

Palaeoenvironmental and palaeoclimatic reconstruction in relation with the Late Pleistocene human occurrence in the Near East: through the rodent assemblages from Kaldar Cave (Khorramabad valley, Iran)

Iván Rey-Rodríguez^{1,4*}, Juan Manuel López-García^{2,3}, Hugues-Alexandre Blain^{2,3}, Mónica Fernández-García^{4,1}, Laxmi Tumung^{3,2,1}, Andreu Ollé^{2,3}, Behrouz Bazgir^{2,3}

¹ HNHP UMR 7194, CNRS / Muséum national d'Histoire naturelle / UPVD / Sorbonne Universités, Paris, France

² Institut Català de Paleoecologia Humana i Evolució Social (IPHES), Zona Educacional 4. Campus Sescelades URV (Edifici W3), 43007 Tarragona, Spain

³ Àrea de Prehistòria, Universitat Rovira i Virgili. Facultat de Lletres, Avinguda Catalunya 35, 43002 Tarragona, Spain.

⁴ Sezione di Scienze Preistoriche e Antropologiche, Dipartimento di Studi Umanistici, Università degli Studi di Ferrara, C.so Ercole I d'Este, 32 - 44121 Ferrara, Italy.

*Corresponding author. E-mail address: ivanreyrguez@gmail.com/ivan.rey-rodriguez@edu.mnhn.fr



The Site

Kaldar Cave is a key archaeological site that provides evidence of the Middle to Upper Palaeolithic transition in Iran. Excavations at the site in 2014–2015 led to the discovery of cultural remains generally associated with anatomically modern humans (AMHs) and evidence of a probable Neanderthal-made industry in the basal layers (Bazgir et al., 2017). The 2014–2015 excavated trench exposed an approximately 2 m (1.95 cm) section of the sedimentary deposit and is characterized by 5 main levels (Bazgir et al. 2014):

- Levels 1 to 3 (including sub-levels 4 & 4II) contains many phases of the Holocene time, more specifically materials from Islamic era, historical, Bronze Age, Iron Age, Chalcolithic and Neolithic.
- Level 4 (including sub-levels 5, 5II, 6 & 6II) its archaeological content shows mostly Upper Paleolithic features with presence of some fractured flints and debitage in the upper part of the sequence.
- Level 5 (including sub-levels 7 & 7II) contains an outstanding Middle Paleolithic artifacts.

Attempts have been made to establish a chronology for the site. These include four thermoluminescence (TL) dates for Layer 4, ranging from $23,100 \pm 3300$ to $29,400 \pm 2300$ BP, and three AMS radiocarbon dates from charcoal samples belonging to the lower part of the same layer, yielding ages of $38,650-36,750$ cal BP, $44,200-42,350$ cal BP, and $54,400-46,050$ cal BP (all at the 95.4% confidence level).

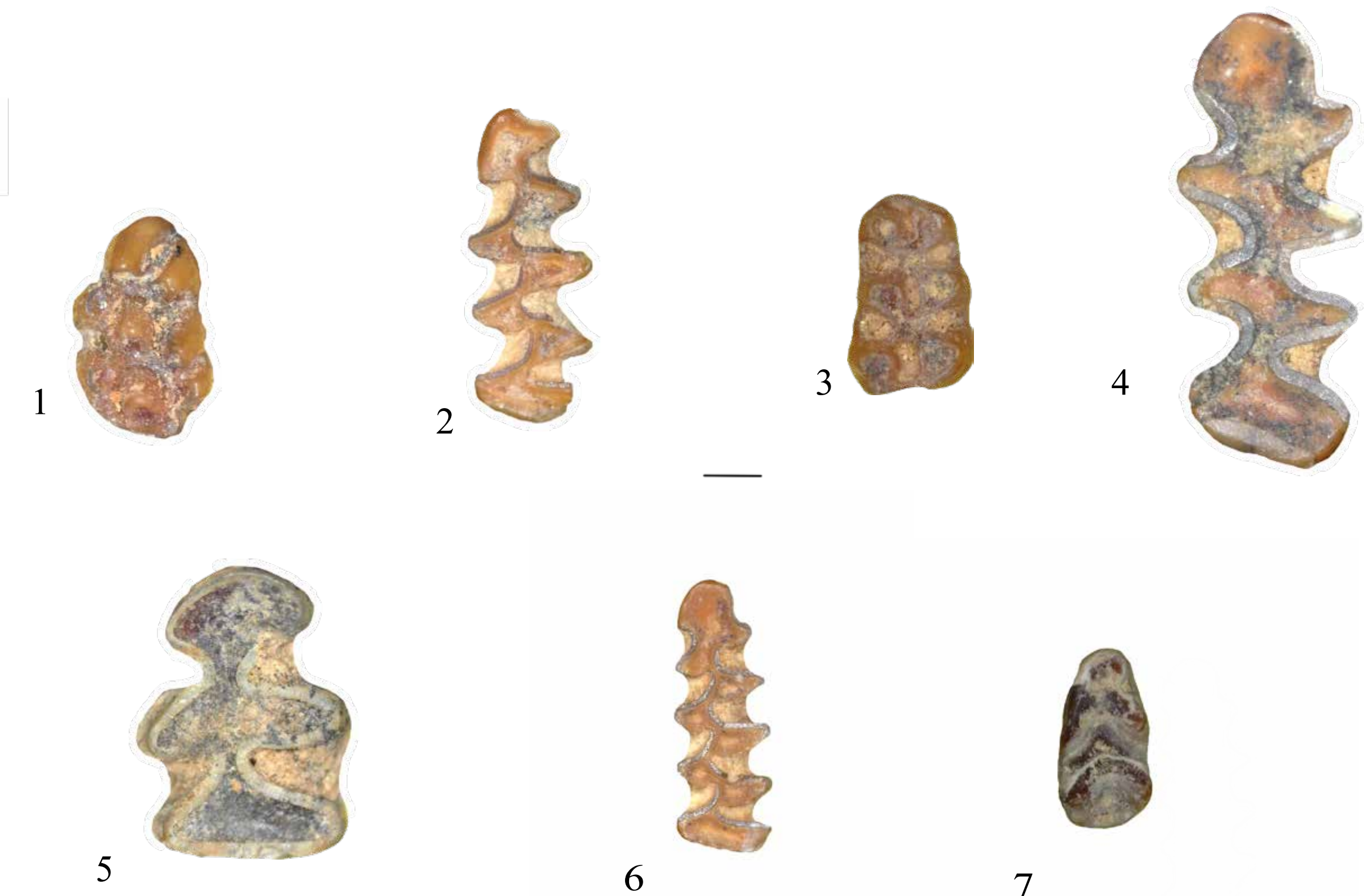
Kaldar Cave is the first well-stratified Late Palaeolithic locality to be excavated in the Zagros which is one of the earliest sites with cultural materials attributed to early AMHs in western Asia (Bazgir et al. 2017).

Material and methods



The rodent fossil remains used in this study comes from the archeo-paleontological excavation campaigns carried out in Kaldar Cave in 2014. Disarticulated bones and isolated teeth compose the sample and were collected by water screened using superimposed 5 and 0.5 mm mesh screens.

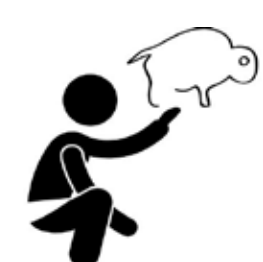
Dental morphological nomenclature of murines is after Vandebroek (1961–1962), that of arvicolines after van der Meulen (1973).



1) *Apodemus cf. flavicollis*; 2) *Chionomys cf. nivalis*; 3) *Cricetulus cf. migratorius*; 4) *Ellobius sp.*; 5) *Meriones sp.*; 6) *Microtus gr. socialis*; 7) *Mus cf. musculus*. Scale 1 mm

Conclusions

The rodent assemblage indicates an environment surrounding the cave mainly composed of open dry meadows, indicated by the most abundant taxa, *Microtus gr. socialis* and *Meriones spp.* Together with these taxa, the identified Murinae species indicate the presence of a certain vegetation cover. Also, most of the herpetofauna identified specimens (*Agamidae*, *Eryx sp.* and *Elapidae*) live in savannahs, steppes and deserts, with a way of life always linked with warm arid areas in rocky or sandy environments.

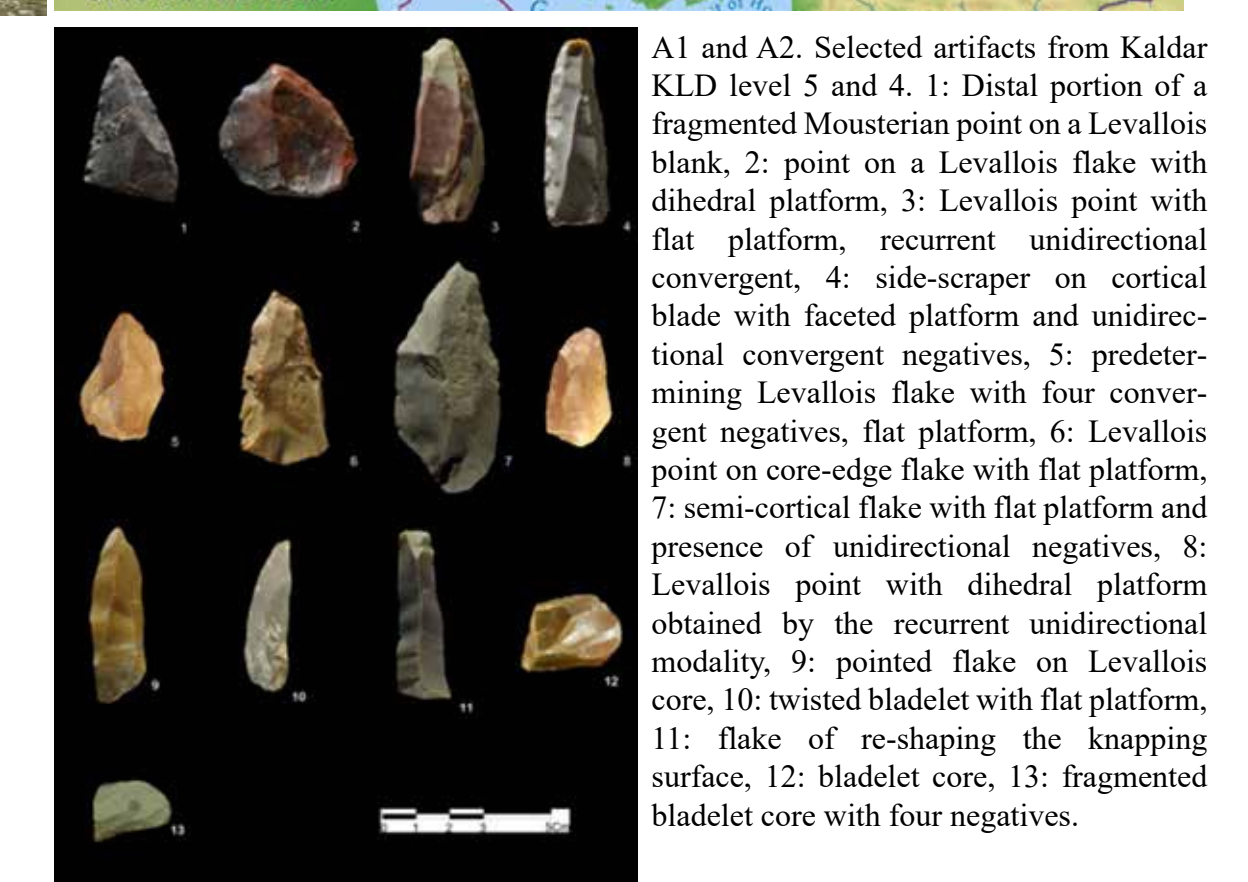
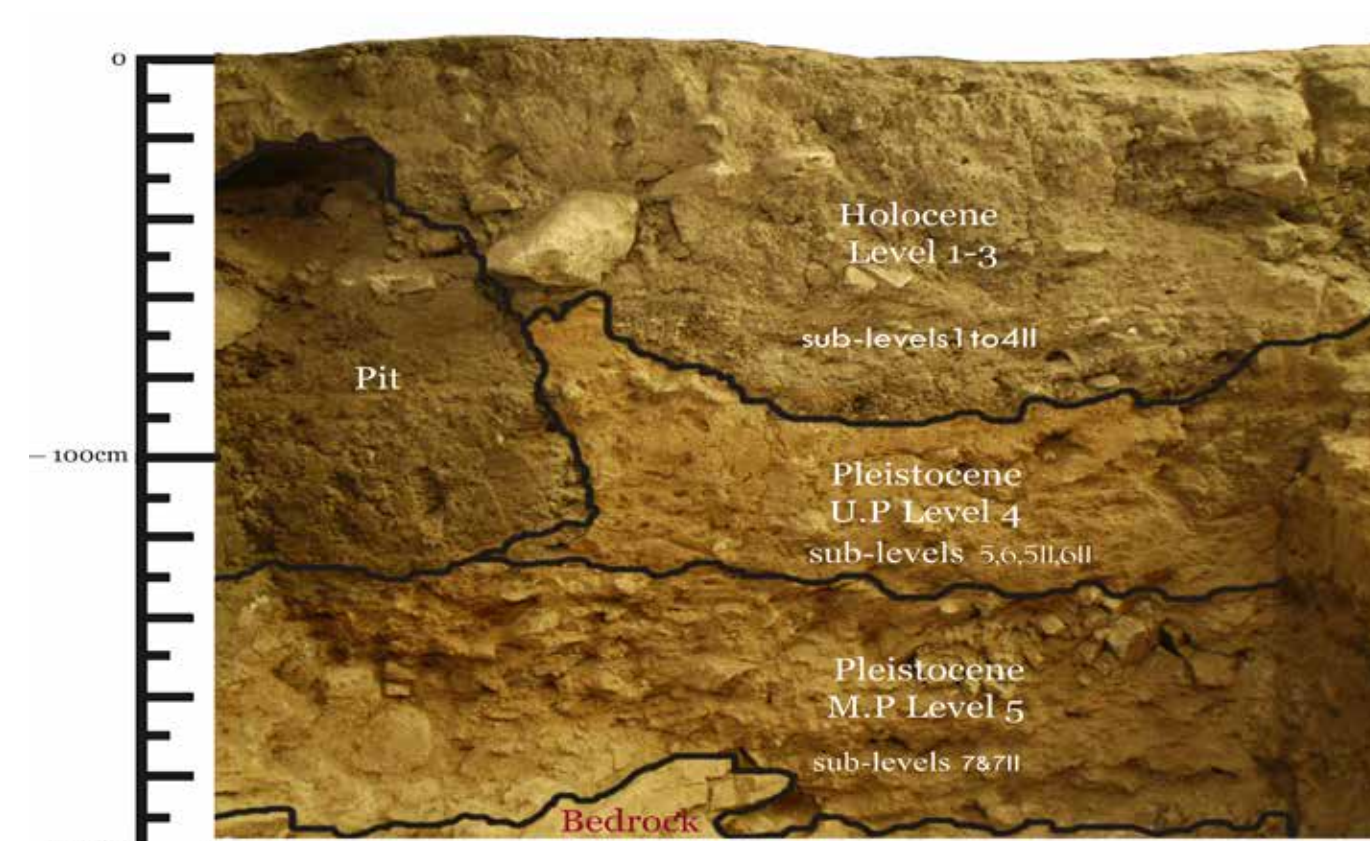
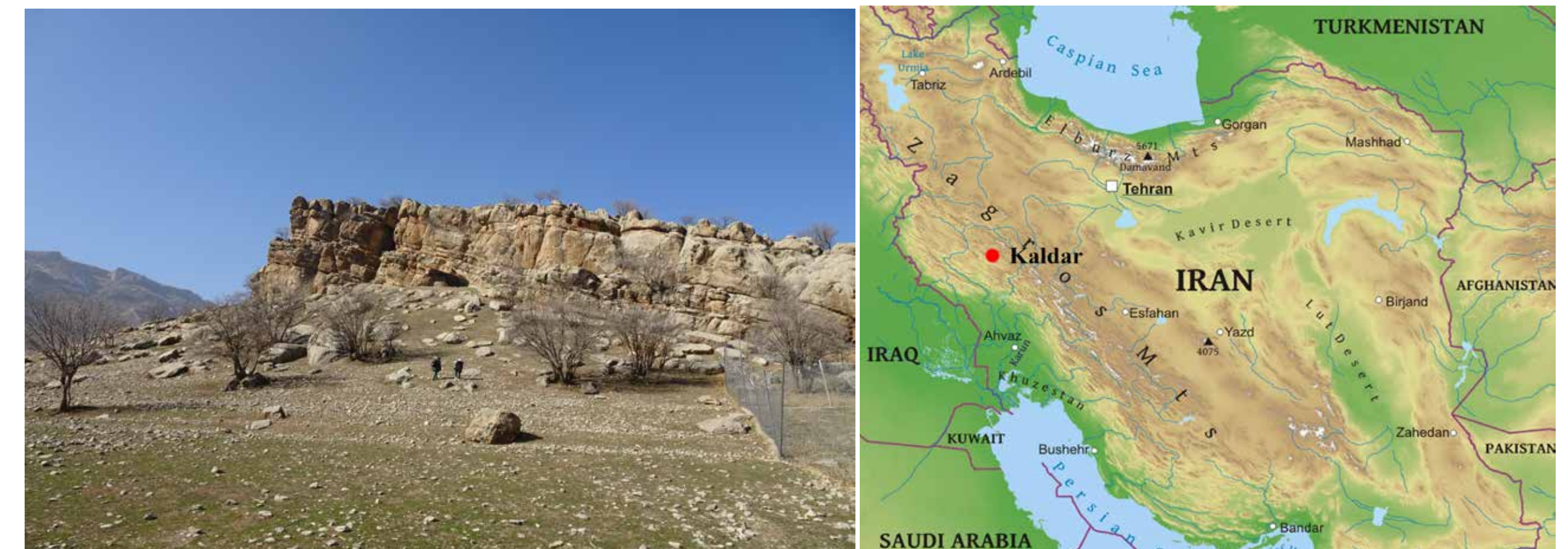


Acknowledgments

This work has been developed within the framework of the projects 2017SGR-859 and 2017SGR-1040 from the Catalan AGAUR. I.Rey-Rodríguez, M. Fernández-García and L. Tumung are beneficiaries of PhD scholarships founded under the Erasmus Mundus Programme – International Doctorate in Quaternary and Prehistory. J.M. López-García was supported by a Ramón y Cajal contract (RYC-2016-19386) with financial sponsor of the Spanish Ministry of Economy and Competitiveness. We would like to thank directors of Iranian RICHT and ICAR for their supports and issuing us the necessary permission for conducting this excavation season. This research is conducted in the framework of a signed scientific agreement between RICHT and IPHES. This project is funded by IPHES and Department of Prehistory of University of Liege.

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A1 and A2. Selected artifacts from Kaldar KLD level 5 and 4. 1: Distal portion of a fragmented Mousterian point on a Levallois blank. 2: point on a Levallois flake with dihedral platform. 3: Levallois point with flat platform, recurrent unidirectional convergent. 4: side-scrapers on cortical blade with faceted platform and unidirectional convergent negatives. 5: predetermining Levallois flake with four convergent negatives, flat platform. 6: Levallois point on core-edge flake with flat platform. 7: semi-cortical flake with flat platform and presence of unidirectional negatives. 8: Levallois point with dihedral platform obtained by the recurrent unidirectional modality. 9: pointed flake on Levallois core. 10: twisted bladelet with flat platform. 11: flake of re-shaping the knapping surface. 12: bladelet core. 13: fragmented bladelet core with four negatives.

Results

The study of the small-mammals from this locality allows us to identify 227 remains coming from sublayers 4 (Holocene), 5II (Upper-Palaeolithic) and 7II (Middle-Palaeolithic).

The small mammals assemblage of Kaldar cave is composed of five arvicolinae, two cricetinae, one gerbidae and two murinae taxa. Due to needs for more samples, the recovered small vertebrates from sub-level 4 do not allow us to interpret the palaeoenvironment. While the Late Pleistocene Sub-layer 5II and 7II have enough sample for that. The preliminary taphonomical analysis, regarding the digested elements, suggests that the main hypothesis for the accumulation is the predation activity, probably a category 3 predator (Andrews, 1990), as *Strix aluco* or *Bubo Bubo*.

Taxa	Sub-layer 4			Sub-layer 5 II			Sub-layer 7 II		
	NISP	MNI	%	NISP	MNI	%	NISP	MNI	%
<i>Microtus gr. socialis</i>	3	2	33,33	28	14	41,18	86	48	57,83
<i>Chionomys cf. nivalis</i>	1	1	16,67	1	1	2,94	0	0	0,00
<i>Ellobius sp.</i>	1	1	16,67	3	3	8,82	9	5	6,02
<i>Cricetulus cf. migratorius</i>	1	1	16,67	5	3	8,82	5	3	3,61
<i>Mesacricetus cf. brandti</i>	0	0	0,00	5	2	5,88	7	3	3,61
<i>Calomyscus sp.</i>	0	0	0,00	0	0	0,00	3	2	2,41
<i>Meriones sp.</i>	3	1	16,67	16	7	20,59	32	11	13,25
<i>Cf. Allactaga sp.</i>	0	0	0,00	0	0	0,00	1	1	1,20
<i>Myomimus sp.</i>	0	0	0,00	0	0	0,00	4	2	2,41
<i>Dryomys cf. nitedula</i>	0	0	0,00	0	0	0,00	1	1	1,20
<i>Apodemus cf. flavicollis</i>	0	0	0,00	4	3	8,82	8	6	7,23
<i>Mus cf. musculus</i>	0	0	0,00	1	1	2,94	2	1	1,20
Total	9	6	100,00	63	34	100,00	158	83	100,00

Representation of the number of identified specimens (NISP), minimum number of individuals (MNI) and the percentage of the MNI (%) for the small vertebrates of Kaldar Cave

In addition to the small-mammals sub-layer 5II delivered 25 remains of the following squamate reptiles and amphibians: an agamid lizard (*Agamidae* indet.), a lizard (*Lacertidae* indet.), a sand boa (*Eryx sp.*, Boidae), a viper (*Viperidae* indet.) and a toad (*Bufo sp.*).

Future perspectives



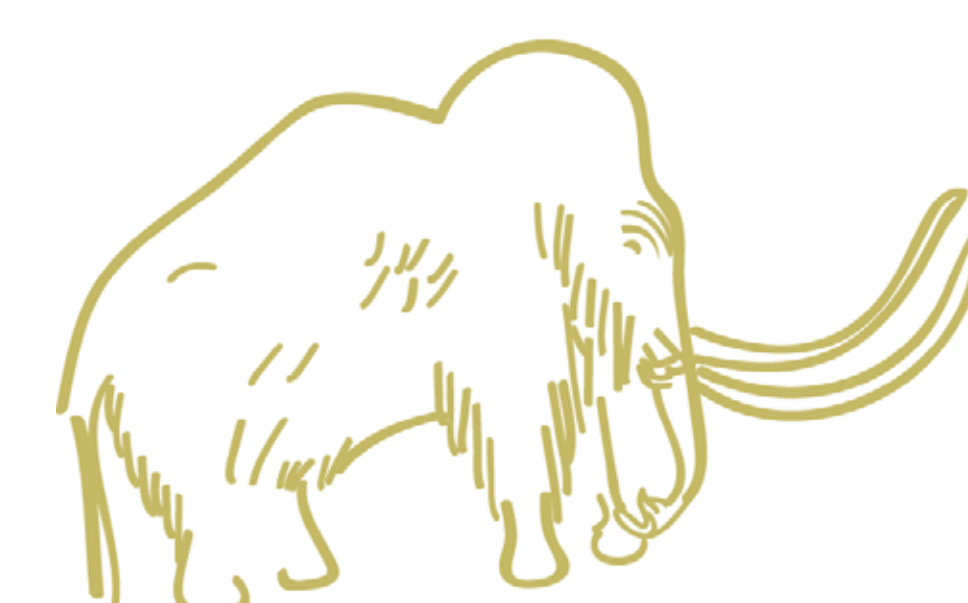
Reference collection from:

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