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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.

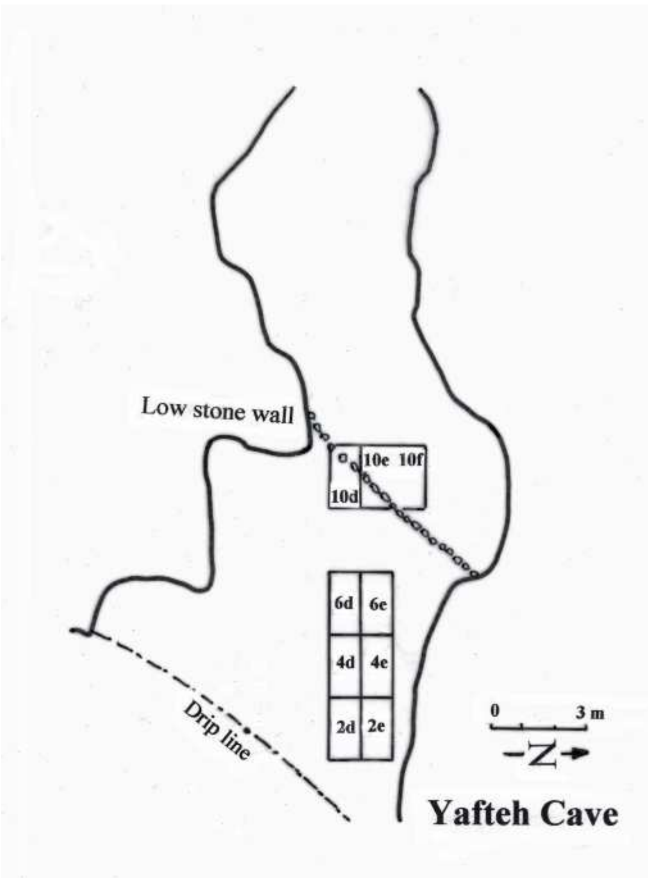

Figure 2 – Plan of the excavation trench.

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.

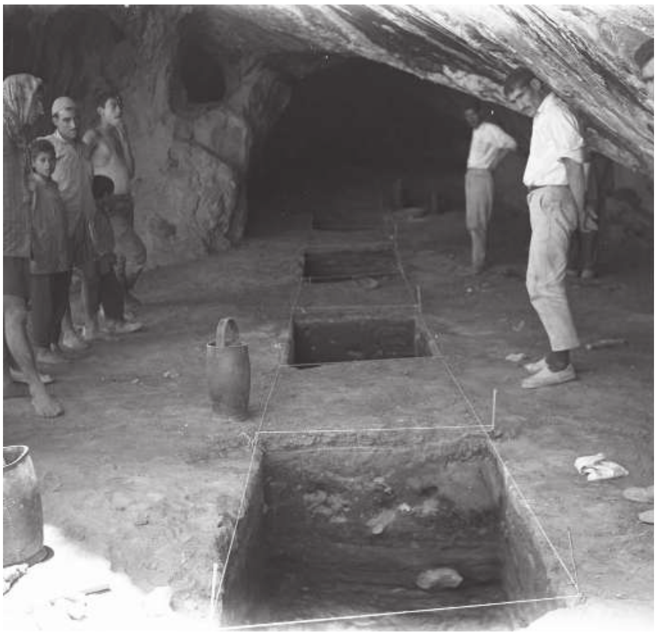

Figure 4 – Layout of the trench, showing alternate placing of the units.

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-

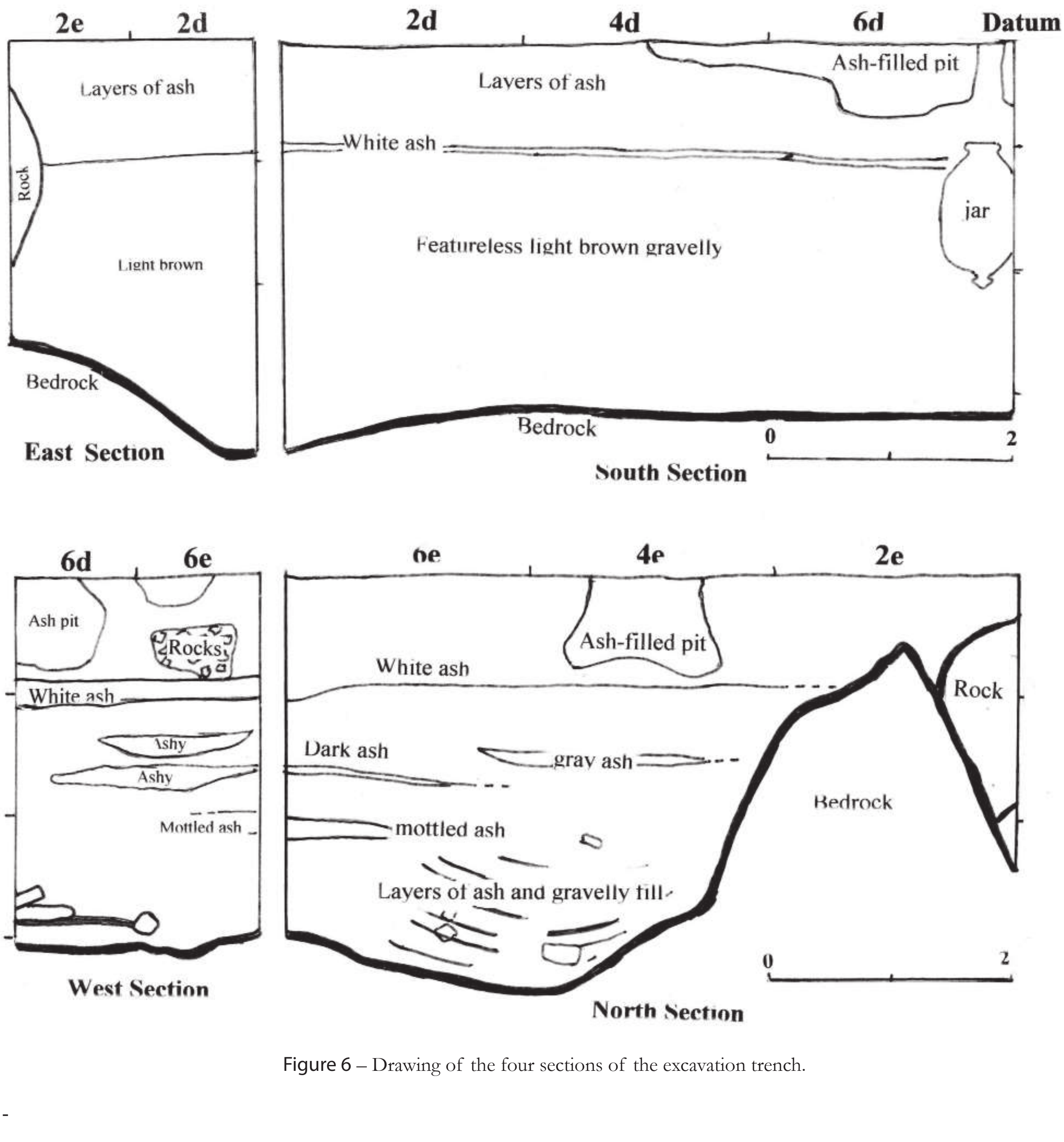

Figure 6 – Drawing of the four sections of the excavation trench.

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.

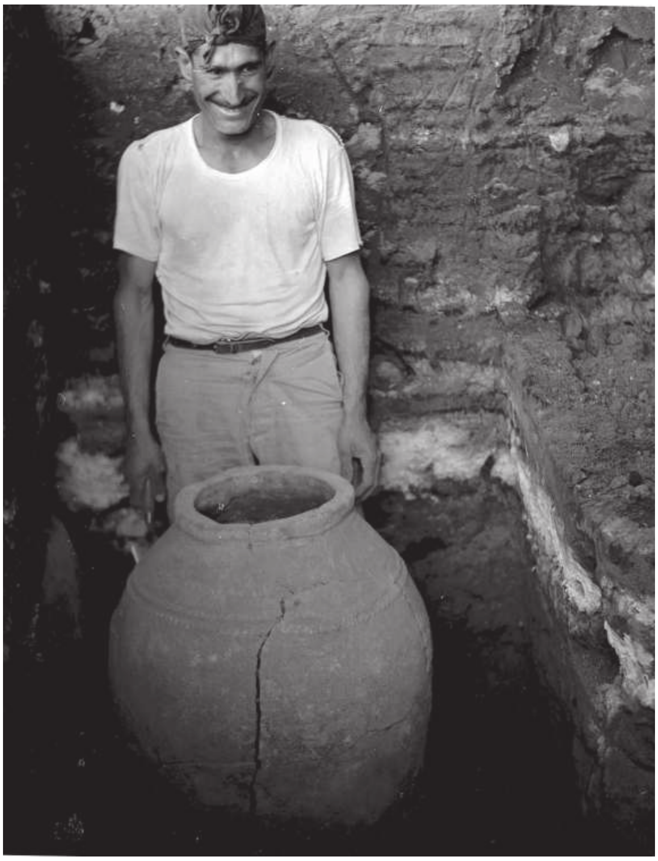

Figure 8 – Storage jar dug into unit Y6d. The top of the jar was at the level of the white ash.

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.

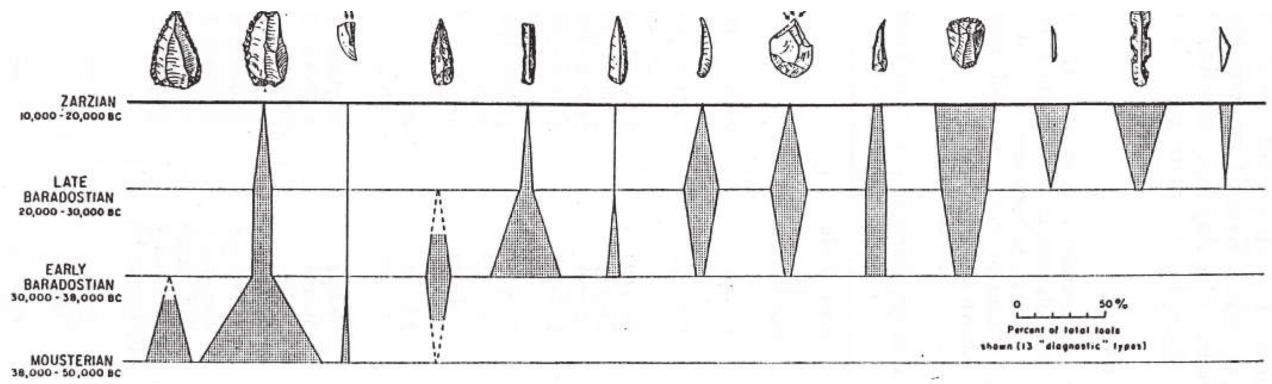

Fig. 2

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

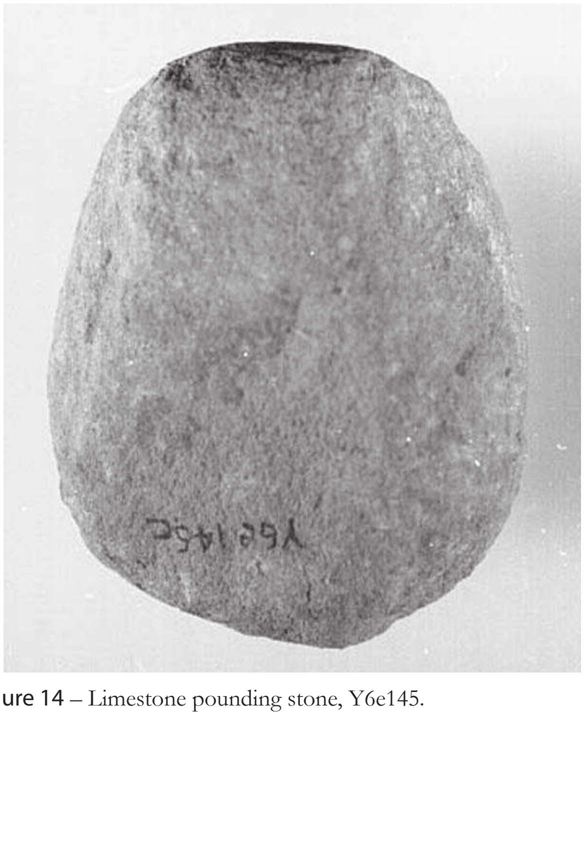

Figure 14 – Limestone pounding stone, Y6e145.

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.

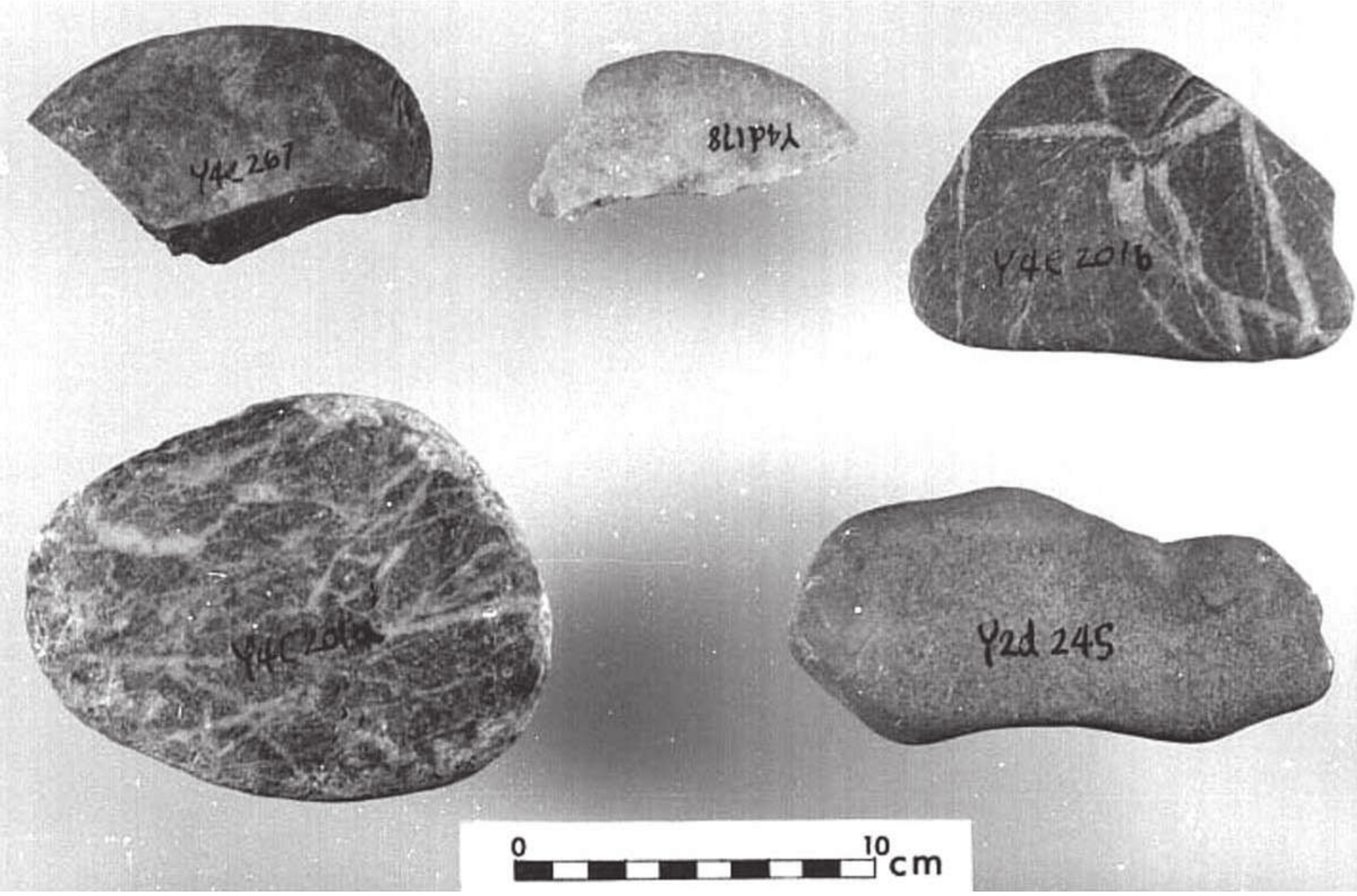

Figure 15 – Flat stones, various contexts.

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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