

# Palaeolithic Research in the Armenian Highlands and Anatolia

Workshop  
October 20, 2015  
Middle East Technical University

## Participants:

Amelié Vialet (National Museum of Natural History, FR)

Kadriye Özçelik (Ankara University, TR)

Berkay Dinçer (Istanbul University, TR)

Darryl Maddy (Newcastle University, UK)

Harun Taşkıran (Ankara University, TR)

Ismail Baykara (Yüzüncü Yıl University, TR)

Boris Gasparyan (Institute of Archaeology and Ethnography, National Academy of Sciences, RA)

Samvel Nahapetyan (Yerevan State University, RA)

Dimitri Arakelyan (Institute of Geological Sciences, National Academy of Sciences, RA)

Dan Adler (University of Connecticut, USA)

Keith Wilkinson (Winchester University, UK)

Phil Glauberman (Middle East Technical University, TR)

Charles Egeland (University of North Carolina - Greensboro, USA)

Radu Ioviță (Archaeological Research Centre and Museum for Human Behavioral Evolution, Monrepos, DE)



# Workshop Information

## Arrival: Airport Transfer

If you are arriving by plane, a car and driver will meet you at the airport, near Exit H at International Arrivals (Dış Hatlar). The driver will have a sign with your name.

## METU Campus Entry

There is gate security at METU.

The gate security will be aware of the workshop and the names of all participants. They can also provide directions to the on-campus accommodation if necessary.

Guests will have to inform gate security that they are attending the workshop, and may also need to show a photo identification document.

## Accommodation

### **Aysel Sabuncu Yaşam Merkezi, Middle East Technical University, Ankara**

METU Gate security and most people on campus will be able to provide directions.

The address above is sufficient for visa applications.

The building is not centrally located (see map). However, taxis are the most efficient way to travel to the center of campus. The front desk at the guest house will call a taxi for you whenever necessary.

The accommodation provides breakfast.

Wifi will be available.

## Workshop Location

**Central Engineering Faculty Building (Merkez Mühendislik Binası)** or known on campus as the, “MM building” (see map). Anyone on campus should be able to provide directions. It is the tallest building on campus, and is visible.

The workshop will be held in room 411, on the fourth floor. It is across from the Graduate School of Social Sciences offices.

## **Food and Drink**

A variety of restaurants and cafes are situated on campus at the **Çarşı** or “market area” (see map). Here you can also find ATM machines, a pharmacy “Eczane”, and other shops.

In the **Cultural and Convention Center (Kültür ve Kongre Merkezi)**, you can find the “Uptown” restaurant that serves American-Turkish style pub food (see map). They do not serve alcohol, but you can bring your own and they will serve it.

The sale of alcohol is prohibited on all university campuses in Turkey. However, one can bring alcohol on campus and drinking in outdoor park areas, in your rooms or at the guesthouse is allowed.

If you would like to buy alcoholic beverages, the most convenient location is just off campus, through the A – 4 Gate (see map). It would be best to take a taxi, unless you are walking from central campus (called the “Alley”). There is a liquor store “Naz Gıda” and bar “Beer All” on the main road from the gate.

## **Nearby Off-Campus Food**

“Arjantin Kebap” in the Yüzüncü Yıl neighborhood is a good place for Turkish meat and vegetarian dishes. Taxi drivers will know it.

There are a few places to eat on the same street near the “Naz Gıda” and “Beer All” mentioned above, most of these serve vegetarian options.

The Yüzüncü Yıl Pazarı (Yüzüncü Yıl Market) area has restaurants including “Aybalık” fish restaurant, and the nearby “Brewer’s Pub”.

## **Transportation**

**At 9:30 on the morning of the workshop, taxis will be arranged to transport all participants staying at the guest house to the workshop location.**

If you would like to go anywhere on campus, or go off campus into town, you can ask the guest house staff to call a taxi and inform the taxi driver where you would like to go. Turkish colleagues will be staying at the accommodation, and they may be able to help with language difficulties should they arise.

Taxis in and around campus will likely cost around 7 - 10 TL.

(ODTÜ) VIP Taxi:

+90 (0) 312 219 51 51

The cost of a taxi from campus to Kızılay (downtown) is roughly 30 TL. To the Tunalı Caddesi area it will be a bit more. To Kale and the Ankara Citadel (Ankara Kalesi), it will be around 40 TL.

To return from anywhere in town, either tell or show the taxi driver the name of the guest house:

### **ODTÜ Aysel Sabuncu Yaşam Merkezi**

#### **Workshop Lunch**

A catered lunch will be served just outside the workshop venue.

#### **Workshop Dinner**

The workshop dinner will be at **Gar Lokantası** in the **Gaziosmanpaşa** neighborhood (Filistin Street No: 35).

A bus will transport participants from the Engineering Building to the restaurant at **6:45**. The bus will return to METU from the restaurant at **22:30**. If participants want to stay late, or venture into town, they will have to take taxis back to METU.

#### **Departure: Airport Transfer**

Those departing by plane will be picked up by a car and driver at the Aysel Sabuncu Yaşam Merkezi guesthouse.

#### **Contact**

Phil Glauberman

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# Palaeolithic Research in the Armenian Highlands and Anatolia

## Workshop Program

**9:30 Taxis leave from Aysel Sabuncu Yaşam Merkezi Guesthouse**

**9:45** Welcome Coffee and Tea

**10:20** Introduction: Phil Glauberman

## Anatolia

**10:40** Amelié Vialet and Cihat Alçıçek (National Museum of Natural History, FR; Pamukkale University, TR)

“The Kocabaş Hominin Fossil (Denizli Basin, Southwest Anatolia) as Evidence of One of the Waves of Hominin Expansion from Africa Towards Eurasia Between 1.6 and 1.2 Ma.”

**11:00** Kadriye Özçelik (Ankara University, TR)

“The First Palaeolithic Stone Tools Documented in the Denizli Region (Southwest Anatolia)”

**11:20** Darryl Maddy et al. (Newcastle University, UK)

“River Terraces: A Context for Early Hominin Occupation and Dispersals in Anatolia?”

**11:40** Coffee/Tea

**12:00** Berkay Dinçer (Istanbul University, TR)

“The Lower Palaeolithic in Anatolia and Eastern Thrace and their Role in the Earliest Hominin Dispersals”

**12:20** Harun Taşkıran (Ankara University, TR)

“The Importance of Northeastern Anatolia in the Distribution of Acheulean Culture to the Caucasus”

**12:40** Ismail Baykara (Yüzüncü Yıl University, TR)

“Gürgürbaba Tepesi: Middle Palaeolithic Assemblages from Van, Eastern Anatolia”

**13:00** Discussion

**13:20 – 14:20** Lunch

## **Armenian Highlands**

**14:20** Boris Gasparyan (Institute of Archaeology and Ethnography, National Academy of Sciences, RA)  
"Recent Study of the Palaeolithic in the Armenian Highlands"

**14:40** Samvel Nahapetyan (Yerevan State University, RA)  
"Pleistocene Geomorphology and Geological Contexts of Palaeolithic Archaeology in the Armenian Highlands"

**15:00** Dan Adler (University of Connecticut, USA)  
"Early Levallois Technology and the Transition from the Lower to Middle Palaeolithic in the Southern Caucasus"

**15:20** Charles Egeland et al. (University of North Carolina - Greensboro, USA)  
"Documenting the Open-Air Component of Middle Palaeolithic Lifeways in the Northern Armenian Highlands"

**15:40** Coffee/Tea

**16:00** Keith Wilkinson et al. (Winchester University, UK)  
"The Geomorphology and Geoarchaeology of the Barozh 12 and 13 Middle Palaeolithic Sites, Western Armenian Highlands"

**16:20** Phil Glauberman et al. (Middle East Technical University, TR)  
"First Excavation Results from Barozh 12: Middle Palaeolithic Technology, Land Use, and Regional Implications"

**16:40** Dmitri Arakelyan (Institute of Geological Sciences, National Academy of Sciences, RA)  
"A GIS Based Model of the Possible Routes of Mobility among Raw-Material Sources Exploited by Palaeolithic Populations in the Armenian Highlands"

**17:00** Radu Ioviță (Archaeological Research Centre and Museum for Human Behavioral Evolution, Monrepos, DE)  
"Were Levallois Points Projectiles? Experimental and Microscopic Methods for Identifying Impact Traces on Obsidian Tools"

**17:30** Discussion

**16:45** Bus Leaves from the Engineering Building to the restaurant  
(Gar Lokantası, Gaziosmanpaşa)

**19:30** Workshop Dinner

# Palaeolithic Research in the Armenian Highlands and Anatolia

## Abstracts

### **The Kocabaş Hominin Fossil (Denizli Basin, Southwest Anatolia) as Evidence of One of the Waves of Hominin Expansion from Africa Towards Eurasia Between 1.6 and 1.2 Ma.**

Amélie Vialet<sup>1</sup> and M. Cihat Alçiçek<sup>2</sup>

<sup>1</sup>National Museum of Natural History, Paris, France ([vialet@mnhn.fr](mailto:vialet@mnhn.fr))

<sup>2</sup>Pammukale University, Denizli, Turkey

Anatolia is a key region to follow the modalities of hominin dispersals within Eurasia from Africa. However, few hominin fossils are known in the region except for the fragmentary skull discovered during travertine block cutting at Kocabaş in southwest Anatolia (Denizli Basin). Firstly, this fossil was reconstructed using CT and 3D imaging techniques. Then, a 3D morphological, metric and morphometric study of the reconstructed specimen was carried out. Based results of these analyses, it appears distinct from a gracile group of *Homo habilis-rudolfensis-georgicus* (2.4 – 1.78 Ma), on the one hand, and from a more recent group of hominins, ascribed to *Homo heidelbergensis* (in the broad sense of the term) and to Neanderthals, on the other hand. Indeed, the Kocabaş fossil is more similar to the African forms over a million years old. Thanks to a multidisciplinary research program, the deposit from which the Kocabaş fossil was recovered (as well as the associated fauna) was dated to 1.2 – 1.6 Ma by <sup>26</sup>Al/<sup>10</sup>Be cosmogenic nuclides, paleomagnetism, and faunal bio-chronology.

The Kocabaş fossil, dated between 1.2 and 1.6 Ma, presents marked affinities with the early African hominins, and provides evidence for a possible expansion into Eurasia. This expansion is different from that represented by the Dmanisi fossils, which probably occurred between 1.85 – 1.78 Ma. Actually, the Kocabaş hominin can be placed somewhere between the Dmanisi population and the biface-making groups known from archaeological evidence in central Anatolia at c. 1 Ma, particularly at the open-air site of Kaletepe Deresi 3.

Today, field research is ongoing. Our team conducts systematic surveys each year in the Denizli Basin, directed by Kadriye Özçelik, to locate in situ prehistoric levels and to find out more about the way of life of *Homo erectus* in Anatolia.

## **The First Palaeolithic Stone Tools Documented in the Denizli Region (Southwest Anatolia)**

Kadriye Özçelik

Ankara University, Ankara, Turkey ([kadriye.ozcelik@ankara.edu.tr](mailto:kadriye.ozcelik@ankara.edu.tr))

In 2002, the fossil remains of *Homo erectus* known as “Denizli Kocabaş Man” were discovered in travertine deposits in the Denizli Basin, Southwest Anatolia. They have recently been dated by a variety of chronometric methods to 1.2 – 1.6 million years ago. Here, we present results of the first Palaeolithic archaeological surveys in the Denizli – Kocabaş region, conducted in 2014. These surveys yielded abundant chipped stone artifacts attributable to the Lower Palaeolithic including pebble tools and bifaces. The survey collections therefore contain the oldest artifacts so far recovered in the region, and represent the first documented archaeological evidence of hominin occupation of Denizli Province. It could be suggested that the Lower Palaeolithic artifacts were manufactured and used by *Homo erectus*. Additionally, the survey collections also contain Middle Palaeolithic artifacts, which further extends the expected time range of hominin occupation of the Denizli region.

## River Terraces: A Context for Early Hominin Occupation and Dispersal in Anatolia?

Darrel Maddy<sup>1</sup>, Tuncer Demir<sup>2</sup>, A. Tom Veldkamp<sup>3</sup>, Danielle Schreve<sup>4</sup>, Robert Scaife<sup>5</sup>, Jeroen Schoorl<sup>6</sup>, Serdar Aytaç<sup>7</sup>, Phil Glauberman<sup>8</sup>

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It is not surprising that Palaeolithic archaeologists have been attracted to rich fossil and artefact-bearing locations where research effort can be maximized based upon substantive physical evidence. Often however, these types of finds occur in natural repositories such as caves or where remains are trapped in travertines or tufas. Unfortunately, although these repositories generally have well-constrained internal stratigraphy they remain isolated from the wider geological context, limiting their correlation with the broader regional stratigraphical record where often more extensive palaeoenvironmental data exists which could potentially provide better context for the archaeology.

In northwest Europe artefact-bearing river sediments have been widely-used to constrain and provide context for the Palaeolithic record. In areas of surface uplift, these former floodplains lie beneath river terraces which form a staircase flanking modern valleys, with progressively older features at higher altitudes above the current floodplains. The key challenge in utilizing this fluvial archive was to understand the stratigraphy of the river terrace sequence and establish a geochronology for each successive level. Fortunately, fluvial archives often contain materials suitable for a wide-range of age estimation procedures. Critical to the success of these studies is the fortuitous continuity of large-scale river terraces across whole catchments, allowing for unequivocal linkage of isolated artefact finds over tens to hundreds of kilometers.

Over the past 15 years we have started to apply the methodologies established in these earlier studies to river systems critical to the understanding of early hominin dispersal. Although our efforts have focused on establishing stratigraphy, palaeoenvironmental change records and geochronology, ultimately these frameworks can be utilized as a context for the artefacts and fossils they contain. Here we will discuss the Early Pleistocene fluvial archive of the Gediz River in Western Turkey and then describe our current pilot study on the Kura River in NE Turkey. Our aim is to demonstrate the potential of river terraces sequences to enhance our knowledge of the early Palaeolithic record in Turkey by providing a secure stratigraphical framework for artefact finds.

## **The Lower Palaeolithic in Anatolia and Eastern Thrace and their Role in the Earliest Hominin Dispersals**

Berkay Dinçer

Istanbul University, Istanbul, Turkey ([berkaydincer@gmail.com](mailto:berkaydincer@gmail.com))

Modern Turkey (Anatolia and Eastern Thrace) covers an enormous landmass at the conjunction of three continents; Africa, Asia and Europe. For this reason many archaeologists accept the region as a "land-bridge" or an obligatory route for dispersing early hominins out-of-Africa. However, the Palaeolithic research in the country is still in its initial stage and proposed hypothesis about their role in the earliest hominin dispersals remains preliminary.

One difficulty hindering the study of the role of this area in the dispersals of early hominins is its large size and another is the complexity of the geographical and topographical features of the landscape. These prevent reaching general conclusions about the whole country. Anatolia and Thrace include seven distinct geographical regions separated both by their topographical features and biogeographical characteristics. For these reasons it is almost impossible to reach firm conclusions about the role Anatolia probably played in early hominin dispersals, given that the Palaeolithic research still does not cover all regions.

This presentation will focus on the "route" hypothesis and presents available data from excavated Lower Palaeolithic sites such as Dursunlu, Kaletepe Deresi 3, Yarımburgaz, and recent surveys in Central and Northwestern Anatolia.

## **The Importance of Northeastern Anatolia in the Distribution of Acheulian Culture to the Caucasus**

Harun Taşkıran

Ankara University, Ankara, Turkey ([haruntaskiran@gmail.com](mailto:haruntaskiran@gmail.com))

Northeastern Anatolia is one of the least researched regions of Turkey in terms of the Palaeolithic time period. Except for research conducted on the ruins of medieval Ani city, the first Palaeolithic research in the region was carried out in the 1940's, when some chipped stone tools were recovered in surveys conducted by Prof. Dr. I. Kılıç Kökten. Especially, bifaces produced on basalt provide evidence of the existence of Acheulian technology in the region. However, a large majority of these artifacts are surface finds, and Lower Palaeolithic artifacts have almost never been recovered from stratified archaeological contexts. In recent years, significant archaeological excavations and research on the Lower and Middle Palaeolithic have occurred in Georgia and Armenia which border northeastern Anatolia. These important discoveries in the Caucasus further demonstrate the potential importance of northeastern Anatolia. It is likely that the transition to Acheulian technology in the Caucasus was via northeastern Anatolia. Therefore, to be able to compare the Lower and Middle Palaeolithic of these two regions, systematic surveys and excavations should be conducted in northeastern Anatolia. Only in this way will it be possible to address problems and questions concerning the distribution of Palaeolithic cultures in this part of Eurasia.

## **Gürgürbaba Tepesi: Middle Palaeolithic Assemblages from Van, Eastern Anatolia**

Ismail Baykara

Yüzüncü Yıl University, Van, Turkey ([ibaykara@yyu.edu.tr](mailto:ibaykara@yyu.edu.tr))

The Middle Palaeolithic archaeological evidence from Gürgürbaba Tepesi has great potential to add to our understanding of the timing and geographic origins of Pleistocene hominin occupation in Eastern Anatolia. Discovered during survey in 2014, Gürgürbaba Tepesi (hill) is a Lower and Middle Palaeolithic site situated near Ulupamir village, north of Erciş in northern Van Province. The site is located at approximately 2200 m above sea level, on a terraced volcanic dome-shaped formation formed by Mt. Meydan volcanic activity. Geomorphological research suggests that the eastern and southern slopes of the hill consist of vertical rhyolite rocks, therefore it is possible that serious erosion was naturally prevented. The lavas of Gürgürbaba consist of grey-black rhyolite rocks, black-brown colored obsidian flows and grey colored perlite. Because the lava flows were formed irregularly, the stratigraphy is complex.

Ongoing analysis of the Middle Palaeolithic artifact assemblages indicates that flake production technology is characterized by a variety of hard-hammer Levallois techniques on obsidian cores. These include unidirectional, bidirectional, and centripetal Levallois reduction methods. Another frequently observed core reduction technique is a “unifacial-unidirectional” method, where removals occur on one flat flaking surface, but the cores lack platform or lateral edge preparation. For the most part these cores were exploited from one platform, so could have provided some of the flakes and blades with parallel scars. Large numbers of flakes were observed at the site. However, the majority of cores have scar patterns that indicate blade production at the final stages of reduction before discard. This suggests that such final blade products were transported off-site. Single scrapers dominate the observed tool assemblage.

## **Recent Study of the Palaeolithic in the Armenian Highlands**

Boris Gasparyan

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The area encompassing the modern Republic of Armenia lies within the Armenian Highlands and is situated at the very core of a dynamic corridor between Africa and Eurasia. As such, the region will prove critical for understanding the initial stages of human settlement and the formation of ancient civilizations in the Near East and beyond. Having rich environmental resources in the past, the Armenian Highlands attracted a variety of Stone Age populations, from early hominids to early complex societies of the Chalcolithic. While much of the Palaeolithic research during the Soviet period was based on a very limited number of well-excavated stratified sites, many “missing links” in our knowledge of the Palaeolithic in the Armenian Highlands still exist. During last decades a new wave of research is beginning to lay a robust theoretical, chronological, and paleoenvironmental foundation for understanding the region’s initial occupations. This is due largely to the establishment of international cooperation and long term joint missions with systematic projects.

In the frame of such collaborations the most significant findings have been made by studying the Lower Palaeolithic sites of the Hrazdan River Valley and the Hrazdan-Kotayk Plateau related to the discovery and study of the open-air site of Nor Geghi-1. This stratified and securely dated Late Middle Pleistocene site (>300 ka) in the Hrazdan River canyon is elucidating our understanding of the transition from the Late Acheulian to the Middle Palaeolithic, i.e. outlining the possible chronological boundary between the Lower and Middle Palaeolithic in the Armenian Highlands, which represents a local technological replacement of bifaces and handaxes by implements produced through the Levallois core reduction method.

The Middle Palaeolithic sites discovered or re-excavated during the last decade: Lusakert-1; Angeghakot-1; Hovk-1 cave sites; Kalavan-2; Barozh-12; Aghavnatun-1; Bagratashen-1 and Ptghavan-4 open-air sites have a wide geographic and functional distribution. Spanning an age range from marine isotope stage (MIS) 5 up to MIS 3, they vary in environmental setting, raw material source exploitation strategies and socio-economic behaviors, and permit us to reconstruct the life ways of Middle Palaeolithic hominins within the Armenian Highlands.

## **Pleistocene Geomorphology and Geological Contexts of Palaeolithic Archaeology in the Armenian Highlands**

Samvel Nahapetyan

Yerevan State University, Republic of Armenia ([nahapetyan@ysu.am](mailto:nahapetyan@ysu.am))

The study of the landscapes affecting hominin lifeways in the Armenian Highlands is strongly related with Quaternary tectonic movements and volcanism, as well as fluvio-glacial, eolian, cryogenic and slope formation processes. Each is a morphogenetic factoring the formation of ancient relief, and understanding them and their relationship with past hominin activities is essential to understanding the Palaeolithic record of the Armenian Highlands.

The development of the Quaternary relief in the Armenian Highlands is related mainly to the morphology of the volcanic, folded and fractured intermountain depressions. The morphodynamic changes of the Quaternary relief are related to neotectonic movements and volcanism during the Lower and Middle Pleistocene. Volcanism caused the paleovalleys to be filled with lava flows, while lavas and pyroclastic deposits also formed a low hilly landscape on the interfluvies. These processes changed the flows of the rivers and created tuff plateaus as well as dammed basins filled by lacustrine deposits. On the other hand the Upper Pleistocene is characterised by the formation of the glacial and periglacial relief. At the end of the Middle and during the whole Upper Pleistocene erosive processes created new or deepened the existing canyons which are ending at the intermountain depressions with alluvial cones.

We have employed geological and geomorphological mapping, the study of stratigraphic sections, absolute dating of the strata (K/Ar, Ar/Ar, U/Tr, OSL, paleomagnetism), as well as archaeological methods, to understand the relationship between the locations of the Palaeolithic sites and paleo-relief. Our results suggest that hominin activity in the modern relief of the Armenian Highlands is recorded at elevations of between 500 and 2300 m a.s.l., while open-air sites are mainly present in moderately or slightly fragmented sections of the relief, on slopes of around 10-15° of incidence. The investigations also show that the activities of Lower to Middle Palaeolithic populations are strongly related to the fluvial terraces (Nor-Geghi-1, Aghavnatun-1, Bagratashen-1, Kalavan-2), lacustrine depressions (Palaeolithic open-air sites of the Aparan Depression, Tashir and the Shirak Depression), volcanic plateaus (Palaeolithic open-air sites of the Aparan Depression, Arteni, Alapars, Jraber), in the niches formed in volcanic strata exposed in river canyons (Yerevan caves, Lusakert-1 and Angeghakot-1), karstic caves located on various elevations (Hovk-1 cave, Berd-1 cave), as well as in areas serving as raw-material sources, i.e. acid extrusive volcanic domes and areas of silicified rocks. The net result of paleolandscape processes and human activity is that in the Lower and Middle Palaeolithic stratigraphic record, interchanges of paleopedogenetic, colluvial, fluvial, eolian, volcanic-sedimentary origin layers are found.

## Early Levallois Technology and the Transition from the Lower to Middle Palaeolithic in the Southern Caucasus

Dan Adler

University of Connecticut, Storrs, CT, United States of America ([daniel.adler@uconn.edu](mailto:daniel.adler@uconn.edu))

The Late Middle Pleistocene (LMP) was a period of profound biological and behavioral change that witnessed the evolution of *Homo sapiens* in Africa and the Neanderthals in Eurasia, and the transition from the Early Stone Age/Lower Palaeolithic to the Middle Stone Age/Middle Palaeolithic. This latter change can be broadly characterized by the gradual replacement of large cutting tools and bifaces by points, flakes and blades produced through a variety of hierarchical core strategies, among which the Levallois method is most prominent. Within the Southern Caucasus, a pivotal geographic region between Africa and Eurasia, virtually nothing is known about the archaeological record of this period. Nor Geghi 1 (NG1) is a LMP open-air site located within the Hrazdan River valley north of Yerevan, Armenia. During 2008 and 2009, over 3,000 obsidian artifacts were recovered from a paleosol (Unit 2) that developed on the floodplain of the paleo-Hrazdan River. These artifacts document the variable behaviors of the site's occupants and chart the local transition from the late Lower Palaeolithic (Mode 2) to the early Middle Palaeolithic (Mode 3) (Adler et al. 2014). Ar40/Ar39 dating of underlying (Basalt 7, 440 ka) and overlying (Basalt 1, 200ka) lava flows, and sanidine grains from cryptotephra (Unit 1, 308 ka) suggest an age for the Unit 2 assemblage of 335–325 ka. These data indicate that NG1 is among the oldest Eurasian transitional industries with bifacial and Levallois technology recovered from a secure archaeological context, and the oldest stratified site in the Armenian Highlands. At NG1, the early synchronic use of bifacial and Levallois technology is consistent with the hypothesis that developments in the technological realm of LMP hominins resulted from deep-rooted evolutionary processes based on a common technological ancestry rather than the expansion of a particular species armed with Mode 3 technology.

### Reference

Adler, D.S., Wilkinson, K.N., Blockley, S., Mark, D., Pinhasi, R., Schmidt-Magee, B.A., Nahapetyan, S., Mallol, C. Berna, F., Glauberman, P. J., Raczynski-Henk, Y., Cullen, V., Frahm, E., Jöris, O., MacLeod, A., Smith, V. Gasparian, B. Early Levallois Technology and the Transition from the Lower to Middle Palaeolithic in the Southern Caucasus. *Science* 345 (6204), 1609–1613.

## Documenting the Open-Air Component of Middle Palaeolithic Lifeways in Northern Armenia

Charles P. Egeland<sup>1</sup>, Boris Gasparian<sup>2</sup>, Cynthia Fadem<sup>3</sup>, Samvel Nahapetyan<sup>4</sup>, Dmitri Arakelyan<sup>5</sup>, Christopher M. Nicholson<sup>6</sup>

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<sup>3</sup> Earlham College, Richmond IN, United States of America

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The Middle Palaeolithic (MP) endured for some 200,000 years and stretched from Europe to the Near East and into the western reaches of Asia. The diversity long known to exist within the MP, a good deal of which resides in the Armenian Highlands and Anatolia, has revealed that these societies were not only sophisticated and flexible but varied a good deal across both space and time. However, those interested in characterizing MP settlement in the Armenian Highlands in particular are equipped with only a handful of sites that (1) preserve stratified deposits; (2) have been excavated with modern archaeological techniques; and (3) are associated with reliable chronometric dates. Progress has been further hindered by a notable bias towards caves and rockshelters. Here we present preliminary data from Bagratashen 1, a stratified, open-air MP site within the Debed River valley of the northern Armenian Highlands. Site formation analysis indicates that while the assemblage was subjected to subaerial exposure and some degree of post-depositional alteration, it is neither severely biased nor substantially reworked. It appears as if all or most stages of flaking were conducted on-site, and hominins utilized a number of core reduction techniques. A majority of the raw materials were likely locally available, although a handful of exotic obsidian pieces exist in the assemblage. Notably, the sample of elongated, retouched points recovered from Bagratashen 1 recall artifacts from early MP contexts in Georgia and the Levant, though two OSL samples from the find horizon returned late Pleistocene ages of 30.5ka and 37.9ka BPOSL. As a rare example of an in situ, open-air occupation, we think Bagratashen 1 can help illuminate key components of the region's MP cultures.

## **The Geomorphology and Geoarchaeology of the Barozh 12 and 13 Middle Palaeolithic Sites, Western Armenian Highlands**

Keith Wilkinson<sup>1</sup> Phil Glauberman<sup>2</sup>, Boris Gasparyan<sup>3</sup>, Yannick Raczynski-Henk<sup>4</sup>, Hayk Haydosyan<sup>5</sup>, Dimitri Arakelyan<sup>6</sup>, Samvel Nahapetyan<sup>7</sup>, and Dan Adler<sup>8</sup>

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The Barozh 12 and 13 sites are located in the western Armenian Highlands, in the southern lea of the dual peaks of Pokr and Mets Arteni and 16km east of the Turkish border. The artefact assemblages from both sites lie within alluvial and aeolian deposits that in turn overlie strata of the 600ka Yerevan-Leninakan Ignimbrite Tuff. Although the precise chronology of the site is uncertain it is nevertheless the case that ongoing tectonic processes have fundamentally altered the topography of the locale since it was occupied by hominins in the Middle and/or Upper Pleistocene. The Ararat massif, on the eastern margin of which the site sits, is undergoing uplift leading to an ever-increasing elevation difference with the Ararat Depression to the immediate southwest. As a result drainage has changed, manifested locally by incision of the floodplain occupied by Middle Palaeolithic hominins at Barozh 12 thereby leaving the site 'high and dry'. Furthermore, subsequent post-depositional processes in part explain the extremely high artefact density (3686 artefacts/m<sup>3</sup> excavated sediment) that characterises the site. In other words, in an environment lacking significant vegetation, winnowing of the strata has resulted in a palimpsest formed from artefacts produced during multiple episodes of human activity. Nevertheless a stratified sequence does survive and therefore the potential exists for hominin behavioural changes to be unraveled.

## First Excavation Results from Barozh 12: Middle Palaeolithic Technology, Land Use, and Regional Implications

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Barozh 12 is a stratified Middle Palaeolithic (MP) site situated on an uplifted plateau just to the southeast of the Mt. Arteni volcanic complex. With its extremely high artifact density, this site provides exceptional opportunities for collecting data on MP technological organization, land use, and mobility in an area of the Armenian Highlands that has until recently seen limited investigation. In this presentation, we report results of ongoing analysis of obsidian artifacts from a northeastern locus of the site. The techno-typology of the lithic assemblages is consistent throughout the excavated sequence, and appears similar to that of MP sites in the region spanning an age range of c. 100 – 30 Kya. Core reduction technology is dominated by unidirectional-convergent and unidirectional Levallois production of points, flakes, and blades. In addition to transported primary source obsidians, locally procured river cobbles were also reduced on-site with similar techniques. The tool assemblage consists predominantly of retouched Levallois points, Mousterian points, convergent scrapers, and other scraper forms. We observe variability in artifact density and tool/flake ratios among excavated stratigraphic units. Raw material sourcing using portable X-Ray fluorescence (pXRF) indicates that while nearby (1 – 2 km) outcrops of Pokr and Mets Arteni obsidians were most commonly exploited, artifacts were also transported from more distant sources in the Armenian Highlands and northeastern Anatolia, over a maximum linear distance of c. 180 km. Together, these results suggest the dynamic role of one locus at Barozh 12 in landscape-scale technological organization in this obsidian-rich area. Results of ongoing chronometric and geoarchaeological analyses will further clarify the age and duration of site occupation, and refine our understanding of site formation processes.

Preliminary techno-typological comparison of the Barozh 12 assemblages with those recovered in the Central Anatolian Volcanic Province at Göllü Dağ suggests generalized differences in obsidian artifact manufacture. Conversely, the Barozh 12 assemblages bear similarities in artifact techno-typology with MP assemblages from the southern Caucasus, the Levant, and the Iranian plateau. These observations raise questions about regionalized technological patterns, and their relationships to hominin population dynamics.

## **A GIS Based Model of the Possible Routes of Mobility among Raw-Material Sources Exploited by Palaeolithic Populations in the Armenian Highlands**

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To understand Pleistocene hominin population movements in the Armenian Highlands, an attempt to create a model of the possible routes of mobility to exploit stone raw material resources of obsidian was undertaken. A GIS based model provides an opportunity to visually track the routes used by Palaeolithic populations to reach raw-material source areas. During the GIS analysis, the factors of the accessibility of the paleo-relief and fitness of landscapes were considered. Pleistocene paleo-lakes existing during different time phases in the Armenian Highlands were also modeled. The model spans the three archaeological time intervals of the Lower, Middle, and Upper Palaeolithic.

The investigation brought to light possible mobility corridors through which the movements of hominins in the ancient landscapes took place. It also targets potential areas where future discoveries of new Palaeolithic sites can be made.

## **Were Levallois Points Projectiles? Experimental and Microscopic Methods for Identifying Impact Traces on Obsidian Tools**

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In the last decade, new microscopic methods have been used for identifying and quantifying the nature of impacts on possible weapon tips made of brittle materials, such as flint and obsidian. In this paper, we will review these methods, concentrating on the relationship between visible secondary fracture characteristics, such as Wallner Lines and Fracture Wings and the impact loading conditions. We discuss the potential for differentiating among hand-thrust lances, hand-thrown javelins, and mechanically-projected spearthrower darts and bow-shot arrows, as well as the implications for research in the obsidian-rich areas of Anatolia and Armenia.