

Persian translation of this paper entitled:
بررسی و تحلیل کاربری فضاهاى دست‌کند حاشیه آبگرم ورتون استان اصفهان
is also published in this issue of journal.

Function Analysis of Man-made Caves Near Vartoun Hot Spring in Isfahan Province

Hassan Basafa*
Mohammad Sadegh Davari**
Mohammad Hosein Rezaei***

Abstract

Vartoun village is located 35 km North East of Isfahan County and is an administrative unit of Sagzi County. Karkas mountain range with a height of over 3000 meters covers North and West of Sagzi County as well as Vartoun village and a relatively flat plain covers other areas of this country. Villages and springs emerged in the margin of these mountains, which are considered the origin of contemporary nomadic people in these areas. During visits to villages and springs in this region, man-made caves were discovered in the margin of Vartoun hot spring. As far as we know, the man-made architecture has been developed in different periods and situations with various functions such as residence, refuge, warehouse and animal shelter. In this study, we first attempt to introduce spatial archaeology, architecture plan analysis, Annales school historiography approach and the collection of man-made caves of Vartoun hot spring in its historical-cultural context and analyze its application and creation time. Spatial and building material analysis as well as survey results of man-made caves in the historic-cultural context of Vartoun hot spring, given the therapeutic importance of hot spring and its long distance from nearby cities and villages, indicates a temporary residential use of man-made spaces before the Seljuks.

Keywords

Vartoun, Hot Spring, Man-made Architecture.

.....
*. Assistant Professor, Department of Archaeology, Faculty of Humanities, Neyshabur University. hbasafa@gmail.com

** . Master of Archeology. sadeghdavari@yahoo.com

***. Assistant Professor, Department of Archaeology, Faculty of Humanities, Neyshabur University. mohammad.1561@yahoo.com

Introduction

Hand-carved works have been created by humans in different times and situations based on the needs of human societies, and have had different applications such as residence, shelter, cereal and forage barn, animal housing and so on. Hand-carved architecture is a context-oriented architectural manifestation with an emphasis on coordination with terrain and the linkage of an environment with space. In hand-carved architecture, each building is formed based on historical, social, cultural, physical and climatic contexts specific to a region. Hand-carved architecture is a type of architecture in which the reduction process is used to create space. In other words, unlike the space that can be provided by the aggregation of building materials in conventional architecture, such a space results from carving parts of a solid mass or volume in hand-carved architecture, and thus it has been known as cast architecture. In the classification of context-oriented architecture, hand-carved architecture can be considered as a combination of physical and climatic context-oriented architectures (Pahlavan Alamdari and Amini Badr, 2014). In addition to numerous monuments from various periods, Vartoun Spa Complex has a set of hand-carved spaces located on the southern tip of the spa. The historic structures and spring houses of this complex were registered in Iranian National Heritage List in 2006 (Bektayan and Shabani, 2006), while there is no mention of hand-carved spaces in the registry of this complex. An important factor in the failure to identify, record and introduce the hand-carved spaces of Vartoun Complex is that the hand-carved studies are still in their infancy. Identification of these spaces is related to a visit by the author with the purpose of exploring the Vartoun Spa complex. In this article, we attempt to illustrate the application and relative chronology of the hand-carved complex using archaeological approaches after introducing the hand-carved collection.

Problem statement

Considering the fact that the Vartoun Spa collection

of hand-carved architecture is the first reported hand-carved architecture in northeastern limit of Isfahan Province, which virtually makes it impossible to compare and contrast it with similar examples in non-adjacent areas, this complex has been neglected in historical texture of the northern limits of Isfahan (the modern counties of Borkhar and Koohpaye), or second territory of Isfahan known as the Balad Kuhāb, which has been mentioned in many historical geography books. Therefore, the correct understanding of this collection, interpretation of its creation time in a chronological framework and analysis of its space applications can be considered as an appropriate study field to interpret the new findings that will be investigated in the future. According to the above statements, this study seeks to answer two fundamental questions: relative chronology and creation time of this complex and the application of its spaces. The hypotheses raised in relation to the above questions include the application of temporary resort for travelers and patients referring to the spa, and its construction dating back to the pre-Seljukid period, namely Sassanid period or early Islamic centuries, according to basics of comparative chronology. There are pieces of evidence for this claim in the complex, which have been demonstrated as research results in line with conducting the current research.

Research background and designation

Kandovan village, Hilevar underground village in East Azerbaijan, rocky village of Meymand in Kerman, Noushabad underground complex in Kashan, the artificial part of the Karaftu Cave, the Samen Malayer and Arzanfoud Underground Complexes in Hamedan are the most prominent examples of hand-carved architecture in Iran (Hemati Azandariani and Khaksar, 2013: 489-490). Several studies have been conducted on hand-carved works in recent years, the most important of which was the holding of the first National Conference on Hand-carved Architecture in Kerman (Ashrafi, 2012). However, architectural studies were accelerated with the submission of

Global Registration Record request for hand-carved works of the village of Meymand, the most important outcomes of which were the holding of the second and first international congresses of hand-carved architecture to introduce the hand-carved complexes, hand-carved architecture morphology, climate, nature and energy in hand-carved architecture, beliefs, dogmas and verbal culture in hand-carved architecture, sustainable development and hand-carved architecture, conservation, restoration and revitalization of hand-work architecture, as well as contemporary hand-carved architecture, social and economic interactions in hand-carved lodgings by the Institute of Historical and Cultural Monuments (Ashrafi, 2015).

Although there have been several studies on historical monuments of northern (Borkhar) and eastern (KooHPaye and Sagzi) counties of Isfahan Province, there has been no comprehensive field research in this regard so far, and the identification of works in these areas has been limited to random and interview methods based on historical sources, which has been associated with shortcomings. The Vartoun Spa Complex hand-carved works have been accidentally detected by the author, whereas the Spa Complex has been registered in the National Heritage List, but this collection has been ignored by the experts responsible for recording this complex. Therefore, since this collection was unknown until recently and as no research has been conducted on it, no significant research background can be considered for this collection. For this reason, as mentioned in the previous section, the exact understanding of this collection and interpretation of the time of its creation in a chronological framework along with an analysis of the application of its spaces can be an appropriate study field for the interpretation of new findings in adjacent regions.

In historical sources, Sagzi has been mentioned as a village of a namesake rural district. Lotfollah Hanafar notes in his book entitled «Comprehensive Lexicon of the names and ancient villages of Isfahan» that Sagzi has been regarded as a large

village in texts with a good climate that is part of a rural district with the same name. He also points out that this county is located en route from Isfahan to Yazd with a population of 1848 people in 1966. Vartoun is composed of the word «varata» in Pahlavi language that means rose and the suffix «An», which means the place attributed to the red rose (Henfair, 1965: 449). From early Islamic era to Seljukid period, Kuhāb was the largest village of Isfahan after Jay, which extended from Borkhar to KooHPaye and included the modern counties of KooHPaye, Borkhar and Khorasgan (ibid), and this complex and Vartoun region was among the villages of Kuhāb area in a pre-Seljukid.

Theoretical Foundations and Research

Method

Spatial archeology is the most practical approach to analyze the application of hand-carved collections. It is an academic effort to retrieve information from spatial communications as well as human behavior patterns in relation to architectural spaces and their intrasite and extra site surrounding networks (Karimian, 2005: 112-113). This branch of science makes a significant breakthrough by taking advantage of various disciplines such as environmental, human, economic and political geography (Nast, 1996: 44), sociology and anthropology (Allison, 1999: 1-100; Singleton, 2001: 98), and ethnoarchaeology, architecture, and land-based statistical data. In spatial archaeology, no description of architectural, aesthetic, typological and historical evolution course of structures and comparison of their artistic aspects is intended except for inevitable cases; instead, information on spaces, whether tangible or intangible, are retrieved and studied as a whole and in relation to each other in comparison to other places in order to understand the social, economic, political and cultural nature of their creators (Karimian and Ahmadi, 2015: 104 & 105).

There is research potential in space archaeology in various ways. In the study of spaces in the urban context, the researcher is required to compile

information on biological, social, economic and political components, communication paths, state centralization and other components of a society that are geometrically analyzed with the output of geo-maps, as well as the study of spaces in an architectural complex in which the researcher collects all the evidence with respect to the use of spaces and their use cases in the internal environment. In addition, the researcher attempts to test various assumptions about the use of spaces, matching of spaces with similar samples, modeling based on the available sizes and dimensions, as well as testing the models in relation to the assumptions (see Karimian & Ahmadi, 2014; Hojjat, 1998). Based on this brief introduction, in the present research, considering the concept of space in architecture rather than urban spaces, we have first attempted to collect all the evidence concerning the use of spaces in internal and external environments, including burner holes, luggage storage and living platforms, stone walls blocking entrances to create a safe environment, evidence of the use of fire and smoke on the roof of spaces, the porch and entrance vestibule of spaces and niches. Moreover, plotting the plan of spaces and measuring the dimensions and sizes of the phenomena present in the spaces, including the width of entrances, the height of roof, dimensions of niches, and the height and width of the living quarters were put to test by several individuals for efficiency and use, which achieved good results. The method of this research to determine the relative creation date of this complex was the use of Annales school historiography approach with an emphasis on comparative method of Mark Bloch, namely research with regard to a particular zone or area of interest by searching and exploring with a contemporary zone in another region, country or continent, or just with the same area at a time» (Clark, 1999: vol. 4: 51-63), which ultimately leads to the study of Vartoun Spa Complex in its historical-cultural context in different periods.

The purpose of this research is to introduce the typology and provide the relative chronology and spatial analysis for this complex. First of all, we try

to introduce this complex with a descriptive method and an archeological approach by citing the collected and documented data, as well as library information. Then, the use and relative chronology of this complex will be dealt with using descriptive and comparative methods along with a space archaeology approach and Annales school historiography (i.e. reviewing the data in their own geographical and cultural context).

Study Area

The village of Vartoun from Sagzi city is located in the easternmost point of Borkhar on the border between Borkhar and Koohpaye counties. The Vartoun spa is located 12 km northeast of the village of Vartoun. This spring has been referred to as the "Sagzi Abad Spa" in texts (Siro, 1978). This spa is located at 32°55'121''N 52°71'32''E coordinates (Fig. 1). Next to this spring is a collection of buildings, including the old spa building and spring house, the spa therapist's tomb, the set of lodgings and hand-carved complex (Fig. 1).

Geology of the region

Geologically, this area is located in the midst of young low-lying terraces. The travertines of this area are often located directly on the Oligomyocene limes (Qom Formation) and match the younger sections of Quaternary alluvial deposits. The possible Vartoun fault is seen with a northwest-southeast trend, of which there are several travertine-made fountains (Mosaddeqzadeh and Nasr Esfahani, 2011) (Fig. 2).

Description and introduction of hand-carved spaces

Within 30 meters of the southern front of Vartoun Spa, there is a rock with an approximate size of 25x40 meters with a height of six meters from the surrounding land on which two fully hand-carved spaces and a composite hand carved-constructed structure have been created on the western side of the rock. To better describe and explain these spaces, they were named A space from the north, combined and middle

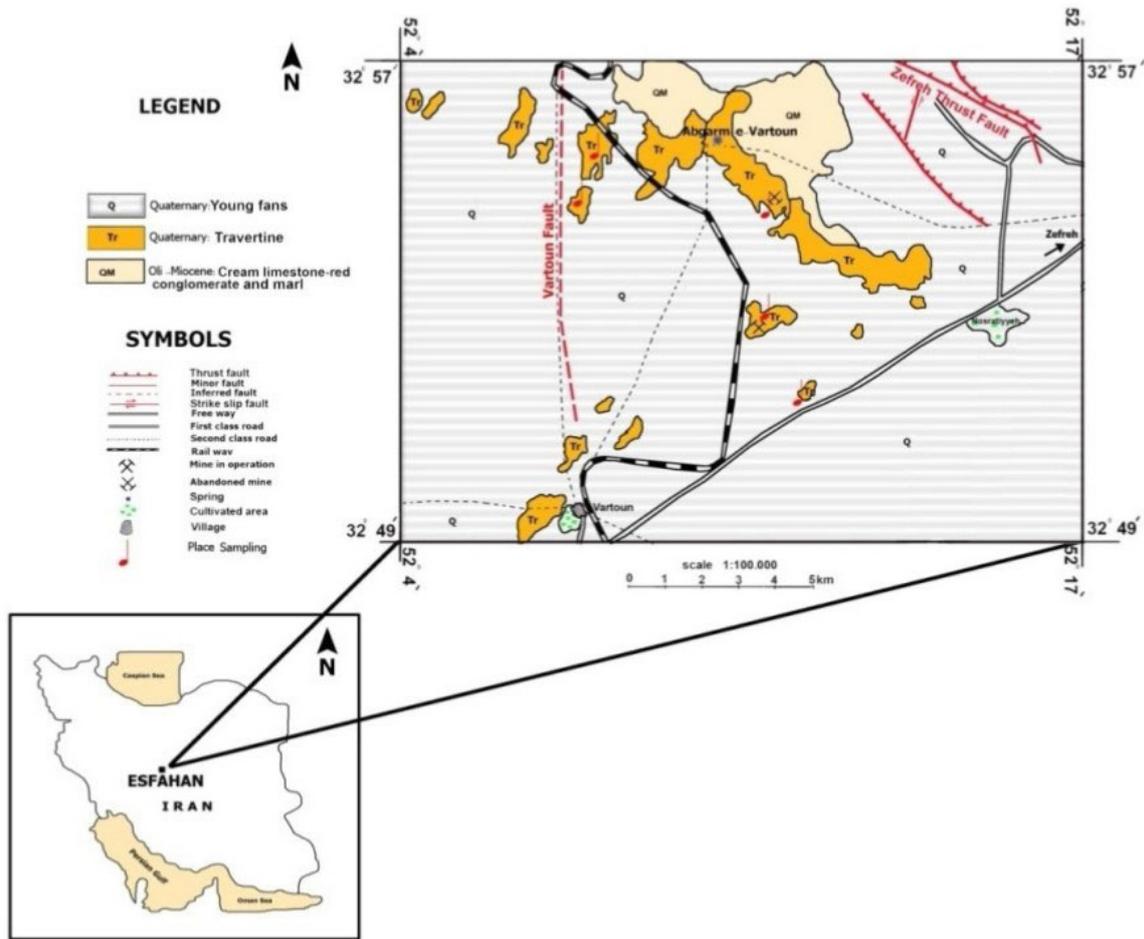


Fig. 1. Geological map and geographic bed of the Vartoun spa hand-carved complex. Source: Mosaddeqzadeh and Nasr Esfahani, 2011.



Fig. 2. The location of the historic monuments of the Spa Complex. Source: Google earth.

B space and the south C space, respectively (Plan 1).

Space A

Space A has been created in the northernmost part of the rock and has two entrances with a height of 3 m and a width of 3.5 m, which have been blocked by a stone wall. There is only a space on the right side of the entrance with a width of 80 cm and extending to the roof for coming and going, which has been tested with the hypothesis of human use of these spaces (Fig. 3a,b). A natural cylinder-shaped column extending from below the roof up to the floor separates these two spaces from each other, which is a function of cast process to create space (Fig. 3c). The space A has a surface area of nearly 73 square meters having holes on walls with different uses such as niche, as well as the torch and burner holding places. In the southernmost part of this space, there is a platform with a height of 60 cm, an approximate width of 65 cm and a length of 80 cm with an unknown application (Fig. 3d). There is a portico-

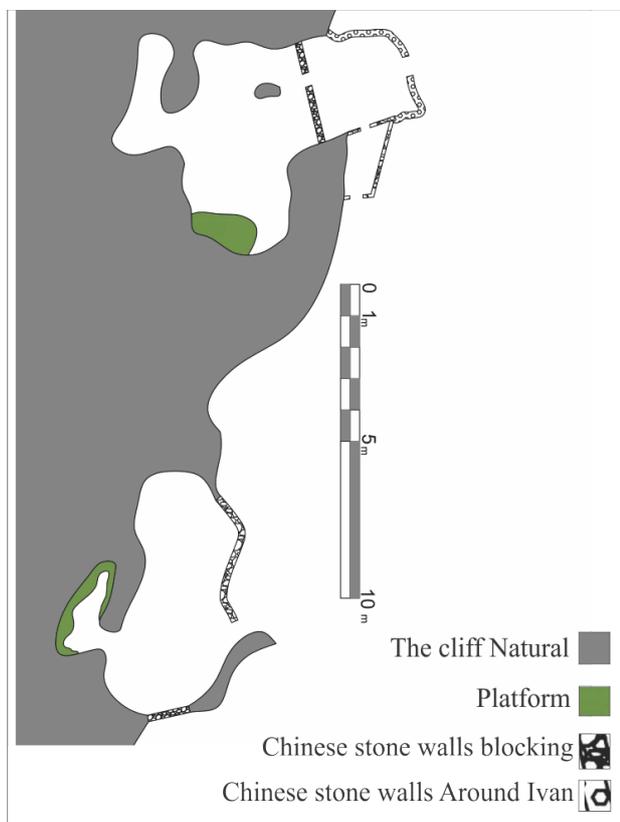
like or vestibule-like space with 3.5×5.5 dimensions surrounded by cut stone fragments so that space has been completely created inside the rock as a cavity.

Space B

Space B with 1.5×2 dimensions is a combination of hand-carved architecture and construction, half of which is hand-carved and the other half a stone structure. The entrance of the space with a height of 70 cm lies on the southern side with a fireplace and cube-shaped niches. The space roof is a semicircular arch and is made of flat cut stones (Fig. 4).

Space C

This space lies 16 meters south to space A. It is divided into northern and southern parts, and a stone wall like space A blocks the front of these two parts, separating the northern and southern parts of this space (Plan 1). The width of space C that lies on its left side is 80 cm (Figure 5a). The northern part of this space is simple with a height of nearly 2 m (Fig. 5a). The southern part of this space has a height of 110 cm with a length of 2 m and width of 1.5 m with holes on walls of the southern part that are used for placing appliances, burner or torch. A natural platform of rock with height and width of 30 cm surrounds this part. Holes have been created in lower parts of these platforms that are similar to the place for placing shoes (Fig. 5b).



Plan 1. The hand-carved spaces. Source: authors.

Monuments of Vartoun Spa Complex

The Vartoun Spa Complex, which is still used because of its therapeutic importance, includes an old stone spring house. In view of typology and study of historical texts (Siro, 1978), it belongs to Seljukid period, to which other parts have been added in the restoration process (Baktayian & Shabani, 2006).

The plan of the building includes four walls with a dome erected on them. According to the remnants, it has been implemented using squinch technique (Fig. 6a) and has arches in terms of architectural elements, which has been constructed with square-shaped bricks in 25×25 and 30×30 dimensions

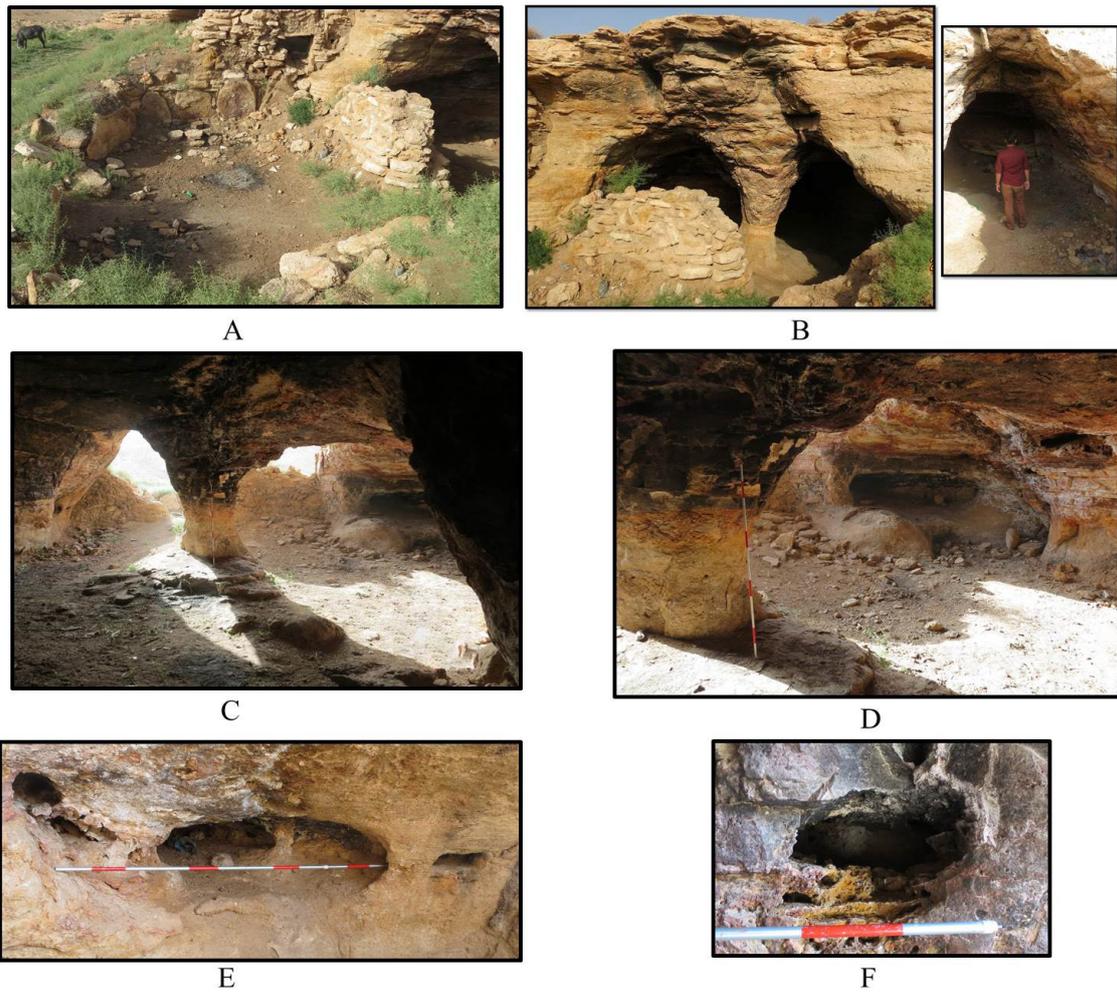


Fig. 3. a) The enclosure surrounded by stone fragments (portico or vestibule). Source: authors.
 b) Entrances and the stone wall blocking the entrance of space A and testing the entrances for human use. Source: authors.
 c) Internal view of space A and the natural column inside the space. Source: authors.
 d) Southern platform of space A. Source: authors.
 e) Location Luggage. Source: authors.
 f) Location Torch. Source: authors.

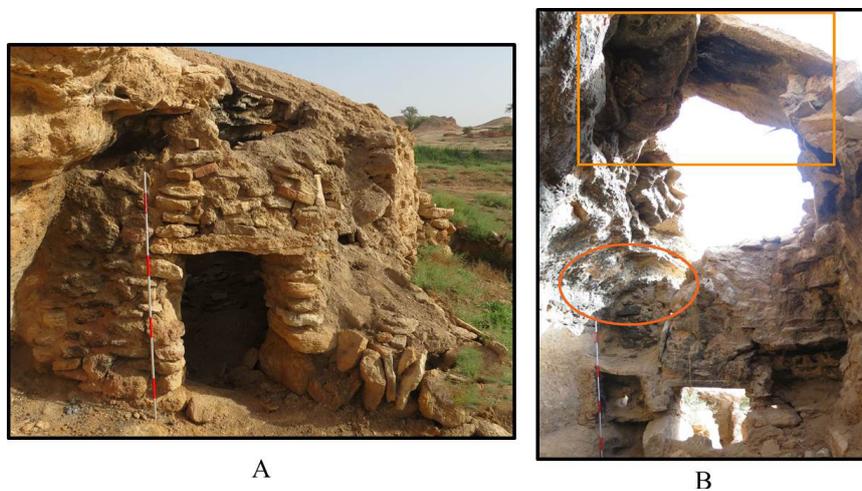


Fig. 4. a) Southern view of space b) entrance to the space. Source: authors.
 b) Internal view of space b) Arched and combined roof. Source: authors.

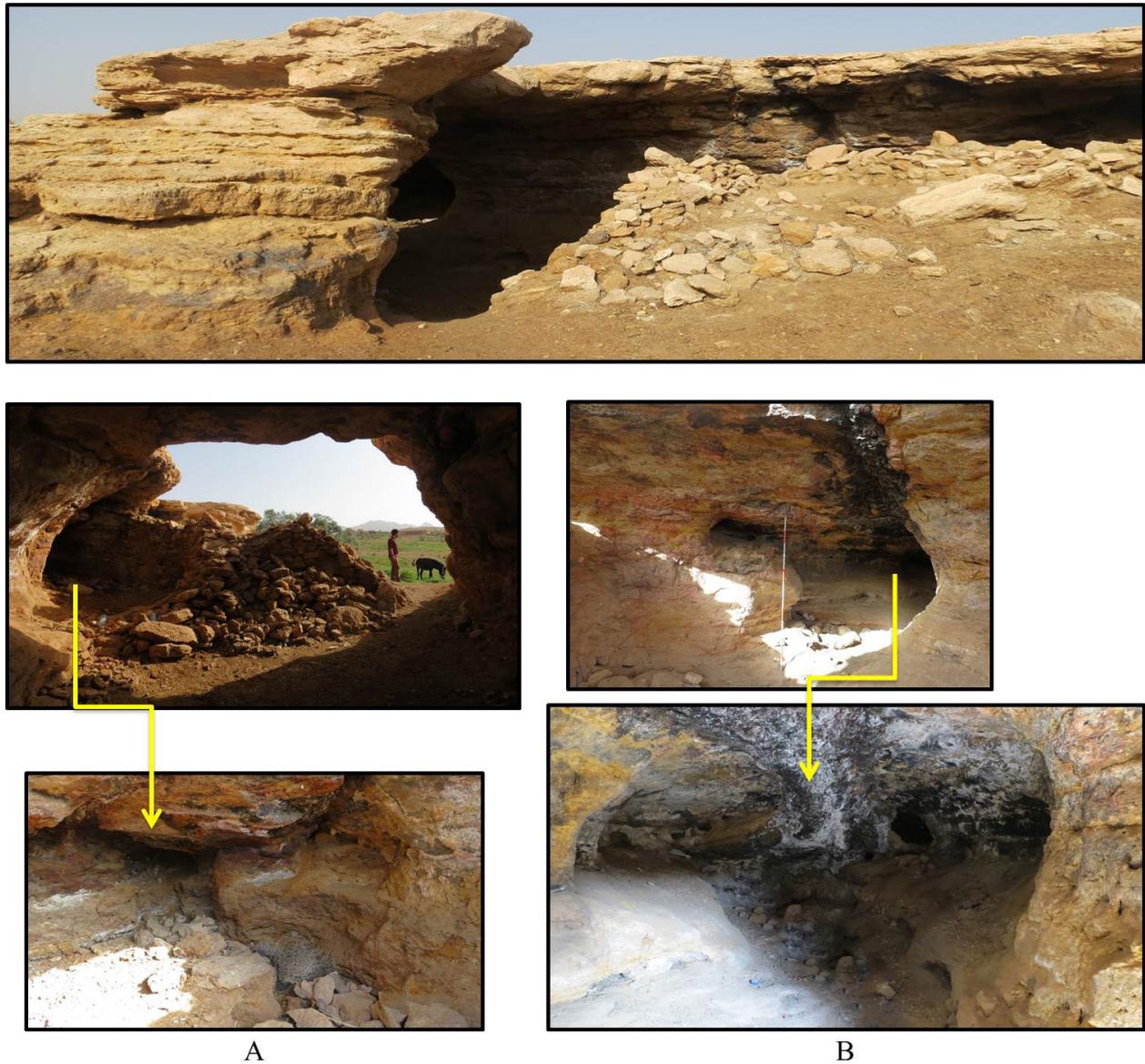


Fig.5.a.NorthernpartofspaceC.Source:authors. b) Southern part of space C. Source: authors.

with a thickness of nearly 5 cm with a mortar-like mordant. Plinths of limestone and travertine rocks of white and mustard-yellow colors extracted from the mines of the same area with a height of 50 cm have decorated the interior of the building, which prevented the penetration of moisture in the brick body of the building (Fig. 6a). The spring house of this building has two parts made of cut pieces of stone with a length of 50 cm and a thickness of 12 cm. In later periods, the destroyed parts of the spring house have been restored by bricks in 25×25×5 cm dimensions during the restoration process (Fig. 6b).

During the Safavid period, some structures were added to the spa complex, including a new spring house near the Seljukid period spring house (Morad spring house) made of bricks in 25×25×5 dimensions with mortar as mordant (Fig. 2).

In the east of spring house from the Seljukid period, there is a complex known as spy therapist's tomb, or Turkish Tugan Tomb according to local people. There is no mention of the buried person and history of the tomb in historical sources. The plan of the building is of a domed char Taghi type made of clipped stone (local building materials) in

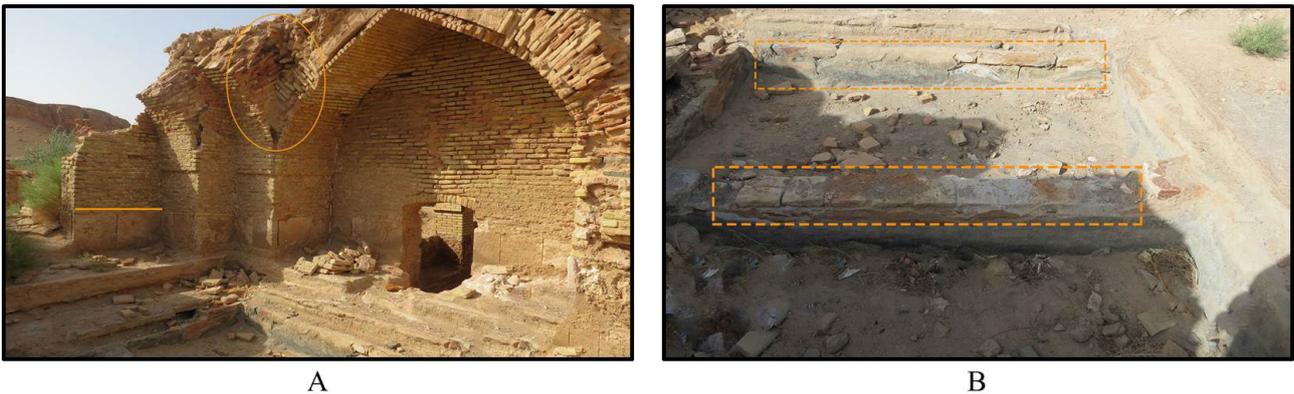


Fig. 6. A. The Seljukid period spring house-squinches connecting the dome and stone plinths. Source: authors.
 b) Morad stone basin made of stone fragments and restored by brick. Source: authors.

northwest-southeast direction, and the dome has been implemented using squinch technique that is similar to pre-Islamic charTagh is, as well as domed shrines of early Islamic period in the region (Davari, 2013 and Ahmadi, 2012). There is a porch with 3×1.5 dimensions on the southwest side of the building (Fig. 7 & 8).

The set of rooms meant for accommodation is located on the southwest side of the spa therapist’s tomb (Figure 9). The building blocks of these rooms are stone similar to spring house from the Seljukid period, which has been restored by bricks of 25×25×5 cm dimensions using mortar as mordant. The entrance of the majority of these rooms is low-lying with a height

of about 80 cm with internal elements of fireplace and niche. The dimensions of rooms vary from 2×1 to 2×2m. The presence of these rooms reflects the settlement of patients visiting the spa, as well as the passengers passing from Nayin to Ray road, which was one of the major branches of the Great Khorasan Road that passed nearby this area (see, Siro, 1978).

Discussion and analysis

Annaleschool is a historiography school of nineteenth and twentieth centuries, which was developed in France. Based on this method, attempts are made to introduce acceptable theories and interpretations in order to interpret history in a systematic way.

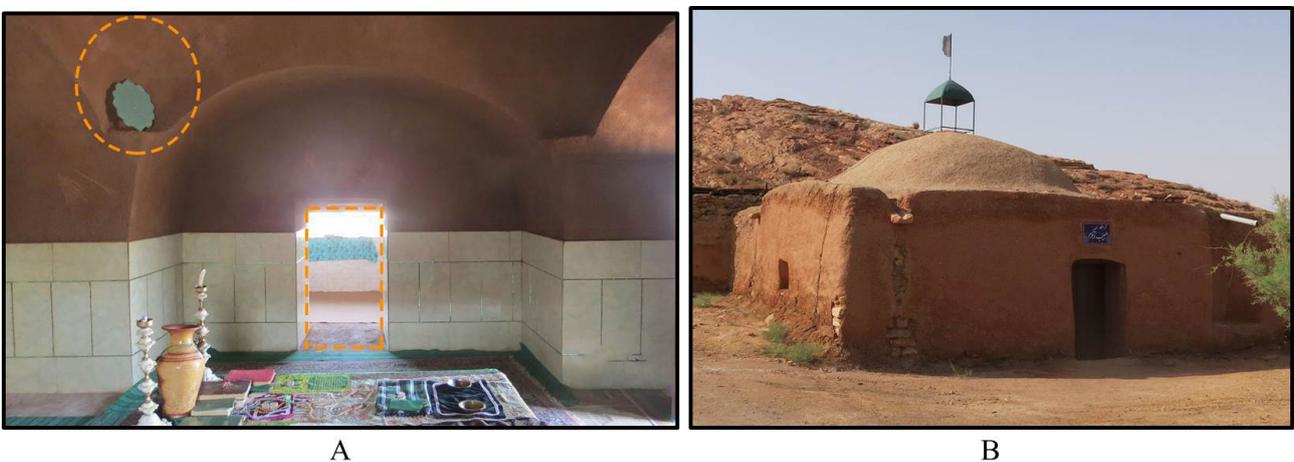


Fig. 7. Chartaghi of spy therapist’s tomb, entrance to porch and position of squinches. Source: authors.

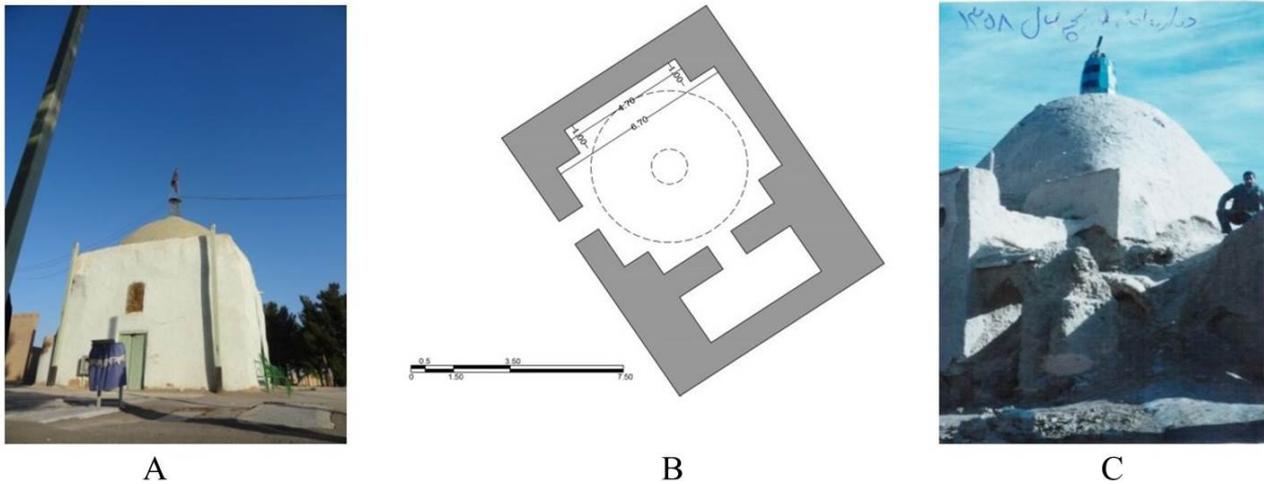


Fig. 8. a) Chartaghi of Shahfirooz Shrine b) The chartaghi plan of spy therapist's tomb c) Chartaghi of Ludaricheh. Source: authors.

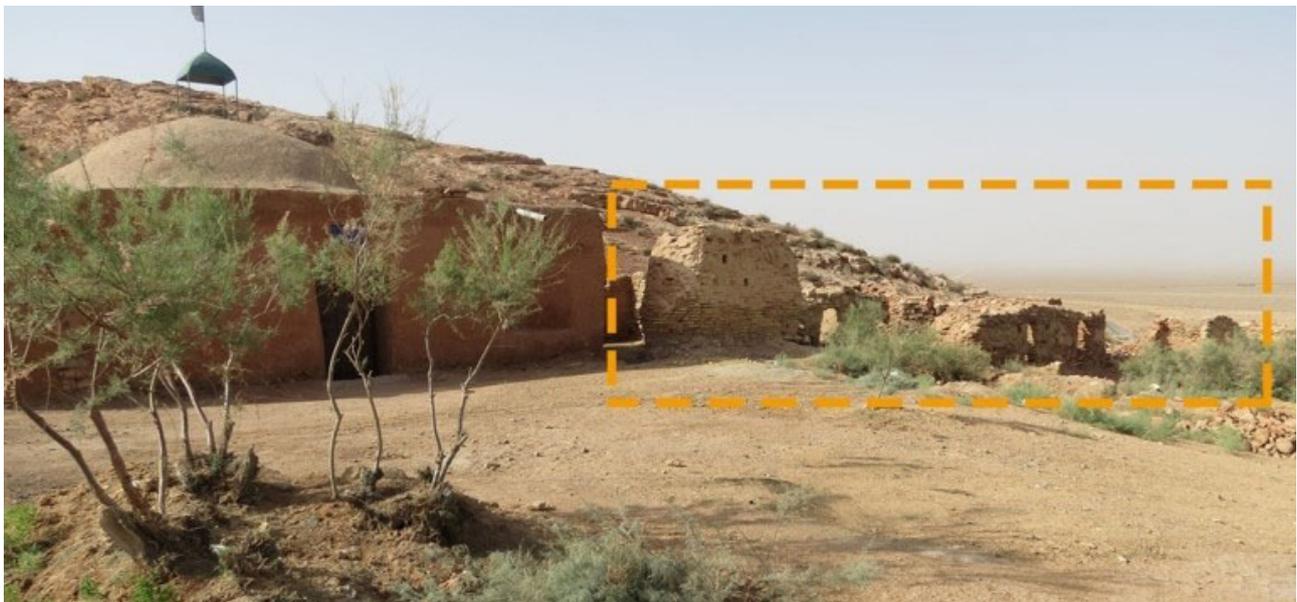


Fig. 9. The collection of residential places of Safavid period. Source: authors.

The development and expansion of social sciences along with natural sciences in the nineteenth century, especially in France, played a major role in the emergence of the Annales historiography school. Recognition of the necessity of convergence between history with other social sciences (and even some natural sciences) was the main factor behind the success of the scholars of this school, as well as its spread outside of France and Europe (Fazlinezhad, 2009). Overall, the annals school and the practical method of Mark Bloch are approaches that

deal with anthropology and history of contemporary human life in a given spatial and temporal context, especially in rural contexts and local history. The historiography approach of Annales school was used for relative chronology of hand-carved spaces of Vartoun Spa using the comparative method of Mark Bloch (Clark, 1999: Vol 4: 51-63). The hand-carved spaces were reviewed in a certain local, cultural, historical and social position, namely the spatial location of Borkar County and the village of Vartoun, as well as the position and background of the historic

Vartoun Spa Complex with buildings of various cultural periods. To determine the use of this complex, a spatial archeological approach emphasizing the concept of space in architecture and not in the city was used, according to which it becomes possible to comment on the creation date and use of these spaces. Given the presence of structures meant for accommodation in historic Vartoun Spa Complex from Seljukid and Safavid periods (see Baktayian & Shabani, 2006), the hand-carved works of Vartoun Spa have been considered for accommodation but before the Seljukid and Safavid periods. The existing pieces of evidence, including the smoke vestiges, narrow entrances, living quarters and luggage holders in hand-carved spaces are indicative of the use of this collection for temporary accommodation. The vestiges of smoke on the walls and roof of these spaces along the burner places indicate the use of fire in these spaces for human needs. The presence of holes indicate the likely places of burner or torch on walls because the vestiges of smoke start from above these holes and extend to the roof of space. The presence of living quarters in space C, holes for the placement of luggage and equipment, the presence of entrances with a width of 80 cm, as well as blocking the openings of these spaces by stone walls to create a safe and secure environment are other evidences of the use of these spaces for housing and human use. Due to therapeutic importance and the presence of the spa therapist's tomb and his status among the inhabitants of Isfahan and surrounding villages, the patients and mendicants (Sufis practicing their rites in the region) visited this complex for various reasons from the Seljukid period and were temporarily settled in the Spa Complex due to various reasons given the transport facilities of that period. The hand-carved spaces of Vartoun Spa Complex have been interpreted in social, economic, political and religious contexts in three levels: micro, semi-micro, and macro (see Karimiyan & Ahmadi, 2015). Multiple spaces from different periods illustrate the importance of this spa for the people and rulers of the region so that during the Seljukid period,

new structures and basins were constructed in this complex, which was restored during the Safavid period and even new buildings were added to this collection. Considering the fact that a number of rooms were constructed for accommodation in this complex during the Seljukid period, which was restored in the Safavid period, the hand-carved spaces were not meant for accommodation during the Seljukid and Safavid periods, and the hand-carved collection cannot belong to the Seljukid to Safavid periods. The building materials used in Seljukid buildings of the collection include bricks in 30×30×6 cm dimensions, regularly cut pieces of stone in different sizes and mortar as the mordant, and bricks in 30×30×6 cm dimensions and mortar as the mordant were used as building materials of the Safavid period. Therefore, if it was necessary to construct buildings for the purpose of settlement in the Seljukid to Safavid periods and even later, the building materials of other monuments would be used for this purpose. In addition, these materials were not even used for blocking the openings, but instead broken pieces of stone have been used for this purpose, which is different from those used in Seljukid period buildings. The use of gypsum mortar is the only common point of hand-carved buildings of this complex (especially in the stone walls in front of the spaces) with the Seljukid period monuments and Safavid buildings, with plenty of mines existing in this region that have been extracted and used in different periods. According to the above statements, the following question is posed: "if the creation time of hand-carved spaces does not date back to Seljukid to Safavid periods, then in what period have these spaces been created? According to the approaches used in this research, the answer to this question will require a review of other evidence in the historic Spa Complex. The only available data and the point that can be mentioned is the char Taghi of the spy therapist's tomb (Turkish Tugan shrine), which is made of local building materials. This building has a char Taghi plan with the northwest-southeast direction (opposite the direction of Mecca), which is similar

to the Sassanid period and early Islamic chartaghis, including Firoz Shah's tomb of Shahpurabad in Borkhar and Ludaricheh char Taghi. Based on a comparative study, the char Taghi structure of the spy therapist's tomb (Touqan Turk) is considered to be the oldest structure of the Vartoun Spa Complex,

which was made neither from Seljukid nor Safavid period building materials, but rather from local building materials with Sassanid and early Islamic char Taghi techniques, which are not definitely unrelated to hand-carved spaces of the complex.

Conclusion

If the hypothesis is correct that the spa therapist's char Taghi structure for which there is no mention of the buried person or construction date of the building in historical texts, which is different with chartaghis of Sassanid period and early Islamic period in terms of architecture style and the use of local building materials, the hand-carved spaces can be attributed to the Sassanid period or early centuries of Islam, or even before the Seljukid period and have been created simultaneous with char Taghi building of Vartoun Spa Complex and were used in later times up to the Seljukid period. From the Seljukid period when a collection of stone chambers were built (that were rebuilt with bricks during the Safavid period), the use of hand-carved spaces was changed and turned into a space for keeping animals like livestock by which the travelers and patients were transported. The green texture and porosity of the soil mixed with animal dung on the floor of hand-carved spaces are also confirmed by the local inhabitants. Therefore, according to the study of evidences, as well as comparative evaluation of building materials, techniques and architectural elements of the hand-carved collection with other historical monuments of the spa, drawing the plan of spaces and testing the architectural elements as spaces with human use in terms of size and dimension, it was clearly found that these spaces had human uses as temporary accommodations for patients and mendicants visiting the spa. Based on comparative studies, the creation time of hand-carved spaces dates back to the pre-Safavid period, namely the Sassanid period and early Islamic times. On the other hand, it should be kept in mind that there is no spring or water source suitable for daily consumption and drinking in the collection, except for hot springs with a high percentage of minerals especially sulfur, which is an important indication of the temporary use of spaces and the lack of association between this collection and ancient water-related rituals because the capacity of biological conditions in the complex does not exceed a few consecutive days given the nutritional and water resources.

The result obtained from this study is a function of visual evidence in the collection, spatial analysis based on the structures in the spaces, in particular the size and dimension of architectural elements, including the surface area of spaces, the height and width of entrances, the roof height of spaces, the dimension of platforms, niches, dimensions of porch structure or vestibule entrance to the spaces, structural analysis in the spatial-historical boundaries (historical-cultural context) of Vartoun Spa, as well as written data. Therefore, there is a need for archaeological exploration to prove the raised assumptions and to obtain a larger population and more accurate dating.

Reference list

- Ahmadi, A. A. (2009). *Space and Society in Satellite Townships of Isfahan in the Safavid Period: The Case Study of the Moorchehort and Ghurtan*. Doctoral dissertation. Tehran: The University of Tehran, Faculty of Literature and Humanities (not published).
- Ahmadi, A. A. (2012). Study of the history of architecture and stylistics of holy shrines in Borkhar. *National Congress of Holy Shrines with an emphasis on Hazrat Hussein Ibn Musa Kazem*. Tehran: Sazman owghaf va omur-e kheyrie.
- Allison, P. M. (1999). Introduction, The archaeology of household activities: dwelling in the past. Penelope M. Allison, (ed.). London: Routledge.
- Ashrafi, M. (2012). *Proceedings of the First Conference on Hand-Carved Architecture in Kerman*. May 2-4, 2011. Tehran: Research Institute of Cultural Heritage, Handicraft, and Tourism.
- Ashrafi, M. (2015). *Abstract of the articles of the second international congress of hand-carved architecture in Tehran*. October 2015. Tehran: Institute of Cultural Heritage, Handicraft, and Tourism.
- Clark, S. (1999). The Annales School Critical Assessments.
- Lioyd, C.D., Atkinson, P. M. (2004). Archaeology and geostatistics. *Archaeological Science*, (31): 151- 165.
- Gross, R. S., Marshall, F. (2004). Reconstruction of spatial organization in abandoned Maasai settlements: implications for site structure in the pastoral Neolithic of east Africa. *Archaeological Science*, (31): 1395- 1411.
- Davari, M.S. (2013). *Documentation and preliminary report of archaeological research on Ludaricheh char Taghi in Borkhar County*. Esfahan: Directorate General of Heritage, Handicraft, and Tourism of Isfahan Province. Unit for the recording of works (not published).
- Dekhoda, A. A. (1961). *Dekhoda Dictionary*. QOM: Computer Science Research Center of Islamic Sciences.
- Esfahani, H. H. (1988). *Sanial Mulukularz val Anbia*. Translated by Shaa'ar, J. Tehran. Amir Kabir Press.
- Fazli Nejad, A. (2009). Research in “annals” historiography. *Electronic Monthly Journal of Contemporary History of Iran*, (16): 47-81.
- Hemmtiazandariani, I. & Khaksar, A. (2013). A look at the archaeological research of the underground hand-carved architectural complex of Arzanfoud in Hamedan. Proceedings of the Third International Conference of Young Archaeologists in November 2013. Tehran: Mirase Ketab.
- Hojjat, M. (1998). Space. *Ravagh Journal*, (1): 17-27.
- Karimiyani, H. (2005). Necessity of Utilization of New Theories in Spatial Structure Analysis of ancient textures. *Journal of Literature and Human Sciences faculty*, 56 (172): 111 - 121.
- Karimian, H. & Ahmadi, A.A. (2015). Space archaeology; a scientific approach to the study and analysis of architecture works, urban spaces, and ancient textures. *Journal of Archaeological Studies*, 7 (2): 103-116.
- Mehriar, M. (2005). *Comprehensive lexicon of names and old places of Isfahan*. With an introduction by Salavati, F. Isfahan: Farhang and Mardom Press.
- Nast, Heidi, J. (1996). Islam, gender and slavery in west of the Kano Palace, Northern Nigeria. *Annals of the Association of American Geographers*, 86 (1): 44- 77.
- Mossadeghzadeh, H. and Nasr Esfahani, A. KH. (2011). Travertine petrology of red mines northwest to Vartoun Village in the northeast of Isfahan. *Proceedings the second Conference Earth Sciences and Commemoration of Mohammad Gharib*. the pioneer professor of geological sciences, Azad University, Ashtian Unit.
- Pahlavan Alamdari, L. & Amini Badr, F. (2014). An Analytical Study of Factors Affecting the Formation, Classification, and Recognition of the Iranian Hand-Carved Architecture. Case Study of Kandovan and Meymand villages. *International Conference on new methods of Field-oriented architecture design and construction*. Tabriz: Department of Architecture and Urban Design of Seismic Retrofitting Institute of Iran, <http://www.civilica.com/>

Paper-EETCC01-EETCC01_146.html.

- Siro, M. (1978). *Ancient paths of Isfahan area and dependent ways*. Mehdi Mashayekhi. Tehran: National Organization for the Protection of Iranian Antiquities.
- Yektayan, G. & Shabani, M. (2006). *Vartoun Spa Facility Registration Record*. Controlled and rewritten by Fahime Naghashzargar. Cultural Heritage, Handicraft and Tourism Organization of Isfahan Province: Unit for the recording of works (not published).