

New Research on the Palaeolithic Occupation of Ghar-e Boof, Fars Province

Nicholas J. Conard¹ and Mohsen Zeidi²

Abstract: Building on the successes of the 2006 and 2007 field seasons of excavations at Ghar-e Boof, the goals of the 2015 TISARP excavation at the site were to achieve higher resolution in the cultural stratigraphic sequence and to gain more robust observations in both synchronic and diachronic perspectives. While the results of the earlier excavations have been published in some details, thus far, our observations were not sufficient for looking at short-term cultural change or examining occupational episodes with precision. Additionally, we hoped to determine if the site contained finds from the Middle Palaeolithic. To varying degrees, we have achieved these goals. The 2015 season focused on the front part of the cave where deposits are thick and offer much higher stratigraphic resolution than was possible in past seasons. This year's excavation extended far deeper than those of previous seasons, providing for the first time, important information on the use of the site during the Middle Palaeolithic, which in turn allows us to consider possible explanations for the significant differences between the cultural signatures left by the Upper and Middle Palaeolithic occupants of the cave. The documentation of multiple features and the artefacts associated with them, make the study of occupational events at Ghar-e Boof possible. Finally, the presence of a small number of geometric microliths and thumbnail scrapers suggests that Ghar-e Boof preserves evidence for the use of the site during Epipalaeolithic in addition to the rich Upper Palaeolithic record of the site.

Keywords: Fars Province, Ghar-e Boof, Palaeolithic, Stone artefact

چکیده: با توجه به دستاوردهای فصول گذشته کاوش در غار بوف در سال‌های ۲۰۰۶ و ۲۰۰۷ م، اهداف فصل کاوش سال ۲۰۱۵ م، دستیابی به دیدگاهی دقیق‌تر درباره توالی لایه‌نگاری و گاه‌نگاری و بینشی بهتر درباره رویدادهای در زمانی و هم‌زمانی در این محوطه باستانی بود. گزارش‌های کاوش‌های فصول پیشین با جزئیات نسبی منتشر شده‌اند؛ اما مشاهدات ما به آن اندازه نبود تا تغییرات فرهنگی کوتاه‌مدت را بررسی کنیم یا با دقت به بررسی مراحل استقرار در این غار بپردازیم. علاوه بر این، قصد داشتیم بدانیم که آیا در این غار آثاری از دوره پارینه‌سنگی میانه هم وجود دارد یا خیر. با کاوش سال ۲۰۱۵ م، تا حدودی به تمام این اهداف دست‌یافتیم. در فصل ۲۰۱۵ م، بر قسمت جلویی غار تمرکز کردیم که نهشته‌ها عمق بیشتری دارند و نسبت به فصول گذشته لایه‌نگاری دقیق‌تری در اختیار ما می‌نهد. کاوش امسال به لایه‌هایی عمیق‌تر از سال‌های گذشته نفوذ کرد و برای اولین بار به اطلاعات مهمی درباره استفاده از این غار در دوره پارینه‌سنگی میانه دست‌یافت. این امر به ما اجازه می‌دهد تا توضیح بهتری برای تفاوت‌های بنیادین در شاخصه فرهنگی ساکنان غار از دوره پارینه‌سنگی میانه تا پارینه‌سنگی جدید بیابیم. ثبت و ضبط چندین و چند پدیدار باستانی و دست‌ساخته‌های همراه با آن‌ها به ما کمک می‌کنند رویداد استقرار غار بوف را بهتر بشناسیم. در نهایت، کشف تعداد اندکی ریزتیغه هندسی و خراشنده‌های شستی حاکی از آن است که در غار بوف علاوه بر دوره‌های پارینه‌سنگی میانه و نو، آثاری نیز از دوره فرابارینه‌سنگی وجود دارد.

کلیدواژه‌گان: استان فارس، غار بوف، دوران پارینه‌سنگی، ابزار سنگی

Introduction and goals of the study

Founded in 2004, the Tübingen Iranian Stone Age Research Project (TISARP) has conducted many seasons of survey and excavation with the aim of contributing to the understanding of Stone Age archaeology of the country and contextualizing these results at multiple spatial

and temporal scales. Along with work at Chogha Golan (Zeidi et al. 2012; Riehl et al. 2013; Zeidi and Conard 2013; Conard and Zeidi 2013), Qaleh Gusheh (Conard et al. 2009), Zaviyeh (Conard et al. 2007), Kermanshah (Heydari-Guran, 2014) and other activities, our survey in the Dasht-e Rostam and the excavation at Ghar-e

1. Schloss Hohentübingen, 72070 Tübingen, Germany Author for correspondence: nicholas.conard@unituebingen.de

2. Department of Early Prehistory and Quaternary Ecology and Senckenberg Centre for Human Evolution and Palaeoenvironment at University of Tübingen



Fig. 1. Ghar-e Boof 2015. Overview of the site (Photo: N. J. Conard).



Fig. 2. Ghar-e Boof 2015. Excavation area in front of the cave (Photo: M. Zeidi).

Boof (Fig. 1) form an important focus of our research (Conard et al. 2006; 2009; Ghasidian et al. 2009; Ghasidian, 2014).

We worked in the region in 2005, 2006 and 2007 achieved results with wide reaching implications. This survey of the Dasht-e Rostam formed the central part of the Ph.D. thesis of S. Heydari-Guran (2014), while the first two seasons of excavation formed the basis of the Ph. D. thesis of E. Ghasidian (2014). Ghasidian's

monograph provided a detailed description of the lithic assemblages of Ghar-e Boof and elaborated on the Rostamian cultural group of the early Upper Palaeolithic defined by Conard and Ghasidian (2011). This work emphasized the essential homogeneity of the cultural sequence of archaeological horizons (AH) III, IIIa and IIIb. Available dates from the radiocarbon laboratories of the universities of Kiel and Oxford provided the chronographic position of the assemblages in the range of 35.0–41.5 ka cal. BP.

Initially when we received these ages for the sequence at Ghar-e Boof, we were surprised that the deposits were so old since the lithic assemblage is dominated by tools made on small bladelets, and small bladelet cores are the most common cores in all the deposits. We had documented the same lithic assemblages at many of the region's caves and rockshelters that we studied on survey. With the 2015 season we hoped to gain a more nuanced understanding of the cultural and chronostratigraphy of the Rostamian. To do this,

we focused on the deposits in the front of the cave where the deposits are thickest and provide the best chance of establishing a complete cultural sequence (Fig. 2). Through careful excavation, the crew aimed at establishing a higher stratigraphic resolution than had been achieved in the earlier campaigns. Additionally, we hoped to recover more materials from AH IV and, if possible, from lower deposits to try establishing whether or not Ghar-e Boof had been occupied by hominins of the Middle Palaeolithic.

Methods

In general, we followed the methods that we had successfully applied during the excavations in 2006 and 2007. Excavators worked within our grid in quarter meters (Fig. 3) by digging *Abträge* that followed the slope of the deposits rather than digging in horizontal spits. In most cases, square meters were excavated in a uniform way that approximates temporal horizons. As in the past, we floated all of the archaeological sediments to recover botanical remains. The sediments were also water screened to facilitate careful sorting of the heavy fractions following flotation (Figs. 4-6). Sorting the heavy fraction from the tons of sediment excavated constituted an enormous job that had not yet been completed at the time of writing this report. Thus, the numbers reported here are represent only preliminary values available to the authors. During excavation lithic artefacts, faunal remains, botanical remains and shell beads were piece-plotted in three dimensions (Fig. 7). Excavators recorded the orientation of larger elongated finds. After completing each *Abtrag*, excavators took photographs and made sketches to document sediments (Fig. 8). At the dig house, we conducted preliminary analyses of finds as time permitted.

Stratigraphy and site formation processes

For the most part we were able to follow the stratigraphic designations from the 2006 and 2007 field seasons (Conard and Ghasidian, 2011; Ghasidian, 2014). We, however, made some adjustments that we felt would improve the definition of the archaeological units of analysis.

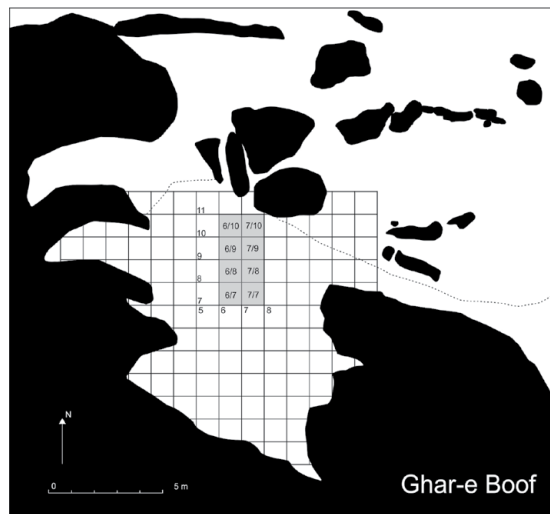


Fig. 3. Ghar-e Boof 2015. Topo map and location of the trench (Prepared by TISARP).

Fig. 4. Ghar-e Boof 2015. Flotation by of buckets by hand (Photo: M. Parizi).

Fig. 5. Ghar-e Boof 2015. Recovery of the charcoal and plant remains (Photo: M. Parizi).

Fig. 6. Ghar-e Boof 2015. Heavy fraction remains after water screening the sediment (Photo: M. Parizi).



Fig. 7. Top left: Ghar-e Boof 2015. Find density in AH III (Photo: M. Zeidi).



Fig. 8. Top right: Ghar-e Boof 2015. Overview of the excavation area (Photo: K. Bretzke).



Fig. 9. Down left: Ghar-e Boof 2015. Square 6/8 showing deepest stratigraphical units (Photo: M. Zeidi).



Fig. 10. Down right: Ghar-e Boof 2015. Middle Palaeolithic artefact in AH IVc (Photo: N. J. Conard).

We redefined AH IIIa to make it slightly thicker, so it would provide a sample of material large enough to allow more meaningful comparisons. Continuing downward, at the base of AH IIIb, we reached new deposits and defined a new unit that began with an irregular cemented crust and stopped with the light brown silt with small angular fragments of limestone that characterize AH IV. In previous seasons, we had reached AH IV only in the extreme rear of the cave in excavation unit 6/2.

As excavations continued deeper, the find densities tended to decrease. This can be seen in the very high number of finds in AH III (Fig. 7) and somewhat lower find densities in AH IIIa and IIIb. In the still deeper strata, the number and density of finds dropped further with AH IIIc forming a sort of turning point with which the low find densities became the norm. Although we have not yet examined the question systematically, it seems that often the amounts of faunal remains, botanical remains and lithic

artefacts covary. This being said, lithic artefacts clearly outnumber all other classes of finds in AH III, IIIa and IIIb.

In our third season of excavation at Ghar-e Boof, we gained our first real look at deeper deposits and were able to excavate unit 6/8 down to a depth of $z = \text{ca. } 3.10 \text{ m}$ in our local grid. Here AH IV, IVa, IVb, IVc and IVd are characterized by alternating bands of fine rocky light brown silt and medium brown rocky silt (Fig. 9). The IV complex has an overall thickness of ca. 70 cm, before the sediments switch to a light brown less rocky unit sometimes underlain by a dark brown band of a few centimetres and then by a medium brown silty sediment, all of which is classified GH 5 and AH V. Finally, the deepest horizon AH Va is reminiscent of AH IV with its light brown silty matrix with many small sharp-edged pieces of limestone. So far, we have excavated 50 cm of this stratigraphic unit in square 6/8 and there is, as of yet, no indication that we are near bedrock. Even in the deepest part of the site, which corresponds

to z values of about 3.10m, both lithic artefacts and bones are present. Starting with AH IV and continuing with AH V and Va, Middle Palaeolithic artefacts are represented in the small assemblages (Fig. 10). These artefacts are lacking in the Rostamian deposits of AH III–IIIb.

Biogalleries are present in all layers. In light brown silty sediments of AH III the biogalleries were often voids filled only with air, suggesting that they are fairly young. When the sediments were filling the galleries, they were often grey homogenized sediments from the AH II complex and were easy to distinguish from the in-situ sediments of AH III. In AH IIIa and IIIb, the biogalleries were often filled with sediments that were harder to distinguish from the intact sediments. Also, in complexes of AH IV and V biogalleries occurred. When possible, we separated the contents of the biogalleries from the bulk of the intact sediments. Still a small degree of mixing within and between the finds horizons likely occurred at the site. Future analyses of the assemblages and new radiometric dates will help to test the degree to which burrowing animals damaged the strata and displaced materials.

During the 2015 season, we were able to document features in AH III, IIIa, IV, IVa. In all these cases, the features resembled hearths (Fig. 11). They may also provide a basis for organizing finds within archaeological units to establish chronocultural sub-strata that may represent short occupations of the site. While it comes as no surprise that the rich upper find horizons AH III–IIIb contain such combustion features, the features in AH IV and IVa seem to reflect ephemeral use of the cave since few artefacts are associated with the hearths. Chris Miller and colleagues from the University of Tübingen will be examining the many micromorphology samples and loose sediment samples collected from these features to help interpret them.

Perhaps the most important achievements of the excavations are to have gained a still more high resolution record of the AH III–IIIb archaeological complex and to have established a new sequence in the deeper strata extending from AH IIIc–Va.



Fig. 11. Ghar-e Boof 2015. Combustion features in AH IV and IVa (Photos: N. J. Conard and M. Zeidi).

Flora

During the course of the project, the team excavated about 700 sediment samples containing a total of about 6600 litres of sediment. The crew carefully hand washed and floated all of this sediment to isolate the botanical finds, which could be decanted from buckets used to disassociate and sediments (Figs. 4–6). Based on past work at Ghar-e Boof and Chogha Golan, we know that this kind of careful hand floating provides better results than flotation machine, which often damage delicate specimens. Although it is premature to draw any specific conclusions, since none of the finds have been studied systematically, we can already say that the great majority of the 700 samples yielded archaeological floral material that could be important for reconstructing past environmental conditions as well as economic practices. In addition to the countless specimens of charred botanical remains recovered by flotation, we also hand collected 238 particularly large and

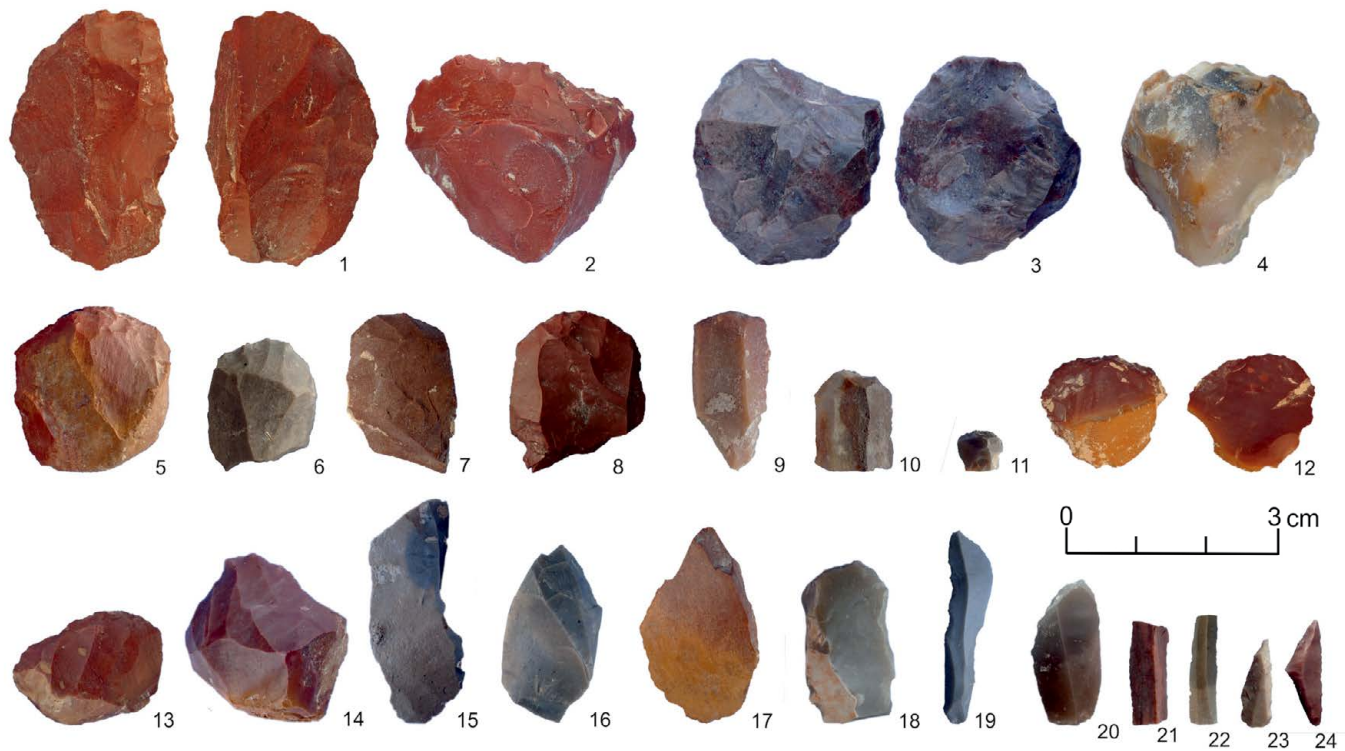


Fig.12. Ghar-e Boof 2015. Lithic artefacts from AH III (Prepared by M. Zeidi).

visible pieces of charcoal. These specimens would be appropriate for radiocarbon dating or other analyses for which we need to know the exact provenience of the specimens. The plant remains recovered from the 2015 season should allow colleagues including Simone Riehl from the University of Tübingen to gain much new information about the archaeology of the inhabitants of Ghar-e Boof and about past environmental conditions.

Fauna

The 2015 season greatly expanded our faunal assemblages. During excavation the team piece-plotted 477 faunal remains including 107 finds that were clearly burnt. All strata produced faunal remains, although the specifics of the preservation varied. In many cases, bones were encased by sediment crusts, presumably made of calcium carbonate. Nonetheless, many specimens were well preserved and easy identify. The bones are generally red-brown in colour and heavy. The bones generally look to be in good condition, but we know from earlier attempts to conduct research on stable isotopes and from failed attempts of

radiocarbon dating, that collagen is not preserved in most specimens. Similarly, attempts to extract a DNA have not been successful.

Most of the finds are from animals in the size ranges of gazelle, sheep and goat. Occasionally fish bones and tortoise shells could be recovered. A quick look at the finds allowed us to identify one bone point or awl and one carefully perforated incisor of what is likely a small ungulate (Fig. 16). Colleagues including Britt Starkovich from the University of Tübingen will be examining the faunal collections in more detail, and we are confident that this research will produce many useful new results.

Lithic artefacts

As expected, lithic artefacts form, by far, the most numerous class of artefacts. We piece-plotted well over 1000 lithic finds including 308 cores and 129 tools (Figs. 12-13). Given the small size of the artefacts, many finds are recovered by sorting the water screened sediments. This work is still ongoing and, as with other classes of finds, we are still far from having final counts.

The finds are dominated by the red, yellow

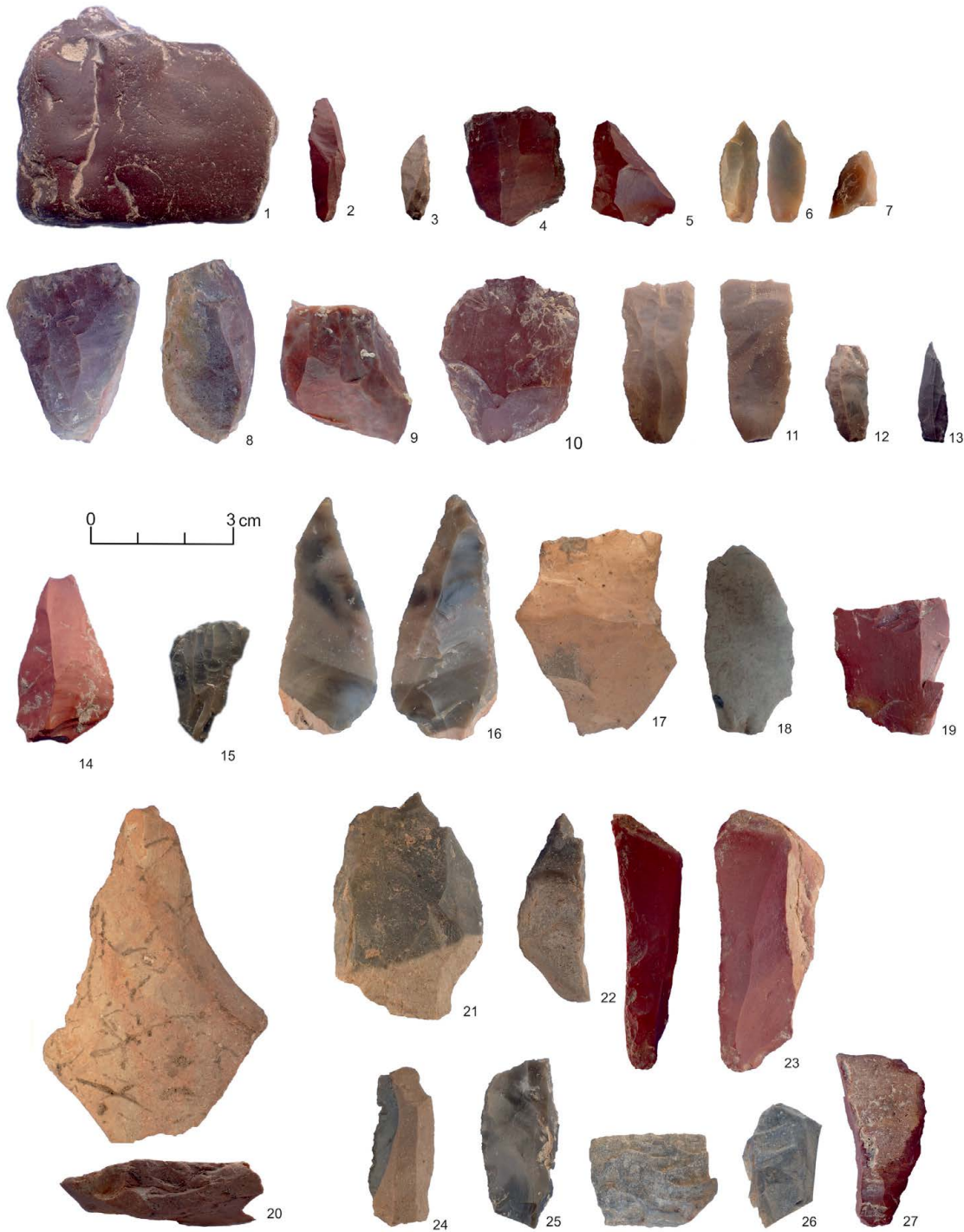


Fig. 13. Ghar-e Boof 2015. Lithic artifacts from AH IIIa-Va (1-3 IIIa; 4-10 IIIb; 11-13 IIIc; 14-15 IV; 16-19 IVc; 20-22 V; 23-27 Va) (Prepared by M. Zeidi).

and brown flints from the gravels of the Fahlyan River. Additionally, many grey flints of the Khan Ahmadi varieties are present, forming the second most common class of raw materials. As Ghasidian (2014) has discussed in detail, these flints represent the vast majority of the raw materials used in AH III-IIIb. As one goes

lower in the sequence more and more other lithic raw materials appear and the much smaller assemblages represent much less complete reduction sequences. In the rich deposits of AH III-IIIb we often could identify groups of decortication flakes that came from the initial phases of lithic reduction. Equally common were

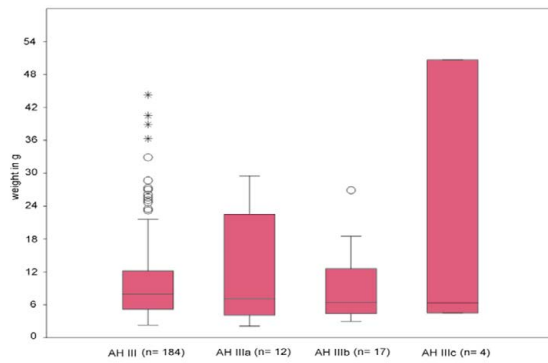


Fig. 14. Ghar-e Boof 2015. Length vs. width of complete bladelets (III n = 145, IIIa n = 32, IIIb n=26, IIIc n =12) (Data and graphics by K. Bretzke).

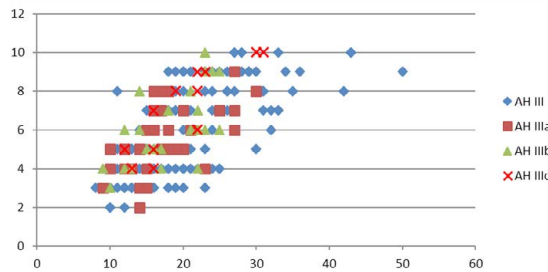


Fig.15. Ghar-e Boof 2015. Weight of cores. Boxes show 50% of the assemblage. The line is the median (Data and graphics by K. Bretzke).

finds of later phases of knapping as well as many end products and heavily reduced cores. In general, all phases of knapping are well documented. As expected, the nature of lithic variability fit closely to those described by Ghasidian (2014) in her monograph on the Rostamian cultural group. The assemblages include abundant bladelet cores and retouched bladelets together with a wide array of numerically less important flake tools of diverse forms, including occasional bifacial tools.

Table 1. Ghar-e Boof 2015. Classes of lithic artifacts. Tools are not listed separately, but with respect to the form of their blanks (Data from K. Bretzke).

AH	blade	bladelet	flake	core	Core on flake	Crested blade	Crested bladelet	AD	Indert.	Total
III	58	174	142	190	7	6	14	11	6	608
IIIa	10	45	42	12	0	0	0	6	0	115
IIIb	14	49	71	17	3	6	4	7	4	175
IIIc	5	24	13	3	1	0	3	1	0	50
IV	2	6	10	1	0	0	0	1	0	20
IVa	1	0	6	0	0	1	0	0	0	8
IVb	1	1	1	0	0	0	0	1	0	4
IVc	2	0	1	1	1	0	0	1	0	6
V	2	0	3	0	0	0	0	0	0	5
Va	2	0	4	0	0	0	0	0	0	6

Table 2. Ghar-e Boof 2015. Characteristics of striking platforms on flakes, blades and bladelets (Data from K. Bretzke).

AH	line/point	plain	faceted	dihedral	crushed	cortex
III	141	147	5	3	0	23
IIIa	45	24	1		4	11
IIIb	44	64	3	1	2	4
IIIc	15	14	1	0	1	1
IV	5	7	1	0	0	0
IVa	0	2	4		1	0
IVb	1	0	1	0	0	0
IVc	0	2	2	0	1	0
V	0	1	2	0	0	0

Table 3. Ghar-e Boof 2015. Shape of bladelets (Data from K. Bretzke).

AH	convergent	divergent	parallel
III	65	4	98
IIIa	22	3	19
IIIb	13	2	30
IIIc	12	0	10
IV	2	1	3
IVa	0	0	0
IVb	0	0	1
IVc	0	0	0
V	0	0	0

Table 4. Ghar-e Boof 2015. Profiles of bladelets (Data from K. Bretzke).

AH	curved	twisted	straight
III	40	65	63
IIIa	11	17	15
IIIb	12	16	17
IIIc	5	7	11
IV	1	1	4
IVa	0	0	0
IVb	0	1	0
IVc	0	0	0
V	0	0	0

Excavations at the top of AH III also yielded what may be part of an Epipalaeolithic or Zarzian assemblage. One carefully made small backed triangle (Fig. 12: 24) and multiple thumbnail scrapers (Fig. 12: 11) may postdate the main Rostamian deposits that appear to date between 35 and 42 ka cal. BP. In the future, we plan to obtain many new radiocarbon dates to clarify the temporal sequence of the site.

Starting with AH IIIc the find density of lithic artefacts declines, and we observe a much greater



Fig. 16. Ghar-e Boof 2015. Shell beads and other worked pieces (Prepared by M. Zeidi).

range in lithic raw materials. These artefacts include more coarse-grained materials that have not yet been characterized mineralogically and fine-grained translucent fine-grained lithics. In the layers down to AH Va, the assemblages seem to represent collections of isolated finds rather than artefacts from more complete knapping sequences.

Knut Bretzke of the University of Tübingen has conducted a preliminary examination of the lithics from the 2015 excavation at Ghar-e Boof (Figs. 14-15; Tabs. 1-4) that will be presented in more detail as more data become available.

Shell beads

The 2015 season has so far yielded 33 shell beads and fragments of shells that are thought to be parts of beads. As in the past (Conard and Ghasidian, 2011) multiple species of marine molluscs are represented in the assemblages of personal ornaments from Ghar-e Boof. With the exception of one large Cowry shell and a larger, as of yet, unidentified shell that were found during excavations, all the shell beads were found during water screening (Fig. 16). As in 2006 and 2007, the beads originate from multiple stratigraphic units indicating that personal ornaments were a frequent part of the material culture used by the inhabitants of the site.

Implications for the cultural sequence of the Dasht-e Rostam

With the 2015 field season at Ghar-e Boof we have been able to greatly extend the stratigraphic

sequence of the site. For the first time we have recovered stratified finds from the Middle Palaeolithic, and we hope that the small assemblages from the Middle Palaeolithic will provide new information on the similarities and difference between the adaptations of Middle Palaeolithic people and the Rostamian occupants of the site. For now, we argue that during the Middle Palaeolithic either archaic or early modern humans used the site in an ephemeral manner, while the Rostamian people spent much long periods at Ghar-e Boof and likely performed more varied activities as suggested by the richer number and variety of artefacts. Considering the results from survey that also show much more frequent evidence for occupations during the Rostamian, the excavations from Ghar-e Boof likely fit with a general pattern for the region.

As the sorting and laboratory works continue, we hope to establish a more detailed cultural and chronological sequence for Ghar-e Boof that can serve as a key point of reference for regional and later interregional comparisons. Before entering far reaching speculation, the next step the TISARP team faces is completing the processing of the sediments and all classes of material from the site. Even at this stage of research, the results from 2015 give us every reason for optimism about the great potential Ghar-e Boof possesses for improving our understanding of how Middle and Upper Palaeolithic peoples lived and organized their social and economic activities in the Dasht-e Rostam.

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