

Preliminary data for the environmental reconstruction of the latest Pleistocene from Kaldar Cave (Khorramabad Valley, Iran) through the small-vertebrates assemblages

Iván Rey-Rodríguez^{a,b}; Juan Manuel López-García^{a,b}; Hugues-Alexandre Blain^{a,b}; Mónica Fernández-García^c; Xosé Pedro Rodríguez-Álvarez^{a,b}; Laxmi Tumung^{a,b}; Andreu Ollé^{a,b}; Behrouz Bazgir^{a,b}
 a Institut Català de Paleocologia Humana i Evolució Social (IPHES), C/Marcel·lí Domingo s/n (Edifici W3), Campus Sescelades, 43007 Tarragona, Spain.
 b Area de Prehistòria, Universitat Rovira i Virgili, Fac. de Lletres, Avinguda Catalunya 35, 43002 Tarragona, Spain.
 c Sezione di Scienze Preistoriche e Antropologiche, Dipartimento di Studi Umanistici, Università degli Studi di Ferrara, C.so Ercole I d'Este, 32 - 44100 Ferrara, Italy.

*Corresponding author.

E-mail address: ivanreyrguez@gmail.com

The Site

Kaldar Cave is located in the northern part of the Khorramabad valley (Iran, Central Zagros) at 1290 meters a.s.l. The site contains both Pleistocene and Holocene occupations (Bazgir et al. 2014).

The 2014-2015 excavated trench exposed an approximately 2m (1.95cm) section of the sedimentary deposit and is characterized by 5 main levels:

- Levels 1 to 3 (including sub-levels 4 & 4II) consist of ashy sediment with a blackish green color containing both thick and lean angular stones. It varies in thickness from 60 to 90 cm and contains many phases of the Holocene time, more specifically materials from Islamic era, historical, Bronze Age, Iron Age, Chalcolithic and Neolithic.

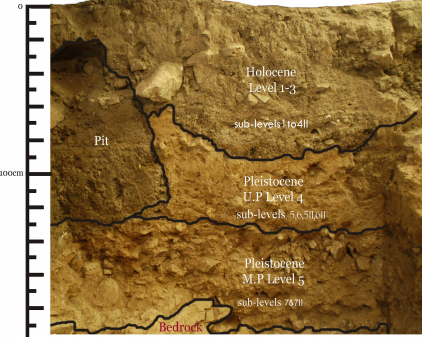
- Level 4 (including sub-levels 5, 5II, 6 & 6II) consists of a fine but dense sediment in dark-brown color. In this level, its archaeological content shows mostly Upper Paleolithic features with presence of some fractured flints and debitage in the upper part of the sequence.

- Level 5 (including sub-levels 7&7II) encompasses an extremely dense sediment in reddish-brown color with presence of some small angular blocks and contains an outstanding Middle Paleolithic artifacts.

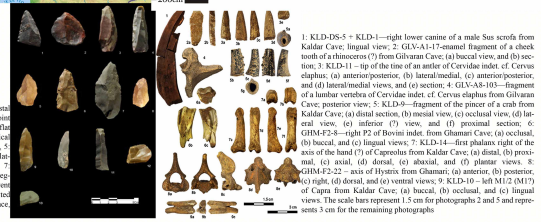
Material and methods

The small-vertebrate fossil remains used in this study comes from the archaeological excavation campaigns carried out in Kaldar Cave in 2014. Disarticulated bones compose the sample and also isolated teeth that 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).



A1 and A2. Selected artifacts from Kaldar KLD level 5 and 4. 1. Distal portion of a fragmented Mesolithic point on a Levallois blank, 2. point on a Levallois flake with dihedral platform, 3. Levallois point with flake platform, recurrent unidirectional convergent, 4. side-scraper on cortical blade with fractured platform and unidirectional convergent negatives, 5. proto-denticulate Levallois flake with four convergent negatives, fine flake form, 6. Levallois point on core-edge flake with flake platform, 7. semi-cortical flake with flake 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 flake platform, 11. flake of re-shaping the knapping surface, 12. bladelet core, 13. fragmented bladelet core with four negatives.



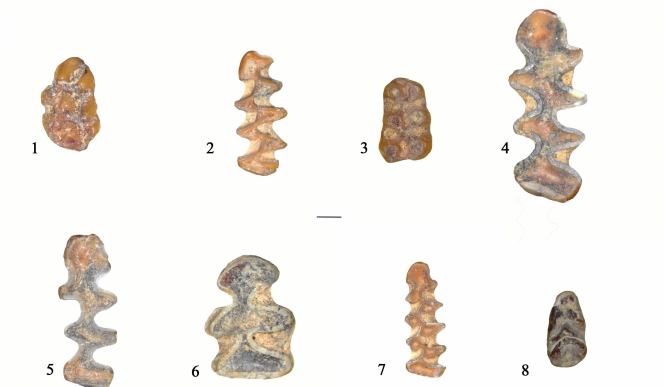
1: KLD-DS-5 + KLD-1—right lower canine of a male *Sus scrofa* from Kaldar Cave; lingual view; 2: GLVA-1-17—stained fragment of a cheek tooth of a rhinoceros (*R.* from Gilvaran Cave); (a) buccal view, and (b) section; 3: KLD-11—tip of the tibia of an antler of *Cervus elaphus*; (a) anterior-posterior, (b) lateral-medial, (c) anterior-posterior, and (d) lateral-medial views, and (e) section; 4: GLVA-103—fragment of a lumbar vertebra of *Cervus elaphus* from Gilvaran Cave; posterior view; 5: KLD-10—fragment of the pincer of a crab from Kaldar Cave; (a) distal section, (b) mesial view, (c) occlusal view, (d) lateral view, (e) inferior (V) view, and (f) proximal section; 6: GMM-F2-8—right P2 of *Bovini* indet. from Gilvaran Cave; (a) occlusal, (b) buccal, and (c) lingual views; 7: KLD-14—first phalanx right of the axis of the hand (*O.*) of *Capreolus* from Kaldar Cave; (a) distal, (b) proximal, (c) axial, (d) dorsal, (e) abaxial, and (f) plantar views; 8: GMM-F2-22—axis of *Bovini* from Gilvaran; (a) anterior, (b) posterior, (c) right, (d) dorsal, and (e) ventral views; 9: KLD-10—left M1/2 (M17) of *Capra* from Kaldar Cave; (a) buccal, (b) occlusal, and (c) lingual views. The scale bars represent 1.5 cm for photographs 2 and 5 and represent 3 cm for the remaining photographs.

Results

The preliminary study of the small vertebrates from this locality allows us to identify 72 remains coming from levels 4 (Holocene) and 5II (Upper-Pleistocene).

The small mammals assemblage of Kaldar cave is composed of five arvicolineae, two cricetineae, one gerbidae and two murinae taxa. Due to needs for more samples, the recovered small vertebrates from level 4 do not allow us to interpret the palaeoenvironment. While the Late Pleistocene level 5II has 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, as *Strix aluco* or *Bubo Bubo*.



1) *Apodemus cf. flavicollis*; 2) *Chionomys cf. nivalis*; 3) *Cricetulus cf. migratorius*; 4) *Ellobius cf. lutescens*; 5) *Ellobius cf. talpinus*; 6) *Meriones sp.*; 7) *Microtus gr. socialis*; 8) *Mus cf. musculus*. Scale 0.5mm

	Level 4			Level 5		
	NISP	MNI	%	NISP	MNI	%
<i>Microtus gr. socialis</i>	3	2	33.33	28	14	41.18
<i>Chionomys cf. nivalis</i>	1	1	16.67	1	1	2.94
<i>Ellobius cf. lutescens</i>	1	1	16.68	0	0	0.00
<i>Ellobius cf. talpinus</i>	0	0	0.00	1	1	2.94
<i>Ellobius sp.</i>	0	0	0.00	2	2	5.88
<i>Cricetulus cf. migratorius</i>	1	1	16.67	5	3	8.82
<i>Mesocricetus cf. brandti</i>	0	0	0.00	5	2	5.88
<i>Meriones sp.</i>	3	1	16.67	16	7	20.59
<i>Apodemus cf. flavicollis</i>	0	0	0.00	4	3	8.82
<i>Mus cf. musculus</i>	0	0	0.00	1	1	2.94
Total	9	6	100	63	34	100

In addition to the small mammals level 5 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.*).

Conclusion

The rodents assemblage indicates an environment surrounding the cave, mainly composed by 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, amphibians and squamate reptiles fossil remains have been recovered, and the identified taxa indicates rocky or sandy environments linked with warm arid areas

Acknowledgments

We would like to thank both directors of Iranian RICHT (Seyed Mohammad Beheshti) and ICAR (Hamide Choubak) for their supports and issuing the necessary permissions for conducting the excavation in the Kaldar Cave. Unsparing efforts by J. Van der Made, A. Picin, M. Jayez, N. Hashemi, I. Beheshti, S. Azadbakht, S. Horshid, M. Hashemi, F. Bakhtiari, Z. Feiz, R. Khazaeli and A. Baharvand that participated in a period or full season of excavation are highly appreciated. This research is conducted in the framework of a signed scientific agreement between RICHT and IPHES. The 2014-15 excavations season was funded by IPHES and Department of Prehistory of University of Liege. Bazgir is a beneficiary of a predoctoral scholarship from the Fondation Atapuerca. M. Fernández-García and L. Tumung are beneficiaries of PhD scholarships founded under the Erasmus Mundus Programme – International Doctorate in Quaternary and Prehistory. This work has been developed within the framework of the projects 2014SGR-889 and 2014SGR- 901 from the Catalan AGAUR.

References

-Bazgir, B. et al. (2014) Test excavations and initial results at the Middle and Upper Paleolithic sites of Gilvaran, Kaldar, Ghamari caves and Gar Arjene Rockshelter, Khorramabad Valley, western Iran. *Comptes Rendus Palevol* 6, 511-525
 -van der Meulen, A.J. (1973) Middle Pleistocene Smaller Mammals from the Monte Peglia (Orvieto, Italy) with Special Reference to the Phylogeny of *Microtus* (Arvicolidae, Rodentia). *Quaternaria* 17, 1–144.
 -Vandebroek, G. (1961–1962) The Comparative Anatomy of the Teeth of Lower and non Specialized Mammals. 1–2. *Paleis der Academiën*, Brussels.



Kaldar Cave; General View from West (Photo B.Bazgir)

The 14th Annual Symposium on the Iranian Archaeology
 Tehran 6-8 March 2016