



ژورنال علمی باستان‌شناسی ایران

PAZHOSHESH-HA-YE BASTANSHENASI IRAN  
P. ISSN: 2345-5225 & E. ISSN: 2345-5500  
Homepage: <https://nbsh.basu.ac.ir/>  
Vol. 14, No. 41, Summer 2024



I. Assistant Professor, Department of Archaeology, Faculty of Cultural Heritage, Handicrafts and Tourism, University of Mazandaran, Babolsar, Iran.

Email: [k.Beik-Mohammadi@umz.ac.ir](mailto:k.Beik-Mohammadi@umz.ac.ir)

**Citations:** Beik-Mohammadi, Kh., (2024). "Reevaluating the Relative and Absolute Chronological Framework of Neolithic Rural Settlements in the Alvand Mountain Range and Malayer Plain (Insights from C14 Dating of Tapeh Posht-e Foroudgah)". *Pazhohesh-ha-ye Bastan Shenasi Iran*, 14(41): 69-95. doi: [10.22084/nb.2024.29679.2701](https://doi.org/10.22084/nb.2024.29679.2701)

**Homepage of this Article:** [https://nbsh.basu.ac.ir/article\\_5726.html?lang=en](https://nbsh.basu.ac.ir/article_5726.html?lang=en)

PAZHOSHESH-HA-YE BASTANSHENASI IRAN  
Archaeological Researches of Iran  
Journal of Department of Archaeology, Faculty of Art and Architecture, Bu-Ali Sina University, Hamadan, Iran.

Publisher: Bu-Ali Sina University. All rights reserved.

© Copyright©2022, The Authors. This open-access article is published under the terms of the Creative Commons.

## Reevaluating the Relative and Absolute Chronological Framework of Neolithic Rural Settlements in the Alvand Mountain Range and Malayer Plain (Insights from C14 Dating of Tapeh Posht-e Foroudgah)

Khalil-Ollah Beik-Mohammadi<sup>1</sup>

<https://dx.doi.org/10.22084/nb.2024.29679.2701>

Received: 2024/03/18; Revised: Accepted: 2024/05/30; Accepted: 2024/06/14

Type of Article: Research

Pp: 69-95

### Abstract

The interplay between chronology and the reassessment of both relative and absolute dating methods is a fundamental aspect of archaeological research. A significant focus within Iranian archaeology pertains to the central Zagros region, particularly the southern slopes of the Alvand mountain range and the Malayer plain. This area has attracted the attention of international archaeologists since the 1990s and continues to be a subject of study. The Malayer plain stands out as a crucial prehistoric cultural zone within Hamadan province, characterized by the presence of key archaeological sites from various periods, thereby contributing to the scholarly discourse surrounding Central Zagros archaeology. This region possesses absolute dating for certain historical epochs, particularly during the Chalcolithic period. In contrast, earlier historical phases, such as the initial rural settlements, have been documented through relative dating methods. Consequently, establishing an absolute chronology is crucial and serves as the primary objective of this article. This study aims to provide a more definitive chronological framework for the 6<sup>th</sup> millennium BC within this cultural area by utilizing C14 dating provided by the University of Copenhagen, Denmark, thereby enhancing the reliability of the timeline previously inferred from pottery assemblages. The primary focus of this research is the chronological framework of Tapeh Posht-e Foroudgah, with a critical examination of the established chronology in the region as delineated by Godin's sequence. A central inquiry emerges regarding the relative dating of the earliest human settlements in the Malayer plain, particularly through the lens of "pottery traditions". To address this, it is essential to evaluate how existing theories align with the absolute dating findings that have been reported. As a result, the research suggests that the C14 dating samples collected from the lower layers of Tapeh Posht-e Foroudgah indicate that the previous relative dating is largely valid, while the new findings show only a slight deviation from the established theories and dates. The research methodology employed in this article is qualitative, utilizing an analytical historical approach complemented by the laboratory technique of C14 dating. The findings reveal the existence of human societies dating back to the sixth millennium BC, specifically within the calibrated timeframe of 5216-4994 BC, which corresponds to the "late Sarab" cultural horizon.

**Keywords:** Chronology, Late Neolithic, Tepe Posht-e Forodgah, C14.

## Introduction

The slopes of the Alvand mountain range are of considerable significance in the archaeological literature pertaining to central Zagros, characterized by a multitude of sites from various prehistoric periods. However, the absence of comprehensive research has left the chronology, especially concerning the early rural Neolithic phase and subsequent developments, ambiguous. This uncertainty has occasionally led to critical scrutiny (e.g., see: Motarjem et al., 2020: 208–215). Despite the presence of important archaeological sites in this cultural landscape, the “traditional method” of dating, which is primarily based on the stratigraphy of Godin Tepe, continues to dominate the field. This approach is problematic, particularly because the dating of the lower strata at Godin Tepe is fraught with uncertainty. Applying this approach to the eastern slopes of the Alvand mountain range reveals significant limitations, as it often fails to be applicable. This is largely due to the pervasive influence of Northwestern cultures, including the Neolithic buff soft ware horizon, Chalcolithic-related Dalma tradition, and early Bronze Age Yanik tradition, which are prevalent in the expansive plains of Hamedan (notably in areas such as Posht-e Foroudgah, Tazehkand, and Pissa) but are either absent or minimally represented at Godin Tepe, particularly the Dalma tradition. Consequently, this discrepancy poses challenges for accurate dating methods. The cultural sequence observed at these sites, influenced by Northwestern cultures along the Alvand mountain range’s slopes, presents a distinct narrative compared to the western slopes in Kangavar, particularly at Godin Tepe, necessitating a careful reevaluation of dating practices on the eastern side of the Alvand mountain range.

The Malayer Plain, situated on the slopes of Alvand, represents a crucial area of study, particularly considering the recent decades that have seen significant advancements in understanding its cultural sequences and chronological development. This is especially true for the prehistoric era, spanning from the late Neolithic to the Iron Age, as evidenced by archaeological investigations at sites such as Tapeh Posht-e Foroudgah (Beik-Mohammadi, 2017), Tepe Pari (Masoumi, 2004; Babapiri, 2005), Tepe Gourab (Kabiri, 1974; Khaksar, 2006; Hemmati Azandriani et al., 2020), Gunespan (Rezvani, 2007b), and Shat Ghilah (Roustaiei, 2007; Roustaiei & Azadi, 2017). The Malayer Plain, situated on the southern slopes of the Alvand mountain range, represents the sole cultural region within Hamedan Province that showcases evidence spanning from the late Neolithic period to the Iron Age. Extensive archaeological investigations

have been conducted in this area, allowing for the establishment of a cultural sequence for the area thanks to its diverse archaeological sites. Comprehensive research in this area facilitates the construction of a more coherent continuous representation of the prehistoric chronological framework, at least for the southern slopes of the Alvand.

The primary challenges associated with the sequence of prehistoric cultures in Hamadan Province stem from the insufficient examination of areas containing prehistoric settlements, particularly during the pre-chalcolithic and Neolithic periods. Recent investigations in the northeastern parts of Hamadan Province have yielded significant findings, including potsherds from the Cheshmeh Ali tradition discovered in Razan Plain (pers. comm. M. Shabani). Furthermore, within the broader cultural landscape of Razan-Avaj, a milky tooth belonging to archaic Homo was unearthed from the Qaleh Kurd Cave, dating back approximately to 175,000 ka (Vahdati Nasab et al., 2020; 2024). This evidence underscores the cultural richness of the area long before the Neolithic period. Thus, to address the aforementioned gap, it is imperative to conduct more thorough investigations and systematic explorations in various locales, such as Razan, Malayer, and Nahavand plains, which possess climatic and geographical attributes conducive to human habitation. Consequently, the existing chronology of prehistoric periods in the central Zagros area, particularly during the Neolithic and preceding epochs, exhibits significant deficiencies. In many regions of the province, there is a lack of information regarding early societies, and where data does exist, it is predominantly derived from surface archaeological surveys, resulting in relative chronology primarily based on pottery fragments and other cultural artifacts. It is noteworthy that “Gourab Tepe” showcase the sole prehistoric site with an established absolute chronology (see: Khaksar et al., 2014: 66–47; Hemmati Azandriani et al., 2020: 263-283). Recently, chronological samples have been collected from the Bronze Age site of Tepe Pissa, with results forthcoming (pers. comm.: A. Motarjem), which may contribute to the development of a more comprehensive chronology for the cultural area under study.

The Malayer Plain is currently recognized as the sole cultural area in the province with Neolithic evidence, a conclusion drawn from archaeological research conducted at five distinct sites (Howell, 1979; Bakhtiari, 2008). A comprehensive and systematic investigation of one of these sites, specifically the site known as Tapeh Posht-e Foroudgah (Beik-Mohammadi, 2017), has led to the publication of more precise and coherent

accounts of Neolithic settlements and their associated cultural practices in recent years. It is important to note that prior to this, the understanding of the cultural sequence and dating within this area was predominantly reliant on relative chronology. Consequently, the need for establishing an absolute chronology has become evident. This article aims to address the shortcomings and uncertainties present in the prehistoric chronology framework of Hamadan Province, particularly concerning the Malayer Plain, and to propose an absolute chronological framework for the Alvand mountain range across various prehistoric epochs.

**Questions and Assumptions:** This research critically examines the traditional chronological method that relies on the cultural sequence of Godin Tepe, leading to the central inquiry: how do the relative dates of the earliest human settlements in the Malayer Plain, established through pottery analysis, align with the absolute dating? The hypothesis posited in this study suggests that the carbon-14 dating of coal samples from Tapeh Posht-e Foroudgah indicates a degree of accuracy in the previously established relative chronology for the this site. The findings, albeit with some margin for error, corroborate earlier conclusions derived from comparative dating.

## Research Method

This study is primarily of fundamental nature and is qualitative, incorporating both laboratory techniques, specifically C14 dating, and library research grounded in a historical-analytical framework. Consequently, the research is structured into several key sections, which encompass: an introduction that delineates the research propositions; a background section that contextualizes the study within its temporal and geographical parameters; a theoretical foundations segment that explores the contributions of interdisciplinary sciences and the significance of the archaeometric approach in archaeological inquiry; an examination of the geographical context and archaeological discoveries of the area, particularly focusing on the Tapeh Posht-e Foroudgah, and the outcomes of the carbon-14 analysis; a discussion and analysis section that provides a comprehensive review of the chronology of Hamadan Province, with particular emphasis on the Malayer Plain during Neolithic period; and finally, a conclusion that addresses the research propositions and questions.

## History of Research

This section addresses two types of research focused on the relative and

absolute chronology of Hamadan Province, particularly concerning the eastern slopes of the Alvand mountain range. A review of archaeological studies reveals that numerous investigations have been conducted over the past century to understand the prehistoric cultural traditions in Hamedan Province. These studies encompass the surface survey and identification of archaeological sites, the missions for delimitation purposes, as well as stratigraphic analysis, with a significant emphasis placed on both relative and absolute chronological frameworks.

The cultural area in question was first introduced into Iranian archaeological literature as “Chronology of the central part of western Iran” by Voigt and Dyson (2003: 100 & 117), drawing upon the archaeological investigations conducted by Howell (1979) at the Neolithic sites of Malayer Plain. This was subsequently expanded through the research of Contenau and Ghirshman (1935) at Tepe Giyan, which spans the Chalcolithic Period to the Bronze Age. Tepe Giyan, located in Nahavand, is recognized as the first significant site in Hamedan Province with a coherent cultural sequence, yielding artifacts that date from the 5<sup>th</sup> to the 1<sup>st</sup> millennia BC, representing Chalcolithic Period and 123 graves from the Bronze and Iron Ages (Contenau & Ghirshman, 1935; see also: Hemmati Azandriani & Khaksar, 2018). The chronology established at this site relies on relative dating methods based on pottery comparisons; however, it lacks a definitive and precise chronology when evaluated against excavation methodologies. It is noteworthy that prior to the publication of the chronology for Godin Tepe in the 1960s (Young, 1966-1967), Tepe Giyan was regarded by D. McCown as the type-site for the “Central West of Iran,” with its cultural sequence referred to as “Giyān Culture.” This designation diminished following Henrikson’s detailed chronology of Godin Tepe (1985-1986) (see: Heydari & Motarjem, 2019: 65). Nevertheless, substantial advancements in the chronology of this cultural area have emerged from studies conducted in recent decades.

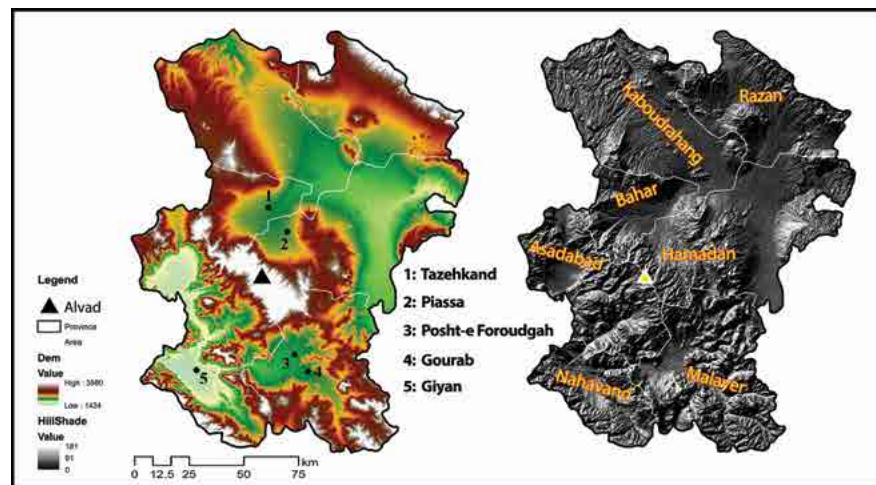
Among the notable prehistoric sites that have undergone excavation, “Tepe Tazehkand” stands out (Balmaki, 2011). The findings from this site contributed to the establishment of a relative chronology of the prehistory of Hamedan (Balmaki, 2017) and culminated in the publication of “Prehistoric Archaeology of the Hamedan Plain” (Balmaki, 2018). In this context, other sites from the Neolithic Period have been examined, including Tepe Bahram Abad, where relative dating based on pottery has placed the site within the Chalcolithic Period. Tepe Pissa is recognized as the sole prehistoric site in the Hamedan Plain, having been investigated

over several seasons (Mohammadifar & Motarjem, 2008; Mohammadifar et al., 2011). Recent efforts have yielded absolute chronology samples, with results pending publication, while its relative chronology appears to be validated (pers. comm.: A. Motarjem). Regarding the research background on absolute chronology in Hamedan Province, Tepe Hegmataneh has been a focal point for various absolute dating efforts, revealing distinct dates from historical periods within the Partho-Sasanian contexts (Saraf, 1999; Mohammadifar et al., 2013; Azarnoush et al., 2016: 121).

The southern slopes of the Alvand mountain range, which can be broadly referred to as the Malayer Plain, represent a significant geographical region in the eastern central Zagros. The archaeological significance of this area was highlighted following the investigations conducted by the British Institute of Persian Studies, led by David Stronach, after the discovery of Noushijan Tepe in 1965, which marked Malayer Plain's entry into the archaeological discourse of Iran (Stronach, 1969). Subsequently, Rosalind Howell identified 270 archaeological sites, revealing evidence that dates back to the late 6<sup>th</sup> millennium BC (Howell, 1979: 156). These findings underscored the Malayer Plain's critical role in archaeological research. Numerous studies focusing on prehistory have since been conducted in this region, including at notable sites such as Tepe Pari (Masoumi, 2004: 197), Tepe Gourab (Kabiri, 1974; Khaksar, 2006), Gunespan (Rezvani 2007b), Shat Ghilah (Roustaiei 2007; Roustaiei & Azadi, 2017), and Baba Kamal (Mohammadifar & Hemmati Azandariani, 2008). The chronological assessment of these sites primarily relied on relative chronology derived from pottery analysis and stratigraphy, particularly from key sites like Godin Tepe, Giyan, and Gouran. Notably, "Tepe Gourab" stands out as the only site in this region with absolute chronological data from prehistoric times. Samples for dating, including pottery and carbon-14, were collected from this site and sent to the University of Oxford, yielding significant insights into the Bronze Age (Khaksar et al., 2013: 47). Among the samples, three were associated with the Chalcolithic Period, while one pertained to the Early Bronze Age (Hemmati Azandariani et al., 2019: 263).

The research concerning the early village periods within the specified geographical region has been extensively documented through various studies (Howell, 1979; Bakhtiari, 2008; Bakhtiari et al., 2014). In the past decade, significant publications have emerged regarding the early village period at Tapeh Posht-e Foroudgah, offering insights into diverse aspects such as the sequence of cultural settlements (Beik-Mohammadi 2018; 2021), pottery (Beik-Mohammadi & Javamanardzadeh, 2020), and

subsistence strategies (Beik-Mohammadi et al., 2019). An examination of the archaeological evidence from this region elucidates its pivotal role during the late Neolithic period. Consequently, the southern slopes of the Alvand mountain range can be regarded as a critical focal point for understanding the concluding events of the early village period, significantly contributing to the chronological framework of Hamedan Province. The significance of this site is underscored by the presence of the oldest in-situ stratified cultural remains discovered to date in Hamedan Province and Malayer, situated to the south of the Alvand mountain range. Yet, prior to this publication, no research had been conducted on the absolute chronology of Tapeh Posht-e Foroudgah. Consequently, the significance and originality of this study, in contrast to earlier research conducted on various prehistoric eras, particularly regarding early village settlements in Hamedan Province and Malayer Plain, lies in the fact that prior knowledge has predominantly relied on superficial discoveries (Howell, 1979; Bakhtiari, 2008) and comparative chronological analyses (Beik-Mohammadi, 2018; 2021). The subsequent sections will address the absolute chronology of Tapeh Posht-e Foroudgah.



Map. 1: The archaeological sites mentioned in the text (Beik-Mohammadi, 2017). ▶

## Theoretical Framework

The interdependence of chronology and the reevaluation of both relative and absolute dating techniques has been a fundamental aspect of archaeological research. As highlighted in the introduction and background sections, the majority of archaeological investigations in Iran, particularly within the Central Zagros region, have relied on relative and comparative chronological frameworks. However, advancements in interdisciplinary approaches have rendered these traditional dating methods less dependable. Willard F. Libby is credited with the pioneering application of

radiocarbon-14 in archaeology in 1949 (Bagherzadeh Kathiri, 2020: 43), which significantly advanced archaeological exploration. Subsequently, two major advancements in radiocarbon dating methodologies emerged, enhancing both the accessibility and precision of this technique. The first was the introduction of accelerator mass spectrometry (AMS), which dramatically decreased the sample size needed for analysis from several grams to mere milligrams, while extending the dating range from 50,000 to 80,000 years (Ibid.: 44-46). The second advancement involved the development of calibration methods for radiocarbon dates, utilizing graphical representations and software tools such as INTKAL and OxCal, alongside other dating techniques like dendrochronology to convert radiocarbon dates into calendar years (Ibid.: 47-48).

This study employed the carbon-14 dating technique on charcoal samples recovered from the lower strata of Tapeh Posht-e Foroudgah. The analysis was conducted using the AMS method, facilitated by the Bronk Ramsey 2020 OxCal v4.4.2 calibration program and the IntCal20 calibration curve, both utilized at the laboratory of the University of Copenhagen.

### **Physiography**

The Western Zagros region exhibits a more diverse and dense vegetation due to its higher levels of precipitation compared to the eastern counterpart. In contrast, the eastern front of the Zagros is characterized by a relatively arid climate; however, its elevated terrain and seasonal snow cover render it a vital source of both surface and groundwater. The slopes of this region serve as summer grazing grounds, underscoring the significance of Zagros as a central hub for pastoral livelihoods and semi-nomadic communities in Iran. The Zagros mountains are characterized by numerous narrow valleys, which contribute to their structural complexity. These valleys, often situated at significant depths, act as significant barriers to communication (Ehlers, 1986: 96). Central Zagros encompasses a variety of macroclimates, leading to a diverse human population that is intricately linked to the region's geography. This relationship is particularly evident on the eastern and western slopes of the Alvand mountain range. The eastern slope, largely within Hamedan Province, features a range of intermountain plains and basins, including the Hamadan-Bahar, Qahavand, Kabudarahang, and Razan plains, extending to the Avaj mountains (National Geographical Organization of Iran, 2001: 21). Conversely, the western slope comprises parts of Hamedan Province, including the Asadabad plains and the elevated Tuyserkan Plain, as well as parts of Kermanshah Province, which



encompass the Kangavar and Bis-ton-Harsin plains, reaching Mahidasht. Consequently, the Alvand mountain range presents distinct geographical conditions across these two areas, which are rich in intermountain plains and hold significant importance for archaeological research in Central Zagros. Malayer, located in the intermountain plain on the eastern slopes of Central Zagros and the southern slopes of the Alvand mountain range, is the largest city in Hamadan. Malayer County, situated within the intermountain plain on the eastern slopes of the central Zagros and the southern inclines of the Alvand mountain range, stands as the largest urban center in Hamadan Province, encompassing an area of approximately 3,210 square kilometers. The County of Malayer is geographically bordered to the north by Hamedan, to the east by Arak, to the south by Borujerd, and to the west by Tuyserkhan and Nahavand. The average elevation of Malayer is 1,780 meters asl, and it is located 86 kilometers from the city of Hamedan (Ja'afari, 2006: 16-3).

Tapeh Posht-e Foroudgah is situated approximately 20 kilometers north of Malayer city, within the Saman district, specifically in Hosseinabad Nazim village (Haramabad) and to the south of Dehno Village, about 2.5 kilometers east of Mianzulan/Mizlan Village. This archaeological site lies on the lands belonging to Arteh Bolagh Village, characterized by flat, clayey-salty terrain (Shoureh Zar). Its proximity to the airport within agricultural lands has contributed to its designation as "Tapeh Posht-e Foroudgah" (Map 2). The site encompasses an area of roughly 5,000 square meters and rises approximately 2 meters above the surrounding lands, presenting itself as a low hill. Initially documented by Rosalind Howell (Howell, 1979: 156), it was subsequently referenced in the surface surveys of the Malayer Plain, Samen sector, under the same name (SN.001; Bakhtiari, 2008). It has been officially recorded in the cultural heritage listings of Hamedan Province under this designation. However, among the local residents, it is commonly referred to as "Mianzulan mound" due to its closeness to Mianzulan Village.

### **Tapeh Posht-e Foroudgah**

Tapeh Posht-e Foroudgah, situated on the eastern slopes of the central Zagros, is a notable mound characterized by a semi-sedentary lifestyle and animal husbandry practices. This archaeological site is recognized as one of the significant Neolithic Period locations (Late Neolithic) within Hamedan Province. Its findings are particularly valuable, as they represent one of the few village period settlements in the region that have yielded substantial

insights into this era for the first time (Beik-Mohammadi et al., 2018; 2021). The artifacts from this site date back to the late 6th millennium BC and are distinguishable from both preceding and subsequent periods by notable variations in pottery style and coloration. Among the most prominent pottery types from this era are coarse soft wares adorned with geometric patterns, which play a crucial role in understanding the Late Neolithic traditions of Central Zagros. This pottery tradition has been documented not only along the eastern parts of the central Zagros but also in other regions of the Malayer Plain (for further details on the pottery traditions of this area, see: Bakhtiari et al., 2014; Beik-Mohammadi & Javanmardzadeh 2020). Excavations at Tapeh Posht-e Foroudgah have uncovered a variety of cultural artifacts, including pottery, spindle whorls, diverse stone and bone tools, and faunal remains, all of which suggest a pastoralist way of life (Beik-Mohammadi et al., 2020). The remains discovered exhibit distinct characteristics that set them apart from the earliest artifacts and findings associated with the lower strata at the sites of Tazehkand, Giyan, Gourab, and Shahnabad horizon in Godin Tepe. The archaeological investigation of Tapeh Posht-e Foroudgah was conducted in two phases: the initial phase involved delimiting the surface area of the site, followed by a comprehensive excavation in two designated trenches named Trench I and II. The exploration commenced in Trench I with the aim of retrieving cultural artifacts. Notably, the presence of decorated pottery in the western section of the mound prompted further investigation in Trench II, focusing on the acquisition of Neolithic artifacts characterized by decorated pottery with geometric motifs, specifically of the Late Neolithic type known as Siahbid style. It is important to note that previous publications have addressed the findings and cultural traditions documented at Tapeh Posht-e Foroudgah; thus, the previous archaeological discoveries will be cited only briefly.

## The Findings

- **Trench I:** This section represents the primary area of excavation within the mound, where deposits measuring 140 cm in thickness, spanning from the Early Bronze Age to the Ceramic Neolithic, have been uncovered. Within this trench, researchers have identified 12 loci (numbered 101 to 112) and five distinct settlement phases. The artifacts recovered include pottery from the middle Islamic period, as well as Early Chalcolithic pottery characterized by thick red slip on both the inner and outer surfaces. Additionally, transitional Neolithic pottery features a thick red slip on the

inner surface, complemented by cream and buff coatings on the exterior. The Neolithic Period is represented by soft ware with decorated pottery exhibiting fading motifs and a buff slip covering, alongside brittle and fragile handmade plain pottery that incorporates rough vegetal temper, often displaying a brown or occasionally red clay slip, with a smoked core resulting from inadequate furnace temperatures.

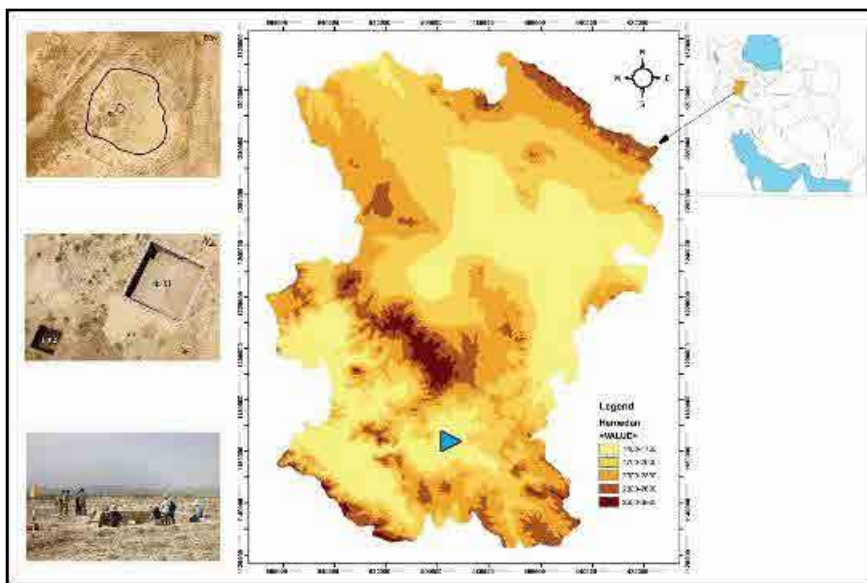
The archaeological investigation of Trench I revealed five distinct settlement phases, yielding a diverse array of cultural artifacts. These included spindle whorls, beads, pendants, stone tools, and a significant quantity of caprid and bovid bones, alongside several intact and fragmented human remains. Notably, the cultural materials identified in the lower Neolithic layers exhibit marked differences from those in the upper layers. The lower layers contained a unique assortment of brittle software featuring buff coatings in both external and internal surfaces, as well as geometric (netted) fading designs created with ochre. Additionally, a substantial collection of caprid bones, various spindle whorls differing in shape from those in earlier layers, and distinct construction styles and sizes were documented. Other artifacts included polished bone and bone caps of varying dimensions, stone blades crafted from bullet cores indicative of the Neolithic era, percussion tools, and an assortment of heated stone and clay beads and pendants. These findings suggest the existence of a distinct cultural tradition, potentially linked to a different ethnic group from those in the upper levels of the site (for further details, see: Beik-Mohammadi et al., 2021).

- **Trench 2:** The trench was dug in the eastern part of the mound, which features a gentle incline. It has dimensions of approximately  $2 \times 2$  meters. This excavation has revealed six loci (201 to 206) and four distinct phases of settlement, encompassing the Early Bronze Age, the transitional Neolithic Period, the Ceramic Neolithic marked by decorated pottery of the Late Neolithic Siahbid style, and buff ware with fading decorative elements. The cultural layers within this trench attain a thickness of 65 cm. A wide variety of cultural artifacts has been unearthed, including pottery, spindle whorls, stone and clay beads, figurines, animal remains, and stone implements.

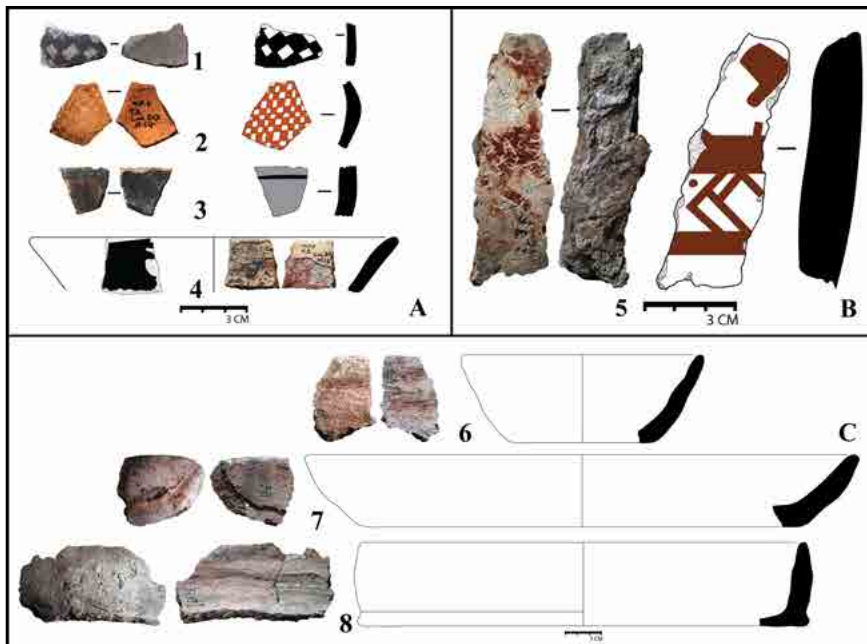
### Comparative Dating

The chronology of the communities during the settlement period at Tapeh Posht-e Foroudgah has been established through various studies and published works (Howell, 1979; Bakhtiari, 2008; Bakhtiari et al., 2014;

Beik-Mohammadi et al., 2018; Beik-Mohammadi & Javanmardzadeh, 2020; Beik-Mohammadi et al., 2020; 2021). This chronology primarily relies on the typological and comparative analysis of pottery, supplemented by examinations of other cultural artifacts, including spindle whorls and stone tools. These findings have been compared with contemporary sites located in the adjacent Kermanshah and Luristan provinces (see: Table 1). The initial phase of settlement at Tapeh Posht-e Foroudgah, identified as layer VI (Late Neolithic Phase C), aligns with the Late Sarab period (McDonald, 1977: 172-173), the earliest Neolithic phase of Qalagap mound (Abdollahi & Sardari Zarchi, 2013: 122), and the Late Ceramic Neolithic



◀ Map 2: Colorful topographic map of the studied area (Beik-Mohammadi, 2017).

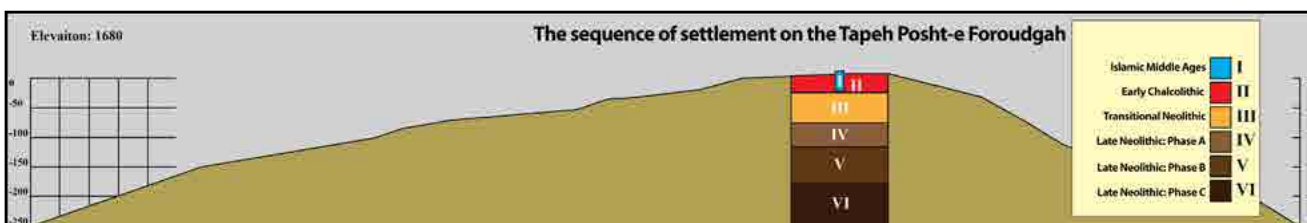


◀ Fig. 1. The pottery grouping from the Late Neolithic settlement periods at Tapeh Posht-e Foroudgah are as follows: Nos. 1-4 consist of decorated ceramics featuring geometric designs, which are categorized as phase A of the Late Sarab. Type 5 is characterized by red (ochre) on buff ware, designated as phase B of the Late Neolithic. Types 6-8 are identified as plain ware with a rough and brittle temper, representing phase C of the Late Neolithic at this site (Beik-Mohammadi, 2017).

of Gouran (D) (Meldgaard et al., 1963: 115). The subsequent phase, layer V (Late Neolithic phase B), is associated with the “Baghnu” pottery tradition (McDonald, 1979) and corresponds to the second phase of Qalagap (Abdollahi & Sardari Zarchi, 2013: 123). The third phase, represented by Stratum IV (Late Neolithic phase A), features pottery adorned with trapezoidal designs or checkered squares, which is comparable to the ceramics found at Sarab Mound A (Levine & McDonald, 1977: Pp 45, Pl. 1a) and is contemporaneous with Sehgabi phase. The fourth phase, layer III (transitional period), is dated to the same horizon as the lower layers of Tepe Qeshlaq Vc. Lastly, the fifth phase, layer II (Early Bronze Age), is characterized by pottery with a thick slip coating, akin to the “J” ware of Mahidasht, indicating its contemporaneity with Godin XII.

Tab. 1: The cultural sequence and periodization of the settlement phases at Tapeh Posht-e Foroudgah (Beik-Mohammadi, 2017). ▼

Sequence of settlement	Period	Cultural evidence and chronological basis	Cultural horizon
I	Islamic Middle Ages	Oven, Pottery	Ilkhanate
II	Early Chalcolithic	Pottery, Tools, Spindle Whorls	Godin XII
III	Transitional Neolithic	Pottery, Tools, Spindle Whorls	Qeshlaq Vc
IV	Late Neolithic: Phase A	Pottery (Embossed with Geometric Motifs), Tools, Spindle Whorls and Animal Figures	Sehgabi: phase C
V	Late Neolithic: Phase B	Pottery (Patterned with Fading Motifs), Tools, Spindle Whorls and Animal Figures, C 14	Qalagap: second phase
VI	Late Neolithic: Phase C	Pottery (Software Type), Tools and Animal Figures, Spindle Whorls	Late Sarab, Gouran D, Qalagap: first phase



▲ Fig. 2: Hypothetical section of Tapeh Posht-e Foroudgah based on the deposits and sequence of settlement phases (Beik-Mohammadi, 2017).

### Absolute Chronology

The absolute chronology of Tapeh Posht-e Foroudgah is primarily established through carbon-14 dating (AMS) conducted on a charcoal sample of plant origin (RN: 1192), which was retrieved from a depth of 105 cm in Locus 110 of Trench I, specifically from the lower strata of the Late Neolithic B phase at the site. This analysis was performed by the laboratory at the University of Copenhagen, Denmark (see Table 2). The calibration outcomes indicate a temporal range extending from 5216 to 4994 BC, with a confidence interval of 95% (Table 2).

Tab. 2: The information regarding absolute chronological analysis conducted on a charcoal sample (©University of Copenhagen, 2021). ▼

AAR	SID	Name	Material	Description	Yield (%)	14C Age 14C yr. BP		Calibration Program	Calibration Options	Calibrated Age (1 $\sigma$ )		Calibrated Age (2 $\sigma$ )
33882	41578	Posht-e Fordoudagh RN 1192 (Sample 11) Trench 1, Locus 110A	Plant charred	AMS-præp: 4 kunne ikke fryses ud for brint tilsætning. Pumpet væk og brint tilsat/hj.	31/3	6160	40	OxCal v4.4.2 Bronk Ramsey (2020); r:5	IntCal20	5208BC (26.2%) 5156BC 5127BC (42.0%) 5045BC	5216BC (95.4%) 4994BC	

## Discussion

The initial published prehistoric relative chronology for central Zagros was introduced by E.F. Henrickson, who based her findings on pottery stylistics (Henrickson, 1983: 9), although this work contained certain shortcomings. It is important to acknowledge the contributions of C.T. Young (1966) and C. Goff (1971) in this domain. Subsequently, Voigt and Dyson provided a more comprehensive chronology for the eastern regions of central Zagros in their publication “Chronology of Iran,” which encompassed the area pertinent to this study (i.e., Hamedan) under the designation “the central part of western Iran” (Voigt & Dyson, 2003: 100). At that juncture, the absence of systematic excavations in Hamedan Province, coupled with a chronological void, led these researchers to categorize this cultural area within the “region of Kangavar and eastern Luristan” (Ibid.: 116). Regarding the [Late] Neolithic period in Hamedan, they briefly referenced Howell’s research (1979: 157), which identified six new Neolithic sites and highlighted the white-on-black decorated pottery tradition, suggesting that this period could be likened to the third phase of Sehghi C (Ibid.: 117). Voigt and Dyson have made a significant contribution to the understanding of the archaeological context in Kangavar by identifying a distinct phase characterized by straw-tempered decorated buff ware featuring a series of red or black triangles. This identification is based on a comparative analysis with pottery and stone artifacts from Tepe Sarab. They propose that this phase is contemporaneous with the pottery from Sarab, while also suggesting that it predates the Shahnabad phase. However, due to insufficient data for this period, they refrain from establishing a precise chronology. Furthermore, they have not integrated this phase into the cultural sequence or chronological framework of the region, citing the challenges in recognizing it across the broader area. In their work, Voigt and Dyson have also delineated the Shahnabad phase, or Early Chalcolithic phase, under the labels “Godin XII” and “Kangavar XI,” asserting that it follows the Sarab phase. Subsequently, they outline the Late Chalcolithic cultural sequence of Malayer, drawing connections to the findings at Tepe Giyan, which they consider to be contemporary with Godin VII.

The chronological framework established in this research, referred to as “traditional chronology,” is grounded in the cultural sequence of Godin Tepe. This framework has been utilized in archaeological studies of Hamadan, located on the eastern side of the Alvand mountain range, for a considerable period, extending up until approximately the last decade. However, during the 1390s SH (solar Hijri, the official calendar of Iran; 2011–early 2021), investigations into prehistoric sites across various regions of the Alvand mountain range revealed the existence of hitherto-unknown and more distinct cultural entities that diverged from the Godin cultural sequence found on the western bank of the Alvand. These discoveries have, to some extent, diminished the relevance of the traditional chronology approach. A critical examination of this traditional method, as reflected in the work of A. Motarjem et al., (2020), has highlighted its limitations and prompted the proposal of more suitable alternatives for the chronological classification and naming of the prehistoric cultural sequence in Hamedan. This study primarily focuses on the geographical characteristics of the region and explores several parallel narrow plains extending from the Iranian Central Plateau to the Central Zagros borders, ultimately leading to a refined cultural division of the Central Zagros, particularly within Hamedan Province. The findings of this research signify a significant shift from traditional chronology towards a more contemporary chronological perspective. In the study conducted by Motarjem et al., (2021: 209), a thorough examination of the Late Neolithic period has led to the designation of the “Urmia-Hamedan area” based on the analysis of pottery traditions. Recent investigations in Kurdistan Province, particularly in the cities of Sanandaj and Bijar, have corroborated the existence of Late Neolithic artifacts that exhibit pottery styles akin to those found in the “Urmia-Hamedan area” (pers. Comm. with: A.-S. Moucheshi, head of the field survey project in Sanandaj, Kurdistan). A broader geographical perspective reveals similar findings in neighboring sites, including Tepe Qeshlaq (Motarjem & Sharifi, 2018; Sharifi & Motarjem, 2014; 2018; 2023) and Pirtaj mound (Sharifi, 2022) in Bijar, as well as Qalagap (Abdollahi & Sardari Zarchi, 2013) in Azna, Luristan, and Tepe Sarsakhti (Kaka, 2016) in Arak. The presence of similar pottery types in the Malayer Plain, attributed to the software, further substantiates the notion of Neolithic developments within this expansive cultural region. It is reasonable to propose that, given the consistent similarities in pottery styles—characterized by their mixture, form, and decoration—the Neolithic culture of this area may be referred to as the “software Neolithic” and regarded as a distinct entity. The pottery tradition

in question markedly diverges from the Neolithic pottery practices identified in various strata of Tepe Sarab, as previously articulated by Levine (Levine & McDonald, 1977) concerning the Late Neolithic period in central Zagros. This distinctive style has been thoroughly examined in the work of Motarjem et al., (2020), titled “Neolithic Pottery Style of the Urmia-Hamedan Intermediate Region,” which offers a nuanced perspective. The terminology proposed therein is applicable to the Late Neolithic cultural continuum extending from Urmia to Arak. It is important to acknowledge that certain local characteristics, including specific pottery types, persist at various sites and occasionally on a regional scale, which may not be encompassed within the overarching nomenclature. In this context, Tepe Qeshlaq, which boasts a comprehensive settlement sequence from approximately 5500 to 3600 BC without a hiatus between the Neolithic and Chalcolithic periods (Motarjem & Sharifi, 2018: 98), along with Tapeh Posht-e Foroudgah in the Hamedan region, serve as principal exemplars for this classification.

The traditional framework for the chronology of the prehistoric periods in Hamedan Province has primarily relied on the examination of neighboring archaeological sites, including Godin Tepe, Tepe Sehgabi, Tepe Gouran, and notably Tepe Giyan (also referred to as Giyan cultural tradition). However, recent archaeological discoveries over the past few decades have introduced additional sites such as Tazehkand, Tapeh Posht-e Foroudgah, Tepe Gourab, and Pissa. These four sites are particularly significant due to their more coherent cultural sequences and precise dating, offering a revised perspective on the chronology of the various slopes of the Alvand mountain range. A thorough analysis of these findings allows for a clearer understanding of the cultural sequence from the Late Neolithic period to the conclusion of the Bronze Age in the Alvand ranges. Such cultural sequence could be suggested as follows:

- **Late Neolithic:** This period in the central Zagros is known from significant archaeological sites, including Gouran (Meldgaard et al., 1963), Qalagap (Abdollahi & Sardari-Zarchi, 2011; 2013) in Luristan Province, as well as Siahbid and the Sehgabi mounds (Smith & Young, 2003), Tepe and Sarab in Kermanshah Province. The “Urmia-Hamadan zone” reveals the Late Neolithic period through sites such as Tepe Idir (Hessari, 2019), Tepe Khaleseh (Khosravi et al., 2012), and three sites of Yarqi of Huri Daraq, Ganjinu, and Kandenu in the Hurand district (Bakhtiari et al., 2018, 2019). Additional sites include Tepe Qeshlaq (Sharifi & Motarjem, 2018) and Tepe Sarsakhti (Kaka, 2016). The cultural sequence at Tepe Qashlaq



indicates influences from the south of Lake Urmia basin in its layer V (Sharifi & Motarjem, 2018: 94). Consequently, the proposed dating of the Late Neolithic at Tepe Qeshlaq, estimated at 5500 BC based on absolute chronology from Tepe Sarab (Levine & McDonald, 1977), appears to be a plausible timeframe. The archaeological findings related to the village period in the Malayer Plain, thus, could be studied based on three distinct phases (A, B, and C) at Tapeh Posht-e Foroudgah VI-IV, along with Giyan VA. Furthermore, the Razan Plain should be included in this analysis, where surface surveys have identified Late Neolithic artifacts. If a date is to be assigned to this period, the Late Neolithic in this cultural area is primarily based on a carbon-14 sample from Locus 110 (the terminal limit of phase B of the Neolithic) at Tapeh Posht-e Foroudgah, which corresponds to 5300 BC. Additionally, Locus 111, with a deposit depth of approximately 35 cm and older pottery associated with phase C of the Neolithic, suggests a probability of 5500 BC at Tepe Sarab and Tepe Qashlaq.

- **Chalcolithic Period:** This period has been recognized in the Hamedan Plain at the Tazehkand phase I site, while in the Malayer Plain, it is observed at Tapeh Posht-e Foroudgah III and Tepe Gourab VIII, as well as at Tepe Pari and Gunespan. Furthermore, the Nahavand region features the Giyan VB-D, which corresponds to Phase C of the Late Neolithic and Phase B of the Middle Chalcolithic, thereby illustrating this period.

- **Bronze Age:** The Bronze Age in is identified at Tepe Pissa in the Hamedan Plain and at Tepe Gourab (and Tepe Pari and Gunespan) in the Malayer Plain. In addition, Giyan VB-D also represents this era in Nahavand

## Conclusion

The absence of archaeological data has consistently posed a considerable challenge in formulating an appropriate resolution, particularly in the context of dating. It is well established that archaeological discoveries play a crucial role in delineating the evolution and transformation of cultural areas and borders. For instance, during periods characterized by insufficient archaeological evidence, the status of Hamadan within the scheme of “Voigt” and “Dyson” remained unclear, with this cultural area being situated in the “Eastern Luristan and Kangavar region.” A thorough examination of the chronological frameworks from the past century reveals that the cultural significance of Hamedan Province has often been overlooked or even forgotten. In an attempt to address this oversight, the cultural traditions of Hamedan have frequently been ascribed to the cultural

domains of Kermanshah and Luristan, as evidenced by the publications authored by Henrikson, Voigt, and Dyson. This attribution fails to recognize that this region, along with its intermountain plains, possesses a unique and relatively distinct identity compared to its neighboring areas. Rather than establishing a new and independent archaeological cultural field, this article aims to elucidate the ambiguous aspects of cultural developments and sequences by drawing upon cultural knowledge and findings across intra-, inter-, and supra-regional scales. The primary objective of this research is to propose a cultural sequence and chronology for various prehistoric periods in the Alvand mountain range, specifically focusing on village period settlements, based on recent studies conducted over the last two decades. Excavations and field surveys from this period reveal a shared cultural zone extending from the northwest of Iran to the southern slopes of the central Zagros, spanning from the Late and transitional Neolithic period to the conclusion of the Bronze Age. Consequently, a reevaluation of previous theories is warranted.

This research primarily addresses the critical evaluation of the traditional chronological methodology applied to the eastern slope of the Alvand mountain range, juxtaposed with the cultural sequence observed on the western slope. The central aim is to investigate the alignment of relative dating with absolute dating in the eastern slopes. By analyzing archaeological evidence from both the eastern sites, including Tazehkand, Tepe Gourab, Tepe Pari, and Gunespan, and the western sites, such as Sehgabi, Siahbid, and Godin Tepe, across various periods from the Early Chalcolithic Period to the early third millennium BC, the study identifies distinct potteries and cultural traditions. These traditions encompass a range of pottery types, such as the type “J”, Dalma, and Yanik, and are further categorized into subgroups influenced by regional and local factors, based on recent archaeological discoveries. However, the cultural traditions and pottery characteristics of the Late Neolithic and transitional periods—particularly in the eastern domain—remain inadequately understood, as does the evolution of human societies during this time. This research employs a case study of Tapeh Posht-e Foroudgah, comparing it with sites such as Tepe Sarab and Tepe Qeshlaq, to elucidate these obscured aspects through a comprehensive analysis informed by contemporary innovations and theoretical frameworks.

In light of the aforementioned topics, it is possible to introduce new entries into the chronology table pertaining to the cultural sequence and the chronology of the eastern sector of the Alvand mountain range. Initially, the stratification at Tazehkand site (Balmaki, 2011; 2017; 2018) allows

**Tab. 3: Prehistoric chronology table of slopes of Alvand mountain range & neighboring sites in Central Zagros (Beik-Mohammadi, 2023). ▶**

\*These items are absolutely dated based on C14.

\*This table is prepared based on the researches and dating done from the archeological studies of Central Zagros and it is the result of the research of different researchers. Due to the density of the contents of the table, the references are avoided, but instead of the research contents such as “background” & “discussion”, the references of each site are included.

Period (BC)	Hamadan		Hamadan	Hamadan		Nahavand	Kurdistan Samandaj-Bijar	Kermanshah		Mahidasht	Lorestan	Northwest Soldoz
	Hamadan	Malayer		Malayer	Nahavand			Kangavar	Mahidasht			
Late Bronze						Giyān II					Qalagap12	
Middle Bronze	*Piassa III	Gunspar IV		Giyān III & IV				* Godin III6-4	Period Maran		Qalagap13 Kazabad- Gouran Qaleh Nisar-All Qalagap14	Hafivan VIII *Barveh
Early Bronze	*Piassa I & II	*Gourab VII		Giyān V <sub>B-D</sub>				Godin IV				
		Gourab VIII		Giyān V <sub>C</sub>				* Godin V Godin VI Godin VII Godin VIII	Dehstvar Sehgabi VII-VI		Qalagap15-16 Babajan V	Hasanlu VIII *Grdashawan
Late Chalcolithic	Tazehkand Sequence Period							Godin IX Godin X (Dalma)				
Middle Chalcolithic	Tazehkand I - I & III	*Gourab VIII		Giyān V <sub>B</sub>				Godin XI (Shahmabad)	Sehgabi B Late Siah Bid Early Siah Bid		Qalagap19-21	Pisdeli
Early Chalcolithic	Tepch Matrouk	Posht-e Foroudgah II						Godin XII?	Sehgabi XI (Pottery I)		Qalagap22 Parchineh & Hakalan	Dalma (Hasanlu IX)
Transitional	?	Posht-e Foroudgah III		Giyān V					Sehgabi-Sehgabi		Qalagap	
Late Neolithic	?	Posht-e Foroudgah IV *Posht-e Foroudgah V Posht-e Foroudgah VI		Giyān V				Kangavar XI (Pottery Software)	*Late Sarab		Qalagap: second phase Qalagap: first phase Gouran D *Bagnoo	Hajji Firuz (Hasanlu X)
											Gouran V	

for the establishment of a Chalcolithic cultural sequence based on the pottery artifacts discovered. Additionally, the excavation at Tepe Gourab (Khaksar et al., 2014; Hemmati Azandariani et al., 2020) reveals stratified layers spanning from the Bronze to the Iron Age, enriched with an absolute chronology. This excavation facilitates an examination of the continuity from the Chalcolithic Period into the Bronze Age, thereby contributing to the cultural sequence of the area. Furthermore, significant findings from Tepe Pissa, which encompass the Early Bronze to the Iron Age, are anticipated to be published soon (Motarjem, in press.), offering a clearer understanding of the Bronze Age cultural sequence. Collectively, these three sites, along with others such as Tepe Pari, Gunespan, Shat Ghilah, and Baba Kamal, provide substantial data that can be synthesized into a coherent chronological table, thereby enhancing the cultural sequence from the Early Chalcolithic Period to the conclusion of the Bronze Age for the region in question. Moreover, the inclusion of studies from Tapeh Posht-e Foroudgah could yield a broader chronological perspective, presenting a more integrated narrative from the Neolithic period to the onset of the Iron Age in the Alvand slopes. This would further substantiate Voigt/Dyson's hypothesis regarding the pottery tradition of straw-tempered buff ware, thereby enriching the chronology table of the Central Zagros (see: Table 3).

Finally, it is recommended that the chronological framework of the eastern slopes of Alvand should be examined separately from that of the western sector. The cultural artifacts from the Neolithic era in this area can be analyzed in conjunction with the "Neolithic pottery style of the Urmia-Hamadan intermediate region." Future research should not focus on the association of these artifacts with sites such as Gouran, Sehghi, Siahbid, and Godin Tepe, which lie outside this area, while also advocating for the establishment of new chronological tables.

### **Acknowledgement**

I would like to express my heartfelt gratitude to Dr. Abbas Motarjem for generously sharing Unpublished results of C-14 from Tepe Pissa. My appreciation also extends to Dr. Amir Saed Moucheshi for his insightful ideas, as well as for his consultation regarding the Neolithic period in Kurdistan Province. Additionally, I am thankful to Dr. Morteza Hissari and the team at the Cultural Heritage Research Institute for their support in sending the carbon-14 test sample out of the country. I would also like to recognize the contributions of the staff at the Chronology Laboratory of the University of Copenhagen, Denmark, for their efforts in conducting the carbon-14 dating. Finally, I wish to acknowledge the anonymous reviewers

of the draft of this article for their valuable comments, which significantly enhanced the quality and depth of this research.

### Conflict of Interest

The author declares no competing interests.

### References

- Abdoallahi, M. & Sardari Zarchi, A., (2013). "Eastern Central Zagros During the Neolithic Period: Based on the Excavation at Tappeh Qelāgap". *Pazhoheshha-ye Bastan Shenasi Iran*, 3(4), 117-138. (in Persian).
- Abdollahi, M. & Sardari Zarchi, A., (2019). "Preliminary Report of Archeological Excavations of Qalagap Tepe, Azna". Research Institute Archeology of Tehran (Unpublished) (in Persian).
- Abdollahi, M., Niknami, K., Hesari, M. & Sardari Zarchi, A., (2014). "Village Life and the Cultural Transformations of the Eastern Central Zagros Societies: Archaeological Excavation at Tappeh Qelagap". *Journal of Archaeological Studies*, 6(1). 67-86. doi: <https://doi.org/10.22059/jarcs.2014.52676> (in Persian).
- Azarnoush, M., Sharifi, A. & Hozhabri, A., (2016). "Revising the Relative and Absolute Chronology of Tepe Hegmataneh, Hamadan, Iran: Based on the Finds and the Results of Thermo-Luminescent and Radiocarbon Dating". *Pazhoheshha-ye Bastan Shenasi Iran*, 6(10): 121-140. doi: <https://doi.org/10.22084/nbsh.2016.1550> (in Persian).
- Babapiri, J., (2004). "Report on the stratification and determination of the boundaries of Tepe Pari Malayer". Archives of the General Directorate of Cultural Heritage, Tourism and Handicrafts of Hamadan Province, Autumn (Unpublished), (in Persian).
- Bagherzadeh Kathiri, M., (2020). *Laboratory methods of dating ancient monuments*. Tabriz: Islamic Art University of Tabriz. (in Persian).
- Bakhtiari, Z., (2007). "Investigation of identification and documentation of ancient artifacts of Samen Malayr section: Volumes 1 and 2". Archives of the General Directorate of Cultural Heritage, Tourism and Handicrafts of Hamadan Province, (Unpublished), (in Persian).
- Bakhtiari, Z., Biranvand M. & Ranjbran, M., (2014). "Short Expection on Apumend of First The Protista Rural Pupils (Late Neolithic) Malayer Plain (With Central It Studying From Produce on Examining and Identification Samen Superficial)". In: *Article Set of Tourism Malayer Archeology Congre*, Collector: Ali Khaksar, Esmael Rahmani, Holdber Culture Inheritance Organization, Hamedan Cultural Heritage, Handicrafts and Tourism Organization (in Persian).

- Balmaki, B., (2017). "The Dalma Culture in the Hamedan Plain Stratigraphic Excavation at Tappeh Taze-Kand". *Pazhoheshha-ye Bastan Shenasi Iran*, 7(12): 63-82. doi: <https://doi.org/10.22084/nbsh.2017.11149.1477> (in Persian).
- Balmaki, B., (2017). *Prehistoric Archeology of Hamedan Plain, (Archaeological Researches of the Village Era)*. first edition, Tehran, Zhino Publishing (in Persian).
- Beik-Mohammadi, Kh., Rezaloo, R., Afkhani, B. & Javanmardzadeh, A., (2021). "An Attitude to the Common Cultural Developments of the Late Neolithic Period of Malayer Plain: Excavation at Tappeh Posht-e Forodgah". *Journal of Archaeological Studies*, 13(2): 71-94. doi: <https://doi.org/10.22059/jarcs.2021.258800.142575> (in Persian).
- Beik-Mohammadi Kh, Marjani, S. & Ahmad-Yosefi-Sarhadi, Z., (2020). "Spinning, A Manifestation of the Components of the Endogenous Livelihood Economy of Semi-Unilateral Establishment Sheep Communities (Case Study: Spindle Whorls Discovered from Fxcavation Poshteh-Forodgah Tepe)". *Parseh J. Archaeol Stud.*, 4(11): 7-26. doi: <https://doi.org/10.30699/PJAS.4.11.7> (in Persian).
- Beik-Mohammady, Kh., & Javanmardzadeh, A., (2020). "Study and Typology of Neolithic Pottery Discovered from the Poshteh-Forodgah Tepe, Malayer Plain". *Pazhoheshha-ye Bastan Shenasi Iran*, 10(25): 29-52. doi: <https://doi.org/10.22084/nbsh.2020.22546.2207> (in Persian).
- Beik-Mohammady, Kh., Rezaloo, R., Afkhani, B. & Javanmardzadeh, A., (2018). "Poshteh-Forodgah Tepe the Semi-Unilateral Establishment of a Late Neolithic Period in the Eastern Coast of Central Zagros, Plain Malayer". *Pazhoheshha-ye Bastan Shenasi Iran*, 8(16): 63-82. doi: <https://doi.org/10.22084/nbsh.2018.16384.1747> (in Persian).
- Contenau, G. & Ghrihman, R., (1935). *Fouilles De Tepe Giyan Pers De Nehavand*. Paris.
- Ehlarz, A., (1986). *Iran: Geographical Country Survey Foundations Volum One Natural Geography*. Translation: Mohamad-Taghi Rahmani, Tehran: Natural Geography Institution and Sahab Cartography (in Persian).
- Goff Mead, C., (1971). "Luriŝtan before the Iron age". *Iran*, 9: 131-152. <https://doi.org/10.2307/4300443>
- Hemati Azandaryai, E., Khaksar, A. & Ahmادتajari, P., (2020). "A Study and Analysis of Chalcolithic Period in Malayer Plain Based on Stratigraphic Excavation in Tape Gourab". *Journal of Archaeological Studies*, 12(1), 263-283. doi: <https://doi.org/10.22059/jarcs.2020.268866.142636> (in Persian).
- Hemati Azandaryani, E., Khaksar A., (2019). "Recently Result of Archaeological Excavation in Tape Giyan – Nahavand". *Parseh J Archaeol*

*Stud.*, 2(6), 7-22. doi: <https://doi.org/10.30699/PJAS.2.6.7> (in Persian).

- Henrickson, E. F., (1983). "Ceramic styles and cultural interaction in the early and middle chalcolithic of the central Zagros, Iran". Ph.D. thesis University of Toronto.

- Henrickson, E. F., (1985). "An Update Chronology of the Central Zagros Chalcolithic". *Iran*, No. XXIII.

- Henrickson, R. C., (1986). "A regional perspective on Godin III cultural development in center western Iran". *Iran*, 22: 1-57. <https://doi.org/10.2307/4299764>

- Hessari, M., (2019). "A Study, Analyses and Variation of the Chalcolithic Pottery Tradition in Idier Tappeh, Ardabil Province". *Pazhoheshha-ye Bastan shenasi Iran*, 9(21): 23-40. doi: [10.22084/nbsh.2019.16391.1748](https://doi.org/10.22084/nbsh.2019.16391.1748)

- Heydari, M. & Motarjem, A., (2018). *Lorestan in the Bronze Age*. Khorramabad: Ordibehesht Janan (in Persian).

- Howell, R., (1979). "Survey of Excavations in Iran: Survey of the Malayer Plain David Stronach (1978)". *Journal of the British Institute of Persian Studies, Iran (Journal of Persian Studies)*, 17: 143-159. <https://doi.org/10.2307/4299684>

- Jafari, A., (2015). "Rural tourism attractions of Malayr county with emphasis on Zand district". Master's thesis. (Unpublished), (in Persian).

- Kabiri, A., (1974). "Review report and registration file of Gourab". Archives of the General Directorate of Cultural Heritage, Tourism and Handicrafts of Hamadan Province, (Unpublished), (in Persian).

- Kaka, Gh., (2016). "Preliminary report of the first chapter of the archaeological excavation of Shazand site in Central Province". Archives of the General Directorate of Cultural Heritage, Tourism and Handicrafts of Markazi province (Unpublished), (in Persian).

- Khaksar, A., (2006). "Final report of the stratigraphic excavations of the ancient Tepe of Gourab (Malayr)". Archives of the General Directorate of Cultural Heritage, Tourism and Handicrafts of Hamadan Province, Autumn (Unpublished), (in Persian).

- Khaksar, A., Hemati Azandaryani, E., & Norozi, A., (2015). "The Analysis of Yaniq Culture at Tappeh Gourab of Malayer, Based on Stratigraphical Excavation". *Pazhoheshha-ye Bastan Shenasi Iran*, 4(7): 47-66. [https://nbsh.basu.ac.ir/article\\_987.html?lang=en](https://nbsh.basu.ac.ir/article_987.html?lang=en) (in Persian).

- Khosravi, S., Khatib Shahidi, H., Vahdatinasab, H., Alibaigi, S. & Aali, A., (2012). "Early villages and prehistoric sites in the Abharroud Basin, North West of Iranian central plateau". *Journal of Archaeological Studies*, 4(1), 131-154. doi: <https://doi.org/10.22059/jarcs.2012.35379>

- Levine, L. D., (1976). "Survey in the Province of Kermanshah, 1975: Mahidasht in the Prehistoric and early Historic Periods". in: F. Bgherzadeh (ed), *Proceeding of the 4<sup>th</sup> Annual Symposium on Archaeological Research in Iran*, Tehran: 284-279. (in Persian).
- Levine, L. D. & McDonald, M. A., (1977). "The Neolithic and Chalcolithic periods in the Mahidasht". *Iran* 15: 39-50. <https://doi.org/10.2307/4300563>
- Levine, L. D., (1976). "Survey in the Province of Kermanshah, 1975: Mahidasht in the Prehistoric and early Historic Periods". in: F. Bgherzadeh (ed), *Proceeding of the 4<sup>th</sup> Annual Symposium on Archaeological Research in Iran*, Tehran: 284-279. (in Persian).
- Masoumi, Gh., (2013). *History of Archaeology*. first edition, Tehran: Samt. (in Persian).
- McDonald, M. M. A., (1979). "An examination of mid-Holocene settlement pattern in the Central Zagros region of western Iran". PhD. Dissertation, Department of Anthropology, University of Toronto.
- Meldgaard, J., Mortensen, P. & Thrane, H., (1963). "Excavation at tepe Guran, Lurištan". *Acta Archaeologica*, XXXIV: 97-133.
- Mohammadifar, Y. & Hemati Azandariani, E., (2017). "Archaeological excavation of Tepe Baba Kamal Toiserkan". Archives of the General Directorate of Cultural Heritage, Tourism and Handicrafts of Hamadan Province (Unpublished), (in Persian).
- Mohammadifar, Y. & Motarjem, A., (2008). "Report of the second season of the archaeological excavation in Tappeh Pissa". Archives of the General Directorate of Cultural Heritage, Tourism and Handicrafts of Hamadan Province (Unpublished), (in Persian).
- Mohammadifar, Y., Motarjem, A. & Niknami, K., (2019). "Introduction and classification of some graphic and geometric decorative motifs on Bronze Age pottery based on evidence obtained from Pissa Tepe in Hamadan". *Payam Bastanshenas Journal*, 8 (16): 35-48 (in Persian).
- Mohammadifar, Y., Nowrozi, A. & Sharifi, A., (2013). "Achievements of the 16<sup>th</sup> season of the excavation of Hegmatane Tepe". In: *The collection of articles on archeology and history of Hamedan on the occasion of the 100<sup>th</sup> anniversary of the excavation in Hamedan* / by: Ali Hejbari, Tehran, Heritage Organization Culture of Handicrafts and Tourism Research Institute of Cultural Heritage and Tourism, first edition: 151-172.(in Persian).
- Mortensen, P., (1963). "Early villag-farming occupation". in: Jorgen Meldgaard et al., *excavations at Tape Guran Lurištan*, acta archeological.
- Motarjem, A. & Bakhtiari, Z., (2011). "The third season of exploration



in Pissa Tepe Hamedan”. in: *The 11<sup>th</sup> archaeological meeting Iran*. Tehran: Research Institute of Cultural Heritage and Tourism: 390 (in Persian).

- Motarjem, A. & Sharifi, M., (2014). “The Cultural Development of Chalcolithic Era in the East of Central Zagros based on Archaeological Excavations at Tepe Gheshlagh in Bijar, Kurdistan Province”. *Iranian Journal of Archaeological Studies*, 4(1): 49–65. DOI: <https://doi.org/10.22111/ijas.2014.1963> (in Persian).

- Motarjem, A. & Sharifi, M., (2018). “The Cultural Transition from Late Neolithic to Early Chalcolithic in Border Land of Eastern Central Zagros”. *Pazhoheshha-ye Bastan Shenasi Iran*, 8(16): 83-102. doi: <https://doi.org/10.22084/nbsh.2018.11334.1486> (in Persian).

- Motarjem, A., Yousefi Zoshk, R. & Zeyghami, M., (2020). “The Geographical and Cultural Boundaries of Central Zagros and Central Plateau of Iran”. *Journal of Archaeological Studies*, 12(1): 199-220. doi: <https://doi.org/10.22059/jarcs.2020.264896.142611> (in Persian).

- Natural Sources and Hamadan City Aquifers (2010). *Physiognomy of Natural Sources and Hamadan City Aquifers (Booklet)*. Agriculture Holy War Ministry, Forests Organization, Hamadan (in Persian).

- Rezvani, H., (2006). “Salvation exploration of Pa Tepe of Malayr and surrounding areas”. The first chapter, Tehran: Institute of Archeology. (Unpublished) (in Persian).

- Roštāei, K. & Azadi, A. (2017). “The Cultural Contact Between Central Zagros and Central Plateau During the 4th Millennium B.C.: Further Evidence from Shat Ghilah, Malayr”. *Pazhoheshha-ye Bastan Shenasi Iran*, 7(14), 39-58. doi: <https://doi.org/10.22084/nbsh.2017.12431.1540> (in Persian).

- Roštāei, K., (2006). “Speculation report in the area of Shatghileh, Kalan Malayr Dam”. Report of the rescue excavations of Patappheh Malayr and surrounding areas under the supervision of Hassan Rezvani, Tehran: Archeology Research Institute Document Center (Unpublished) (in Persian).

- Saed Moucheshi, A., (2023) Personal conversation.

- Saed Moucheshi, A., (2023). “Report of investigation and identification of Kurdistan Province”. Archives of the General Directorate of Cultural Heritage, Tourism and Handicrafts of Kurdistan Province, Sanandaj, (Unpublished) (in Persian).

- Sarraf, M., (1999). “The architectural and urban development process of the ancient city of Hegmataneh (Hamadan) at the end of the ninth season of excavation, autumn 1998”. in: *The second congress of the history of architecture and urban planning of Iran, Bam Citadel, Kerman*, Volume 1, Tehran: Organization of Cultural Heritage: 87-120. (in Persian).

- Shabani, M., (2023). Personal conversation. (in Persian).
- Sharifi, M. & Abbas, M., (2018). "The process of cultural change in the Chalcolithic period in the highlands of Western Iran at Tepe Gheshlagh". *Documenta Praehistorica*, XLV: 86-99. DOI: <https://doi.org/10.4312/dp.45.7> (in Persian).
- Sharifi, M. & Omrani, B., (2022). "A Laboratory Analysis of the Kura-Araxes Pottery from Tepe Pirtaj Using Petrography and XRF Techniques". *Archaeometry journal*, 64: 883-897. DOI: <https://doi.org/10.1111/arc.12751> (in Persian).
- Sharifi, M., (2020). "Excavations at Barveh Tepe: New Insights into the Early Bronze Age in Northwest Iran". *Journal of Near Eastern Studies*, 29 (2): 287-303. DOI: <https://doi.org/10.1086/710363> (in Persian).
- Sharifi, M., (2022). "The Late Chalcolithic settlement of Gird-i Ashoan in the Zab basin, northwest Iran". *Ancient near eastern studies, ANES* 59: 53-79. DOI: <https://doi.org/10.2143/ANES.59.0.3291189>
- Smith, Ph. & Young, T. C., (2003). "The force of numbers: population pressure in the Central West of Zagros from 12000 to 45000BC". Translated by: Korosh Roštai. *Journal of Archeology & History*, 17 (2): 5-37. (in Persian).
- Stronach, D., (1969). "Excavation at tepe nush-I jan". *Iran*, VII. <https://doi.org/10.2307/4299610> (in Persian).
- Vahdati Nasab, H., Brion, J., Hashemi, S. M. et al., (2019) "Qaleh Kurd Cave, an area related to the Middle Paleolithic with human remains, Avaj (Qazvin)". In: *The Paleolithic Special Issue of the Archaeological Reports Series (2<sup>nd</sup> Series, No. 7)*, by: Saman Goran and Elham Qasidian, first edition. Tehran. Institute of Cultural Heritage and Tourism: 22-34. (in Persian).
- Vahdati Nasab, H., Berillon, G., Hashemi, S. M., et al., (2024). "Qaleh Kurd Cave (Qazvin, Iran): Oldest Evidence of Middle Pleistocene Hominin Occupations and a Human Deciduous Tooth in the Iranian Central Plateau". *JPaleoArch*, 7 (16): 1-28. <https://doi.org/10.1007/s41982-024-00180-4>
- Voigt, M. & Dyson, R. H., (2003). *Chronology of Iran. Ca. 8,000 to 2,000 BC*. Translated by Akbar Pour Faradj and Ahmad Chaychi Amirkhiz, first edition, Nasl-e Baran Publications. (in Persian).
- Young, T. C., (1966). "Survey in western Iran 1961". *Journal of Near Eastern Studies*, 25 (4): 228. <https://doi.org/10.1086/371877>
- Young, T. C., (1967). "The migration into the Zagros". *Iran*, V: 1-34. <https://doi.org/10.2307/4299585>



## پیشنهادی بر بازنگری توالی گاهنگاری نسبی و مطلق روستانشینی کرانه شرقی و دامنه‌های جنوبی رشته‌کوه الوند (براساس گاهنگاری نسبی و نتیجه رادیوکربن تپه پشت فرودگاه-ملایر)

خلیل‌الله بیگ محمدی<sup>۱</sup>

شناسه دیجیتال (DOI): <https://dx.doi.org/10.22084/nb.2024.29679.2701>

تاریخ دریافت: ۱۴۰۲/۱۲/۲۸، تاریخ بازنگری: ۱۴۰۳/۰۳/۱۰، تاریخ پذیرش: ۱۴۰۳/۰۳/۲۵

نوع مقاله: پژوهشی

صص: ۶۹-۹۵

### چکیده

«گاهنگاری» و بازبینی تاریخ‌گذاری‌های نسبی و مطلق حوزه‌های فرهنگی، همواره از اقتضائات جدایی‌ناپذیر در علم باستان‌شناسی است. بر این اساس، از مناطق با اهمیت و ریشه‌دار در گاهنگاری مطالعات باستان‌شناسی ایران، زاگرس مرکزی و دامنه‌های جنوبی رشته‌کوه الوند و دشت ملایر است که از دهه ۱۹۹۰ م. با حضور باستان‌شناسان غیرایرانی مورد بحث و توجه بوده و تا به امروز نیز کمابیش ادامه داشته است. دشت ملایر از حوزه‌های فرهنگی شاخص پیش‌تاریخ استان همدان به‌شمار می‌آید که با حضور محوطه‌های کلیدی از ادوار مختلف، همواره مورد مناقشه و بحث بوده و در ادبیات باستان‌شناختی زاگرس مرکزی نقش آفرینی کرده است. این منطقه در برخی از ادوار تاریخی، مانند دوره مس‌وسنگ دارای تاریخ‌گذاری مطلق است و دوره‌های تاریخی قبل از آن، یعنی روستانشینی آغازین با تاریخ‌گذاری نسبی، معرفی و گاهنگاری شده است؛ بنابراین شناخت و ضرورت گاهنگاری مطلق آن، امری ضروری بوده و هدف اصلی این نوشتار است. در این پژوهش با ارائه تاریخ‌گذاری مطلق آزمایش کربن ۱۴ از دانشگاه کوپنهاک دانمارک، جدول گاهنگاری هزاره ششم پیش‌ازمیلاد این حوزه فرهنگی با اطمینان خاطر بیشتری ارائه می‌شود که پیش‌تر به صورت نسبی و بر مبنای سفال بیان گردیده است. مسأله اصلی پژوهش - ضمن نگاه انتقادی به روش گاهنگاری سنتی این حوزه مبتنی بر توالی فرهنگی گودین - با طرح این پرسش پی‌گیری می‌شود که، با توجه به ارائه تاریخ‌گذاری نسبی در خصوص نخستین استقرارهای جوامع انسانی در دشت ملایر که مبتنی بر «سفال» سامان یافته است، چه مقدار این نظریات با تاریخ‌گذاری مطلق آن تطابق دارد؟ براساس این پرسش، فرضیه پژوهش چنین طرح می‌یابد که، براساس نمونه آزمایش کربن ۱۴ از لایه‌های تحتانی محوطه پشت فرودگاه، تاحدودی تاریخ‌گذاری نسبی پیشین صحیح بوده و نتایج حاصله - با کمی تسامح - منطبق با نظریات و تاریخ‌گذاری‌ها ارائه شده است. روش پژوهش در این نوشتار، نظریه داده‌بنیاد از نوع کیفی و مبتنی بر روش تاریخی - تحلیلی با بهره‌مندی از روش آزمایشگاهی تاریخ‌گذاری رادیوکربن ۱۴ خواهد بود. برآیند و نتایج، نشان از حضور جوامع نخستین طی هزاره ششم (با تاریخ کالیبره شده ۵۲۱۶-۴۹۹۴ پ.م.) با افق فرهنگی «سراب جدید» مشخص می‌گردد.

**کلیدواژگان:** گاهنگاری، رشته‌کوه الوند، نوسنگی جدید، تپه پشت فرودگاه، آزمایش رادیوکربن ۱۴.

۱. استادیار گروه باستان‌شناسی، دانشکده میراث فرهنگی، صنایع دستی و گردشگری، دانشگاه مازندران، بابلسر، ایران

Email: [k.Beik-Mohammadi@umz.ac.ir](mailto:k.Beik-Mohammadi@umz.ac.ir)

ارجاع به مقاله: بیگ محمدی، خلیل‌الله، (۱۴۰۳). «پیشنهادی بر بازنگری توالی گاهنگاری نسبی و مطلق روستانشینی کرانه شرقی و دامنه‌های جنوبی رشته‌کوه الوند (براساس گاهنگاری نسبی و نتیجه رادیوکربن تپه پشت فرودگاه-ملایر)». پژوهش‌های باستان‌شناسی ایران، (۴۱)۱۴: ۶۹-۹۵. doi: 10.22084/nb.2024.29679.2701

صفحه اصلی مقاله در سامانه نشریه:

[https://nbsh.basui.ac.ir/article\\_5726.htm-1?lang=fa](https://nbsh.basui.ac.ir/article_5726.htm-1?lang=fa)

فصلنامه علمی گروه باستان‌شناسی دانشکده هنر و معماری، دانشگاه بوعلی سینا، همدان، ایران.

© حق نشر متعلق به نویسنده(گان) است و نویسنده تحت مجوز Creative Commons Attribution License به مجله اجازه می‌دهد مقاله چاپ شده را در سامانه به اشتراک بگذارد، منوط بر این‌که حقوق مؤلف اثر حفظ و به انتشار اولیه مقاله در این مجله اشاره شود.