking of its manufacturers and their manufacturing skill and experience. Such a mass of quality and experience cannot arise within a short time and from nothing. Here should be applied the same logic as in the above question concerning the existence of a special pre-Chellean stage. The relatively high standard of the Oldowan industry is somehow incompatible with our ideas on the initial, original stages of forming the society, it will be difficult to explain it from the viewpoint of "archaeological universe" (G. P. Grigoriev). On the very contrary, the very facts that led to the introduction of this term document clearly that the Oldowan production is not the oldest one and it does not represent the initial stage of production (Matyukhin, 1983, p. 145). Furthermore there are very good reasons not to limit ourselves to purely abstract presumptions. The existing facts make it possible to ask once again in a more qualified way, whether there was a period in the development of the society preceding the Oldowan.

Thanks to the research by R. Leakey, G. Isaak, G. Chavaillon, K. Arambourg, G. Merrick and other scholars specializing in the study of the region of the Rudolf Lake (Turkana) and in the valley of the Omo River it has been possible to discover the earliest sediments containing numerous remains of hominids, of the fauna, stone tools, etc. coming from the period earlier than 1—3 mill. years (Table 1). The earliest assemblages come from three main groups of sites:

1. The northern group of settlement, formation Shungura, the valley of the Omo River (Ftji 1, Ftji 2, Ftji 5, excavations by Merrick) they come from layer F whose top and bottom tuff is dated according to K/A — to  $2.04 \pm 0.1$  and  $1.93 \pm 0.1$  mill. years (Merrick, Heinzelin, Haesaerts, Howell, 1973, Merrick, 1976, H. Merrick, J. Merrick, 1976).

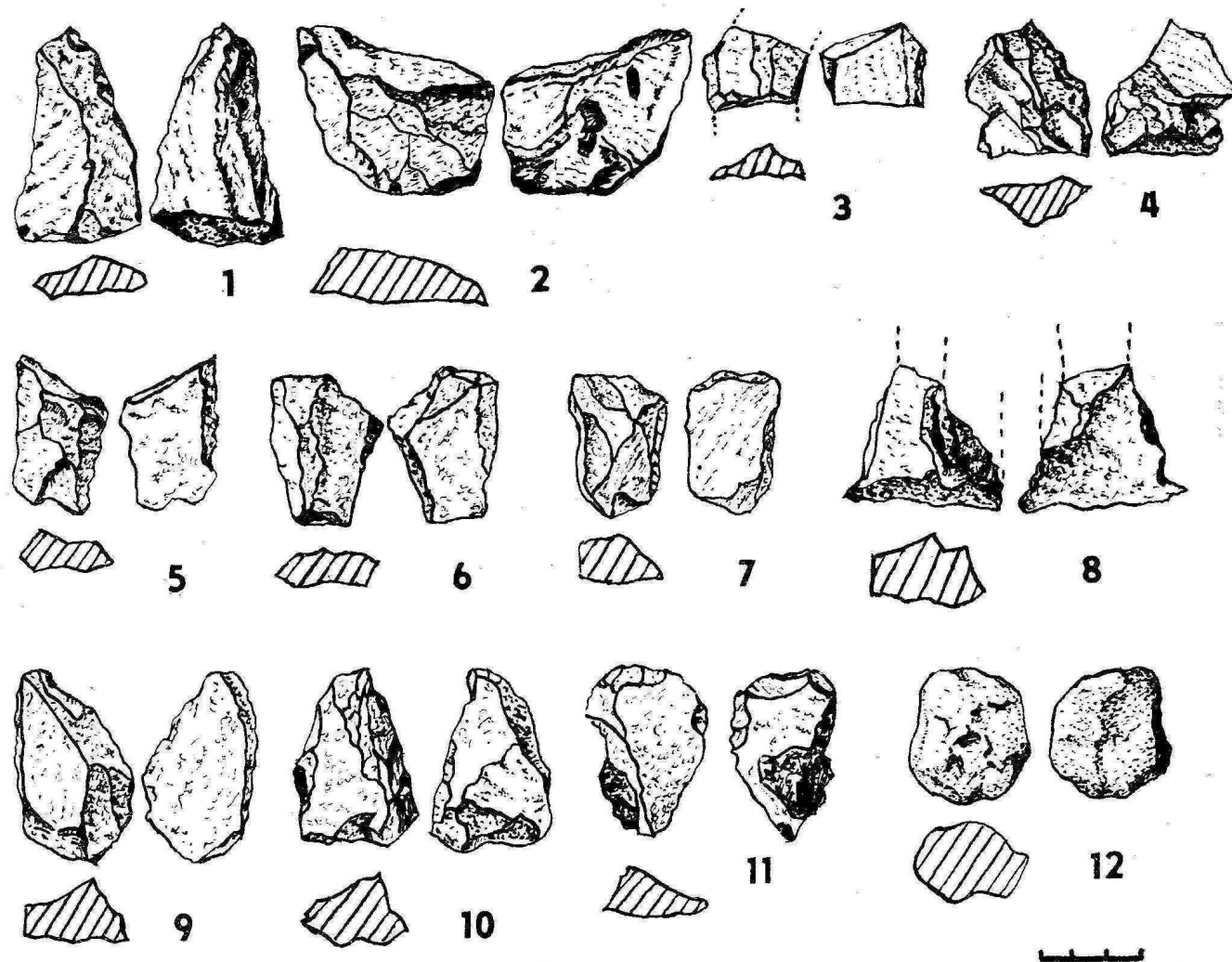


FIGURE 1. Quartz products from the Ftji locality in Shungura (found in situ) (according to Merrick): 1—3. Flake fragments, 4—11. Angular fragments, 12. Manuport.



TABLE 1. *The Chronology of the oldest East African finds*

1,0	Olduvai, upper part of layer II	1,0
1,2	Olduvai, middle part of layer II	1,2
1,4	Olduvai, bottom of layer II	1,4
1,6	Olduvai, layer I	1,6
1,8		1,8
2,0		2,0
2,2		2,2
2,4		2,4
2,6		2,6
2,8		2,8
3,0		3,0

2. The southern group of the Shungura settlement formation, the valley of the Omo River (Omo 57, 123, excavations by Chavaillon) also come from layer F which is 2 million years old (Chavaillon, 1976). J. Chavaillon discovered some more localities — Omo 71 — layer E — more than 2 mill. years old, isolated artifacts, from the layers C, D (2.5–2.7 mill. years old), however, the collections from these sites are not too numerous or perhaps they were not found in situ (Chavaillon, 1976, Isaak, 1976, p. 487).

We shall call the northern settlement group Shungura, and the southern — Omo.

3. Koobi Fora, the eastern part of Turkana (KBS, HAS, NMS, CPH). There are two possible variants of determining the age of Koobi Fora. The first date — 2.6 mill. years — was obtained with the help of the isotope method ( $AP^{40}/AP^{39}$ ) Fitch, Miller (1970, 1976), and later it was proved also through palaeomagnetic method (Brock, Isaak, 1974), and partially through the remains of fauna (Maglio, 1972). The second date — 1.6–1.8 mill. years — was obtained with the help of the new K/A isotop method (Isaak, 1975), and its correctness is proved by the fauna (Isaak, 1976, p. 128). In Brock's recent publications we read that the sediments in eastern Turkana are not very suitable for palaeomagnetic analysis. G. Isaak refrains from categorical conclusions, however, he is inclined to support the earlier date (Isaak et al. 1976, p. 533), but in his recent publications he seems to adhere to the later date — to 1.8 mill. years (Isaak, 1978, p. 93). Most experts are prone to support the later Koobi Fora date.

Recently a new focal point of the earliest human activities seems to have been discovered — namely in the valley of the river Awash in Ethiopia. A few years ago we learnt about the discovery of the hitherto earliest vestiges of human activities at the Gona site

in Afar (Ethiopia), whose age is estimated at 2.5–2.7 mill. years. (The hitherto publications do not contain the relative proofs, documenting the above age of the finds. The only thing we know is that the finds were situated above the tuff, whose age was determined with the help of the potash-argon method (P/Ar) at  $2.89 \pm 0.11$  mill. years; the result obtained through the fission track method was  $2.7 \pm 0.11$  mill. years).

The excavations yielded 18 stone artifacts and 5 bone fragments. The external looks of the finds make it possible to conclude that they were found in their primary position and that their shift in the layer was very slight. The stone artifacts are represented by fragments and flakes, no probable tools, especially no choppers were found. All finds are of small dimensions. Experts hold that the artifacts with sharp margins should have served as cutting tools (Harris, Johanson, 1982, pp. 305–306).

At a closer look we can see that the assemblages evidently belonging to the Oldowan stage differ from the Oldowan elements and are missing completely or at least partially (Table 2).

The artifacts from Shungura belong fully to the category of angular fragments (96.8 %) and flakes (3.1 %). The max. dimension of the artifacts is 4 cm. Tools and cores are missing.

The production from Omo seems to be more developed, the share of flakes is larger (up to 40 %), the proportion of angular fragments is lower (56–70%) they, however, still prevail, isolated cores occur (max. 2 %, Fig. 2) — among them discs and polyheders (we should add that the term "nucleus" (core) used by Chavaillon holds for all spherical and cubic pieces). A small part of the flakes was used as tools (0.3 and 6.6 %; Fig. 2, N 7, 8), similarly as some of the cores with cutting edge. (The parameters of the finds — max. 5 cm).

At the HAS site (Koobi Fora) we found 118 artifacts made of lava, 29 % of them being flakes and 71 % fragments. In the layer we found a single chopper fragment (?) and a flake with a stiletto-shaped bevelled edge; outside the stratigraphy we found 3 microchoppers and a polyheder. All artifacts have microlithic size, with a well perceptible degree of higher microlithisation than is the case with KBS (Isaak, 1976c, P. 556).

The industries from KBS have some characteristic Oldowan elements: choppers, core tools, polyheders, discs, each of them represented by one or two specimens (Leakey, 1970, p. 229; Isaak, 1976c, p. 557, Fig. 2, N 4–6). Most of these artifacts have been made of volcanic rocks — of andesite (basalt). They are somewhat bigger, but the collection as a whole does not exceed the limits of microindustry. The microparameters of the finds from KBS differ from those found in Olduvai and are closer to the parameters of the Omo and Shungura assemblages. The flakes are quite perfect, in some of them the sides are parallel. A blade was also discovered (Isaak, 1976c, p. 557, Fig. 2, N 1). However, still prevail flakes and their fragments and lumps — 93 %, a feature bringing KBS nearer to the locality in the valley of the Omo River. It seems that the Oldowan artifacts appear here at the bearing stage. Tools characteristic of the Oldowan stage

TABLE 2. *Technical-typological indices of the earliest East African assemblages*

Localities	Number of finds	Choppers	Polyheders	Discs	Core scrapers (Heavy-duty scrapers)	Various	Used pebbles	Used flakes	Cores	Core-like fragments	Flakes	Flake fragments	Angular fragments
<i>Koobi-Fora</i>													
KBS	139*) 79	3 8	1 0	2 0	1 0	—	0 3	3 1	—	0 1	44 38	85**) 28	
HAS	118 47	1? 3	1 1	—	0 1?	1 1	—	1 1	—	0 1	33 16	81**) 23	
NMS	293 0	8	—	2	1	1	—	—	—	—	70	211*)	
<i>Omo</i>													
Omo 123	767 1014	—	—	—	—	—	—	2 3	12 24	18 70	298 346		433 571
Omo 57	30 211	—	—	—	—	—	—	1 19	0 7	1 11	7 48		21 126
<i>Shungura</i>													
Ftji 1	377 270	—	—	—	—	—	—	—	1? 0	—	17 19	8 30	351 221
Ftji 2	223 130	—	—	—	—	—	—	—	—	—	3 6	4 14	216 110
Ftji 5	24 77	—	—	—	—	—	—	—	0 3?	—	1 6	0 1	23 67

\*) — in the numerator is indicated the number of artifacts found in situ, in the denominator we see the number of artifacts found on the surface

\*\*) — these figures represent a combined indicator: fragments of flakes and of angular fragments

only begin to appear. The collection from NMS is very similar to the artifacts from the KBS site. If we take into account the specific features of the artifacts from Koobi Fora, then all finds coming from the oldest sediments (tuff KBS) are sometimes called KBS industry (Isaak, 1976d, p. 9).

All the above assemblages are characterized by microlithism, by the use of small pebbles as raw material, the technique of flaking is very primitive, characterized by missing, or isolated occurrence of cores, large quantities of angular fragments and flat stone fragments lacking all the traditional traces of hammering, in no or imperfect secondary processing, in an extraordinarily poor assortment of permanent typological forms: choppers and tools made of flakes, appear very rarely or not at all. With the above characters these assemblages greatly differ from the classical Oldowan assemblages.

So it happens that while some researchers regard the above assemblage as Oldowan — with or without reservations — others dismiss them because they do not consider them authentic.

To grasp all the intricacy of the characteristics of the earliest East African assemblages we have several hypotheses explaining these characteristic features.

*Hypothesis No. 1:* the finds from Koobi Fora, Omo, Shungura and Gona are not man-made products (artifacts), they are natural objects. In order to be able to agree or disagree with this hypothesis we have to explain first what is an "artifact".

The criteria for determining reliably a palaeolithic artifact have been worked out long ago. The main features of an artifact are:

1. the striking platform,
2. the bulb of percussion,
3. blunting of the flake sides, evident traces of secondary processing of the tools, retouch and stiletto-shaped flakes.

In the view of certain experts only cores, flakes, and tools with secondary processing belong to this group. But are these criteria really sufficient for reliably determining the products of human hands at all stages of human development? In other words, is it really necessary to draw dividing lines between artificial human products and natural objects strictly on the basis of traditional criteria and to regard all objects behind this line as natural objects? This dogmatic approach to the definition of artifacts is based exclusively on the morphological characters of the objects, regardless of the concrete conditions of the find and its age, artificially separating them from the

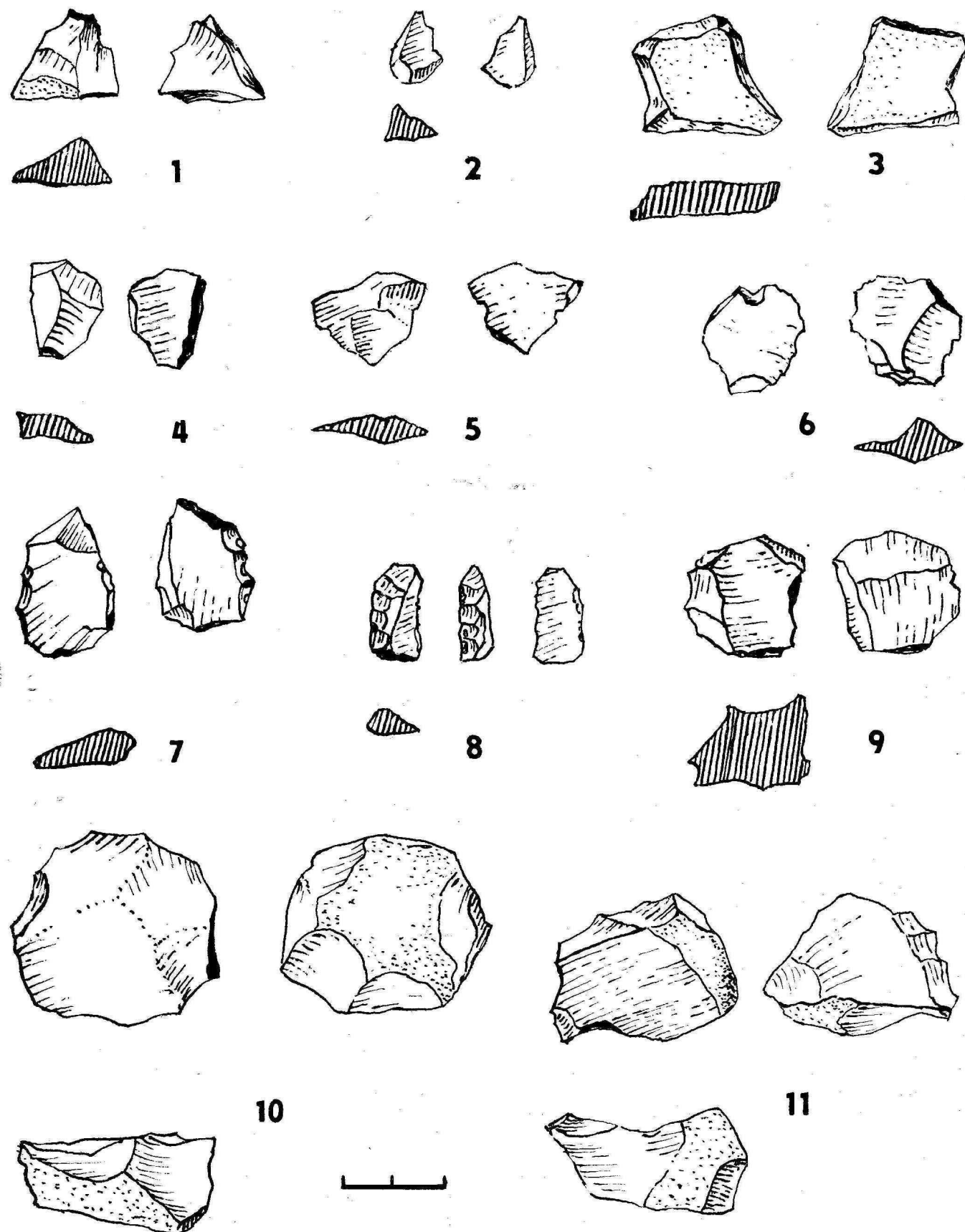


FIGURE 2. Artifacts from the Omo 57 and Omo 123 localities (according to Chavaillon); 1—2. Quartz fragments (Omo 123, *in situ*); 4. Fragmented quartz flake (Omo, 57, *in situ*); 5. Quartz flake (Omo 57, *in situ*); 6. Quartz flake (Omo 123, from the surface); 7. Used quartz flake (Omo 57, *in situ*); 8. Retouched and used flake from Jasper (Omo 57, *in situ*); 9. Polyhedral quartz core (Omo 123, from the surface); 10. Disc-shaped quartz core (Omo 57, from the surface); 11. Polyhedral quartz core (Omo 57, from the surface).

category of artifacts, of products made by man on purpose and used in the production process at early stages of the development of the production.

The traditional methods of defining the artifacts have their limitations. In some Acheulian assemblages of Transcarpathia (Korolevo), and of Central Asia the layers containing reliable finds yielded also a large number of flat and angular fragments of the initial raw material without any traces of artificial flaking. The remarkable thing is that with the development of the technique of primary flaking the number of these objects is gradually decreasing (namely from 60 % in Layer 7 in Korolevo to 10 % in Layer 5 of the same locality and it disappears completely in the Mousterian). It is symptomatic that during the recent research into the Karatau Culture in Tadzhikistan V. A. Ranov found several stone objects without any of the typical traces of flaking, in sediments with unambiguous stratigraphic conditions accompanied by fauna (Ranov 1982). The considerable distance from the sources of raw materials, the planigraphy and stratigraphy, localization of the finds, their direct connection with the fauna, all these factors indicate that the above objects are very old and primitive artificial products.

Similar artifacts (fragments, flat flakes without any traces of artificial flaking) were found also in the earliest East African assemblages.

In order to differentiate the stone artifacts from natural objects we should introduce the following additional criteria:

- position of the finds in situ
- elimination of possible mechanical damaging, no traces of transport or polishing
- localization of the finds within a limited section
- distance of the products from the raw material deposits
- absence of pebbles, and rock fragments in the findbearing layer
- presence of accompanying materials; remains of fauna, charcoal.

Of basic importance for the classification of artifacts are their morphological characters and also the conditions of their discovery. Anyhow, accurate and concrete historical approach is imperative. The motion of artifact is a historical category. The development of the technique of primary flaking of stones and of their secondary processing went through stages. Some objects at the later development stage regarded as waste arising from the processing of stone could have been, and in fact also were, primitive working tools.

To document the authentic character of the finds from Koobi Fora, Omo and Gona the following traditional criteria will fully suffice:

- occurrence — only together with fragments — with large numbers of flakes with the usual traces of artificial flaking
- occurrence of solitary cores (up to 2 %), of flakes with traces of their use (up to 7 %) in Omo and of specially adapted tools and cores (up to 5 %) in Koobi Fora. Besides these finds were accompanied

with finds of split bones (KBS, Omo, Gona) and including a complete skeleton of a hippopotamus.

To document the artificial origin of the finds from Shungura traditional characters will not suffice. In these assemblages prevail angular stone fragments (up to 97 %), but in slight amount there are also flakes and their fragments. The authenticity of finds from the Ftji 2 site is documented by:

- the position of finds in situ; there were two layers of finds with a gap of 15 cm, interpreted as horizons inhabited for a short period (H. Merrick, J. Merrick, 1976, p. 582); the stone artifacts do not show any traces of transport; damaging, polishing, erosion; they have fresh look and sharp margins

- the finds were discovered in a thin layer of sandy clay in stratified position.

- concentration of artifacts within a limited section

- the raw material from which the artifacts have been made is very rare at the locality, not only on the surface, but also in the layers below and above the finds. The authors hold that the raw material had been brought to the site from a distance of several kilometres, or was taken from the nearest brook (Merrick, 1976, p. 480)

- the layer with finds did not contain any pebbles, concretions or fine gravel

- the collected material is of the same quality as the assemblage of stone artifacts coming from this layer.

All these facts document the authenticity of artifacts from site Ftji 2. This means that hypothesis No. 1 is not acceptable for Ftji (Shungura), neither for the Omo, Koobi Fora and Gona sites is it acceptable. The objects found in these localities are real artifacts.

The artifacts from Ftji 1 and Ftji 5 in Shungura were discovered in secondary position in a layer of gravel, on the bottom of a dry brook. Some of these finds carry traces of polishing. They were found alongside with skeletal remains of big mammals. There were also polished relatively new fragments among them. The students doubt very much that there might be any links between these fragments and between the stone artifacts. The finds from these sites remind of the artifacts from Ftji 2, but for the time being we shall be well advised not to attach them to the group of intentional artifacts.

*Hypothesis No. 2:* the special character of the earliest East African industry is among other things also the result of natural selection in these finds: the minor fragments and flakes have been moved from their primary position, that is why no big pieces, tools or cores were found during the excavations. This hypothesis is made incompatible by the following facts:

- the above evidence the integrity and intact character of the layer containing the finds in Ftji 2 (Shungura). The same proofs exist also for a number of Koobi Fora sites (KBS, HAS, NMS), Omo 123, Omo 57 and Gona

- heavy concentration of finds within a limited section



— occurrence of accompanying material: of split bones, of a complete hippo skeleton (HAS), impression of a fig-leaf (KBS)

— occurrence of artifacts of various dimensions — of small fragments (up to 1 cm) on the one side, and of bigger artifacts (up to 5 cm in Omo, Gona and up to 6–8 cm in KBS), on the other — excludes any probability of natural selection of the finds

— the large quantities of collected material connected with these localities did not contain big tools, neither cores; surface finds do not differ from the artifacts from the layer as regards their technical-typological indices.

At the Koobi Fora, Omo, Shungura and Gona sites we should exclude any possibility of natural selection of the finds.

*Hypothesis No. 3:* the special features of the assemblages from Koobi Fora, Omo, Gona and Shungura can be explained by intentional human activities — by artificial selection. In other words these localities can be regarded as workshops, central parts of settlements, results of the beginning division of labour at the Oldowan stage.

However, it is difficult to consider the above localities as "workshops", namely for the following reasons: Workshops arose as a rule at the sources of raw materials, and the studied region is very poor in raw materials. Students have repeatedly emphasized that the raw material, the stones, were brought here from distant deposits or were taken from the nearest brooks (Isaak, 1976e, p. 561; Merrick, 1976). If we accept this hypothesis, we should assume that the hominids brought the pebbles from distant deposits, processed them at certain places and brought them ready to the settlement. This hypothesis lacks any plausibility. Besides that the workshops should contain semi-finished tools, and also large quantities of cores. But absolutely no semi-finished tools were found and very few cores appeared. Besides that no "workshops" and no "production centers" were found in the Olduvai Gorge. It is unlikely that they could have spread in an earlier period. Besides that in KBS, Omo and Gona the products were found alongside with the remains of fauna, which is a feature not typical of workshops.

It is quite possible that the main settlements have not yet been discovered, but the surface finds do not support such views. Large quantities of material have been collected, but tools or cores appear very rarely. Besides that there are certain well perceptible characteristic features in the settlement pattern of the region. The hominids settled the areas along brooks and lakes, setting up their small campsites.

The third hypothesis can be accepted — to a certain extent — only for settlement HAS in Koobi Fora. In the year 1971 a complete skeleton was discovered here, alongside with stone artifacts — most of them flakes and their fragments, the site measures 15–20 sq. m. G. Isaak holds that these flakes are primitive tools, used for carving the carcasses of the game. In his view HAS is the earliest butchery site (Isaak et al., 1976, p. 540; Isaak et al. 1975b). He compares it with a similar site from a later period, described by D. Clark (Clark, Haynes, 1970). He men-

tions also a site in the Olduvai Gorge, where the carcasses of elephant and of a dinotherium were carved. Here too, besides big tools also a number of small flakes were found. They served for secondary-processing of the meat (Leakey, 1971, p. 85–86).

The above arguments make it possible to dismiss the hypothesis on artifactual classification and to exclude the existence of "workshops" and "production centres" or other specialized production complexes in the studied region, perhaps with the exception of the HAS settlement in Koobi Fora.

*Hypothesis No. 4:* the special features of the assemblages can be explained by the character of the raw materials. G. Merrick who studied the Shungura-assemblages regards it as one of the causes of microlithism and primitivism of this production (Merrick, 1976, p. 480).

And indeed, the artifacts in Shungura are maximally inexpressive and are represented by a whole series of shapeless fragments and flakes (97 %); tools and cores are missing. For the manufacture of these artifacts, quartz was used prevalingly. But, in small quantities, appeared here also artifacts made of other easily flakeable rocks, such as slate, lava and chalcodony. It is symptomatic, that with the exception of a single broken flake, similarly as in the quartz artifacts, we can see here only angular fragments of flat stone fragments. Along these finds there is not a single artifact slightly reminding of a core, chopper or other tool. The artifacts from Omo are also made of quartz of poor quality (Chavaillon, 1976), however, this fact is not reflected by the shape of these finds. In the collection Omo 123 alongside numerous fragments there are also clear flakes, with traces of non-intentional flaking (298 specimens), isolated, but real cores, flakes with traces of their use. Similar situation was found also in Omo 57.

There is no doubt that the raw material used always influenced the features of the respective industry, this holds namely for early stages of stone processing, but of course never to such a degree as to determine fully its external shape. We have to dismiss the so-called "raw material" hypothesis especially in case of the Omo and Koobi Fora assemblages, where the quartz artifacts have relatively perfect shape. In this case it is so not due to the character of the initial raw material, but mainly due to the primitive way of its processing, i.e. through non-systematic breaking of pebbles and their concretions. This technique is characterized by haphazard breaking of the rock materials with a single hit, without the application of any special system. The technique of flaking is not based on the production and use of the core. The fragments, flakes, flat fragments are obtained with the help of several extraordinarily primitive flaking methods: by throwing a stone on another stone, by shattering it on a hard base, or by hitting it against an anvil. The use of these methods results mostly in angular, misshapened fragments and flat chips of the initial raw material, without any of the traditional traces of intentional flaking, with very few real flakes. Many splinters obtained in this way have sharp edges that could be used for various operations during the production process. Survivals of this obviously very

ancient stone processing technique appear also in the later period — in the Acheulian. E.g. in the lower layers of the multilayer locality in Korolevo, in Transcarpathia (Günz-, Günz-Mindel, Mindel, Mindel-Riss) more than 60 per cent of the finds were of this type. In the later cultural horizons on this site (Riss) the share of angular fragments and flat chips conspicuously drops (down to 10 per cent), and is completely disappearing in the Mousterian. Large numbers of similar artifacts were discovered in the Acheulian assemblages of the Karatau Culture in Tadzhikistan. Their presence cannot be explained through natural factors (we have the accurate stratigraphic and planigraphic localization of the finds), they are very distant from the raw material deposits, all traces of long-distance transport are missing, real cores, flakes, tools and remains of animals were found (Davis, Ranov, Dodonov 1980). It seems that we have the necessary material for the definition of one more method of stone processing, more primitive than any of the known flaking method (radial, Levalloisian, parallel, "citrus"); we can call it shattering or breaking method.

As far as the explanation of the technical-typological features of the Shungura, Omo, Koobi Fora assemblages are concerned, we have to dismiss the "raw material" hypothesis as such. In this connection we should add that the raw material influenced the dimensions of the products, but not the degree of their perfectness. We shall certainly not exaggerate if we say that the shortage of raw materials in the studied area and the small dimensions of the initial raw material — of the pebbles in many aspects predetermined the microlithic character of the Koobi Fora, Omo and Shungura assemblages. It seems that exactly here we should seek the beginnings of the later microlithic industries of Acheulian and Mousterian in Europe.

*Hypothesis No. 5:* one of the specific features of the Koobi Fora, Omo, Shungura and Gona assemblages is that they are very limited and these limited numbers necessarily lead to unreliable selection.

We have sufficient amount of finds from each group of settlements in the Shungura, Omo and Koobi Fora regions (Table II). The finds from the KBS and HAS sites are somewhat smaller than the assemblages from Omo and Shungura, but they are not less numerous than some assemblages from the Olduvai Gorge.

In the CPH site in Koobi Fora we found 24 artifacts without stratigraphy and 10 in the layer. Omo 71 yielded a single chopper, isolated artifacts were found also in earlier Omo layers (in layers C and D whose dating is estimated between 2–2.6 mill. years). The Gona locality is represented by 18 artifacts found in situ, 50 were found on the surface. Of course we cannot operate with similar collections, they are still very scarce, and we lack also qualified publications. The assemblage from Omo 57 is also small, but the artifacts found here, i.e. their technical-typological parameters, are identical with those from Omo 123 and we can make use of the data also from this locality.

Of full value (from the scientific viewpoint) are the following finds: Koobi Fora — settlements KBS,

HAS, NMS, in Omo — Omo 123, 57, in Shungura — Ftji 2.

On the basis of analyses of the above hypotheses we can say that:

1. Assemblages Ftji 1, Ftji 5 from Shungura (in consequence of disturbed layer), CPH in Koobi Fora, Gona, Omo 71 and some other Omo settlements (in layers C, D, E) in view of poor and small collections of stone products are not suitable for accurate scientific conclusions, in spite of the fact that the shape and the composition of the artifacts from these sites do not differ at all from the studied and fully reliable assemblages.

2. Locality HAS in Koobi Fora is obviously the oldest known site where the butchered animals were dissected and the method of the intentional classification of stone artifacts is fully applicable on it.

3. The Ftji 2 complexes in Shungura and Omo cannot be considered pseudo-artifacts — classified naturally or artificially their characteristic features cannot be explained either by the character of the raw material, or by the selection. These assemblages are without doubt authentic.

The KBS locality in Koobi Fora occupies a special position. Some of its features are very close to those of the Shungura and Omo assemblages (the microlithic character of the artifacts, predominance of fragments and flakes over other objects, very poor assortment of products), but also with the Olduvai finds (presence of choppers — although in limited numbers — together with polyheders and discs). The above features are typical also of the NMS locality in Koobi Fora.

We could of course suggest also several other variants of interpreting the KBS, NMS, Omo and Shungura assemblages: Proposal No. 1: the above-mentioned assemblages are local manifestations of the Oldowan stage or are typical of its early stage. Proposal No. 2: the above assemblages belong to an earlier, pre-Oldowan industry.

The microlithic character of the "KBS industry" and the small number of Oldowan elements (choppers, polyheders, discs) make it possible to regard these assemblages as local variants of the Oldowan (micro-Oldowan), namely as its initial stage.

The Omo and Shungura assemblages are earlier than all the other known Oldowan assemblages, and are therefore much more primitive. There are no reasons to consider them local manifestations of the Oldowan or to attach them to its early stage since the technical-typological differences between these assemblages and the Oldowan assemblages exceed the framework of the Oldowan stage and they lack the most characteristic Oldowan features. These artifacts represent a completely different earlier industry.

We have thus all the preconditions for defining the earlier stage in the development of the human society, namely the pre-Oldowan represented by the Shungura and Omo assemblages (dated to more than 2 mill. years). The epoch can be called pre-Oldowan stage, or according to the most characteristic, more archaic and probably earliest finds from the Shungura region they can be called Shungura stage. The interesting thing is that Chavaillon who discovered the



differences between the Shungura-Omo finds on the one side, and the Oldowan finds on the other, did not attach them to the classical Oldowan; he defined them as a special local facies of Oldowan — the Shungura facies (Chavaillon, 1976, p. 572).

On the basis of an analysis of the earliest East African assemblages we can make the following conclusions:

1. The Oldowan assemblages are not the earliest ones;
2. There is not a single Oldowan, it consists of Micro-Oldowan (Koobi Fora) and Classical Oldowan (Oldowan Gorge: DK, FLK and others, Gambore 1 and others);
3. The Shungura and Omo localities with their technical and typological properties and characteristics differ from the Oldowan proper and represent an earlier and more primitive production — the pre-Oldowan industry.

On summarizing what we have said above we can define the most typical characters of the pre-Oldowan production as follows:

1. Predominance of shapeless splinters and fragments over the flakes;
2. The technique of flaking is characterized by an utterly primitive method — i.e. by breaking or shattering or by acquiring flakes from rare, non-expressive polyhedral cores;
3. Microlithism of the artifacts;
4. Utter absence of intentionally manufactured tools, namely of choppers;
5. The use of non-worked fragments, flat stone splinters and flaked-off pieces of stones as working tools.

These characters are typical of all pre-Oldowan localities, although to varying degree. The Shungura collections look more archaic, compared with the Omo assemblages. This is reflected by the prevailing share of splinters (97 per cent), utter lack of cores, traces of use can be seen on some of the fragments only. At Omo we can see an increasing share of flakes (up to 40 per cent), due to this fact the share of fragments is dropping, although they are still prevailing; occasionally appear isolated polyhedral, cubic, or rarely also disk-shaped cores (up to 2 %). At Omo 123 flakes and some cores were used for the working operations, instead of fragments. Some flakes show traces reminding of regular retouch (up to 7 %). They are interpreted as cutting and grinding tools and end scrapers (Chavaillon, 1976, p. 571). It seems that some cores were used also as choppers.

It can be supposed that the pre-Oldowan period also consisted of two stages — of an early and of a late one, as represented by the Shungura and Omo localities. This assumption, however, is not based on a chronology of finds; according to our hitherto knowledge they are contemporaries. On the other hand, if we take into account the uneven development of the society and the survival of archaic stone processing methods we can admit that in the pre-Oldowan could have really existed two stages. The first stage being that of the random breaking of stones and the use of all fragments (the "fragment stage"). The second stage was that of the use of flakes from the cores and

their use in various working operations, without special further processing (so-called "flake" method). Both the first and the second stage are characterized by the fact that they lack intentionally manufactured tools. The second stage is directly connected with the first one, it had in fact developed from the first one, it is the result of a long evolution in the technique of stone processing. It is quite possible that in such a situation survived also the use of assemblages from the "fragment" method in the later and more developed "flake" method of the pre-Oldowan stage.

When studying the earliest assemblages from East Africa we have to take into account also the following facts: possible changes in the present dating of some of the localities, as was the case with Koobi Fora and the extension of some of the small collections in the course of the future researches. We cannot exclude that the age of some of the Oldowan finds will be also reassessed, i.e. their origin will be shifted to an earlier period. Such moves would shift the lower limit of the pre-Oldowan stage. But regardless of any possible changes in the chronology of the pre-Oldowan finds, their interpretation should follow retrospectively, with special regards to the principle of uneven development of the society and long survival of the ancient traditions in the processing of stone. We should emphasize the importance of this principle. By accepting changes in dating, we automatically confirm also the survival of archaic "fragment" and "flake" industries throughout the later Oldowan stage of the development of the human society. In this way at certain stages there could have been coexistence and parallel development in the "fragment" and "flake" industries on the one side, and in the Oldowan production, on the other.

We shall naturally ask what kind of human being used the pre-Oldowan technique? None of the pre-Oldowan artifacts were found together with human skeletal remains. If we take into account that these very ancient stone tools were found over the extensive Hadar region in Gona estimated 2.5 mill. years old, we cannot exclude that the manufacturer of the pre-Oldowan artifacts was *Australopithecus*, or an unknown being, a link between *Australopithecus afarensis* and *Homo habilis*.

The definition of the initial, pre-Oldowan stage of the development of human society is of extraordinary importance for solving the problems connected with the further development of the earliest African industries, with the origin of the Early Palaeolithic assemblages in Eurasia, it is of great importance for determining the time and directions of settling the Eurasian Continent with primitive common economy groups.

We have in Africa a whole series of artifacts that might fill up to a certain extent the huge gap between the Shungura-Omo "fragment" and "flake" assemblages on the one hand, and between the European finds on the other; the two groups have a number of common features. The group of localities coming from the upper part of Koobi Fora (Karari, Ileret) in Kenya belongs to the Early Acheulian in Africa (1.2—1.4 mill. years). Nevertheless, with their technological features these assemblages differ from the Acheulian assemblages proper. In many collections

prevail flakes and their fragments, chips, splinters and flakes (ranging from 90 % to 99 %); tools are very rare among them. One of the most prominent feature of the typological scope is the complete absence of hand-axes and cleavers. The assortment of tools is poor and of limited variety. Among the tools prevail side scrapers, made of fragments and flakes, representing sufficiently permanent series (the authors of the investigations have attached to this group also denticulated tools; the shape of some side scrapers and denticulated tools reminds of limaces). The lists of tools comprise choppers, polyheders, discs, sometimes appear also proto-bifaces. In order to distinguish between these assemblages and the real Acheulian assemblages, and to define their properties the finds from the Karari region are often called "Karari industry" (Harris, Bishop, 1976; Isaak, Harris, Crader, 1976). However, from the technical-typological viewpoint the finds are rather heterogeneous and they can be divided into the following locality groups:

1. assemblages without intentionally manufactured tools, the collections consist of flakes and fragments;
2. assemblages with relatively limited numbers of tools, represented exclusively by side scrapers made of fragments and flakes;
3. assemblages with somewhat larger number of tools, with side scrapers prevailing and with choppers represented.

Some of the finds from the Karari and Ileret regions can be interpreted as:

1. the survival of the pre-Oldowan "flake" industry in the later Oldowan and Acheulian stages without any qualitative changes;
2. survival of the "flake" industries in somewhat changed form (the side scrapers appear in large enough series). It seems little plausible that the "flake" industries might resist any changes during such a long period. These industry may be considered Acheulian — i.e. Acheulian with sufficiently perfect side scrapers and denticulated tools, practically without any cutting tools;
3. transition of Oldowan assemblages into unifacial Acheulian (Acheulian with choppers, side scrapers, with relatively rare protobifaces, without hand-axes and cleavers).

The finds in this region as a whole are characterized by a typical non-biphase development of the Acheulian industries. The variants of the draft interpretation of the assemblages do not exclude each other. They are evidently applicable to certain localities or groups of localities in Karari and Ileret.

If we take into account the broad time bracket of the existence of the Karari assemblage, we cannot exclude with certainty the possibility that their heterogeneity reflects various chronological stages of the same industry.

There are certain links between the pre-Oldowan, Oldowan and Acheulian assemblages of East Africa on the one hand and between the earliest Palaeolithic industries of Europe and Asia, on the other. The survival of the "fragment" industries is well perceptible in the Acheulian assemblages of Karatau I and Korolevo (layers 7 and 6), where, as mentioned

above, the technique of primary flaking is characterized by a large number of fragments and chips. The pre-Oldowan assemblages of Shungura and Omo evidently gave origin to Micro-Oldowan (Koobi Fora), and on its basis could have developed later the European Micro-Acheulian (Vértesszölös, Arago and Bilzingsleben) and from this genetic basis arose the Micro-Mousterian industry of the Continent. We can clearly follow the evolution even in the "flake" industries Olduvai Gorge (DK, layer 1) — Somme Valley (Lumley, 1975), although not in the microlithic variant. The survival of this tradition is evident in the 8th layer in Korolevo (Günz); the collection in this layer consists of more than 400 artifacts, but is represented only by two inconclusive tools, the rest are flakes and fragments. We cannot exclude that the flake industries of East Africa became the basis for forming the Clactonian in England and in northern France. Finds of classical Oldowan are limited to the southern parts of Europe and are roughly 1 mill. years old (Vallonnet, Šandalja). We can presume that the unifacial Acheulian developed later on their basis (i.e. Acheulian with choppers without hand-axes). It is typical of the Balkans and of central Europe. Nio Skala (Greece), Bečov, Přezletice and Suchdol (Czechoslovakia), Transcarpathia in the USSR (Korolevo, Rokosova) and others. All these facts document — some more, others less — the survival of certain technical traditions of the development of the earliest Palaeolithic industries during a very long period.

The proposed interpretation of the earliest assemblages from East Africa and of the evolution of these industries during a very long period opens new prospects for studying the problem of the period, its stages and main directions of settling the Eurasian Continent. It is already evident that it was a protracted and recurring process taking place in various directions. The settling of Europe took place at various stages of the development of the society, beginning with Oldowan and was expanding through the main directions, through Pyrenees, Apennines and through Small Asia.

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