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Espahabad Khorshid Cave, Mazandaran, Iran: Some Insights into Sasanian Period Buildings

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Abstract

The Espahabad Khorshid Cave, located in Savadkooh District, Mazandaran province, is a huge natural cavity that opens on the northern flank of Mount Lakamar, in the Khatir Kooh Valley, just above the River Talar. The cave has long been used as a natural refuge and during the Sasanian period it was the stronghold of the last ruler of Ṭabarestān. From the mid-1950s the cave has been visited and described by various professional and non professional archaeologists. Over the years, few scholars have paid attention to these ruins, although the site has always been visible because of its location. In general, the position of the cave and the arrangement of the internal architectural structures makes it impossible for casual visitors to gain access to the site, especially to the upper levels which can be reached only by expert climbers. The archaeological and architectural structures preserved in the cave (mostly from late Sasanian times and later periods) were systematically documented by a team of Iranian architects between 2008 and 2011. In 2015, with the permission of the Mazandaran Provincial authorities, a preliminary Iranian - Italian archaeological expedition started the systematic collection of data regarding architecture and artefacts. The study of the various classes of building materials has been initially focussed on the analysis of some timber structures in the eastern building complex. The remains of some wooden planks and beams were still in situ, roughly confined in the margins of the main walls. The preservation of the wood was excellent and has allowed detailed analysis of the wooden building material, and indirect analysis of the local environment. The wood used for these planks/beams was found to belong to two different species, *Fraxinus* sp. and *Quercus* sp., providing the first preliminary information on the use of the local wood resources. Further collection of structural timbers from the destroyed buildings will allow us to investigate ancient wood technology and the exploitation of the woodlands together with the history of human occupation of the Espahabad Khorshid Cave.

Keywords: Archaeology of Mazandaran, Sasanian Period, Espahabad Khorshid Cave, Wood analysis

Article Type: Research Article

Introduction

The aim of this paper is to introduce and discuss some historical and archaeological features of the site well known as the Espahabad Khorshid Cave[3] . The cave, located in Savadkooh District, in the middle of the mountainous region of Mazandaran, is a huge natural cavity that opens on the northern flank of the limestone Mount Shervin, in the Khatir Kooh Valley, just above the River Talar (Figure. 1). The cave is 314 meters above the Katir Kooh road (950 m. a.s.l.) and can be reached by means of two rough tracks both starting directly from this road. The cave has constituted a natural refuge through time and it is believed that during the Sasanian period it was the stronghold of the last ruler of Ṭabarestān (Keshavarz *et al.* 2015: 153-155). Reliable knowledge concerning the rulers

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of the Dabuyid dynasty[1] extends from just a few years before the Sasanian Empire fell in AD 651 until 761, year of the suicide of the last king of the dynasty, named Ḵᵛoršīd. The Dabuyids were one of the most important families of northern Iran during the last stages of the Sasanian Empire. The main source regarding the history of the dynasty is Ebn Esfandīār, a 13th century historian who wrote the Tārīḵ-e Ṭabarestān, the earliest surviving history of the Ṭabarestān area. From the mid-1950s the cave has been visited and briefly described by various archaeologists and climbers, like C. Sheykhli, M. Sotudeh and S. Soortijee (Sheykhli 1961; Sotudeh 1987; Soortijee 2003: 44-31). Over the years, only these few scholars have paid attention to the archaeological and architectural evidence preserved inside the Espahabad Khorshid Cave, although the site has always been visible because of its location. In general, the position of the cave and the arrangement of the structures makes it impossible for casual visitors and grave-robbers to gain access to the site, especially to the upper levels which can be reached only by expert climbers. Between 2008 and 2011 Mohammad Keshavarz Divkolaee, with a group of architects, began the first systematic documentation of all the structures preserved in the cave. In 2015, with the permission of the Cultural Heritage, Handicrafts and Tourism Organization (ICHHTO) of Mazandaran, a preliminary Iranian-Italian archaeological expedition started the systematic collection of data regarding architecture and artefacts.

Geographical Context

Mount Shervin, where the cave is located, is part of the Alborz Mountain belt in Savadkooh County, located at the centre of Mazandaran Province (Figure. 2). From a phytogeographical perspective that part of Iranian territory, the southern Caspian belt, is classified as the Hyrcanian region, one of the three main biogeographic regions of Iran (Mobayen & Tregubov 1970; Zohary 1973; Sabeti 1976; Frey & Probst 1986: 1-43). The Hyrcanian district includes the South Caspian coastal plain and the northern slopes of the Alborz Mountains, up to altitudes of about 3000 meters a.s.l. (Frey & Probst 1986). The Hyrcanian region (province) is a temperate deciduous forest ecosystem that has been classified as a plant biodiversity hotspot, with high biological diversity and endemism of flowering plants. This unique ecosystem belongs to the Euro-

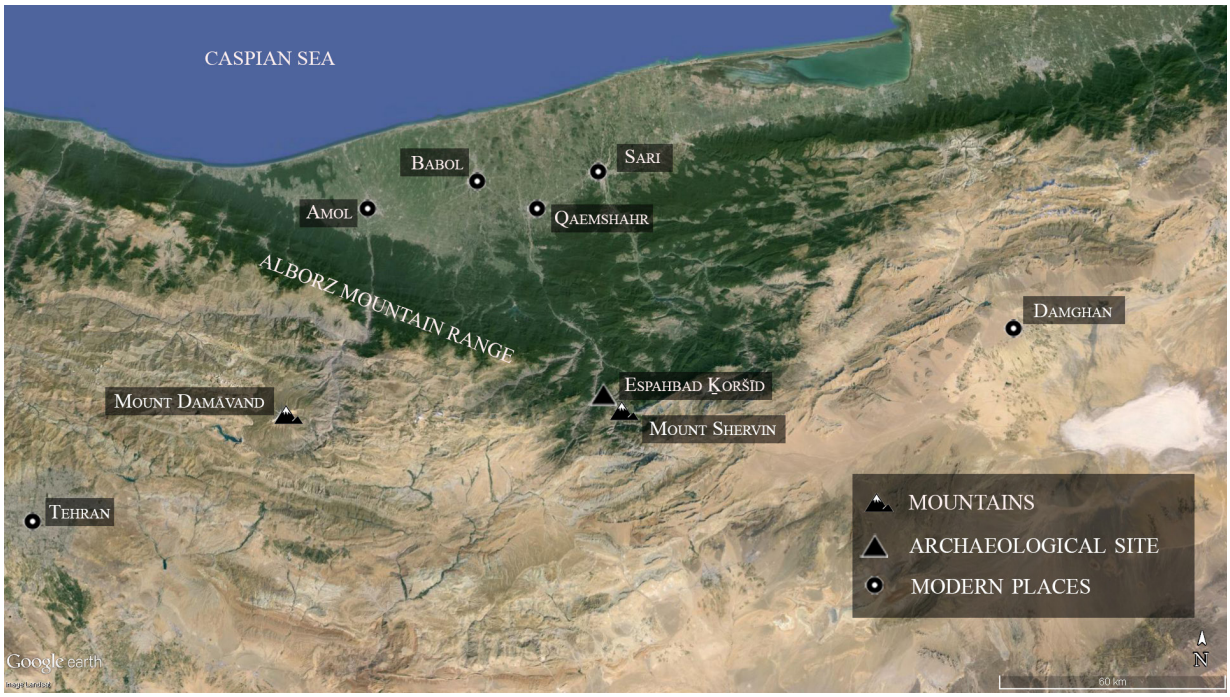


Figure. 1: *Satellite image showing the location of Espahabad Khorshid Cave (After: Google Earth 31/12/2012).*

[1] The majority of this account of the history of the Dabuyid dynasty was translated directly from the Persian work by Ibn Isfandīyār, Muḥammad b. Ḥasan (Ebn Isfandīyār 1941).

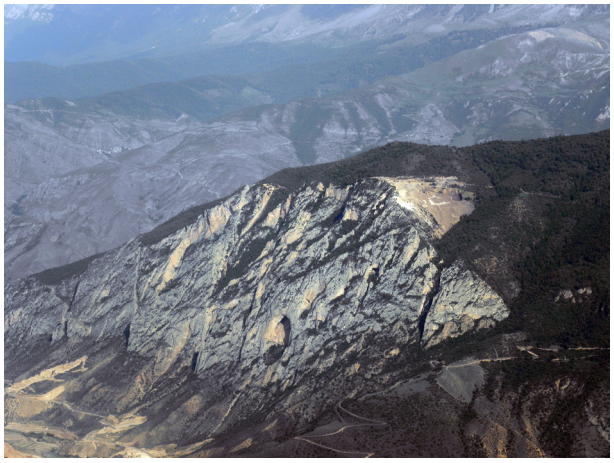


***Figure. 2**: General view of Mount Shervin with Espahabad Khorshid Cave from the west.*

Siberian floristic region and hosts relict flora which have survived the Quaternary glaciations (Jafari *et al.* 2015). On the basis of environmental factors, the Hyrcanian region is one of the four Ecological Zones of Iran which have different physiographical and climatic conditions. Hyrcanian forests extend from sea level up to an altitude of 2800 meters a.s.l. and include different forest types thanks to the considerable number of woody species (trees and shrubs) combined in various plant associations, according to the altitude and ecology of the terrain. The Hyrcanian forests are regarded as one of the major refugia areas for many temperate broad-leaved trees during the Quaternary glaciations. The survival of Arcto-Tertiary relict elements, such as *Zelkova carpinifolia*, *Parrotia persica*, and *Pterocarya fraxinifolia*, demonstrates that the Albourz Mountains have represented a unique ecological system and an important environmental refuge for temperate broad-leaved trees throughout the Quaternary glaciations (Zohary 1973; Miller 1994; Leestmans 2005; Leroy & Arpe 2007; Akhani *et al.* 2010.).

Architectural Remains

The site of Espahabad Khorshid is a complex of archaeological deposits, not yet explored and still largely unknown, and remains of ancient stone buildings located in three different areas and at various levels inside the cave. All the architectural levels are now completely full of debris fallen from higher up in the structure. In 2015, during a preliminary campaign of archaeological investigation, a systematic survey of all accessible deposits and structures was carried out. No excavation was performed, but some samples were collected, in accordance with the permission issued by the local authorities. The cave has a peculiar shape, with a very large opening but small depth. Structures, which can be attributed to the Sasanian times according to the pottery collected in the cave, the construction technique and some specific architectural features[1] , have been constructed on both sides of the cave on multiple levels. Two minor caves filled with structures are connected to the upper part of the cave, and three transverse corridors linked by means of stairs join together the various constructions. The overall measurements of the cave are 100 meters high and 85 meters wide, with a depth that varies between 2 meters (in the lower part) and 15 meters (in the upper part), for an estimated surface area of 8,500 square meters (Figure. 3). The arrangement of the architectural remains is rather unusual. On the east side, a vertical series of six levels is clearly visible, built against the side of the cave, progressively further back in position with increasing height. On the west side, three architectural levels are still evident (Figure. 4). In general, as is characteristic of Sasanian architecture in Mazandaran, the masonry was built using roughly-worked stones of different sizes bonded with mortar, often with plastered surfaces. The average thickness of walls inside the cave is 70 centimeters, similar to that attested in many Sasanian sites in the region. The mortar was made with gypsum, sand, lime, ochre and water and has the same composition whether used for bonding wall courses or rendering. The average thickness of the mortar used as a surface finishing is between 4.5 and 6 centimeters. The natural rock of the cave was used in various different ways. Many rooms of the complex have walls carved directly from the bedrock itself, without the need for masonry. Almost all the stone-built walls were built up against the rock face, and are based on stepped foundations cut from the rock. In addition, the stairs were founded

[1] We are referring to the use of small and medium sized stones joined with plaster, a technique used in all the Sasanian sites of the region as, for example, the Kangeloo complex, which is located not far from the cave (Soortijee 2003).



***Figure. 3**. General view of the cave from the north.*

on bedrock. In numerous places may be seen the remains of stairs partly cut into the rock, or the stone foundations of superstructures that later collapsed. The stone used for the construction of the walls was limestone likely taken directly from Mount Shervin. Arches occur frequently in the cave, although unfortunately due to poor preservation and accumulated debris, only a few are completely visible and analysable (Figure. 5). All the arches are made of stones and mortar that bears the imprints of wooden beams used for centrings. Two different types of arch for the construction of doors and stairs have been documented: arches narrower than the distances below, attested in several part of the site. These resemble arches in the fortress of Kangeloo and in the Div Khaneh Cave, nearby Sasanian period structures (Keshavarz 2012: 19-21). A second type of arch occurs in two doors located on structures in the first level of the lower western complex. This kind of arch, usually called horseshoe arch, is widely found in all Sasanian architecture (Mazhari Motlagh 2011). Originally the recesses would not have been visible, as the arches were completely plastered; they served to better support the stucco decoration inside the arch. From the eastern to the western side of the lower part of the cave ran a long stone-built corridor 85 meters in length. Today only the ruins of this passage remain in the central part of



***Figure. 4**. Detail of the first level on the western side of the cave*



***Figure. 5.** Remains of a door where stucco decorations are missing*

the cave, for a total length of 22 meters and maximum height of 16.30 meters. This central group of structures is very poorly preserved, being those most easily reached. Between the amorphous walls are clearly distinguishable the ruins of a

rectangular room, partly constructed with stone-built walls and partly hewn from the bedrock. The room was entered from a door that is still partly visible. From the room starts a staircase, partly built with stones and partly carved from the rock, but badly damaged, that probably originally led to the central corridor of the cave. Unfortunately, the stairway now survives only to a height of 3.6 meters. Ruins of the foundations of this central part are still visible more than 10 meters below in the access level of the cave. At mid-height, in the middle of the cave, about 46 meters from its bottom, a large transverse corridor crossed the cave from east to west. This corridor would have been built to connect the upper level of the lower east complex with the upper western cave. The corridor is preserved for a length of 20 meters; the other parts have completely disappeared due to the way it was constructed. Indeed, the corridor, built using medium sized stones and mortar, jutted out from the steep rock wall of the cave, and the missing sections have collapsed down the slope. The building materials used were small pieces of rock and mortar, and the passage was 4 meters wide. The corridor was connected to the lower eastern complex by stairs partly cut into the bedrock, that began from the second terrace on the eastern side. Some parts of the stone structures built for this staircase are still visible in situ. The most important parts of the complex were situated in two caves connected to the two upper corners of the main cave. The western cave is partly known due to the work of explorers, but unfortunately nothing is known about the eastern cave. Reports and photographs made by an explorer suggest that structures are definitely present inside. A big transverse passageway connected the two upper caves. The corridor was constructed at a height of about 85 meters above the lower part of the cave. Two sections of this corridor are still preserved but, due to their position, measurement was impossible. The total length of these two sections may be estimated as 15-20 meters. The height of the corridor is between 4 and 6 meters, but nothing is known regarding its width due to the extreme difficulty of reaching the structure. The west cave is the better-known part. This was organized in two main areas divided by a central main corridor. A possible entrance doorway to this cave has probably fallen below, since the remains of some stone-built foundations are still visible attached to the rock. The east-west oriented corridor was more than 12 meters long and about 1.5 meters wide. Two doors are still visible on the south side, one of which leads to a corridor covered by a typical Sasanian arch, with the arch narrower than the aperture. A few stairs start from the gate, with four steps leading to the corridor level. This lateral corridor ends after 4 meters, directly against the rock. Some doors originally led to other rooms, probably two on the east side and one or more on the west side, but which now are not clearly visible. A second door on the main corridor is perhaps 1.30 meters wide, but the area is badly damaged and it is impossible to measure the exact dimensions or understand the arrangement of the structures inside. On the north wall of the main corridor there are the remains of two very poorly preserved doorways leading into a big room 8 meters long and 5 meters wide. This was the central room of a complex that occupied three floors. The roof of the room was a big arch, now partly destroyed, through which one can see the upper floor of the complex, largely destroyed. A large hole excavated by illicit diggers has exposed the ruins of another lower floor; the only architectural feature still visible is a door with an arch. In total this three-floored structure, a veritable palace, was at least 11 meters in height. This should be confirmed by the observation of the big wall built on external part of the cave. A group of three cisterns is located in the eastern side of the site, just outside the lower part of the cave. The cisterns were constructed to collect the water from natural springs, rain and from the melting of the winter snow, and thus to supply water to the inhabitants of the cave. All the cistern cavities were lined and waterproofed with a layer of mortar 4.5 to 6 centimeters thick. Given that all the cisterns are partly infilled, it is impossible to establish their original capacity before excavation. In front of cisterns 1 and 2 there was an artificial terrace constructed for the protection of these structures. The artificial terrace, partly damaged, was composed of small stones bound by mortar with overall dimensions of 14.10 meters long, 2.25 meters wide and about 5 meters high, with 7.20 meters difference in level between the two extremities.

Preliminary Analysis of the Wood Samples

Throughout the three-day survey at Espahabad Khorshid Cave, special attention was paid to searching for archaeological evidence, i.e. pottery fragments and other archaeological material, in order to trace a very preliminary cultural and chronological sketch of the surface deposit. The aim of the survey was not to excavate but to collect material and data in connection with the main architectural structures which had not been noticed until then. The materials collected consist of few diagnostic pottery sherds, currently under study (some of which have been attributed to late Sasanian times and to the Ilkhanid period[1]) and three samples of wood obtained from beams still inserted in their original architectural context (Figure. 6). The samples were collected in the so-called first level of the eastern buildings complex of the Espahabad Khorshid Cave. Non-structural woods were also recognized in the building ruins and their number has been considered of relevant interest because the analysis of these wood remains can gave direct information about the exploitation of the local wood resources and about the ancient environment. Moreover, like all the wooden remains present in the cave, they can provide valuable technical information and chronological data by means of C^{14} dating (Figure. 7); they were numbered as samples EKC 1, 2 and 3. The timber structure (Figure. 8) from which EKC-1 (Figure. 9) was taken was clearly visible on the ground, while the two other structural timber elements (planks?) from which samples EKC-2 (Figure. 10) and EKC-3 (Figure. 11) were taken were found not far from EKC-1, mixed with other stone and plaster fragments that had fallen on the ground. The last two timbers were sampled though their origin was uncertain, since it was the first survey and the team decided that the three samples were enough for a preliminary study and they did not want to take more samples from timber structures to avoid damage. The identification of each sample was based on the study of three classic sections: transverse, tangential longitudinal, and radial longitudinal. Vessel elements, parenchyma, rays, fibres and other cellular elements were observed as well. The observed anatomical patterns of each sample were compared with anatomy atlases and a specialized bibliography (Greguss 1959; Schweingruber 1978; Schweingruber 1990; Niloufari 1986). The anatomy of the three wood samples made possible to identify them as: EKC 1, oak, *Quercus* sp.; EKC 2, ash, *Fraxinus* sp.; EKC 3, oak, *Quercus* sp. The surface of the sample EKC 3, the best preserved sample, was cleaned in order to observe the growth features under low magnification, because the rhythm of plant growth can be altered by a number of different factors, such as environment, climate, human exploitation, animal grazing, microorganism attack, etc. (Schweingruber 1996). Trees are considered natural proxy data recorders and they can represent reliable archives for historical environmental and climate information. The rings of a timber are directly connected with the age of the plant, and their number can be used to determine how old a tree is. The size (width) of each ring is determined by a tree's growth rate, which in turn is determined by environmental conditions. Drought years produce narrow growth rings, while the years of plentiful rain generate wide growth rings, so the ages of climatic events can be worked out very precisely by counting back the rings and measuring the size of each ring. The wood sample EKC 3 examined in cross section displayed a long sequence of about 200 rings with a variable ring size (width), due to periods of good growth (wide rings) and poor growth (narrow rings). The tree from which the original lumber was cut, after an initial period of good growth lasting about 45 years, suffered a long period of about 60 bad years of poor



Figure. 6: *Wooden beams in situ from the fourth level of the east side.*

[1]Among the sherds, we recognized fragments of typical cream ware, plain and unglazed, characteristic of the Sasanian period and some glazed pottery typical of the Ilkhanid period.



***Figure. 7**: View of the first terrace on the lower eastern side of the cave.*



***Figure. 8:** Timber structure on the lower terrace on the eastern side.*

growth, marked by very narrow rings, and followed by an alternation of good and poor growth. Although the EKC-3 sample was taken from a building structure supposed to belong to the Sasanian period, until now no absolute dating evidence has been available to confirm the suggested chronology, but (sub)samples of the identified woods have been submitted for radiocarbon dating by AMS. It would be of great interest to know the age of that wood sample, and also of the other wood sample relating to the Sasanian occupation of the cave, because of a major climatic event that began in AD 536 and lasted until at least AD 545 (Baillie 1994; Helama *et al.* 2018).



***Figure. 9:** Wood sample EKC 1.*

Conclusions

In conclusion, it is important to underline that given the extension and complexity of the architectural remains, it appears clear that the cave was occupied for quite a long period. It does not seem possible that the Dabuyids built the complex



Figure. 10: *Wood sample EKC 2.*



Figure. 11: *Wood sample EKC 3.*

during the last stages of their existence. The cave was probably in use before the Abbasid invasion as a sheltered residence, an hypothesis suggested because of its exceptional location. In the absence of any kind of archaeological investigation it is premature to suggest that the cave was occupied during the pre-Sasanian period, although this hypothesis cannot be excluded. In any case, with regard to the information collected to date, certain architectural details indicate the presence of several construction phases, probably more than one relating to Sasanian times. This is suggested by the presence in the cave of two distinct types of Sasanian arches, a circumstance that could suggest the occurrence of more than one architectural intervention during this epoch. The site is evidently of great historical and archaeological interest and needs to be studied in depth because of its unique character. However, there are many problems connected with the morphology of the site, especially with respect to the exploration and conservation of some parts of the cave settlement. In fact, many parts of the structures have fallen down due to the steepness of the rock face, the infiltration of water and the growth of vegetation. Large parts of the middle and upper transverse corridors have collapsed for these reasons, leaving exposed the rock-cut structures that supported them. It is clear that future projects will inevitably require close collaboration between archaeologists and climbers for the safe exploration of the complex, and restorers for its conservation.

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