L'AURIGNACIEN DE LA GROTTE YAFTEH ET SON CONTEXTE (FOUILLES 2005-2008)

THE AURIGNACIAN OF YAFTEH CAVE AND ITS CONTEXT (2005-2008 EXCAVATIONS)

Marcel OTTE,
Sonia SHIDRANG & Damien FLAS (eds.)

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INTRODUCTION

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Entre vos mains, vous tenez l'une des publications récentes consacrées au Paléolithique du Zagros. Nos propres fouilles furent entreprises dans la province du Luristan, en Iran, en 2005 et 2008. Loin d'être terminés, ces travaux de terrain requièrent néanmoins un bilan, à vocation exhaustive mais dans un état très partiel de cet ensemble de recherches. Pour notre part, nous avons édité une monographie consacrée aux études sur les collections conservées à Téhéran, à Philadelphie, à Yale et à Columbia (Otte & Kozlowski 2007). Ensuite, nous avons organisé un colloque à ce sujet dans le cadre du Congrès UISPP, tenu à Lisbonne en 2006 (Otte *et al.* 2009). L'immense richesse des sites paléolithiques largement méconnus, fut ainsi révélée autant par nos prospections, les collections étudiées et les nouvelles recherches sur terrain, rassemblées à Lisbonne. En réalité, l'Aurignacien (ou le « Baradostien ») s'étend à d'innombrables sites du plateau iranien et seule cette tradition semble y être présente pour l'ensemble du premier Paléolithique supérieur « régional », soit du Zagros aux déserts centraux. Un terrain culturel gigantesque, directement lié à l'Europe, s'ouvre, de la Chine au Caucase, semblant constituer un énorme réservoir démographique et culturel. À tout le moins, cette entité gigantesque doit-elle être considérée dans toute tentative d'explication des brusques changements observés depuis si longtemps en Europe.

Cette richesse avait déjà été pressentie par Dorothy Garrod qui avait désigné cette région comme l'épicentre de l'Aurignacien (Garrod 1930). Toujours dans le Caucase, mais du côté irakien, Ralph et Rose Solecki ont fouillé le vaste complexe des grottes et d'abris à Shanidar. Outre les sépultures moustériennes, ils reconnurent une tradition identique à celle décrite par Dorothy Garrod, de l'autre côté de la chaîne montagneuse (Solecki 1958). Ralph Solecki conseilla alors sagement à Dorothy Garrod d'utiliser un terme neutre « Baradostien » (de la vallée proche de Shanidar) et provisoirement, à la place d'Aurignacien « afin de ne pas agacer les Français » ! (Solecki, communication personnelle). Tout au contraire, dans une synthèse récente, Henri Delporte (1998), pourtant très français, situe précisément l'origine de l'Aurignacien la « plus probable » dans ces régions du Zagros et en Asie Centrale, bien davantage qu'au Levant où certains voulaient la voir.

Entre ces déjà anciennes recherches et les nôtres actuelles, divers travaux ont été menés sur le matériel, extrait du territoire iranien ou iraquien, mais resté accessible à toute nouvelle recherche fondée sur les techniques lithiques. Particulièrement, Harrold Dibble et Deborah Olszewski (Olszewski & Dibble 1994) et Philip Smith (1986) ont consacré diverses études sur ces sujets complexes. Les inventaires de Philip Smith ont démontré la richesse de ce patrimoine. Harrold Dibble et, surtout, Deborah Olszewski insistèrent à la fois sur le caractère aurignacien de ces ensembles et sur la probabilité d'une origine locale de cette tradition émergente. Aucune information, à ce jour, ne semble s'opposer à cette théorie, mais les données radicales font encore défaut. Essentiellement, ces études étaient fondées sur les collections de Warwasi (fig. 1), site inaccessible aujourd'hui pour des raisons de sécurité. Ainsi, seules les collections conservées à Philadelphie posséderaient la clef de cette hypothétique transition entre « Moustérien du Zagros » et Aurignacien régional.

Tous ces éléments accumulés ne pouvaient que stimuler notre propre entreprise, toujours en cours actuellement. Après des campagnes de prospection, notre choix s'est porté sur la grotte de Yafteh, fouillée dans les années 1960 par Franck Hole (Yale). Ses rapports (voir ce volume) avaient clairement démontré une longue séquence stratigraphique intacte, à travers tout ce « Baradostien » au cœur du Zagros. Or les dates ^{14}C remontaient jusqu'à 41 mille ans ! Tout y indiquait une potentialité, largement restée intacte, autant d'après les plans de fouilles que par les informations directement fournies par le plus cordial des collègues.

Pour des raisons administratives complexes, voire incompréhensibles, il ne nous a pas encore été possible de poursuivre ces recherches sur terrain. Il nous a donc paru opportun de concentrer nos efforts sur l'étude et la publication, que nous espérons tout provisoire.

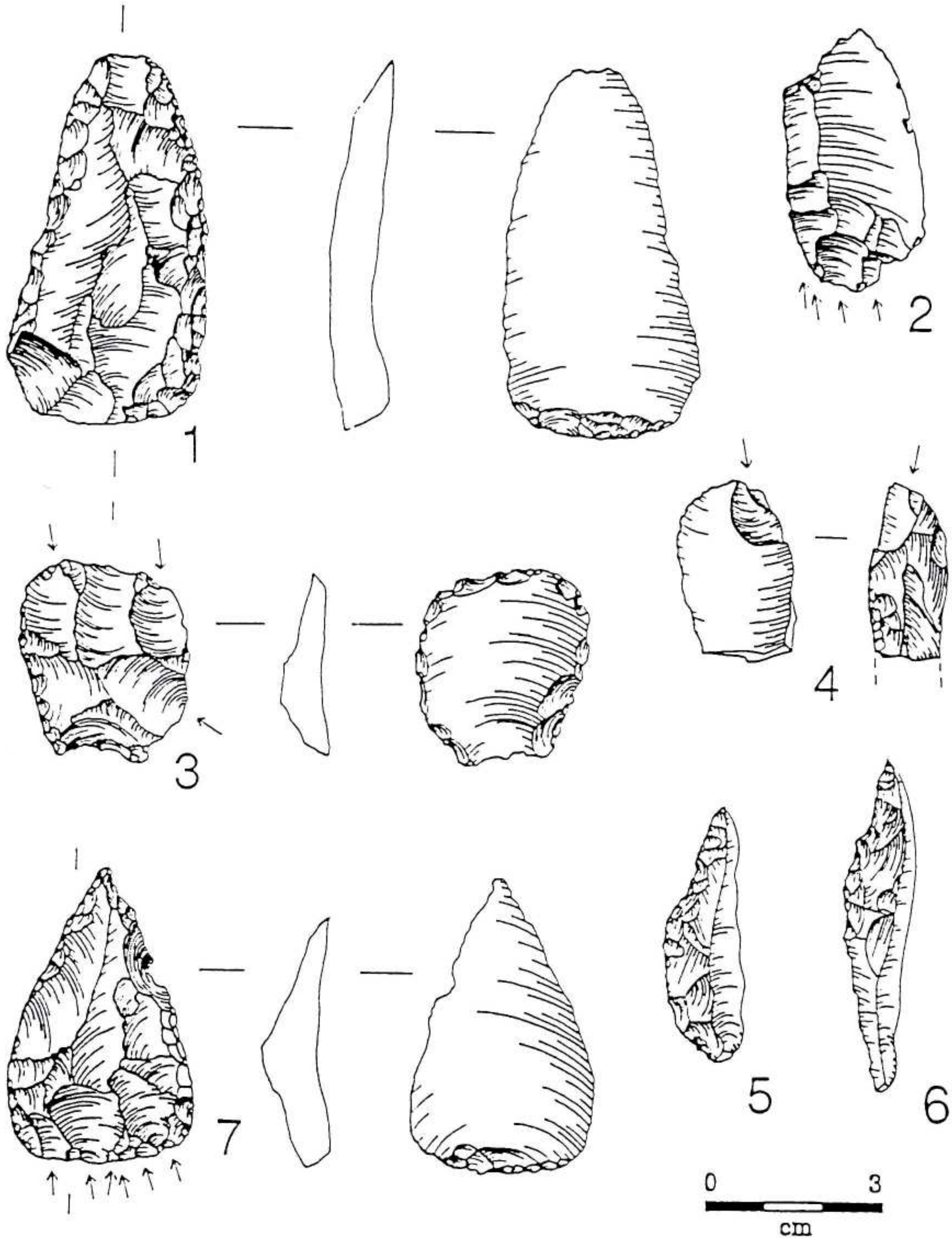

Figure 1 – Moustérien du Zagros, provenant de Warwasi (d'après Dibble & Holdaway 1993).

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I - THE 1960s EXCAVATIONS AT YAFTEH CAVE

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1. Introduction [1]

In the 1960s when we began our excavations in the Khorramabad Valley, the Paleolithic of the Zagros was known primarily from Bruce Howe's excavation at Warwasi and by Ralph Solecki's excavation at Shanidar Cave. The sites of Zarzi and Palegawra rounded out the known sequence of Middle to Epi-Paleolithic. My interest in the Paleolithic came largely from having witnessed Howe's excavation at Warwasi and learning of its possible continuous sequence from Mousterian through Zarzian. I was aware, however, that Warwasi had little obvious stratification and lacked definitive evidence of continuity.

Accordingly, in 1963 when Kent Flannery and I began exploration of Paleolithic sites in the Khorramabad Valley, we had two general goals. First, we hoped to find a complete stratigraphic sequence from the Middle Paleolithic Mousterian to the Upper Paleolithic Baradostian, to the final Paleolithic Zarzian, and thence into the early agricultural villages (Hole & Flannery 1967). In regard to the Paleolithic our primary goal was to discover whether there was a continuous sequence or a discontinuity between the MP and the UP. Previous work in the Zagros had revealed segments of the sequence but no convincing series of deposits that spanned the Paleolithic had been reported. The link between the Mousterian and Upper Paleolithic is important for its bearing on the development of modern *Homo sapiens* and of the occupation of the Zagros during the final glacial advances. Solecki's work in Shanidar had shown that Classic Neandertals were present there, but an apparent hiatus intervened between these deposits and the succeeding Upper Paleolithic Baradostian. Bruce Howe's excavation of Warwasi rockshelter in the Kermanshah Valley, which revealed a long sequence from the MP through the Zarzian, suggested the possibility of continuity, yet the stratification was not secure. (Braidwood *et al.* 1961), and continuity remains a contentious issue today (Dibble & Holdaway 1993; Olszewski 1993a, 1993b). Similarly, our excavation of Gar Arjeneh rockshelter in the Khorramabad Valley recovered lithics of the entire sequence (Hole & Flannery 1967). But, as at Warwasi, there was no stratification and the deposit had been severely disturbed by the burrowing of porcupines. The key to resolving whether there had been an *in situ* transition was to find a cave where strata of both MP and UP were preserved. After we tested both Kunji and Ghamari, finding nothing other than MP in either, we turned to Yafteh where UP lithics on the surface, as well as the size and aspect of the cave, gave us hope of finding older material as well.

Figure 1 – Yafteh cave from below showing the site in a low spur of the Kuh-i-Yafteh.

The excavation of Yafteh Cave took place in 1965 as part of a general survey and sampling of Paleolithic sites in the Khorramabad Valley. After the Kermanshah Valley, these sites represented the largest known group of Paleolithic sites in the central Zagros. Unfortunately, caves and rock shelters form in bedded limestone formations that are not commonly found; rather, the faces of the folded mountain ridges often crumble into steep talus slopes, which lack caves but may preserve shelters as at Gar Arjeneh. What we found, however, is that the aspect of the site is also important for occupation. South-facing sites, and those with overviews of substantial terrain are the most likely to have been occupied. No doubt there were other criteria, such as the availability of water, fuel, and flint that helped to determine where people camped.

Only three relatively large caves that might have been suitable for prolonged occupation in any weather, were discovered in the valley. Two of these, Kunji and Ghamari, proved to have been occupied only during the Middle Paleolithic when Mousterian tools were being used. The remaining site, Yafteh Cave, has a lengthy sequence of Upper Paleolithic that is the subject of this report.

The Khorramabad valley is one of many small valleys in the folded zone of the central Zagros where the northwest-southeast trending anticlines are cut transversely by rivers flowing through steep gorges, but much of the region lacks surface water. The Khorramabad Valley is an exception in that there are several large springs and a perennial river, tributary to the Kashgan Rud, which joins the Saimarreh and Karkheh. Owing to its large expanse of flat land and adequate water, the valley was well-suited to hunter-gatherers, even if only for the short summer season. It is likely that people migrated along with herds of herbivores, such as gazelle, onager, deer, sheep and goats that must also have found it necessary to seek warmer, snow-free land during the winter, although we have yet to find evidence of sites in the lowland (*garmsir*) region (Lindly 1997).

At 1300 m, Yafteh lies in a zone that receives considerable snow today and would have been well above the tree line and perhaps suitable only for short summer occupation during the Pleistocene when conditions were much colder. If the climate was substantially colder during the LGM when the site was occupied, good southern exposures would be all the more desirable. The cave is situated in the extreme west end of the Khorramabad Valley, about 18 kms from the city and about 200 m north of the road that runs toward the neighboring valley of Kuh-i-Dasht. The cave is in a low spur that juts out from the main east-west trending mountain range, the Kuh-i-Yafteh (fig. 1). The Kuh-i-Yafteh is immediately south of the higher and larger Sefid Kuh. Easily visible from the road, the cave is about 25 m above the valley floor, across the road from the small village of Surkh Aliazar. At present there is no surface water at this end of the valley and the two nearby villages depend on wells that supply only a scant amount of water. The nearest spring, Sarab Chengai, is a few kilometers east of the cave, along the road between Yafteh and Khorramabad City.

Figure 3 - Stone foundations of tents or pens on the talus in front of Yafteh Cave.

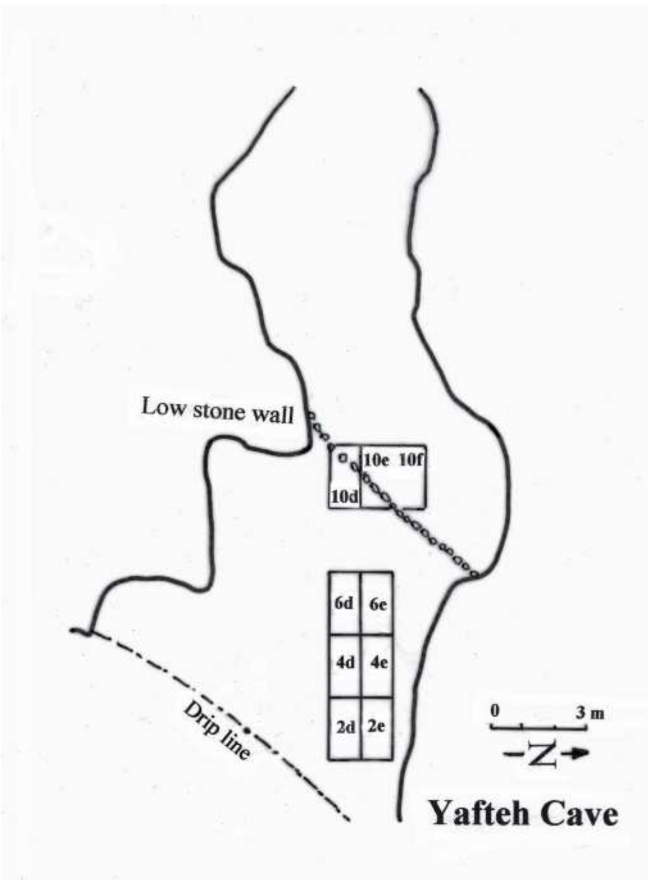

Figure 2 – Plan of the excavation trench.

Yafteh Cave has an irregular, elongate chamber about 22 by 9 m in its largest dimensions (fig. 2). The D-shaped entrance is about 4 m high and faces southeast along the axis of the valley. In recent times the cave has been in use as a pen for sheep and goats. To aid in penning the animals herders built a stone wall about 1 m high across the front of the cave, and the foundations of a similar wall occurred about half way back into the cave. The talus in front of the cave has many stone foundations for huts but these have not been used in the memory of any of the local inhabitants (fig. 3).

2. The excavation

The site was dug between 12 and 24 July 1965 under the supervision of Frank Hole, assisted by John Durham and Jahangir Yassi, with a work crew of 16 men and boys from the local village.

After clearing the cave floor of the rock walls and superficial dust layer, we laid out a trench consisting of six, 1 x 2 m rectangles, denominated Y2d, 2e in the front and running toward the rear of the cave to rectangles Y6d, 6e (figs. 2 and 4). We removed material by arbitrary layers of 10 cm. The initial trenches were opened as alternate rectangles, which allowed us to see in section, the nature of stratification in the undug units. All earth was sieved by hand through two sizes of mesh, the smaller of which had an opening ca. 3x3 mm. This digging method was adopted because the excavation was designed to be only a brief exploratory trench and we had no prior knowledge of any natural stratigraphy. Further, as we discovered, the deposits were mostly without visible layering. While these methods enabled us to gain a rapid impression of the cave and its contents, it does not meet today's standards of sedimentary and stratigraphic practices. Only further exploration of the cave, with greater attention to the better preserved layers back from the entrance, will inform on whether the picture will change substantially from what we report here.

2.2. Depositional history

There were two obvious periods of occupation, the earliest of which dates to the Upper Paleolithic and is clearly differentiated from the later historic period by stratigraphy and artifacts. The Paleolithic, whose duration may have lasted as much as 10,000 years, did not exhibit noticeable breaks in continuity; rather there seems to have been a regularly occurring series of occupations differing but little from one another.

Paleolithic

Paleolithic deposits occur over the entire area dug, at depths greater that 110 cm[2]. These deposits are separated from the later ones by a depth of white ash or a hard crust that is overlain by the soft ashy historic material (fig. 5). In other words, texture, color and contents clearly demarcate the two zones. The stratigraphy in the Paleolithic is relatively unclear except in the northwest portion of the excavation, and the layers fade and become imperceptible toward the front of the cave. Except in the lowermost levels, the ash layers are confined to the northwest and hence give the impression that the occupation was concentrated in that area. This need not have been the case if weathering of the deposit has substantially altered the fill in the front of the site. The profile of the south side reveals little stratification and verifies that ash layers are not preserved here (fig. 6). This suggests that the most fruitful portions of the cave remain to be dug.

While visible stratification of the deposits was largely absent in the Pleistocene layers, particularly east of Y4d and Y4e, there are seven concentrations of ash that deserve comment and of these, three are associated with rocks that probably delimited fire areas. In no case, however, was there burned earth of the sort commonly found with hearths. For the most part the deposit was relatively unconsolidated and easy to excavate.

1. The lowermost portion of the site - from 270 cm to bedrock - is a rich deposit of ash and bones that fills the low spots of the irregular rock floor of the cave (fig. 7). This deposit probably represents an accumulation of many years, perhaps from refuse generated elsewhere in the cave that was tossed into the hollow. The deposit is notable for the large amount of fauna and lithics, and large stones were scattered throughout. A circular cluster of stones in Y4d that showed traces of burning may have been a hearth. A number of samples of charred material were taken for dating, as discussed below.

2. Some 20 cm higher another major concentration of ash occurred, again in connection with large stones, although both the ash and stones were too dispersed to describe a hearth-like arrangement. This ash layer was richest in Y2e and Y4e between 250-260 cm but it extended up as high as 240 cm in the west and sloped downward toward the east to 270 cm. There are two radiocarbon dates from this area.

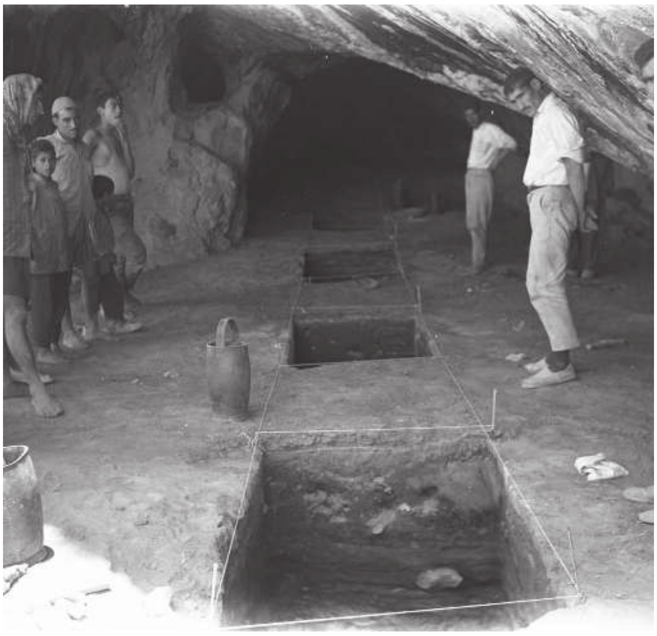

Figure 4 – Layout of the trench, showing alternate placing of the units.

Figure 5 – Western and northern sections of the trench showing ash layer that denotes the separation of Paleolithic from historic deposits. Compare with Fig. 6.

3. Considerable time elapsed before the next hearth was deposited at about 210-220 cm in Y4e and Y6e. This deposit runs under the north profile and does not extend into Y4d. Covering the ash was a layer of small rocks. There is one radiocarbon date from this ash deposit.

4. Just above the previous ash, at a level of about 190-210 cm, an extensive hearth area covered most of Y4e and Y6e. Both excavation units contained abundant large and small rocks. There were no visible strata south of these units. As with the layer directly below, much of this ash remains under the north profile. Quantities of burned bone and earth as well as charcoal were taken from this ash.

5. At about 150-160 cm another ash bed covered Y4e, Y6e and Y6d. Unfortunately much of the deposit was riddled with burrows and the material was judged not to be safe for radiocarbon dating. A pit had been dug into Y4d for the placement of a large storage jar (Fig. 8).

6. The final paleolithic ash bed was the smallest and appeared at about 130-140 cm in Y6e. At the same level, the adjacent squares contained a lot of rocks. Because of the proximity to disturbance by pit digging and burrowing of rodents, no radiocarbon samples were taken.
The several concentrations of ash occur toward the rear of the cave and seem to be concentrated against the northern wall. One recalls a similar distribution at Kebara where the excavator concluded that the occupants of the cave had swept their refuse away from the living space. We should bear in mind, however, that our trench was rather narrow and that we know nothing about the center of the cave; moreover, because of the degradation of layers toward the front of the cave, former hearths may have gone unnoticed.

Historic

Very little material accumulated on the surface of the cave fol-

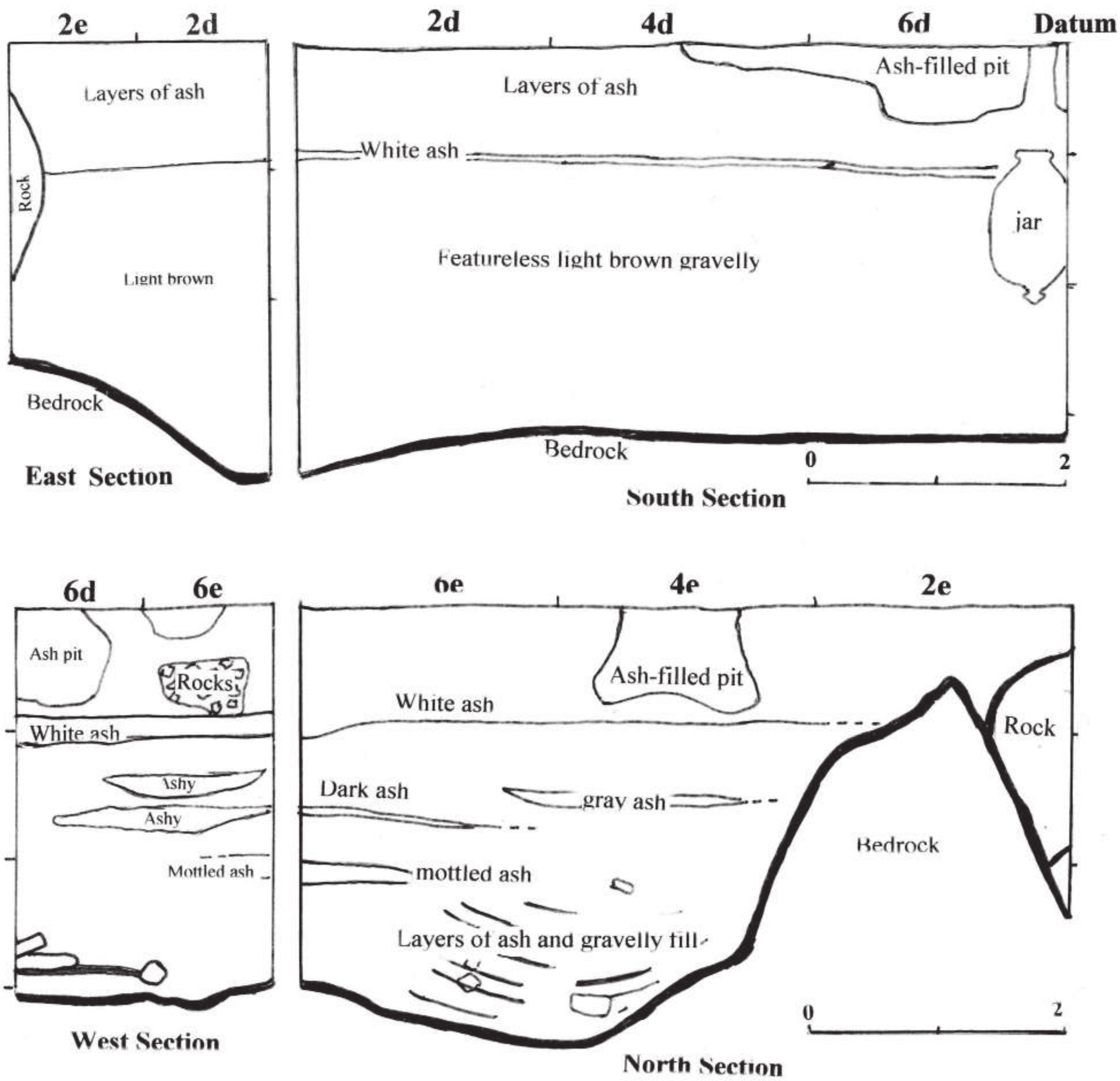

Figure 6 – Drawing of the four sections of the excavation trench.

Figure 7 – Bedrock at the eastern end of the excavation trench.

lowing the termination of the Upper Paleolithic occupation. The upper few centimeters of the Paleolithic deposits closest to the entrance of the cave were somewhat harder or crustier than the remainder of the fill but there was no sign of an interval during which sterile soil accumulated.
The historic deposits appear abruptly. Over most of the area excavated the change was marked by a layer of white ash varying in thickness up to 30 cm. The ash was uniform in color and virtually free of artifacts. The bottom of the ash was at about 100 cm across the entire area excavated.
Although the upper meter of deposits was nicely stratified with layers of orange, brown and white ash there were very few artifacts and the material was not saved. The most noteworthy artifact was a large storage jar that had been sunk into the prehistoric deposits in Y6d (Fig. 8). The top of the jar was at 90 cm and the bottom extended down to 180 cm. The jar was covered with a flat rock and was empty. The historic deposits represent occupation by shepherds and the ash is the remains of burned dung. The jars may have been placed by people who lived on the terrace outside the entrance of the cave.

3. Lithics and Other Artifacts

3.1. Introduction

Since we carried out our surveys and small-scale excavations in 1963 and 1965, on which our preliminary publication was based (Hole & Flannery 1967), there have been several complete analyses of the lithic assembages of caves and rock shelters in the Central Zagros (Olszewski 1993a; Otte *et al.* 2007; Smith 1986). The early work of Garrod (Garrod 1930) and Solecki (Solecki 1958) can now be placed in wider geographic context that emphasizes similarities rather than differences, while still maintaining some regional distinctiveness. Today, what Solecki defined as the Baradostian Upper Paleolithic, is named the Zagros Aurignacian (Olszewski *et al.* 1994). Further, specific tool types, previously given local terms, such as Arjeneh points, are now recognized to be equivalent to Krems points. Our Baradostian bladelets can now be seen to be variants of *lamelles* Dufour.

The occasion to study the lithics from Warwasi rock shelter raised the uncomfortable fact that there were no strictly quantitative studies of the Central Zagros lithics yet published, despite various "preliminary" statements. The careful analyses by Dibble and Olszewski on Warwasi, and Speth and Baumler on Kunji, along with Solecki's and Garrod's older studies, raised questions that can be answered only through further analyses of unpublished material, or further excavation, and detailed analysis. This report is an attempt to rectify the deficiency for one site whose deposits fall squarely into the Zagros Aurignacian (Baradostian).

The classification of lithics was carried out shortly after the excavation, according to a typology based on form of piece and location of retouch (fig. 9; also published in Otte et al. 2007: figs. 5 & 6; Otte & Kozlowski 2007: Pl. 68). Pieces that lacked standardized form or evidence of retouch were counted as debitage and, for the most part, discarded after they were counted. As a result it is not possible to do a detailed chaine operatoire analysis, nor record all of the classes of chipping debris that might have been present as, for example, in Olszewski 1993a.

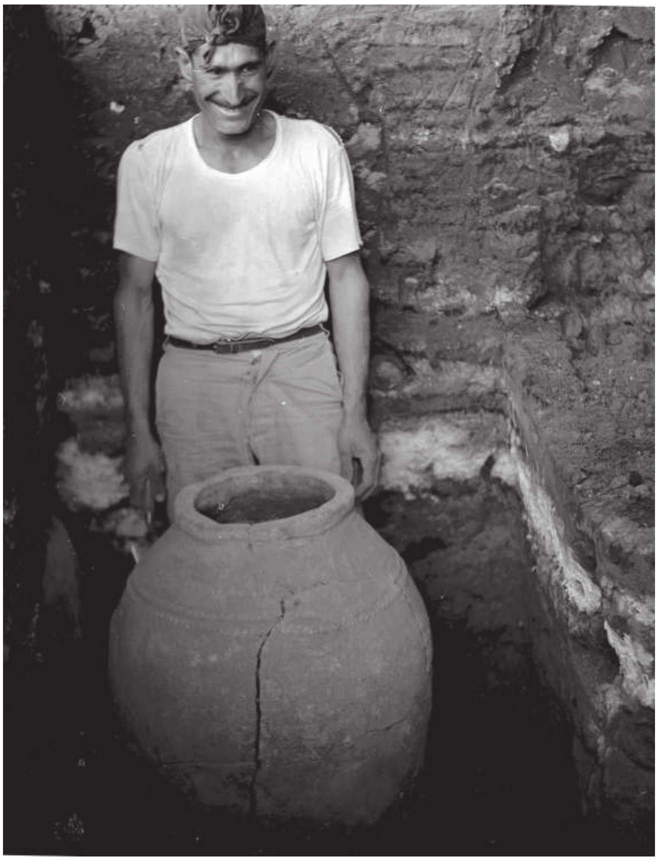

Figure 8 – Storage jar dug into unit Y6d. The top of the jar was at the level of the white ash.

Cores and pieces that were identified as core trimming flakes and fragments were retained. All blades and bladelets whether retouched or not were also retained.

By far the greatest quantity of lithics was debitage, counted at 59,007 pieces (tab.1). Since this category is ubiquitous as well as abundant, it provides a representative overview of the quantitative and spatial distribution of all types of lithics. A simple tally of these pieces by level showed a narrow range of variation and the density of debitage was around 2500 pieces per cubic meter throughout the site. This suggests relatively intensive primary core reduction in the cave and a relatively slow and constant rate of sediment accumulation. This is not to say that each level (10 cm) and each excavation unit (2x1m) held the same quantity of material, but that the quantity recovered for each combined level was, with few exceptions, similar. In other words, while the density of lithics varies across the extent of any level, there are no "sterile" levels that might suggest a hiatus in occupation. This is significant in regard to understanding changes in the types and their frequencies.

We can also compare the density of lithics with that recorded for other sites. Olszewski (Olszewski 1993a: 191) reports a density in the Baradostian layers at Warwasi of 1800/m^3, whereas it reportedly was 23 tools/m^3 at Shanidar, and Mortensen (Mortensen 1993: 166) reports 3100 pieces/m^2 (*sic*) at Mar Gurgalan Sarab. It is probable that such a wide degree of variability in density relates to the rate of non-cultural deposition and methods of recovery, rather than to differences in cultural behavior.

3.2. Classification of Lithics

I have previously published only samples of the lithic types and there is no complete set of drawings, based on my excavation (Hole 1970; Hole & Flannery 1967). The drawings made by Otte, who visited my lab suffice to show the range, but his classification into types is somewhat different from mine (Otte *et al.* 2007). Further, I did not carry out the detailed study, also in my lab by Tsanova and Zwyns, which forms the basis for tabulations in Otte *et al.* 2007.
Figure 9 is a previously published schematic of the lithic types (Hole & Flannery 1967), and Table 1 is a summary of all of the lithics.

Krems (Arjeneh) Points (Sample: 300)

As the name implies similar points have a wide distribution, but were described in our earlier publication as Arjeneh points (Hole 1970; Hole & Flannery 1967). These are slender, leaf-shaped points ranging in length between 4.6 and 3.2 cm. Most examples are chipped around their entire periphery with fine retouch that gives a shallow to semi-steep edge. The retouch is not invasive. In a few instances one edge is chipped on the bulbar face. These points are nearly all confined to the lower half of the deposit and there are a few clusters where they number in double digits in an excavation unit.

Lamelles Dufour **(Baradostian Bladelets)**

These bladelets, with a slight twist in the long axis, are retouched in various ways as described below.
Bulbar Retouch (B). Sample 477. These pieces have nibbling retouch along the left bulbar edge if the piece is oriented with the bulb at the bottom. Only a handful of examples show retouch on the right edge. The retouch may be along an entire edge or concentrated in the center. If it is in the center it may be deeply invasive. The precise shape of these pieces seems to have been of less importance than size because they are highly variable in outline and many have rounded or blunt ends. Most are on fairly thin bladelets, but pieces with a thicker triangular section are also found. These pieces occur throughout the deposit but are much more numerous in the upper half.

Bulbar-Bulbar Retouch (BB). Sample 30. Twisted bladelets with retouch on both bulbar edges. The retouch on the two edges is approximately equal in extent and in kind.
The distribution of BB retouch is largely in the lower half of the deposit.

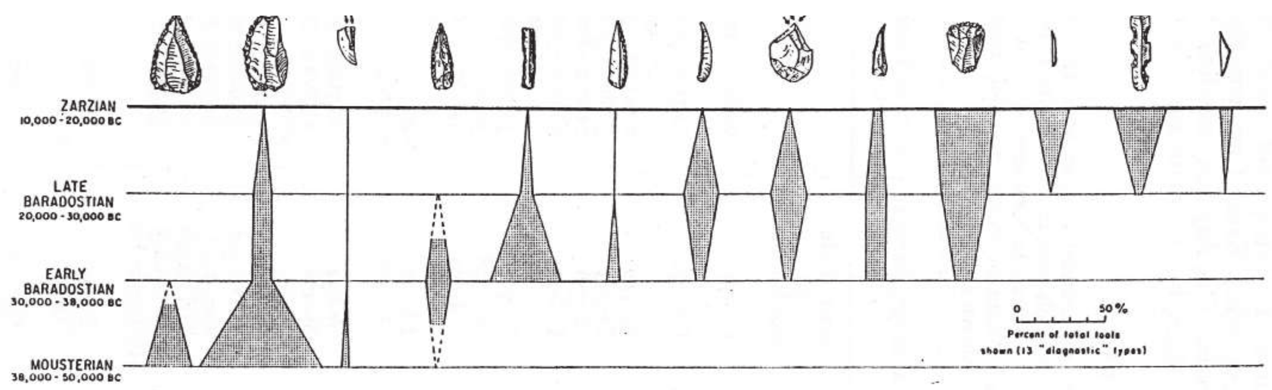

Fig. 2

Frequency polygons, showing changes in relative proportions of various flint tool types through time in the Paleolithic of the Khorramabad Valley. The full range of implements is not shown; these thirteen tool types have been selected because they are diagnostic enough to serve as index fossils for the various stages of the Paleolithic. Percentages given for each tool are those calculated against the other twelve types shown on the chart, and do not represent the frequency of the tool within the entire tool assemblage.

Figure 9 – Lithic types described in this report.

Top and Bulbar Retouch (TB). Sample 275. These bladelets have approximately equal amounts of retouch on one bulbar and one upper edge. (When the retouch is markedly asymmetrical, the piece is counted as B or T retouch.) The retouched bulbar edge is usually the left as in the case with B Retouch. On the thicker pieces the retouch may be nearly steep. In a few cases, especially pieces from the lower levels, the bladelets are relatively flat and wide. More of these pieces are found in the lower half of the deposit, with no special concentrations.

Top Retouch (T). Sample 321. These twisted bladelets have retouch on one upper edge. The retouch may be extensive, along a whole edge, or concentrated in one area. Retouch usually consists of relatively minor nibbling, but on the thicker pieces it may approach backing. These pieces are found throughout the deposit, but their average size is smaller in the upper half.

Yafteh Cave Lithic Distribution by Type and Grouped Layers									
TypeDepth[3]	**103**	**136**	**169**	**192**	**205**	**258**	**281**	**313**	**Totals**
Arjeneh point	5	5	25	74	75	72	43	1	300
Baradost blade B	78	129	104	76	47	20	22	1	477
Baradostian bldt BB	0	5	1	7	4	9	4	0	30
Baradostian bldt TB	18	26	33	28	48	62	59	1	275
Baradostian bldt T	52	35	24	41	69	67	32	1	321
Baradostian bldt TT	19	21	22	82	139	203	134	9	629
Blades TT	6	5	17	33	45	47	29	0	182
Backed Bldt	6	2	0	2	2	4	2	0	18
Backed blades	2	5	2	13	25	27	10	0	84
Baradost bl plain	749	761	891	822	820	401	201	2	4647
Unretouched blade	148	135	154	382	469	559	314	13	2174
Ret/used Blade	21	20	28	46	60	44	19	1	239
Notched blade	17	9	12	8	6	5	3	0	60
Notched flake	24	19	16	14	5	12	6	0	96
Ret/used flake	61	56	53	66	49	67	28	0	380
Side Scraper	33	51	53	60	49	52	20	0	318
Rounded-end scraper	97	69	36	73	56	55	21	0	407
Miscellaneous end	0	1	1	4	3	4	1	0	14
Steep dentic scr	1	4	1	10	11	8	1	0	36
Bulbar retouch	2	2	6	16	11	15	4	0	56
Bifacial-discoidal scr	1	1	6	12	2	0	3	0	25
Reamers	3	4	2	18	15	18	4	0	64
Pointed pieces	4	7	7	18	33	33	8	1	111
Polyhedric angle burin	4	8	8	8	4	3	0	0	35
Polyhedric dihedral	72	93	65	74	47	15	7	0	373
Angle burin	15	25	22	13	18	4	2	0	99
Dihedral burin	17	10	6	10	5	8	0	0	56
Simple burin	7	11	11	7	3	4	1	0	44
Angled blade core	208	246	335	273	198	134	64	1	1459
Multifacetted core	7	7	8	9	5	1	1	0	38
Pyramidal flake core	36	53	32	44	42	28	24	1	260
Amorphous core	8	15	11	19	7	11	6	0	77
Nodule	3	4	12	8	1	3	4	0	35
Core fragments	673	912	873	1113	790	718	392	0	5471
Debitage	7859	8251	8706	11101	10553	8264	4169	104	59007
Totals	**10256**	**11007**	**11583**	**14584**	**13716**	**10977**	**5919**	**449**	**77897**

Table 1 – Distribution of lithic types and categories across the excavation units, grouped by 30 cm levels.

Top Top Retouch (TT). Sample 629. These have retouch along both edges of the upper face. The retouch is along most of both upper edges and tends to make the sides parallel. There is no tendency for the sides to converge in a point. In most cases the retouch is steep and there are more flat than twisted bladelets. The average size of the bladelets is smaller in the upper levels, but small examples occur throughout. Blades that have only irregular traces of use on each upper edge are counted with TT. Distribution is heavily weighted toward the lower half of the deposit.

Top Top Retouch Blade (TT). *Sample 182. Similar to above,* these are non-microlithic blades with retouch on both upper faces.

Piercing-Reaming Tools

Pointed Pieces. Sample 111. Blades and bladelets that have limited retouch at one end that creates a point or tip. The retouch may be steep or shallow and it is ordinarily confined to the tip. Some of these have the appearance of Arjeneh points but the retouch here is confined to the tip. These are mostly found in the lower half of the deposit.

Reamers. Sample 65. Similar to pointed pieces except that the ends are blunt because they are thick or rounded by retouch. The retouch may be steep or shallow and it is usually along all of both edges. Many of these closely resemble TT Blades and Bladelets except that here, in all cases, the ends are retouched. These are nearly all in the lower half of the site. Y4d278 has a reamer with bulbar end retouch.

Burins

Burins are basically sharp angles formed by the intersection of two planes, at least one of which must have been deliberately created by the removal of a spall. Depending on the kind of chipping involved, one can distinguish several types of burins. There is relatively little variety in the present collection. In the definitions that follow, all types of burins (except micro-burins) may be *simple*, in which case one spall was removed, or *polyhedric*, when more than one spall in any direction was removed.

Polyhedric Dihedral. Sample 336. The burin angles on these flakes were formed by the removal of spalls from two directions. At least one of the planes of intersection was formed by the removal of more than one spall. These occur throughout but more in the upper half.

Polyhedric Angle. Sample 35. On these the end of the flake is truncated and the multiple burin blows use the truncated end as a striking platform. These occur in the upper 2/3 of the deposit.

Dihedral. Sample 56. A single spall was removed from each direction to create the burin angle. These occur throughout.

Angle. Sample 96. One end of a flake was truncated and a burin blow was directed from this platform to create the burin angle. These occur mainly in the upper half of the deposit.

Simple. Sample 44. A burin spall was removed from one plain, unretouched end of a flake. These occur throughout.

Scrapers

Rounded. Sample 407. This group includes a range that is often divided into end scrapers and thumbnail scrapers. All of these pieces have an end or edge retouched into a blunt rounded form. The angle of the edge relative to the plane of the flint varies from nearly vertical to about 45°. These tools may be made on either blades or flakes.

At one extreme, are thumbnail scrapers, usually made on stubby flakes and chipped so they are about as wide as long. At the other extreme, scrapers on the end of blades are obviously longer than wide. These two groups are not separated because they both occur throughout the sequence and the smaller variety may just be extensively reused end scrapers. A comparison of the scraper lengths with Pa Sangar reveals that while the implements in the lower half of the site are relatively long, those in the upper half more closely match the diminutive size of the Zarzian scrapers. Rather than there being a difference in thumbnail versus end scraper, it is overall size that changes with time.

Miscellaneous-end. Sample 14. Blades and flakes whose ends have horizontal, concave, or irregular retouch. These are all in the lower 2/3 of the deposit.

"Mousterian" side scrapers. Sample 318. These are flakes that have all or most of one or both edges shaped by non-steep step flaking. Most of the pieces are elongate and the edges relatively straight. A few examples have curved edges and on some the retouched edges converge in a blunt point. These occur throughout the deposit.

Bifacial-Discoidal. Sample 25. These thick flakes have a discoidal shape with some flaking on the bulbar surface. The final retouch was often directed only from the bulbar face. The pieces are lenticular or plano-convex in section and often have sharp edges. They are mostly in the middle levels of the Yafteh deposit.

Steep, Denticulate. Sample 36. Thick flakes and core fragments that have rough scaled or step chipping that results in a slightly scalloped edge or edges. The pieces are chunky and have steep edges. Found throughout the deposit, but mostly in the lower half.

Bulbar End. Sample 56. These flakes have secondary retouch on the bulbar end which results in a smooth edge suitable for scraping. They are thin in section and tend to be crescentic or sub-round in plan. Although the retouch on the bulbar end makes them look somewhat like flakes struck from a prepared Levallois core, this kind of core is not found in the Khorramabad region. Found throughout the deposit.

Cutting-Scraping Tools

This group consists of tools made on both blades and flakes, whose principal use seems to have been for cutting and scra-

ping. These range from well-made and deliberately retouched pieces to those that have clear evidence of use but no consistent pattern of chipping to achieve a desired edge or shape.
Blades are elongate flakes, with length usually more than twice the width, and parallel or nearly parallel edges. The tips are frequently pointed but the body of the blade has parallel sides. One, two, and sometimes more, flake scars run the length of the piece, as a result of several blades that have been taken off a core in succession. When laid on its bulbar face a blade is usually flat, although curvature in the long dimension is common on the larger pieces. Bladelets, as defined below, are less than 6 mm wide and the great majority of them in this collection, are twisted; hence the designation Baradostian bladelet.

Backed Blades. Sample 104. Blades whose maximum width, after retouching, is more than 6 mm wide. The Backed Blades have steep retouch on one edge. The opposite edge may have irregular nibbling but no consistent retouch. The retouched edge may be parallel to its opposite or merge with it in a diagonal end, but there is no trend toward making slender double pointed tools. When the edges converge only one is retouched. Most of these occur in the lower half of the deposit.

Backed Bladelets. Sample 18. These pieces do not exceed 6 mm wide after retouch, and typically widths range between 2 - 6 mm. Some of these are moderately twisted but the usual form is flat. The step retouch extends along most or all of one straight or curved edge. Whole bladelets that describe an elongated crescentic shape are included here. To judge from the whole pieces and fragments, the artisans usually attempted to make slender double pointed tools. However, some of the pieces show that only one end of the bladelet was intended to be retouched. A great many have non-steep retouch on one edge at the end which merges with the steeply retouched edges to form a sharp point or tip. This type is commonly found in the later Zarzian but examples are found throughout the deposit.

Notched Blades. Sample 60. These are blades and rarely bladelets whose edge or edges are notched singly or in series as a result of retouch or localized use. Mostly found in the upper half of the deposit.
Notched Flakes. Sample 96. Flakes whose edges have one or a series of notches chipped into them either deliberately of through use. They occur throughout, but more frequently in the upper half.

Used Blades. Sample 239. These blades have limited chipping along an edge or edges indicating use but not deliberate retouch. They are found throughout.

Used Flakes. Sample 380. These flakes have limited chipping indicating use but not deliberate retouch. Found throughout.

Plain Blades (Sample 2174).

Blades whose edges show neither retouch nor chipping. The greatest proportion of these occurs in the lower half of the deposit.

Plain Baradostian Bladelets (Sample 4647)

Similar in appearance to blades, these pieces have a twist in both their horizontal and vertical planes as a result of the shape of the core. Typically as one looks at the bulbar side of a Baradostian bladelet, which has its bulb down, the twist is to the left. These pieces generally have more than two flakes scars running the length of the dorsal side. When whole, these bladelets have a characteristic tear drop shape with the bulb forming the bottom of the drop. These are found in greater proportion in the upper half of the deposit.

Cores

Angled Blade Core. Sample 1459. Usually made on pebbles with the striking platform at about a 450 angle to the axis of the blade. Because the platform is angled, chipping is on only one face of the core body. Frequently the bulk of the core is left unaltered. A few cores are double ended with the chipping done from opposite ends.

Multi-facetted Core. Sample 38. These exhibit two or more platforms from which blades or flakes were struck.

Pyramidal Flake Core. Sample 260. Similar to pyramidal blade cores there may have started as blade cores but proved to be defective and produced only flakes.

Amorphous Core. Sample 77. Seemingly without consistent orientation or well-developed striking platforms, these may be considered aborted attempts.

Nodule. Sample 35. Natural sources of raw material that were not yet reduced to cores and blades.

Core Fragments. Sample 5471. The large number of these is testament to the intensive core reduction that occurred at the site, these pieces consist of edges of platforms and other distinctive removals during preparation of the cores.

Figure 10 – Bone awls: right, Y2e201, left, Y6e178.

Debitage (Sample 59,007)

Apparently chipping debris, these pieces have no visible sign of retouch or use wear.

We have not carried out any use-wear studies to verify if they have signs of use. Most debitage was discarded in the field.

Lithic comparisons

The lithics from Kunji Cave, Ghamari Cave, Gar Arjeneh, Yafteh and Pa Sangar were analyzed according to the same method, so comparisons among the five sites can be readily made. For this paper, it is instructive to look at the possible implications for a continuous sequence from MP through the Zarzian. For this we have the well stratified collections from Kunji Cave, Yafteh Cave and Pa Sangar. I omit Gar Arjeneh because of potential problems with mixing and Ghamari because of the very small sample.

One can observe a number of gross differences among these sites, which are thought to represent the three main periods of the Middle-Upper Paleolithic in the Zagros (fig. 10). First is the presence or absence of certain types, second the proportions of types through time, and finally, the number of types in each period[4]. The available data make clear that one cannot make a case for a continuous sequence if these three sites comprise the entirety of each segment of a sequence. This cannot be determined in the absence of unequivocal "transitional" sites, or that changes in types were so abrupt as to leave no intermediary traces.

Evidence for discontinuities

Our trench in Kunji Cave revealed a coherent classic Middle Paleolithic lithic assemblage. "Mousterian points" or convergent scrapers accounted for some 30% of the assemblage, and side scrapers another 40%. Retouched/used flakes were some 18%. Only ten types, including cores are present in the assemblage of 417 pieces. It is likely that Kunji was a site with limited uses, probably a camp of hunters who did most of their lithic reduction away from the cave.

The contrast with Yafteh Cave in the aggregate, ignoring any time dependent changes, is stark (fig. 10). Rather than 10 designated types, now there are more than 30, including various core types. There are no "Mousterian Points," and side scrapers have diminished to <1%. Mousterian Points have been replaced by Arjeneh/Krems points and their variants. There is no apparent "transition" at Kunji Cave to the new Baradostian types.

A similar situation is apparent with Pa Sangar, which also has 31 types, but not all the same as those in Yafteh. Particularly striking is that the Arjeneh/Krems-style points are replaced by various micro-lithic geometrics and backed elements, which do not occur in Yafteh. Their possible counterparts, Baradostian bladelets TT Steep, TT, TB, and T are not in Pa Sangar. Assuming that points were used in hunting, this marks a third technological change in this basic subsistence activity. Considering all types, blades comprise 60% of the lithics in Pa Sangar and 31% in Yafteh, possibly indicating a shift in activities or at least in core reduction. While the proportion of blade cores in the two sites is ca. 10%, only Pa Sangar has pyramidal blade cores. Notched blades, which are common in Pa Sangar are represented by only a few examples in upper Yafteh.

One can also point to significant changes in proportions of types, such as thumbnail scrapers which are found in low numbers only in the upper part of Yafteh, but are numerous in all levels of Pa Sangar (Hole & Flannery 1967: fig. 5, tab. III). Similarly we can point to Large Backed blades which occur in small numbers primarily in the lower part of Yafteh, but in only two instances in Pa Sangar, and Borers are absent in Pa Sangar.

The evidence shows changes within both Yafteh and Pa Sangar, but does not close the gap between the two sites, and there is no overlap with the Middle Paleolithic. At least in the sites so far excavated in the Khorramabad Valley, it appears that there were three distinct periods of occupation, albeit with internal changes in the latter two periods.

Bone Artifacts

Awls

Among the faunal remains we found several bones that had been sharpened like awls. Typically scratches made during shaping and scraping run longitudinally except where only the tip is preserved. Many fragments were too small to identify the bone part. The fragments are listed individually, from the oldest to the most recent.

Y6e 278 – This is a centimeter-long tip that is well worn and burnished to a dark hue.
Y2d 256 – A splinter of a bone shaft that has been worked to produce a flattened pointed tip.
Y2e 201 – A hollow shaft fragment, one end of which was ground down to a rounded tip, the end of which is missing (Fig. 10 right). The bone has a calcium crust.
Y4e 201 – The well-formed tip of a bone splinter awl.
Y6e 178 – A dark, well-polished, deeply scratched awl made on a bone splinter (fig. 10 left).
Y42 167 – The tip of a bone-splinter awl. The tip has been worn down to a narrow shaft.
Y6d 156 – The well-polished tip of a bone awl.
Y4e 134 – Description missing, burned

Bones with cut marks

Some of the cut marks on pieces of bone may have derived from butchering, but a few have linear cuts running along the length of the bone, perhaps indicating another activity. None of the cuts is transversal. Because of the highly fragmented faunal collection, no doubt other fragments with cuts were missed in the field sorting.

Y6d 278 – Three small bits of bone each of which has a single cut mark.
Y2d 245 – A burned shaft fragment with a cut mark.

Y6e 190 – Two bone fragments each have three longitudinal cuts and a third has one cut. One of the bones is a rib segment. The cuts appear to have resulted from something other than butchering.

Miscellaneous Stone and Mineral Finds

We recovered many pieces of stone that were neither flint nor apparently derived from the cave itself. These pieces were all counted and roughly categorized in the field and a sample was brought to America, as indicated below.

Ochre

We recovered small bits of ochre or haematite, and at least one grinding stone and perhaps a pendant retained traces of ochre. It is clear from the grinding stone that ochre was used deliberately, although we cannot tell for what purpose.

Y4e 267 – A hard chunk of ochre. Apparently there is "also some crumbly yellow rock in foil. Note also the very granular piece which is well abraded." The latter is missing.
Y4e 256 – Small bits of ochre.
Y2e 256 – missing[5]
Y4d 245 – Two small bits of ochre.
Y6e 223 – missing
Y6e 190 – missing
Y4e 167 – Small chunk of oolitic haematite.
Y4e 167 – good chunk of ochre
Y6d 156 – Two pieces missing
Y4e 156 – missing

Ochre Stained stones

These are small chunks of limestone that have traces of ochre on their surfaces. None of these has an obvious facet so it is probable that they merely came into contact with a supply of ochre powder. The same is probably true of a number of lithic artifacts that also have ochre traces, such as stone pounders.

Y4d 278 – 2 pieces
Y4e 190 – 1 piece
Y62 178 – 1 piece with flat surface, probably natural
Y4e 167 – 3 good sized pieces

Grinding Stone?

Y62 145 – An irregular limestone rock, measuring 20 x 12 cm, has traces of ochre on its flat surface. The rock varies in thickness from 7-10 cm and is covered with a thin carbonate deposit. Some of this deposit also covers part of the ochre although that surface is relatively free of this deposit. It is probable that this rock was used as an anvil or palette for grinding or pounding ochre which is softer than the limestone and consequently did not leave visible striations. This rock could have been gathered from rockfall within the cave itself and then used as an expedient tool.

Pendant?

Y6d 278 – A roughly oval limestone pebble with a perforation in one end, has traces of ochre on its surfaces (fig. 11). One end of the pebble is broken and covered with ochre. The pebble appears to have been formed by natural processes, including the hole that shows no signs of artificial working.

Figure 11 – Possible stone pendant, Y6d278

Miscellaneous Stones

Rocks and stones that appear to have been brought into the cave are included here. These stones have rounded edges and/ or are of a different from the limestone that occurs in the cave walls. It is clear that most of these were brought in from outside and thus they are "manuports" if not artifacts. The following describes the "exotic" stones in the Yale collection. Many of these exhibit surface marks, such as scratches, pits, chips, flattening, and polishing, suggesting that they were used in different activities.

Pounding stones – This is a highly varied group, whose members range from small, flat pebbles, to fist-sized, rounded rocks. A number of these stones, all of which have rounded edges, display evidence of pitting, resulting from pounding against a hard surface. Many are too small to be considered "pounders." Many stones are nearly round but most are irregular. Some of the surfaces have slight polish as if rubbing as well as pounding was involved in their use. Two of the stones have traces of ochre and may have been used for grinding or pounding that material.

Y2d 167 – a sub-round pounder with traces of ochre (fig. 12 left).
Y2d 178 – Half of a flat ovoid pebble with traces of ochre.
Y2d 157 – A small quartz pounder.
Y6e 123 – A rounded pebble with a smooth facet and evidence of pounding on the edges.
Y4e 256 – A large rounded cobble that was broken in half that has evidence of heavy pounding on its end (fig. 12 right).
Y2d 223 – A heavy metamorphic rock that has a number of large chips removed from its edges, and extensive evidence of heavy pounding on the edges.
Y6e 145 – A heavy metamorphic rock with chipping and battering (fig. 13)

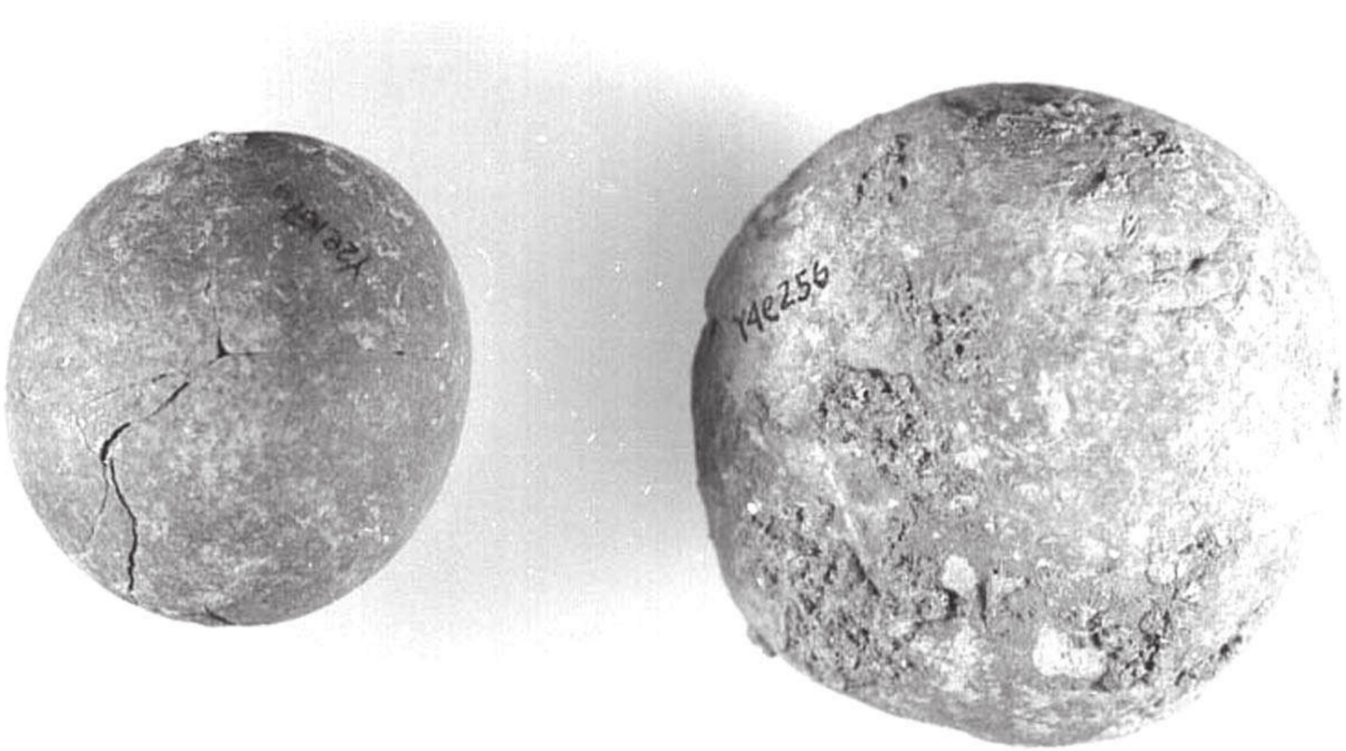

Figure 12 – Sub-spherical pounding stones, left,Y2e167, right, Y4e256.

Y6e 145 – A sub-rectangular, tan sandstone pounder with a concave depression on one side (fig. 14). There are pits from pounding around the three sides.
Rubbing Stones.
Y6e234 – A piece of a dense sandstone tablet with flat surfaces.
Y6d 289 – A dense rounded cobble with one flat side describing a rubbing surface and signs of pounding around the sides. Small patches of smooth polish are on the upper side of the piece.
Y6d 234 – A sandstone pebble.
Y2e 167 – A small rounded, polished pebble, possibly haematite.
Y6e 123 – An oval pebble with pounding marks on its flat face rather than on the edges.

5.6. Flat Stones

A group of flattened river pebbles exhibits scratches on the surface, of a type that does not occur naturally (fig. 15). To demonstrate this I collected a sample of pebbles from the gravel bed of the wadi that flows past the village of Daurai. This sample includes all of the types of stone found in Yafteh, including sandstone. The stones vary in color from dark gray, laced with white calcite veins, to white and buff colors. Experimental use of the pebbles verified that pounding pits the edges and surfaces differently from water action in the wadi, and that scratching can be accomplished by using the pebbles to abrade core platforms. The important point is that pebbles were brought into the cave for various purposes. These pebbles were left in their natural shape and size and probably used for only a short time before being discarded. A few stones show no signs of use except that they are well polished as if they had been rubbed or handled extensively. Many of these pebbles are broken.

5.7. Clay Pellets

A number of pellets of clay that probably were hardened through contact with fire, were recovered. Most of the pellets consist of sandy clay with small grit inclusions. One pellet appears to be fairly clean clay and has no visible inclusions. These all appear to be accidental and, although it is possible that people living in the cave manipulated clay, they did not deliberately fire it.

Y62 290 – A pellet that had been pressed against a flat surface and also has the impression of a plant stem with linear fibers.
Y6e 278 – A small pellet.
Y2e 267 – A pellet with possible stick impression.
Y6e 256 – A small pellet.
Y4d 212 – A pellet with three plant stem impressions.
Y4e 167 – Tiny bits of clay, probably a smashed pellet.
Y42 112 – A pellet that had been pressed onto a flat surface.
Y4e 112 – A pellet with an indeterminate impression.

6. Radiocarbon Samples

In 1965 I secured a series of samples for radiocarbon dating, eleven of which were run, five by Smithsonian, and six by Geochron. The SI dates are uniformly younger than the Geochron and one SI date is 10,000 years younger than the others.

Concerning each of the samples, Geochron stated: "The mount of pure carbon flecks which could be recovered was too small to provide an accurate date in the expected age range, therefore, the sample was supplemented by using some of the carbon-bearing ash. The entire sample was thoroughly digested in HCl to remove carbonate material which was very abundant."

Fortuitously I held back four of the samples which appear to be largely ash and therefore little charcoal, but with AMS it should be possible to get a date. These samples are from the upper to middle deposits. Rather than run these I accepted Melinda Zeder's offer to have burned goat bone dated and these are reported below.

Old Series, conventional dating

Level	Lab #	Date bp
Y62 200	GX-711	34,800 +2900/-4500
Y42 201	GX-710	32,500 +2400/-3400
Y42 201	SI-332	29,410 +/- 1150
Y62 212	SI-333	30,860 +/- 3000
Y62 260	GX-709	38,000 +3400/-7500
Y42 250	SI-336	21,000 +/- 800
Y4e 278	GX-708	>36,000
Y6e 280	SI-334	31,760 +/- 3000
Y42 280	GX 707	34,200 +2100/-3500
Y42 285	SI-335	>40,000
Y4e 290	GX-706	>35,600

New dates, AMS on charred bone

Y 256	30,300 +/- 320	too little material to calibrate
Y 278	32,470 +/- 380	"
Y 256	18,580 +/- 80	22,060 cal
Y 278	18,980 +/- 80	22,520 cal

If these new dates are correct it puts the site at the height of the LGM (Clark et al. 2009), and contemporary with Ohalo II, an Epi-Paleolithic site in the Sea of Galilee, northern Jordan Valley (Nadel et al. 1995). This late date seems very unlikely.

New dates from 2005 excavation

Beta 206711	24,470+-280
Beta 206712	33,400+-840
Beta 205844	35,600+-600

Figure 14 – Limestone pounding stone, Y6e145.

These dates (Otte et al. 2007), while in stratigraphic order, more closely match the first series of SI and Geochron dates and would place the site well before the LGM, a dating that would imply more favorable environmental conditions for hunters at Yafteh. Moreover, these dates push the site back closer to where one would expect it to be considering the lithics, and farther from the Kebaran of Ohalo II.

Figure 13 – Grinding stone of metamorphic rock, Y6e145.

7.Fauna

When we were first studying the material in the 1960s, Kent Flannery and Jane Wheeler examined the bones. In a note attached to the data sheets, he remarked,

"Study not complete yet, but it's obviously a base camp occupied by many people over at least a season. MONOTONOUSLY GOAT. Most big wild goats (high % adults), some hare, fox, turtle, onager. Literally thousands of pounds of meat are represented in the small sondage, so stuffed it has more bones than dirt."

The fauna of Yafteh Cave is anomalous in that some expected species are missing. Assuming that this site is contemporary with Gar Arjeneh, it is hard to understand why there are so few bones of cattle and onager where several "butchering episodes" of these animals took place (Hole & Flannery 1967). Warwasi shows a similar set of fauna (Turnbull 1975). Preliminary examination by Kent Flannery notes that Pa Sangar, like Yafteh, is also overwhelmingly goat. These contrast with the Mousterian of Kunji, where there is red deer, pig, sheep, gazelle, onager, and a variety of birds. When accurate dates for these sites can be obtained, they may help to resolve whether the differences in faunal composition are related to climatic stages during the Pleistocene or different hunting practices.

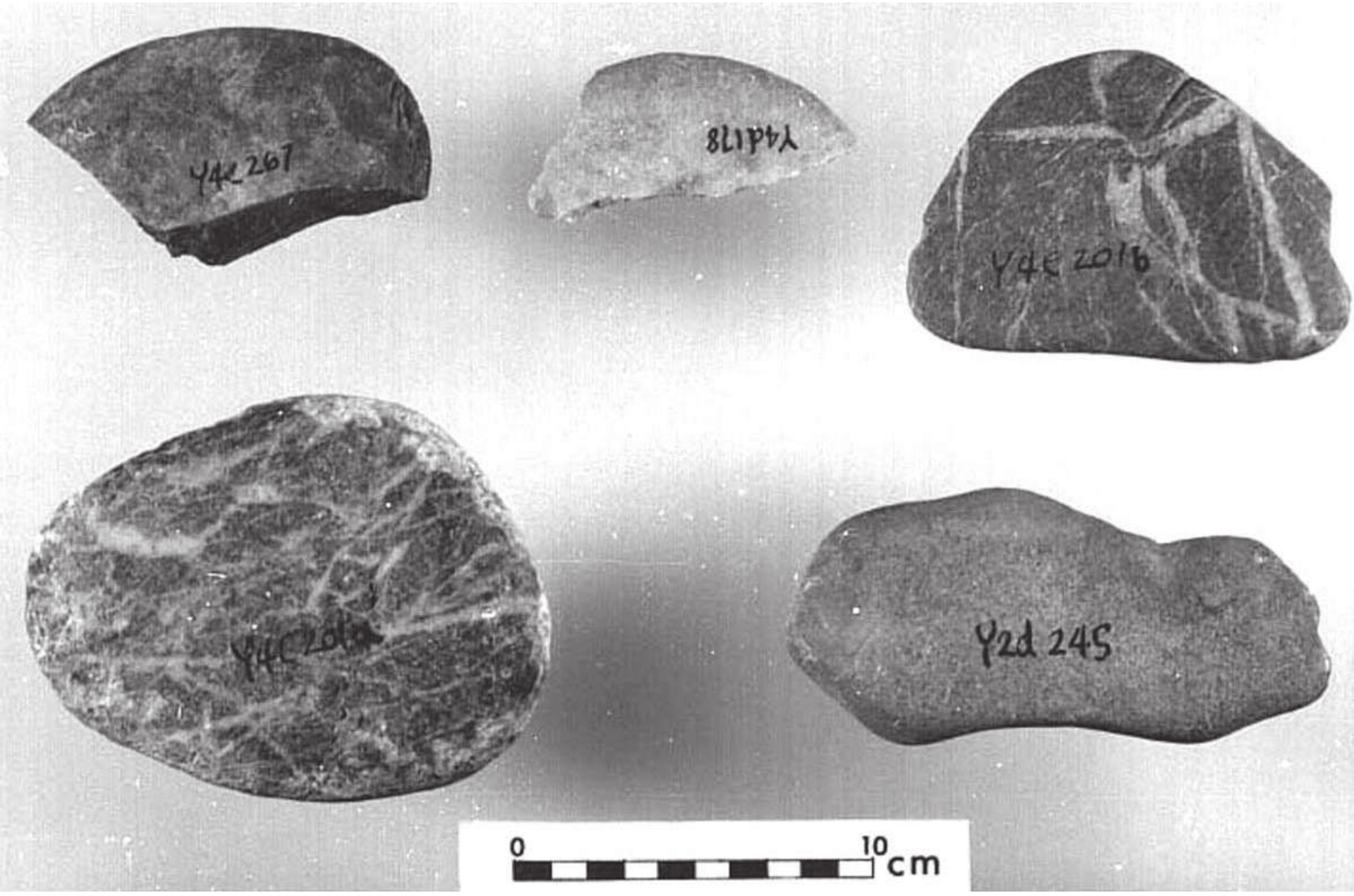

Figure 15 – Flat stones, various contexts.

Notes

[1] This chapter stands as a record of what we did in 1965 and, except for a few remarks, does not attempt to integrate it with the recent excavations at Yafteh and elsewhere, or publications on Yafteh itself, which are covered in this volume.

[2] Datum is the surface at the northeast corner of Y2e.

[3] Table 1 is a summary of my analysis of the chipped lithics. Rather than tabulate the distribution of material by each excavation unit and level, I constructed 30 cm groups of levels, e.g., 103=100-130 cm; 281=280-310 cm. Grouping has the advantage of showing changes without making the table too large to comprehend. Complete data tables by excavation unit and layer are at Yale.

[4] Data for these observations are in the files at Yale and will be published at a later time.

[5] A number of pieces of ochre were recorded in the field notes, but were not retained.

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II - THE BARADOSTIAN SEQUENCE OF YAFTEH CAVE. A TYPO-TECHNOLOGICAL LITHIC ANALYSIS BASED ON THE HOLE & FLANNERY COLLECTION

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Abstract: A typo-technological analysis of the lithic materials recovered by the excavation of F. Hole and K. Flannery at Yafteh Cave (Khorramabad, Zagros, Iran) leads to a new discussion of the definition of the Baradostian and its relation to contemporary industries in south-west Eurasia. Despite some relatively early dates, these assemblages show no technical proximity with the local Middle Paleolithic or any transitional industry. The debitage, made with an organic soft hammer, is exclusively oriented toward blade and bladelet production. Based essentially on the bladelet productions, it is possible to distinguish two main assemblages clearly organized in a single archeo-sequence. The upper layers contain small twisted bladelets with alternate retouch (Dufour bladelets, Roc-de-Combe sub-type), mostly produced from lateral carinated burins. The base of the sequence contains long bladelets with a curved or rectilinear profile. Most have direct bilateral retouch, convergent (Arjeneh Points), or not ("rods"), but there are also some with alternate retouch (Dufour bladelets, Dufour sub-type). These long bladelets are obtained from prismatic cores on small blocks. Many have impact fractures, indicating their utilization as projectile points.
The general tendency of Yafteh sequence thus follows the same pattern as contemporaneous European and Near Eastern industries.

Résumé: Une analyse typo-technologique du matériel lithique issu des fouilles de F. Hole et K. Flannery à la grotte de Yafteh (Korramabad, Zagros iranien) conduit à rediscuter la définition du Baradostien et ses rapports avec les industries contemporaines du sud-ouest de l'Eurasie. Malgré des dates très anciennes, ces ensembles ne montrent aucune proximité technique avec la Paléolithique moyen local. Le débitage, effectué au percuteur tendre organique, est strictement lamino-lamellaire. Essentiellement à partir des productions lamellaires, il est possible de distinguer deux grands ensembles qui s'organisent très clairement en une archéoséquence. Les niveaux supérieurs livrent des petites lamelles torses à retouche alterne (lamelles Dufour sous-type Roc de Combe), essentiellement produites à partir de burins carénés plans. La base de la séquence montre une production de grandes lamelles courbes ou rectilignes, majoritairement à retouche bilatérale directe convergente (pointes d'Arjeneh) ou non ("rods"), mais aussi à retouche alterne (lamelles Dufour sous type Dufour). Ces grandes lamelles sont obtenues à partir de nucléus prismatiques sur petits blocs. Elles montrent de fréquentes fractures d'impacts, qui permettent de supposer leur usage comme pointes de projectiles. Dans ses grandes lignes, cette séquence est similaire à celles que montrent les industries contemporaines du Proche Orient et de l'Europe.

1. Introduction

In numerous debates and discussions on Middle to Upper Paleolithic transition, the Zagros lithic industries have received relatively less attention compared to Europe and the Levant. Due to many reasons, such as political revolution or war, few Paleolithic excavations have been conducted in the past thirty years and our main information comes from collections from excavations conducted in the 1960s and 1970s using methods that were acceptable at the time but only used partially today.

The Early Upper Paleolithic industry of the Zagros was termed the Baradostian by R.Solecki in 1958 after its recognition in layer C of Shanidar Cave in Baradost Mountain, Iraq. But the major Baradostian sites known are located in the Iranian part of the Zagros, including Warwasi, Yafteh, Pa Sangar, Gar Arjeneh and Ghare Khar, in Kermanshah and Lorestan provinces. Since its definition, the Baradostian technocomplex has been associated with two issues which structure its analysis: the question of its origin and its relevance and resemblance to the Aurignacian.

The dominant hypothesis concerning the origin of the Baradostian is the continuation of the local Middle Paleolithic, based mainly on data derived from the Warwasi assemblages. Warwasi rock-shelter is located in northern Kermanshah and was excavated by Bruce Howe in the late 1950s (Braidwood & Howe 1960; Braidwood *et al.* 1960). The Warwasi excavation yielded a rich sequence containing Middle, Upper and Epi-Paleolithic lithic materials recovered by excavating 10-cm-thick arbitrary horizontal spits (Olszewski & Dibble 1994).

Warwasi's Upper Paleolithic sequence shows a decreasing frequency of elements with Mousterian characteristics from base to top (Levallois cores and products, scrapers and points). However, some doubts were raised about the presence of such components in the Baradostian, due to possible natural mixture of layers or the method of excavation (Olszewski & Dibble 1994). For integration of the Baradostian within a wider geographical context, the same typo-technological study proposed that on the basis of

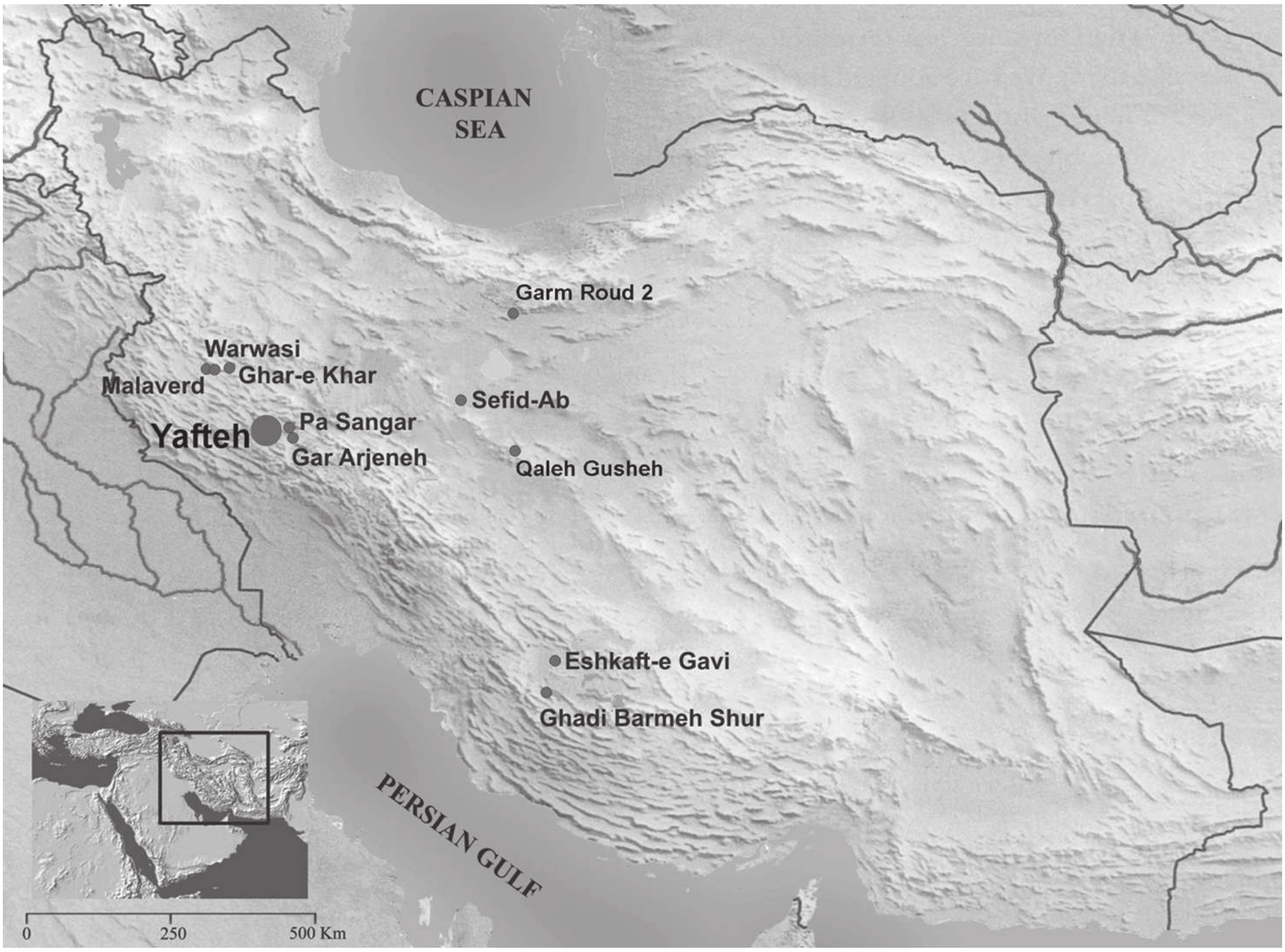

Figure 1 – Distribution of the main known Early Upper Paleolithic sites. After Shidrang 2007, 2009, modified.

similarities in its lithic characteristics, the Baradostian is comparable to the Aurignacian (Zagros Aurignacian) particularly in the Near East and Eastern Europe (Olszewski 1993, 1999, 2001). On the other hand, Yafteh's early radiocarbon dates (Hole & Flannery 1967) also led the debate to consider the Baradostian as one of the earliest facies of the Aurignacian and provided support for the hypothesis of a local origin for the Upper Paleolithic.

A more recent synthesis, based on a number of lithic collections in the Middle East, not only confirmed the hypothesis of attribution of the Baradostian to the Aurignacian, but also considered it as the local origin of this technocomplex (Otte & Kozlowski 2004). In this discussion, Yafteh Cave in particular has played a central role, with a date around 40 ky BP and an industry associated with Levallois elements at the base of the sequence, and including retouched bladelets, a bone industry and ornaments (Otte *et al.* 2007).

Here we present a typo- technological analysis of the collection from the 1965 excavation in Yafteh Cave, conserved at the National Museum of Iran, in order to evaluate the hypothesis of Mousterian components at the base of this important sequence and to discuss the proximity of the industry to what is known as the Aurignacian.

2. Presentation of the site and the collection

The karstic cave of Yafteh opens in the limestone cliffs of Kuh-e-Sefid in the heart of the central Zagros chain that extends through Lorestan province in western Iran (fig. 1). It is located in a region rich in Paleolithic sites along the Khoramabad Valley, some of which were surveyed and excavated in 1963 and 1965 by F. Hole and K. Flannery during their prehistoric project in south western Iran (Hole & Flannery 1967). The excavation of Yafteh in 1965 revealed a Pleistocene sequence over two meters thick, exclusively composed of Baradostian levels overlain by a meter of historical sediments (fig. 2).
The materials were collected from six 1x2m trenches along the North Eastern wall toward the center of the cave and each trench was excavated in 10 cm arbitrary levels. After excavation, the rich collections were separated into two equivalent parts: squares 4e, 6d and 6e remained in Iran while the rest of the collection and most of the fauna, including the bone industry, was transferred to the United States. The results of the 1963-1965 surveys and excavations were published by F. Hole and K. Flannery in a general report covering the Middle Paleolithic to the end of the Ubaid Period about 3700 BP (Hole & Flannery 1967). The collections which are the subject of the present analysis were also studied pre-

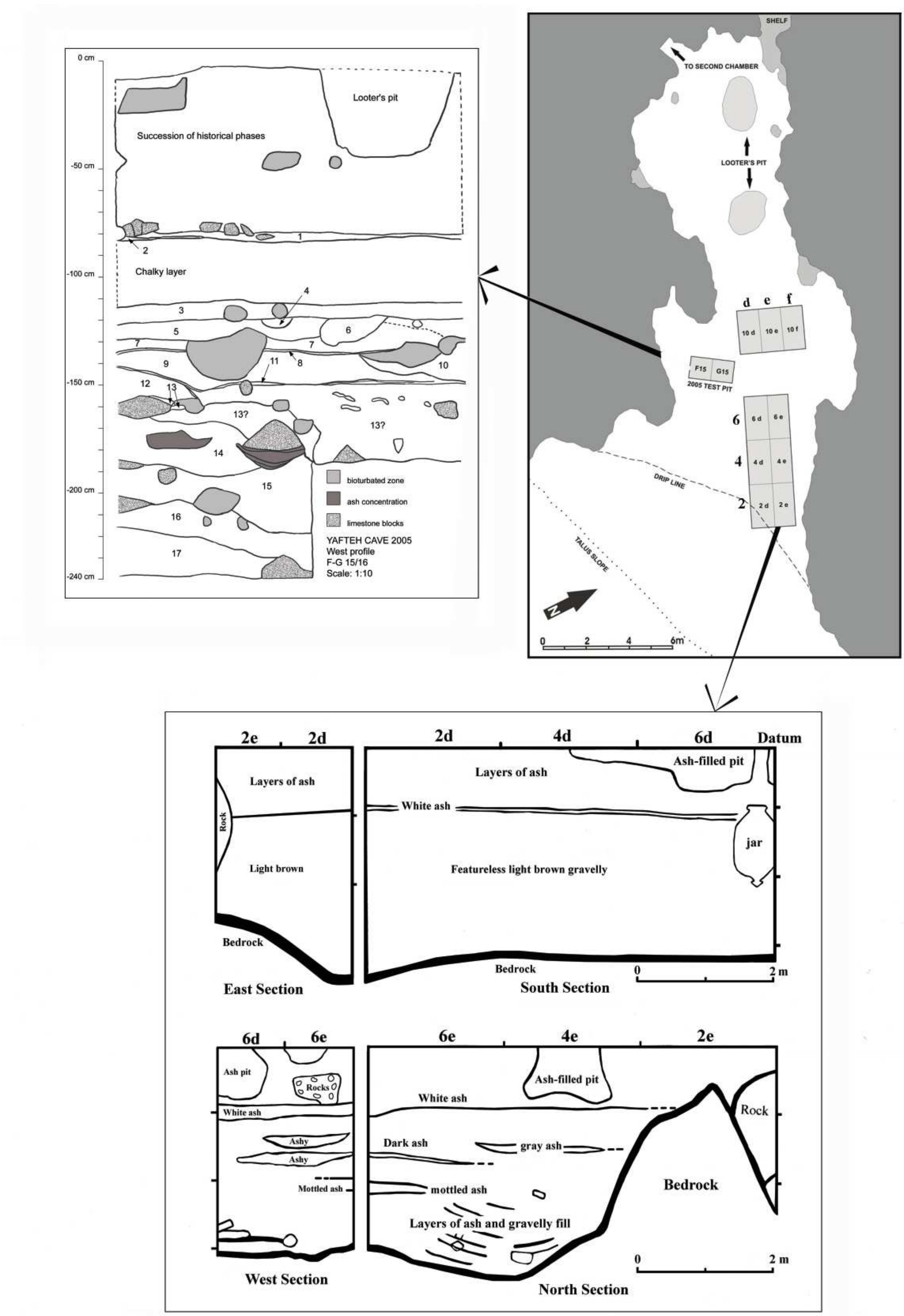

Figure 2 – Yafteh cave, excavation and sequence identified by F. Hole and K. Flannery, courtesy of F. Hole, modified; and 2005 excavation and stratigraphy, after Otte *et al.* 2007.

viously by M. Otte (Kozłowski & Otte 2007). In 2005 and 2008, M. Otte and F. Biglari, and then S. Shidrang conducted a new test excavation at Yafteh, which resulted in the discovery of a new set of ornaments, bone tools and lithic assemblages as well as providing new radiocarbon dates (Otte *et al.* 2007, 2011). The current paper is the result of our study of the collection from squares 4e, 6d and 6e, carried out in 2004 as a part of a cooperative project on the Paleolithic between Iran and France, directed by J. Jaubert and F. Biglari.

3. The value of the collection, preliminary considerations

One glance at the Hole and Flannery stratigraphic description is enough to follow the depositional sequence of Yafteh; a concentration of archaeological material, quite horizontal ash and charcoal lines, separated in part by probable sterile levels as well as evidence of some bioturbation. The 2005-2008 small test excavation in Yafteh confirmed the accuracy of this description in the zone along the western wall of the cave with more detail (Otte *et al.* 2007). The Hole and Flannery lithic collection is clearly sorted, with most of the assemblage represented by tools, lamellar blanks, large blade/bladelets and bladelet cores. But sorting of small objects by the excavator was also done, seen particularly by the large number of unretouched bladelets which are very small in size, indicating the high accuracy and resolution of the excavator. However, we do not know much about the sieving method or whether it was systematic; this factor can significantly influence the industry's composition (Bordes & Lenoble 2001). In our preliminary analysis, we therefore consider that this collection cannot address economic issues and we remain cautious about the quantitative aspect of the different types of artifacts. However, as we will see in the analysis, the large number of available artifacts and consistency of their stratigraphic distribution allow us to consider the Yafteh sequence as a valuable source of information. It is clear that further excavations conducted by modern methods will reveal the full extent of these deposits which seems to have great informative potential.

	6e	4e	6d	total
Retouched bladelets	376	212	318	906
Non-retouched bladelets	992	910	993	2895
Bladelets cores	155	179	263	597
Tools on blades and flakes	102	142	111	355
Blades and flakes with some retouch	57	45	114	216
Non-retouched blades and flakes	10	7	23	22
Undetermined blanks, retouched or not	102	145	91	338
Total	**1853**	**1744**	**1943**	**5538**

Table 1 – Yafteh, Hole and Flannery excavation, collection held in National Museum of Iran, Inventory of the entire lithic collection.

4. Analysis

4.1. Preliminary statements and observations

Table.1 shows a clear consistency in the different artifact categories counted by square and indicates that we probably do not have a differential distribution of lithic industries within the excavated area. As a result, we base most of our analysis on the richest, square 6d, since the results for other squares did not differ significantly. The assemblages are dominated by bladelet production which on average represents more than 82% of the collected artifacts. It is difficult to determine whether the very low number of blades and non-retouched flakes corresponds to an economic factor (no on site reduction, except bladelets, which have a significant raw frequency).

Consequently, retouched tools represent about 25% of the assemblage or nearly 40% if we include pieces that are slightly retouched and some bladelet cores which were previously counted as tools. Considering, firstly, the significant scale of production and utilization of bladelets and secondly, the fact that these artifacts have already been noted as the best marker of the chronological sequence for the Early Upper Paleolithic (e.g. Le Brun-Ricalens 2005), we concentrate our initial sorting efforts on bladelets. It then becomes evident to observe two main patterns in the whole assemblage: one leading to the production of small twisted bladelets, especially from burins or nosed scraper core types, the other in the manufacture of large curved or straight bladelets from prismatic cores on blocks.

4.2. Demonstration of an archaeological sequence:

The central role of bladelets

According to observations of the excavators, the Paleolithic sequence of Yafteh is about two meters thick and many lenticular levels have been identified. Although no layer name was assigned during the excavation (1965 excavation), the depth of each piece was documented on its ventral face. Thus, a piece marked as 167 was actually between 160 and 170 cm below 0 (1965 absolute datum), pieces marked as 223 are between 220 and 230 cm in depth, etc. On the drawing plates, we cited the first two digits only. For example, an item recorded as 13 was between a depth of 130 and 140 cm. The distribution of the different types of retouched bladelets strongly depends on the depth: in the lower part (over 200 cm in depth), we found rather large bladelets, straight or slightly curved in profile and in the upper part (less than 170 cm in depth) small twisted bladelets (fig. 3). Pieces with bladelet removal scars follow the same trend, confirming their status as cores and showing the technical coherency of the sets and individuals (fig. 4). Between 170 and 200 cm, both types of production exist, but taking into account the imprecision of the available data, we have chosen to exclude this middle part from our analysis. Although our study is preliminary and depends only on one part of the 1965 lithic collection and without precise contextual data, we prefer to discuss the definite techno-typological characteristics of the assemblages and do not interpret the origin of this co-occurrence (natural mixture, caused by excavation or coexistence of two productions?).

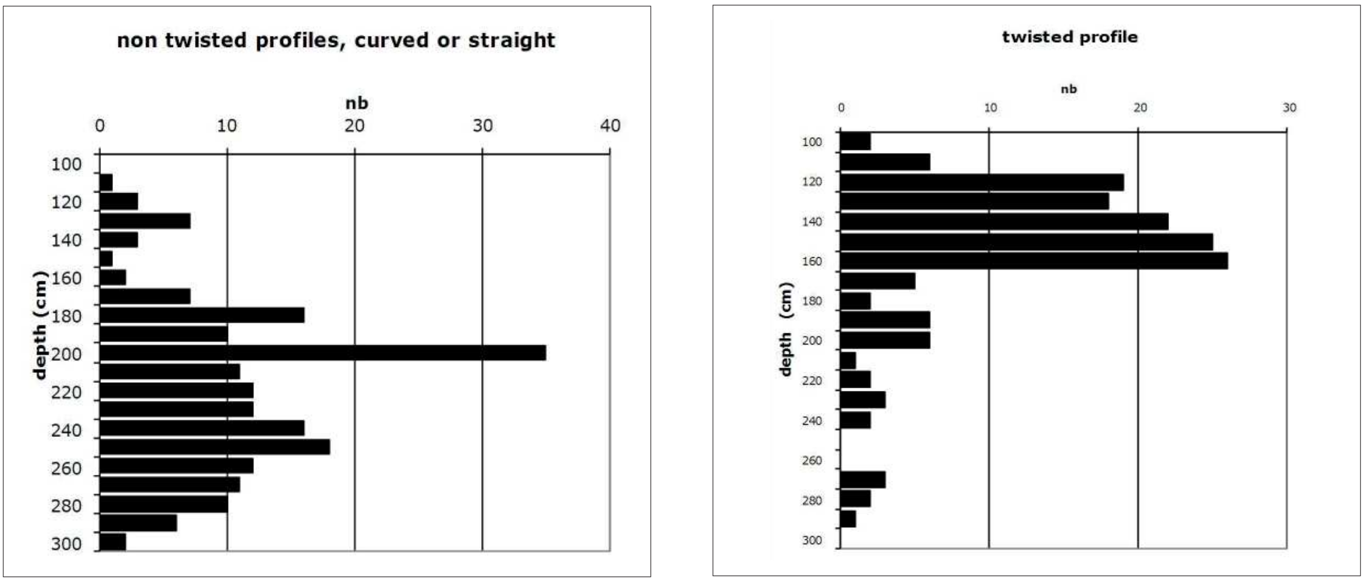

Figure 3 – Distribution of bladelets according to their depth and profile. We clearly distinguish a sequence with two subdivisions: at the base: bladelets with rectilinear or slightly curved profile, at the top: bladelets with a twisted profile.

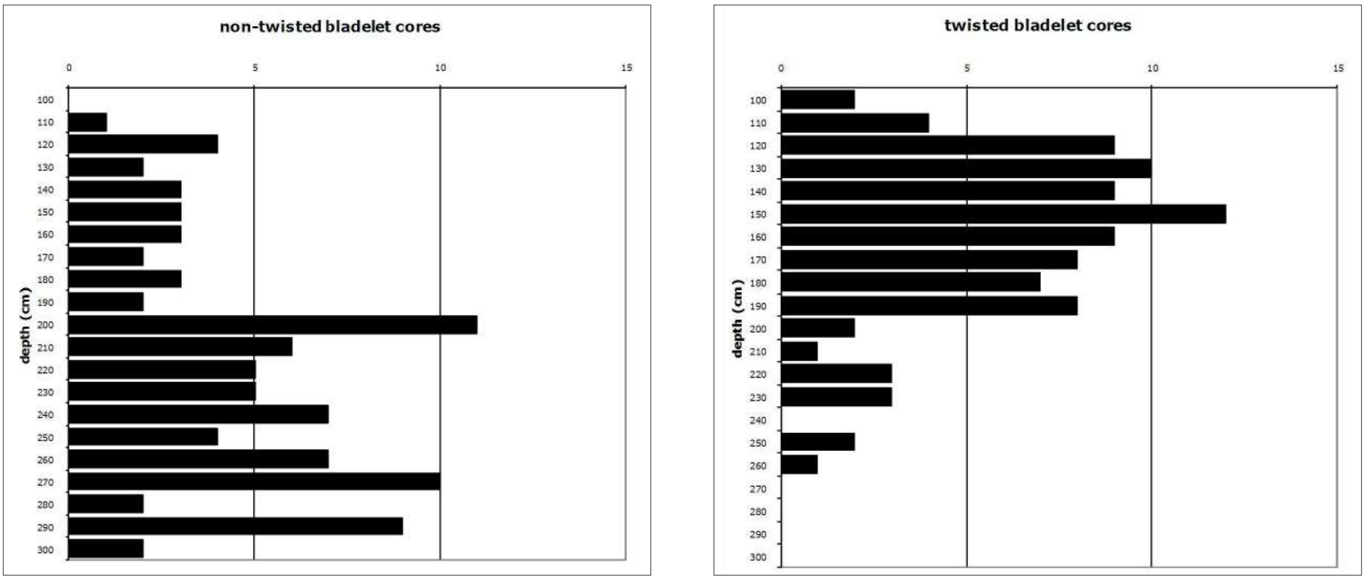

Figure 4 – Distribution of pieces with bladelet removal negatives (cores) according to their depth and the morphology of the last successful removals: twisted (top) or not (base of the sequence).

5. The Example of Square 6d

In order to refine these observations, we have taken into account the assemblage from square 6d, the frequency and structure of which is given in Table 2.

5.1. Common Elements in the Entire Sequence

Debitage Technique

For all blade and bladelet products, the only diagnostic detachment technique is organic soft hammer used for direct percussion. On thicker blades, the proximal part is prepared and faceted slightly and then carefully abraded on the dorsal face (Fig. 9d and 12f), quite similar to such procedures observed for the European Upper Paleolithic, particularly during the Aurignacian (Bon 2002, Bordes & Tixier 2002). There are also a few fragments in the assemblage that show traces of direct percussion knapping by hammer stone. These few pieces are mostly flakes which are usually potential blanks for bladelet cores and burins, and in some cases scrapers.

Raw Material

A few products have cortical margins, while bladelet cores in particular show the reduction of small rounded nodules most likely from river terraces. Larger products, however, show no trace of rounded cortex. Due to the lack of regional survey, the source(s) of these high quality materials, which vary in color, remains unknown.

Scrapers and Burins: Tools or Cores?

As always it is not easy to determine the technological status of the "scrapers" and "burins"., We counted all pieces showing the or-

Scraper on blade	31
Scraper on flake*	13
Total of scrapers	**44**
Burin with only one removal	15
Burin with multiple removal*	15
Total of burins	71
Scrapers / burins	2
Retouched blades	30
Retouched flakes	4
Total of tools on blade or flake	**111**
Arjeneh Points	42
Retouched bladelets with curved or straight profile	213
Retouched bladelets with twisted profile	69
Total of retouched bladelets	**318**
Total of tools	**586**
Flakes without retouch or with some retouch	45
Blades or Bladelets without retouch or with some retouch	91
Total of pieces without retouch or with some retouch	**137**
Non-retouched twisted bladelets	167
Large bladelets without retouch, not twisted	688
Small bladelets without retouch, not twisted	138
Total of non-retouched bladelets	**993**
Cores without noticeable organization and preparation	21
Prismatic cores	52
Twisted bladelet cores	48
« carinated scraper » core type	83
« carinated burin » core type	52
Abandoned cores at the stage of bifacial shape	7
Total of cores	**263**
Total	**1979**

Table 2 – Yafteh, excavation by Hole and Flannery, collection conserved in Tehran. Inventory of the lithic assemblage of square 6d.

ganized arrangements of bladelet production as cores and pieces with one bladelet scar as comparable to definite cores; pieces with no clear organization of different scars from bladelet production were counted as probable tools (name followed by an asterisk in table 2) and other retouched pieces as tools. This uncertainty prevents us from discussing the scraper versus burin part of the assemblage, which are the only types of tools on non-bladelet blanks in this assemblage.

In all cases and the structure of the collection in general, the assemblage is dominated by elements linked to bladelet production: retouched products, unretouched bladelets and potential cores.

General Information on Blade Production

The rest of the tools are mostly on blades. Based on the dorsal removal scars, blade production appears to be unidirectional. The absence of blade cores and the extreme rarity of its technical by-products (core tablets, rejuvenation flakes, etc.), prevent us from further discussing blade production techniques.

Flake Production?

The flakes in this assemblage have three characteristics:

- The vast majority is composed of "burin" or "scraper" bladelet core types.

- There is no preferential type of tool on flakes; most are classified as "flakes with some retouch". None are related to any production method known for the Middle Paleolithic. In particular, the few flakes which have a "carefully prepared butt" are in fact rejuvenation tablets from the striking platform of blade or bladelet cores, usually identified as core tablets. The "faceting" is actually formed by the proximal scars of blades or bladelets removed by detachment from the core tablet (fig. 5). - Furthermore, a few "bifacial pieces" are present, which are actually bladelet cores abandoned in their shaping stage. We reconstruct all the stages of this production method to the exhausted core (see below).

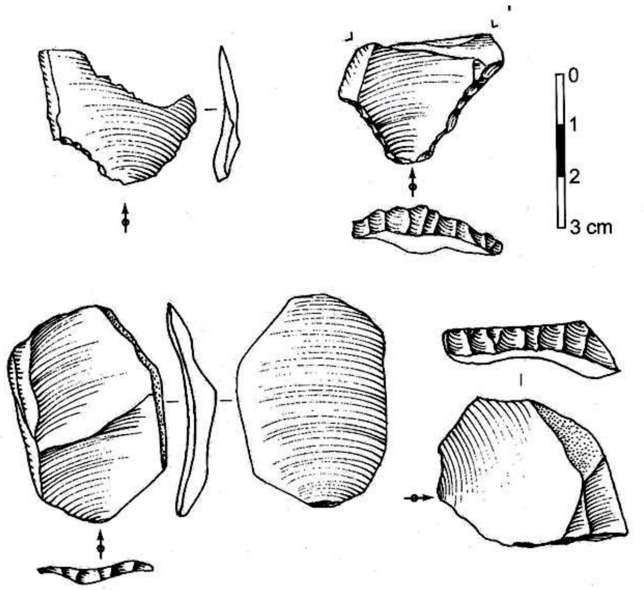

Figure 5 – Yafteh, flakes with a facetted butt (after fig. 6, Otte *et al.* 2007, modified) or rejuvenation flakes of the bladelet striking platform?

5.2. Upper Part of the Sequence

Bladelet

Retouched bladelets have very standardized typological and morphometric characteristics: length between 16 and 26 mm, width between 4 and 6 mm. The twisted profile is systematically counter-clockwise. Inverse retouch is found on the concave right edge and direct retouch is sometimes presents on the convex left edge (fig. 6). The morphology of these blanks is linked to cores present in the assemblage (fig. 7): a very narrow debitage surface, bladelet removals for which the point of percussion is off centered on the left flank of the debitage surface (if we place the striking platform on top of the drawing). The bladelet cores are blocks or flakes. Nothing seems to help distinguish the patterns of removals on both types of blanks. Formatting and shaping of the cores are quite variable: from none (regular shape flake with a steep edge) to complete. In the latter case (fig. 8), the shaped core takes the form of a bifacial piece with a rather acute angle at the point of its equator. an initial knapped bladelet is detached from this point: its negative forms a striking platform for rapid production of twisted bladelets. It is possible to detect this type of management on bifacial crests, more and less peripheral, on many twisted bladelet cores in this assemblage. All of these characteristics, particularly the retouched products, strongly resemble those described for the late (recent) southwestern European Aurignacian (Dufour bladelet- Roc-de-Combe subtype; Demars & Laurent 1990).

Blades

The rare blade products in the assemblage show two groups: large size blades (Fig. 9), thick, with scaly retouch (scraper, retouched blade and pointed pieces) and smaller size blades without lateral retouch, retouched on the end as scrapers, discrete, dihedral burins or burins on truncation (Fig.9h). A significant part of bladelet production on very small nodules or flakes is independent of other production patterns. For the rest, it has not been possible to determine to what extent the production of these different types of blanks was nested.

5.3. Lower Part of the Sequence

Bladelet

Both in terms of blank and retouch, variability of retouched bladelets is higher than in the upper assemblages. However, one characteristic of all these blanks which differentiates them significantly from those found in the upper levels of the sequence is to be slightly curved or straight, but never twisted in profile. The desired blanks are generally larger (often up to 40 mm) and wider (often 10 to 12 mm) than in the upper levels. In this preliminary analysis, we have identified three main groups of artifacts based on retouch:

- Bladelets with bilateral direct retouch are by far the most abundant. Two types are distinguished according to the retouch which creates a pointed tip or not.

- The clearly pointed bladelets ("Arjeneh points") are more numerous (N=33 in 6d), and seem to be made on the most consistent blank (fig. 10). The retouch is always marginal and semi abrupt, sometimes only on the tip but often involving the entire blank, although less developed in its medial part. The cross-section is mostly symmetrical, but there are exceptions (Fig. 10b and h).

- Many bladelets (N=29 in 6d) have a convergent edge after retouching the end, without being really pointed. Are these pieces being manufactured where the tip did not have to be vulnerant or is this merely the consequence of edge management?

- The bladelets with parallel edges along their length ("rods") are actually quite rare (N= 8 in 6d). The shape of these items is rectangular and retouch is nearly abrupt (fig. 10k and i). Bladelets with inverse or alternate semi abrupt retouch (Dufour) are also rare (N=8 in 6d) but distinguishable and are mostly fragmented in the sample under consideration (fig. 10).

Traces of impact

Nearly 10% of large retouched bladelets in the lower levels show characteristic fractures typically attributed to projectile point use (fig. 11). Some objects also have a large skimming removal on their ventral face, which we believe should be distinguished from simple retouching (fig. 11). All the bladelets showing a complex type of fracture have direct bilateral retouch. It would be necessary to complete this simple observation by a thorough study of these objects.

Blades

Just as in the upper levels, the blade blanks are mostly long, wide and thick and have scaly retouch (scarpers and mainly retouched blades, fig. 12). There is also a smaller size group of blanks but

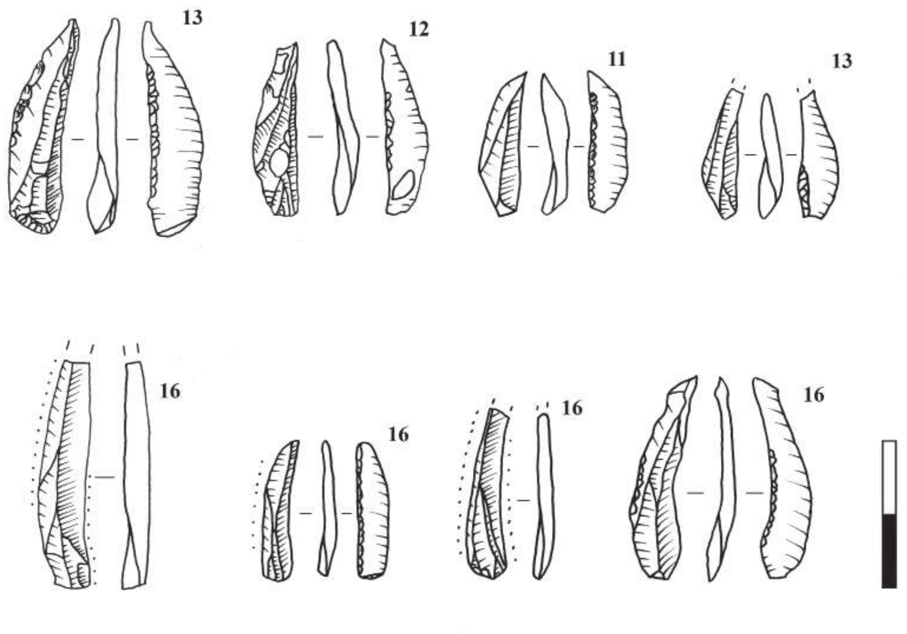

Figure 6 – Yafteh, excavation by Hole and Flannery, twisted bladelets with inverse or alternate retouch, Dufour bladelets, Roc-de- Combe subtype. The numbers indicate the depth in tens of centimeters.

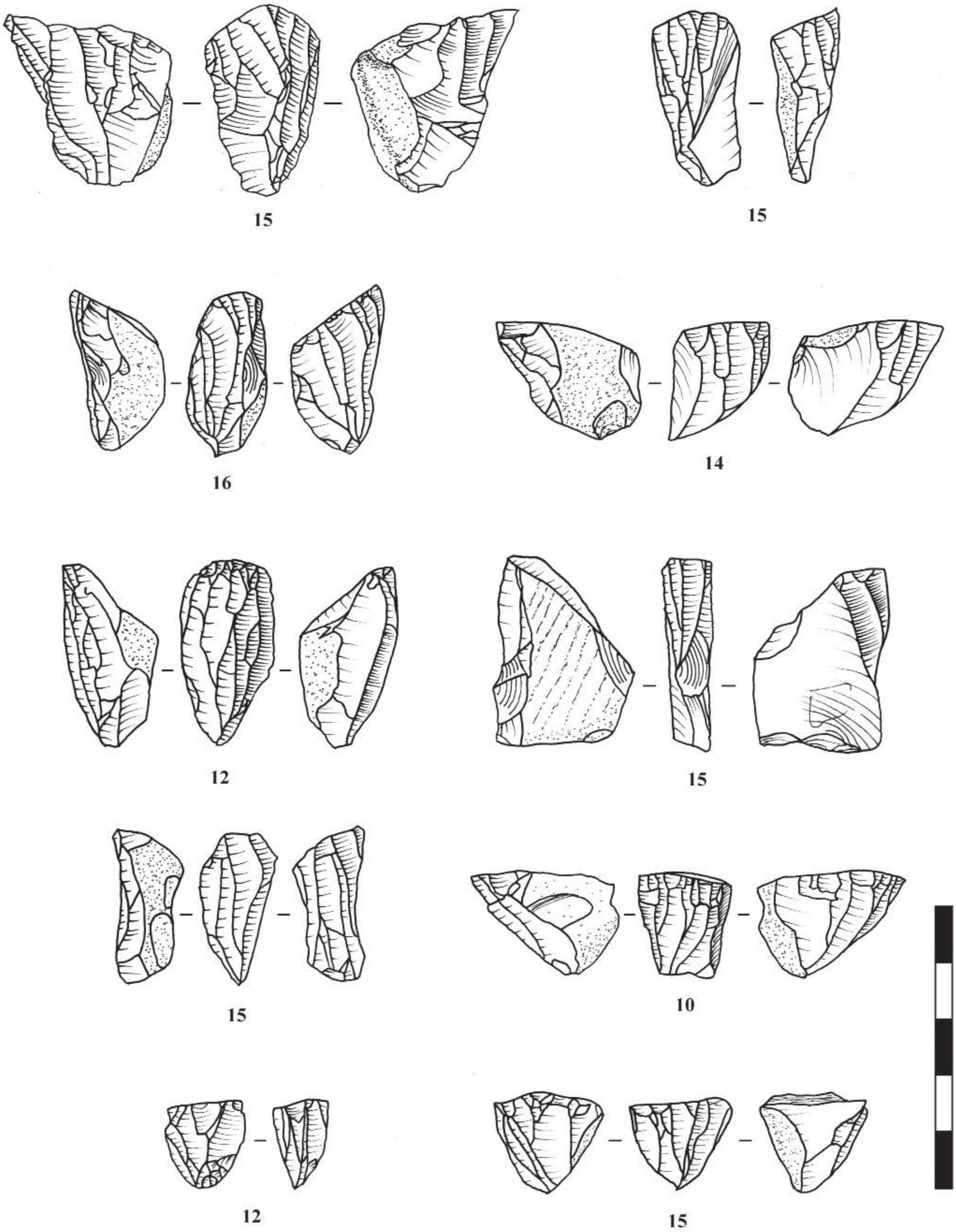

Figure 7 – Yafteh, excavations by Hole and Flannery, twisted bladelet cores.

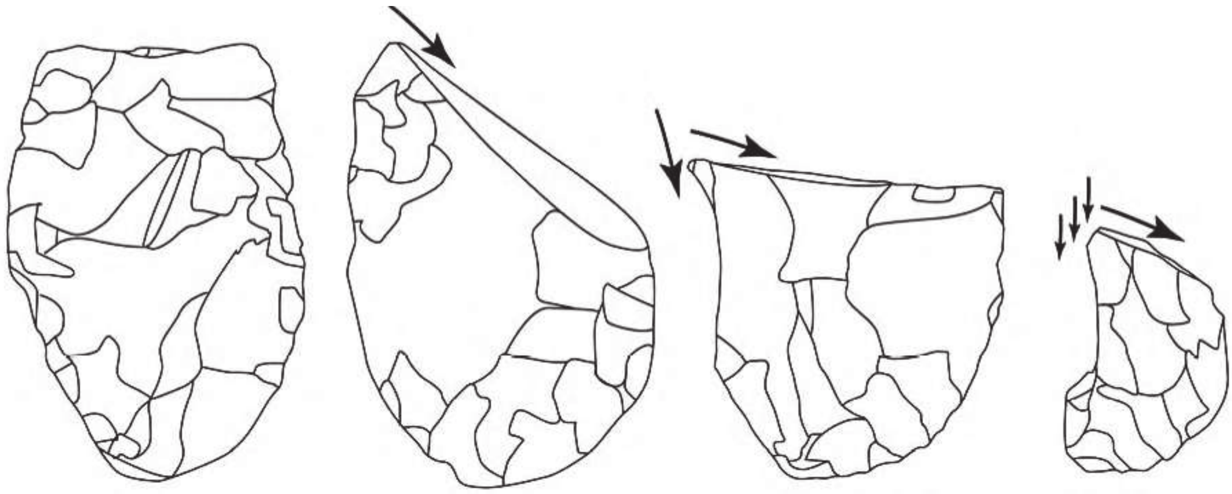

Figure 8 – Yafteh, excavations by Hole and Flannery, different stages of abandon of bladelet cores prepared by bifacial shaping. From left to right: abandon during or at the end of bifacial shaping; after the detachment of a bladelet serving as a striking platform; after the detachment of a twisted bladelet; after the detachment of several bladelets. On this latter piece, we clearly distinguish the traces of the bifacial preparation (right bottom).

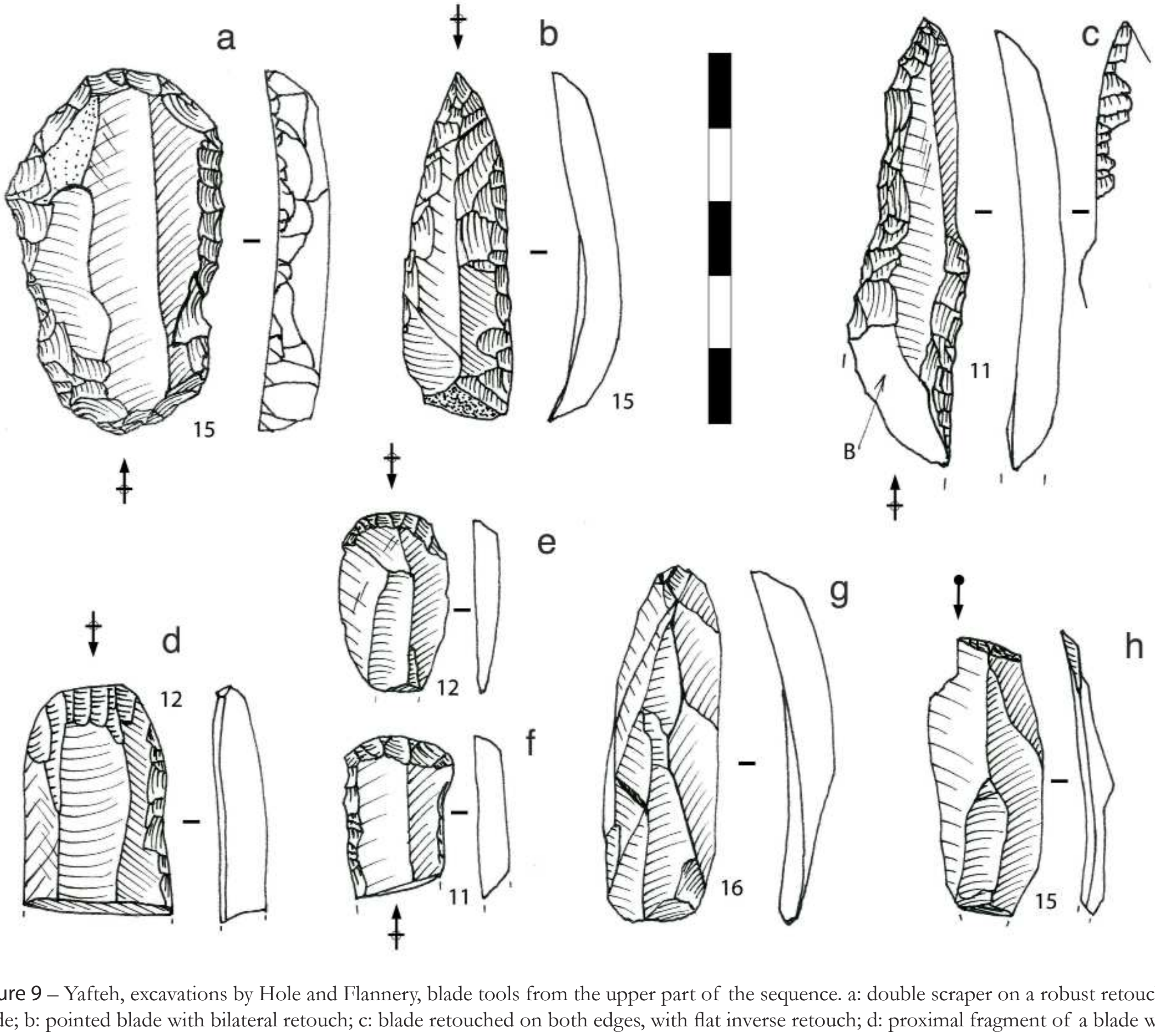

Figure 9 – Yafteh, excavations by Hole and Flannery, blade tools from the upper part of the sequence. a: double scraper on a robust retouched blade; b: pointed blade with bilateral retouch; c: blade retouched on both edges, with flat inverse retouch; d: proximal fragment of a blade with one retouched edge (note the detachment preparation); e and f: end scrapers on small blades; g: unretouched blade showing unipolar convergent debitage; h: truncation burin on a small blade.

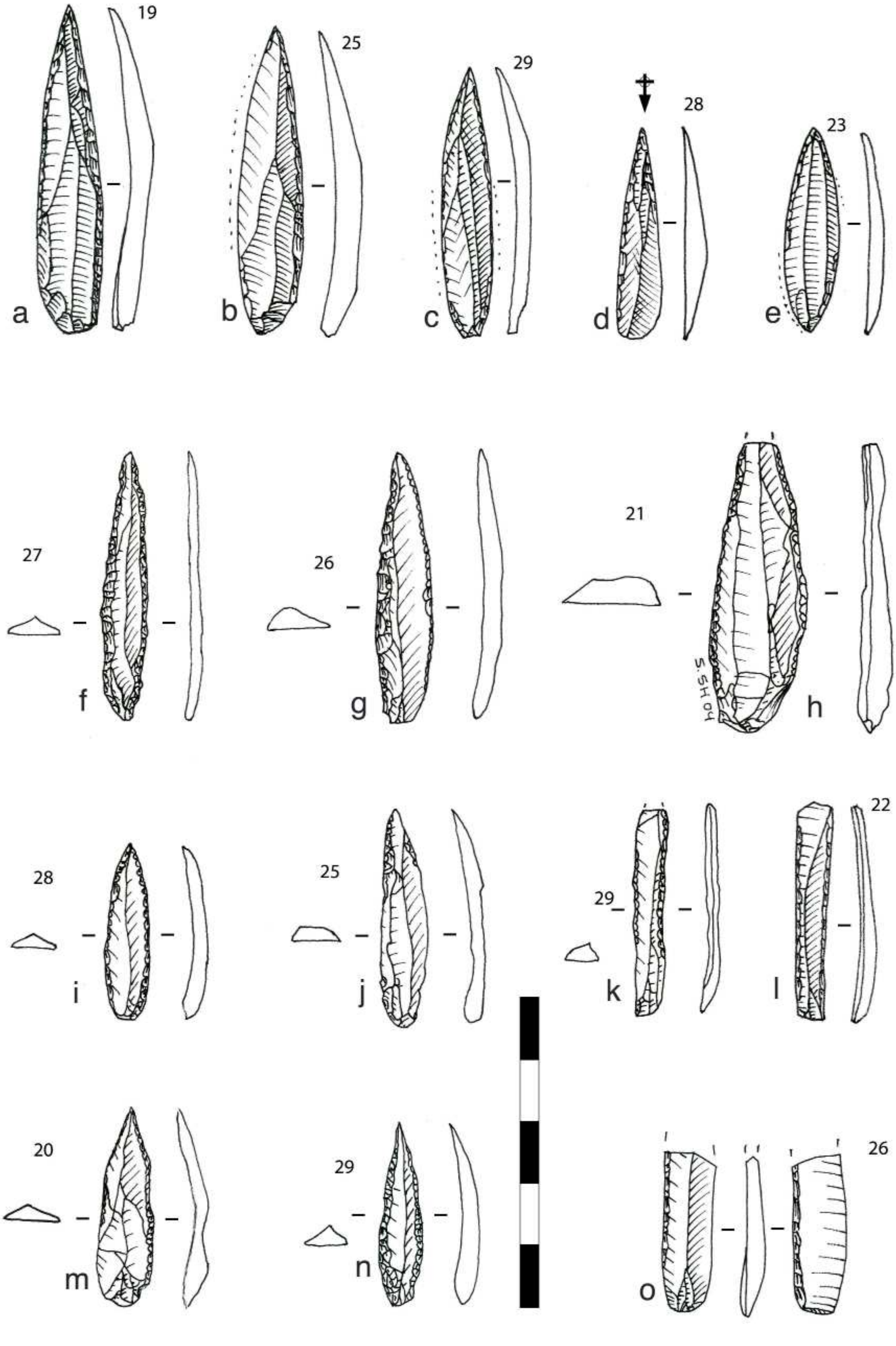

Figure 10 – Yafteh, excavations by Hole and Flannery, retouched blades from the lower part of the sequence. a to j: Arjeneh Points; k and l: "rods"; o: proximal fragment of a long, non-twisted bladelet.

unlike in the higher levels, such blanks are not often retouched (fig. 13a, b and c); however, the edges are polished (traces of use?). In addition, some blade blanks have dorsal bladelet scars (fig. 12e). However, this assemblage does not allow specification of size and characteristics, but we point out intercalated blade and bladelet production in the lower part which does not seem to exist in the upper levels.

6. Conclusions and Perspectives

Given the quality of excavations, the richness of available collections and the consistency of its sequence, Yafteh Cave provides an important reference for the Early Upper Paleolithic of the Zagros and also across the Middle East. The upper levels show the production of small twisted bladelets coming in particular from burin core types. These bladelets usually have inverse retouch on their concave edge which is often associated with direct retouch on their convex edge.

The base of the sequence yielded an industry dominated by the production of rather large, straight or generally curved bladelets. Pointed bladelets are dominant and Dufour bladelets are also present in lower frequency. The industry is free of any Mousterian influence. The Yafteh sequence is quite similar to those known at some sites in the Near East, in particular assemblages belonging to the lower levels (Early Baradostian) that can be compared to the Ahmarian in the Levant, while the upper level assemblages (Late Baradostian) are similar to the Levantine Aurignacian (see Goring-Morris & Belfer-Cohen 2003 for an overview). Apart from the Levant, this sequence is also similar to the Western European Aurignacian, except that here the "Early Aurignacien" is not present (Bordes 2006). We stop the comparisons at this level, since it would be necessary to confirm and describe the sequence characteristics by more precise studies of collections, new systematic excavations and eventually test and demonstrate its regional value in other nearby sites. We believe, however, with current data, proposing an Iranian origin for Aurignacian is quite difficult, given the absence of a transitional industry, but considering the small number of sites studied so far, this remains an open issue for further research.

Although unable to provide us with information on population movement, these common tendencies may at minimum indicate the fluid circulation of ideas in terms of technical equipment between Early Upper Paleolithic groups at a large geographical scale, throughout Baradostian, Ahmarian and Aurignacian groups. This overall unity obviously should not obscure the regional variability of the lithic industries, the characterization of which remains to be explored, particularly in the Zagros region. It is obvious that these data should be complemented with those obtained from other disciplines before proposing any definitive cultural process interpretations.

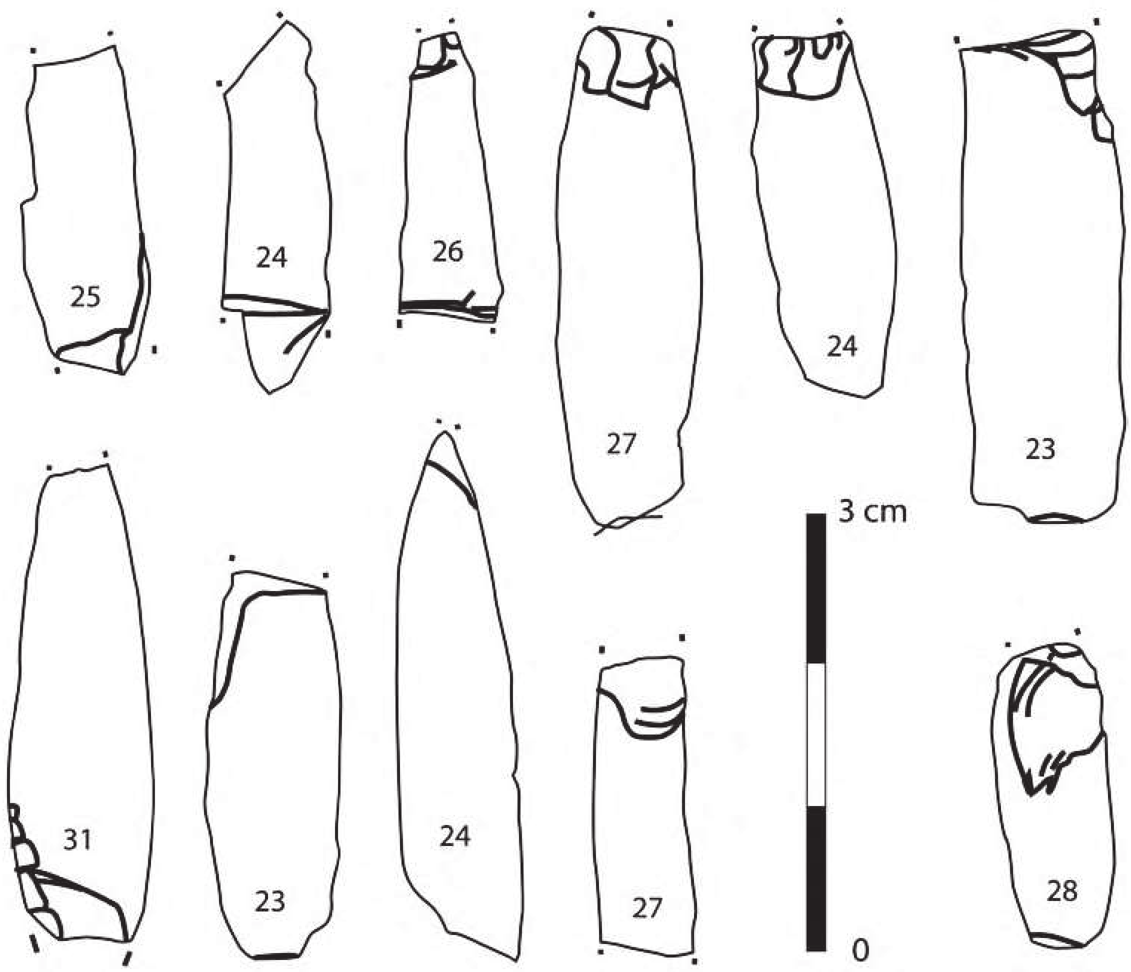

Figure 11 – Yafteh, excavations by Hole and Flannery, lower part of the sequence, retouched bladelets with complex fractures indicating use as projectile point elements.

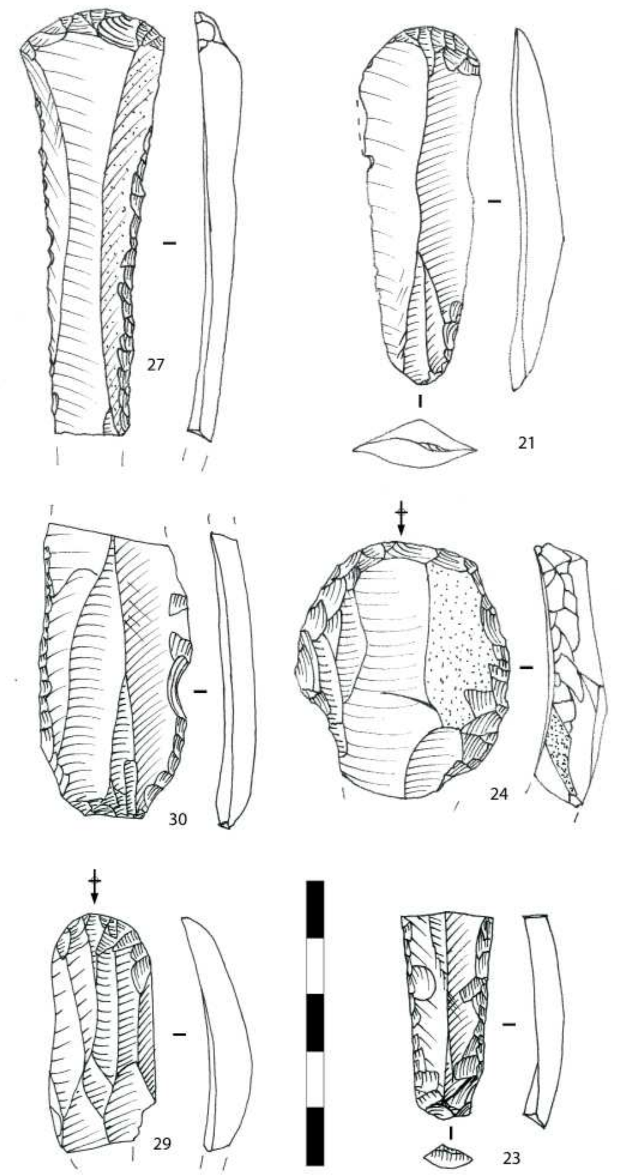

Figure 12 – Yafteh, excavations by Hole and Flannery, lower part of the sequence, blade tools

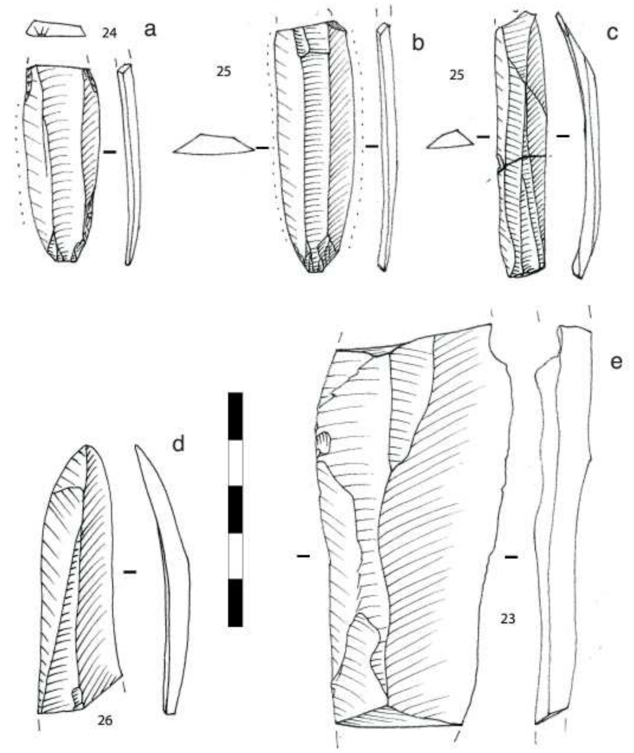

Figure 13 – Yafteh, excavations by Hole and Flannery, lower part of the sequence, blades unretouched or with slightly crushed edges (use traces?)

Acknowledgments

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III - LES FOUILLES 2005-2008 À YAFTEH ET LA CHRONOLOGIE RADIOCARBONE

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1. Introduction

Le choix de mener de nouvelles fouilles dans la grotte Yafteh était lié à plusieurs facteurs : grotte facilement accessible (au contraire de Warwasi, par exemple), recelant une longue séquence baradostienne et dont les dépôts pléistocènes ont été relativement protégés des dégâts causés par les pilleurs ou lors des occupations plus récentes de la grotte (on note néanmoins l'installation d'une grande jarre enterrée découverte lors des fouilles précédentes ; Hole & Flannery 1967; Hole, ce volume). Les datations radiocarbones effectuées dans les années 60 indiquaient, en outre, un âge très ancien pour cette séquence (Hole & Flannery 1967).

L'apparition du phénomène aurignacien en Eurasie a été l'objet de nombreuses recherches depuis plus d'un siècle. Dans les montagnes du Zagros, R. Solecki (1963) s'est basé sur l'industrie provenant de la couche C de la grotte Shanidar pour définir le Baradostien (tirant son nom des Monts Baradost où se situe cette grotte, dans le Nord de l'Irak). Braidwood et Howe identifièrent un second ensemble baradostien dans l'abri de Warwasi en Iran (Braidwood 1960), puis Hole et Flannery (1967) reconnurent trois autres sites baradostiens (abri de Gar Arjeneh, grottes Pa Sangar et Yafteh) dans la région de Khoramabad. F. Hole (1970) souligna dès cette époque les similitudes entre le matériel de Yafteh et l'Aurignacien de l'abri de Siuren I en Crimée. Plus récemment, H. Dibble et D. Olszewski ont proposé de considérer le Baradostien comme une variante locale de l'Aurignacien, notamment sur base d'une comparaison techno-typologique avec le Bacho-Kirien (Olszewski & Dibble 2006).

Sur base de la séquence de l'abri de Warwasi, D. Olszewski (2001) a également avancé un modèle de développement local de cet Aurignacien du Zagros à partir du substrat moustérien.
Ces deux hypothèses furent reprises par M. Otte et J. Kozlowski (2007) lors de leur révision des ensembles baradostiens. L'Aurignacien du Zagros étant ainsi considéré comme la source de la dispersion de l'Aurignacien et des populations anatomiquement modernes en Eurasie (Otte 2007a).

2. Les fouilles 2005 et 2008

Yafteh est située dans la chaîne du Zagros, à une altitude de 1278 m d'altitude, à environ 13 km au nord-ouest de la ville de Khorramabad, dans la province du Luristan. C'est une grotte karstique à la base du flanc sud du Kuh-e Sefid (Shidrang 2007).

Dans le cadre des nouvelles fouilles, il a été décidé de réaliser un sondage de 2 m², dans la partie occidentale de l'entrée de la grotte, zone qui n'avait pas été fouillée auparavant par Hole et Flannery (fig. 1).

Les premières fouilles de ce nouveau projet eurent lieu en mai 2005 pendant environ trois semaines. L'équipe belgo-iranienne a ouvert une zone de 2 x 2m dont 2 m² (carrés F15-G15) furent fouillés sur base de décapage horizontaux (autour de 10 cm d'épaisseur). Le matériel lithique et osseux découvert ne fut donc pas coordonné précisément, à l'exception des charbons pressentis pour être envoyés au laboratoire de datation. Lors de la campagne 2005, les sédiments furent tamisés à sec avec des tamis de 5 mm et de 2mm, permettant la récolte des éléments les plus petits. Lors de cette première campagne, les fouilles atteignirent une profondeur de ca. 190 cm (par rapport au niveau du sol actuel de la grotte) dans le carré G15 et de 240 cm dans le carré F15. Cette première campagne a livré 3846 artefacts lithiques dont 3468 éléments de débitage et 378 outils, ainsi que quelques artefacts osseux et des éléments de parure (Otte *et al.* 2007), confirmant la grande richesse de la grotte Yafteh.

La seconde campagne, en mai 2008, également d'une durée d'environ trois semaines, a permis d'atteindre le substrat rocheux de la grotte dans les deux carrés concernés, vers 280 cm de profondeur (fig. 2). Lors de cette campagne 2008, le tamisage à 2 mm fut désormais effectué à l'eau, optimisant la récolte des éléments de petites dimensions.

La partie supérieure des dépôts présente une accumulation récente de fines couches cendreuses ayant livré quelques tessons de période islamique et historique. Cette épaisse couche de cendres récentes a protégé les dépôts pléistocènes des activités des pilleurs. Sous ces cendres, on se trouve face à une phase d'érosion où les dépôts mêlent du matériel récent et préhistorique, il y a un contact

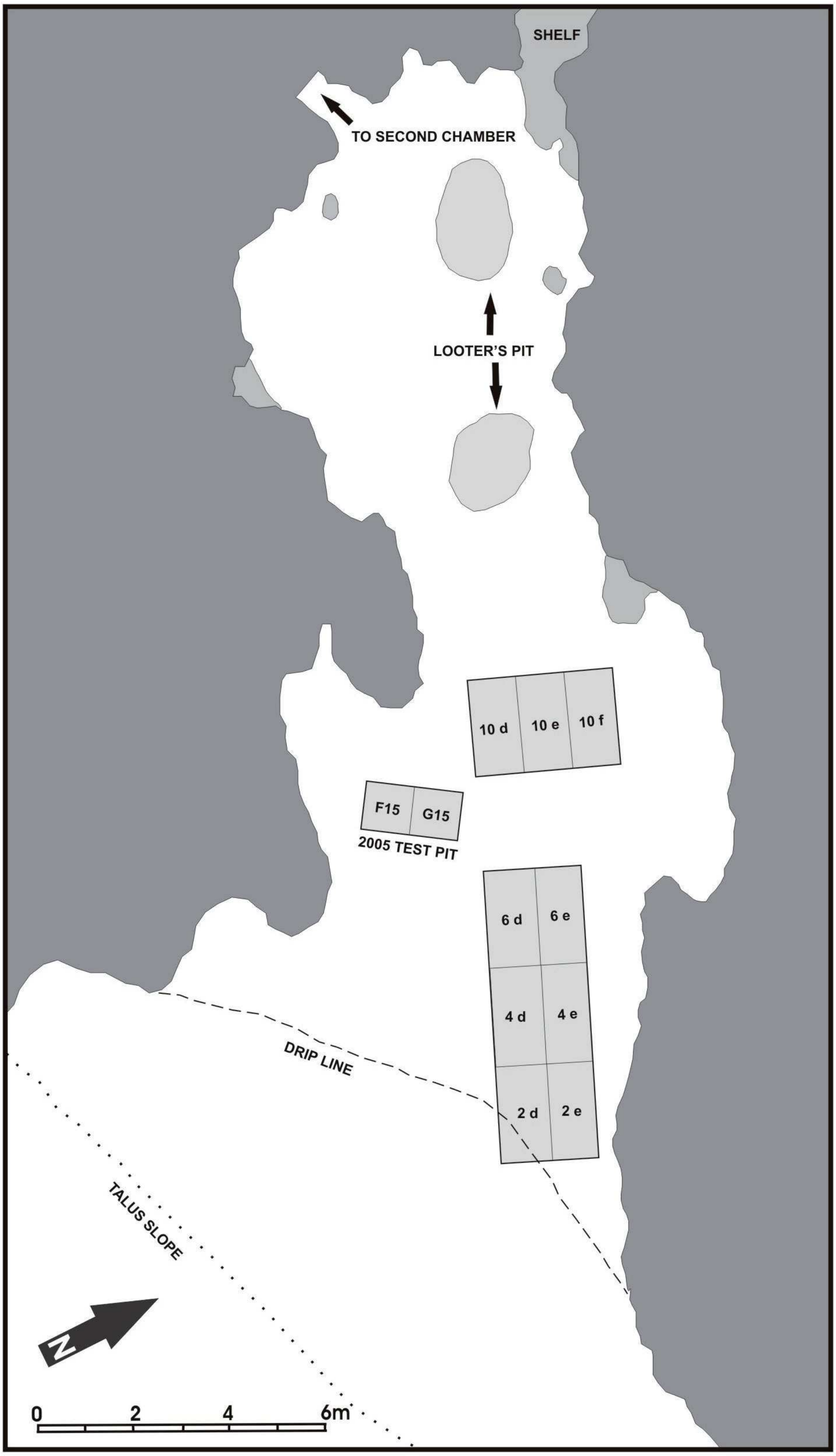

Figure 1 –Plan de la grotte Yafteh montrant la position de la tranchée de F. Hole et K. Flannery ainsi que celle du sondage F15-G15 effectué par l'équipe belgo-iranienne en 2005 et 2008 (dessin par F. Biglari, S. Shidrang et R. Naderi).

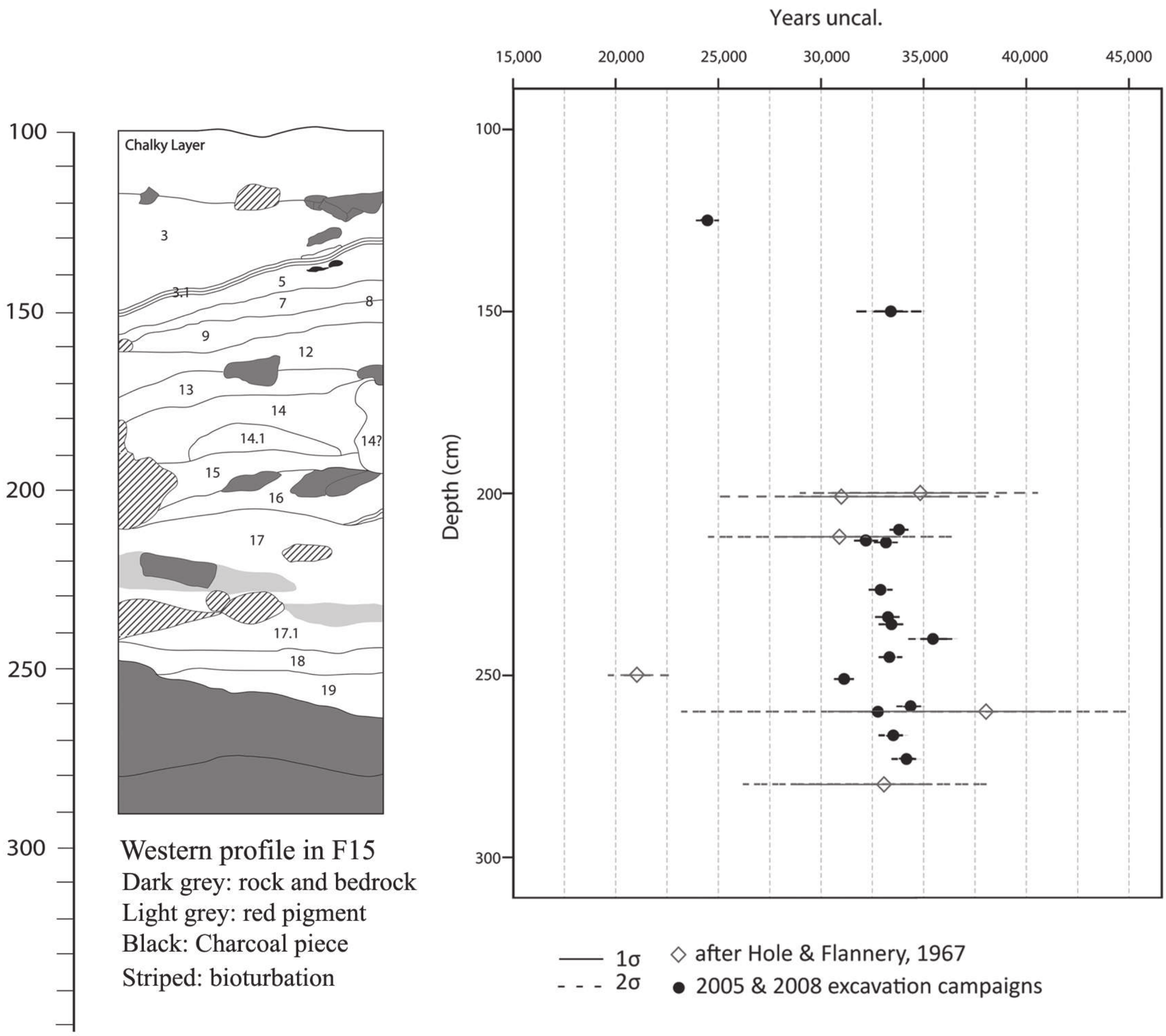

Figure 2 – Profil Ouest du carré F15 montrant les principales unités sédimentaires. À droite, les datations radiocarbones non calibrées, réparties selon la profondeur des échantillons.

direct entre une épaisse couche crayeuse blanche (« *chalky layer* »), située à la base des cendres récentes, et les dépôts pléistocènes sous-jacents (fig. 2).

Les observations de la séquence des dépôts du sondage F15-G15 furent limitées par la nature restreinte de cette zone de fouilles ainsi que par la difficulté d'éclairage de la partie inférieure de la séquence dans une tranchée profonde et étroite (atteignant près de 3 m de profondeur pour seulement 1 m de largeur). Plusieurs unités sédimentaires furent différenciées selon les couleurs et les textures des dépôts rencontrés. Ces unités sont parfois séparées par des fines couches cendreuses et des artefacts en position relativement horizontales, indiquant la présence de dépôts probablement bien préservés dans la partie occidentale du sondage. Cependant, dans la partie supérieure des dépôts pléistocènes, l'interface entre les unités sédimentaires montre un pendage important (depuis l'intérieur vers l'extérieur de la grotte, notamment les couches 3 à 9 de la fig. 2) mais semblent par contre plus horizontales dans la partie inférieure de la séquence. A part dans la partie la plus profonde, la majorité des couches peuvent être assez facilement identifiées sur les profils du carré F15, les limites sont néanmoins plus floues en G15. Certains éléments particuliers peuvent être cependant signalés, comme la présence, vers 175 cm de profondeur, d'une succession de lentilles cendreuses limitées dans une dépression, couverte par un bloc de calcaire, et qui semble correspondre à un foyer. D'autres zones cendreuses et charbonneuses ont été remarquées à différents endroits de la séquence, faisant échos à ce qui avait été décrit lors des fouilles précédentes (Hole, ce volume).

Étant donné le contexte karstique et la présence de plusieurs galeries non explorées à l'arrière de la grotte, il peut être proposé que les sédiments dérivent à la fois de la grotte elle-même mais également par apport extérieur dans l'entrée de la grotte. Il n'y a cependant eu aucune étude géologique, sédimentologique ou micro-morphologique permettant d'établir la nature et le mode de déposition des sédiments ni les éventuels facteurs de perturbation des occupations humaines dans la grotte Yafteh. La méthode de fouille utilisée dans le cadre de la réalisation de ce sondage, dont l'objectif principal était la récolte d'échantillons en vue de nouvelles datations radiocarbones, ne permet pas de précision quant à la définition d'ensembles archéologiques homogènes. Des bioturbations de petites dimensions sont présentes tout au long de la séquence et ont été séparées et relevées dans la mesure du possible. Comme le montre l'étude des restes osseux (Mashkour *et al.* 2009, ce volume), l'essentiel de l'accumulation de la faune semble être liée à l'activité humaine, avec une faible influence des grands carnivores. Nous avons pu observer quelques traces localisées indiquant des zones probablement remaniées (fragments de calcaire en position verticale) ainsi que la présence de brèche cimentant des artefacts et des ossements. En dehors de certains artefacts provenant des dépôts de la partie supérieure, au contact avec la zone d'érosion récente, les éléments lithiques sont frais, avec des bords et des nervures bien préservés. La préservation et l'horizontalité de certaines zones de foyers semble indiquer un degré de perturbation limité. Des études plus détaillées seraient nécessaires pour éclaircir la nature des dépôts et la taphonomie des occupations humaines avant toute interprétation plus poussée.

3. Les datations radiocarbones

Au début de l'utilisation de la méthode de datation au ^{14}C, plusieurs résultats furent obtenus à partir d'échantillons de charbons de bois provenant des fouilles de F. Hole (Hole & Flannery 1967 ; Hole, ce volume). Ces datations étaient, cependant, relativement imprécises et parfois incohérentes avec leur succession stratigraphique mais permettaient néanmoins, avec des résultats étalés entre 21.000 et >40.000 BP (Table 1), une attribution du matériel à l'Interpléniglaciaire.

En 2005, trois charbons de bois provenant des nouveaux travaux de l'équipe belgo-iranienne furent sélectionnés sur base de leurs dimensions et de leur état de préservation. Ces échantillons furent envoyés au laboratoire Beta Analytic pour datation ^{14}C AMS (avec prétraitement dans une solution acide-base-acide). Les résultats obtenus étaient en accord avec leur succession stratigraphique, indiquant une chronologie entre 24.500 et 36.000 BP (non calibré) pour la partie supérieure de la séquence pléistocène.

En 2008, la seconde campagne permit de fouiller la partie inférieure de la séquence stratigraphique jusqu'à atteindre le substrat rocheux. Dix charbons de bois furent sélectionnés pour dater cette partie des dépôts. Les résultats indiquent une seule phase chronologique autour de 33.500 BP non calibré (Tableau 1) ; la majorité des échantillons se recoupant à deux sigmas. La datation à 35.450 ± 600 BP (Beta-205844), obtenue lors de la campagne 2005, bien qu'en apparence un peu plus ancienne, recoupe en fait également les nouveaux résultats (à deux sigmas). Étant donné leurs larges marges d'erreur, la plupart des datations obtenues auparavant par Frank Hole sont également en accord avec les nouveaux résultats, même à un seul sigma (Fig. 2). Parmi les datations obtenues par F. Hole, les résultats fournis par la Smithsonian Institution sont tous significativement plus récents que ceux provenant du laboratoire Geochron. La date de 21.000 ± 800 BP (SI-336) issue d'un charbon provenant de la partie inférieure de la séquence est clairement incohérente avec les autres datations obtenues par F. Hole comme avec les nôtres. Seule la datation de 24.470 ± 280 BP (Beta-206711) a livré un résultat plus récent que la moyenne des autres dates. Les résultats des nouvelles datations ont été calibré en utilisant la courbe Intcal09 (Reimer *et al.* 2009) dans Oxcal 4.1 (Bronk Ramsey 1995, Bronk Ramsey 2009) (Fig. 3). Ils indiquent une seule phase chronologique entre 37 et 39.000 ans BP calibré.

Définir un modèle chronologique lié à la profondeur des échantillons datés n'a pas donné de résultats significatifs, seules sept des quinze dates affichant une valeur A >60 (Tableau 1). Etant donné les relations incertaines entre les échantillons et les couches stratigraphiques, en raison de la méthode de fouilles en décapages horizontaux, l'hypothèse la plus simple est que la séquence, et donc l'ensemble lithique, corresponde à une seule phase. Le modèle bayésien correspondant à une phase unique (Bronk Ramsey 2009) présente une cohérence convaincante (A = 94), la plupart des résultats calibrés se recouvrant à un ou deux sigmas. Lorsqu'un modèle bayésien correspondant à deux phases stratigraphiques est appliqué avec, d'une part, deux datations (Beta-206711 et Beta-206712) pour la partie supérieure de la séquence (Phase 1) et, d'autre part, le reste des datations pour la partie inférieure de la stratigraphie (Phase 2), nous obtenons un résultat satisfaisant mais moins probable que le modèle correspondant à une phase unique (A = 84). Ainsi, la datation la plus ancienne, dans la partie inférieure de la séquence stratigraphique (Beta-205844), est rejetée par ce modèle correspondant à deux phases puisqu'elle peut correspondre à une date de la partie supérieure de la stratigraphie (Beta-206712). Il est donc plus cohérent, sur base de cette approche des résultats radiocarbones, de considérer que l'on observe une seule phase chronologique.

Selon la courbe paléoclimatique GISP2 (Grootes et al. 1993), nos datations calibrées placeraient les occupations de la grotte Yafteh à la fin du Greeland Stadial (GS) 9 (équivalent du Heinrich Event 4) et au début du Greenland Interstadial (GI) 8. Selon le Greenland Ice Core Chronology 2005 (GICC05), le début du GI 8 est daté de 38.220 ± 724 BP calibré (Andersen *et al.* 2006). Ce GI 8 apparaît comme une amélioration climatique à large échelle enregistrée dans différentes séquences d'Eurasie [le paléosol MG13 à Mitoc-Malu Galben en Moldavie et le paléosol V de Kurtak en Sibérie (Haesaerts *et al.* 2005), ainsi que les réchauffements observés autour de 38.000 BP calibré dans les spéléothèmes de la grotte Soreq (Bar-Matthews & Ayalon 2003) et de la grotte Hulu (Wang *et al.* 2001).

4. Discussion

Sur la base du matériel lithique provenant des carrés D6, E6 et E4 des fouilles de Frank Hole (collection du Musée de Téhéran), J.-G. Bordes et S. Shidrang ont proposé l'existence de deux phases dans la séquence de la grotte Yafteh (Bordes & Shidrang 2009, ce volume). La partie inférieure des dépôts (200 à 300 cm sous le niveau du sol) contiendrait un ensemble marqué par la production de lamelles de relativement grandes dimensions, rectilignes ou légèrement courbes, provenant de nucléus prismatique ou sur tranche d'éclats, et retouchées en lamelles Dufour sous-type Dufour ou en pointe d'Arjeneh (à retouches bilatérales directes). Dans la partie supérieure de la stratigraphie (de 100 à 170 cm), ils observent par contre une dominance des burins carénés à partir desquels des lamelles torses de dimensions plus restreintes furent débitées et ensuite retouchées en lamelles Dufour sous-type Roc-de-Combe.
Selon ces auteurs, ce type de lamelles remplacerait éventuellement les pointes d'Arjeneh. En raison des risques de mélanges, ils ont

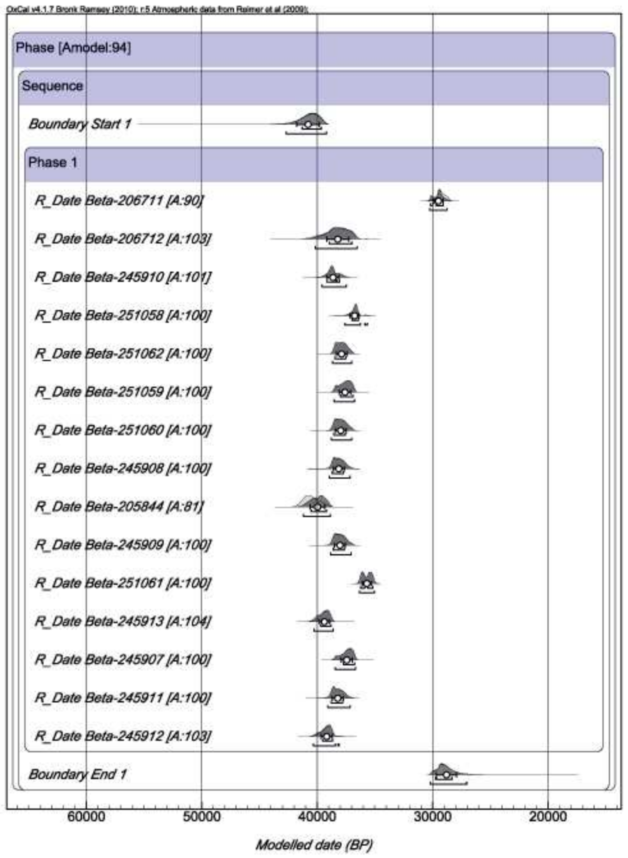

Figure 3 – Datations calibrées utilisant OxCal 4.1. Les dates sont classées par profondeur des échantillons du sommet vers la base. Les points blancs correspondent à la valeur moyenne, la barre supérieure indique l'erreur standard à 1 σ et la barre inférieure à 2 σ.

prudemment exclus de leur analyse le matériel provenant de la partie médiane de la séquence (de 170 à 200 cm), mais ils y ont néanmoins remarqué la coexistence des deux types de production lamellaire.

Deux datations ^{14}C sont disponibles pour la partie supérieure de la séquence. Une de 24.470 ± 280 BP (Beta-206711) sur un charbon récolté 125 cm sous le sol actuel, c'est-à-dire 15-20 cm sous la limite entre les dépôts modernes et pléistocènes. Étant donné que cette date s'écarte fortement des autres résultats et en raison de sa position stratigraphique, nous ne pouvons exclure une possible contamination. Une seconde datation d'un échantillon situé à 150 cm de profondeur, au niveau où la production de lamelles torses est observées par Bordes et Shidrang, à l'interface entre le remplissage d'un potentiel foyer et de l'unité sédimentaire 12, a livré un résultat de 33.400 ± 840 BP (Beta-206712). Bien que cette datation isolée nécessiterait d'être confirmée, ce résultat est similaire à ceux obtenus pour la partie inférieure de la séquence.

L'unité 8 du site de Garm Roud 2 (Alborz central) a livré une datation de 23.920 ± 160 BP (Beta-206996), associée à des lamelles torses. Les auteurs considèrent ce résultat comme un âge minimum étant donné la nature de l'échantillon (matière organique noire non indéterminée) (Berillon *et al.* 2007). La faiblesse de l'ensemble lithique, l'aspect non diagnostique des nucléus à lamelles et l'absence de lamelles retouchées empêche de toute façon des comparaisons pertinentes avec le matériel de la grotte Yafteh. Il pourrait s'agir d'un ensemble réellement plus récent. Quoi qu'il en soit, la comparaison de la datation de Garm Roud 2 avec les datations les plus jeunes obtenues à Yafteh, qu'il s'agisse de celles provenant des fouilles de F. Hole ou celles de l'équipe belgo-iranienne, est peu pertinente puisqu'une de ces dates, produites dans les années 1960, est incohérente par rapport à sa position stratigraphique et que l'autre pourrait être affectée par une contamination.

Les nouvelles données chronologiques semble indiquer que les occupations de la grotte Yafteh eurent lieu lors d'une période de temps assez courte autour de 33.500 BP, aucune tendance ne pouvant être observée dans la répartition des datations au long de la séquence stratigraphique. Les deux phases décrites par J.-G. Bordes et S. Shidrang pourraient être interprétées comme très proches chronologiquement ou comme reflétant une variabilité fonctionnelle dans l'occupation du site plutôt que deux phases chronoculturelle distinctes.

Les résultats sont, par ailleurs, en accord avec les données chronologiques disponibles pour le niveau C de Shanidar (Solecki 1963, 1971) qui a livré des datations ^{14}C entre 36 et 28.000 BP Il est intéressant de noter qu'à Shanidar les lamelles Dufour sous-type Dufour semblent absentes et que les nucléus de type burins carénés sont présents dans toute l'épaisseur de l'unité sédimentaire.

Les fouilles récentes à Gar-e-Boof (Zagros méridional), livrant une industrie apparemment similaire à celle de Yafteh, ont également donné des datations dans la même fourchette chronologique, entre 36 et 30.000 BP (Conard & Ghasidian 2011).

Si on élargit le cadre des comparaisons chronologiques, les datations de Yafteh semblent être plus anciennes que la fourchette chronologie de l'Aurignacien levantin, recoupant seulement celles de l'Aurignacien de Kebara. Ainsi à Ksar'Akil, les datations sur charbon provenant des niveaux 9a, 9 et 10 de Tixier (correspondant aux niveaux IV, VI, VII et VIII) indiquent un âge entre 29.700 et 33.500 BP (Mellars & Tixier 1989). La couche D d'Hayonim a livré des résultats similaires entre 26.600 et 30.700 BP sur des échantillons osseux (Bar-Yosef 1991). Par ailleurs, une datation sur charbon associée au matériel aurignacien du niveau III de la grotte Raqefet a livré un âge de 30.540 ± 440 BP (Lengyel *et al.* 2006). À Umm-el-Tlel, en Syrie, le niveau IIb a livré un matériel aurignacien très riche en lamelles Dufour torses et est daté à 32.000 ± 580 BP (Gif-A93212). De manière plus large, les datations TL et ^{14}C des niveaux du « Paléolithique intermédiaire » d'Umm-el-Tlel indiquent que l'occupation aurignacienne y prend place entre 32 et 30.000 ^{14}C BP (Soriano & Ploux 2003). À Kebara, les charbons datés entre la base du niveau I et le sommet du niveau II indiquent un âge entre 33.200 and 35.200 BP, notamment une date à 34.300 ± 1.100 BP (Gif-TAN-90028) provenant d'un foyer du niveau I inf. En tenant compte des marges d'erreur, ces résultats recouvrent ceux du niveau II inf. Seule une datation sur un foyer de la couche du niveau II inf. a donné un résultat de 42.800 ± 480 BP (Gx-17276) qui est considéré comme incohérente par rapport aux autres résultats (Bar-Yosef *et al.* 1996). Il faut souligner que les datations radiocarbones livrées par ces différents sites ont été produites il y a quelques années déjà et pourraient être l'objet d'une révision en fonction des développements récents des techniques de datation. Elles ont, en outre, été obtenues sur des échantillons de natures diverses et dans différents laboratoires.

Depth (from ground level)	Collected	Age	cal BP ± 1σ	Lab. Number	13C/ 12C	A
125	**2005**	**24470±280**	**29252±374**	**Beta-206711**	**-24.8 o/oo**	**89.7**
150	**2005**	**33400±840**	**38300±1049**	**Beta-206712**	**-24.4 o/oo**	**103.1**
200	1965	34800+2900/-4500		GX-711		
201	1965	32500+2400/-3400		GX-710		
201	1965	29410±1150		SI-332		
210.5	**2008**	**33800±330**	**38629±528**	**Beta-245910**	**-23.7 o/oo**	**100.8**
212	1965	30860±3000		SI-333		
213	**2008**	**32190± 290**	**36755±384**	**Beta-251058**	**-22.5 o/oo**	**100**
213.5	**2008**	**33160± 240**	**37879±450**	**Beta-251062**	**-25.3 o/oo**	**100**
226.5	**2008**	**32900±290**	**37584±501**	**Beta-251059**	**-24.0 o/oo**	**100**
234	**2008**	**33260± 300**	**37957±473**	**Beta-251060**	**-23.4 o/oo**	**100**
236	**2008**	**33430±310**	**38118±471**	**Beta-245908**	**-24.7 o/oo**	**100**
240	**2005**	**35450±600**	**40510±672**	**Beta-205844**	**-24.9 o/oo**	**80.8**
245	**2008**	**33330±310**	**38020±474**	**Beta-245909**	**-25.2 o/oo**	**100**
250	1965	21000±800		SI-336		
251	**2008**	**31120±240**	**35696±388**	**Beta-251061**	**-23.3 o/oo**	**100**
258.5	**2008**	**34360±340**	**39437±479**	**Beta-245913**	**-24.7 o/oo**	**103.9**
260	**2008**	**32770±290**	**37435±491**	**Beta-245907**	**-24.7 o/oo**	**100**
260	1965	38000+3400/-7500		GX-709		
266.5	**2008**	**33520±330**	**38212±495**	**Beta-245911**	**-23.2 o/oo**	**100.1**
273	**2008**	**34160±360**	**39220±518**	**Beta-245912**	**-27.4 o/oo**	**103.4**
278	1965	31760±3000		SI-334		
280	1965	>36000		GX-708		
280	1965	34300+2100/-3500		GX-707		
285	1965	>40000		SI-335		
290	1965	>35600		GX-706		

Tableau 1 – Datations ^{14}C et leur calibration. La valeur "*A*" correspond au coefficient de cohérence de chaque échantillon quand un modèle de phase unique est utilisé ; il est considéré comme significatif quand il est >60 (Bronk-Ramsey 2009; Higham *et al.* 2010). Les datations en caractère gras correspondent aux échantillons datés depuis 2005.

Il apparaît également que les datations de la grotte Yafteh recoupe, voire précède, certaines des datations de l'Ahmarian ancien. La couche B d'Ucagizli est ainsi datée entre 28.750 et 33.420 BP (Kuhn *et al.* 2009), tandis qu'à Qseimeh I, les datations sur oeufs d'autruche se placent autour de 34.000 BP. Sur les sites de Lagama IIID, VII et VIII, Qadesh Barnea 601B et 501, Abu Noshra I et Abu Noshra II, les résultats s'inscrivent entre 36.000 et 30.000 BP (Gilead 1991; Gilead & Bar-Yosef 1993). Seuls les couches IIIa, IIIb, IVb et IV/V de Kebara (Bar-Yosef *et al.* 1996 ; Rebollo *et al.* 2011), le niveau 9 de Qafzeh (Bar-Yosef & Belfer-Cohen 2004) ainsi que le site de Boker A (Monigal 2003) fournissent des datations plus anciennes (voir aussi Belfer-Cohen & Goring-Morris, ce volume).

Des comparaisons avec des industries du Caucase et celles de Crimée ont déjà été proposées par F. Hole dans les premières publications de la grotte Yafteh (Hole 1970). Nos résultats chronologiques sont grosso modo contemporains des ensembles géorgiens tels que ceux d'Ortvale Klde, dont les niveaux 4c et 4d sont datés au ^{14}C entre 30.000 et 35.000 BP (Adler *et al.* 2008). Les mêmes auteurs soulignent d'ailleurs qu'une date plus ancienne pour le niveau 4d, à 38.100 ± 935 BP (RTT- 4725), doit être considérée avec prudence (Adler *et al.* 2008: 828). La grotte Mezmaiskaya a livré des ensembles similaires dans les niveaux 1A, 1B et 1C (Golovanova *et al.* 2010). Les datations ^{14}C sur os et charbons confirment une position de ce complexe entre 36 et 28.000 BP non calibré. Les ensembles du Paléolithique supérieur ancien d'Ortvale Klde et de Mezmaiskaya sont marqués par la présence d'une production laminaire et lamellaire unipolaire et les lamelles sont souvent aménagées par retouche marginale directe et sont parfois similaires aux pointes d'Arjeneh. Il y a néanmoins également certaines différences typologiques (Golovanova *et al.* 2007; Otte 2007b; Golovanova & Doronichev, ce volume). En particulier, on peut, en effet, noter l'absence de lamelles Dufour dans les ensembles géorgiens. Une industrie osseuse est également présente (Adler *et al.* 2006). A Dzudzuana, des ensembles qui apparaissent similaires sont plus récents, entre 30 et 20.000 BP (Bar-Yosef *et al.* 2011). Il est intéressant de comparer ces industries géorgiennes à celles de Buran Kaya couche 6-1, associée à des restes humains modernes datés aux environs de 32.000 BP (Prat *et al.* 2011).

5. Conclusion

En résumé, les nouvelles données chronologiques obtenues pour la grotte Yafteh confirment la position chronologique intermédiaire du Baradostien, en partie contemporain de l'Ahmarien et précédant la plupart des datations associées à l'Aurignacien du Levant. Les observations faites par Bordes & Shidrang (2009 ; ce volume) semblent correspondre à un changement rapide au sein de la production lamellaire. Cependant, une telle variabilité technologique devrait être confirmée dans d'autres ensembles baradostiens. En outre, l'observation du matériel des fouilles 2005 et 2008 à la grotte Yafteh montre la présence des pointes d'Arjeneh dans la partie supérieure de la séquence (Otte *et al.* 2007; Shidrang 2007; Otte, ce volume).

Malgré la proximité chronologique, on peut souligner que l'importance des lamelles Dufour sous-type Dufour dans la partie inférieure de la séquence de Yafteh ne se retrouvent pas dans les ensembles ahmariens mais quelles sont, par contre, plus communes dans les industries protoaurignaciennes d'Europe. De telles pièces sont également présentes dans l'ensemble aurignacien d'Umm-el-Tlel P1c secteur 5 (légèrement plus récent) où elles sont associées à des lamelles torses (Soriano & Ploux 2003).

Sur base des données archéologiques et chronologiques, on peut proposer une hypothèse pour expliquer la position des industries de la grotte Yafteh au sein de la séquence chrono-culturelle du Paléolithique supérieur ancien du Proche et Moyen-Orient. Par ses caractères techniques et typologiques et par sa position chronologique, la séquence de la grotte Yafteh peut hypothétiquement être considérée comme une unité taxonomique à la charnière entre une tradition technique dérivée de l'Ahmarien ancien, d'une part, et l'Aurignacien du Levant, plus tardif, d'autre part. Même si des différences typologiques existent, la partie inférieure de la séquence de la grotte Yafteh présente des similitudes avec l'Ahmarien ancien ainsi qu'une chronologie proche. La partie supérieure de la séquence se compare plutôt avec l'Aurignacien levantin (*sensu lato*). Cette hypothèse d'une unité taxonomique intermédiaire est renforcée par l'unité chronologique de la séquence d'occupations de la grotte Yafteh et par la continuité technique et typologique observée, notamment par le maintien des pointes d'Arjeneh tout au long de cette séquence. La séquence de Yafteh pourrait également illustrer un changement local relativement rapide dans les modes de production de lamelles Dufour, avant la présence de l'Aurignacien levantin au Proche-Orient et contemporain des industries du Paléolithique supérieur ancien du Caucase. Ces hypothèses ne peuvent, cependant, être évaluées que par une approche archéologique et taphonomique plus précise des ensembles lithiques de la grotte Yafteh.

Par ailleurs, si on peut supposer que le Baradostien était l'oeuvre de populations d'anatomie moderne, les données paléoanthropologiques soutenant cette idée sont maigres. Une molaire provenant d'Eshkaft-e Gavi (Zagros méridional) est hypothétiquement associée à un ensemble baradostien (Scott & Marean 2009). Une prémolaire provenant de la grotte Wezmeh peut également être mentionnée, mais elle n'est pas diagnostique, n'est pas associée à du matériel archéologique et sa chronologie n'est pas déterminée avec précision (datation par spectrométrie gamma à la fin de l'OIS 3/ début de l'OIS 2, mais pourrait également correspondre à un âge minimum ; Trinkaus *et al.* 2008). Il faut néanmoins rappeler que les ensembles de la grotte Yafteh montrent des analogies fortes avec l'Aurignacien européen et sont d'ailleurs contemporains d'une partie de l'Aurignacien ancien et récent d'Europe (par exemple : Kostenki 14 couche de cendre, Mitoc-Malu Galben, Geissenklösterle, Abri Pataud couche 13 à 6 ; Haesaerts *et al.* 2003; Higham *et al.* 2011, 2012; Sinitsyn, 2003; Sinitsyn & Hoffecker 2006).

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IV - LES VESTIGES TECHNIQUES EN PIERRE TAILLÉE

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Dans un premier temps, nous considérons les vestiges lithiques issus des divers sondages à Yafteh dans leur globalité (des décomptes partiels du matériel provenant des fouilles récentes été présenté dans Otte *et al.* 2007 et Shidrang 2007). Nous n'avons pas observé de différences significatives entre les ensembles, sur les plans techniques ou typologiques. Cependant, nous reprendrons séparément ces variations en fin d'étude.

L'ensemble des comportements, exprimés via les roches taillées, se réduit à quelques intentions, menées d'un bout à l'autre sur le site, comme si on en saisissait les diverses étapes. Les articulations avec les autres matériaux s'y font toutefois clairement sentir : travaux des ossements, ramures, coquilles, peaux, bois. Nous indiquerons ces points d'interface dès qu'ils nous paraissent pertinents. En particulier, les systèmes d'emmanchement dans du bois ou de l'os justifient souvent les cassures à mi-longueur des grattoirs, les mises à gabarit des supports, par retouches latérales, par coups de burins ou par appointement. En particulier, les nombreuses lames retouchées brisées semblent résulter en partie de cette considération. Les « lames aurignaciennes » prennent ici tout leur sens : les lames massives, les outils aurignaciens requièrent de fortes retouches afin de les insérer dans des manches, robustes et plus précieux que le front en pierre qu'ils maintiennent (pl. 23). Pour la large gamme d'outils domestiques (grattoirs, burins, pièces esquillées, lames tronquées, appointées ou retouchées), l'essentiel des supports fut réalisé sur place, sur nucléus laminaires aménagés en percussion dure et directe (pl. 1). Toutes les méthodes de remise en forme des galets ovoïdes soulignent l'intention d'obtenir des supports courts et massifs. Le cas échéant, les blocs furent traités par crête, latérale ou dorsale, afin d'entretenir le bombement de la surface débitée (pl. 2, fig. 1 et 3 ; pl. 3). L'extrémité opposée à la principale direction de débitage fut amincie ou réduite par des enlèvements en sens opposé (pl. 1, fig. 1 et 2 ; pl. 2, fig. 3 et 4 ; pl. 4, fig. 3). Les « tablettes » qui rafraichissent le plan de frappe sont plutôt rares (pl. 6) car les blocs de départ devaient déjà être très courts (galets de la rivière toute proche) et leur extrême abondance ne requérait pas d'élaboration économique. Dans les supports calibrés qui en furent extraits, on croit « lire » la forte intention exprimée dans ce rapport ternaire : du bloc ovoïde vers l'outil massif, en passant par ces lames courtes et régulières (pl. 7 à 10). Aux extrémités, des plages corticales subsistent du galet original (pl. 7, fig. 6 ; pl. 9, fig. 3 ; pl. 10, fig. 7). La finesse exercée dans leur préparation se manifeste souvent par de courts enlèvements lamellaires, proximaux et dorsaux, antérieurs à l'extraction du support recherché (pl. 7, fig. 2, 3, 6 ; pl. 8, fig. 1, 3, 5, 6, 7, 11, 12 ; pl. 10, fig. 1, 5, 8). En particulier, ces lames furent utilisées comme supports d'outils brisés et méconnaissables (pl. 11, fig. 1 et 4), comme supports de troncatures (pl. 12, fig. 3 ; pl. 14, fig. 9) ou de perçoirs (pl. 14, fig. 10). Mais ces lames retouchées possèdent surtout leur propre autonomie, telles les véritables « lames aurignaciennes » (pl. 11, fig. 14 ; pl. 12, fig. 4) ou des lames appointées (pl. 14, fig. 1 à 8). Manifestement, ces outils entretiennent un rapport avec des matières organiques, tels le cuir ou le bois ; la tracéologie reste à faire…

Les burins participent de cette pensée technique dominante, au moins sous leur forme élaborée, tels ceux faits sur une ligne de retouches abruptes (« troncature » ; pl. 13 et 15). Leur biseau y est clairement préparé, au méplat ménagé, sur le bord ou vers le centre d'un support épais, lui-même préparé à cet effet. Les plages corticales y sont fréquentes, comme si les enlèvements externes y étaient recherchés (pl. 13, fig. 3 et 7 ; pl. 15, fig. 1). Ils emportent aussi souvent des crêtes, plus épaisses que de simples lames (pl. 13, fig. 2 et 5 ; pl. 15, fig. 1 et 2). Les retouches latérales, également fréquentes, manifestent l'intention de calibrer l'outil destiné à l'emmanchement (pl. 13, fig. 3, 5, 6 ; pl. 15, fig. 2 et 3). Tout indique la tendance à y combiner la précision du biseau à la force exercée grâce à son support, robuste et emmanché. L'abondance des burins carénés renouvelle l'éternelle question de leur destinée : outils massifs à large méplat ou nucléus à lamelles torses (pl. 16 à 18, 34 et 35). Leur fréquence détermine, en tous les cas, un choix culturel essentiel, l'un de ceux reconnus partout comme une des signatures de l'Aurignacien, après les lames retouchées évoquées plus haut (Movius 1975). Quoiqu'il en soit, une large panoplie d'objets fut façonnée par lamelles courbes (dont les abondants grattoirs carénés) et cette méthode manifeste une habitude culturelle significative. Les outils doubles (pl. 19) montrent l'alternance des extrémités actives en phases d'utilisation, insérées d'un côté ou de l'autre du manche. Les burins dièdres, courts et massifs, parfois taillés du côté proximal pour garantir la robustesse de leur biseau (pl. 20 et 21), attestent à nouveau de l'importance prise par le travail sur matières osseuses, signe complémentaire du nouvel univers où l'homme moderne a pénétré dans sa relation avec la nature : l'animal y est devenu objet. Les grattoirs sur lames montrent l'importance du travail des peaux (pl. 22 et 23). Leur cassure à mi-longueur du support indique les limites approximatives du manche où la force exercée par la combinaison de la poussée et de la traction créait une aire de flexion et de rupture (pl. 22, fig. 1, 4, 8 ; pl. 23, fig. 3 et 4). L'abondance des retouches latérales (pl. 22, fig. 5 et 10 ; pl. 23, fig. 1 à 7) comme le doublement du front sur le même support (pl. 22, fig. 10 à 12), jusqu'à l'appointement de la base (pl. 23, fig. 7), attestent des restrictions morphologiques strictes imposées par la forme du manche, jusqu'à la conception même du support laminaire. Au passage, certaines retouches, très abruptes, taillées en écailles sur support épais, possèdent tous les critères de la mode aurignacienne (pl. 22, fig. 10 ; pl. 23, fig. 2, 4, 5, 6, 7).

Les lames retouchées constituent une large famille d'outils à elles seules. Autant supports d'outils (pl. 24, fig. 12 ; pl. 25, fig. 10) que vestiges brisés de leurs bases (pl. 24, fig. 10 ; pl. 25, fig. 8 et 9 ; elles sont aussi des outils en soi, telles les lames appointées (pl. 23, fig. 8 à 10 ; pl. 24, fig. 5 à 8 ; pl. 25, fig. 5), encochées (pl. 26, fig. 2, 3, 4, 11) ou simplement allongées sur un bord ainsi renforcé (pl. 24, fig. 10 ; pl. 25, fig. 1, 3, 5, 6 ; pl. 26, fig. 1, 8, 9, 10). À nouveau, la retouche écailleuse sur le mode aurignacien domine, bien sûr adaptée aux supports épais, mais surtout étroitement liée à la même pensée technique que les lamelles de l'Aurignacien. Les grattoirs carénés sont également fréquents (pl. 30, 32 et 33) et ne résolvent pas davantage qu'ailleurs la question de leur destinée : supports pour l'extraction de lamelles ou outils à raboter, voire les deux alternativement (Bourlon *et al.* 1912). Le fait essentiel réside dans leur présence, leur abondance et leur morphologie, toutes caractéristiques de l'esprit aurignacien, tel qu'il régnera sur l'ensemble de l'Eurasie (Davis 1978, 2004 ; Otte & Derevianko 2001). Quelques pointes à dos courbe évoquent les couteaux à dos abattus des prémices du paléolithique supérieur (pl. 31). Les supports laminaires furent aussi fréquemment utilisés comme segments tranchants destinés à fendre le bois ou l'os, et retrouvés sous la forme dénommée « pièces esquillées », présentes ici dans toutes leurs étapes et toutes leurs formes (pl. 37 à 39).

De beaucoup plus fortes lames, à débitage très régulier, sont manifestement d'origine lointaine : aucun déchet n'atteste leur préparation locale, cette roche est inexistante dans l'environnement alentours et les dimensions dépassent largement les possibilités offertes par les galets les plus fréquemment utilisés (pl. 40). Elles témoignent d'un apport lointain, lieu probable d'origine ou de camp principal du groupe de chasseurs installés provisoirement à Yafteh.

Comme les lames retouchées, les éclats massifs, aménagés par retouches grossières et profondes, manifestent une anatomie technique, typologique et fonctionnelle (pl. 41 et 42). Les denticulés massifs y dominent avec les encoches et toute une série de racloirs approximatifs.

L'un des plus grands mystères présentés par les industries de Yafteh touche à l'emploi régulier de la retouche plate rasante (pl. 43 et 44). Il peut s'agir de disques (pl. 44, fig. 1 et 2), de nucléus (pl. 43, fig. 4 ; pl. 44, fig. 6), de supports d'outils (pl. 44, fig. 3 et 4) ou d'enlèvements débordants (pl. 44, fig. 8). Mais toutes possèdent cette particularité systématique de créer des formes, spécialement plates, élégantes et sans utilité pratique apparente ! Ces sortes de disques correspondent à une fonction symbolique, extérieure au registre utilitaire, au même titre qu'un biface au paléolithique ancien.

Toute aussi fondamentale et aussi nette se présente la technique centripète ou Levallois. Les supports sont formés des mêmes galets de petite taille issus de la rivière proche. Ils sont distribués également sur toute la hauteur des sondages et constituent, comme les lames ou les éclats plats, une des méthodes disponibles dans la gamme technique des Aurignaciens de Yafteh (pl. 45 à 49). On y trouve autant les nucléus centripètes (pl. 45 ; pl. 48, fig. 9), les éclats préparés à talon facetté, identiques aux Levallois (pl. 46, fig. 9 ; pl. 50), que les outils qui en furent réalisés (pl. 48, fig. 6 ; pl. 49, fig. 7 à 9). Tous conçus et réalisés sur le même modèle, certes non dominant mais effectivement présent en abondance dans l'Aurignacien de Yafteh.

Un tout autre univers s'ouvre avec la confection des lamelles, de leurs diverses mises en forme et de leurs usages vraisemblables. Outre les outils carénés évoqués plus haut, les lamelles sont surtout extraites de nucléus sur blocs spécialement mis en forme et, plus encore, sur bords d'éclats épais, traités dans la tranche afin de calibrer les proportions de leurs produits (pl. 51 à 55). Ainsi, deux destins se dessinent d'emblée dans les productions lamellaires. Les premières, courbes, torses et légères, furent liées aux outils carénés dans leurs productions et aboutissent aux « lamelles Dufour » assez abondantes à Yafteh, mais dont l'emploi reste vague. Tout porte à croire qu'il s'agissait d'armatures latérales aux pointes osseuses ou de bois, afin de faciliter la pénétration dans la proie (pl. 60 et 61). Par ailleurs, les lamelles rectilignes (pl. 56), tirées des tranches d'éclats ou de nucléus sur blocs (pl. 51 à 54), ont servi de support soit aux « pointes de Font-Yves » (pl. 62 et 63) soit, surtout, aux pointes d'Arjeneh ou de Krems, extrêmement fréquentes à Yafteh (pl. 57 à 59). Ces pointes, à silhouette fusiforme ou losangique, furent réalisées par fines retouches marginales qui découpent les deux bords opposés, jusqu'à la pointe finement affûtée. Le plus souvent, ces pointes furent retrouvées intactes et complètes, mais on observe aussi de fréquents éléments, brisés à la limite de leur fixation à la hampe (pl. 58, fig. 17 et 18 ; pl. 59, fig. 3, 10, 11, 13, 15, 17, 19). Par leur légèreté et leur régularité, ces pièces démontrent l'emploi de l'arc, parmi la large gamme d'armes propulsées. Parmi les outils osseux, nous avons retrouvé au moins un fragment de sagaie de morphologie identique aux pointes aurignaciennes (Otte *et al.* 2007). Les pièces de type Font-Yves possèdent deux bords grignotés par retouches latérales parallèles, mais à extrémités obtuses, rectilignes ou naturelles (pl. 62 à 64 ; Pesesse 2011). Enfin, de courtes lamelles rectilignes portent de fines retouches latérales sur un seul bord, mais dépourvues d'extrémités aménagées (« lamelles Yafteh », pl. 65 à 68).

Dans cette catégorie lamellaire, le plus étonnant fut de retrouver des « lamelles à dos abattu », identiques à celles du Magdalénien européen ! (pl. 69). Dans nos fouilles, elles ne furent pas concentrées vers la base, mais nous les avons observées en grand nombre dans les collections de fouilles de Fr. Hole. Souvent à dos bilatéral, elles entraient dans la catégorie des « rods » (tiges) définie à cette époque. Leur présence, leur régularité et leur abondance ne laissent aucun doute sur leur valeur essentielle dans l'équipement technique. Complémentairement aux autres armatures (pointes de Yafteh et sagaies osseuses), il faut donc bien admettre la présence d'armes composites dès cette phase ancienne du paléolithique supérieur, à l'instar de ce que furent les armatures magdaléniennes.
Les lamelles ont aussi servi de supports aux nombreux perçoirs, très délicats et à mèche finement délimitée (pl. 72). D'évidence,

leur usage fut lié aux percements des pendeloques (os, coquille, pierre) qui requéraient un travail fin et précis. Toutefois, ce mode d'outil perforant peut aussi bien percer les peaux, l'os ou le bois pour tout usage domestique.

Une autre donnée d'une extrême importance tient à la microlithisation de certains outils (grattoirs unguiformes, pl. 71), jusqu'à la formation d'armatures géométriques triangulaires (pl. 71, fig. 1 à 4). Rien, dans la stratigraphie ou lors de la fouille, n'autorise à y voir des intrusions, d'autant moins que le Zarzien n'existe pas à Yafteh. Par contre, de telles armatures microlithiques furent décrites dans l'Aurignacien non seulement en Iran lui-même (Olszewski 1993), mais aussi en Ouzbékistan (Dodekatym : Kolobova *et al.* 2011 ; Kulbulak : Flas *et al.* 2010) et au Tadjikistan (Shougnou : Ranov *et al.* 2012) (pl. 74). Chacun sait que le paléolithique récent de l'Iran est constitué par les industries « zarziennes » où les triangles dominent (Olszewski 1993). Devant leur apparition si précoce dans différents faciès aurignaciens d'Asie Centrale, il semble probable que ce Zarzien y plonge ses racines, et y poursuive son évolution régionale. En Europe par contre, le même Aurignacien, oriental, prolongé vers l'ouest, possède une évolution tronquée par les migrations gravettiennes, apparemment issues de l'Asie plus septentrionale (Kara Bom, par exemple : Goebel *et al.* 1993).

Caractère supplémentaire illustrant les rapports nouveaux entre l'homme et son milieu, les pendeloques apparaissent à Yafteh selon les mêmes formules que celles adoptées par l'Aurignacien européen (pl. 73). Les croches de cerf apparaissent (pl. 73, fig. 3), sélectionnées, isolées et percées, autant sous une forme directe que dans leur imitation en hématite (pl. 73 fig. 2). Cette « copie » en voie d'élaboration possède en outre une décoration ponctuée à la manière des pendeloques européennes. Les coquilles fossiles perforées complètent cette série : elles démontrent des rapports lointains avec le golfe Persique (pl. 73 fig. 1 ; Otte *et al.* 2007).

Les industries aurignaciennes de Yafteh possèdent de grandes affinités avec tous les autres sites du Zagros, Shanidar inclus (Otte & Kozlowski 2007). Aucune autre culture contemporaine n'y est connue et les sites y sont très denses. L'affinité aurignacienne n'y fait aucun doute, par les abondants outils carénés (dont les célèbres « burins busqués », pl. 36), les lames aurignaciennes, les lamelles Dufour, les lamelles appointées (Krems, Font-Yves), les pendeloques, les fragments de sagaies osseuses. Avec le recul, on dispose donc d'un immense territoire où cette tradition fut représentée et, par conséquent, un énorme réservoir démographique s'est constitué, apparemment sur place, à partir du « Moustérien du Zagros » où les tendances lamellaires s'amorcent déjà (Warwasi : Olszewski & Dibble 1994 ; Dibble & Holdaway 1990 ; Tsanova *et al.* sous presse). Les conséquences d'un armement propulsé si efficace (arcs et sagaies) ont entraîné un accroissement démographique, donc une mobilité accrue, par exemple vers l'Europe, mais aussi vers le Levant, et selon toute vraisemblance, vers l'Inde du Nord-Ouest (Pendjab, Pakistan) où de tels ensembles furent récemment décrits (Petraglia *et al.* 2009). Cette masse de populations ne pouvait être que « moderne », dans la mesure où elle échappait à l'endémisme européen, à l'abri des flux géniques. Symétriquement, la population d'Asie Centrale poursuivait en accéléré les tendances ostéo-musculaires, très puissantes dans les vastes espaces, comme la Chine ou l'Afrique. Les isolats marginaux, telle l'Europe néandertalienne ou, à l'autre extrémité, l'Australie aborigène, conservent des caractères fossiles des différentes étapes de l'évolution anatomique, tout ceci dans la même enveloppe spécifique, comme aujourd'hui les diverses populations du globe l'illustrent brillamment.

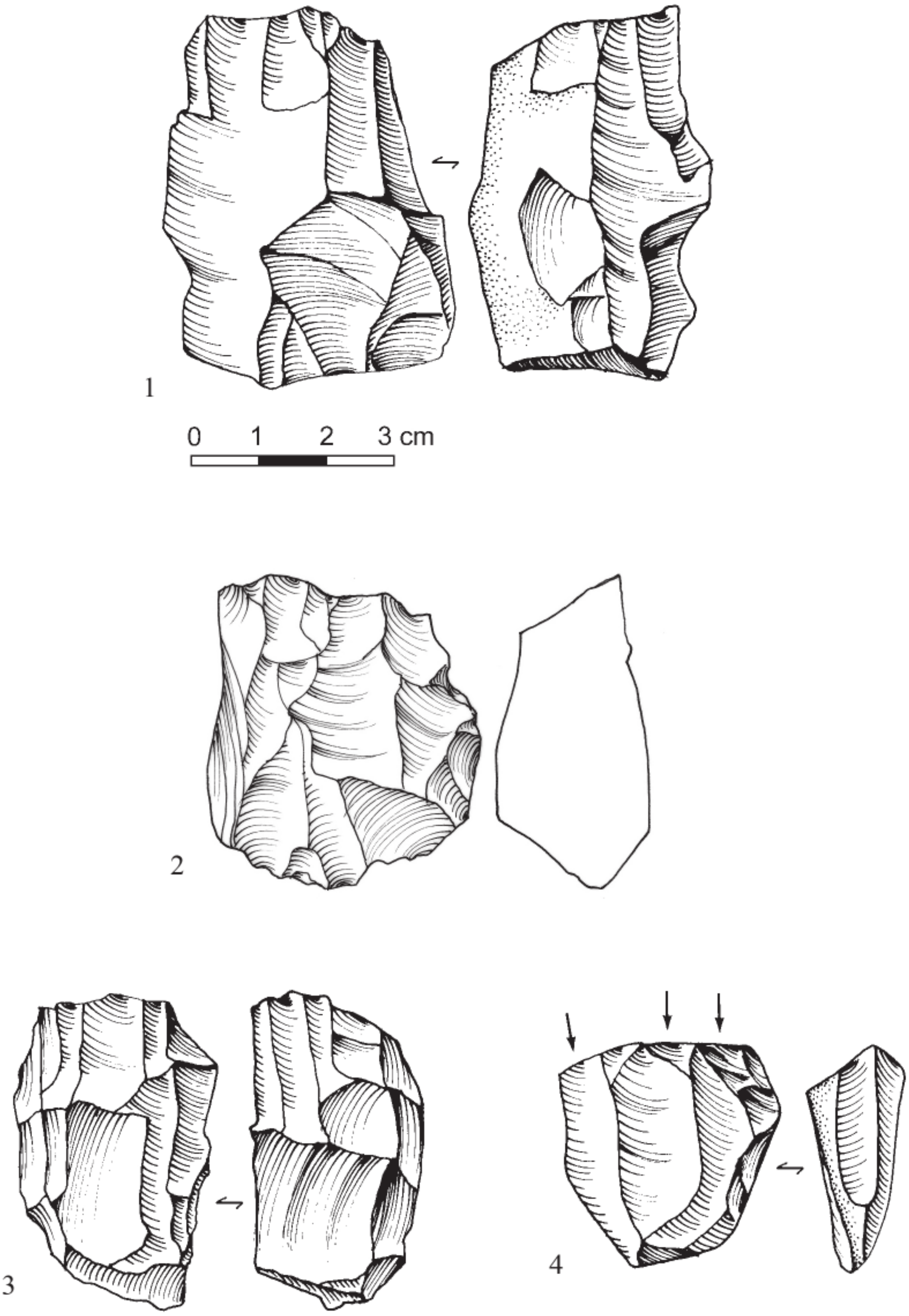


Planche 1 – Nucléus à lames, coll. Fr. Hole et fouilles 2005-2008.
Fig. 1 : sur galet, à deux sens opposés, à préparation latérale (unit 13, 210-220 cm). Fig. 2 : à deux sens opposés et préparation latérale (déc. 16, 260-268 cm). Fig. 3 : à un seul sens et à reprise au flanc de la base, mise en forme dorsale (unit 16, 240-250 cm). Fig. 4 : unidirectionnel, préparation latérale (unit 7, 150-160 cm).

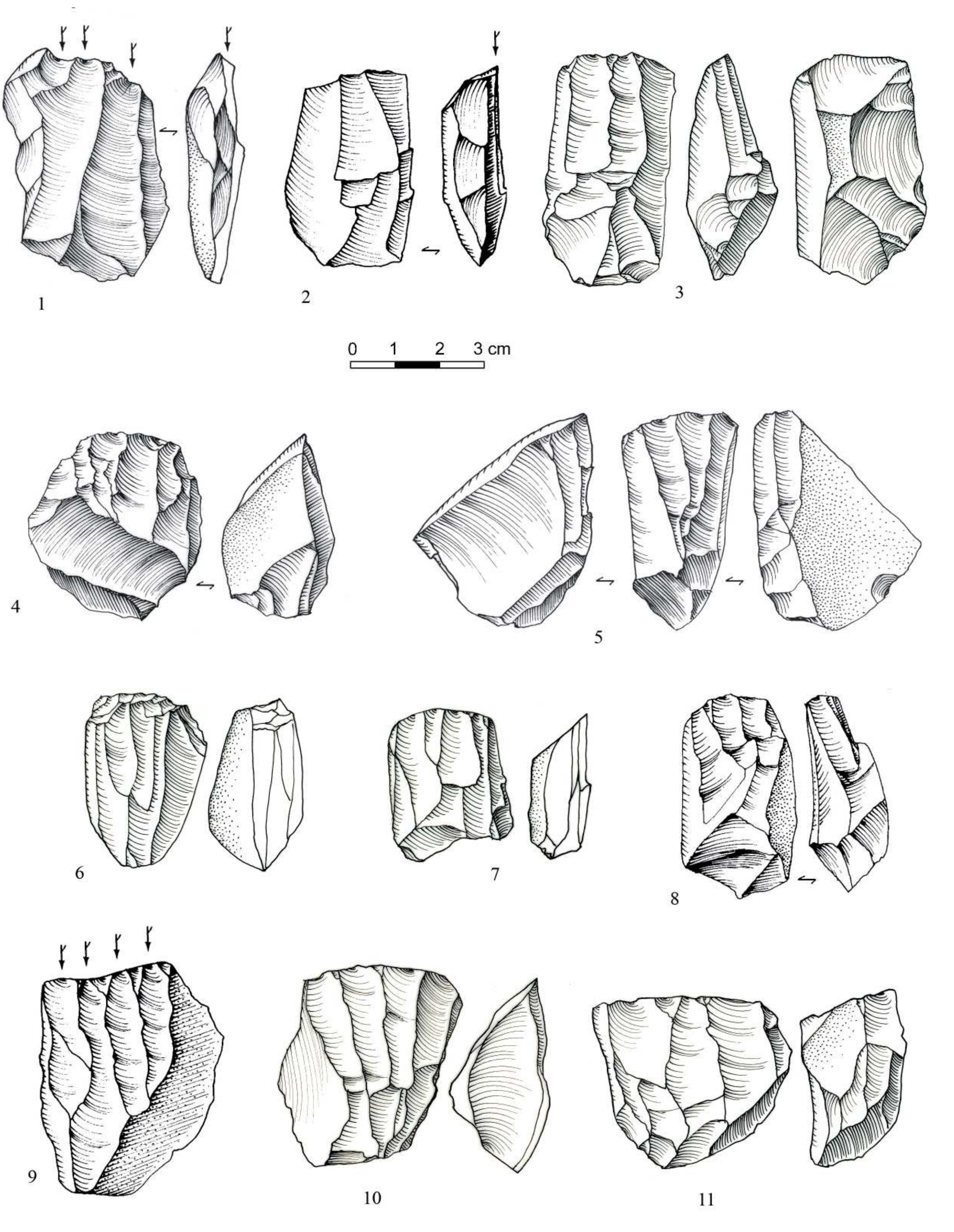


Planche 2 – Nucléus à lames, fouilles 2005 et 2008.
Fig. 1 : un seul sens, préparation latérale. Fig. 2 : unidirectionnel, préparation frontale. Fig. 3 : deux sens opposés, avivage par flanc latéral, préparation dorsale. Fig. 4 : un seul sens, avivage par flanc latéral. Fig. 5 : sur tranche de silex tabulaire, préparation frontale. Fig. 6 : unidirectionnel, extraction d'une tablette et reprise infructueuse, rebroussements. Fig. 7 : unidirectionnel, brisé par outrepassement. Fig. 8 : unidirectionnel, extraction d'un flanc latéral, excessif. Fig. 9 : unidirectionnel, sur galet, sans trace d'aménagement. Fig. 10 : unidirectionnel, préparation latérale. Fig. 11 : unidirectionnel, extractions de flancs à la base.
Fig. 1, 5, 6, 7, 11 : déc. 12 (226-240 cm) ; fig. 2 : déc. 6 (162-169 cm) ; fig. 3 : déc. 10 (199-213 cm) ; fig. 4 : déc. 11 (213-226 cm) ; fig. 8 : déc. 4 (143-153 cm) ; fig. 9 : déc. 5 (153-162 cm) ; fig. 10 : déc. 14 (245-252 cm).

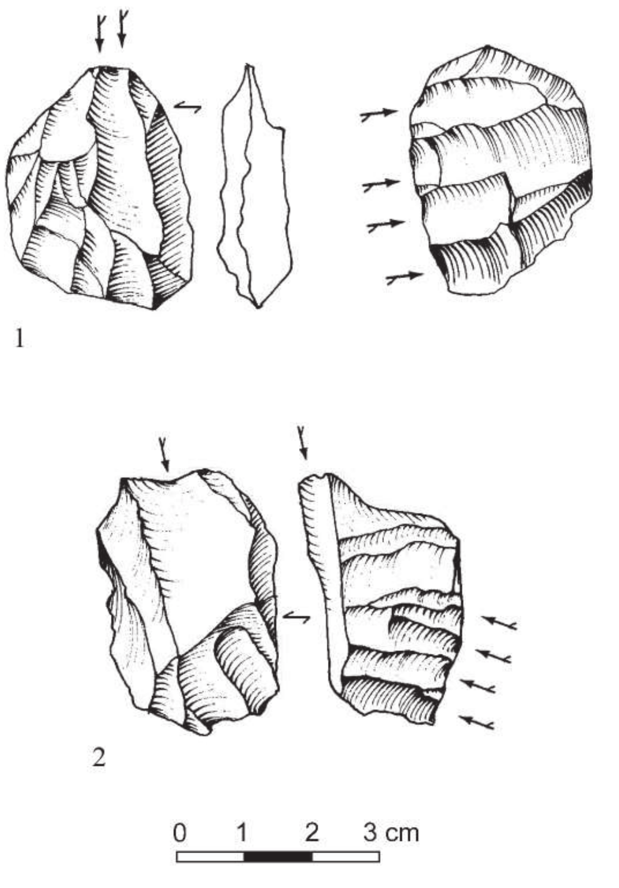


Planche 3 – Nucléus à lamelles à préparation latérale, fouilles 2005 et 2008. – Fig.1 : déc. 5 (153-162 cm) ; fig. 2 : déc. 1 (112-123 cm).

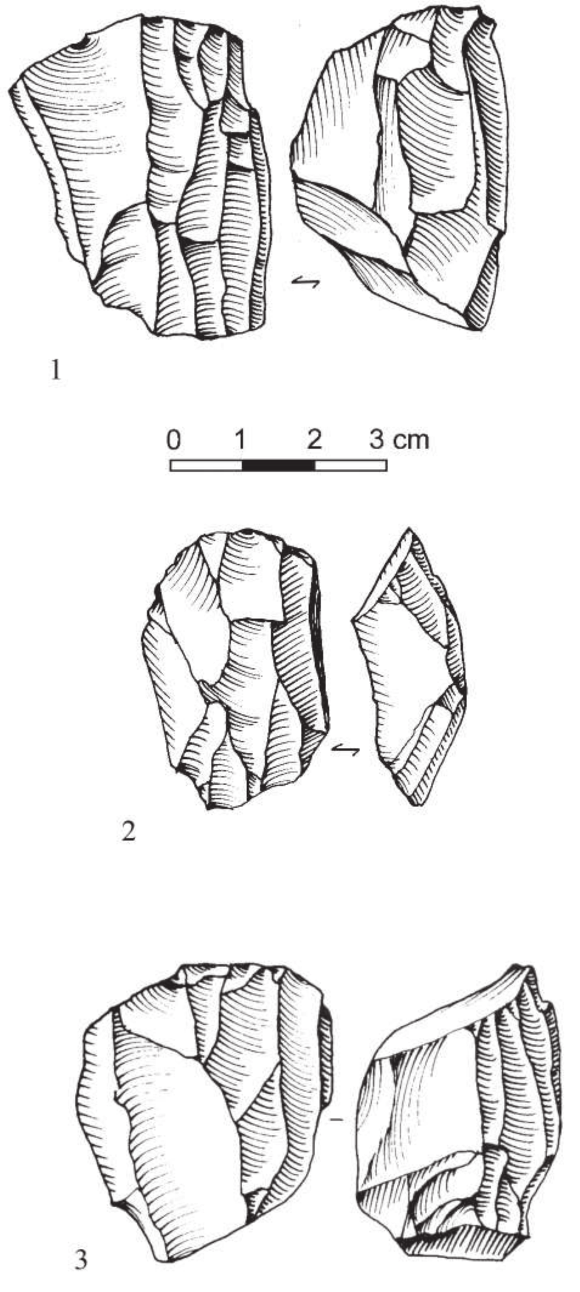


Planche 4 – Nucléus à deux sens opposés, coll. Fr. Hole. Fig. 1 : à crête dorsale (unit 22, 300-310 cm). Fig. 2 : en phase d'exhaustion (unit 20, 280-290 cm). Fig. 3 : à crête dorsale (unit 16, 240-250 cm).

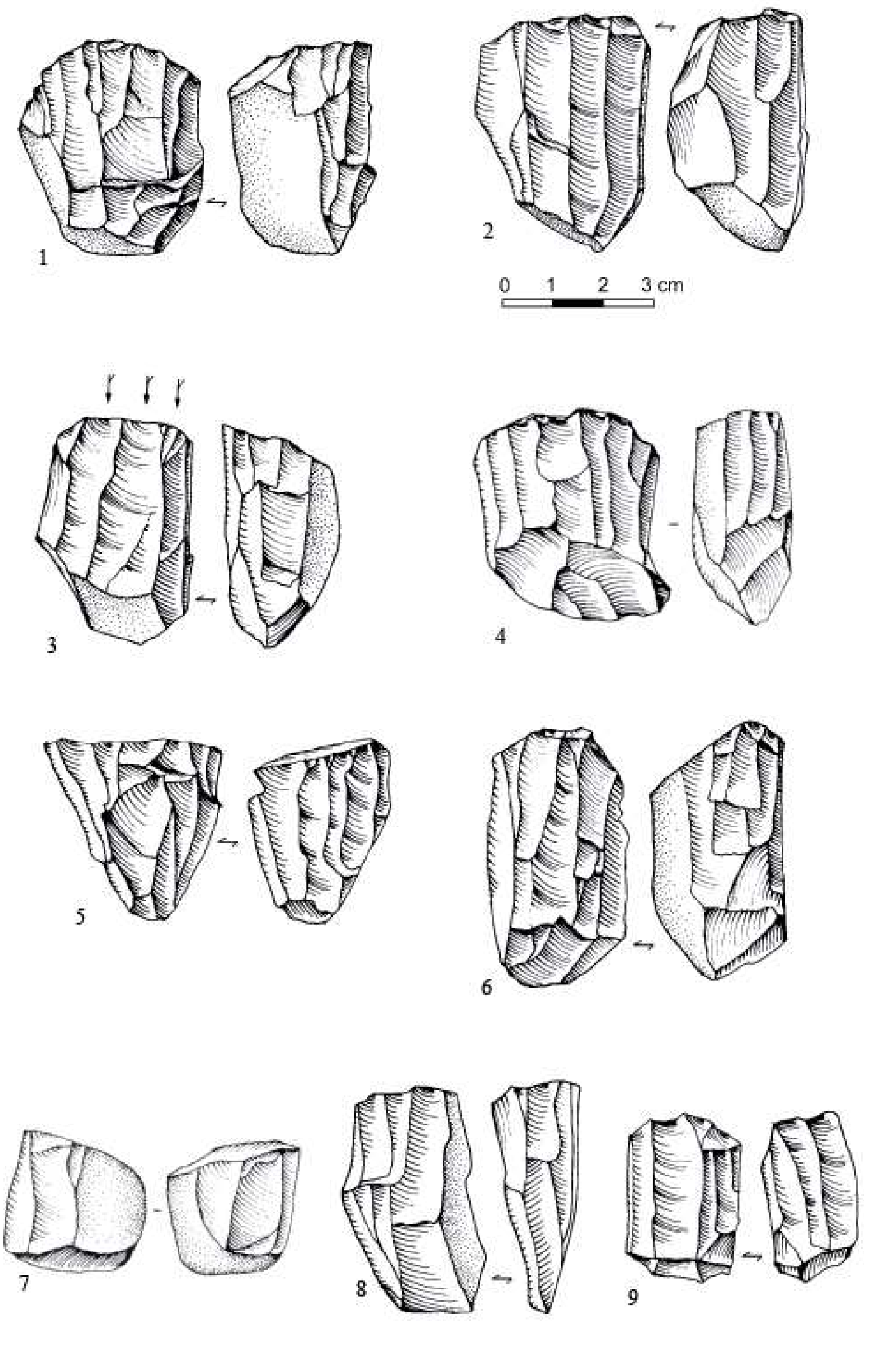


Planche 5 –Nucléus à lames sur bloc, coll. Fr. Hole.
Fig. 1 : unidirectionnel sur galet (unit 13, 210-220 cm). Fig. 2 : idem, préparation dorsale (unit 19, 270-280 cm). Fig. 3 : idem (unit 13, 210-220 cm). Fig. 4 : unidirectionnel avec avivage par flancs opposés. Fig. 5 : unidirectionnel (unit 18, 260-270 cm). Fig. 6 : unidirectionnel à crête latérale partielle (unit 9, 170-180 cm). Fig. 7 : fracturé par outrepassement (unit 2, 100-110 cm). Fig. 8 : unidirectionnel sur tranche de galet (unit 18, 260-270 cm). Fig. 9 : idem, brisé par le flanc porté à la base (unit 17, 250-260 cm).

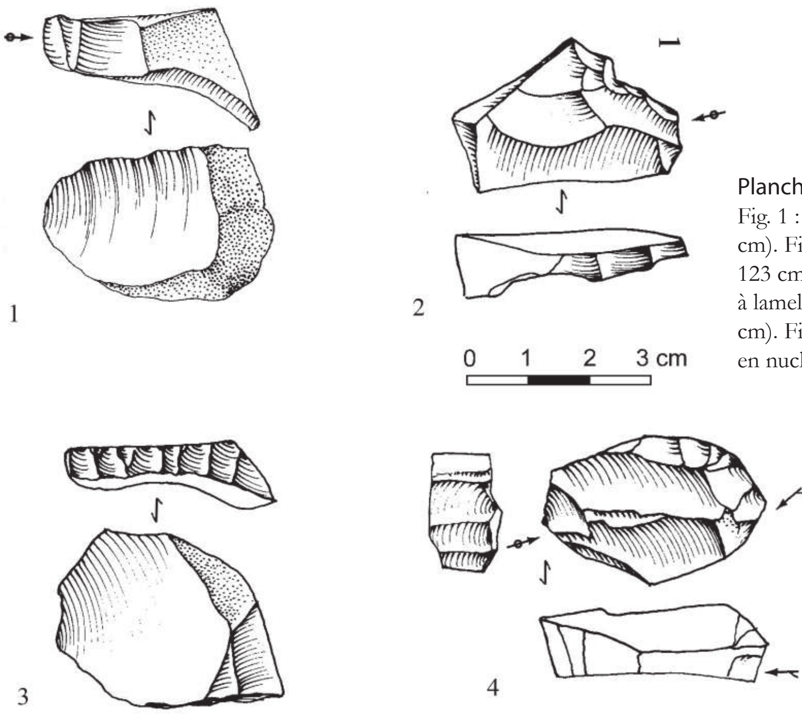
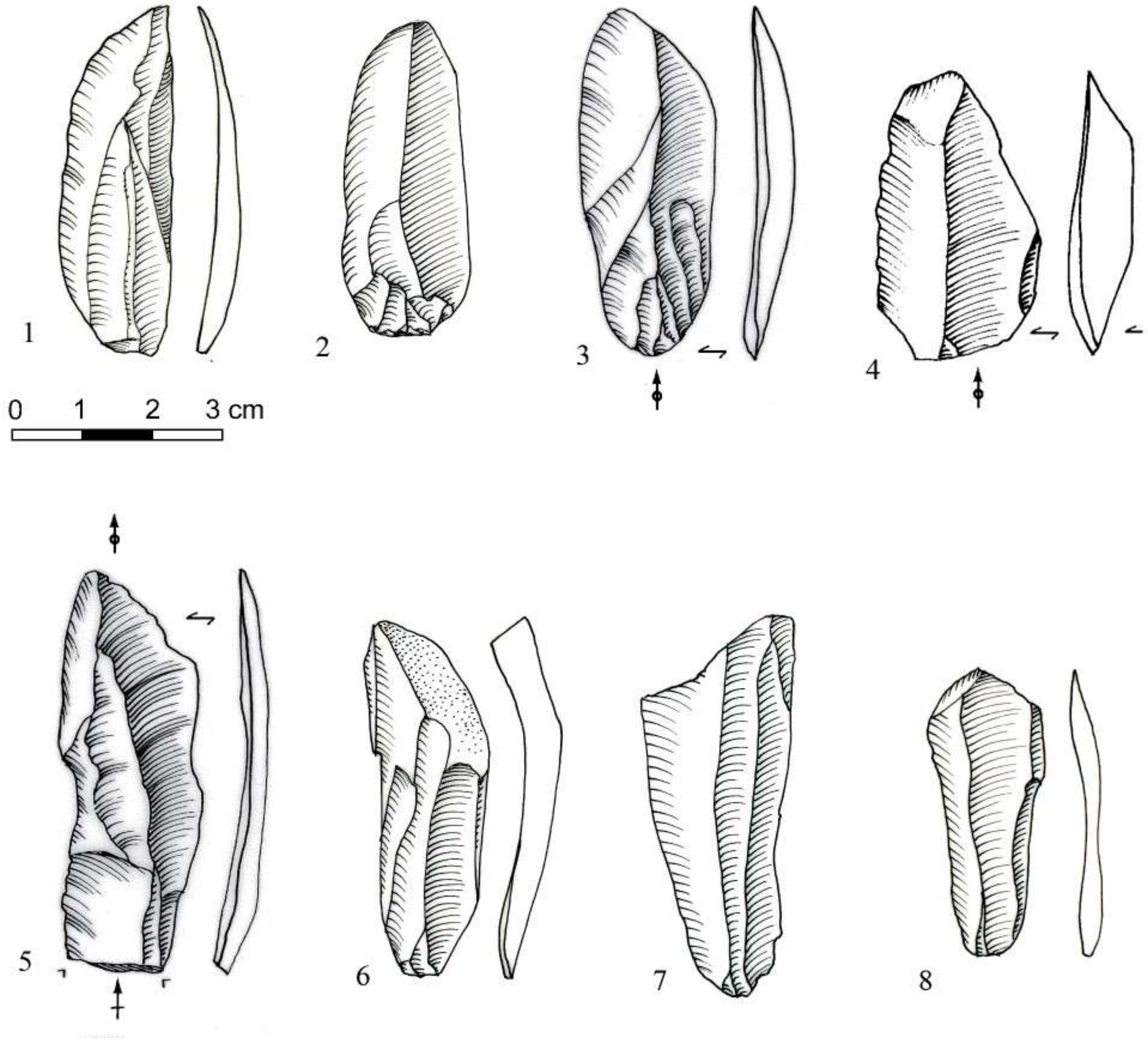


Planche 6 – Tablettes de nucléus à lames, fouilles 2005 et 2008. Fig. 1 : outrepassée, emportant le dos cortical (déc. 4, 143-153 cm). Fig. 2 : à inversion de débitage transversalement (déc. 1, 112-123 cm). Fig. 3 : rafraîchissement du plan de frappe d'un nucléus à lamelles, outrepassé, emportant le dos cortical (déc. 3, 137-143 cm). Fig. 4 : à inversion d'axe de débitage, une extrémité reprise en nucléus à lamelles sur la tranche (déc. 7, 169-180 cm).



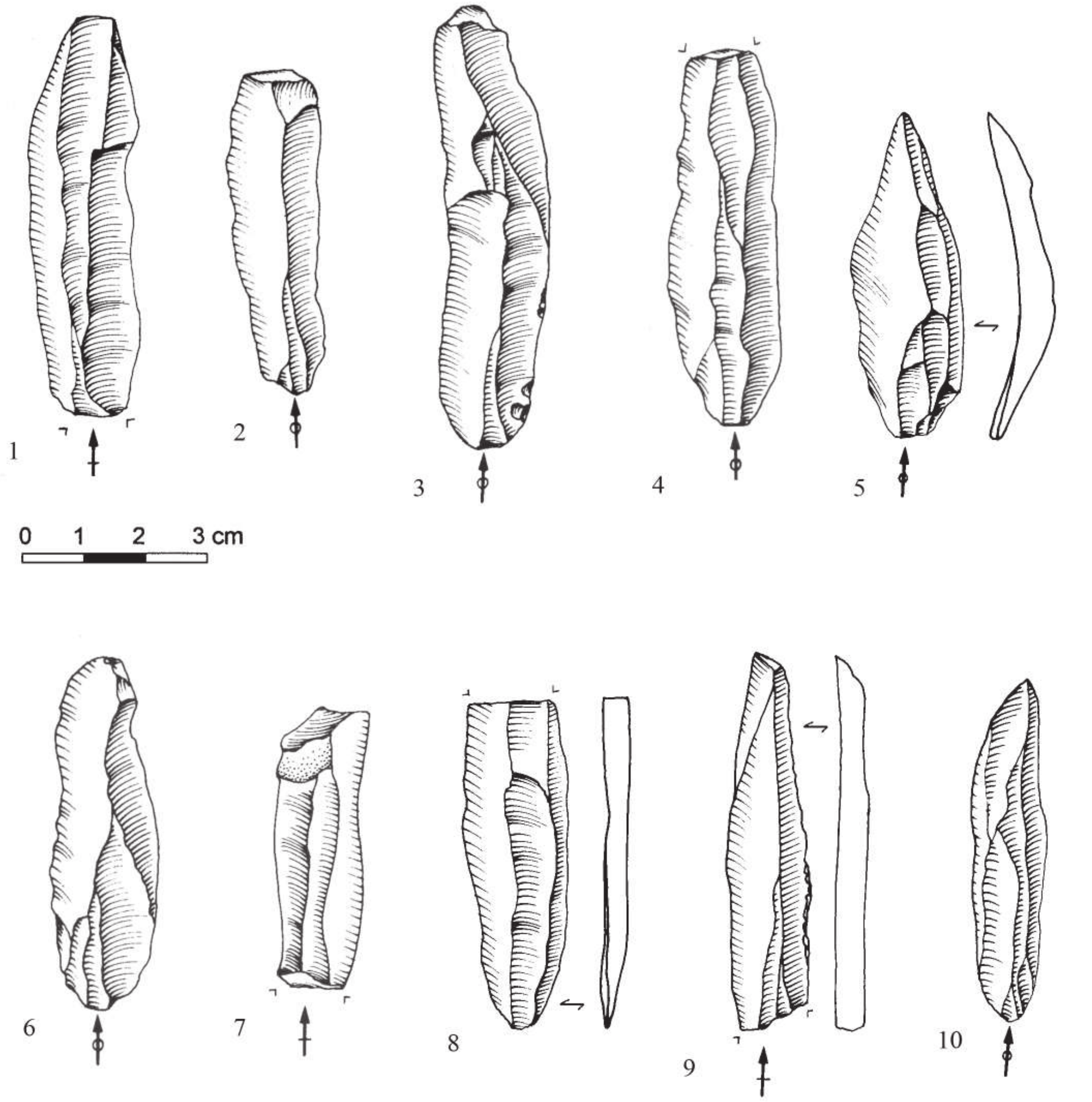


Planche 8 – Lames brutes, coll. Fr. Hole et fouilles 2005-2008.
Même calibrage des lames, fortes et courtes, fréquemment à préparation lamellaire du talon (fig. 1, 2, 3, 5, 6, 7, 11, 12). Des lames d'une silhouette d'une extrême élégance attestent le contrôle total des méthodes.
Fig. 1, 3, 8 : unit 18, 260-270 cm ; fig. 2 : unit 3, 110-120 cm ; fig. 4: unit 17, 250-260 cm ; fig. 5 : déc. 4, 143-153 cm ; fig. 6: unit 5, 160-170 cm ; fig. 7, 12 : unit 19, 280-290 cm ; fig. 9 : unit 17, 250-260 cm ; fig. 10 : unit 20, 280-310 cm.

Ci-contre : Planche 7 – Lames brutes, fouilles 2005 et 2008.
On observe la précision et la calibration, parfaitement maîtrisée, dans le format général de ces lames (elles ne sont pas les seules à Yafteh). Souvent, la préparation du talon fut faite par de fins enlèvement lamellaires qui régularisent le point d'impact, élimine les irrégularités précédentes et orientent l'axe et le module de la lame (fig. 2, 3, 7, 8, 9, 11). La minceur et l'extrême régularité de la fig. 10 montrent l'éventail des méthodes disponibles par les tailleurs de Yafteh. Fracturée et laissée en sa partie médiane, cette lame devait posséder à l'origine une longueur et une finesse exceptionnelles dans ce contexte.
Fig. 2, 7, 8, 10, 11 : déc. 14 (245-252 cm) ; fig. 3 : déc. 11 (213-226 cm) ; fig. 4 : déc. 5 (153-162 cm) ; fig. 1 : déc. 1 (112-123 cm) ; fig. 6 : déc. 12 (226-240 cm) ; fig. 9 : déc. 15 (252-260 cm).

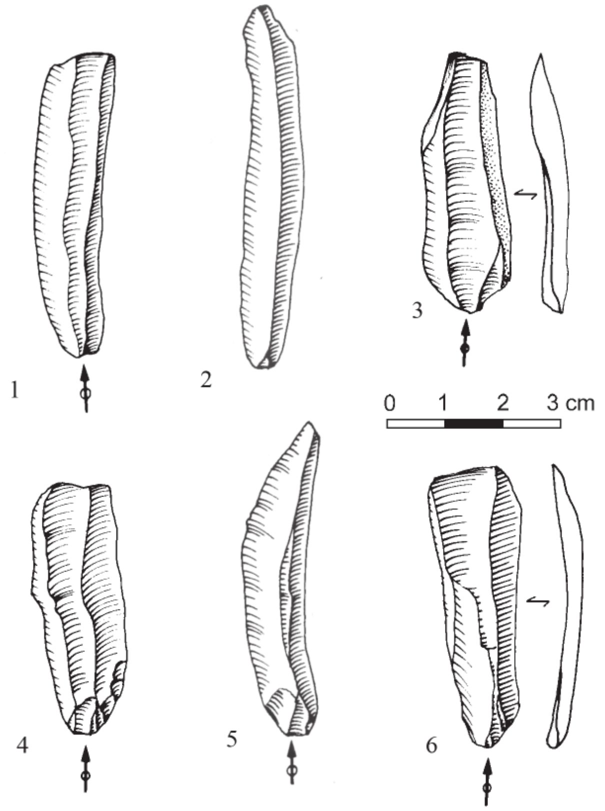


Planche 9 – Lames brutes, coll. Fr. Hole.
Mêmes commentaires, notez l'élégance de la fig. 2.
Fig. 1 : unit 19, 280-290 cm ; fig. 2 : unit 6, 240-250 cm ; fig. 3 : unit 8, 160-170 cm ; fig. 4 : unit 9, 170-180 cm ; fig. 5 : unit 12, 200-210 cm ; fig. 6 : unit 22, 300-310 cm.

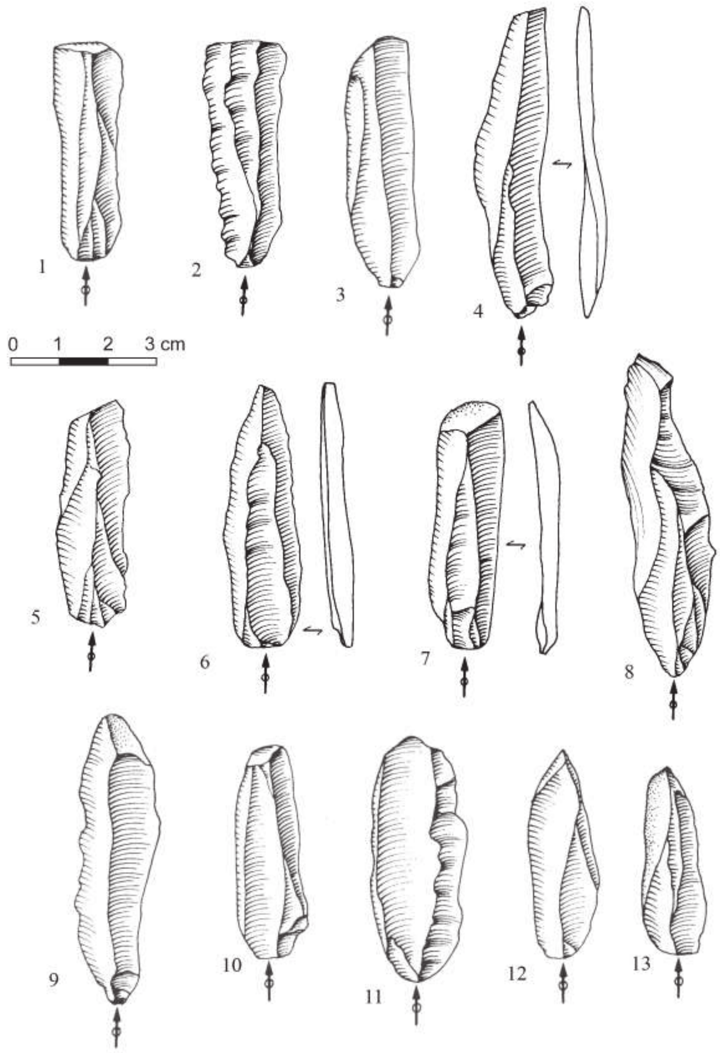


Planche 10 – Lames brutes, collection Fr. Hole.
Extrême calibrage de ces lames, destinées aux supports d'outils domestiques, courtes et régulières : entre 5 et 6 cm de longueur, pour 1 à 2 cm de largeur, retrouvées souvent intactes. La régularité fut obtenue autant par la mise en forme du bloc (enlèvements transversaux) et la mise en saillie du point d'impact, via les enlèvements lamellaires proximaux (fig. 1, 2, 4, 5, 6, 7, 8, 11).
Fig. 2 : unit 6, 140-150 cm ; fig. 13 : unit 4 ; fig. 10 : unit 17 : 250-260 ; fig. 1, 9, 11 : unit 18, 260-270 cm ; fig. 12 : unit 19, 280-290 cm ; fig. 3 : unit 21, 290-300 cm ; fig. 4 : unit 15 ; fig. 8 : unit 12, 200-210 cm ; fig. 7 : unit 20, 280-310 cm ; fig. 6 : unit 11, 190-220 cm ; fig. 5 : unit 16, 240-250 cm.

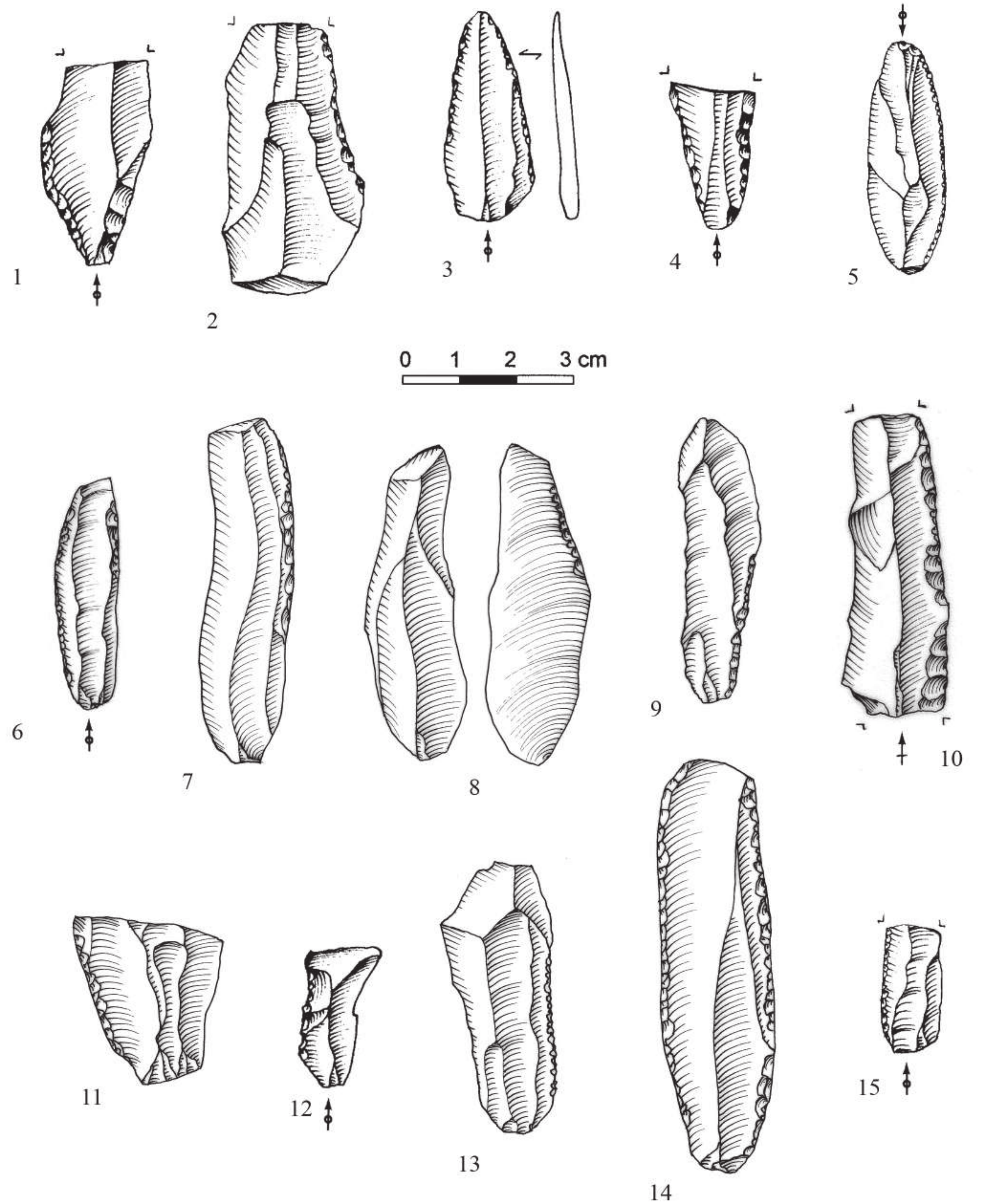


Planche 11 – Lames retouchées, fouilles 2005-2008.
À retouches intégrales sur le modèle « aurignacien » (fig. 14 : déc. 10, 199-213 cm), convergentes (bases d'outils ?) (fig. 1 : déc. 11, 213-226 cm ; fig. 4 : déc. 2, 123-137 cm), proximales partielles sur base d'outils (fig. 11 : déc. 17, 268-277 cm ; fig. 15, déc. 2, 123-137 cm), appointées (fig. 3 : déc. 6, 162-169 cm), limitées à un seul bord (fig. 2 : déc. 2, 123-137 cm ; fig. 5 : déc. 6, 162-169 cm ; fig. 7, 9, 10 : déc. 10, 199-213c m ; fig. 12 : déc. 3,137-143 cm ; fig. 13 : déc. 11, 213-226 cm), inverses (fig. 8 : déc. 12, 226-240 cm) ou bilatérales (fig. 6 : déc. 8, 180-188 cm).

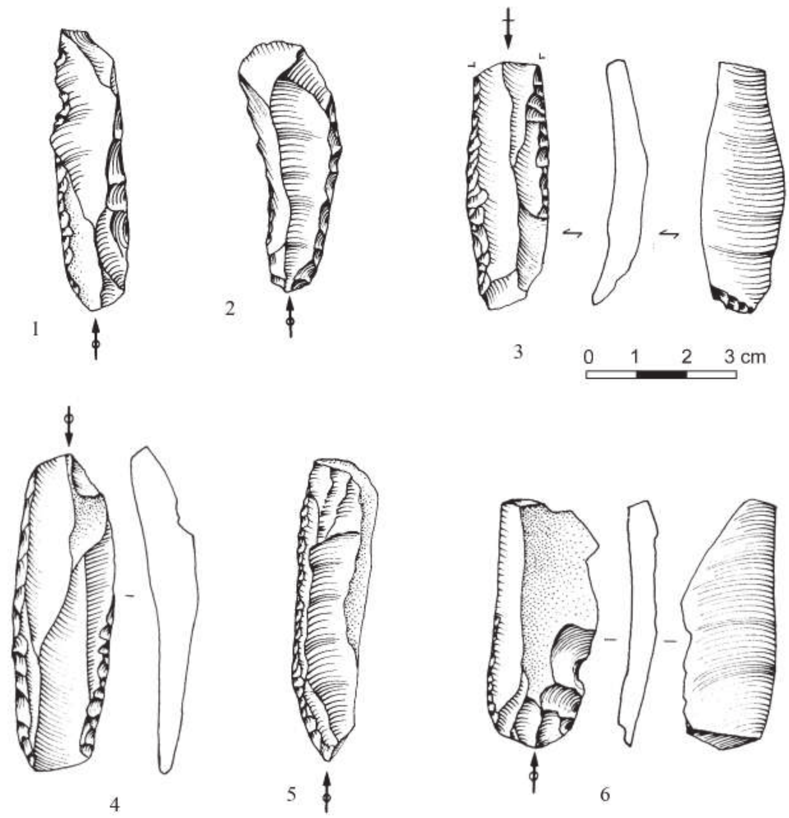


Planche 12 – Lames retouchées, coll. Fr. Hole. Bilatérales sur le modèle aurignacien (fig. 1 : unit 12, 200-210 cm ; fig. 3 : unit 4, 120-130 cm ; fig. 4 : unit 12, 200-210 cm), sur un seul bord (fig. 2 : unit 19, 270-280 cm ; fig. 5 : unit 9, 170-180 cm), denticulées (fig. 1 : unit 12, 200-210 cm ; fig. 6 : unit 19, 170-180 cm).

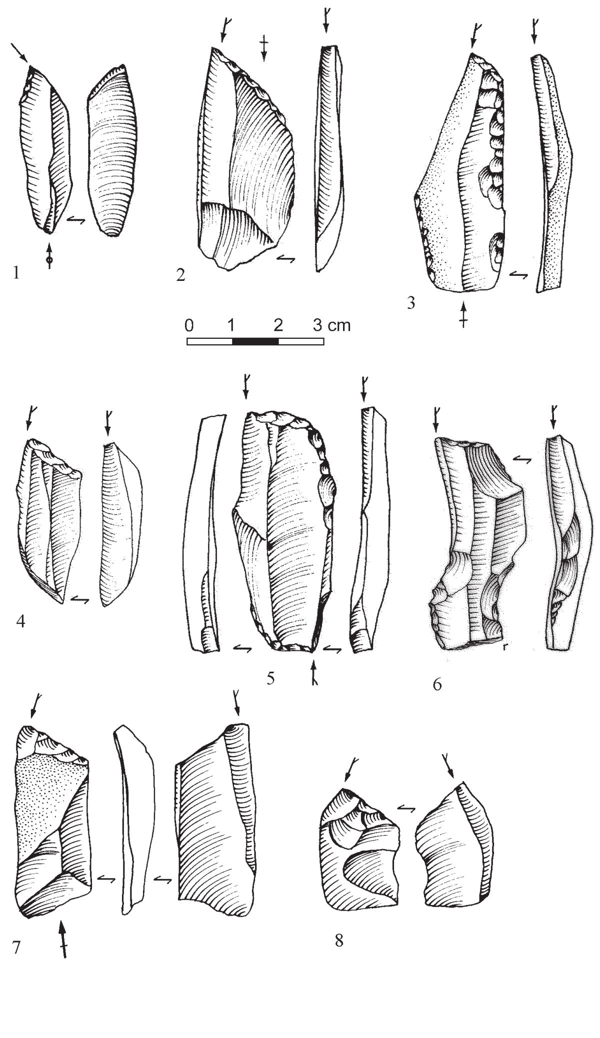


Planche 13 – Burins sur troncature, fouilles 2005-2008 et coll. Fr. Hole. Sur lame retouchée (fig. 3, 6), double alterne (fig. 5), outrepassée (fig. 4, 8). Fig. 1, 2, 3, 4 : déc. 2 (123-137 cm) ; fig. 5 : déc. 7 (169-180 cm) ; fig. 6 : déc. 10 (199-213 cm) ; fig. 7, 8 : unit 16, 240-250 cm.

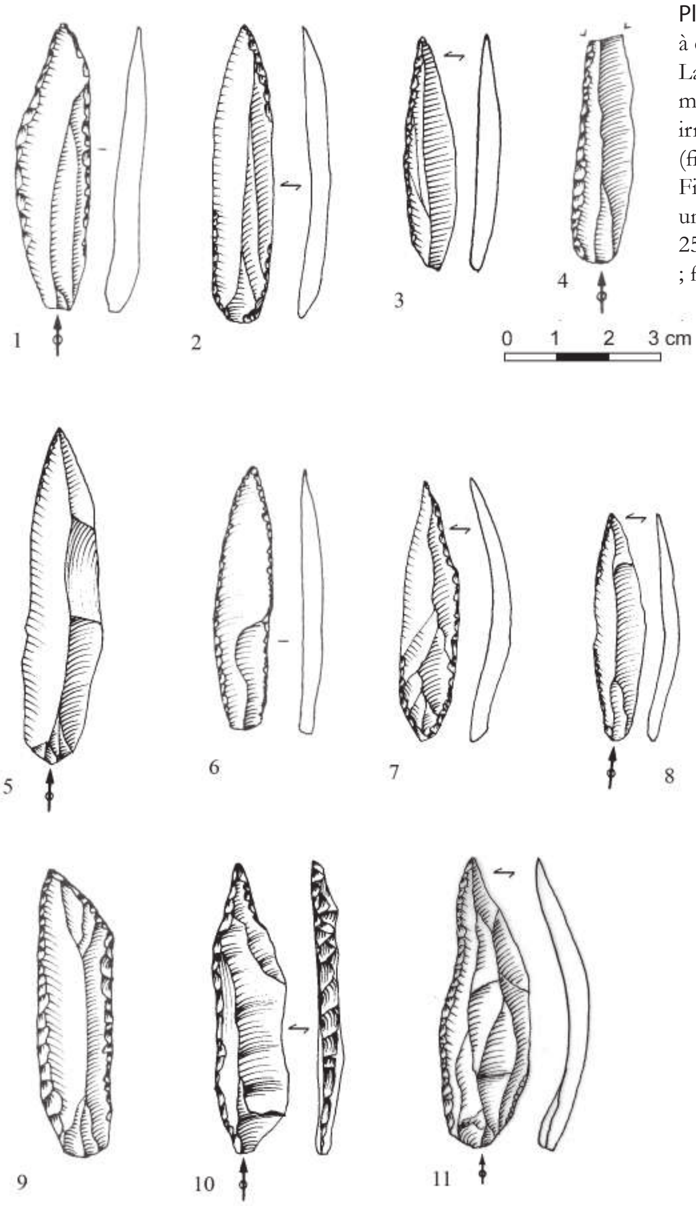


Planche 14 – Lames appointées, lames tronquées, perçoirs et pointes à dos, coll. Fr. Hole et fouilles 2005-2008.
Lames appointées (fig. 1 à 8), probablement des pointes d'armatures, mais de dimensions exceptionnelles et aux aménagements secondaires irréguliers. Lame retouchée et tronquée (fig. 9). Perçoir sur lame à dos (fig. 10). Pointe à dos abattu (fig. 11).
Fig. 1, 4 : unit 16, 240-250 cm ; fig. 2, 5 : unit 4, 120-130 cm ; fig. 3 : unit 18, 260-270 cm ; fig. 6 : unit 19, 270-280 cm ; fig. 7, 8 : unit 17, 250-260 cm ; fig. 9 : unit 7, 150-160 cm ; fig. 10 : unit 11 : 180-190 cm ; fig. 11 : déc. 9 (188-200 cm).

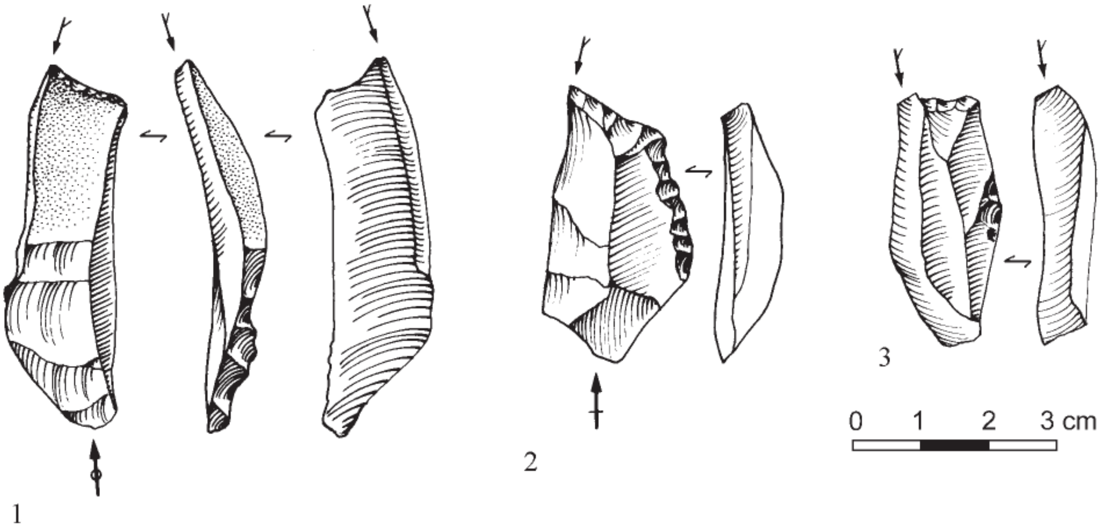


Planche 15 – Burins sur troncature, coll. Fr. Hole.
Sur lame à crête (fig. 1, 2), outrepassée (fig. 3).
Fig. 1 : unit 9, 170-180 cm ; fig. 2 : unit 11, 190-200 cm ; fig. 3 : unit 7, 150-160 cm.

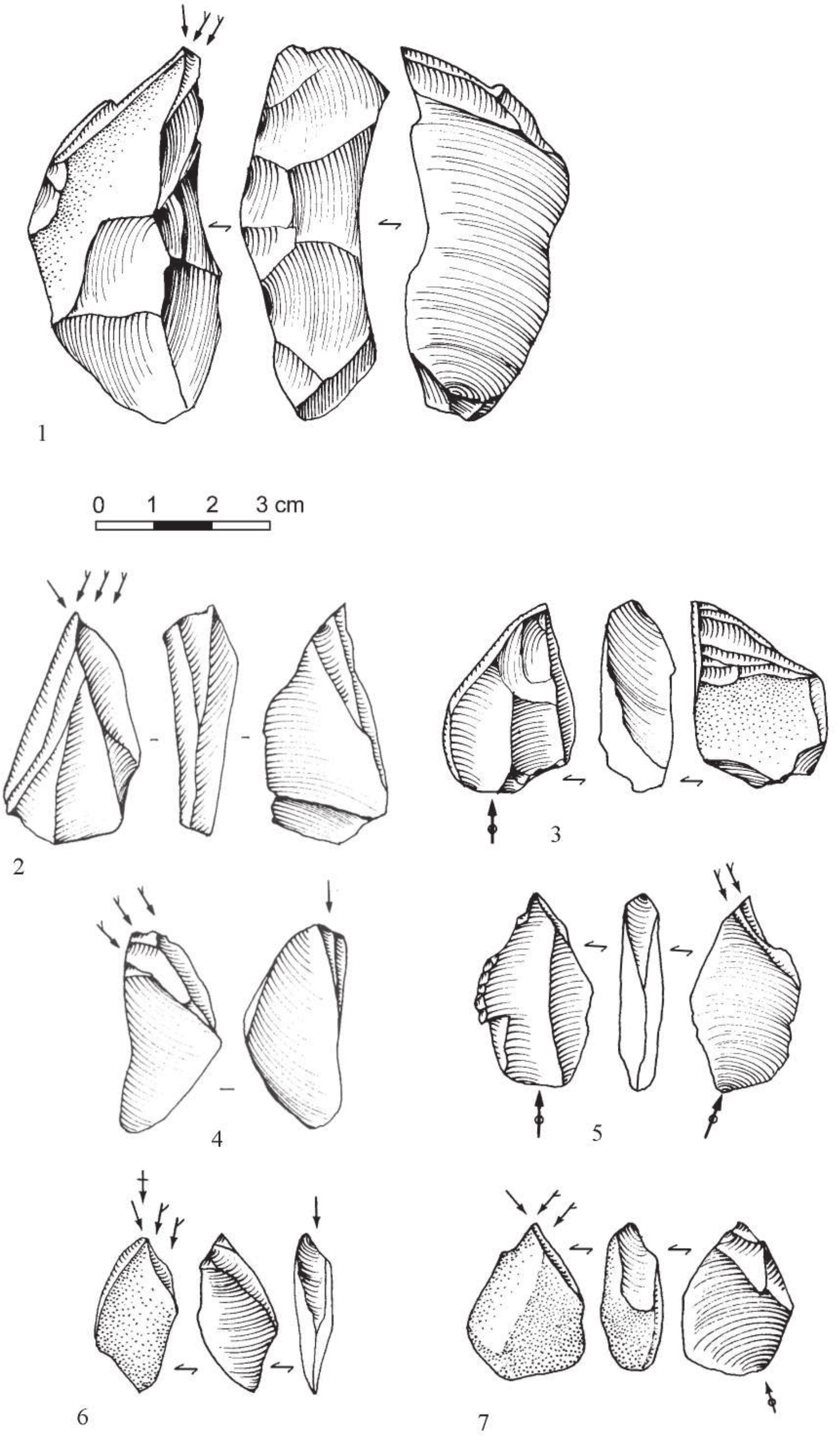


Planche 16 – Burins carénés, coll. Fr. Hole et fouilles 2005-2008.
Sur lame à crête (fig. 1), à enlèvements plans sur face ventrale (fig. 2, 4, 5, 7), à enlèvements courbes (fig. 3, 4).
Fig. 1 : unit 20, 280-290 cm ; fig. 2 : unit 12, 200-210 cm ; fig. 3, 5 : unit 7, 150-160 cm ; fig. 4 : unit 14, 220-230 cm ; fig. 6 : déc. 4 (143-153 cm) ; fig. 7 : déc. 1 (112-123 cm).

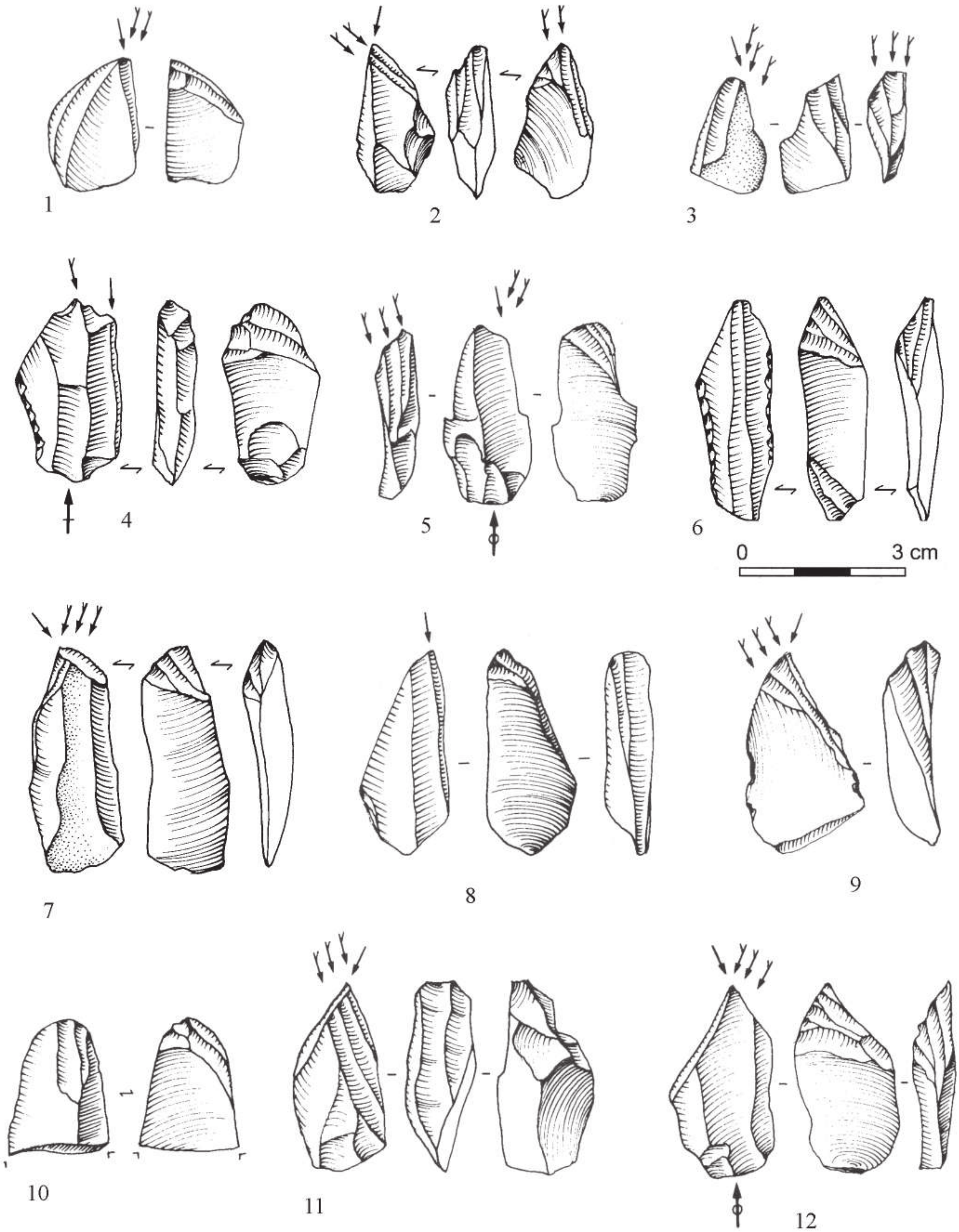


Planche 17 – Burins carénés, coll. Fr. Hole.
Fig. 1, 4 : unit 3, 110-120 cm ; fig. 2 : unit 5, 130-140 cm ; fig. 3, 7 : unit 7, 150-160 cm ; fig. 5, 6 : unit 9, 170-180 cm ; fig. 9 : unit 13, 210-220 cm ; fig. 8 : unit 10, 180-190 cm ; fig. 11, 12 : unit 7, 150-160 cm.

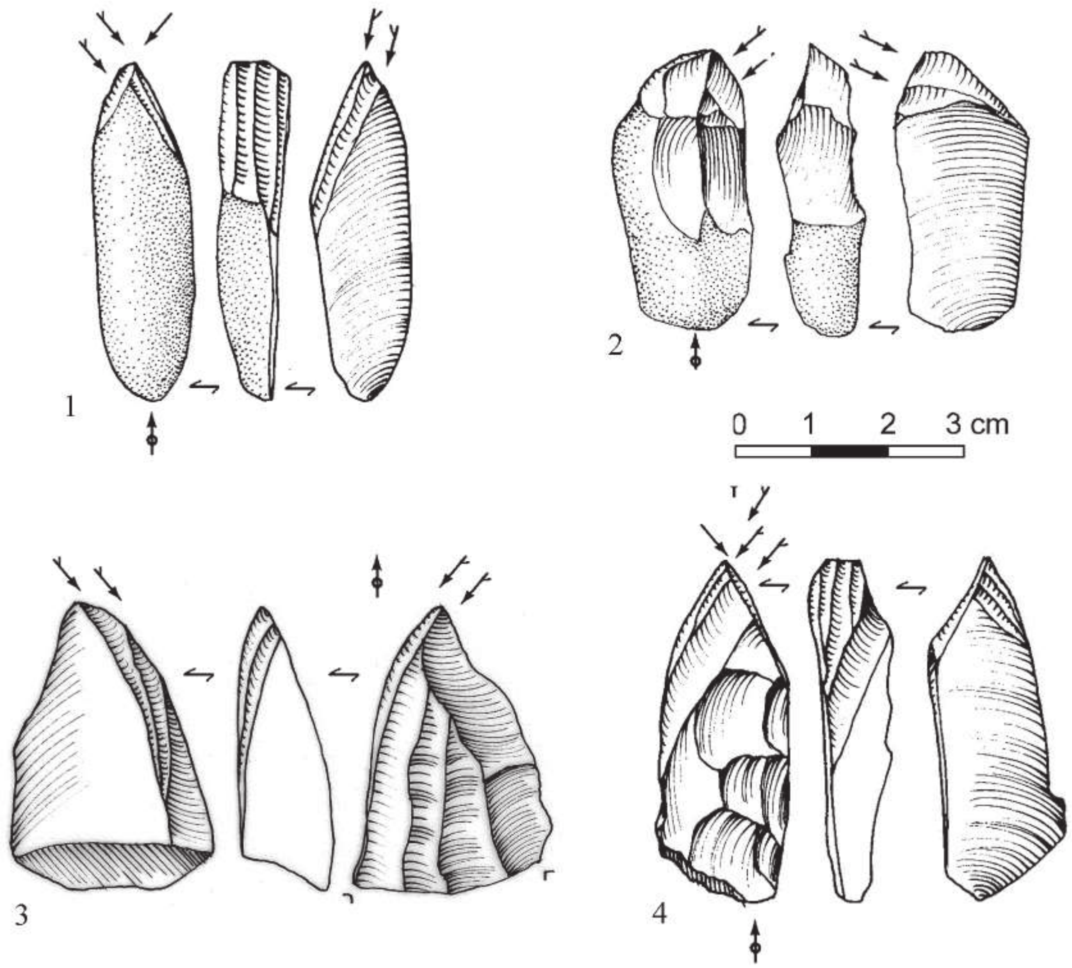


Planche 18 – Burins carénés, fouilles 2005-2008.
Sur lame à crête (fig. 2, 4), sur lame corticale (fig. 1), à enlèvements courbes (fig. 2, 3, 4).
Fig. 1, 4 : déc. 2 (123-137 cm) ; fig. 2 : déc. 3 (137-143 cm) ; fig. 3 : déc. 4 (143-153 cm).

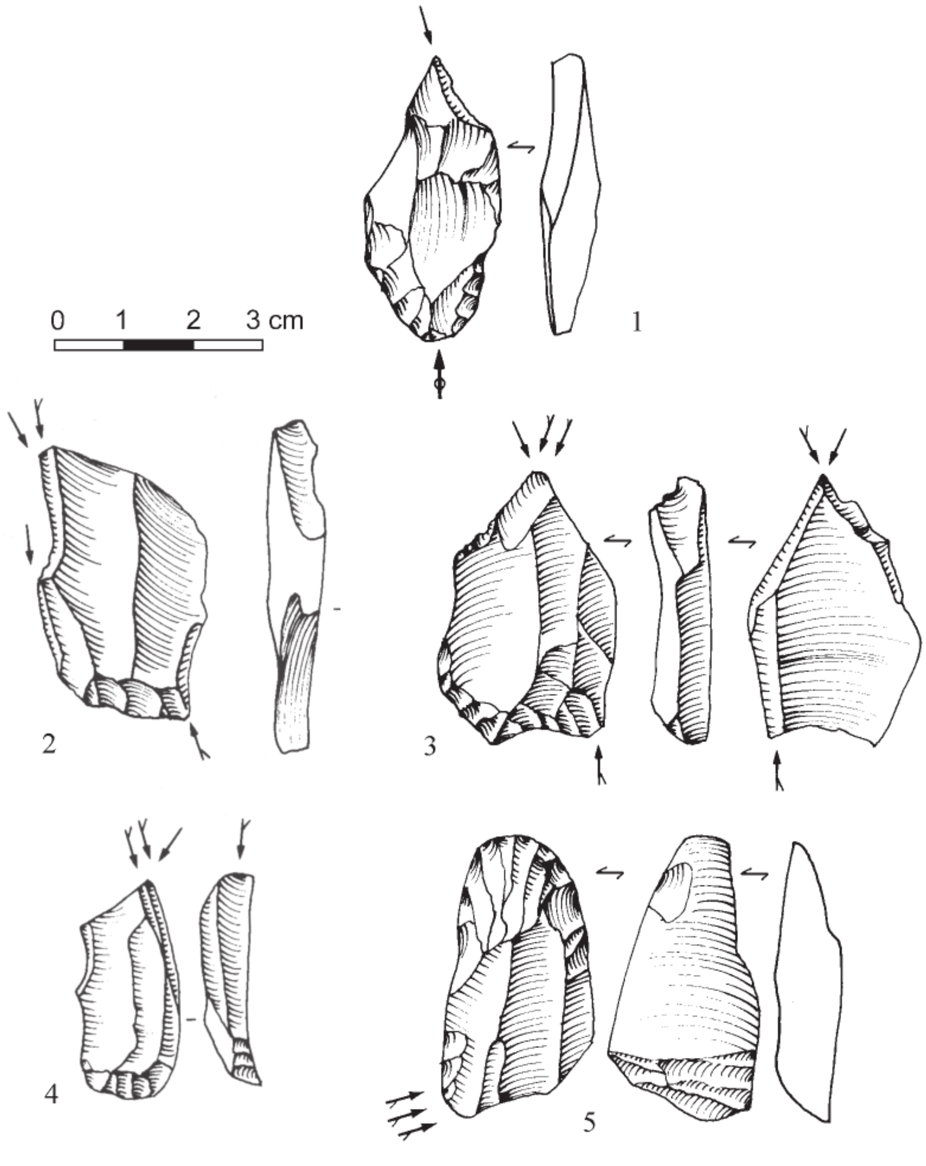


Planche 19 – Outils composites, coll. Fr. Hole.
Grattoir-burin (fig. 1, 4, 5), burins mixtes (fig. 2, 3). Exemples de ré-emmanchements (fig. 2, 3) ou d'affûtage des bases (fig. 1, 5).
Fig. 1 : unit 4, 120-130 cm ; fig. 2 : unit 10, 180-190 cm ; fig. 3 : unit 8, 160-170 cm ; fig. 4 : unit 3, 110-120 cm ; fig. 5 : unit 11, 190-200 cm.

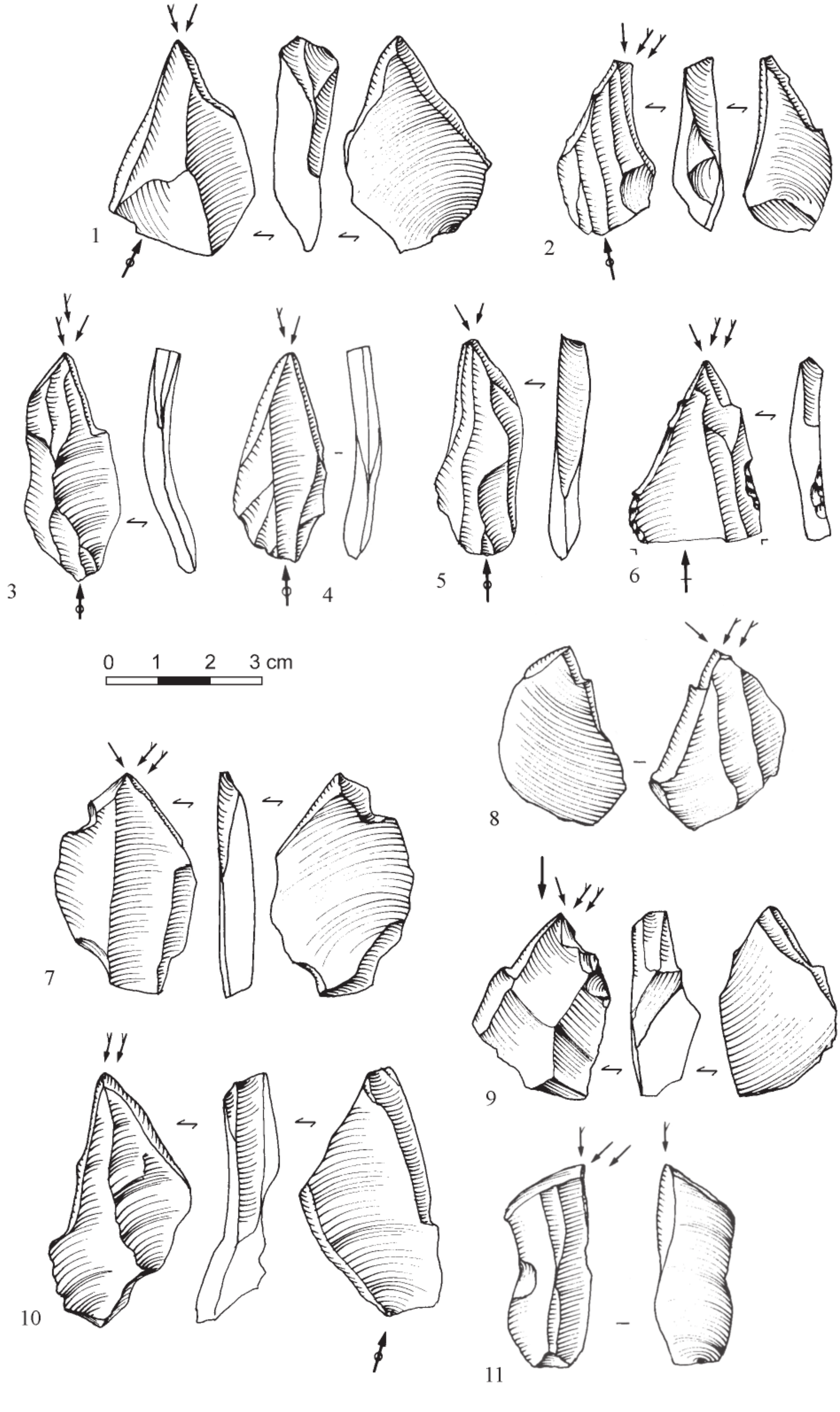


Planche 20 – Burins dièdres, coll. Fr. Hole.

Fig. 1 : unit 22, 300-310 cm ; fig. 2 : unit 4, 120-130 cm ; fig. 3 : unit 15, 230-240 cm ; fig. 4 : unit 2, 100-110 cm ; fig. 5 : unit 7, 150-160 cm ; fig. 6 : unit 5, 130-140 cm ; fig. 7 : unit 18, 260-270 cm ; fig. 8 : unit 19, 270-280 cm ; fig. 9 : unit 13, 210-220 cm ; fig. 10, 11 : unit 12, 200-210 cm.

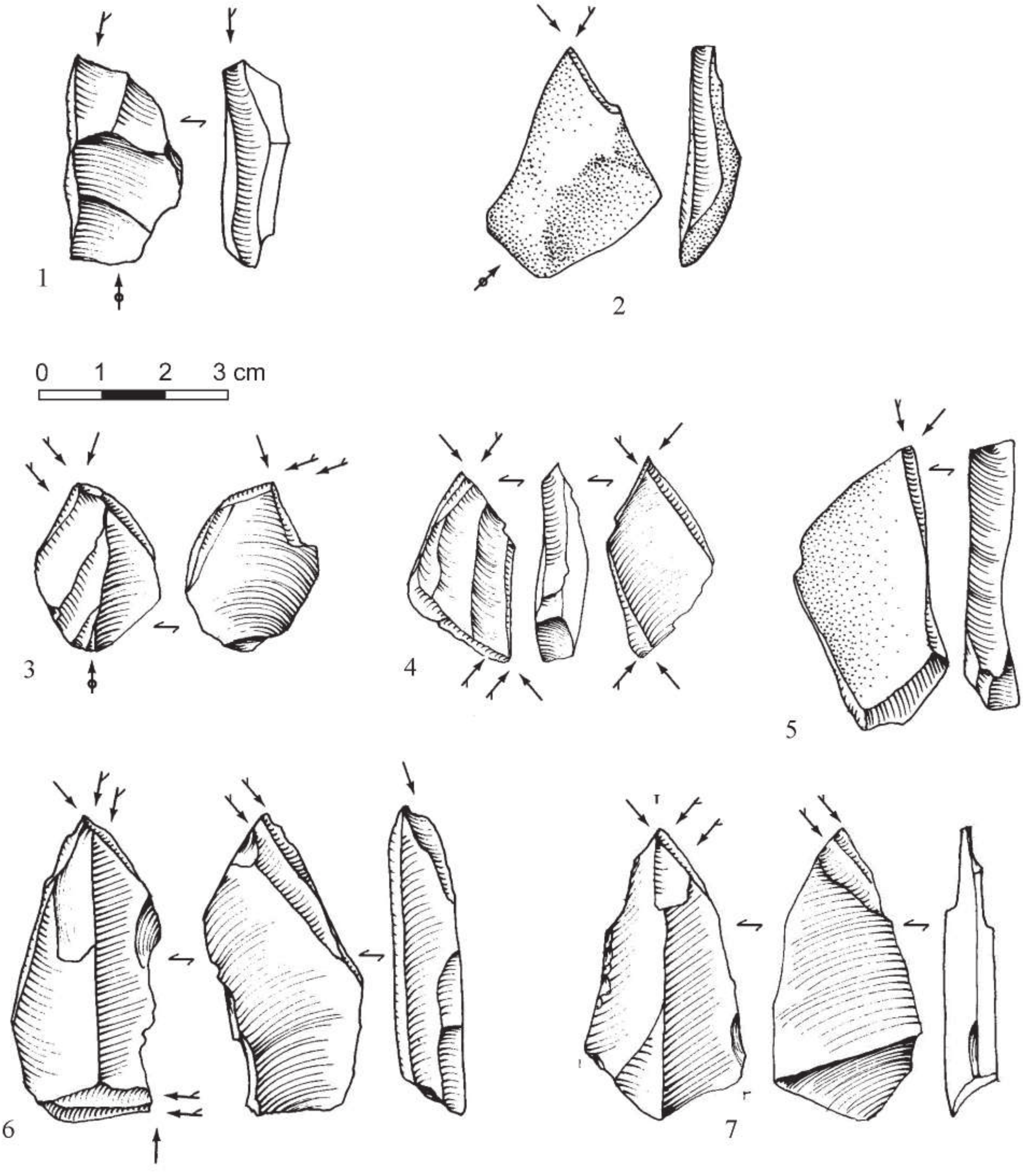
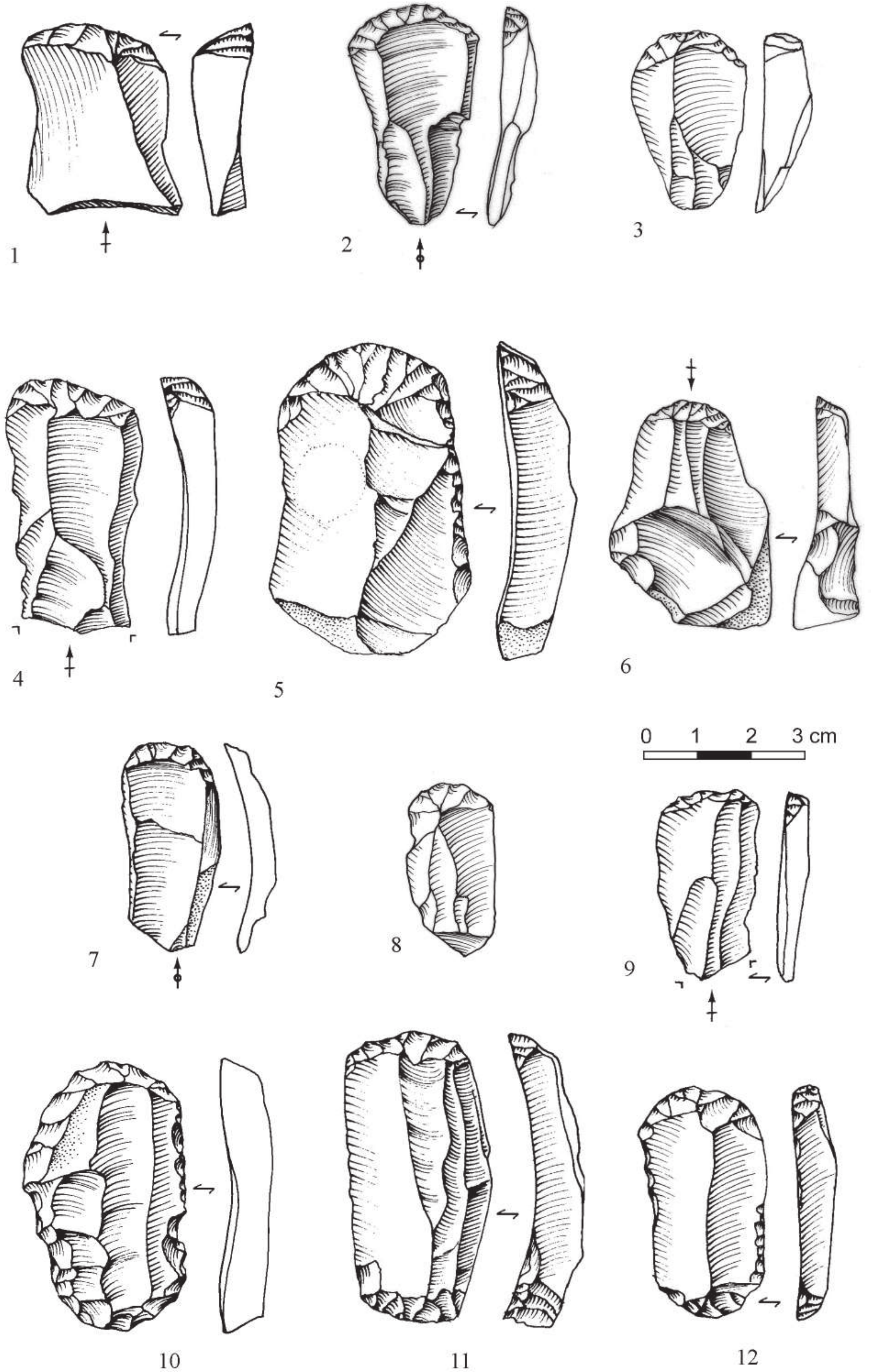


Planche 21 – Burins dièdres, fouilles 2005-2008.
Fig. 2, 7 : déc. 1 (112-123 cm) ; fig. 1 : déc. 2 (123-137 cm) ; fig. 4 : déc. 3 (137-143 cm) ; fig. 5, 6 : déc. 4 (143-153 cm) ; fig. 3 : déc. 5 (153-162 cm).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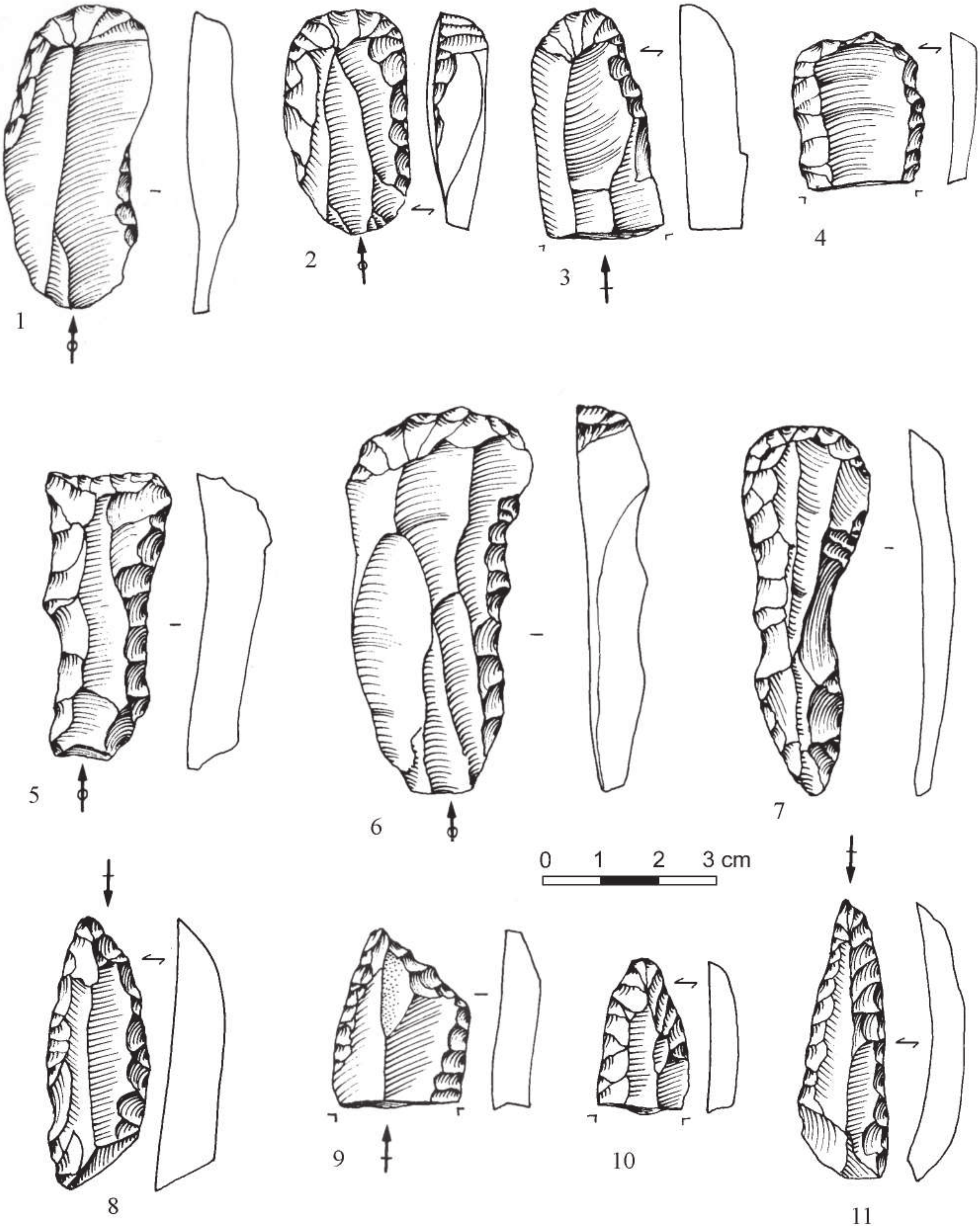


Planche 23 – Grattoirs sur lame et lames appointées, coll. Fr. Hole.
Grattoirs sur lame retouchée (fig. 1 à 4, 6), sur lame appointée telle une base emmanchée (fig. 7), lames tronquées et retouchées sur le mode aurignacien (fig. 5, 9), lames appointées par retouches aurignaciennes (fig. 8, 10, 11).
Fig. 1 : unit 16, 240-250 cm ; Fig. 2 : unit 12, 200-210 cm ; Fig. 3 et 4 : unit 15, 230-240 cm ; Fig. 5 : unit 18, 260-270 ; Fig. 6 : unit 17, 250-260 cm ; Fig. 7 : unit 21, 290-300 cm ; Fig. 8 : unit 20, 280-290 cm ; Fig. 9 : unit 11, 190-200 cm. Fig. 10 : unit 9, 170-180 cm ; Fig. 11 : unit 7, 150-160 cm.

Ci-contre : Planche 22 – Grattoirs sur lame, fouilles 2005-2008 et coll. Fr. Hole.
Simples (fig. 1 à 9) et doubles (fig. 10 à 12).
Fig. 4 : déc. 1 (112-123 cm) ; fig. 1, 8 : déc. 2 (123-137 cm) ; fig. 7, 11 : déc. 5 (153-162 cm) ; fig. 12 : déc. 6, 162-169 cm ; fig. 6 : déc. 8 (180-188 cm) ; fig. 5 : déc. 9 (188-200 cm) ; fig. 3 : déc. 10 (199-213 cm) ; fig. 2 : déc. 11 (213-226 cm) ; fig. 9 : déc. 12 (226-240 cm) ; fig. 10 : unit 7, 150-160 cm.

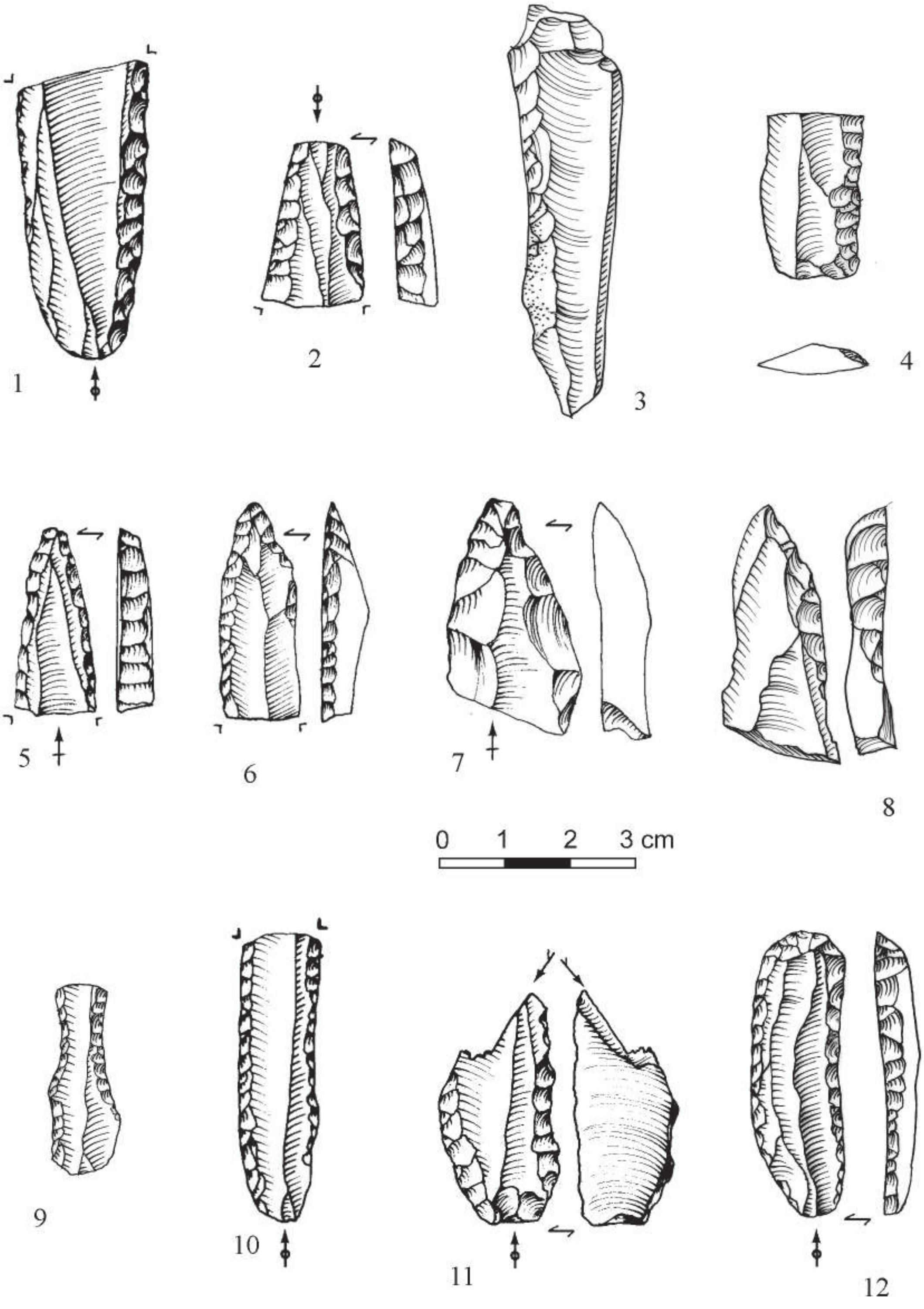


Planche 24 – Lames aurignaciennes et outils dérivés, fouilles 2005-2008.
Bases de lame retouchée (fig. 1, 4, 10, 11), extrémités de lames appointées (fig. 2, 5 à 8), lame étranglée (fig. 9), grattoir sur lame retouchée (fig. 12).
Fig. 1, 5, 6, 10 : déc. 2 (123-137 cm) ; fig. 11 : déc. 1 (112-123 cm) ; fig. 2 : déc. 4 (143-153 cm) ; fig. 8, 9, 12 : déc. 9 (188-200 cm) ; fig. 3, 4 : déc. 13 (240-245 cm) ; fig. 7 : déc. 7 (169-180 cm).

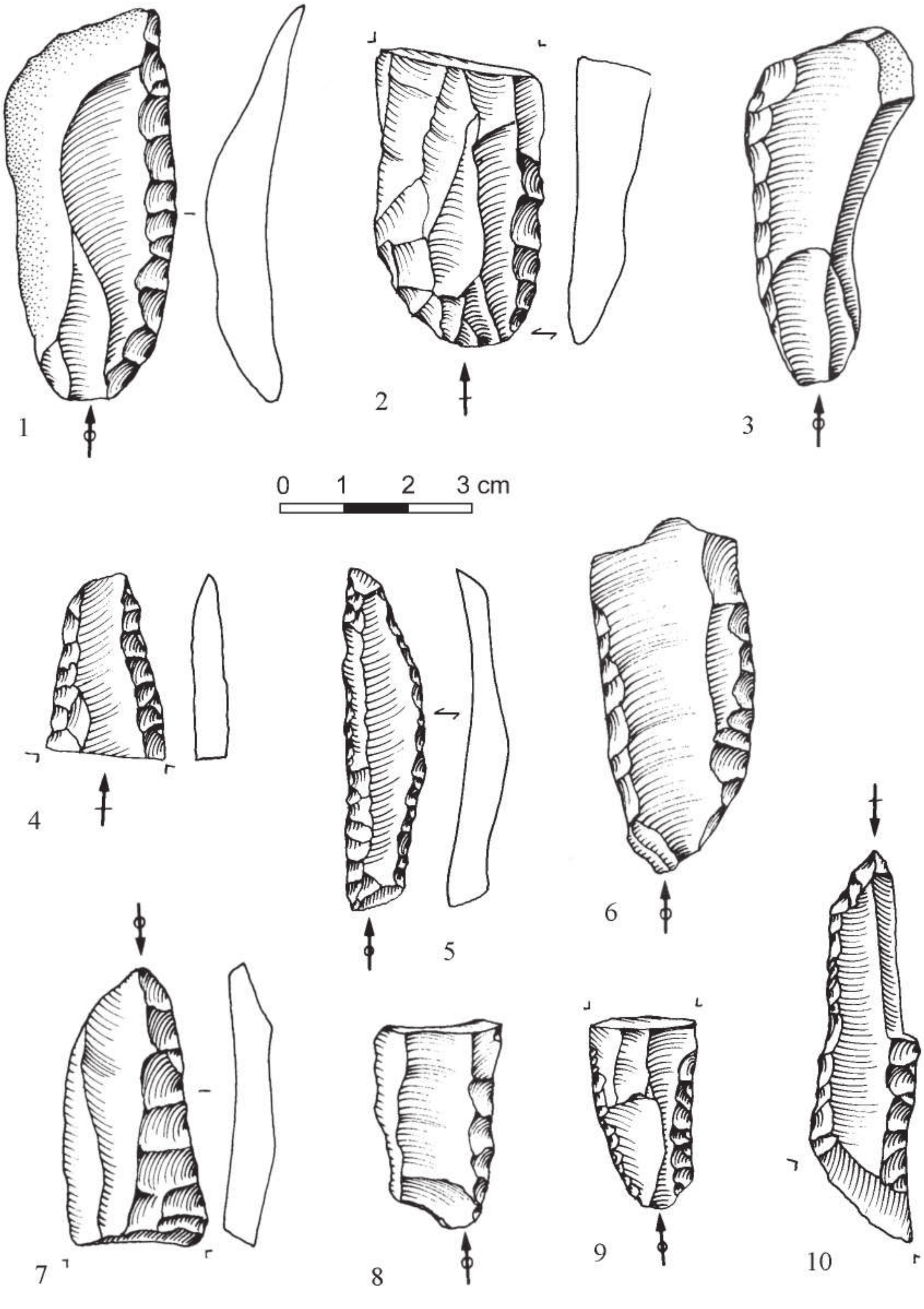


Planche 25 – Lames aurignaciennes et outils dérivés, coll. Fr. Hole.
Lames complètes (fig. 1, 3, 5, 6), bases d'outils (fig. 2, 7, 8, 9), extrémité de lame (fig. 4).
Fig. 1 : unit 8, 160-170 cm ; fig. 2 : unit 17, 250-260 cm ; fig. 3 : unit 21, 290-300 cm ; fig. 4 : unit 10, 180-190 cm ; fig. 5, 9 : unit 4, 120-130 cm ; fig. 6 : unit 18, 260-270 cm ; fig. 7, 8 : unit 19, 280-290 cm ; fig. 10 : unit 3, 110-120 cm.

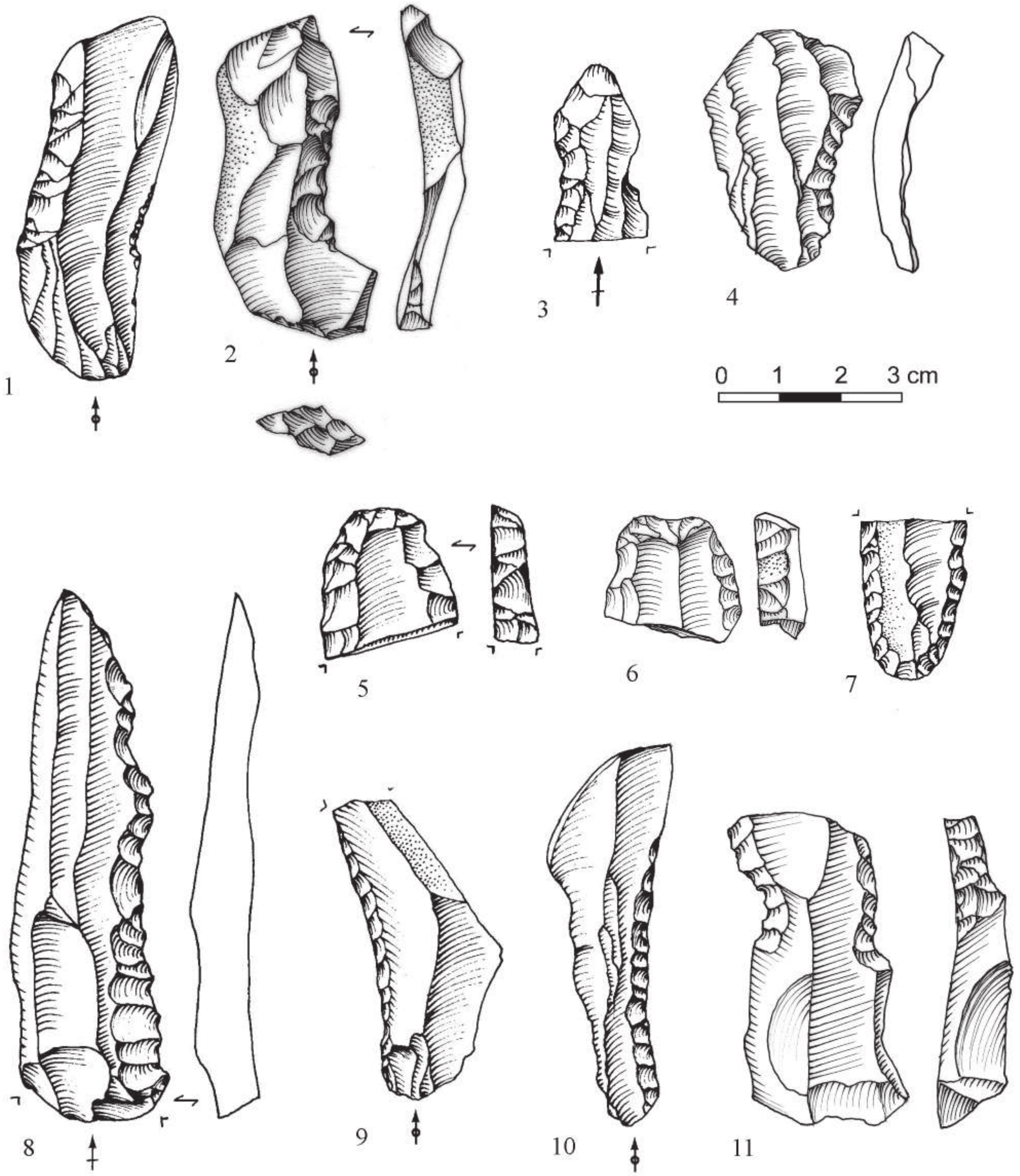


Planche 26 – Lames retouchées, fouilles 2005-2008 et coll. Fr. Hole.
À bout tronqué aux limites du manche (fig. 6, 7, 8), à retouches aurignaciennes continues (fig. 1, 9, 10), denticulées ou en encoches (fig. 2, 3, 4, 5, 11). Fig. 9, 10 : déc. 2 (123-137 cm) ; fig. 6 : déc. 6, 162-169 cm ; fig. 8 : unit 7, 196 cm ; fig. 2 : déc. 11 (213-226 cm) ; fig. 1, 4, 5, 10 : déc. 12 (226-240 cm) ; fig. 8 : déc. 7 (169-180 cm) ; fig. 3 : déc. 18 ; fig. 7 : déc. 15 (252-260 cm) ; fig. 11 : déc. 13 (240-245 cm).

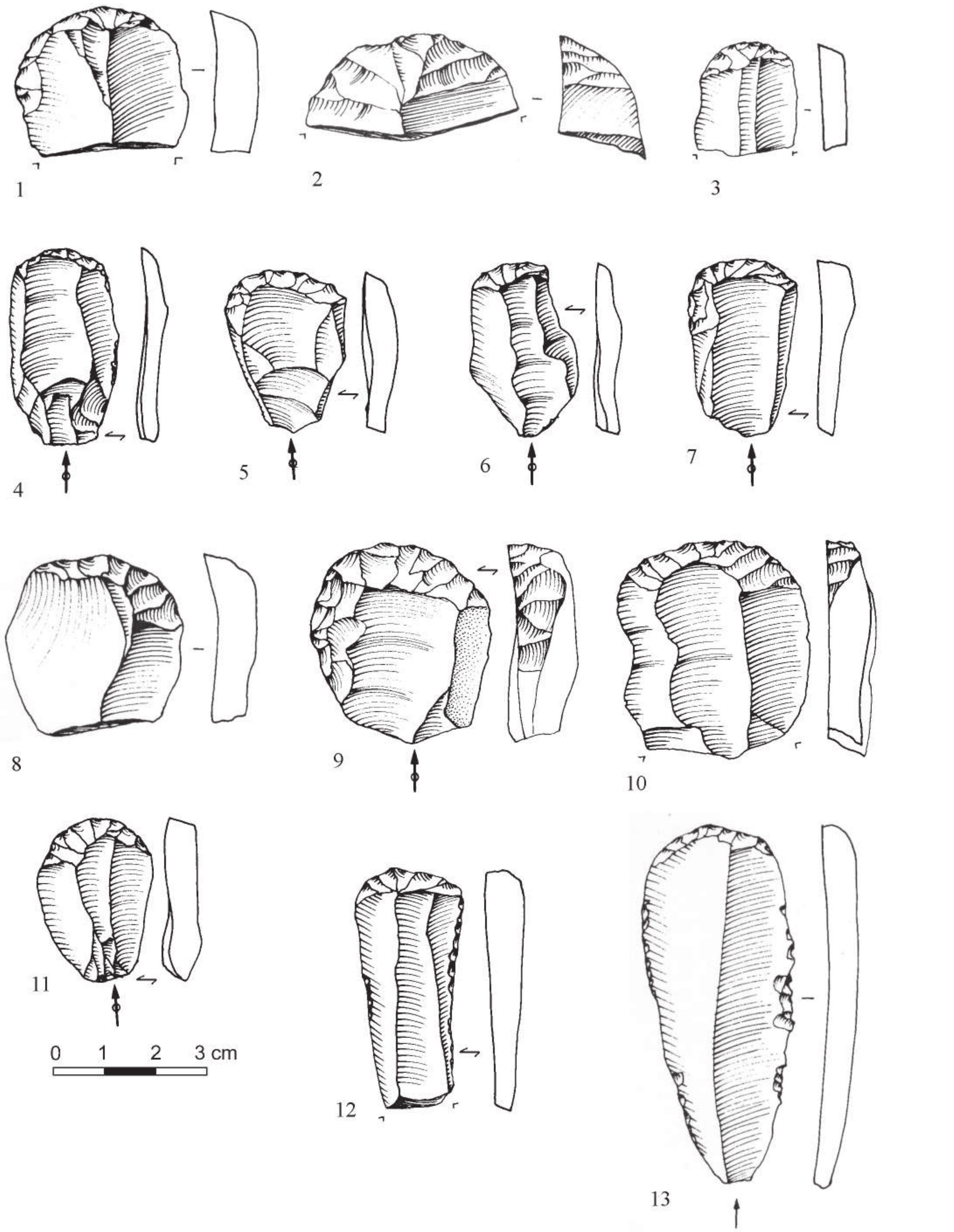


Planche 27 – Grattoirs sur lames, coll. Fr. Hole.
Nombreux fragments cassés à la limite du manche (fig. 1, 2, 3, 17). La plupart, intacts, donne la catégorie formelle recherchée et indique les deux variétés principales d'emmanchement corrélatives, dans la masse d'un bois (mode africaine, fig. 4 à 11) ou dans une tige osseuse (mode esquimau, fig. 12, 13). Fig. 1, 4 : unit 13, 210-220 cm ; fig. 2 : unit 19, 280-290 cm ; fig. 3 : unit 2, 100-110 cm ; fig. 5, 10 : unit 15, 230-240 cm ; fig. 6 : unit 18, 260-270 cm ; fig. 7, 9 : unit 4, 120-130 cm ; fig. 8 : unit 5, 130-140 cm ; fig. 11, 13 : unit 14, 220-230 cm ; fig. 12 : unit 17, 250-260 cm.

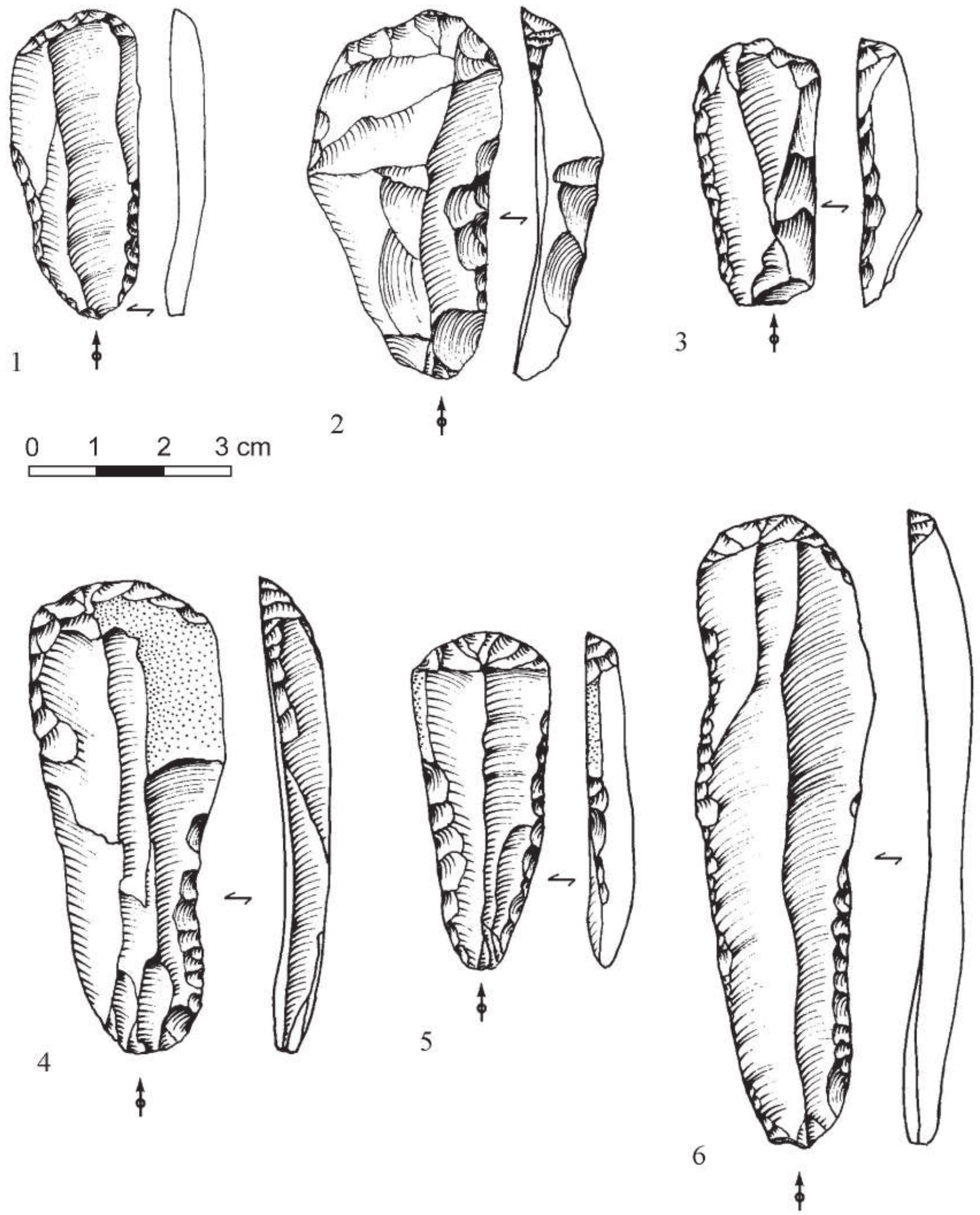


Planche 28 – Grattoirs sur lames retouchées, fouilles 2005-2008.
Les retouches des bords évoquent les méthodes aurignaciennes, elles visent à calibrer l'outil afin de le fixer dans un manche allongé, fabriqué au préalable et à usage constant, la partie lithique reste interchangeable, se brise à la limite du manche et se renouvelle.
Fig. 1, 2 : déc. 7 (169-180 cm) ; fig. 4 : déc. 5 (153-162 cm) ; fig. 6 : déc. 9 (188-200 cm) ; fig. 3, 5 : déc. 11 (213-226 cm).

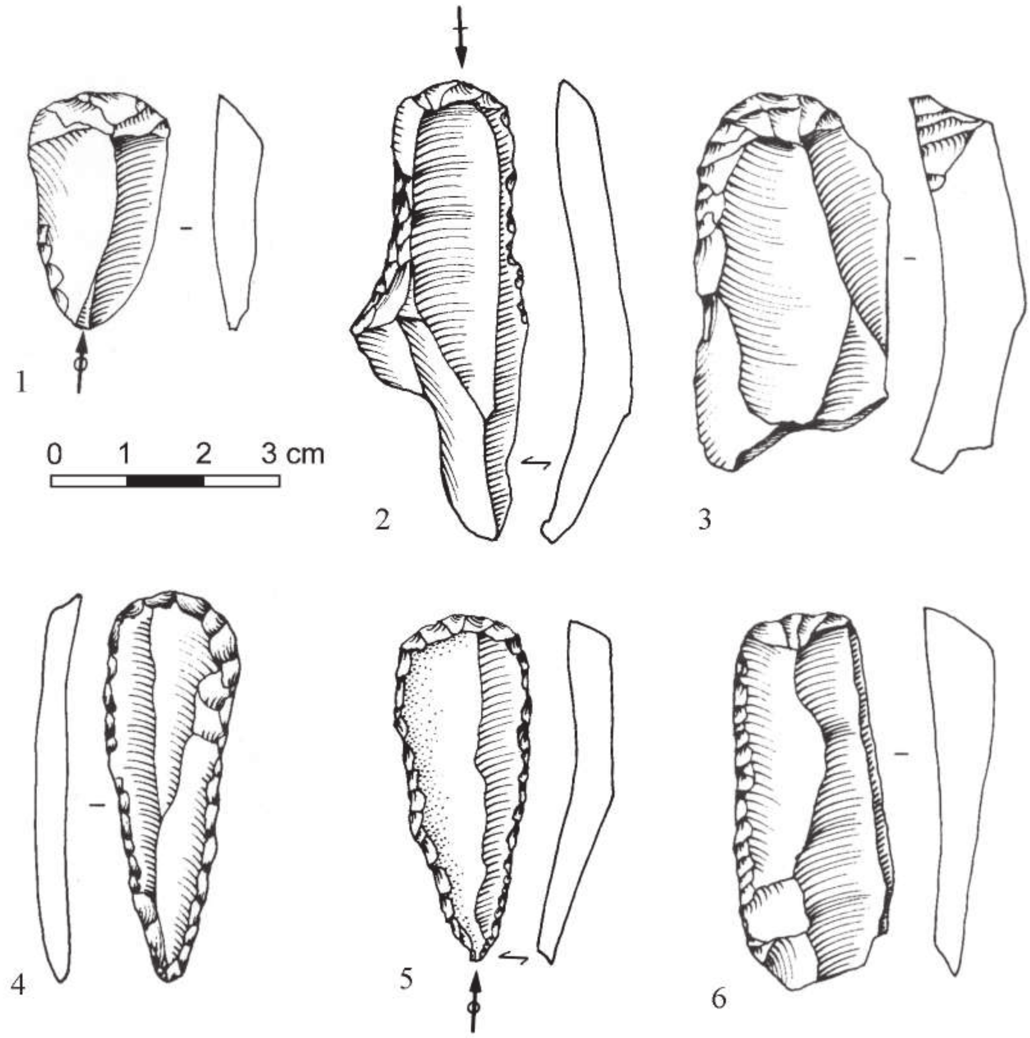


Planche 29 – Grattoirs sur extrémité laminaire, coll. Fr. Hole.
Sur lame étranglée (fig. 2), sur lames appointées (fig. 4, 5), sur lame retouchée (fig. 17).
Fig. 1 : unit 5, 130-140 cm ; fig. 2 : unit 15, 230-240 cm ; fig. 3, 6 : unit 17, 250-260 cm ; fig. 5 : unit 12, 200-210 cm ; fig. 4 : unit 18, 260-270 cm.

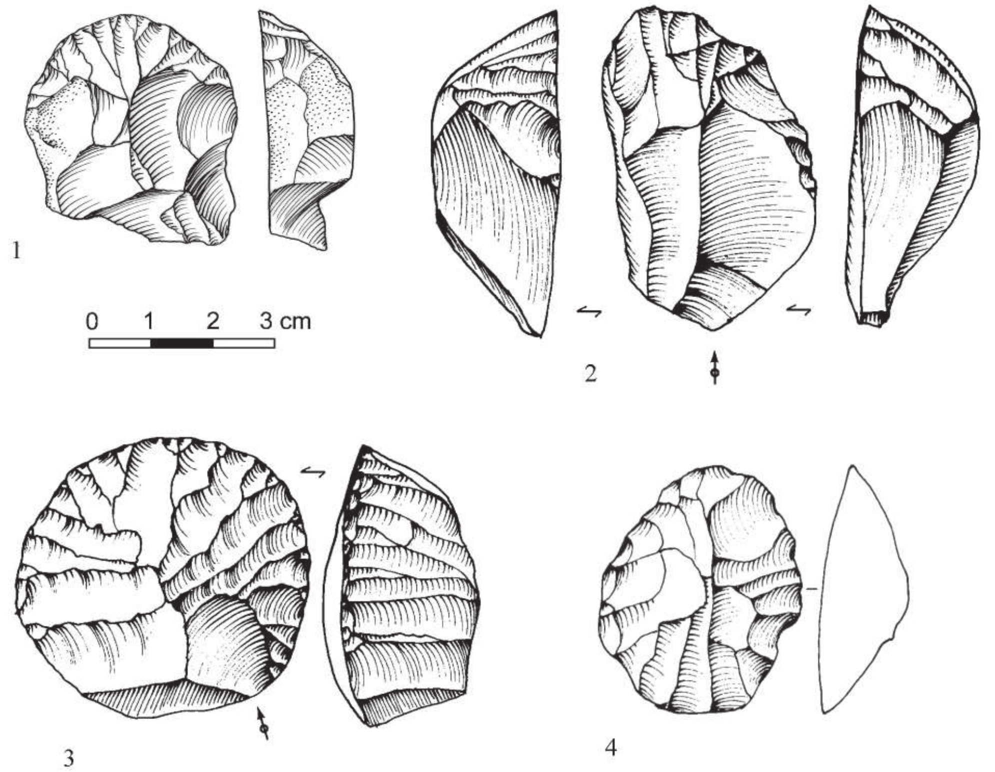


Planche 30 – Grattoirs carénés, fouilles 2005-2008 et coll. Fr. Hole.
Certains tendent vers le « rabot » (fig. 4), d'autres vers le nucléus à lamelles (fig. 2, 3). Tous possèdent la même morphologie de base : enlèvements lamellaires courbes sur méplat ventral d'un enlèvement épais.
Fig. 1 : déc. 9 (188-200 cm) ; fig. 2 : déc. 7 (169-180 cm) ; fig. 3 : déc. 6 (162-169 cm) ; fig. 4 : unit 13, 210-220 cm.

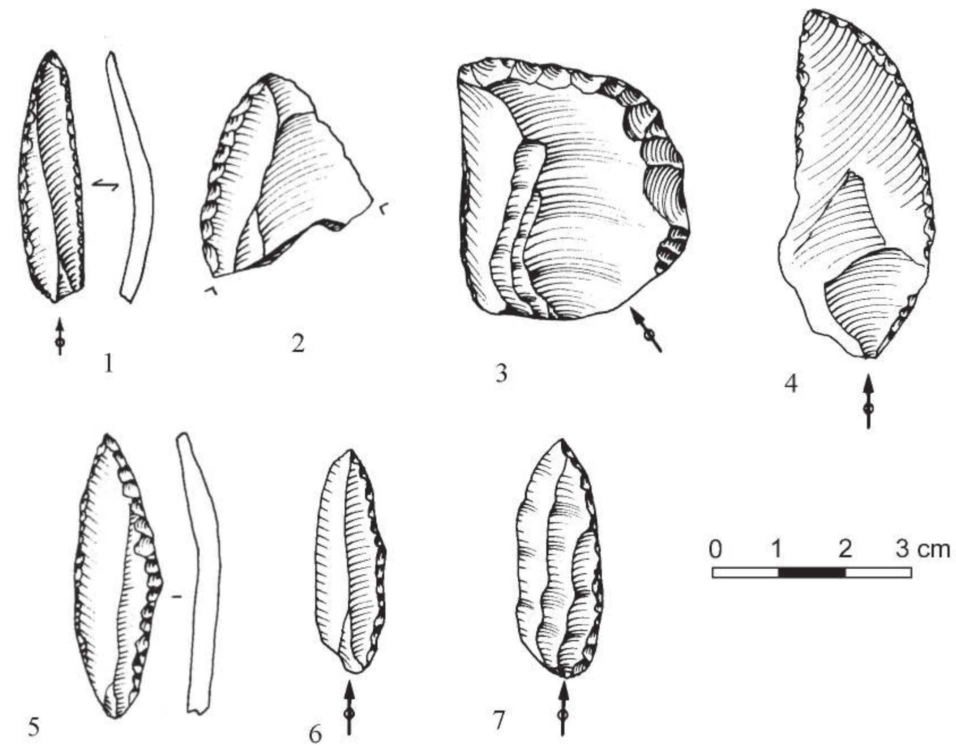


Planche 31 – Pièces à dos courbe, coll. Fr. Hole et fouilles 2005-2008.
Dont des pointes type Font-Yves (fig. 1, 5), d'autres évoquent les couteaux de Châtelperron (fig. 2, 3), voire des pointes aziliennes (fig. 6, 7).
Fig. 1 : déc. 3 (137-143 cm) ; fig. 2 : unit 11, 190-200 cm ; fig. 4 : unit 6, 140-150 cm ; fig. 5 : unit 21, 290-300 cm ; fig. 6 : unit 17, 250-260 cm ; fig. 7 : unit 16, 240-250cm ; fig. 3 : unit 15, 230-240 cm.

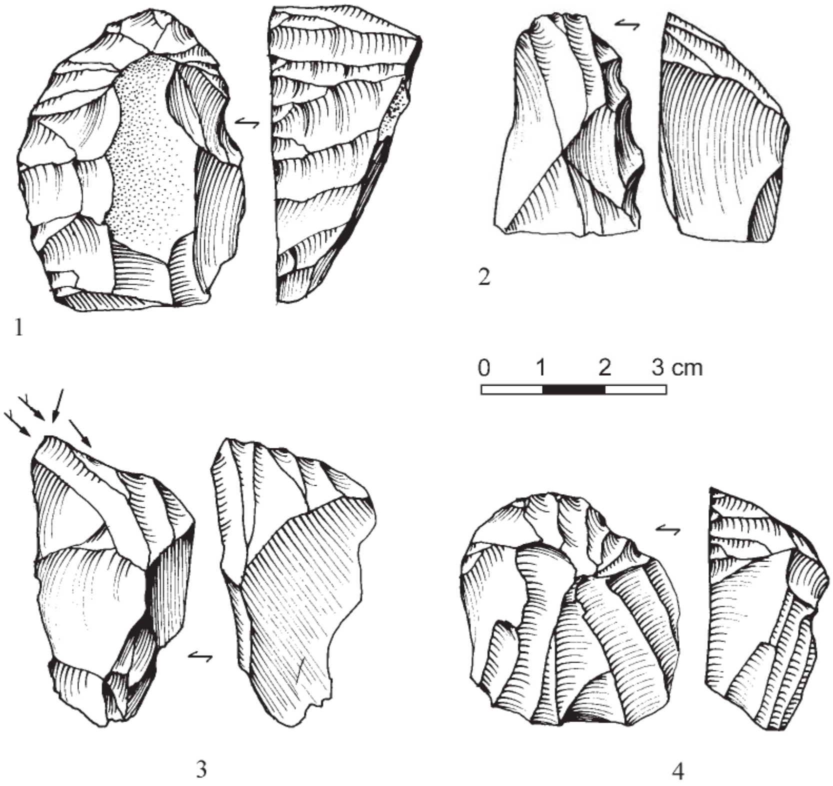


Planche 32 – Nucléus à lamelles, coll. Fr. Hole et fouilles 2005-2008.
Tirés sur blocs, ces nucléus ne laissent aucun doute sur leur fonction première (le n° 3 est brisé).
Fig. 1 : unit 14, 220-230 cm ; fig. 2 : déc. 2 (123-137 cm) ; fig. 3 : unit 12, 200-210 cm ; fig. 4 : unit 11, 190-200 cm.

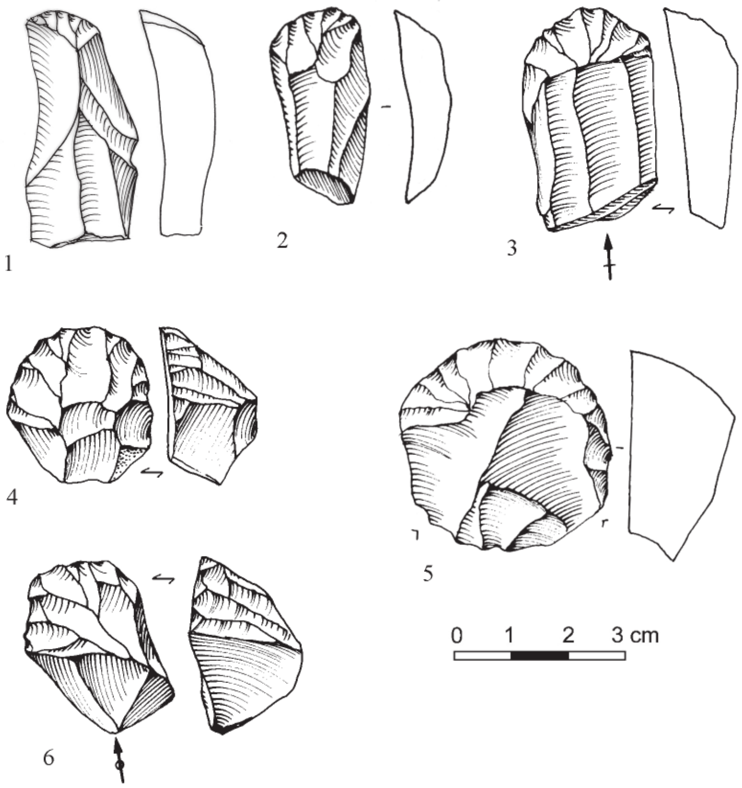


Planche 33 – Grattoirs carénés, coll. Fr. Hole et fouilles 2005-2008.
Les enlèvements courbes partent de surfaces d'éclatement. Fig. 1 : déc. 15 (252-260 cm) ; fig. 2 : unit 5, 130-140 cm ; fig. 3 : unit 20, 280-310 cm ; fig. 4 : unit 15 ; fig. 5 : unit 19, 280-290 cm ; fig. 6 : unit 12, 200-210 cm.

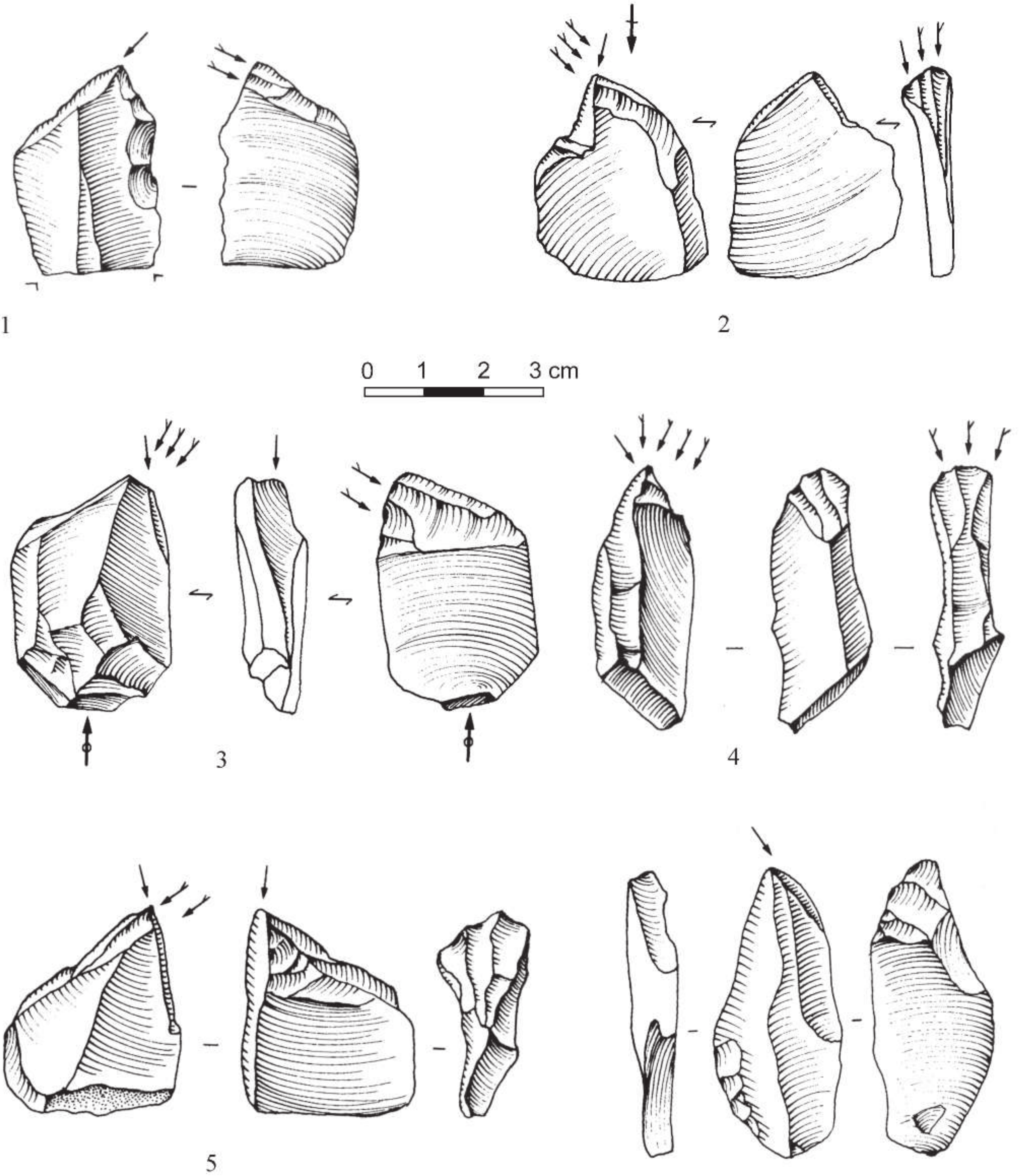


Planche 34 – Burins carénés, coll. Fr. Hole.
Fig. 1 : unit 12, 200-210 cm ; fig. 2 : unit 8, 160-170 cm ; fig. 3 : unit 7, 150-160 cm ; fig. 4, 5 : unit 14, 220-230 cm ; fig. 6 : unit 10, 180-190 cm.

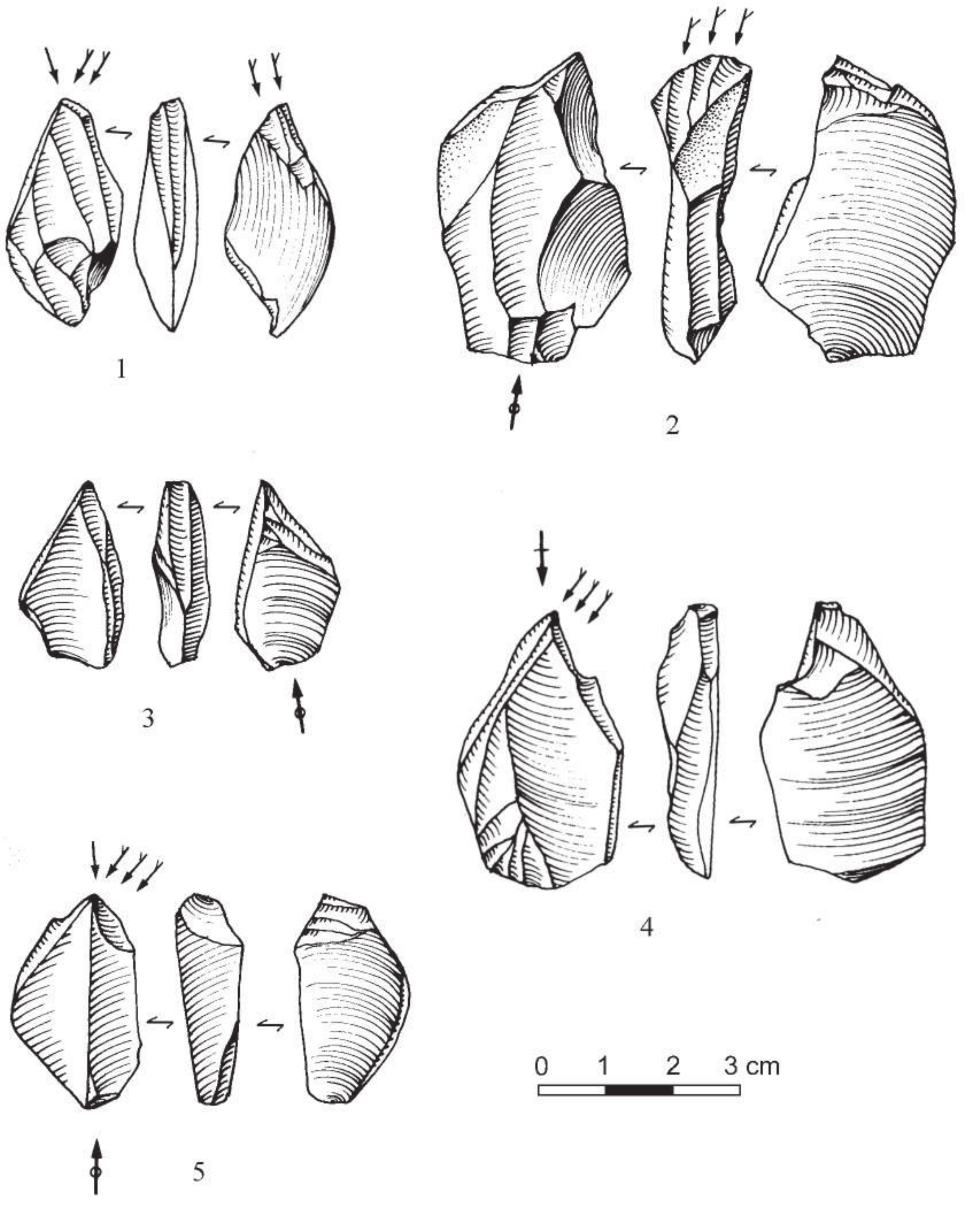


Planche 35 – Burins carénés, coll. Fr. Hole.
Fig. 1 : unit 9, 170-180 cm ; fig. 2 : unit 5, 130-140 cm ; fig. 3 : unit 3, 110-120 cm ; fig. 4 : unit 11, 190-200 cm ; fig. 5 : unit 12, 200-210 cm.

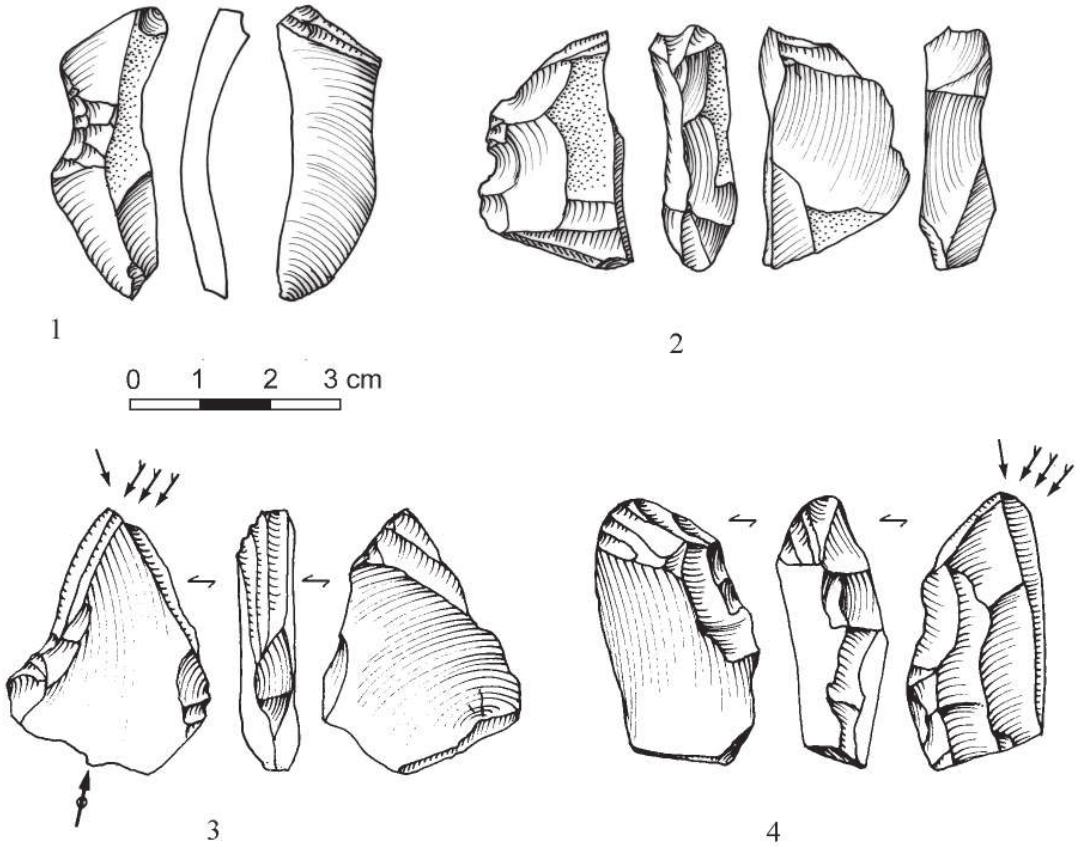


Planche 36 – Burins busqués, coll. Fr. Hole et fouilles 2005-2008.
Fig. 1, 2 : déc. 15 (252-260 cm) ; fig. 3 : unit 7, 150-160 cm ; fig. 4 : unit 12, 200-210 cm.

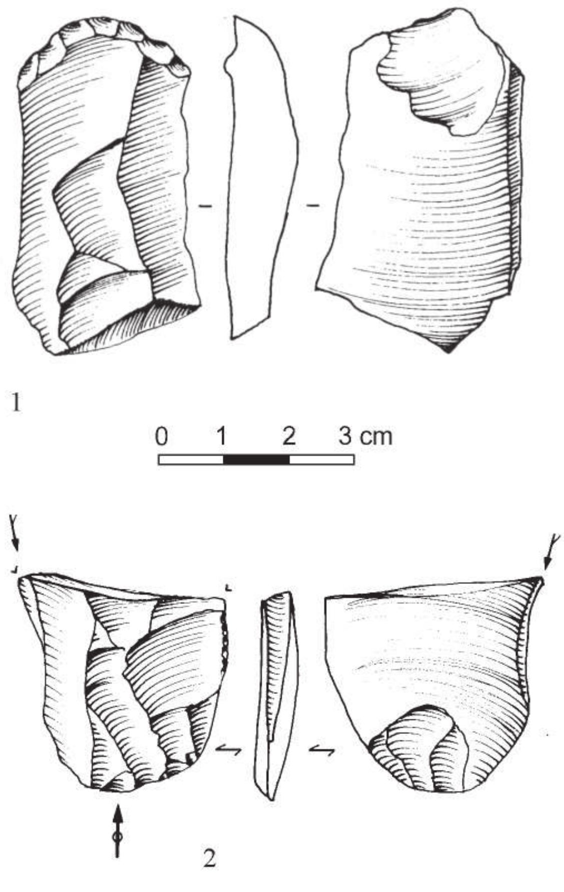


Planche 37 – Pièces esquillées, coll. Fr. Hole.
Fig. 1 : unit 21, 290-300 cm ; fig. 2 : unit 7, 150-160 cm.

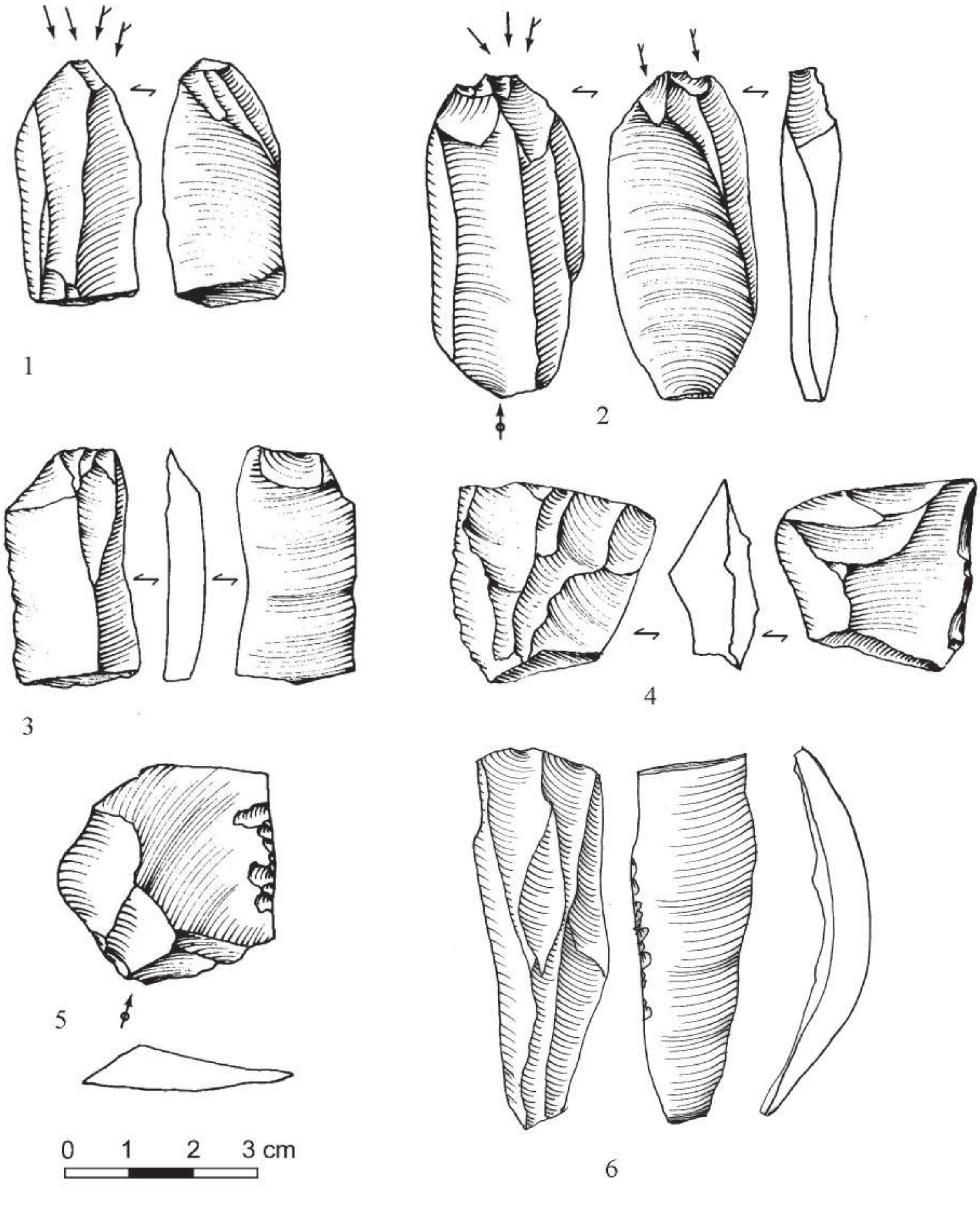


Planche 38 – Pièces esquillées, fouilles 2005-2008.
Fig. 1, 2, 3 : déc. 2 (123-137 cm) ; fig. 4 : déc. 3 (137-143 cm) ; fig. 5 : déc. 6 (162-169 cm) ; fig. 6 : déc. 9 (188-200 cm).

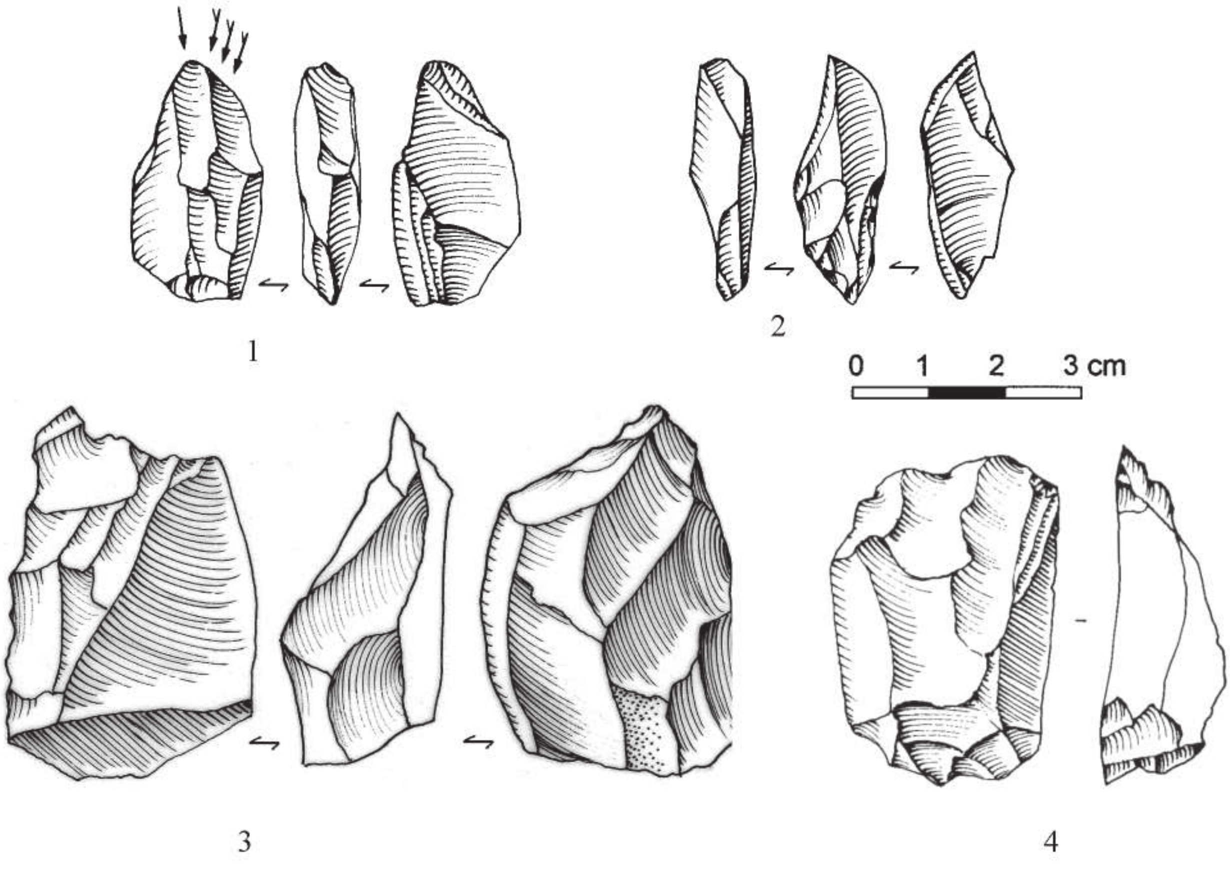


Planche 39 – Pièces esquillées, coll. Fr. Hole et fouilles 2005-2008.
Fig. 1 : unit 8, 167 cm ; fig. 2 : unit 5, 134-139 cm ; fig. 3 : déc. 10 (199-213 cm) ; fig. 4 : unit 14, 220-230 cm.

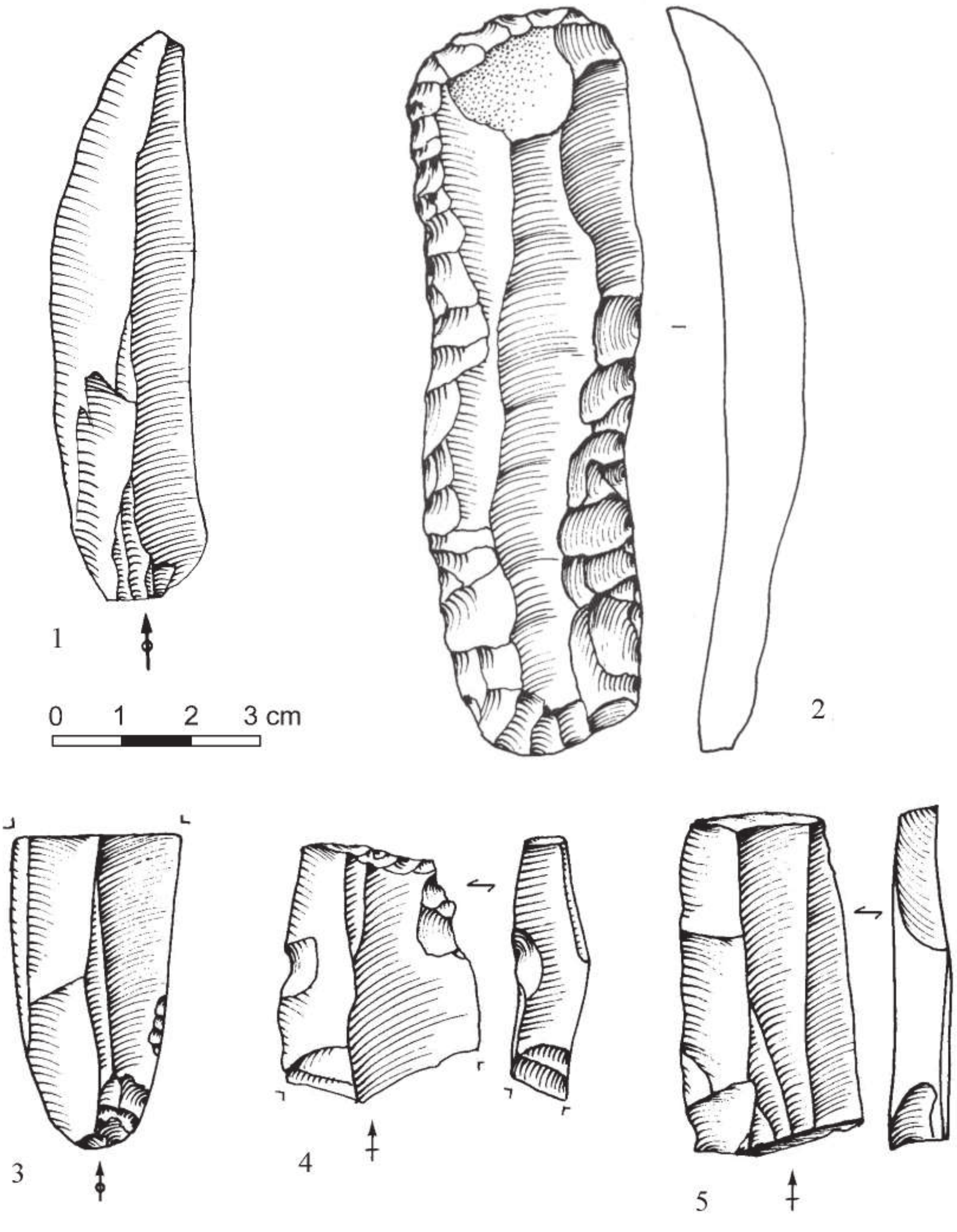


Planche 40 – Grandes pièces exotiques, quant aux matériaux, aux techniques et aux dimensions. Lames brutes (fig. 1, 3, 5), grattoir double sur lame aurignacienne (fig. 2), extrémité de lame tronquée (fig. 4). Coll. Fr. Hole et fouilles 2005-2008.
Fig. 1 : unit 5, 130-140 cm ; fig. 2 : unit 17, 250-260 cm ; fig. 3 : déc. 12 (226-240 cm) ; fig. 4 : déc. 6 (162-169 cm) ; fig. 5 : déc. 3 (137-143 cm).

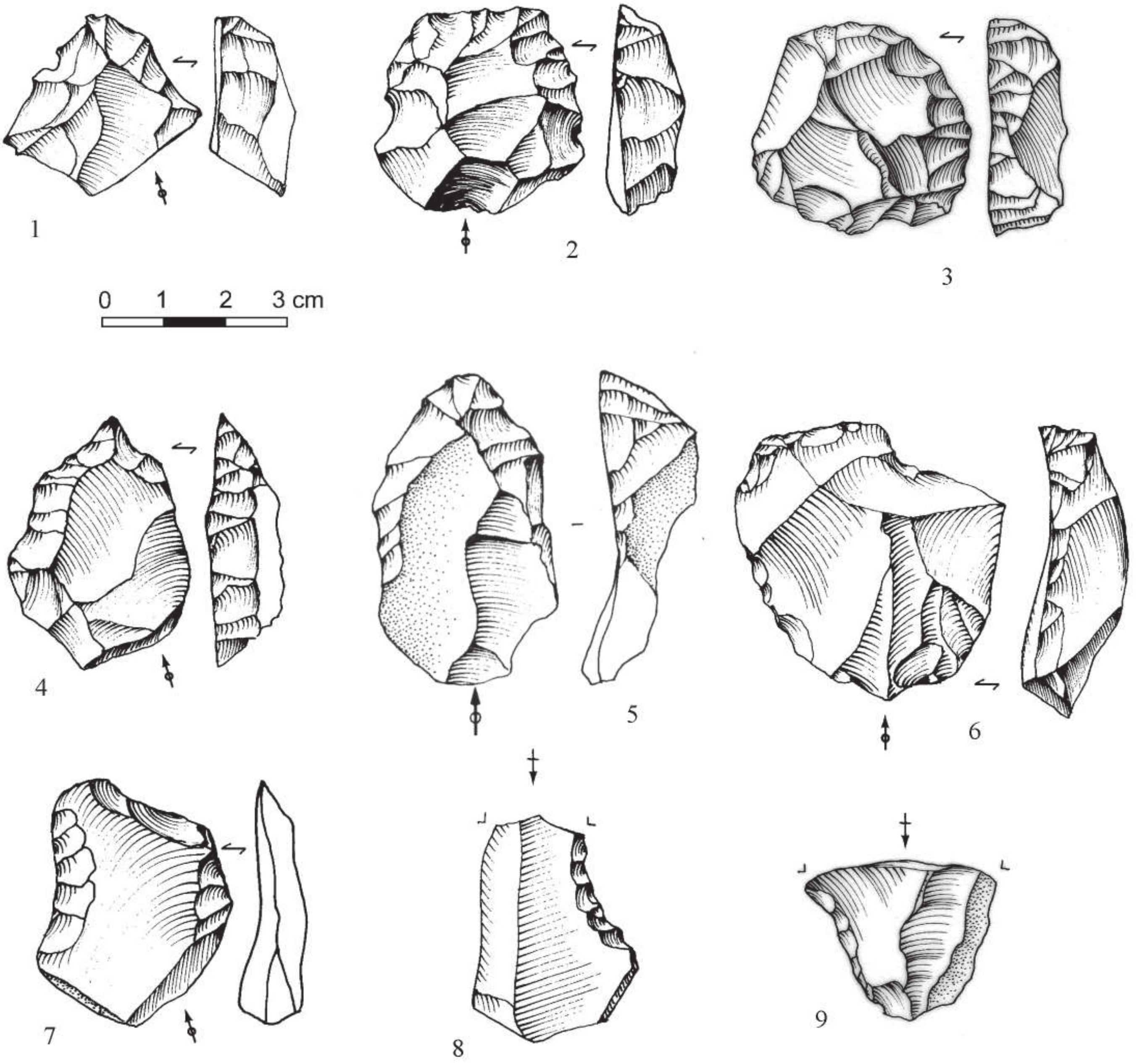


Planche 41 – Denticulés et encoches sur éclats massifs, fouilles 2005-2008 et coll. Fr. Hole.
Fig. 1, 8 : déc. 1 (112-123 cm) ; fig. 4 : déc. 2 (123-137 cm) ; fig. 6 : déc. 6 (162-169 cm) ; fig. 7 : déc. 7 (169-180 cm) ; fig. 3 : déc. 10 (199-213 cm) ; fig. 9 : déc. 11 (213-226 cm) ; fig. 2 : déc. 12 (226-240 cm) ; fig. 5 : unit 12, 200-210 cm.

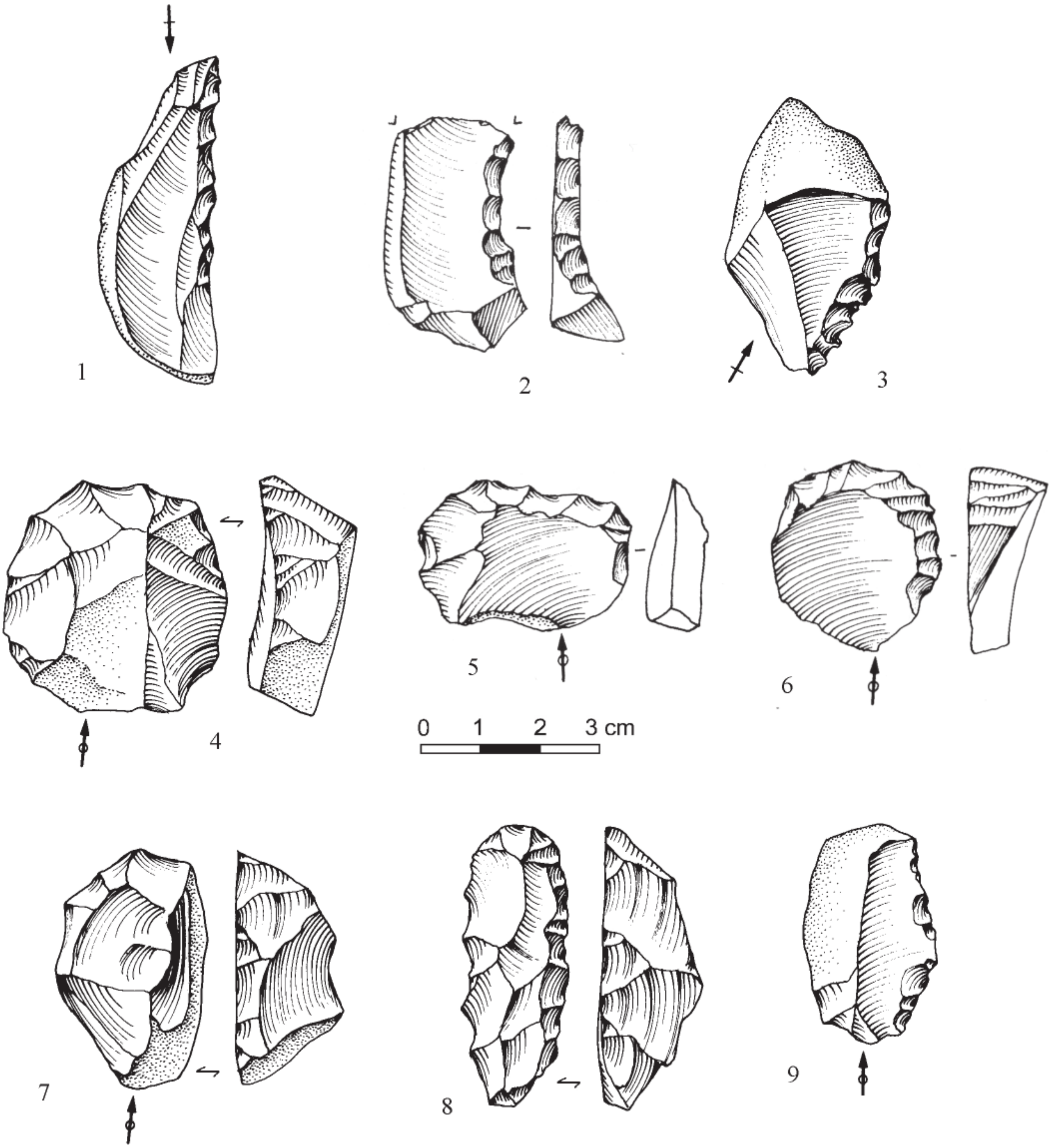


Planche 42 – Denticulés et encoches, coll. Fr. Hole.
Fig. 1 : unit 11, 190-200 cm ; fig. 2, 5 : unit 5, 130-140 cm ; fig. 3 : unit 8, 160-170 cm ; fig. 4 : unit 13, 210-220 cm ; fig. 6, 7, 8 : unit 14, 220-230 cm; fig. 9 : unit 19, 180-190 cm.

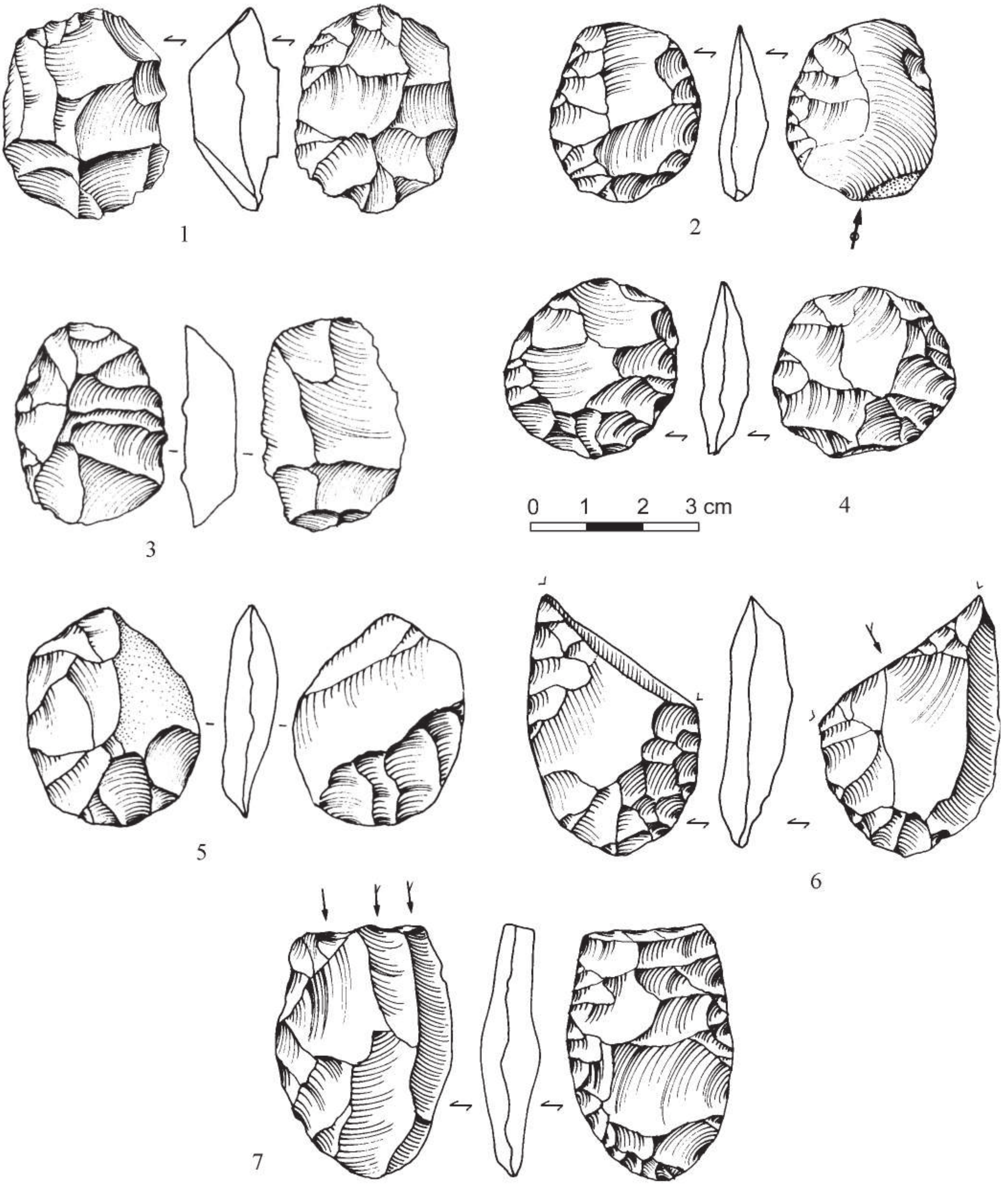


Planche 43 – Pièces à retouches plates bifaciales, coll. Fr. Hole et fouilles 2005-2008.
Fig. 1 : déc. 7 (169-180 cm) ; fig. 2 : unit 9, 170-180 cm ; fig. 3, 5 : unit 12, 200-210 cm ; fig. 4, 6, 7 : unit 11, 190-200 cm.

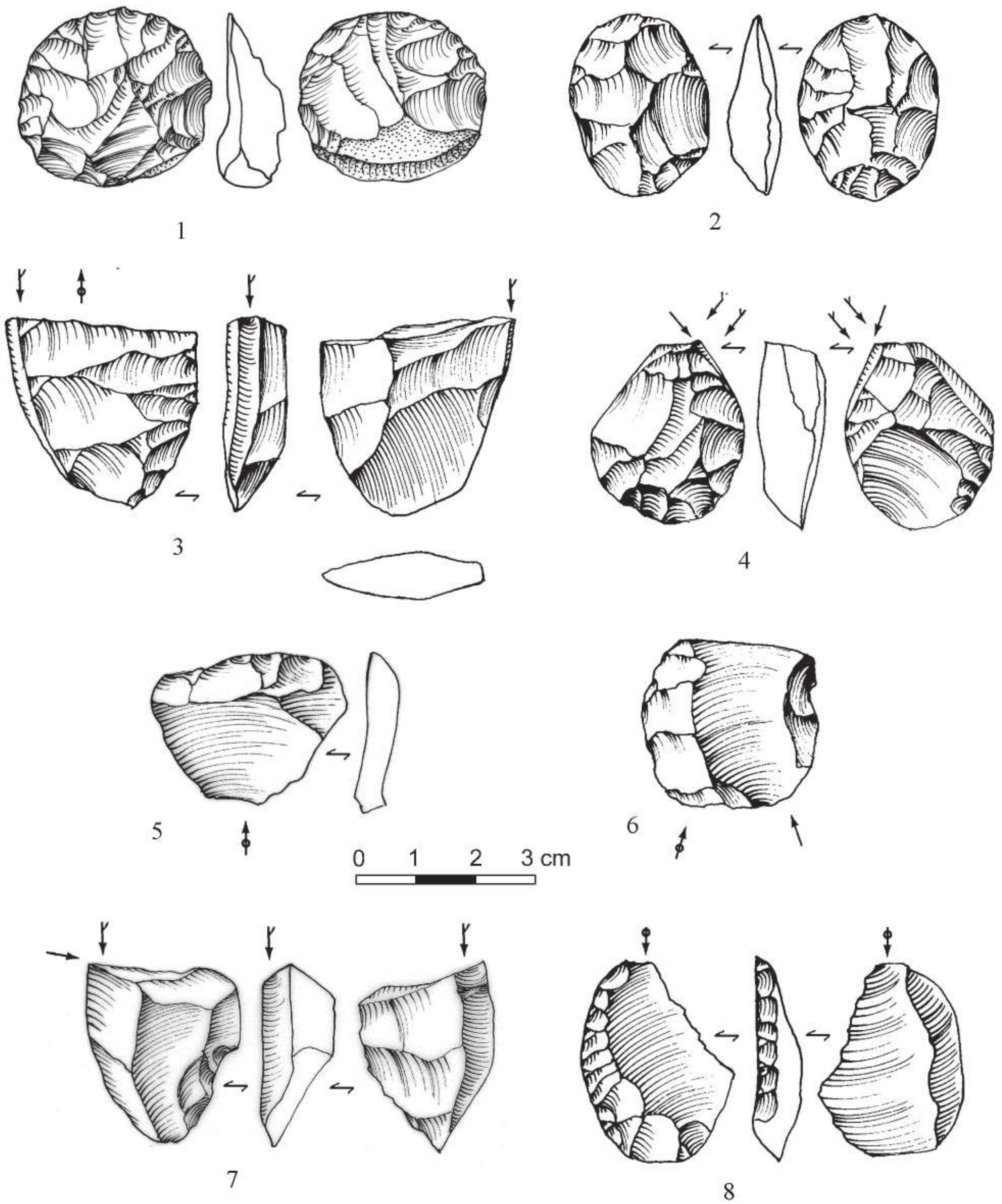


Planche 44 – Pièces à retouches plates bifaciales, fouilles 2005-2008.
Certaines sont des enlèvements outrepassés (fig. 5, 7), d'autres des nucléus surexploités (fig. 6), d'autres furent transformées en burins (fig. 3, 4, 7), d'autres ne sont que des disques non utilisés (fig. 1, 2).
Fig. 1 : déc. 16 (260-268 cm) ; fig. 2 : déc. 1 (112-123 cm) ; fig. 3, 5 : déc. 4 (143-153 cm) ; fig. 4 : déc. 2 (123-137 cm) ; fig. 6 : déc. 3 (137-143 cm) ; fig. 7 : déc. 10 (199-213 cm) ; fig. 8 : déc. 7 (169-180 cm).

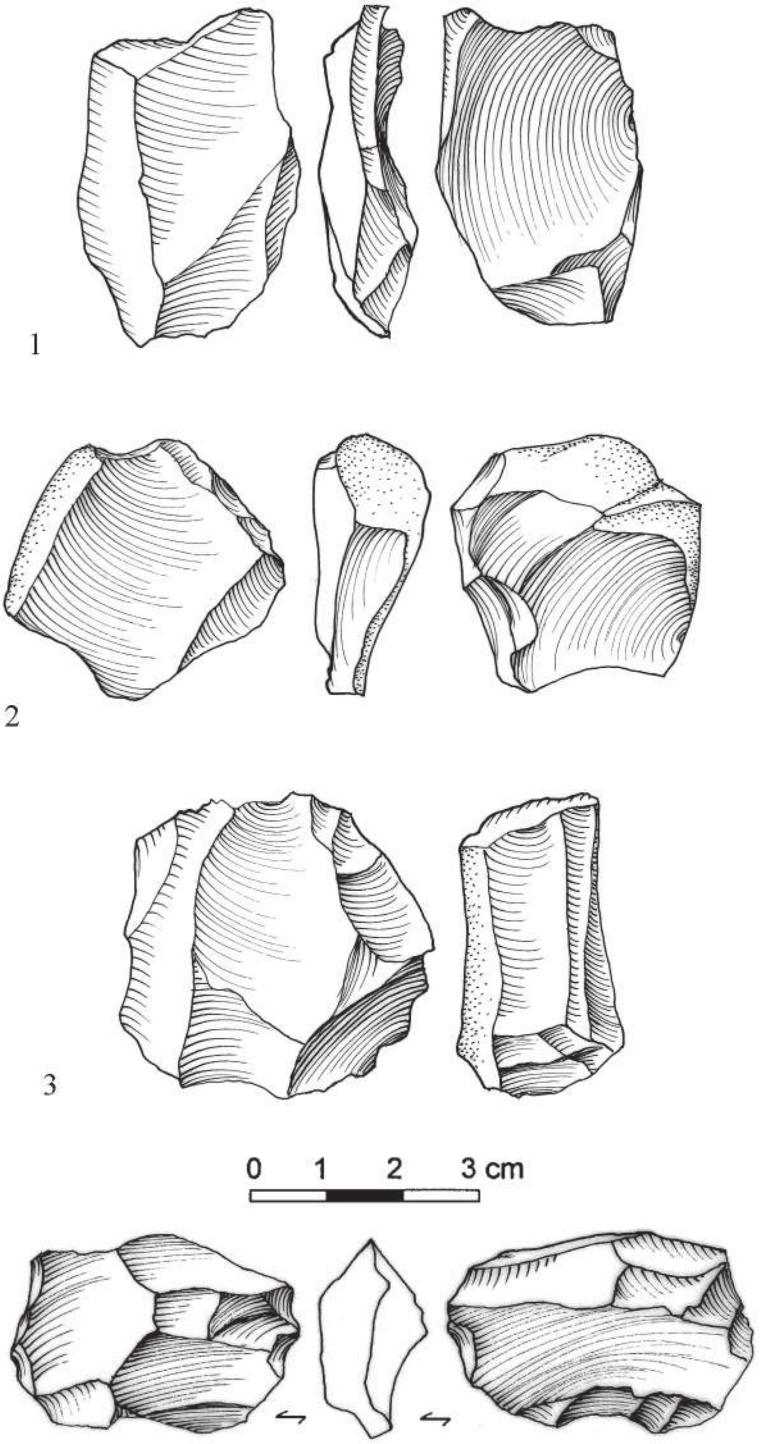


Planche 45 – Nucléus à préparation centripète, fouilles 2005-2008.
Fig. 1 : déc. 12 (226-240 cm) ; fig. 2 : déc. 13 (240-245 cm) ; fig. 3 : déc. 10 (199-213 cm) ; fig. 4 : déc. 8 (180-188 cm).

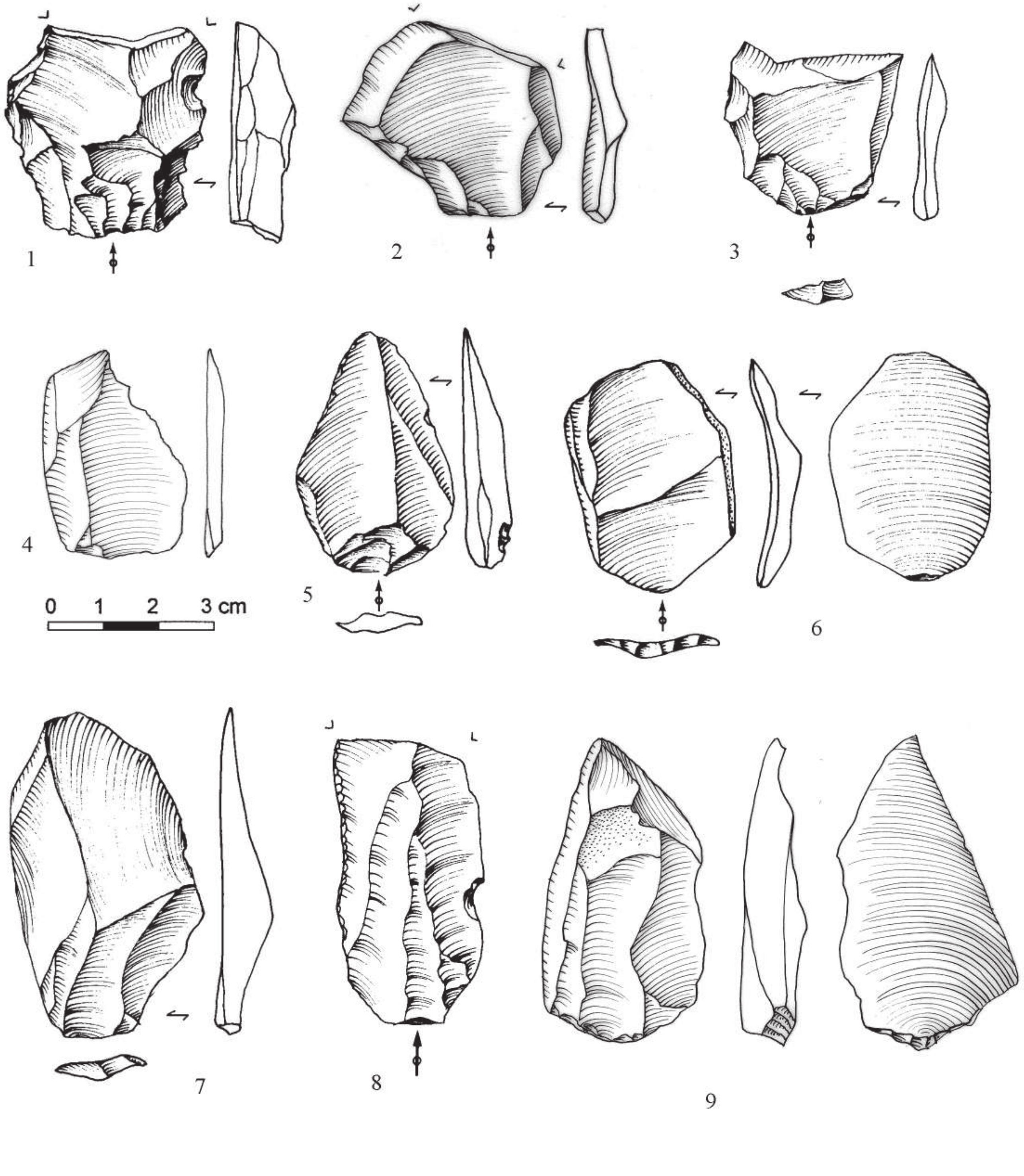


Planche 46 – Enlèvements à préparation centripète, fouilles 2005-2008 et coll. Fr. Hole.
Certains possèdent des talons facettés, identiques aux éclats Levallois (fig. 3, 6, 7, 9). Certains sont transformés en outils (denticulé : fig. 1 ; lame retouchée : fig. 8).
Fig. 1, 2 : déc. 12 (226-240 cm) ; fig. 3 : déc. 8 (180-188 cm) ; fig. 4, 7 : déc. 7 (169-180 cm) ; fig. 5 : déc. 5 (153-162 cm) ; fig. 6 : déc. 3 (137-143 cm); fig. 8 : unit 22, 300-310 cm ; fig. 9 : déc. 13 (240-245 cm).

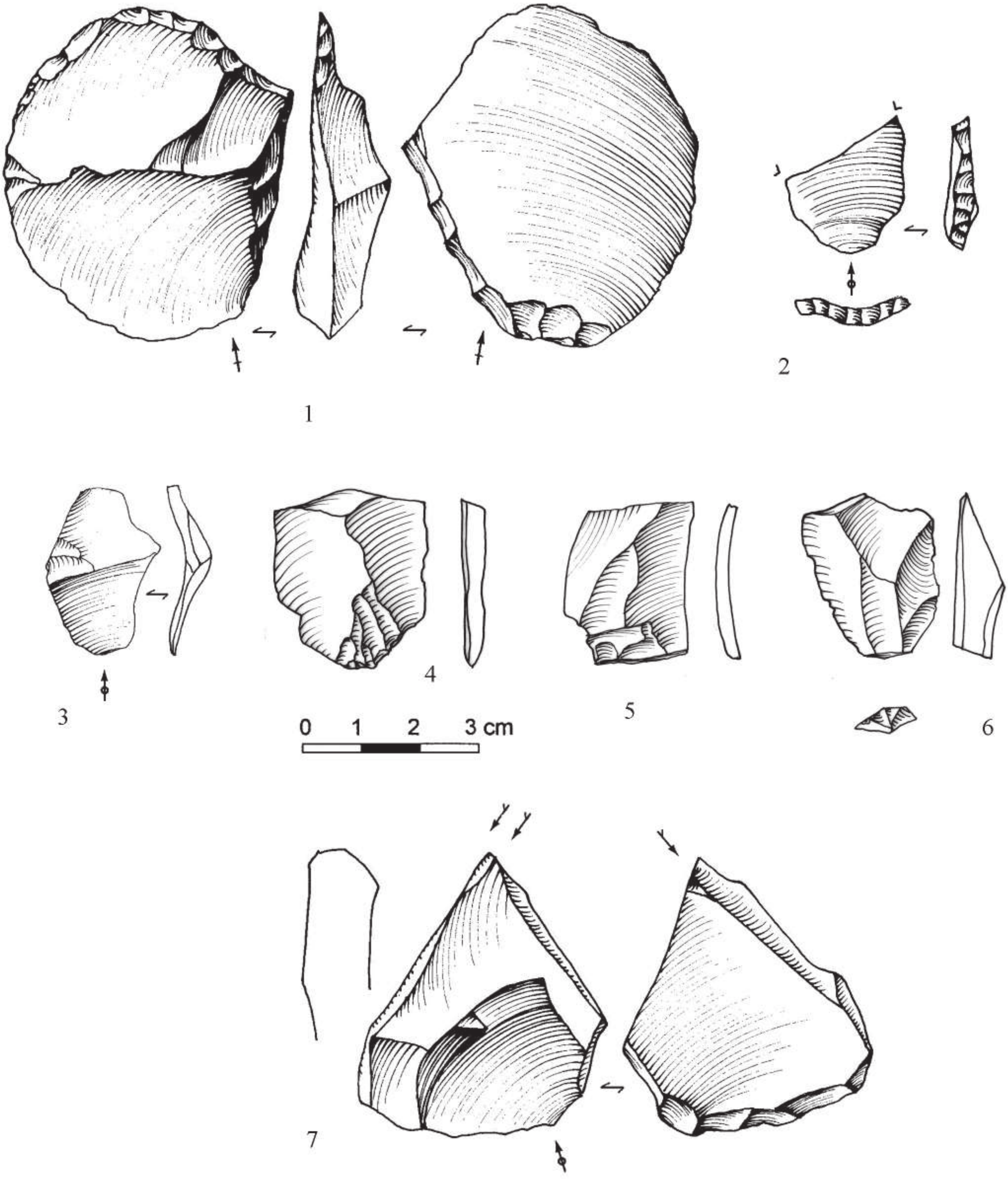
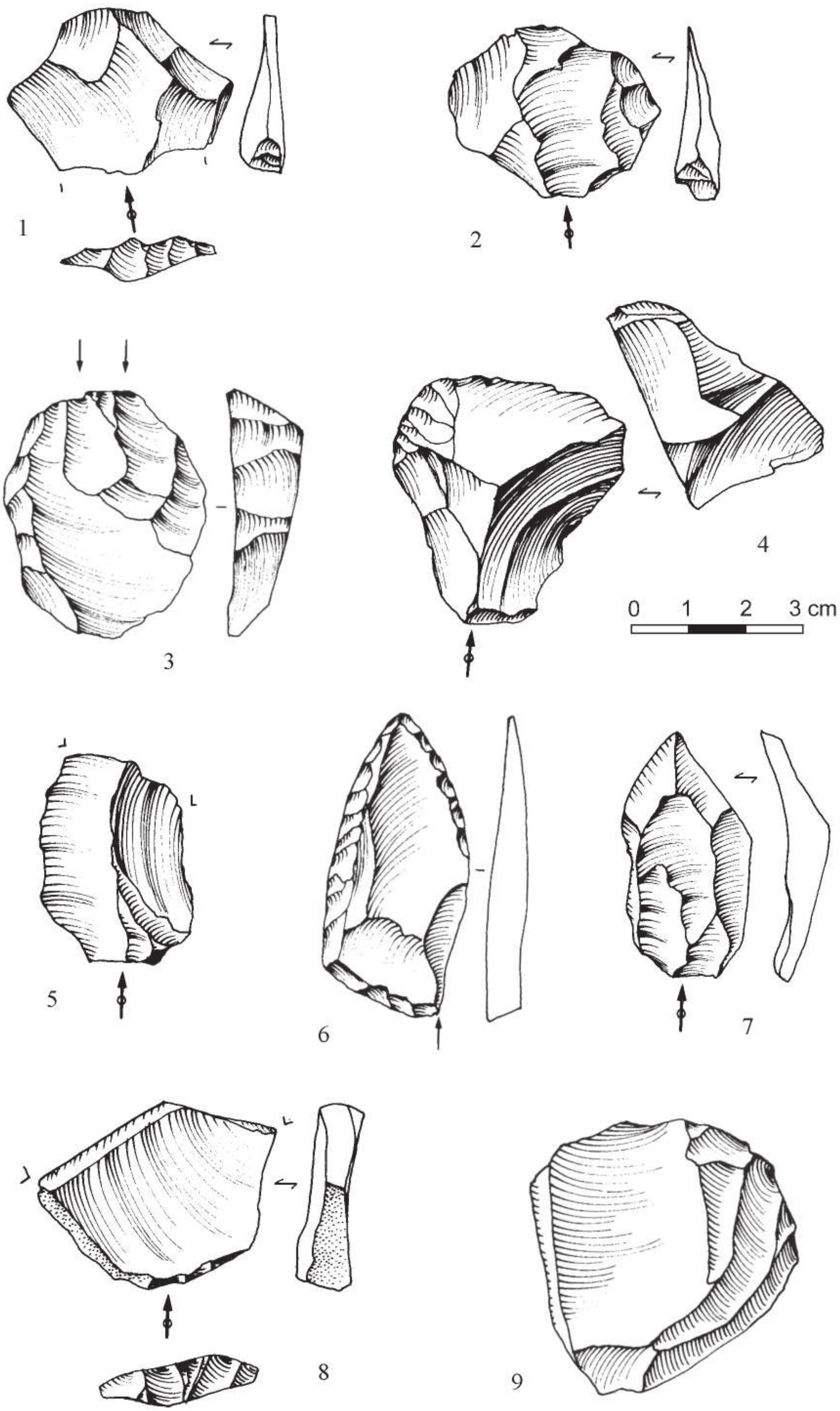


Planche 47 – Débitage centripète : éclats et outils, fouilles 2005-2008.
Fig. 1 : déc. 6 (162-169 cm) ; fig. 2 : déc. 13 (240-245 cm) ; fig. 3 : déc. 2 (123-137 cm) ; fig. 4 : déc. 14 (245-252 cm) ; fig. 5, 6 : déc. 17 (268-277 cm); fig. 7 : déc. 1 (112-123 cm).

Ci-contre : Planche 48 – Pièces à technique centripète et Levallois, coll. Fr. Hole.
Éclats Levallois (fig. 1, 2, 7, 8), nucléus Levallois (fig. 3, 11), grattoir caréné sur éclat débordant (fig. 4), pointe moustérienne sur éclat Levallois (fig. 6). Fig. 1 : unit 19, 270-280 cm ; fig. 2 : unit 17, 250-260 cm ; fig. 3, 6 : unit 12, 200-210 cm ; fig. 4, 9 : unit 11, 190-200 cm ; fig. 5 : unit 4, 120-130 cm ; fig. 7 : unit 13, 210-220 cm ; fig. 8 : unit 19, 270-280 cm.


1
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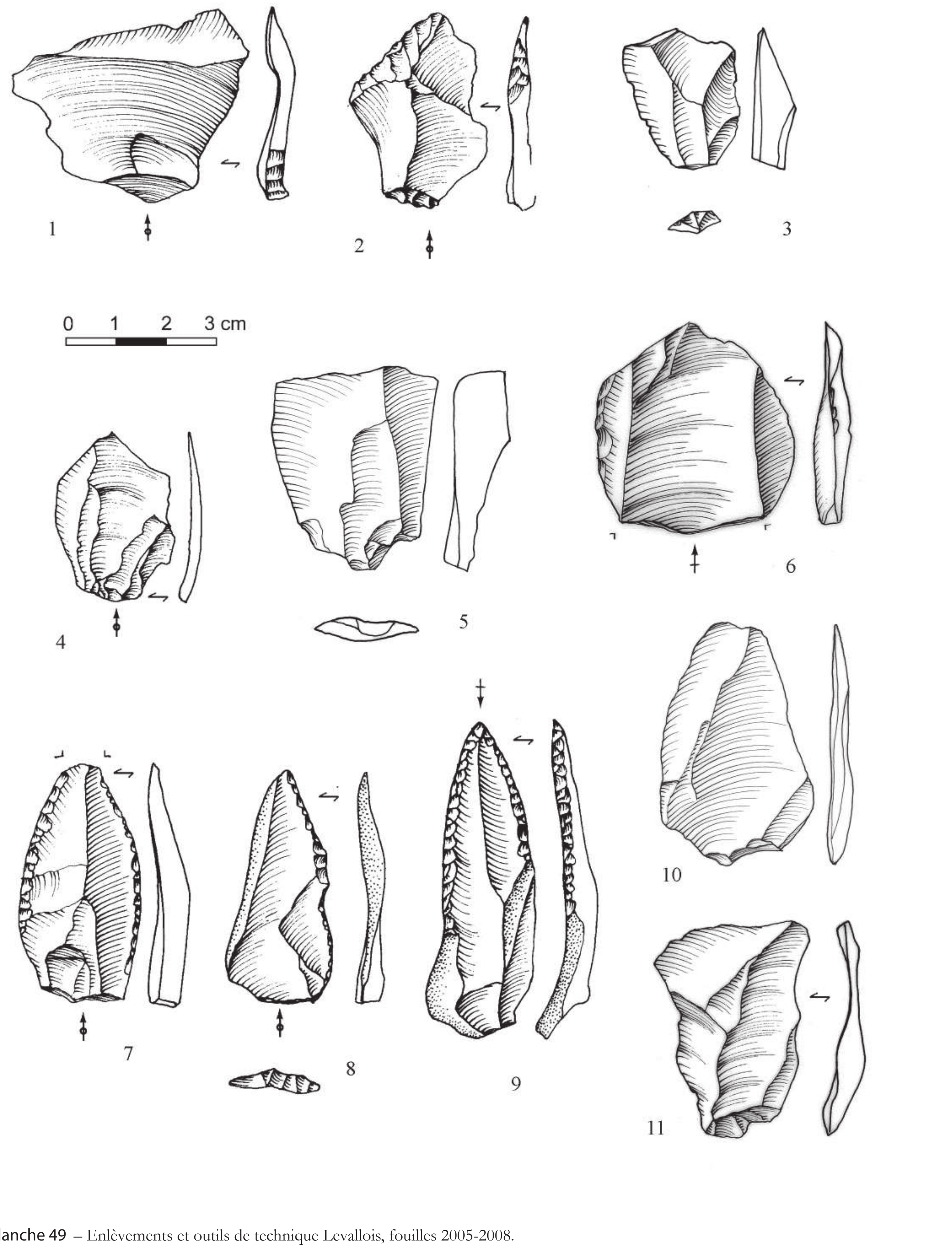


Planche 49 – Enlèvements et outils de technique Levallois, fouilles 2005-2008.
Enlèvements centripètes à talon facetté (fig. 1, 3, 4, 5, 6, 10, 11), lame Levallois à retouches plates (fig. 2), pointes moustériennes sur éclats Levallois (fig. 7, 8, 9). Fig. 1, 2 : déc. 2 (123-137 cm) ; fig. 3 : déc. 17 (268-277 cm) ; fig. 4 : déc. 3 (137-143 cm) ; fig. 5 : déc. 1 (112-123 cm) ; fig. 6 : déc. 12 (226-240 cm) ; fig. 7, 8 : déc. 7 (169-180 cm) ; fig. 9, 11 : déc. 8 (180-188 cm) ; fig. 10 : déc. 9 (188-200 cm).

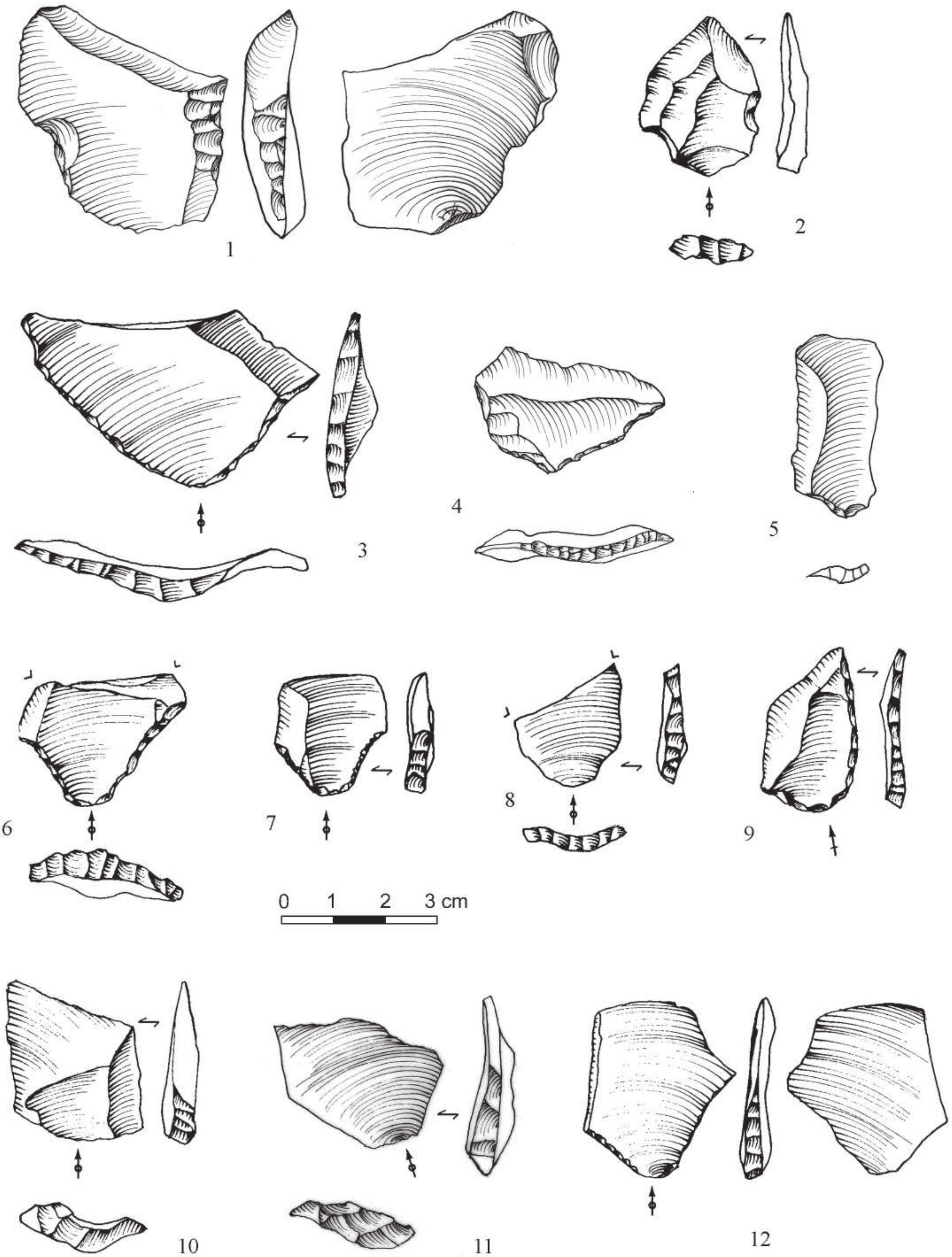


Planche 50 – Enlèvements et outils à débitage convergent et à talon facetté, fouilles 2005-2008.
Fig. 1 : déc. 10 (199-213 cm) ; fig. 2, 6 à 10 : déc. 2 (123-137 cm) ; fig. 3 : déc. 6 (162-169 cm) ; fig. 4 : déc. 14 (245-252 cm) ; fig. 5 : déc. 17 (268-277 cm) ; fig. 11 : déc. 11 (213-226 cm) ; fig. 12 : déc. 1 (112-123 cm).

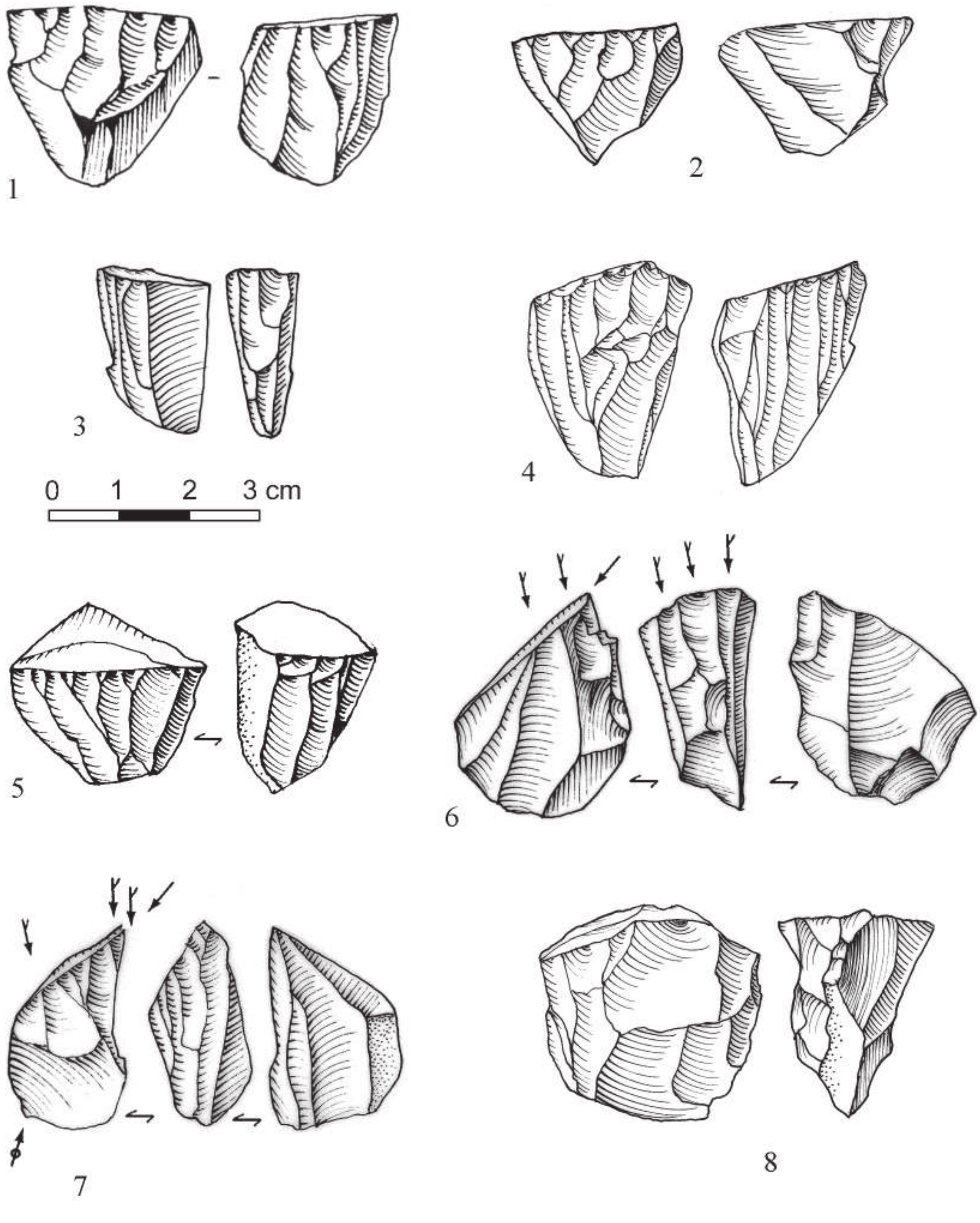


Planche 51 – Nucléus à lamelles, fouilles 2005-2008 et coll. Fr. Hole.
Le plus souvent sur bloc, à préparation latérale (fig. 6, 8), ou sur tranche d'éclats (fig. 3, 7).
Fig. 1 : unit 16, 240-250 cm ; fig. 2 : déc. 11 (213-226 cm) ; fig. 3 : déc. 15 (252-260 cm) ; fig. 4, 8 : déc. 14 (245-252 cm) ; fig. 5 : déc. 1 (112-123 cm) ; fig. 6 : déc. 8 (180-188 cm) ; fig. 7 : déc. 4 (143-153 cm).

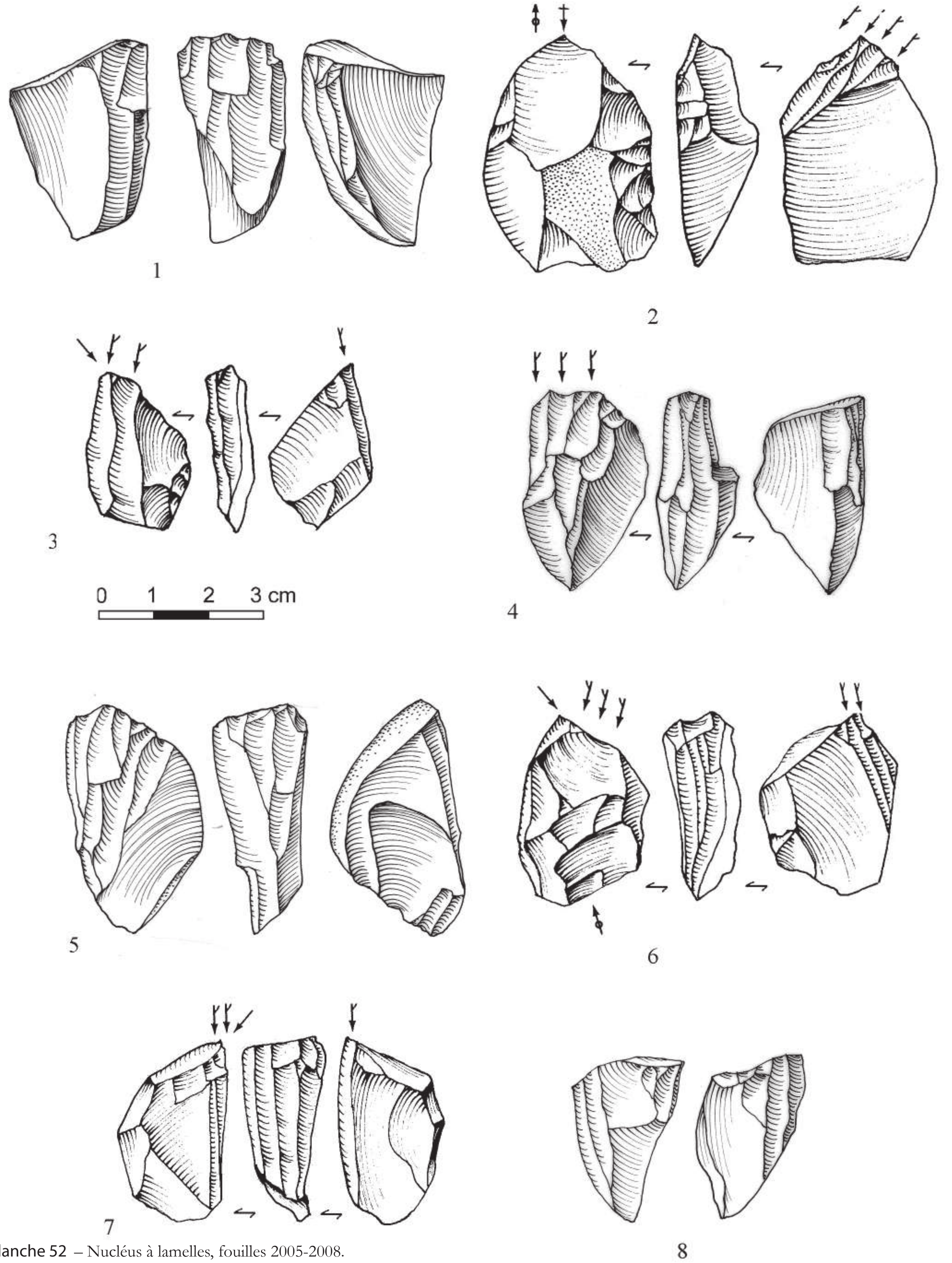


Planche 52 – Nucléus à lamelles, fouilles 2005-2008.
Réalisés sur éclats, épais et courts, débités sur la tranche.
Fig. 1 : déc. 15 (252-260 cm) ; fig. 2 : déc. 3 (137-143 cm) ; fig. 3 : déc. 7 (169-180 cm) ; fig. 4 : déc. 8 (180-188 cm) ; fig. 5 : déc. 11 (213-226 cm) ; fig. 6 : déc. 2 (123-137 cm) ; fig. 7 : déc. 1 (112-123 cm) ; fig. 8 : déc. 13 (240-245 cm).

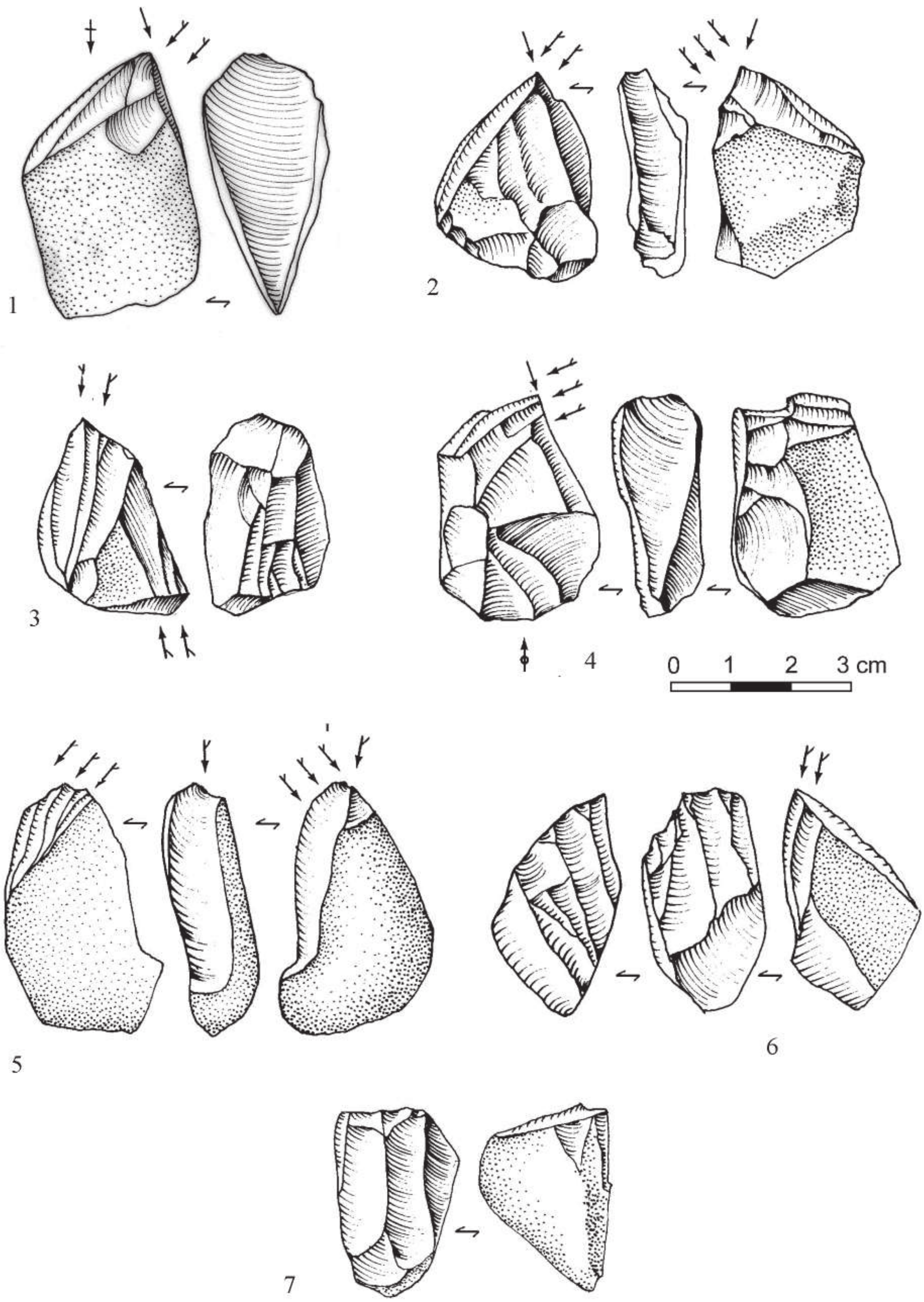


Planche 53 – Nucléus à lamelles, fouilles 2005-2008. Réalisés sur éclats corticaux.
Fig. 1 : déc. 10 (199-213 cm) ; fig. 2 : déc. 3 (137-143 cm) ; fig. 3 : déc. 1 (112-123 cm) ; fig. 4 à 7 : déc. 2 (123-137 cm).

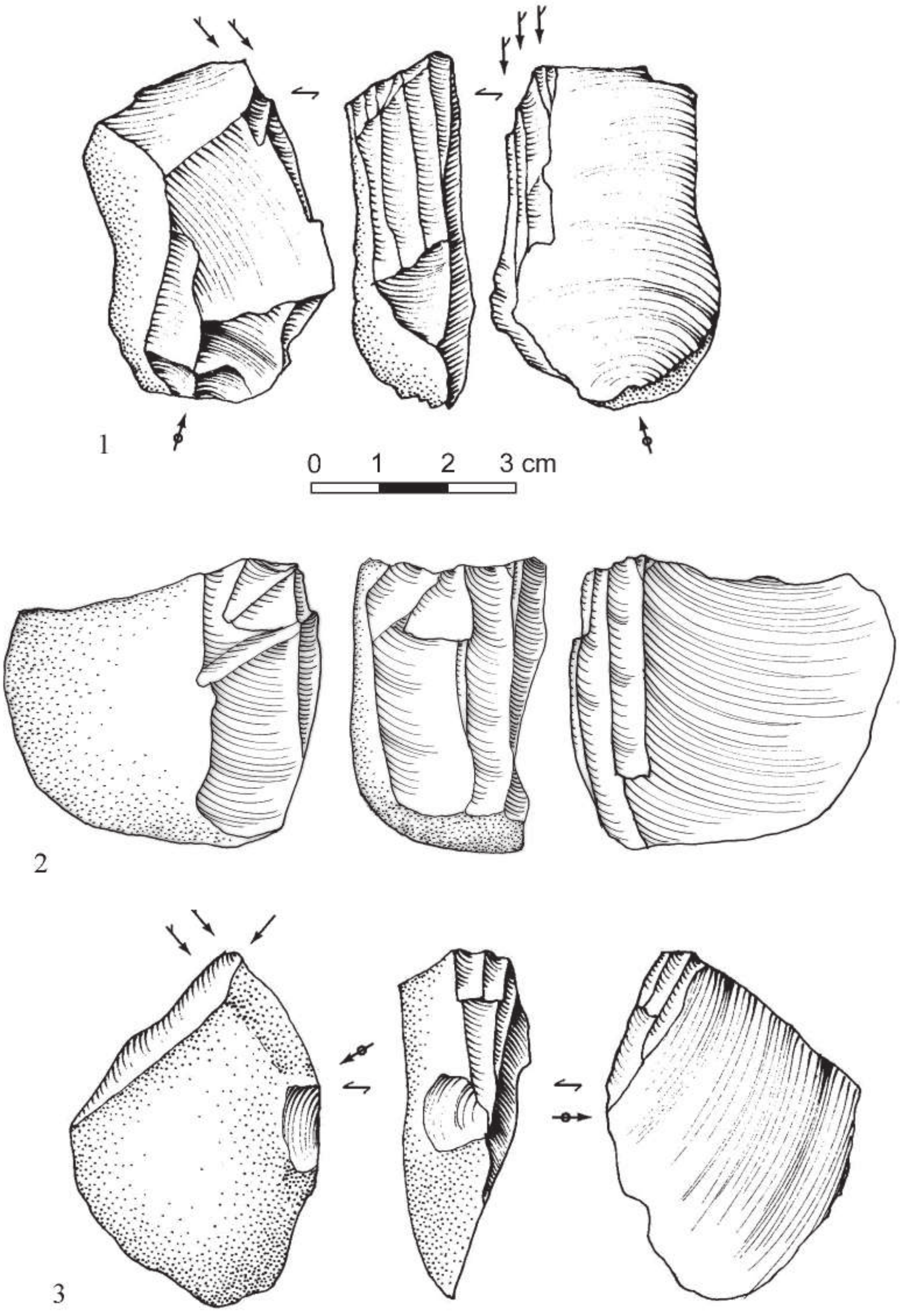


Planche 54 – Nucléus à lamelles sur tranche d'éclats corticaux, fouilles 2005-2008.
Fig. 1 : déc. 3 (137-143 cm) ; fig. 2 : déc. 10 (199-213 cm) ; fig. 3 : déc. 1 (112-123 cm).

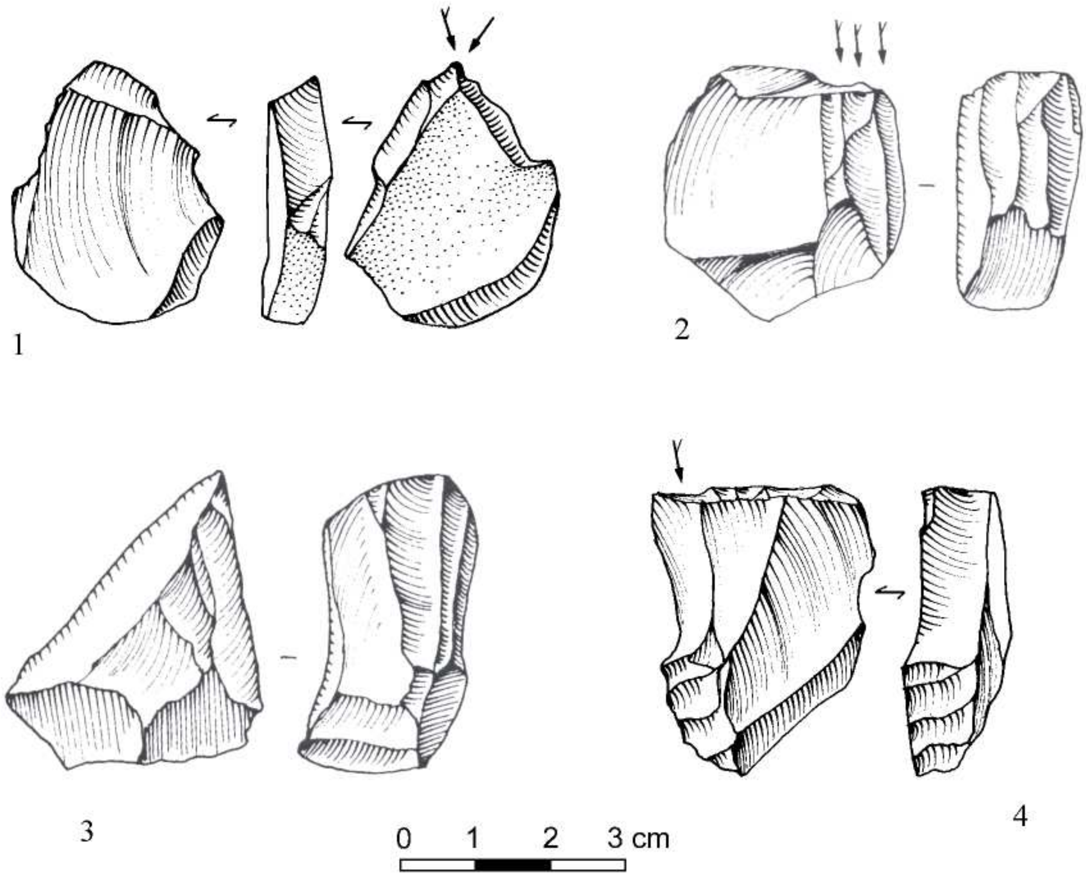


Planche 55 – Nucléus à lamelles sur tranche d'éclats corticaux, coll. Fr. Hole.
Fig. 1 : unit 3, 110-120 cm ; fig. 2 : unit 12, 200-210 cm ; fig. 3 : unit 16, 240-250 cm ; fig. 4 : unit 19, 270-280 cm.

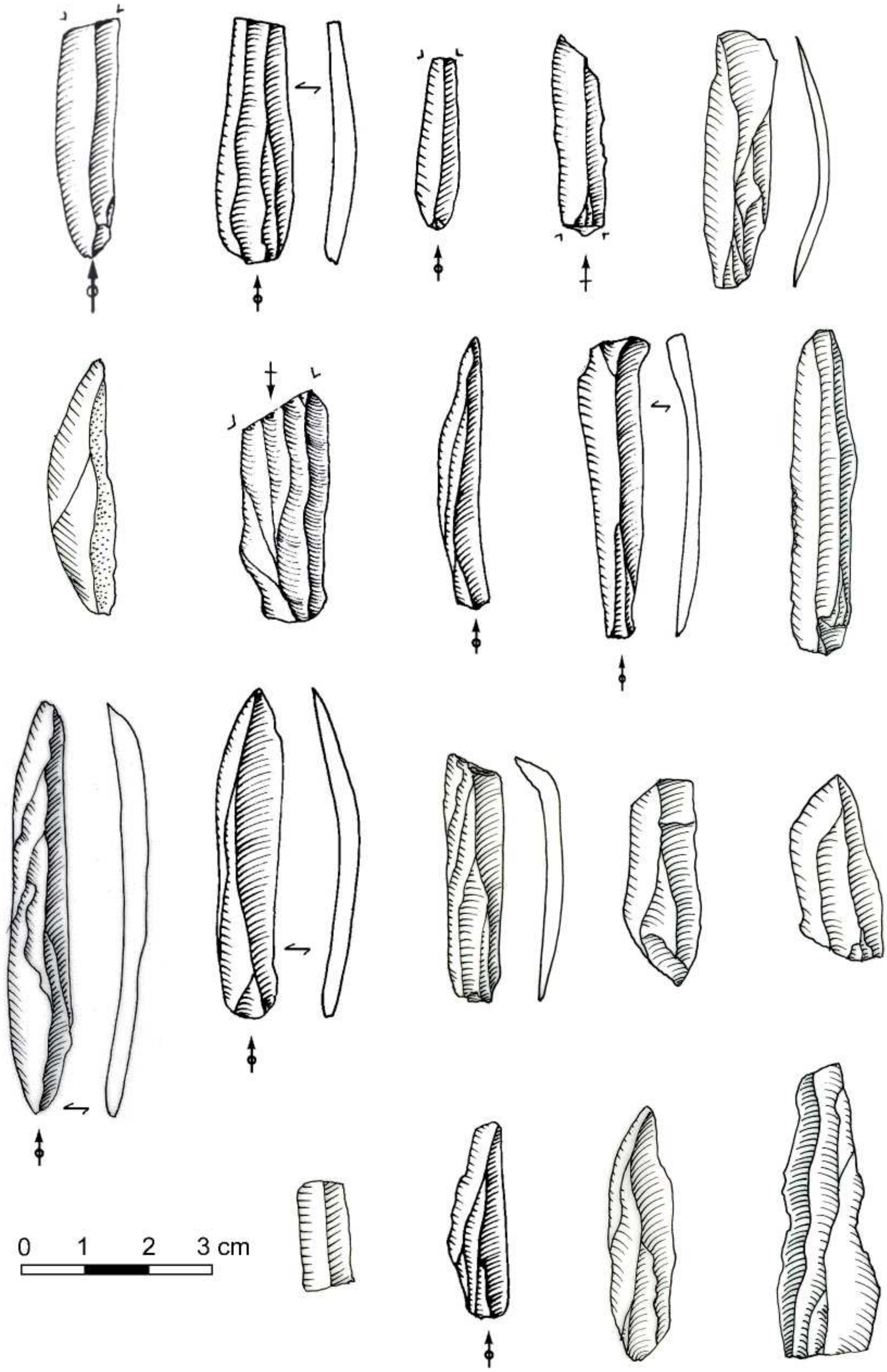


Planche 56 – Lamelles brutes, fouilles 2005-2008.

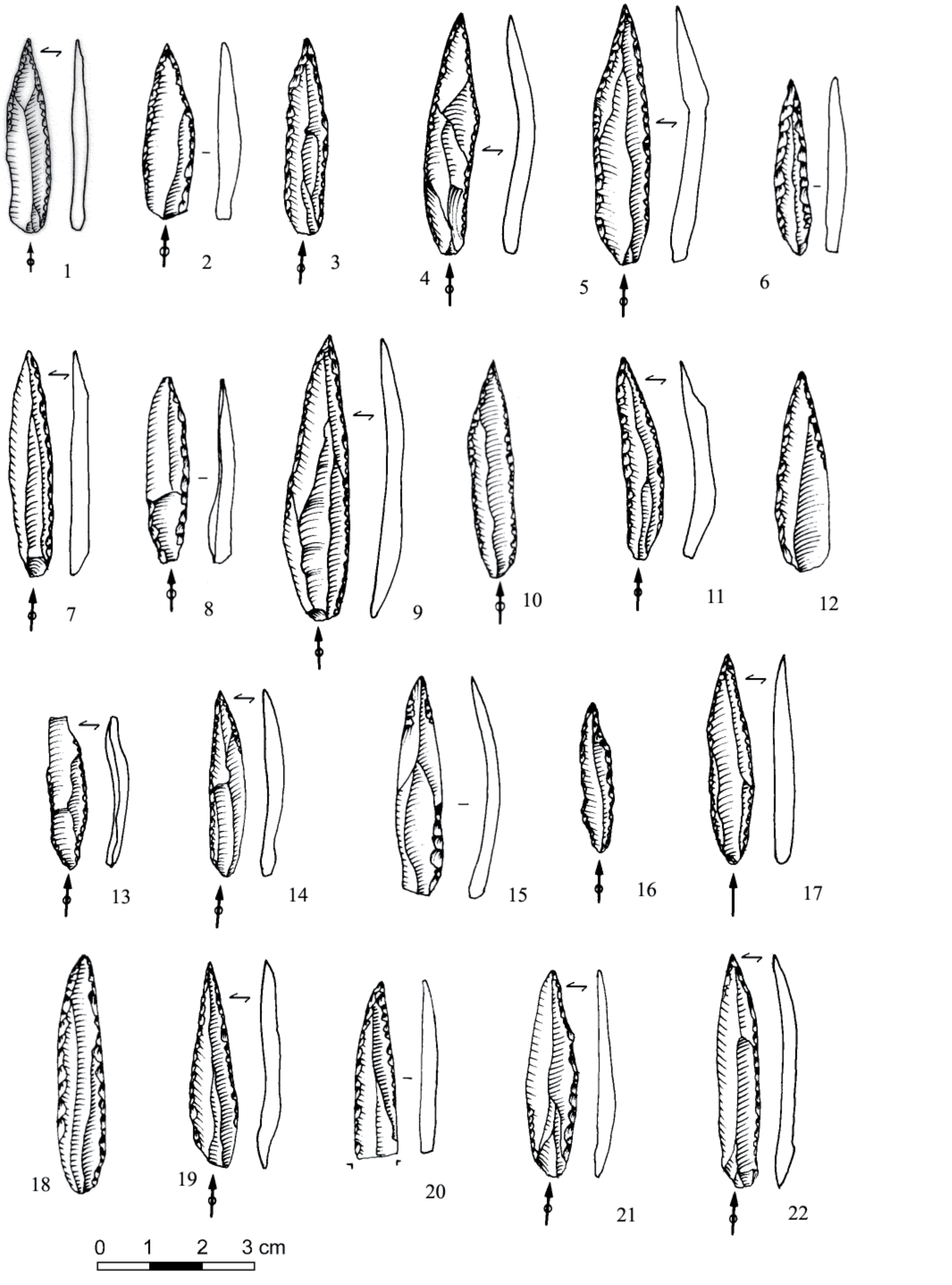


Planche 57 – Pointes d'Arjeneh (ou de Krems), coll. Fr. Hole et fouilles 2005-2008.
Fig. 1 : déc. 9 (188-200 cm) ; Fig. 2, 13 et 14 : unit 17 (250-260 cm) ; Fig. 3, 12 : unit 16 (240-250 cm) ; Fig. 4, 5 : unit 10 (180-190) ; Fig. 6, 8 : unit 19 (270-280 cm) ; Fig. 7, 19, 22 : unit 12 (200-210 cm) ; Fig. 9, 17 : unit 11 (190-200 cm) ; Fig. 10 : unit 21 (290-300 cm) ; Fig. 11, 15 : unit 18 (260-270 cm) ; Fig. 16 : unit 14 (220-230 cm) ; Fig. 18, 21 : unit 5 (130-140 cm) ; Fig. 13 : unit 13.

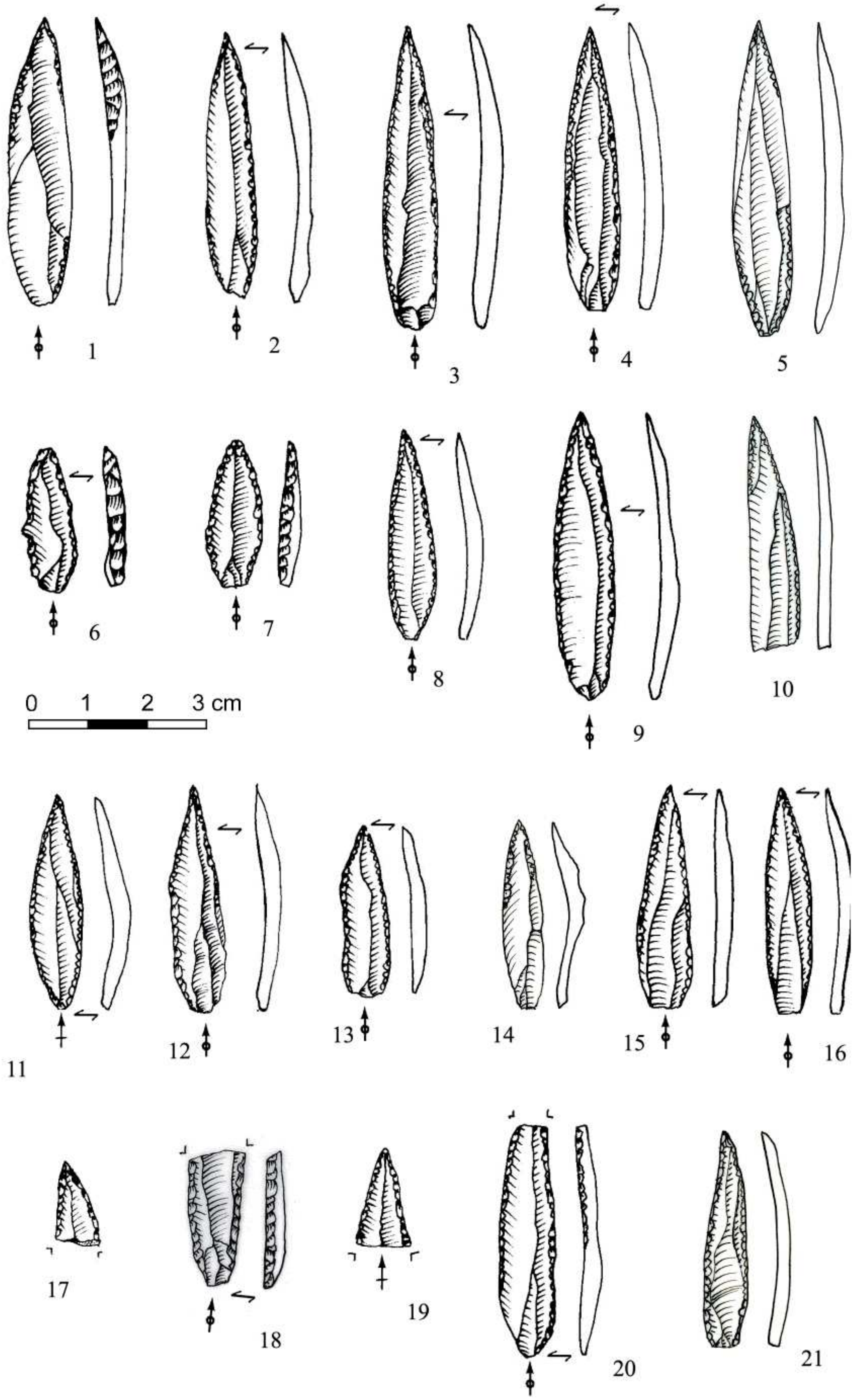


Planche 58 – Pointes d'Arjeneh, fouilles 2005-2008.
La plupart sont intactes, d'autres réduites à leur pointe (fig. 10, 17, 19), d'autres à leur base (fig. 18).
Fig. 1 à 4 : déc. 5 (153-162 cm) ; Fig. 5 : déc. 14 (245-252 cm) ; Fig. 6 à 8, 11 à 13 : déc. 7 (169-180 cm) ; Fig. 9 : déc. 6 (162-169 cm) ; Fig. 10, 14 : déc. 13 (240-245 cm) ; Fig. 15 : déc. 12 (226-240 cm) ; Fig. 16 : déc. 2 (123-137 cm) ; Fig. 17, 20 : déc. 4 (143-153 cm) ; Fig. 18 : déc. 11 (213-226 cm) ; Fig. 19 : déc. 1 (112-123 cm) ; Fig. 21 : déc. 16 (260-268 cm).

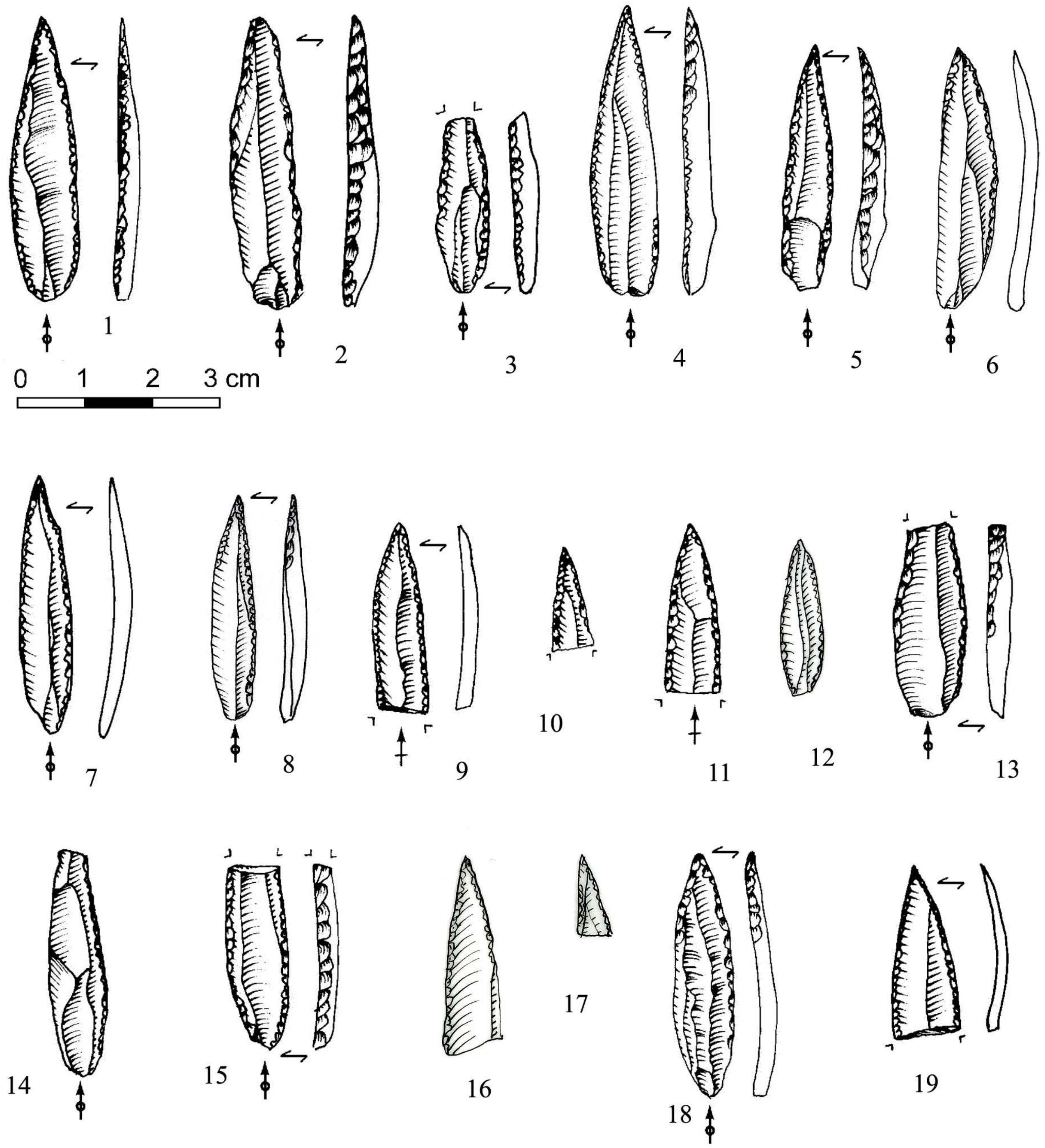


Planche 59 – Pointes d'Arjeneh, fouilles 2005-2008.
La plupart intactes, d'autres réduites à leur pointe (fig. 10, 11, 16, 17, 19), d'autres à leur base (fig. 3, 13, 14). L'ensemble, avec les nucléus et les lamelles brutes, atteste bien d'une spécialisation d'un site de chasse à l'arc.
Fig. 1 à 5, 7 : déc. 6 (162-169 cm) ; Fig. 6, 19 : déc. 8 (180-188 cm) ; Fig. 8 : déc. 12 (226-240 cm) ; Fig. 9 : déc. 11 (213-226 cm) ; Fig. 10, 11, 18 : déc. 4 (143-153 cm) ; Fig. 12 : déc. 10 (199-213 cm) ; Fig. 13 : déc. 1 (112-123 cm) ; Fig. 14 : déc. 5 (153-162 cm) ; Fig. 16 : déc. 3 (137-143 cm) ; Fig. 15, 16 : déc. 15 (252-260 cm).

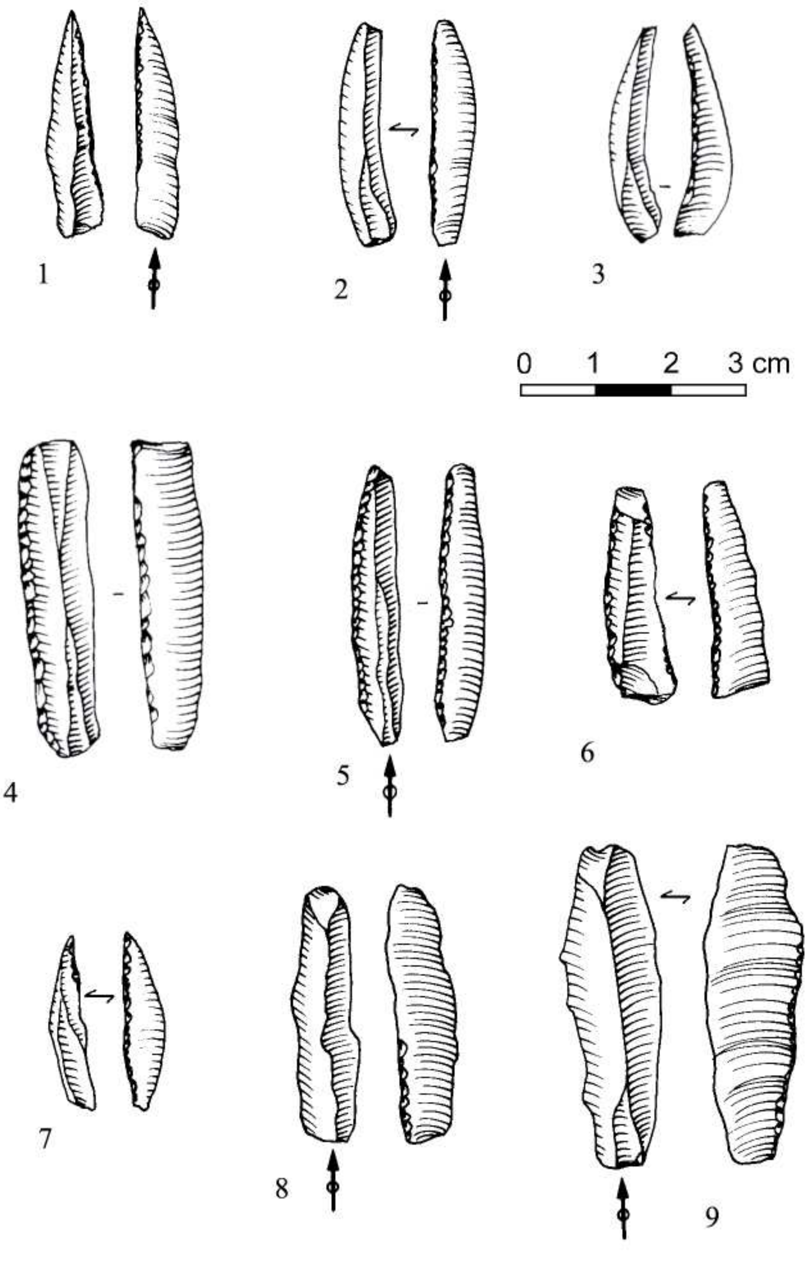


Planche 60 – Lamelles Dufour, coll. Fr. Hole.
Sur lamelles courbes, à fines retouches marginales, mordant à peine le bord sans en modifier la silhouette, et souvent inverses ou alternes. Elles semblent correspondre à des armatures latérales, de sagaies ou de flèches.
Fig. 1 : unit 7 (150-160 cm) ; Fig. 2 : unit 8 (160-170 cm) ; Fig. 3 : unit 3 (110-112 cm) ; Fig. 4 : unit 21 (290-300 cm) : Fig. 5, 8 : unit 13 (210-220 cm) ; Fig. 6 : unit 15 (230-240 cm) ; Fig. 7 : unit 14 (220-230 cm) ; Fig. 9 : unit 18 (260-270 cm).

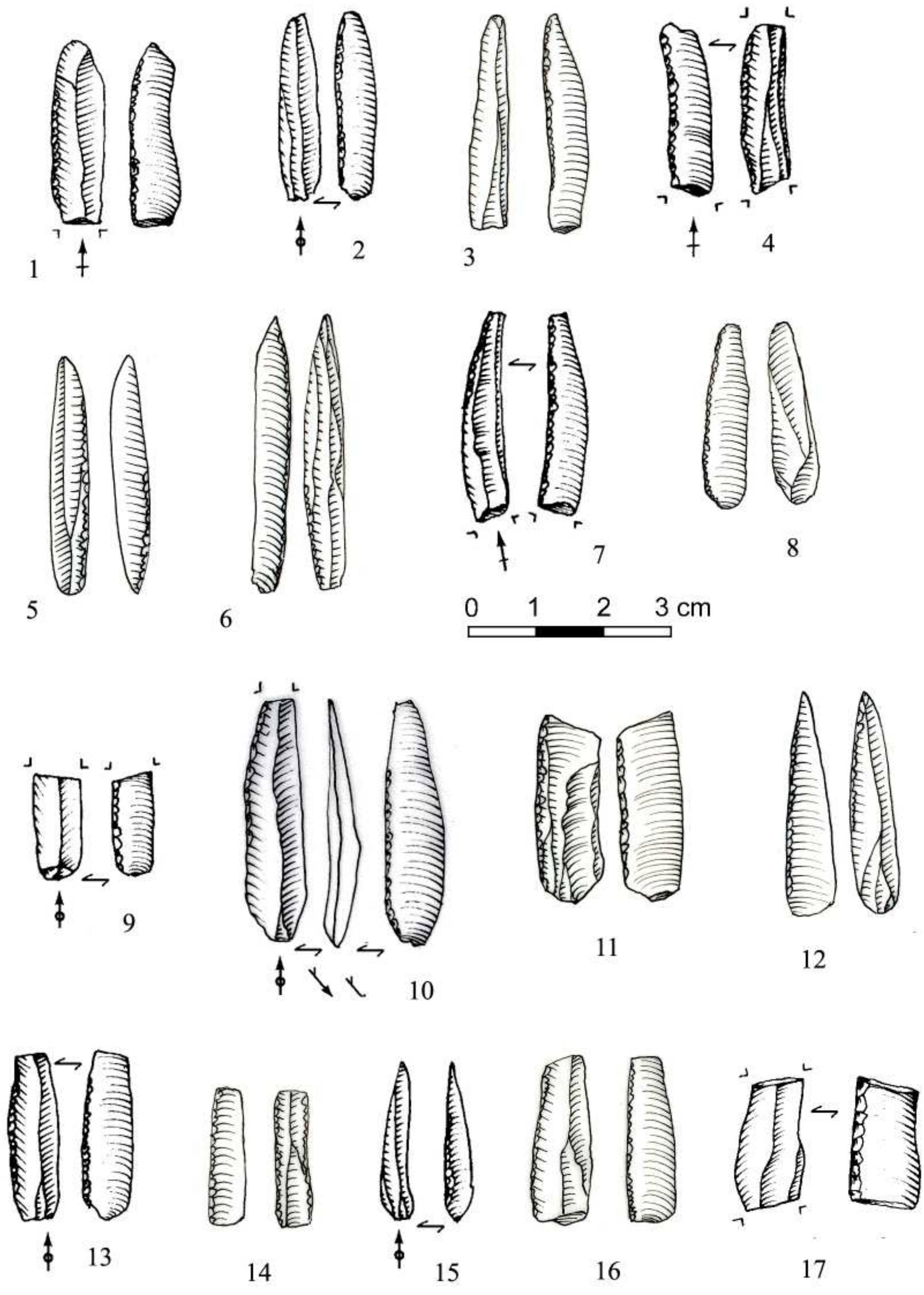


Planche 61 – Lamelles Dufour, fouilles 2005-2008.
Mêmes observations que pour la planche 60.
Fig. 1 : déc. 7 (169-180 cm) ; Fig. 2 : déc. 2 (123-137 cm) ; Fig. 3 : déc. 9 (188-200 cm) ; Fig. 4, 13 : déc. 3 (137-143 cm) ; Fig. 5 : déc. 13 (240-245 cm) ; Fig. 6 : déc. 17 (268-277 cm) ; Fig. 7 : déc. 5 (153-162 cm) ; Fig. 8, 11, 14 : déc. 15 (252-260 cm) ; Fig. 9 : déc. 6 (162-169 cm) ; Fig. 10 : déc. 4 (143-153 cm) ; Fig. 12 : déc. 16 (260-268 cm) ; Fig. 15, 17 : déc. 1 (112-123 cm) ; Fig. 16 : déc. 14 (245-252 cm).

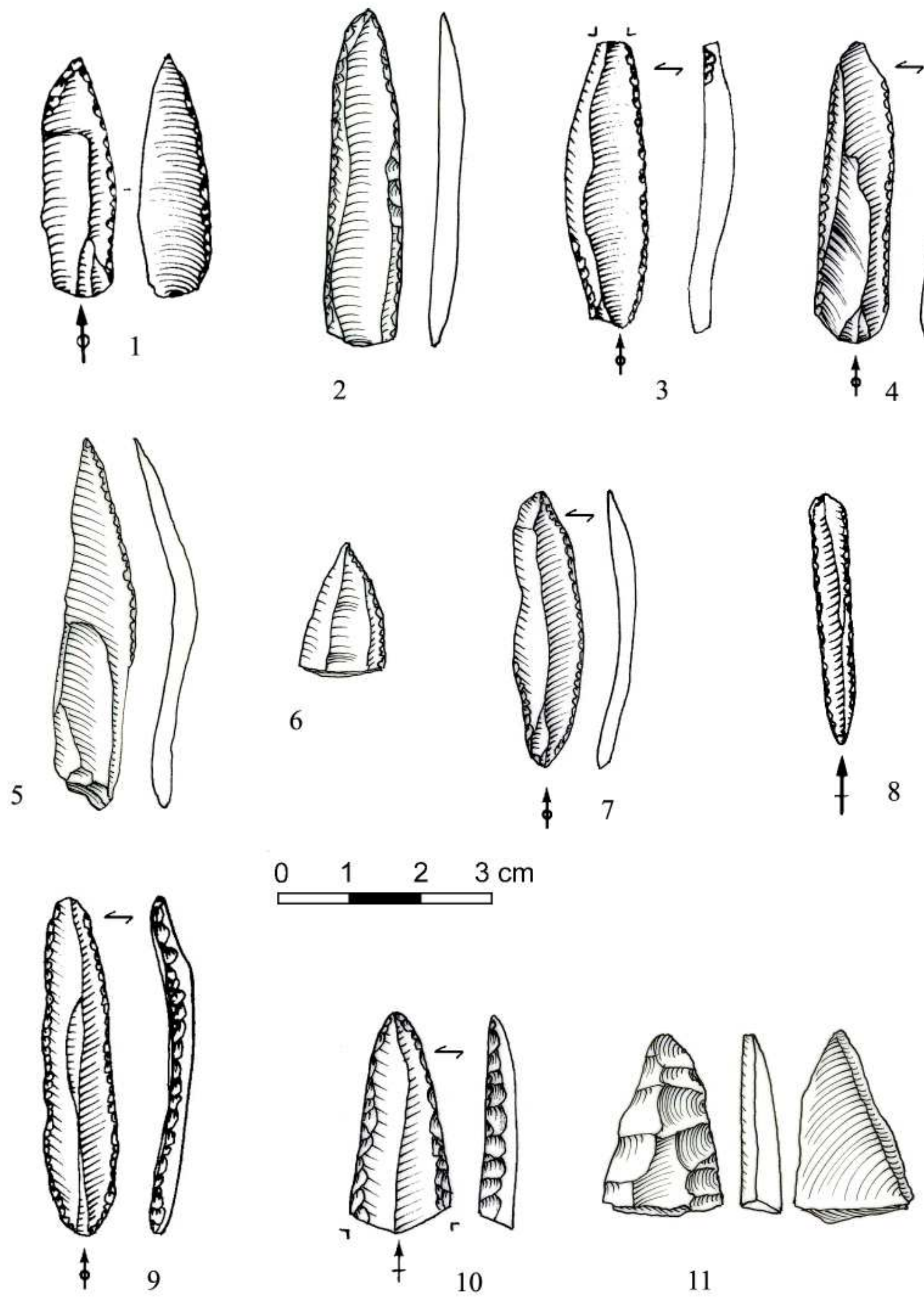


Planche 62 – « Pointes » de Font-Yves, fouilles 2005-2008 et coll. Fr. Hole.
Souvent obtuses, retouchées sur les deux bords convergents, dont un par retouches plates (fig. 11).
Fig. 1 : unit 18 (160-270 cm) ; Fig. 2, 10 : déc. 10 (199-213 cm) ; Fig. 3 : déc. 9 (188-200 cm); Fig. 4 : déc. 11 (213-226 cm) ; Fig. 5 : déc. 15 (252-260 cm) ; Fig. 6 : déc. 13 (240-245 cm) ; Fig. 7 : déc. 8 (180-188 cm) ; Fig. 8 : unit 19 (270-280 cm) ; Fig. 9 : déc. 7 (169-180 cm) ; Fig. 11 : déc. 9 (188-200 cm).

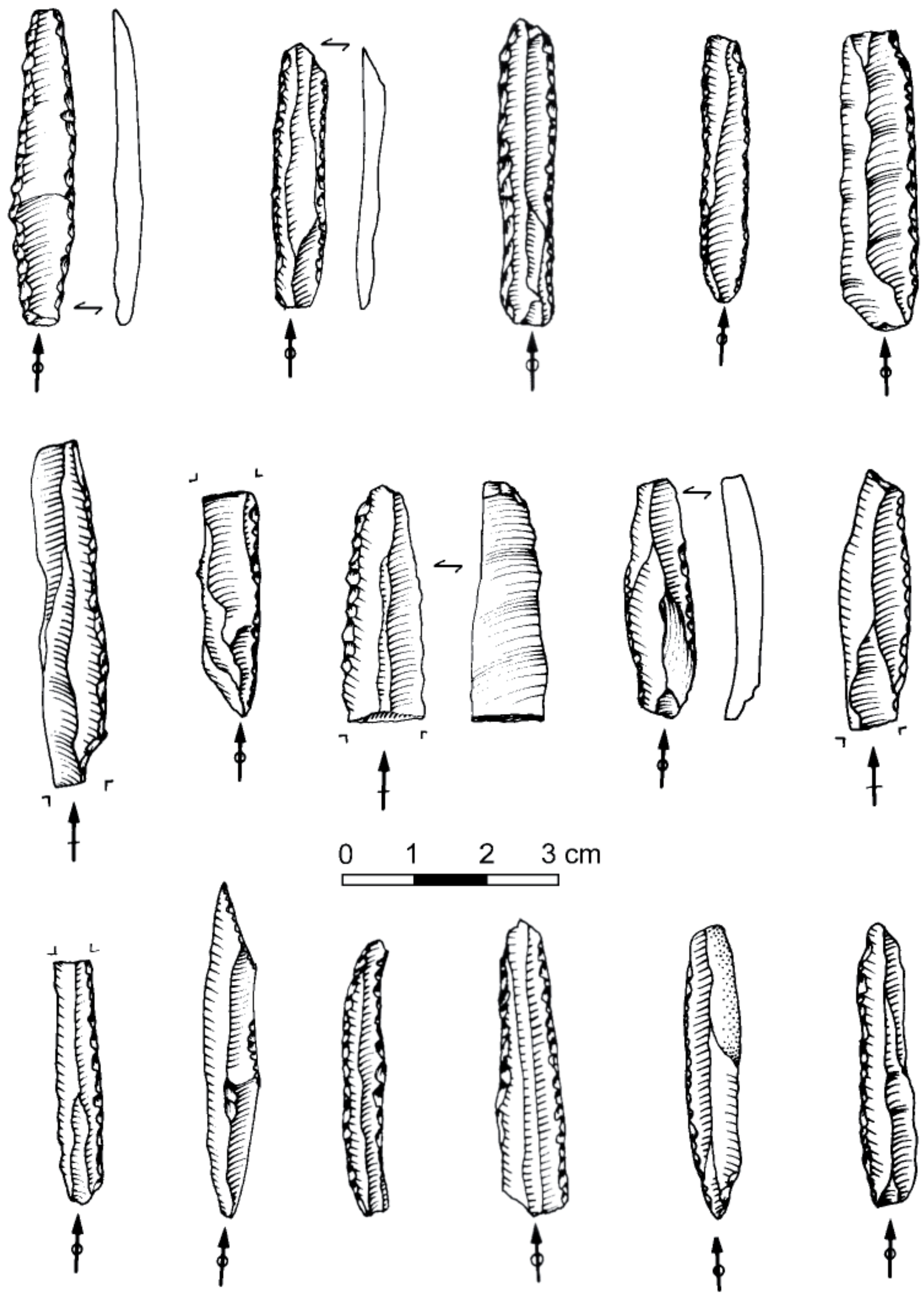


Planche 63 – « Pointes » de Font-Yves, fouilles 2005-2008 et coll. Fr. Hole.
Sur lamelles rectilignes, aux deux bords convergents et obtus.

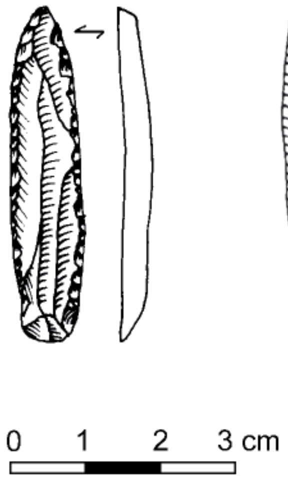


Planche 64 – Pointes de Font-Yves, coll. Fr. Hole.

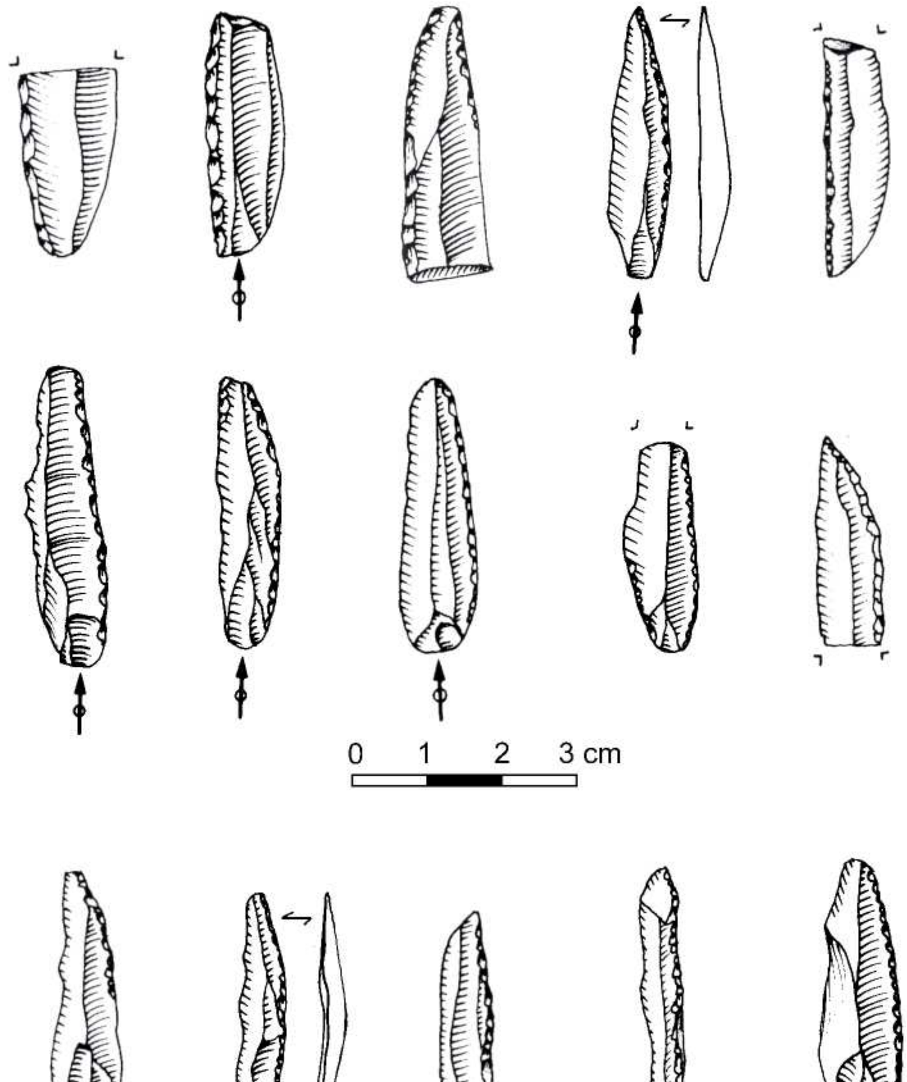


Planche 65 – Lamelles à fines retouches marginales d’un seul bord, dites « lamelles Yafteh », coll. Fr. Hole.

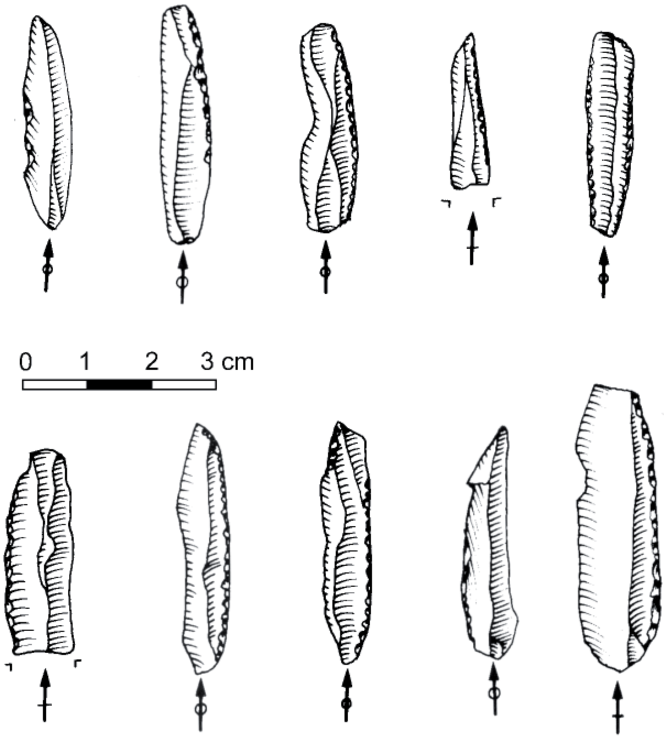


Planche 66 – « Lamelles Yafteh », coll. Fr. Hole.

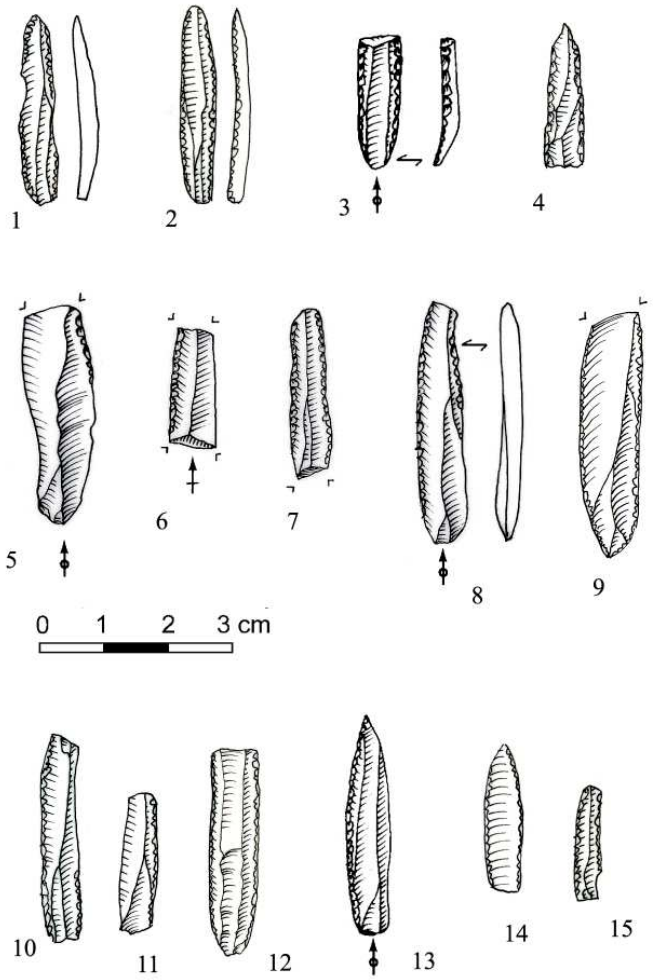


Planche 67 – « Lamelles Yafteh », fouilles 2005-2008.
Fig. 1, 10 à 12 : déc. 13 (240-245 cm) ; Fig. 2, 14, 15 : déc. 16 (260-268 cm) ; Fig. 3 : déc. 3 (137-143 cm) ; Fig. 4 : déc. 9 (188-200 cm) ; Fig. 5 : déc. 8 (180-188 cm) ; Fig. 6 à 9 : déc. 10 (199-213 cm) ; Fig. 13 : déc. 7 (169-180 cm).

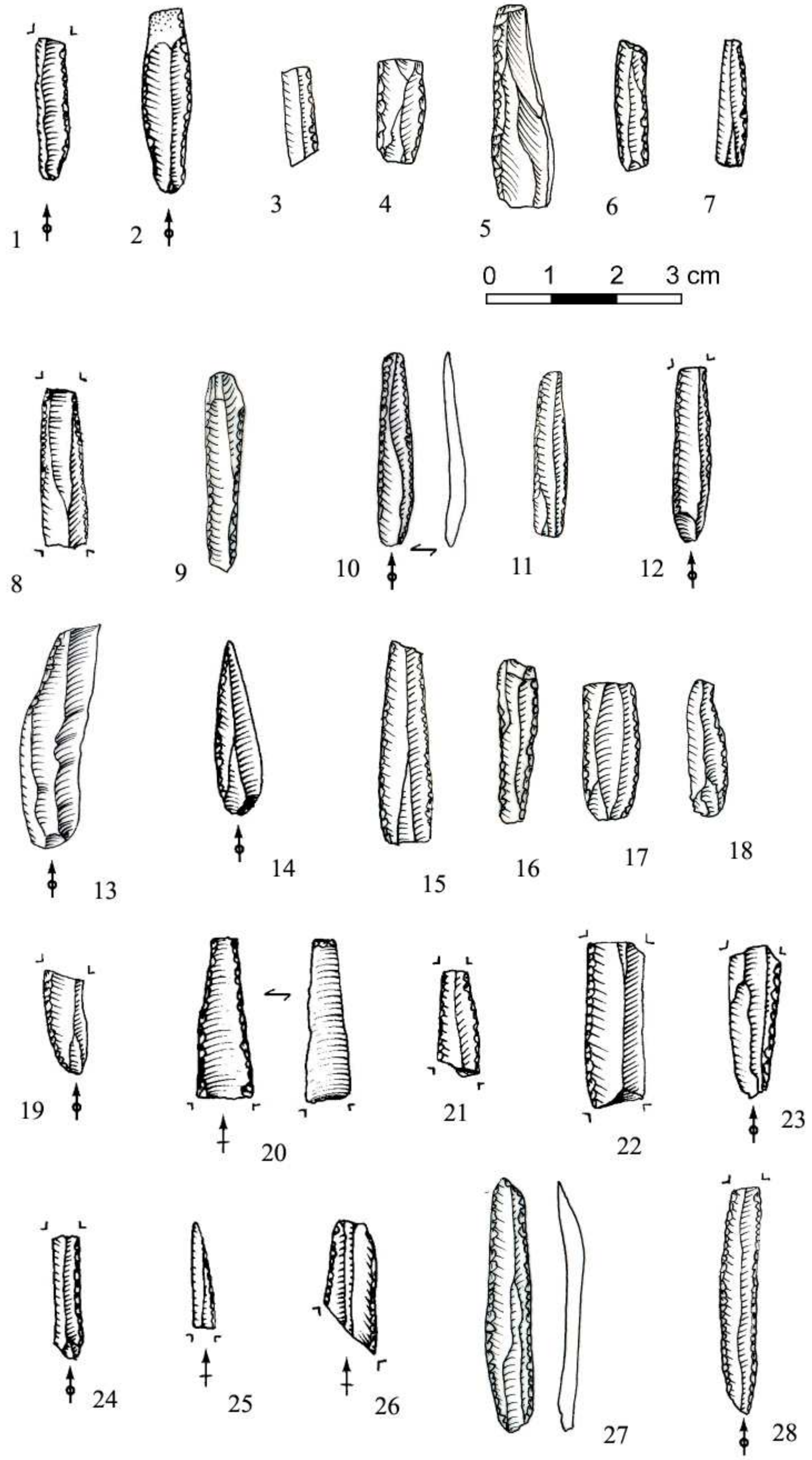
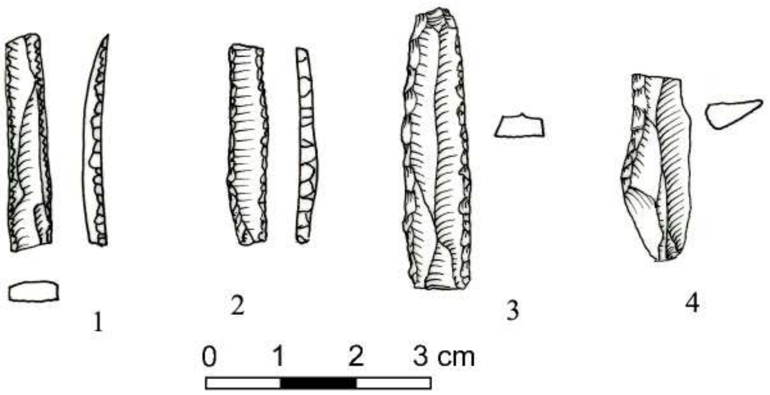


Planche 68 – « Lamelles Yafteh », fouilles 2005-2008.
Fig. 1, 2 : déc. 5 (153-162 cm) ; Fig. 3 à 6, 9 : déc. 15 (252-260 cm) ; Fig. 7, 14 : déc. 2 (123-137 cm) ; Fig. 8, 22 et 23 : déc. 4 (143-153 cm) ; Fig. 10, 11 : déc. 11 (213-226 cm) ; Fig. 12 : déc. 12 (226-240 cm) ; Fig. 13 : déc. 8 (180-188 cm) ; Fig. 15 à 18 : déc. 13 (240-245 cm) ; Fig. 19 et 20 : déc. 1 (112-123 cm) ; Fig. 24 et 25 : déc. 3 (137-143 cm) ; Fig. 26 : déc. 6 (162-169 cm) ; Fig. 27 et 28 : déc. 10 (199-213 cm).



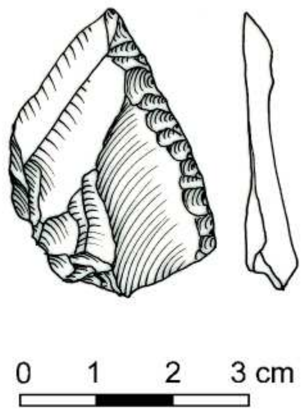
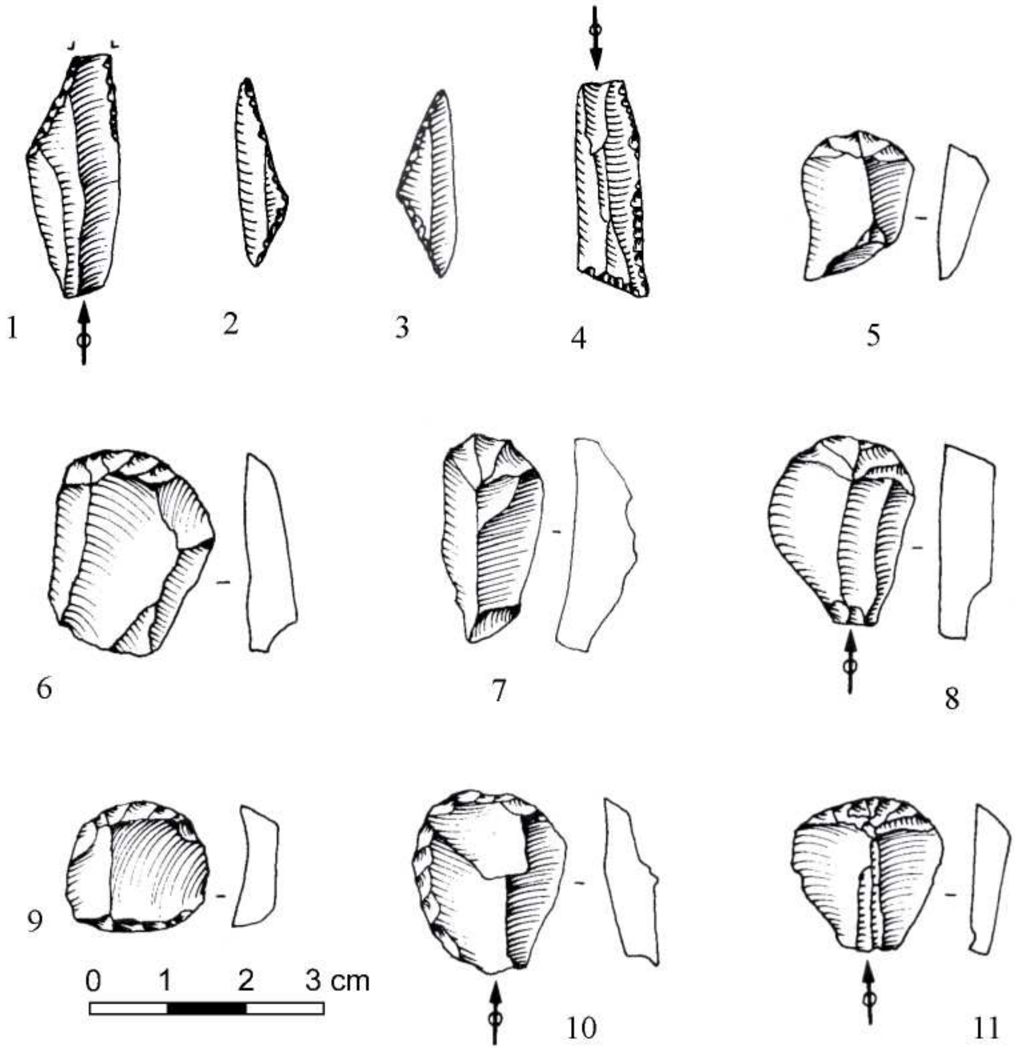


Planche 69 – Lamelles à dos abattu, sur le mode magdalénien, fouilles 2005-2008.
Fig. 1 : déc. 15 (252-260 cm) ; Fig. 2 : déc. 10 (199-213 cm) ; Fig. 3 et 4 : déc. 9 (188-200 cm).

Planche 70 – Pointe moustérienne intrusive. Fouilles 2005-2008, décapage 17.
Elle possède tout d'une intrusion : roche et patine différentes, talon épais et lisse (percussion dure), ne ressemble à aucune pièce des fouilles. Une occupation moustérienne a été repérée sur le talus.



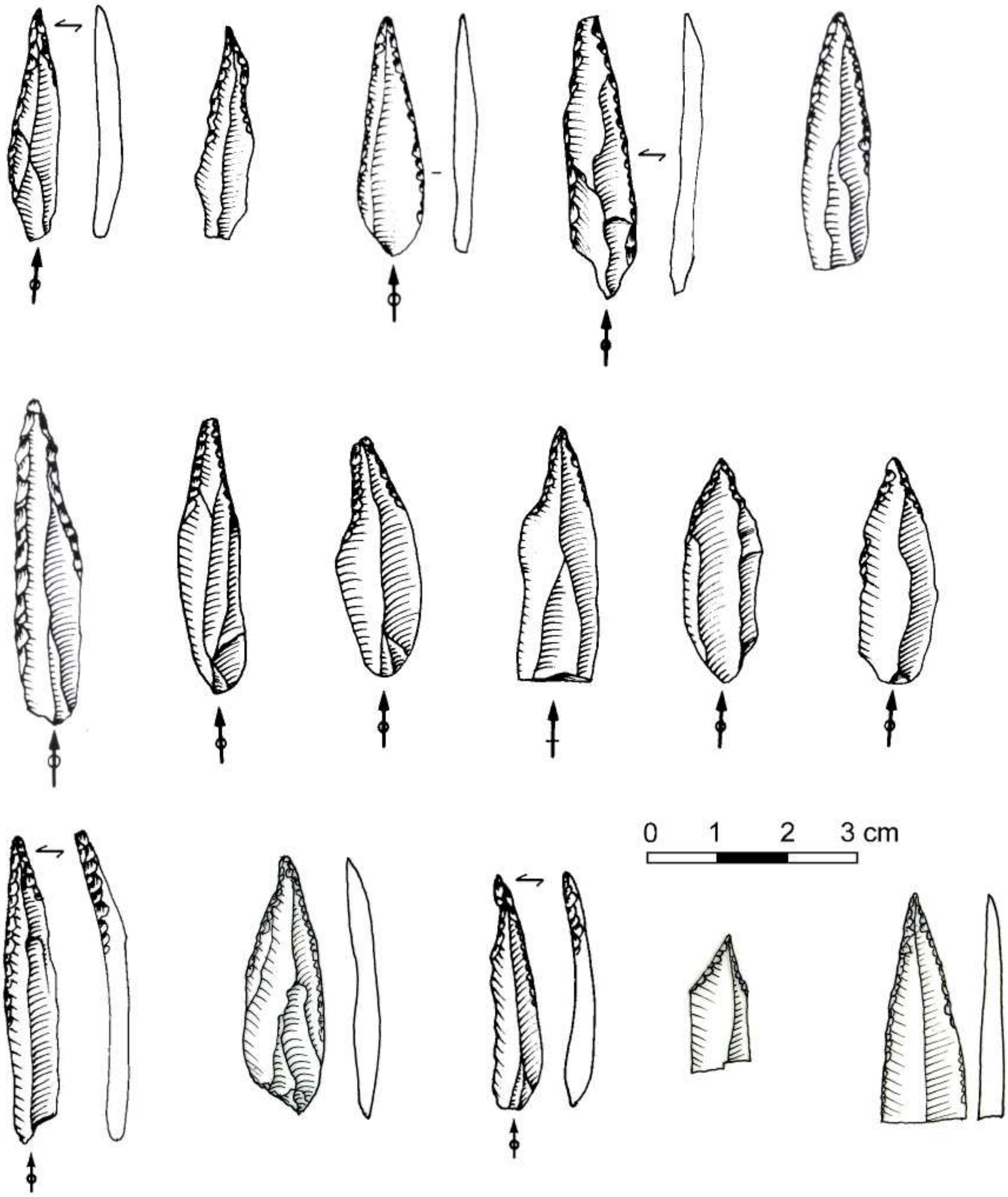


Planche 72 – Perçoirs sur lamelles, coll. Fr. Hole.

Ci-contre : Planche 71 – Pièces microlithiques, à morphologie « zarzienne », coll. Fr. Hole.
Fig. 1 : unit 13, 210-220 cm ; fig. 2 : unit 14, 220-230 cm ; fig. 3 : unit 2, 100-110 cm ; fig. 4 : unit 18, 260-270 cm ; fig. 5 : unit 11, 190-200 cm ; fig. 6 : unit 15, 130-140 cm ; fig. 7, 8, 10 : unit 7, 150-160 cm ; fig. 9 : unit 8, 160-170 cm ; fig. 11 : unit 3, 110-120 cm.

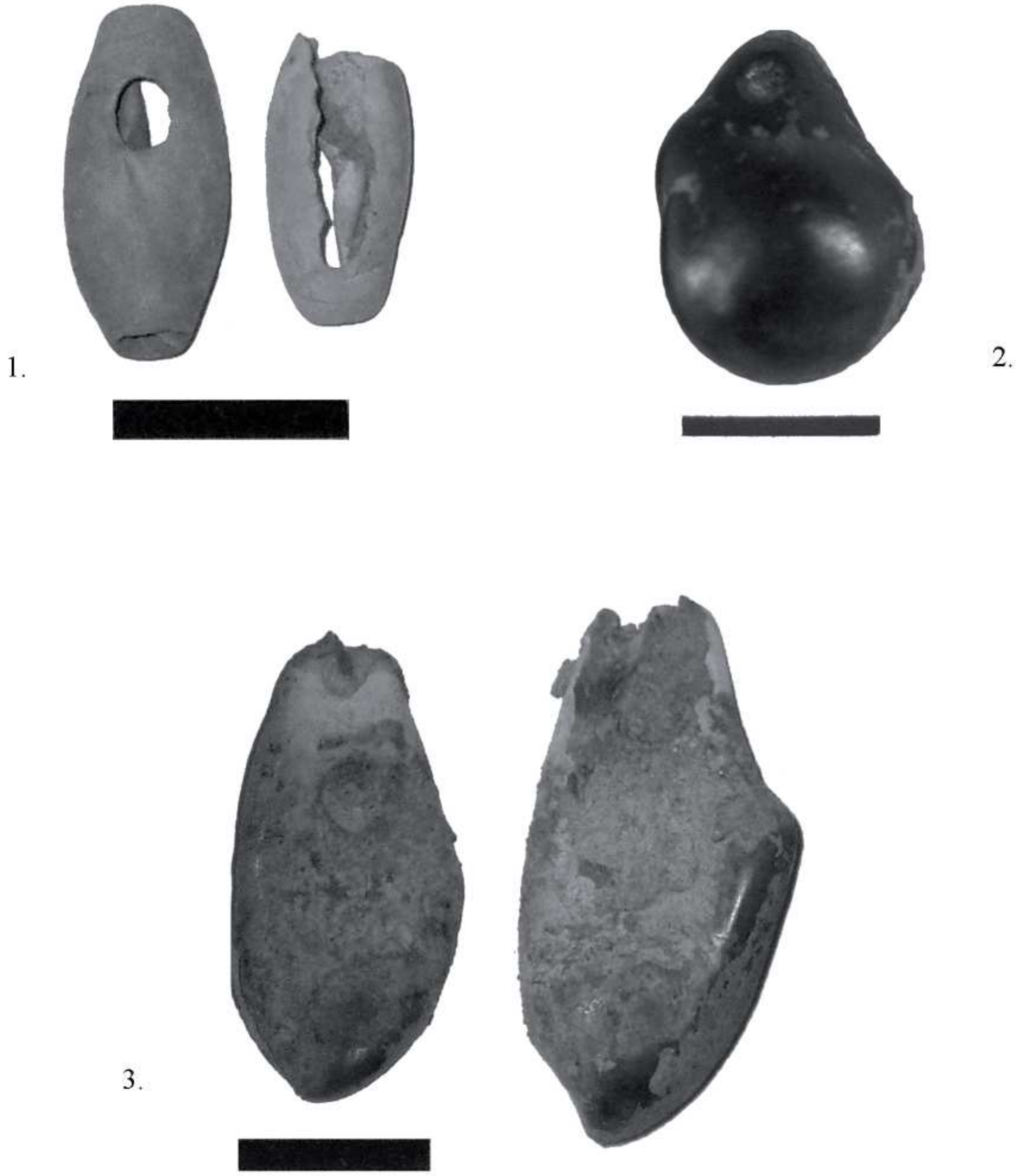


Planche 73 – Éléments de parure (échelles = 1 cm). Fig. 1 : coquilles marines perforées, déc. 2 (123-137 cm) et 3 (137-143 cm) ; fig. 2 : perle d'hématite avec début de perforation (déc. 10, 199-213 cm) ; fig. 3 : croches de cerf perforées, déc. 7 (169-180 cm) et 10/11 (199-226 cm).

Planche 74 – Carte des principaux sites évoqués dans le texte (modifié d'après Zwyns & Flas 2010).

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V - THE UPPER PALEOLITHIC FAUNAL REMAINS FROM YAFTEH CAVE (CENTRAL ZAGROS), 2005 CAMPAIGN. A PRELIMINARY STUDY

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1. Introduction

Yafteh Cave in Khorramabad Valley (Lorestan province) is among the many sites discovered by Hole and Flannery in the 1960s during their prehistoric investigations in southwest Iran. In 1965, Hole's excavation at Yafteh yielded a large artifact assemblage which was described briefly in a general report on the prehistoric sequences of southwest Iran (Hole & Flannery 1967).

Recent re-excavation at Yafteh Cave by a joint Iranian-Belgian team in 2005, directed by M. Otte and F. Biglari, led to the discovery of rich assemblages of lithic artifacts, faunal remains and other finds from a small 2 x 2 m test pit (Otte *et al.* 2007, Shidrang 2007).Two squares (F15 and G15) were excavated, each divided into four sub- squares and excavated by arbitrary 10-15 cm thick spits. The excavation yielded a significant amount of faunal remains for which initial results were published in the 2007 report (Otte *et al.* 2007). The present paper is the result of faunal analysis of the 2005 excavation at Yafteh Cave. In this preliminary presentation we focus our discussion on taxonomic identifications and taphonomic issues, discussing the definition of each taxonomic group.

2. The faunal assemblage[1]

Initial study of the assemblage was undertaken in Iran at the Palaeolithic Center of the National Museum in Iran, followed by some expertise at the Archaeozoology Laboratory of the Natural History Museum of Paris. The collection is now housed at the Centre for Palaeolithic Research at the National Museum of Iran in Tehran. Approximately 16000 faunal remains have been examined.

2.1. Mammalian Remains

Taphonomic issues

Bone preservation is rather poor and a heavy concretion covers most of the bones. Animal bones also suffered high fragmentation as shown by the ratio of unidentified remains (12570 remains) (Tab.1).

Yafteh 2005 assemblage	N	Weight	% N	% Weight (g)	W/N
NISP	1183	2281.3	7.4	20.5	1.9
LM/SM/SR	2149	4737.3	13.5	42.5	2.2
UI	12570	4121.7	79.0	37.0	0.3
Total	15902	11140.3	100.0	100.0	0.7

Table 1 – Distribution of animal bones in Yafteh cave (assemblage 2005). NISP = Number of Identified Specimen; LM/SM/SR= Large Mammal, Small, Ruminant; UI= Unidentified fragments.

A specific acid treatment was necessary to clean the bones and make them ready for study. The Yafteh animal bone assemblage is highly fragmented (cf. trampling). Other factors also contributed to its deterioration: direct firing or heat exposure (Plate 1b) and human or carnivore gnawing, breakage (Plate 1c). The high fragmentation of the assemblage restricted the recording of many measurements. The most frequent anatomical parts and measurable ones of the assemblage were the phalanges and metapodials of medium size mammals (PR^2 =39%) (Fig. 1).

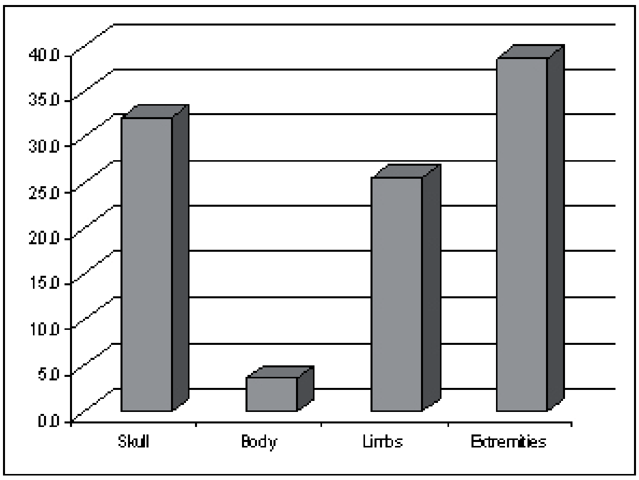

Figure 1 – Relative distribution of the skeletal part in Yafteh 2005.

The significant number of first, second and third phalanges in the assemblage attracted our attention to a taphonomic question addressed for faunal assemblages in caves and the origin of their accumulation. Experimental studies on Egyptian vulture (Gypaetus barbatus) nests show that this bone eater raptor could have been the putative bone accumulator in archaeological sites (Robert & Vigne 2005). Besides the high representation of the extremities in the assemblage, other factors should also be examined, among which digestion marks are the most important diagnostic indication for the contribution of the Egyptian vulture to the bone accumulation. In Yafteh, digestion marks are very rare and the hypothesis of the accumulation by this raptor can be rejected. Anatomical discrepancies are thus related to other taphonomic and anthropogenic factors. The macromammalian remains of Yafteh were accumulated by humans as evidenced by the faunal composition and cut marks left on the bones (plate 1a); the species composition (mainly herbivores), the presence of hearths and the high percentage of burnt bones, the presence of cut marks and the relative absence of carnivore activity are solid arguments supporting this assumption. However, the Yafteh assemblage also contains microvertebrate remains (rodents, fish and other microvertebrates). The taphonomic characteristics of these remains are discussed below.

Herbivores

The bulk of the assemblage is composed of small herbivores expressed by 54 % of the NISP (fig. 2a and b, table 2a and 2b). The principal taxa in this category are represented by ovi-caprids (96 %) and 4 % gazelles. The ratio of sheep to goat is 1:4.

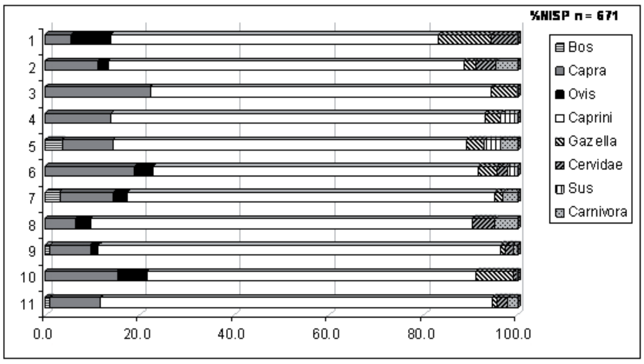

Figure 2a – Yafteh 2005. Distribution of the principal Mammalian species by means of NISP. gnawing marks.

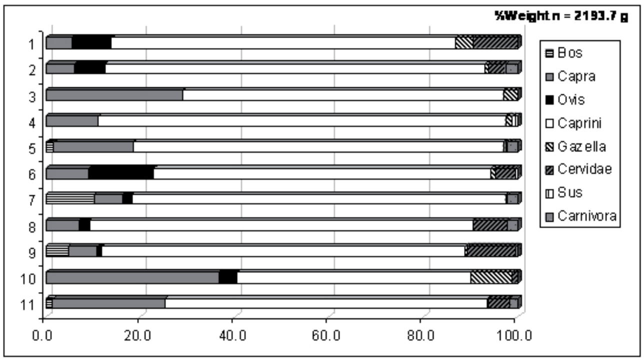

Figure 2b – Yafteh 2005. Distribution of the principal Mammalian species by means of weight.

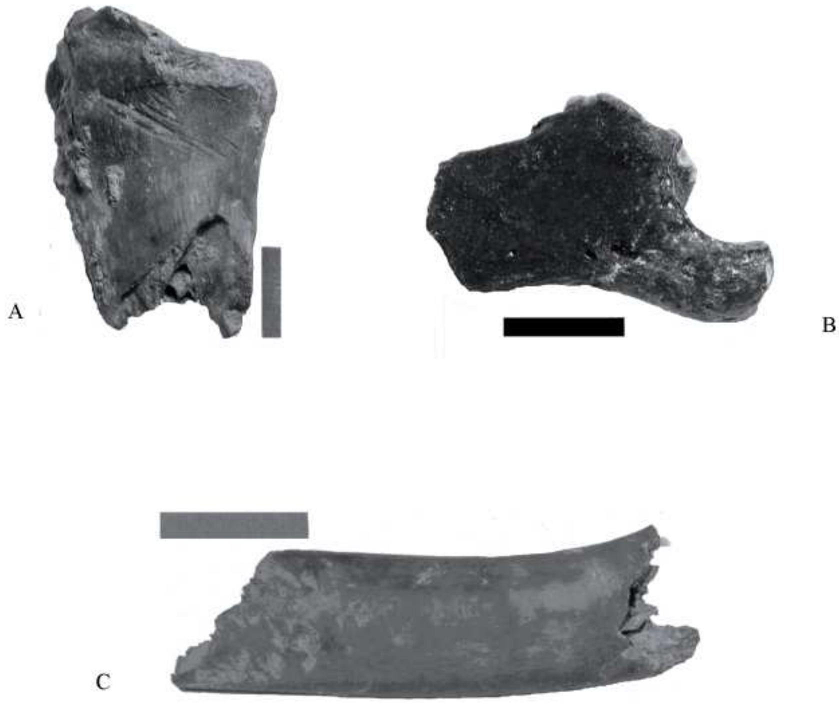

Plate 1 – Anthropogenic traces in Yafteh (2005). A) 15A-6, D 164 - 172 cm, *Caprini*- Radius Proximal with disarticulation cut marks. B) F15C-10, D. 203 - 216 cm, Capra , third phalanx, burned. C) F15A -2, D. 113 - 134 cm; Medium Mammal, rib, Carnivore gnawing marks.

NISP % **Spits**	Bos	Capra	Ovis	Caprini	Gazella	Cervidae	Sus	Carnivora	Lepus	Microvertebrate	Bird	Turtle	Fish	Mollusc	**Total NISP**
1	0.0	4.3	6.5	54.3	8.7	4.3	0.0	0.0	0.0	17.4	0.0	2.2	2.2	0.0	**46**
2	0.0	1.8	0.4	12.3	0.4	0.7	0.0	0.7	1.1	2.5	0.4	0.4	79.4	0.0	**277**
3	0.0	7.8	0.0	25.5	2.0	0.0	0.0	0.0	7.8	15.7	0.0	0.0	41.2	0.0	**51**
4	0.0	4.7	0.0	27.1	1.2	0.0	1.2	0.0	1.2	3.5	1.2	1.2	58.8	0.0	**85**
5	1.8	5.5	0.0	38.2	1.8	0.0	1.8	1.8	7.3	36.4	0.0	5.5	0.0	0.0	**55**
6	0.0	12.3	2.7	45.2	2.7	1.4	1.4	0.0	17.8	11.0	1.4	4.1	0.0	0.0	**73**
7	2.1	7.3	2.1	51.0	1.0	0.0	0.0	2.1	16.7	17.7	0.0	0.0	0.0	0.0	**96**
8	0.0	4.6	2.3	58.6	0.0	3.4	0.0	3.4	9.2	14.9	0.0	1.1	1.1	1.1	**87**
9	0.7	7.1	1.4	69.5	0.7	1.4	0.0	0.7	7.8	9.2	0.0	1.4	0.0	0.0	**141**
10	0.0	13.9	5.8	63.5	7.3	0.7	0.0	0.0	2.9	5.1	0.7	0.0	0.0	0.0	**137**
11	0.9	8.7	0.0	67.8	0.9	1.7	0.0	1.7	10.4	5.2	0.0	2.6	0.0	0.0	**115**
12	0.0	0.0	0.0	27.8	0.0	5.6	0.0	5.6	55.6	0.0	0.0	0.0	5.6	0.0	**18**
Total NISP	5	77	20	517	23	14	3	12	86	110	4	15	294	1	**1181**

Table 2a – Yafteh 2005. Distribution of the faunal remains (NISP).

Weight% **Spits**	Bos	Capra	Ovis	Caprini	Gazella	Cervidae	Sus	Carnivora	Lepus	Microvertebrate	Bird	Fish	**Total Weight (g)**
1	0.0	5.3	8.0	69.9	3.6	9.0	0.0	0.0	0.0	3.4	0.0	0.9	**118.0**
2	0.0	6.0	6.2	78.1	0.9	3.4	0.0	2.4	1.1	0.8	0.2	0.7	**194.5**
3	0.0	27.0	0.0	62.8	2.9	0.0	0.0	0.0	3.5	3.7	0.0	0.0	**51.4**
4	0.0	10.5	0.0	81.8	1.4	0.0	1.1	0.0	0.4	3.2	0.4	1.2	**56.1**
5	1.5	15.0	0.0	70.1	0.4	0.0	0.6	1.8	1.2	3.2	0.0	6.2	**72.5**
6	0.0	8.2	12.3	64.3	0.9	3.8	0.4	0.0	3.4	0.1	0.4	6.3	**151.4**
7	9.7	6.0	1.8	76.1	0.4	0.0	0.0	2.1	2.1	1.7	0.0	0.0	**205.4**
8	0.0	6.8	1.9	76.6	0.0	7.0	0.0	2.0	2.5	1.9	0.0	1.5	**198.0**
9	4.5	6.1	0.8	75.1	0.6	9.9	0.0	0.4	1.2	0.3	0.0	1.2	**312.4**
10	0.0	36.4	3.7	49.3	8.7	1.3	0.0	0.0	0.6	0.0	0.0	0.0	**525.5**
11	1.5	22.9	0.0	65.9	0.3	4.4	0.0	1.6	1.8	0.3	0.0	1.3	**340.9**
12	0.0	0.0	0.0	40.8	0.0	44.2	0.0	7.1	8.0	0.0	0.0	0.0	**55.2**
Total Weight	40.2	375.2	69.7	1509.5	59.3	113.6	1.6	24.6	37.2	20.8	1.2	28.4	**2281.3**

Table 2b – Yafteh 2005. Distribution of the faunal remains (Weight -g-).

The few measurements for the second phalanges of Capra with a minimum of 26 and a maximum of 31.7 are comparable to those reported by M. A. Zeder (2003:129, fig. 4) for the Palaeolithic sites of Iran.

Other species identified in the fauna are cervids and boars, represented by post-cranial and cranial bones. It was not possible to identify whether these remains belonged to Dama or Cervus. Boar is barely represented in the assemblage with only 3 remains.

Carnivores

Carnivores are represented by 3 families, Canidae (Vulpes vulpes), Felidae (Panthera pardus and Felis sp.), Mustelidae (Mustela foina and Meles meles) (see plate 2). Two different types of coprolites of large carnivores, most probably hyenas and bears, indicate other possible inhabitants in the site. An interesting find in Yafteh Cave was the presence of leopard (Panthera pardus) first and second phalanges, in different spits of the lower levels of the site.

F	15	C	7	169 - 182 cm	Metapodial (plate 2b)
G	15	D	8	179 - 185 cm	Phalanx 2 (plate 2a)
F	15	A	12	225 - 239 cm	Phalanx 1

The presence of these extremities could be related to the use of the skin; they are generally not removed during the preparation of the skin.

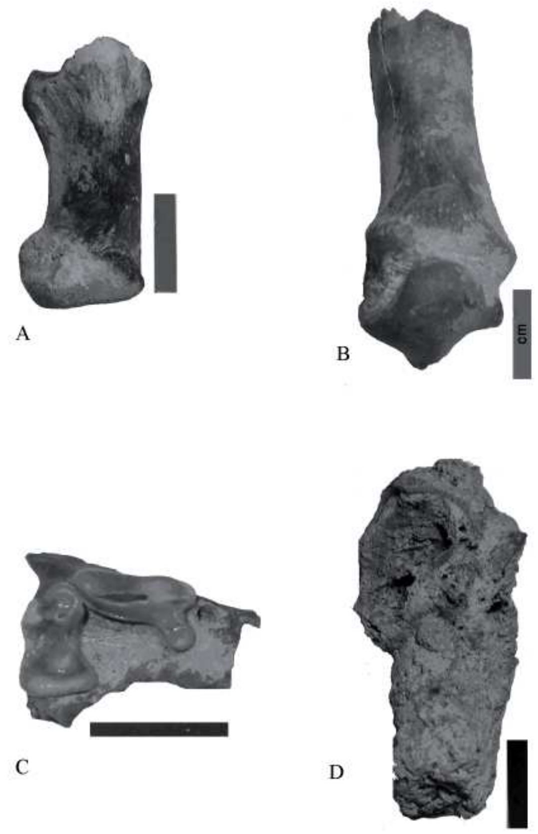

Plate 2 – Carnivore remains in Yafteh (2005). A) G15D-8, D. 179 - 185 cm. *Panthera pardus*- Second phalanx. B) F15C-7, D. 169 – 182 cm; *Panthera pardus*, Distal metapodial. C) G15B-2 D.126 - 137 cm; *Martes foina*. D) F15B-11, D. 212 - 227 cm; *Hyena coprolite*.

2.2. Microvertebrates

These remains are principally composed of fish and rodent remains (fig. 3). The bones were collected after systematic dry sieving of the sediments, a volume of approximately 500 litres which was sieved with three sizes of mesh with apertures of 1 mm³, 2.2 mm and 4.4 mm.

Rodent remains

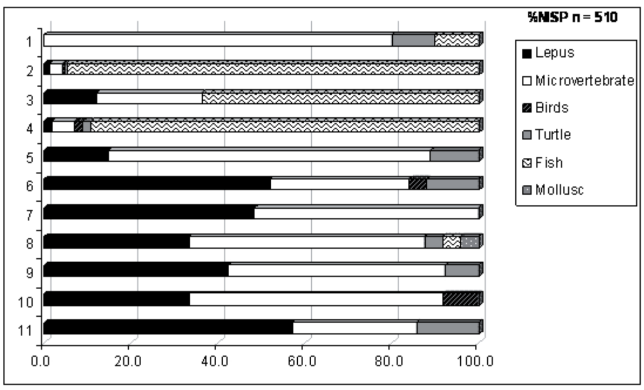

Figure 3 – Yafteh 2005. Distribution of the small vertebrates and non vertebrates by means of NISP.

The collected material was studied by using comparative osteological collections of Iranian rodents at the Department of Rodent Studies of Ferdowsi University in Mashhad. The mandibles and teeth (NISP=30) were washed with HCL (5 %) and separately classified and studied in detail for taxonomic identification. For the rodents, two families and eight species have been identified based on the upper or lower molars recover by dry sieving. The remains are distributed between a depth of 130 cm and 160 cm (fig. 4).

The most abundant species are from the Muridae family. The

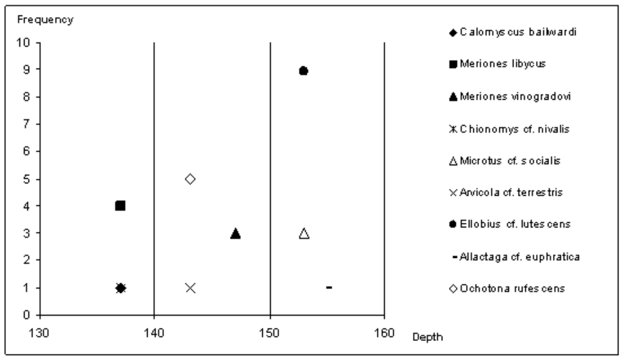

Figure 4 – Taxinomic distribution of the Rodents and Lagomorpha molar and premolars (excepted Lepus) in Yafteh 2005.

Muridae are represented by the Cricetinae (hamster), Gerbillinae (jirds) and the large sub family of Microtinae (voles) for which four species could be identified: the Kurdistan mole-vole (Ellobius cf lutescens), the snow vole (Chionomys nivalis), the water vole (Arvicola terrestris) and the social vole (Microtus cf. socialis). The last rodent group in Yafteh is the Dipodidae, represented by the jerboa (Allactaga cf. Williamsi).

The other microvertebrate group is represented by the Lagomorpha for which two species were identified: the pika (Ochotona rufescens) and the hare (Lepus europaeus) (plate 3).
These last species are also easily distinguishable by their post-cranial bones and were identified in both F and G squares and in various loci. They are present throughout practically all the excavated Upper Palaeolithic sequence.

Rodents and Lagomorpha (except hare) recovered in Yafteh in 2005 result from the pellet accumulation from birds of prey.

Fish remains

Taphonomy of the fish remains

The dry sieving was also important for the recovery of fish remains. Out of 329 remains, 294 were identified (166 in F15 and 163 in G15) (table 3).

They are mostly concentrated in loci 2 and 4, and only one bone in Locus 8. From a taphonomic point of view, burn and heat marks are present in low number on 30 bones (9.12 %). Post-depositional factors may be the cause of these marks; however, human activity aiming at the preparation of the fish for food cannot be

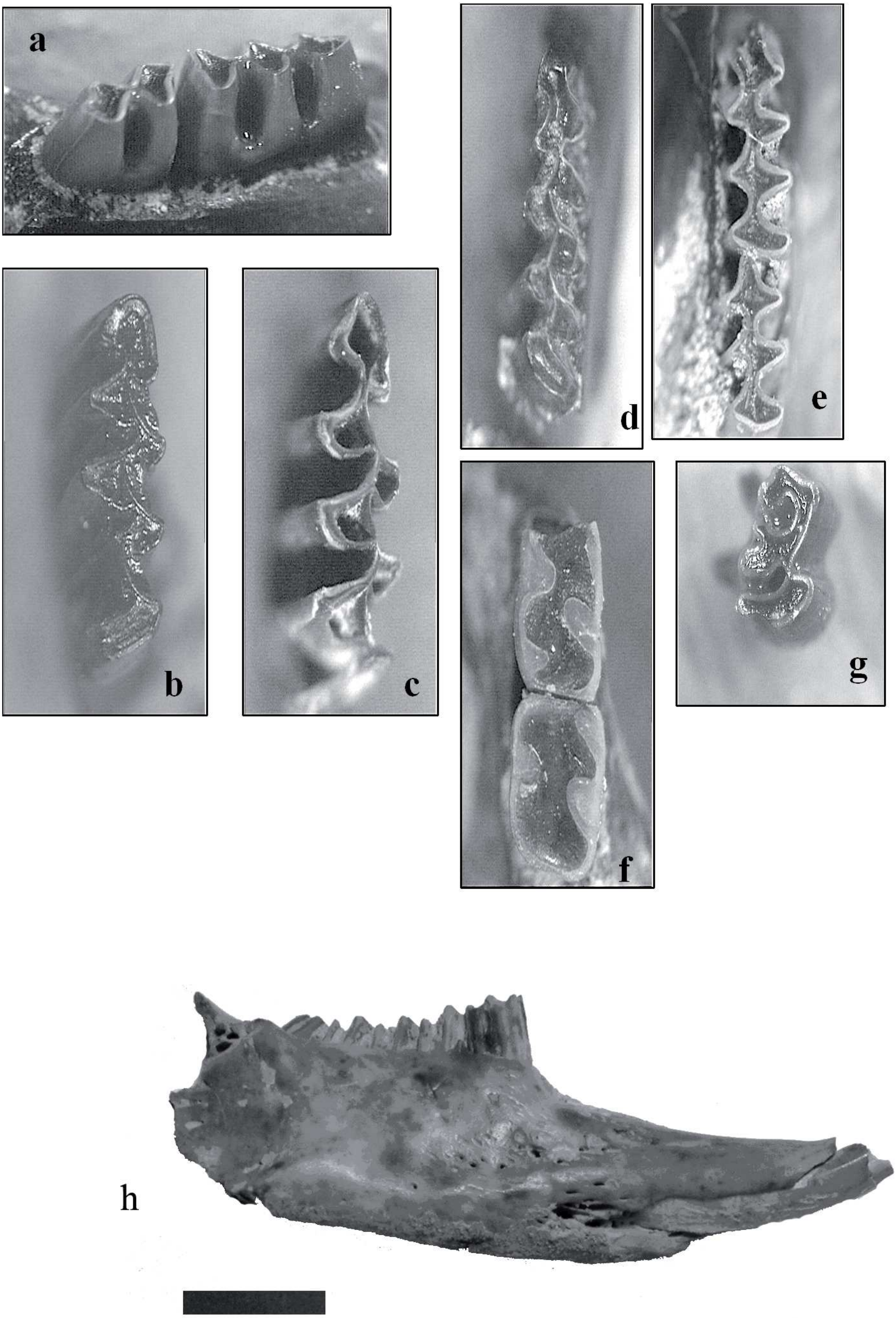

Plate 3 – Rodentia and Lagomorpha in Yafteh (2005). a) Lower molar teeth of *Meriones libycus* (25 x). b)- Lower right molar (M1) of *Chionomys cf. nivalis* (40 x). c)- Lower right molar (M1) of *Arvicola cf. terresteris* (40X). d)- Lower right molar (M1) of *Microtus cf. socialis* (40 x). e)- Lower left molar teeth of *Ellobius cf. lutescens* (40x). f)- Lower right molar containing M1 and M2 of *Calomyscus bailwardi* (25 x). g)- Isolated teeth of *Allactaga cf. Euphratica* (25x). i)- Mandible of *Lepus europaeus*. Pictures b, c, d, e, f and g are here distorted.

	Square F15			
Locus (depth in cm)	Cyprinidae	Leuciscus (?)	IND	**Total**
1 (113-125)	1	2	1	**2**
2 (134-141)	105		11	**118**
3 (137-146)	7	2		**7**
4 (143-153)	30	4	7	**39**
Total F15	**143**		**19**	**166**
	Square G15			
2 (125-140)	111	2	9	**122**
3 (137-147)	14		7	**21**
4 (143-153)	18		1	**19**
8 (179-185)	1			**1**
Total G15	**145**	**2**	**17**	**163**

Table 3 – List of fish taxa by square.

excluded. Only one remain presents modifications due to digestive processes (Nicholson 1993; Wheeler & Jones 1989:61-78; Butler & Schroeder 1998): distortions (figure 1f, plate 4). Other bone modifications were not observed.

Taxonomic considerations

The cranial bones and vertebrae were identified to the taxonomic level of family, represented by one taxon; the Cyprinids (carp fish) all found in loci 2 and 4. Only in one case a pharyngeal bone allowed identification to the level of genera and revealed the presence of a chub (Leuciscus) (plate 4). Leuciscus are represented at least by four species on the basis of morphological differences. It is, however, difficult to identify these species, since no local collections exist.

The reconstruction of dimensions for Cyprinid vertebrae was realized separately for precaudal and caudal vertebrae following the Global Rachidan Profiles (GRP) method (Desse et al. 1989) and data from modern carp (Radu, unpublished data) (table 4). In Figure 5 we report vertical (M1) and horizontal (M2) diameters of all vertebrae, plus the reference data for modern carps (TL=132 mm; TL=28 mm; Tl=265 mm). It can be observed that the maximum values obtained in Yafteh are not higher than 265 mm TL.

The size of the precaudals range between 124 and 231 mm (weight 20-145 g) and the caudals between 133 and 188 mm (25-75 g). Finally, it can be observed that the medium sizes are very small: 150 mm Tl (40 g) , the minimum and maximum varying between 124 mm (10-20 g) and 231 mm Tl (145 g). The Leuciscus individuals are also quite small. The two individuals, whose dimensions were approximate, are 74 and 147 mm Tl (17 and 34 g). Small sized Cyprinids predominate in the assemblage.

Environmental indications

As for the environmental information, Cyprinids live in medium temperature (around 0-15 °C). They need a stable environment, excluding harsh and long winters. The absence of Salmonids and Esocids in a Palaeolithic site and the exclusive presence of Cyprinids is surprising. Trout is today distributed on the upper levels of the Tigris basin[4]; it seems that during the Palaeolithic the species was absent. This might be its most southern limits. The exclusive presence of Cyprinids indicates a mild climate with a relatively short winter. This is in contradiction with Van Zeist and Bottema's studies (1982:278) suggesting a climate "colder than at present […] also much drier".

Taphonomic remarks

It is still difficult to determine whether the fish remains resulted from human (fish consumption) or animal activity (faecal remains, regurgitation pellets from ichthyophagous birds, etc.). Noteworthy is the concentration of the fish remains in loci/spits 2 and 4 suggesting the same groups of consumers. If the assemblage was originated from human activity, then the distribution of the reconstructed fish lengths is similar to the distribution for the captures realized by humans using different fishing gear (gill net, seine

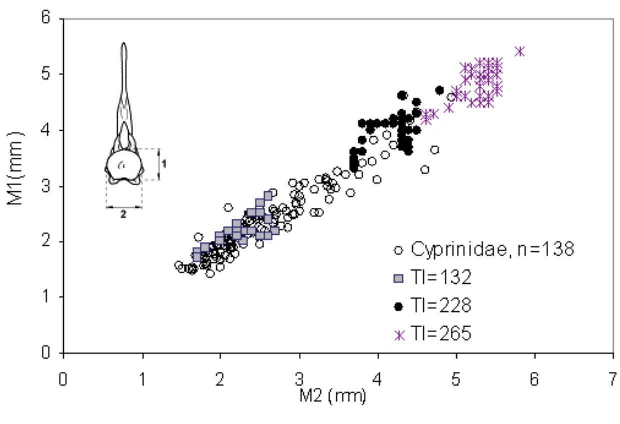

Figure 5 – Vertebras diameters (M1 & M2) of Yafteh in comparison with 3 modern carps *(Cyprinus carpio)*. Plain circles = Yafteh material. Stars, squares and bold circles = comparative matrial.

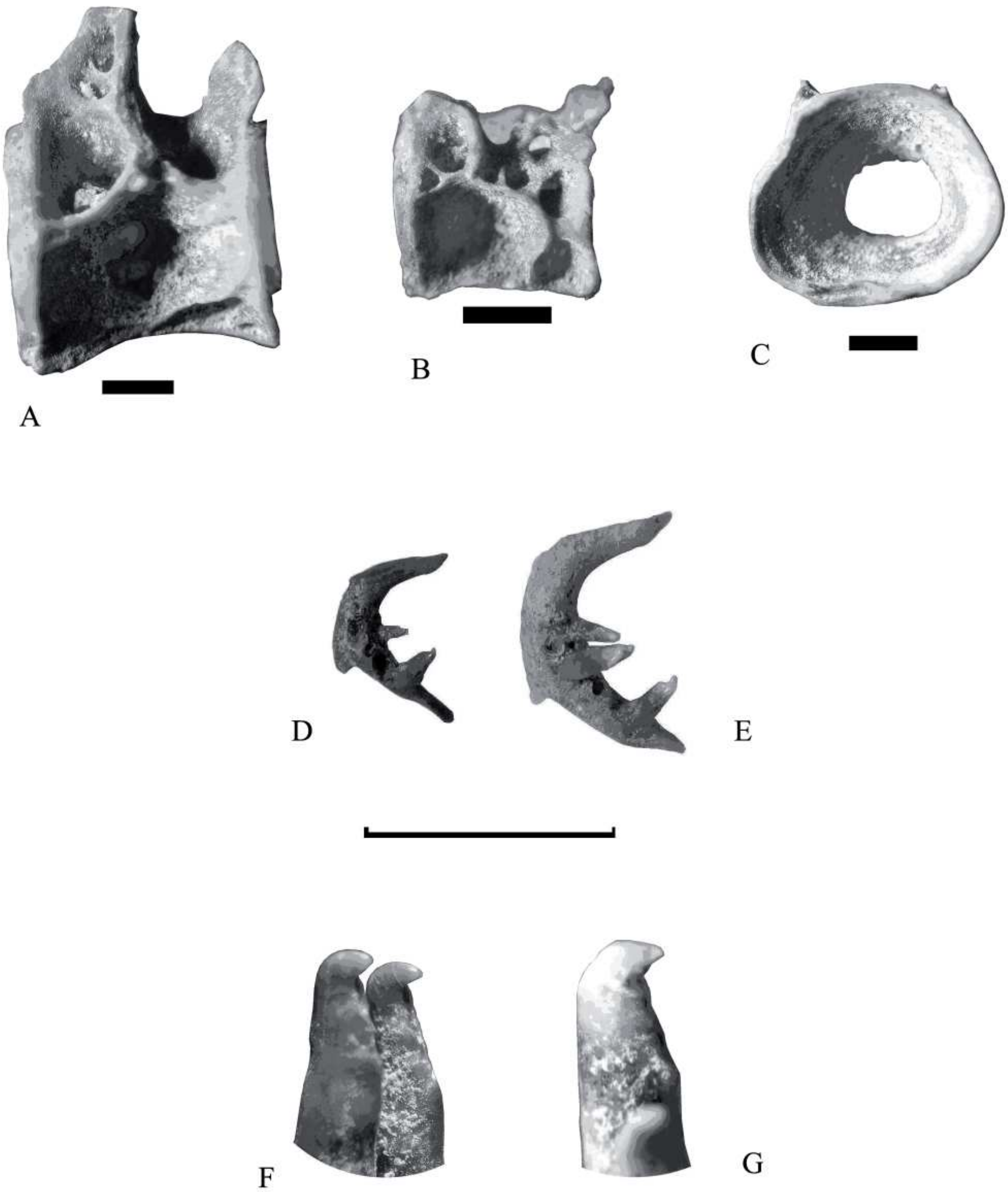

Plate 4 – Fish remains in Yafteh (2005). A, B: Cyprinids, precaudal vertebra. C: Cyprinid, vertebra affected by digestive processes (scale 1 mm). D: *Leuciscus* sp.: *os pharyngeum inferius* from Yafteh. E: *Leuciscus* sp.: *os pharyngeum inferius* from Danube site (scale 1 cm). F, G: teeth details from Yafteh and from Danube site.

Taxa	Bone	Equations	Coefficient of determination
Cyprinus carpio	precaudal vertebra 8	TL = 55.702M1 + 70.287	R^2 = 0.9733
	precaudal vertebra 17	TL = 55.37M1 + 43.155	R^2 = 0.9852
	caudal vertebra 22	TL = 51.786M1 + 55.408	R^2 = 0.9929
	caudal vertebra 33	TL = 64.412M1 + 56.86	R^2 = 0.9857
	Weight	Weight = $1.9697*10^{-5}$ $Tl^{(2.9574)}$	R^2 = 0.995
Leuciscus idus	*os pharyngeum inferius*	TL = 46.195M4+13.592	R^2 = 0.99
	Weight	Weight =$4.3739*10^{-6}$ $Tl^{(3.1819)}$	R^2 = 0.997

Table 4 – Equations for estimate the size (TL in mm and Weight in g).

net, baited hook (Greenspan 1998:974 fig. 1) Also it should be borne in mind that selection can also be due to carnivores. Among those represented in the site the fox, (Vulpes vulpes), the leopard (Panthera pardus), the stone marten (Mustela foina), the badger (Meles meles), and probably the hyenas or bears (indirect evidence or the coprolits) consume food in the hunting place (Van Neer 1997:208). However, the remains can be deposited with the faeces if the animals have come to the cave.

So the question can be posed regarding the origin of the accumulation of these remains, whether they result from carnivore, human or raptor activities, since we also have other microvertebrate remains belonging to pellet deposits.

3. General Discussion

The human subsistence activity in Yafteh is based on the hunting of small size herbivores (Ovis-Capra-Gazella); Capra outnumber Ovis remains and Gazella is represented by an average of 2.5 %. Medium and large herbivores (Cervids and Bos) were also hunted by the inhabitants of Yafteh. Finally, hare seems to be a relatively important component of subsistence range since it is present in all spits.

The presence of cut marks and breaks evidence intensive anthropogenic action on animals bones. The presence of these marks has been observed in near equal amounts in all spits.

As for the microvertebrates, the presence of these remains simultaneously with the anthropogenic material makes it difficult to allocate these remains to either human or carnivore/raptor activities. For the rodent remains, however, the remains belong to pellets. The question could not yet be resolved for the fish remains.

Environmental reconstruction is also an important issue for the general understanding of this Palaeolithic settlement. The rodent remains are statistically too small to allow a reliable environmental image (Fig. 4), although it is diversified. On the basis of the present-day distribution of the represented species, Yafteh Cave may have been surrounded by several ecological niches: steppe lowlands (gazelles, gerbils, jerboa, social vole), piedmont and cooler uplands (wild sheep, wild goat and mouse-like hamster) and forested/bushy zones (red deer, wild boar).

The information yielded by the rodents gives only partial insight into the environmental setting of Yafteh:

1. Because of the concentration of data between a depth of 130 and 160 cm (spits 1 to 4)

2. Because of the limited taxonomic associations in each context, not exceeding two. For a reliable environmental understanding we need more data form all spits and also complementary information from botanical material (carpology and palynology).

On the basis of the available data, it can be concluded that hunting activity in Yafteh was concentrated on small herbivores, and principally wild goats. The understanding of the Yafteh fauna should be also viewed through comparison with other sites in the Zagros (fig. 6).

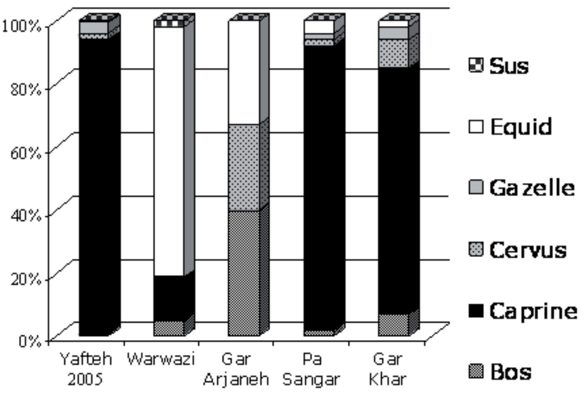

Figure 6 – Faunal spectra of the Zagros Upper Palaeolithic sites.

Brian Hesse in his Gar e Khar paper (1989:41) noted that the Yafteh material compares in many ways to the Upper Palaeolithic samples from Ghar e Khar, Shanidar, Pa Sangar and especially to Karim Shahir, exceptional for their restricted faunal spectra and divergences with some of the other contemporaneous sites in the Zagros. However, the major difference of Yafteh (2005) with these sites is the number of identified remains, more important that the others and which may introduce a bias for comparisons and interpretations. In the meantime, even with error introduced by sample size, narrow specialised faunal spectra tend suggest seasonal occupations[5]. The occupation season of the Yafteh cave is still under investigation with the use of herbivore tooth remains – extremely fragmented – and bone fusion data. Initial analyses show that young or very young animals are present in this assemblage, but a bone survival study should be performed properly on the entire assemblage. If after these analyses the frequency of young animals is still important, we could suggest a spring /summer occupation of the site.

4. Conclusion

On the basis of a significant bone sample, the following observations can be made:

1. All the mammalian species are still living on the Iranian Plateau.
2. Hunting activity in Yafteh was concentrated on small herbivores, and principally wild goats.
3. No major changes are observed in the faunal composition and distribution along the sequence represented by 12 Spits/loci, especially striking when examining the weight diagram (fig. 2b).

On the basis of the present-day distribution of the represented species, Yafteh Cave might have been surrounded by several ecological niches. Steppe lowlands (gazelles, meriones, allactaga, social vole), the piedmont and the cooler uplands (wild sheep, wild goat and mouse-like hamster) and the presence of forested spots suggested by the presence of red deer, wild boar and hare. Important issues to be examined in detail are the understanding of the environmental setting and the dissociation of the anthropogenic and natural contribution in the present faunal spectrum since the site seems to have been occupied simultaneously by humans and carnivores within a seasonal alternation. Other issues that are currently being studied on the Yafteh material are the mortality profiles, with the help of biochemistry. The latter will help in documenting the seasonality of the food resources. Future investigations in Yafteh Cave should be more intensively concentrated on the recovery techniques of microvertebrates and the recovery of other bioenvironmental markers (insects and parasites), complemented with botanical studies.

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Notes

[1] A short report of the faunal remains of Yafteh Cave was published in Otte *et al.* 2007.

[2] The Percentage of Representation of skeletal parts was calculated here by correcting the NISP of each bone to the actual representation of the bone in the skeleton (e.g., herbivore phalanges: the total number of phalanges was divided to 8).

[3] The 1 mm aperture was unfortunately not used, not easily compatible with dry sieving and the hard sediment.

[4] Recently the European brown trout Salmo trutta was artificially introduced in the upper part of the Tigris River basin (where populations still existed in the 1970s (Banarescu 1977:47). From the Zagros Mountains near Kerman, two records exist (Walczak 1972 cited by Code B.) that have not been confirmed by specimens.

[5] The practical absence of aurochs and the total absence of Equids are noted in Yafteh Cave.

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VI - THE EARLIER UPPER PALAEOLITHIC: A VIEW FROM THE SOUTHERN LEVANT

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1. Introduction

Southwest Asia encompasses Anatolia, the Levant, Cyprus, Mesopotamia, Arabia and, sometimes, Transcaucasia, as well as Iran. Prehistoric research within this vast region has been patchy, with a notable historical bias on the Levant. Pioneering prehistoric research there and further afield was Euro-centric in outlook, as demonstrated by the initial six stage unilinear model proposed for the Levantine Upper Palaeolithic by Neuville (1934) and subsequently modified by Garrod (1951). Even much later, prehistoric phenomena continued to be evaluated in comparison with European 'counterparts' (e.g. Bordes 1977).

Comparisons between the Levantine archaeological record and that from other Southwest Asian regions have been problematic, especially with regards data from stratified cave and rockshelter sites. Some of this data derives from old excavations that did not employ the rigorous methodology of present-day research, and thus one can question the very integrity of some of this information. A point to bear in mind is the fact that from the beginning of explorations in the Levant, it was conducted by different schools of prehistoric research. These circumstances have been a prime-mover with regards competing theoretical frameworks to explain the local archaeological record (see e.g. Marks 2003). In the late 1960's the later part of the Upper Palaeolithic sequence (post ca. 23,000 years) was re-defined as a separate unit, namely the Epi-Palaeolithic (for the history of research see Belfer-Cohen & Goring-Morris 2002). Still, during the earlier part of the 1970's discourse on the Levantine Upper Palaeolithic largely revolved around the aforementioned unilinear conceptual framework (e.g. Bar-Yosef 1970; Copeland 1975; Garrod 1957; Perrot 1968; Ronen 1976; Rust 1950). It was only following fieldwork within the marginal regions of the southern Levant that this unilinear developmental model was replaced by a radically new hypothesis relevant for the entire Levant. This new approach posited the presence of parallel Upper Palaeolithic phyla, encompassing at least the 'Ahmarian' and the 'Aurignacian' traditions (Gilead 1981; Marks 1981; and see Belfer-Cohen & Goring-Morris 2003 for an overview).

However, the 'European' frame of reference lingers on, as some researchers continue, for example, to impose the definitions of the 'Aurignacian' as originally formulated in Europe upon archaeological entities in the Levant and elsewhere in Southwest Asia. This is quite problematic bearing in mind that the term 'Aurignacian' was for a long while accepted in Europe as a generic synonym for 'Early Upper Palaeolithic'. Over time, it became apparent that various entities (in Europe and elsewhere) defined as 'Aurignacian' *sensu lato* differ in their specific techno-typological characteristics. These observations have caused profound changes in how the 'Aurignacian' is perceived in European research (and see Mellars 2009; Teyssandier 2008; Teyssandier et al. 2010).

Another issue to be addressed concerns the terminology of the technological and typological frameworks. This is most notable in the plethora of names used to describe the projectile points characteristic especially of the earlier phases of the Upper Palaeolithic – whether the Font Yves/Krems/Umm el-Tlel/Arjaneh/el Wad/Ksar Akil points – these terms have all been used at various times to describe what are basically, more or less symmetrically pointed blade/lets fashioned using inverse and obverse retouch (and see Copeland 1986 for a discussion of lumping all those types together). In the Levant such forms are present in both the Ahmarian and the Levantine Aurignacian (and see below): this has caused considerable confusion, as originally and in some places to this very day, the tool type was considered to represent a strictly Aurignacian feature (i.e. in the West European 'classical' Aurignacian). The same is true for the Dufour bladelet category, which comprises a great variety of morphotypes and is present in almost all Upper Palaeolithic entities in the Levant, and elsewhere, with differences in their reported frequencies stemming mostly from the quality of the excavation methods (i.e. with or without wet sieving procedures).

Carination was accepted by all and sundry to be a synonym for the 'Aurignacian', yet it was encountered in clearly much later industries from the Epi-Palaeolithic Kebaran in the Levant (Bar-Yosef 1991) to the Upper Palaeolithic industries of Georgia (Bar-Yosef *et al.* 2011). Moreover, A.E. Marks was the first to draw attention to the fact that most of the carinated items in the Upper Palaeolithic 'flake' industries are of the lateral variety, so much so that this was the only new tool type he had defined for the assemblages he had excavated in the Negev (Marks 1976), otherwise using as a rule type-lists designated for the European UP. And indeed, flat carinated items are reported only from the sporadic Levantine Aurignacian assemblages, while all the other industries with high percentages of carinated items display mostly the lateral variety (Belfer-Cohen & Grosman 2007). This contrasts with the European Aurignacian, where flat carinated items outnumber lateral varieties.

Altogether the Levantine Upper Palaeolithic currently spans some 25,000 years, beginning ca. 50 k calBP, and concluding with the shift to the Epi-Palaeolithic at ca. 23 k calBP with the onset of the Late Glacial Maximum. The dating of the Middle to Upper Palaeolithic (MP-UP) transition in the Levant is currently based on readings from the latest Mousterian and the earliest Initial Upper Palaeolithic (IUP) - and see the sequence of both TL and 14C dates at Kebara cave, though the IUP there is missing (Rebollo *et al.* 2011 and references therein). It appears that the MP-UP shift occurred between ~48.5-47.1 k calBP, corroborating the ^{14}C dates of ca. 50 k calBP for the IUP levels 1-2 at Boker Tachtit (Volkman & Kaufman 1983). In the following pages we shall focus upon the local UP record through to ca. 30 k calBP, without presenting the later part of the sequence. Accordingly we shall not present later UP industries, including the 'Atlitian' and the late Ahmarian/'Masraqan' (Garrod & Bate 1937; Belfer-Cohen & Goring-Morris 2003). Furthermore, the shift to the Epi-Palaeolithic at the beginning of the LGM, ca. 23 k yrs ago, cuts the Levantine UP short as compared to its duration elsewhere, until the beginnings of the Holocene.

2. The emergence of the Levantine Upper Palaeolithic

A technological shift is observed in the transformation from Middle to Upper Palaeolithic, from surface exploitation (for flake blanks) to volumetric concepts (for blade/let production); yet we believe that the 'radical' aspect of this change has sometimes been over-emphasized (see Bar-Yosef 2000; Bar-Yosef & Kuhn 1999; Belfer-Cohen & Goring-Morris 2007, 2009). From a typological perspective, the characteristic forms of the late Middle Palaeolithic, i.e. flake-based points and sidescrapers, were replaced by endscrapers, burins, and blade/let forms.

It is interesting that the genetic evidence indicates a more radical scenario, as opposed to the gradual transformation indicated by the flint assemblages, for the MP-UP transition, with modern humans dispersing out of Africa (e.g. Olivierri *et al.* 2006). The tempo of modern human migration into and through the Near East is indicated by new ^{14}C dating in key sites (e.g. Mellars 2006; Bar-Yosef 2007). However, since human remains are almost absent for the time period involved, it is currently impossible to clarify the inter-relationships between the newcomers and the local populations in the region as a whole. Evidently, one has to be very careful when trying to connect between archaeological entities and discrete ethnic groups. World-wide, this has been a much debated issue pertaining to the prehistoric sequence. While the topic is beyond the scope of the present article, one can refer to the discussions focusing on the meaning of variability during the local Epi-Palaeolithic (and see Clark 1991; Clark & Lindly 1991; and debate in Goring-Morris *et al.* 1996).

2.1 The Initial Upper Palaeolithic (IUP)

During initial research in the Levant it was accepted as a given that Early Upper Palaeolithic lithic assemblages comprised 'archaic', Mousterian elements, i.e. Levallois products and sidescrapers, in tandem with 'new', Upper Palaeolithic tool types, i.e. blades, endscrapers, and burins, heralding the fully-fledged Upper Palaeolithic to come. Neuville (1951), in considering the first post-Mousterian industry, as recognized at Emireh cave, called it 'Upper Palaeolithic Phase I'. Garrod (1955) then suggested labeling this entity as the 'Emiran', based on her studies of both the material from Emireh cave and el Wad cave layer E.

Later research revealed the presence of at least two IUP provinces in the Levant. Ksar 'Akil rockshelter is a unique key site on the Lebanese littoral, with 15 m of Upper and Epi-Palaeolithic deposits. After a hiatus following the Middle Palaeolithic, the lowermost UP layers (layers XXV–XXIV) are considered as representing a 'Transitional Industry', since the assemblages display typical UP typologies combined with a characteristic MP technology (Azoury 1986; Copeland 1975; Ohnuma 1988).

A similar but different blend of 'transitional' characteristics was observed at Boker Tachtit in the Negev (Marks 1983; Marks & Kaufman 1983; Volkman 1983), where refitted cores revealed that Mousterian morphotypes, i.e. Levallois points, were produced using an Upper Palaeolithic bi-directional blade technology. This represents a change in the knappers' concept of the nodule's volume (the so-called north African 'Nubian' concept – and see Belfer-Cohen & Goring-Morris 2007, 2009) differing significantly from the local late Mousterian, which is characterized by a convergent Levallois point technology (Meignen & Bar-Yosef 1991; Kerry & Henry 2003). Accordingly, the term 'Transitional Industry' denotes a local cultural transition from the Levantine MP into the UP; this has biological implications, since continuity in the realm of lithic production could also reflect biological continuity (Kuhn 2003; and see above).

In the northern Levant, at Ksar 'Akil, the 'Transitional' industry is characterised by chamfered items on Levallois blanks – items shaped by a tranchet-type removal, producing a bevelled edge (Newcomer 1968-69). Interestingly, similar chamfered items are common in the Dabban layers at Haua Fteah cave, Cyrenaica (Libya), in the local IUP culture (McBurney 1967). Chamfered items also appear at the surface site of Nag Hamadi in the Nile valley (sometimes considered Proto-Dynastic in age), while only one small surface assemblage has been collected to date in the Negev (Goring-Morris & Rosen 1989).

Long-distance similarities have been observed also for the other known IUP variant, the 'Emiran', which is characterized by bifacially thinned Emireh points. Assemblages pertaining to this variant are known mostly from the southern Levant, including surface finds in Lebanon, where they chronologically overlap with the chamfered elements (Copeland 2001). Among the most prominent 'Emiran' assemblages are Boker Tachtit levels 1-2, which bear remarkable similarities to the distant Moravian 'Bohunician' entity (Svoboda & Bar-Yosef 2003 and papers therein; Tostevin 2003).

Accordingly, it seems plausible to suggest that both IUP variants reflect diffusions by long-range, 'leap-frogging' movements of highly mobile groups, on their route from Africa to Europe, a hypothesis substantiated by the dates of those industries, which are earlier in the Levant as compared with their European counterparts.

The assemblages of Ksar ‘Akil layers XXIII-XXI/XX that overlie the 'chamfered' IUP feature single platform pyramidal cores for serial production of convergent blades and elongated, facetted Levallois-type points (Ohnuma & Bergman 1990); here we note resemblances to the IUP Emiran variant at Boker Tachtit. Additionally, somewhat similar techno-typological attributes were uncovered at Tor Sadaf in southern Transjordan (Fox 2003), where, notwithstanding the absence of Emireh points, the reduction sequence comprises a uni-directional technology for the production of blades and elongated triangular blanks with facetted platforms, i.e. corresponding morphologically to 'Levallois points'. Thus, the production of an ‘old’ tool form using ‘new’ core-reduction strategies testifies for a certain degree of continuity. Furthermore, blade production, a distinctive characteristic of the IUP industries in addition to the production of triangular points, has been observed within the Nile Valley (and see the Mousterian site of Taramsa [van Peer 2004; Vermeersch 2001]). This may correlate with the genetic evidence for a ‘wave of advance’ of groups from Africa (Olivierri *et al.* 2006) through the Levant, although the possibility of movement from the Horn of Africa via Yemen is also feasible (Rose 2010; Rose *et al.* 2011).

Another IUP site, situated in the el-Kowm basin of northeast Syria, within the steppic belt, is the open-air site of Umm el Tlel. Here, layers II Base and III 2A overlie a long Mousterian succession, characterized by a 'para-Levallois' reduction sequence (Boëda & Muhesen 1993; Bourguignon 1998). Many of the cores in these layers are volumetrically flat, producing numerous blades that mostly resemble narrow and elongated Levallois - 'Umm el Tlel' – points, which feature uni-directional scar patterns. These cores grade into 'regular' blade core types, thus marking the technological change at the beginning of the UP; these are somewhat akin to those at Tor Sadaf. The assemblages at Umm el-Tlel also display a pronounced UP character, comprising numerous burins and endscrapers. As in other IUP assemblages, these layers furnish some MP elements, such as the Nahr Ibrahim technique, notches and denticulates. However, the available dates (AMS date of 34 k calBP and a TL date of 36 k for III2A) seem rather late compared with IUP dates elsewhere.

IUP assemblages were also uncovered further north in the Levant, at the coastal Turkish sites of Üçagizli and Kanal caves. These assemblages are blade-based, with faceted striking platforms, comprising ‘Umm el-Tlel points’, a few chamfered pieces, endscrapers, burins and retouched blades (Kuhn *et al.* 2009). Noteworthy are the marine mollusc beads found in Üçagizli, which are similar to those reported from IUP layers at Ksar ‘Akil (Kuhn & Stiner 2007).

2.2 The Early Upper Palaeolithic

The revolutionary notion that there are locally more Early Upper Palaeolithic cultural entities than the Aurignacian and its derivatives (as was accepted in Europe and assumed to be valid for all other regions of the Old World) was suggested independently by both Gilead (1981) and Marks (1981), based on research in the Negev and Sinai, thus defining the 'Ahmarian'. The evidence they presented was subsequently reinforced by data from the Mediterranean zone, whether by new discoveries, publication of previously excavated sites, or the re-interpretation of finds (Azoury 1986; Bachdach 1982; Bar-Yosef *et al.* 1996; Bar-Yosef & Belfer-Cohen 2004; Bergman 1987; Ohnuma 1988). The 'Ahmarian' was actually first observed in the much earlier excavations at Qafzeh and Erq el-Ahmar caves (Neuville 1951); yet, preconceptions barred an awareness of this UP variant and its significance at that time (and see Ronen 1976). It is of interest to note that layer XVII at Ksar ‘Akil yielded the earliest Upper Palaeolithic *Homo sapiens* burial (‘Egbert’) recovered in the Levant (Bergman & Stringer 1989; Williams & Bergman 2010). The Ahmarian was eventually subdivided into an Early - ca. 45-30 k calBP - and a Late phase - ca. 30-23/22 k calBP (Belfer-Cohen & Goring-Morris 2003). In the southern and eastern steppic margins there appears to have been a greater degree of Ahmarian continuity than in Mediterranean coastal areas, where the cultural sequence appears to have been interrupted by the incursion of the Levantine Aurignacian.

The Early Ahmarian (ca. 42-30/25 k calBP)

The earliest dates for the Early Ahmarian were obtained for levels IV-III at Kebara (Bar-Yosef *et al.* 1996). While it is indeed found throughout the Levant, the Early Ahmarian is most clearly expressed in the semi-arid margins, as small and relatively ephemeral open-air sites, often adjacent to springs, most probably reflecting occupations by small groups of highly mobile foragers e.g. Boqer, Lagama, Qadesh Barnea, Ain Qadis, Abu Noshra, Wadi Hasa and Nahal Nizzana (Becker 2003; Gilead & Bar-Yosef 1993; Marks 1983; Monigal 2003). Occasionally, however, larger base-camp sites are found, e.g. Sde Divshon and Azmon (Ferring 1976; Phillips & Saca 2003). In the Mediterranean zone the Ahmarian lasted from ca. 42 k calBP until the arrival of the Levantine Aurignacian at about 37/33 k calBP. Prominent sites include cave and rockshelter occupations such as Erq el-Ahmar, Kebara, Qafzeh and Ksar Akil (Belfer-Cohen & Goring-Morris 2003).

The common denominators of all Early Ahmarian assemblages include series of standardized, symmetrical convergent blade/let blanks produced from single platform, narrow-fronted cores. Blanks for other tool classes, such as scrapers and burins derived from the initial setting up of the core preforms (Becker 2003; Davidzon & Goring-Morris 2002; Monigal 2003). The el-Wad point initially defined by Garrod (1957) and considered as a *fossile directeur* of the Levantine Aurignacian, is the most notable tool form. Other finds categories include rare bone tools (Coinman 1997), Mediterranean dentalium beads, as well as ochre, which is quite common in many sites. Rare, unmodified grinding stones have been documented at Qafzeh and Boqer (Gilead 1991). It is worth recalling that there is evidence especially in more peripheral areas, for local continuity at least through to and including much of the LGM (Goring-Morris 1995).

The Levantine Aurignacian (ca. 37-33 k calBP)

As noted above, just as the Aurignacian bearers in Western Europe, the Cro-Magnons became synonymous with modern humans, the term 'Aurignacian' came to globally designate virtually all early

Upper Palaeolithic industries. Thus also in the Levant, industries postdating the local Mousterian were called 'Aurignacian', even though many of the assemblages lacked 'typical' Aurignacian characteristics. The obvious differences were explained through different environmental backgrounds, admixtures of local traditions, etc. This was compounded by diverse interpretations as to the meaning of what constitutes the 'classic' definition of the Aurignacian (and see Clark & Riel-Salvatore 2009; Mellars 2009). As an example, for quite a while, the presence of carination was considered as a prominent hallmark of the 'Aurignacian', even though this technique appears more than once in the prehistoric record (including the 'Ahmarian', e.g. Boker BE [Marks 1983: fig.9-15] and the Epi-Palaeolithic 'Kebaran' [Bar-Yosef 1991]). Moreover, it transpired that it is crucial to differentiate between lateral carination and flat carination (Belfer-Cohen & Goring-Morris 1986; Marks 2003; Williams 2006, and see above). Indeed, it is instructive to follow Garrod's growing unease with the situation of using European 'yardsticks' : *"… the small, sharp Font-Yves point, which is the special feature of Upper Palaeolithic III* [i.e., the Levantine Aurignacian of today]*, is hardly known in the West"* (Garrod 1953:25). *And, additionally, "… the Upper Palaeolithic III represents the stage at which an incoming Aurignacian group made contact with the natives, adopting and developing the Font-Yves point, which was missing from their original tool-kit, and which in any case rather soon went out of fashion again" (ibid.: 33).*

Nonetheless, during the 1968 'Ksar Akil conference' it was decided (by broad consent) to incorporate all pre-LGM UP variants in the Levant under the term 'Levantine Aurignacian', enumerating the specifics of the particular characteristics of each stage, i.e. the division of the (Lebanese) sequence into 'Levantine Aurignacian A', 'B' and 'C' (Copeland 1975). Notwithstanding the subsequent definition of a quite separate and distinct UP strand (i.e. the Ahmarian), the definition of an 'Aurignacian' entity in the Levant using European criteria still lingers on. While in the Levant the decoupling of this automatic association has been under way for some time, this is not the case elsewhere in Southwest Asia (and see below).

It was merely by a fluke that the first UP assemblages to be excavated in the Levant resembled the European Aurignacian more than other assemblages that were uncovered during subsequent exploration. Nowadays, after 80 years of investigation, the geographic distribution of the Levantine Aurignacian (*sensu stricto*), which indeed is the only entity to share many common denominators with the European Aurignacian, is restricted to a few cave and rockshelter sites within the Mediterranean zone, e.g. el-Wad, Kebara, Raqefet, Hayonim, Ksar Akil and Yabrud. All other assemblages previously assigned to this taxon were re-checked and re-assigned to different, distinct entities. The ^{14}C dates available are quite dispersed, and it seems that the Levantine Aurignacian reflects but a brief incursion into the region, most probably via Anatolia (Goring-Morris & Belfer-Cohen 2006; Kozlowski 1992). Indeed, its dates are later than those available in central/western Europe (Conard & Bolus 2003). Apparently, the Levantine Aurignacian was thus briefly contemporaneous with the Early Ahmarian, which continued to develop in the steppic regions (Bar-Yosef *et al.* 1996; Lengyel *et al.* 2006). Levantine Aurignacian occupations are quite limited in scope, such as that in Hayonim cave, where it was located in a depression, with a few hearths accompanied by a 'kitchen midden' (Belfer-Cohen & Bar-Yosef 1981).

The technological attributes of the Levantine Aurignacian lithic industry comprise mostly tool blanks made on blades and, to a lesser degree, (twisted) bladelets. Yet the vast majority of the debitage items comprise flakes. The tool types include 'classic' Aurignacian features, à la Western Europe in the sense of 'Aurignacian I', such as nosed and shouldered flat carinated items on flake blanks, Dufour bladelets, scalar retouched items, and a rich bone and antler industry including horn bipoints (Newcomer 1974). Two split-base points, a hallmark of 'Aurignacian I' were reported from Kebara and Hayonim caves (Belfer-Cohen & Bar-Yosef 1999). The bone/antler points seem to have largely substituted the stone points of the Ahmarian. Other unique finds were two engraved limestone slabs at Hayonim, a number of pierced pendants on teeth of medium-sized mammals and notations on animal bones (Belfer-Cohen & Bar-Yosef 1981, 1999; Davis 1974; Marshack 1997).

Unnamed Flake-based Entities (post ca. 30 k calBP)

This later UP entity (sometimes called 'Arqov/Divshon') is distributed primarily in the arid zones of the Levant (Marks 1983, 2003). Again, the chronological position of the entity remains problematic, although the stratigraphic evidence indicates that it postdates most of the Ahmarian. These assemblages are characterized by laterally carinated items on thick flakes ('scrapers', 'burins' and/or 'cores') that differ significantly from classic Aurignacian flat carinated items; they had previously been included within the 'Levantine Aurignacian' tradition (Belfer-Cohen & Grosman 2007; Gilead 1991; Marks 1981; Williams 2003). In the Negev and Sinai this entity includes assemblages from: Har Horesha I, Ein Aqev (D31), Boqer C, Qadesh Barnea 602, Qseimeh II, Ramat Matred/Har Lavan, and Shunera XV, as well as the Madamagh sites in southern Jordan and others in the el-Kowm region east of the Rift Valley (and see Belfer-Cohen & Goring-Morris 2003). While several radiocarbon dates are available, most sites lack tight chrono-stratigraphic control, but it seems likely that most fall between 30-22 k calBP (Belfer-Cohen & Goring-Morris 2003).

3. The Levantine Early UP in the broader Southwest Asian context

Until recently prehistoric research in the huge expanses to the north of the Levant (of mountains, inter-montane valleys and plateaux) has been at best patchy and sporadic. We are constrained to discussions concerning the techno-typological configurations of particular assemblages, frequently located hundreds of kilometres apart. Moreover, as noted in the introduction, the very integrity of supposedly 'referential' assemblages is often doubtful. An illustrative example is the claim for in situ evolution from the MP based on the presence of Mousterian elements within local UP assemblages. This claim was first introduced for the Zagros UP on the basis of a study by Olszewski and Dibble (1994, 2006) of the assemblages from Warwasi, excavated in 1960 (Braidwood *et al.* 1961). Moreover, the earliest UP assemblages from that site were given a new taxonomic denomination, the 'Zagros Aurignacian'. Up to that time, the Zagros early UP was recognized as a local entity, the 'Baradostian' as defined by Solecki (1958), following his excavations in layer C in Shanidar cave. The identification of the assemblages from Warwasi, Shanidar and Yafteh (Hole & Flannery 1967) as 'Aurignacian' was endorsed by Otte and others who took it a step further by proposing that this entity actually represents the origins of the 'classical' European Aurignacian (Otte 2007, 2008; Otte *et al.* 2007; Otte & Kozlowski 2009).

While some have claimed that it was actually Garrod who observed the similarity between UP industries from Zarzi and the European Aurignacian (Garrod 1930), it is worth recalling that those assemblages studied by her actually date to the later UP, and are today broadly recognized as the 'Zarzian' Epi-Palaeolithic entity. The use of the term 'Aurignacian' by Garrod thus reflected the terminology of her time, when everything related to the Upper Palaeolithic was considered as 'Aurignacian' *sensu lato*... (Olszewski 1999). This is one of the reasons why it is difficult for us to accept the terminology of a Zagros 'Aurignacian', or that the European 'Aurignacian' originated from a local MP to UP evolution in the Zagros. Indeed in the Levant, we have witnessed a progression from broad acceptance of a lengthy and widespread 'Aurignacian' presence, to one where, today, many researchers restrict the use of the term to but a few distinctive and often short-lived assemblages (and see above). We currently find it problematic to follow the reasoning of the local evolution proponents; thus, while Otte & Kozlowski (2009) note that the local Zagros Mousterian evolves quite naturally into the Aurignacian, sharing many common techno-typological traits, Otte *et al.* (2011: p.6) state that the lower part of the UP sequence at Yafteh is actually more attuned with Ahmarian techno-typology, while 'Aurignacian' characteristics only begin to appear higher up the sequence: *"The main arguments are technological and chronological analogies between the lower occupations at Yafteh and the Early Ahmarian (although typological differences exist) and technological and typological analogies between the upper occupation in Yafteh and the Levantine Aurignacian sensu lato".*

Undoubtedly there are techno-typological traits observed in the Zagros UP assemblages similar to those of the West European Aurignacian (sharing these traits, to various degrees, with other UP assemblages elsewhere in Europe and Southwestern Asia). Yet, tracing and following particular characteristics over huge distances is approaching research from a 19th century paradigm, by ignoring the distinctive nature of local adaptations and regional variability. Clearly, there were connections between regions, yet one should take into consideration also the fact that there were also certain independent local trajectories, as demonstrated in the UP sequence of the Levant as well as in the Zagros.

Indeed, we should note that similarities may indicate: a) parallel or convergent developments; or b) even if elements were introduced from elsewhere, in no time (by prehistoric standards) those will be assimilated within local traditions, or adapted to particular local conditions. The only option to explain wide-ranging overall similarities is by accepting the notion of total replacement, as observed shortly after it occurred. Thus it is difficult for us to believe that the local early UP at Yafteh represents a mirror-picture of the French Aurignacian. Moreover, it was Garrod herself who suggested to Solecki to define the local UP he excavated at Shanidar as 'Baradostian' (having herself [in 1930] evaluated every post-Mousterian assemblage with a European measuring stick), thus bringing to an end the rule of Eurocentric orientation. Indeed, we need to balance both the existence of local developments and interactions, together with the 'larger' picture of highly mobile groups moving rapidly over huge distances, with the southwest Asia serving as a bridge between Africa and Eurasia. Accordingly, we need to be cautious when defining endemic occurrences, without introducing terminologies based on a priori paradigms.

Here, a good example is the definition of the same lithic points as hallmarks of both the Levantine Ahmarian and Aurignacian complexes (and see above). Already in early 1950's Dorothy Garrod (1953) had concluded that the frequencies of points and Dufour bladelets in the Levant (but also in the Zagros, see values for those tool types at Yafteh [Otte *et al.* 2007]) are much higher than those reported from European sites; she accordingly concluded that these were local morphotypes, adopted by incoming Aurignacian groups (and see the full citation above).

At the present level of knowledge, one should be cautious defining complexes just through single elements as has been demonstrated time and time again. One can mention again the presence of 'Aurignacian' elements such as carinated scrapers and scalar retouched blades, which both appear in small numbers within Ahmarian assemblages (e.g., Marks 1983, Fig. 9.9 – the site of Boker A and figs. 9.15, 18 – the site of Boker BE). Indeed, they even appear in later industries, such as the Middle Epi-Palaeolithic Ramonian (ca. 16/15 k calBP) assemblage from Nahal Neqarot (Belfer-Cohen 1994). Without going into details suffice it to state that we are witnessing morpho-typological convergence rather than direct linear evolution.

The Yafteh assemblages (Hole & Flannery 1967; Bordes & Shidrang 2009; Otte *et al.* 2007) are described differently by the various scholars who studied the material excavated by Hole and Flannery in the 1960's. Thus J.-G. Bordes and Shidrang identify a sequence of two different technological traditions, the older producing straight blade/lets from prismatic cores, with 'Arjeneh' points that broadly correspond to el Wad points. Later UP levels feature narrow-fronted cores (including lateral carinated) and twisted retouched (Dufour) bladelets. Others, such as Otte *et al.* (2007) see a direct *in situ* evolution from the Middle to early UP, considering this to be the birthplace of the entire Eurasian 'Aurignacian' phenomenon, which then spread westwards and southwards, an archaeological simile for later 'Indo-European' diffusions.

Granted, similarities with the Aurignacian are observed at Yafteh; but still, there is also a very distinct local character, so much so that in the most recent publication Otte *et al.* (2011) state: *"Yafteh could then be seen as a hypothetical taxonomic unit between a technological tradition derived from the Early Ahmarian and the Levantine Aurignacian."* If one is to acknowledge that this industry is evolving along its own, particular trajectory, then why not call it by a local name: the Baradostian?

There are researchers who consider also assemblages from Anatolia (i.e. Karain and Ökuzini) as variants of the 'Zagros Aurignacian' (Otte 2008), corresponding to movements by modern humans with their 'Aurignacian' industries out of Central Asia into Anatolia and thence into Europe. Yet there is currently no evidence to indicate that 'Zagros Aurignacian' assemblages predate those in Europe (Otte *et al.* 2011).

The initial appearance of the UP in Southwest Asia seems to have differed from region to region, reflecting local evolution as well as the very existence and intensity of inter-regional connections.

Unfortunately, we can reconstruct but only a small part of the processes leading to the appearance and development of the UP in each region. Within the Levant the transformation from MP to UP was relatively rapid, being characterised by considerable techno-typological variability. Recently published dating places the end of the Mousterian in the southern Levant at ca. 49,000 calBP with the earliest Ahmarian occurrence dated to ca. 47.5 k calBP, thus providing a time range for the local IUP (Rebollo *et al.* 2011). By contrast, in the more northerly regions of the Taurus/Zagros (and the Caucasus [Bar-Yosef *et al.* 2011]) the earliest dates for the local UP in Yafteh cave cluster ca. 39-36 k calBP (Otte et al. 2011, Table 1), so that there is no evidence for parallels with the Levantine IUP. Indeed, though the record remains fragmentary, with poor chronological control, there are indications that within the rugged mountainous areas of the Taurus, Zagros and Alburz, occupations were relatively ephemeral, perhaps with gaps corresponding to colder phases.

The Levantine IUP developed into the blade-based pan-Levantine Ahmarian tradition, which thrived in more steppic regions. The evidence available could indicate that some of highly mobile Ahmarian groups budded-off and left their historical 'core-area'. Moving by way of southern Anatolia to the Danube valley and/or the Mediterranean and thence into central and western Europe, they may be responsible for the so-called 'Proto-Aurignacian' (e.g. Bon 2000). Subsequently, following the emergence of the 'classic' Aurignacian in Europe, a brief incursion back into the Mediterranean portions of the Levant corresponds to the 'Levantine Aurignacian', which appears to have had a limited impact on future local developments.

Overall, one can observe close ties between our current comprehension of cultural processes and the relative intensity of research on the UP throughout Southwest Asia. While numerous phases and facies are recognized and defined in the southern Levant, the situation in the vast territories encompassing the Taurus/Zagros is broadly comparable to the situation in the southern Levant several decades ago. It seems that accepting an uninterrupted, unilinear cultural development, as was posited previously for the Levant, means ignoring possibilities of gaps in the record, i.e. absence of occupation, as well as the impact of the dynamic movements of small foraging groups creating their own local, endemic trajectories.

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VII - THE EARLY UPPER PALEOLITHIC OF THE CAUCASUS IN THE WEST EURASIAN CONTEXT

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Beginning in the mid 1990s, new data has begun to emerge, changing our knowledge of the character and origin of the Early Upper Paleolithic (EUP) in the Caucasus (Meshveliani *et al.* 2004; Bar-Yosef *et al.* 2006, 2011; Adler *et al.* 2006a, 2006b, 2008; Golovanova *et al.* 2006, 2010a, 2010b; Tushabramishvili *et al.* 2012). Modern excavation techniques, including total sediment water screening and an expanded series of absolute dates (table 1) from recently excavated sites (fig. 1) have revolutionized the perception of the EUP in this region, with important implications for our understanding of regional developments and spread of the EUP in Western Eurasia.

1. The Early Upper Paleolithic in the northern Caucasus

1.1. Mezmaiskaya Cave

Mezmaiskaya Cave is situated in the northwestern Caucasus, on the Lago-Naki plateau, in the Sukhoi Kurdjips River valley (a tributary of Belaya River, Kuban River basin) (fig. 1). The cave is located at an elevation of 1310 m above sea level, at 440 N and 400 E. It is more than 500 square meters and faces southwest. Since 1987, about 100 square meters have been carefully excavated to a maximum depth of 5 m, yielding thousands of lithic and organic artifacts, and a rich faunal assemblage. Currently the stratigraphic sequence of the cave consists of 3 Holocene and 20 Pleistocene strata. Until recently, Mezmaiskaya was widely known as a Middle Palaeolithic Micoquian occupation, in which a Neanderthal newborn skeleton is found (Golovanova *et al.* 1999; Golovanova & Doronichev 2003). Since 1997, in the interior part of the cave, eight stratified Upper Palaeolithic layers (UP, from top to bottom): 1-3, 1-4, 1A-1, 1A-2, 1A-3, 1B-1, 1B-2, and 1C are being excavated.

The earliest UP layer 1C is excavated so far in about 25 square meters. Layer 1C (10 to 20 cm in depth) is replete with ash, charred wood, and bone fragments, and shows evidence of intensive human occupation: about 390 lithic artifacts and 300 bone fragments are found per one square meter. Also, layer 1C is unique in the Early Upper Paleolithic (EUP) of the Caucasus in its high level of preservation of organic materials and human-made structures. Remains of several artificial structures are carefully excavated in the layer. They include two scooped out pits intruded into the underlying deposits and three fireplaces. The latter include a small (48x30 cm) fireplace and a large (105x90 cm) fireplace surrounded by limestone blocks. The most interesting structure is the third fireplace that represents a real hearth (88x60 cm) having a complex construction: first, a small pit was scooped out to the depth of 20-30 cm; then the southwestern edge (those facing to the cave entrance) of the pit was ringed by limestone slabs slightly inclining toward the interior of the pit.

Dating

There are now 11 radiometric (mostly accelerator mass spectrometry, AMS) dates obtained by 5 different laboratories for the EUP layer 1C of Mezmaiskaya Cave (table 1). Layer 1C has an AMS date of 32,010 ± 250 BP (uncal., Beta-113536) on wood charcoal from a hearth in quadrant M-17. The Geological Institute RAS (GIN) in Moscow obtained a conventional date of 32,900 ± 900 BP (uncal., GIN-10946) on a sample of small bone fragments. The University of Arizona laboratory obtained an AMS date of 36,100 ± 2.300 BP (uncal., AA-41856) on a long bone fragment found in quadrant M-17 near the above hearth. The University of Colorado laboratory again obtained a series of three dates from a single charcoal sample divided into three parts: 33,000 ± 240 BP (uncal., CURL-5760), 33,100 ± 270 BP (uncal., CURL-5761), and 33,000 ± 260 BP (uncal., CURL-5762). These radiocarbon results estimate the onset of the EUP in layer 1C at ~33 ka ^{14}C BP or about 38–37 ka cal BP applying CalPal_2007_HULU (Adler *et al.* 2008; Golovanova *et al.* 2010b).

More recently 5 AMS determinations using ultrafiltration, which are obtained at the Oxford Radiocarbon Accelerator Unit (ORAU) from humanly modified cut-marked bones from layer 1C at Mezmaiskaya (Pinhasi *et al.* 2011: table S2), are more variable, from 20.640 ± 130 BP (uncal., OxA-21819) to 34.750 ± 650 BP (uncal., OxA-21820), than the previous AMS estimates for this layer, and one of Oxford results (OxA-21819) is significantly younger compared with all other dates and the site stratigraphy. In our opinion, this may be due to the small sizes of these dating samples.

The total series of ^{14}C results (excluding the aberrant date OxA-21819) using the IntCal09 dataset (Pinhasi *et al.* 2011: Table S2)

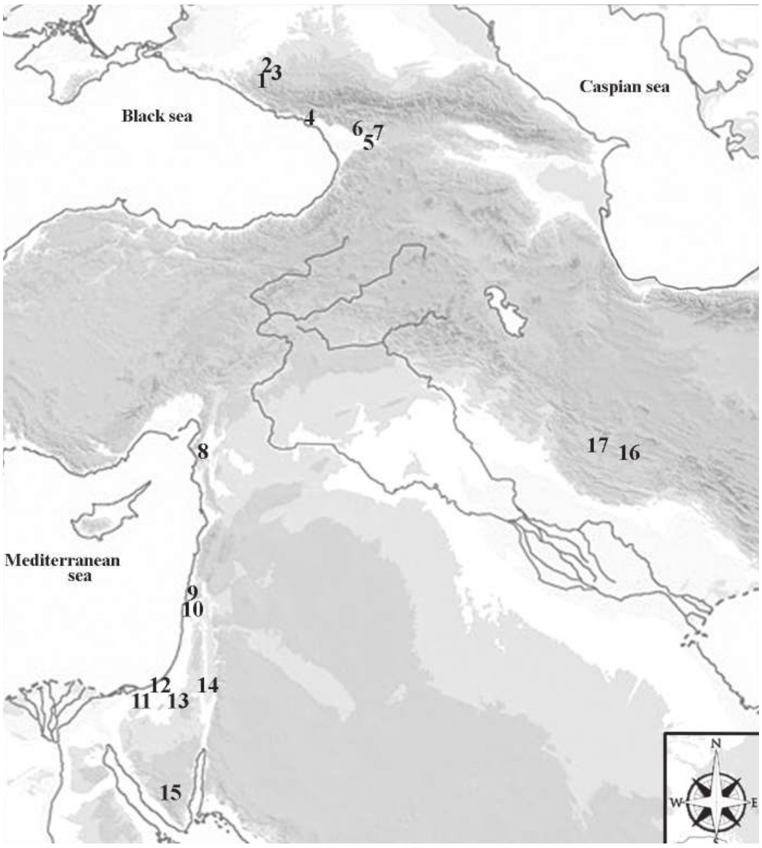

Figure 1 – Map showing EUP sites in the Caucasus, Levant, and Zagros. 1 – Mezmaiskaya; 2 – Korotkaya; 3 – Kamennomostskaya; 4 – Apiancha; 5 – Bondi; 6 – Ortvala Klde; 7 – Dzudzuana; 8 – Ucagizli; 9 – Qufzeh; 10 – Kebara; 11 – Lagama VII, VIII and IIID; 12 – Nizzana XIII; 13 – Boker A; 14 – Tor Sadaf, Ain al-Buhayra, Multaqa al-Widyan; 15 – Abu Noshra 1, II, VI; 16 – Yafteh; 17 – Warwazi

defines with 95.4% probability the calendric age of the EUP occupations in layer 1C at Mezmaiskaya from about 39-36 ka cal BP (for the earlier seven dates from 36 to 32 ka ^{14}C BP) to about 33-31 ka cal BP (for the younger three dates from 29 to 27 ka ^{14}C BP).

Lithic industry

The large assemblage of 9564 lithic artifacts was found in layer 1C in total, including material derived from water sieving (table 2). The bulk of this assemblage was made on a local gray flint. However, the collection of layer 1C includes a large number of colored flint pieces that were transported to the cave from distant sources located 60 km and more from the cave (Doronicheva 2009). There are many obsidian artefacts. The nearest natural outcrops of obsidian today are known in Zaiukovo, north-central Caucasus, but there are also sources in the southern Caucasus. Once the obsidian from the Mezmaiskaya assemblage is sourced, we will be able to develop hypotheses of migration routes through the mountains. Obsidian artifacts from the EUP layer 1C were analyzed by S. Shackley (Golovanova *et al.* 2010a). The study suggests that these EUP artifacts may have been produced from obsidian procured from the Kojun Dag (Paravan) source located to the southwest of the Caucasus in southern Georgia. These results suggest that the inhabitants of the EUP layer 1C at Mezmaiskaya had some contact with areas quite distant from the cave, including the southern Caucasus.

Most of the collection (49.8%) of layer 1C is composed of chips (5-10 mm) and micro-chips (1-5 mm), and also small flint debris (13.5%) found by water screening of excavated sediments. This data testifies to active tool production and rejuvenation in the site. Most cores are heavily used and represent exhausted pieces (fig. 2:4-8). A large quantity of technical (i.e., core trimming) debitage (table 2) points to the important role of core preparation and modification in this industry. Most of the technical debitage (153 pieces), such as crested blades (fig. 2:9, 12), result from the preparation or modification of flaking surfaces, while core tablets (fig. 2:10, 11) result from the preparation of striking platforms.

There are 61 cores in varying stages of reduction – from testing cores with cortex and few scars, prismatic cores with bladelet or micro-bladelet removals (fig. 2:1,2,4) to heavily reduced and exhausted cores (fig. 2:5-8). Some cores may be defined as carinated items (fig. 2:4). Cores in total demonstrate a high level of reduction.

Site	Stratum	Lab. No	Method	Material	Age ^{14}C BP	Source
NORTHERN CAUCASUS						
Mezmaiskaya	Layer 1C	OxA-21821	AMS	Bone	27,070 ± 250	Pinhasi *et al.* 2011
		OxA-21820	AMS	Bone	34,750 ± 650	
		OxA-21819	AMS	Bone	20,640 ± 130	
		OxA-21105	AMS	Bone	28,880 ± 140	
		OxA-21104	AMS	Bone	28,510 ± 140	
		Beta-113536	AMS	Wood charcoal	32,010 ± 250	Golovanova *et al.* 2010
		CURL-5762	AMS	Wood charcoal	33,000 ± 260	
		CURL-5760	AMS	Wood charcoal	33,000 ± 240	
		CURL-5761	AMS	Wood charcoal	33,100 ± 270	
		GIN-10946	Conven.	Bone	32,900 ± 900	
		AA-41856	AMS	Bone	36,100 ± 2,300	
Korotkaya	Layer 2, horizon 8	LU-5601	Conven.	Bone	30,200 ± 2,400	Blajko 2009
		SPb-87к3	Conven.	Bone	32,800 ± 2,000	First publication
SOUTHERN CAUCASUS						
Dzudzuana	Unit D	RTT-4336	AMS	Charcoal	26,320 ± 260	Bar-Yosef *et al.* 2011
		RTT-4340	AMS	Charcoal	26,925 ± 255	
		RTA-3436	AMS	Bone	27,150 ± 300	
		RTA-3437	AMS	Bone	27,400 ± 300	
		RTT-4338	AMS	Bone	27,450 ± 275	
		RTT-4701	AMS	Charcoal	32,140 ± 500	
		RTA-3438	AMS	Bone	30,350 ± 400	
		RTT-4747	AMS	Bone	29,445 ± 1,015	
		RTT-5745	AMS	Bone	27,260 ± 775	
Ortvale Klde	Layer 4C	AA-38193	AMS	Charcoal	30,660 ± 430	Adler *et al.* 2008
		AA-38197	AMS	Charcoal	30,260 ± 490	
		RTT-4207	AMS	Charcoal	31,900 ± 780	
		RTT-4210	AMS	Charcoal	31,700 ± 500	
		RTT-4209	AMS	Charcoal	31,800 ± 400	
		RTT-4208	AMS	Charcoal	32,200 ± 550	
		RTT-4211	AMS	Charcoal	32,300 ± 550	
		AA-45865	AMS	Charcoal	32,510 ± 530	
		RTT-4214	AMS	Charcoal	34,100 ± 800	
		RTT-4213	AMS	Charcoal	34,600 ± 600	
		AA-45864	AMS	Charcoal	33,700 ± 620	
		RTT-4212	AMS	Charcoal	34,300 ± 650	
	Layer 4d	RTT-4725	AMS	Bone	38,100 ± 935	
Bondi	Layer Vb	Beta-270161	AMS	Bone	21,550 ± 120	Tushabramishvili *et al.* 2012
		SacA-12068	AMS	Bone	24,620 ± 300	
	Layer VI	SacA-12069	AMS	Bone	31,270 ± 640	
LEVANT						
Ucagizli	Above B	AA-35258	AMS	Charcoal	31,060 ± 140	Kuhn *et al.* 2003
	Layer B	AA-38203	AMS	Aragonite	29,130 ± 380	
	Layer BI	AA-38201	AMS	Aragonite	32,670 ± 760	
Qafzeh	Layer 9	Amino-Acid racemization		Bone	31,950	Bar-Yosef & Belfer-Cohen 2004
		Amino-Acid racemization		Bone	38,950	
		Amino-Acid racemization		Bone	46,950	
		GifA-97337	AMS	Charcoal	28,340 ± 360	
		AA-27291	AMS	Charcoal	28,020 ± 320	
		GifA-98230	AMS	Charcoal	29,060 ± 390	
		AA-27292	AMS	Charcoal	28,380 ± 330	
	Layer 11	GifA-97338	AMS	Charcoal	31,520 ± 490	
		AA-27290	AMS	Charcoal	29,320 ± 360	
Kebara	Level IIIA	Pta-4263	AMS	Charcoal	31,400 ± 480	Gorring-Morris & Belfer-Cohen 2003, Appendix; Rebollo *et al.* 2011
	Lev. IIIBf	Pta-5002	AMS	Charcoal	42,500 ± 1,800	
		Pta-4987	AMS	Charcoal	42,100 ± 2,100	
		OxA-3977	AMS	Charcoal	>43,800	
		OxA-1567	AMS	Charcoal	35,600 ± 1,600	

Kebara	Lev. IIIBf	Pta-4267	AMS	Charcoal	36,000 ± 1,100	Gorring-Morris & Belfer-Cohen 2003, Appendix; Rebollo *et al.* 2011
		OxA-3976	AMS	Charcoal	43,500 ± 2,200	
		OxA-18425	AMS	Charcoal	41,200 ± 450	
		RTO 5590	AMS	Charcoal	42,600 ± 500	
		RTOX 5796-2	AMS	Charcoal	42,800 ± 650	
		OxA-18424	AMS	Charcoal	40,350 ± 400	
	Level IIIB	RTO 5679-1	AMS	Charcoal	40,500 ± 400	
		RTO 5679-1	AMS	Charcoal	40,600 ± 400	
		RTO 5589	AMS	Charcoal	42,850 ± 550	
		RTOX 5589-2	AMS	Charcoal	41,400 ± 1,200	
		Pta-4267	AMS	Charcoal	36,100 ± 1,100	
	Level IVB	OxA-3978	AMS	Charcoal	28,890 ± 400	
		Pta-5002	AMS	Charcoal	42,500 ± 1,800	
		Pta-4987	AMS	Charcoal	42,100 ± 2,100	
		OxA-3978	AMS	Charcoal	28,890 ± 400	
	Level IV	RTO 5680-1	AMS	Charcoal	41,650 ± 450	
		RTOX 5680-2	AMS	Charcoal	40,400 ± 400	
		RTO 5681-1	AMS	Charcoal	43,600 ± 600	
		RTOX 5681-2	AMS	Charcoal	40,300 ± 550	
		RTOX 5797-2	AMS	Charcoal	35,160 ± 310	
		RTO 5799-1	AMS	Charcoal	36,110 ± 330	
		RTOX 5799-2	AMS	Charcoal	40,500 ± 1,200	
	Lev. IV/V	Pta-5141	AMS	Charcoal	43,700 ± 1,800	
		OxA-2800	AMS	Bone	33,500 ± 930	
Boker A		SMU-187	AMS	Charcoal	>33600	Monigal 2003
		SMU-260	AMS	Charcoal	>33420	
		SMU-578	AMS	Charcoal	37,920 ± 2,810	
Abu Noshra I		B-12125	AMS	Charcoal	>30,440	Gorring-Morris & Belfer-Cohen 2003, Appendix
		B-13897		Sediment	25,950 ± 360	
		SMU-1824	AMS	Charcoal	31,330 ± 2,880	
		SMU-2254	AMS	Charcoal	35,824 ± 1,090	
Abu Noshra VI		SMU-2371	AMS	Charcoal	31,100 ± 300	
Lagama VII		SMU-172	AMS	Charcoal	34,170 ± 3,670	
		SMU-185	AMS	Charcoal	31,210 ± 2,780	

Table 1 – Radiometric dates of EUP in the Caucasus and Early Ahmarian in the Levant.

Blades, bladelets, and micro-bladelets predominate (62.2%) among total flakes. Bladelets and micro-bladelets are most common among laminar blanks (table 2 & 4), while blades are relatively infrequent (16.7% of laminar blanks). The overwhelming prevalence of tools manufactured on blades, bladelets, and micro-bladelets – 75.8 percent of the tool set – is a significant characteristic of the lithic industry from EUP layer 1C. However, more than half of the end-scrapers are made on core trimming flakes or plain flakes often having cortex areas (fig. 3:2, 4). Also, burins are produced on core trimming flakes (fig. 4:7) or plain flakes often with cortex areas (fig. 4:3), and crested blades (fig. 4:6).
Most end-scrapers are made on thick flakes by abrupt retouch (fig. 3:2, 3, 4), and some are similar to carinated (fig. 3:6) or rounded scrapers (fig. 3:5). Only 3 end-scrapers are made on blades (Fig. 3-1, 8), including a scraper on a large and long (12.7 cm) blade (fig. 3:1), and 5 end-scrapers are made on blade fragments (fig. 3:7). Indeed, a few Aurignacian retouched end-scrapers on blades and no typical Aurignacian carinated or nosed scrapers are found in the EUP layer 1C at Mezmaiskaya.

Burins are less represented (5.9%) than end-scrapers (6.6%) in layer 1C and quite variable – dihedral axial (fig. 4:1, 8), dihedral angled (fig. 4:7), angled, a burin on a straight retouched truncation (fig. 4:4), a double burin on blade (fig. 4:5) combining one similar to the Noailles burin (after Brezillon 1971) and angled burin, and few multifaceted burins (fig. 4:2, 3, 6). Very rare pièces esquillées are made on flakes (fig. 3:9) or blade fragments (fig. 3:10).

Backed bladelets (fig. 5:17, 18, 19, 21) are most common (48.2%) among tools (table 3), while bladelets with bilateral backed retouch (fig. 5:22) are rare. Blades and bladelets with fine direct retouch (fig. 5:20) are also quite numerous (17.1%).

Points are the second most common group of tools (17.5%) and are dominated by Gravette points (after Brezillon 1971:318; Demars & Laurent 1992) – 52.5 percent (fig. 5:12, 13, 14), including Gravette point fragments (fig. 5:15) and some micro-Gravette points (fig. 5:5). Also numerous (22.5%) are symmetrical points with abrupt or semi-abrupt retouch, all found in distal fragments (fig. 5:6-10). There are some needle-like double points made on micro-bladelets by abrupt retouch (fig. 5:1-4), and points with oblique retouch (fig. 5:11, 16).

Organic artifacts

Bone tools form a significant component of the layer 1C artifact assemblage and are quite variable. They include 5 massive awls (fig. 6:9, 10), a borer-polisher (fig. 6:4), a fragment of needle with eye

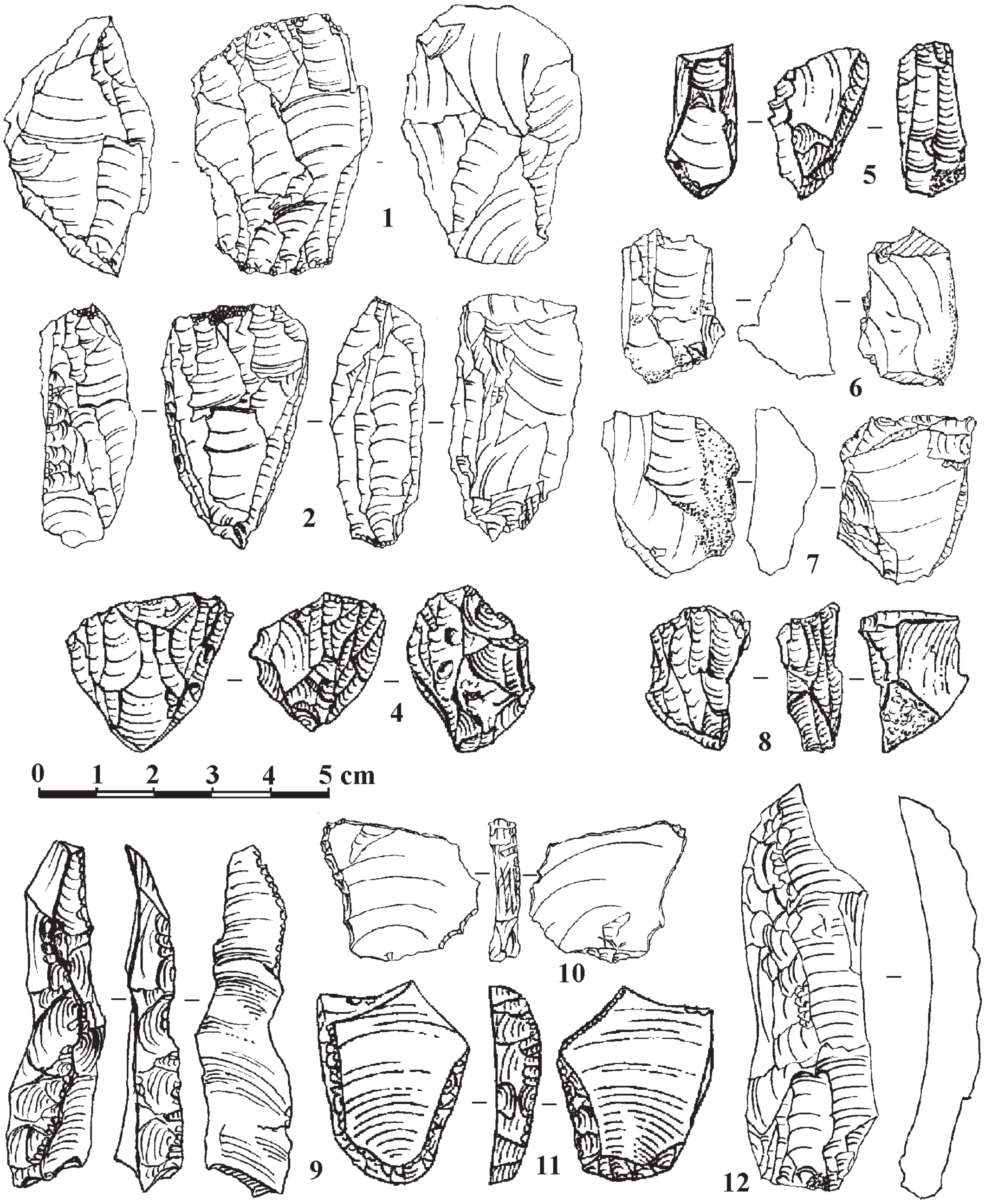

Figure 2 – Mezmaiskaya Cave. Layer 1C. 1-8 – blade/bladelet cores; 9, 12 – crested blades; 10, 11 – core tablets

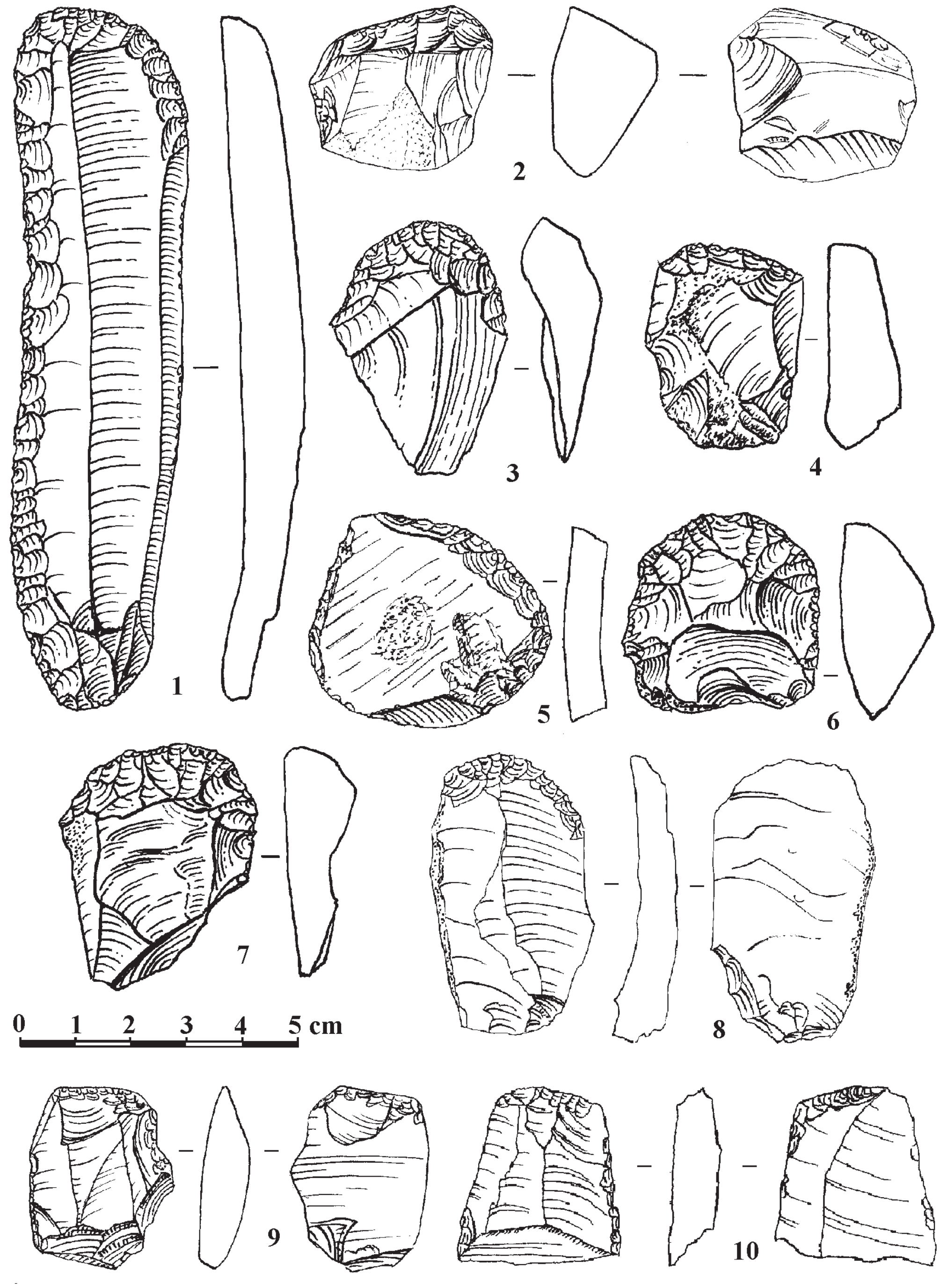

Figure 3 – Mezmaiskaya Cave. Layer 1C. 1-8 – end-scrapers on blades and flakes; 9, 10 – pièces esquillés on blade fragments

Site/layer	Cores	Plain flakes/ cortex flakes	Blades/ cortex blades	Bladelets	Micro-bladelets	Technical flakes/CTE	Chips/burin spalls	Fragments	Tools	Total
Mezmaiskaya layer 1C	61	987	313 total	902	663	153/-	4805/-	1311	455	9650
Dzudzuana Unit D, upper excav.	53	938/189	279/48	490	?	-/209	2624/38	77	309	5000
Dzudzuana Unit D, lower excav.	55	768/245	188/51	379	?	-/197	3945/34	276	271	6083
Bondi layer V	28	381	326 total	147	?	?	1431/-	57	73	2443
Bondi layer VI	4	26	15 total	2	?	?	8/-	5	5	65

Table 2 – Composition of EUP assemblages in the Caucasus.

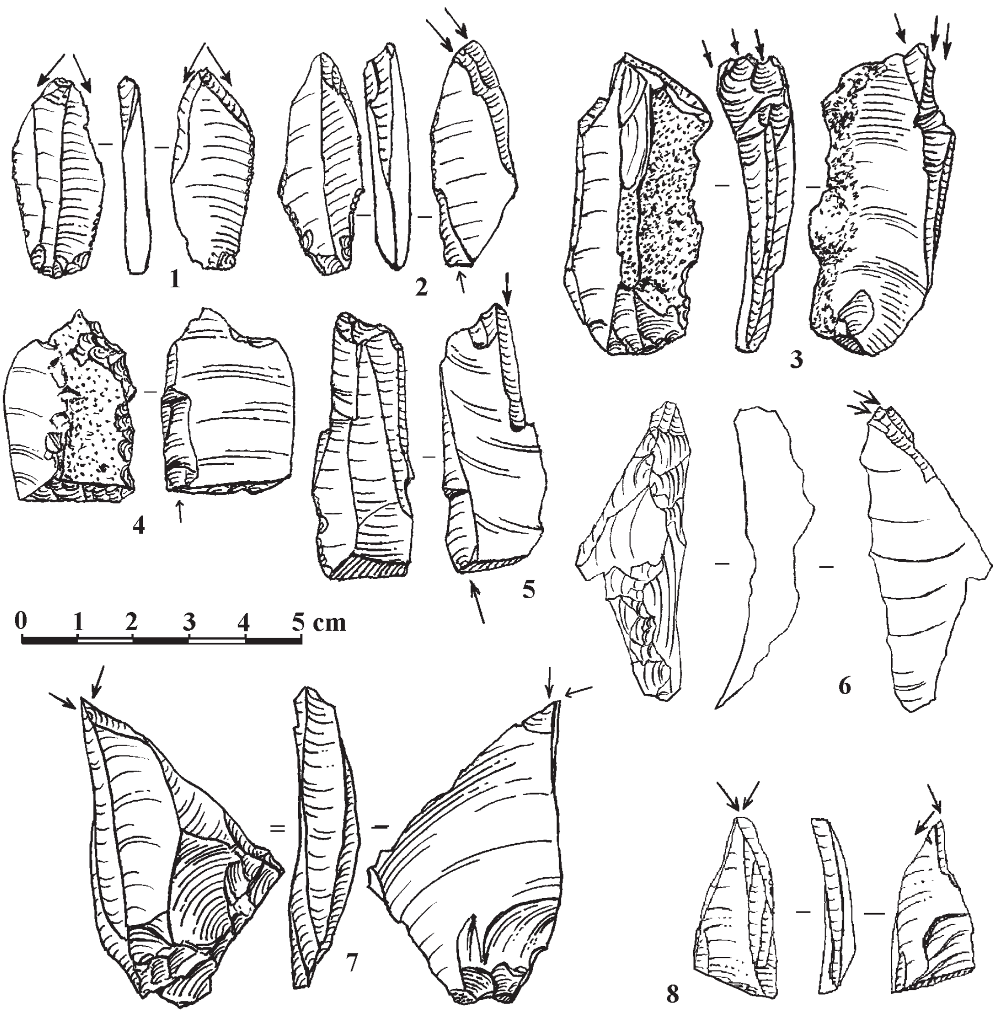

Figure 4 – Mezmaiskaya Cave. Burins from Layer 1C.

(fig. 6:3), and a tip fragment of flat point (fig. 6:2). One awl has red pigmentation, probably from ochre coloring within the layer, in the inner and part of the outer surfaces. Also, there are 8 bone points with rounded cross-sections – 2 nearly complete (fig. 6:5) and 6 tips with one refitting midsection (fig. 6:6, 7, 8). A unique pendant is made from a goat incisor notched from one side (fig. 6:1). Another unique item, which was found near the hearth in square M-17, is an unretouched flint bladelet fragment lodged in a small piece of burned unidentifiable bone (fig. 6:11).

1.2. Korotkaya Cave

Korotkaya Cave is located in the Khakodz River valley (a tributary of Belaya River, Kuban River basin), at an elevation of 550 m above sea level (i.e., 800 m lower than Mezmaiskaya) in the deciduous wood vegetation zone. The total area of the cave is nearby 50 sq. m. The cave was discovered in 1986 by L. Golovanova and then excavated in 2000 and 2006 by A. Blajko (2001, 2009). About 10 sq. meters excavation revealed a thick UP layer 2 excavated in eight horizons, but did not reach the bottom of the cave. The top UP horizons have close radiocarbon estimates of 24,900 ± 700 BP (uncal., GIN-10948b) and 24,500 ± 2.000 BP (uncal., GIN-10947a). The lowermost horizon 8 has two radiocarbon dates of 30,200 ± 2.400 BP (uncal., LU-5601) and 32,800 ± 2.000 BP (uncal., SPb-87k3).

The Korotkaya UP deposit produced an EUP industry dominated by bladelets, micro-bladelets, and other small tools (Blajko 2001, 2009). All lithic artifacts are manufactured from transported and mostly color flint, and no flint sources are found in the cave vicinity. The overwhelming majority of tools is made on bladelets and micro-bladelets, and backed bladelets are the most common tool group. Other bladelet tools include Gravette and Font-Yves points, bi-lateral backed bladelets, and truncated bladelets. End-scrapers or burins are not found. Organic artifacts are representing only by bone awls.

Based on the radiocarbon estimates, the lowermost UP horizon 8 at Korotkaya may be roughly synchronized with the EUP layers 1C and 1B at Mezmaiskaya cave. Consequently, the industry from Korotkaya Cave now presents the second site, after layer 1C of Mezmaiskaya, with reliable evidence of EUP occupation in the northern Caucasus. Significantly, the EUP assemblage of Korotkaya shows close similarity to the EUP of Mezmaiskaya.

1.3. Kamennomostskaya Cave

A. Formozov (1965) found Kamennomostskaya Cave in 1960 and excavated 24 sq. meters in 1961. The cave is located in the Meshoko River valley (a tributary of the Belaya River, Kuban River basin), at an elevation of 720 m above sea level (Fig. 1). The total area of the cave is more than 200 sq. meters, and the entrance faces to the southwest. In the cave, stratum 3 – a thick (from 1.0 to 1.9 m) yellow clay deposit – produced an UP assemblage.

Since the early 1970s, the assemblage recovered from layer 3 in Kamennomostskaya was interpreted (based only on its technological and typological characteristics) as the earliest UP Aurignacian industry in the northern Caucasus (e.g., Amirkhanov 1986; Cohen & Stepanchuk 1999). Recently, this assemblage stored in the Museum of Anthropology of Moscow State University was re-examined by Golovanova (2000; Golovanova *et al.* 2006) after Formozov's permission. The study shows major differences between the EUP of Mezmaiskaya and the Kamennomostskaya Cave material.

Flaking technology shows the most striking differences. In contrast to the Kamennomostskaya, the EUP technology at Mezmaiskaya is characterized by: a) core preparation using crests and tablets, b) production of blades and bladelets with predominantly punctiform striking platforms, and c) flaking technology oriented to the massive production of bladelets and micro-bladelets, which were then used for tool manufacture. Despite a few and minor similarities in burin and end-scraper types, the assemblages from Kamennomostskaya and Mezmaiskaya are also very different in tool typology. Layer 1C at Mezmaiskaya is dominated by micro-tools made on bladelets and micro-bladelets (57% of all tools), while only two such tools (a Dufour bladelet and a bladelet point) are found at Kamennomostskaya. On the contrary, the 'Aurignacian' characteristics of the Kamennomostskaya assemblage – blades (36%), tools on large blades (18.8%), as well as end-scrapers and burins (22.3% in total) are common, while blunted backed bladelets and bladelet points are rare (2.3%), and a Dufour bladelet is found (Golovanova 2000) – do not occur in the EUP industries from Mezmaiskaya and other sites in the Caucasus.

One can assume that most of the bladelets and other small lithics were lost during the 50-years old excavation at Kamennomostskaya because it did not involve water screening. Nevertheless, the 'Aurignacian' and some other characteristics– low percentage of punctiform platforms, absence of crested blades and core tablets, presence of Mousterian tool types – of the Kamennomostskaya assemblage contradict features observed in Mezmaiskaya and other securely excavated EUP sites in the Caucasus. This suggests that either the thick (1.0-1.9 m) lower layer 3 in Kamennomostskaya Cave contains admixture of Mousterian and UP artifacts or the UP assemblage of Kamennomostskaya totally or partially belongs to the later (post-EUP) stage of the Upper Paleolithic. Unfortunately, it is impossible to resolve this dilemma about this undated and likely inhomogeneous material by re-excavation of this site. Kamennomostskaya Cave was completely destroyed by explosive works in a limestone quarry in the end of 1980s.

2. The Early Upper Paleolithic in the southern Caucasus

2.1. Dzudzuana Cave

One of the largest caves in western Georgia – Dzudzuana Cave – is located at 440 N and 400 E and at an elevation of 560 m above sea level, in the Nekressi River gorge (Kvirila River Basin). It is about 750 sq. meters and has the entrance facing to the east. D. Tushabramishvili directed the first excavation (40 sq. m) in Dzudzuana Cave in 1966–1975, and then T. Meshveliani excavated Dzudzuana in 1983-1986. In 1996-2008, an international team led by researchers from Georgia (T. Meshveliani), USA (O. Bar-Yosef), and Israel (A. Belfer-Cohen) carefully excavated 24 sq. m. in this site using wet-sieving of the excavated deposits to retrieve the smallest artifacts. Now, the sequence of the cave is divided into four main stratigraphic units (A–D), the earliest of which (Unit D) is defined as the EUP occupation (Bar-Yosef *et al.* 2011).

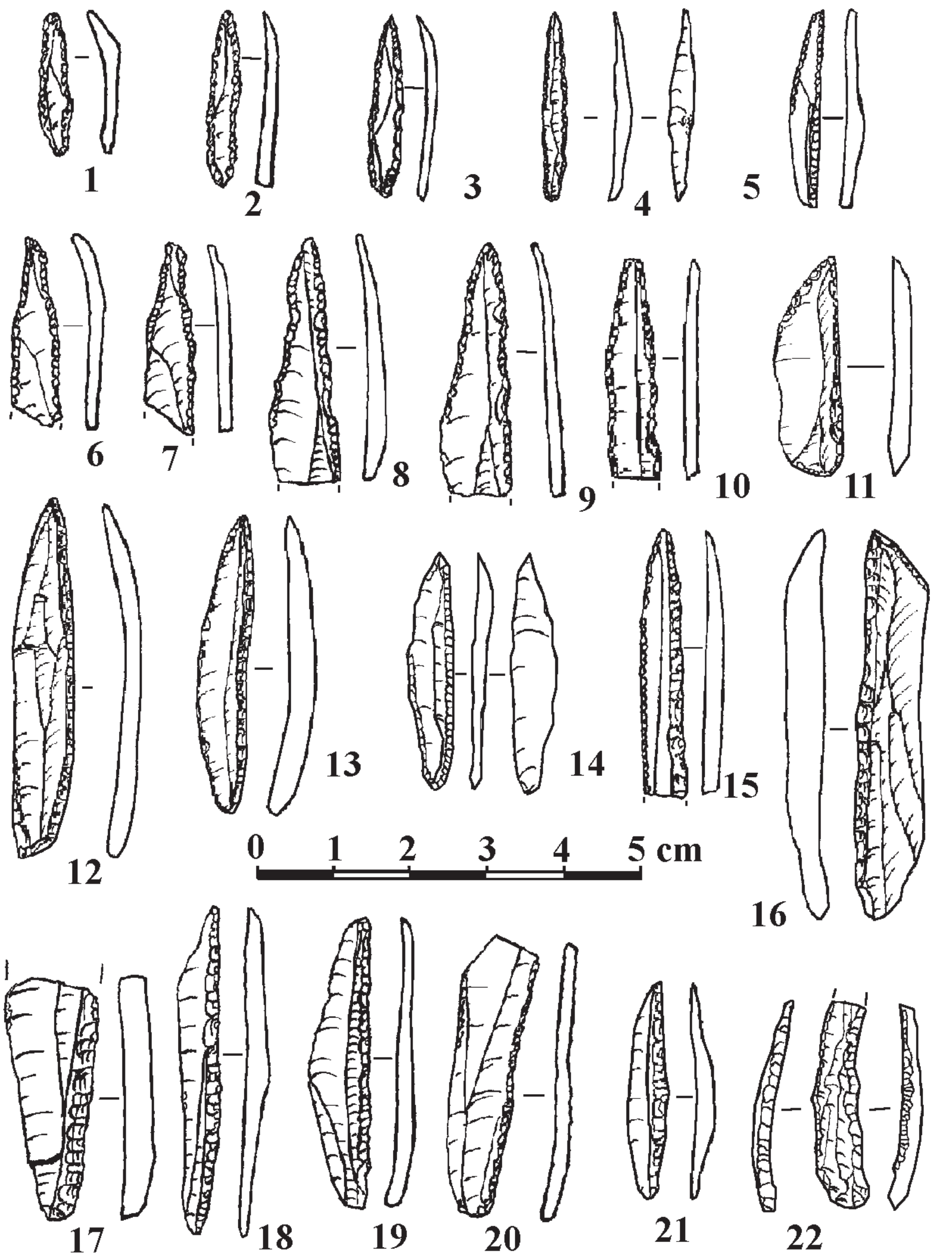

Figure 5 – Mezmaiskaya Cave. Layer 1C. 1-4 – 'needle-like' points; 5 – micro-Gravette point; 6-10 – points with symmetrical bi-lateral retouch; 11, 16 – points with oblique retouch; 12-15 – Gravette points; 17-19, 21 – backed bladelets; 20 – bladelet with fine retouch; 22 – bi-lateral backed bladelet

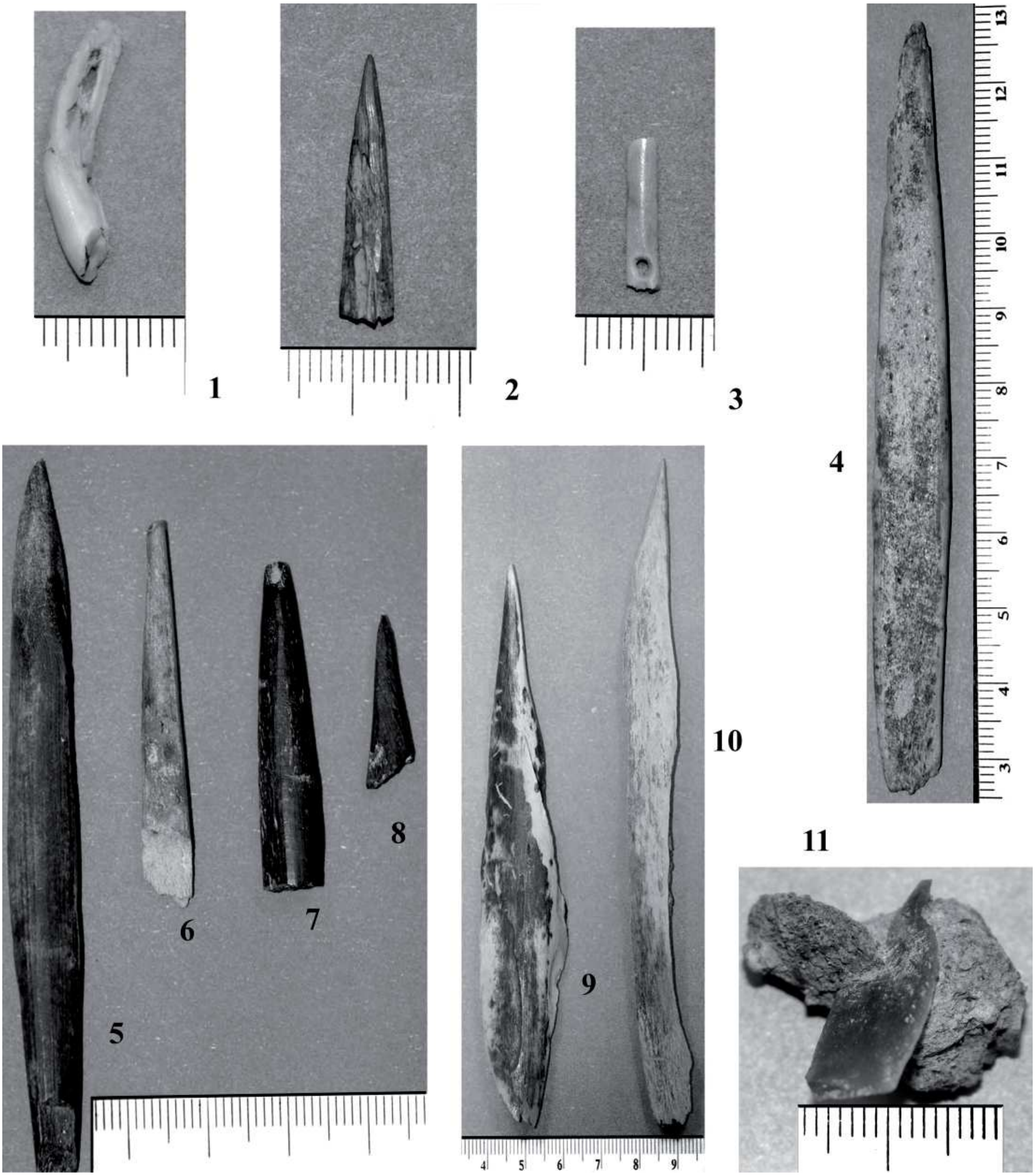

Figure 6 – Mezmaiskaya Cave. Layer 1C. 1 – tooth pendant; 2 – flat bone point fragment; 3 – bone needle fragment; 4 – bone polisher; 5 –bone point; 6-8 – bone point fragments; 9, 10 – massive bone awls; 11 - flint bladelet cut into a burned bone fragment.

Dating

Nine radiocarbon AMS dates from 32,140 ± 500 BP (uncal., RTT-4701) to 26,320 ± 260 BP (uncal., RTT-4336) have been obtained for the EUP unit D of Dzudzuana (table 1). The total series of dates defines (with 1σ, applying CalPal_2007_HULU) the calendric age of the EUP in Dzudzuana approximately between 35 and 32 ka cal BP. However, excluding three significantly aberrant dates (RTT-4747, RTT-4701, and RTT-3438), five dates within this series are overlapping or almost overlapping (RTT-4336) within a very narrow range between 31.8 and 31.5 ka cal BP.

Lithic industry

The total assemblage from Unit D comprises 11083 lithics recovered from the lower (near the cave entrance) and upper (inside the cave) excavation areas (table 2). Most of these lithics are made in a local chert variety (radiolarite). Obsidian artifacts, which were transported to the cave from sources located approximately 80–100 km away, compose only 0.8% and 2.3% of the total lithics in the upper and lower excavations, respectively. Most obsidian artifacts are flakes, bladelets, and chips, while tools are not numerous, and only 2 cores are found (Bar-Yosef *et al.* 2011).

In Unit D, cores compose about 1% of the total assemblage in both excavation areas (table 2). Chunks are not numerous (1.5% and 4.5% in the upper and lower excavations), while chips and burin spalls together compose a bulk of the total artifacts (53.2% and 65.4% in the upper and lower excavations, respectively). Total flakes, including plain and primary flakes, blades and primary blades, bladelets, and core trimming elements (CTE) comprise 43% and 30% of the total artifacts in the upper and lower excavations. Among total flakes, flakes and blades with cortex areas and CTE (fig. 7:21) are quite numerous (20.7% and 27% in the upper and lower excavations, respectively) that evidences active primary flaking in the site.

The total percentage of blades and bladelets varies between 38% and 34% of the total flakes in the upper and lower excavations at Dzudzuana and is almost twice less than in the Mezmaiskaya Cave. However, like Mezmaiskaya, bladelets strongly predominate (60% and 61% in the upper and lower excavations, respectively) in the total laminar debitage, which includes blades and bladelets, at Dzudzuana. This suggests that the laminarity parameter is apparently underestimated in Dzudzuana, in comparison to Mezmaiskaya, due to plenty of flaking debris in the former. Hence, differences in the debitage composition and laminarity between Mezmaiskaya and Dzudzuana may be related to various activity patterns in these sites.

The EUP industry of Unit D is characterized by a continuous production of blades and bladelets from unipolar (34% and 25.4% in the upper and lower excavations; fig. 7:20) and bipolar (22.6% and 27% in the upper and lower excavations; fig. 7:8) prismatic cores. Carinated cores (4% and 7% in the upper and lower excavations; fig. 7:22) are very rare (Bar-Yosef *et al.* 2011).

The most common tools in Unit D are various finely retouched bladelets (fig. 7:1-17) and blades, for which total percentage varies from 29,5% to 36% in the upper and lower excavations, respectively. Also, bladelet tools in total compose at least about 37-37.5% of all tools in both excavation areas. Backed bladelets and blades are quite numerous (16% and 7% in the upper and lower excavations; table 3), while points are extremely rare – 3 micro-Gravette points and a Sakajia point – and found only in the upper excavation (Bar-Yosef *et al.* 2006, 2011).

End-scrapers are manufactured on flakes and blades, and compose 23.3% and 21.4% in the upper and lower excavations, respectively (fig. 8:4). Thumbnail scrapers and double end-scrapers (fig. 8:5) are found in both excavations. Rounded scrapers (fig. 8:6, 7, 8) are rare. Burins are less numerous (6.8% and 14.8% in the upper and lower excavations) than end-scrapers, and represented mostly by dihedral burins (Fig. 8 – 2) and then burins on truncation (fig. 8:3). Some pièces esquillées (7.4% and 3.3% in the upper and lower excavations; fig. 8:1), and also rare truncations, awls or borers, notches and denticulates, and others are reported (Bar-Yosef *et al.* 2011).

Organic artifacts.

The bone industry of EUP Unit D includes 4 bone artifacts – awl, antler point, polished bone fragment, and decorated piece – from the lower excavation, and 8 bone artifacts – two awls and 6 bone points – from the upper excavation (fig. 7:22).

2.2. Ortvale Klde Rockshelter

Ortvale Klde – a large (about 300 sq. meters) rockshelter with two chambers opening to the east – is located at an elevation of 530 m above sea level in the Cherula River gorge (Kvirila River Basin), western Georgia. D. Tushabramishvili first investigated the site in

Site/layer	Bladelet points	Backed bladelets/ blades	Retouched bladelets/ blades	End-scrapers	Burins	Pièces esquillé	Denticulates	Fragments	Varia	Total
Mezmaiskaya layer 1C	80	187/-	78/-	30	27	3	18	8	24	455
Dzudzuana Unit D, upper excav.	4	39/10	73/18	72	21	23	1	6	42	309
Dzudzuana Unit D, lower excav.	-	18/1	82/16	58	40	9	3	3	41	271

Table 3 – Distribution of major retouched tool classes in the EUP assemblages in the Caucasus.

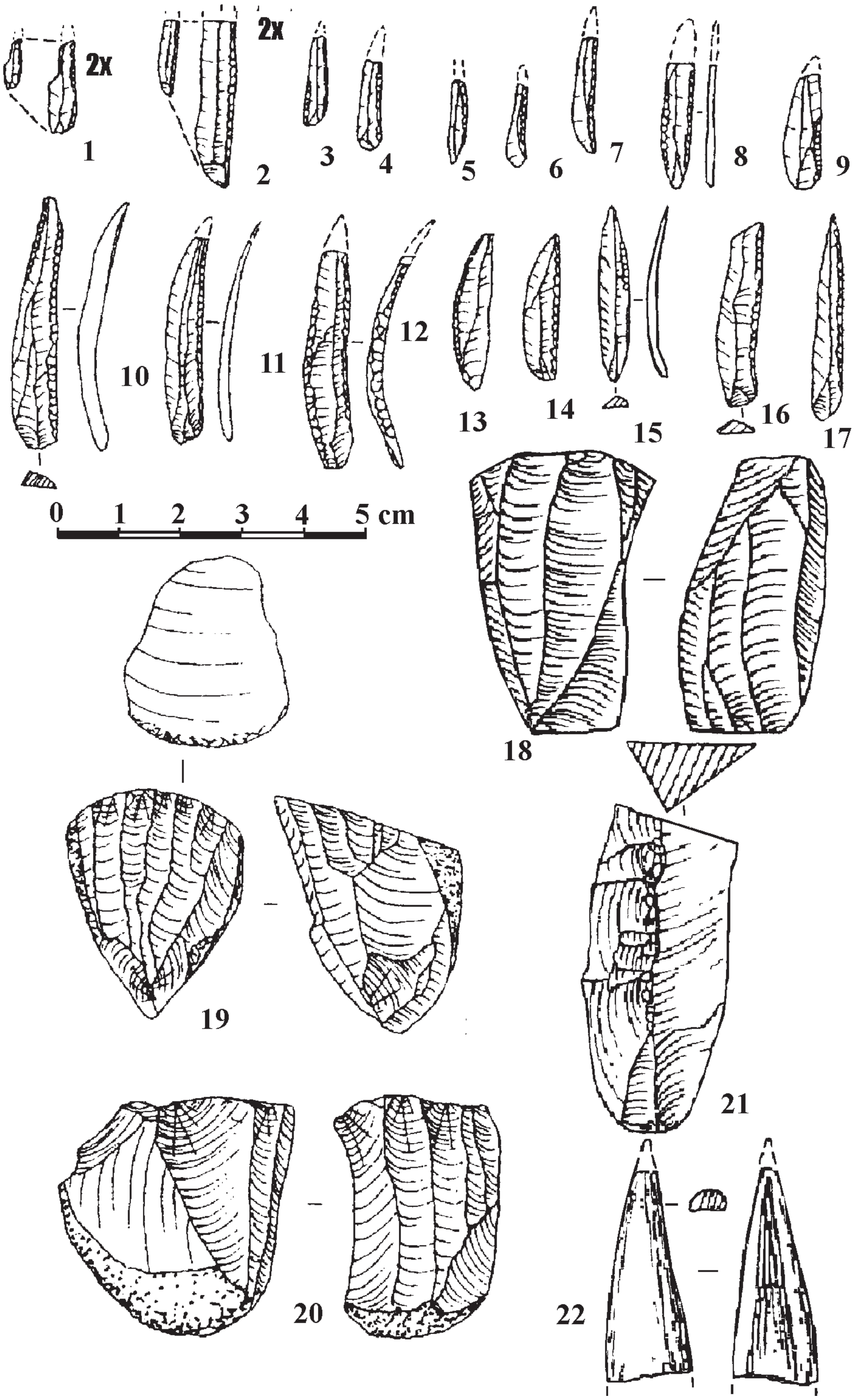

Figure 7 – Stone artifacts from Dzudzuana Cave, Unit D. 1-17 – retouched bladelets; 18-20 – blade/bladelet cores; 21 – crested blade; 22 – bone point/awl fragment (numbers 1 and 2 show real sizes and twice enlarged sizes). After Meshveliani *et al.* 2004; Bar-Yosef *et al.* 2011.

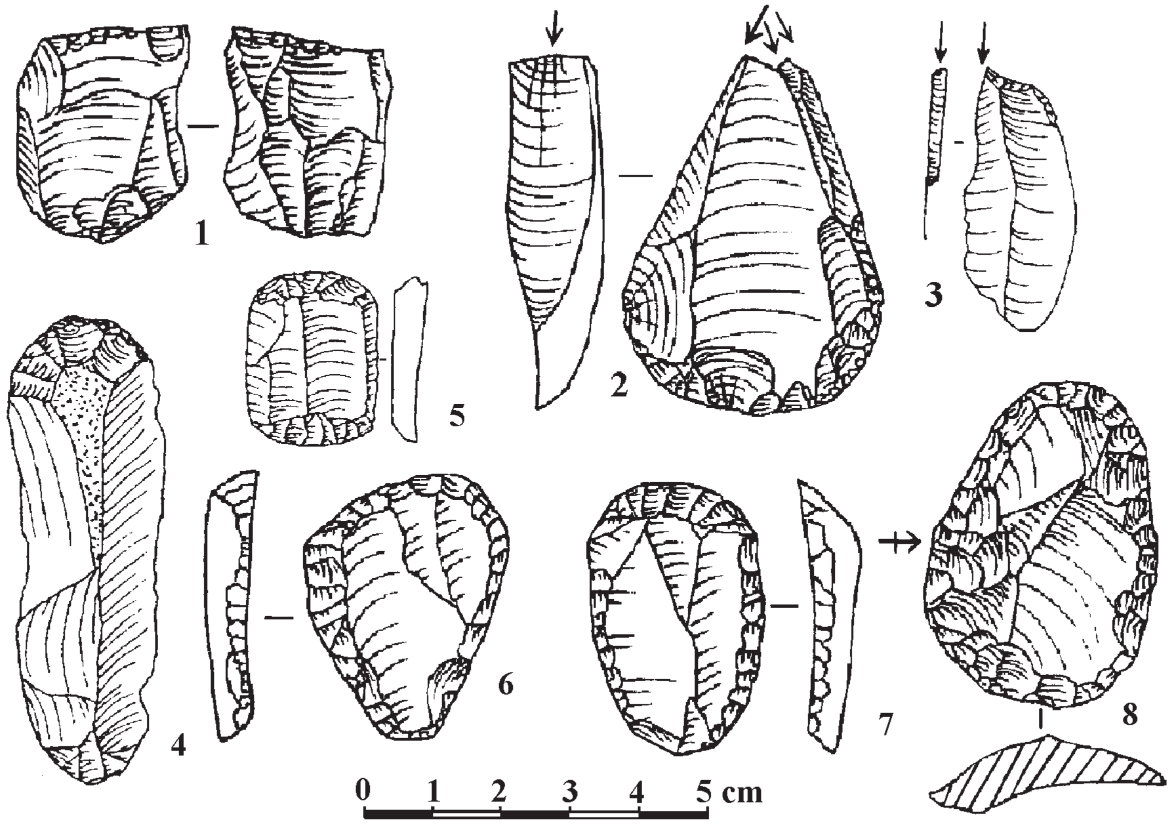

Figure 8 – Stone artifacts from Dzudzuana Cave, Unit D. 1 – splintered piece; 2, 3 – burins; 4-8 – end-scrapers. After Meshveliani *et al.* 2004; Bar-Yosef *et al.* 2011.

1973, and later N. Tushabramishvili excavated about 40 sq. meters in the southern chamber of this rockshelter (Tushabramishvili et al. 1999). More recently, work at Ortvale Klde was conducted in 1997-2001 by an international team leaded by researchers from Georgia (N. Tushabramishvili) and USA (D. Adler), excavating about 6 sq. meters next to the previous excavation area (Adler et al. 2006a, 2006b, 2008; Adler & Bar-Oz 2009).

In the earlier excavations, 11 strata were identified, of which two were defined as UP layers and seven as MP layers. In the recent excavations, stratum 4 assigned earlier to the Middle Paleolithic was re-defined as the EUP layer divided into four sub-layers (4a, 4b, 4c, and 4d, from top to bottom). All EUP levels produced rich lithic assemblages and faunal collections. In the earliest UP layer 4d, a scooped-out hearth, ringed by large fire-cracked limestone blocks and containing numerous burned backed microliths of flint and obsidian, was excavated. Layer 4c also contains evidence of fire activity such as a succession of black and gray ash lenses (Adler et al. 2006b, 2008).

Dating

During the recent excavations at Ortvale Klde, 15 AMS dates were obtained for layer 4C by two different laboratories, but only 12 dates were accepted as reliable estimates for the radiocarbon chronology of the layer (table 1). Also, 3 AMS dates were produced for the earliest EUP layer 4d, but two of them were rejected as aberrant estimates, while the single acceptable date of 38,100 ± 935 BP (uncal., RTT-4725) "must be treated with caution" (Adler *et al.* 2008:14). The total series of AMS results for layer 4C accepted by Adler and colleagues (2008) defines (with 1σ, applying CalPal_2007_HULU) the calendric age of the EUP in Ortvale Klde approximately from 40-39 ka cal BP (4 dates) to 37-35 ka cal BP (8 dates). A series of five TL dates obtained for layer 4C produced very consistent but significantly younger age estimate by 28.9 ka BP_{TL} than the AMS calendric age for layer 4C, and "this deviation cannot be explained" (Adler *et al.* 2008: 823, table 3).

Lithic industry

Adler and colleagues (2006a, 2006b, 2008, 2009) report that over 3200 faunal remains and more than 12000 lithic artifacts were recovered during the recent excavation campaign of EUP layers at Ortvale Klde. Most of them are made from local flints, but a small part of the lithics is from transported obsidian. Recently, Le Bourdonnec and coauthors (2012) published results on two obsidian artifacts from the UP deposits at Ortvale Klde during the new 2006 excavation. They conclude that the obsidians originate from faraway sources located in eastern Anatolia or Armenia. Obsidians were brought to Ortvale Klde as unretouched and retouched flakes, while some obsidian cores were also flaked inside the site (Adler *et al.* 2006a, 2006b, 2008).

Unipolar cores for blade and bladelet production (fig. 9:14), numerous retouched bladelets (fig. 9:1-5, 8-9), some backed bladelets (fig. 9:6), end-scrapers manufactured on blade fragments (fig. 9:13), rounded scrapers on flakes (fig. 9:10), and various burins (fig. 9:9, 12, 15) are found in the EUP assemblages from layers 4d and 4c in Ortvale Klde (Adler *et al.* 2006a, 2006b; Bar-Yosef *et al.* 2006).

Earlier, Adler and Tushabramishvili (2004: 104) reported that this EUP "[…] *assemblage is dominated by small, backed bladelets, bevel-based bone points* […] *and a general lack of Aurignacian elements*". Later, Bar-Yosef and coauthors (2006) noted similarities between EUP industries from Ortvale Klde and Dzudzuana. However, a detailed study of the EUP in Ortvale Klde is unpublished as yet.

Organic artifacts

In all UP layers of Ortvale Klde three bevel-based bone/antler points, two polished bone/antler abraders, and a polished bone with parallel linear incisions were found (Adler *et al.* 2006a, 2006b).

2.3. Bondi Cave

Bondi Cave is located at an elevation of 477 m above sea level in the Tabagrebi River gorge (Kvirila River Basin in western Georgia), and near the sites of Ortvale Klde and Dzudzuana. It is a gallery cave about 120 sq. meters in total area, opening to the south. Excavation of about 12 sq. meters was undertaken in 2007-2010 near the cave entrance (Tushabramishvili et al. 2012; Le Bourdonnec et al. 2012). The total section of Bondi Cave is more than 3 m and is divided into 8 distinct strata. The upper layers II, III, IV, and Va-Vd (about 150 cm in the total thickness) yielded abundant UP artifacts, while lower layers VII and VIII (more 60 cm thick) produced relatively fewer artifacts assigned to the Middle Paleolithic. These UP and MP deposits are divided by Stratum VI that contains limestone blocks representing the main roof collapse and sediments of the lower UP Layer Vd introduced among these blocks. Evidence of fire has been recovered in different layers.

Human fossils

A tooth assigned to *H. sapiens* (Tushabramishvili *et al.* 2012:183) was found in Layer Vb.

Dating

Tushabramishvili and coauthors (2012) report a sole conventional radiocarbon date of 31,270 ± 640 BP (uncal., SacA-12069) for the collapse Layer VI with certain UP artifacts, which dates the layer to about 35.4 ka cal BP (with 1σ, applying Cal_BP_{Hulu}). The excavators suggest that Layer VI shows either the initial UP occupation of the cave, or a hiatus of several thousand years between MP and UP deposits. The lower UP levels Vd and Vc are undated as yet. At present, only two conventional radiocarbon dates for UP level Vb (table 1) provide the earliest age estimate of the UP deposits in Bondi Cave between 29.5 and 25.7 ka cal BP_{Hulu}.

Lithic industry

The 2007-2010 excavations in Bondi Cave produced 2851 faunal remains and more than 7000 lithic artifacts, most of which are made from local flints. Obsidian pieces are rare and occur only in UP layers II, IV and V (Tushabramishvili *et al.* 2012). A study of four obsidian artifacts from the UP levels (Le Bourdonnec *et al.* 2012) shows that one obsidian (LV-C4) from level V is likely derived from the Chikiani-Paravani source in southern Georgia located about 170 km away from the site, and other obsidians were likely procured from sources in northern Anatolia. However, other sources in eastern Anatolia, Armenia and Azerbaijan are also possible. These results suggest that the EUP inhabitants of Bondi Cave had some contact with areas about 350 km distant from the cave. Most obsidian artifacts were brought to Bondi Cave as small pieces, and evidence for their on-site retouching are rare.

Tushabramishvili and colleagues (2012) report that the assemblage from Layer VI includes 65 lithics only (table 2, 3), among which unretouched flakes, blades, and bladelets predominate (66%), and blades prevail over bladelets (table 4). The excavators combine lithics from the different sub-levels of Layer V that yielded 2443 artifacts in total. In the total UP assemblage from Layer V, chips and fragments comprise 61% of all lithics. Blades and bladelets predominate (55.4%) among total flakes, and blades are more common (31%) than bladelets. Retouched tools are only 3% of the total assemblage. Detailed descriptions and statistics for the UP Layer V are as yet unpublished. The excavators note orientation of flaking technology toward the production of laminar (blades and bladelets) blanks, presence of microlithic tools, as well as the absence of an obvious 'Aurignacian' component and rarity of carinated pieces (Tushabramishvili *et al.* 2012).

Organic artifacts include only a cockleshell bead found in level Vb.

A somewhat similar EUP industry from Apiancha Cave (fig. 1) located in the north-western part of the southern Caucasus, in Abkhazia (Korkia 1998), dated to >32.8 ka 14C BP (Bar-Yosef *et al.* 2011). However, data about the EUP industry of this site are poorly published.

3. The EUP of the Caucasus in West Eurasian Context

The recent data received from Mezmaiskaya, Dzudzuana, Ortvale Klde, and Bondi fundamentally changes our understanding of the origin and industrial peculiarities of the EUP in the Caucasus. All Caucasian EUP sites lack a period of transition from the Middle to the Upper Paleolithic, and instead clearly show the abrupt appearance of the EUP in the Caucasus as a fully developed technological tradition, and lithic and bone industry suggesting the arrival of a new biological population (i.e. *Homo sapiens*) and population replacement of local Neanderthals (for details see Meshveliani *et al.* 2004; Bar-Yosef *et. al.* 2006, 2011; Adler *et al.* 2006a, 2006b, 2008; Golovanova *et al.* 2006, 2010a, 2010b; Tushabramishvili *et al.* 2012).

The recent evidence also show that the Caucasian EUP is generally characterized by highly developed blade and bladelet industries (table 4) distinguished by the predominance of blades and bladelets among blanks, as well as prevailing (in Mezmaiskaya) or high (in Dzudzuana) value for different kinds of bladelet tools, among

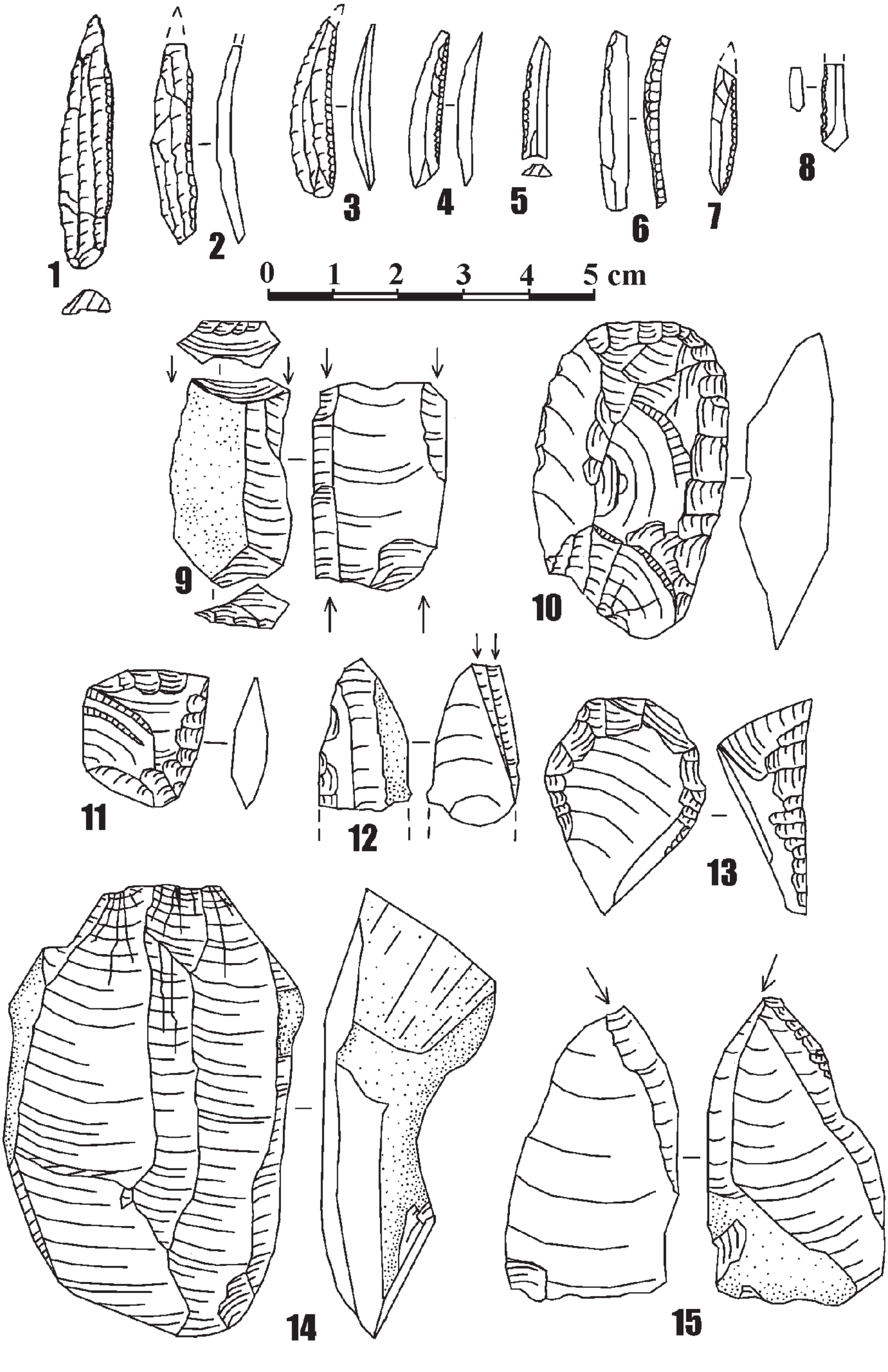

Figure 9 – Upper Paleolithic artifacts from Layer 4c (1-10, 13, 15), Layer 4d (11), and Layer 3 (14) in Ortvale Klde. 1-5, 7, 8 – retouched bladelets; 6 – backed bladelet; 9 – burin on truncation; 10 – end-scraper on flake; 11 – atypical scraper; 12 – burin on broken blade; 13 – end-scraper on retouched flake; 14 – unidirectional blade core; 15 – burin on oblique truncation. After Adler *et al.* 2006.

Site	Layer	Blade Index %	Total % bladelets/ blades	Tools on bladelets/ blades %	Bone tools n	Decoration items n	Source
CAUCASUS							
Mezmaiskaya	1C	62,2	83,3	75,8/–	27	1	Golovanova *et al.* 2010b
Dzudzuana	D	36,1	60,6	min 37,2/–	11	1	Bar-Yosef et al. 2011
Bondi	V	~55,4	~31,1	?	–	1	Tushabramishvili *et al.* 2012
LEVANT							
Ucagizli	B	54,7 or 25,1	?	?/57,7	14	Shell beads	Kuhn *et al.* 2003
	BI-IV	57,1 or 26,2	?	?/60,7			
Quafzeh	E	77,7	16,4	12/68	–	–	Bar-Yosef & Belfer-Cohen 2004
Boker A		62	>50	~80	–	–	Monigal 2003
Abu-Noshra I		?	>45	>45	–	–	Becker 2003
Abu-Noshra II		?	>45	>45	–	–	Becker 2003
Lagama VII		?	73,1	>53	–	–	Bar-Yosef & Belfer 1977

Table 4 – Comparative features (technology and bone industry) of EUP in the Caucasus and Early Ahmarian in the Levant.

Site	Layer	Points on bladelets/ blades %	Backed bladelets/ blades %	Bladelets/ blades with fine retouch %	End-scrapers %	Burins %	Pièces esquillées %	Total
CAUCASUS								
Mezmaiskaya	1C	17,6/–	41,1/–	17,1/–	6,6	5,9	0,7	455
Dzudzuana	D	0,7/–	9,8/1,9	26,7/5,9	22,4	10,5	5,5	580
Bondi	V	?	?	?	?	?	?	73
LEVANT								
Ucagizli	B	?/19,4	?/2,0	?/20,4	42,7	3,0	0,4	504
	BI-IV	?/16,4	?/2,7	?/23,1	43,0	2,7	0,8	862
Quafzeh	E	32,9 total	0,9/–	–/14,4	27,6	7,2	–	319
Boker A		~32	~10	25	2	16	–	102
Abu-Noshra I		?	25,8 total	20,1 total	0,6	16,4	–	159
Abu-Noshra II		?	25,5 total	9,3 total	5,2	7,9	–	463
Lagama VII		46,7 total	-	36,9/9,4	0,2	2,5	–	903

Table 5 – Comparative features (typology) of EUP in the Caucasus and Early Ahmarian in the Levant (sources see Table 4).

which many are retouched bladelets. End-scrapers, burins, and pièces esquillées are innumerous (table 5). Rounded scrapers are found in Mezmaiskaya, Dzudzuana, and Ortvale Klde, and a high variability of burins is reported in some EUP sites. All Caucasian EUP industries include a wide assortment of bone implements, mostly awls and points with rounded cross-sections. Also, personal ornaments are found in Mezmaiskaya and Bondi.

In comparing the EUP industry of layer 1C at Mezmaiskaya with the EUP in nearby regions, Golovanova (2000: 175) finds the Mezmaiskaya materials to be most similar to the earliest fully-fledged UP industry in the Levant, the Early Ahmarian, and particularly in Ahmarian assemblages from Abu Noshra and Lagama in Sinai, dating between 35 and 30 ka ^{14}C BP (Gilead 1991). Nowadays, there is a wide consensus among researchers that the Caucasian EUP resembles the Early Ahmarian in the Levant while differing from Typical Aurignacian in Europe (Adler *et al.* 2008; Bar-Yosef et al. 2006, 2011; Golovanova *et al.* 2006, 2007, 2010b; Meshveliani *et al.* 2004; Tushabramishvili *et al.* 2012).

The Early Ahmarian is generally characterized by a highly developed technology for the production of slender blades and bladelets, distinguished by an overwhelming blade/bladelet component among blanks and tools (table 4, 5; both tables show the main techno-typological features of selected Ahmarian sites having well-preserved occupational layers, representative total assemblages, and tool inventories more than 100 items). The Ahmarian industries from the southern Levant, such as Abu-Noshra I, II and Lagama VII in Sinai and Boker A in Negev are particularly similar to the EUP assemblages from Mezmaiskaya and Dzudzuana in the highest blade/bladelet component among blanks and tools, as well as a high value of slender blades and bladelets with lateral retouch in the tool set. Backed pieces are abundant in Abu-Noshra I, II and Layer 1C at Mezmaiskaya, and quite numerous in Boker A and Dzudzuana (table 5). However, the rarity or absence of some tool groups, such as backed pieces or bladelet points, in other EUP sites in the Levant or Caucasus may be partly explained by different typology approaches applied by researchers. The percentage of end-scrapers is low in most sites, excluding Ucagizli, Qafzeh and Dzudzuana, in which this percent is higher. Burins are not numerous and variable in most sites. Some Early Ahmarian industries (Boker A and Qafzeh) are distinguished by high values of end-scrapers and burins made on primary flakes, primary blades, and core trimming pieces; this feature is also characteristic for the EUP of Mezmaiskaya. Rare rounded scrapers, *pièces esquillées*, bone implements, and personal ornaments are found in Ucagizli and Caucasian EUP sites, but absent in most EUP sites in the Levant.

While there are strong similarities between the Caucasian EUP and the Early Ahmarian in the Levant, the inter-assemblage variability within these regions is also becoming obvious. The variability within the EUP in the Levant may resulted from different reasons (Phillips & Saca 2003; Belfer-Cohen & Goring-Morris 2003). Also, other factors should be taken into account, such as provenance and preservation of cultural remains within the occupational layer (i.e., is it a real 'living floor' with dense artifact accumulation, fireplaces, and other artificial constructions or just a deposit with dispersed artifacts); and excavation methods that can result in abundance (e.g., applying dry screening or water screening of archaeological deposits) or loss of small lithics. Also, it is important to pay attention to the common admixture of artifacts from various strata and loss of the micro-industry in the majority of old excavations. The application of more recent lithic study methods, including analysis of core or tool reduction sequences, is one of the most important issues in Paleolithic research. For example, the core/tool reduction approach resulted in redefinition of carinated scrapers produced by bladelet removals as bladelet cores (Belfer-Cohen & Grosman 2007). Many laminar industries are traditionally analyzed using F. Bordes's 'Blade Index'. While the 'Blade Index' is obviously important, the ratio of blades and bladelets is often more indicative for comparisons of the UP micro-laminar (bladelet) industries, such as the Caucasian EUP or Early Ahmarian. However, this ratio is not reported in many publications.

The extremely significant issue of EUP typology is the differentiation of point types manufactured on blades and bladelets in various EUP industries. For example, el-Wad points made on slender blades/bladelets by fine lateral retouch are the most common point type in EUP assemblages in the Levant and the key tool of the Levantine Early Ahmarian (Belfer-Cohen & Goring-Morris 2007). A strict and clear definition of el-Wad points was discussed in detail by Bar-Yosef and Belfer (1977). However, researchers now assign very different tools to el-Wad points (examples see in figure 10). Only a part of these tools are 'classic' el-Wad points, while other tools are closer to Font-Yves points or should be designated as special point types. Following a 'broad' definition, el-Wad points may be found in many UP industries, including Mezmaiskaya Cave. On the contrary, following the 'strict' definition as in Bar-Yosef and Belfer (1977), el-Wad points are absent in Mezmaiskaya and other EUP sites in the Caucasus. This example shows that only the application of strict definitions of tool types alongside detailed descriptions and statistics for each tool group can provide the basis for defining similarities or distinctions among EUP industries of the West Asia.

The problem of strict definitions sharply rises especially in comparing the Caucasian EUP with coeval or slightly earlier EUP industries of the West Eurasia – Typical Aurignacian, Levantine Aurignacian, Zagros Aurignacian, Mediterranean Aurignacian, and Ahmarian – that demonstrate highly variable technological and typological characteristics, most of which are quite different from those typical for the 'classic' Aurignacian in the Perigord (table 6, 7). Again, following a 'broad' definition, the term 'Aurignacian' becomes almost synonymous with the term 'Early Upper Paleolithic'. This results in the picture, which we have now, when at least five roughly contemporaneous and different 'Aurignacian' variants, each having different distribution and apparently different origins, are identified in Western Eurasia.

The earliest EUP industries in Southern Europe and Western Asia – Mediterranean Aurignacian ('Proto-Aurignacian') and Early Ahmarian – show similar technologies oriented toward continuous production of slender blades and bladelets from unipolar narrow-fronted and prismatic cores, while differing significantly in tool sets. The Mediterranean Aurignacian assemblages are characterized by serial carinated pieces, including carinated scrapers and carinated burins, Dufour bladelets, and split-base bone points. Points made on blade/bladelet blanks, such as el-Wad points representing the 'key fossil' of the Early Ahmarian, are absent in the Mediterranean Aurignacian. While the oldest dates are between 42–36 ka 14C BP, most radiocarbon estimates of the Mediterranean Aurignacian fall between 36.5 and 34 ka ^{14}C BP (table 6, 7), overlapping with chronological ranges of the early Typical Aurignacian in France (35–32 ka ^{14}C BP) and the early 'Swabian' Aurignacian in Germany (35.5–33 ka ^{14}C BP). Both early Typical Aurignacian and early Swabian Aurignacian demonstrate some level of typological continuity marked by the production of carinated pieces and split-base bone points with apparently slightly earlier Mediterranean Aurignacian, but a different technological tradition based on production of thick 'Aurignacian' blades from unipolar prismatic cores and a different tool manufacture tradition based on common use of tools made on 'Aurignacian' blades.

The Early Ahmarian in the Levant shows a great range of radiocarbon dates (table 1). Most of them fall between 37 and 31 ka ^{14}C BP, while the oldest dating series for Units IV-III at Kebara is between 42-43 ka ^{14}C BP. The Early Ahmarian is distinguished by common production of el-Wad points and virtual absence of Dufour bladelets, carinated scrapers, and split-base bone points. The Zagros Aurignacian or 'Baradostian' in Iran is now dated between approximately 35-29 ka ^{14}C BP (table 6, 7). The more recent studies of the Zagros Aurignacian assemblages from Yafteh and Warwazi show a general similarity of technologies oriented toward continuous production of slender blades and bladelets and common use of blades/bladelets as tool blanks between the Zagros Aurignacian and two EUP entities in the Levant – 'classic' Levantine Aurignacian and Early Ahmarian. These three industry types are separated mostly on typological grounds, but demonstrate a mosaic combination of diagnostic features. The Zagros Aurignacian is distinguished by common production of carinated pieces and Dufour bladelets (both feature are also typical for the Levantine Aurignacian), and rarity of el-Wad points (more common in the Levantine Aurignacian). Arjeneh points, which are defined a key component of the Zagros Aurignacian, are similar to Font-Yves points and some varieties of el-Wad points made on bladelets (fig.

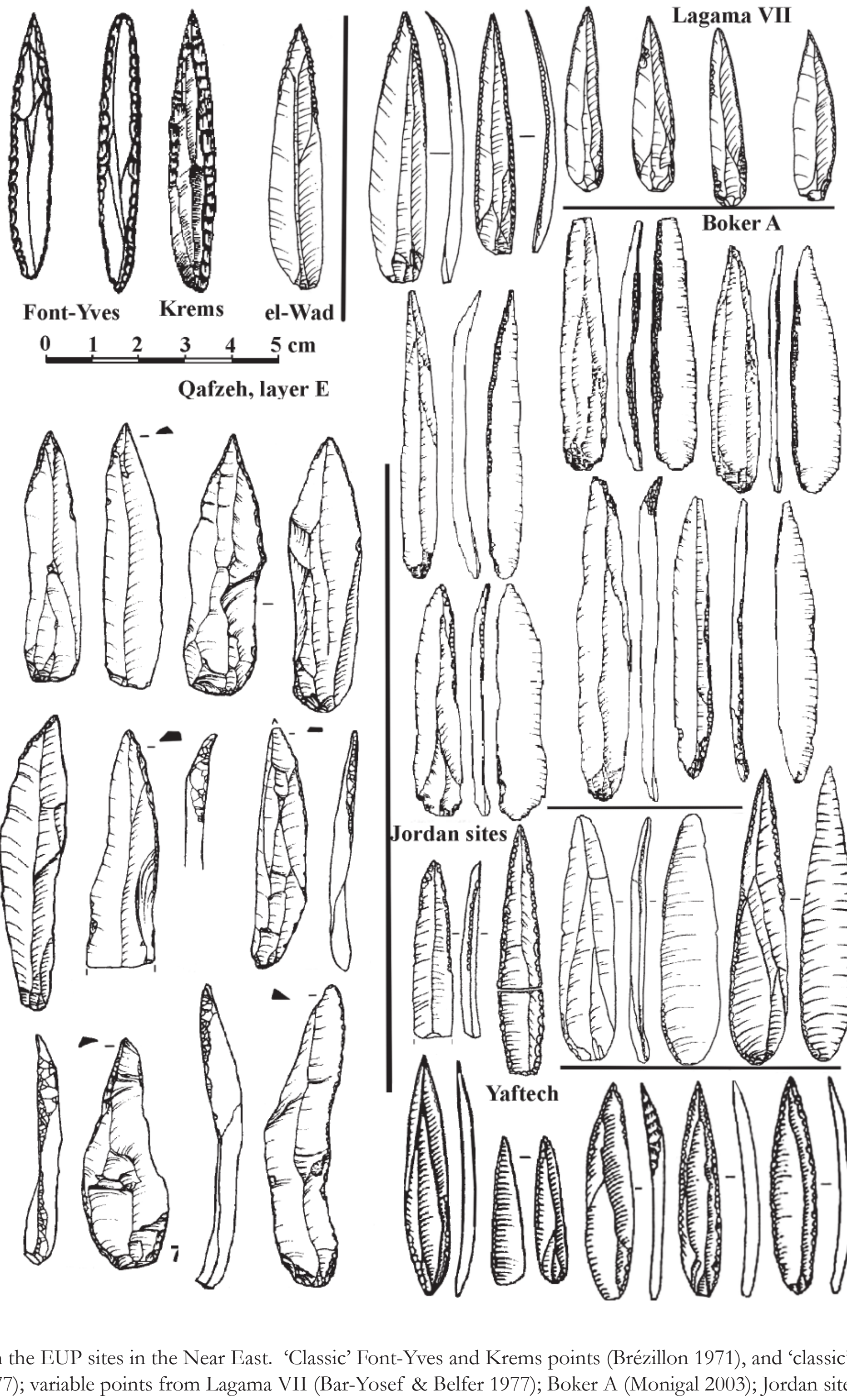

Figure 10 – Points from the EUP sites in the Near East. 'Classic' Font-Yves and Krems points (Brézillon 1971), and 'classic' el-Wad point (Bar-Yosef & Belfer 1977); variable points from Lagama VII (Bar-Yosef & Belfer 1977); Boker A (Monigal 2003); Jordan sites (Coinman 2003); Qafzeh, layer E (Bar-Yosef & Belfer-Cohen 2004); Yafteh (Otte *et al.* 2007, 2011).

EUP Industry	Chronology/ context	Flaking technology: blade or bladelet oriented	Tool blanks: blades or bladelets	Sources
WESTERN EUROPE				
Typical Aurignacian early phase= 'Aurignac. I' in Perigord, France	oldest date for the early Typical Aurignacian in Castanet is 35 ka ^{14}C BP; most of dates are between 34–32 ka ^{14}C BP	two separate technologies: 1) 'Aurignacian' blades are produced from unipolar prismatic cores with minimal pre-forming, crests are uncommon; core tablets; facetted or spur butts predominate on blades; 2) bladelets are straight or curved, come from carinated pieces with wide front	most tools are made on 'Aurignacian' (large, wide, thick, curbed) blades; tools made on bladelets are rare	Bon 2002; Bordes 2006; Fernandez 2006
Swabian Aurignacian (early phase) in Swabia, German	oldest dates >40 ka ^{14}C BP; most of dates are 35.5–33 ka ^{14}C B*P*; strong similarities with the early Aurignacian in Perigord	two separate technologies: 1) blades come from unipolar prismatic cores; 2) bladelets mostly come from carinated pieces	most tools are made on 'Aurignacian' blades; tools made on bladelets are absent	Teyssandier, *et al.*2006; Conard & Bolus 2006
Mediterran Aurignacian 'Archaic' or 'Proto-Aurignacian', Mediterranean Europe, incl. Le Piage, K in Perigord and 'Krems' Aurignacian in Austria	oldest dates in Fumane, L'Arbreda, and others fall between 42–36 ka ^{14}C BP; within robust series most earlier dates fall between 36.5–34.5 ka ^{14}C BP as in layer C4d at Isturitz and layer 8 at Cueva Morín; recent ABOx–SC dates of level A2 at Fumane are 35.9–34.2 ka ^{14}C BP; chronology of 'Krems' Aurignacian is worse	continuous production of slender blades (significantly thinner than 'Aurignacian' blades) and long (3.5-4 cm), narrow (width 0.5-1 cm), straight or slightly curved bladelets from unipolar prismatic cores; simple pre-forming; débordant blades or crests are uncommon; core tablets; bladelets also come from large carinated pieces	most tools are made on blades/bladelets; diversity of tools on blades and flakes; bladelets are used mostly for production of Dufour bladelets	Bordes 2006; Fernandez 2006; Conard & Bolus 2006; Teyssandier, *et al.*2006; Kozlowski 2006; Higham *et al.* 2009
WESTERN ASIA				
Levantine Aurignacian (early phase) in the Levant	Levantine Aurignacian lays atop Early Ahmarian in Ksar Akil and Kebara; most complete sequence in Ksar Akil shows three phases 'A' (lev. XIII-IX), 'B' (levels VIII-VII) and 'C' (levels VI-IV); dates are 33.5–29.5 ka ^{14}C BP at Ksar Akil and Umm-el-Tlel, and 35–33 ka ^{14}C BP in units I-II at Kebara	flaking technology oriented to the continuous production of slender and long, straight or slightly curved blades and bladelets from mostly unipolar prismatic cores; predominance of blades & bladelets (59% in levels XIII-IX at Ksar Akil); bladelets are also produced from carinated pieces with wide front	most tools are made on flakes, and slender blades and bladelets; blades are used mostly for production tools with lateral retouch, burins, and end-scrapers	Bar-Yosef & Belfer-Cohen 1996; Belfer-Cohen & Bar-Yosef 1999; Soriano & Ploux 2003; Gorring-Morris & Belfer-Cohen 2006; Lengyel *et al.* 2006
Zagros Aurignacian 'Baradostian' (early phase) in Iran	Zagros Aurignacian lays atop IUP industry from lev. AA-LL at Warwasi; dates are 35.5–29 ka ^{14}C BP in Shanidar lev. C, and ca 33.5 ka ^{14}C BP in lower lev. at Yafteh; early Zagros Aurignacian (lev. P-Z in Warwasi) is similar to early Levant. Aurign. - lev. XIII-IX at Ksar Akil	continuous production of slender and long, straight or slightly curved blades and bladelets (60% , mostly bladelets) from unipolar (53%) or opposed platforms (18%) prismatic cores; thick 'Aurignacian' blades are rare; bladelets also come from carinated pieces; small discoidal cores for flakes	most tools are made on blades or bladelets (60% in levels P-Z at Warwasi); in Yafteh most tools are made on bladelets, while blades are used mostly for production pieces with lateral retouch, burins, and end-scrapers	Olszewski & Dibble 2006 ; Bordes & Shidrang 2009; Otte *et al.* 2007, 2011
Ahmarian (early phase) in the Levant	the earliest fully-fledged UP industry in the Levant; oldest dates are 43–38 ka ^{14}C BP in Kebara (IV–III), most 30-35 ka ^{14}C BP	continuum of blade and bladelet production from mostly unipolar narrow-fronted and prismatic cores	most tools are made on bladelets / blades; CTE used for production burins, and end-scrapers	Bar-Yosef & Belfer, 1977; Belfer-Cohen & Gorring-Morris 2007; Rebollo *et al.* 2011

Table 6 – EUP Industries of Western Europe and Western Asia (chronology and technology).

EUP Industry	Points	Backed pieces	Retouched bladelets	Retouched blades	End-scrapers	Burins	Organic artifacts	Sources
WESTERN EUROPE								
Typical Aurignacian early phase= 'Aurignac. I' in Perigord, France	points on bladelets are absent	entirely absent	rare; retouch is marginal and mostly inverse; rare Dufour bladelets	are common (16% of the tool set), 4% blades w/'Aurign.' retouch	52-56% of tools, are made on blades; 11-12% carinated or nosed	8-11% of tools; made on blades	split-base points	Sonnev.- Bordes 1960; Bon 2002; Bordes 2006
Swabian Aurignacian (early phase) in Swabia, German	points on bladelets are absent	entirely absent	retouched or Dufour bladelets are absent	are common	prevail in tools on blades; carinated pieces are common	made on blades	bone tools & other organic artifacts common; figurines; split-base points	Teyssandier *et al.* 2006; Conard & Bolus 2006
Mediterran Aurignacian 'Archaic' or 'Proto-Aurignacian', Mediterranean Europe, incl. Le Piage, K in Perigord and 'Krems' Aurignacian in Austria	points on bladelets are absent	entirely absent	retouched bladelets are common (7-20%); Dufour bladelets are common	are rare; blades with 'Aurignac.' retouch are absent	are made on blades; carinated pieces are common	made on blades	some bone tools; split-base point	Bordes 2006; Fernandez 2006
WESTERN ASIA								
Levantine Aurignacian (early phase) in the Levant	El Wad points are common	are rare (1%) or absent	Dufour bladelets are common	are common	are made on blades; carinated pieces are common	made on blades	some bone artifacts; split-base points; perforated canines	Gorring-Morris & Belfer-Cohen 2006
Zagros Aurignacian 'Baradostian' (early phase) in Iran	El-Wad points are rare (1%); Arjeneh points are common in Yafteh (19%)	are rare	Dufour bladelets are common (14% in Warwasi) or predominate (47% in Yafteh)	are common (12% in Yafteh)	common (7.5-8%), are made on blades; carinated pieces are common	burins (10-11%), mostly made on blades	some bone tools & personal ornament. split-base points absent	Olszewski & Dibble 2006; Otte *et al.* 2007, 2011
Ahmarian (early phase) in the Levant	el-Wad points are common	very rare	domined marginal dorsal retouch; Dufour bladelets are rare or absent; inversely retouched	the retouch is semi-abrupt or fine; alternately, inversely retouched	are made on blades, technical flakes, on flakes	made on blades, technic. flakes, on flakes	split-base points absent	Belfer-Cohen & Gorring-Morris 2007; Bar-Yosef & Belfer, 1977

Table 7 – EUP Industries of Western Europe and Western Asia (typology).

10). However, it is difficult to evaluate a degree of affinity among various types of EUP bladelet points basing on available publications, before a special comparative study of the entire assortment of the West Asian EUP points is done.

Split-base projectile points, which are the most characteristic bone tools of all Aurignacian industries in Europe and the Levantine Aurignacian, are absent in the Zagros Aurignacian and the Levantine Ahmarian. The Levantine Aurignacian, which is dated to the same time interval of about 35–29.5 ka ^{14}C BP as the Zagros Aurignacian (table 6, 7), represents an even more mosaic cultural entity.

In comparing the EUP in the Caucasus with the EUP in nearby regions, one can note (table 1) that the earliest dates for the Caucasian EUP fall between 38 ka ^{14}C BP (Layer 4d in Ortvale Klde) and 36 ka ^{14}C BP (Layer 1C in Mezmaiskaya). Also, most researchers agree that in general the Caucasian EUP is more similar to the Early Ahmarian than to either the Zagros Aurignacian or Levantine Aurignacian. Our data discussed above suggest that the Caucasian EUP shows particular similarity to some Ahmarian industries from the southern Levant, such as Abu-Noshra I, II in Sinai and Boker A in Negev. All these observations may point out to a quite early northward migration of some EUP groups from the Levant to the Caucasus.

This hypothesis is supported by new data that demonstrate the abrupt appearance of the EUP in the Caucasus after 40 ka cal BP as a fully developed technological tradition (Adler *et al.* 2008; Bar-Yosef *et al.* 2006, 2011; Golovanova *et al.* 2006, 2010a). Also, the northward movements of EUP human groups are supported by preliminary results of obsidian transport studies. These studies suggest that some artifacts from the EUP levels of Mezmaiskaya Cave in the northwestern Caucasus are produced from obsidian procured from the Kojun Dag (Paravan) source located in the southwestern Caucasus. In Bondi Cave and Ortvale Klde, western Georgia, some artifacts are produced from obsidian procured from the same Chikiani-Paravani source area in southern Georgia, located about 170 km southward of the sites, as well as from more distant southern sources in eastern Anatolia, Armenia and Azerbaijan.

We conclude that the time period between 40 and 30 ka cal BP was significant for the dispersal of essentially new EUP micro-laminar (bladelet) industries distinguished by developed blade and bladelet technologies, together with numerous and variable bladelet tools across a broad region including Mediterranean Europe, Zagros, Levant and Caucasus (Golovanova *et al.* 2007, 2010a). Further development of these industries could result in regionally unique features in each of these regions. The data considered above confirm this idea of geographical divergence of EUP modern human groups in Western Eurasia. The Caucasian records show a specific pathway of EUP development, as is shown by regional differences of the Caucasian EUP. Typical Gravette points with straight backs made by blunted retouch are the most common point type in the EUP levels at Mezmaiskaya Cave. Various backed bladelets are found in the EUP of Mezmaiskaya, Korotkaya, Dzudzuana, and Ortvale Klde. The Caucasian EUP demonstrates a wide assortment of bone tools, and some personal ornaments. These organic artifacts include points with rounded cross-sections, bone awls and needles, pendants made from caprid teeth, cockleshell or marine gastropod beads. Bone implements with geometric ornamentation are absent in the oldest EUP industries but appear in the later EUP levels in Mezmaiskaya, Dzudzuana, and Ortvale Klde (Golovanova *et al.* 2010b).

These recent findings significantly contribute to our understanding of EUP origin and development in the Caucasus. New and more detailed data from ongoing research will provide in the future better knowledge of the EUP in the Caucasus and its relationship to EUP entities in the extensive surrounding Paleolithic landscape of West Eurasia.

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CONCLUSION

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Effectivement, le site de Yafteh était resté parfaitement intact, comme les études de Frank Hole l'avaient démontré. Nos fouilles furent limitées à quelques mètres carrés, situés à l'exact opposé des sondages menés par Frank. Sur toute la hauteur, les niveaux aurignaciens furent rencontrés avec une extrême densité et dans une situation originelle : plusieurs surfaces d'occupation purent être suivies, indurées par la chaleur. Des traces de foyers, de cendres, de rejets charbonneux, de minuscules restes de poissons encore alignés prouvent l'intégrité des niveaux successifs. Ces campagnes ne nous ont pas permis de suivre ces sols sur de grandes surfaces, et les dépôts inférieurs n'ont pu être atteints, nous privant de vérifier l'hypothèse de continuité régionale. Inversement, le matériel archéologique est aujourd'hui d'une masse et d'une richesse considérable. Outre les classiques approches techniques, fauniques et radiométriques, nous disposons aussi d'indices spirituels comme les pendeloques d'une étonnante variété, l'importance des colorants récoltés, les matériaux exogènes, établissant un réseau de contacts lointains.

Le plus stupéfiant (aux yeux de chercheurs occidentaux !) tient en l'étonnante souplesse des techniques utilisées : fondamentalement orientées vers les productions lamellaires et laminaires, elles contiennent aussi bien des schémas centripètes (« mini-Levallois ») et une très curieuse méthode par retouches plates. L'ensemble de ces schémas théoriques semblait disponible à chaque moment de la séquence, mais elles se sont exprimées selon des proportions variées. On ne peut pas perdre de vue l'existence d'éléments exotiques, manifestés non seulement par les matières, homogènes et fines, mais surtout par les traces de tout autres procédés de débitage : il s'agit de longues lames, épaisses et régulières, impossibles à obtenir par les techniques et matériaux disponibles à Yafteh.

En aval de ces critères techniques, et dans leur directe corrélation, les armatures légères abondent (pointes d'Arjeneh et lamelles Dufour). La chasse à l'arc y semble donc prédominante, en accord avec la situation de cet abri, au pied des massifs rocheux dont les capridés ne peuvent être abattus que par ces armes légères, précises et rapides. Dans le même raisonnement, on peut intégrer l'importance prise par les chèvres sauvages parmi les restes du gibier découverts dans les mêmes ensembles (Mashkour, ce volume). Le travail des matières osseuses, quoique discret (par exemple poinçons, lissoirs, une sagaie) démontre la voie prise dans cette direction, si spécifique au Paléolithique supérieur européen. Ces matières furent clairement liées et orientées non seulement vers les supports laminaires (pour les outils aptes à leur réalisation) mais aussi aux projectiles adaptés aux vastes paysages, ouverts et steppiques, où la sagaie propulsée présente la meilleure adéquation à la chasse.

Compte tenu de la densité de tels ensembles, de leur parfait agencement aux schémas culturels transposés en Europe, ces régions d'Asie centrale semblent constituer le meilleur candidat pour la source d'expansion rapide des Aurignaciens vers l'Europe (fig. 1). Cette impression se renforce encore lorsque l'on considère l'existence de cet Aurignacien, absolument identique jusqu'aux régions méridionales à proximité de Chiraz (Eshkaft-e Gavi ; Rosenberg 1985), mais aussi vers l'Est, avec la grotte de Kara Kamar en Afghanistan (Davis 1978), et vers le Nord avec le site de Shugnou au Tadjikistan (Ranov et al. 2012) et celui de Kulbulak en Ouzbékistan (Flas *et al.* 2010). Une aire géographique considérable témoigne d'une densité démographique énorme, tenant comte des riches capacités giboyeuses de la steppe. À ce stade, ce scénario n'est que théorique mais, inversement comment pourrait-on à la fois expliquer les mouvements migratoires dont tout le contient européen témoigne, et le destin de ces si denses populations du Moyen Orient paléolithique ? Si l'on tient compte, en outre, du lointain « Zarzien », aux ultimes limites du Paléolithique et chargé en microlithes (Olszewski 1993), alors l'apparition des triangles à Kulbulak ou à Dodekatym (Kolobova *et al.* 2011) pourrait les annoncer dès l'Aurignacien sensu stricto. De telle sorte que l'aire européenne et l'aire asiatique du même mouvement culturel auraient dès lors poursuivi des destins différents, à la suite de la période migratoire initiale. Il en va toujours de même lors de quelconques vagues d'expansion où, pour simplifier, la colonie s'émancipe de la métropole en poursuivant sa propre aventure, pourtant très attachée à ses valeurs originelles, parfois même à son insu.

Last but not least : nos rapports avec la population iranienne ont toujours été empreints de cordialité, de chaleur et d'un intérêt passionné pour les raisons de nos visites dans leur beau pays, émaillé de la magie des « Contes des Mille et Une Nuits », des mausolées raffinés, des superbes mosquées et d'une nature prodigieuse. Cette publication s'offre un peu aussi comme une marque de reconnaissance à ce peuple.

Sur le terrain et dans les arcanes administratifs complexes, notre équipe a toujours été fidèlement soutenue par nos collègues iraniens. Outre leur grande compétence, tout leur dévouement et leur solide amitié nous furent d'une aide indispensable et nous tenons à leur adresser toute notre amitié et nos profonds remerciements.

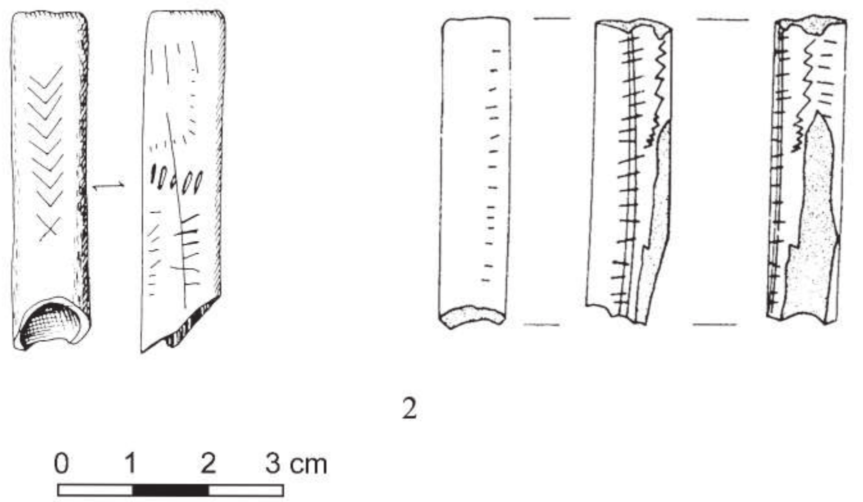

Figure 1 – Tube en os incisés. 1 : Grotte de Spy (Belgique) ; 2 : Eshkaft-e Gavi (Iran) (Rosenberg 1985).

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