The Aurignacian in the Zagros region: new research at Yafteh Cave, Lorestan, Iran

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The Yafteh cave in Iran has an intact Aurignacian sequence over 2m deep. First explored by Frank Hole and Kent Flannery in the 1960s, its strata and assemblage are here re-evaluated at first hand by a new international team. The authors show that the assemblage is genuine Aurignacian and dates back to about 35.5K uncal BP. They propose it as emerging locally and even as providing a culture of origin for modern humans in West Asia and Europe.

Keywords: Palaeolithic, Aurignacian, Europe, Iran, Zagros, modern humans

Introduction

In Europe, modern humans and the Aurignacian culture appeared, abruptly, at around 36 500 BP (Verpoorte 2005). The absence of local regional traces suggests an external origin for the phenomenon, by way of a significant population migration. This radical demographic expansion led to both the disappearance of local Neandertals and the establishment of modern European populations. Over many years, we have followed the lines of this tradition and this population, in Eastern Europe, the Near East and Central Asia. By its extraordinary density of Aurignacian sites, Central Asia (centred on modern Iran) is today proposed as the most probable centre of origin for this dual ethnic movement: in both anatomy and cultural tradition. Excavations during the twentieth century have already demonstrated the great antiquity of this process (Coon 1957; Solecki 1955; Hole & Flannery 1967; Rosenberg 1988). It was thus necessary to organise new research in this region in order to clarify the homogeneity of the assemblages, obtain new AMS dates and particularly to clarify the local evolutionary processes for the transition from the Middle to the Upper Palaeolithic.

The new research project has been developed between the University of Liège and the Iranian Center for Archaeological Research (ICAR), focusing on the Palaeolithic of the

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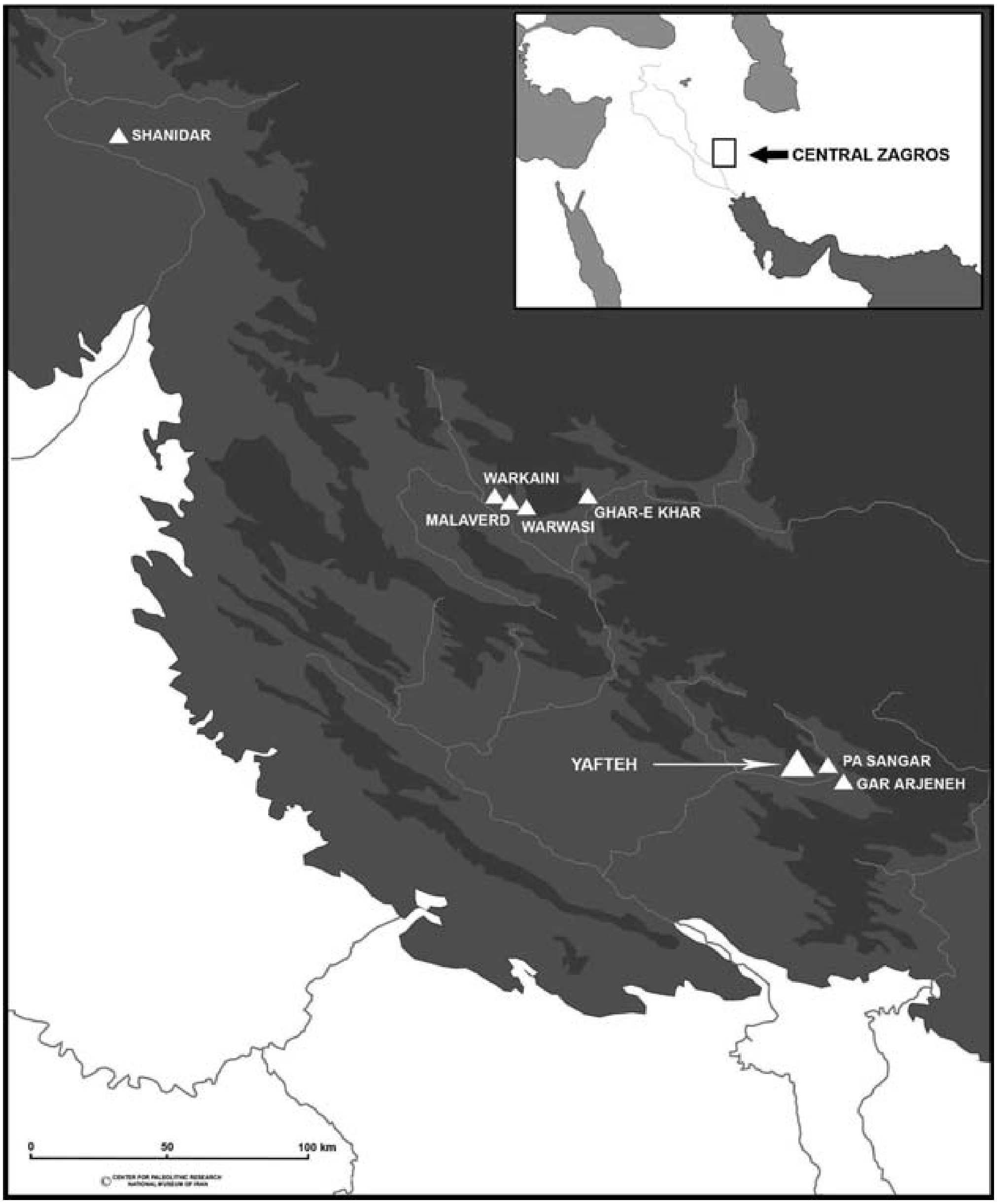

Figure 1. Location of recently surveyed main Aurignacian sites in the west-central Zagros (Drawn by R. Naderi and F. Biglari).

Zagros. In the past few years, within the framework of this project, we have re-analysed lithic assemblages from earlier excavations and re-examined the potential of many sites, leading to new test excavations at the site of Yafteh Cave (Otte 2004; Otte & Biglari 2004; Otte & Kozlowski 2004; Otte *et al.* 2004). At the outset, the aim was to clarify the role played by the Zagros in the origin of anatomically modern humans in Eurasia. Many earlier publications demonstrated the early age of the Aurignacian in Central Asia, based on sites in Iran, Iraq and Afghanistan (Garrod 1930; 1937; 1957; Coon 1951; see also Davis 2004). Recent field surveys in Iran led to the discovery of new early Upper Palaeolithic sites in the Zagros region and on the Iranian Central Plateau (Shidrang 2005; Shidrang & Biglari 2005). However, led by the richness of Iran, our project also includes research on the Lower Palaeolithic (Otte *et al.* 2004) as well as, in particular, the magnificent corpus of protohistoric rock art in the Houmian region of Lorestan (Adeli *et al.* 2001; Otte *et al.* 2003; Remacle *et al.*, in press).

Site selection

After re-examination of various sites (Figure 1), Yafteh Cave in the Khoramabad region (Lorestan province) was selected for new test excavations, with the assistance of the regional archaeological services (Figures 2 and 3). This large cave had been previously excavated in the 1960s by an American team from Yale University, directed by F. Hole and K. Flannery (Hole & Flannery 1967). Thanks to the extreme helpfulness of Frank Hole, we were able to study the old lithic collections at Yale University. Examination of the lithic assemblages bears out the importance of the Aurignacian component (Otte & Kozlowski 2004), present in a stratigraphic sequence around 2m deep (Figure 4). This study also demonstrated the diversity of internal components from the Aurignacian period: laminar, lamellar and prepared flakes. Our objectives in re-excavating Yafteh Cave were thus to verify the homogeneity and integrity of these assemblages and to obtain new radiometric dates to confirm the antiquity of the Aurignacian in this region.

Figure 2. Yafteh Cave (Photo: L.C. Bertensen).

Stratigraphy

The zone to the left of the cave entrance was chosen for the excavation of a 2 × 2m test pit because this zone had not been previously excavated by Frank Hole (Figure 3). We had a plan of the site drawn by Hole during his excavation which clearly showed the location of the test pits, and in addition, one of the workers who participated in the 1960s project and still resides in the nearby village was able to point out the original location of Hole's trenches on the ground. In the upper part of the deposits was a historically recent layer of ash accumulation containing some historic and Islamic potsherds which had served to protect Pleistocene deposits from looting. Below the ash layer is a zone corresponding to an erosion phase in which recent and prehistoric material is mixed; there is direct contact between a thick chalky layer and Palaeolithic stratum 3. The underlying deposits (strata 5-17) are Pleistocene and the Aurignacian industry is present from

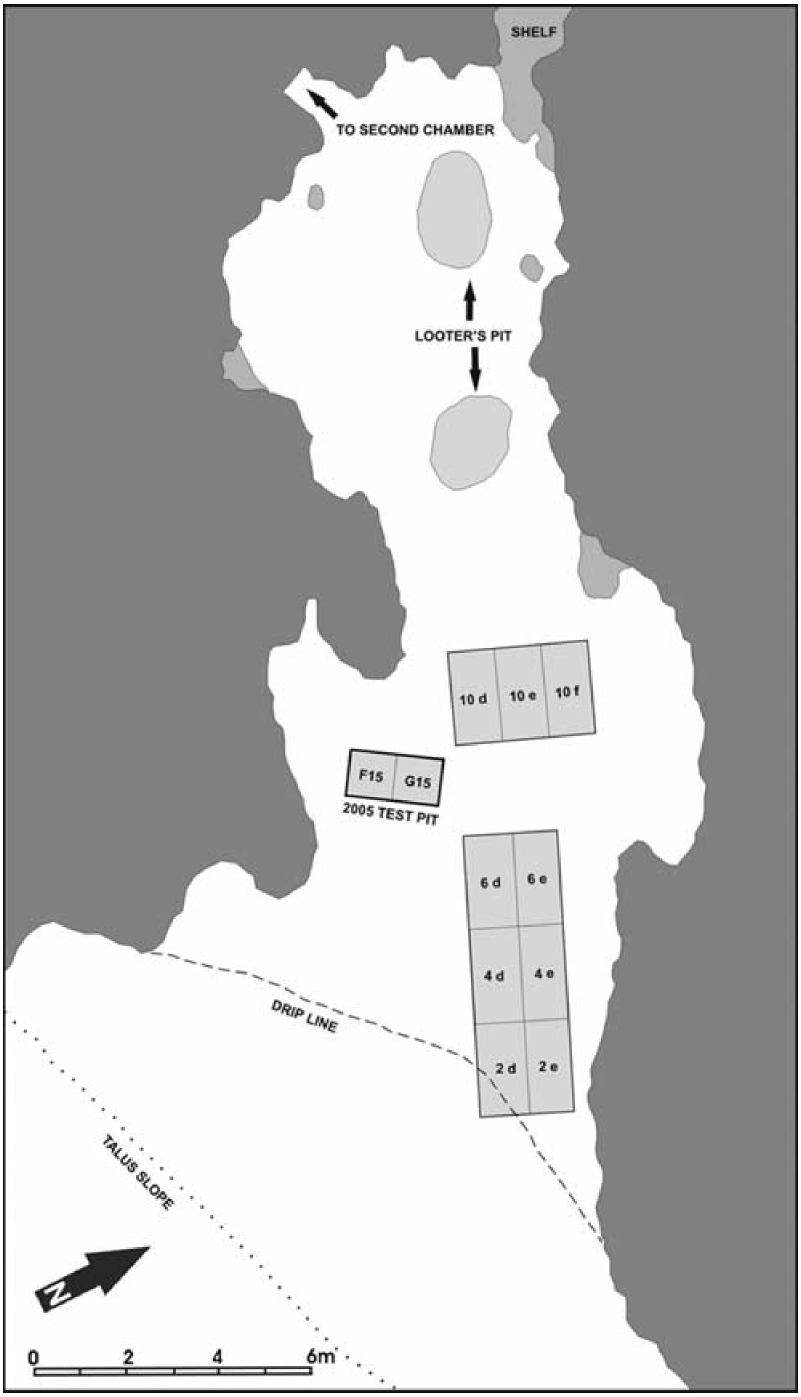

Figure 3. Plan of Yafteh Cave: F. Hole's 1965 excavations on the right, the 2005 test pit on the left. (Drawn by F. Biglari, S. Shidrang & R. Naderi 2005.)

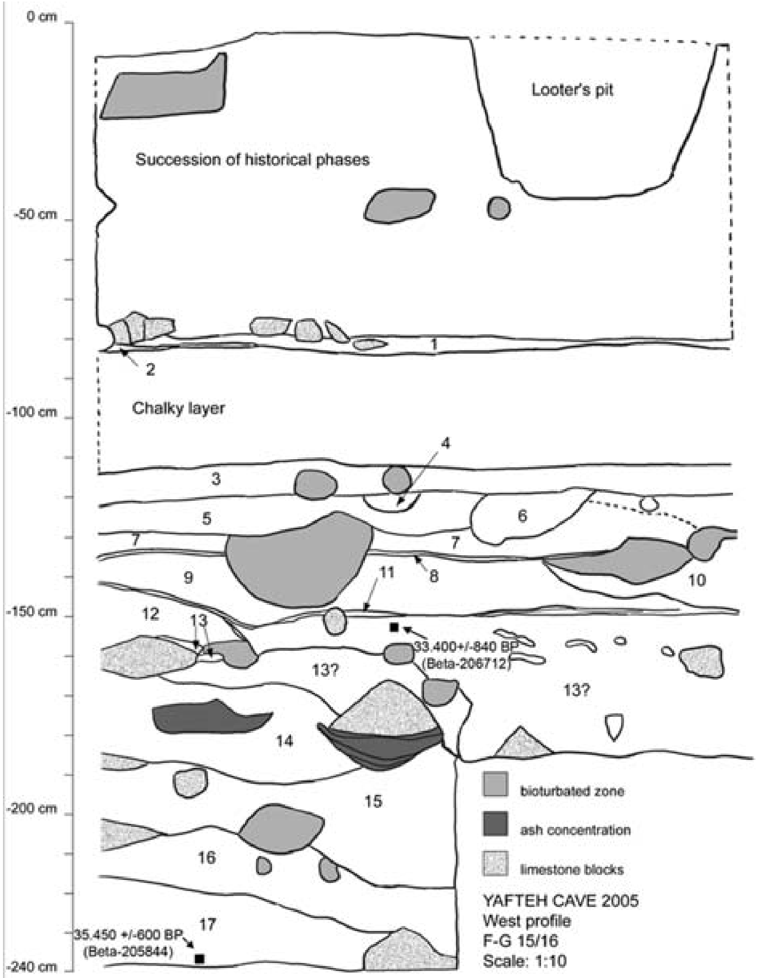

Figure 4. Yafteh Cave, west profile F-G 15/16. Description of the strata: 1: black ash; 2: brown ash; unnumbered: chalky layer; 3: sequence of slight ashy and sandy layers; 4: slightly sandy brown sediment; 5: light brown sediment; 6: brown sediment; 7: grey sediment; 8: sandy yellow sediment; 9: grey sediment; 10: light brown sediment with charcoal; 11: orange-brown sediment; 12: brown sediment; 13: light grey sediment with charcoal; 14: brown sediment with small limestone pieces; 15: light grey sediment with ochre and charcoal; 16: dark grey ashy sediment; 17: red-brown sediment with charcoal. (Drawn by N. Zwyns & D. Flas.)

near the top of stratum 5 (Figure 4). Post-depositional bioturbation by small rodents can be observed at various places within the Pleistocene sequence; there is no evidence of larger rodents such as porcupines, or carnivores such as badgers. The overall depositional processes for the sequence cannot as yet be described in detail, given the limited area excavated in the test pit. However, we have observed evidence of relatively limited cryoclastic activity as well as the localised presence of breccia cementing artefacts and fauna. Given the karstic (limestone) context of the site and the presence of several as-yet-unexplored corridors at the back of the cave, it can be suggested that there were at least two processes leading to the deposition of sediments: via the rocky massif and from the terrace. Certain zones in the sequence appear to be intact and contain scattered ochre, combustion areas and ash lenses.

Apart from some of the artefacts found in sediments corresponding to recent erosion of the upper part of the Pleistocene sequence, lithic artefacts are fresh, with unabraded ridges and edges. The distribution and horizontality of the hearths and the preservation of fauna seems to indicate a low degree of disturbance of the archaeological assemblages. The material has likely undergone the episodic action of water circulation, but at low intensity.

Artefacts

The vast majority of flint comes from on-site knapping activity of small river cobbles, available not far from the site. However, exogenous fine-grained flints, from as-yet-unknown sources, were transported to Yafteh in semi-finished forms: large thick blades with sharp edges (Figure 5, panel 1). Other evidence of long-distance contacts is the presence of perforated marine shells, apparently from the Persian Gulf, at least 350km south-southeast from Yafteh. A series of different techniques seems to have been applied to core reduction and blank production, including the centripetal method, blade and bladelet production. Statistical analyses on the lithic assemblages from the test pit indicate that the techniques do not vary with the stratification. They appear uniformly throughout the sequence, and are heavily dominated by bladelet production. Preparation of centripetal flakes (small Levallois flakes) was incorporated into the range of reduction techniques used because it was necessary for the production of flake blanks for certain kinds of tools (Figure 6, panel 8). Bladelets were obtained in different ways: from bladelet cores, from flake edges and from the proximal ends of 'carinated burins' (Figure 5, panel 5).

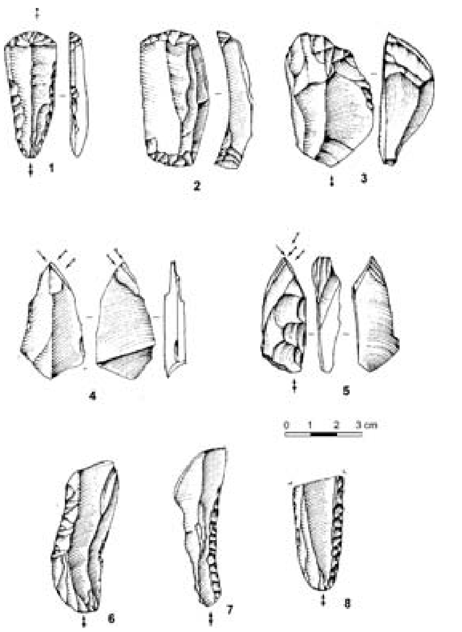

Figure 5. Yafteh cave, lithics. 1: Endscraper on retouched blade; 2: Double endscraper on blade; 3: Carinated endscraper; 4: Dihedral burin; 5: Carinated burin; 6-8: Aurignacian blades; Artefact provenance (square-spit). 1: F15D-11; 2: G15A-5; 3: G15C-7; 4: G15C-1; 5: G15D-2; 6: F15B-12; 7: G15B-2; 8: G15A-5.

The main classic typological categories of the Aurignacian toolkit are all present, with a clear abundance of bladelet tools, primarily Arjeneh points. These are bladelets with a nearly rectilinear section, with short direct retouch limited to the edges to produce a fusiform contour (Figure 6, panels 1-3). They are identical to Krems and Font-Yves points found in Europe. 'Dufour bladelets' are also present and have semi-abrupt fine ventral or alternate retouch limited to the lateral edges (Figure 6, panels 4-6). The toolkit also includes 'Aurignacian blades', sometimes pointed (Figure 5, panels 6-8), numerous burins of different types (Figure 5, panel 4), endscrapers on blades (Figure 5, panels 1-2) and rare perçoirs and splintered pieces. In addition to bladelet tools, tools unique to the Aurignacian - carinated endscrapers and burins - are also present (Figure 5, panels 3 & 5).

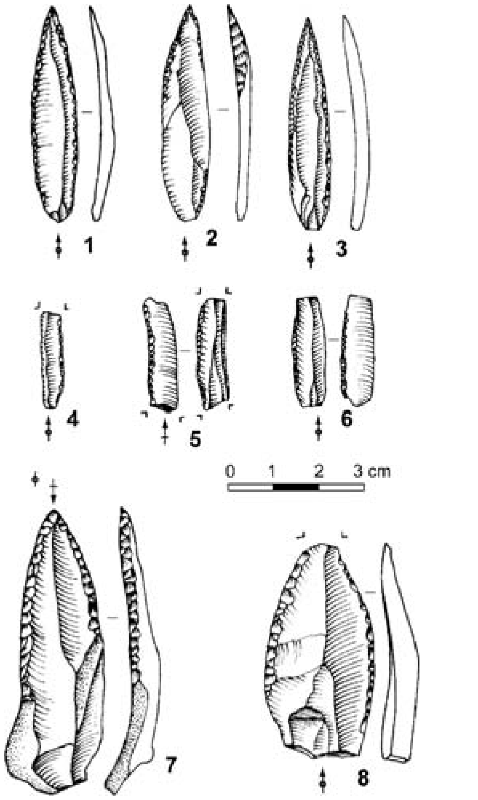

Figure 6. Yafteh cave, lithics. 1-3: Arjeneh points; 4-6: Dufour bladelets; 7: Pointed laminar flakes; 8: Mousterian point Artefact provenances (square-spit). 1: G15B-6; 2: F15A-5; 3: F15C-5; 4: F15A-5; 5: F15A-3; 6: F15A-3; 7: F15C-8; 8: F15C-7.

One of the surprises of the 2005 excavation was the discovery of bone tools, including awls and fine piercers (Figure 7, panel 1). Most remarkable was the discovery of a mesial fragment of a sagaie with an oval cross-section, unique to the Aurignacian (Figure 7, panel 2). Other fragments may have also come from this sagaie, but are not clearly recognisable.

Vertical spatial distribution

Table 1 indicates the importance of core reduction in each spit of the sequence. The 'spits' defined here are arbitrary 10-15cm thick excavation units within the geological strata containing the Aurignacian assemblages. For spits 1-8, frequencies were calculated for an area of $2m^2$; for spits 9-12, the area is limited to $1m^2$. It should be noted that the first two spits contain the highest density of lithic artefacts, nearly double the amount for lower spits; however, the tripartite proportion of cores, removals and tools remains nearly constant throughout the sequence exposed in the test pit. Bladelets by far dominate the assemblages, indicating a general orientation of activities, possibly associated with hunting. Table 2 summarises the frequencies of the different debitage categories by spit. Bladelets account for 48.3 per cent of the total assemblage and clearly dominate each spit throughout the entire sequence. This type of functional concentration should be verified by extension of the excavated area.

The tool assemblages from each spit are clearly dominated by armatures on bladelets: Arjeneh points (19.3 per cent of the total tool assemblage) and particularly Dufour bladelets (47.4 per cent). Table 3 shows the frequencies of classes of tools.

Aesthetic activities

In spite of the limited area excavated by the test pit, we were nonetheless able to observe traces of ochre, sometimes in place. This colourant seems to have been intentionally spread across the ground surface. In certain zones, ochre is spread within a thickness of more than 20cm in a single stratum. Hematite blocks were recovered from different layers, again highly coloured. Shiny black hematite blocks and minerals were also brought to the site. The implications for personal decoration are significant, given the small area excavated. Two perforated vestigial deer canines (Figure 8,

Figure 7. Yafteh cave. 1: Bone awl; 2: Fragment of sagaie point. Artefact provenances (square-spit). 1: F15B-9; 2: F15A-10. (Photos: N. Zwyns.)

panels 1 & 2) and two perforated marine shells (Figure 8, panels 3 & 4) were recovered. A small perforated and incised terracotta block was found (Figure 8, panel 5). An unusual pendant was made on hematite, in the form of an imitation deer canine; a series of small aligned depressions is present near the top of the pendant and the perforation is unfinished (Figure 8, panel 6). The latter two objects were found in bioturbated context and may reflect contamination from more recent strata. Once again, the presence of objects of personal decoration strongly evokes the Aurignacian tradition as recognised and defined in Europe.

Radiocarbon dates

In the 1960s, F. Hole obtained a series of radiocarbon dates on charcoal samples (Table 4). The apparent incoherence of certain results was due in part to mixture between strata (rodent dens; excavation with inexperienced workers) and to the inaccuracy in radiocarbon methodology during the 1960s.

We have begun new systematic dating of the sequence, carefully selecting charcoal samples; however, we have not yet reached the lower strata described by F. Hole. Our dates are summarised in Table 5. Other samples have also been collected from this part of the sequence and new samples will be obtained during excavation of the lower part of the sequence. Once again, the dates obtained are compatible with the European Aurignacian (Verpoorte 2005).

Fauna

Approximately 16 000 faunal remains have been examined. Bone preservation is rather poor and a heavy concretion covers most of the bones. The Yafteh animal bone assemblage has suffered a high degree of fragmentation (perhaps from trampling) as evidenced by the frequency of unidentified remains (n = 12570) for a mean weight of 0.3g (Table 6 and Figure 9). Other factors have contributed to the deterioration of bone: direct burning or heat exposure. A specific acid treatment was necessary to clean the bones and make them ready for study. The study began in Iran at the Palaeolithic Center of the National Museum

Table 1. Yafteh Cave 2005. Frequencies and percentage of cores, removals and tools by spit within the Aurignacian strata. (Note: Percentages for classes are horizontal: 3.8 per cent of the spit 1 assemblage are cores. Total percentages, however, represent the percentage per spit of the total collection.)

Ending depth (cm BD)	Spit	Cores		Removals		Tools		TOTAL	
		n	%	n	%	n	%	n	%
129	1	19	3.8%	459	91.4%	24	4.8%	**502**	**13.1**
141	2	27	4.4%	534	88.0%	46	7.6%	**607**	**15.8**
146	3	9	3.1%	259	90.2%	19	6.6%	**287**	**7.5**
153	4	12	3.7%	276	85.7%	34	10.6%	**322**	**8.4**
164	5	11	3.2%	308	88.3%	30	8.6%	**349**	**9.1**
172	6	4	1.2%	293	87.5%	38	11.3%	**335**	**8.7**
181	7	12	4.5%	222	83.5%	32	12.0%	**266**	**6.9**
190	8	5	2.0%	214	83.6%	37	14.5%	**256**	**6.7**
203	9	3	2.1%	122	84.1%	20	13.8%	**145**	**3.8**
213	10	5	3.9%	106	83.5%	16	12.6%	**127**	**3.3**
225	11	11	3.1%	310	86.1%	39	10.8%	**360**	**9.4**
240	12	5	1.7%	242	83.4%	43	14.8%	**290**	**7.5**
	TOTAL	**123**	**3.2%**	**3345**	**87.0%**	**378**	**9.8%**	**3846**	**100.0%**

Table 2. Yafteh cave 2005. Frequencies of debitage categories by spit (tools not included). FLc: flake cores; BLc: blade cores; Bldtc: bladelet cores; BL: blades; CrBL: crested blades; Bldt: bladelets; Bsp: burin spalls; Cbsp: carinated burin spalls; FL: flakes; CenFL: centripetal flakes, CorFL: cortical flakes; T: tablets.

Spit	Debitage categories (tools not included)												TOTAL	
	FLc	BLc	Bldtc	BL	CrBL	Bldt	Bsp	Cbsp	FL	CenFL	CorFL	T	n	%
1	4	-	15	33	20	221	42	31	80	1	28	3	**478**	**13.8**
2	6	-	21	65	23	229	27	56	77	13	37	7	**561**	**16.2**
3	2	-	7	33	11	129	8	21	36	4	15	2	**268**	**7.7**
4	3	-	9	43	14	133	2	18	43	2	17	4	**288**	**8.3**
5	1	5	5	31	19	170	4	24	38	3	15	4	**319**	**9.2**
6	-	1	3	35	16	165	-	20	31	5	20	1	**297**	**8.6**
7	6	2	4	26	12	104	-	16	34	3	25	1	**233**	**6.7**
8	1	1	3	35	12	104	5	15	25	3	16	-	**220**	**6.3**
9	1	1	1	11	10	66	2	4	14	-	15	-	**125**	**3.6**
10	3	-	2	22	3	52	2	5	17	-	5	-	**111**	**3.2**
11	3	1	7	50	10	177	-	9	35	7	20	2	**321**	**9.3**
12	-	1	4	44	17	125	-	4	29	4	19	-	**247**	**7.1**
TOTAL n	**30**	**12**	**81**	**428**	**167**	**1675**	**92**	**223**	**459**	**45**	**232**	**24**	**3468**	**100.0**
TOTAL %	**0.9**	**0.3**	**2.3**	**12.3**	**4.8**	**48.3**	**2.7**	**6.4**	**13.2**	**1.3**	**6.7**	**0.7**	**100.0**	

in Iran, where an initial sorting of the bones was done to separate identified and unidentified bones. The identified skeletal parts count for 7.4 per cent of the material for a mean weight of 2g. The macro-mammalian remains of Yafteh are considered to be uniquely of anthropic origin, for the following reasons: a high percentage of burnt bones, the presence of cut

Table 3. Frequencies and percentages of tool classes by spit.

Spit	End-scrapers	Burins	Ret. blades	Arjeneh	Dufour	Other	TOTAL n	TOTAL %
1	2	6	6	2	6	2	**24**	**6.3**
2	6	18	12	4	5	1	**46**	**12.2**
3	-	7	1	3	8	-	**19**	**5.0**
4	1	3	2	12	15	1	**34**	**9.0**
5	3	4	1	6	16	-	**30**	**7.9**
6	4	-	3	10	19	2	**38**	**10.1**
7	3	1	2	6	20	-	**32**	**8.5**
8	1	-	5	6	25	-	**37**	**9.8**
9	4	-	1	5	9	1	**20**	**5.3**
10	1	1	4	1	9	-	**16**	**4.2**
11	2	1	3	8	25	-	**39**	**10.3**
12	2	2	7	10	22	-	**43**	**11.4**
TOTAL n	**29**	**43**	**47**	**73**	**179**	**7**	**378**	**100.0**
TOTAL %	**7.7**	**11.4**	**12.4**	**19.3**	**47.4**	**1.9**	**100.0**	

marks, and a notable absence of carnivore activity on the bones, although carnivores were present in the cave.

The bulk of the assemblage is composed of small herbivores comprising 54 per cent of the number of identifiable specimens (NISP). The principal taxa of small herbivores are represented by caprids (96 per cent); the remaining 4 per cent are gazelles. The ratio of sheep to goat is 1:4. Other species (Figure 10) identified in the fauna are cervids, represented by post-cranial and cranial bones (worked canine). Suids (pigs) are sparsely present in the assemblage. Carnivores are represented by five families: Canidae (*Vulpes vulpes*), Felidae (*Panthera pardus* and *Felis* sp.), Mustelidae (*Mustela foina* and *Meles meles*), Hyenidae and Ursidae. The two last groups are indirectly represented by their coprolites. An interesting find in Yafteh Cave is the presence of the first phalanges of leopard (*Panthera pardus*), which could be related to use of its skin. Phalanges in this case would remain attached to the skin.

Micro-vertebrate remains are principally composed of fish and rodents. Approximately 300 remains of fish have been studied by V. Radu. They are mostly concentrated in spits 2 and 4. A single vertebra was found in spit 8, the deepest spit where fish remains were found. The remains were attributed to cyprinids (*Leuciscus*), represented by at least four species on the basis of the morphological differences. It is, however, difficult to identify these species, since no local collections exist. The mean size of the recovered fish ranges between 124 and 287mm. Cyprinids live in medium-temperature waters (around 0-15°C). They need a stable environment, excluding harsh and long winters. There are several problems not yet resolved for the interpretation of these remains. Is the fish assemblage the result of accumulation by people or by animals (raptors, carnivores)? Several arguments can be made for the second alternative: digestion marks, presence of a variety of rodents and the concentration of the data in principally 2 spits. At the same time, at this point in the zooarchaeological analysis, none of these arguments can exclude an anthropic origin of the remains. But for a proper interpretation of the fish assemblage, more scrutiny is needed of

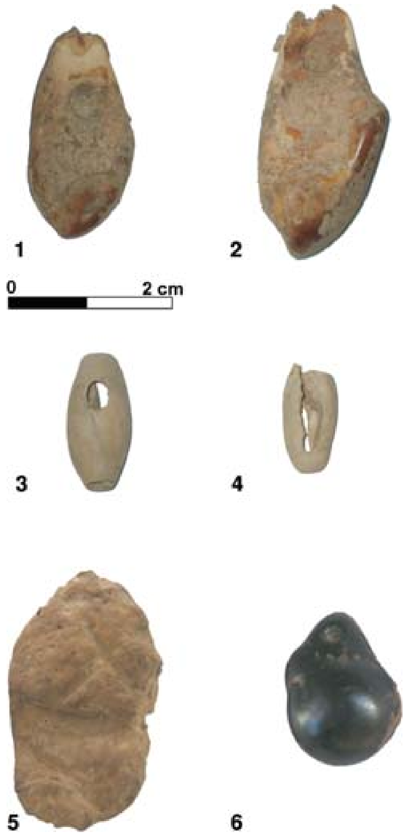

Figure 8. Yafteh cave. 1-2: Perforated vestigial deer canines; 3-4: Perforated fossil shells; 5: Perforated terracotta block; 6: Hematite pendant. Artefact provenances (square-spit). 1: GB-7; 2: Cleaning profile-10-11; 3-4: F15C-3; 5: G15B-2; 6: F15A-10. (Photos: N. Zwyns.)

the ecology of the surrounding environment of Yafteh Cave: comparison with freshwater fish bones from the study region; more controlled sampling methods (sediment quantification); comparison of the taxonomic identification and frequencies in the archaeological sequence with those of other micro-vertebrates; and comparison of these data with the rest of the archaeological material.

The rodents at Yafteh studied by N. Hashemi & J. Darvish belong to six families: *Ellobius* cf. *lutesence*, *Chionomys* cf. *nivalis*, *Microtus* cf. *socialis*, *Meriones libycus*, *Meriones vinogradovi*, *Calomyscus bailwardi* and *Allactaga* sp. *Meriones* and *Allactaga* and *Microtus* cf. *socialis* are xerophytic mammals and for the two former, even semi-desert species; *Calomyscus bailwardi* (Zagros mouse-like hamster) are found in habitats ranging from barren rocky hillsides to wetter regions. *Ellobius* cf. *lutesence* (Transcaucasian mole vole) is more sensitive to the geological substrate than to ecological conditions. The first impression from the rodent assemblage tends towards accumulation by other animals (most probably raptor pellets). However, a detailed taphonomic study of

Table 4. Yafteh Cave. Radiocarbon dates obtained by F. Hole on charcoal samples.

Depth below datum	Dates (uncal. BP)	Lab N°
200	34,800	GX-711
201	32,500	GX-710
201	29,410	SI-332
212	30,860	SI-333
250	21,000	SI-336
260	38,000	GX-709
278	31,760	SI-334
280	>36,000	GX-708
280	34,300	GX-707
285	>40,000	SI-335
290	>35,600	GX-706

Table 5. Yafteh Cave. New radiocarbon dates obtained in 2005.

Depth (cm below datum)	Dates (uncal. BP)	Lab N°
125	24,470 ± 280	Beta 206 711
150	33,400 ± 840	Beta 206 712
240	35,450 ± 600	Beta 205 844

Table 6. Distribution of animal bones in Yafteh cave (assemblage 2005). NISP = Number of Identifiable Specimens; LM/SM/SR = Large Mammal, Small Mammal, Small Ruminant; UI = Unidentified fragments.

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**

this assemblage has not yet been carried out. As for the invertebrate fauna of Yafteh, besides the worked shell from the Persian Gulf, a freshwater shell *Melanopsis praemorsa* (Linnaeus, 1758) was also recovered (identification made by Dr. Ch. Martin, UMR 5197 CNRS/MNHN France).

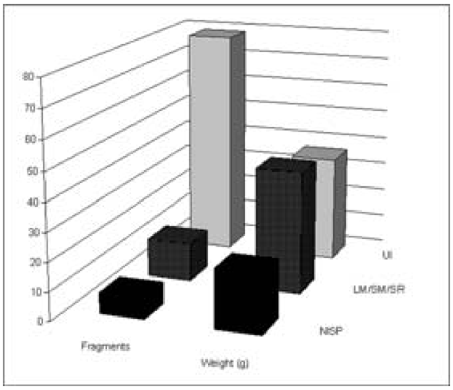

Figure 9. Mean distribution of remains by frequency and weight of fragments.

All the mammalian species represented are still extant on the Iranian Plateau. Hunting activity in Yafteh was concentrated on small herbivores, and principally wild goats. No major changes are observed in the faunal composition and distribution along the sequence represented by 12 spits, especially striking when examining the weight diagram (Figure 10B). On the basis of the present-day distribution of the represented species, Yafteh Cave may have been surrounded by several ecological niches: arid lowlands (gazelles, gerbils, jerboa, social vole), piedmont and cooler uplands (wild sheep, wild goat and mouse-like hamster), and forested zones (red deer and wild boar). The near-absence of aurochs and the total absence of equids are noted at Yafteh Cave. The Yafteh material compares in many ways to the Upper Palaeolithic samples from Ghar e Khar, Shanidar, Pa Sangar and especially Karim Shahir (Hesse 1989: 41). The major difference with these sites, however, is the size of the Yafteh sample, with a limited number of identified bone fragments which may introduce a bias for comparisons.

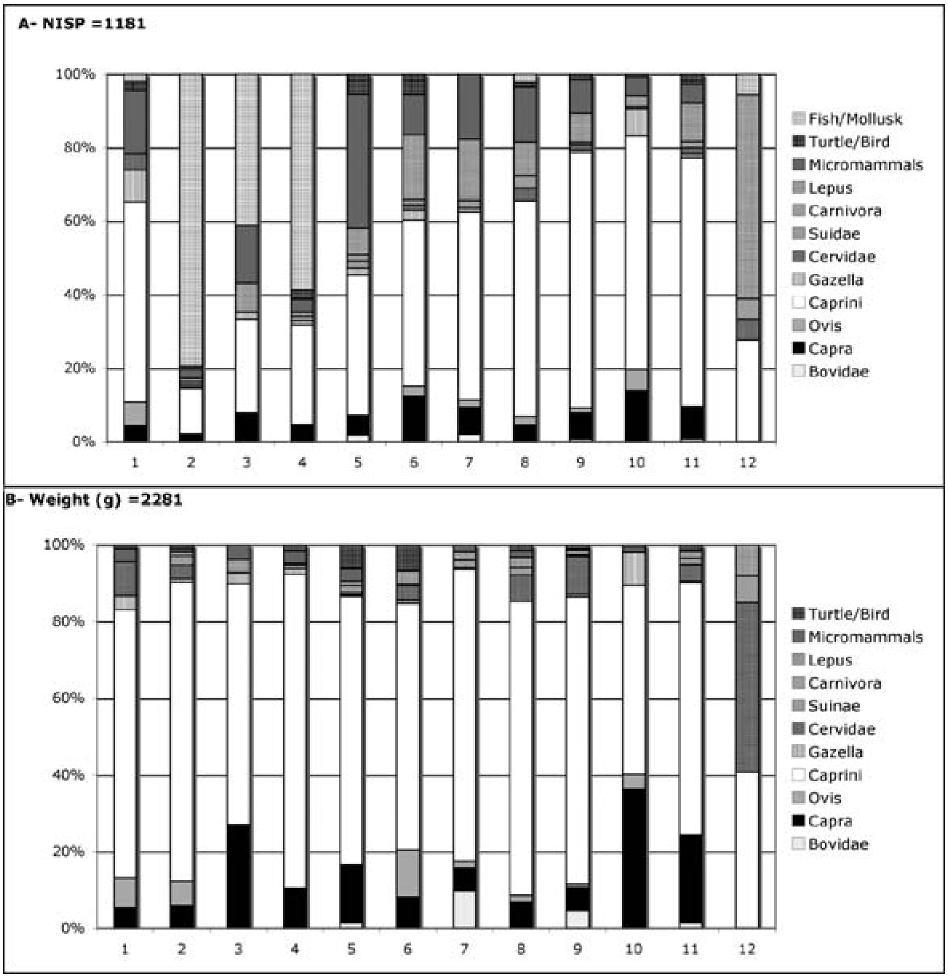

Figure 10. Taxonomic distribution of animal bones in the Yafteh Cave sequence. A: NISP, B: weight.

Conclusions

Yafteh Cave provides us with a large and undisturbed assemblage relating to the earliest phases of activity of early modern humans outside Africa. The immense region, from the Caucasus to Afghanistan, passing by the Taurus and Zagros Mountains, is an enormous demographic 'reservoir' from which the Aurignacian culture could have spread to parts of western Eurasia, like the Levant (Otte 2004; 2005; in press; Otte & Derevianko 2001). The cultural identification of the Central Asian Aurignacian as being truly Aurignacian is clear from the material record (Olszewski & Dibble 1994; Olszewski 2001). Moreover, analyses of the Shanidar and Warwasi assemblages have demonstrated a local evolution of the Aurignacian from the Mousterian in this part of Asia (Otte & Kozlowski, in press). The high regions of the Zagros, mainly in modern Iran, can be proposed as the most probable centre for the origin of the Aurignacian and modern humans in Europe, that is to say the origin of the archaeological version of the 'Indo-Europeans' (Otte 1995).

Many sites in Europe support the intimate association of modern humans with the Aurignacian material culture. The site with the clearest evidence is Mladeč (Moravia) where radiocarbon dates were, among others, obtained directly on the human remains (Wild *et al.* 2005). The site of Kostenki I, level 3, is another example (Sinitsyn 1993; 2003; 2004; Richards *et al.* 2001). The new population apparently had a reproduction rate so rapid that it could explain both the rapidity of population expansion and the disappearance of the Neandertals, possibly by absorption into the modern genetic pool. In particular, the relationship between modern humans and nature was quite different from that of Neandertals: they recovered the defensive weapons of animals (bone armatures), socialised animal remains by transforming them into ornaments (e.g. perforated canines) and in particular, captured their images via symbolic representation (leading to the origins of European art). Based on the calculations of the number of major sites in Europe, the ratio between the Middle and Upper Palaeolithic is 1:20. This would explain the significant demographic rate so important for modern humans and perhaps the progressive ecological disequilibrium that began then. At present, data strongly support an origin for European early modern humans situated between Afghanistan (Kara Kamar, Coon & Ralph 1955; Coon 1957) and the Caucasus (Nioradze & Otte 2000) via Anatolia, the northern coast of the Black Sea, or both at the same time.

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