

# The Malacological Evidence of Animal Remains from the Areni-1 Cave, Armenia

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**Abstract:** Systematic archaeological excavations at Areni-1 cave in the Republic of Armenia provided rich archaeozoological remains, among of which a large collection of water and terrestrial mollusks remains in different preserving degree (Phylum Mollusca) was separated. The recorded species mainly belong to the class Gastropoda (9 families, 8 genera, 8 species), which provide important information about the prevailing ecology during the periods of habitation and usage of the cave by Late Chalcolithic and Medieval inhabitants. The archaeological and zoological evidence could suggest a possible occurrence of rodents and birds, which are predators feeding on land mollusks. Finally, snail assemblages of Areni-1 cave suggest, that the climate regimes, vegetation and environment are similar to the present.

**Keywords:** Mollusca Remains, Areni-1 Cave, Armenia, Archaeozoology

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## 1. Introduction

The analysis of mollusca remains from archaeological contexts is an indivisible part of environmental archaeology and archaeozoology.

Because of their variable but high inorganic content, shells of the Mollusca present one of the most durable categories of biogenic finds in the global archaeological record. Depending on the geographic area and research question, investigations may focus on molluscs of terrestrial, freshwater, or marine origin, and they may focus on molluscs that were exploited as food resource or as raw material in artifact manufacture. Because mollusk shells archive changes in their ambient environment as they grow incrementally [9], archaeological mollusk shells can become subjects of independent or integrated studies of paleo-environmental conditions.

Both human-modified and naturally occurring mollusk remains can be subject to molluscan analysis in archaeology.

The nature of archaeological mollusk evidence can be alternatively classified in terms of different molluscan taxa and habitats. Archaeological molluscs of terrestrial origin consist of gastropods and are colloquially dubbed as land snails. Molluscs originating from marine environments mainly comprise both gastropods (e.g., whelks, topshells, limpets) and bivalves (e.g., clams, oysters).

Areni-1 (also known as Birds' Cave) is a three-chambered karstic cave located on the left-hand side of the Arpa River basin, a tributary of the River Araxes, within the eastern portion of the modern village of Areni in the Vayots Dzor Province of southern Armenia (Figures 1 and 2). Excavations at the site began in 2007 and were directed by Boris Gasparyan (Institute of Archaeology and Ethnography, National Academy of Sciences, Armenia) and co-directed by Ron Pinhasi (School of Archaeology, University College Dublin, Ireland) and Gregory Areshian (Cotsen Institute of Archaeology at UCLA, USA). The major significance of the

site was abundantly clear during the initial excavations when very well preserved Late Chalcolithic (4300–3400 cal BC) and Medieval (4<sup>th</sup>–18<sup>th</sup> centuries AD) occupations were exposed [4, 8, 13]. Chalcolithic finds within the first gallery of the cave include numerous large storage vessels, some of which contain human skulls of adolescent females. Grape remains and vessels typical of wine storage, associated with chemical analyses of the contents of the vessels point to Chalcolithic wine production at the site [5]. It appears that from the end of the 5<sup>th</sup> millennium BC onwards, people used the cave for different purposes—as a habitation, for keeping animals and storing plant foods, for the production of wine, as well as for ritual purposes. The data from the cave demonstrate clear evidence for incipient social complexity. The workshops, wine producing complex, and the funerary features or “burials” represent a common ritual and production oriented complex [10].

Medieval finds in the cave span the entire medieval period from the fourth to the eighteenth centuries AD. Remains of a well preserved circular dwelling span the 7<sup>th</sup> to 9<sup>th</sup> centuries. Later finds dating to the 11<sup>th</sup> to 14<sup>th</sup> centuries AD include structures, a fragment of an Armenian manuscript, two well-preserved ovens, a wine-storage jar, associated pottery, fragments of glass, and other small finds [4, 8, 13]. A group of limited small finds dated via <sup>14</sup>C dating document early usage of the cave between the 4<sup>th</sup> and the 7<sup>th</sup> centuries AD as well as later during the 15<sup>th</sup> to 18<sup>th</sup> centuries AD [10].

Very limited, and what appear to be short-lived, Middle and Late Bronze Age and Iron Age occupations are also evident at Areni-1. Roughly a dozen artifacts dating to these time periods (ceramic sherds, a bronze axe, and jewelry fragments) were recovered from Trenches 1 to 5. A lack of associated architecture and an overall scarcity of finds underscores the brevity of these occupations. Minimal temperature oscillations and constant levels of low humidity within the cave have provided an ideal environment for preservation of organic remains. As a consequence of this constant microclimate, Areni-1 has yielded large quantities of exceptionally well-preserved organic remains including the world's oldest leather shoe [8] along with basketry and clothing [11].

Six trenches are currently being excavated at Areni-1 (Figure 2). Trench 1 is located in the main or first gallery inside the cave and contains artifacts and features that clearly relate to funerary ritual, including human remains, as well as wine making paraphernalia dating to 4000–3800 cal BC. Trench 2, within the same gallery as Trench 1, has yielded pots containing cremations, as well as isolated human remains recovered from loci between the pots (Figure 2). Trench 3 is located under the overhang of the cave on the outer edge at the main entrance to the first gallery (Figure 2). This trench contains medieval dwellings cutting into at least three Late Chalcolithic occupational phases designated as Chalcolithic Horizons I–III (4300–3400 cal BC). Of the three horizons, the first uppermost horizon tends to be most truncated; it is present only in Trench 3 and the slope at the entrance of the cave complex. Within Trench 3, Horizon I

was damaged by the construction of an Early medieval (7<sup>th</sup> to 9<sup>th</sup> centuries) house or hut and by later medieval (11<sup>th</sup> to 14<sup>th</sup> centuries) storage pits and ovens. Horizon I is represented by hard packed and repeatedly rebuilt dirt floors atop household pits and jar burials and dates to the final phase of the Late Chalcolithic (3700–3400 cal BC). Chalcolithic Horizon II underlies Horizon I but is separated from it by a layer of zoogenic humus (dung layer). Horizon II occupies a more extensive area beginning in Trench 3, outside the entrance to the first gallery and extends into the cave, to the rear part of the first gallery spanning Trenches 1 and 2. It also reaches into Trench 3, where it is characterized by hard packed and repeatedly finished floors and wooden constructions or buildings and large, unfired bins. A set of radiocarbon dates from Horizon II yield a date range of 4000–3800 cal BC, which places it in the middle phase of the Late Chalcolithic. The third Chalcolithic Horizon encompasses a rather small area and appears in multiple areas beneath Horizon II. Horizon III is separated from Horizon II by a layer of zoogenic humus in Trench 3 and inside the first gallery, where it spans Trenches 1 and 2. Traces of very high quality plastered floors and partially destroyed stone constructions (damaged by intrusive bins dug during Horizon II) are recorded in Trench 3. Dates for this Horizon range between 4300–4000 cal BC placing the Horizon III occupation in the early phase of the Late Chalcolithic [10].

## 2. Materials and Methods

### 2.1. Materials

The material presented in this paper is originating from Areni-1 cave (Trenches N 1, 2, 3 and 4) excavated during the 2007-2010 excavation seasons (description of the stratigraphy and the excavated trenches see below).

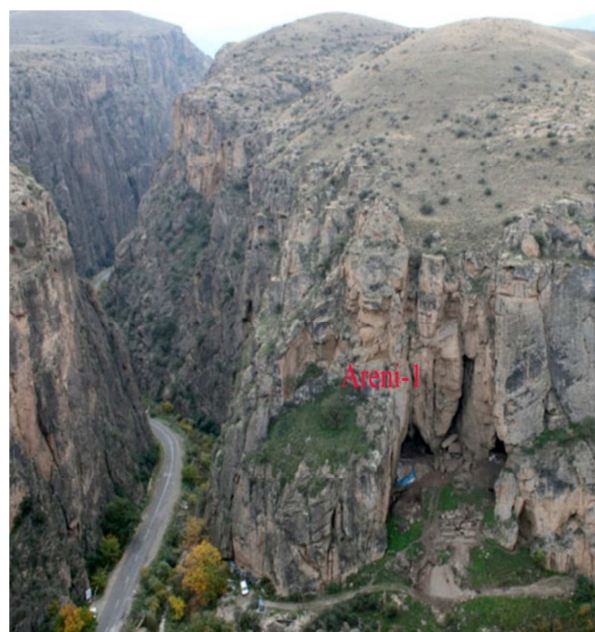


Figure 1. Areni-1 cave location in nature.

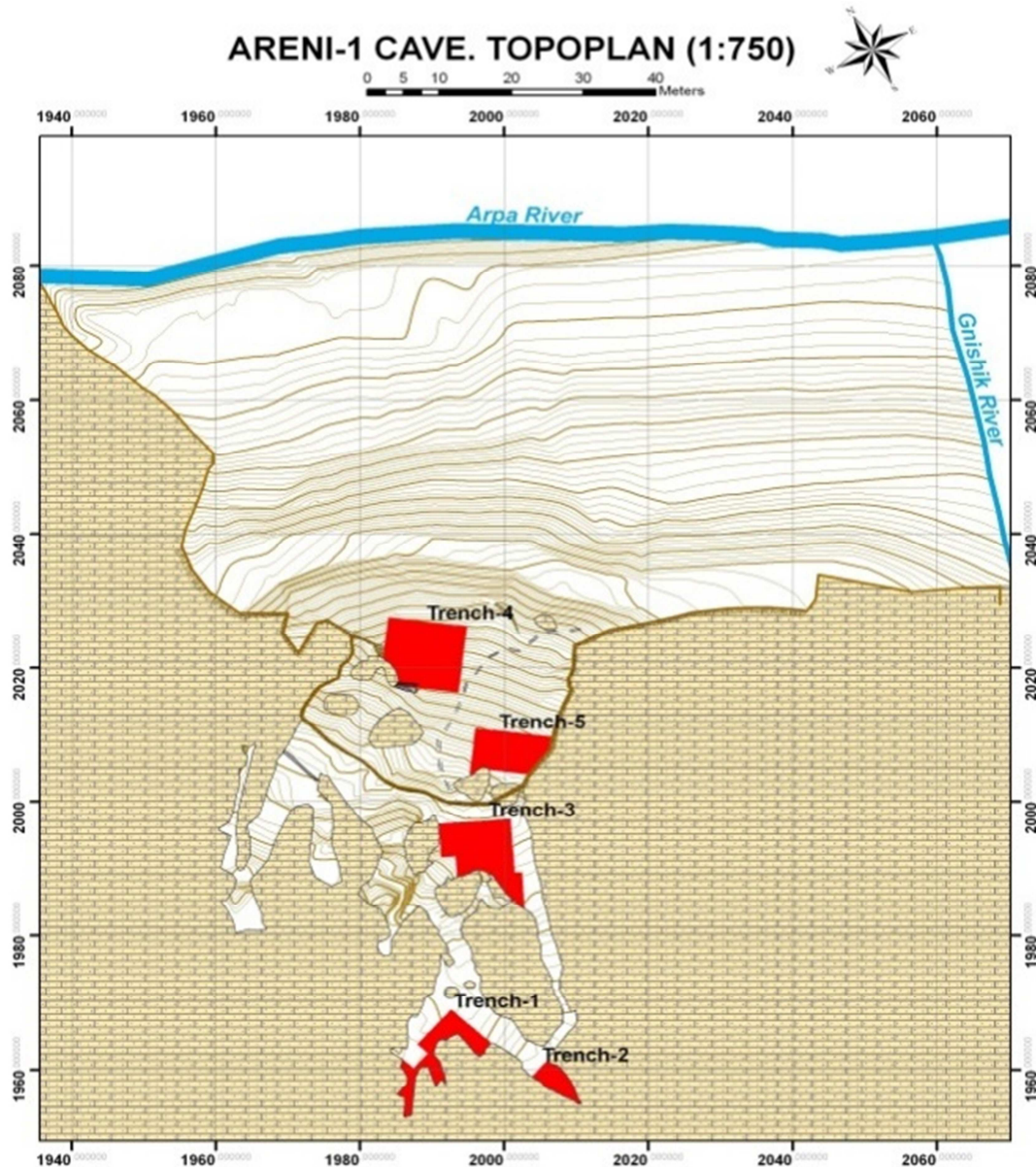


Figure 2. Areni-1 cave topographic plan.

A comprehensive sampling strategy was adopted at Areni-1, and mollusks remains samples were collected from every possible archaeological context if exists. Each sample consisted of 5 L of sediment.

## 2.2. Methods

Since the organic remains are desiccated, and contact with water results in their disintegration, dry sieving was used to recover them. All sediment samples were sieved using a 1 mm sieve and material <1mm was discarded. Of the sieved material in the >1mm fraction, 1 L of filtered soil was collected for investigation and the remaining filtered soil was placed in a labeled bag and stored within the cave for future generations to examine. The 1 L bag of filtered soil was then subject to detailed analysis and all organic remains (plants, insects, micromammals), bones, pottery fragments, etc., were

separated via hand-picking and labeled appropriately [10].

Most of the samples have been through the second processing stage in the laboratory (the 'washing' stage), which consists in disaggregating the samples in warm water and passing them through a 300 $\mu$ -mesh sieve. For each sample processed, the floating material (the organic fraction) was collected and stored in jars with ethanol in a refrigerator, while the heavy residue was left to dry. These heavy residues were scanned under a lamp with a magnifying glass to aid the description of the samples' contents.

Identifications of the samples were achieved through anatomical comparisons with modern specimens collections of NAS RA Scientific Center of Zoology and Hydrogeology and aided by consultation of publications [1-3], 7, 12]. The minimum number of individuals been calculated from the most abundant mollusks part. There are fragments of



mollusks used as beads (referred in table 1 and Figure 5).

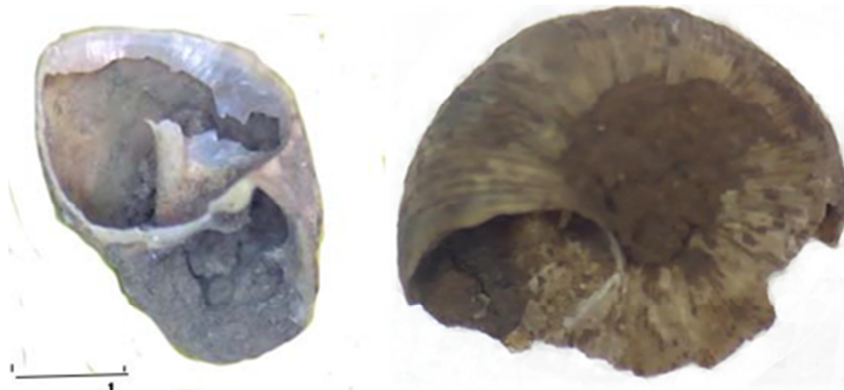
**Table 1.** Description of sub-fossilized mollusks preserved samples of Areni-1.

No	Species	Origin	Class: Family	Trench	MNI	Bead or not
1	<i>Oxylomaelegans</i> (Rossmassler, 1835)	Land snail	Gastropoda: Succineidae	Areni1/3	1	NB
2	<i>Euconulus fulvus</i> (Muller, 1774)	Land snail	Gastropoda: Euconilidae	Areni 1/1	2	NB
3	<i>Acanthinula</i> sp.	Land snail	Gastropoda: Valloniidae	Areni1/1	1	NB
4	<i>Chondrulatridens</i> (Muller, 1774).	Land snail	Gastropoda: Enidae	Areni1/1	1	NB
5	<i>Trichia</i> sp.	Land snail	Gastropoda: Helicidae	Areni1/3	1	NB
6	<i>Discus ruderatus</i> (Ferussac, 1821).	Land snail	Gastropoda: Discidae	Areni1/3	3	NB
7	<i>Eupolitader bentina</i> (Lindholm, 1914).	Land snail	Gastropoda: Zonitidae	Areni1/4, 1/2	4	NB
8	<i>Euompha liapisiformis</i> (L. Pfeiffer, 1848).	Land snail	Gastropoda: Hygromiidae	Areni1/4	4	NB
9	<i>Xeropicta derbentina</i> (Krynicky, 1836).	Land snail	Gastropoda: Helicidae	Areni 1/4	2	NB
10	<i>Levantina djulfensis</i> (Dubois de Montpereux, 1840)	Land snail	Gastropoda: Helicidae	Areni1/4	6	NB
11	<i>Not identified</i>	Water snail	Bivalvia: Unionidae	Areni 1/3	2	Bead

### 3. Results and Discussion

The land snail shell assemblage, composed of nine different species (table 1), reflects an open landscape with few rocks and stones since typical rock dwelling snails, such as *Levantina* sp. The climate is that of a semiarid zone with

rainfall ranging from 200 to 400 millimeters. Both snail and plant distribution are influenced by rainfall and the substratum. It is not possible to determine past vegetation based on these land snails. Most of the land snail species are present in all trenches and are present in the area as a part of recent fauna of Armenia. This similarity implies that climate and landscape of the past is quite similar to that seen today.



**Figure 3.** Rodent predated shells of *Chondrula tridens* and *Discus ruderatus*.

Different interpretations been proposed to explain the presence of mollusks at archaeological sites. In real, considering them an anthropogenic resource, which supports the hypothesis of natural accumulations, is far from our assemblages, because mollusk shells been found with many micro-mammal bones, did not deposit in pits, most of them not well preserved or must say there are obvious signs of abrasion. Besides, the identified species are small sized which are not serve as a food.



**Figure 4.** Bead of *Bivalvia*.

Land mollusks have very variable tolerances to subterranean habitats; very few species in nature are troglobites – obligate cave dwellers. In Areni-1 mollusks we didn't find true troglobites, so we concluded, that all the remains presence in the cave was not the result of its normal behavior and unlikely to maintain even temporary populations in caves [6] and certainly arrived to the cave by a variety of processes. As evidence, the occurrence *Oxylomaelegans* refers to vegetation in moist habitats such as marshes along the edge of a small river and *Acanthinula* sp. is supposed to occur in natural forests and their edges. In another hand, we found that the carnivorous taxa regarded as troglobites *Discus ruderatus* are widespread in Armenian caves. However, the most logical suggest of mollusks occurrence in the cave was that people might have brought vegetation into caves and thus inadvertently introduced land snails adhering to the plants. Other vectors include moles and rodents, which all carry land snails into their burrows in cave fills to eat them undisturbed (evidenced by the occurrence of big number of rodents remains). Birds can also carry the snails to the cave. Patterns of damaged shell also refers to the

rodents predated snails (Figure 3).

Since, shells are tools by which we may investigate not only palaeo-environments and human diets but also human interactions.

With that background, the presence of some water snails' particles (*Bivalvia*) (Figure 4) refers to beads,



**Figure 5.** 1. *Chondrulatridens*, 2. *Euconulus fulvus*, 3. *Oxylomaelegans*, 4. *Trichia* sp. 5. *Discus ruderratus ruderratus*, 6. *Eupolitaderbentina*, 7. *Xeropictaderbentina*, 8. *Euompha liapisiformis*, 9. *Levantina djulfensis*.

that have been used by young women, which may acquire from passerby merchants. This result may be used to interpret one of the aspects of social archaeoanthropology for the region and determine everyday activity areas, and extend to the definition of gender and age groups and social hierarchy, but in our case because of a low MNI we should not discuss that aspect.

## 4. Conclusion

The mollusks remains in our study presented as archaeological and zoological evidences for occurring rodents and birds, which are predators feeding on land mollusks. Finally, the land snail assemblages of Areni-1 cave suggest that the climate regimes, vegetation and environment of Late Chalcolithic and Medieval Periods in Armenia are similar to the present.

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