



HAL
open science

Living the High Life: The Upper Paleolithic Settlement of the Armenian Highlands

Boris Gasparyan, Andrew Kandell, Cyril Montoya

► **To cite this version:**

Boris Gasparyan, Andrew Kandell, Cyril Montoya. Living the High Life: The Upper Paleolithic Settlement of the Armenian Highlands. Stone Age of Armenia A Guide-book to the Stone Age Archaeology in the Republic of Armenia, Boris GASPARYAN Makoto ARIMURA (Eds), Monograph of the JSPS-Bilateral Joint Research Project, Center for Cultural Resource Studies, Kanazawa University, 2014. hal-02530143

HAL Id: hal-02530143

<https://hal.science/hal-02530143>

Submitted on 9 Apr 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Edited by

Boris GASPARYAN

Makoto ARIMURA

STONE AGE OF ARMENIA



Kanazawa University

2014

Institute of Archaeology and Ethnography of
the National Academy of Sciences of
the Republic of Armenia

Gfoeller Fund of America Corporation, Armenian Branch

Center for Cultural Resource Studies, Kanazawa University

STONE AGE OF ARMENIA

*A Guide-book to the Stone Age Archaeology in
the Republic of Armenia*

Edited by

Boris GASPARYAN

Makoto ARIMURA

Scientific advisory board:

Pavel AVETISYAN, Sumio FUJII

Monograph of the JSPS-Bilateral Joint Research Project

Center for Cultural Resource Studies,
Kanazawa University

2014

Stone Age of Armenia. A Guide-book to the Stone Age Archaeology in the Republic of Armenia.

Monograph of the JSPS-Bilateral Joint Research Project.

Edited by Boris Gasparyan, Makoto Arimura

Published by Center for Cultural Resource Studies, Kanazawa University, Kanazawa, Japan. 2014.

ISBN 978-4-9908070-0-9

Scientific advisory board:

Pavel Avetisyan (Institute of Archaeology and Ethnography of NAS RA)

Sumio Fujii (Center for Cultural Resource Studies, Kanazawa University)

© 2014 Center for Cultural Resource Studies, Kanazawa University

© 2014 Institute of Archaeology and Ethnography of NAS RA

© 2014 Gfoeller Fund of America Corporation, Armenian Branch

All rights reserved.

Printed in Japan.

ACKNOWLEDGEMENTS

This monograph is the fruit of international cooperations by who have passion to understand the Stone Age in Armenia. We deeply express our thanks to the following people.

We want to acknowledge Charles P. Egeland, Andrew W. Kandel and Dan S. Adler for their incredible help to review and correct the English texts. Also Diana Zardaryan provided English translations for some of the texts written in Russian and Armenian. Arsen Bobokhyan and Kristine Martirosyan-Olshansky contribute to corrections of numerous texts. We thank Benik Yeritsyan for providing the photographs and lithic materials from the Soviet period excavations. The photography of the archaeological materials, map and schematic images are made by Dmitri Arakelyan. Also Andrew W. Kandel, Cyril Montoya, Vram Hakobyan, Kristine Martirosyan-Olshansky, Armine Hayrapetyan, Alexia Smith, Lyssa Stapleton, Diana Zardaryan, Arthur Petrosyan, Aleksandr Yesayan, Anna Khechoyan, Firdus Muradyan contributed to the figures and photography of the archaeological materials. Topographic and architectural plans are drawn by Smbat Davtyan, Hasmik Sargsyan, Hovhannes Sanamyan, Andrew W. Kandel, Armine Hayrapetyan and Tigran Badishyan. Geological drawing for the stratigraphic sections of archaeological sites are provided by Samvel Nahapetyan. Drawings of the artifacts are done by Garik Prveyan, Gauthier Devilder, Elham Ghasidian, Hasmik Sargsyan, Armine Harutyunyan, Narine Mkhitarian, Phil Glauberman, Yanik Henk and Diana Zardaryan. Restoration and cleaning of the textiles, basketry and metal artifacts is done by Yelena Atoyants. Special thanks to Anahit Galstyan for her kind help with the design of the figures. We acknowledge all those mentioned here without of whose contribution the book will come up just as a poor collection of texts.

We should also to acknowledge members of our team not appearing as authors, but have a big organizational input bringing this event to life, who are Suren Kesejyan, Hovhannes Partevyan and Robert Ghukasyan.

And finally, but most importantly, we extend our profound thanks to all the colleagues spending their energies, times and efforts to make this publication a reality.

CONTENTS

7 Introduction

Pavel Avetisyan and Sumio Fujii

13 Study of the Stone Age in the Republic of Armenia. Achievements and Perspectives

Boris Gasparyan and Makoto Arimura

PALEOLITHIC

37 Recently Discovered Lower Paleolithic Sites of Armenia

Boris Gasparyan, Daniel S. Adler, Charles P. Egeland and Karen Azatyan

65 The Middle Paleolithic Occupation of Armenia: Summarizing Old and New Data

*Boris Gasparyan, Charles P. Egeland, Daniel S. Adler, Ron Pinhasi,
Phil Glauberman and Hayk Haydosyan*

107 Living the High Life: The Upper Paleolithic Settlement of the Armenian Highlands

Boris Gasparyan, Andrew W. Kandel and Cyril Montoya

EARLY HOLOCENE / NEOLITHIC

135 Early Holocene Sites of the Republic of Armenia: Questions of Cultural Distribution and Chronology

Arthur Petorsyan, Makoto Arimura, Boris Gasparian and Christine Chataigner

161 Aknashen – the Late Neolithic Settlement of the Ararat Valley: Main Results and Prospects for the Research

Ruben Badalyan and Armine Harutyunyan

177 Preliminary Results of 2012 Excavations at the Late Neolithic Settlement of Masis-Blur

*Armine Hayrapetyan, Kristine Martirosyan-Olshansky, Gregory E. Areshian and
Pavel Avetisyan*

191 On Neolithic Pottery from the Settlement of Aknashen in the Ararat Valley

Armine Harutyunyan

CHALCOLITHIC

- 207 About Some Types of Decorations on the Chalcolithic Pottery of the Southern Caucasus**
Diana Zardaryan
- 219 Weaving the Ancient Past: Chalcolithic Basket and Textile Technology at the Areni-1 Cave, Armenia**
Lyssa Stapleton, Lusine Margaryan, Gregory E. Areshyan, Ron Pinhahi and Boris Gasparyan
- 233 Late Chalcolithic and Medieval Archaeobotanical Remains from Areni-1 (Birds' Cave), Armenia**
Alexia Smith, Tamara Bagoyan, Ivan Gabrielyan, Ron Pinhasi and Boris Gasparyan
- 261 Forest Exploitation during the Holocene in the Aghstev Valley, Northeast Armenia**
Makoto Arimura, Boris Gasparyan, Samvel Nahapetyan and Ron Pinhasi
- 283 Transition to Extractive Metallurgy and Social Transformation in Armenia at the End of the Stone Age**
Arsen Bobokhyan, Khachatur Meliksetian, Boris Gasparyan, Pavel Avetisyan, Christine Chataigner and Ernst Pernicka
- 315 Rock-Painting Phenomenon in the Republic of Armenia**
Anna Khechoyan and Boris Gasparyan
- 339 Discovery of the First Chalcolithic Burial Mounds in the Republic of Armenia**
Firdus Muradyan
(with contributions by Diana Zardaryan, Boris Gasparyan and Levon Aghikyan)
- 365 List of Authors**

LIVING THE HIGH LIFE: THE UPPER PALEOLITHIC SETTLEMENT OF THE ARMENIAN HIGHLANDS

Boris Gasparyan, Andrew W. Kandel and Cyril Montoya

1. Introduction

While the Armenian Highlands have benefited from a longer history of research into the Early and Middle Paleolithic occupations of this region, its Upper Paleolithic settlement has only recently begun to come into focus. With this brief contribution we summarize new archaeological data from two high elevation sites that together span the majority of the Upper Paleolithic. These well stratified sites in the Armenian Highlands benefited from the use of modern excavation methods. The first evidence for modern human behavior is seen at Aghitu-3 Cave in Syunik Province of southern Armenia, while cultural remains from the late Upper Paleolithic are documented in the north at the site of Kalavan-1, located in the wooded montane landscape north of Lake Sevan. We hypothesize that any hominin who entered the Armenian Highlands had to solve the problem of how to survive in this high altitude environment. Under modern conditions, which we view as analogous to an interglacial, the climate is continental, exhibiting a large fluctuation between summer and winter temperatures. This high altitude region, much of it above 2000 m, is blanketed by snow during the winter and well into spring. During glacial periods, alpine ice sheets would have covered a considerable portion of the region, providing a significant impediment for human habitation. Such environmental hurdles would surely have imprinted on the early inhabitants of the region and facilitated the solutions that led to their survival at these high altitudes.

2. Background on Upper Paleolithic research in Armenia

The first lithic artifacts from the Upper Paleolithic of Armenia were published by M.Z. Panichkina. She reported findings from two open-air localities (Chatkeran and Nurnus) during her 1946-1947 survey of the middle reaches of the Hrazdan River canyon, identifying surface collections of obsidian tools as characteristic of that time period. The small assemblages of lithic artifacts (150 implements from Chatkeran and 130 from Nurnus), prepared from obsidian pebbles washed by the Hrazdan, included prismatic cores, massive retouched blades of regular shape, notches, end scrapers, carinated scrapers, burins, points and borers, chisels (*pièces esquillées*) and sickle elements, with end scrapers and burins predominating. Based on her detailed typological description of the finds and a comparison with similar ones from Georgia, the Caucasus, Iran and the Near East, Panichkina concluded that the open-air sites of Hrazdan, which are not rich with archaeological materials, but nonetheless contain very characteristic types, could be attributed to the second half of the Upper Paleolithic. This period was presumed to be coeval with the cave sites of Georgia. This assumption placed these finds at the end of the second chronological group of the Upper Paleolithic scheme proposed by S.N. Zamyatnin for Transcaucasia, approximately equivalent to the Magdalenian, based on Western European classification. The Upper Paleolithic culture of Armenia differs from that of Eastern Europe. It is associated with sites of the same age in Georgia, Crimea and the Eastern Mediterranean, and linked through their shared mild climate and suitable geographical conditions for habitation (Panichkina 1948; 1950, pp. 13, 90-98, 101).

A more substantial collection of implements attributed to the Upper Paleolithic was published by S.H. Sardaryan. From 1945-1949 he collected artifacts from the open-air sites of the Hrazdan River valley (Arzni, Nurnus) and Mt. Arteni (Satani-dar, Areguni blur, Yerkaruk blur) in central and west-central Armenia, which were located in close proximity to obsidian raw material sources. Based on the same methodology as Panichkina, Sardaryan came to similar conclusions and, using the Western European chronological scheme, divided his collection of over 1,700 implements into the three conventional typo-chronological groups dated between 40,000 and 12,000 – the Aurignacian, Solutrean and Magdalenian (Sardaryan 1954, pp. 127-168, 170-171; 1967, pp. 76-93).

In 1967 B.G. Yeritsyan recorded Upper Paleolithic finds in northern Armenia (Noyemberyan district) on the northwestern slopes of the Gugarats Range. Stone artifacts from the Hatsut-1 open-air site were collected from about 100-150 m² on a dry river terrace. Test trenches yielded *in situ* lithic finds and small unidentifiable faunal remains. He collected a total of 170 artifacts made mainly on local flint, in addition to limited obsidian and quartz implements. The cores were represented

by small and highly reduced unidirectional examples, mainly oriented toward bladelet production. Small sized flakes, blades and bladelets dominate the finds, and often bear traces of retouch. The toolkit includes borers and points, as well as scrapers and denticulates, but lacks burins. Based on his short description Yeritsyan attributes the site to the developed Upper Paleolithic culture, which would be contemporaneous with the materials from Chatkeran (Yeritsyan 1970a, pp. 88-90).

Further publications report the discovery of several other sites with Upper Paleolithic material collected from the Hrazdan River gorge and the Hrazdan-Kotayk Plateau (e.g. Argel, Jraber, Nurnus 1-4, Hatis, Yerablur, Aramus). However, these generally lack site descriptions, as well as the corresponding lithic materials (Tadevosyan 1986; Yeritsyan *et al.* 1996; 1998). Compared to the rich Upper Paleolithic occupations documented in the caves of Georgia (“Imeretian” culture) and the northern Caucasus (“Gubs culture”), the Upper Paleolithic discoveries of Armenia did not receive much attention, nor were they discussed in detail in the summary publications of the Soviet era. Some scholars hypothesized that the Armenian Highlands were not inhabited during the Last Glacial Maximum due to its high altitude environment and cold climate (Bader 1984; Lyubin 1989). Others researchers shared a different opinion, and suggested that the Upper Paleolithic of Armenia derives from the Middle Paleolithic, resulting from the further evolution, innovation and transformation of the Middle Paleolithic into the typological and morphological variants of the Upper Paleolithic (e.g. end scrapers, points, and burins). Based on research at the caves of Yerevan-1 (Units 1-2) and Lusakert-1 (Units A-B), the final stages of development showed tool forms more characteristic of the Upper Paleolithic starting to predominate (>47% at Lusakert-1, excluding microliths). Meanwhile those tools were shaped by the technological traditions characteristic of the Middle Paleolithic (Yeritsyan 1970b, pp. 25-26; Yeritsyan and Tadevosyan 1986; Tadevosyan 1985; 1986; 1991; 1998; 2008; Fourloubey 2003, pp. 16-17; Adler *et al.* 2012, p. 26).

However, further investigations and multiple visits to the areas of these collections have demonstrated that the open-air sites described by Panichkina, Sardaryan and the others are probably Neolithic-Chalcolithic workshops located near obsidian raw material sources. In the case of Yerevan and Lusakert caves, it is not certain whether Upper Paleolithic occupation occurred during the formation of the upper parts of the strata, despite the nature of some of the finds, because the sediments have a colluvial origin, comprising sediments originating from above the cliff and from cliff collapse. This means that Units A and B of Lusakert-1 are not *in situ*, and there is little potential for obtaining reliable absolute dates on the archaeological material from these strata (Adler *et al.* 2012, p. 27).

In summary, the only site that can be securely attributed to the Upper Paleolithic is Hatsut-1, which despite limited publication of the finds (Yeritsyan 1970a, pp. 88-90), looks similar to the materials from Kalavan-1 (see below). Within this in mind, we present here the first “true” Upper Paleolithic sites of Armenia, which have only been recently uncovered and evaluated.

3. Aghitu-3 cave

The Tübingen-Armenian Paleolithic Project (TAPP) conducted its first field reconnaissance of southern Armenia in the Vorotan River valley in June, 2008. During its visit to the village of Aghitu, the TAPP team identified a series of caves along the base of a flat-topped basalt massif. Often referred to as the fortress of Aghitu (Achaemenid-Hellenistic Period, Aghitu Fortress, Sisian, 1640 m, N39 30'49.7" E46 4'51.2"), the basalt plateau shows ample evidence of occupation from the Bronze Age through the Middle Ages (Cherry *et al.* 2007; Kroll 2006). In addition to the outlines of stone structures visible atop the massif, finds of pottery and the bones of domesticated animals are common. As our team conducted survey around the base of the hill, we also recognized stone artifacts typical of the Paleolithic and fossilized bones on the floor of a cave named Aghitu-3. Measuring 18 m wide, 11 m deep and 6 m high, this cave seemed to have the potential to yield older sediments (Figures 1 and 2).

Therefore, between 2009 and 2013 the TAPP team conducted archaeological excavations at Aghitu-3 (Kandel *et al.* 2012; 2014). The cave is situated at 1601 m above sea level at the base of the basalt formation. The basalt flow that formed the cave was deposited during a series of volcanic eruptions that issued from nearby Mt. Bugdatapa between 126,000–111,000 (Ollivier *et al.* 2010). Further evidence of continuing volcanic eruptions is demonstrated by at least two tephra layers contained in the site. In addition to experiencing active volcanism, the region shows geomorphological evidence of glaciation, such as ground and end moraines, U-shaped trog valleys, glacial striations on bedrock, glacial erratics atop sedimentary deposits, and poorly sorted glacial tills (Ollivier *et al.* 2010, Samvel Nahapetyan pers. comm.).

Based on five years of careful excavation, profile drawing and sediment sampling, the stratigraphy of the cave was divided into 12 geological horizons (GH) containing seven archaeological horizons (AH) (Figure 3). The Holocene deposits of layers GH 1 and 2 (AH I and II) contained stone artifacts, bones and ceramics. While layer 1 was loose and strewn with modern rubbish consisting of metal, glass and plastic, layer 2 was more compact and free of modern debris. Both layers 1 and 2 contained stratified dung layers that were often burned. These layers were also disturbed by numerous features including basalt walls, a pit lined with basalt slabs, a clay oven-

tonir for baking bread (Figure 4: 1), a pit with the remains of several cattle, and most notably, an undisturbed tomb containing seven individuals and grave goods dating to the Parthian era of the 1st century BC (Figure 4: 2).

Beginning with layer GH 3 (AH III), about 40 cm below the original surface, we observed a remarkable change. The sediment became more compact and finely stratified with many shattered basalt plates. Modern debris and ceramic were absent and artifacts typical of the Upper Paleolithic became common. In fact GH 3 contained at least four, spatially continuous, archaeological layers (AH IIIa-d), each about 2-3 cm thick, documenting intensive use of the site between about 28,000–24,000 Cal BP (Figures 3, 5: 1, 7). While analytical studies of all find classes are presently underway, based on the team's field and laboratory observations, we report here on a few notable trends.

Layer AH III was the most intensively occupied layer at Aghitu-3. Stone artifacts are numerous, with almost 10,000 pieces recorded. The most common raw material is obsidian that comes in a wide variety of types, including glassy translucent, gray matte, and red-black striped "tiger". The volcanic mountains of Syunik offer primary sources obsidian 30-40 km to the northeast, and we collected secondary obsidian pebbles and cobbles along the Vorotan River and its tributaries. Handheld X-ray diffraction studies of the obsidian is presently underway and suggests mostly local sources, although about 10% of the obsidian assemblage comes from sources in northern Armenia up to 250 km away (Ellery Frahm pers. comm.). Chert is the next most common lithic raw material and comes in a multitude of colors including white, gray, green, yellow, red, and brown. Geological maps and field survey indicate that primary sources of chert are available about 5 km to the west near Brnakot and 40 km to the east near Goris. Other raw materials are extremely rare and include chipped basalt and dacite.

The stone tools are distinct in their technology and typology. The lithic industry is based almost entirely on the production of laminar blanks, predominantly bladelets, from small highly reduced unidirectional cores. When a second platform was initiated, reduction continued in one direction. The vast majority of tools are fashioned from laminar blanks and consist of bladelets finely retouched on one or both lateral edges. Other tool forms are less frequent and include a variety of backed forms, burins and carinated scrapers. Regardless of the raw material chosen, the method of reduction produced standardized blanks and tools, suggesting that people had a fixed concept of the implements they required (Figure 6).

Many of the faunal remains consist of shaft fragments and suggest that hunting focused on the acquisition and processing of wild sheep, wild goat, and equids. Other faunal remains

include wolf, fox, hare, micromammals, birds and fish. Isotopic and genetic studies are underway to examine questions of subsistence, as well as whether the canids showed signs of incipient domestication. Not only have three bone tools (one eyed bone needle, one bone point and one bone awl) been identified among the remains of layer 3, but six perforated shells, are also present. These remains hint at the manufacture of clothing and personal ornamentation. Based on micromammals, pollen and sedimentology, the first results from environmental studies tell us of a cold and dry period. Thus, we conclude that the manufacture of clothing was an important element in the life cycle of these Upper Paleolithic people.

Layers GH 4-8 (AH IV-V) yielded few archaeological remains. Nonetheless, these layers date between 31,000–28,000 Cal BP and indicate a continued cold and dry climate. Layer GH 8 documents two phases of volcanic ash deposition (Victoria Cullen pers. comm.). Micromammal diversity is very high, indicating that a raptor such as the eagle owl (*Bubo bubo*) accumulated the assemblage. Micromammal density is also very high (Lior Weissbrod pers. comm.), telling us that humans were not using the site that often. Whether caused by an earthquake or the very cold conditions, a very large rockfall (GH 9) suggests that humans would have found it difficult to use the cave during this period (Figures 3 and 5: 1).

Layer GH 10 (AH VI) denotes a significant change in sedimentation at the site. In stark contrast to the overlying strata, GH 10 consists mainly of fine-grained sediments with very little basalt debris. This layer dates between 35,000–31,000 Cal BP. Human occupation can be seen through distinct, spatially isolated occupation events. These horizons document small combustion features associated with low densities of lithic artifacts numbering about 350 pieces. The raw material spectrum, technology and typology of AH VI are remarkably similar to AH III. However, many of the faunal remains may not have been accumulated by humans. At least the predominance of wild sheep and wild goat, combined with an unusual body part representation and evidence of gastric etching indicate that carnivores contributed significantly to this accumulation of fauna (Hans-Peter Uerpman pers. comm.). Micromammals indicate a warmer climate (Lior Weissbrod pers. comm.), as do pollen spectra (Angela Bruch pers. comm.) and sedimentological observations (Samvel Nahapetyan pers. comm.).

In Layer GH 11 (AH VII) we observe another significant sedimentological change. The sediment matrix is a mélange of all size classes strewn between basalt boulders. Nonetheless, a small collection of about 50 lithic artifacts was recovered, as well as some faunal remains. Based on its stratigraphic position, this layer pre-dates 35,000 Cal BP, with further radiocarbon dating currently in progress. Initial observations suggest that this layer was laid down under a higher

energy regimen than the overlying fine-grained deposits of GH 10.

The deepest strata we encountered at Aghitu-3 was GH 12 at a depth of almost 6 m below surface. This layer contained neither lithics nor faunal remains and resembled the sterile layers we observed at the base of other test trenches excavated along the basalt massif. If our interpretation is correct, this layer represents the bedrock onto which the basalt flowed and thus predates it.

In summary, the thick, well stratified Paleolithic sequence excavated at Aghitu-3 cave offers us the chance to decipher the climatic and behavioral record of the first half of the Upper Paleolithic in the Armenian Highlands. This remarkable sequence is presently under study and will allow us to better understand how the first modern humans of Armenia survived in this high altitude region. To understand the second half of the Upper Paleolithic sequence we move north to study the deposits at the open air locality of Kalavan-1.

4. Kalavan-1 open-air site

The open-air site of Kalavan-1 is located to the north of Lake Sevan at an altitude of 1640 m in the Barepat valley, in the heart of the Aregunyats Mountain Range. Discovered in 2004, it was excavated in the framework of the Armenian-French joint team of the Institute of Archaeology and Ethnography of the National Academy of Sciences of the Republic of Armenia and “Mission Caucas” (co-directed by B. Gasparyan and C. Chataigner; Chataigner *et al.* 2012, pp. 52-54, 59-61; Montoya *et al.* 2013). The excavation revealed the great potential of the Kalavan sites, documenting an Early Bronze Age (Kura-Araxes culture) necropolis and Upper Paleolithic layers (Liagre *et al.* 2009). A few hundred meters downstream, a survey shed light on an important Middle Paleolithic sequence (Kalavan-2; Ghukasyan *et al.* 2011).

Kalavan-1 is positioned in a bottleneck, at the interface between the narrowing of the Barepat valley and the opening of the alpine meadows situated above 2000 m. It is a strategic position for hunting because it provides an overview of the seasonal migrations of mammals ascending and descending the valley.

This late Upper Paleolithic settlement was situated on an old alluvial terrace of the Barepat (Figure 8). The analysis of the stratigraphic sequence highlights a sedimentary dynamic in two phases: alluvial at the base, then colluvial above. The Upper Paleolithic occupation was recognized within sedimentary unit 7 (7d1 and 7d3) positioned at the beginning of the colluvial sedimentary cycle, probably allowing for the quick burial of the artifacts and the optimal preservation of the site (Figure 9). The analysis of the taphonomic processes highlighted classical phenomena of disturbances on the principal archaeological level 7d3 (e.g. bioturbation, vertical dispersion by

freezing and thawing) without disturbing the archaeological structures or modifying the general spatial organization of the artifacts.

Kalavan-1 can be interpreted as a high mountain seasonal kill site of Caprinae. Archaeozoological studies have demonstrated a restricted faunal spectrum, composed mainly of wild Caucasian caprinae (*Ovis* sp./*Capra* sp. = *Ovis orientalis gmelini*?). The hunting strategy for Caprinae appears to be focused on adult animals between one and six years old. The presence of most anatomical parts of the animals at the site supports a kill site close to Kalavan-1 (Montoya *et al.* 2013).

From a spatial point of view, the activities are marked by a knapping area and also a hearth (G28) comprising backed bladelets and two bladelet cores whose function appears related to the preparation of hunting weapons. The excavation also revealed a space structured by two other hearths, as well as lithic and/or fauna concentrations. The densest concentration (GF 23-24), probably a debris mound, is composed of nearly 1200 remains of fauna with nearly twenty caprinae mandibles (Figure 10; Montoya *et al.* 2013).

The examination of lithic raw material evokes a nomadic logistic with planned management of allochthonous material: nearly 60% of the lithic raw material is composed of obsidian. Using LA-ICP-MS analysis we identified the Armenian Volcanic Highlands (1500–3000 m) as the source of the obsidian to the west and south of Lake Sevan (Geghasar, Gutanasar, Hatis, Syunik Highlands), approximately three to four days' walk from Kalavan-1 (Barge and Chataigner 2004; Chataigner and Gratuze 2013). It is probably near these obsidian sources that the blades imported to Kalavan-1 were produced. Indeed, there is no evidence of a laminar *chaîne opératoire* discovered on the site. The cutting-edge quality of these blades and their robustness suggest their potential for use in butchery activities. Conversely, the *chaîne opératoire* of bladelets was mainly dedicated to the fabrication of microgravettes and backed bladelets for hunting weaponry (Figures 11-14). The techno-typological characteristics and, in particular, the presence of many microgravette points, argue for a cultural attribution to the Epigravettian tradition (Figures 13: 5-10, 14), well represented since the Last Glacial Maximum in the Caucasus (Nioradze and Otte 2000).

Seven AMS dates between 18,000–16,000 Cal BP (Figure 15) provide chronological information for the occupation during a cold period with a dry environment, composed of a steppic herb vegetation around the site and the presence of some trees in the valley bottoms (Montoya *et al.* 2013). Kalavan-1 is the first site in the Lesser Caucasus to document, on the one hand, the process of (re)colonization by human groups at this high altitude during the Late Glacial, and on the other, the mobility strategies and subsistence patterns developed by the local populations in this area.

5. Concluding remarks

Recent investigations of the Upper Paleolithic of Armenia revealed at least two new stratified sites: Aghitu-3 cave and Kalavan-1 open-air. These sites provide us with a well-preserved environmental and cultural stratigraphic record, respectively dated between 40,000 and 24,000 Cal BP (early to middle Upper Paleolithic) and 18,000–16,000 Cal BP (late Upper Paleolithic). For now, the timeframe between 24,000 and 18,000 Cal BP remains unknown. Furthermore, the as yet undocumented Middle to Upper Paleolithic transition in Armenia counts among the most important research questions. We are sure that these ongoing projects will help fill the existing gaps and place new Upper Paleolithic sites on the map of Armenia. These sites, together with the ones in Georgia and the northern Caucasus, are helping to paint an overall picture of the cultural development of the regional Upper Paleolithic populations. The Armenian sites are also important from the perspective of their geographic distribution. The Soviet era researchers of the regional Upper Paleolithic postulated that the late Upper Paleolithic cultures of Georgia (“Imeretian”) and the Near East (“Zarzian”) were linked with the sites of Armenia. Now it is clear that the Armenian sites will play an important role in providing concrete evidence about whether such connections existed (Bader 1966, pp. 143-144; 1984, pp. 287-288; Lyubin 1989, pp. 138-142).

References

- Adler, D.S., Yeritsyan, B., Wilkinson, K., Pinhasi, R., Bar-Oz, G., Nahapetyan, S., Mallol, C., Berna, F., Bailey, R., Schmidt, B.A., Glauberman, P., Wales, N. and Gasparyan, B. (2012) The Hrazdan Gorge Palaeolithic project, 2008-2009. In: Avetisyan, P. and Bobokhyan, A. (eds.), *Archaeology of Armenia in Regional Context, Proceedings of the International Conference dedicated to the 50th Anniversary of the Institute of Archaeology and Ethnography Held on September 15-17, 2009 in Yerevan*. Yerevan: National Academy of Sciences of the Republic of Armenia “Gitutyun” Publishing House, pp. 21–37.
- Bader, N.O. (1966) Razlichiya mezhdru verkhnepaleoliticheskimi kul'turami Zakavkazya i Blizhnego Vostoka (Differences between the Upper Paleolithic Cultures of the Transcaucasus and the Near East). In: Merpert, N.Ya. and Kozhin, P.M. (eds.), *Arkheologiya Starogo i Novogo Sveta* (The Archaeology of the Old and New World). Moscow: “Nauka” Publishing House, pp. 135–143 (in Russian).
- Bader, N.O. (1984) Pozdnyy Paleolit Kavkaza (Late Paleolithic of the Caucasus), In: Boriskovskiy, P.I. (ed.), *Paleolit SSR iz serii Arkheologiya SSSR* (The Paleolithic of USSR, Series of Archaeology of the USSR). Moscow: “Nauka” Publishing House, pp. 272–301 (in Russian).
- Barge, O. and Chataigner, C. (2004) Un SIG pour l’analyse des approvisionnements: l’exemple de l’obsidienne de l’Arménie. *Revue d’Archéométrie* 28, pp. 25–33.

- Bronk Ramsey, C. (2013) Recent and planned developments of the program OXCAL. *Radiocarbon* 55, pp. 720–730.
- Chataigner, C., Gasparyan, B., Montoya, C., Arimura, M., Melikyan, V., Liagre, J., Petrosyan, A., Ghukasyan, R., Colonge, D., Fourloubey, K., Arakelyan, D., Astruc, L., Nahapetyan, S., Hovsepian, R., Balasescu, A., Tome, K. and Radu, V. (2012) From the Late Upper Palaeolithic to Neolithic in North-Western Armenia: Preliminary results. In: Avetisyan, P. and Bobokhyan, A. (eds.), *Archaeology of Armenia in Regional Context, Proceedings of the International Conference dedicated to the 50th Anniversary of the Institute of Archaeology and Ethnography Held on September 15-17, 2009 in Yerevan*. Yerevan: National Academy of Sciences of the Republic of Armenia “Gitutyun” Publishing House, pp. 52–63.
- Chataigner, C. and Gratuze, B. (2013) New data on the exploitation of obsidian in the Southern Caucasus (Armenia, Georgia) and eastern Turkey. Part1: Source characterization. New data on the exploitation of obsidian in the Southern Caucasus (Armenia, Georgia) and eastern Turkey. Part2: Obsidian procurement from the Upper Palaeolithic to the Late Bronze Age. *Archaeometry* (doi: 10.1111/arc.12007).
- Cherry, J.F., Manning, S.W., Alcock, S.E., Tonikyan, A.V. and Zardaryan, M.H. (2007) Radiocarbon dates for the second and first millennia B.C. from southern Armenia: Preliminary results from the Vorotan Project 2005-2006. *Aramazd* 2, pp. 52–71, 228.
- Fourloubey, C., Beauval, C., Colonge, D., Liagre, J., Ollivier, V. and Chataigner, C. (2003) Le Paléolithique en Arménie: Etat de connaissances acquises et données récentes. *Paléorient* 29/1, pp. 5–18.
- Ghukasyan, R., Colonge, D., Nahapetyan, S., Ollivier, V., Gasparyan, B., Monchot, H. and Chataigner, Ch. (2011) Kalavan-2 (North of Lake Sevan, Armenia): A New Late Middle Paleolithic Site in the Lesser Caucasus. *Archaeology, Ethnology and Anthropology of Eurasia* 38/4, pp. 39–51.
- Kandel, A.W., Gasparyan, B., Bruch, A.A., Weissbrod, L. and Zardaryan, D. (2012) Introducing Aghitu-3, the First Upper Paleolithic Cave Site in Armenia. *Aramazd* 6/2, pp. 7–23, 220–221, 235–247.
- Kandel, A.W., Gasparyan, B., Nahapetyan, S., Taller, A. and Weissbrod, L. (2014) The Upper Paleolithic Settlement of the Armenian Highlands. In: Otte, M. (ed.), *Modes of contacts and displacements during the Eurasian Paleolithic, Conference Proceedings, Liège, 29-31 May 2012*. ERAUL 140. Luxembourg, pp. 39–60.
- Kroll, S. (2006) Southern Armenia Survey (Syunik), 2000-2003. *Aramazd* 1, pp. 19–49, 265–266.
- Liagre, J., Arakelyan, D., Gasparyan, B., Nahapetyan, S. and Chataigner, C. (2009) Mobilité des groupes préhistoriques et approvisionnement des matières premières à la fin du Paléolithique supérieur dans le Petit Caucase: données récentes sur le site de plein air de Kalavan 1 (nord du lac Sevan, Arménie). In: Djindjian, F., Kozłowski, J. and Bicho, N. (eds.), *Le concept de territoires dans le Paléolithique supérieur européen - UISPP, Proceedings of the XV World Congress (Lisbon, 4-9 September 2006)*. BAR International Series 1938. Oxford: ArchaeoPress, pp. 75–84.
- Lyubin, V.P. (1989) Paleolit Kavkaza, Glava 2, Verkhniy Paleolit (Paleolithic of Caucasus, Chapter 2, Upper Paleolithic). In: Boriskovskiy (ed.), *“Paleolit Kavkaza i Severnoy Azii”*, iz serii “Paleolit Mira, Issledovaniya po Arkheologii Drevnego Kamennogo Veka” (“The Paleolithic of Caucasus and Northern Asia”, from Series of

- “The Old Stone Age of the World, Studies in the Paleolithic Cultures”). Leningrad: “Nauka” Publishing House, Leningrad Branch, pp. 93–142 (in Russian).
- Montoya, C., Balasescu, A., Joannin, S., Ollivier, V., Liagre, J., Nahapetyan, S., Ghukasyan, R., Colonge, D., Gasparyan, B. and Chataigner, C. (2013) The Upper Palaeolithic site of Kalavan 1 (Armenia): An Epigravettian settlement in the Lesser Caucasus. *Journal of Human Evolution* 65 (5), pp. 621–640.
- Nioradze, M.G. and Otte, M. (2000) Paléolithique supérieur de Géorgie. *L'Anthropologie* 104, pp. 265–300.
- Ollivier, V., Nahapetyan, S., Roiron, P., Gabrielyan, I., Gasparyan, B., Chataigner, C., Joannin, S., Cornée, J.-J., Guillou, H., Scaillet, S., Munch, P. and Krijgsman, W. (2010) Quaternary volcano-lacustrine patterns and palaeobotanical data in southern Armenia. *Quaternary Research* 223–224, pp. 312–326.
- Panichkina, M.Z. (1948) K voprosu o verxnem paleolite v Armenii (To the question of the Upper Paleolithic in Armenia). *Izvestiya Akademii Nauk Armyanskoy SSR, Obshchestvennye nauki* (Bulletin of the Academy of Sciences of the Armenian SSR, Social Sciences) 7, pp. 67–80.
- Panichkina, M.Z. (1950) *Paleolit Armenii* (Paleolithic of Armenia). Leningrad: State Hermitage Press (in Russian).
- Reimer, P.J., Bard, E., Bayliss, A., Beck, J.W., Blackwell, P.G., Bronk Ramsey, C., Buck, C.E., Cheng, H., Edwards, R.L., Friedrich, M., Grootes, P.M., Guilderson, T.P., Hafflidason, H., Hajdas, I., Hatté, C., Heaton, T.J., Hoffmann, D.L., Hogg, A.G., Hughen, K.A., Kaiser, K.F., Kromer, B., Manning, S.W., Niu, M., Reimer, R.W., Richards, D.A., Scott, E.M., Southon, J.R., Staff, R.A., Turney, C.S.M. and van der Plicht, J. (2013) IntCal13 and Marine13 Radiocarbon Age Calibration Curves 0–50,000 Years Cal BP. *Radiocarbon* 55, pp. 1869–1887.
- Sardaryan, S.H. (1954) *Paleolit v Armenii* (Paleolithic in Armenia). Yerevan: Armenian SSR Academy of Sciences Press (in Russian).
- Sardaryan, S.H. (1967) *Nakhnadaryan hasarakutyuny Hayastanum* (Primitive Society in Armenia). Yerevan: “Mitk” Publishing House (in Armenian, with Russian and English Resume).
- Tadevosyan, S.V. (1985) Lusakert arajin karayri verin paleolityan mshakuyty (Upper Paleolithic culture of the Lusakert one cave). In: Arakelyan, B.N. (ed.), *Haykakan SSH-um 1983-1984 tt. dashtayin hnagitakan ashkhatankneri ardyunknerin nvirvats gitakan nstashrjan, april 1985 t., Zekutsumneri tezisner* (Abstracts of Reports of the Conference devoted to the Archaeological Fieldwork Results in 1983-1984 in the Armenian SSR, april 1985). Yerevan: Armenian SSR Academy of Sciences Press, pp. 5–6 (in Armenian).
- Tadevosyan, S.V. (1986) Hayastani verin paleolityan kayannery ev drants mshakuyty (Upper Paleolithic sites of Armenia and their culture). In: Kharatyan, Z.V. and Petrosyan, H.L. (eds.), “*Hay zhoghovrdakan mshakuyti hetazotman hartser*”, *Yeritasard gitnakanneri VIII konferans nvirvats SMKK XXVII hamagumarin (19-21 mart 1986 t.), Zekutsumneri himnadruytner* [Abstracts of reports of “Questions of Investigation of Armenian Folk Culture”, VIII Conference of young scientists dedicated to the XXVII Congress of the SUCP (19-21 March 1986)]. Yerevan: Institute of Archaeology and Ethnography Press, pp. 3–4 (in Armenian).
- Tadevosyan, S.V. (1991) Verin paleoliti drsevorunnery Hayastanum (Distributions of the Upper Paleolithic in Armenia), In: Tiratsyan, G.A. (ed.), *Hayastani Hanrapetutyunum 1989-1990 tt. dashtayin hnagitakan ashkhatankneri ardyunknerin nvirvats gitakan nstashrjan, mayis 1991 t., Zekutsumneri tezisner* (Abstracts

- of Reports of the Conference devoted to the Archaeological Fieldwork Results in 1989-1990 in the Republic of Armenia, may 1991). Yerevan: Republic of Armenia Academy of Sciences Press, Yerevan, pp. 7–8 (in Armenian).
- Tadevosyan, S.V. (1998) Verin paleoliti teghy Hayastani kari dari parberatsman hamakargum (Place of the Upper Paleolithic in the Stone Age Periodization System of Armenia). In: Kalantaryan, A.A. and Harutyunyan, S.B. (eds.), *Hin Hayastani mshakuyty XI, Hanrapetakan gitakan nstashrjan nvirvats prof. K. Ghafadaryani hishatakin, Zekutsumneri himnadruytner* (Culture of Ancient Armenia, XI, Abstracts of Reports of the Republican Conference dedicated to the memory of prof. K. Ghafadaryan). Yerevan: Institute of Archaeology and Ethnography Press, pp. 24–25 (in Armenian).
- Tadevosyan, S.V. (2008) Tekhnologicheskie sposobi vtorichnoy obrabotki verxnepaleoliticheskix orudiy peshcheri Yerevan-1 (Technology of the secondary processing of the Upper Paleolithic tools from the Yerevan-1 cave). In: Avetisyan, P.S., Kalantaryan, A.A. and Badalyan, R.S. (eds.), *Hin Hayastani mshakuyty XIV, Nyuter Hanrapetakan gitakan nstashrjani nvirvats akademikos B.B. Piotrovsku ev H.M. Janpoladyani hishatakin* (Culture of Ancient Armenia, XIV, Materials of the Republican Conference dedicated to the memory of academician B.B. Piotrovskiy and H.M. Janpoladyan). Yerevan: National Academy of Sciences of the Republic of Armenia “Gitutyun” Publishing House, pp. 11–16 (in Russian).
- Yeritsyan, B.G. (1970a) Karedaryan kayanner Noyemberyani shrjanum (Stone Age sites in Noyemberyan district). *Lraber Hasarakakan Gitutyunneri* (Herald of Social Sciences) 5 (234), pp. 84–90 (in Armenian).
- Yeritsyan, B.G. (1970b) *Yerevanskaya peshchernaya stoyanka i ee mesto sredi dreneyshix pamyatnikov Kavkaza* (Yerevan cave site and its place among the ancient monuments of the Caucasus). Avtoreferat dissertatsii na soiskanie uchenoy stepeni kandidata istoricheskix nauk (Synopsis of Candidate Dissertation). Moscow (in Russian).
- Yeritsyan, B.G. and Tadevosyan, S.V. (1986) Paleoliticheskaya peshchernaya stoyanka Lusakert 1 (Paleolithic cave site Lusakert 1). In: Shilov, V.P. (ed.), *Arkheologicheskiye otkritiya 1984 goda* (Archaeological Discoveries of the year 1984). Moscow: “Nauka” Publishing House, p. 432 (in Russian).
- Yeritsyan, B.G., Tadevosyan, S.V. and Gasparyan, B.Z. (1996) Kul’turniye osobennosti materialov mestonakhzhdeniya kamennogo veka Jraber (Cultural features of the materials of the Stone Age Site of Jraber). *Banber Yerevani Hamalsarani, Hasarakakan gitutyunner* (Bulletin of the Yerevan University, Social Sciences) 3 (90), pp. 125–131 (in Russian).
- Yeritsyan, B.G., Tadevosyan, S.V. and Gasparyan, B.Z. (1998) Rezul’tati issledovaniya mestonakhzhdeniya kamennogo veka Nurnus (The results of investigation of the Stone Age Site of Nurnus). *Lraber Hasarakakan Gitutyunneri* (Herald of Social Sciences) 1 (597), pp. 164–169 (in Russian).



1



2

Figure 1
Aghitu-3 cave. 1: View of the Aghitu basalt massif looking west into the valley of the Vorotan River and showing the Zangezur mountain range in the background; 2: View looking west into the cave.

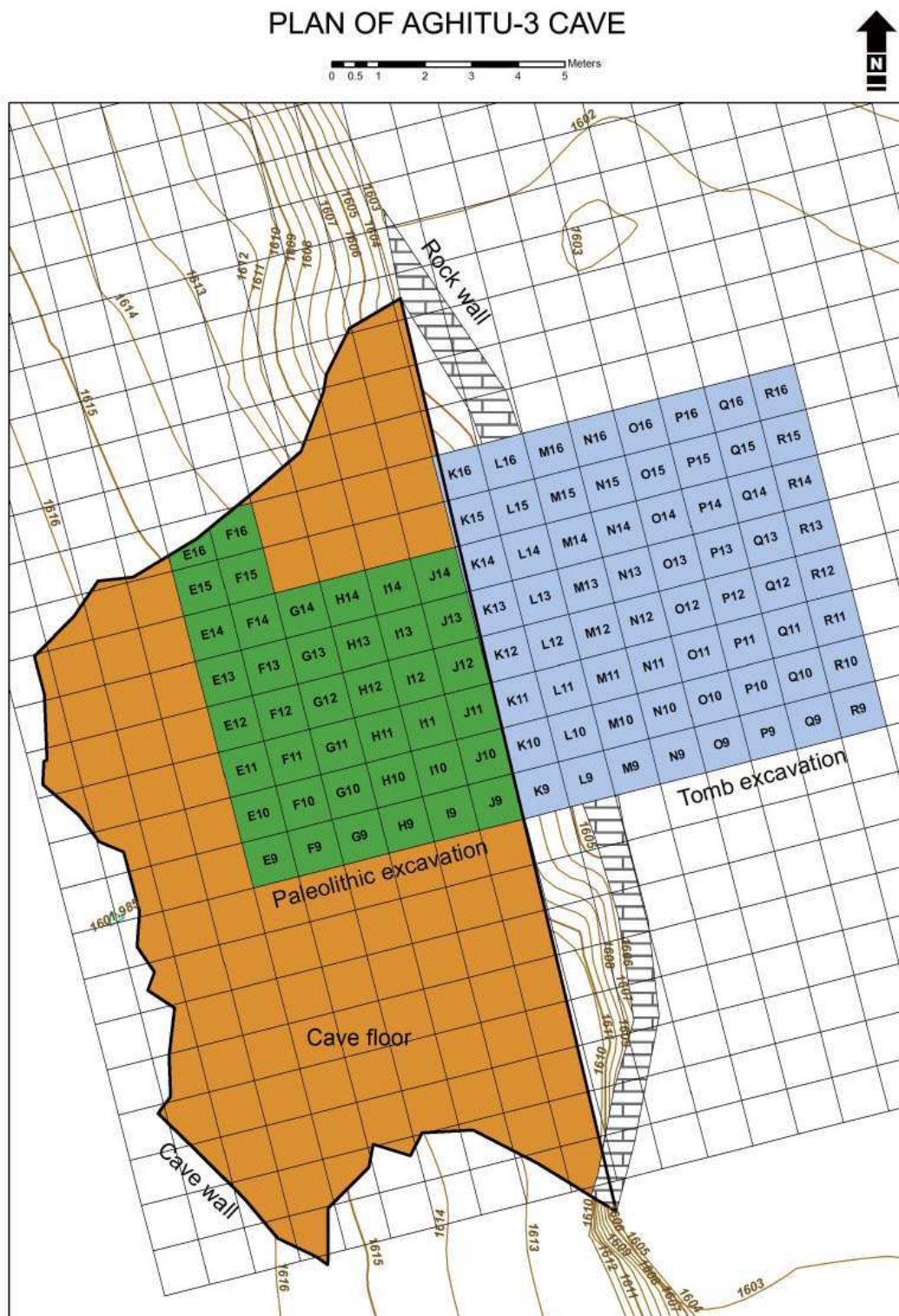
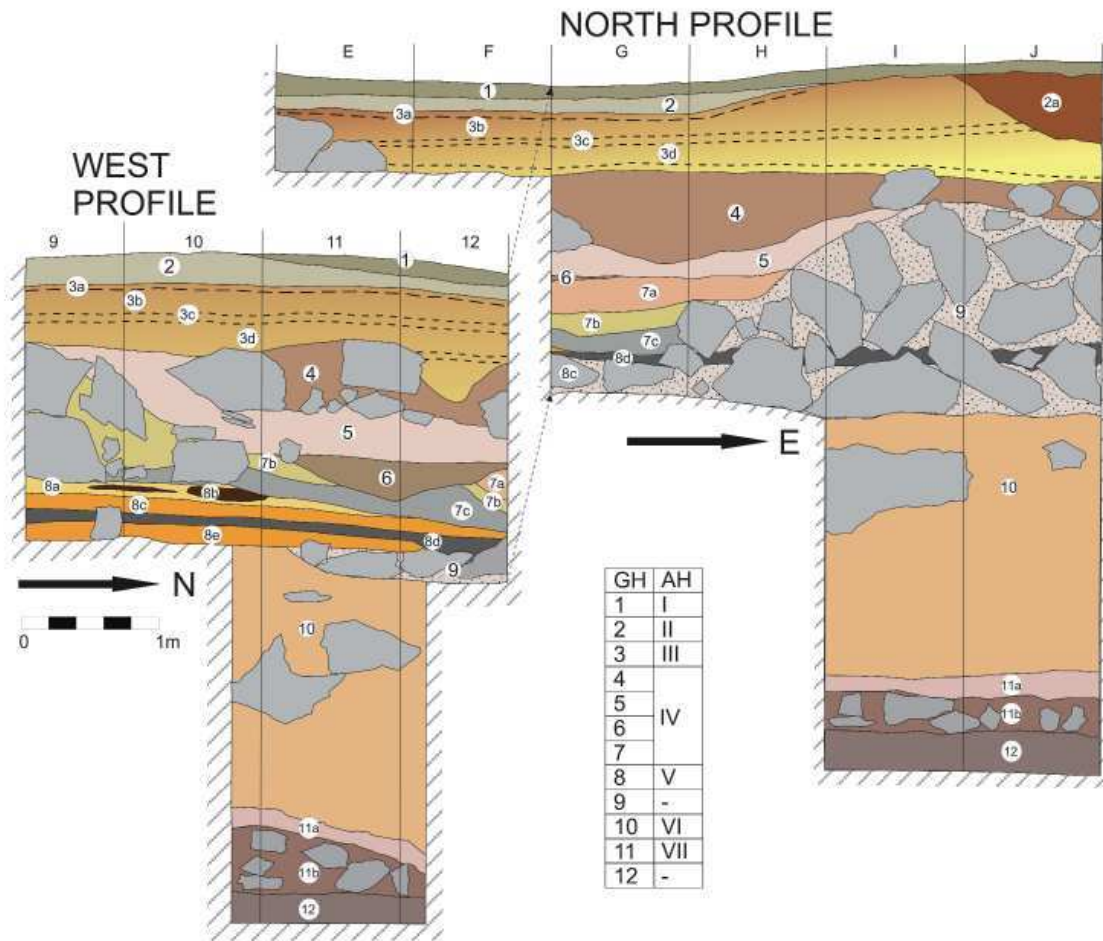


Figure 2
 Aghitu-3 cave. Plan of the cave showing the areas of Paleolithic (green) and tomb (blue) excavations.



1. 10YR 4/2 Dark grayish brown sandy humus with some angular debris (modern human activity)
2. 10YR 5/2 Grayish brown humus with silt, angular debris and sand (colluvial and eolian formation)
- 2a. 10YR 4/2 Dark grayish brown humic silt with angular debris (mix by human activity)
- 3a, 3c, 3e. 10YR 6/4 Light yellowish brown angular debris with silt, includes fine carbonate sand (colluvial and eolian formation)
- 3b, 3d. 10YR 6/4 Light yellowish brown angular debris with silt, angular cobbles and fine sand (colluvial and eolian formation)
4. 10YR 6/4 Light yellowish brown angular debris with eolian silt and angular boulders (colluvial and eolian formation)
5. 10YR 6/4 Light yellowish brown eolian silt with angular debris and fine sand, some boulders (colluvial and eolian formation)
6. 10YR 6/4 Light yellowish brown fine sand including angular debris, facies changes every 1-2 cm (fluvial and colluvial formation)
- 7a, 7c. 2.5YR 5/3 Light olive brown silt including angular debris and angular boulders (colluvial and eolian formation)
- 7b. 2.5YR 5/3 Light olive brown angular debris including silt and angular boulders (colluvial and eolian formation)
- 8a. 2.5YR 5/3 Light olive brown fine sand, small sized pebbles of basalt and pumice (fluvial formation)
- 8b. 10YR 2/2 Very dark brown fine sand, small sized pebbles of basalt and pumice including charcoal (fluvial formation)
- 8c. 2.5YR 4/4 Olive brown loam (fluvial formation)
- 8d. 2.5YR 3/1 Very dark gray fine sand, small sized pebbles of basalt and pumice (fluvial formation)
- 8e. 2.5YR 4/4 Olive brown loam and fine sand, facies changes every 1-2 cm (fluvial formation)
9. Rockfall - Angular boulders including silt and angular debris (rock fall, cliff debris and eolian formation)
10. 2.5YR 4/4 Olive brown loam including some sub-angular debris and angular boulders, lens of peat and charcoal (fluvial formation)
- 11a, 11b. 2.5YR 4/4 Olive brown loam and angular debris, including some angular and sub-angular medium-size boulders (rock fall, cliff debris and eolian formation)
12. 10YR 4/4 Dark yellowish brown angular and sub-angular boulders including loam and lens of sand (colluvial, fluvial and eluvial formation)

Figure 3
 Aghitu-3 cave. Profile drawings of the north and west walls of the Paleolithic excavation, including a general soil description of each layer and a chart correlating the geological horizons (GH) with the archaeological horizons (AH).



1



2

Figure 4
Aghitu-3 cave. 1: Remains of a clay oven-tonir located in square G14 whose base was originally dug about 30 cm into GH 3; 2: View looking southwest into the Parthian era (1st century BC) tomb constructed of basalt blocks and containing seven individuals.



1



2

Figure 5
Aghitu-3 cave. 1: Upper portion of the west profile wall depicting GH 1-10; 2: Lower portion of the west profile wall showing GH 10-12.

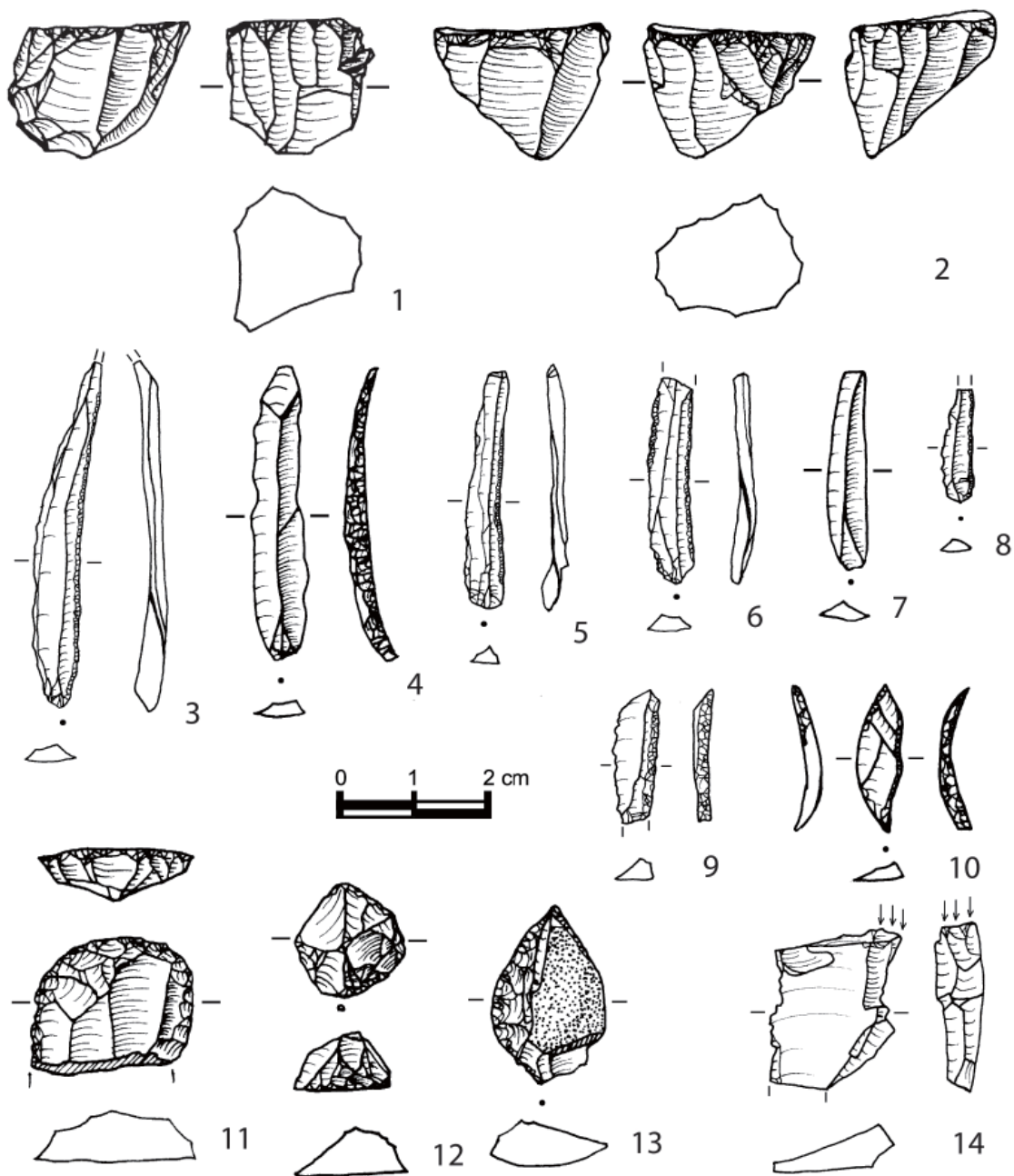


Figure 6
 Aghitu-3 cave. Obsidian (1-6, 8-9, 12-14) and chert (7, 11) artifacts from GH 3. 1-2: Single platform cores; 3, 5-6, 8: Retouched bladelets; 4, 9-10: Backed pieces; 11-13: Scrapers; 14: Burin.

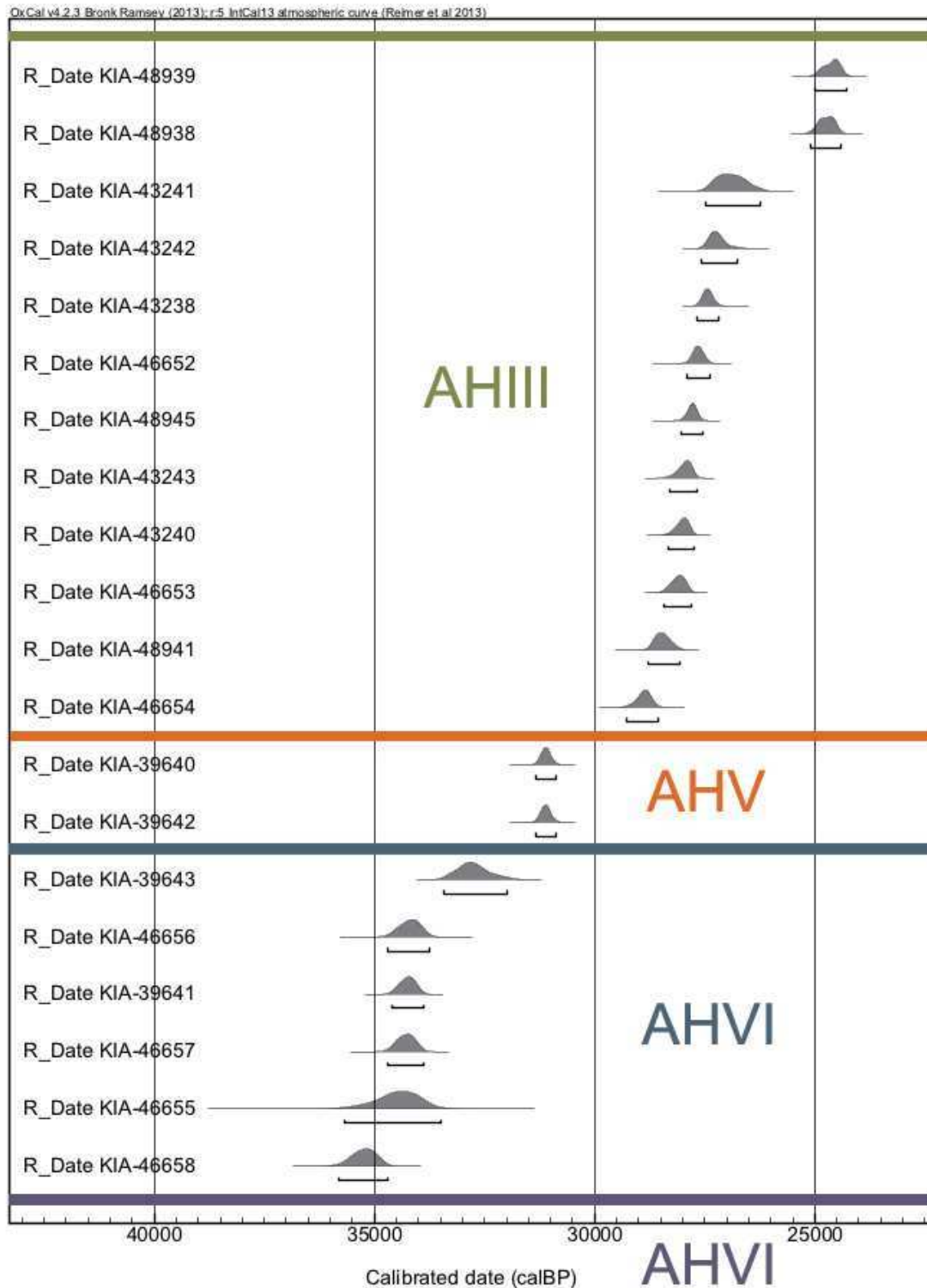


Figure 7

Aghitu-3 cave. Summary of radiocarbon dating results calibrated using OxCal v. 4.2.3 (Bronk Ramsey 2013) and IntCal 09 (Reimer *et al.* 2013).

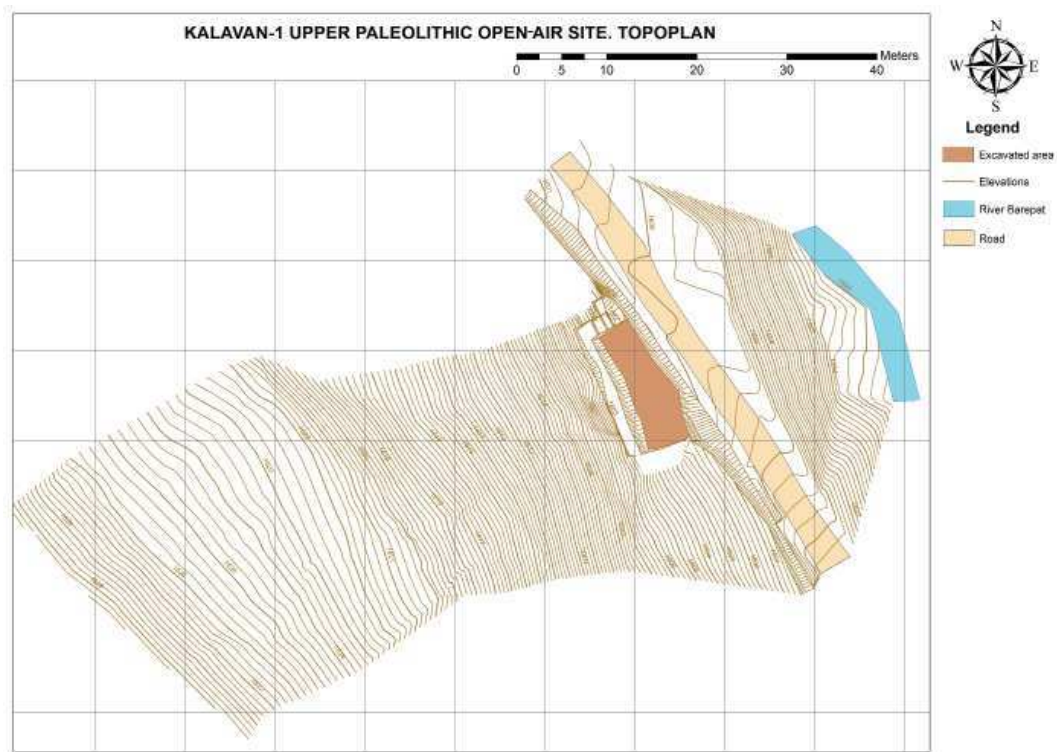


Figure 8
Kalavan-1 open-air site. Plan of site showing local topography, area of excavation and position of Barepat River.

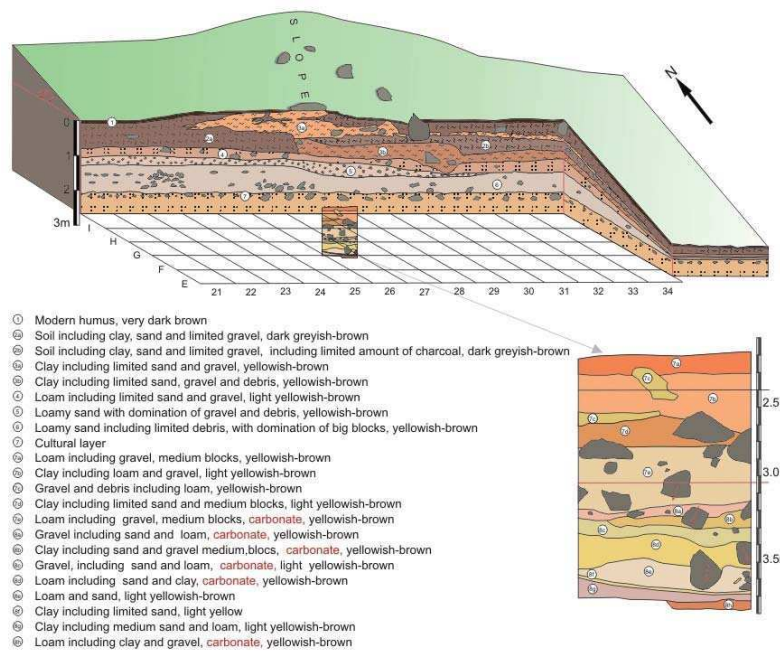


Figure 9
Kalavan-1 open-air site. 3D block diagram depicting profiles of the north and east walls of the excavation.



1



2

Figure 10
Kalavan-1 open-air site. 1: Squares GF 23-24, debris mound; 2: Concentration of lithic artifacts and faunal remains in Square F24.

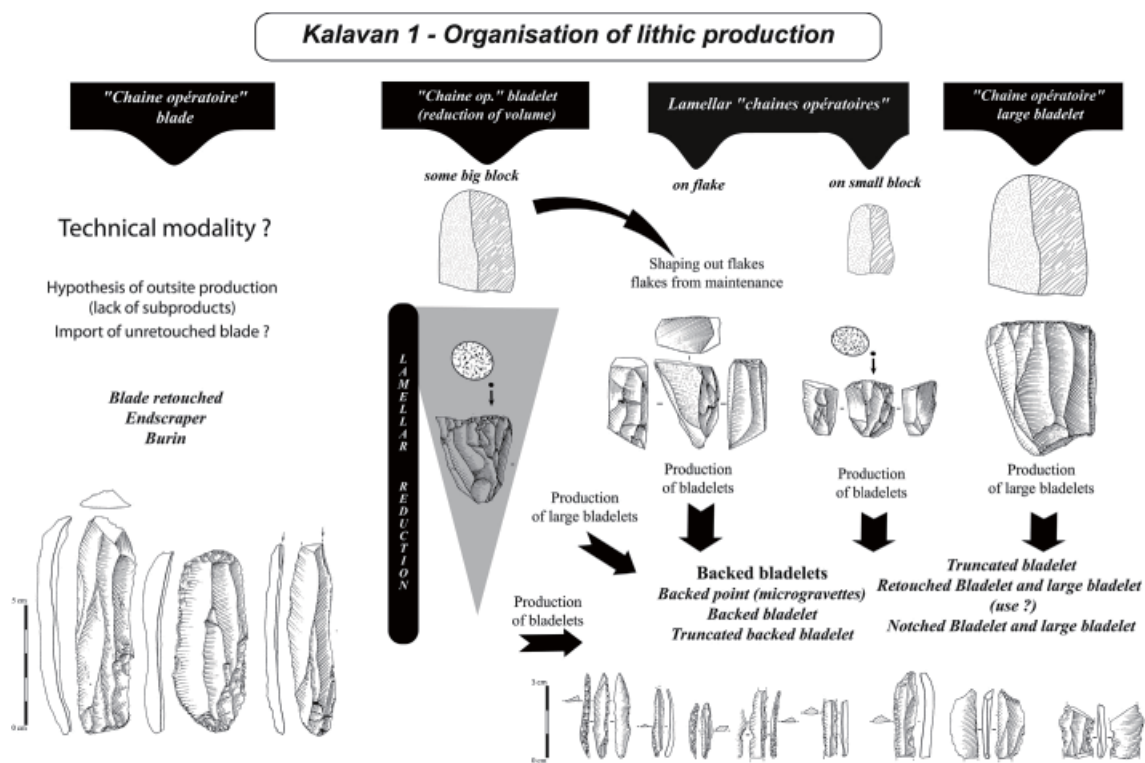


Figure 11
Kalavan-1 open-air site. Organization of lithic production.

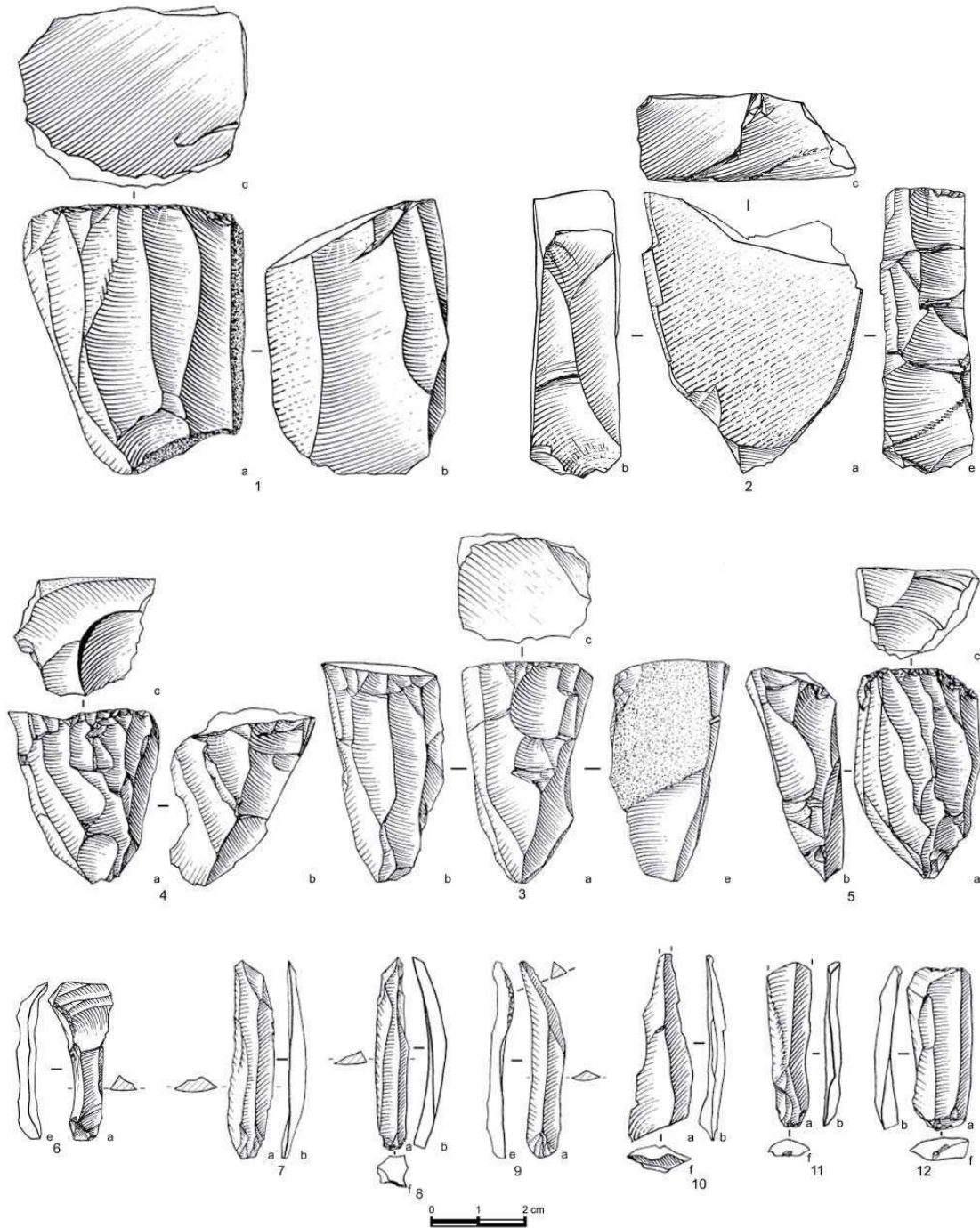


Figure 12
Kalavan-1 open-air site. 1-5: Single and double platform cores; 6-12: Bladelets.

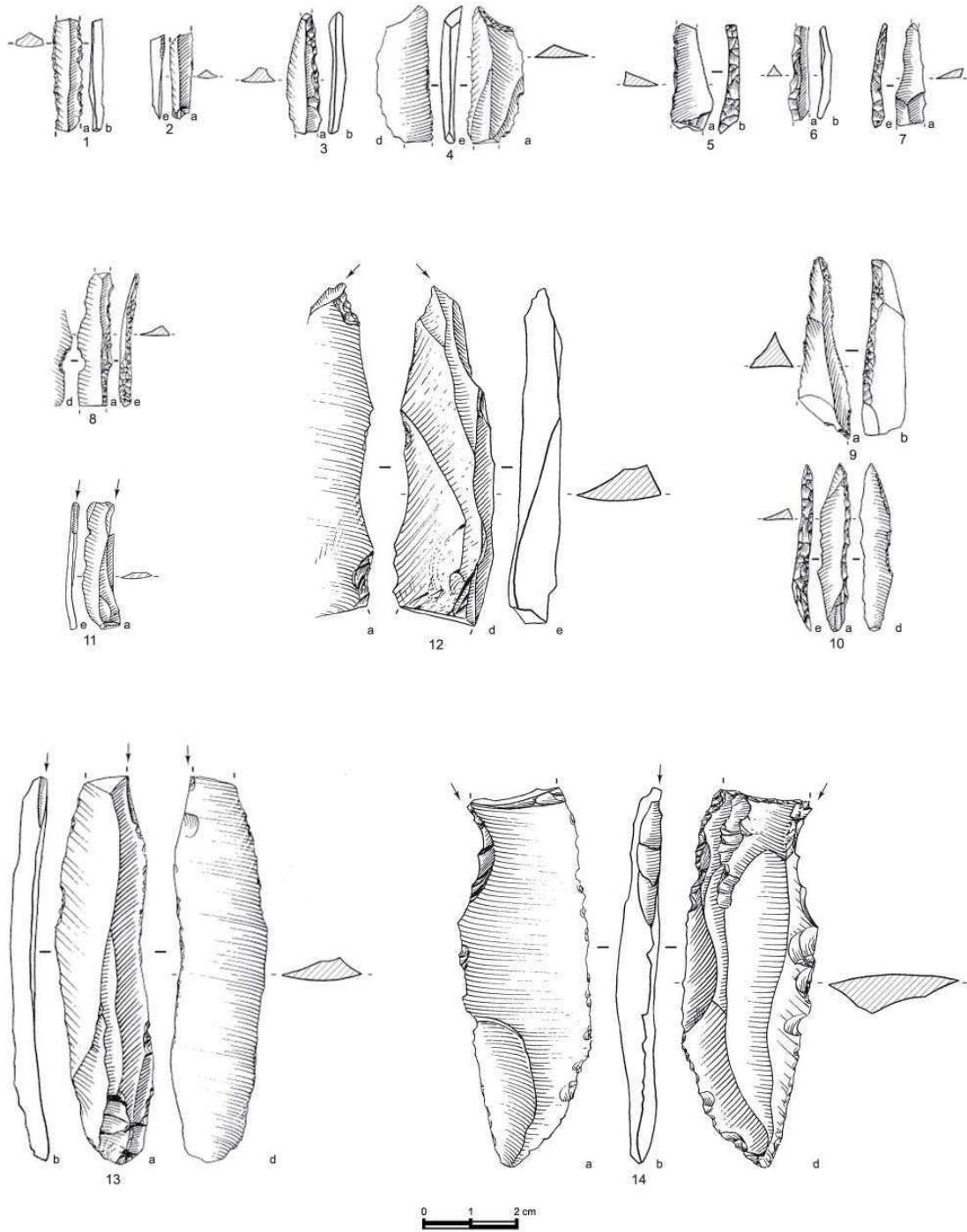


Figure 13
Kalavan-1 open-air site. 1-4: Retouched blades and bladelets; 5-10: Backed bladelet points (“microgravettes”); 11-14: Burins.

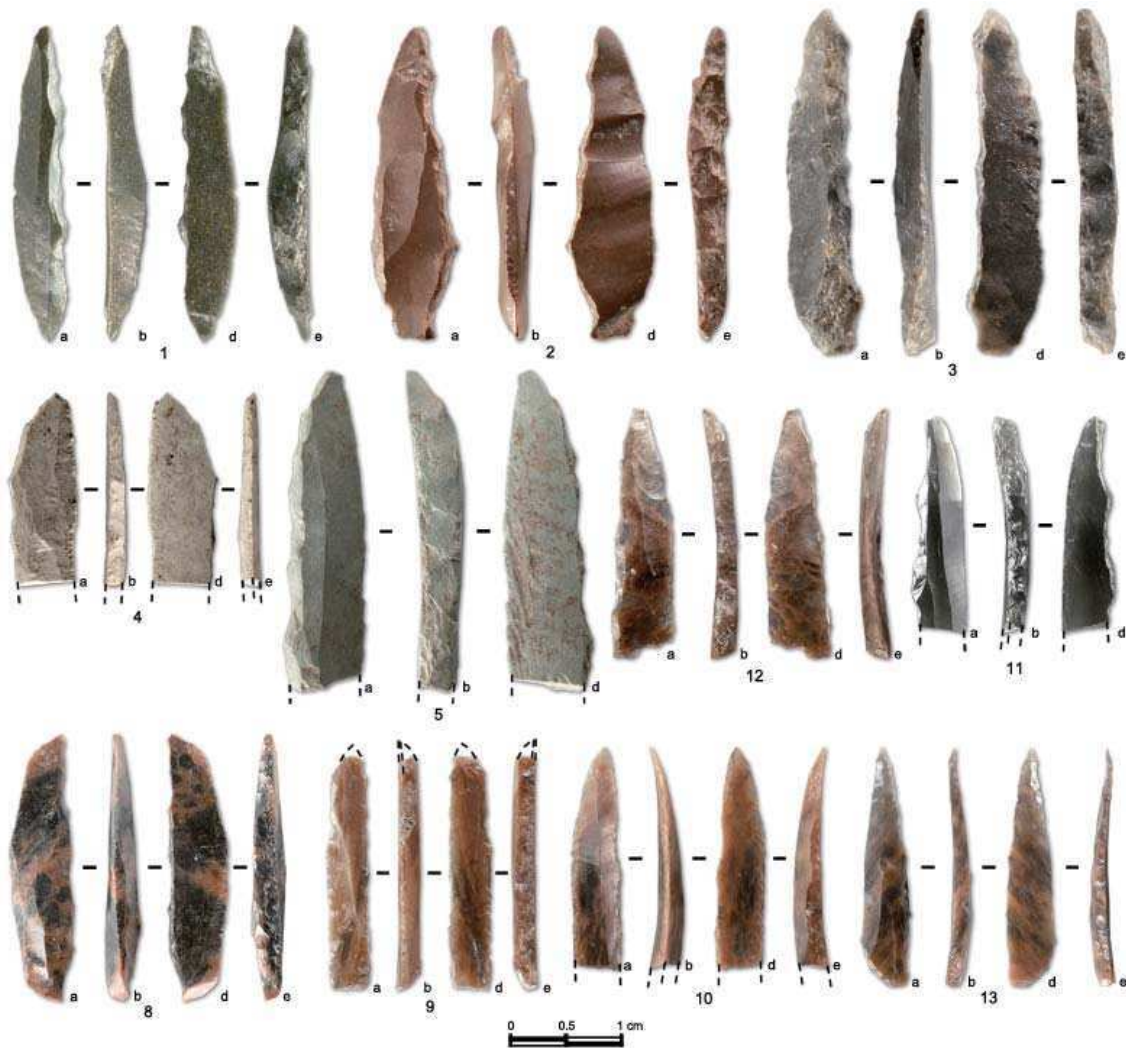


Figure 14
Kalavan-1 open-air site. 1-13: Backed bladelet points (“microgravettes”) made from flint, limestone and obsidian for hunting weaponry.

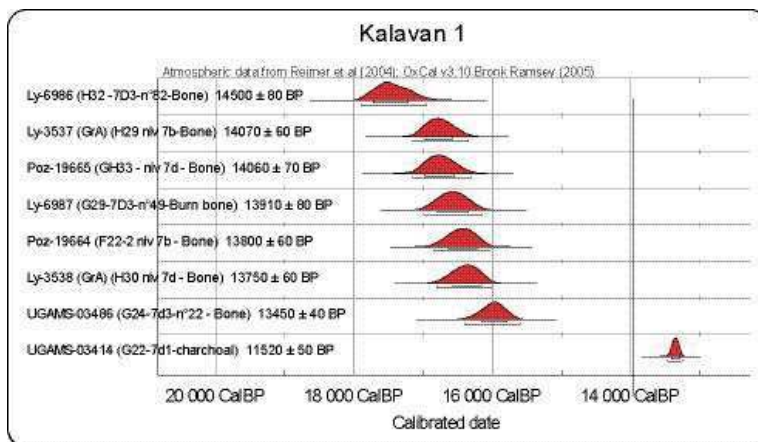


Figure 15
Kalavan-1 open-air site. Summary of radiocarbon dating results calibrated using OxCal v.3.10 (Bronk Ramsey 2005) and IntCal 09 (Reimer *et al.* 2004).