Chapter 5

EF-HR

Introduction

EF-HR is the oldest of the sites Leakey (1971) excavated above Tuff IIB. Although for several decades its chronology has been established around 1.4 my, the most recent dates (Manega 1993) establish its age must range between the 1.6 my and 1.5 my established for Tuffs IIB and IIC, below and above EF-HR respectively.

In 1963, Leakey (1971) uncovered a 5.7 x 6.6 metre surface which she subsequently expanded through several pits. The archaeological level appeared directly above a limestone stratum, linked to a clay deposit which in some locations had been eroded by a gravel channel. According to Leakey (1971:124), most of the artefacts were concentrated in the area where gravel and clay came into contact, proposing the hypothesis that the lithic pieces had originally been included in the clays and that some of them had subsequently been transported by the flowing water. The pieces appeared in a level merely 9 cms thick, which led Leakey (1971:260) to estimate an average of approximately 13 artefacts per m^2. Leakey notes that most pieces appeared in two concentrations in the highest area of the clay surface, separated by the depression formed by the stream, about 60-75 cm deep. Thus, this author interpreted the assemblage as a small temporal camp located on both sides of a shallow stream.

The lithic industry has an exceptionally preservation, since pieces present intact edges. Nonetheless, Leakey (1971) documented some rounded pieces linked to the stream, which probably have a postdepositional history different to that of the rest of the assemblage. Bone remains are very scarce and poorly preserved, except for a complete giraffe skull found in the stream, which Leakey (1971:126) attributes to human accumulation.

General characteristics

Despite its importance as one of the first Acheulean sites ever discovered, EF-HR has not been given the same attention as Bed I assemblages. However, as well as Leakey (1971), several other researchers have re-examined the collection partially or totally, for example Stiles (1977), Bower (1977), Kimura (2002), Ludwig (1999) and Kyara (1999). As occurred previously, the number of items varies for each researcher; therefore, whilst the original work only contemplated 522 pieces (Leakey 1971:136), Kimura (2002:296) totals 553 items. Ludwig (1999:31) counted 481 pieces, and in this study we have only found 429. Since Leakey's frequencies for knapping products coincide *grosso modo* with our estimations (tabl. 5.1), it would seem that the sample that disappeared when we performed our analysis could correspond to large objects like cores and hammerstones.

Although table 5.1 could prove that the scant number of items indicates the marginality of human activities, that impression disappears when bearing in mind the total volume of raw material transported to EF-HR (tabl. 5.2), since hominids worked over 46 kilograms of quartzes and lavas. The total weight for the transported raw material was probably much greater, but the authors that have had access to the whole collection (for example Kimura 2002) have not included data that could allow this estimation. In any case, suffice it to say that FLK Zinj, one of the sites for which we assume a systematic and repetitive occupation of the same area over a long period of time, presented no more than 44 kilograms of worked lithic material.

	Quartz		Lava		Total	
	n	%	n	%	n	%
Cores	2	1.3	4	1.4	6	1.4
Core fragments	-	-	3	1.1	3	0.7
Large Cutting Tools	9	6	20	7.2	29	6.8
Small retouched pieces	1	0.7	4	1.4	5	1.2
Hammerstones	3	2	1	0.4	4	0.9
Blanks for L.C.T.*	1	0.7	1	0.4	2	0.5
Whole flakes	10	6.7	68	24.4	78	18.1
Flake fragments	79	52.7	142	50.6	221	51.5
Frag. < 20 mm	4	2.7	19	6.8	23	5.4
Angular fragments	38	25.3	16	5.7	54	12.6
Hammerstone fragments	3	2	1	0.4	4	0.9
Total	150	100	279	100	429	100

Table 5.1. Lithic categories according to raw materials from EF-HR.

	Quartz (g)	Lava (g)	Total (g)
Cores	676	1628	2304
Large Cutting Tools	4238	13215	17453
Small retouched pieces	132	1203	1335
Hammerstones	221	298	519
Blanks for L.C.T.	-	1473	1473
Whole flakes	1318	4612	5930
Flake fragments	1674	11003	12677
Frag. < 20 mm	8	51	59
Angular fragments	2891	1341	4232
Hammerstone fragments	350	56	406
Total	11508	34880	46388

Table 5.2. Total weight of general lithic categories.

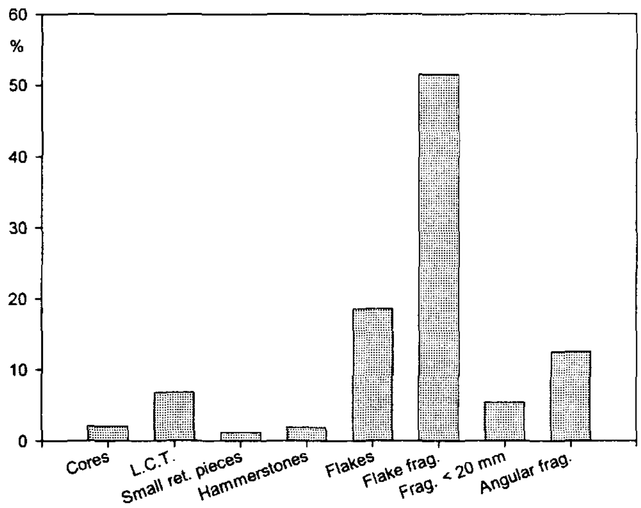


Figure. 5.1. Lithic categories at EF-HR. L.C.T.: large cutting tools.

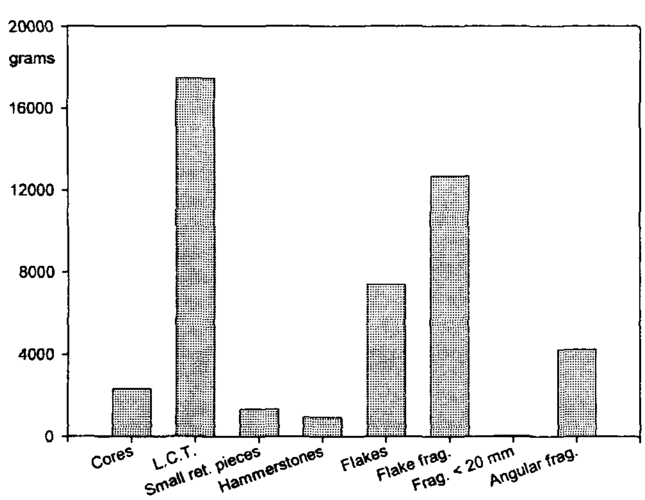


Figure. 5.2. Weight (in grams) of each general category at EF-HR.

With under 500 analysed pieces, EF-HR already exceeds the total volume of modified raw material in FLK Zinj. Thus, EF-HR is not relevant in view of the absolute frequencies of the objects but given the volume of raw material; therefore, we should continuously consider the genuine contribution of each of these categories. This is noticeable in figure 5.1; flake fragments, flakes and chunks are the most numerous pieces. Nonetheless, when considering the weight of the objects, we note that the large cutting tools were the most important items in terms of the investment of raw material (fig. 5.2). Therefore, and despite the meagre amount of items (n=29), the large cutting tools category should be considered the site's most relevant category.

As regards raw material, three fourths of the slightly over 46 kilograms worked in EF-HR correspond to lava knapping, whilst only 11 kilograms of quartzes were modified anthropically (tabl. 5.2). This pattern is not new, since we saw in DK, FLK Zinj or FLK North that, even when quartzes could exceed lavas in number, the latter is always more important in terms of the volume of raw material. Moreover, in EF-HR quartzes were generally used the same way as lavas (fig. 5.3).

The Lien test (fig. 5.4) shows there are only two categories presenting a vast difference between quartzes and lavas; one corresponds to chunks and the other to flakes. Both can be explained taking into consideration the constrictions inherent to the raw material and not an intentional technical dichotomy. Given the low coherence of quartz crystals, when this material fractures it smashes more easily than other raw materials and generates many amorphous fragments (for example Amick & Mauldin 1997). This could be one reason to explain the greater abundance of quartz chunks compared to lavas, without ruling out the fact that a good part of these fragments would have fortuitously detached from quartz hammerstones, the sole category that shows a prevalence of this raw material. Likewise, the greater relative profusion of whole lava flakes could be explained in view of the lower fragmentation of such raw material, which produces *débitage* products more easily, without them breaking during the knapping processes.

Quartz and lavas do not seem to have been used differently to manufacture specific categories, since, proportionally, there is a very similar number of large cutting tools, the most frequent type of object present in EF-HR. Nonetheless, this should not mask the real trend: phonolites, trachytes and basalts were the most frequently used raw materials.

Knapping products

EF-HR presents 80 whole flakes (including the blanks for large cutting tools), a total that exceeds other sites which, nevertheless, present a greater number of lithic remains. There are no differences between the size of the knapping products, with the low number of quartz flakes included in a size interval very similar to lavas (fig. 5.5). Although the average length has been established at approximately 5 centimetres (tabl. 5.3), there are a great number of examples in a superior size range (fig. 5.6), which proves the considerable size of many of these flakes.

If in other sites the tabular nature of the quartz blocks sometimes hampered the reliability of the cortex percentages, in

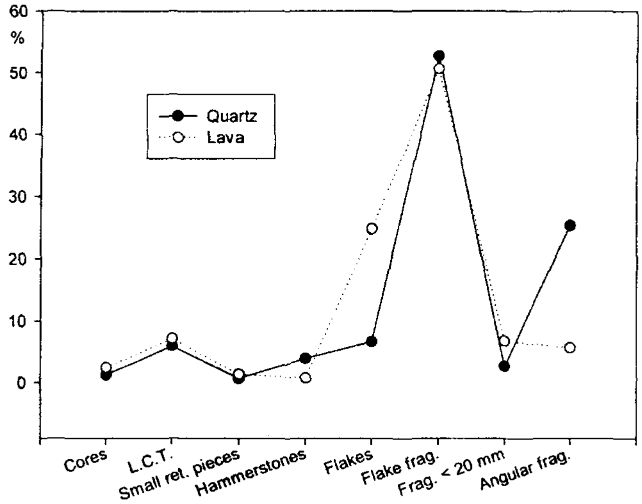


Figure 5.3. Representation of categories in terms of raw materials documented in EF-HR.

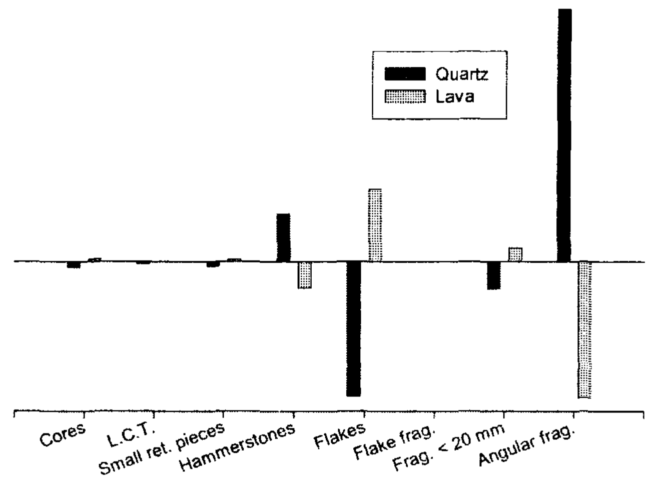


Figure 5.4. Lien Test comparing categories and raw material.

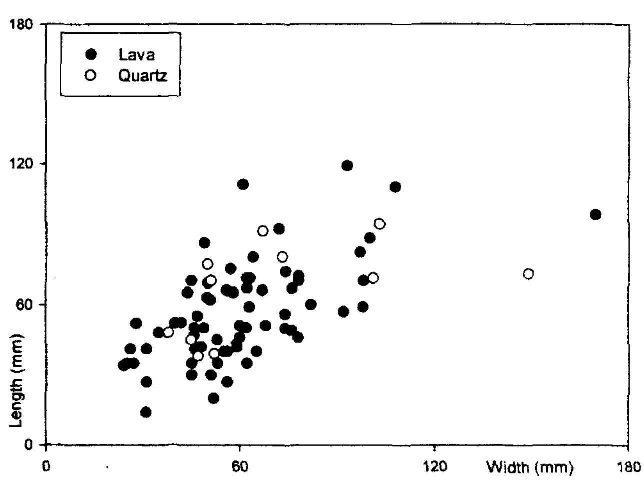


Figure 5.5. Dimensions of the quartz and lava whole flakes.

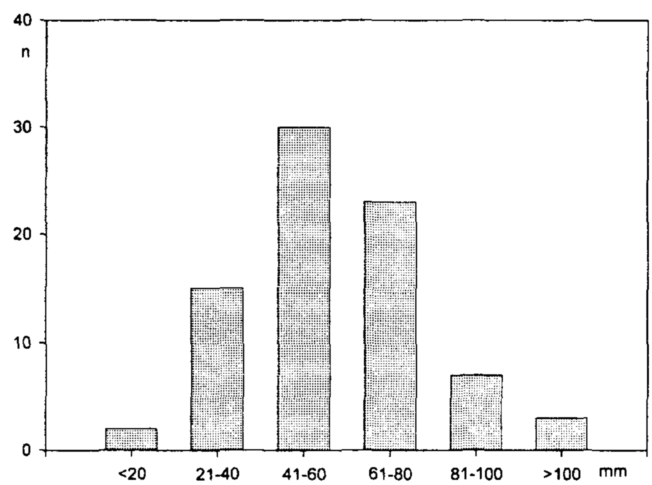


Figure 5.6. Length patterns of the whole flakes.

	Minimum	Maximum	Mean	Std. deviation
Length	14	119	57.65	21.246
Width	24	170	61.55	25.267
Thickness	3	65	17.86	9.679
Weight	3	882	92.54	138.81

Table 5.3. Dimensions of the whole flakes.

Dorsal face	Striking platform				Total	
	Cortical		Non-cortical			
	N	%	N	%	N	%
Full cortex	2	2.5	1	1.3	1	1.3
Cortex > 50%	-	-	8	10	8	10
Cortex < 50%	3	3.8	18	22.5	21	26.3
Ncortical	6	7.5	42	52.5	48	60
Total	11	13.8	69	86.3	80	100

Table 5.4. Cortical frequencies in the whole flakes.

EF-HR a good part of these metamorphic rocks appear as stream cobbles, in which it is much easier to identify cortical areas. Therefore, adding quartz and lava flakes, we find that up to 40% of these products preserve cortex remains on their dorsal faces, and up to 13.8% on the butts (tabl. 5.4). Consequently, a good part of the initial flaking was obviously performed in the site itself, since flakes of all the types contemplated by Villa (1983) and Toth (1982) were found within (see fig. 5.7).

The analysis of the flakes' butts (fig. 5.8) shows that knapping platforms were generally unprepared and that a high number were cortical. However, the percentage of dihedral or multi-faceted butts is substantially greater than in previously analysed sites. This implies greater attention to the preparation of striking platforms. The quantitative information we have to date already allows the inference of certain technolo-

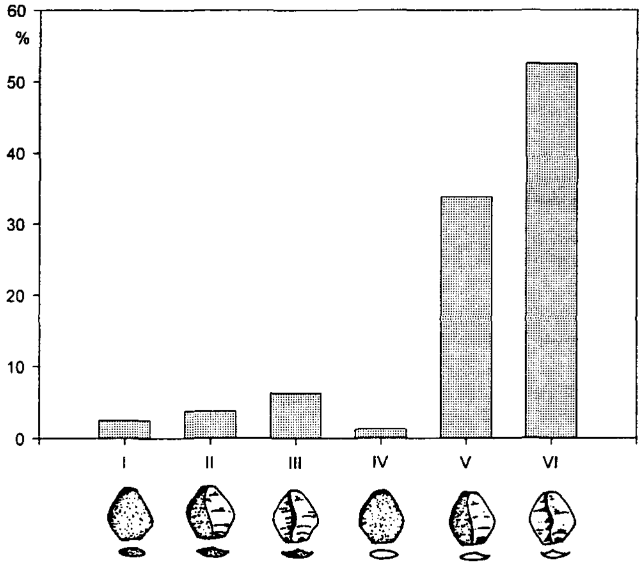


Figure 5.7. Whole flakes according to Toth's (1982) classification.

Figure 5.8. Types of striking platforms in the whole flakes.

gical differences compared to knapping products obtained in the Oldowan sites. Nonetheless, limiting the work to a quantitative study of independent attributes (Ludwig 1999; Kimura 2002) prevents a correct comprehension of the underlying technical strategies. So as to understand the genuine dimension the technological change EF-HR involves, we should focus on the qualitative nature of each individual object. An initial example that proves the need for monographic consideration appears in the analysis of flake fragments and chunks: just these fragments total approximately 17 kilograms of worked raw material. Furthermore, studying these fragments indicates a vast profusion of Siret accidents during the knapping process (fig. 5.9), which also suggests that a too great force was applied on high-quality cores. The strong blows should come as no surprise, since the size of the Siret flakes and other fragments indicate the nodules must have been enormous (fig. 5.9 and 5.10). Moreover, both the presence of numerous split fractures and the profusion of large discarded flake fragments indicate that the processes for decorticating the large cores could have been performed *in situ* in the actual settlement. We are referring to flake fragments weighing an average 300 grams each, which were not employed after the technical error that fractured them. This would not make sense if such processes had not been carried out in the site itself. Therefore, the fact that the large nodules were exploited *in situ* (an aspect that is hard to prove, as we will see below), would be extremely relevant when assessing the transportation of raw materials.

EF-HR presents a great number of whole flakes, generally with excellent morphologies, edges and sections. Considering the ranges proposed in figure 5.6, but particularly taking qualitative characteristics into consideration, we can distinguish three types of flakes, small, medium and large. This distinction is based mainly on their position in the *chaîne opératoire*, not on metrical criteria.

The small-sized flakes (fig. 5.11) are characterised by a 3-5 cm metrical module, dorsal faces with 2-4 previous scars and a generally longitudinal unidirectional pattern. It is hard to reliably differentiate flakes obtained from a typical *débitage* system, those obtained from the preparation of nodules for the detachment of large Acheulean blanks, or even from those obtained from the *façonnage* of such blanks. There are some criteria to distinguish these flakes, for example the angle formed between the ventral face and the butt (generally very wide in pieces linked to obtaining and/or the *façonnage* of blanks) or the actual size of the butts (substantially smaller in typical *débitage* than in other processes). However, these attributes are not sufficiently defined to assign flakes to one process and or another confidently. We have consequently decided to include small-sized flakes in a single group. In any case, in view of the low number of cores from the most classical *débitage* system, we could assign most of these flakes to processes linked to obtaining blanks for large cutting tools.

Medium-sized flakes, between 5-8 cms, are certainly linked to sequences for obtaining large blanks. Here the question lies in assigning these flakes either to the preparation of nodules to obtain these large blanks, or to the *façonnage* of such pieces. In general, we favour the first option, since the large cutting tools did not undergo a relevant secondary reduction. On the other hand, these medium-sized flakes, whose dorsal faces frequently indicate a multidirectional pattern, suggest a systematic working of the knapping surfaces from which they originated (fig. 5.12 and 5.13). Occasionally, given their length and width, these medium-sized flakes could be included among the blanks for large cutting tools. Herein, this categorisation is explained considering the meagre thickness of their sections, which contrasts with the forcefulness of objects considered as blanks for large cutting tools, and that of the retouched pieces themselves.

Finally we will move on to analyse the group of the large flakes which, without undergoing secondary modification, present all the features that make them potential blanks for

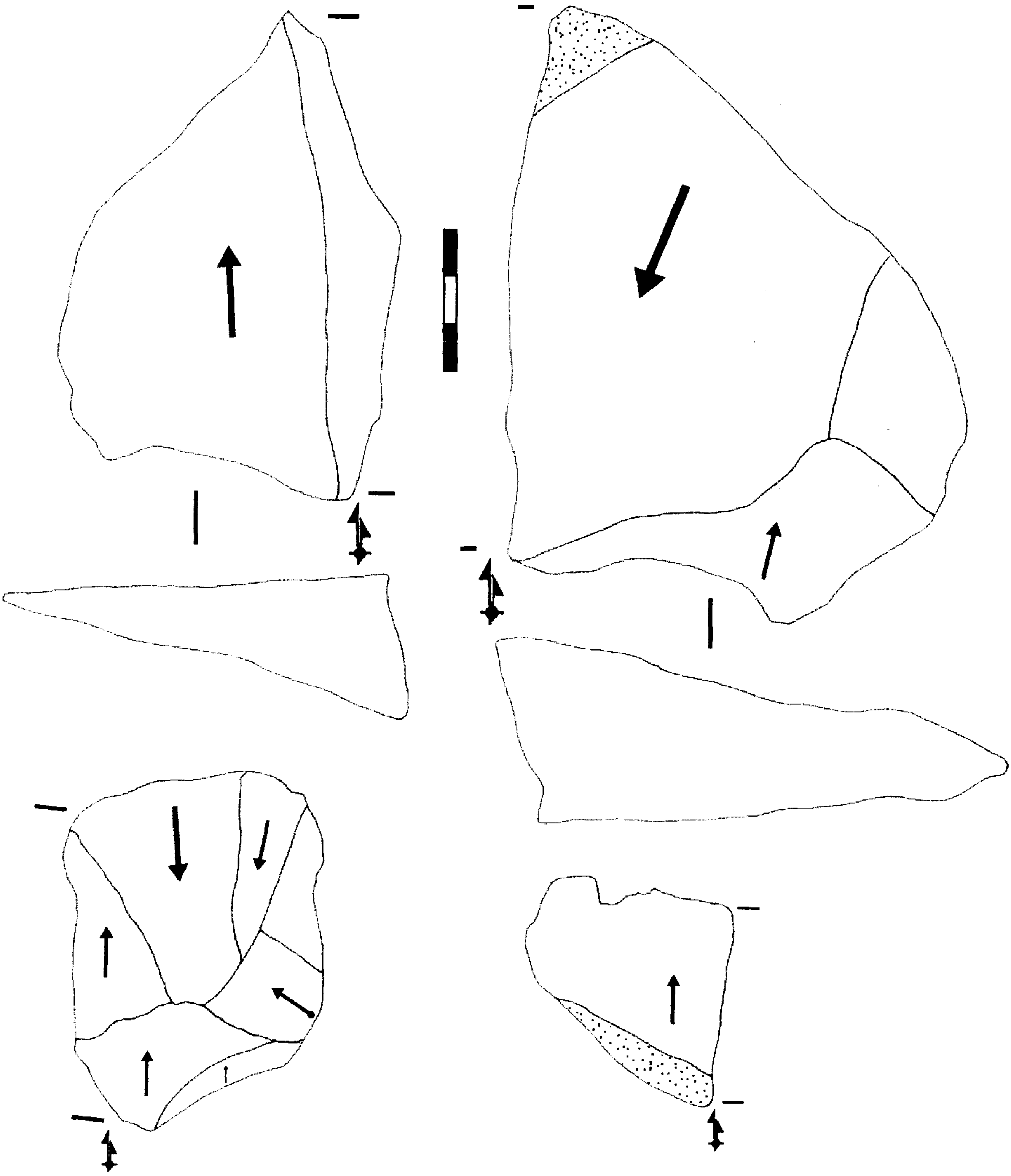


Figure 5.9. Examples of split fractures (Siret flakes) from EF-HR. All of them are high-quality basalt except the third, a quartz fragment.

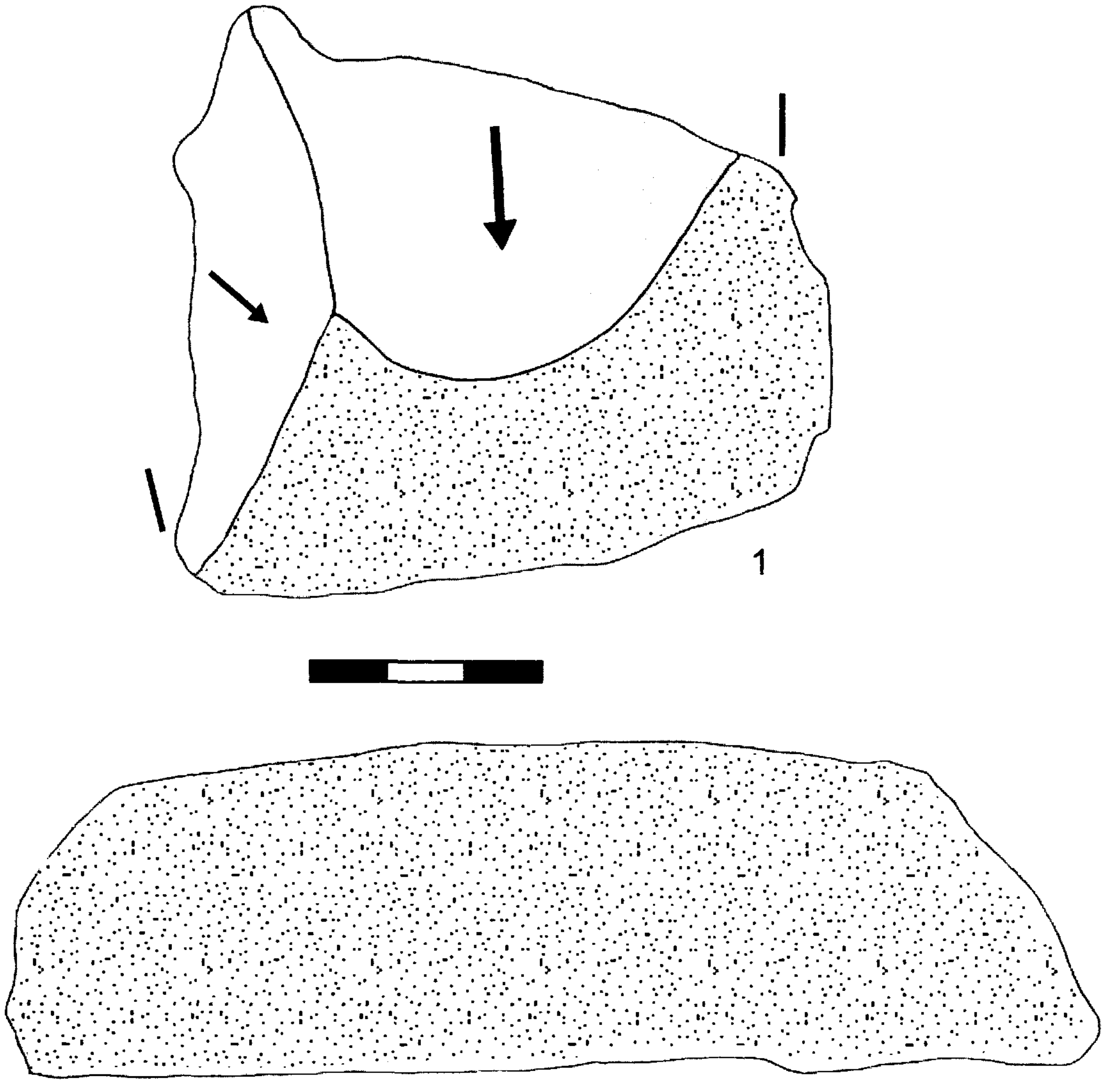


Figure 5.10. Examples of fragments from EF-HR. 1: phonolite flake fragment, with most of the surface covered by fluvial cortex indicating a large original boulder; 2: quartz chunk, also with fluvial cortex denoting a large original cobble.

large cutting tools (fig. 5.14). Table 5.1 shows we have only considered two whole flakes as large flakes, although really their technological genesis could be applied to all large cutting tools. Therefore, and since the sample is larger among retouched items than among the blanks presenting no secondary modification, we will postpone our hypothesis on the way these flakes were produced.

In all, EF-HR presents a vast collection of flakes that suggest different stages and even different types of reduction. Some of them, the smallest amount, are linked to the typical *débitage* system for knapping small cores. The rest of the flakes seem to be linked to the *chaîne opératoire* for the production of large cutting tools, involving the corresponding reduction stages, from the initial flaking of the nodules to the preparation of the knapping surfaces which would subsequently produce the large blanks that would finally be retouched. Consequently, these facts suppose an important structuring of the knapping systems, which is noticeable in the flakes' dorsal patterns (fig. 5.15 and 5.16), which indicate a systematic exploitation of the knapping surfaces. Furthermore, as stated above, the final goal is to obtain blanks that will subsequently be retouched.

Retouched pieces

This section includes two groups, the small retouched pieces and the large cutting tools on huge blanks. Table 5.5 shows that even items which we consider small retouched pieces are much bigger than those available in other previously studied Oldowan sites. The difference between these pieces and those considered large cutting tools fades from a metrical viewpoint, but we have thought it relevant to distinguish them given the lesser "blunt" nature of the five side scrapers that

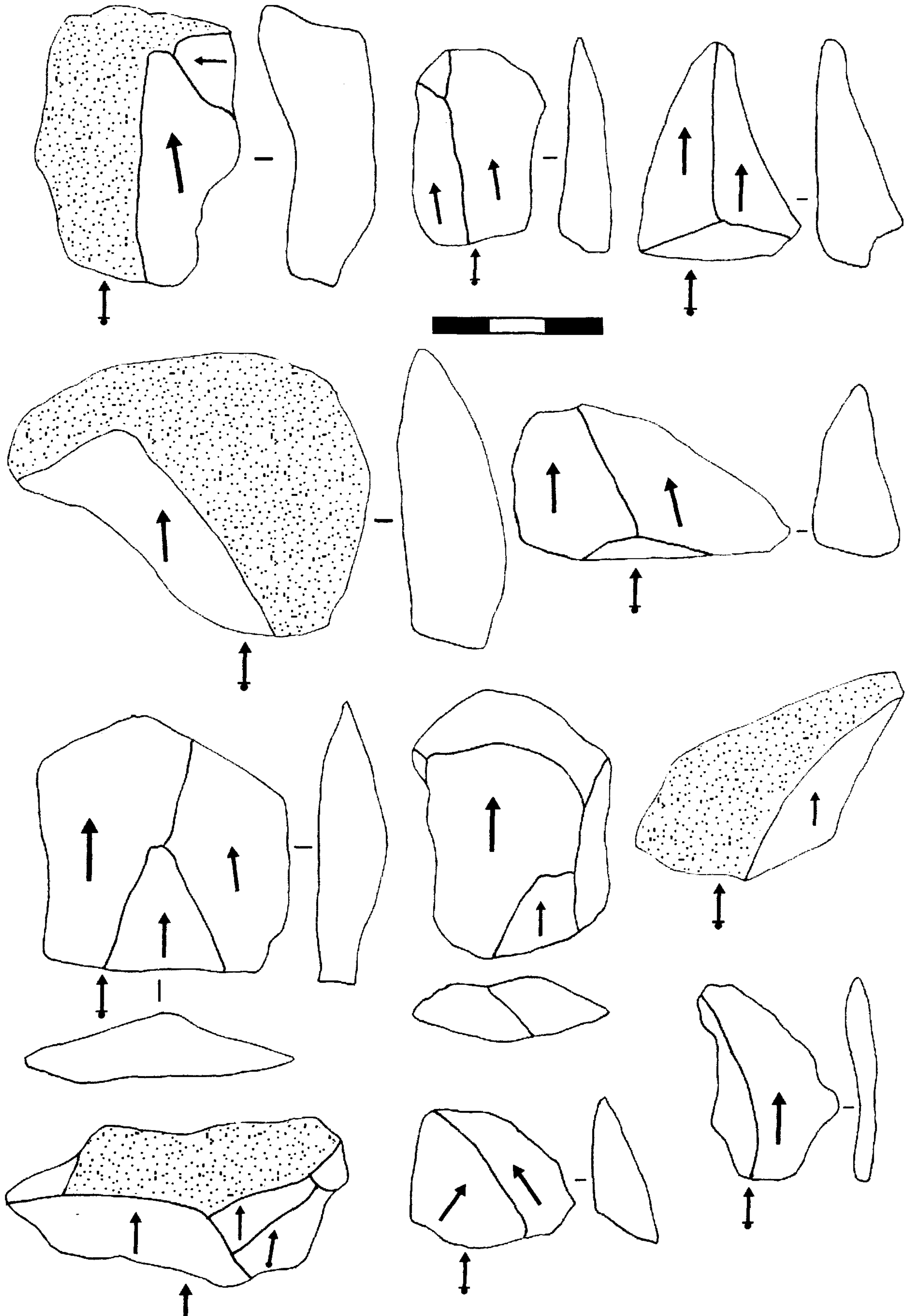
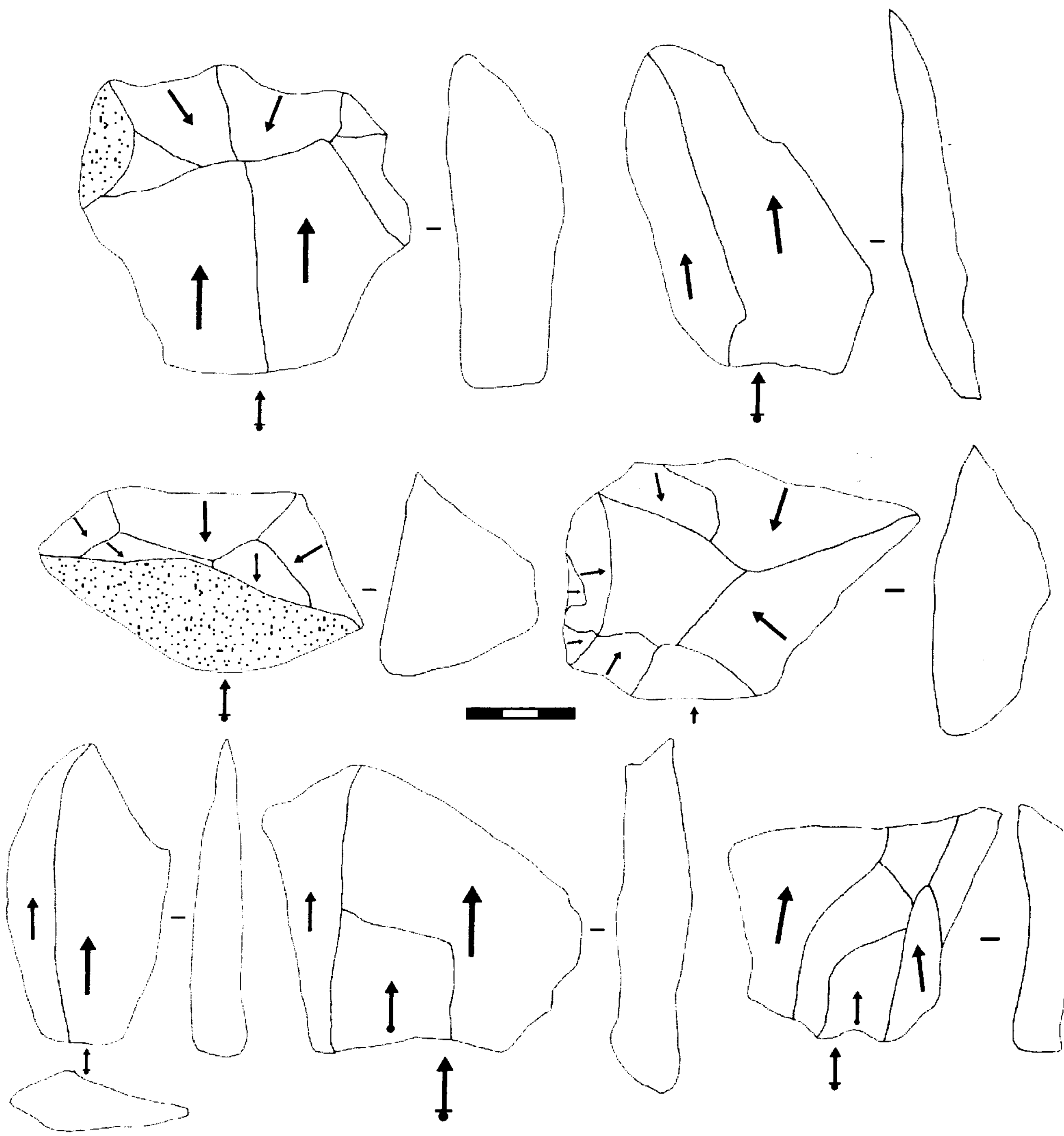


Figure 5.11. Examples of small-sized lava flakes.



form the group of the small retouched pieces. In any case, their profusion and relevance in the assemblage is insignificant compared to the large cutting tools, therefore we should focus on the latter.

The first problem we encounter upon describing the large cutting tools is linked to terminology. One of the most successful systematisations for the classification of the assemblages from the African Acheulean was proposed by Kleindienst (1962), although explicitly stating that such "*classification is deliberately based on morphology, insofar as technique can be divorced from form, and takes no account of the quality of workmanship or 'finish'*" (Kleindienst 1962:83). The author considered the artefacts we are dealing with at present, i.e. large cutting tools, were tools with sharp edges, a size ranging between 10-30 cm, which could be classified in five main groups (see Kleindienst 1962). In his re-examination of the African Acheulean, Isaac (1977) grouped all the types Kleindienst (1962) defined in what he called large cutting tools. Hence, Isaac (1977) simplified the previous typology, although

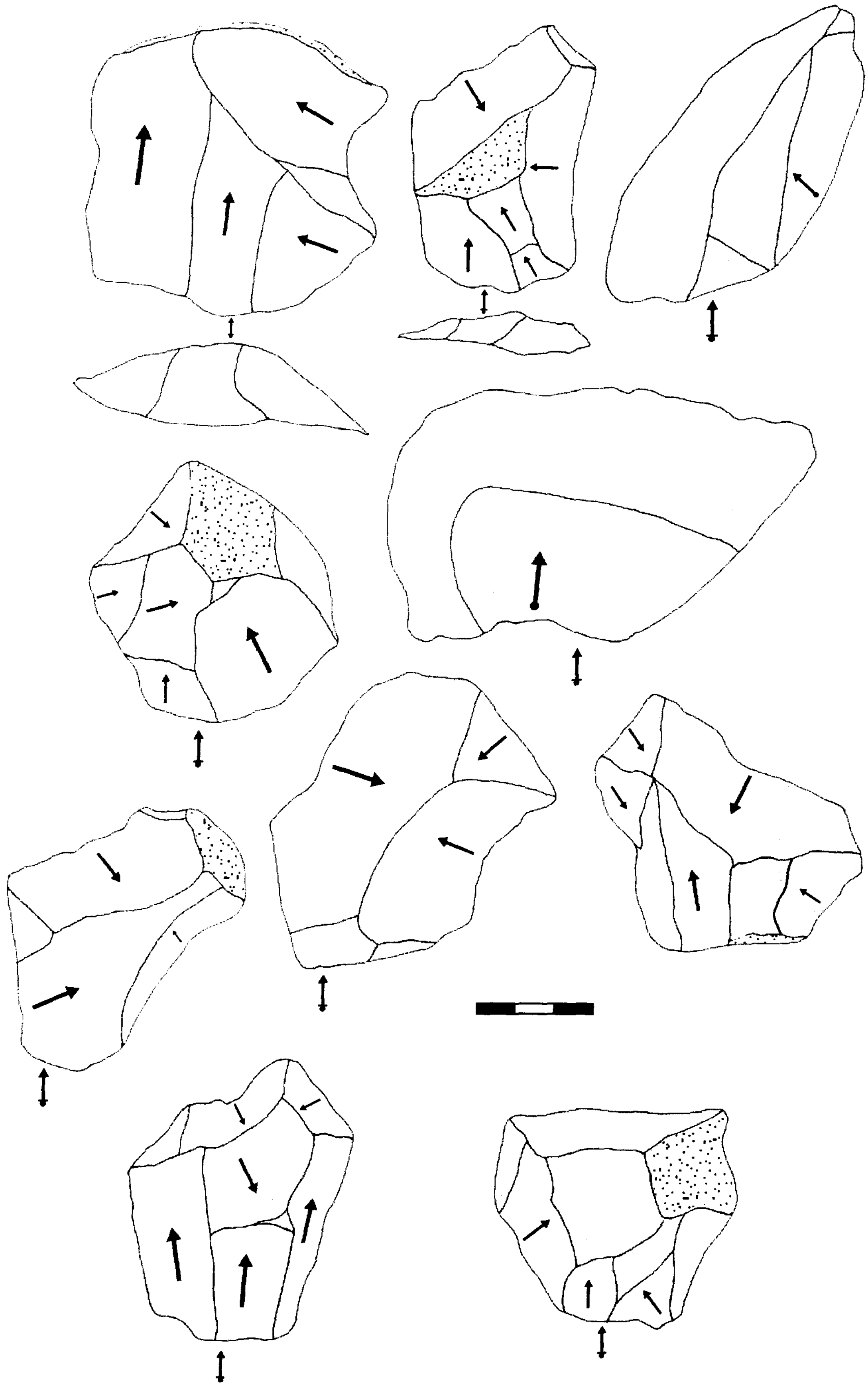


Figure 5.13. Medium-sized lava flakes.

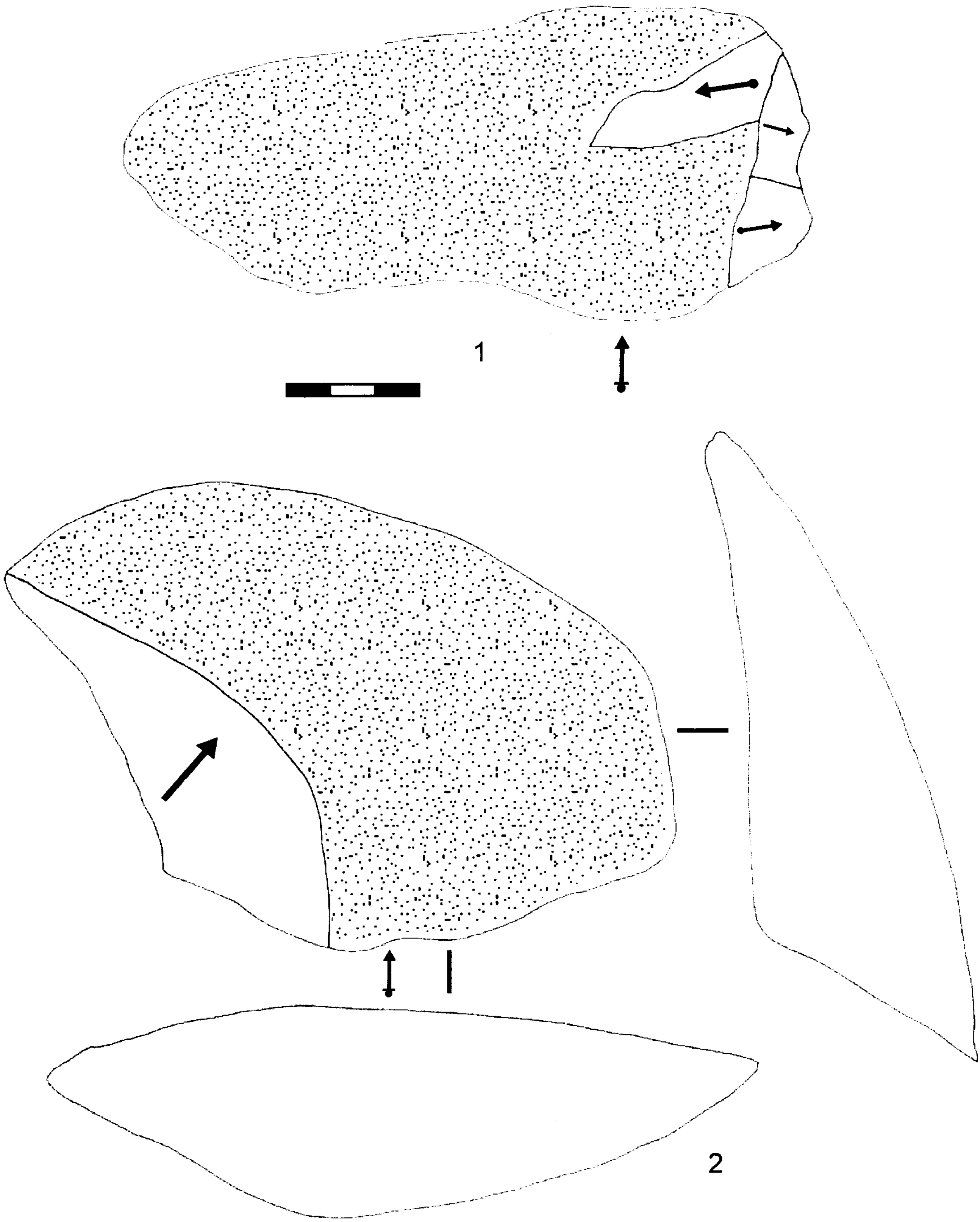


Figure 5.14. Large flakes, typical blanks for large cutting tools, in this case without secondary modifications. 1: quartz example with fluvial cortex; 2: basalt example, the fluvial cortex denoting a large original cobble.

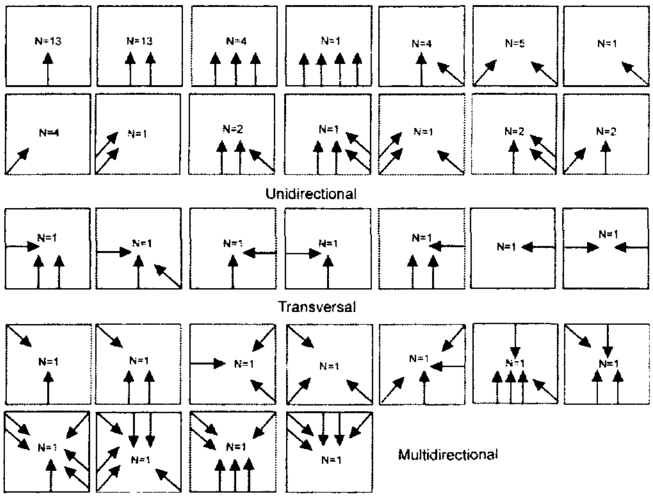


Figure 5.15. Diacritic schemes of the dorsal flaking on the whole flakes.

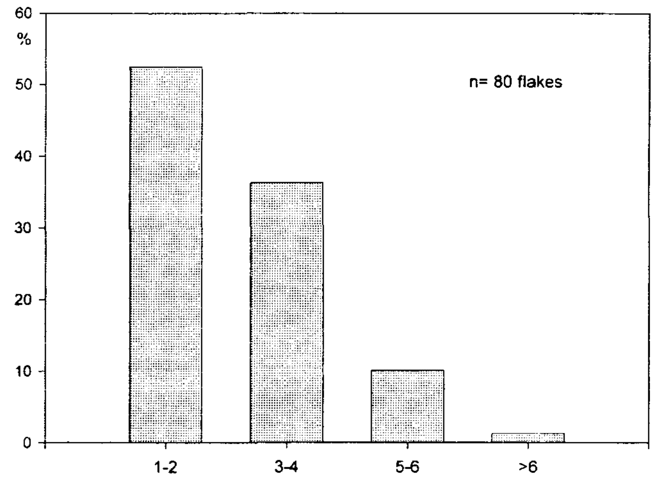


Figure 5.16. Number of scars on the dorsal sides of the whole flakes.

	Minimum	Maximum	Mean	Std. deviation
Length	68	101	81.8	12.657
Width	61	120	83.4	22.93
Thickness	28	49	36.4	8.764
Weight	132	528	267	159.543

Table 5.5. Dimensions of the small retouched pieces.

he still contemplated the existence of discreet types of bifaces, cleavers, picks, triedres and knives. This designation has been successful, and recently the term large cutting tools still prevails in the classifications aiming to organise this type of artefacts (for example Isaac *et al.* 1997; Clark & Kleindienst 2001; Noll 2000; etc). As regards the Olduvai monograph, Leakey (1971:5) favoured a synthesis of the different types of bifaces, considered alongside the groups of cleavers and picks, without furthering more complex subdivisions.

In EF-HR, Leakey (1971:124-126) asserted the prevalence of oval bifaces, although she also noted the presence of picks, triedres and a cleaver. The problem is that, from a technological perspective, it proves hard to sustain the validity of the typological groups Leakey (1971) defined. Consequently, we should initially analyse the way these pieces were obtained to then move on to investigate if we can establish a typological standardisation. Leakey (1971:126) herself noted that a good part of these pieces used large flakes as blanks. Indeed, our analysis of these blanks shows that 26 of the 29 pieces are flakes, with two other objects in which the retouch does not allow us to identify the original blank and one showing that it was worked directly on a block. Although not frequent, we sometimes find that the butt was thinned by a retouch that also gives the flake's proximal area a sharp edge. In pieces that preserve the butt, this element forms a wide angle with the ventral face. Such angle, alongside the thickness of the butts, indicate that the percussion point on the knapping platform was always distant from the edge of the core. Consequently, hominids aimed to obtain a specific volume, involving the loss of raw material on the horizontal plane (knapping platform), the transversal plane (exploitation surface with previous detachments) and plane h′ (see fig. 5.17). This hypothesis is corroborated in view of the actual examples from EF-HR, with large retouched blanks with cortical butts and distal ends with cortex removed from the opposite platform, indicating both the large size of the cobbles and the interaction between the different core surfaces.

The dorsal faces of the large cutting tools show that the cores from which they originate are not very structured: although an average of 7.6 previous detachments have been estimated for each blank, several are mainly cortical and over a half present cortex remains on their dorsal faces. Small-sized flakes could have been used to rejuvenate knapping platforms, whilst the medium-sized flakes were mostly probably used to prepare knapping surfaces prior to the detachment of the large blanks. Yet in general, it does not seem that cores were prepared extensively; hominids selected high quality large boulders (we have estimated elements weighing over 2-3 kilograms) which, after little or no preparation, they struck heavily to obtain large-size flakes which they retouched subsequently. Therefore, we need to consider the secondary modification patterns (i.e. retouching) such blanks underwent.

The problem we face is the systematisation of these objects. Leakey (1971) gathered all objects under the terms bifaces, picks and cleavers, but in our opinion the designation biface is already risky. To begin with, bearing in mind the fact that most of the EF-HR pieces do not present bifacial retouch but unifacial retouch. Actually, the only similarity between these artefacts and real bifaces lies in their genuinely large size (tabl. 5.6). On all other counts, they are much closer to different types of enormous scrapers, which employ the ventral faces of large flakes as striking platforms to retouch the edge on the dorsal face: of the 29 pieces, only 15 present shaped ventral faces, with the rest of the surface free of any other type of modification. Therefore, we should refer to unifaces instead of pieces worked bifacially.

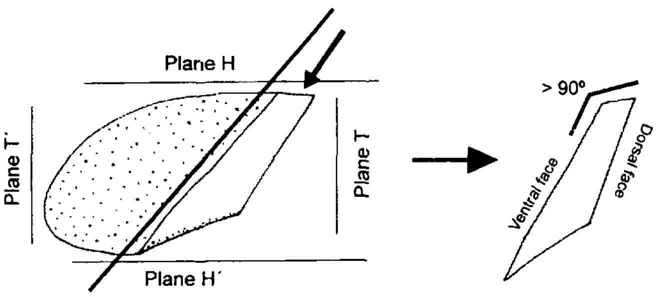


Figure 5.17. Ideal representation of the process for obtaining large flakes, which – when obtained – detach part of the knapping platform (Horizontal Plane), from the knapping surface (Transversal Plane) and the surface on the opposite side to the knapping platform (prime Horizontal Plane).

	Minimum	Maximum	Mean	Std. deviation
Length	73	235	123.86	38.975
Width	62	197	109.69	38.47
Thickness	27	63	43.55	8.79
Weight	306	1375	605.52	222.32

Table 5.6. Dimensions of the large cutting tools.

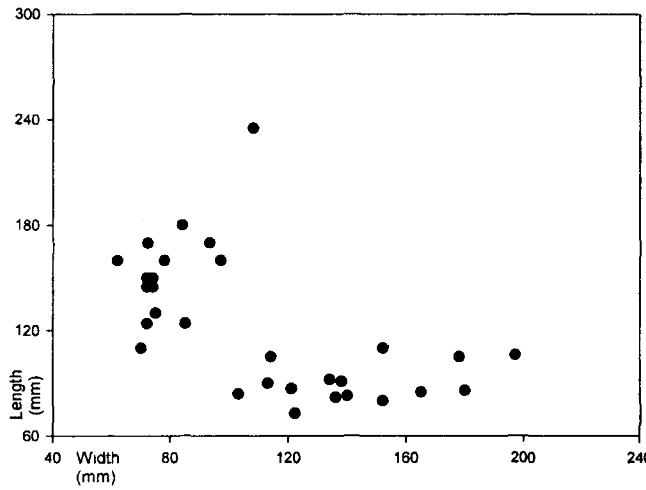


Figure 5.18. Dimensions of the large cutting tools. The graph shows two groups, one with pieces that are longer than they are wide and others that are wider than they are short. The elongated pattern is artificial, however, since the pieces for which the original butt position cannot be established are oriented in terms of their major axis, which is assigned the length variable. Actually, the flakes for which the butt has been established (oriented in terms of the technological axis of flaking) are always wider than they are long.

Furthermore, on artefacts presenting bifacial retouch, such secondary modification is never invasive, i.e. knappers do not work the whole surface, but simply modify the edges slightly. This is very significant since, whilst in genuine bifaces *façonnage* aims to obtain two proportionate volumes, thus involving interaction between both surfaces, bifacial retouch in EF-HR only aims to rectify the morphology of the edges, without ever creating two surfaces separated by an intersection plane. Furthermore, we find another difference with genuine bifaces: in EF-HR retouch usually is denticulated, with a simple angle and normal width. This means that, firstly, the edges of the pieces are discontinuous and carelessly created, and therefore do not present the regularity of the edges found on real bifaces. Secondly, simple angle blows break the rim penetrating too far into the edge, and the lack of depth in the width of the retouch collapsed the central part of the worked surface.

Therefore, EF-HR presents none of the concepts linked to biface shaping, showing simply a formal similarity based on the size and morphology of these artefacts. As regards the morphologic similarity between these large cutting tools and genuine bifaces, the main aspect is that their generally pointed nature – as Leakey (1971:126) stated – is obtained from the simple intersection between two or three blows that create a flat or trihedral point. As regards size, table 5.6 shows the bluntness of these pieces, frequently weighing over one kilogram, and the profusion of wide, short flakes over long, thin ones (fig. 5.18). This is linked to the technological process, since the great width of these flakes is determined by the large butts, which usually take up the whole width of the flakes; when dealing a heavy blow to an area distant from the edge of the core on wide surfaces, the resulting flake detaches a good part of the striking platform, at the same time determining the wide, short morphology of the blank.

In conclusion, we can summarise the characteristics of these large cutting tools by saying that they are large, wide, short flakes, with well-developed, thick sections which, given the vast volume they detached from the core, left knapping surfaces exhausted, requiring a complete rejuvenation process. The large blanks obtained were only partially modified by retouch, which was limited to shaping the edges, never the volume of the dorsal and/or ventral surfaces. This retouch aimed to modify or create a unifacial or bifacial edge and, frequently, to obtain a point on one of the lateral ends of the flake, although the existence of at least three cleavers is also documented. In our opinion, any attempt at systematising the common characteristics of what are actually large scrapers cannot be taken any further than this. The pieces from EF-HR are large, sometimes sharp, sometimes pointed, shaped on a flake or on a block, etc. Despite this variability, they all share certain attributes: general modification of the shape of the object and the creation of massive edges. Nonetheless, we cannot assign these pieces to biface typological groups or integrate them in any morphological assemblage. Therefore, we have decided to present hereunder some specific examples of the pieces from EF-HR, hoping that the individualised *X-rays* will enable the comprehension of the genuine dimension of the technological strategies that gave way to these characteristic objects (see fig. 5.19 to 5.25).

The *chaîne opératoire*

The basic goal for stone working in EF-HR focused on obtaining large blanks which were subsequently retouched.

As table 5.2 demonstrated, there are over 17 kilograms of raw material turned into large cutting tools, and surely most of the other categories (flakes, flake fragments, etc) correspond to secondary products generated when obtaining large retouch blanks. In any case, we need to reconsider the percentages of the different categories so as to understand the type of *chaînes opératoires* that governed the technology in EF-HR.

Firstly, the manifest lack of chips is notable, composing slightly over 5% (tabl. 5.1). As regards EF-HR, knapping debris are not generated solely during flake production activities, but also (and quite pronouncedly in this case) during the processes involving the *façonnage* of large objects. This underscores the scarce debris index. We have considered three hypotheses to explain this infra-representation. The first is that the site could have been affected by hydrologic processes. Bearing in mind the stream that cuts through the site dividing it in two, the truth is that, except for the pieces Leakey (1971) recovered exactly from the actual stream, the rest of the collection is in exceptionally preservation conditions, and we cannot sustain that items have undergone any kind of hydraulic traction.

A second hypothesis suggests that both the *débitage* products and the retouched objects were manufactured in another location and then transported to the site; therefore, the millimetric debris would have been left in the original knapping area. This hypothesis cannot be discarded since, as we will see below, the site also lacks other elements (mainly the cores) which should appear if knapping had been a predominant activity. Without excluding this explanation, we should also consider the profusion of fragments and pieces discarded after knapping mistakes. As aforementioned, it is pointless to document over 16 kilograms of discarded fragments without considering the need for *in situ* knapping in the site itself. In fact, we even have refitted some fragments, which indicate that the knapping accident was produced in the actual settlement.

A third explanation for the lack of chips in the collection could be linked to the conditions in which the remains were recovered. Leakey (1971) could not perform the map of the site since a storm moved the archaeological material on display. This could have caused the rains to shift the smallest pieces, or could simply mean Leakey did not sift the sediment for such reason. Furthermore, as regards EF-HR we know Leakey added surface material to the general aggregates, which always hinders the proportion of small remains, and could alter the relative frequencies expected for each category. In any case, these factors unrelated to the actual occupation of EF-HR, could provide a good explanation to justify the fact that size ranges seem to favour greater dimensions.

Another surprising infra-representation appears in the amount of hammerstones, since only 4 were discovered (tabl. 5.1). Moreover, the three quartz hammerstones are quite fragmented, and the single lava hammerstone is too small to be used to detach large blanks and would have been more appropriate for *façonnage* processes. Indeed, knapping activities were performed in the site, since we have both hammerstones and some typical "hammerstone flakes" that detached fortuitously from the cortical surfaces of cobbles after pounding. However, the hammerstones are not big enough to have produced large flakes. Once again we encounter two alternatives; Leakey (1971:136) referred to up to 10 utilised cobblestones, which would be added to the 4 aforementioned hammerstones. Leakey (1971:132-133) also refers to 9 quartz subspheroids and spheroids that could have been used as active percussion elements. These pieces could be part of the group of materials we could not find in the National Museum at Nairobi, and could in fact be the hammerstones missing from the site. Another alternative is that there were only the 4 hammerstones Leakey described, which we re-examined, and that we are, once again, facing a missing link in the *chaîne opératoire* we are trying to reconstruct.

The most important inconsistency appears in terms of the cores. Not a single core studied in EF-HR is linked to the production sequence for the large blanks. Of the 6 documented cores, two were exploited using a unifacial abrupt system, another using a bifacial abrupt system, a fourth example employed multifacial exploitation, and the two final samples used a bifacial peripheral strategy (fig. 5.26). These strategies do not coincide with the method applied for obtaining large flakes. This does not simply evoke the technical schema, since if we turn to a metric comparison (tabl. 5.7) we find that these cores are unrelated to the *chaîne opératoire* for the production of large blanks: none of the cores are larger or at least similar to the large cutting tools. A fact which, obviously, makes it impossible to believe the large blanks come from these cores.

The outcome is that the cores in EF-HR belong to a different *chaîne opératoire* than the large blanks. With an average of 9 detachments per piece, these cores' scars range between 28 mm long and 31 mm wide, which does not even coincide with the range of the small flakes that we have analysed. Therefore, we are facing a strategy very focused on flake *débitage* employing systems already studied in Oldowan sites, which do not aim to obtain large blanks. Moreover, we must consider the fact that these cores composed under two kilograms of the total amount of raw material transported to the site, even less than the total composed by flakes and fragments. Therefore, it seems obvious to think that the knapping process for small flakes was a peripheral activity in EF-HR, which focused on obtaining large blanks which were subsequently retouched.

The problem is that we did not document a single example of block or cobblestone that could have been employed to detach these large flakes. Considering the large size of many of the retouched items, which also present a fluvial cortex, it seems appropriate to think the cores that produced them were huge basalt, phonolite and (to a lesser degree) quartz boulders. Perhaps the large size of the boulders deterred the hominids from transporting these cores to EF-HR. Consequently, we face the possibility of such large blanks being obtained in streams, and that only the flakes were transported to the site.

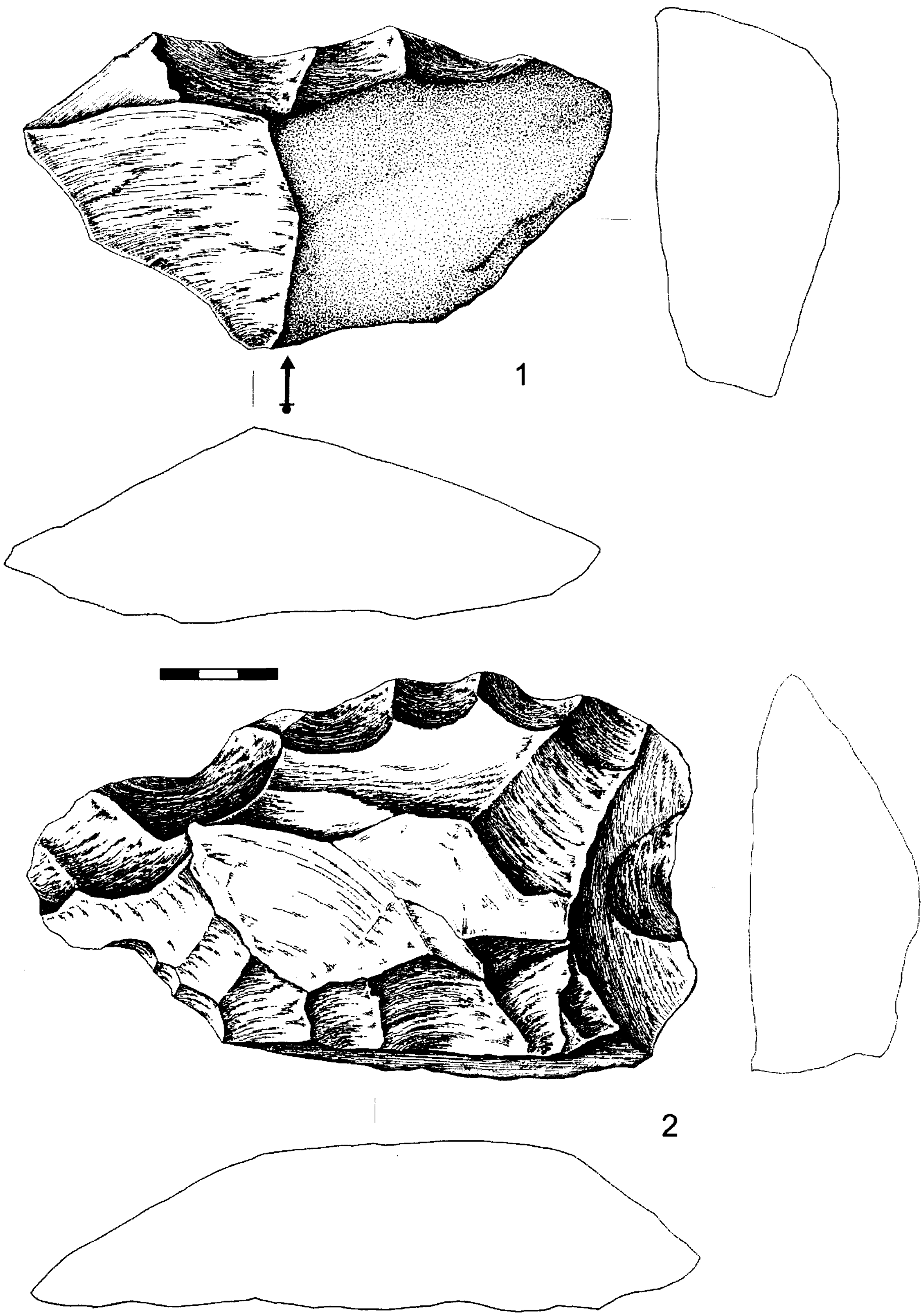


Figure 5.19. Lava large cutting tools. They could be classified in the knives group, since they both present an abrupt area that coincides with the butt and on the opposite side to a retouched edge. 1: basalt flake with an unifacial, transversal, denticulate and abrupt retouch. The dorsal face was not worked significantly before the flake was detached; 2: phonolite flake with a broken butt. Except for a few isolated blows on the ventral face, the retouching is unifacial, denticulate, with a simple angle and focused on the transversal edge of the flake (drawn by N. Morán).

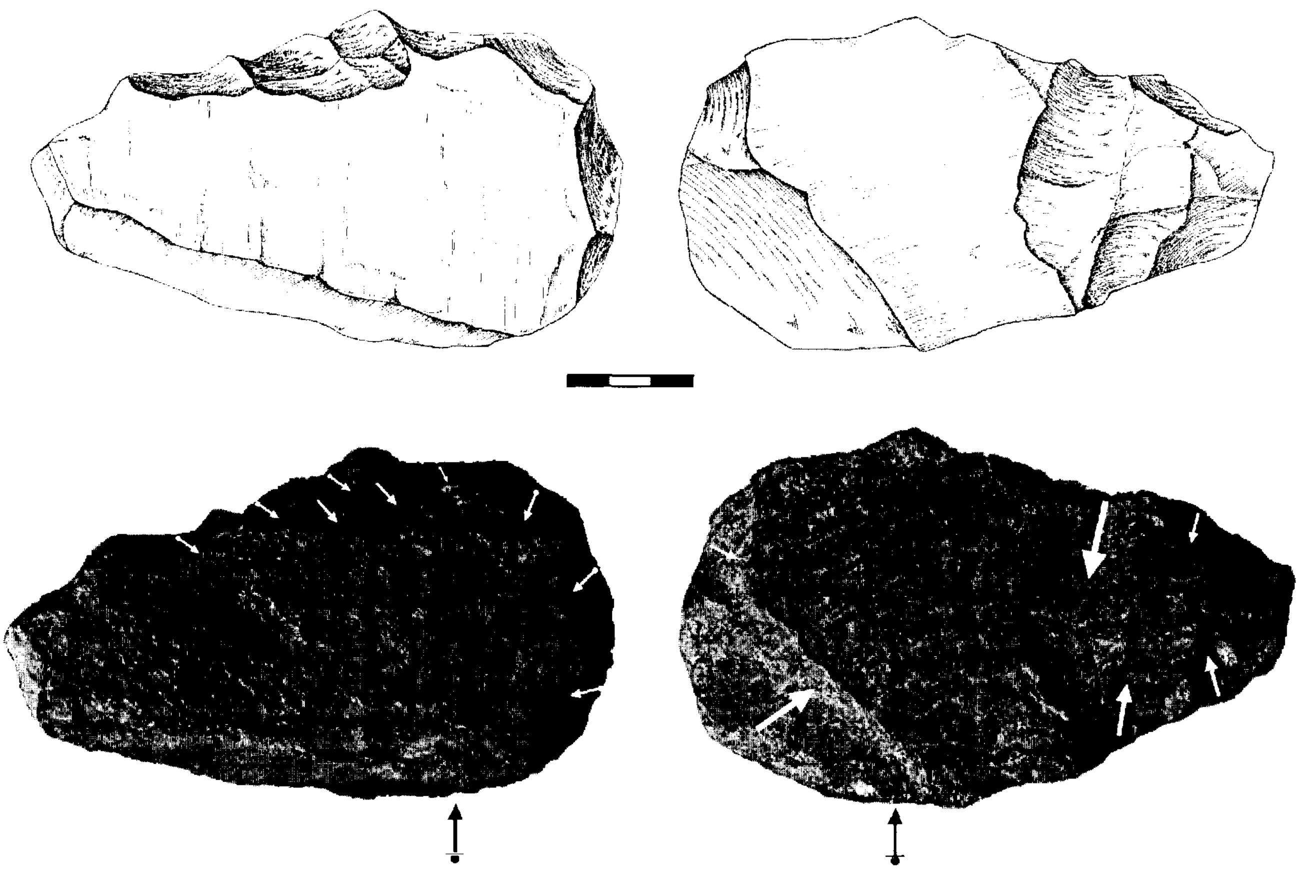


Figure 5.20. As with the figures in the previous example, this basalt retouched flake could be classified in the knives group, since the butt forms an abrupt back on the opposite side to a modified transversal edge with a retouch that is denticulate, simple and normal. The ventral face presents a continuous and flat retouch on the right side that creates a sharp area (drawn by N. Morán).

This is the most plausible hypothesis. Yet, as aforementioned, we have found large flake fragments caused by technical errors, which were discarded in the actual site. Their presence can only be explained assuming the importance of *in situ* knapping. Unfortunately, we are unaware of the configuration or characteristics of the stream linked to the clays in EF-HR. Leakey (1971:136) mentions the existence of cobblestones in this gravel, but does not describe their nature. Kyara (1999) mentions the fact that the blocks in this stream are very large, and in fact links them to the obtaining of what he calls the EF-HR bifaces. As a speculation, we could propose the large cores used to extract flake blanks were obtained there, which accounts for them being left in the stream.

In any case, the *chaîne opératoire* in EF-HR aims, primordially, to obtain large flakes that acted as blanks for subsequent retouch. There is an alternative *chaîne opératoire* for the production of small flakes, as the documented cores suggest, but this is a peripheral option. In fact, the characteristics of most of the small flakes seem to connect them to the preparation of cores for large blanks, o to the actual *façonnage* of the large flakes; not to the *débitage* of small cores. The items we have called medium-sized flakes are frequently longer than the *débitage* cores, and are linked to the production of large blanks. Furthermore, the production of these large flakes is directly linked to obtaining enormous blanks that will be retouched subsequently (fig. 5.27). Figure 5.28 displays the fact that the large cutting tools are invariably bigger than the other categories. That is to say, the largest objects were retouched.

We are contemplating a selection of specific blanks that were subsequently modified to achieve a concrete morphology. Therefore, we must consider such morphology. Leakey (1971, 1975), Stiles (1980, 1991) and others have always referred to the term bifaces to define the pieces from EF-HR. Nonetheless, none of the artefacts we have studied falls under such designation. In her illustrations, Leakey (1971: fig. 63-68) chose to represent the largest and most spectacular pieces. Yet, not even these items can be considered bifaces after studying their diacritical schemes. The fact is that the exam-

	Minimum	Maximum	Mean	Std. deviation
Length	65	105	80.83	14.317
Width	57	73	64	6
Thickness	39	50	45.17	4.07
Weight	204	423	325.67	84.123

Table 5.7. Dimensions of the cores.

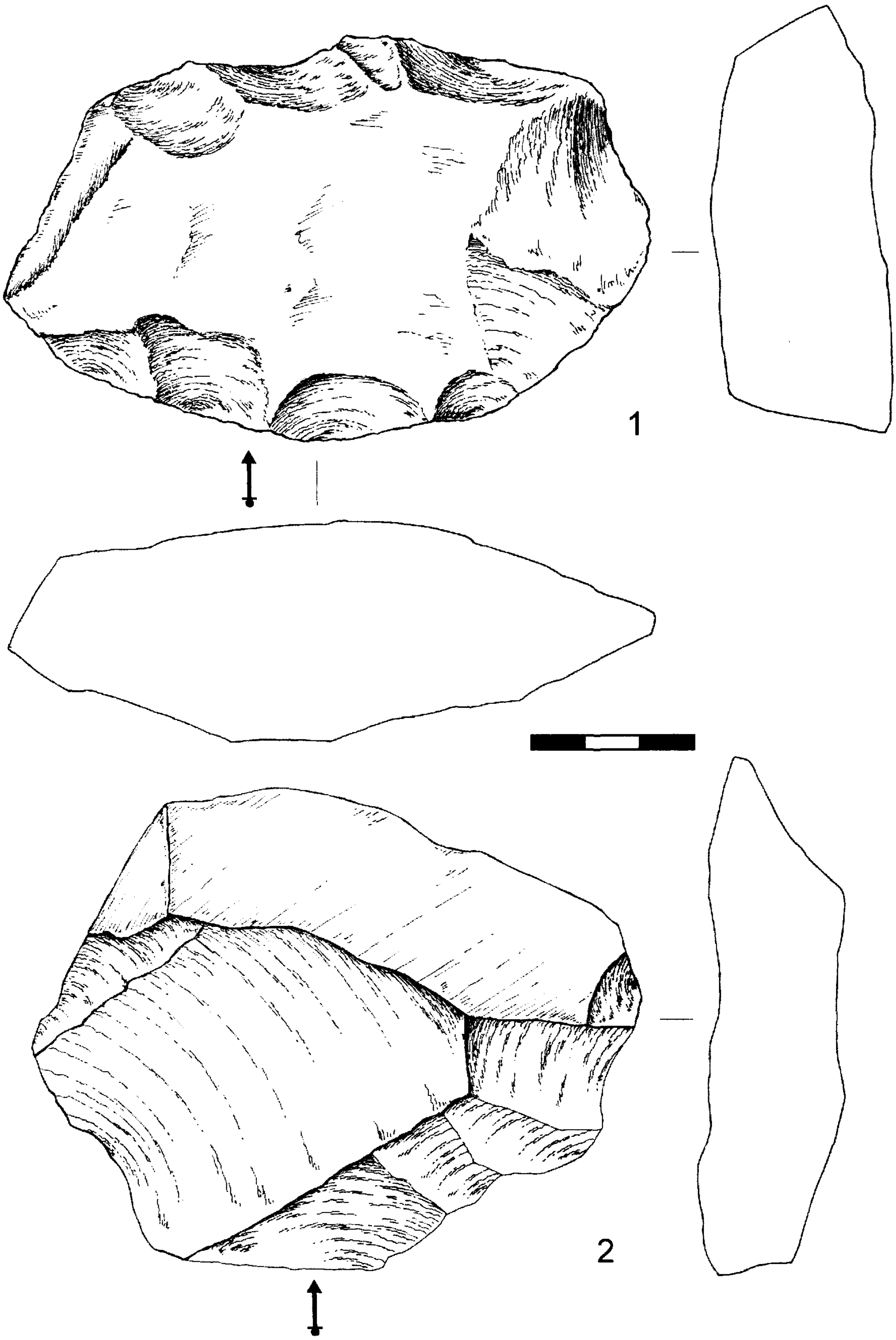
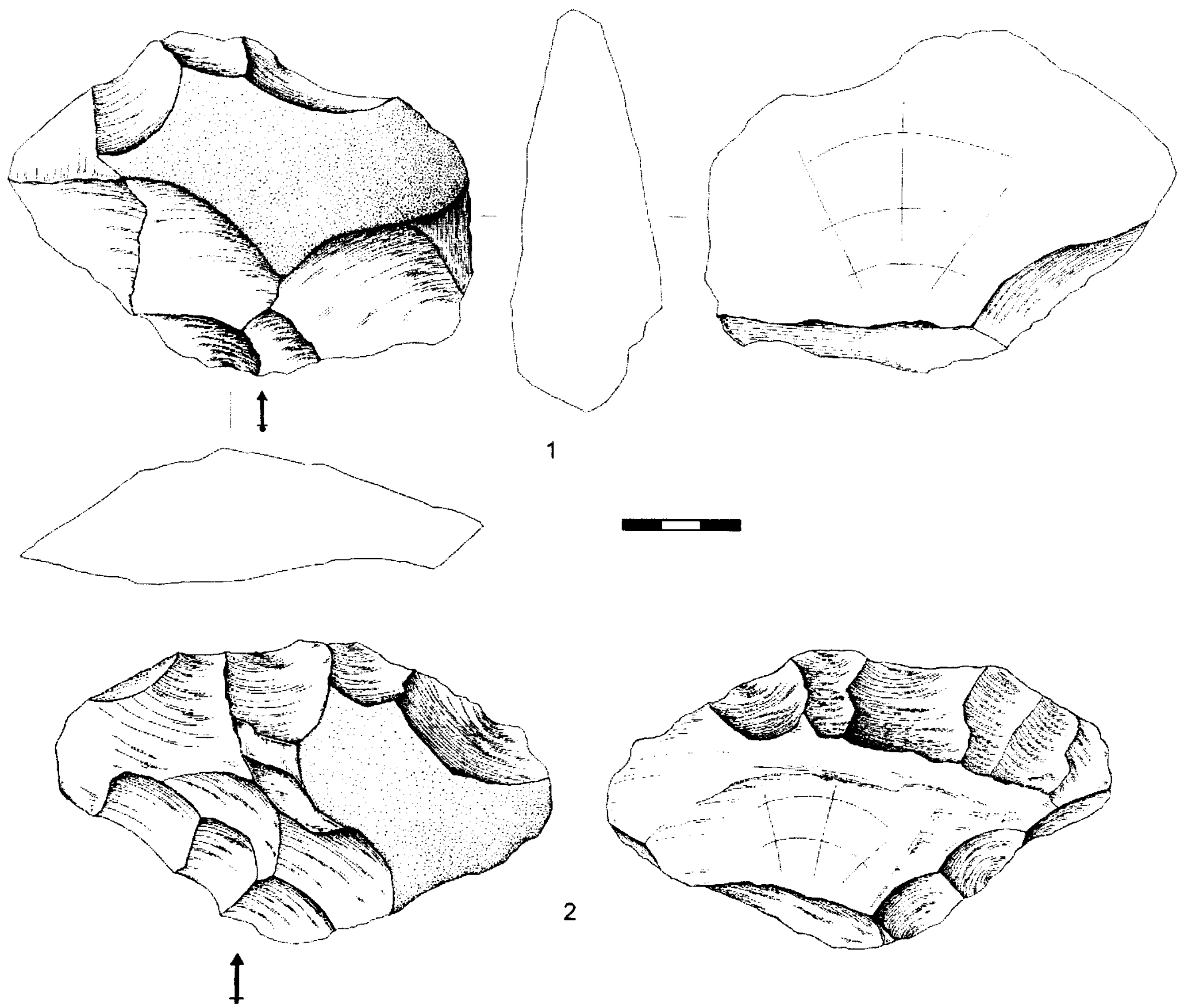


Figure 5.21. Repetition of the same pattern as in previous examples, although this time on quartz pieces. 1: the abrupt edge that represents the butt on the opposite side to an edge that has been modified unifacially by a continuous, simple and normal retouch; 2: unifacial denticulate, simple and normal retouch on the right side of the flake (drawn by N. Morán).



1

2

Figure 5.22. 1: this object could also be classed as knife, with unifacial transversal denticulation, and a single blow on the ventral side of this basalt flake; 2: basalt flake with partially eliminated butt. In this case we no longer have an abrupt end on the opposite side to a retouched edge; instead both the proximal and distal parts are modified via bifacial continuous, simple angle retouch. Retouch converges on the ventral face, most probably intending to create a pointed area (drawn by N. Morán).

ples depicted in the monograph are always large flakes that have undergone little retouching, which is limited to the modification of the edges. The pieces described in figures 5.19 to 5.25 present the same characteristics, a scant amount of retouching, generally unifacial, limited to the dorsal face, altering only the edges, without penetrating in the volume of the artefacts.

Most respond to the Kleindienst's (1962) designation of knives: In EF-HR most of the large cutting tools present an abrupt side (generally the flake's actual butt) on the opposite side to a retouched edge. They are really enormous side scrapers, usually presenting a unifacial retouch that is simple, denticulate or continuous. Sometimes, the retouch converging on two edges creates pointed areas on one of the lateral ends. These are not sophisticated points, but are achieved by two or three opposite blows that generate a sharp end, sometimes in the shape of a triedre. Alongside these pieces we find three examples that could be classified as cleavers, although it is hard to assume a technical predetermination in their realisation, essential requirement when referring to genuine cleavers (Roche & Texier 1996; Texier & Roche 1995b).

We do not consider the classification of large cutting tools should be taken any further, since there is no typological standardisation in EF-HR; the morphology of these retouches is larger or smaller, thicker or thinner, in terms of the blank used in the retouch processes. Yet such retouch never aims to correct the volumes of the object; it merely modifies the morphology occasionally to obtain a point. Beyond this fact, each

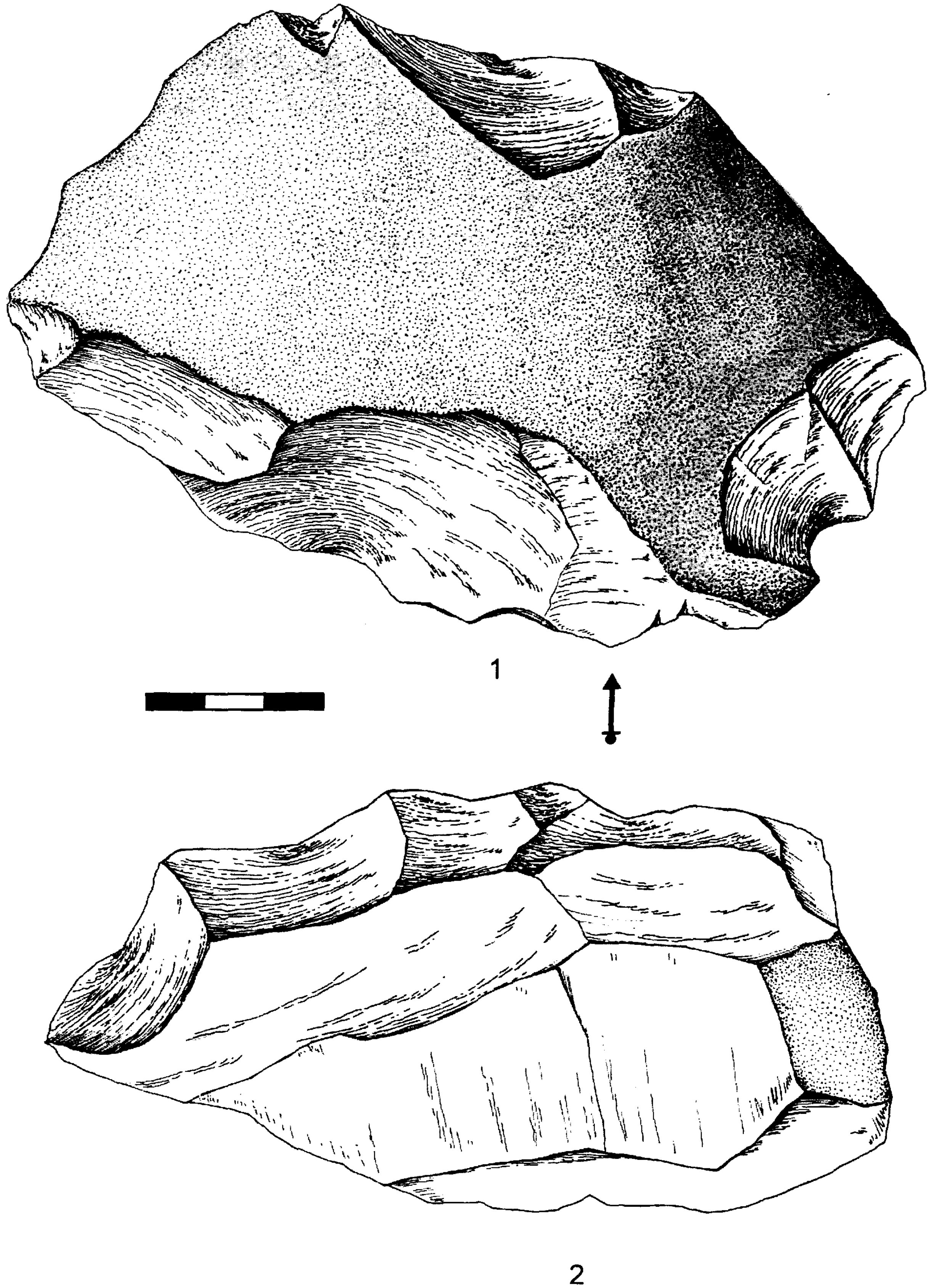


Figure 5.23. 1: first generation basalt flake, completely cortical except for a few retouch blows on the dorsal face and no blows on the ventral face. Leakey (1971) classified it as a biface, although it could be considered a cleaver with a cortical edge; 2: basalt flake fragment. This piece has lost its butt and only presents a unifacial retouch on a single edge, that is denticulate, and with a simple angle (drawn by N. Morán).

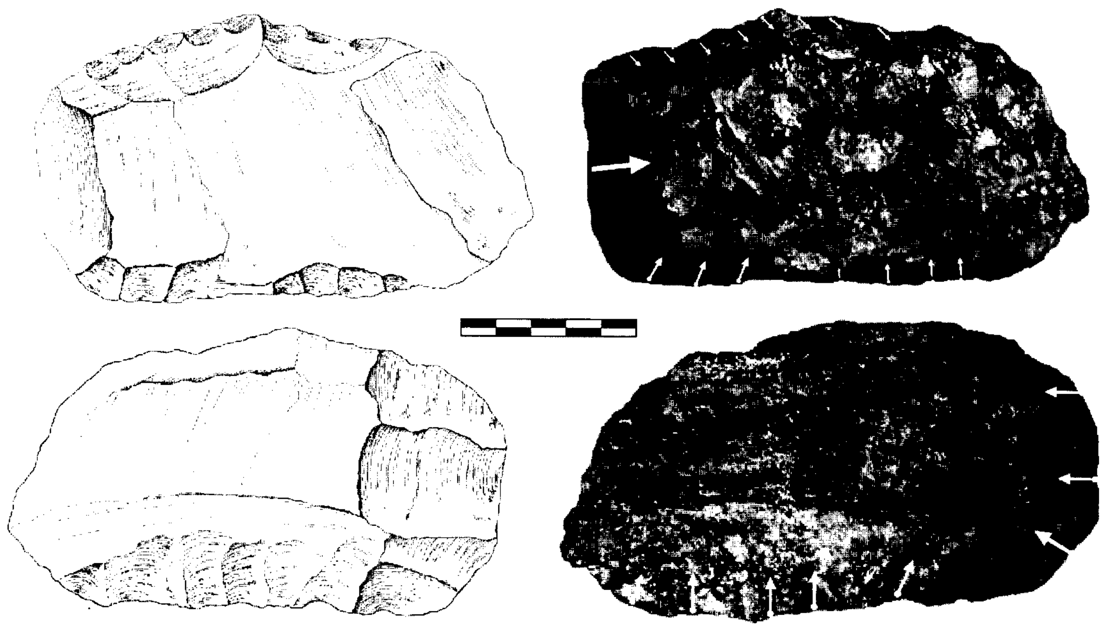


Figure 5.24. Quartz large cutting tool, most probably created on a tabular block, not on a flake. Retouching is sometimes bifacial, although we see a prevalence of unifacial, continuous and abrupt retouch, which only affects the edges, without penetrating the volume of the piece (drawn by N. Morán).

piece is different. If anything, we could refer to a certain standardisation of the goal to be achieved through retouching large blanks: to obtain resistant edges, generally on the opposite side to a dorsal face, and usually accompanied by the creation of a point. It is symptomatic to observe that the EF-HR knappers did not want the natural edges found on large flakes, and preferred to transform them via retouching. The explanation seems easy: the natural edges, given their narrow angles, do not present a resistant mass. Therefore, they prefer to modify them using a simple retouch that creates wider angles which are, consequently, stronger. The same thing applies to points, since they are never delicate but present an available mass thanks to notch-type retouch that generates *trihedral* sections which are highly resistant. This is all accompanied regularly by an abrupt back that gives pieces an ergonomic shape, frequently maximising the mass of the butt of the flake.

EF-HR presents a series of uncertainties that cannot be solved through the available data. Kimura (2002:296) attributes the assemblage an important postdepositional alteration, but presents no arguments to support her conclusions. Actually, the material is in an exceptional state of preservation, which leads us to believe the clay-based artefacts were found in a primary position. Nonetheless, we lack certain elements from the *chaîne opératoire*, such as the cores which produced the large flakes. These flakes could have been taken directly to the site from raw material supply points. The following question is what were the objects transported to the site used for. These pieces sometimes weigh over one kilogram. We have already noted that their technical features indicate they were employed in heavy duty activities, which would certainly have been the case in view of their large size.

Nonetheless, bone remains are almost inexistent in this site. We are dealing with over 46 kilograms of worked raw material in an excavated surface no larger than 30 m², although the site was probably much bigger. Consequently, it seems obvious to think that, given the location of EF-HR, it was intensely occupied by hominids and focused on the production of enormous objects used for forceful activities. The currently unsolvable problem is discovering such activities. Until that day comes, we can at least state that the Olduvai hominids had developed a new technology. This new strategy allowed them to obtain large products they subsequently turned into other objects, an activity which, up until this site, had not been contemplated in the management of lithic resources in the region. The qualitative difference is, unquestionably, fundamental.

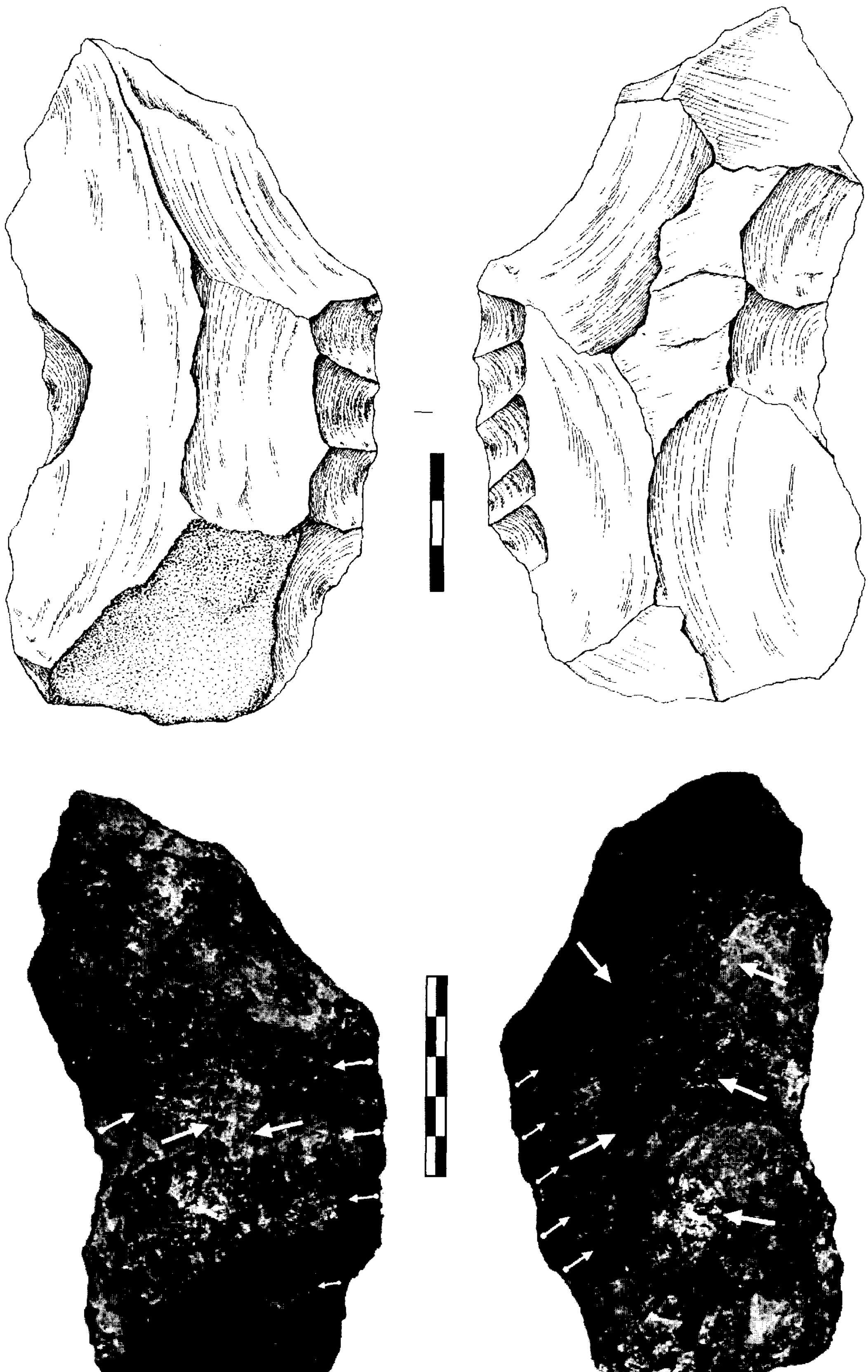


Figure 5.25. Quartz large cutting tool, indeterminate blank. Retouch only appears on the medial area and the right proximal area, with a bifacial continuous, simple method. The other scars do not seem to have been produced by retouching but by previous flaking of the core (drawn by N. Morán).

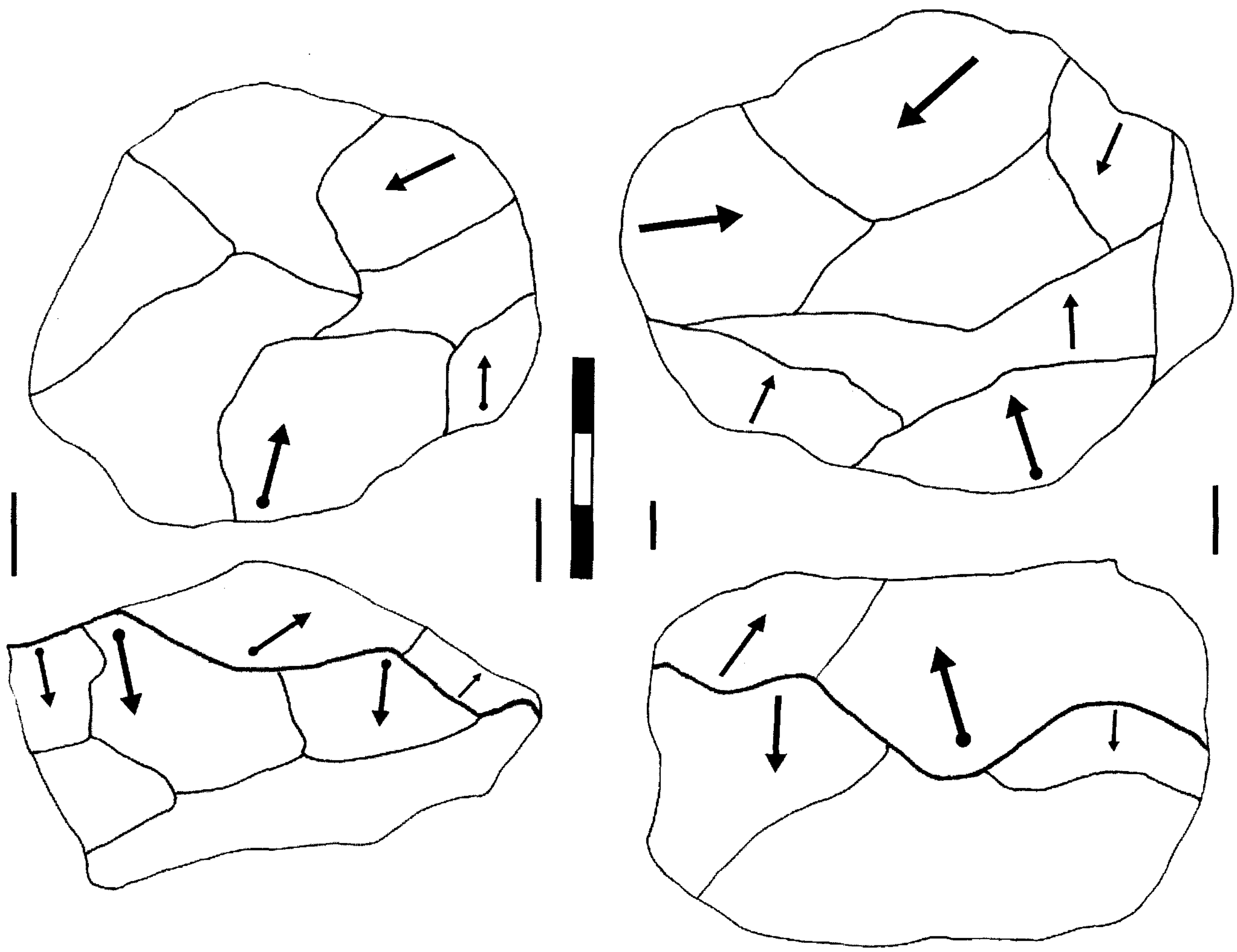


Figure 5.26. Basalt cores, bifacial peripheral system. This *débitage* is unrelated technically and metrically to the production of large blanks.

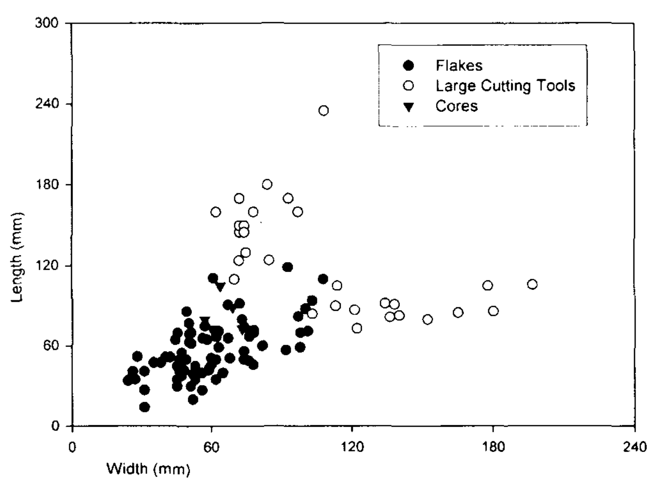


Figure 5.28. Dimensions of the main categories at EF-HR.

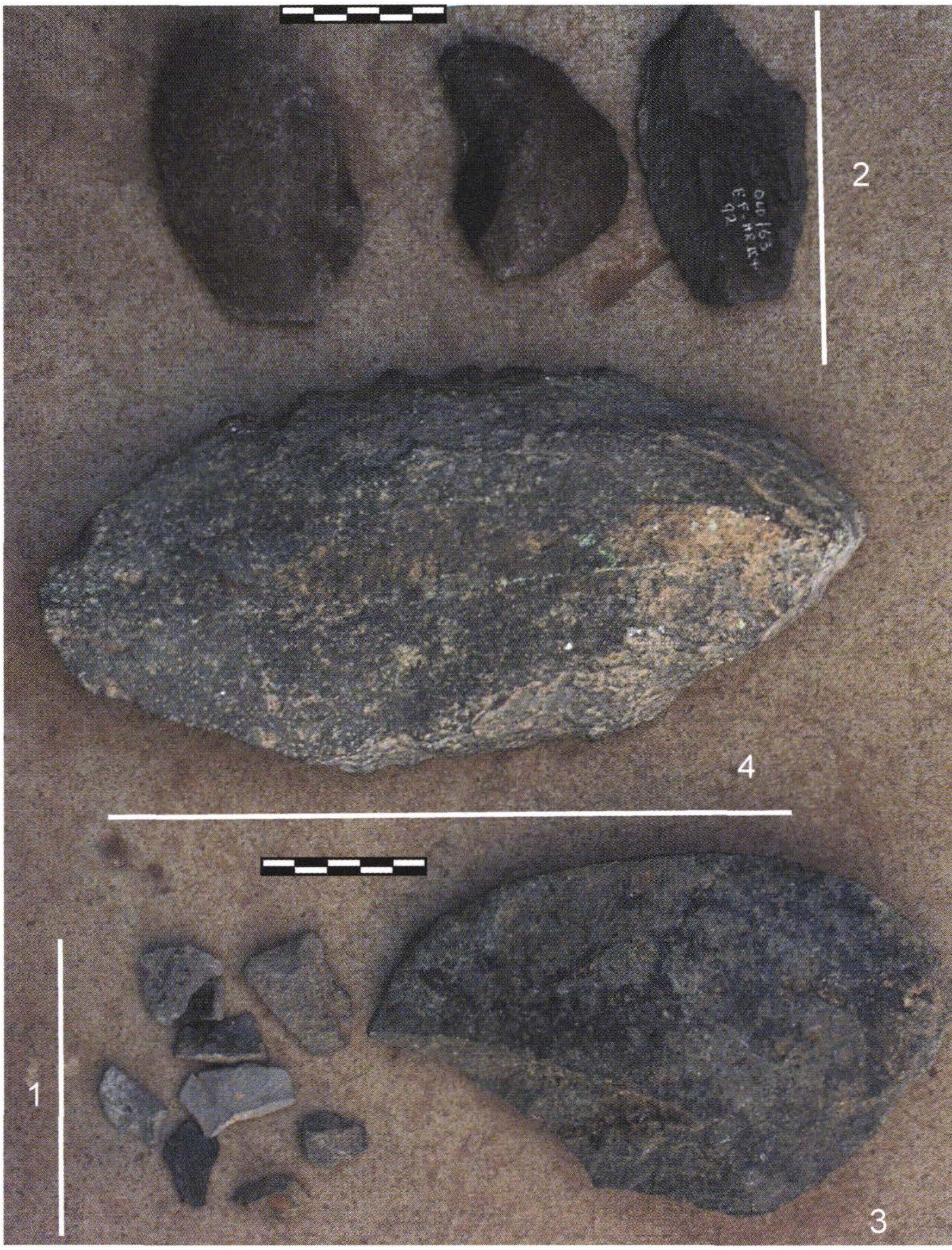


Figure 5.27. Main categories at EF-HR. 1: small-sized flakes; 2: medium-sized flakes for preparing cores for the detachment of large blanks; 3: large blank without retouching. It corresponds to the example drawn in figure 5.14 no. 2; 4: large cutting tool. It corresponds to the example drawn in Leakey (1971:129).