پژوهش‌های باستان‌شناسی ایران

۴۱

دانشگاه بوعلی سینا

انجمن علمی باستان‌شناسی ایران

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فصلنامهٔ علمی پژوهش‌های باستان‌شناسی ایران شمارهٔ ۴۱ دورهٔ چهاردهم تابستان ۱۴۰۳

گروه باستان‌شناسی دانشکده هنر و معماری دانشگاه بوعلی سینا

ویژگی‌های کلی مقاله‌ی مورد پذیرش

هدف نشریه‌ی علمی-پژوهشی *پژوهش‌های باستان‌شناسی ایران*، انتشار پژوهش‌ها و تجربه‌های علمی در زمینه‌های باستان‌شناسی، تاریخ هنر و معماری است.

نوشتار باید نتیجه‌ی پژوهش‌های نویسنده (یا نویسندگان) بوده و در نشریه‌ی دیگر منتشری نشده باشد.

پذیرش مقاله برای چاپ پس از داوری و با تأیید در جلسه‌ی هیأت تحریریه‌ی مجله است.

مسئولیت درستی نوشته‌ها با خود نویسنده (یا نویسندگان) مقاله است.

مقاله باید بر یک روی صفحه‌ی استاندارد A۴ (۳۰×۲۱ سانتی‌متر) و با اندازه‌ی (سایز) ۱۳ و قلم (فونت) B Mitra با فرمت ۲۰۰۳ و ۲۰۰۷ WORD و حواشی ۲/۵ سانتی‌متر تنظیم شده و در نهایت کل مقاله نباید از ۲۰ صفحه‌ی استاندارد (۲۴ سطری) و از ۷۰۰۰ کلمه بیشتر باشد.

صفحه‌ی اول باید شامل نام و نشانی کامل و شماره تلفن نویسنده، پست الکترونیک و محل خدمت و مرتبه‌ی علمی وی (با دو زبان فارسی و انگلیسی) باشد.

در صورتی که مقاله برگرفته از پایان‌نامه‌ی نویسنده باشد، مجوز و ذکر نام استاد راهنما الزامی است.

نوشتارها باید به‌ترتیب شامل: عنوان، چکیده، مقدمه، پیشینه‌ی تحقیق، مبانی نظری، بدنه‌ی تحقیق شامل: موضوعات مختلف، نتیجه‌گیری، سپاسگزاری، پی‌نوشت، فهرست منابع و بخش انگلیسی (مقاله‌ی کوتاه ۱۲۰۰ کلمه‌ای) طبق راهنمای شیوه‌نامه باشد.

- «عنوان» شامل: موضوع مقاله، نام و نام خانوادگی نویسنده و مرتبه‌ی علمی و دانشگاه محل تدریس و تحصیل وی است؛ عنوان مقاله باید گویا و بیانگر محتوای نوشتار باشد.

- «چکیده» شرح مختصر، اما جامعی از مسایل محتوایی و نوشتاری شامل: بیان مسئله، اهداف، ضرورت، سؤال، فرضیه، روش پژوهش، نکته‌های مهم و نتیجه‌ی بحث است. چکیده‌ی فارسی نباید بیشتر یا کمتر از ۳۰۰ کلمه باشد.

- «واژگان کلیدی» شامل چهار تا شش واژه‌ی تخصصی که بسامد و اهمیت آن در متن مقاله بیش از سایر واژگان بوده است.

- «مقدمه» شامل طرح مسئله‌ی اصلی است که مورد پذیرش و هدف پژوهشگر از بررسی و انتشار آن است؛ در این بخش باید به اجمال بیان مسئله،اهداف، ضرورت، سؤال، فرضیه، روش تحقیق و پیشینه‌ی تحقیق، مشخص گردد که در طی بررسی به آن پرداخته شود.

- «روش تحقیق» شامل ذکر بسیار مختصر روش و ابداعات نویسنده در پژوهش در این زمینه است.

- «نتیجه‌گیری» شامل جمع‌بندی بحث متن مقاله با روش منطقی و مفید و روشنگر مسئله‌ی مورد پژوهش است و می‌تواند با جدول، تصویر و نمودار و.. هم‌راه باشد.

- «سپاسگزاری» در پایان این بخش نویسنده، راهنمایی دیگران -که در نوشتن مقاله مؤثر بوده‌اند- را یادآوری و از ایشان مختصراً سپاسگزاری می‌نماید (در صورت تمایل).

عناوین جدول‌ها با ذکر شماره در بالا و تصاویر، نقشه‌ها، طرح‌ها و نمودارها با ذکر شماره (توضیحات و ذکر منابع) در پایین ضروری است.

مجموع تصاویر، جداول، نمودارها، نقشه‌ها و طرح‌ها نباید در مجموع بیشتر از ۱۲ عدد باشند و همچنین باید در داخل متن قرار گرفته و یک نسخه از آن‌ها به‌صورت مجزا در یک فایل جداگانه، با فرمت JPEG و کیفیت DPI ۳۰۰ همراه مقاله در وب‌سایت نشریه بارگذاری گردد.

بخش خلاصه‌ی انگلیسی:

این بخش باید به‌همراه مقاله در یک فایل جداگانه (Word) به‌عنوان مقاله‌ی کوتاه انگلیسی به دفتر نشریه ارسال شود؛ که دربردارنده‌ی مشخصات نویسندگان و ترجمه‌ی کاملی از خلاصه‌ی مقاله (به‌صورت مقاله‌ای کوتاه) در ۱۲۰۰ کلمه، شامل: چکیده (همان چکیده‌ی ۳۰۰ کلمه‌ی فارسی و شامل: طرح و بیان مسأله، اهداف و ضرورت پژوهش، پرسش و فرضیه‌ی (اصلی) پژوهش، روش تحقیق و مهم‌ترین یافته‌ها و نتیجه‌گیری)، مقدمه (۴۰۰ کلمه و شامل: طرح و بیان مسأله، اهداف و ضرورت پژوهش، پرسش و فرضیه (اصلی و فرعی) پژوهش، به‌صورت جامع)، متن مقاله (۳۰۰ کلمه)، نتیجه‌گیری (۲۰۰ کلمه) و تمامی منابع فارسی و انگلیسی مورد استفاده در تحقیق باشد.

شیوه‌ی ارجاع به منابع:

ارجاعات مندرج در مقاله، مستند و مبتنی‌بر منابع خواهد بود و از معتبرترین منابع استفاده شود.

درباره آثار مفقود و نیز منسوب، به منابعی که از آن‌ها یاد کرده و یا توضیحی داده‌اند، ارجاع داده می‌شود.

ارجاع داخل متن مقاله: نام خانوادگی نویسنده، سال چاپ اثر: شماره صفحه یا صفحات؛ مثال فارسی: (نگهبان، ۱۳۷۸: ۱۱۲)

درباره‌ی استفاده از سنت شفاهی (مصاحبه با افراد خبره و صاحب نظر) به‌صورت زیر ارجاع‌دهی صورت گیرد و در بخش تشکر از ایشان سپاسگزاری شود. (حسینی، مصاحبه‌شونده، ۱۳۹۰/۱/۱۲).

ارجاع پایانی متن مقاله (منابع):

فارسی:

ارجاع به کتاب:

- نام‌خانوادگی، نام؛ و نام‌خانوادگی و نام سایر افراد دخیل؛ تاریخ چاپ اثر، *نام اثر (ایتالیک)*، ترجمه‌ی...، تعداد جلد...، نام محل نشر: نام ناشر.

ارجاع به مقالات دانشنامه‌ها (دایرةالمعارف‌ها) فصلنامه‌ها، مجلات و نمونه‌های دیگر:

- نام‌خانوادگی، نام، تاریخ چاپ اثر، «نام مقاله»، *نام مجموعه مقالات (ایتالیک)*، تعداد جلد، محل نشر: ناشر، شماره صفحه‌ی آغاز و پایان مقاله.

لاتین:

در کتاب‌نامه‌ی لاتین حروف اول باید بزرگ باشد و بین فواصل ویرگول قید شود.

ارجاع به کتاب:

Ward-Perkins, J. B., 1990, *Roman Imperial Architecture London*, Penguin Books.

ارجاع به مقالات مجله‌ها:

Trinkaus, E., 1982, "Artificial Cranial Deformation in the Shanidar 1 and 5 Neanderthals", *Current Anthropology* 23 (2): 198-199.

ارجاع به مجموعه مقالات:

Liverani, M., 2003, "The Rise and Fall of Media", Continuity of Empire (?): Assyria, Media, Persia, (Lanfranchi, G.B and others) eds. Padova, 1-12.

ارجاع به پایان‌نامه‌ها:

Blom, D.E., 1999, "Tiwanaku Regional Interaction and Social Identity, a Bioarchaeological Approach", Ph.D. Thesis, Department of Anthropology, University of Chicago.

نکات دیگر در باب ارجاع به منابع:

- منابع مقاله به‌صورت الفبایی و بر اساس نام مؤلف تنظیم می‌شود؛ منابعی که در پایان مقاله ذکر می‌شود، همان منابعی است که در داخل متن استفاده شده است.
- در صورتی‌که یک نویسنده منابع متعدد مربوط به سال‌های مختلف استفاده کرده، باید به ترتیب تاریخ انتشار باشد.
- در صورتی که از یک نویسنده منابعی ذکر شود که مربوط به یک سال شمسی یا میلادی است به این صورت عمل شود: (مجیدزاده، ۱۳۸۷الف: ۱۵) و (مجیدزاده، ۱۳۸۷ب: ۳۵).
- در صورتی که مؤلف منبع اثر، معلوم نباشد، نام اثر جایگزین نام مؤلف می‌شود.
- عنوان کتاب‌ها و مقاله‌ها در منابع پایانی مقاله به‌طور کامل ذکر خواهد شد.
- منابع غیر فارسی، پس از منابع فارسی و به ترتیب: عربی، انگلیسی، فرانسوی و... آورده شود.
- هر توضیح دیگری غیر از ارجاع به منابع مورد استفاده، در پی‌نوشت، ذکر شود.
- تمامی منابع فارسی نیز باید به‌صورت ترجمه شده‌ی انگلیسی در مقاله آورده شود.

نحوه‌ی ارسال مقاله:

- مقاله‌های علمی-پژوهشی را همراه با درخواست کتبی نویسنده و یا نویسندگان، فقط از طریق وب‌سایت نشریه و به‌نشانی: **nbsh.basu.ac.ir** ارسال فرمایید.

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گروه باستان‌شناسی

دانشکدهٔ هنر و معماری دانشگاه بوعلی‌سینا

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شاپای الکترونیکی: ۵۵۰۰-۲۳۴۵

رتبهٔ علمی نشریه در وزارت علوم: A

ناشر: دانشگاه بوعلی‌سینا

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انجمن علمی باستان‌شناسی ایران

پژوهش‌های باستان‌شناسی ایران ۴۱

شاپای چاپی: ۵۲۲۵-۲۳۴۵
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فصلنامهٔ پژوهش‌های باستان‌شناسی ایران دارای درجهٔ علمی-پژوهشی بر اساس مجوز شمارهٔ ۳/۱۸/۵۴۷۳۹۸ تاریخ ۱۳۹۲/۱۰/۲۳ از کمیسیون بررسی نشریات علمی وزارت علوم، تحقیقات و فناوری می‌باشد.

مقالات مندرج لزوماً نقطه نظر فصلنامهٔ پژوهش‌های باستان‌شناسی ایران نیست و مسئولیت مقالات به عهدهٔ نویسندگان گرامی می‌باشد. استفاده از مطالب و کلیهٔ تصاویر نشریه با ذکر منبع بلامانع است.

رتبهٔ علمی نشریه در وزارت علوم: A

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فهرست مطالب

بسمه تعالی

گواهی رتبه علمی

جمهوری اسلامی ایران
وزارت علوم، تحقیقات و فناوری
معاونت پژوهش و فناوری
کمیسیون نشریات علمی

نشریه

پژوهش های باستان شناسی

با صاحب امتیازی دانشگاه بوعلی سینا بر اساس آیین‌نامه نشریات علمی مصوب ۱۳۹۸/۰۲/۰۲ در ارزیابی سال ۱۳۹۸، موفق به کسب رتبه الف شده است.

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الف

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An Introduction to the Newly found Paleolithic Landscape of Boulan in the North of the Eyvanekey Alluvial Fan with a focus on Lithic Techno-Typology

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Abstract

The findings gathered from the Northern Iranian Central Desert (NICD) over the past two decades suggest the significance of the region during the Pleistocene, indicating that different and fluctuating environmental conditions governed the region in the past, contrary to the hot and dry conditions of today. From an archaeological perspective, this means that human populations might have been able to live here during milder times. Based on this assumption and the escalating number of Paleolithic localities, the hypothesis of considering the NICD as a significant Pleistocene dispersal corridor was put forward. However, the available information regarding the Pleistocene human populations in the region was limited only to its eastern and western parts. Up until recently, the Pleistocene "plain dwellers" in the more central parts of the NICD (corresponding to the modern-day Alborz, Tehran, and western Semnan provinces) were not known to us. The picture took a turn when Showr-e Qazi, a paleolithic surface lithic scatter, located about 18km southwest of Eyvanekey, came to light. Following this discovery, the authors embarked on a comprehensive investigation of Eyvanekey. Doing so, a systematic intensive pedestrian field survey was conducted in the vicinity of Eyvanekey County to tackle questions regarding the role of the central parts of the NICD for the dispersal of Pleistocene human populations and the degree of connectivity and relatedness of the landscapes, and resultantly, strengthening or weakening the mentioned hypothesis. As a result, extensive Paleolithic surface scatters were recorded using a combined method of proportionate stratified random and adaptive sampling. The lithic assemblage from Boulan, one of these scatters, has been examined here using techno-typological approach. The preliminary results suggest Middle and Upper Paleolithic affinities. In addition, in general terms, the lithic tradition in Boulan is geared toward the expedient and opportunistic end of the spectrum. Lastly, the discovery of extensive Paleolithic localities in the central parts of the NICD provides additional support for the hypothesis of a Northern dispersal corridor.

Keywords: The Northern Central Desert of Iran, Pleistocene Dispersal Corridor, Eyvanekey area, Middle and Upper Paleolithic Periods, Lithic Artifacts.

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Introduction

The proximity of the Alborz Mountains to the north and the Central Desert to the south has created an elongated east-west belt on the northern strip of the Iranian Central Desert (NICD). During the Pleistocene, this strip of land was a habitat for various hominin populations and most probably one of the dispersal corridors linking Africa and West Asia to the Central and Inner Asia (Shoaee et al., 2021, 2023; Vahdati Nasab et al., 2013, 2019; Vahdati Nasab & Hashemi 2016). The width of this corridor was variable and depended on climatic fluctuation and its impacts, specifically, the expansion and retreat of the Central Desert (Hashemi et al., 2018; Vahdati Nasab et al., 2013). The strip of NICD (as a subset of the Northern Iranian Central Plateau), is delimited from the pediments of south Alborz at approximately 50.50° longitude near Hashtgerd urban area, at the border of Alborz and Qazvin provinces. Moving eastward, the NICD stretches to around 56° longitude in the eastern part of the Khar Turan National Park, situated between the borders of modern-day Semnan and North Khorasan provinces. With a length of roughly 530 km, the width of this strip varies in different locations, ranging from 25 to nearly 40 km.

The NICD and the surrounding areas have been home to many Paleolithic localities, including Qaleh Kurd Cave in Avaj, Qazvin (Soleymani & Alibeigi 2018; Vahdati Nasab et al., 2024), Tepe Khaleseh in Khorramdarreh, Zanjan (Alibeigi & Khosravi 2009), Sepid Dasht surface scatter in Boein Zahra, Qazvin (Vahdati Nasab et al., 2009), Nargeh surface scatter in Takestan, Qazvin (Biglari 2003b), Zaviyeh surface scatter in Parandak, Markazi (Heydari-Guran et al., 2014), cave and rockshelter complex of Sorheh in Savojbolagh, Alborz (Hariryan et al., 2021), Sefid Ab surface scatter in Kashan (Biglari 2003a), Showr-e Qazi and Sar Darreh surface scatters in the southwest of Eyvaneky (Nateqi et al., 2020), the complex of surface scatters Qaleh Qousheh, Holabad, Niasar, and Arisman in Kashan (Conard et al., 2009; Heydari-Guran & Ghasidian, 2011), Moghanak and Otchounak surface scatters in Damavand (Berillon et al., 2007), the open-air site of Soufi Abad in Sorkheh, Semnan (Vahdati Nasab & Feiz 2014), Anzo Cave in Mehdi Shahr, Semnan (Jayez et al., 2019), the open-air sites of Mirak (Vahdati Nasab et al., 2019) and Delazian in Semnan (Vahdati Nasab & Clark 2014), and finally, Chah-e Jam surface scatter near Damghan (Vahdati Nasab & Hashemi 2016). Out of the various sites mentioned, only Mirak and Qaleh Kurd Cave have been subject to archaeological excavations, whereas the rest have been comparatively dated based on lithic techno-typology. In addition, in more

distant areas such as Khorasan in the east, several surface lithic scatters of Paleolithic affinities have recently been reported (Fig. 1; see e.g., Sadraei et al., 2022). It is important to highlight that within the sites listed, Zaviyeh, Sorheh, Moghanak-Othoucnak, Showr-e Qazi, Sar Darreh, Anzo, Mirak, Delazian, Soufi Abad, and Chah-e Jam are situated precisely within the NICD, whereas the remaining sites are situated in the surrounding regions (Fig. 1).

In the years to come, research studies can contribute to the examination of diverse hypotheses regarding the impact of the NICD on the distribution and dispersal of hominin populations. For instance, based on the findings at Mirak Open-air site, it is suggested that there were intermittent occurrences of hominin populations in the NICD throughout the Late Pleistocene (Hashemi et al., 2018; Vahdati Nasab et al., 2019). Insufficient Pleistocene cultural findings with absolute chronology in the NICD hinders the ability to confidently speculate on a dispersal corridor. The consistent utilization of a corridor is contingent upon the relative interconnectedness of its habitats. In simpler terms, any disruptions caused by climatic, environmental, or topographical changes should not hinder this uninterrupted continuity (see Dennell 2020). One way to emphasize landscape continuity in archaeology is to find archaeological evidence that is comparable or roughly contemporaneous in almost all parts of this possible corridor. The Paleolithic localities mentioned above have been found in the eastern and western parts of the NICD while the official reports of more central parts (i.e., the modern provinces of Alborz, Tehran, and the western part of Semnan) are meager. Hence, the evidence is fragmented for a dispersal corridor-to-be. This particular area is referred to as the "central area" of the NICD below (Fig. 1). Whilst the Sorheh Rockshelter and Moghanak-Otchounak are situated within the central parts of the NICD, they pertain to the mountainous and undulating landscapes of the north. It is thus essential to recognize Paleolithic localities in the more southern pediplains which are the major and dominant landforms that characterize the NICD. As a result of this shortage of information from the pediplains, the area corresponding to Eyvanekey County in the central part of the NICD and the western Semnan Province was chosen for field investigation with a hope that conducting such surveys could aid in piecing together the enigma of the Paleolithic Period in the NICD. It should be noted that the scattered findings of Showr-e Qazi and some unofficial reports of sporadic lithic findings near the village of Chandab, both within the Eyvanakey area, prompted the corresponding author to design a research plan for field

investigation. Besides the reconnaissance findings, the Eyvanekey area was chosen because extensive human constructions in the plains of Tehran and Karaj hinder effective pedestrian field surveys. Thus, Eyvanekey's proximity to the Tehran Plain may mean that the results could be extended to the latter area.

Based on what has been mentioned, the objectives of this investigation were trying to piece together the jigsaw of the Paleolithic Period in the NICD, determining relative chronology, finding in-situ Paleolithic deposits, examining toolmaking traditions, population interactions, and as such. Furthermore, the results could be utilized as a basis for gauging the area's potential for in-depth research in the years ahead. As a result of conducting the field survey, several Paleolithic localities were recovered. The finds of only one of them, Boulan, is analyzed here within the framework of techno-typology. The others including Yousuf Abad, Chandab, Sangab, Hossein Abad-e Korus, and Korak. The dimensions of each locality range from two kilometers in Korak to eight kilometers in Sangab (Fig. 1). A separate occasion is needed to delve into the discussion of the other surface lithic scatters in Eyvanekey.

Research Questions: The research questions formulated for the fieldwork revolved around the following topics: What is the significance of the central area of the NICD in terms of hominin presence during the Pleistocene? How have the potential sites been distributed, and what does this distribution suggest about the mobility of hominin populations? What is the estimated chronological range of the potential findings? It is important to highlight that these inquiries were crafted prior to the field survey. As a result, they go beyond the scope of this paper which focuses solely on the findings from Boulan. Hence, it is not possible to address these questions adequately in this context. The techno-typological analysis of the lithics from Boulan marks the initial phase in disseminating research related to the Paleolithic Period in Eyvanekey and the central parts of the NICD.

Research Methods: The survey was carried out in 2021 in an area of 891km2, with 65.2km2 being systematically explored. By conducting a comprehensive reconnaissance survey, the area was categorized into four zones in terms of the possibility of yielding lithics based on several factors (judgemental stratification; Fig. 1). These factors included the probability of paleosurface visibility, topography, slopes, estimation of lithic artifact density, identification of deflated areas through satellite imagery, assessment of landscape accessibility, and intensity of human constructions. Zone 1 exhibits the highest potential, whereas zone 4 is

characterized by intense human construction, leading to its disregard. The potential of zone 1 resulted in a greater number of grids being selected from that area, while the least were chosen from zone 3 (disproportional stratified sampling; Banning 2002: 116). Within each grid, the sampling was conducted randomly. Furthermore, in cases where a substantial number of lithics were documented in each transect, say 15 artifacts in half square kilometers, its neighboring units were surveyed to identify any potential clusters (Adaptive cluster sampling; e.g., Orton 2000: 34). This combined method allows for the identification of clusters of stone artifacts in open landscapes. It is important to note that zone one encompasses dissected hilly plains located to the south of the mountains and the north of the puffy clay flats in the south (Fig. 1).

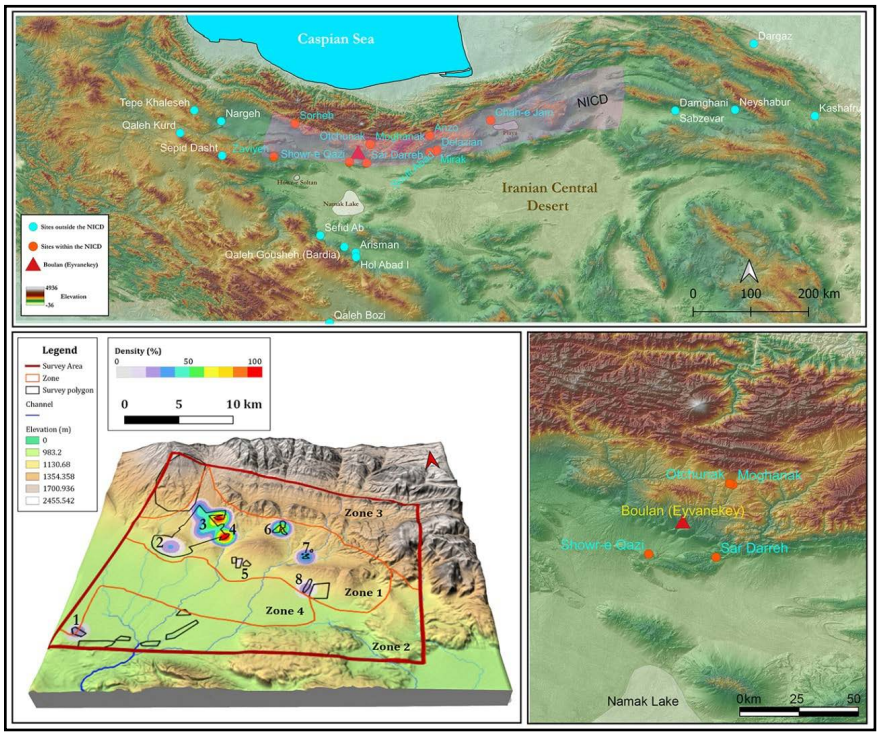


Fig. 1: Above. The location of the NICD, Eyvanekey, and the main Paleolithic sites in the NICD and around the Iranian Central Plateau; Below left. the outlines of surveyed areas (black polygons) within the judgmental zoning system (orange lines) and the Kernel heatmaps based on lithic densities. 1. Yousef Abad; 2. Chandab; 3. Sangab; 4. Hossein Abad-e Korus; 5 and 8. Sporadic scatters in the north of the city of Eyvanekey; 6. Boulan; 7. Korak; Below right. A close-up view illustrating Eyvanekey, the neighboring Paleolithic localities, and Namak Lake (the source of raw DEMs: NASA Shuttle Radar Topography Mission, SRTM (2013). Shuttle Radar Topography Mission (SRTM) Global. Distributed by ©OpenTopography. Doi: https://doi.org/10.5069/G9445JDF. Accessed: 2024-01-29; 3D map in the below left was drawn by: ©Mehdi Alirezazadeh). ▶

Physiography

Boulan exhibits an extensive surface scatter of lithic artifacts, situated on the old and elevated Quaternary terrace of the same name. Positioned in the pediment zone (as part of the foothill or piedmont zone), it is situated approximately 7 km to the north of Eyvanekey City, 5 km to the west of Kilan Road, and 11 km to the south of Boulan Village. With a triangular shape (Fig. 3: 2) and an area about 2 km2, the maximum extent of lithic scatters is 1.7*1.6 km. The geometric center of the locality is at an elevation of about 1280 m asl (Fig. 3: 3) with elevations ranging from 1240 to 1320 m asl. Here, the stone artifacts are recovered on deflated

surfaces known as desert pavements (Fig. 2: 1, 3). This Quaternary alluvial terrace covers the upper red formation of the Miocene (units M3C and Unit M_3b^SC; Geological Survey & Mineral Exploration of Iran, Map no. 6460; Fig. 3: 1). The general appearance of Boulan is characterized by arid, mountainous, and undulating terrain, with shallow valleys, elongated hills, and slopes ranging from zero to almost fifty degrees. Vegetation cover is sparse, consisting mainly of small annual halophyte, xerophyte, and psammophyte plants (Fig. 2: 2). Numerous braided channels resulting from surface runoff have carved the surface, following the general slope in a northeast-southwest direction.

◄ **Fig. 2: 1. The view of the undulating landscape related to the Upper Red Formation from the Miocene (unit M3C) as seen from the top of the Boulan terrace; 2. Shallow and denuded valleys on the surface of the Boulan terrace; 3. Deflated desert pavement on the surface of the Boulan terrace (Authors, 2024).**

The average density of lithics is approximately 120 distinct pieces per square kilometer. In this context, "distinct" refers to artifacts that are easily visible on the ground, indicating a high level of obtrusiveness. However, it appears that the actual density of stone artifacts exceeds the calculated value. Due to various factors such as surface covering or erosion, the small size of some lithics (low obtrusiveness compared to the background matrix), and the presence of numerous natural gravels that share a similar color and appearance with the stone artifacts, it would be extremely challenging to document some of the stone artifacts. Taking these factors into account, it can be estimated that there are approximately one to two thousand lithics on the surface, with only a small portion of them being sampled. Lithics are distributed throughout the entire landscape, albeit with varying densities in

different areas (see Fig. 4). Furthermore, the majority of lithics (over 90%) are found in the upper hills rather than the valleys (see Fig. 2: 3). It is worth noting that paleo-surfaces and stone artifacts are exclusively found on the deflated desert pavements. In Addition, the rugged terrain and steep slopes may have caused some stone artifacts to be displaced from their original locations during heavy rains and flash floods. Upon examining the deposits incised by waterways and other erosive factors, no Pleistocene cultural deposit was discovered; consequently, the existence of in-situ cultural deposits remains uncertain. The sparse vegetation and progressive aridification contribute to loosening top sediments that are easily eroded by wind. Deflation has played a significant role in the patchy exposure of old Pleistocene surfaces that were previously covered by more recent Holocene sediments. Lastly, the remote location of the Boulan area results in the absence of significant anthropogenic disturbance.

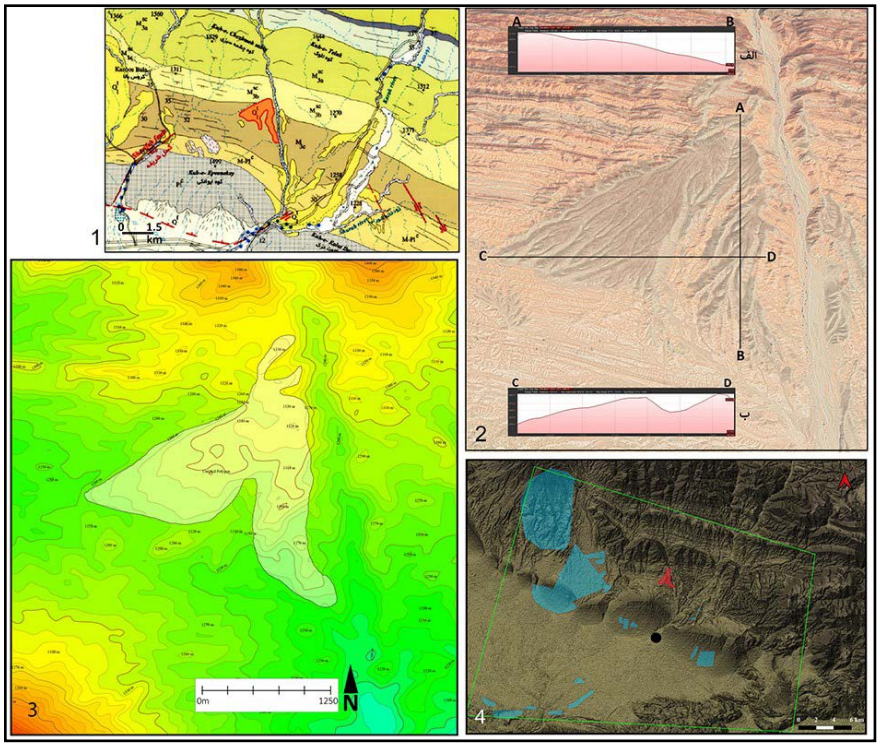
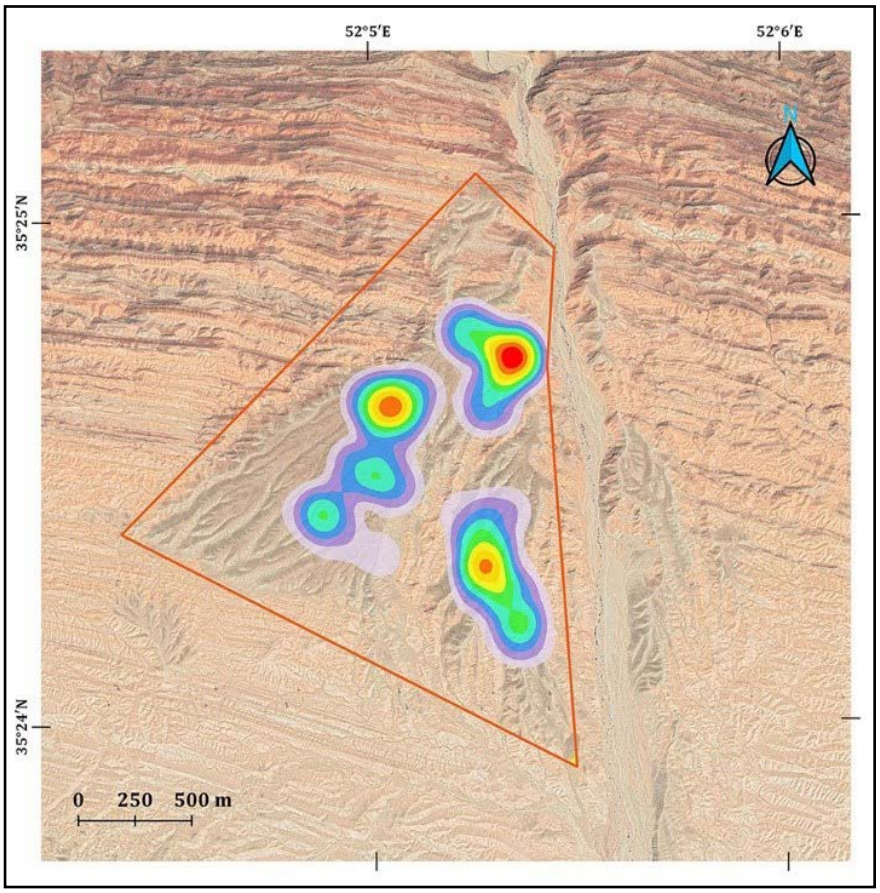


Fig. 3: 1. The position of the Boulan terrace (red polygon in the center of the image) within the major geological formations (1:100,000 geological map); 2. The satellite image of the Boulan Quaternary terrace and the terrain profile along the north-south (A-B) and east-west (C-D) directions; 3. Topographic map of Boulan; 4. The location of Boulan terrace (red area) in the north of the city of Eyvanekey (black dot) compared to the other surveyed areas shown by blue polygons (part 4 is drawn by ©Mehdi Alirezazadeh). ▶

Lithic Techno-Typology at Boulan

A total of 165 stone artifacts were sampled during the field survey. Just over 45% of these lithics are crafted from high-quality chert, while about 52% of them are made from greenish to brownish, light gray volcanic tuff. A very few of them are made of siltstone and limestone. The dimensions of these stone artifacts typically range from medium to large. For example, the average maximum length of the flakes is around 46.2 mm, with an average



◀ **Fig. 4: The colored heat map based on the Kernel density of stone artifacts with warmer colors denoting higher densities (Drawing by ©Mehdi Alirezazadeh).**

maximum width of about 39.9 mm (the coefficient of length variation (CVL): 28.9, the range of length values: 22–87 mm; the coefficient of width variation (CVW): 32.1, range of width values: 18–98 mm). The cores have an average maximum length of 55.62 mm and an average maximum width of 46.42 mm (CVL: 41.81 and length's range: 32.6–119 mm; CVW: 18.18 and width's range: 30.6–67 mm). Primary cortex is recorded only on 11% of the lithics, with most of them covering a small portion of the surface (78% of the cortical pieces show cortex coverages of up to 30%), while only three specimens, two cores, and one flake debitage possess a higher coverage of 50% or more. This suggests that decortication was effectively carried out prior to knapping and may imply a significant difference in dimensions between the procured raw materials and the ready-to-knap cores, as well as the inappropriate shapes of the primary raw materials for prompt flintknapping.

Almost all the stone artifacts have a shiny to dull coating of desert varnish in light to dark brown colors (Fig. 6–8), which seems to be the result of a combination of subsurface processes as well as exposure to the surface elements (see e.g. Glauberman & Thorson 2012). In terms of

breakage, the lithic artifacts are not in a good condition, which may be related to surface exposure and taphonomic processes. Generally, 22.5% of the collection displays signs of breakage, with partial fractures making up a larger proportion at 65% compared to major breakage at 35%. The data indicates that typologically-defined retouched tools make up 54.2% of the pieces displaying partial breakage while only 15.4% of the pieces possessing significant breakage are tools. This finding suggests a potential relationship between the intensity of tool use and the occurrence of partial fractures, while major breakages are more commonly associated with physico-chemical taphonomic processes. It is important to highlight that breakage is observed solely in the removals (debitages and tools).

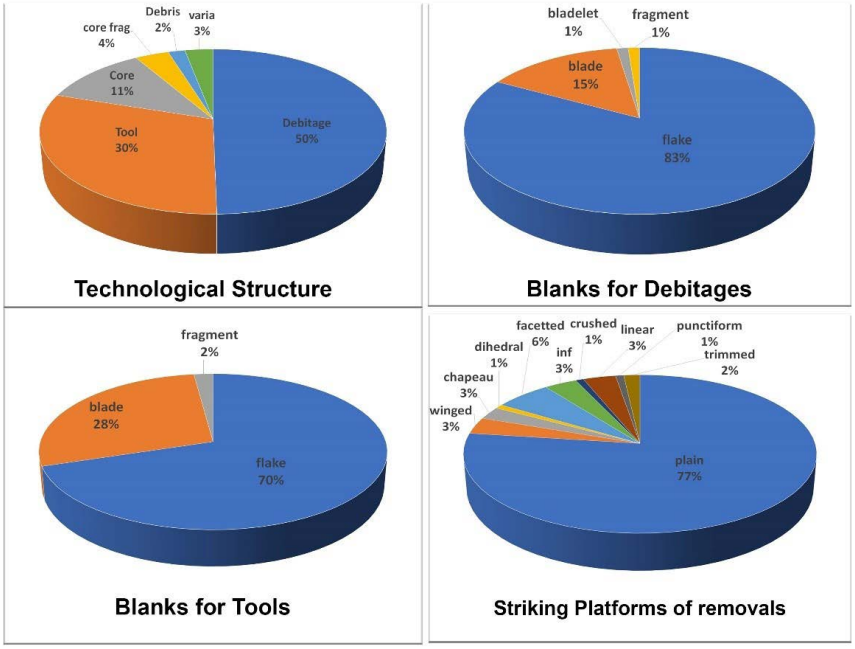
In terms of technological composition, slightly less than half of the lithics are categorized as unretouched debitage, while tools account for just over 30% of the assemblage. Moreover, approximately 15.2% of the lithics consist of cores and the associated pieces. The remaining percentage is divided between debrises (1.8%) and indeterminates (3%) (Fig. 5 and Table 1). Among the unretouched debitage, the majority consists of flakes, making up around 82.9% of the category. Blades, on the other hand, represent approximately 14.6% of the debitage, while the share of bladelets, if they can be accurately identified as true bladelet, is only 1.2% (Fig. 5 and Table 1). Furthermore, the prevalence of flakes is evident in the tool category, where 70% of the tools are fashioned from flakes. In contrast, 28% of the tools are made from blades, and no bladelet tools were documented (Fig. 5 and Table 1). In general, approximately 38% of the removals have been converted into typologically-defined tools, suggesting a moderate toolmaking intensity.

Table 1. General lithic techno-typological information from Boulan (Authors, 2024). ▼

Technological Structure			Debitage			Tool		
Type	**No.**	**%**	**Type**	**No.**	**%**	**Type**	**No.**	**%**
Debitage	82	49.70	**Flake**	68	82.93	**Flake**	35	70
Tool	50	30.30	**Blade**	12	14.63	**Blade**	14	28
Core	19	11.52	**Bladelet**	1	1.22	**Fragments**	1	2
Core Frag.	6	3.64	**Fragments**	1	1.22			
Debris	3	1.82						
Indeterminate	5	3.03						
Total	165	100	**Total**	82	100	**Total**	50	100

It is crucial to bear in mind that classifying some artifacts into plain unretouched "debitage" category does not automatically imply that they were not utilized as tools. Use-wear/functional studies has consistently

emphasized this point since the early 1970s, cautioning researchers against conflating typologically-defined standard tools with specimens that were genuinely employed as tools (Semenov 1970). The use of crude and unretouched flakes as tools, especially in expedient and opportunistic industries have been common, as evidenced by archaeological findings (e.g., Claud et al., 2019; Fuentes et al., 2019; Knutsson et al., 2015; Marreiros et al., 2020) and ethnographic accounts (e.g., Andrefsky 2014; Hayden 1977; Shott & Sillitoe 2005). Experimental archaeology has also demonstrated the effectiveness of using unretouched flakes as tools (e.g., Clarkson et al., 2015; Jones 1980). Functional analysis is crucial in understanding the significance of unretouched flakes in Boulan. However, conducting such analysis is presently unattainable due to several reasons. Firstly, these findings are superficial and susceptible to taphonomic factors that alter or obliterate the evidence found on the edges. Secondly, a substantial number of these artifacts are coated with desert varnish, which conceals or eradicates any traces of use.

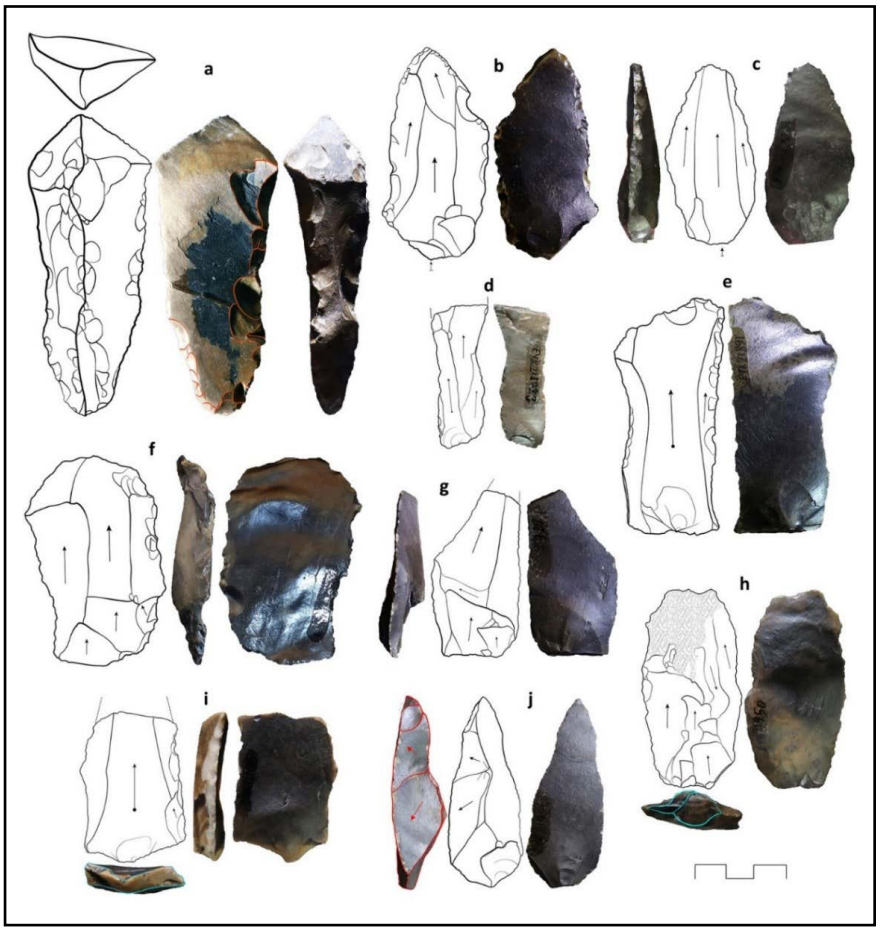


◄ **Fig. 5: The pie charts for some of the techno-typological features mentioned in the text (Authors, 2024).**

According to Table 2, the majority of tools, 58%, are crafted on flakes, with 20% made on blades. The tools discovered in Boulan showcase a diverse range but are not particularly abundant. Thus, the emphasis of toolmaking activities has predominantly been on flakes. From a typological viewpoint, the highest percentage belongs to simple side-retouched flakes and nibbled flakes (Fig. 6: a, b, f; 7: g), possibly indicating a preference for creating informal tools and potential discarding in the initial stages and hence, low reduction intensity (for the relationship between retouch

intensity and reduction, see e.g., Blades 2008; Eren et al., 2005). Scrapers rank as the second most prevalent tool type, with side scrapers having a larger share compared to convergent types (Fig. 6: b, c, e; 7: c). Only one end scraper has been discovered. Denticulated and notched pieces collectively represent 8% of the tools, with only one instance of burin and one retouched Levallois point identified (Fig. 6: i). Additionally, two backed pieces are included in the tool assemblage. It is important to note that three truncated pieces are also recorded (Table 2). Moreover, ten tools were expediently produced on cores, core fragments, or non-debitage pieces, as outlined in Table 2. They are classified under categories such as cores, core fragments, or indeterminate in Table 1. One bifacial knife or keilmesser (Fig. 8: b) is also recorded, which is reminiscent of the types uncovered in later Middle Paleolithic contexts of Central or Eastern Europe, particularly within the Micoquian tradition (Weiss 2020). The scarcity of retouched points and convergent scrapers (Fig. 6: b, c, i; 7: c) is an intriguing aspect to consider. However, the sub-triangular morphologies with converging or pointed lateral edges and distal ends, regardless of whether they have retouched edges or not, make up approximately 13% of the total removals (17 pieces; Fig. 6: g, j; 7: b, f). This ratio is quite significant and suggests that perhaps the convergence of the edges alone, without the aid of retouching, was sufficient for utilizing these fragments as points (Douze et al., 2020; Timbrell et al., 2022). The basal and proximal trimming of certain triangular pieces, which may be aided for hafting purposes, provides additional support for this argument (Fig. 6: g, j; 7: b, f). Generally, the tools display an opportunistic and informal appearance; nonetheless, a few formal examples bear resemblance to the common types found in the Middle Paleolithic (Bordes 1961; Debénath & Dibble 1994; Geneste 1985) and the Zagros Mousterian tradition (e.g., Baumler & Speth 1993; Dibble 1984, 1991; Dibble & Holdaway 1993) or Middle Paleolithic in the NICD (e.g., Heydari-Guran et al., 2014; Vahdati Nasab & Hashemi 2016; Vahdati Nasab et al., 2019).

A few lithic artifacts at Boulan could be considered as core-tools, an example of which is the mentioned keilmesser (Fig. 8: b). In addition, there is another sub-symmetrical biface with 28 negative scars, some of which exhibit characteristics of retouch. The shaping of this particular piece resulted in a symmetric amygdaloid-lanceate shape, a form described by Bordes (1961). Notably, there are no soft-hammer finishing retouches visible on this artifact. With a length of around 10 cm, this specimen falls towards the lower end of the hand axe spectrum. It could be loosely categorized as a hard hammer hand axe or symmetrical core-flake.



◄ **Fig. 6. Some of the tools which were made on elongated blanks. a. Retouched piece made on a non-debitage trihedral fragment; b. Basally-trimmed retouched point made on a Levallois flake; c. Convergent scraper with short continuous retouch; d. Blade with nibbling edges; e. Side scraper on a broad blade; f. Basally-trimmed side-retouched flake; g. Basally-trimmed convergent flake; h. Basally-trimmed broad cortical blade; i. Retouched Levallois point (?); j. Basally-trimmed crested blade with convergent lateral edges (Authors, 2024).**

◄ **Table 2. Tool typology at Boulan. *: other here means tools made on non-debitage pieces. FTs and BTs denote flake tools and blade tools, respectively. (Authors, 2024).**

On Flake blanks	No.	% in FTs	% in Tools	On Blade blanks	No.	% in BTs	% in Tools
Side Scraper	2	5.71	3.33	Side Scraper	2	25	5
Nibbling	10	28.57	16.67	Nibbling	2	16.67	3.33
Side-retouched	8	22.86	13.33	Side-retouched	1	8.33	1.67
Convergent scraper	3	8.57	5	Denticulate	1	8.33	1.67
End scraper	1	2.86	1.67	Backed	1	8.33	1.67
Backed piece	1	2.86	1.67	Naturally Backed	1	8.33	1.67
Retouched Levallois point	1	2.86	1.67	Burin	1	8.33	1.67
Notch	3	8.57	5	Core-on-Blade	1	8.33	1.67
Pseudo-Levallois point	1	2.86	1.67	Multiple tool	1	8.33	1.67
Core-on-flake	1	2.86	1.67	Total	12	100	20
Multiple tool	1	2.86	1.67	Nibbling Bladelet	2		3.33
Truncation	3	8.57	5	Retouched Bladelet	1		1.67
Total	35	100	58.33	Other*	10		16.67

Within the findings, there is one Levallois core exhibiting limited surface and platform preparation and two consecutive preferential removals (bidirectional opposed removals; Fig. 9: a). This specimen shares similarities with early Levallois cores discovered in Lower Paleolithic contexts elsewhere (see e.g., Centi & Zaidner 2021; Rosenberg-Yefet et al., 2022). However, it is worth noting that only a single specimen of this kind has been found in Boulan, which does not aid in determining

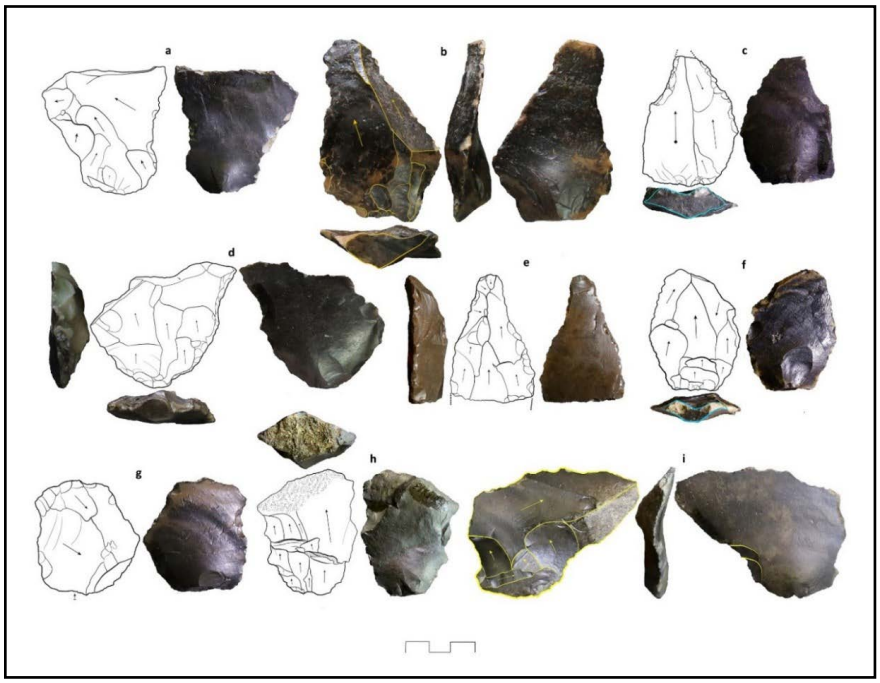
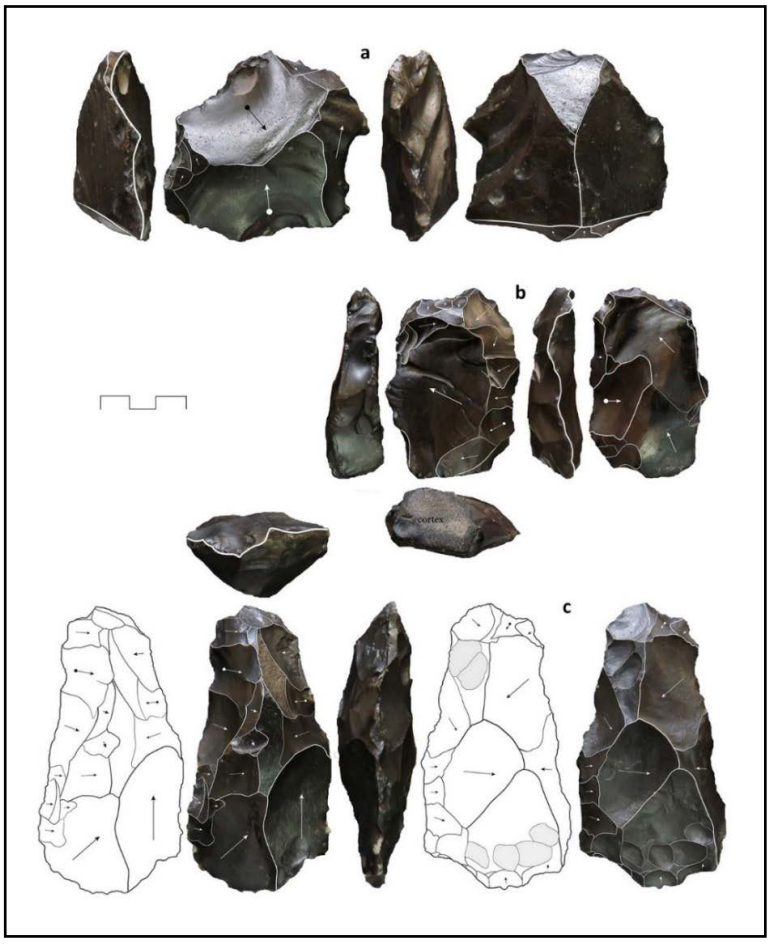


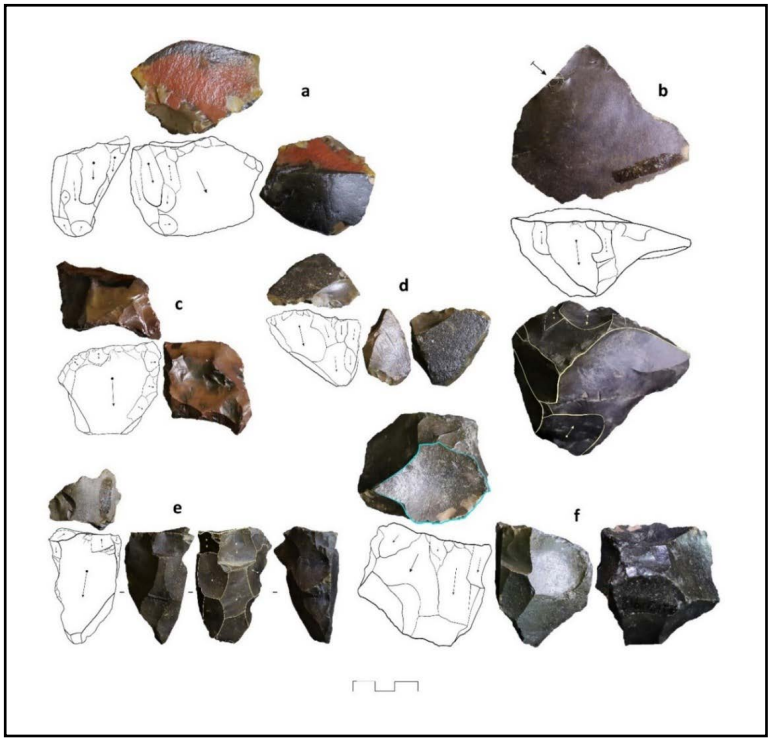
Fig. 7: Some of the lithic specimens made on nono-elongated flakes. a. Divergent flake with basal trimming; b. Convergent flake with basal trimming; c. Retouched point; d. Dejeté/side scraper; e. Retouched point with proximal breakage; f. Levallois flake with basal modifications; g. Side-retouched piece with alternating retouch; h. Divergent plunging flake with distal cortex (blade/ bladelet core rejuvenation element); i. Atypical core-trimming element (?) with hinge termination (Authors, 2024). ▶

relative chronology. The platform-type cores (Conard et al., 2004) show limited variation. They possess one distinct platform formed by a single blow, often with minimal preparation. Knapping activities have resulted in removals on both narrow (Fig. 9: a) and broad (Fig. 9: c and d) faces of the cores. At times, both faces are utilized (Fig. 9: a), while in other instances, distinguishing between narrow and broad faces proves challenging due to morphological characteristics (Fig. 9: e & f). Furthermore, in one specimen (Fig. 9: b), the core is made on a thick flake, with its ventral part serving as the platform. Negative scars typically range from small flakes to blade and non-elongated bladelets, often with a sub-parallel arrangement. The majority of knapping activities were conducted using hard hammer technique, although evidence of using soft hammers could be observed in certain cases (e.g., Fig. 9: a & d). Most of the cores display irregular and informal morphologies, with only a few exceptions that can be formally grouped, such as one sub-pyramidal prismatic core (Fig. 9: e). In summary, both surficial and volumetric exploitations have been documented.

Complete flakes (both blanks and tools) exhibit considerable diversity in terms of morphology. Approximately 14.5% of them display sub-triangular shapes with converging and pointed ends (12.5% of blades show converging or pointed ends). Among these pieces, there are two examples that show evidence of basal trimming, suggesting possible functions for hafting. Overall, 14 blanks (including two blades and twelve flakes) exhibit indications of proximal/basal modifications. These treatments



◄ **Fig. 8. Surficial (parallel: Conard et al., 2004) cores and bifaces from Boulan. a. Levallois flake core; b. Bifacial knife (keilmesser); c. Diminutive hard hammer handaxe or bifacial small flake core (Authors, 2024).**



◄ **Fig. 9: Platform cores recovered from Boulan. a. Narrow- and broad-fronted single-platform mixed blade/bladelet core; b. Single platform flake core made on a thick flake; c. Broad-faced flake core with facetted platform; d. Broad-fronted single-platform bladelet core with cortical platform; e. Sub-pyramidal single-platform small flake/blade core with signs of modification using cresting; f. Multidirectional polyhedral small flake core with a one preferred platform (Authors, 2024).**

involved various techniques such as chipping the dorsal part for thinning, removing small chips, notching, creating relatively deep retouches, and even micro-chipping resembling burin shapes. In addition to sub-triangular blanks, sub-circular and sub-oval morphologies are also commonly found, comprising approximately 9.6% of complete flakes. However, a substantial majority of flakes (around 61%) exhibit irregular shapes, suggesting a lack of standardization in Boulan (Pargeter & Groucutt 2023). It is important to consider the viewpoint of scholars like Shea (2023), who contend that the search for standardization in the Paleolithic period is futile and primarily influenced by artificial classification frameworks established by researchers.

In addition to what has been mentioned, small flake scars have been the dominant type of negative scars on the dorsal face of flakes (65% of the scars) while blade/bladelet scars make up approximately 23% of the total, and mixed scars make up the remaining 12%. Unidirectional scars represent 77.3% of the total, with bidirectional scars making up 18.2%, and multidirectional scars comprising only 4.5%. It is worth noting that all unidirectional scars display a sub-parallel arrangement. The prevalence of unidirectional sub-parallel scars, in conjunction with volumetric single-platform unidirectional cores and sub-prismatic core morphologies (Fig. 8), may suggest the chronologies inclined to the Upper Paleolithic Period.

Approximately 75% of the platforms found in flakes are plain, with 8 (10.6%) of them being lipped platforms. The presence of lips is often associated with striking the platforms with specific angles and forces or utilizing the soft hammer technique (Driscoll & García-Rojas 2014; Koch & Schindler 2012). Among the pieces with lipped platforms, some exhibit diffuse bulbs of percussion, while others completely lack such bulbs. This could potentially strengthen the use of soft hammerstones (Ohnuma & Bergman 1982). Simple facetted platforms account for nearly 10% of the platforms, while chapeau de gendarme variety makes up about 3% of the butts. It is important to note that these “prepared” platforms are generally less complex compared to the typical examples found in the Levallois method. The remaining percentage is distributed among various types of platforms, including winged, linear, punctiform, crushed, and dihedral platforms.

Discussion

Based on the explanation provided, it appears that Boulan’s landscape exhibits a combination of two cultural traditions commonly found in the

Middle and Upper Paleolithic periods. It is important to highlight that, in a broad sense, the Middle Paleolithic traditions are more prominently represented. The key techno-typological characteristics observed in Boulan include a flake-oriented assemblage featuring flakes of medium to large dimensions in various morphologies, a notable presence of broad and non-elongated blades, a high proportion of thick and massive flakes with distinct bulbs of percussion, a preference for the direct hard hammer technique over the soft hammer technique, limited utilization of the Levallois method with minimal preparation prior to removal, diverse surficial and volumetric core types with an emphasis on the latter, sporadic indications of core-tool concept in bifaces, scattered discontinuous retouching on the edges of some cores, indeterminates, and even ecofacts in an expedient manner to use them as tools, the significant presence of informal tools, a relatively straightforward simple reduction scheme with an overall expedient appearance, the predominance of unidirectional sub-parallel scheme with much fewer signs of bidirectional reduction and the absence of radial centripetal preparation or reduction, indirect evidence of laminar reduction sequence through negative scars of bladelets on the flakes' dorsal faces, and surprisingly, the rarity of bladelet removals themselves as a direct indicator of bladelet reduction. Furthermore, notwithstanding its expedient appearance, the tool list depicts inclination toward Middle Paleolithic Period, from a typological perspective. The predominant retouching tradition commonly observed at Boulan appears to involve scattered, direct, and short retouches that were typically executed at low angles. It is worth mentioning that a significant number of the artifacts, often showing converging edges, were probably mounted on handles, and used for daily activities.

The techno-typological characteristics mentioned above, as well as those observed generally in the Eyvanekey area (Hashemi et al., 2024), do not seem to correspond with the evidence found in the eastern parts of the NICD. Notably, sites like Mirak, Soufi Abad, Delazian, and Chah-e Jam (Vahdati Nasab & Clark 2014; Vahdati Nasab & Feiz 2014; Vahdati Nasab & Hashemi 2016; Vahdati Nasab et al., 2019) exhibit different characteristics. Similarly, in the westernmost parts of the Central Plateau, such as at Qaleh Kurd Cave (Vahdati-Nasab et al., 2024), distinct features are observed. This discrepancy can have implications for the complexities and population diversity within the NICD. In addition, it could stem from varying chronologies, subsistence-adaptive strategies in response to diverse environmental characteristics and different spatio-temporal patterns of

resource distribution. While there is a lack of overall techno-typological homogeneity at the intra-regional level, sites clustered near Semnan (Mirak, Delazian, and Soufi Abad) display more internal homogeneity (Hashemi et al., 2018) compared to those near Eyvanekey. The toolmaking traditions of the NICD also differ from the Zagros Mousterian (Hashemi et al., 2018, 2021), suggesting distinct regional variations. While the Zagros Mousterian has been regarded as a non-coherent entity by Nymark (2021), it remains uncertain whether the sites within the NICD adhere to this pattern. In order to gain a comprehensive understanding of the clustering of traditions in the NICD, further comparative studies are necessary in the future.

The identification of Paleolithic evidence in Eyvanekey, as detailed by Hashemi et al., (2024), has the potential to significantly enhance the comprehension of archaeological findings in the region. These findings may help bridge the fragmented evidence of Pleistocene hominin populations in the NICD and establish a stronger spatial connection between Paleolithic landscapes in the area. While each identified landscape could potentially address some of the chronological gaps in the region, the scarcity of sites with absolute chronology currently hinders the ability to verify this claim. Nonetheless, the unearthing of any new Pleistocene landscape in the NICD could bolster the notion of a continuous yet intermittent presence of hominin in the NICD (see Hashemi et al., 2018) during the Pleistocene epoch. The vertical mobility of the NICD hominin populations during the Pleistocene is another subject begging to be addressed. Essentially, during this era, human populations inhabited various altitudes and latitudes of the NICD, ranging from piedmont and high-elevations sites such as Qaleh Kurd Cave, Sorheh Rockshelter, and Moghanek-Otchunk surface scatters to low-lying downstream floodplain and discharge zone sites (such as Mirak, Delazian, and Soufi Abad open-air sites and Chah-e Jam and Showr-e Qazi surface scatters) as well as the intermediate pediplain and alluvial fan zone sites in the case of Eyvanekey or Zaviyeh surface scatters. This suggests that these populations were relatively well-adapted to life in the region, as evidenced by their widespread presence. Notably, their ability to thrive in high and mountainous landscapes, such as Qaleh Kurd Cave, Sorheh, and Moghanak-Otchounak indicates the high adaptability of human populations in the NICD.

The Boulan area, like other Paleolithic landscapes within the Eyvanekey area (Nateqi et al., 2020; Hashemi et al., 2024), as well as certain sites located in the NICD (such as Chah-e Jam; Vahdati Nasab & Hashemi 2016), displays a wide distribution but a limited concentration of stone

artifacts. The low density of surface lithic artifacts can be attributed to various factors, including erosion, post-depositional processes, and the burial of stone artifacts beneath very recent (late Holocene) deposits. In essence, it is plausible that a significant proportion of the Eyvanekey stone artifacts remain buried beneath relatively recent sediments. As time progresses, and with the intensification of aridity and erosive forces, particularly aeolian deflation, the lithics gradually resurface and reveal again in a patchy fashion. Fortunately, the level of contemporary anthropogenic destruction at Boulan is insignificant. However, it appears that severe wind erosion plays a crucial role in the absence or destruction of cultural deposits over time. As mentioned earlier, aeolian activity is the primary factor responsible for the removal of Holocene sediments and unearthing of lithics in a desert pavement setting. It is important to note that in wind erosion, areas with higher wind exposure tend to reveal old surfaces and form desert pavements, providing potential locations to discover stone artifacts. It is important to acknowledge that alongside wind erosion, the occurrence of wind deposition can be observed in certain parts of the landscape. This implies that the sediments that are eroded from one location by the wind gather in another location, leading to the formation of surface coverings. Consequently, in this manner, the aeolian processes might have a notable impact on the uneven dispersion of surface lithic artifacts. Water erosion has led to the creation of a sequence of elongated linear crestlines distinguished by gentle sinusoidal undulations, where the ridges are more prone to aeolian deflation and consequently smoothed out. Elsewhere in the landscape, the collaboration between wind, water, and tectonic activity has given rise to the creation of low-altitude mounds where finer-grained sediments are deposited atop by wind (erg) while the adjacent shallow valleys retain coarser-grained sediments (reg) that may contain lithics. The intricate interplay of these forces presents difficulties in accurately delineating the boundaries of Paleolithic surface scatters in the Eyvanekey area.

Desert ecosystems have the potential to support substantial human populations, provided there is a reliable supply of water resources, since water availability is a crucial determinant in desert and semi-desert regions (Marshall 1976: 76; Yellen & Lee 1976). Precipitation in these areas is not only limited in quantity but also highly unpredictable and erratic, exhibiting significant spatio-temporal fluctuations (Noy-Meir 1973; Yellen 1977: 264). Furthermore, deserts are characterized by intense sunlight and high daytime temperatures, substantial temperature differentials

between day and night, chilly nights, rapid evapotranspiration rates, sparse vegetation cover, and the prevalence of strong winds. Moreover, providing shelter during the daytime is a necessity (Moran 2022: 164, 173). The combination of warm dusty winds and solar radiation plays a pivotal role in hastening dehydration (e.g., Briggs 1975: 97). The spatio-temporal fluctuation in water and moisture availability in arid and semi-arid biomes lead to heterogeneous distribution of vegetation (Yang et al., 2016). Consequently, the presence of large herbivorous mammals also exhibits fluctuations across space and time, as discussed by Hitchcock & Ebert (1984: 331). Additionally, many desert-dwelling animals, apart from birds, are nocturnal and remain hidden during daylight hours, while some species hibernate in the summer (Moran 2022: 167) or form smaller groups during the dry season. These behavioral patterns make hunting more challenging for human populations. Overall, deserts are characterized by limited food resources, particularly during the drier seasons. As a result, hunter-gatherer groups tend to split into smaller units during these periods, residing near water sources such as tributaries or freshwater reservoirs, and in proximity to spots rich with resources suitable for starting fires (Allaby 2006: 159).

Hence, the key attributes of the hunter-gatherer communities found in desert regions, in response to the aforementioned characteristics, encompass residing in small groups, maintaining a low population density, and exhibiting flexibility in group composition (Lee & DeVore 1968: 7–11). From a settlement pattern perspective, it is advantageous to concentrate activities in a central location that serves as the approximate gravitational center of the surrounding environment, particularly when resources are sporadic, mobile, and heterogeneously dispersed across the landscape (Horn 1968: Fig. 5). This strategy ensures that proximity to one potential resource location does not result in a significant distance from other resources (Clarkson 2007: 10). The selection of these central places is primarily influenced by the availability of water sources (Kelly 2013: 90). In such scenarios, the mobility strategy typically leans towards the logistical end of the spectrum, whereby specialized groups are dispatched from the central hub to engage in hunting and resource acquisition (including lithic raw materials), subsequently returning to this central location once again. In this given case, there is no simultaneous mobilization of all members within the group. This approach will persist until the costs associated with gathering and utilizing resources from the surrounding landscape reach or surpass the level of benefit. Consequently, the central location will be relocated, resulting in residential mobility (Beck et al., 2002:

485; Clarkson 2007: 10; Habu & Fitzhugh 2002: 1, 2; Kelly 2013: 78). As a result, the range of desert-dwelling human populations tends to be relatively extensive. The adoption of high mobility and the occupation of a large territory serve as strategies to effectively cope with risks in desert environments, thereby increasing the likelihood of encountering resources. Furthermore, heightened levels of mobility contribute to a deeper knowledge of the surrounding environment, including its seasonal, annual, and time to time fluctuations (Clarkson 2007: 12; Kelly 2013: 103). Additionally, risk mitigation strategies in such landscapes encompass group foraging, diversification, intensification, and resource sharing (Halstead & O'Shea 1989: 3). In general, due to optimality principle (Hashemi 2016) and due to the spatio-temporal fluctuations, diversification of the diet (vegetable-animal) is prevalent in these landscapes, which in turn, leads to an increase in the size of habitats (Hitchcock & Ebert 1984: 332; Kelly 2013: 93). Thus, the reason behind the similarity in tool-making practices and the scarcity of lithic artifacts across the Eyvanekey area might be attributed to the expansive territories, diet diversification, high mobility, and flexibility in group composition. Furthermore, the absence of a high density of stone artifacts in any part of the area may indicate either the absence of central places or severe erosion over time.

The expedient nature of lithic asseblages in Boulan and Eyvanekey, as discussed by Hashemi et al., (2024), poses challenges in establishing a relative chronology. Traditionally, lithic analysts indicated that informal assemblages resembling those found in Boulan, characterized by a significant proportion of unretouched flakes and informal tools falling outside the definition of formal retouched tools (Bordes 1961), were indicative of an opportunistic strategy involving the rapid production of non-standardized stone tools based on immediate needs. However, alternative explanations for this behavior include the availability of high-quality raw materials and low mobility (Andrefsky 1994; Bamforth 1986; Parry & Kelly 1987; See Railey 2010 for the counterargument against the correlation between expedient lithic assemblages and low mobility). Furthermore, this expediency has been associated with what Kuhn (1995) calls "provisioning of places" and Binford's (1980) logistical mobility. The Eyvanekey area is characterized by the availability of high-quality lithic raw material. Within various parts of this area, one can come across substantial pieces of tuff and chert, displaying weathered exteriors. Occasionally, these fragments have undergone testing by hominin populations to assess their quality, evidence of which is negative marks of a single removal and minimal effort for

preparation. Among these potentially tested specimens, four samples were discovered in Boulan, albeit relatively small, with the largest measuring a maximum of eight centimeters. Nonetheless, in a few kilometers to the north of Boulan or in neighboring paleolithic landscapes such as Chandab, situated approximately ten kilometers southwest of Boulan (Hashemi et al., 2024), large, tested fragments and cores of considerable size, measuring between 15 and 30 centimeters, have been recovered and thus substantiating the authors' claim. It is worth noting that the interconnection between the various Paleolithic landscapes in Eyvanekey has yet to be explored, leaving it as a topic for future investigation by the authors of this study. It is important to acknowledge that the mere presence of expedient industries does not solely rely on the availability of high-quality raw materials. The utilization of unretouched flakes as tools is often driven by the desire to maximize the ratio between the sharp edge and the overall mass of the flake, as well as to optimize the rate at which each flake is used (Douglass 2010; Withrow 1983). Additionally, it seems that informal tools can fulfill a variety of needs and livelihood activities, like formal tools, while being simpler and faster to construct (Downey 2010: 78). Consequently, it can be inferred that the increased usefulness, efficient (optimal) production, and favorable edge ratio are also the case in this context (Lin et al., 2013).

The absence of large flake cores at Boulan, in contrast to their existence at neighboring sites, may suggest the implementation of a provisioning of place strategy. This approach entails the accumulation of larger raw material pieces outside the primary camp, and when required, designated groups are dispatched to these locations. These groups subsequently fashion their tools through knapping, and exclusively transport the flakes while intentionally leaving the cores behind. Additional support for this behavior can be found in the limited presence of cortex within the Boulan's assemblage.

Conclusion

The field survey carried out in the Eyvanekey area revealed several Paleolithic surface scatters, demonstrating that hominin populations utilized the central and western parts of the NICD. These findings suggest that the presence of these populations was more than just transient, as evidenced by the recovery of stone artifacts from a vast area despite significant challenges like severe erosion, thick Holocene surface covers, and modern human constructions. Therefore, this research strengthens the hypothesis that the NICD functioned as a large-scale corridor.

The distribution pattern of sites in Eyvanekey reveals a non-clustered arrangement across the landscape, and the sites are found where construction activities are minimal and where there is either no Holocene surface cover, or it is displaced by erosion. In such parts, lithic remains with low density can be recorded. Furthermore, it should be noted that the boundaries set for each Paleolithic landscape in Eyvanekey do not possess any behavioral significance. The presence of stone artifacts in the eroded parts is solely a result of natural factors and does not bear implications for the systemic context or human behavior. The distribution of artifacts within Boulan does not exhibit a distinct pattern; rather, they are found sparsely across the landscape. However, it may be feasible to identify focal points through manual delineation aided by kernel density analysis. Nevertheless, it is important to acknowledge that taphonomic factors greatly influence this analysis.

The spatial distribution of Paleolithic sites and lithics within a wide expanse could be attributed to the high mobility displayed by hominin populations. In general, the most fundamental trait of hunter-gatherers inhabiting deserts and open landscapes is their high degree of mobility. Furthermore, it is probable that the mobility in Boulan and Eyvanekey, in general, inclined towards the logistical spectrum of mobility. Drawing upon archaeological findings, it is evident that the immobility of central places necessitated the dispatch of specialized groups to various spots of the landscape for resource procurement, followed by their return to the central hub.

Moreover, the techno-typological investigations conducted on the lithics discovered in Boulan provide additional evidence that this particular landscape was utilized by hominin communities during the Middle and Upper Paleolithic periods. It appears that the strategies employed for adaptation in Boulan, as well as in Eyvanekey more broadly, differed from those observed at Paleolithic sites located in the central and eastern regions of Semnan Province (such as Mirak, Delazian, Soufi Abad, and Chah-e Jam). While the latter sites predominantly exhibit formal tools within their lithic assemblages, with Chah-e Jam being particularly notable in this regard, the former landscape is characterized by a clear emphasis on expediency. It is important to note that this distinction does not necessarily indicate varying levels of complexity among human groups, the levels of compatibility with the environment, or their cognitive capacities. Instead, it could be interpreted as a manifestation of distinct toolmaking traditions that arose in response to different environmental conditions, diverse subsistence

strategies and modes of mobility, the presence of distinct population groups within the NICD with different life histories, or adherence to the principles of optimality. In addition to the formal-informal duality, one of the prominent features of the sites found in the NICD from the west in Qaleh Kurd Cave to the east in Chah-e Jam is the presence of high number of points and convergent scrapers that may imply the importance of hunting. Despite the limited quantity of retouched points, convergent scrapers, and Levallois points at Boulan, it is important to highlight the substantial presence of sub-triangular unretouched or minimally retouched flakes. A considerable number of them exhibit modifications near their proximal or basal ends, indicating a potential purpose of being affixed to wooden handles. Consequently, it is reasonable to speculate that these artifacts were utilized as hunting gear, irrespective of whether they were retouched or not.

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Observation Contribution

Seyyed Milad Hashemi: Head of the field mission, data gathering, data analysis, developing ideas, illustrations, writing the manuscript. Asghar Nateqi: Data gathering, field mission. Aliyeh Abdollahi: Data gathering, field mission, database preparation. Ahmad Zavvar Mousavi: Data gathering, field mission, GIS.

Conflict of Interest

All authors declare that they have no conflicts of interest.

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۴۱ پژوهش‌های باستان‌شناسی ایران

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معرفی چشم‌انداز نویافتهٔ پارینه‌سنگی بولان در شمال مخروط‌افکنهٔ ایوانکی با تمرکز بر تحلیل گونه-فن‌شناسی

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چکیده

یافته‌های دو دههٔ اخیر در شمال دشت کویر، اهمیت این پهنه را در دوران پلیئستوسن نشان می‌دهد و پیشنهاد می‌کند که این بخش از فلات ایران به‌دلیل نوسانات اقلیمی-محیطی در گذشته، شرایط متفاوتی با امروز داشته است؛ بدین‌گونه که در بُرهه‌های زمانی با شرایط مناسب، پذیرای جمعیت‌های انسانی بوده است. برهمین‌اساس، فرضیهٔ گذرگاهِ پراکنشیِ حاشیهٔ شمالی دشت کویر مطرح شد. با این‌وجود، اطلاعات در دسترس از جمعیت‌های انسانی دوران پلیئستوسن در این پهنهٔ اندک و محدود به بخش‌های شرقی و غربی آن است و اطلاعات چندانی از بخش مرکزی، منطبق با استان‌های البرز، تهران و بخش غربی از استان سمنان امروزی، به‌جز چند محوطهٔ بالادست در بخش‌های ناهموار شمالی در دست نیست. شواهد پایین‌دست هم به چشم‌انداز شورقاضی محدود می‌شود. به‌همین‌دلیل، بررسی پیمایشیِ پارینه‌سنگی در پهنهٔ کوچکی از بخش مرکزی در محدودهٔ شهرستان امروزی ایوانکی با اهداف اصلی مشخص کردن وضعیت این بخش از گذرگاه شمالی در دوران پلیئستوسن و بررسی درجهٔ پیوستگی و حضور چشم‌اندازهای پارینه‌سنگی در این گذرگاه و در نتیجه، تقویت یا تضعیف فرضیهٔ مطرح‌شده، انجام شد. در نتیجهٔ انجام بررسی پیمایشی فشرده با پای پیاده و نمونه‌برداری به روش ترکیبیِ طبقه‌بندی‌شدهٔ متناسب (اتفاقی) و روش سازشی، پراکنش‌های گسترده‌ای از دست‌ساخته‌های سنگی ثبت شدند. در اینجا، یکی از این پراکنش‌های سطحی، -محوطهٔ بولان- معرفی شده و مجموعهٔ دست‌ساخته‌های سنگی آن مورد بررسی قرار گرفته است. نتایج مقدماتی پیشنهاد می‌دهد که براساس روش تحلیل گونه-فن‌شناسی و گاهنگاری مقایسه‌ای، می‌توان حضور جمعیت‌های انسانی در دوره‌های پارینه‌سنگی میانی و جدید با دو سنت ابزارسازی متفاوت، اما درهم‌آمیخته را در اینجا تشخیص داد. علاوه‌بر آن، به‌طورکلی، سنت ابزارسازی در بولان به‌صورت ابزارسازی غیررسمی و فرصت‌طلبانه بوده است. درنهایت، یافت‌شدن چشم‌اندازهای وسیع پارینه‌سنگی در بخش مرکزی از شمال دشت کویر به تقویت فرضیهٔ گذرگاه شمالی در دل فلات ایران انجامید.

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New Evidence of the Pottery Neolithic in the Eastern Mazandaran Based on Recent Archaeological Field Survey

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Abstract

The issue of Neolithization in the eastern Mazandaran region has once again become an attractive topic for archaeologists and researchers after 70 years of silence. Excavations and field surveys have been carried out during these years to examine various hypotheses for the origins of plant and animal domestication in this important crossroads region. However, despite the clarification of some issues, more questions have been raised that remain unanswered. Past field surveys could not fully represent the Neolithic capacities of eastern Mazandaran. Therefore, a field survey program titled "Investigation and Identification of Neolithic Settlements in the Lowlands and Highlands of Eastern Mazandaran" was proposed. In this field program, two main goals were considered: 1) regional connections between sites in the highlands and plains of eastern Mazandaran; and 2) relations with adjacent regions of Northeastern Iran and South Turkmenistan. The first goal sought to provide evidence of an endogenous transition to Neolithic lifeways, while the second examined possible routes for an exogenous origin. In the survey, 53 sites were investigated and pottery collections from previous excavations and field surveys were also reviewed. The result was the identification of 30 Neolithic sites in both the highlands and plains, which increased the number of Neolithic settlements in eastern Mazandaran to 42 sites. Study of the collected pottery indicates that there is a clear connection between the plains and the highlands, which is likely related to seasonal grazing of herding communities. According to the evidence, inter-regional relations with adjacent regions should be searched not through intermontane valleys, but through the lowland Caspian littoral region, especially the Gorgan Plain, which may argue for a Neolithization process based on exogenous factors.

Keywords: Neolithization; Caspian Neolithic Software; Eastern Mazandaran, Cultural Interaction; Djeitun Culture.

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Introduction

The history of Neolithic research in eastern Mazandaran goes back to the middle of the 20th century when Carlton Coon excavated Hotu and Kamarband (Belt) caves (Coon, 1951). A noteworthy point in Coon's reports is the gradual emergence in these caves of domesticated goat/sheep after a "Mesolithic" period utilizing native fauna (Coon, 1951); A decade later and during his excavations at Ali Tappeh cave, Charles McBurney reviewed the faunal data from Hotu and Kamarband caves and, contrary to Coon, claimed that these domesticated species appeared suddenly in the Pottery Neolithic (McBurney, 1964; 1968). Coon and McBurney's interpretations of the emergence of domesticated species in eastern Mazandaran have led to the formation of two basic hypotheses for the Neolithization of this region: based on endogenous factors (Ramazanpour et al., 2013; Ramzanpour, 2011; Fazeli Nashli et al., 2016; Leroy et al., 2019) and exogenous factors (Vahdati Nasab and Nikzad, 2015; Nikzad, 2016; Roustaei, 2013; Roustaei, 2016). Research into the Neolithization process in eastern Mazandaran has focused mainly on the lowland zone, due to the rich and attractive ecosystem, while the highlands have not been given equivalent attention. Therefore, it is very important to know the intra-regional relations, especially between the plains and the highlands in the Neolithic period to understand food production processes, such as the herding of animals.

Ceramics are the main indicator of regional andinter-regional cultural interaction during the Pottery Neolithic period. Recent re-examination of the pottery assemblages of Hotu and Kamarband caves, stored in the museum of the University of Pennsylvania, indicates that there are no diagnostic sherds of the Djeitun (Sang-e Chakhmaq) culture, found through southern Turkmenistan and northeastern Iran in the late 7th and early 6th millennia BC (Gregg & Thornton, 2012; Thornton, 2013). Instead of this typical inter-regional ceramic type, Thornton confirmed Dyson's earlier assessment that so-called "Caspian Neolithic Software" was the most typical ceramic type in eastern Mazandaran at this time (Voigt & Dyson, 1992). Recent excavations at Touq Tappeh in the Neka Plain of eastern Mazandaran confirmed no diagnostic sherds of Djeitun/Sang-e Chakhmaq type were found (Abbasnejad Seresti, 2020). Thus, if the lowland region was not involved in the broad inter-regional network indicated by this ceramic type, what was the situation of the highland sites of the region? In the field survey reported here, Asadi Ojaei looked specifically for evidence of connections between the eastern Mazandaran region and the Gorgan,

Shahroud, and Bastam Plains of the Iranian Plateau as well as areas further away in northeastern Iran and south Turkmenistan during the Pottery Neolithic.

Objectives, Questions, and Hypotheses: This study investigates the regional context and interactions between lowlands and highlands in the eastern Mazandaran in relation to animal herding by examining previously documented and newly discovered Neolithic sites. Furthermore, the research seeks to understand the inter-regional connections involving eastern Mazandaran, Gorgan Plain, Shahroud and Bastam plains, northeastern Iran, and south Turkmenistan with respect to the Neolithization process and external influences. The primary focus of this paper is to explore the relationship between highland and low-lying plain sites in eastern Mazandaran, as well as the links between eastern Mazandaran and adjacent regions during the Neolithic period and the initiation of Neolithization. In doing so, the question is as follows: What is the relationship between the sites of the highlands and low-lying plains in eastern Mazandaran, as well as between the eastern Mazandaran and the adjacent regions, during the Neolithic and when the Neolithization process began? Field surveys, identification of pottery Neolithic sites, and comparison of pottery assemblages reveal a direct correlation between highlands and low-lying plains on a regional scale. However, investigating inter-regional interactions through the comparative analysis of pottery assemblages presents significant challenges.

Research Methods: This article employs two distinct and yet complementary methods. Firstly, it utilizes the description and analysis of the field survey data of the Neolithic sites in the highlands and eastern plains of Mazandaran (Lab analysis). The field survey itself was conducted in 2020. Additionally, it includes a review of pottery assemblages from previous excavations and field surveys. Secondly, it incorporates the library analysis of published studies from the Neolithic period in the eastern Mazandaran and adjacent regions.

Research Background

Archaeological surveys and excavations that have been carried out in this region so far have shown that human habitation has been going on since at least the Epi-Paleolithic period. Excavations at Hotu and Kamarband caves (Coon, 1951, 1952) and their re-excavations in recent years (Fazeli Nashli, 1401a; 1401b), as well as excavations at Ali Tappeh cave (McBurny, 1968), Komishan cave (Vahdati-Nasab, 2009), Tappeh Abbasi (Abbasnejad

Seresti, 2009), Tappeh Saad (Mahfrouzi, 2009), Tappeh Terkam (Mahfrouzi, 2010), Qale'Pey (Mahfrouzi, 2010), Komishani open site (Fazeli Nashli, 2017), Touq Tappeh (Abbasnejad Seresti, 2020) and Tappeh Valiki (Nemati Loujandi, 1400; Abbasnejad Seresti and Nemati Loujandi, 1401) indicate a sequence of human settlements from the Epi-Paleolithic to the present era in eastern Mazandaran. During previous archeological field survey, some significant Neolithic sites such as Tappeh Komishani, Narges Keti, Touq Tappeh, and Tappeh Chehaldin were identified and introduced (Mahfrouzi, 2000; 2003). In the Mazandaran archaeological atlas program, the eastern region of Mazandaran was investigated and several other Neolithic sites were identified (Mousavi Kouhpar, 2006). Although these field surveys were comprehensive, the findings were not described, classified, and analyzed within the framework of specific archaeological periods.

Another field study in the region that led to the identification of 14 Neolithic sites in the Behshahr and Neka plains, including Tappeh Swasari, Tappeh Jenn Keti, and Tappeh Veliki, was carried out by Hosein Ramezanpour for his master's thesis (Ramezanpour, 2012; Ramenzanpour et al., 2014). His survey focused on the analysis of the settlement pattern of these sites and did not pay much attention to broader interactions and pottery types of the pottery Neolithic.

The Eastern Mazandaran Region

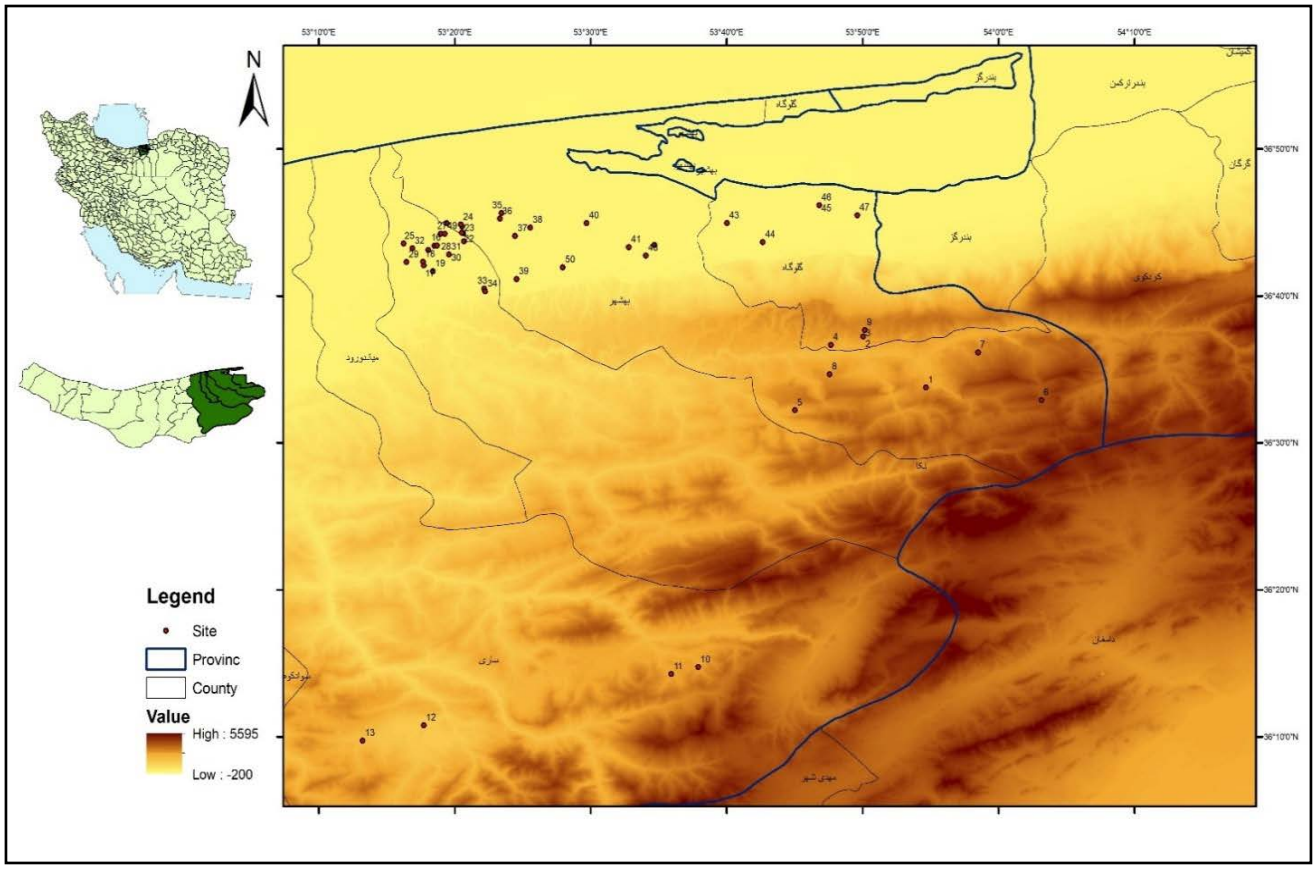
Due to the existence of two natural conditions, the Caspian Sea and the Alborz mountains, special ecosystems and environments have formed in the eastern Mazandaran. The Alborz mountain has prevented the wet weather and cumulonimbus from crossing the northern slopes to the southern slopes, causing different climates to emerge in these two regions. In general, the climate of the region is influenced by the latitude, Alborz mountains, sea level, distance from the sea, local and regional winds, climate fronts entering from northern and western regions, and dense forest (Faraji, 2016: 1119). In the eastern region of Mazandaran, like all the regions on the southern edge of the Caspian Sea, there is rain almost all year round; But usually the amount of precipitation is more in autumn and winter. Autumn rains are intense and continuous and spring rains are more regular, and scattered showers. The highest rainfall is in the months of March and April and the lowest in July and August. The rainfall on the coastal shores is more than in the mountain areas and rainfall pures mostly at altitudes between 900-1500m asl (Alijani, 1997: 165); the average rainfall is 815mm (1200 to 1300mm in the plains areas). This climate has

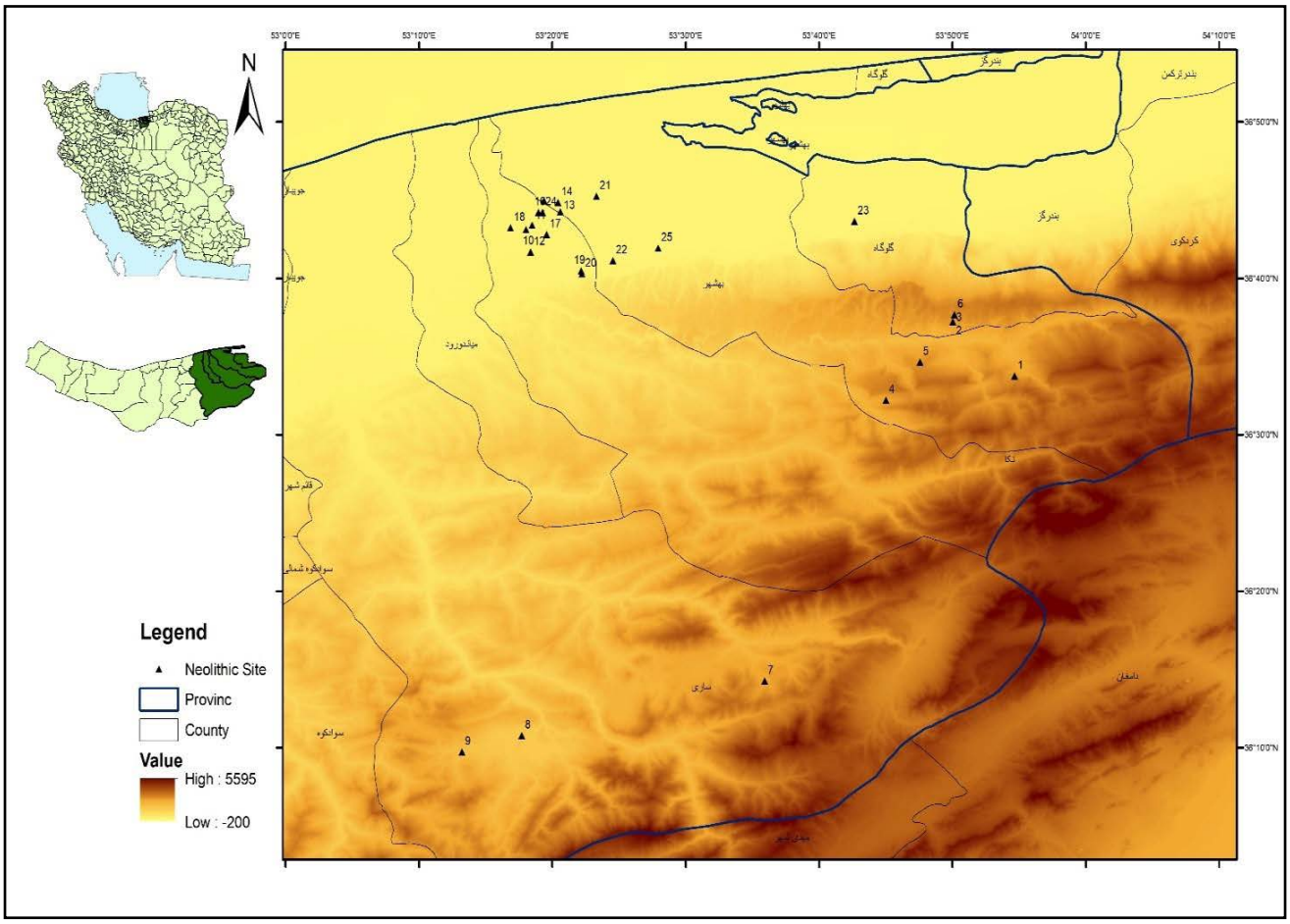
turned the study region into a very rich ecosystem and environment in terms of plant and animal species, as well as marine and raw resources, which have been very attractive and desirable for human communities to live in since long ago.

The Archaeological Field Survey of Neolithic Sites, 2021

In the current field program, 53 sites were recorded and investigated; 15 sites in the highlands and 38 sites in the plains. It has been mentioned above that some sites were investigated before, but since the surface materials and findings were not classified in terms of archaeological periods, materials (mostly pottery) were gathered from the surface of these sites for comparative and analytical studies. Most sites displayed material from multiple periods. 41 sites contain cultural materials from the Neolithic period, while 37 sites belong to the Chalcolithic period, 7 sites belong to the Bronze-Iron ages, and 5 sites to the Historical-Islamic periods. One of the important successes of this field survey program has been the identification of new Neolithic sites, including 10 sites in the highlands and 20 sites in the plains, which are introduced for the first time (Map 1 & 2). Most of the sites of the Neolithic period are located in the southern lowlands

Map 1: All the investigated sites, including: 1) Estarm 2) Kiasar 3) Din Tappeh Nyala 4) Cheheldin Eward 5) Samchool 6) Sorkh Geriveh 7) Arzet 8) Shah Tappeh Gornam; 9) Tappeh Mosayeb Mahalle 10) Din Kuti Thanur 11) Terkam 12) Qale'Pey 13) Tappeh Saad; Qoul Tappeh 14) Rabi Tappeh 15) Kal Zaman Tappeh 16) Mousavi Tappeh 17) Khargoush Tappeh; 18) Khezr Tappeh; 19) Marendin; 20) Muzaffar Tappeh; Sultan Chahar Berar; 21) Chopan Mahalle; 22) Tappeh Zare; 23) Tappeh Mirzaei I; 24) Tappeh Mirzaei II; 25) Babr Tappeh; 26) Garjin Tappeh; 27) Tappeh Tamesh; 28) Tappeh Kash; 29) Tappeh Haj Musa; 30) Seyyed Qasim; 31) Narges Keti; 32) NaierAbad; 33) Tappeh Abbasi; 34) Komishani open site and Komishan cave 35) Swasari 36) Sorkh Din 37) Chehldin Hossein Abad 38) Shoqal Tappeh 39) Yaqut Tappeh 40) Annab Tappeh 41) Namayan Tappeh 42) Musa Khan 43) Tappeh Fakhi 44) Din Tappeh Lemarask 45) Tappeh Graudin 46) Shekar Tappeh; 47) MohammadQoli Sekander 48) Doros Tappeh 50) Shisharkash 51) Tappeh Kash Kohestan (Author, 2023). ▼





near Nekarud and its surroundings areas in the Neka plain, But the relative dearth of sites in the highlands is related to the difficulty of field surveys in those areas, and completing the field survey program will lead to the identification of more Neolithic sites in those areas.

Pottery Neolithic in the Highlands of Eastern Mazandaran

Ten of the 15 sites located in the highlands belong to the Neolithic period; they are: Estarem, Kiasar, Din Tappeh Niala, Samchool, Shah Tappeh Gornam, Mosayeb Mahalle, Terkam, Qale'Pey, Tappeh Saad, and Qoul Tappeh (Fig. 1). These sites are located at altitudes between 700 and 1900m and in the inter-mountain plains and shallow valleys of the northern Alborz mountains. The most eastern sites (Map 2, No. 1 to 6) are located at higher altitudes between 1000 and 1900m, while the western sites (Map 2, No. 7 to 9) are located at altitudes between 700 and 1250m.

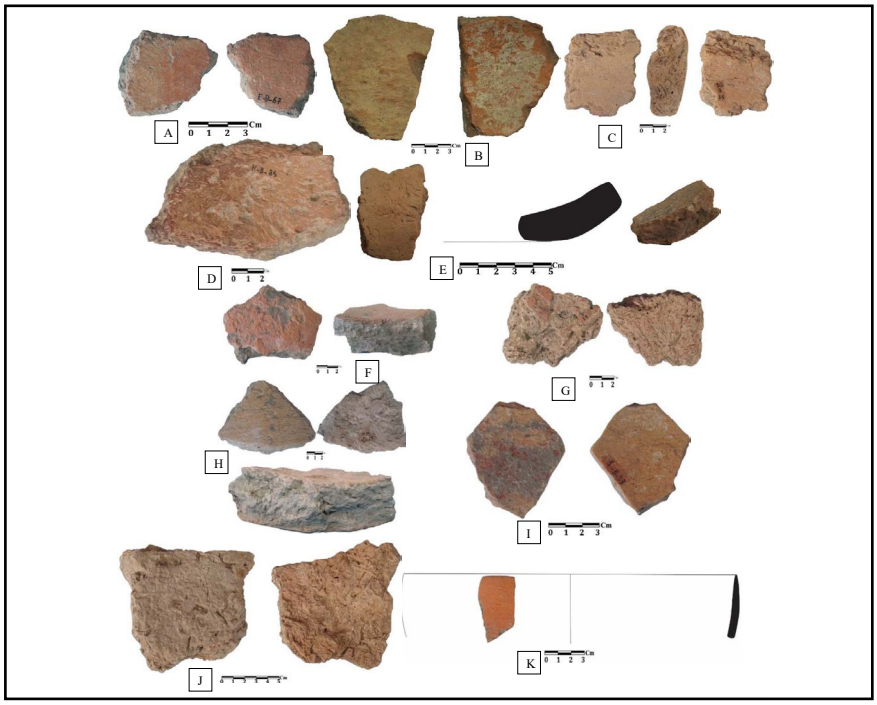
The study of pottery has shown that the Neolithic sites located in the highlands can be sorted into western and eastern parts in terms of pottery traditions. In the eastern part, where the sites of Estarem, Kiasar, Din

▲ Map 2. The location of Newly recorded Neolithic sites: 1) Estarem; 2) Kiasar; 3) Din Tappeh Niala; 4) Samchool; 5) Shah Tappeh Gornam; 6) Tappeh Mosayeb Mahalle; 7) Terkam; 8) Qale'Pey; 9) Tappeh Saad; Qoul Tappeh; 10) Rabi Tappeh; 11) Kal Zaman Tappeh; Mousavi Tappeh; 12) Marendin; 13) Chopan Mahalle; 14) Tappeh Mirzai II; 15) Garjin Tappeh; 16) Tappeh Tamesh; 17) Tappeh Kash; 18) NaierAbad; 19) Tappeh Abbasi; 20) Komishani open site and Komishan cave; 21) Sorkh Din; 22) Yaqut Tappeh; 23) Tappeh Fakhi 24) Din Tappeh Lemarask 25) Shisharkash 26) Tappeh Kash Kohestan (Author, 2023).

Fig. 1: Surveyed Sites in the highlands: A) Estarem; B) Kiasar; C) Qale'Pey; D) Qoul Tappeh (Author, 2023). ▶

Tappeh Niala, Samchool, Shah Tappeh Gornam, and Mosayeb Mahalle are located, Neolithic potteries are simple and, in most cases, their slip has been lost (Fig. 2). These potteries are thick, have a chaff temper, and very high porosity. Creamy-white and brown thick slip, poor firing with dark core, and use of coarse chaff temper in Estarem (Fig. 2, A-B), Kiasar (Fig. 2, D-E), and Mosayeb Mahalle (Fig. 2, G-H) potteries show the most similarity with Caspian Neolithic Software (the CNS). The Neolithic potteries of Din Tappeh Niala are made by the slab construction method. Two Neolithic sherds (Fig. 2, I-K) were identified at Samchool, one of which (Fig. 2, I) has a "Decorative Outer Slip" (DOS) on its body as decoration. At Sorkh Geriveh, the pottery sherd has lost its slip, and its very large chaff temper is the only indicator that can be cited for possibly attributing it to the Neolithic period (Fig. 2, J).

Contrary to the fact that the sites located in the western part of the highlands, such as Qale'Pey, Tappeh Saad, Terkam, and Qoul Tappeh, are further away from the eastern plains (Naka and Behshahr), they show more similarity in terms of pottery assemblage. Terkam, Tappeh Saad, and Qale'Pey were previously excavated although the Neolithic ceramics have never been properly analyzed. Neolithic pottery from Terkam (Fig. 3, A) is of much better quality than other sherds in this group. It contains a very fine chaff temper that is well mixed with clay and has almost no porosity; this sherd's thick orange slip has similarities to the CNS. From the filed survey, Neolithic potteries from Tappeh Saad show all the features of the CNS, except for the thick slip that was lost (Fig. 3, B, C). However, in



◄ Fig. 2: Neolithic potsherds recovered from the Eastern Part of the Highlands: Starem (A, B); Shah Tappeh Gornam (C); Kisar (D, E); Din Tappeh Niala (F); Mosayeb Mahalle (G, H); Samchool (I, K); Sorkh Griveh (J) (Author, 2023).

◄ Table 1: Description of Sherds Represented in Figure 2 (Author, 2023).

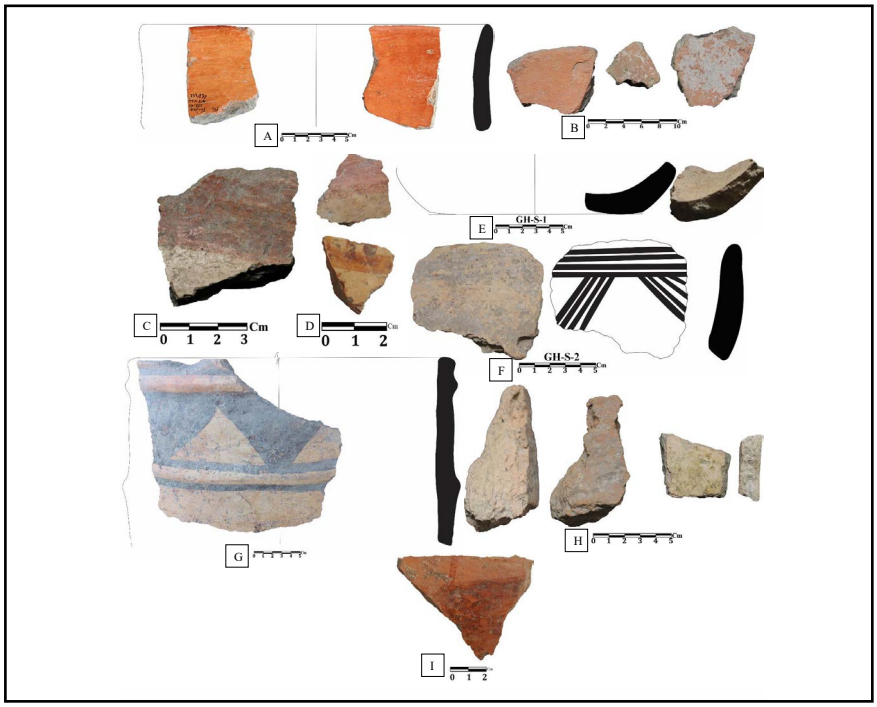
Site	Fragment No.	Description
Estarem	Figure 2-A	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (1.2 cm); Porosity (High); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (None)
Estarem	Figure 2-B	Making Method (Handmade); Firing (Incomplete); Temper (Chaff); Thickness (1.3 cm); Porosity (High); Inside-Outside Slip (Thin-Thin); Decoration Method-Place-Motif (None)
S. T. Gornam	Figure 2-C	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (2.5 cm); Porosity (High); Inside-Outside Slip (Thin-Thin); Decoration Method-Place-Motif (None)
Kiasar	Figure 2-D	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (2.4 cm); Porosity (High); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (None)
Kiasar	Figure 2-E	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (1.8 cm); Porosity (High); Inside-Outside Slip (Thick-Thin); Decoration Method-Place-Motif (None)
Niala	Figure 2-F	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (2.1 cm); Porosity (High); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (None)
Mosayeb Mahalle	Figure 2-G	Making Method (Handmade); Firing (Incomplete); Temper (Chaff); Thickness (1.8 cm); Porosity (High); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (None)
Mosayeb Mahalle	Figure 2-H	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (2.2 cm); Porosity (High); Inside-Outside Slip (Thin-Thick); Decoration Method-Place-Motif (None)
Samchool	Figure 2-I	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (1.3 cm); Porosity (High); Inside-Outside Slip (Thin-Thick); Decoration Method-Place-Motif (DOS -Outside- DOS)
Sorkh Geriveh	Figure. 2-J	Making Method (Handmade); Firing (Incomplete); Temper (Chaff); Thickness (2.8 cm); Porosity (High); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (None)
Samchool	Figure 2-K	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (1.1 cm); Porosity (High); Inside-Outside Slip (Thin-Thin); Decoration Method-Place-Motif (None)

revisiting pottery assemblage from the excavation of the site, few Neolithic sherds were identified. In one sherd, the characteristic features of the CNS, including a thick cream-colored slip and a red-brown band can be seen on its rim (Fig. 3, C). Unfortunately, due to the incompleteness of the rim, it was not possible to stance and draw it. Qoul Tappeh is the only new Neolithic site in the region, which is located 200m south of Tappeh Saad. Its Neolithic pottery shows strong similarities with the ones from the Neka and Behshahr plains. Pottery with thick cream-colored and brown slips, coarse and fine chaff temper, high thickness, and poor firing are their common characteristics. In the pottery of this site, both DOS and complex geometric motifs are used as decorations (Fig. 3, E, F, H).

In the excavation report of Qale'Pey, there is no mention of Neolithic pottery, but during the surface survey of this site in 2011, a few Neolithic pottery sherds were collected (Qasemi Gorji, 2016: 44). One sherd (Fig. 3, G) has a rim with a diameter of more than 30cm, and the maximum thickness of its body is more than 2.5cm. The decoration of this piece is a combination of DOS (a weak layer) and geometric motifs including raised parallel bands bordering downward-facing painted triangles in black color; this type of Neolithic pottery has not been reported in any site in the eastern Mazandaran, although it may relate to the single painted vase found at Rashak III cave (Vahdati Nasab et al., 2013). However, its thick cream-colored slip and coarse chaff temper are very similar to the CNS pottery-making method (Fig. 3, G). During the field survey of the site, some significant sherds of the Neolithic period have been collected. These sherds are very similar to the CNS ones; The use of a color band (Fig. 3, I) and painted geometric motifs similar to ladder motifs (Fig. 3, D) are among the important features of these sherds, that connect them with the recently excavated sites of Touq Tappeh (Abbasnejad Seresti, 2020) and Tappeh Valiki (Abbasnejad Seresti and Nemati Loujendi, 2021) in the Neka plain, 60 kilometers north-east of Qoul Tappeh.

Pottery Neolithic in the Lowlands of Eastern Mazandaran

Out of 53 sites located in the Eastern Mazandaran, 38 are located in the Neka and Behshahr plains. 30 sites are related to the Neolithic period, of which 20 sites have been identified and introduced as Neolithic sites for the first time (Fig. 4). No Neolithic material has been found at 8 sites. As stated, due to the lack of proper introduction and analysis of materials, especially potteries and their role in regional and inter-regional communication, previously identified sites were also subjected to field revisited, and the



◄ **Fig. 3: Neolithic Pottery of the Western Part of the Highlands: A) Terkam (Mahfrouzi 2009; drawing and photo by Asadi Ojaei); B, C) Tappeh Saad (sherd C from the Mahfrouzi excavation, 2008; photo by Asadi Ojaei); E, F, H) Qoul Tappeh; D, G, I) Qale'Pey (sherd G from Ghasemi Gurji's survey, 2013; photo and drawing by the Asadi Ojaei).**

◄**Table 2: Description of Sherds Represented in Figure. 3 (Author, 2023).**

Site	Fragment No.	Description
Terkam	Figure. 3-A	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (1 cm); Porosity (Low); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (None)
Tappeh Saad	Figure. 3-B	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (1.8 cm); Porosity (High); Inside-Outside Slip (Thin-Thin); Decoration Method-Place-Motif (None)
Tappeh Saad	Figure. 3-C	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (1.1 cm); Porosity (Low); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (Geometric-Outside-Color Band)
Qale'Pey	Figure. 3-D	Making Method (Handmade); Firing (Medium); Temper (Chaff-Mineral); Thickness (0.8 cm); Porosity (Low); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (Geometric-Outside-Ladder?)
Qoul Tappeh	Figure. 3-E	Making Method (Handmade); Firing (Incomplete); Temper (Chaff); Thickness (2 cm); Porosity (High); Inside-Outside Slip (Thin-Thick); Decoration Method-Place-Motif (DOS -Outside- DOS)
Qoul Tappeh	Figure. 3-F	Making Method (Handmade); Firing (Incomplete); Temper (Chaff); Thickness (2.1 cm); Porosity (High); Inside-Outside Slip (Thin-Thick); Decoration Method-Place-Motif (Geometric-Outside-parallel Lines)
Qale'Pey	Figure. 3-G	Making Method (Handmade); Firing (Incomplete); Temper (Chaff); Thickness (3.1 cm); Porosity (High); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (Geometric, DOS-Outside-Color Band, Filled Triangles)
Qoul Tappeh	Figure. 3-H	Making Method (Handmade); Firing (Medium); Temper (Chaff-Mineral); Thickness (2.8 cm); Porosity (High); Inside-Outside Slip (Thin-Thick); Decoration Method-Place-Motif (None)
Qale'Pey	Figure. 3-I	Making Method (Handmade); Firing (Medium); Temper (Chaff-Mineral); Thickness (1.6 cm); Porosity (Medium); Inside-Outside Slip (Thin-Thick); Decoration Method-Place-Motif (Geometric-Outside-Color Band)

Fig. 4: Surveyed Sites in the Lowlands: A) Marendin B) Tappeh Garjin C) Tappeh Mirzaei II D) Tappeh Sorkh Din (Author, 2023). ▶

surface findings, especially the potteries, have been reviewed and analyzed.

Rabi Tappeh, Mousavi Tappeh, Kal Zaman Tappeh, Marendin Tappeh, Chopan Mahalle, Tappeh Mirzaei II, Garjin Tappeh, Shisharkash Tappeh, Tamesh Tappeh, Tappeh Kash, Tappeh Haj Musa, Tappeh NaierAbad, Tappeh Abbasi, Tappeh Sorkh Din, Yaqut Tappeh, Tappeh Kash Kohestan, and Din Tappeh Lemrask are the sites that were identified and introduced as new Neolithic settlements (Fig. 5). Note that Tappeh Komishani and Komishan cave, which were introduced in previous studies only as Mesolithic and Pre-Pottery Neolithic, were surveyed, and Neolithic ceramics were collected from their surface in the current program (Fig. 5, F, J). Tappeh Fakhi in the Galugah plain, which has not received much attention in previous field programs, is another site that holds great promise for Neolithic studies in the lowlands (Fig. 6). Seyyed Qasim, Sultan Chahar Berar, Swasari, Annab Tappeh, Muzaffar Tappeh, and Narges Keti were subjected to field revisiting (Fig 7).

The pottery in the plain mostly shows the characteristics of the CNS, which Matson (1951) and Dyson (1991) previously described with characteristics such as thick slip, coarse chaff temper, poor firing, high porosity, a thick body, and mostly deep bowl forms with a concave wall and a rounded rim. The excavations of Touq Tappeh and Tappeh Valiki have also led to the discovery of many such ceramics. The slips of the potsherds are in a range of thick cream (Fig. 5, A, B, G, H), red, reddish brown, dark brown or chocolate (Fig.5, K, O, M), and light olive (Fig.5, C, J). Poor pottery making, low-quality slips, and environmental factors caused the slips of some sherds to be destroyed. Chaff temper is one of the

▲ **Fig. 5. Neolithic Pottery of the newly found Sites in the Eastern Mazandaran: Rabi Tappeh (A, D); Marendin (B, C); Tappeh Garjin (E); Chopan Mahalle (G); Shisharkash (H); Tappeh Komishani (F); Din Tappeh Lemarask (I) Komishan Cave (J); Tappeh Sorkh Din (K); Yaqut Tappeh (L); Tappeh Kash Kohestan (M, N); Mousavi Tappeh (O) (Author, 2023).**

other characteristics of the Neolithic pottery of this region, which can be divided into different types from coarse to fine (Fig. 5, E, M). The current field survey has also shown that in the production of some Neolithic sherds, mineral temper (Fig. 5, B, I) or crushed shells (Fig. 5, N) were also used; of course, a small amount of chaff temper is still observed in these sherds. The pottery from the plain is also classified in terms of firing quality in a range of complete, medium, and incomplete. Incomplete firing, often related to sherds with chaff temper (Fig. 5, A, C, E, F, G, K, L, M, N, O) and complete firing (Fig. 5, B, D, H, I, J) belongs to sherds with the

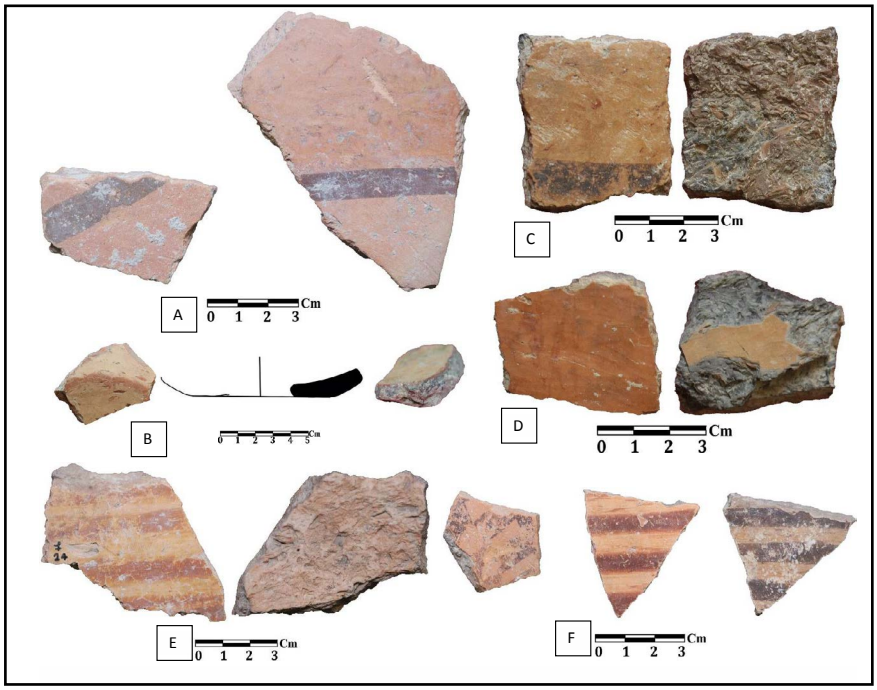
Table 3: Description of Sherds Represented in Figure. 5 (Author, 2023).►

Site	Fragment No.	Description
Rabi Tappeh	Figure. 5-A	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (1 cm); Porosity (Medium); Inside-Outside Slip (Thick-Thin); Decoration Method-Place-Motif (None)
Marendin	Figure. 5-B	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (0.8 cm); Porosity (Low); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (DOS-Outside- DOS)
Marendin	Figure. 5-C	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (1.2 cm); Porosity (Medium); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (None)
Rabi Tappeh	Figure. 5-D	Making Method (Handmade); Firing (Medium); Temper (Chaff-Mineral); Thickness (0.8 cm); Porosity (Low); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (DOS-Outside-DOS)
Garjin	Figure. 5-E	Making Method (Handmade); Firing (Incomplete); Temper (Chaff); Thickness (1.2 cm); Porosity (High); Inside-Outside Slip (Thin-Thick); Decoration Method-Place-Motif (None)
Tappeh Komishani	Figure. 5-F	Making Method (Handmade); Firing (Incomplete); Temper (Chaff); Thickness (1.5 cm); Porosity (High); Inside-Outside Slip (Thin-Thin); Decoration Method-Place-Motif (None)
Chopan Mahalle	Figure. 5-G	Making Method (Handmade); Firing (Medium); Temper (Chaff-Mineral); Thickness (0.7 cm); Porosity (Medium); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (None)
Shisharkash	Figure. 5-H	Making Method (Handmade); Firing (Medium); Temper (Chaff-Mineral); Thickness (0.9 cm); Porosity (Medium); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (None)
Lemrask	Figure. 5-I	Making Method (Handmade); Firing (Medium); Temper (Shell-Mineral); Thickness (1.2 cm); Porosity (Low); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (None)
Komishan Cave	Figure. 5-J	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (1.3 cm); Porosity (High); Inside-Outside Slip (Thin-Thick); Decoration Method-Place-Motif (Geometric-Outside-Color Bands)
Sorkh Din	Figure. 5-K	Making Method (Handmade); Firing (Incomplete); Temper (Mineral); Thickness (2.2 cm); Porosity (High); Inside-Outside Slip (Thin-Thick); Decoration Method-Place-Motif (None)
Yaqut Tappeh	Figure. 5-L	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (2.2 cm); Porosity (High); Inside-Outside Slip (Thin-Thin); Decoration Method-Place-Motif (None)
T.K. Asiabsar	Figure. 5-M	Making Method (Handmade); Firing (Incomplete); Temper (Chaff); Thickness (3.8 cm); Porosity (High); Inside-Outside Slip (Thin-Thin); Decoration Method-Place-Motif (None)
T.K. Asiabsar	Figure. 5-N	Making Method (Handmade); Firing (Medium); Temper (Shell-Mineral); Thickness (0.7 cm); Porosity (High); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (None)
Mousavi Tappeh	Figure. 5-O	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (2.5 cm); Porosity (Low); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (DOS -Inside, Outside- DOS)

mineral temper (with small amount of chaff). Although the CNS is known for being thick and coarse (Fig. 3, K, M), in this field survey, some sherds had thicknesses between 3mm and 5mm (Fig. 5, B, N).

Generally, two types of decoration methods were identified in the CNS of eastern Mazandaran plains: DOS and painted geometric patterns. Also, based on the motifs, three groups can be introduced:

1) The first group is ladder motifs that were executed horizontally near the rim of the wares and are local and specific to the sites of the eastern Mazandaran region (Table 6). In terms of technical characteristics, this



◄ **Fig. 6: Neolithic Pottery of Tappeh Fakhi, Galugah Plain (Author, 2023).**

◄ **Table 4: Description of Sherds Represented in Figure. 6 (Author, 2023).**

Site	Fragment No.	Description
Tappeh Fakhi	Figure. 6-A	Making Method (Handmade); Firing (Medium); Temper (Chaff-Mineral); Thickness (1.1 cm); Porosity (Medium); Inside-Outside Slip (Thin-Thick); Decoration Method-Place-Motif (Geometric-Outside-Color Band)
Tappeh Fakhi	Figure. 6-B	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (1.3 cm); Porosity (High); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (None)
Tappeh Fakhi	Figure. 6-C	Making Method (Handmade); Firing (Incomplete); Temper (Chaff); Thickness (1 cm); Porosity (Medium); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (Geometric-Outside-Color Band)
Tappeh Fakhi	Figure. 6-D	Making Method (Handmade); Firing (Incomplete); Temper (Chaff); Thickness (1.6 cm); Porosity (High); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (None)
Tappeh Fakhi	Figure. 6-E	Making Method (Handmade); Firing (Incomplete); Temper (Chaff); Thickness (1.3 cm); Porosity (High); Inside-Outside Slip (None-Thick); Decoration Method-Place-Motif (Geometric-Outside-Shady)
Tappeh Fakhi	Figure. 6-F	Making Method (Handmade); Firing (Medium); Temper (Chaff-Mineral); Thickness (0.7 cm); Porosity Low); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (Geometric-Outside-Shady)
Tappeh Fakhi	Figure. 6-A	Making Method (Handmade); Firing (Medium); Temper (Chaff-Mineral); Thickness (1.1 cm); Porosity (Medium); Inside-Outside Slip (Thin-Thick); Decoration Method-Place-Motif (Geometric-Outside-Color Band)

pottery has no difference from the ones from the second group which will be explained below. It seems that the ladder motif is specific to lowland plains pottery (Fig. 7, A) as so far this motif has not been reported in the highlands nor even in the Neolithic sites located at the southern end of the plains, such as the Hotu and Kamarband caves. It is worth mentioning that only one sherd suspected to be a ladder motif has been seen in the highlands, at Qale'Pey (Fig. 3, D).

2) The second group is regional pottery or the CNS. Their motifs are single and multiple horizontal, vertical, and diagonal color bands drawn on the body or the rim of the potteries (Fig.5, J; Fig. 7, B, C, E). The DOS is also one of the characteristics of the pottery of this group in the plains; which has also been seen in the highlands (Fig. 5, D, O; Fig. 7, D, H) (Tables 7 and 8).

3) The third group is inter-regional potteries (Table 9). The motifs of this group are the so-called shady (Zeighami, 2009: 101) or fading motifs (Malek Shahmirzadi, 1980). These motifs are drawn in the form of parallel-colored lines and filled in between them with pale lines of the same color spectrum. Such motifs are common in the Pottery Neolithic sites of Northeastern Iran, including Sang-e Chakhmaq, Kalateh Khan and Deh-Kheir (Roustaei et al., 2015: 588, Fig. 10; Roustaei, 2016: 28, fig. 7),

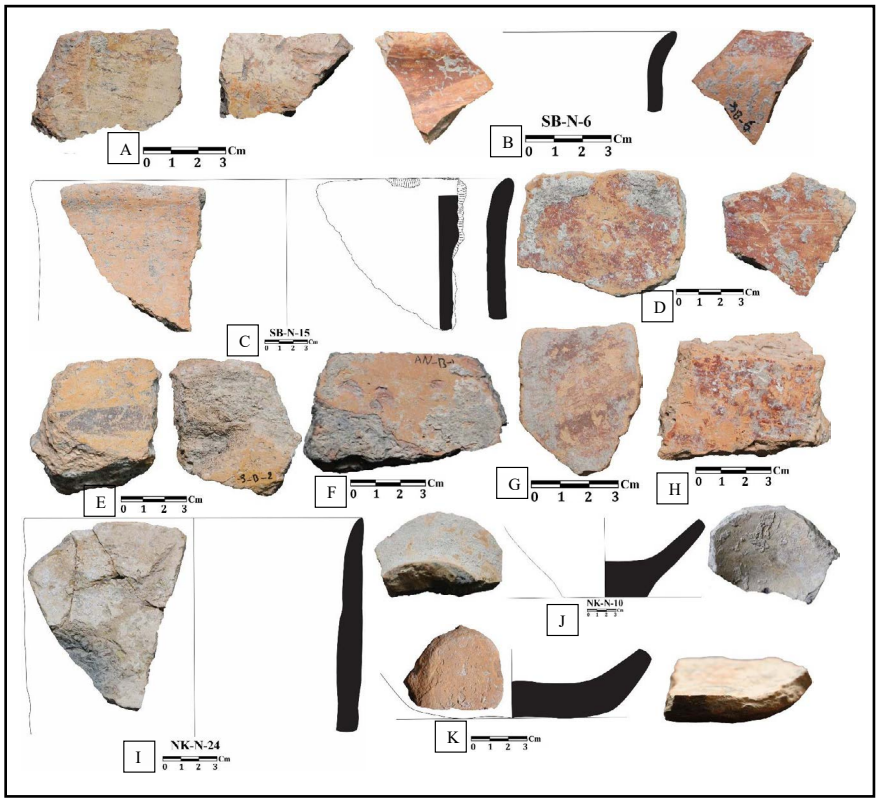


Fig. 7: Neolithic Pottery of the Lowlands from the Revisiting of Previous Surveyed Sites: Seyyed Qasim (A); Sultan Chahar Barar (B, C, D); Swasari (E); Annab Tappeh (F); Muzaffar Tappeh (G); Narges Keti (H, I, J, K) (Author, 2023). ▶

Pookardvall (Zeighami, 2018: 101), Yarim Tappeh (Roustaei, 2016: fig. 3), Aq Tappeh (Malek Shahmirzadi & Nokandeh, 2000: 195, Fig. 3), Qaleh Khan (Garazhian et al., 2014: 43-44, Table 7, 8), as well as at Djeitun sites of Southern Turkmenistan (Coolidge, 2005). Currently, shady-fading motifs have been observed in the pottery collection of Tappeh Fakhi (Fig. 6), Muzaffar Tappeh (Fig. 7, G), and Tappeh Valiki (Abbasnejda Seresti et al., 2022) in the lowland Eastern Mazandaran plains.

Site	Fragment No.	Description
Seyyed Qasim	Figure. 7-A	Making Method (Handmade); Firing (Medium); Temper (Chaff-Mineral); Thickness (1.4 cm); Porosity (Medium); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (Geometric-Outside-Ladder)
Soltan Chahar Barar	Figure. 7-B	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (1 cm); Porosity (Medium); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (Geometric-Inside, Outside-Color Bands)
Soltan Chahar Barar	Figure. 7-C	Making Method (Handmade); Firing (Medium); Temper (Chaff-Mineral); Thickness (1.5 cm); Porosity (High); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (Geometric- Outside-Color Band)
Soltan Chahar Barar	Figure. 7-D	Making Method (Handmade); Firing (Incomplete); Temper (Chaff-Mineral); Thickness (1.4 cm); Porosity (High); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (DOS-Outside-DOS)
Swasari	Figure. 7-E	Making Method (Handmade); Firing (Incomplete); Temper (Chaff); Thickness (3.1 cm); Porosity (High); Inside-Outside Slip (None-Thick); Decoration Method-Place-Motif (Geometric- Outside-Color Band)
Annab Tappeh	Figure. 7-F	Making Method (Handmade); Firing (Medium); Temper (Chaff-Mineral); Thickness (1.3 cm); Porosity (High); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (None)
Muzaffar Tappeh	Figure. 7-G	Making Method (Handmade); Firing (Medium); Temper (Chaff-Mineral); Thickness (0.9 cm); Porosity (Medium); Inside-Outside Slip (Thin-Thin); Decoration Method-Place-Motif (Geometric-Outside-Shady)
Narges Keti	Figure. 7-H	Making Method (Handmade); Firing (Medium); Temper (Chaff-Mineral); Thickness (1.1 cm); Porosity (Medium); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (DOS-Outside-DOS)
Narges Keti	Figure. 7-I	Making Method (Handmade); Firing (Incomplete); Temper (Chaff); Thickness (1.8 cm); Porosity (Medium); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (None)
Narges Keti	Figure. 7-J	Making Method (Handmade); Firing (Incomplete); Temper (Chaff); Thickness (1.5 cm); Porosity (High); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (None)
Narges Keti	Figure. 7-K	Making Method (Handmade); Firing (Medium); Temper (Chaff); Thickness (1.7 cm); Porosity (High); Inside-Outside Slip (Thick-Thick); Decoration Method-Place-Motif (None)

◄Table 5: Description of Sherds Represented in Figure. 7 (Author, 2023).

Analysis of the Neolithic Period in Eastern Mazandaran

One of the aims of this paper is to analyze and explain the process of Neolithization based on the comparative study of survey and excavation data, especially pottery assemblages, in the eastern Mazandaran region. As discussed previously, scholars of this region have for decades debated whether different aspects of Neolithic lifeways developed endogenously or were influenced or brought exogenously. Diffusion and migration models have a great role in the exogenous hypothesis, while the role of local and indigenous communities in creating the Neolithic lifestyle is prominent in the endogenous hypothesis.

Recent field surveys of Neolithic settlements in the lowland and highland plains of eastern Mazandaran have contributed new data regarding regional and inter-regional connections. In this field program, two questions and goals were considered:

1) What data can be used to study the intra-regional interactions between the lowlands and the highlands of eastern Mazandaran?

2) What was the relationship between sites of the eastern Mazandaran

Table 6: Comparable Table of Local Motif (Author, 2023). ▶

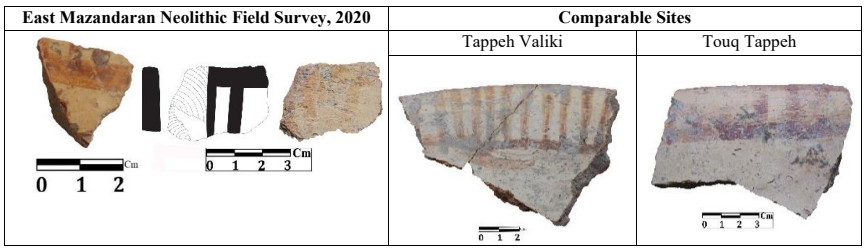


Table 7: Comparable Table of Regional Band Motif (Author, 2023). ▶

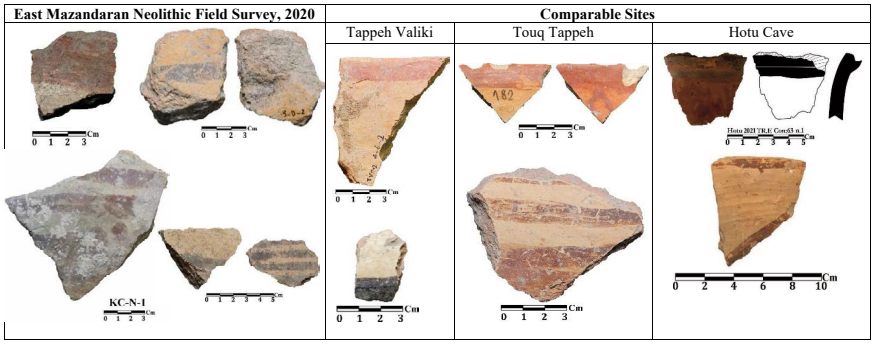
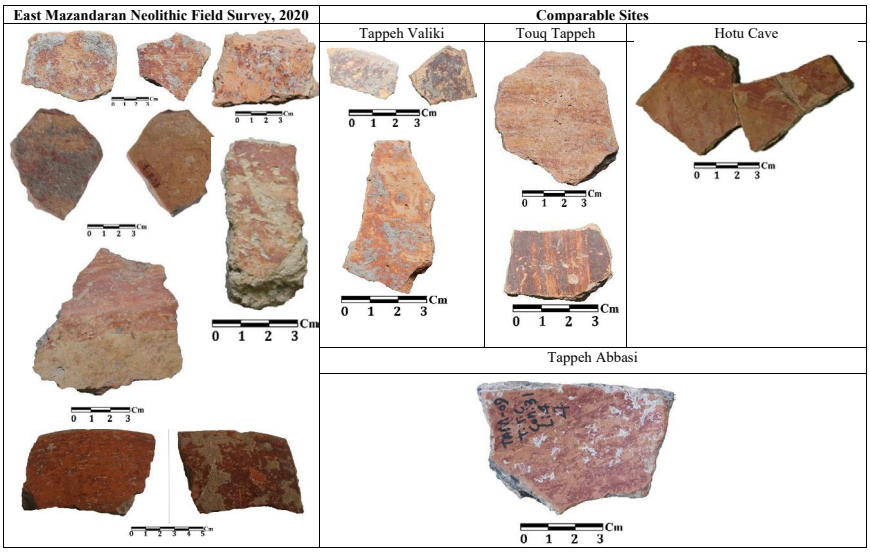


Table 8: Comparable Table of Regional DOS (Author, 2023). ▶



region and the adjacent regions, such as Gorgan Plain, Shahroud and Bastam Plain, northeastern Iran, and south Turkmenistan, during the pottery Neolithic?

Now, let's imagine that the Neolithic and food production package has entered the eastern Mazandaran from the adjacent regions and sites such as Sang-e Chakhmaq or Djeitun. If so, the possibility should not be kept out of view that some cultural materials, especially pottery, have also entered this region along with these imported packages of food production. Moreover, these packages must have entered through two routes: first, through the Gorgan Plain, of which eastern Mazandaran is a natural extension; and second, through the mountainous plains and valleys located between the

Table 9: Comparable Table of Inter-Regional Shady-Fading (Author, 2023). ▼

East Mazandaran Neolithic Field Survey, 2020	Comparable Sites		
	Tappeh Valiki	Touq Tappeh	Yarim Tappeh
	Aq Tappeh	Pookervall	
	Deh Kheir	Sang-e Chakhmaq	

southern and northern slopes of Alborz.

In none of the Neolithic sites identified in the highlands of eastern Mazandaran, do the pottery assemblages indicate a connection with the southern Alborz sites in the Bastam and Shahroud plains. All the Neolithic ceramics of the highlands are of the CNS type, as found and reported in the lowland sites beginning with Hotu and Kamarband caves. This indicates an intra-regional connection between the highlands and the lowlands, which may be related to the formation of pastoralist herding patterns. This issue requires extensive excavation in highland sites, accurate dating of the layers, and accurate recording and description of the findings, as well as

interdisciplinary studies, which, unfortunately, has not been the case in the excavations carried out in Terkam, Qale'Pey, and Tappeh Saad.

Currently, pottery similar to the Djeitun/Sang-e Chakhmaq type has been obtained only in Tappeh Fakhi, Muzaffar Tappeh, and Tappeh Valiki, all three located in the lowlands. In this regard, although the shady-fading motifs do not have the known standard on the pottery of adjacent regions, they can be considered as the main indicator for a comparative study at the inter-regional level. However, it is necessary to mention two points. First of all, aside from the sites of Tappeh Fakhi and Muzaffar Tappeh, we can only refer to two sherds with a shady-fading pattern, out of 81 painted pottery of 1247 Neolithic sherds, discovered from the excavation of Tappeh Valiki (Abbasnejad Seresti and Nemati Loujendi, 2021: 281) which indicates a poor inter-regional connection from the point of view of pottery traditions. Secondly, the earliest date of the Pottery Neolithic in eastern Mazandaran is 6600-6400 BC (Asadi Ojaei et al., in press), which is currently older than all of the sites in the adjacent regions, including the layers in Djeitun/ Sang-e Chakhmaq that contain shady-fading sherds (Table 10). Therefore, currently, the ceramic data not only does not help to analyze the exogenous process in the field of Neolithization in the eastern Mazandaran region but also sometimes causes confusion. An example from regions far away from the studied region in this paper may help to understand the discussion better. The shady-fading type of Neolithic pottery has similarities with the types found in Western Asia, especially in the Neolithic sites of Syria (Fig. 8). In the sites of Tell Sabi Abyad and Tell Seker Al-Aheimar, which have the oldest pottery of Western Asia dated to 6900-6700 BC, sherds very

Fig. 8: Comparison of Sherds from Eastern Mazandaran and Syria: A) Tappeh Fakhi B) Tell Seker Al-Aheimar C) Qale'Pey D) Tell Sabi Abyad (Author, 2023). ▶

Table 10: Comparing the earliest estimated dates of PPN and PN sites of eastern Mazandaran and adjacent regions (Author, 2023). ▼

Region / Period	Eastern Mazandaran (Hotu & Kamarband)	Eastern Mazandaran (Valiki & Touq)	Southern Alborz (Sang-e Chakhmaq)	Gorgan Plain (Pookerdvall)	Northeastern Iran (Qale Khan)	Turkmenistan (Djeitun)
Pre-Pottery Neolithic	8000-7500 BC	----------	7100 BC	----------	----------	----------
Pottery Neolithic	6600-6400 BC	Mid 7th Millennium BC	6200 BC	Late 7th and early 6th Millennium BC	5800 BC	6100 BC

similar to shady-fading types have been found (Nieuwenhuyse, 2017: 18, fig. 3.4; Le Mière, 2017: 12, fig. 2.6). However, despite these similarities, the cultural interactions between these regions are hard to interpret.

Recently, studies conducted on animal remains resulting from the re-excavation of Hotu cave, provide new information about the exploitation of animals such as goats and sheep. De Groone and colleagues state that at the beginning of the Pre-Pottery Neolithic (Early Neolithic), a significant change occurs in terms of subsistence; Gazelle decreased from 64% in the Mesolithic to 0% in the Neolithic period, and goats and sheep increased from 4% in the Mesolithic to 72% in the Pre-Pottery Neolithic and 78.1% in the pottery Neolithic. Although the remains of goats and sheep in this collection are not domesticated and are wild species, their kill-off patterns indicate pre-domestication management, which has already been reported in the Central Zagros during the Late Pre-Pottery Neolithic and the Pottery Neolithic (de Groene et al., 2023). On the other hand, the use of secondary products such as fat and milk has been confirmed through isotopic examinations from the pottery of Hotu and Kamarband caves by Michael Gregg and Gregg Slater (Gregg & Slater, 2012). Therefore, the new zooarchaeology data from Hotu Cave, evidence of animals' secondary product from potteries, and the connections between Pottery Neolithic sites of plains and highlands are the reasons that the eastern Mazandaran might be one of the centers where the Neolithization process, the emergence of domesticated species, and food production took place locally and endogenously.

There is a geographical gap (Hezar Jarib Neka) between the eastern highlands (Baheshahr) and the western highlands (Dodangeh and Farim in Sari), in which there is a gap in our knowledge of the Neolithic period. Moreover, the midlands, which are mainly located in forested areas and connect the highlands and lowlands, have not been subjected to a comprehensive and detailed study of the Neolithic period. The only sites with Mesolithic and Neolithic periods that have been discovered in the midlands are the Shoupari cave in the Mehraban-Rood region of Behshahr, and the Sekileh cave, 8km south of Komishan cave (200m asl). Therefore,

there are sites in the midlands that filled the gap between the highlands and the lowlands and perhaps, made this meandrous path more tolerable for possible herders of the Neolithic period. Thus, it is necessary to carefully survey the midland and highland regions and to identify and examine their possible Neolithic settlements.

Conclusion

Field investigations alone cannot answer archeological questions but are the beginnings of work that will be completed with various interdisciplinary studies and bring us one step closer to the answer. The 2021 field survey of Neolithic settlements in the lowlands and highlands of eastern Mazandaran led us to a few conclusions. First, the status of the Neolithic period and the distribution of the sites located in the eastern highlands of Mazandaran; during the field survey, 10 sites in the highlands (1300m asl) were found that belong to the pottery Neolithic. These sites are located in the inter-mountain plains, which are now suitable for agriculture such as wheat, barley, and rapeseed. Second, the connection between the sites in the highlands and lowlands; by comparing and analyzing the pottery collected from the sites of the two regions, as mentioned above, strong connections are observed. Also, finding traces of the use of secondary products, as well as the evidence of the management of wild species of goats and sheep in Hotu Cave can strengthen the issue of seasonal grazing at least in the Pottery Neolithic. Third, inter-regional connection between eastern Mazandaran and adjacent sites; to investigate this issue, two routes have been considered; pottery sherds from the two sites of Tappeh Fakhi and Muzaffar Tappeh (along with few sherds from the excavation of Tappeh Valiki), based on Djeitun/Sang-e Chakhmaq pottery types, indicate a possible connection with the Djeitun culture through the Gorgan Plain. Fourth, a rapid increase in the number of sites in the Pottery Neolithic; during the Pre-pottery Neolithic there are only 4 sites known in the region; however, in the Pottery Neolithic there are 41 sites. This increase can be observed in other adjacent regions as well. Paleo-climate data of the mid-7th millennium BC indicate improvements in climate and turning the land from swamplands to a forest environment that would be very pleasant for inhabitation. Also, based on the inter-regional connection, we may be witnessing a migration from adjacent regions to eastern Mazandaran due to an increase in population.

Despite the results obtained from this field survey, better and more reliable data for a better understanding of the Neolithization process

can only be obtained through stratigraphic excavations. The process of formation of sites and their changes over time, dating samples, plant and animal remains, paleo-climatic data, and pottery and lithic assemblages and their development process are among the data that we need to understand the Neolithization process and reaching the Neolithic lifestyle in the eastern Mazandaran. These data should be collected and studied not only from the lowlands but also from the midlands and highlands sites.

Acknowledgment

Financial resources for the field survey of Neolithic settlements in the eastern of Mazandaran were provided by the University of Mazandaran and from the research grant of the supervisor, Dr. Rahmat Abbasnejad Seresti. Therefore, appreciation is given to the relevant employees. We are grateful to the Research Institute of Cultural Heritage and Tourism and the Research Institute of Archeology for issuing the permission letter for this program. The unhesitating and sincere cooperation of the employees of the Cultural Heritage, Tourism, and Crafts Organization of Mazandaran is sincerely appreciated. Also, special thanks to Mr. Hossein Nemati Lojandi, Sirolah Ghasemi Gorji, Omid Tousi, and Hadi Amirkhanlou who cooperated and supported in identifying and visiting the sites.

Observation Contribution

The first author has been conducting fieldwork and together with the second author, they have recorded, analyzed and written first draft of the article. The third and fourth authors also evaluated, revised and edited the article, as well as corrected the English language of the article. t is worth to mention tha the field survey program, and the current article obtained from that, are part of the PhD thesis of the first author (Seyyed Kamal Asadi Ojaei).

Conflict of Interest

The University of Mazandaran requested the fieldwork permit from the Cultural Heritage, Handicrafts, and Tourism Organization of Mazandaran, which was then carried out by Seyyed Kamal Asadi Ojaei. Subsequently, the license was issued by the Research Institute of Cultural Heritage and Tourism (Research Institute of Archeology).

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شواهدی تازه از نوسنگی باسفال در شرق مازندران براساس بررسی‌های جدید باستان‌شناسی

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چکیده

مسأله نوسنگی‌شدن و اهلی‌سازی، تولید غذا و رسیدن به سبک زندگی نوسنگی در منطقهٔ شرق مازندران پس ۷۰ سال مسکوت ماندن در یک دههٔ اخیر بار دیگر موضوع جذابی برای باستان‌شناسان و پژوهشگران شده است. کاوش‌ها و بررسی‌های میدانی طی این سال‌ها برای طرح فرضیات نوسنگی‌شدن صورت‌گرفته که باوجود روشن‌شدن برخی از مسائل، پرسش‌های بیشتری نیز مطرح‌شده که هنوز بی‌پاسخ مانده‌اند؛ از طرف دیگر، بررسی‌های میدانی گذشته نتوانسته به‌خوبی ظرفیت‌های نوسنگی شرق مازندران را معرفی کنند؛ بنابراین یک برنامهٔ بررسی میدانی با دو پرسش و هدف اصلی تعریف و پیشنهاد شد: ۱) ارتباطات درون‌منطقه‌ای بین محوطه‌های نوسنگی باسفال شرق مازندران واقع‌در ارتفاعات و دشت‌های جلگه‌ای با توجه به فرضیات نوسنگی‌شدن براساس عوامل درون‌زا چگونه بوده است؟ و ۲) روابط فرامنطقه‌ای شرق مازندران در دوران نوسنگی باسفال با مناطق همجوار نظیر: دشت گرگان، دشت شاهرود، شمال‌شرق ایران و جنوب ترکمنستان و مسیرهای احتمالی آن در راستای فرضیات نوسنگی‌شدن براساس عوامل برون‌زا چگونه بود؟ در بررسی مذکور ۵۳ محوطه مورد بررسی و شناسایی قرار گرفتند و نیز برخی از مجموعه‌های سفالی نیز بازنگری شدند. حاصل کار، شناسایی و اضافه‌شدن ۳۰ محوطهٔ نوسنگی جدید به فهرست محوطه‌های نوسنگی باسفال است که در ارتفاعات و دشت‌های جلگه‌ای واقع‌شده‌اند؛ بنابراین، درحال‌حاضر تعداد محوطه‌های نوسنگی منطقهٔ شرق مازندران به ۴۲ محوطه افزایش‌یافته است. مطالعهٔ سفال‌های جمع‌آوری‌شده نشان می‌دهد که برهمکنش‌هایی بین دشت‌ها و سرزمین‌های مرتفع برقرار بود که می‌تواند در راستای الگوی زیست چراگردی فصلی مورد تحلیل قرار گیرد. هم‌چنین روابط فرامنطقه‌ای با مناطق همجوار را با توجه به شواهد، احتمالاً نه ازطریق دشت‌های میان‌کوهی، بلکه ازطریق دشت‌های جلگه‌ای، به‌خصوص دشت گرگان باید جستجو کرد؛ این موضوع، احتمال روند نوسنگی‌شدن براساس عوامل برون‌زا را مطرح می‌کند. روش پژوهش حاضر، مبتنی‌بر توصیف و تحلیل یافته‌های برنامهٔ بررسی یادشده و مطالعات مقایسه‌ای یافته‌های محوطه‌ها و مناطق همجوار با شرق مازندران است.

کلیدواژگان: سفال پوک کاسپی، شرق مازندران، برهم‌کنش‌های فرهنگی، فرهنگ جیتون.

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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)

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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 6th 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 (Roustaei, 2007; Roustaei & 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 Razen 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 5th to the 1st 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 "Giyan 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.

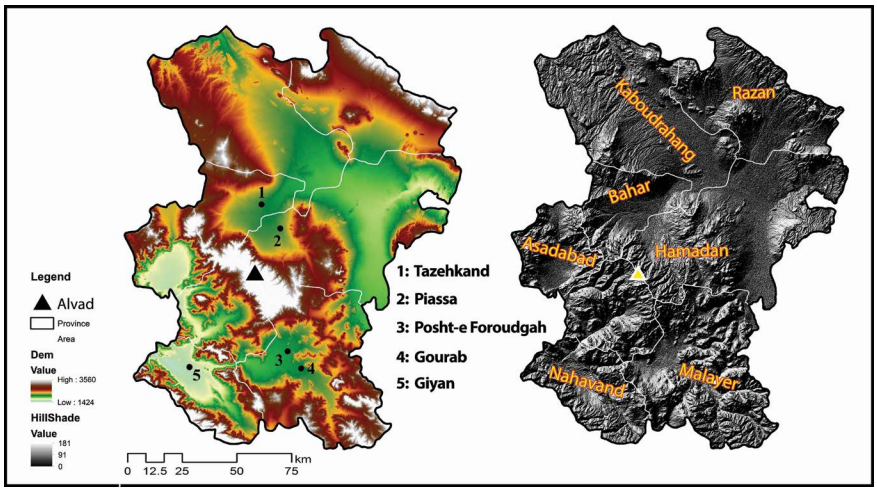
Among the notable prehistoric sites that have undergone excavation, "Tepe Tazehkand" stands out (Balmaki, 2011). The findings from this site contributed to the establishment of a relative chronology of the prehistory of Hamedan (Balmaki, 2017) and culminated in the publication of "Prehistoric Archaeology 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 6th 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 (Roustaei 2007; Roustaei & 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 Biston-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 Tuyserkan 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.

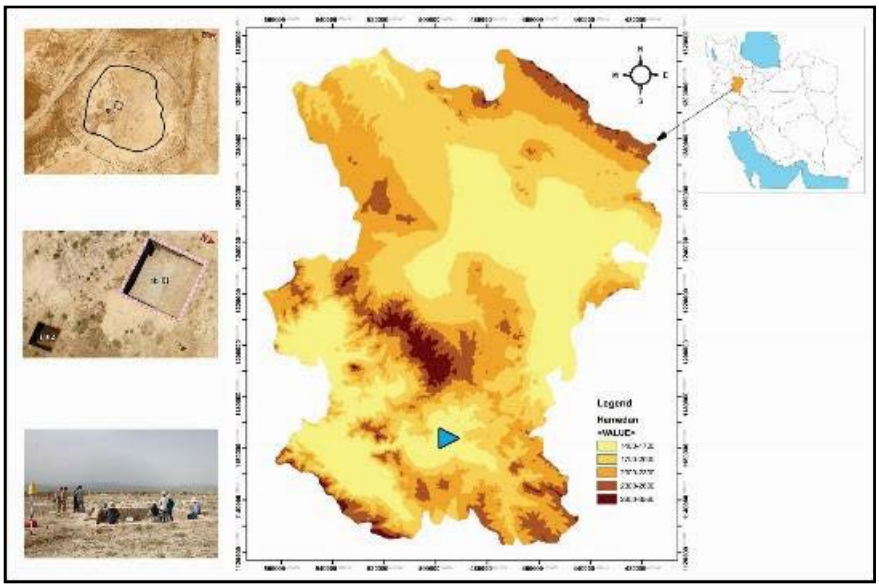
The archaeological investigation of Trench I revealed five distinct settlement phases, yielding a diverse array of cultural artifacts. These included spindle whorls, beads, pendants, stone tools, and a significant quantity of caprid and bovid bones, alongside several intact and fragmented human remains. 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 × 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.

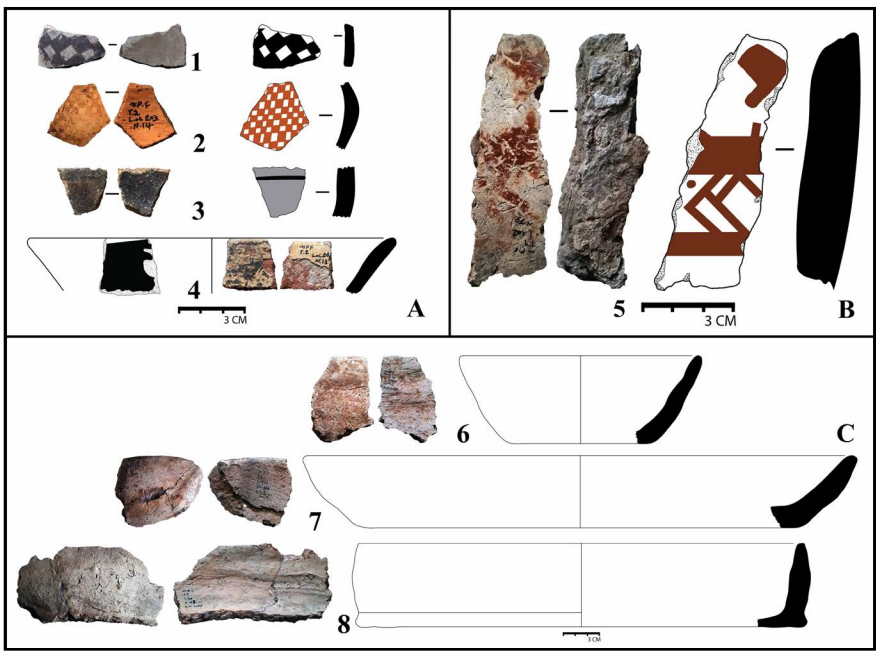
Comparative Dating

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).

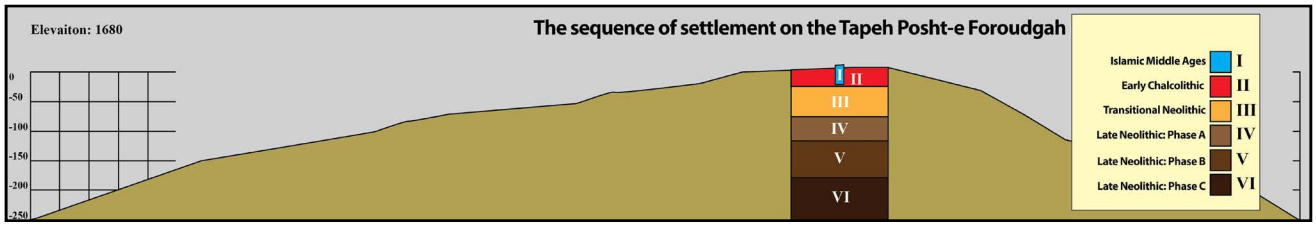


◄ Fig. 1. The pottery grouping from the Late Neolithic settlement periods at Tapeh Posht-e Foroudgah are as follows: Nos. 1–4 consist of decorated ceramics featuring geometric designs, which are categorized as phase A of the Late Sarab. Type 5 is characterized by red (ochre) on buff ware, designated 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 Tape 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 σ)	Calibrated Age (2 σ)
33882	41578	Posht-e Fordoudagh RN 1192 (Sample 11) Trench 1, Locus 110A	Plant charred	AMS-præp: 4 kunne ikke fryses ud før 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 Sehgabi 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 Tape 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, Tape 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 Tape 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 Tape 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 Tape 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

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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			Kurdistan	Kermanshah		Lorestan	Northwest
			Hamadan	Malayer	Nahavand	Sanandaj-Bijar	Kangavar	Mahidasht		Soldoz
Late Bronze		1500		Gunspan IV	Giyan II		Godin III1-2	← Period Maran →	Qalagap12	← Haftvan VIII *Barveh
Middle Bronze		2000	*Piassa III		Giyan III & IV		*Godin III6-4		Qalagap13 Kazabad- Gouran Qaleh Nisar AII Qalagap14	
Early Bronze		2500	← *Piassa I & II	← *Gourab VII	Giyan V_{B-D}	← Qeshlaq II	Godin IV			
		2900								
Late Chalcolithic		3000	Tazehkand Sequence Period →	Gourab VIII →	Giyan V_C	Qeshlaq III →	*Godin V Godin VI Godin VII Godin VIII	Dehsavar Sehgabi VII-VI	Qalagap15-16 Babajan V	Hasanlu VIII → *Grdashawan
		3500								
Middle Chalcolithic		4000	Tazehkand I - I & III	← *Gourab VIII	Giyan V_B	← Qeshlaq IV →	Godin IX Godin X (Dalma)	Sehgabi B Late Siah Bid ↔ Early Siah Bid	Qalagap19-21	Pisdeli
		4400								
Early Chalcolithic		4500	Tepeh Matrouk	Posht-e Foroudgah II →	-	← Qeshlaq V_{A-C} →	Godin XI (Shahnabad)	Sehgabi XI (Pottery J)	Qalagap22 Parchineh & Hakalan	Dalma (Hasanlu IX) ← ؟
		4900								
← Transitional →			?	← Posht-e Foroudgah III	Giyan V	← Qeshlaq V_D →	Godin XII?	Sehgabi-Sehgabi	← Qalagap →	؟ →
Late Neolithic		5000	?	Posht-e Foroudgah IV	← Giyan V	← Qeshlaq V_D Pottery Software (Dargoyz Gholian?)	← Kangavar XI (Pottery Software)	*Late Sarab →	Qalagap: second phase Qalagap: first phase Gouran D → *Bagnoo	Hajji Firuz (Hasanlu X)
		5100								
		5200		*Posht-e Foroudgah V						
		5300								
		5400		Posht-e Foroudgah VI						
		5500								
		6000							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, Sehgabi, Siahbid, and Godin Tepe, which lie outside this area, while also advocating for the establishment of new chronological tables.

Acknowledgement

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Conflict of Interest

The author declares no competing interests.

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۴۱ پژوهش‌های باستان‌شناسی ایران

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دانشگاه بوعلی سینا
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پیشنهادی بر بازنگری توالی گاهنگاری نسبی و مطلق روستانشینی کرانهٔ شرقی و دامنه‌های جنوبی رشته‌کوه الوند (براساس گاهنگاری نسبی و نتیجهٔ رادیوکربن تپهٔ پشت‌فرودگاه-ملایر)

خلیل‌الله بیک‌محمدی[I]

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چکیده

«گاهنگاری» و بازبینیِ تاریخ‌گذاری‌های نسبی و مطلق حوزه‌های فرهنگی، همواره از اقتضائات جدایی‌ناپذیر در علم باستان‌شناسی است. بر این‌اساس، از مناطق با اهمیت و ریشه‌دار در گاهنگاریِ مطالعات باستان‌شناسی ایران، زاگرس‌مرکزی و دامنه‌های جنوبی رشته‌کوه الوند و دشت ملایر است که از دههٔ ۱۹۹۰م. با حضور باستان‌شناسان غیرایرانی مورد بحث و توجه بوده و تا به امروز نیز کمابیش ادامه داشته است. دشت ملایر از حوزه‌های فرهنگی شاخص پیش‌ازتاریخ استان همدان به‌شمار می‌آید که با حضور محوطه‌های کلیدی از ادوار مختلف، همواره مورد مناقشه و بحث بوده و در ادبیات باستان‌شناختی زاگرس‌مرکزی نقش‌آفرینی کرده است. این منطقه در برخی از ادوار تاریخی، مانند دورهٔ 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 کربن۱۴ از دانشگاه کوپنهاک دانمارک، جدول گاهنگاری هزارهٔ ششم پیش‌ازمیلاد این حوزهٔ فرهنگی با اطمینان‌خاطر بیشتری ارائه می‌شود که پیش‌تر به‌صورت نسبی و برمبنای سفال بیان گردیده است. مسألهٔ اصلی پژوهش -ضمن نگاه انتقادی به روش گاهنگاری سنتی این حوزه مبتنی‌بر توالی فرهنگی گودین- با طرح این پرسش پی‌گیری می‌شود که، با توجه به ارائه تاریخ‌گذاری نسبی درخصوص نخستین استقرارهای جوامع انسانی در دشت ملایر که مبتنی‌بر «سفال» سامان یافته است، چه مقدار این نظریات با تاریخ‌گذاری مطلق آن تطابق دارد؟ براساس این پرسش، فرضیهٔ پژوهش چنین طرح می‌یابد که، براساس نمونهٔ آزمایش کربن۱۴ از لایه‌های تحتانی محوطهٔ پشت‌فرودگاه، تاحدودی تاریخ‌گذاری نسبی پیشین صحیح بوده و نتایج حاصله -با کمی تسامح- منطبق با نظریات و تاریخ‌گذاری‌ها ارائه شده است. روش پژوهش در این‌نوشتار، نظریهٔ داده‌بنیاد از نوع کیفی و مبتنی‌بر روش تاریخی-تحلیلی با بهره‌مندی از روش آزمایشگاهی تاریخ‌گذاری رادیوکربن۱۴ خواهد بود. برآیند و نتایج، نشان از حضور جوامع نخستین طی هزارهٔ ششم (با تاریخ کالیبره‌شدهٔ ۵۲۱۶-۴۹۹۴پ.م.) با افق فرهنگیِ «سراب جدید» مشخص می‌گردد.

کلیدواژگان: گاهنگاری، رشته‌کوه الوند، نوسنگی جدید، تپهٔ پشت‌فرودگاه، آزمایش رادیوکربن۱۴.

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Analyzing Animals as A Subject: Economic and Symbolic Role of Animals at Tape Qeshlaq, A Chalcolithic Settlement in the Central Zagros, Iran

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Abstract

Tape Qeshlaq represents a Chalcolithic settlement that was excavated as part of a larger archaeological survey conducted between 2011 and 2013. This study investigates the role of animals during the Chalcolithic period (ca. 5000–3500 BCE) in the Central Zagros region of Iran, utilizing data obtained from the excavations at Tape Qeshlaq. By examining both organic and inorganic data, the research aims to elucidate the subsistence and non-subsistence dimensions of human-animal interactions, thereby assessing how biological data can enhance the understanding of cultural data. The primary objective of this investigation is to ascertain the environmental conditions of the area through faunal data and to explore the cultural implications of the animal species present for the inhabitants during the Chalcolithic era. Faunal remains from Tape Qeshlaq have been collected and stored at the Archaeological Laboratory of Bu-Ali Sina University, where they are analyzed according to Stiner's coding system (2004) and Von den Driesch's (1976) measurement techniques. Statistical evaluations of the organic data reveal that the faunal assemblage from Tape Qeshlaq comprises 550 specimens, which include 474 bones, 41 teeth, 22 horns, and 13 shells. The category of large ungulates includes the fragmented remains of *Bos taurus* (cattle) and equids, specifically wild horses and onagers. Morphological and dental analyses reveal that approximately 70% of the equid remains are attributed to the onager, *Equus hemionus*, or the Asiatic wild ass. This study examines both the practical and relational dimensions of these animals, emphasizing their economic and symbolic significance at Tape Qeshlaq. The dominance of goats, sheep, cattle, and onagers as primary livestock underscores the necessity of varied pastoral strategies in response to the environmental challenges characteristic of steppe regions. Furthermore, the essential role of animal bones in tool production is underscored, highlighting their functional utility. The presence of non-organic artifacts, including zoomorphic figurines, horn-shaped tokens, and decorative pottery, reveals additional cultural dimensions of these animals, illustrating their role not only as vital resources but also as cultural symbols that inspired artistic expression and contributed to the social structure of Chalcolithic communities in western Iran.

Keywords: Central Zagros Archaeology, Zooarchaeology, Chalcolithic, Faunal Data, Herding System, Symbolic Motifs.

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Introduction

The archaeological examination of human-animal interactions has progressed to a new phase that transcends the traditional focus on the utilitarian roles of animals (Reitz & Wing 2008; Hill 2013). Contemporary zooarchaeological methodologies now encompass not only dietary and subsistence patterns but also the social and symbolic dimensions of these relationships (Russell 2011). This research exemplifies a broader archaeological approach that emphasizes the importance of animal data in salvage archaeology, resulting in a prioritization of both organic and inorganic materials. The excavation of Tape Qeshlaq, conducted by Motarjem within the framework of salvage archaeology related to the Talvar Dam, illustrates these efforts (Motarjem 2011 & 2014). Research in this area is hindered by challenges such as unreliable dating techniques, limited systematic investigations, and an overdependence on pottery analysis (Sharifi & Motarjem 2018: 87). This situation underscores the growing importance of interdisciplinary approaches, particularly in the exploration of the broader animal economies in the region, as the Zagros Mountains, recognized for their fertility, have been pivotal in the domestication of key species like *Capra hircus* (goats) in the Eastern Fertile Crescent of Southwest Asia (Zeder & Hesse 2000: 2254).

◄ **Fig. 1: Tape Qeshlaq in the Central Zagros, influenced by the southern basin of Lake Urmia (Authors, 2022).**

Tape Qeshlaq of Talvar

Tape Qeshlaq, located in Bijar, Kurdestan, Iran, is a significant prehistoric site within the Central Zagros archaeological zone (Fig 1). It is recognized as the largest site in the Talvar valley, encompassing an area of 5,600 square

meters and rising approximately 7 meters above the adjacent terrain at its peak. The site is situated near the Talvar River. As a permanent river, it serves as a reliable water source. Before 1971, no archaeological research was done in Bijar. In 1975, Swiny (1975) conducted a survey aimed at identifying sites from the first millennium BC. Subsequent systematic excavations were carried out by Iranian academic teams decades later (Mohamadifar 2010; Motarjem 2011 & 2014). Evidence indicates that the site was continuously occupied across five stratigraphic layers (I–V) from the Early Chalcolithic period to Iron Age III, with two notable cultural gaps. Initial analyses suggest connections to the Hajji Firuz-Dalma cultural traditions and influences from the Hassuna culture (Motarjem & Sharifi 2014: 54-62). Thermoluminescence dating has provided the following chronological framework for the chalcolithic layers (V-III) at Tape Qeshlaq: late Chalcolithic (3600±220-3800, 3915±270, 3850±280-4100 BC), Middle Chalcolithic (396±290-4100 BC), and Early Chalcolithic (5000±305, 5000±250 BC) (Sharifi & Motarjem 2018: 88-91).

Materials and Methods

This research project seeks to demonstrate the substantial influence of biological data analysis on enhancing the accuracy of cultural data interpretations. Faunal remains recovered from Tape Qeshlaq have been systematically collected and preserved at the Archaeological Laboratory of Bu-Ali Sina University. The analysis employs Stiner's coding system (2004) and Von den Driesch's (1976) measurement techniques, supplemented by established methodologies (Boessneck 1969; Schmid 1972; France 2008; Russell 2011) that inform the subsequent identification and analysis processes. Detailed methodological insights into the zooarchaeological and faunal analyses of Tape Qeshlaq are provided in Dehghan (2018). The data analysis was conducted following the implementation of conservation strategies. An effort has been made to establish a coherent relationship between organic and inorganic data, focusing on the economic, symbolic, and social roles of animals (DeFrance 2009) in maintaining the stability of this site over a millennium. The term non-organic animal data encompasses materials that illustrate the connections between humans and animals or reflect their physical characteristics and behaviors, such as zoomorphic motifs found in pottery and figurines.

Statistical Analysis of Organic Data

Statistical evaluations of organic remains from Tape Qeshlaq reveal a total

of 550 specimens, which include 474 bones, 41 teeth, 22 horns, and 13 shells. As presented in Table 1, the category of large ungulates comprises fragmented bones from *Bos taurus* (cattle) and equids (wild horse/onager). Morphological and dental analyses suggest that approximately 70% of the equid remains are attributable to the onager, specifically *Equus hemionus* or the Asiatic wild ass. The caprid remains consist of bones identified as *Ovis aries* (sheep), *Capra hircus* (goat), *Capra aegagrus* (ibex), as well as those classified under the broader Caprine category (goat/sheep). Due to constraints in time and specific research goals, a limited number of intact specimens were collected and analyzed, resulting in an average identification rate of 87% of the total specimens (see Table 2). The overall weight of the organic remains is approximately 5.780 kg, excluding burned and calcified fragments (Von den Driesch, 1976: 3-4).

Taxon	Early Chalcolithic			Middle Chalcolithic			Late Chalcolithic		
	NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%
Goat/Sheep	11	7	10.9	9	6	19.1	35	17	8.7
Goat	7	6	6.9	6	5	12.7	35	17	8.7
Sheep	6	6	5.9	5	4	10.6	33	29	8.2
Ibex							4	4	1
Suid	7	6	6.9				15	15	3.7
Gazelle	4	4	3.9	2	2	4.25	8	8	2
Auroch	1	1	1	1	1	2.1	14	14	3.5
Cattle	11	9	10.8	14	13	29.8	86	42	21.4
Equid	25	17	24.7	2	2	4.25	39	25	9.7
Canid	6	4	5.9				34	6	8.5
Felid	1	1	1				18	5	4.5
Large Ungulate							7	7	1.7
Rodent				1	1	2.1	2	2	0.5
Lepus				2	2	4.25	5	3	1.2
Turtle				2	2	4.25	2	2	0.5
Birds	3	2	2.9				11	8	2.7
Freshwater Shells	4	4	3.9				9	9	2.2
Total	86	67	85%	44	38	93%	357	213	89%

◄ Tab. 1: The NISP (Number of identifiable specimens), MNI (Minimum number of individuals), and NISP% (Number of identifiable specimens%) for each taxon, the Chalcolithic phases, Tape Qeshlaq (Authors, 2022).

For the Early Chalcolithic era, an examination of 101 specimens showed that equids were the most prevalent at 24.7% NISP, and Bos genera, including both *Bos primigenius* (aurochs) and *Bos taurus* (cattle), made up 11.8%. Caprids accounted for nearly 23.79% of the NISP, and suids (boar/pig) accounted for 6.9%, highlighting the significance of small herbivores. The presence of various carnivores (6.9%), *Gazella spp*. (gazelle) at 3.9%, and birds at 2.9% added to the diversity of animals.

The team encountered difficulties in gathering animal remains of the Middle Chalcolithic which were affected by issues such as layer disturbance, high humidity, and time constraints. Out of 47 bone fragments, 44 were successfully identified. During this phase, caprids, with an NISP of 33.5%, highlights the ongoing significance of small ruminants. Cattle (29.8%) accounted as the second predominant NISP% among large herbivores. The

Tab. 2: Summary of animal remain identification during the Chalcolithic era at Tape Qeshlaq (Authors, 2022). ▶

	Early Chalcolithic	Middle Chalcolithic	Late Chalcolithic
NI (indeterminate)	15	3	45
Total NI %	15%	7%	11%
Total MNI	67	38	213
Total NISP	86	44	357
Total NISP %	85%	93%	89%
Total Fragment	101	47	402
Total Fragment: 550		Average NISP%: 89%	

presence of gazelle, equid, Lepus, and turtle, each with a similar NISP of 4.25%, indicates a diverse taxonomy. The scarcity of animal remains during this phase presents challenges in discussing the economic strategies of this period, but the cultural data highlighted the importance of ruminants in the society in terms of function and art.

The late Chalcolithic period is characterized by a more extensive organic dataset, comprising a total of 357 identifiable specimens out of 402 fragments. Within this dataset, cattle account for 21.4% and aurochs for 3.5%, establishing the Bos genus as the primary source of protein among ruminants. Following this, equids represent 9.7% of the NISP, while caprids, which include goats (8.7%), sheep (8.2%), goat/sheep (8.7%), and ibex (1%), also contribute significantly. The percentages for canids and felids are 8.5% and 4.5%, respectively. Notably, while carnivorous bones are present, they lack cut marks or evidence of skinning, although some have been categorized. The NISP percentage for wild fauna, such as gazelles, ibex, and birds, is recorded at less than 3%. The bone data from the late Chalcolithic phase were collected from two pits filled with compacted ash and other refuse sites, indicating a clear pattern of consumption. A significant 51% of the Chalcolithic fragments exhibit a variety of brown hues, which are influenced by environmental factors such as climate, humidity, and soil composition. Additionally, approximately 6% of the bones display distinct signs of burning, likely due to cooking or incineration, with the most pronounced traces found on the calcaneus and phalanges of herbivores (Figs. 2 & 3).

Economic Analyses and Aging

The faunal assemblages identified at Tape Qeshlaq reveal a straightforward dynamic in the interactions between humans and animals. Evidence of caprids, cattle, equids, and gazelles are found consistently across all three layers of the chalcolithic period, suggesting that animal products were sourced from both domesticated herds and wild populations. The Talvar Valley, characterized by its steppe-like environment, served as a habitat for wild animal herds, including equids, gazelles, and ibex, particularly during

◄ **Fig. 2: Equine Distal phalanges show tendency to hunt young equids in the early chalcolithic phases (Authors, 2022).**

◄ **Fig. 3: Cattle and caprids' third phalange, probably charred in disposal pits (Authors, 2022).**

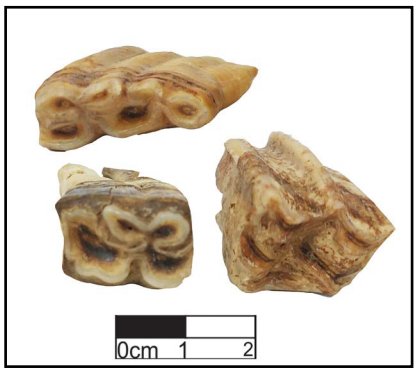
▲ Fig. 4: Proximal phalange of an equid with skinning marks (Authors, 2022).

the colder months. Additionally, the region's verdant pastures supported the practice of animal husbandry. This dual approach to resource acquisition offers settlements a degree of stability amidst seasonal fluctuations and the uncertainties of water and food availability.

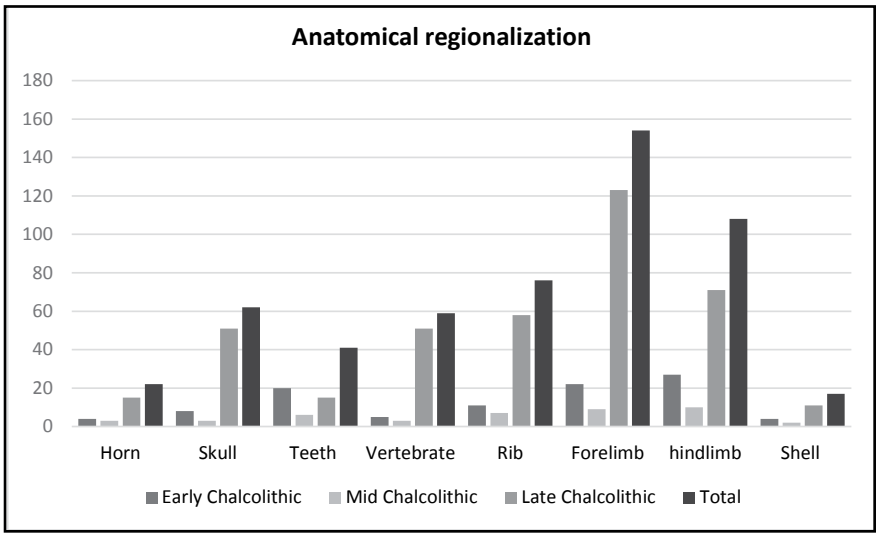
The investigation reveals a diverse array of animal species, encompassing both domesticated and wild adult specimens. Age assessment was conducted through measurements of body size, tooth eruption, and bone density, indicating that 65% of the identified animals are domesticated (65% adults and 35% juveniles), while 35% are wild (62% adults and 38% juveniles). The butchering practices and aging assessments suggest that cattle were generally slaughtered between the ages of 2 and 4, which aligns with prevalent cattle breeding methodologies. In contrast, the aging analysis for equids does not reveal a distinct pattern; however, there is a noted inclination towards hunting younger individuals, typically those under two years of age (Dehghan 2018: 76–91). The spatial distribution of these findings and the taxonomic composition do not imply any specific socioeconomic status (Ashby 2002: 38–43), as the majority of remains from Tape Qeshlaq were retrieved from refuse deposits rather than from defined contexts such as architectural structures.

The Nutritional Value of Animal Resources

Anatomical regionalization (Fig. 6) entails the identification of distinct components within an organism's anatomy. Factors such as spatial orientation, size, age, and domestication status are critical in assessing the nutritional value of animal resources and in reconstructing butchering practices. The skeletal analysis indicates a total of 260 elements in the axial skeleton, which is comparable to the 262 elements found in the appendicular skeleton. The discovery of skulls, horns, and limbs implies that killing and butchering occurred on-site. While long bones are prevalent, they are predominantly fractured to access the bone marrow. Fractures observed on flat bones are attributed to the processes of skinning and flesh removal. Ribs and vertebrae, which serve as meat carriers, are seldom found intact and are mostly fractured. Damage to horns, skulls, and other facial bones is evident, with 20% of ruminant mandibles exhibiting signs of skinning. The on-site processing of carcasses suggests that the Tape Qeshlaq served as a productive center, facilitating easier access to animal resources. Taphonomic analyses reveal that over 60% of the faunal remains in Tape Qeshlaq consist of food remnants.



▲ Fig. 5: The lower M3, M2 and upper M2 of equids. The deep ectoflexid and V-shaped linguaflexid are typical of *Equus hemionus* (Authors, 2022).



◄ **Fig. 6: The anatomical regionalization of organic identifiable data (Authors, 2022).**

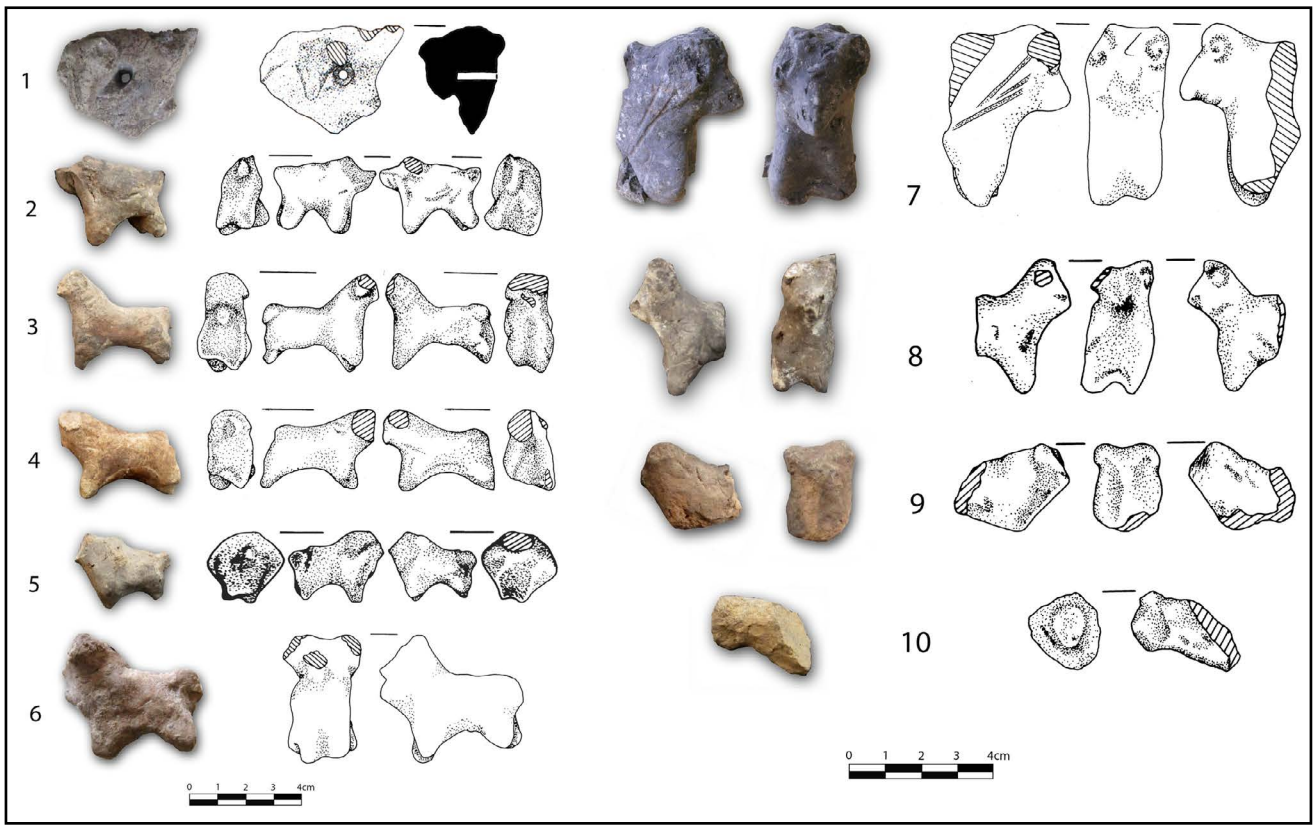
Bone tools

The archaeological excavations yielded 40 bone samples identified as tools, which include 13 needles, 6 awls, 10 cylindrical objects, 8 rings, and 3 clasps. The majority of the tools discovered at Tape Qeshlaq are crafted from the long bones of gazelles and caprids, with a particular emphasis on long bone material. The longest cylindrical artifact measures approximately 11.7 cm in length. The practice of creating bone rings appears to be a local tradition, although instances of awls and cylindrical bones have been documented in the Zagros region (Hamlin 1975: 125; Voigt 1983: 29; Braidwood 1983: 367). The texture analysis of these tools indicates that artisans predominantly utilized unheated natural bone tissue rather than remnants of food (Fig. 7).

Non-organic Animal Data

Investigating non-organic animal data within a broader framework provides a more profound insight into the relationship between humans and animals. This analysis facilitates the exploration of the social functions of animals and emphasizes their role in artistic endeavors and the evolution of human settlements. Ancient populations produced animal-inspired artifacts to honor and connect with their spiritual convictions, perceiving animals as embodiments of strength, agility, and wisdom. Many cultures viewed animals as symbols of protection, fertility, and fortune, making the creation of such items a method to integrate these desirable qualities into their existence. Studies at Tape Qeshlaq reveal the essential importance of animals to its residents, as their access to animal resources has been a fundamental aspect of their livelihood (Fig. 8).

▲ Fig. 7: Bone cylinder, rings and awls, Tape Qeshlaq, mainly from layers III & IV (Authors, 2022).

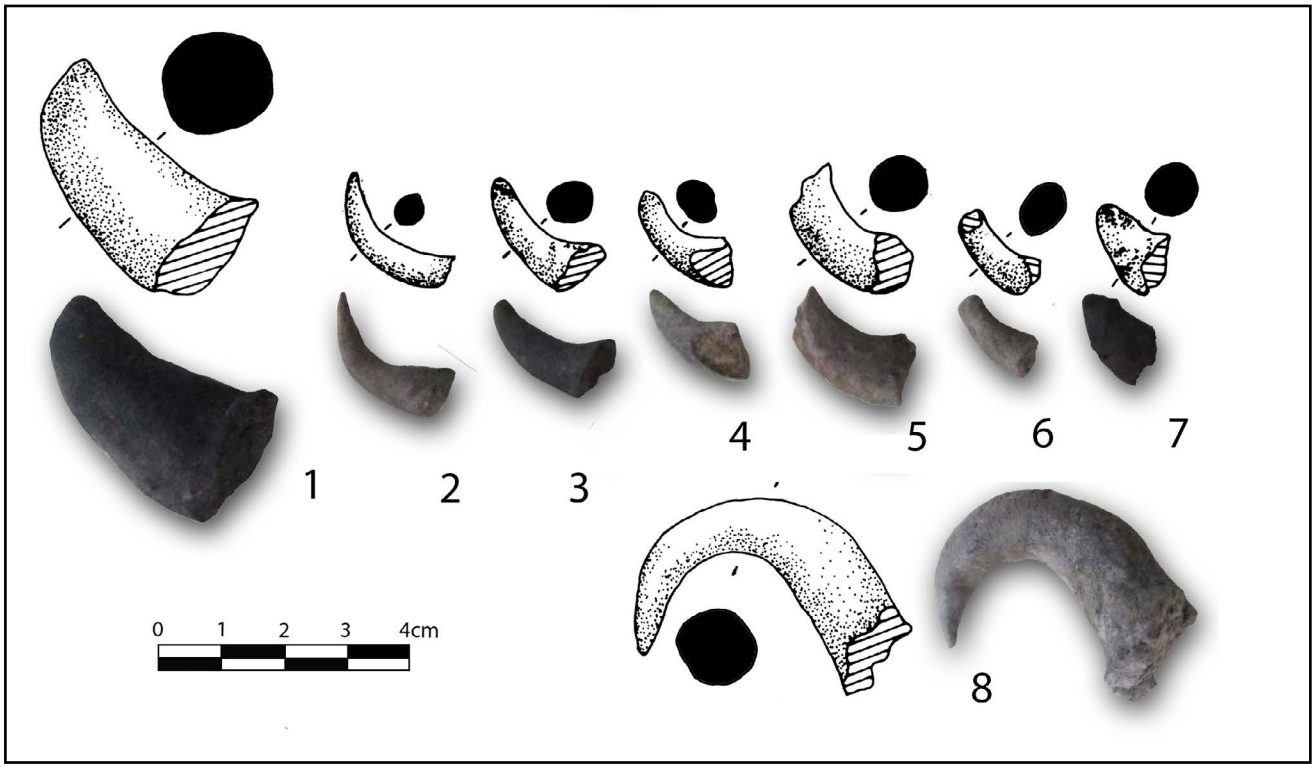


▲ Fig. 8: Animal clay figurines of Loc: 303, T.T.T.VI trench, Tape Qeshlaq (Authors, 2022).

Zoomorphic Figurines

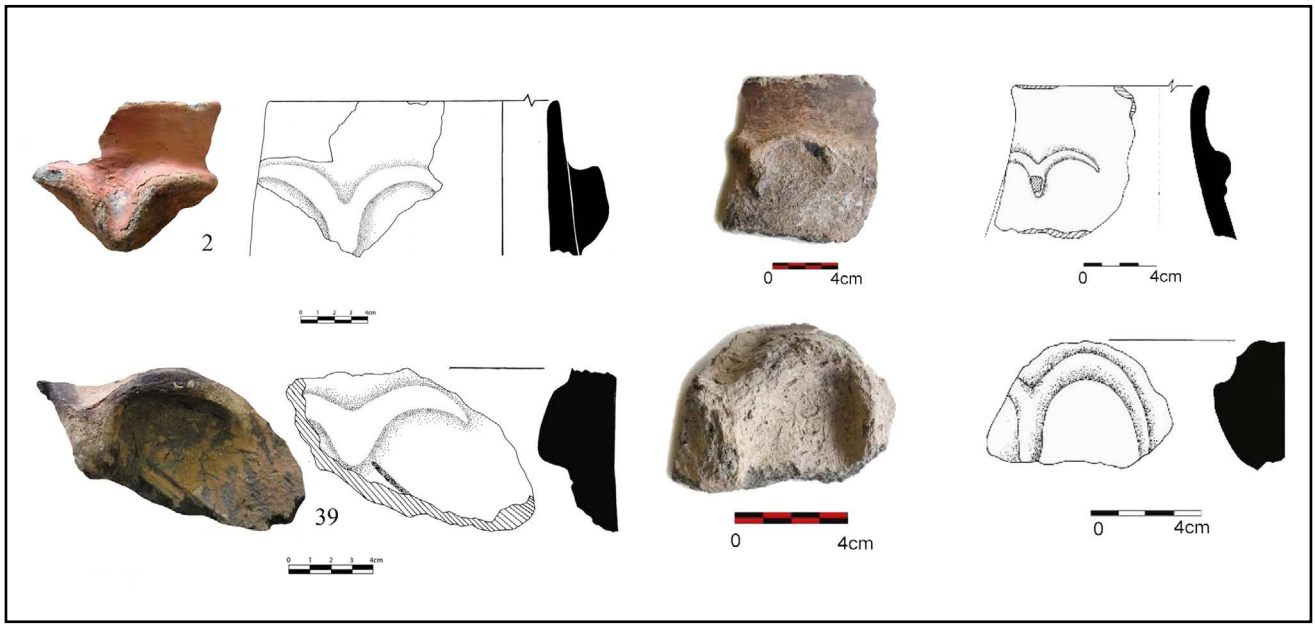
Unless the biologic data in Tape Qeshlaq do not symbolize any particular ideology, the zoomorphic figurines offer intriguing insights into animals as a cultural subject. In the second season, animal figurines were found in a western stratigraphy trench, within the deposition of ashes in two pits associated with the Middle Chalcolithic layer, along with other household waste such as burnt bones and pottery shards (Motarjem 2014: 93). The pit cannot be a cache because the collection is not purposefully buried. These 26 clay figurines have no color or nail decorations. Only one of them depicts a human figure, while the rest represent livestock. They are made in one piece with short legs, similar to Jarmo and Ain Ghazal samples (Broman 1990; Schmandt-Besserat 2013). In less damaged specimens, the twists of the horns resemble bucks, while the other specimens with straight and narrower horns are more likely to represent goats (Fig. 9). The remains of both species are recorded on site (Table 1). Analyzing species, style, size, and context of appearance could be an attempt to understand the social roles these figurines may have played, focusing on prehistoric ontologies and cognitive processes (Valera et al., 2014). Broman (1990: 27–29) mentioned that these miniature forms are based on real-life models that ancient people used to break, probably to release hidden powers, but they were not considered sacred and were mostly found in pits.

Fig. 9: Horn-shaped tokens of Tape Qeshlaq (Authors, 2022). ▼



Horn-shaped Tokens

Many tokens have been discovered in the chalcolithic layers, indicating the area's active trade relations (Sharifi & Motarjem 2018: 94–95). These tokens give numeracy information and are made of clay and burned in the process of incineration. They are modeled in various shapes, such as cylinders, cones, spheres, and disks, but there are also 11 horn-shaped specimens resembling cattle and goat horns, demonstrating their direct inspiration from animals in creating different forms (Fig. 10).



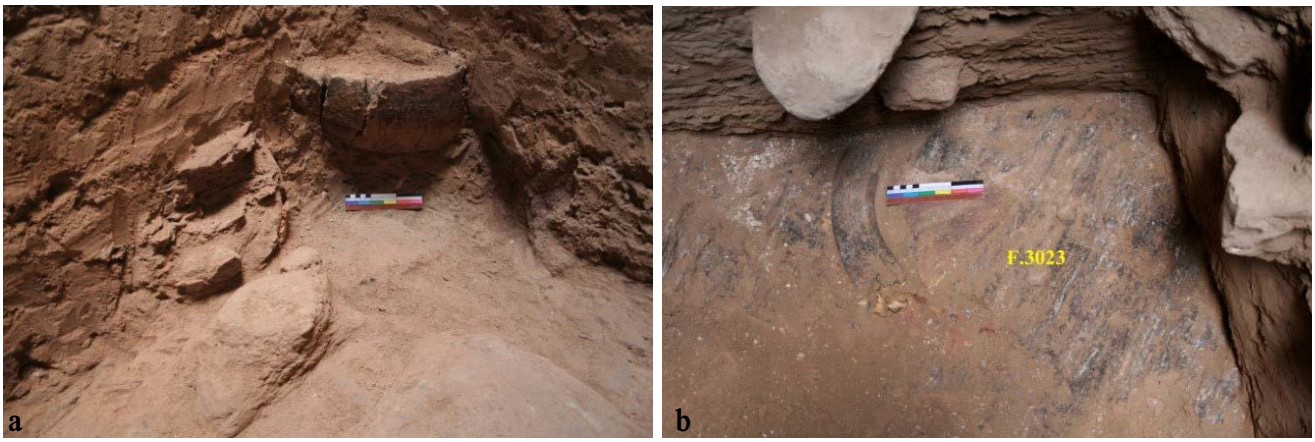
▲ **Fig. 10: Zoomorphic pottery decorations, inspired from ibex and ram horns (Authors, 2022).**

Zoomorphic Pottery Decoration

A limited fraction of the decorative elements found in Tape Qeshlaq pottery is classified under animal motifs, characterized by applied decoration techniques (Fig. 11). These designs prominently feature the stylized horns of both goats and rams. This particular technique is similarly evident in pottery from the lower Hassuna period at Umm Dabaghiyah (Motarjem, 2014: 57; Sharifi & Motarjem, 2018: 92–93). This phenomenon may signify the cultural importance of animals, highlighting their roles in daily activities and inspiring artistic endeavors that reflect the natural world or honor the economic and social significance of these creatures.

Evidence of animals and their presence in ritual activities

The Middle Chalcolithic layer of the T.T.C.VI trench features a stone structure designated as Fi:3023. This structure contains distinct evidence of pottery associated with ritual activities and cattle horns. Particularly significant are the remnants of straw and Cyprus, which have also been



▲ **Fig. 11: a & b: 3023 of the Middle chalcolithic, providing evidence of probable contribution of animals in ritual activities (Authors, 2022).**

identified in other layers. Motarjem (2014: 31-32) strongly posits that the presence of these ritualistic artifacts and cattle horns likely indicates that this area was utilized for ceremonial functions.

Discussion

Tape Qeshlaq reflects a contextual relation between humans and animals shaped by climate and topography. The primary data indicate that domestic animals, followed by wild animals, play a crucial role in meeting the subsistence and non-subsistence requirements of the region. It also acknowledges the functional roles of caprids, cattle, and equids. The Talvar Valley links the Central Zagros and the south of Lake Urmia. The remains of straw, Cyprus, and abundant cattle bones suggest the area probably had sufficient water and humidity. However, due to environmental factors like steppe vegetation, a high-altitude of 1600 meters above sea level, and acidic soil, it does not provide suitable conditions for extensive agricultural activities. Yet, the permanent source of the Talvar River, the steppe vegetation, and rich pastures created a suitable condition for raising domestic ruminants and attracting wild herds.

The significance of animal resources is underscored by the limited agricultural practices and the rarity of sickle blades. Additionally, artifacts such as tokens, stamp seals, obsidian tools, and Ubaid pottery provide substantial evidence of interregional interactions, emphasizing the settlement's dependence on trade networks. Overall, a mixed economy that incorporates both hunting and animal husbandry appears to be the most viable approach for the domestic economy of Tape Qeshlaq. Moreover, after a millennium of sustained habitation in this region, the climate and environmental conditions remained stable until the conclusion of the Late Chalcolithic period and the onset of the Godin VII phase, marked by the incursion of the Yanik culture (Kura-Araxes), which significantly

transformed the spatial organization of the site (Sharifi & Motarjem 2018: 95–97). A comparative analysis of the maximum terrace and overflow levels of the Talvar River, alongside the depth of late Chalcolithic deposits in the western section of the T.T.A.VI trench, suggests a period of aridity at the end of the Chalcolithic, coinciding with the introduction of a new cultural phase and the subsequent abandonment of the settlement.

This research primarily sought to enhance the understanding of human-animal interactions and to facilitate more focused investigations into the Chalcolithic period of western Iran. Consequently, it is essential to prioritize the documentation and analysis of animal-related data in future analysis.

Conclusion

In summary, the evidence strongly suggests a significant relationship between the subsistence functions of animals and their symbolic representations. Animals that have played a pivotal role in the livelihoods of local populations are prominently featured in both cultural and practical contexts. Research conducted on animals during the Chalcolithic period (approximately 5000–3500 BCE) in Central Zagros has uncovered a complex interplay between the inhabitants and their animal counterparts. By examining both practical and relational dimensions, the study emphasizes the economic and symbolic significance of animals at Tape Qeshlaq. The dominance of goats, sheep, cattle, and onagers as primary livestock underscores the necessity of varied pastoral strategies to navigate the environmental challenges characteristic of a steppe region. Taphonomic analyses further illustrate the economic relevance of these animals within consumption practices. The essential role of animal bones in tool production is also underscored, highlighting their practical and functional value. Moreover, non-organic artifacts, including zoomorphic figurines, horn-shaped tokens, and decorative pottery, reveal additional cultural dimensions of these animals, showcasing their evolution into cultural symbols that inspired artistic expression and contributed to the social structure of Chalcolithic communities in western Iran. This investigation deepens our comprehension of the intricate relationships between humans and animals in the ancient societies of Central Zagros during the Chalcolithic, a critical prehistoric era in southwestern Asia.

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Observation Contribution

Abbas Motarjem, was supervised the project, developed the theoretical formalism and unearthed all data in the field Excavation and Zahra Dehghan Studied the Faunal in the Bu-ali Sina laboratory of Archaeology Department and write the manuscript. All authors provided critical feedback and helped shape the research, analysis and manuscript

Conflict of Interest

All authors declare that they have no conflicts of interest.

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۴۱ پژوهش‌های باستان‌شناسی ایران

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تحلیلی بر نقش و اهمیت نمادی و اقتصادی حیوانات براساس مطالعهٔ بقایای جانوری تپه قشلاق از دورهٔ مس‌وسنگ شرق زاگرس‌مرکزی ایران

زهرا دهقان[I]، عباس مترجم[II]

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چکیده

تپه قشلاق درهٔ تالوار واقع‌در حاشیهٔ شرقی زاگرس‌مرکزی، یک محوطهٔ استقراری از دورهٔ مس‌وسنگ (حدود ۵۰۰۰ تا ۳۵۰۰پ.م.) است که به‌عنوان بخشی از یک پروژهٔ باستان‌شناسی نجات‌بخشی طی سال‌های ۲۰۱۱ تا ۲۰۱۳م. مورد کاوش باستان‌شناسی قرار گرفت. بقایای استخوانی جانوری گردآوری‌شده در این کاوش از دو منظر معیشتی و غیرمعیشتی مورد مطالعه دقیق قرار گرفتند. هدف این پروژه، بررسی وضعیت زیست‌محیطی منطقه در دورهٔ مس‌وسنگ برپایهٔ ترکیب گونه‌های جانوری شناسایی شده و در مرحلهٔ دوم برآورد میزان استفاده از بقایای جانوری در ساخت و تولید داده‌های فرهنگی و هم‌چنین انعکاس آن بر دیگر جنبه‌های فرهنگی مانند سفال بود. به‌لحاظ روش‌شناسی، بقایای جانوران تپه قشلاق در محل آزمایشگاه باستان‌شناسی دانشگاه بوعلی‌سینا با استفاده از سیستم کدگذاری استینر (۲۰۰۴) و اندازه‌گیری‌های فون دن دریش (۱۹۷۶) طبقه‌بندی و سپس مورد تجزیه و تحلیل قرار گرفتند. طبقه‌بندی برپایهٔ گونه‌شناسی جانوری از تعداد ۵۵۰ نمونه شامل: ۴۷۴ استخوان، ۴۱ دندان، ۲۲ شاخ و ۱۳ پوسته نشان‌داد که ترکیب اصلی این مجموعه شامل: گونه‌هایی از اسب‌سانان وحشی، گاو و بزسانان بودند؛ درحالی‌که برمبنای بررسی‌های مورفولوژیکی و دندانی مشخص گردید، بیش از ۷۰٪ از داده‌های اسب‌سانان به گونهٔ اکووس همیونوس یا الاغ وحشی آسیاتیک تعلق دارند. فراوانی گونه‌های بز، گوسفند، گاو و اسب‌سانان به‌عنوان منابع اصلی حیوانی در دسترس ساکنان، نشان‌دهندهٔ اهمیت استراتژی‌های متنوع دامداری در سازگاری با چالش‌های زیست‌محیطی این منطقهٔ استپی است؛ چراکه فراوانی گونهٔ الاغ وحشی آسیایی مؤید وجود یک زیست‌محیط نیمه‌بیابانی با پوشش علفزار استپی تلقی می‌گردد. علاوه‌بر این، داده‌های غیرارگانیک مانند پیکرک‌های حیوانی، نشانه‌های شاخی‌شکل پلاک‌شده برروی بدنهٔ برخی سفال‌ها میزان تأثیرات حیوانات بر نشانه‌ها و نمادهای فرهنگی را آشکار می‌کنند.

کلیدواژگان: باستان‌شناسی زاگرس‌مرکزی، دورهٔ مس‌وسنگ، بقایای جانوری، تاریخ دامداری، نمادهای فرهنگی کهن.

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The Evaluation of Children's Labor During Proto Elamite Period in Late 4th Millennium B.C. Iran[1]

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Abstract

Children are a big part of any society. But the meaning of childhood is different from one society to another. This leads to specific child-rearing habits, legal status, and general living conditions. Childhood is more than a biological stage in human development, but a social and political concept, and Iran in the late 4th millennium was no exception to this rule. Children's status has been largely understudied in Proto-literate texts, both in ancient Iran and Mesopotamia. This is not due to a lack of data, while, on the contrary, according to our preliminary estimates, about 50 proto-Elamite texts in a collection of about 1650 written records from all across Iran dating back to about 3300–2800 BC provide insights into the lives of children. But information about them is unevenly distributed across different textual genres and is made more difficult by the lexicon and semantic complexities of the Proto-Elamite writing system. Furthermore, despite the abundance of archaeological data and somehow written texts, we still do not understand many details of how proto-Elamite societies in Iran were organized. Many of the Proto-Elamite tablets from ancient Iran are economic and legal records that are unfairly considered "dull" by some. They originate in the administration archives of pastoral nomads' households of Khans or elites ruling over the community, where they were complex estates, centers of production and redistribution run by bureaucrats trained in writing and accounting. The article aims to discuss a corpus of clay tablets related to child labor in Proto-Elamite. These clay tablets confirm the presence of children, both male and female, among the workers of Proto-Elamite households and administration institutions. Proto-Elamite texts offer complex patterns of classifying workers according to their gender and age. These tablets describe workers as male or female and then distinguish between adults and children according to their rations.

Keywords: Proto Elamite, Clay Tablet, Children at Work, Ancient Iran, Economic System.

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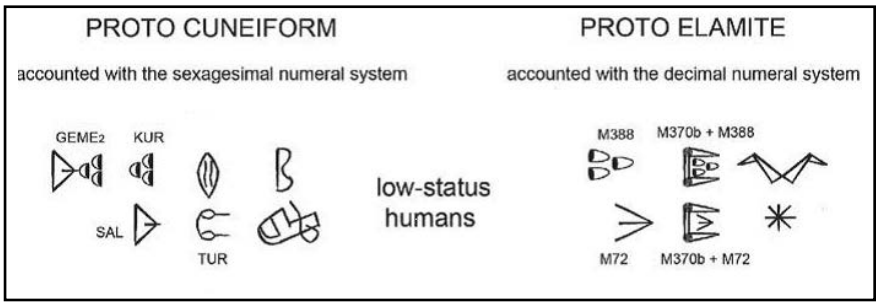
Introduction

Children already appear in written texts from Iranian Plateau in the earliest Proto-Elamite2 written texts dating to the late fourth millennium BCE (Scheil,1905; Dahl et al, 2012; Damerow and Englund,1989). They record minors among the personnel and dependents of Proto-Elamite pastoral nomads' households and economic institutions governed by political elites, the best known from that period being the Acropole 16-14B from Susa (Le Brun, 1971; Dittmann 1986; Dahl et al., 2012). While there are only small number of text references to children in Proto-Elamite period (Dahl et al., 2018), we have substantial a number of ethnological references in modern pastoral nomad societies (Hatami 2021) in which child labor has significant status in subsistence economy of the society (Fig. 1).



◀ **Fig. 1: Graphical correspondences between the Proto-Cuneiform and Proto-Elamite worker's sign (Authors, 2023).**

Damerow and Englund first identified signs for children in Proto-Elamite texts (Damerow and Englund 1989). They suggested that the sign M370b and the related signs and forms represent child workers, in parallel to the interpretation of the sign TUR in the archaic cuneiform corpus (1989: 57 fn. 156). Scribes recorded children according to their gender, similar to what were conducted for adults. The M370 series which are the main signs for the presence of children are determine with simple and complex graphemes as follow; (M370 , M370b , , M370 + SIGN + M370 , , , M370~da and M370~c). Accordingly, there were 9 logographic signs for children in that period derived+ from signs used for adults very similar to TUR3 in the late Uruk (Englund 2004) logographic lexicons (Fig. 2; Fig. 3).

Late Uruk	Proto-Elamite	
TUR	$M370_b$+SIGN	M370+SIGN+M370

◀ **Fig. 2: Graphical correspondences between the Proto-Cuneiform and Proto-Elamite children's sign (Authors, 2023).**

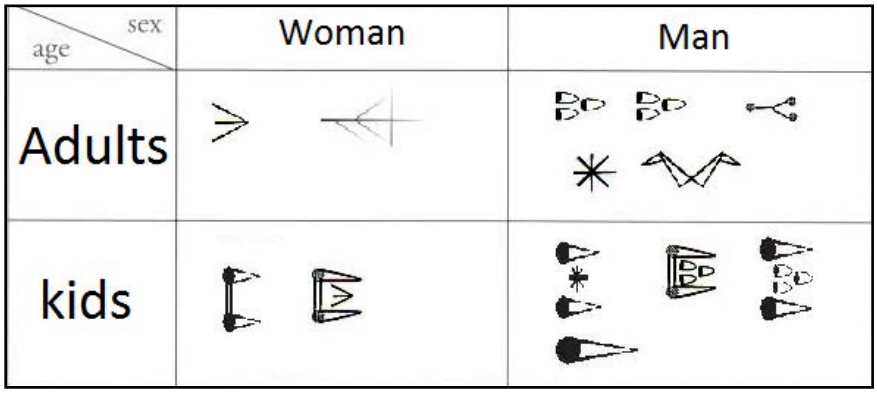


Fig. 3: Graphical correspondences of the Proto-Elamite children's signs according to the gender (Authors, 2023). ▶

Currently, there exist approximately 16 published and Unpublished texts related to children's work, alongside fragments of similar content from the Proto-Elamite period that are part of the Susa collection. The most revealing of these texts regarding children are the records detailing the tasks assigned to them and the rations they received in return for their labor. This article aims to examine two of these texts and provide substantial insights into the status of children within the subsistence economy of Proto-Elamite societies (Tab. 1).

The present discussion on children in Proto-Elamite administrative records was initiated by a consigned text, namely MDP 06, 246 + 269+ 302 + 332. This text, dating back to the late Proto-Elamite period according to Dahl's classification, is going to be thoroughly examined by the authors.

MDP 06, 246 + 269+ 302 + 332 (Workers Ration Texts amid Children's Wages)

A well-preserved ration text provides valuable insights into the status of children within the subsistence framework of Proto-Elamite societies. This clay tablet features various representations of adult and child graphemes, organized by gender. The text enumerates different categories of laborers, including men, women, boys, and girls, concluding with a grain capacity notation (M288) for each labor unit. The counts of these labor units, which range from one to sixteen, suggest that the specific tasks assigned hold greater significance than the diversity of roles within each unit. The notation M288 appears at the end of each unit a total of 13 times, implying that at least 13 distinct groups of varying sizes, genders, and ages were engaged in their designated tasks. Contrary to Dahl's hypothesis that these groups signify teams of workers led by foremen (Dahl et al., 2018), the authors contend that the presence of a foreman for each unit is not addressed

Tab. 1: Proto-Elamite Clay tablets listing deals related to child Labor (Authors, 2023). ▼

Row	Text No	M370	M370*c				M370+		+M370		M373*a	M370*da	M370*c	M370*d
			No sign	+X	+M072	+M388	M072	M388	M046	X				
1	MDP06,208	1												
2	MDP06,211	1												
3	MDP06,243	2												
4	MDP06,246+269-302+332	12			5	4	5	1	1	1				
5	MDP06,253	1												
6	MDP06,254	1												
7	MDP06,285	1												
8	MDP06,287				1									
9	MDP06,309	1												
10	MDP06,311	2					1		1					
11	MDP06,315	2				2		1						
12	MDP06,316+322-324+MDP26s,325+5s,13247	15	2	3	3	3	1	4	2	1				
13	MDP06,343	2			1		2		4					
14	MDP06,383	1												
15	MDP06,392	2												
16	MDP06,4998	1												
17	MDP06,5002	2												
18	MDP06,5007	3					1		2					
19	MDP17,009	1												
20	MDP17,112	2												
21	MDP17,120	9												1
22	MDP17,123												1	
23	MDP17,133												1	
24	MDP17,200	1												

Row	Text No	M370	M370~b				M370+ +M370					M370~da	M370~c	M370~d
			No sign	+X	+M072	+M388	M072	M388	M046	X	M373~a			
														
25	MDP17,210	1												
26	MDP17,221	1												
27	MDP17,231	1												
28	MDP17,234	6						1						
29	MDP17,272												1	
30	MDP17,292	15			4	3			1		1		1	
31	MDP17,304	1												
32	MDP17,315	1												
33	MDP17,368	3												
34	MDP17,411												1	
35	MDP26,54	1												
36	MDP26,63	1												
37	MDP26,71		1											
38	MDP26,82		1											
39	MDP26,155	1												
40	MDP26,177		1											
41	MDP26,218	1												
42	MDP26s,0333	6			1	2	1	2						
43	MDP26s,0339	5				1						1		
44	MDP26s,4763	1												
45	TCL32,02	5			1		1	1		1				
46	TCL32,27	1												
47	TCL32,47	1												
48	chaDAFI,5802	2												
49	SE 121	2												
50	SE 124	1												
Total		121	5	3	16	15	12	10	11	3	1	1	5	1

in this text, and the totals recorded on the reverse side challenge this interpretation. In Proto-Elamite administrative texts concerning labor and rations, a consistent methodology is employed whereby all workers, encompassing both adults and children, are enumerated using a decimal system represented by 18 distinct signs. Each worker is denoted by a unique symbol that corresponds to their gender and age, culminating in a recorded quantity of cereal expressed through a numerical notation aligned with the capacity system as outlined in M288. The tablet retains 126 entries on both its obverse and reverse (Figs. 17 and 18), and despite the fragmentary nature of the evidence, it provides sufficiently preserved data to facilitate an understanding of the role and status of children within Proto-Elamite societies (Fig. 4).

This Rations text discusses various units of laborers, specifically M370 frames M072 and M388, which are identified as female and male workers. When combined with M370 or M370b, they represent an innovative pairing that redefines the concept of female and male children. The ages of these children remain unspecified at this point. In the initial column of the tablet, following the header that includes three symbols (M377~e, M217, and M207), the first unit of laborers is presented, comprising six groups of workers and individuals.

The initial laborer appears to be a woman identified by the inscription M124, accompanied by a series of intricate graphemes (M242~ab#? M230 M096 M003~b?) that may indicate a modification of her household affiliation or potentially the specific task assigned to the entire group. Given that this sequence is assigned a value of 1 (N01), it cannot represent an abstract designation or title for the role. In contrast, the subsequent entry, according to the author's interpretation, suggests a different understanding. The second entry seems to refer to an individual rather than a collective, also valued at 1 (N01).

The data indicates that M124 is classified as a female worker, whereas M370 is identified as a child laborer with an indeterminate gender. Assuming M370 is neutral, M124 can be redefined as a female child worker, closely resembling the combinations of M370b with M072, as well as M370, M072, and M370. The third individual is a child laborer with an unknown gender, denoted as M370+x+M370, assigned a value of 1 (N01). The fourth entry within the primary group consists of two children, both of whom lack a specified gender (M373, 2N01). The fifth entry comprises two males, and the final entry documents a female child worker, represented by M370~b+M072. The first unit is ultimately recorded as M288 in the numerical notation of the capacity system (Fig. 5).

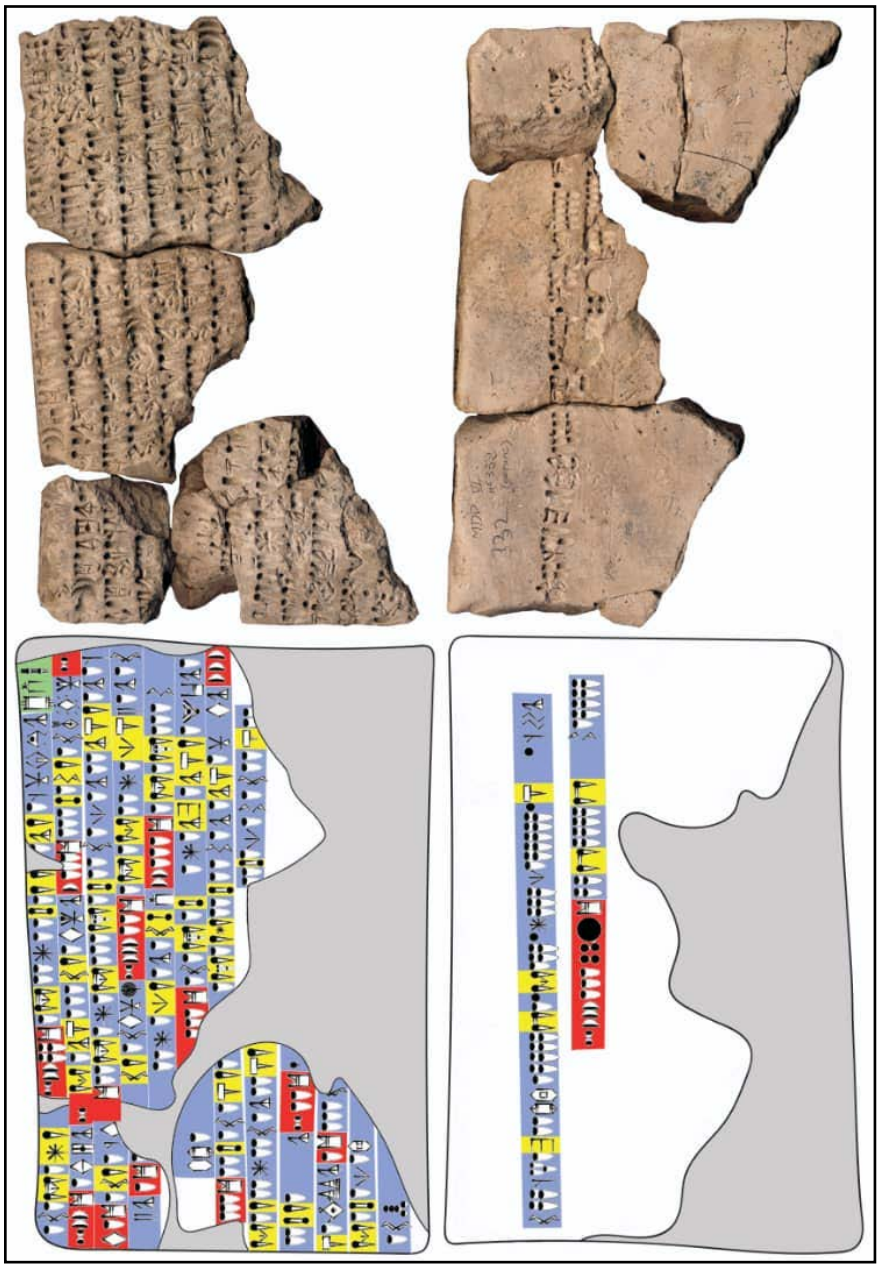
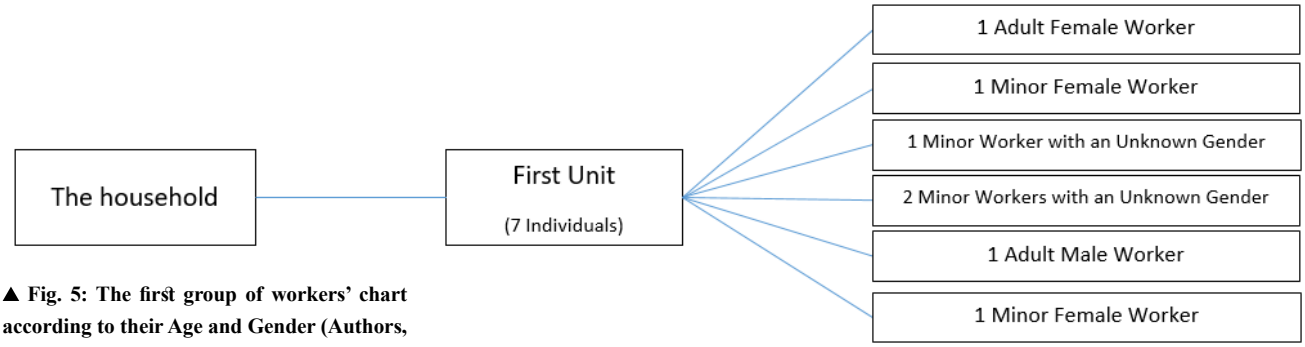
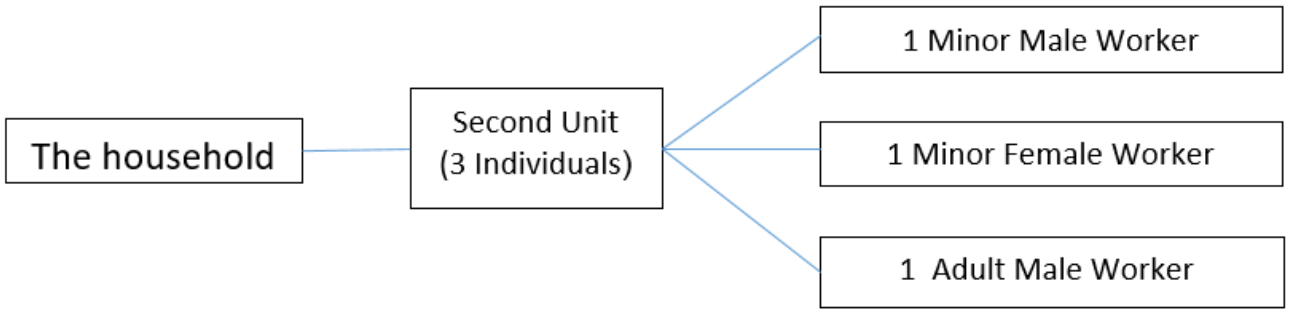


Fig. 4: A Proto-Elamite clay tablet (MDP 06, 246 + 269+ 302 + 332) (Authors, 2023). ▶



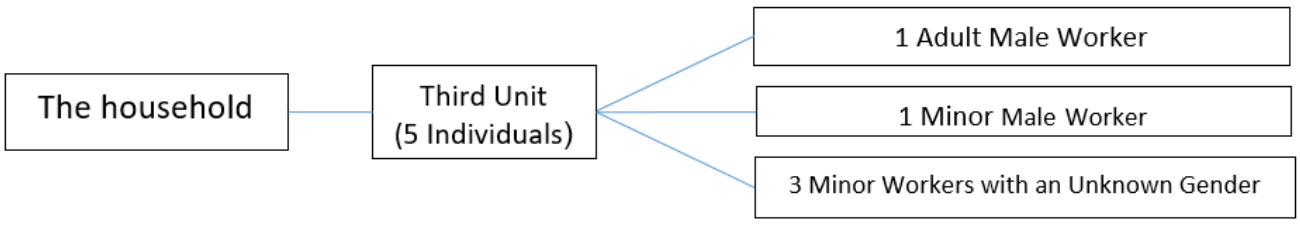
▲ Fig. 5: The first group of workers' chart according to their Age and Gender (Authors, 2023).

The second cohort of laborers is comprised of three distinct groups of individual workers. The first worker appears to be a young male, designated as M370# M046, with a valuation of 1 (N01). If we interpret M370 as neutral, M046 alters its gender, aligning closely with the initial group as a male child worker. The second individual is a female child laborer, represented as M370~b+M072, also valued at 1 (N01). The third member of this group is an adult male worker, identified as M054, with a valuation of 1 (N01), although the remaining numerical notation is incomplete. The unit concludes with the numerical notation (1(N24)), while M288 remains unrecorded (Fig. 6).



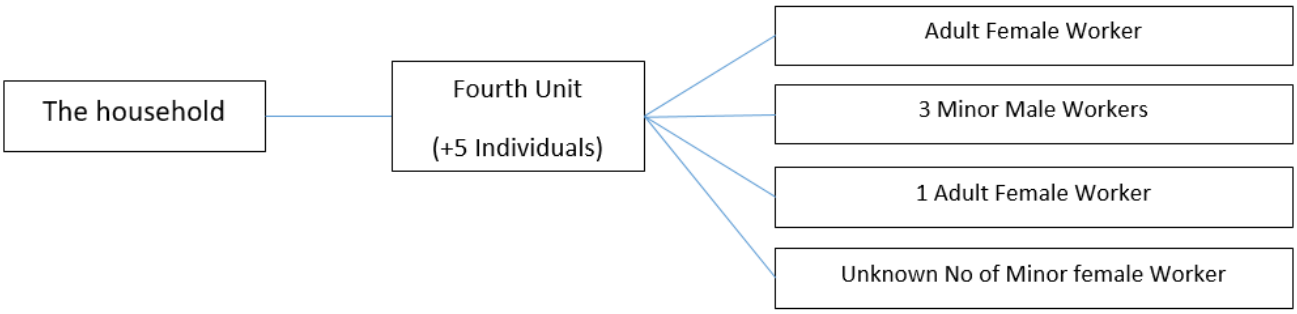
▲ Fig 6. The Second Group of Workers' chart according to their Age and Gender (Authors, 2023).

The third group of workers is made up of two individuals (M097~h M218~b M250~ba M054/ M370 M053~a) and a collective of three children whose genders are not specified (M371#?). The first individual is identified as an adult male, represented by a series of symbols that carry a value of 1 (N01). The second individual is classified as an immature male worker (M370 M053~a), which is a detailed amalgamation of two symbols indicating both age and gender, thereby creating a complex grapheme that denotes a male child worker. The final component of this group consists of child workers with unknown gender. The unit is concluded with M288 and a numerical notation (3(N01) #? 1(N39B) (Fig. 7).



▲ Fig 7. The Third Group of Workers' Chart according to their Age and Gender (Authors, 2023).

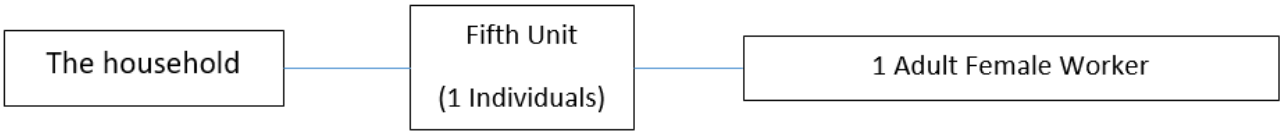
Comprising the fourth unit of workers is one female individual (M124# M097~h M218) and a collective of three minor male children (M370 M054), one adult female (M203~a M124), and a minor female



▲ **Fig. 8: The Third Group of Workers' Chart according to their Age and Gender (Authors, 2023).**

child. The numerical designations that represent these individuals are partially missing. This unit receives payment through the capacity system; however, M288 and most of the numerical identifiers are compromised, leaving only one identifier (N24) available (Fig. 8).

The fifth unit is modified by one individual (M124 M145~a M220), apparently an adult female worker assigned to a specific solitary job and numerical notations quantifying her wages as M288, 2(N39B) 1(N24) (Fig. 9).



▲ **Fig. 9: The Fifth Group of Workers' chart according to their age and gender (Authors, 2023).**

The sixth unit, comprising 16 workers, includes 7 individuals identified as M003~b, M124, M124, M072, M054, M373#?, and M370~b+M072, as well as M046 and M370~b+M072. Within this group, there are 4 adult females, 1 adult male, 1 minor male, and 1 minor female. Additionally, there are 4 distinct groups of workers: the first group (M370 M203~a M124/M054) contains 2 minor females; the second group (M370~b+M388) consists of 2 adult females; the third group (M370~b+M072) includes 3 minor males; and the final group concludes with 2 minor females, resulting in M288. It is noteworthy that the numerical notations are missing (Fig. 10).

The seventh unit is modified by two individuals (M218 M003~b and M370 M054), apparently an adult worker with an unknown gender and a minor male laborer assigned to a job and numerical notations quantifying their wages as M288, 1(N01) (Fig. 11).

The eighth unit of 7 workers consists of a group of 2 adult males (M046) and 5 individuals (M054/ M124/ M009 M203~a M072/ M370+M072+M370/ |M370~b+M072), among them are one adult male, one adult female and 3 minor female workers ended up with M288, 2(N01) 3(N39B) 1(N24) (Fig. 12).

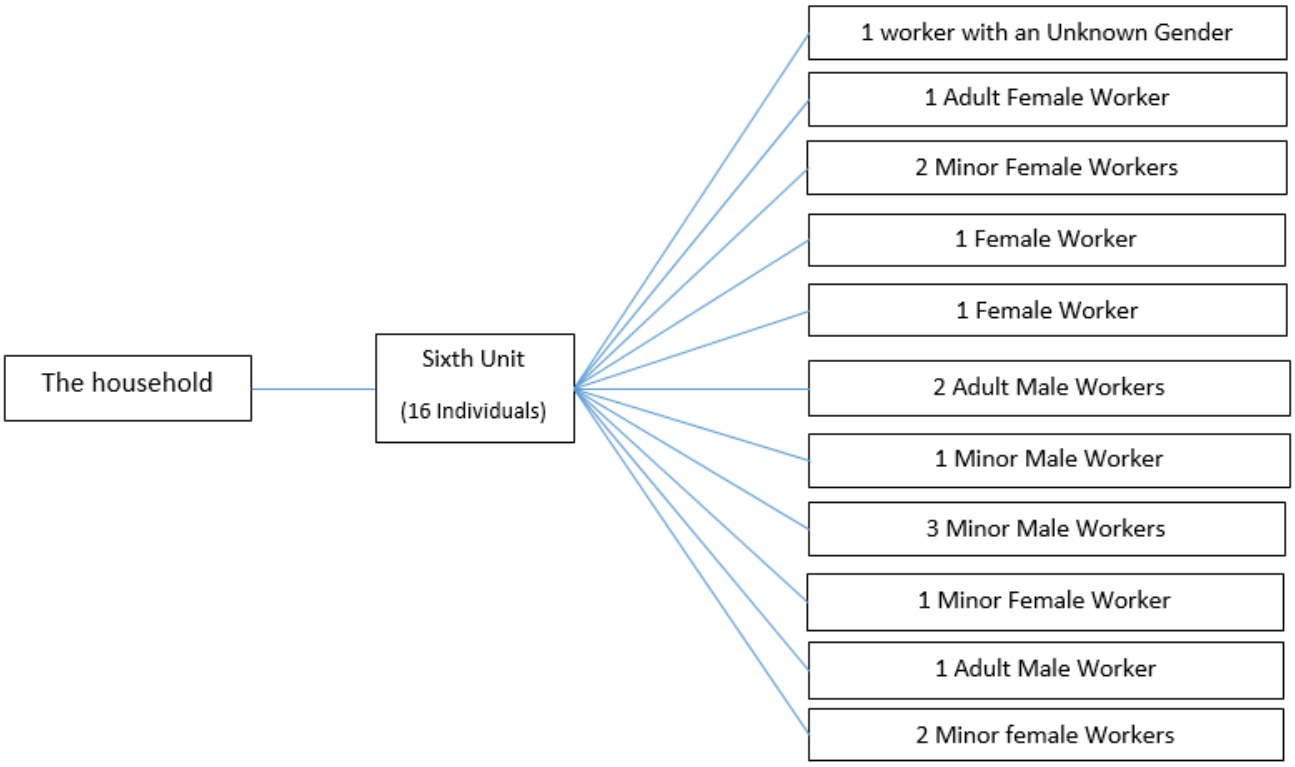


Fig. 10: The sixth group of workers' chart according to their age and gender (Authors, 2023). ▲

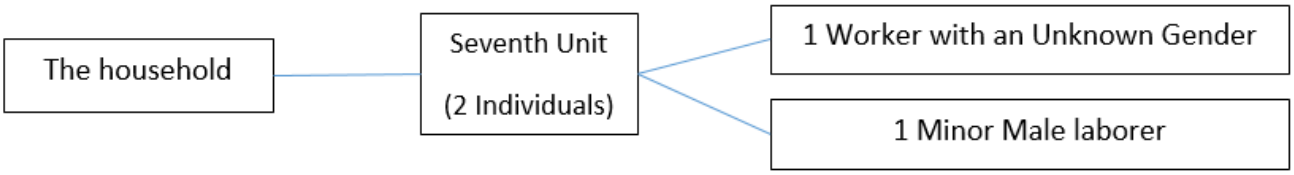


Fig. 11: The seventh group of workers' chart according to their age and gender (Authors, 2023). ▲

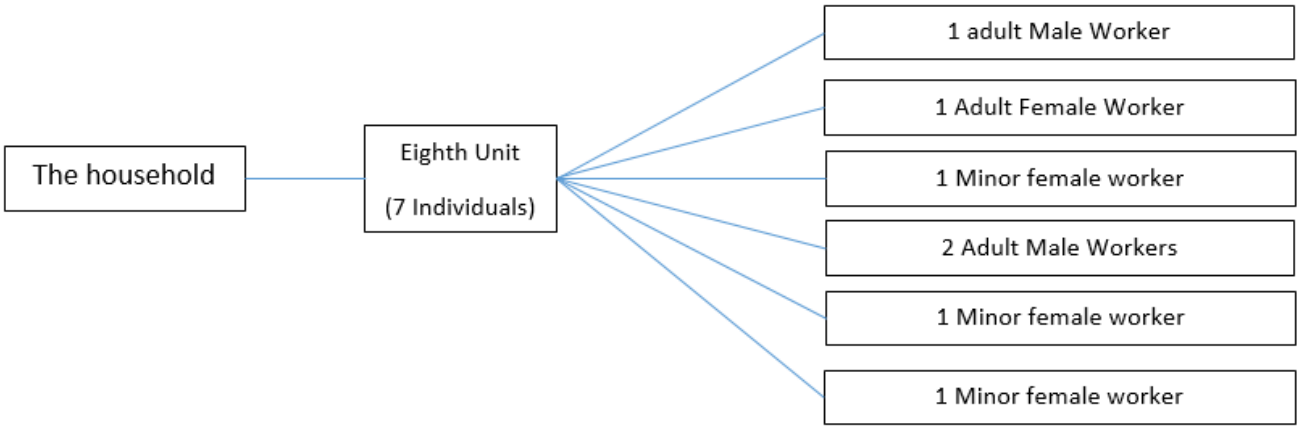
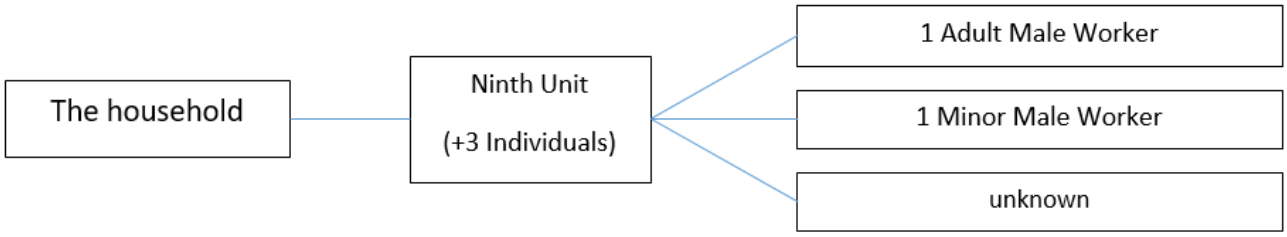
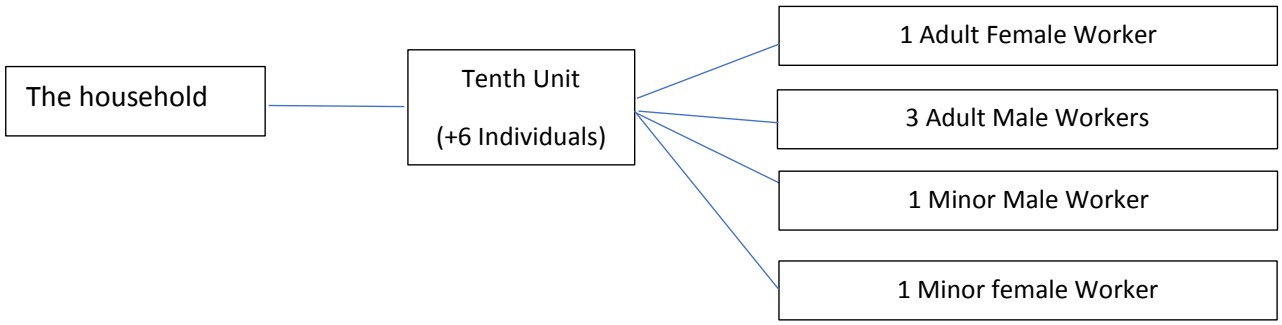


Fig. 12: The eighth group of workers' chart according to their age and gender (Authors, 2023). ▲



▲ Fig. 13: The ninth group of workers' chart according to their age and gender (Authors, 2023).

The ninth unit consists of one individual for sure (M352~o M096 M218 M054) and one minor male worker with a broken number quantifying him (M370#? M054). The sign for the next group of workers, or perhaps an individual, is broken and only 1 (N01) is available. The unit ends up with M288 and numerical notation (3(N01) #? 1(N39B) (Fig. 13).



▲ Fig. 14: The tenth group of workers' chart according to their age and gender (Authors, 2023).

The tenth unit is registered with 4 entries, an adult female with a broken numerical quantifier, 3 adult male workers, 1 minor male worker, and 1 minor female worker ended up with M288 and string numerical notations within the capacity system (3(N01) and 2(N39B)).

The remaining entries are largely fragmentary, making it difficult to provide a definitive interpretation. Overall, the text records 37 instances of child laborer symbols, which include 15 female children, 9 male children, and 13 child workers whose gender remains unidentified. The diversity of sign combinations employed to denote children is remarkable, particularly within the proto-cuneiform lexicon, as well as through an intuitive approach that combines M370 with various adult worker symbols to indicate gender modifications for M370. The variants of M370 representing children are illustrated below (Fig. 15).

NO	Sign	Gender	Icon
1		*Minor with an Uknown Gender*	
2		*Minor with an Uknown Gender*	
3		*Minor with an Uknown Gender*	
4		Minor Female	
5		Minor Male	
6		Minor Male	
7		Minor Female	
8		Minor Female	
9		Minor Male	
10		*Minor with an Uknown Gender*	
11		*Minor with an Uknown Gender*	
12		Minor Female	
13		Minor Female	
14		Minor Female	

◀ **Fig. 15: Minor male and female signs used in the text (Authors, 2023).**

Tab. 2: Transliteration on the obverse of tablet MDP 06, 246 + 269+ 302 + 332 (After: Dahl et al., 2018). ▼

Primary Publication: *Jacob L. Dahl, Laura F. Hawkins, Kathryn. Kelley* (2018) MDP 06, 246 + 269+ 302 + 332 (P008043)**:** Louvre Museum, Paris, France/ **Provenience:** Susa/ **Period:** Proto-Elamite (ca. 3100-2900 BC)

ROW	Tablet obverse	ROW	Tablet obverse
1	[…] M377~e,	60	M370 M072, 1(N01)
2	*M217 M207,*	61	M046#, 2(N01)#?
3	M124 M242~ab#? M230 M096 M003~b?, 1(N01)	62	M370# x, […] *n lines broken*
4	M370 M124, 1(N01)	63	[…], 1(N01)
5	[M370+x+M370?], 1(N01)	64	M124 M029~a M073~a, 1(N01)
6	M373, 2(N01)	65	M370 M203~a M124, 1(N01)
7	M046, 2(N01)	66	M041 M124, 1(N01)
8	|M370~b+M072|#, 1(N01)	67	M046, […]
9	M288, 4(N01) 2(N39B) 1(N24)# *n lines broken*	68	M371#, 1(N01)
10	[…] M370# M046#?, 1(N01)	69	|M370~b+M388|, 1(N01)
11	|M370~b+M072|#, 1(N01)	70	M054, 1(N01)
12	M054#, 1(N01)# *n lines broken*	71	M288, 2(N01) […] *n lines broken*
13	[M288], […] 1(N24)	72	[…] x, 1(N01)
14	M097~h M218~b M250~ba M054, 1(N01)	73	|M305+X| x […], […] *n lines broken*
15	M370 M053~a, 1(N01)	74	[…], […] 3(N39B)
16	M371#?, 3(N01)#	75	M124 M218 x M096#?, 1(N01)
17	M288#, 3(N01)#? 1(N39B)	76	M203~a M124, 1(N01)
18	M124# M097~h M218, 1(N01)	77	M124, 1(N01)
19	M370 M054, 3(N01)	78	M053~a, 2(N01)
20	M203~a M124, 1(N01)	79	x, 2(N01)
21	|M370+M072+M370|, […]	80	|M370+M046+M370|, 1(N01)
22	[M288], […] 1(N24)	81	|M370+M388+M370| 1(N01) *n lines broken*
23	M124 M145~a M220, 1(N01)	82	[…], […] 1(N01)
24	M288, 2(N39B) 1(N24) *n lines broken*	83	M370# M203~a, 1(N01)
25	[…] M003~b, 1(N01)	84	M054#, 1(N01)
26	M124, 1(N01)	85	M373#?, 2(N01)
27	M370 M203~a M124, 2(N01)	86	M288, 2(N01) […] *n lines broken*
28	M124, 1(N01)	87	x x M203~a#?, 2(N01)
29	M072, 1(N01)	88	M054, 1(N01)
30	M054, 2(N01)	89	M053~a, 1(N01)
31	M373#?, 1(N01)	90	M072, 1(N01)
32	|M370~b+M388|, 3(N01)	91	M373#, 2(N01) *n lines broken*
33	|M370~b+M072|#, 1(N01)	92	[…] M370 M203~a, 1(N01)
34	M046, 1(N01)	93	M124, 1(N01)
35	|M370~b+M072|, 2(N01)	94	M054, 2(N01)
36	M288#, […]	95	M046, 2(N01)
37	x M218 M003~b, 1(N01)	96	M373#?, 1(N01)
38	M370 M054, 1(N01)	97	|M370+M072+M370|#?, […] *n lines broken*
39	M288, 1(N01)	98	[…] x, 1(N01)#
40	M218 […], […] *n lines broken*	99	M288#, 2(N01) 1(N24)
41	M054, 1(N01)	100	M124 x x, […]
42	M124, 1(N01)	101	[…], 1(N01)
43	M009 M203~a M072, 1(N01)	102	M370 M373, 2(N01) […] *n lines broken*
44	M046, 2(N01)	103	[…] M054#, 1(N01)
45	|M370+M072+M370|, 1(N01)	104	x, 1(N01)
46	|M370~b+M072|#?, 1(N01)#	105	M288#, 1(N01)
47	M288, 2(N01) 3(N39B) 1(N24)	106	M124 M115~a M281~c#?, 1(N01)
48	M352~o M096 M218 M054, 1(N01)	107	M203~a […], […] *n lines broken*
49	M370#? M054 […], […] *n lines broken*	108	[…] M298~a, 1(N01)
50	[...], 1(N01)#	109	M072, 1(N01)
51	M288#, 1(N01)	110	M373, 1(N01)
52	M124 x, [...] *n lines broken*	111	|M370+M072+M370|, [...] *n lines broken*
53	[...], 1(N01)#	112	[...] x M380~b M054, 1(N01) [...]

Tab. 3: Transliteration on the reverse of tablet MDP 06, 246 + 269+ 302 + 332 (After: Dahl et al., 2018). ▼

Primary Publication: Dahl, Jacob L. (2019) TCL 32 2/**Collection:** Louvre Museum, Paris, France/ **Provenience:** Susa/ **Period:** Proto-Elamite (ca. 3100-2900 BC)			
Row	**Tablet obverse**	**Row**	**Tablet obverse**
1	*beginning broken* M123~b#? M054# [...], [...], *n lines broken*	**22**	M370#, 1(N01)
2	x M203~a, 2(N01)	**23**	M373#, 3(N01)
3	x [...], [...], *n lines broken*	**24**	|M370+M072+M370|, 1(N01)
4	x, 1(N39B)#	**25**	|M370+X+M370|, 2(N01) *n lines broken*
5	M046, 2(N01)	**26**	M332~d? M066? M054, 1(N01)
6	x [...], [...] *n lines broken*	**27**	M370 M373, 2(N01)
7	M370#, 1(N01)	**28**	x, [...] *n lines broken*
8	M009#?, 3(N01) *n lines broken*	**29**	[...] x M347 M371, 1(N01)
9	M203~a, [...]	**39**	M370 M124, 1(N01)# *n lines broken*
10	[...], 1(N01)	**41**	[...], 1(N01)
11	M046, 3(N01)	**42**	M203~a, 1(N01)
12	x M054, [...]	**#**	*rest broken*
13	[...], 2(N01)#	**#**	**Tablet reverse**
14	M288#?, [...] *n lines broken*	**#**	**broken**
15	[...], 1(N01)# *n lines broken*		
16	[...] M370#, 1(N01)		
17	|M370+M388+M370|, 1(N01)		
18	|M370~b+M072|#, 1(N01) *n lines broken*		
19	[...], 1(N01)#		
20	[...], 2(N01)#		
21	x, 1(N01)#		

Conclusion

Clay tablets dating from the Proto-Elamite period serve as significant evidence for the involvement of children in the subsistence economies of both households and economic institutions. Notably, this classification system exhibited only minor variations during the late Uruk period in Mesopotamia. Based on preliminary investigations into human logography within Proto-Elamite texts conducted by the authors, we can discern distinct sets of symbols that illustrate various methodologies for categorizing human labor resources within tribal households. The initial set comprises two tiers of classification: the primary tier identifies the sex of the individual, while the secondary tier distinguishes individuals as either adults or children. Proto-Elamite terminology includes specific terms for adults. However, within the texts concerning child labor and rations in Proto-Elamite, there is an absence of references to the biological age of the children categorized. The precise ages of both children and adults remain unknown. The authors suggest that the indicators used do not reliably represent the ages of the children assigned to various tasks. However, ethnoarchaeological research on pastoral nomads indicates that children as young as four typically participate in the family's subsistence economy, which is integral to the broader tribal community. This classification system, which is based

on gender and age, appears to have served primarily as a method for bureaucrats to account for human resources within each economic unit. The specific ages and social attributes of the individuals documented in the texts are unclear, largely due to our limited comprehension of these records. The evidence suggests that the terminology employed was indicative of an individual's worth as a laborer, which in turn influenced their food rations.

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Observation Contribution

Donya Etemadifar: preparing database, writing review of literature, Comparative analysis of similar texts

Rouhollah Yousefi Zoshk: laying out the subject, transliteration and interpretation of the text, Writing down the conclution

Conflict of Interest

All authors declare that they have no conflicts of interest.

Endnote

1. This article is part of the first author's PhD thesis entitled "Political, social and economic structure of Susa in the second half of the fourth millennium BC; a research based on transliteration of Proto Elamite tablets" which is going to be accomplished in the Department of History and Archaeology at Islamic Azad University, Science and Research Branch, Tehran, Iran.

2. Proto-Elamite is the conventional name given to the earliest indigenous writing system from Iran. The Mesopotamian proto-cuneiform writing is often highlighted as the oldest writing system, overshadowing the neighboring regions. Yet, the Iranian Plateau likely had a significant, albeit overlooked, influence in this regard. In 1900, the French mission's epigraphist in Susa became the first to publish the initial two Proto-Elamite tablets. These tablets, discovered in Susa, were initially labeled as 'Proto-Elamite' by Scheil in 1905, solely based on their Susian geographical origin and without taking into account any linguistic factors. The term 'Proto Elamite', initially used solely for geographical purposes, underwent significant semantic expansion, encompassing not only a particular type of tablets but also various archaeological contexts, layers, material culture styles, periods, and ultimately, a civilization.

3. Proto Elamite signs M388 and M72 have been likened to proto-cuneiform signs KUR and SAL, denoting male and female laborers in proto-cuneiform inscriptions. As a result, M388 and M72 may represent male and female individuals of low social standing, with some Proto-Elamite texts containing as many as 591 instances of M388 and 1776 occurrences of M72; the PE sign M370b was identified as visually similar to the proto-cuneiform sign TUR, symbolizing the concept of child (DUMU). Combinations of signs M370b + M388 and M370b + M72 could therefore signify young male and female laborers of low status.

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ارزیابی و بررسی کار کودکان در نظام اقتصادی دورهٔ آغازایلامی در نیمهٔ دوم هزارهٔ چهارم پیش‌ازمیلاد ایران*

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چکیده

کودکان بخش غیرقابل‌انکاری از هر جامعه هستند؛ اما معنای کودکی در هر جامعه متفاوت است و منجر به شکل‌گیری سنت‌های فرهنگی خاص از نقطه‌نظر حقوقی و شرایط عمومی زندگی کودکان در جوامع می‌شود. دوران کودکی علاوه‌بر رشد بیولوژیکی در رشد انسان، مفهوم اجتماعی و سیاسی است و ایران در اواخر هزارهٔ چهارم پیش‌ازمیلاد نیز از این قاعده مستثنی نبوده است. جایگاه کودکان از این دید در هیچ‌کدام از متون آغاز نگارش ایران باستان و بین‌النهرین به درستی مطالعه نشده است. این موضوع به‌دلیل کمبود اطلاعات نیست و برعکس، طبق برآورد اولیهٔ نویسندگان این پژوهش، حدود ۵۰ متن آغازایلامی در مجموعه‌ای از حدود ۱۶۵۰ سند مکتوب از سراسر ایران که قدمت آن به حدود ۲۸۰۰-۳۳۰۰ پ.م. می‌رسد، شواهد منحصربه‌فردی را در مورد حضور کودکان در نظام اقتصادی ارائه می‌کند. اطلاعات کودکان کارگر در متون آغازایلامی در کنار سایر موضوعات آمده که پیچیده بودن این سیستم نوشتاری، درک این اطلاعات را برای ما دشوار کرده است. هم‌چنین، باوجود فراوانی داده‌ها در متون مکتوب، هنوز جزئیات زیادی از ساختار سیاسی و اقتصادی جوامع آغازایلامی در ایران در دست نیست. بسیاری از متون آغازایلامی سندهای اقتصادی و حسابرسی هستند که برخی آن‌ها را فاقد ارزش در شناخت عناصر اجتماعی جوامع آن می‌دانند. هدف از نگارش این پژوهش بررسی یک متن شاخص با موضوعیت کودکان کار از میان الواح گلی مربوط به کار کودکان در دورهٔ آغازایلامی است که حضور کودکان کارگر دختر و پسر را در میان کارگران دورهٔ آغازایلامی و مؤسسات اداری تأیید می‌کند. این متون الگوهای پیچیده‌ای از طبقه‌بندی کارگران براساس جنسیت و سن آن‌ها ارائه می‌دهند و هم‌چنین حضور کارگران مرد و زن و کودکان و جیره‌ای که مطابق با کار آن‌ها پرداخت شده را توضیح می‌دهد.

کلیدواژگان: آغازایلامی، گل‌نبشته، کودکان کار، ایران باستان، نظام اقتصادی.

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Abstract

Tal-e Malyan as known as ancient Anšan, is located in the Beyza plain of Fars Province. Anšan was a centre of Elamite highland in the eastern of the Susiana plain and a significant cultural center of Elamite. William Sumner's excavations from 1971 -1978 uncovered an administrative archive written in Middle Elamite language. The archive belongs to the Šutrukid dynasty (1210- 1100 B.C), the last dynasty of Middle Elamite period. The importance of the Anshan's archive compared to the earlier Elamite archive is that the clay tablets are written in middle Elamite cuneiform, a tradition that was begun gradually from the first middle Elamite dynasty, the Kidinu period (1550- 1400 B.C) in Haft- Tepe archive. The Anšan archive reveals details about construction of a temple and delivering commodities to administration in the city of Anšan by Huteluduš-Inšušinak (1120-1110 B.C), the last Šutrukid king. Text contents are about movement of commodities inside and outside of the Anšan administration office. These commodities mainly included metals such as gold, silver and bronze, which were delivered as raw material to the administration to make statues and objects for temples. The individuals who were participating in administrative procedures included officials, clerks, skilled artisans and labourers. These individuals on their roles in archive and the type of received commodities are classified. The aim of this paper is to analyse the Anšan archive texts in order to present a comprehensive overview of its contents and its administrative framework. Through the examination of this archive, try to gain a deeper understanding of administrative procedures in the Elamite bureaucracy.

Keywords: Middle Elamite Period, Anšan, Tal-e Malyan, The Archive of Anšan, Shutrukid Dynasty.

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Introduction

The Middle Elamite archive of Anšan is the archive where its texts were written in Elamite cuneiform. This archive represents the Elamite administration, which at the end of the second millennium B.C reached a level of sophistication and tried to be independent from Mesopotamian cuneiform writing (Akkadian, old and middle Babylonian cuneiform), that had been used in Elam since 3rd millennium B.C, indeed this movement was started from Haft- Tepe archive. The footprint of Anšan archive can be seen in the Neo-Elamite archive of the Acropole of Susa and even the Persepolis Fortification archive. The corpus of this archive, which was found in Tal-e Malyan, is a result of the administrative activities in the city of Anšan.

Tal-e Malyan is located in Beyza plain in the Fars province, Iran. This area can be divided into three sections. The first section consists of a row of narrow mounds (about 50 meters wide) with approximate height of 4-8 meters, which surround the Malyan from three sides, which it seems they were related to the remains of the ancient wall of the city. The second section is an open area inside the mentioned remaining walls, which covers an area of about 70 hectares, few archaeological materials have been found from this area. The third one is interconnected mounds that cover an area of almost 100 hectares, and the main part of the city is found in this section of Tall-Malyan (Fig. 1). The highest mounds are located in northwest of the site which are 7 up to 8 meters above the plain. These mounds are located approximately 400 meters southwest of a large horseshoe-shaped structure; it is a mud-brick structure that seems to have been an important gate (Carter 1996: 1-4).

The first excavation of Tall-Malyan was conducted by Fereidoon Tavallali, in the early 1960s, but unfortunately, there is no record of it. William Sumner, who had not been aware of the Unpublished excavation of Tavallali, identified this site in 1968 in his surveys in the Fars. Subsequently, in 1971, he commenced the excavation of Tall-Malyan by collaborations with archaeological teams from the University of Pennsylvania and the Ohio State University. The excavation efforts persisted for a period of five seasons, concluding in 1978 (Abdi 2001: 48). The excavations were done in the sector of EDD where Middle Elamite remains and Anšan archive (TTM) were discovered (Carter 1996: 1). Excavations of this building have not been completed, but the Anšan archive texts, which are receipts of administrative activities in the city of Anšan, may be able to help in recognizing the type of building in ancient Anšan at the end of the second

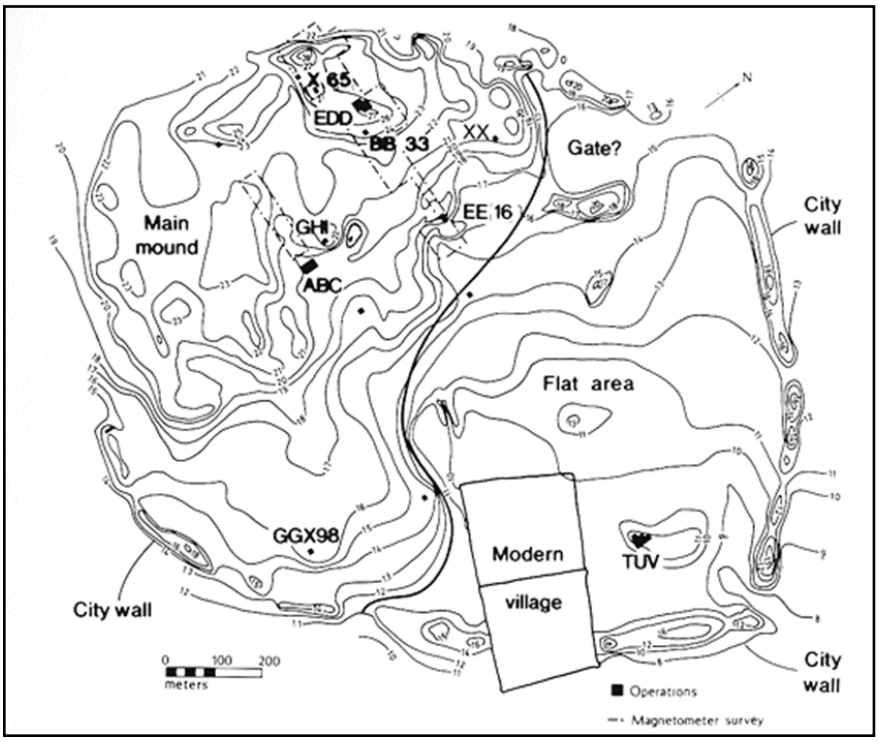


Fig. 1: The site of Tal-e Malyan (Carter 1996: 143, Fig. 3). ▶

millennium B.C. In this paper, tried to outline the type of archive and organization it served, administrative system, the official administrative levels and finally the dating of the archive.

Methodology: This research focuses on excavation reports and monographs related to the middle Elamite period, Anšan and archival studies. Matthew Stolper translation of part of the cuneiform clay tablets of Anšan archive (1984) is the main reference in this research which the database was developed based on it. Finally, an analysis of archaeological and philological studies of the archive presented.

Literature Review

In fact, after more than a century of searching to find the place of ancient Anšan, Hansman proposed Marvdasht area as a possible place in 1972, one year after Sumner's excavations started in this area. He put forward this theory by analysis the historical documents and taking into account the expected size and wealth of Anšan, Marvdasht was proposed as a promising candidate due to its position as the main agricultural center of Fars province. Upon analysing the archaeological excavations in Marvdasht plain, it became evident that the sites with pre-Achaemenid pottery, like Tepe Sabz, were not as extensive as expected for the ancient city of Anšan. This led the researchers to explore Beyza Plain, where a significant site containing pre-Achaemenid pottery and an ancient wall in Tell-Malyan

was discovered. Consequently, after a year of Sumner's excavations, Tal-e Malyan was proposed as a potential location for the ancient city of Anšan (Hansman 1972: 111-112). In the same year, Maurice Lambert published an unprovenanced inscribed cuneiform brick in Vol. 66 of Revue d'Assyriologie et d'archéologie orientale, claiming it was discovered in a location "between Shiraz and Persepolis". This inscription detailed the building of a temple in the city of Anšan (Lambert 1972). Subsequently, Erica Reiner published fragments of inscribed brick in the following volume of the same journal, which was discovered from Tal-e Malyan, the text described the construction of a temple commissioned by Huteluduš-Inšušinak and dedicated to Napiriša, Kiririša, Šimut, and Inšušinak. In her work, Reiner analyzed the brick fragments she had acquired and compared them to Lambert's published inscription (Reiner 1973: 8; Potts 2011: 35), ultimately identifying Tal-e Malyan as the ancient city of Anšan.

As stated above, the excavations of Sumner led to the discovery of a building and an archive belonging to the Middle Elamite period. Part of the corpus of the texts was published by Stolper (1984) in Texts from Tall-I Malyan I, where he translated and analysed the texts from a philological perspective. Then stolper postponed a more general analysis to the publication of the second volume, which unfortunately have not been published yet. Apart from this book, Stolper published several articles from palaeographic and philological perspectives. In 2013 he published a paper, in which he gave a brief analysis on the organizational structure of the present archive (Stolper 2013). Stolper's contributions are the main source for the study of the Middle Elam archive of Anšan. This archive is rarely mentioned in the publications of other scholars, and from the few contributions, we can mention the works of Marie-Joseph Steve (Steve 1992), Olof Pedersén (Pedersén 1998) and Gian Pietro Basello and Grazia Giovinazzo (Basello & Giovinazzo 2018).

Dating of the building of EDD and the archive of Anšan

There are two views about dating of the excavated EDD building: the first view is known as the "Anšan view" and dates the building to c. 1000 BC or a century earlier (Stolper 1984: 9; Carter 1996: 16; Potts 2016: 255), and the second, is known as the "Susa view" and dates the building to 1000 BC or a century later (Steve 1987: 18–19; Steve 1992: 21; Steve, Vallat & Gasche 2002: 470–471).

Stolper, who was one of the pioneers and supporters of the "Anšan view", by considering diverse evidence, such as seal impressions found on the tablets and their similarities to other seal impressions found in Susa

and other Elamite sites, suggests a dating of c. 1300 BC, for the layer, in which the Anšan archive has been discovered. Furthermore, he made a palaeographic study and compared the cuneiform signs of the tablets of the Anšan archive with other Elamite tablets, and accordingly, he suggested a period after the reign of Šilhak-Inšušinak (c. 1125 BC). Finally, by considering the discovered inscribed brick of Huteluduš-Inšušinak, he proposed a dating of c. 11th and 10th centuries BC for the Anšan archive (Stolper 1984: 9).

Supporting the stolper view, Elizabeth Carter after studying the discovered Elamite goblets of Tal-e Malyan and the Elamite sites in Susiana plain and proposed a dating of second millennium B.C, then by establishing C14 dating, suggested the date of c. 1498–1056 B.C as date of construction the buildings and c. 1100–1000 B.C as the date of collapse of buildings (Carter 1996: 16). Also, Daniel T. Potts, followed Stolper, by emphasizing the palaeographic evidence obtained from fragments of discovered inscribed cuneiform brick of Tal-e Malyan, as well as comparing the pottery fragments of the EDD building with the pottery of Susa and Chogha Zanbil, and finally by taking the results of C14 dating into account, confirmed the proposed dating of Carter (Potts 2016: 240–243). On the other hand, Steve who was one of the supporters of "Susa view", based on palaeographic evolutions witnessed that several signs attributed the archive to the first phase of the Neo-Elamite period (1000- 800 B.C) (Steve 1987: 18–19; Steve 1992: 21; Steve, Vallat & Gasche 2002: 470–471).

The distinction between these two views lies in different historical interpretations of political and cultural history of Elam, not in specific evidence or precise date of destruction of the building or dating of the Anšan archive. Specifically, the "Anšan view" interprets that the existing organization was indicative of final years of the Šutrukid dynasty's rule, associated with a faction of Elamite elites residing in the highlands of Elam (Stolper 2013: 402).

The "Susa view" indicates this building belongs to the early Neo-Elamite period (1000- 550 B.C). Supporters of this view argue that following the Nebuchadnezzar I (1121-1100 B.C) conquest of Elam and subsequent collapse of the last Middle Elamite dynasty, this building represents primary evidence of state administrative organization which arose after long period of inactivity in Elam. This interpretation suggests that those responsible for establishing this organization were Elamite elites who reconstituted the political framework after the extensive devastation of the Šutrukid dynasty (Ibid:).

However, due to the more definite evidence of the first view, such as the C14 dating, study of potteries and inscribed bricks of Huteluduš-Inšušinak, it seems proposed dating of "Anšan view" is more acceptable and it is main criteria for dating of the building of EDD.

Elamite Archives

During the early old Elamite period, the city of Susa was conquered and governed by the successors of Sargon of Akkad (2250- 2100 B.C), followed by the rulers of the Ur III dynasty (2112- 2004 B.C) by end of the third millennium B.C. These rulers administered Susa as if it was a domestic province, used Mesopotamian bureaucratic systems, along with Sumerian and Akkadian cuneiform writing in Susa (Stolper 1992: 255; De Graef 2013: 272-273). From 1898-1910, approximately 90 Sumerian and Akkadian cuneiform clay tablets and inscriptions were discovered from different areas of the Acropole of Susa, which belonged to the Akkad and Ur III Dynasty, also one text was found during the 1926 excavation. Regarding the design and configuration of the signs, these texts exhibit similarities to the Akkadian tablets unearthed in Eshnunna and other cities in Mesopotamia under the domination of Akkadian authority (Basello & Giovinazzo 2018: 484).

From the Middle Elamite period, three archives have been discovered so far. The first is the archive of Haft Tepe (Kabnak). More than thousand complete and broken cuneiform clay tablets were discovered in the excavations of 1965–1978, under the supervision of Negahban (Negahban 1993; Mofidi-Nasrabadi 2013: 161). P. Herrero and J.J. Glassner published about 290 texts from the aforementioned collection, in four articles (Herrero & Glassner 1990, 1991, 1993, 1996). In the excavations, directed by B. Mofidi-Nasrabadi, in the warehouse of a structure previously considered as a scribal space, new tablets were discovered. In 2005, about 30 tablets were found in room 1, about 30 tablets from room 5 and, in 2007 about 50 tablets were found from room 12. Some of these tablets have been published by D. Prechel and Mofidi-Nasrabadi, and the rest of them are still Unpublished (Prechel 2010, 2018; Mofidi-Nasrabadi 2021).

The cuneiform tablets of Haft Tepe are written in Babylonian but the names of individual and some goods, some of administrative and religious terms, also the month name are mainly Elamite. Actually, this archive shows the change from Akkadian bureaucratic tradition in the land of Elam to the Elamite gradually. After the Kidinuid dynasty, the Igi-Halki dynasty (1400- 1210 B.C) began. Humban-Numena (circa 1370 B.C), the powerful Elamite king, started use of the Elamite cuneiform script and language

extensively in the administrative system. (Malbran-Labat 1995: 59–61; Mofidi-Nasrabadi 2018: 236–237).

Second archive is the Goshtaspi archive which found from the Tepe with the same name near Khan Ahmad village in Bashet region of Kohgiluyeh and Boyer-Ahmad Province (cf. Ata'i 2016; Yaghma'i et al., 2018, 2015). The 39 middle Elamite clay tablets, a tag and a clay envelope were obtained (Ata'i & Rayat 2017: 347–346). The third Middle Elamite archive is the Anšan archive.

The Archive of Tal-e Malyan (Anšan)

The excavations of Carter in 1972–1974 in Tal-e Malyan, led to the discovery of the middle Elamite buildings (Carter 1996; Basello & Giovinazzo 2018: 487–488; fig. 2). It seems that this building was destroyed by fire in the IVa at the end of the 12th or 11th century B.C and Two sets of the middle Elamite cuneiform tablets were discovered from it. The primary set, comprising 246 tablets, was unearthed during the 1972–1974 excavations in sections A and B within the burnt layer IVa. These tablets primarily document metal transactions. Subsequently, in 1976, approximately 34 additional texts were found in the burnt layer, which differ from the first group in terms of content, their texts focusing on rations, foodstuffs, and livestock. The tablets are described as small and cigarette-shaped in form (Basello & Giovinazzo 2018: 487).

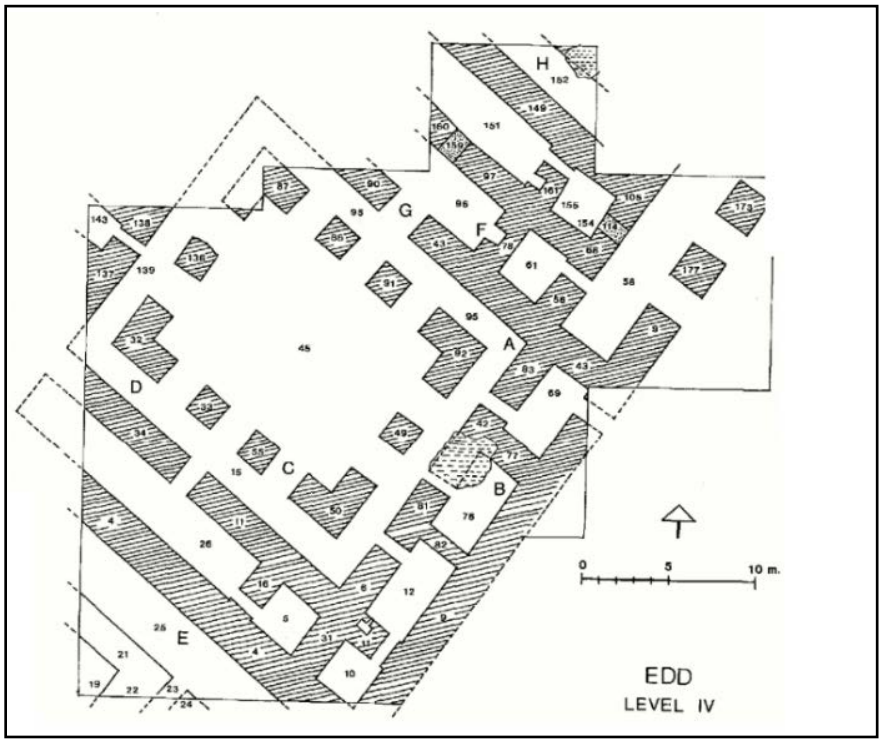


Fig. 2: Plan of the Middle Elamite building of Anšan, EDD (Stolper 1984: 4, fig. 3). ▶

	Group	Category	Raison d'être	Texts
1	Audit and transfer of goods	1a: The transfer of the raw metals to officials	Auditing of raw metals and supervise the objects production	TTM 2, 4, 8, 9, 10, 14, 15, 17, 18, 19, 24, 33, 40, 44, 45, 48, 54, 55, 56, 57, 61, 66, 67, 68, 73, 74, 78, 90
		1b: The transfer of constructed objects to officials	Audit producing objects, monitor their use and send object to the desired location	TTM 14, 16, 58, 73, 95
2	The transfer of the raw materials to the individuals	2a: Transferring metals to craftsmen	The production of the desired materials	TTM 1, 3, 7, 11, 13, 20, 21, 25, 26, 27, 28, 30, 31, 32, 36, 37, 42, 43, 46, 47, 49, 53, 56, 59, 66, 69, 73, 76, 97
		2b: Transfer of the agricultural and livestock products	Rations	M-1461, M-1463, M-1468, M-1470, M-1472, M-1484, M-1486, M-1488, M-1506, M-1507, M-1509, M-1517

◀ **Table 1: Classification of the archival texts of Malyan (Authors, 2023).**

Language and script in the Middle Elamite archive of Anšan

Tal-e Malyan tablets written in Middle Elamite cuneiform, but for accurate dating, Stolper indicate lack of Elamite texts from period of 1100-750 B.C make a problem to recognize and exact date that these tablets were written (Stolper 1984: 7–8). Generally, the comparisons between available middle Elamite texts from Susa and Malyan texts have demonstrated that the writing and cuneiform script of Malyan archive are later than what is called the middle Elamite script.

The unprovenanced text of MDP 11 299 (Stolper 1984: 8–9; Scheil 1911: 299), along with BM 136845, BM 136846, and BM 136847, contains the name Šilhak-Inšušinak (Walker 1980: 76–79; Stolper 1984: 8–9). These texts all include names and words that were also found on the Malyan clay tablets. These texts do not provide a precise date, but according to Scheil and the existence of the name of Šilhak-Inšušinak, they should be dated from the 12th to 7th century B.C (Stolper 1984: 8–9). Although the language used in the writing of the Malyan archive is middle Elamite, they contain many Mesopotamian words and logograms (Stolper 1984: 8–9).

The Classification of the administrative texts of Anšan

The Malyan archive texts based on their contents can be categorized in the two main groups, also each group divided to the two subgroups. The primary group are audit texts, which relate to management supply of raw materials for goods manufacturing, as well as control the use of manufactured goods. The second group is concerning movement of goods and it's divided into two subgroups as well. The first subgroup involves sending raw materials to craftsmen and artisans for making objects, while the second group of texts are about dispatching rations, livestock, and other consumable goods (Table 1).

First group

In the first group of Malyan texts, which is related to the audit of raw materials, certain amount of metals such as gold, silver, bronze and etc. was sent by the central administrative organization to one of the employees and he received it. Probably, this person was responsible for supervising manufacture of objects from these raw materials. For example, in text TTM 57, it is mentioned that a talent of copper (30 kg) was sent to an individual named Haltir-Akšir and he received it (Stolper 1984: 87).

Stolper 1984: 87, TTM 57:

1. 1 talent of copper;
2. large ... ;
3. transferred to Haltir-akšir
4. Lalube, [x].
5. [ ] received(?).

Although, the text format of the second group is similar to the first, the employees who received the goods had different tasks in the manufacture of goods. These texts probably show the next step of good production which is returning the raw materials to the archive in the form of manufactured objects. For example, in the text of TTM 16, Ururu received the value of 516 silver stars. In this text, it is indicated that these stars were weighted and then received (Stolper 1984: 47). Probably, the purpose of the measurement was to determine that the weight of the manufactured product is equal to the weight of the raw metal delivered to the master craftsman to make the object.Stolper 1984, 47, TTM 16:

1. 516 silver stars;
2. Weighed out and
3. received, accounted for,
4. and Ururu
5. received (them);
6. for …
7. Lalube,
8. 13.

Second group

The first group of these texts shows the transaction of goods from Anšan administration to the craftsmen to produce desired objects. For example, Tempipi, who was mentioned as a master craftsman in TTM 97, received a shipment of gold to produce “horns” (Stolper 1984: 68).

Stolper 1984: 68, TTM 97:

1. 24 minas 5 shekels of gold;

2. for “horn(s)”;
3. transferred to Tempipi.
4. Api, 15.
5. He received (it).
6. Anza[n].

The second category of this group is related to the payment of agricultural and livestock products as rations to state employees in Anšan. For example, texts M-1463 and M-1560 are related to the payment of flour by the Anšan administration.

Geographical extent of the archive of Anšan

The only toponym mentioned in the texts of the Malyan archive is Anšan, which is written as h.An-za-an. Anšan has been attested seventeen times in the texts, fourteen times after the date formula, and three times in other parts of texts. Since this toponym is mentioned where we expect to see the place of transactions, or where the text is written and stored, and the fact that no other place is mentioned in this archive texts, the possibility is strengthened that the Malyan archive only worked in the city or the province of Anšan (Stolper 1984: 15).

It seems that the administrative texts of Malyan can be divided into two general categories in terms of origin and destination of shipments. The tablets of TTM 1-78, are indicating the movement and circulation of materials inside the state organization of Anšan or related administrations. The second group are includes the tablets of TTM 79-83, indicating the movement of materials from inside the organization to the outside or vice versa (Stolper 1984: 16).

The commodities mentioned in the texts of Anšan

The main commodities group that administrative activities of Anšan archive related to are: the metals includes raw metals, also the metal objects and agricultural and livestock products (Basello & Giovinazzo 2018: 488). Here, these objects and materials mentioned by their names. Among the 116 published texts, 82 texts[1] are related to the transfer of raw metals, which are gold, silver, copper, tin, and antimony (Stolper 1984: 30–153) and 12 texts[2] refer to the metal objects such as statues and horns (Table 2).

Unfortunately, the main body of texts which related to agricultural and livestock products has not been published, resulting in limited understanding of the content. Stolper’s work in 2013, Text M-1157, as well as M-1470, M-1472, M-1486, and M-1488, discuss the shipment and delivery of grain

(Stolper 1976: 4, 2013: 401, 412). Also, several texts correlated to the transportation and delivery of livestock. For example, M-1461 mentions sheep, while M-1517 and M-1484 mention cows (Stolper 1976: 4-5). Nevertheless, due to the absence of publication of remaining tablets, it appears that quantity of texts referencing these animals and commodities is significantly higher than the current count.

The diversity of administrative texts of the Anšan archive suggests the wide range of activities carried out by this archive and potentially the scale of the structures overseen by this institution. For example, items like flour are documented in M-1463, M-1506, M-1507, and M-1509, with a specific mention of a "grain product" in M-1463. Additionally, animal products like sheep hides in M-1461 and goat hides in M-1468 are also listed among these commodities.

Table 2: Mentioned materials and goods in the archive of Anšan (Authors, 2023). ▶

	Category of Materials	Material	Sign of the material	Texts
1	Metals	Copper	*za-bar*^{MEŠ}	TTM 2, 6, 7, 9, 10, 15, 17, 18, 19, 20, 22, 24, 25, 26, 27, 28, 30, 31, 32, 33, 34, 36, 37, 40, 41, 42, 46, 47, 48, 49, 50, 51, 53, 54, 55, 56, 57, 67, 68, 76, 78, 90, 92
		Tin	*a-na-ku*	TTM 7, 67, 90
		Gold	KÙ.GI^{MEŠ}	TTM 1, 4, 8, 11, 12, 13, 14, 39, 43, 44, 45, 59, 66, 73, 74, 86
		Silver	KÙ.BABBAR^{MEŠ}	TTM 21, 61, 73, 75
		Antimony	*lu-lu*^{MEŠ}	TTM 67
2	Metal objects	statues	*za-al-mu*^{MEŠ}	TTM 1, 2, 4, 6, 7, 86
		Stars	MUL^{MEŠ}	TTM 14, 15, 16, 17
		wall pegs	*hu-up-hu-pu-um*^{MEŠ}	TTM 34, 36, 37, 58, 69, 70, 78, 95, 97
		chariot	^{GIŠ}GIGIR^{MEŠ}	TTM 17
		horn	*ka*$_4$*-as-su-na*	TTM 39, 40, 41, 42, 44, 66, 90
		ring	HAR^{MEŠ}	TTM 8, 9, 10, 73, 75
		bolt, knob	*li-gi*^{MEŠ}	TTM 25, 67
		beam	^{GIŠ}*ku-šu-ru*^{MEŠ}	TTM 12, 13
3	Agricultural products	grain	ŠE.BAR^{MEŠ}	M-1157, M-1470, M-1472, M-1486, M-1488
4	Livestock products	sheep	UDU.NITA	M-1461
		cow	*ku-maš*^{MEŠ}	M-1517, M-1484
5	Secondary agricultural products	flour	ZÍ.DA^{MEŠ}	M-1463, M-1506, M-1507, M-1509
		Product produced from grain	*ši-ip-ru-um*	M-1463
6	Secondary livestock products	sheep's hide	KUŠ^{MEŠ}	M-1461
		Goat's hide	ÙZ^{MEŠ} / *hi-du*^{MEŠ}	M-1468

The Archival Practice in the Archive of Anšan

The Anšan archive serves as an administrative repository for the state. The tablets found in the EDD building predominantly depict the transfer of

various raw materials, including copper, tin, silver, gold, and antimony, from the administrative office of Anšan to individuals both within and outside of the organization. These materials were utilized in the production of items such as chariots (TTM 17), wall pegs (TTM 72-69, 77-78, 80-84, 96-97), and statuettes (TTM 1-7, 85). It is possible that production of these objects was part of the procedure of temple construction, dedicated to the gods Napiriša, Kiririša, Inšušinak, and Šimut, in the city of Anšan by the order of Huteluduš-Inšušinak (c. the end of the 12th century BC).

The administrative structure of the Anšan archive is similar to the Haft Tepe archive (ancient Kabnak). A state archive was established in the city of Haft Tepe to supervise the construction of temples and tombs, also to manage other resources as well. The present study has demonstrated that the administrative organization of Kabnak functions in the same way as the administrative organization of Anšan (Mofidi-Nasrabadi 2013: 161; Basello & Giovinazzo 2018: 486-487).

The architectural analysis reveals a resemblance in construction patterns between the plan of phase IV of the EDD building in Tal-e Malyan and the plan of palaces numbers 2 and 3 in Chogha Zanbil (Stolper 1984: 27; Carter 1996: 6-7; Ghirshman 1996, Plates nos. 13-14).

Both organizations appear to produce materials and the decorative items, as commissioned by the administrative office. For example, H.T. 39, discovered at Haft Tepe, documents transfer of silver to an individual tasked with crafting various components of a chariot (Herrero & Glassner 1990: 8). Similarly, TTM 17, discovered at Tal-e Malyan, related to delivery of copper for making of large copper stars to decorate a chariot (Stolper 1984: 48). Additionally, the text H.T. 435 from Haft Tepe references the production of gold plates, bracelets, statues, and figurines (Herrero & Glassner 1990: 23). Furthermore, TTM 4 from Malyan discusses the payment of one shekel of gold for the creation of golden figures (Stolper 1984: 32–33).

No evidence of the aforementioned statues and chariots has been discovered in these two sites so far. However, during the excavations of 1904 in Susa, a collection of gold, silver, and copper statues, as well as golden rings and plaques, were discovered under the pavement near the wall of the temple of Inšušinak on the Acropole. These artifacts, dating back to the 12th and 11th centuries B.C, coincide with the period when administrative texts from Anšan reference the creation of such items for embellishment of a temple in the city. Since these artifacts were not discovered in Haft Tepe or Anšan, but rather in Susa, it is plausible to

infer that the creation of such ritual objects was likely a standard practice for Elamite temples or palaces. Considering the efforts of Elamite Kings who aimed to construct temples for deities across all major cities of Elam, it is plausible to assume that the creation of such objects was a customary undertaking in every Elamite city. It is important to highlight that in order to carry out such tasks, the presence of an administrative structure is crucial to control management of raw materials and production processes, in addition to equipped workshops, artisans, raw materials and goods. Therefore, it is reasonable to assume that in every significant Elamite city with a temple, the likelihood of an administrative organization (to supervise construction activities and raw materials), an archive (for record keeping), and workshops (to produce demanded objects) is high.

Fig. 3: The obtained objects from the "The Inšušinak temple hoard" (Álvarez-Mon 2020: pl. 126). ▶

So, the administrative system of Anšan archive was responsible for managing the raw materials for making of ordered objects by the state administration. The administrative procedure was as follows: first shipment of metals which was sent to an artist or workshop to make ordered objects. It is not clear whether the person who received the metals was a master craftsman or if he was just an official who had the task of supervising production of objects (Stolper 1984: 30). After producing the items, they were delivered and back to the state institution, then the objects were sent by the administrative system to individuals, probably to be placed and installed in the desired place, as in TTM 85, the transfer of statue to the unknown destination in the city of Anšan was mentioned (Stolper 1984: 120–121; Sajjadiyan 2022: 66).

The large number of material shipments in the Anšan archive shows the extent and magnitude of the activities of state administration in this city. The texts that record small shipments of metals mainly indicate the withdrawal of metals from the institute to produce objects, but texts that record movement of considerable amounts of metals indicate the withdrawal of metals from the institution, both for producing objects and in the form of raw metals (Stolper 1984: 13–14). For instance, text TTM 92, in the first line, mentions thirty talents of copper in one shipment.

In addition, the city of Anšan is located in the fertile plain of Beyza, a plain that is still a place for planting all kinds of agricultural products and raising livestock, so the archive was active in agricultural and livestock issues. For example, text M-1509 is evidence for sending flour outside of estate administration (Stolper 1984: 100, fig. 7), as rations for their employees. Furthermore, aside from the aforementioned text, there are more texts relating to the trade of livestock, crops, and grains, as well as processed agricultural goods such as flour and animal husbandry (Hinz & Koch 1987: 305; Stolper 2013: 401, 414).

Within the administrative texts of Anšan, the key information includes: the quantity and type of metals, and objects, destination, the administrative procedure, and the date. Although variations may exist in the level of detail provided, these four elements generally encompass the essential content of the texts (Stolper 1984: 10).

The type of metals is usually mentioned at the beginning of the texts. Gold and silver signs were written as Sumerograms. Copper is the most frequently mentioned metal in the texts. The weight units used in the texts were talent (30 kg = 60 mina), mina (500 grams = 60 shekel) and shekel (8.4 grams), which in fact were the common Babylonian weights (Stolper

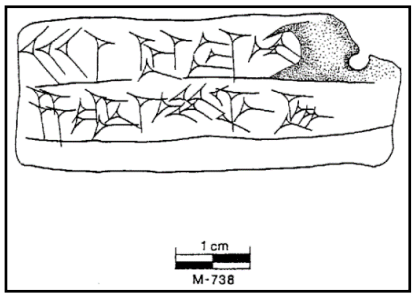
1984: 10; Kuhrt 2007: 884). Fractions and particles are usually indicated by numerical signs, except for ri-bu-utMEŠ, which means a quarter of a shekel (Stolper 1984: 10).

After the tablets were produced, the issue of arranging and safeguarding the texts was raised. According to the documents found in room 76, it seems that specific texts might have been stored on wooden shelves in room 76, which is located next to the central courtyard.

The tablets appear to have been categorized based on their content and the specific products they referenced. It is likely that these tablets were divided into two distinct groups: the first group consisting of tablets discussing precious metals like gold and silver, which were discovered in the northeast corner of the eastern corridor within the central courtyard. The second group of tablets pertained to less valuable metals such as copper and tin, and were found in room 76 (Ibid:).

It is important to note that the tablets found in the northeast corner of the eastern corridor of the central courtyard were not discarded in this place, in fact, their positioning serves as proof of evacuation of the EDD building prior to the devastating fire. Remarkably, the texts found in the same clusters contain identical content, indicating that they were categorized according to their subject matter. Within this context, the terms HAR.ŠI.GAL and HAR.ŠI.BÍL are notable. Stolper interprets these terms as signifying “large storehouse” and “new storehouse,” respectively. This observation indicates the existence of a minimum of two storehouses within this administrative framework, likely tasked with the management and storage of goods and raw materials (Ibid: 100-101).

Among the Malyan texts, TTM 5 stands out due to its significance in archival practices. This particular tablet features a brief inscription consisting of two lines. Although part of the tablet is damaged, it references a specific quantity of metal designated for the creation of a statue. Notably, there is a perforation in the upper right corner of the tablet (Fig. 4), which likely served the purpose of suspending a string or plaque to facilitate the identification of the tablet (Ibid: 34). A similar issue has been frequently noted in the tablets of the Persepolis Fortification archive, which had two holes for string.



▲ **Fig. 4: The TTM 5 tablet (Stolper 1984: 34, fig. 5).**

In the archive, numbers of documents are associated with individual accounts. These records show certain individuals can be creditors of administration that were waiting for delivery of specific products which did not arrive yet or they can be debtors to the administration. For example, in the text of TTM 49, a shipment of copper was sent to a person

named Attibet under the title of "not deposited". He was a creditor to the administration. This means that a shipment was probably supposed to be sent to him, and for whatever reason, it did not happen so the mentioned person was a creditor to the administration. Subsequently, upon that the Anšan administration pay his debt and fulfilled its duty towards this person, it is mentioned in the archive text (Ibid: 77).

Some texts seem to be a receipt for finish of work. For example, the text TTM 44 related to make of an object. At the beginning of this text, seven shekels of gold are mentioned, and then it is said that the amount of "horn" and "anvil?" by means of which they were made by Dannan-Pinigir, sent to Akkamen (Stolper 1984: 74, 44).

Record of the volume of transactions

Based on number of transactions, the texts can be divided into two groups: single-issue memoranda (Ibid: nos. 1-65, 79-83) and multiple-issues memoranda (Ibid: nos. 66-78), (Ibid: nos. 84-99). The first group tablets, which represent a single transaction, recorded shipments from the amount of 1 to 1445 shekels of gold (Stolper 1984: 4, 39). This group of texts also recorded the transaction of shipments from 205 to 3600 shekels of copper (Ibid: nos. 38, 57). The second group include tablets related to several transactions and summary texts of transactions, have recorded amounts of up to 36,000 shekels of metal (Ibid: no. 92).

After recording the metals and their quantities, name of the expected product or the destination of shipment is mentioned. These objects and goods have been recorded by Sumerian and Akkadian logograms, Elamite signs with specific meanings and unknown Elamite signs (Ibid: 10).

After this section, the administrative formula is mentioned. These formulas mainly include PI+PÍR which probably means "sent to" and conjugational forms of the verbs sira- meaning "weighed" and du- meaning "received" or "issued", and occasionally a combination of these formulas is given in the texts (Ibid:). According to Stolper, all three mentioned signs probably represent different parts of a process (Ibid: 14). In general, nineteen different administrative formulas are mentioned in these texts, the most repeated formula is: "Sent to PN" (PI+PÍR PN).

Seals Usage in the archive of Anšan

About a quarter of tablets have seal impressions. These seals cover the unwritten part of the tablets (Stolper, 1984: 15). This issue indicates that the tablets were sealed after writing. Two seal impression can be recognized

from the sealed tablets. Seal number 1 (Fig. 5) is used on almost all of the sealed tablets, i.e. 25 tablets[3], except one tablet which was sealed by another seal (Ibid: 16).

Seal number 2 is recorded only on TTM 45 (Fig. 6), which is related to the shipment of gold for making the "horn" that was delivered to an individual named Akkamen (Ibid: 16).

Stolper asserts that the uniformity in handwriting found on these tablets, along with the consistency in seal impressions, suggests the presence of a centralized entity responsible for managing the transportation of goods (Ibid: 26).

Administrative hierarchy in the archive of Anšan

Due to the lack of evidence and the nature of the administrative texts of this archive, it is not possible to obtain the job titles and hierarchy of the active individuals in the Anšan administrative system, but an attempt has been made to provide a general classification. So, the individuals who received

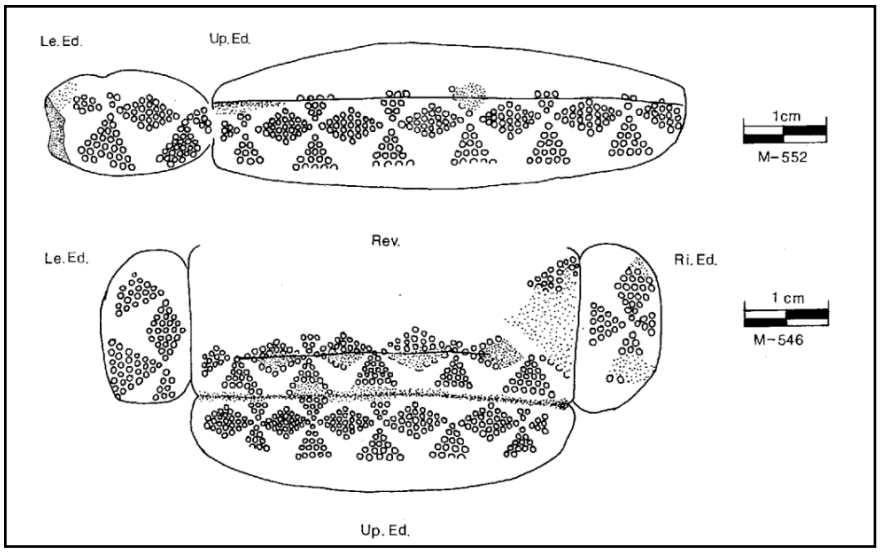


Fig. 5: Seal no. 1 (Stolper 1984: 17, fig. 4). ▶

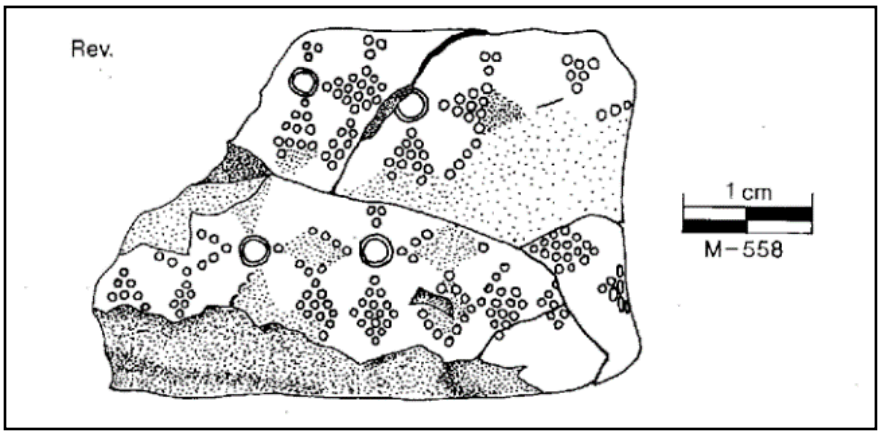


Fig. 6: Seal no. 2 (Stolper 1984: 17, fig. 5). ▶

only raw metal are artisans, and the persons who received produced goods in addition to raw metal are known as officials. In the meantime, the titles used for artisans and administrative officials in the texts have been a kind of confirmation of this pattern. For example, Akkamen, mentioned in TTM 4, is referred to as ka4-si-te, which, as Stolper suggested, may indicate a role related to metals, such as metal smith or craftsman (Stolper 1984: 33). Similarly, in TTM 53, the title kurkurrumbe is used, which appears to signify craftsman (Ibid: 83). These individuals, who hold these titles, have only been provided with raw metals from the archive.

On the other hand, another person in a text related to distributed rations, M-603, has the title of teppír (Stolper 2013: 400), which seems to mean "Schreiber" or "Sekretär" (Hinz & Koch 1987: 319). As mentioned earlier, this problem shows that the administrative officials were also among the recipients of the goods, and although the texts are only the receipts of these transactions, they also indicate the administrative procedures.

Conclusion

The administrative archive of Anšan was one of the first Elamite archives that written in Elamite cuneiform and it was the beginning of tradition that was continued in the archives of Susa and Persepolis. Actually, the Anšan archive has not received the attention it deserves.

The Anšan texts are recorded of process of receiving and distributing raw materials by state administration in the city. These materials, predominantly metals, are initially provided to individuals in for crafting various objects. Skilled craftsmen then transform these raw materials into decorative objects such as chariot parts, copper and gold ornaments, and knobs. Subsequently, these finished products are returned to the administration office storage and likely distributed to individuals for installation in specific locations within the city, probably temples. Moreover, it appears that the administration also compensates state employees in Anšan with livestock and agricultural supplies.

Despite the absence of any evidence of the recognized of metal objects from the excavations in this region, a comparative analysis of the middle Elamite archives from Anšan and Haft Tepe, along with two collections of artifacts discovered from the Acropole of Susa—specifically, the "hoard of the temple of Inšušinak" and the "royal hoard"—can enhance our comprehension of the operational dynamics of such structures.

The administrative records found in the Haft Tepe archive exhibit resemblances in transactional activities with the Anšan archive. Both

archives document transactions involving the exchange of raw materials and finished goods, including plaques, figurines, and chariot components made of copper, silver, and gold.

The workshop responsible for the production of these items at Haft Tepe has yet to be identified; however, evidence of other workshops where different products were created has been uncovered. This suggests a relationship and co-existence among these various structures.

The artifacts founded from the surroundings of the Inshushinak Temple of the Acropole of Susa encompass a variety of items such as rings, figurines, and plaques adorned with a star motif crafted from copper, gold, and silver. Notably, these items had been previously referenced in the archives of Anšan and Haft Tepe. While it is conceivable that these artifacts were produced in Susa or other regions rather than Anšan and Kabnak, their presence offers insight into the final products of administrative institutions and workshops. The unearthing of treasures from the Acropole and the discovery of texts from Haft Tepe near industrial complexes suggest that the administrative structure of Anšan may have been part of a vast state complex, which only the bureaucratic aspect has been uncovered thus far.

When it comes to the type of activity, the Anšan archive is similar to the Haft Tepe archive. This similarity extends to the construction of a sacred complex consisting of tombs and temples, as well as an administrative structure responsible for the distribution of raw metals, the production of decorative objects such as parts of chariots and statues, and the provision of rations for tombs. The archival records of the Anšan archive reveal the presence of officials, master craftsmen, and artisans.

Based on the texts, the active individuals in Anšan archive can be categorized into four distinct classes. At the top tier of the hierarchy are officials and employees holding administrative positions. The second group consists of lower-level employees tasked with overseeing and executing the organization's operations. The third class comprises master craftsmen who bear direct responsibility for constructing the organization's intended items. Finally, the lowest and most extensive class is made up of low-level artisans who likely operate under the guidance of the master craftsmen.

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Observation Contribution

The sections 1-5 of the article and the overall supervision were conducted by Leila Makvandi, and the writing of sections 6-11 was carried out by Aboutaleb Sajjadiyan, the corresponding author.

Conflict of Interest

The authors declare the absence of any conflicts of interest while adhering to publication ethics in citation practices.

Endnote

1. TTM 1-4, 6-15, 17-59, 61-69, 73-76, 78-79, 82-84, 86-90, 91-94, 99 and 107.
2. TTM 5, 16, 60, 70-72, 77, 80, 85, 91 and 95-96.
3. TTM 3, 4, 11, 12, 13, 14, 17, 18, 23, 30, 32, 39, 44, 48, 59, 60, 61, 66, 67, 68, 78, 93, 97, 98 and 113.

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چکیده

محوطهٔ تل ملیان واقع در دشت بیضا استان فارس، به عنوان انشان باستان، مهم‌ترین پایگاه عیلامیان در شرق دشت شوشان و شاید مهم‌ترین مرکز فرهنگی عیلامیان در جهان عیلامی بوده است. در کاوش‌های ویلیام سامنر در فاصله سال‌های ۱۹۷۸ -۱۹۷۱م. یک بایگانی اداری به خط و زبان عیلامی میانه به دست آمده است. این بایگانی که از آخرین آثار برجای مانده از دورهٔ عیلام میانه، سلسلهٔ شوتروکی، و فعالیت شاهان این دوره در این منطقه است اهمیت به سزایی در مطالعات بایگانی‌های عیلامی دارد. اهمیت بایگانی انشان در قیاس با بایگانی‌های اداری عیلامی پیش از خود که به خط اکدی/ بابلی نوشته می‌شدند در این است که متون آن به خط و زبان عیلامی نگاشته شده‌اند و به نوعی آغازگر میراثی است که نتیجهٔ آن را می‌توان در بایگانی‌های هخامنشی بارو و خزانهٔ تخت جمشید کرد. مطالعه این بایگانی میتواند در شناخت ساختارهای دیوانسالاری عیلامی راهگشا باشد، بایگانی ای که پس از گذشت بیش از چهل سال از کشف، همچنان مورد مطالعهٔ هدفمند قرار نگرفته است. بایگانی حاضر نشان دهندهٔ ساخت معبدی در شهر انشان به دستور آخرین شاه عیلام میانه، هوتلودوش اینشوشیناک، هستند و وظیفهٔ این بایگانی مدیریت منابع و نیروهای آن است. بایگانی انشان در این میان به کنترل جریان های ورودی مواد به سازمان و یا از سازمان به افرادی در بیرون از آن می‌پرداخته است، به این صورت که مواد اولیه که شامل فلزات با ارزش بوده‌اند را از مرحله دریافت تا مرحله ساخت و قرار گرفتن در محل مورد نظر سازمان کنترل و مدیریت میکرده است. در این فرآیند نام افرادی در متون اداری ثبت شده که در این پژوهش با توجه به فعالیت و کالایی که دریافت کرده‌اند به گروه‌هایی نظیر مسئولان، کاتبان، استادکاران و کارگران تقسیم شده‌اند. هدف پژوهش پیش رو این است که با به بررسی بایگانی انشان، نوع متون و ساختار آن، تصویری از محتوای متون و ساختار اداری بایگانی انشان ارائه کند.

کلیدواژگان: عیلام میانه، انشان، تل ملیان، بایگانی انشان.

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Rereading of Neo-Assyrian Pottery in the West and Northwest of Iran

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Abstract

The Neo-Assyrian Empire, a significant power in the ancient Middle East during the first millennium BC, left behind a legacy of pottery types that serve as crucial archaeological evidence. Previous studies have categorized Assyrian pottery into two main groups: “Standard ware” and “Palace ware.” This research focuses on identifying the characteristics of Neo-Assyrian pottery in the western and northwest regions of Iran. The examination of Neo-Assyrian pottery across the western, central, and eastern territories of the empire has been conducted and contrasted with that of Iron Age sites in the western and northwestern regions of Iran through the utilization of library research methodology. The inquiries that necessitate responses pertain to identifying the characteristics of Neo-Assyrian pottery in the western and northwestern areas of Iran, as well as determining the specific types of Neo-Assyrian pottery discovered in these areas. The findings demonstrate the presence of Neo-Assyrian “Standard ware” in the western, central, and eastern sectors, while “Palace ware” remains absent in the eastern territories. The analysis of Neo-Assyrian “Standard ware” typology and its comparison indicates its prevalence in the west and northwest of Iran. Given the significance of recognizing Neo-Assyrian pottery for scholars studying the Iron Age in these regions, a systematic and comprehensive typological framework for common and distinctive Neo-Assyrian pottery has been established in this study.

Keywords: Neo-Assyria, Pottery, West of Iran, Northwest of Iran.

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Introduction

The Assyrians rose to power and built a vast empire towards the end of the Late Bronze Age, solidifying their dominance in the ancient Middle East during the first millennium BC. In its greatest extent, this empire reached from Egypt to western Iran, encompassing regions of Anatolia to the Persian Gulf (Frahm, 2017: 179-190). The pottery remains from this period provide valuable insights into the Assyrian presence in various parts of the Middle East, with Neo-Assyrian "Standard ware" and "Palace ware" being key classifications.

The pottery of this era stands out due to its unique features in both form and function, setting it apart from pottery produced in other periods. Additionally, different regions within the expansive empire exhibit specific characteristics in their pottery. This results in a blend of the empire's distinct pottery style in the central region with local pottery, creating a type of pottery that is distinct from local variations and shares typological similarities with imperial pottery. By studying a combination of Neo-Assyrian and local pottery, researchers can gain a deeper insight into the Assyrian influence across the empire.

This research has developed a consistent and inclusive model for identifying and classifying prevalent and distinctive Neo-Assyrian pottery. Moreover, all the main types and sub-branches of Neo-Assyrian pottery resulting from field activities from the 19th to the 21st century have been introduced and compared with those of the sites in the west and northwest of Zagros.

The findings of this research could have been articulated in two manners: by verifying the existence of Assyrians in the western and northwestern regions of Iran based on textual and archaeological proof, such as the identification of unique Assyrian pottery, and by establishing a precise classification system for the shapes and features of common and unique Neo-Assyrian pottery for archaeological investigations in the western and northwestern regions of Iran.

Research Background and the Studied Area

With the end of the late Bronze Age and the reign of Ashur-dan II in 934 BCE, the Assyrians were able to expand their territory beyond the core region. This period, from 934 to 824 BC, marked the foundation of the empire. During this time, their presence in the eastern and western regions of the central territory was consolidated, and new provinces and agricultural infrastructure were established. At the end of this period, the regions of

Khabur, Middle Euphrates, and eastern Zab were occupied, and the buffer zones on the border with Urartu were strengthened (Frahm, 2017: 161-209). Assyria experienced a period of internal turmoil following the passing of Shalmaneser III, leading to an economic downturn from 824 to 745 BC. Nevertheless, there emerged a period of heightened Assyrian power from 744 to 631 BCE, encompassing territories from the east to the Salt Desert, Mount Bikni, and the Great Sea, and from the west to the Mediterranean Sea and Egypt, with the southern border reaching the Persian Gulf and the northern border extending to the foothills of the Taurus Mountains. During this time, Assyrian supremacy was undisputed, and threats from Elam, Egypt, and Urartu were successfully neutralized. The decline of the Assyrian Empire commenced with the demise of Ashurbanipal. Ultimately, Nineveh fell due to the combined forces of Babylon and Media in 612 BC, leading to the disappearance of the Assyrian Empire from the political landscape (Radner, 2006; Bagg, 2011; Frahm, 2017; Iravani Ghadim, 2017: 130-136).

In this study, significant settlements of the Neo-Assyrian in central, western, and eastern regions have been investigated. These areas include the central section known in ancient literature as Central Assyria or the Assyrian Triangle, consisting of the areas between the three cities of Assur, Nineveh, and Arbela. The geographical scope of this region encompasses from the east to the stretch of the Little Zab, from the south along the Tigris to the confluence of the Little Zab and the Tigris, from the north along Arbela to Khorsabad, and from the west to the eastern bank of the Tigris, terminating at Nineveh and Khorsabad. Notable urban centers within this locality include Assur, Kar-Tukulti-Ninurta, Nimrud, Khorsabad, Nineveh, and Arbela (Sarre et al., 1911; Parker, 2001; Altaweel, 2008; Radner, 2011; Harmanşah, 2012; Ur, 2013; Maul, 2017; Politopoulos, 2020).

The western regions in this study extend from the western part of the Assyrian Triangle to the Mediterranean Sea, encompassing the eastern Syrian territories and the Taurus Mountains in this area. The Neo-Assyrian Empire conducted a total of 67 military campaigns in these regions and established 21 provinces and administrative centers to control the western territories (Sader, 1987; Hawkins, 1995; Bagg, 2017). The eastern regions of the Neo-Assyrian Empire extend from the eastern part of the Little Zab to the western Zagros along the current political borders of Iran.

The studies on Neo-Assyrian potsherds began sporadically in 1954. In this study, Neo-Assyrian settlements in the tripartite regions were examined as follows:

The studies on settlements in the Neo-Assyrian Triangle included ancient sites such as Assur (1954, 2000, 2007, 2014)[1], Nimrud (1954, 1959, 1999, 2014, 2016)[2], Nineveh (1999, 2014, 2016)[3], Kar-Tukulti-Ninurta (1999)[4], Arbela (2007, 2008, 2012)[5], Qasr Shammamokh (2008, 2010)[6], Tel Gomel (2018), and Kikk Mish (2018)[7].

The studies on settlements in the western region of the Neo-Assyrian Empire included ancient sites such as Sultan Tepe (1953)[8], Khirbet Qasrij (1989)[9], Tel Rima (1997)[10], Khirbet Khatuniyah (1997)[11], Tel Bidar (1997)[12], Mosul Dam Rescue Excavations (1999)[13], Tel Hoyuk (1999)[14], Tel Ahmar (1999, 2012)[15], Leader Hoyuk (1999)[16], Tel Sheikh Hamad (2006)[17], Ziyarat Tepe (2007)[18], Carchemish (2014)[19]. The studies on settlements in the eastern region of the Neo-Assyrian Empire included ancient sites such as Bakrava (2011)[20], Ancient Shor (2012)[21], Gerd-e Bazaar (2016)[22], Satu Qala (2016)[23], Tepe Dinka (2019)[24], Nakor Plain (2019, 2020)[25], Darband Rania (2020)[26] (Table 1).

The western and northwestern regions of Iran have been of interest since the Early Assyrian period, but the first serious presence of the Assyrians occurred during the reign of Shalmaneser I. The Assyrian kings pursued a policy aimed at gaining war booty without a permanent presence in the region before the reign of Shalmaneser III. However, it was during the reign of Tiglath-Pileser III that the Assyrians established a permanent presence in the west (Kermanshah, Kurdistan, and Hamadan) and northwestern Zagros (Urmia Lake basin) with the establishment of provinces such as Parsua and Bit-Hamban and the reconstruction of the city of Nikur. This continued until the end of the reign of Ashurbanipal, during which eight cities[27] were established or rebuilt in the western and northwestern Zagros region (Fuchs, 1994: 390-445; Tadmor et al., 2011: 171-192; Grayson, 2012: 100-230; MacGinnis, 2020: 37-55).

In this study, data obtained from Iron Age settlements[28] in western[29] and northwestern Iran included Ziwiyeh (1965)[30], Babajan (1985)[31], Godin (2000, 2011)[32], Zindan-e Suleiman (2006)[33], Changbar Cemetery (2016)[34], Hasanlu (2011, 2013)[35], Tel Bary (2017)[36], Qaleh Jowshatooyi (2021)[37], and Sanqur Plain (2017)[38], Brisu Tepe (2015)[39], and Tel Karash (2018-2019)[40] were compared with Neo-Assyrian settlements in eastern and central Assyria. (The sources and related studies are in Table 1 and Table 7).

Until 2010, the focus of Neo-Assyrian pottery studies was primarily on regions such as the Assyrian Triangle and the eastern part of the empire, as seen in pottery atlases like the “Atlas of Assyrian Pottery” (Anastasio,

2010; Hausleiter, 2010). On the other hand, these atlases do not include new data, and there is not much attention given to eastern regions, particularly there is no mention of excavations in western and northwestern Iran.

With the initiation of excavations in the eastern part of the empire in 2011, a new chapter of Neo-Assyrian pottery studies began. Excavations by Radner and Cooper in Gerd-e Bazaar, Dinka, and Bestansur have effectively analyzed the connection of Neo-Assyrian pottery with the center of Assyria and the eastern empire (Radner et al., 2016-2017-2018-2019; Herr, 2018: 97-112; Cooper, 2019, p.174-175). However, there have been brief mentions of the western Zagros regions, and a comprehensive analysis of them has not been conducted. In this study, pottery from 43 archaeological settlements was evaluated (Table 1; Fig. 1).

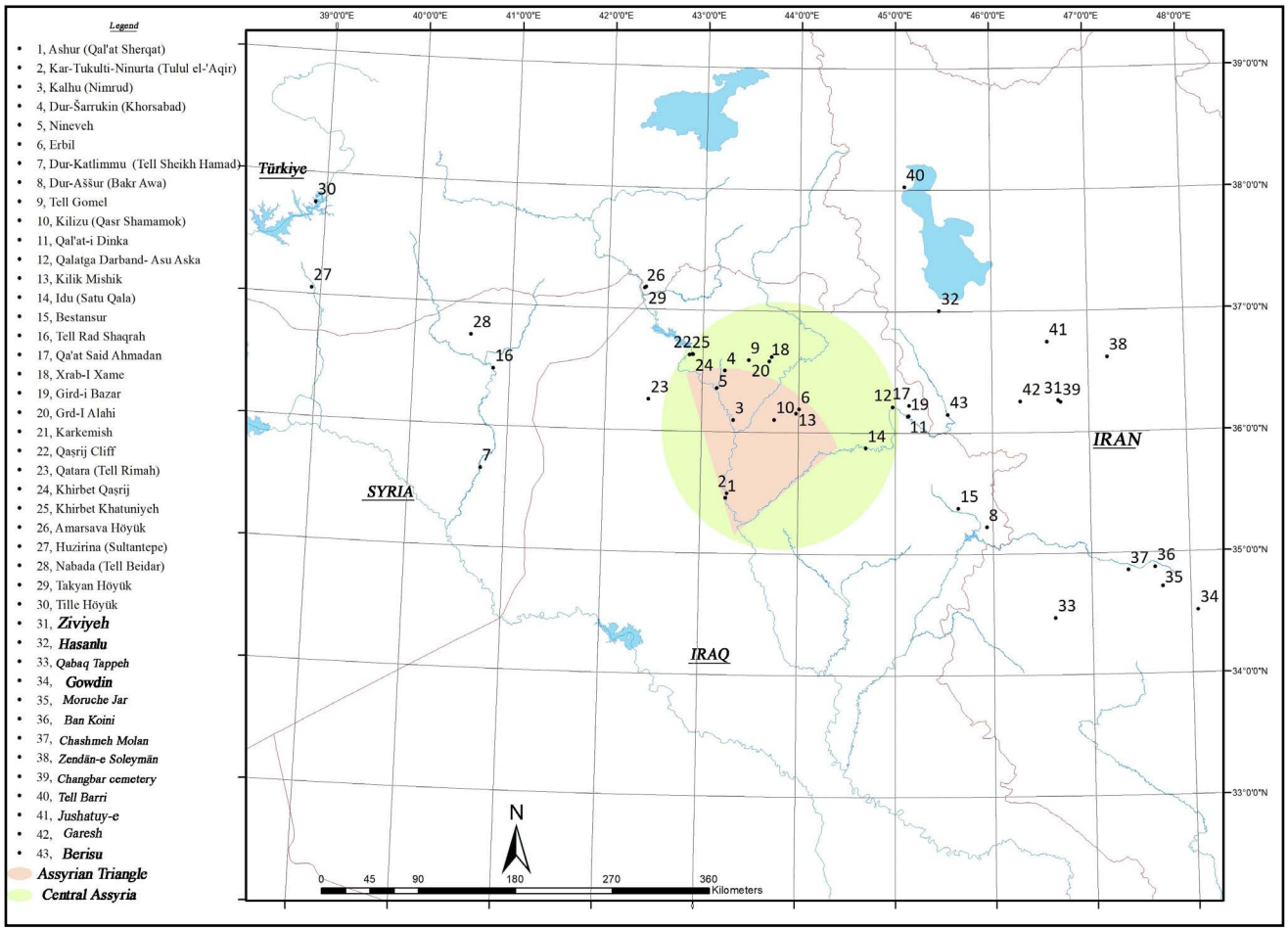


Fig. 1: Distribution of the Sites (Authors, 2022). ▲

Neo-Assyrian Standard Ware

The present investigation presents Neo-Assyrian pottery in two distinct categories: Standard Ware and Palace Ware. Neo-Assyrian Standard Ware encompasses the various types of pottery that were prevalent during the Neo-Assyrian era and served a wide range of purposes. These pottery types

◄ **Table 1: Distribution of the Sites (Authors, 2022).**

References	Selected Sites with Neo-Assyrian Pottery
Lloyd & Gokçe, 1953	Sultantepe
Lines, 1954	Nimrud
Haller, 1954	Assur
Oates, 1959	Fort Shalmaneser
Muscarella, 1974	Tepe Dinkha
Goff, 1985	Baba Jan
Curtis, 1989	Qasrij Cliff; Khirbet Qasrij
Curtis & Green 1997	Khirbet Khatuniyeh
Bretschneider 1997	Tell Beydar
Postgate et al., 1997	Tell al-Rimah
Lumsden, 1999	Nineveh/Ninawa
Hausleiter, 1999	Kalḫu/Nimrud
Jamieson, 1999	Tell Ahmar
Blaylock, 1999	Tille Höyük
Green, 1999	Eski-Mosul Region
Schmidt, 1999	Kar-Tukulti-Ninurta
Müller, 1999	Lidar Höyük
Miglus, 2000	Assur
Kreppner, 2006	Tall Šēḫ Ḥamad, Dūr-Katlimmu
Matney, et al., 2007	Ziyaret Tepe
Beuger, 2007	Assur
Filipský & Pavelka, 2008	City of Arbil
Anastasio, 2008	Qasr Shamamuk
Hausleiter 2010	Neuassyrische Keramik im Kerngebiet Assyriens
Anastasio 2010	Atlas of the Assyrian Pottery of the Iron Age
Gopnik & Rothmann 2011	Godin Tape
Miglus, et al. 2011	Tell Bakr Āwa
Cooper, et al. 2012	Bestansur Tell
Algaze, et al. 2012	Cizre dam; Cizre-silopi Plain Survey
Jamieson, 2012	Tell Ahmar III
Van Ess, et al. 2012	City of Arbil
Bonomo, & Zaina, 2014	Karkemish; Yunus
Pappi, 2016	Satu Qala
Coşkun, 2016	Harran Plain
Radner, et al. 2016	Gird-i Bazar; Qalat-i Dinka
Gavagnin, et al. 2016	Nineveh
Pfälzner, 2016	The Eastern Habur Archaeological Survey
Othman, 2018	Tell Kilik Mishik
Bonacossi, et al. 2018	Gir-e Gomel
Radner, et al. 2019	qalat-i dinka
Koliński, et al. 2020	navkūr plain (Grd-I Alahi; Xrab-I Xame)
MacGinnis, et al. 2020	Darband-i Rania

can be distinguished across the empire's territory based on their defining characteristics (Tables 2–4, 6). In contrast, Palace Ware is exclusive to the Neo-Assyrian period (Table 5), as it was not manufactured in the periods preceding or succeeding Neo-Assyria. This particular type of pottery was acquired in the central and western regions of Assyria.

The first step in recognizing Neo-Assyrian pottery is to understand its components. Generally, pottery vessels consist of three main parts: the rim, body, and base. Depending on the function and form of the vessel, it may also have a neck, foot, spout, and handle (Hendrix et al., 1997: 5-9). The most common and characteristic forms of Neo-Assyrian pottery rims (Table 2) include plain rim, dentate rim, hammered rim, raised rim, outward sloping rim, everted rim, triangular rim, rectangular rim, thickened rim, rounded rim, thick rounded rim, square rim, inverted rim, banded rim, narrowed rim, beveled rim, projecting rim, and molded banded rim. The most common and characteristic forms of Neo-Assyrian pottery bases (Table 3) include ring base, point base, button base, nipple base, spur-footed base, pedestal base, rounded base, concave grooved base, plain concave base, disc base, convex base, and flat or smooth base[41].

Table 2: Neo-Assyrian Pottery Rims (Authors, 2022). ▶

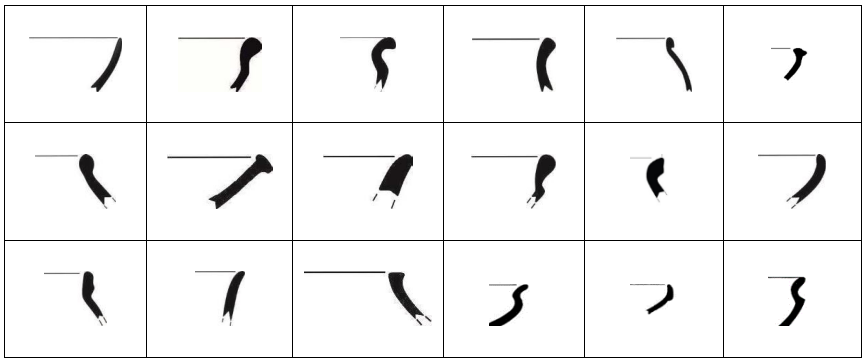
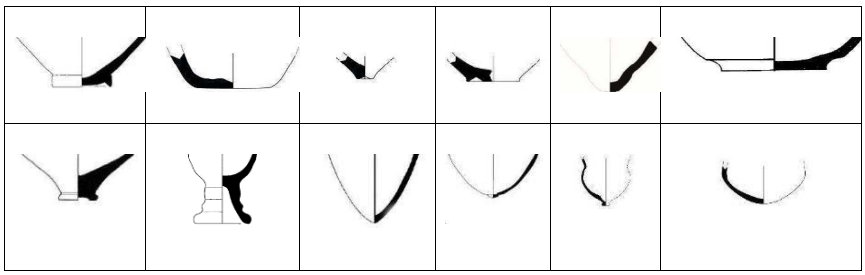


Table 3: Neo-Assyrian Pottery Bases (Authors, 2022). ▶



In pottery typology, particularly in Neo-Assyrian pottery, recognizing the form of pottery vessels is essential. Form is a combination of shape and size of a pottery vessel and, regardless of spatio-temporal dimensions, it is divided into two main types: open-mouthed and closed-mouthed forms (Hendrix et al., 1997)[42]. All types of Neo-Assyrian pottery vessels

are classified into these two groups, where bowls are categorized as the primary form and origin of open-mouthed vessels, and jars as the primary form and origin of closed-mouthed vessels. Other pottery vessels fall under the subcategories of these three primary forms. The second step in pottery vessel typology is determining the vessel's size (Hendrix et al., 1997: 26-28).

The size of open-mouthed vessels is calculated based on their maximum diameter and depth, determining the ratio of the maximum diameter to the height. Accordingly, small bowls have a diameter of 10 centimeters, medium bowls range from 10 to 14.9 centimeters, large bowls range from 15 to 24.9 centimeters, very large bowls range from 25 to 75 centimeters, and extra-large bowls exceed 75 centimeters. The depth of the bowl, based on the ratio of diameter to height, includes shallow bowls with a ratio of less than 20%, medium-depth bowls with a ratio between 20% and 74.9%, and deep bowls with a ratio of 75% to 100% (Hendrix et al., 1997: 31-37).

The common and characteristic open-mouthed forms in standard Assyrian pottery include: Simple bowl with a plain rim and a ring base (Table 4: Row 1)[43], simple bowl with a thickened rim and a ring base (Table 4: Row 2)[44], simple bowl with a dentate rim (Table 4: Row 3)[45], simple bowl with an outward-flaring rim (Table 4: Row 4)[46], angled bowl with an outward-sloping rim and a ring base (Table 4: Row 5)[47], angled bowl with a thickened rim and ring base and a groove on the rim (Table 4: Row 6)[48], angled bowl with an outward-flaring S-shaped rim, typically with a ring base (Table 4: Row 7)[49], angled bowl with a dentate rim (Table 4: Row 8a), angled bowl with a rounded rim (Table 4: Row 8b)[50], convex bowl with an outward-flaring rim (Table 4: Row 9)[51], convex bowl with a hammered rim (Table 4: Row 10)[52], convex bowl with a square rim (Table 4: Row 11)[53], and convex bowl with a triangular rim (Table 4: Row 12)[54].

Most Assyrian bowls are predominantly small to medium-sized and are made using pottery wheel techniques. Based on the study of Assyrian pottery from the examined areas, the temper used in the western regions consists mostly of straw, while in the central and eastern regions, it tends to be sandy or mineral-based (Curtis, 1989; Curtis & Green, 1997). The hue of the paste used for crafting bowls remains relatively consistent, predominantly appearing as buff with shades that span from yellow to green, often concealed beneath a layer of paste. Consequently, the surface of the bowl exhibits a slightly altered coloration due to the influence of heat. Assyrian open-mouthed vessels of standard design undergo firing at three distinct temperature thresholds: between 600 and 700 degrees

Celsius, the paste displays a brownish tinge with hints of red; when fired at 700-850 degrees Celsius, it transitions to hues of orange and buff; and finally, firing at 850-1000 degrees Celsius results in a more pronounced buff coloration (Othman, 2018).

Bowls originating from the central areas of Assyria typically consist of paste that varies in color from pink to brick-red, showcasing a surface that leans towards a pinkish-yellow tint. The predominant hue for the paste is buff with subtle undertones of orange, although in the western territories, the paste tends to exhibit a more pinkish-buff shade, whereas in the eastern regions, it tends towards reddish-yellow or pink (Jamieson, 2012; Bonomo & Zaina, 2014: 142; Othman, 2018: 137-139).

Assyrian potters commonly crafted simple and angled bowls in small to medium sizes with shallow to medium depth, dentated rims, and ring bases in buff color (Table 4: Rows 3-8)[55]. These products were prevalent during the Assyrian Middle Period but became more common during the Neo-Assyrian Period. Shallow angled bowls with protruding and outward-turned rims, along with ring bases, made of sandy and medium to fine paste, are characteristic examples from the Nimrud region (Table 4: Rows 5-7)[56].

Other common types of open-mouthed vessels in Assyrian Standard Ware are bowls and cups, including a bowl with a straight profile and thinned rim and flat base (Table 4: Row 13)[57], a bowl with a curved profile and outward-sloping rim and flat base, known as a istekan (Table 4: Row 14)[58], a bowl with an angled profile, outward-sloping rim, and nipple base (Table 4: Row 15)[59], an angled cup with outward-sloping rim and tall base (Table 4: Row 16)[60], and an angled cup with outward-sloping rim and tall base (Table 4: Row 17)[61].

Istekans are small drinking vessels that were widely popular in the 7th century BC and were found in most central and western areas of the empire, as well as in some eastern areas. Generally, cups and bowls are small to medium-sized drinking vessels with shallow to moderate depths[62]. The type with a nipple base was more popular in Nimrud (Table 4: Row 15)[63].

In this study, pots are classified as Assyrian closed vessels. The most common pots of this period include necked pots[64] decorated on the shoulder and with a rounded bottom (Table 4: Row 18)[65], neckless pots with raised edges (Table 4: Row 19)[66], and pots with loop handles (Table 4: Row 20)[67]. The pots obtained from Assyrian settlements are wheel-made and have a medium texture, with their paste mainly being sandy and exhibiting a color

spectrum ranging from brown to reddish-brown.

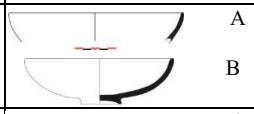
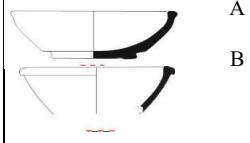
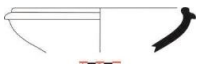
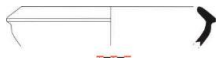
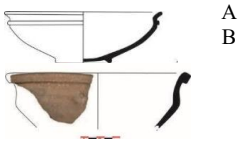
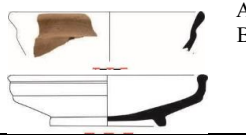
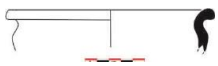
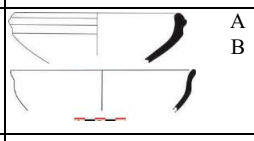
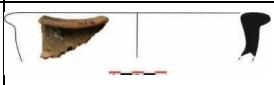
Standard closed-mouth vessels of the Assyrian period include neckless jars with angular rims (Table 4: Row 21)[68], neckless jars with dentate rims (Table 4: Row 22)[69], jars with a pear-shaped body and thickened rim with a button base (Table 4: Row 23)[70], jars with an elongated and tall body with a button base (Table 4: Row 24)[71], necked jars with a thickened rounded rim (Table 4: Row 25)[72], necked jars with a cornered rim (Table 4: Row 26)[73], necked jars with incised and added decorations on the shoulder (Table 4: Row 27)[74], and necked jars with a rounded bottom and decorations on the shoulder and neck (Table 4: Row 28)[75].

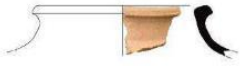
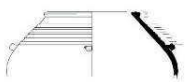
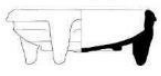
Storage jars were an essential part of transportation and storage practices in the Middle Assyrian period. These jars, which came in various forms including handled, handle-less, necked, and neckless, were crafted by hand using mixtures of straw, organic, and mineral materials. These types of vessels were commonly used during the Middle Assyrian period and continued to be prevalent. Moreover, tripod vessels and oil lamps were also uncovered in Neo-Assyrian settlements throughout the Assyrian Empire (Table 4: Rows 29-30)[77].

Palace Ware

In 1954, the initial classification of fine and eggshell potteries was established during the examination of pottery vessels from the northwestern palace of Nimrud, a category that became known as Palace Ware (Rawson, 1954). Subsequently, in 1959, Oates re-evaluated this classification in his analysis of pottery from the palace of Shalmaneser III, positing that Palace Ware was characterized by its thinness and a buff or greenish-gray hue. She identified two distinct categories of pottery, namely Palace Ware and Standard Assyrian Ware (Oates, 1959). Palace Ware serves as a representative and characteristic form of pottery from the Assyrian era, characterized by its brief period of prominence. Its creation began during the Iron Age and concluded with the decline of the Assyrian Empire, although a few instances persisted until 608 BC. According to Hunt, this type of pottery is attributed to the late 8th to 7th centuries BC (Hunt, 2014: 135). The main types of palace ware include: Necked cup with a thin outward-leaning rim, and button base, decorated with fingerprint impressions and regular incised lines (Table 5: Row 31)[78]; Necked cup with a thin outward-leaning rim, and nipple base, decorated with fingerprint impressions (Table 5: Row 32)[79]; Necked cup with a thin outward-leaning rim, and ring base, decorated with fingerprint impressions (Table 5: Row 33)[80]; Necked cup

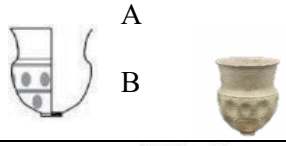
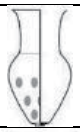
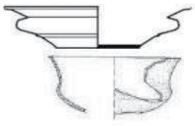
Table 4: Neo-Assyrian Standard Ware (Authors, 2022). ▼

References	Triple regions			Standard Ware	NO
	West	HeartLand	East		
Cooper, et al., 2012, fig. 3.1; Jamieson 2012, fig. 3.2; Miglus, et al., 2011, Taf. 1: d-e; Hausleiter, 1999, fig.2; Lumsden, 1999, fig. 4.1; Curtis, & Green, 1997, fig. 29, fig 35; Lines, 1954: Pl. XXXVII.	✱	✱	✱	 A B	1
Gavagnin, et al., 2016, fig. 18; Pfälzner, 2016, pl. 9; Cooper, et al., 2012, fig. 13.1; Van Ess, et al. 2012, pl. 11; Jamieson, 2012, fig. 3.4; Anastasio, 2010, Pl.6; Pl.8; Kreppner, 2006, Taf. 5, 10; Postgate, et al., 1997, Pl. 56; Jamieson, 1999, fig.1; Green, 1999, fig. 8; Lumsden, 1999, fig. 4; Hausleiter, 1999, fig. 4; Curtis, & Green, 1997, fig. 35; Curtis, 1989, fig. 26; fig. 28; Oates, 1959, pl. XXXV.	✱	✱	✱	 A B	2
Pfälzner, 2016, pl. 9; Jamieson, 2012, fig. 3.4; Cooper, et al., 2012, fig. 13.1; Anastasio, 2010, 89, pl. 6; Matney, et al., 2007, fig. 18d; Kreppner, 2006, taf. 4, 7; Schmidt, 1999, Abb. 6a; Lumsden, 1999, fig. 5; Jamieson, 1999, fig. 6; Bretschneider, 1997, Taf. II, I. Postgate, et al., 1997, Pl. 56; Curtis, 1989, fig. 27; Oates, 1959, pl. XXXV; Haller, 1954, Taf. 6; Lloyd, & Gokçe, 1953, fig. 6.	✱	✱	✱		3
Bonomo, & Zaina, 2014, fig. 3; Cooper, et al., 2012, fig. 13.1; Jamieson, 2012, fig. 3.4; Gopnik, 2011, fig. 7; Goff, 1985, fig. 2; Curtis, 1989, fig. 23.	✱	✱	✱		4
Radner, et al., 2019, fig. G1.3; fig., G1.2; Jamieson, 2012, fig. 3.4; Bonomo & Zaina, 2014, fig. 3; Lumsden, 1999, fig. 5; Jamieson, 1999, fig. 1, 12; Miglus, et al., 2000, Abb. 9k; 29c; 30f; Kreppner, 2006, Taf. 5, 9. Blaylock, 1999, fig. 5; Anastasio, 2010, 97, pl.10. Pfälzner, 2016, pl. 9; Haller, 1954, Taf. 6; Green, 1999, fig. 6.	✱	✱	✱	 A B	5
MacGinnis, et al., 2020, fig. 29; Radner, et al., 2019, fig. G1.2; Anastasio, 2008, tav.V; Beuger, 2007, taf. 22, 23a; Gavagnin, et al., 2016, fig. 18; Othman, 2018, pl. 38; pl.40; Hausleiter, 1999, fig.4; Jamieson, 2012, fig. 3.3; Bonomo, & Zaina, 2014, fig. 3.	✱	✱	✱	 A B	6
Oates, 1959, pl. XXXV; Othman, 2018, pl. 34; pl.39; Curtis, & Green, 1997, fig. 56; fig. 28; fig. 33; Jamieson, 2012, fig. 3.3; Bonomo, & Zaina, 2014, fig. 3; Algaze, 2012, fig. 25; Cooper, et al., 2012, fig. 13.1; Hausleiter, 1999, fig.5.	✱	✱	✱		7
Anastasio, 2010, 97, pl.13; Gavagnin, et al., 2016, fig 18; Bonomo, & Zaina, 2014, fig. 3; Jamieson, 2012, fig. 3.5; Blaylock, 1999, fig. 5; Oates, 1959, pl. XXXV; Coşkun, 2016, fig.5; fig. 2; Othman, 2018, pl. 38; pl. 39; Radner, et al, 2016, fig. D2.3.	✱	✱	✱	 A B	8
Bonacossi, et al., 2018, Fig. 41; Coşkun, 2016, fig. 5; fig. 2; fig 4; fig 7; Othman, 2018, pl. 34; pl. 36; Kreppner, 2006, Taf. 48.4; Bonomo, &Zaina, 2014, fig. 3.	✱	✱			9
Othman, 2018, pl. 35; Kreppner, 2006, Taf. 51; Jamieson, 2012, fig. 3.6.	✱	✱			10
Othman, 2018, pl. 35; Jamieson, 1999, fig. 1.	✱	✱			11
Radner, et al., 2016, fig. D2.2; Hausleiter, 2010, pl. 53: SF 8.3; Jamieson, 2012, fig. 3.6.	✱	✱	✱		12
Oates, 1959, pl. XXXVI; Curtis, 1989, fig. 10, 33; Anastasio, 2010, pl.27; Jamieson, 2012, fig. 3.13; Jamieson, 1999, fig. 4, 1-2. 4-5.	✱	✱			13
Oates, 1959, pl. XXXVI; Curtis, 1989, fig. 10, 33; Anastasio, 2010, pl.27; Jamieson, 1999, fig. 4, 1-2. 4-5.	✱	✱			14

Oates, 1959, pl. XXXVI; Curtis, 1989, fig. 10, 33; Anastasio, 2010, pl.27; Jamieson, 1999, fig. 4, 1-2. 4-5; Jamieson, 2012, fig. 3.13.	❋	❋			15
Jamieson, 2012, fig. 3.13; Müller, 1999. Abb.17; Miglus, et al, 2000, Abb. 30a; Anastasio, 2010, pl.16; Oates, 1959, pl. XXXVII.	❋	❋			16
Matney, et al., 2007, fig. 16; Blaylock, 1999, fig. 10; Jamieson, 2012, fig. 3.13; Anastasio, 2010, pl.16.	❋	❋			17
Othman, 2018, pl. 44; Bonomo, &Zaina, 2014, fig. 6; Radner, et al., 2019, fig. G1.3; fig, G1.5; Cooper, et al., 2012, fig.13.2; Radner, et al, 2016, fig. D2.6; Jamieson, 2012, fig. 3.12; Schmidt, 1999, Abb. 8.	❋	❋	❋		18
Bonomo, & Zaina, 2014, fig. 6; Coşkun, 2016, fig.5; fig. 7; Radner, et al., 2016, fig. D2.6; Othman, 2018, pl. 41; pl. 42; pl. 43; Jamieson, 1999, fig. 5; Jamieson, 2012, fig. 3.12; Blaylock, 1999, fig. 3.	❋	❋	❋		19
Radner, et al., 2019, fig, G1.5; Radner, et al., 2016, fig. D2.6; Jamieson, 2012, fig. 3.12; Bonomo, &Zaina, 2014, fig. 6; Hausleiter, 1999, fig.6; Schmidt, 1999, Abb. 7b; Blaylock, 1999, fig. 3; fig. 3; Goff, 1985, fig. 6.	❋	❋	❋		20
Othman, 2018, pl. 46; pl. 47; pl. 48; Kreppner, 2006, Taf. 30; Taf. 56; Muscarella, 1975, fig. 36; Blaylock, 1999, fig. 11.	❋	❋	❋		21
Othman, 2018, pl. 47; Bonomo, & Zaina, 2014, fig. 6; Blaylock, 1999, fig. 11; Lumsden, 1999, fig. 7; Jamieson, 2012, fig. 3.12.	❋	❋	❋		22
Anastasio, 2010, Pl. 6; Pl. 27; Kreppner, 2006, Taf. 14; Taf. 24; Blaylock, 1999, fig. 9; Oates, 1959, pl. XXXVIII; Pappi, 2016, fig. 6.	❋	❋	❋		23
Pappi, 2016, fig. 6; Blaylock, 1999, fig. 9; Kreppner, 2006, Taf. 14; Taf. 22; Lines, 1954: Pl. XXXVIX; Curtis, & Green, 1997, fig. 42; Curtis, & Reade, 1995, 159; Anastasio, 2010, Pl. 6; Pl. 24; Matney, et al., 2007, fig. 19.	❋	❋	❋		24
Radner, et al., 2019, fig., G1.4; Radner, et al., 2016, fig., D2.5; Kreppner, 2006, Taf. 12; Jamieson, 2012, fig. 3.18; Lumsden, 1999, fig. 7; Othman, 2018, pl. 50; pl. 51; Bonomo, & Zaina, 2014, fig. 6.	❋	❋	❋		25
Othman, 2018, pl. 52; pl. 53; Bonomo & Zaina, 2014, fig. 6; fig. 8; Radner, et al, 2016, fig, D2.6; Kreppner, 2006, Taf. 11; Cooper, et al, 2012, fig.13.1; Gopnik, 2011, fig. 7; Algaze, 2012, fig. 24; Bonacossi, et al, 2018, Fig. 41.	❋	❋	❋		26
Radner, et al, 2019, fig, G1.13; Jamieson, 2012, fig. 3.20; Hausleiter, 1999, fig. 3; Blaylock, 1999, fig. 11; Gavagnin, et al., 2016, fig 18; Haller, 1954, Taf. 3f; Anastasio, 2010, Pl. 24; Bonacossi, et al., 2018, Fig. 42; Radner, et al., 2016, fig. D2.5.	❋	❋	❋		27
Anastasio, 2008, tav.VII; Othman, 2018, pl. 49; pl. 50; pl. 54; pl. 56; Jamieson, 2012, fig. 3.17; Bonomo &Zaina, 2014, fig. 4; Hausleiter, 1999, fig. 6.	❋	❋	❋		28
Lines, 1954: Pl. XXXVIII; Postgate, et al., 1997, Pl. 56; Jamieson, 2012, fig. 3.27; Hausleiter, 1999, fig. 2; Blaylock, 1999, fig. 4.	❋	❋	❋		29
Miglus, et al., 2000, Abb. 29b; Kreppner, 2006, Taf. 57; Blaylock, 1999, fig. 10; Jamieson, 2012, fig. 3.15.	❋	❋	❋		30

with a thin outward-leaning rim, and nipple base, decorated with regular incised lines (Table 5: Row 34)[81]; Tall-necked cup with a thin outward-leaning rim, and button base, decorated with fingerprint impressions (Table 5: Row 35)[82]; Necked jar with a thin outward-leaning rim, and flat base, decorated with fingerprint impressions (Table 5: Row 36)[83]; Necked jar with a thin outward-leaning rim, and button base, decorated with fingerprint impressions and regular incised lines (Table 5: Row 37)[84]; Tall-necked jar with a thin outward-leaning rim, flat base, and sometimes nipple, decorated with fingerprint impressions (Table 5: Row 38)[85]; Angled bowl with thin outward-leaning rim, flat base, decorated with regular incised lines (Table 5: Row 39); Angled bowl with thin outward-leaning rim, without decoration (Table 5: Row 39)[86].

Table 5: Neo-Assyrian Palace Ware (Authors, 2022).▼

References	Triple regions			Palace Ware	NO
	West	Heartland	East		
Hunt, 2015, fig.3.12; fig. 4.22; Kreppner, 2006, Taf. 97; Haller, 1954, Taf. 5u; Oates, 1959, pl. XXXVII. Curtis, 1989, fig. 10, 42.	✱	✱		A B 	31
Hunt, 2015, fig.3.13; fig. 3.16; Kreppner, 2006, Taf. 97; Oates, 1959, pl. XXXVII; Miglus, et al., 2000, Abb. 30b; Anastasio, 2010, pl. 2.7.	✱	✱			32
Hunt, 2015, fig.3.12; Bonacossi, et al., 2018, Fig. 16b.	✱	✱			33
Hussein, el al., 2016, pl. 216c; pl. 216f. Curtis & Green, 1997. Fig. 51 ; Oates, 1959, pl.XXXVII; Bonacossi, et al., 2018, Fig. 16c.	✱	✱			34
Hunt, 2015, fig. 3.14; Oates, 1959, pl.XXXVII.	✱	✱			35
Hunt, 2015, fig. 3.16; Curtis & Green, 1997, Fig. 51; Oates, 1959, pl.XXXVII.	✱	✱			36
Hunt, 2015, fig. 3.16; Oates, 1959, pl.XXXVII.	✱	✱			37
Hunt, 2015, fig. 3.18; Jamieson, 2012, fig. 3.25; Oates, 1959, pl. XXXVII; Kreppner, 2006, Taf. 11.	✱	✱			38
Hunt, 2015, fig. 3.10; Jamieson, 2012, fig 3.25; Blaylock, 1999, fig. 10; Kreppner, 2006, Taf. 96; Oates, 1959, pl. XXXVII; Curtis, 1989, fig. 31; Jamieson, 1999, fig. 6.	✱	✱			39

The Palace Ware has several distinctive features that distinguish it from other Assyrian pottery. These vessels include bowls, cups, and very small jars with a maximum diameter of 6–14 centimeters, a rim diameter of 6–14 centimeters, a base diameter of 0–8 centimeters, and an average wall thickness of 0.20 centimeters. (The thin eggshell wall is one of the key features of Palace Ware, with a thickness ranging from 0.15–3.5 centimeters, typically averaging 0.20 centimeters, regardless of the shape and size of the ceramic piece). The paste is very fine-grained and buff, with a slight greenish hue, and it has been fired at temperatures between 850 to 1100 degrees Celsius (The palace ware, characterized by its thinness, shares a similar surface and paste coloration with artifacts from Nimrud and Nineveh, which generally display a spectrum of colors ranging from olive to light brownish-yellow. The paste is composed of fine sand particles, including quartz, amphibole, and mica, and is subjected to firing temperatures ranging from 1100 to 1050 degrees Celsius).

Due to their outwardly protruding rims, these pottery vessels were largely incapable of accommodating lids. Furthermore, their small size and thin construction made them impractical for use in transportation or storage. However, it is conceivable that they were utilized for the conveyance of valuable materials such as refined oils, perfumes, and resins[87] (Freestone, 1989; Hughes, et al., 1997; Engstrom, 2004; Hunt, 2015).

Decorations of Neo Assyrian Pottery

Standard Assyrian ware is distinguished by its diverse decorative techniques, which encompass added, incised, impressed, and polished motifs. The hallmark decorations of this pottery type include glazed surfaces, painted imagery, incised circular designs, and linear patterns that are often geometric in nature. Conversely, Palace Ware is primarily adorned with delicate incised patterns of parallel lines and unique fingerprint impressions, which are specific to its surfaces.

Incised decoration: In most cases, horizontal or geometric lines are carved into the shoulder and body of Standard Assyrian ware utilizing a sharp tool, a practice that is frequently noted on larger and medium-sized closed-mouth vessels (Table 6: Row 40)[88].

Added decoration: This particular decorative style is seldom encountered in Standard Assyrian ware and is usually identified on large jars, where it manifests as impressions that mimic cords (Table 6: Row 42)[89].

Painting: The occurrence of painting on Assyrian pottery is an uncommon phenomenon, primarily observed in the central region of

Assyria. This artistic expression is typically manifested as horizontal bands on diminutive jars characterized by pointed or nipple-shaped bases. The painted motifs include horizontal bands, geometric designs, and undulating lines, utilizing a color palette that spans from reddish-brown to black, particularly on Standard Assyrian ware (Table 6: Row 41)[90].

Glaze: In the ancient cities of Nimrud, Assyria, and Nineveh, the occurrence of glazed vessels is notably infrequent. This scarcity is particularly striking given that glazed bricks are a defining characteristic of royal Assyrian architecture (Reade, 1963: 38-47; Iravani Ghadim, et al., 2015: 15-20). Conversely, glazed pottery is prevalent in northern Syria, suggesting that its production was limited in this area, likely due to the forced relocation of its population to the core of the Assyrian empire (Jamieson, 2012: 37). The glazes sourced from eastern territories exhibit a matte blue to slightly green hue, while the paste colors range from light yellow to cream, with specimens discovered in the Zagros Mountains of Iran (Hassanzadeh, 2016). However, glazed decorations featuring floral patterns on the shoulders of necked jars have been found in the central and eastern Assyrian regions (Table 6: Row 44)[91]. Glazes were produced for both aesthetic and functional purposes, as they could provide a good seal for ceramic vessels.

Stamped or molded decoration: These patterns are created by using a mold on the vessel when it is not yet fully hardened. Several examples of molded decorations have been found in Shalmaneser Qal'at (Table 6: Row 43)[92].

Discussion and Analysis

Neo-Assyrian pottery has been identified through scientific excavations in the central and western regions of the Neo-Assyrian Empire, contributing to a detailed understanding of the stratigraphic sequence of this historical period (Iravani ghadim & Amirnejad, 2023: 97-123). This pottery can be classified into two main types: Standard Ware and Palace Ware. Standard Ware consisted of ordinary vessels used by common people, produced and utilized in various open-mouthed and closed-mouthed forms, along with their subsets. Generally, this type of pottery comprised a mixture of organic materials such as straw and plant fibers to mineral substances like sandstone, calcite, mica, and so on as temper.

Curtis believed that the standard pottery of the Neo-Assyrian Empire, based on pottery from the western and central regions, contained a straw mixture as temper. He also suggested that sand and fine sand mixtures were

Table 6: Neo-Assyrian Palace Ware (Authors, 2022). ▼

References	Triple regions			Decorations	NO
	West	HeartLand	East		
Bonomo &Zaina, 2014, fig. 6; Curtis & Green, 1997, fig. 52; Hausleiter, 2010: Tafel 117; Curtis, 1989, Fig.36; Jamieson, 2012, fig. 3.30; Koliński, 2019, 257, PL.PP.020.1; Othman, 2018, pl. 60.	✱	✱	✱		40
Othman, 2018, pl. 61; Jamieson, 2012, fig. 3.29; Hausleiter, 1999: fig. 6.	✱	✱	✱		41
Othman, 2018, pl. 61; Curtis & Green, 1997, fig. 52; Radner, et al., 2019, fig. G1.6.	✱	✱	✱		42
Curtis & Green, 1997, fig. 66; Schmidt, 1999, Abb. 6b; Jamieson, 2012, fig. 3.30; Curtis & Reade, 1995, fig. 57.	✱	✱	✱		43
Curtis & Green, 1997, fig. 38; Jamieson, 2012, fig. 3.29; Radner, et al., 2019, fig. G1.7; Jamieson, 1999, fig.7; Blaylock, 1999, fig. 11.	✱	✱	✱		44

used in later periods after the Neo-Assyrian period[93] (Curtis, 1989; Curtis & Green, 1997).

Palace Ware was mainly used by the ruling class and elites of Assyria unlike Standard Ware, which had general utility. Due to their distinctive features in form, these pottery items can be observed playing prominent roles in the Assyrian royal reliefs (Stronach, 2000).

This type of pottery exhibits five distinctive features, including thin walls, very fine-grained paste, uniform delicate color, low capacity, and impression of fingerprints. The characteristic form of this pottery includes necked bowls, jars, and angled bowls, which were primarily used for beverages and possibly in very limited instances for storing precious materials such as purified oil, perfumes, and resins (Hunt, 2015: 89).

One of the main objectives and questions of this research is related to the presence of Assyrian pottery in the western and northwestern Zagros region. Therefore, it is necessary to first investigate the presence of Assyrians in this area.

The written sources of the Assyrian Empire indicate that Assyrian presence in the region has been continuous since the time of Tiglath-Pileser III (744-725 BC). They mention the presence of Assyrians among the Medes living in the Iranian plateau, referred to as “bēl āli,” meaning local

rulers or small city lords. They were considered poor people, incomparable to the urban centers of Mesopotamia.

Between 716 and 713 BC, more than 28 local Median rulers paid tribute to Sargon II, and governors of the provinces of Kiššim and Harhar which were responsible for controlling and collecting tribute from these rulers. According to sources, we know that this region was directly or indirectly administered by the empire for more than a century (Fuchs, 2017: 263). Archaeological evidence such as seals, ivory objects, and reliefs also testify to the presence of the Assyrians in the western regions of the Zagros (Radner, et al., 2020; Alibaigi, et al., 2023).

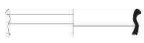
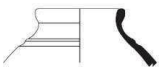
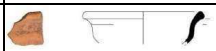
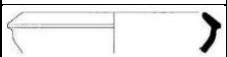
Despite textual and archaeological evidence, there has been no mention of Assyrian pottery in the region in the investigations and excavations conducted so far[94]. The lack of awareness and familiarity among Iranian researchers with Assyrian pottery could be one of the significant factors contributing to the failure to recognize these ceramics in archaeological studies in the western and northwestern Zagros region. Therefore, this research, as the first comprehensive study on recognizing Assyrian pottery in the West and Northwest of Iran, could be a valuable aid to active researchers in the western and northwestern Zagros region.

With the onset of archaeological excavations in the 2010s by Radner and Cooper in the Gerd-e Bazaar, Dinka, and Bestansur sites in the eastern regions of the empire, a limited comparison of Assyrian pottery with the Hasanlu IV site has been conducted. However, these studies have not extended to other areas in the west and northwest.

This research focused on the typology of Assyrian pottery in the Ziwiyeh, Hasanlu, Godin, Changbar Cemetery, Zindan-e Suleiman, Qaleh Jowshatooyi, Tel Bary, Berisu, and Garsh Tepe sites (Table 7: Rows 45-56) and the archaeological investigation of the Sanqur Plain, including the Molanabad Tepe, Morcheh Jar Tepe, and Ban Kini Tepe (Ghannbari, 2017, Fig 4-17. 19. 27). The results indicate the presence of Standard Assyrian Ware.

The selection of study areas was based on the settlements within the territories of the tribes residing in the western Zagros and the Mana territories. This is because there is conclusive evidence of Assyrian presence in these areas. Considering the Assyrian presence in the region, it is necessary to classify the pottery obtained. Pottery typology indicates that in terms of form, the pottery corresponds to the Assyrian type. Although the presence of Standard Assyrian Ware has been confirmed in the western and northwestern regions of the Zagros based on the findings of this research,

Table 7: Neo-Assyrian Standard Ware pottery in the west and northwest of Zagros (Authors, 2022). ▼

References	Pottery	References	Settlements	Pottery	NO
Schmidt, 1999, Abb. 6a; Algaze, 2012, fig. 25		Young, 1965. Fig3.	Ziwiyeh		45
Cooper, et al., 2012, fig.13.1; Curtis, 1989, fig. 24;		Danti, 2011. Fig. 18; Gopnik, 2000. Pl. 7.	Hasanlu, Godin		46
Pfälzner, 2016, pl. 9; Haller, 1954, Taf. 6; Green, 1999, fig. 6; Lumsden, 1999, fig. 5.		Danti, 2011. Fig. 18.	Hasanlu		47
Gavagnin, et al, 2016, fig 18; MacGinnis, et al, 2020, fig.29; Hausleiter, 1999, fig.5.		Danti, 2013. Fig. 4.2; Gopnik, 2000. Pl. 6.	Hasanlu, Godin		48
Radner, et al, 2019, fig. G1.4; Gavagnin, et al, 2016, fig 18; Oates, 1959, pl. XXXVIII; Bonacossi, et al, 2018, Fig. 41; Radner, et al, 2016, fig. D2.5; Hausleiter, 1999, fig.6.		Danti, 2013. Fig. 4.3; Gopnik, 2000. Pl. 1.	Hasanlu, Godin		49
Anastasio, 2010, pl. 59		Hassanzadeh, 2009, fig. 33.3	Changbar Cemetery		50
Othman, 2018, pl. 56.		Thomalsky, 2006, 251A 9.	Zindan-e Suleiman		51
Jamieson, 2012, fig. 3.4; Cooper, et al, 2012, fig. 13.1; Anastasio, 2010, 89, pl.6; Matney, et al, 2007, fig. 18d.		Gopnik, 2000. Pl. 8.	Godin		52
Radner, et al., 2019. Fig. G1.2		Mollazadeh, &Binandeh, 2021. Fig.10	Qaleh Jowshatooyi		53
Curtis, 1989, fig. 23; Anastasio, 2010. pl.6; Algaze, 2012.fig.24; fälzner, 2016. pl. 9.		Mollazadeh, &Binandeh, A. 2021. Fig.11	Qaleh Jowshatooyi		54
Othman, 2018, pl. 53-54.		Binandeh, et al, 2017. Fig 11.	Tel Bary		55
Radner, et al, 2016.fig D2.5; Cooper, et al, 2012, fig.13.1.		Binandeh, & Razmpoush, 2015. Fig. 6; Ahmadinia, et al. 2018-2019. Fig. 9	Berisu, and Garsh Tepe		56

so far, Palace Ware has not been discovered in the eastern regions of the empire and the western and northwestern regions of the Zagros.

Limited excavations in these areas could play a key role in the absence of Palace Ware findings. Additionally, the continuous presence of Assyria and the establishment of provincial centers, which indicate the presence of Assyrian elites as governors and high-ranking officials in the region (Rander, 2006; Morello, 2010), could be a reason for the existence of palace pottery.

Conclusion

Common and characteristic Assyrian pottery can be classified into two main groups: Standard Ware and Palace Ware. These are further subdivided into two primary types of vessels: open-mouthed and closed-mouthed. Standard open-mouthed Ware includes various types of simple bowls, angular bowls in different forms, phiale, and cups, while the closed-mouthed type consists of pots, jars, and pitchers. Standard Ware is wheel-made, with only limited examples of handmade jars. The pottery paste is composed of both organic and mineral materials, with larger vessels primarily using organic paste, while smaller and medium-sized ones contain more fine sand. The color of the pottery pastes ranges from buff, light red, gray, to brown, with slight variations in color compared to the paste. Decorations on standard pottery are rare, but examples of incised, added, glazed, stamped, and painted decorations can be found.

Palace Ware is emblematic of the empire. With the fall of the empire, the production of this pottery also ceases. It is very delicate and often referred to as eggshell pottery, with limited capacity, making it best suited for drinking vessels. Palace Ware typically has a buff paste color, with its surface primarily made of pottery paste.

In total, a study of pottery data from 43 sites within the imperial domain has classified them into two main types: Standard Ware and Palace Ware. Standard Ware comprises 30 subcategories, while Palace Ware consists of 9 subcategories. Additionally, the prominent and common decorations of Standard Ware have been classified into 5 decorative styles.

According to the findings of this research, it is possible to identify the Assyrian pottery indices based on tables 4 and 7 in western and northwestern Iran. Accordingly, 12 pottery types with Assyrian construction techniques and decorations can be introduced in the settlements of Hasanlu, Ziwiyeh, Godin, Changbar Cemetery, Qaleh Jowshatooyi, Tel Berisu, and some other settlements. These types undoubtedly have similar structures to

Assyrian specimens in the central and western regions of the empire, but the Palace Ware types and their specific decorations have not been found in the eastern regions of the empire and western and northwestern Iran.

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Observation Contribution

The authors of the article jointly participated in research and review, methodology and editing.

Conflict of Interest

The authors are sure of the originality of their work, declares that there is no conflict of interest.

Endnote

1. Haller, 1954; Miglus, 2000; Beuger, 2007; Hunt, 2014.
2. Lines, 1954; Oates, 1959; Hausleiter, 1999; Hunt, 2014; Hussein, et al., 2016.
3. Gavagnin, et al., 2016; Lumsden, 1999; Hunt, 2014.
4. Schmidt, 1999.
5. Beuger, 2007; Filipský, &Pavelka, 2008; Van Ess, et al., 2012.
6. Anastasio, 2008-2010.
7. Othman, 2018.
8. Lloyd, & Gokçe, 1953.
9. Curtis, 1989; Freestone & Hughes, 1989.
10. Postgate, et al., 1997.
11. Curtis, & Green, 1997.
12. Bretschneider, 1997.
13. Green, 1999.
14. Blaylock, 1999.
15. Jamieson, 1999-2012.
16. Müller, 1999.
17. Kreppner, 2006.
18. Matney, et al., 2007.
19. Bonomo, & Zaina, 2014.
20. Miglus, et al., 2011-2013.
21. Cooper, et al.2012.
22. Radner, et al., 2016.
23. Pappi, 2016.
24. Radner, et al., 2019-2016.
25. Koliński, 2019-2020; Koliński, et al., 2020.
26. MacGinnis, et al., 2020.
27. Bīt-Ḫamban (Radner 2006, 57); Ḫarḫar, Kar Šarrukīn (Morello, 2010); Parsua(š) (Tadmor 1994, 98 ; SAA VII 128); Kišessim, Kar Nergal (Reade 1995, 39; Fuchs 1994, 443); KārNabû, Kār-Sin, Kār-Adad, Kār-Ištar (Fuchs 1994).

28. 1000-600B.C.

29. The excavation of Quwakh Tapeh (Qabaq Tepe) in Kozran, Kermanshah, under the supervision of Alibaigi, is ongoing, but the Assyrian pottery of this settlement has not been published so far (Alibaigi, et al., 2023).

30. Young, 1965.

31. Goff, 1985.

32. Gopnik, 2000; Gopnik, & Rothmann, 2011.

33. Thomalsky, 2006.

34. Hassanzadeh, 2009- 2016.

35. Danti, 2011-2013.

36. Binandeh, et al., 2017.

37. Binandeh, 2021.

38. Ghanbari, 2017.

39. Binandeh, & Razmpoush, 2015.

40. Ahmadinia, et al., 2018-2019.

41. Studies of Neo-Assyrian Pottery from 1953 to 2020.

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43. Cooper, et al., 2012, fig.3.1; Jamieson, 2012, fig. 3.2; Miglus, et al., 2011, Taf. 1: d-e; Hausleiter, 1999, fig.2; Lumsden, 1999, fig. 4.1; Curtis, & Green, 1997, fig. 29; fig 35; Lines, 1954: Pl. XXXVII.

44. Gavagnin, et al, 2016, fig 18; Pfälzner, 2016, pl. 9; Cooper, et al, 2012, fig. 13.1; Van Ess, et al., 2012, pl. 11; Jamieson, 2012, fig. 3.4; Anastasio, 2010, Pl.6; Pl.8; Kreppner, 2006, Taf. 5, 10; Postgate, Et al, 1997, Pl. 56; Jamieson, 1999, fig.1; Green, 1999, fig. 8; Lumsden, 1999, fig. 4; Hausleiter, 1999, fig.4; Curtis, & Green, 1997, fig 35; Curtis, 1989, fig. 26; fig.28; Oates, 1959, pl. XXXV.

45. Pfälzner, 2016, pl. 9; Jamieson, 2012, fig. 3.4; Cooper, et al, 2012, fig. 13.1; Anastasio, 2010, 89, pl.6; Matney, et al, 2007, fig. 18d; Kreppner, 2006, taf. 4, 7; Schmidt, 1999, Abb. 6a; Lumsden, 1999, fig. 5; Jamieson, 1999, fig. 6; Bretschneider, 1997, Taf. II, I. Postgate, et al, 1997, Pl. 56; Curtis, 1989, fig. 27; Oates, 1959, pl. XXXV; Haller, 1954, Taf. 6; Lloyd, Gokçe, N., 1953, fig. 6.

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50. Anastasio, 2010, 97, pl.13; Gavagnin, et al, 2016, fig 18; Bonomo &Zaina, 2014, fig. 3; Jamieson, 2012, fig. 3.5; Blaylock, 1999, fig. 5; Oates, 1959, pl. XXXV; Coşkun, 2016, fig.5; fig. 2; Othman, 2018, pl. 38; pl. 39; Radner, Et al, 2016, fig. D2.3.

51. Bonacossi, et al, 2018, Fig. 41; Coşkun, 2016, fig.5; fig. 2; fig 4; fig 7; Othman, 2018, pl. 34; pl. 36; Kreppner, 2006, Taf. 48.4; Bonomo & Zaina, 2014, fig. 3.

52. Othman, 2018, pl. 35; Kreppner, 2006, Taf. 51; Jamieson, 2012, fig. 3.6.

53. Othman, 2018, pl. 35; Jamieson, 1999, fig. 1.

54. Radner, et al, 2016, fig. D2.2; Hausleiter, 2010, pl. 53: SF 8.3; Jamieson, 2012, fig. 3.6.

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3; Lumsden, 1999, fig. 5; Jamieson, 1999, fig. 1, 12; Miglus, Et al, 2000, Abb. 9k; 29c; 30f; Kreppner, 2006, Taf. 5, 9. Blaylock, 1999, fig. 5; Anastasio, 2010, 97, pl.10; Pfälzner, 2016, pl. 9; Haller, 1954, Taf. 6; Green, 1999, fig. 6.

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63. Oates, 1959, pl. XXXVI; Curtis, 1989, fig. 10, 33; Anastasio, 2010, pl.27; Jamieson, 1999, fig. 4, 1-2. 4-5; Jamieson, 2012, fig. 3.13.

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73. Othman, 2018, pl. 52; pl. 53; Bonomo & Zaina, F., 2014, fig. 6; fig. 8; Radner, et al, 2016, fig, D2.6; Kreppner, 2006, Taf. 11; Cooper, et al, 2012, fig.13.1; Gopnik, 2011, fig. 7; Algaze, 2012, fig. 24; Bonacossi, et al, 2018, Fig. 41.

74. Radner, et al, 2019, fig, G1.13; Jamieson, 2012, fig. 3.20; Hausleiter, 1999, fig.3; Blaylock, 1999, fig. 11; Gavagnin, et al, 2016, fig 18; Haller, 1954, Taf. 3f; Anastasio, 2010, Pl.24; Bonacossi, et al, 2018, Fig. 42; Radner, et al, 2016, fig, D2.5.

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93. According to the new archeological excavations in the central and eastern areas, the hypothesis of Curtis has been rejected.

94. The excavation of Quwakh Tapeh (Qabaq Tepe) in Kozran, Kermanshah, under the supervision of Alibaigi, is ongoing, but the Assyrian pottery of this settlement has not been published so far (Alibaigi, Et al., 2023).

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چکیده

امپراتوری آشورنو، یکی از مهم‌ترین قدرت‌های هزارهٔ اول پیش‌ازمیلاد در خاورمیانه باستان بود. یکی از شناخته‌شده‌ترین داده‌های باستان‌شناسی امپراتوری آشور نو، سفال‌های این دوره است. براساس مطالعات انجام‌شده، سفال‌های آشورنو در دو فرم اصلی سفال استاندارد و سفال کاخ طبقه‌بندی می‌شود. سفال‌های شاخص آشورنو از نظر فرم و کارکرد دارای خصوصیات مختص به خود است که آن‌را از سفال‌های ادوار قبل و بعداز آن متمایز می‌کند؛ این خصوصیات در هر منطقه از قلمرو گستردهٔ امپراتوری دارای ویژگی‌های خاصی است، به‌طوری‌که سفال‌های شاخص امپراتوری در قلمروی مرکزی با سفال‌های محلی درهم‌آمیخته و گونه‌ای منحصر ایجاد می‌کند که با سفال‌های بومی متفاوت بوده و ارتباط گونه‌شناسی مشخصی با سفال امپراتوری دارد؛ این آمیختگی سفال شاخص آشورنو با سفال‌های محلی این امکان را برای پژوهشگر ایجاد می‌کند تا بتواند درک درستی از حضور آشوریان در سراسر قلمرو امپراتوری داشته باشند. شناخت شاخص‌های سفال آشورنو در غرب و شمال‌غرب ایران مسأله اصلی این پژوهش می‌باشد؛ در این راستا، سفال‌های آشورنو در مناطق غربی، مرکزی و شرقی امپراتوری به‌صورت کتابخانه‌ای مورد مطالعه قرار خواهد گرفت و با گونه‌های سفالی محوطه‌های عصر آهن در غرب و شمال‌غرب ایران مورد مقایسه قرار می‌گیرند تا به این پرسش‌ها پاسخ دهند که، سفال آشور نو در غرب و شمال‌غرب ایران دارای چه شاخص‌هایی است؟ سفال آشورنو در غرب و شمال‌غرب ایران در چه گونه‌هایی به‌دست آمده است؟ نتایج نشان می‌دهد که، سفال استاندارد آشورنو در مناطق غربی، مرکزی و شرقی شناسایی شده و سفال کاخ در مناطق شرقی به‌دست نیامده است؛ گونه‌شناسی و مقایسهٔ سفال‌های استاندارد آشورنو نشان می‌دهد که، این گونهٔ سفالی در غرب و شمال‌غرب ایران وجود دارد؛ از آنجا که شناخت سفال‌های آشور نو برای پژوهشگران عصر آهن در غرب و شمال‌غرب ایران دارای اهمیت بنیادین است. در این پژوهش الگوی گونه‌شناسی منظم و جامع از سفال‌های رایج و شاخص آشورنو تدوین گردیده است.

کلیدواژگان: سفال، آشورنو، غرب ایران، شمال‌غرب ایران.

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Examining the Settlement Patterns of Historical and Islamic Sites in the Western Margins of the Lut Desert

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Abstract

The western margins of the Lut Desert have long been a crucial hub for cultural exchange, owing to its distinctive geographical location. Dating back to the third millennium BC, Shahdad stands out as a key site in the archaeological studies of southeastern Iran. In 2011, a focused purposive survey was conducted to unveil the settlement patterns of historical and Islamic sites in the west of the Lut. The study successfully recorded 94 archaeological sites, including sites, architectural structures, cemeteries, troglodytic spaces, and rock art spanning from the 5th millennium BC to the late Islamic centuries. The primary aim of this research is to unravel how environmental and human factors shaped the distribution of these sites over time. The primary focus of the study is to analyze the spatial and temporal distribution of ancient sites in the Lut area, as well as the underlying factors shaping this particular pattern. Survey findings revealed that 70 sites were associated with historical and Islamic periods, contrasting with the predominantly prehistoric origins of the others. Furthermore, the research delved into the spatial distribution of historical and Islamic settlements across the cultural landscape of the Lut Desert. It emerged that the Shahdad alluvial fan, stretching along the desert's western edge from north to northeast, served as a dynamic crossroad facilitating exchange from the historical period to the late Islamic centuries, profoundly impacting the evolution and distribution of settlements in the area.

Keywords: Western Margin of Lut Desert, Historical Period, Islamic Period, Archaeological Sites.

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Introduction

There are significant settlements dating back from prehistory to the late Islamic centuries in the western margins of the Lut Desert. A systematic examination of the distribution and layout of historical and Islamic sites in this area is notably absent, prompting the initiation of this study. By conducting a thorough survey, the researchers aimed to address this gap by mapping out the temporal and spatial distribution of sites. In 2011, a comprehensive archaeological survey was carried out by the authors in the area, revealing a total of 94 archaeological sites, with 70 of them dated to historical and Islamic periods1 . This survey, authorized by the Cultural Heritage, Handicrafts, and Tourism Organization of Kerman Province, sought to uncover settlement patterns in the area, enriching the archaeological landscape of the area and completing the archaeological map of the country. Through this exploration, the researchers aimed to unveil the evolving settlement patterns over time and investigate the dynamic interplay between human communities and the natural environment across different historical periods. The urgency of this investigation stems from the glaring absence of any prior research on the distribution and settlement patterns of historical and Islamic sites in the western periphery of the Lut Desert.

Research Question and Hypothesis: The primary inquiry in the present study is as follows: how was the spatial and temporal distribution of historical and Islamic sites in the western margins of Lut Desert? and what factors influenced it? It is hypothesized that the prosperity of the area in the historical and Islamic periods continued on the alluvial fan of Shahdad, similar to prehistoric settlements, but to a different extent and quality. A systematic and comprehensive survey was undertaken to identify all archaeological sites in the region for the field component of the study. The functional analysis of the settlements was conducted utilizing various tools such as geographical maps, Google Earth images, and local information. The diversity of landscapes in the studied area required different approaches and methods depending on the location. A descriptive-analytical approach was taken, along with a comprehensive survey, to clarify the cultural landscape of the western margins of the desert. Different types of maps and GIS analyses were effectively used to achieve this goal. The project encompassed various stages including identification, documentation, utilization of GPS devices for geographical positioning, and the creation of topographic maps, plans, and sketches. Each site was meticulously detailed in terms of typology, stratigraphy, conservation evaluation, and

environmental status, with a specific emphasis on pottery sampling for relative dating purposes. Field data was collected, and site conditions were taken into account, encompassing surface findings, topography, and inter-site relationships to accurately delineate their spatial distribution. Archaeological sites located in Shahdad were denoted with the prefix (Shd), while those in Golbaf were marked with Gbf. The survey conducted in the western region encountered challenges such as landmines and security concerns. Additionally, the proximity to the Lut Desert presented obstacles, with drifting sand covering portions of the sites, necessitating thorough surveys for identification.

Research Background

Under the direction of Ahmad Mostoufi in the winter of 1967, the Geography Department at the University of Tehran discovered an ancient cemetery in the desert, located two kilometers east of Shahdad town. Following this, Ali Hakemi from the General Directorate of Archaeology and Public Culture conducted a series of archaeological excavations from 1969 to 1977 in Shahdad, an archaeological site dating back to the third millennium BC (Hakemi, 1997, 2006). After a decade and a half of suspension, in the first decade of the 21st century, explorations in the Shahdad plain continued for another four seasons under the supervision of Kaboli (Kaboli 1997, 2001, 2002). The excavations by Hakemi were concentrated in the cemetery of Shahdad, in the south of the area, leading to the identification of 383 graves. Exploration in the northern sector and residential area of the site was carried out by Kaboli, leading to the identification of residential architectural complexes. Within the framework of Hakemi's project, an Italian team conducted a brief archaeological survey in Shahdad, aiding in the identification of various sections and completing the city map (Salvatori & Vidale 1982). In the twelve seasons of excavation in this region, no archaeological survey had been conducted in the western margin of the Lut Desert until Nasir Eskandari's team performed a sampling survey in 2011 as part of the country's archaeological mapping project. This resulted in the documentation of 94 archaeological sites, with potsherds being the predominant findings. These findings played a significant role in advancing our understanding of the settlement phases and relative chronology.

The first relevant publication is an article by Hakemi (1973) entitled 'Excavations of the Lut (Discovery of Prehistoric Civilization in Khabis of Shahdad),' detailing the four seasons of excavation carried out at Shahdad between 1969 and 1973. Kaboli (1997) in a book titled 'Report

of the 10th season of excavation at ancient Shahdad,' details the 1997 excavation. Subsequently, Kaboli published reports on the eleventh and twelfth seasons of Shahdad excavations in two other books (Kaboli 2001, 2002). One notable publication related to the study area is Hakemi's (2006) book titled 'Archaeological Report of Eight Seasons of Survey and Excavation at Shahdad (Lut Plain),' which covers excavations of the Bronze Age remains from 1968 to 1975. Furthermore, in another study by Hakemi (1997), he briefly discussed the results of field works related to the Bronze Age at Shahdad. In recent studies, the research on 'Prehistoric Settlements in the Lut Desert, Southeast Iran' stands out for exploring how natural and cultural aspects intertwined during the Chalcolithic and Bronze Ages (Eskandari et al., 2016). Another noteworthy study by Eskandari & Mollasalehi (2016) titled 'Excavations at the Prehistoric Sites of Tepe Dehno and Tepe East Dehno, Shahdad, Southeastern Iran,' is one of the articles in the monograph dedicated to Mir Abedin Kaboli. Subsequently, Eskandari (2016) reported the survey results in two Chalcolithic and Bronze Age sites in 2011, along with an article titled 'A reappraisal of the chronology of the Chalcolithic Period in the SE of Iran: Absolute and relative chronology of Tepe Dehno and Tepe East Dehno, Shahdad,' suggesting a central role for Shahdad in the extensive network of exchanges in the third millennium BC in southwest Asia. As is evident from the overall research background, the focus of studies has been predominantly on the prehistoric period of the region, while the later periods have not been addressed as expected.

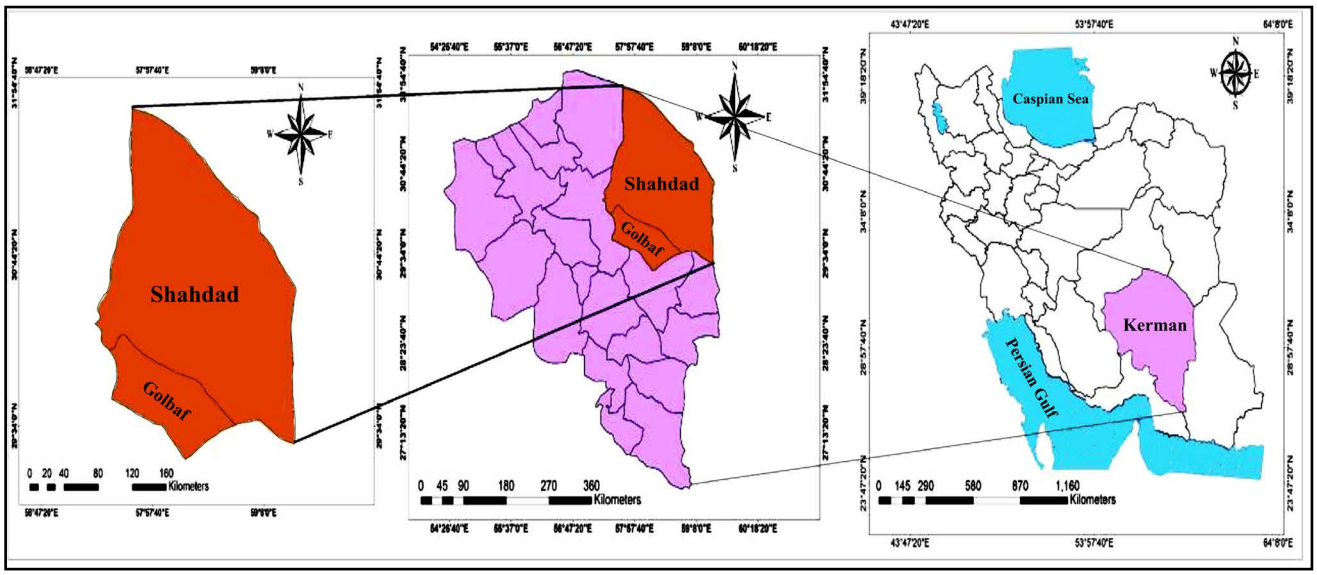
The geography of the area

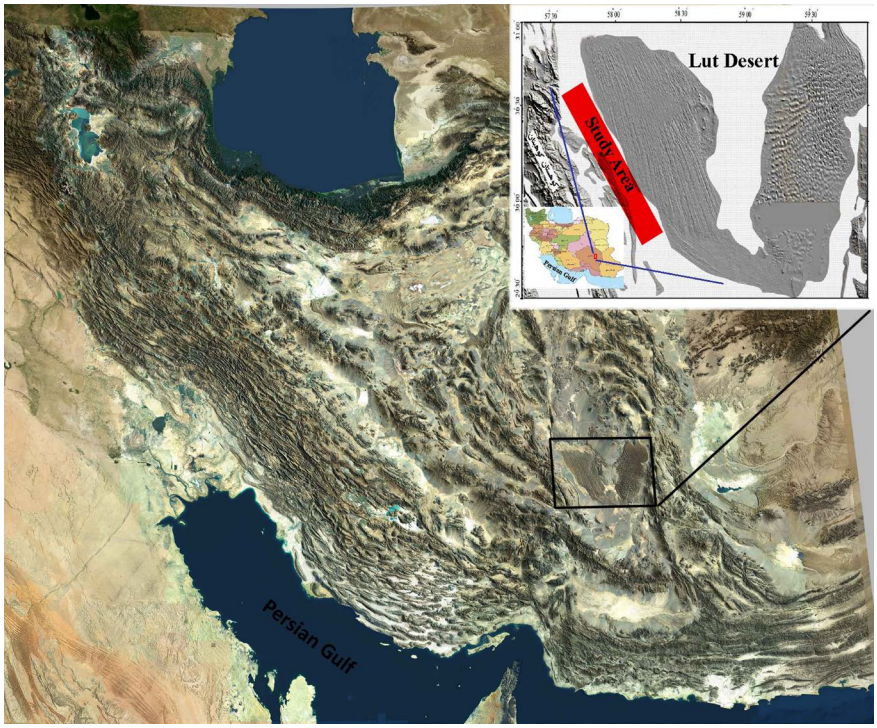
The area under investigation covers the western part of the Lut Desert in Kerman County, consisting of the northern parts of Shahdad and the southern parts of Golbaf (Fig. 1). Up to 50 years ago, these two parts used to form a single unit called Shahdad. The geographical scope includes the area between the eastern foothills of the Kerman mountains and the Lut Desert, covering an area equivalent to 4000 km2 (40 × 100 kilometers) (Fig. 2). The patterns of life, architectural styles, and spatial organization of ancient sites in this area have exhibited a diverse range over time, encompassing a variety of settlement sizes and types, from expansive to modest with some located near villages (caravanserais or forts) or situated in isolated settings (mausoleums or forts). According to Fig. 2, the plain located near the western edge of the Lut and the alluvial fan of Kuhbanan Mountain form the study area. The highlands in the western part, such as Sirch and Jaftan are over 3000 m high, while the altitude of the eastern part is less

than 400 m above the sea level. The western lands of the Lut are mostly devoid of vegetation cover, but in some eastern villages of the Shahdad plain such as Rudkhaneh, Mohammadiyeh, and Rashidabad, there is abundant vegetation cover. The vegetation of the northern part of Shahdad is bare, where rarely Ziziphus trees and Tamarisk bushes are visible. In the Kalut lands in the western edge of Lut, there are scattered bushes of tamarisk. In the valleys with water leading to the Kaluts, individual bushes of Astragalus are seen, which slowly vanish as one reach the desert at the base of the Kaluts. The plant types in the low-lying areas at the edge of Lut are generally halophytic (salt-tolerant plants), Haloxylon, Astragalus, while sagebrush (Artemisia) is seen in the highlands. The emergence and decline of Shahdad and neighboring areas are heavily influenced by environmental factors, trade networks, and the economic standing of the region.

The strategic position of Shahdad made it a key hub for trade between Sistan and Baluchestan, Kerman, and Khorasan (Mostoufi 1972: 57). However, despite its historical significance, the city's prosperity during historical and Islamic times paled in comparison to its prehistoric era. Islamic historians and geographers (see e.g., Qazvini 1994: 243; Maqdisi 1982: 680; Istakhri 1994: 246; Hamavi 2004: 269) have documented the cultivation of silkworms, berry trees, and dates in Shahdad, as well as the presence of defensive walls and settlements with names like Guk, Kathrowa, Keshit, and Nask. Today, the historical ruins of walls and other structures from both pre-Islamic and Islamic periods are still visible.

Fig. 1: The location of Shahdad and Golbaf cities in the northeast of Kerman Province (Authors, 2011). ▼





◄ **Fig. 2: The geographical location of the study area in the western margin of the Lut Desert (red area) (Maghsoudi et al 2012, with modifications by the Authors).**

Results

An archaeological survey carried out in the western region of Lut, specifically in the Shahdad and Golbaf district of Kerman Province, unveiled a total of 94 sites spanning from the fifth millennium BC to the late Islamic centuries. Within these sites, 23 were classified as prehistoric, 12 as historical, and 59 as Islamic sites. It should be noted that some sites exhibited multiple periods; for instance, from the examination of 59 Islamic sites, 70 distinct time periods are recorded. The survey findings shed light on notable settlement fluctuations in the study area from prehistory to the late Islamic centuries. Prehistoric settlements dating back to the fifth to the second millennia BC have been previously explored and introduced in prior studies (Eskandari et al., 2016). Interestingly, Parthian and Sasanian settlements were found to be less prevalent compared to those from the post-Islamic and prehistoric eras. Conversely, the majority of sites discovered were from the Islamic period (early, middle, and especially, late centuries). Subsequent sections of this research will elucidate the evolution of settlements during the historical and Islamic periods.

Historical Periods

- Parthian Period

Among the historical sites in the western margins of Lut, only three sites, including Hematabad-e Paeen I (Takab village), Kazemabad Chaharfarsakh

(Sirch village), and Qal'eh Nask (Golbaf district) contain evidence of Parthian period (Table 1). Given the scattered and limited number of Parthian sites (Fig. 3), it is difficult to make any definite statements about settlement patterns in this period. The formation of settlements in the Parthian period in the Shahdad alluvial fan follows a similar pattern as other subsequent periods. The potsherds discovered from the sites are plain, predominantly in red and lateritious hues. Crafted through wheel-throwing techniques, these medium-sized vessels are well-fired, and filled with sand and fine sand. Some pieces feature incised decoration, with forms including bowls boasting either curved-out or inwardly rounded rims (Fig. 4). They are compared with the ceramics from the Chaharfarsakh in Nehbandan (Labaf Khaniki et al., 2021: 301, Fig. 5), Sarakhs plain (Behruzifar et al., 2021: 150, Fig. 2), Shahr Tapeh in Daregaz (Nami & Mousavinia, 2021: 182, Fig. 14), Sangsheer in Hamadan (Afshari & Naghshineh 2014), Bisotun (Alibeigi 2009; Rahbar 2003; Alizadeh 2002), and Rey (Kleiss 1987). Qal'eh Nask, a historical site from the Parthian period, features a 120x30 meter rectangular plan. Constructed with rubble, limestone, and plaster mortar, it was built in harmony with the natural form and rocky terrain of

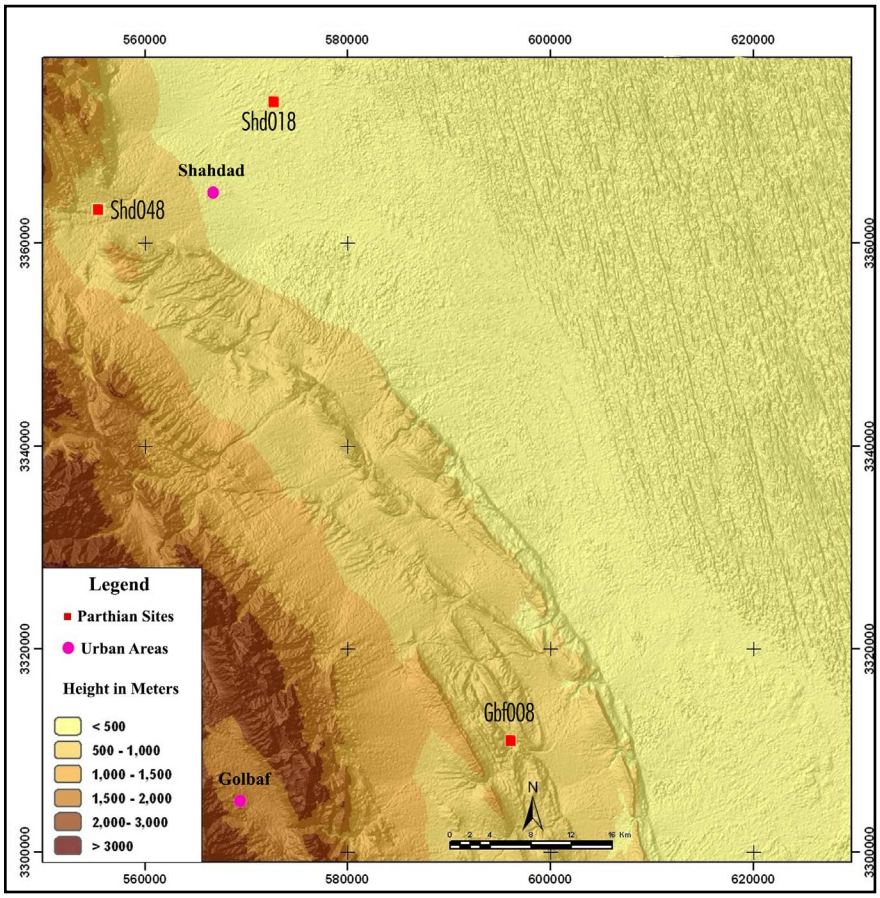
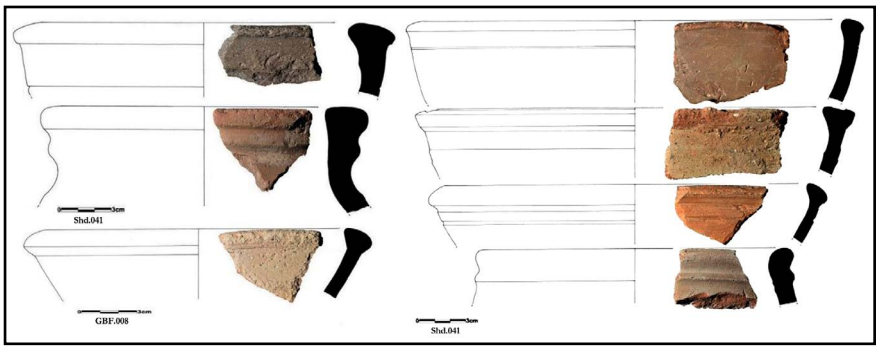


Fig. 3: Distribution of Parthian sites in the western margins of the Lut Desert (Authors 2022). ▶

No	Title	code	Location	E Longitude	N Latitude	Altitude
1	Hematabad-e Paeen I	Shd 018	Shahdad, Takab, Hematabad-e Paeen village	3374160m N	40R0574620m E	350
2	Kazemaba-e Chaharfarsakh	Shd 041	Shahdad, Sirch, Faizabad village	3367508m N	40R0547057m E	1530
3	Qal'eh Nask	Gbf 008	Golbaf, Keshit, Nask village	3301753m N	40R0591356m E	909

▲ Table 1: Location of Parthian sites in the Western Margins of the Lut Desert (Authors, 2011).



◄ Fig. 4: Parthian potsherds from Kazemabad-e Chaharfarsakh (Shd041) and Qal'eh Nask (Gbf008) (Authors, 2011).

the mountain where it is located. This east-west-oriented construction is rare architectural evidence from the Parthian period in the area.

- Sasanian Period

The findings of the sampling surveys in the studied region point to a greater significance of the Sasanian period and a higher number of sites attributed to this period compared to the Parthian period. As mentioned in the 'Karnamak-e Ardeshir Babakan', Ardeshir I campaigned in the area at the beginning of his reign, suggesting a shift in power dynamics with the Arsacid family as local rulers (Lukonin 2005: 51). However, scholarly debates continue regarding the specifics of territorial control, administrative structures, and political landscapes in Kerman, Sistan, and Baluchestan during this period. Through the investigation carried out in the Shahdad district, eleven sites related to the Sasanian period have been documented (Fig. 5). Situated along the trade and military path connecting Kerman and Khorasan (Ibn Khordadbeh 1992: 230), Shahdad experienced a period of economic growth during the Sasanian and early Islamic centuries, contrasting with its position during the Parthian period.

The development of Sasanian sites within the Shahdad alluvial fan is notable (Fig. 5). This region held significant importance during that time, leading to the connection of Sasanian Khabis (Shahdad) with Bam and Narmashir (in the south of Shahdad). Due to its strategic position and role in that period, the majority of structures in Shahdad were forts (Table 2), with the largest being the Qal'eh Kohne, measuring 800 x 350 meters. This fort served as the central hub of the settlement (Kaboli 1989: 82). Over

time, as security improved and settlements expanded beyond the fort's walls, it evolved into the nucleus of the city or village, as highlighted by Zarei & Heidari Babakamal (2014: 203).

Gowdiz Chahartaqi, a notable Sasanian-period find, is located in the Anduhjerd district, 20 kilometers south of Shahdad and one kilometer north of Anduhjerd Village. This square-plan structure measures 460×460 cm, with walls around 60 cm wide and four entrances in the cardinal directions, each 140 cm wide (Fig. 6).

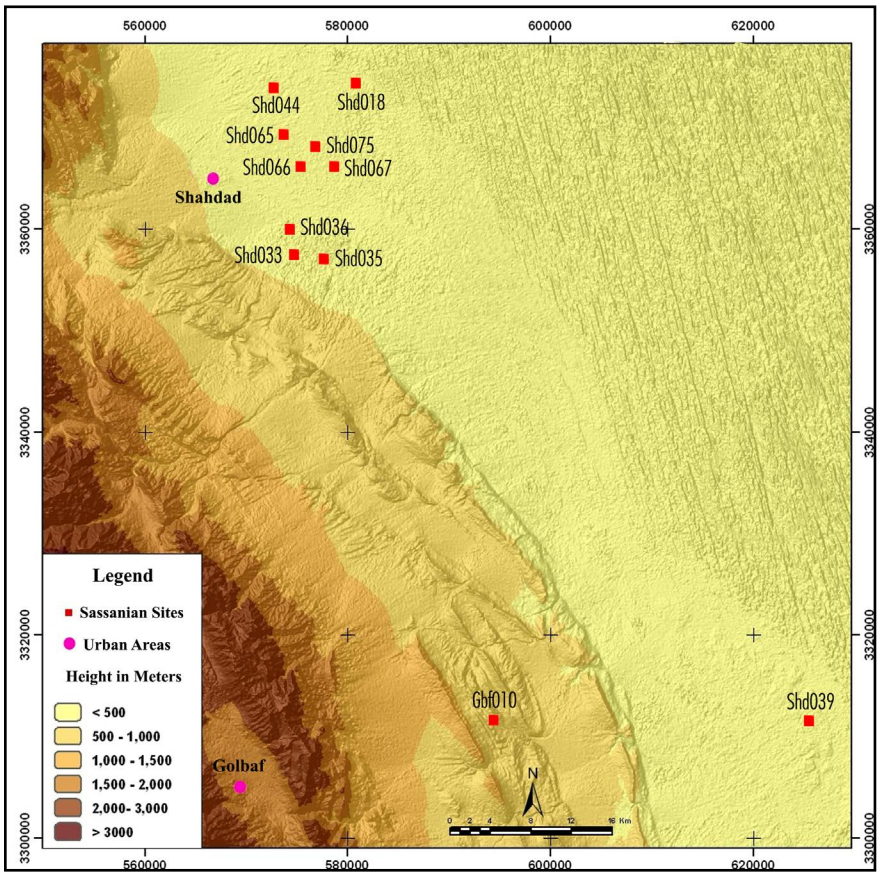
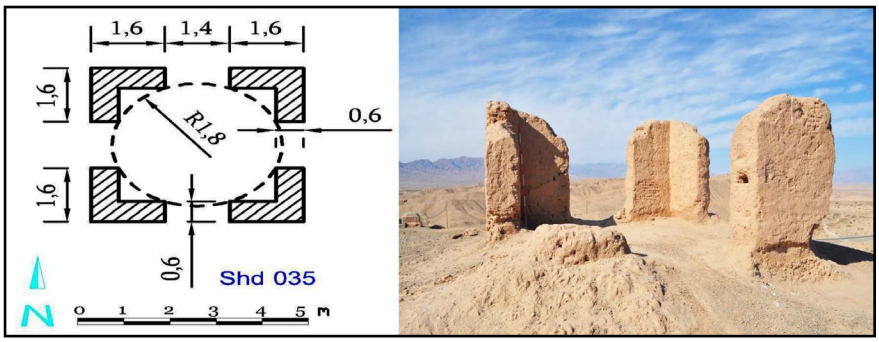


Fig. 5: Distribution of Sasanian sites in the western margins of the Lut Desert (Authors 2022). ▶

The collapsed walls lie in ruins around the structure, and the ceiling has entirely fallen in. The Chahartaqi construction style suggests it once featured a domed roof. The destruction of the Chahartaqi building seems to have been influenced not only by natural causes but also by human actions. The building was made of sun-dried bricks measuring 9×22×22 centimeters and coated with mud mortar. This four-sided structure, in terms of its plan, is comparable to the chahartaqi structures in Posht-e kouh, Luristan, except for the Se pa Chahartaqi in Ivan, which has a surrounding corridor around the central square (Vanden Berghe 1977). Moreover, this building bears a striking resemblance to similar structures in Fars, such as 'Naudaran'

and 'Konar siah' in Firuzabad, 'Malek, Tal-e Jangi, 'Khurma Yak', and Kazerun chahartaq, as well as Aliabad, Darabagh in Kerman (Vanden Berghe 1961), the temple B at Takht-e Soleyman (Navman 1995), and Tureng Tepe (Boucharlat 1979: 54). However, they differ in terms of size and the materials used. Considering the differences, the closest example in the plan to Gowdiz Chahartaqi is the Kazerun example, which even shares similarities in their pier. As observed, the studied examples of Bandian, Tureng Tepe, Takht-e Suleiman, and Navis are comparable to Gowdiz Chahartaqi and are possibly from the second half and the end of the Sasanian period. The potteries of Gowdiz are characterized by items that are either undecorated or adorned with zigzag or wavy geometric patterns. These pieces are wheel-made, of medium size, well-fired, filled with sand, and left unglazed. The vessels typically have inward-facing ribbed bowls as their form of edges. While most edges are left undecorated, some pieces feature zigzag decorations (Fig. 7). In terms of form, decorations, and technical characteristics, the potsherds closely resemble samples from Fars (Alden 1978), Khuzestan (Wenke 1975; Lecomte 1987; Eqbal 1976; Boucharlat & Labrousse 1979), south of the Iranian Plateau (Whitcomb 1987; Adams 1970), Tell Mahuz in northwest Mesopotamia (Venco Ricciardi 1970), and Qal'eh Yazdgird (Keall & Keall 1981).



◄ **Fig. 6: Plan and picture of Gowdiz chahartaqi (Authors, 2011).**

- Islamic Sites

Geographers and historians of the Islamic period (Qazvini, 1994: 244; Maqdisi 1982: 681; Istakhri 1994: 247) believed that the old city of Shahdad was destroyed due to floods, seasonal winds, and conflicts among tribes. From the eighth to the ninth centuries AH, this city faced a decline, but it saw a relative resurgence in prosperity during the Safavid period and beyond. It appears that its strategic location played a more significant role than economic factors in attracting attention to Shahdad and the western margins of the Lut during the Islamic period. Iranian rulers utilized well-established trade networks and secured the infrastructures strategically

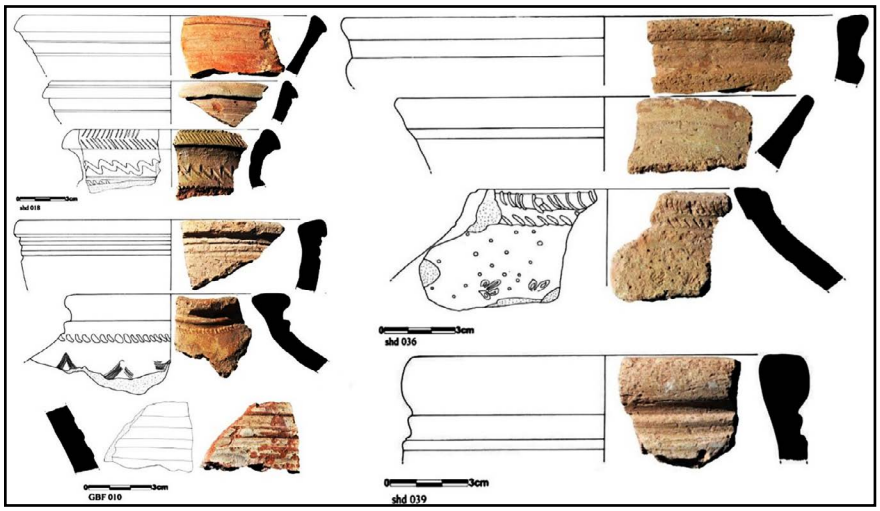


Fig. 7: Sasanian pottery (Shd018, Shd036, Shd039 and Gbf010) (Authors, 2011). ▶

Table 2: The location of Sasanian sites in the western margin of the Lut Desert (Authors, 2011). ▼

No	Title	Code	Location	East Longitude	North Latitude	Altitude
1	Qal'eh Kotkotu	Shd 033	Shahdad, Anduhjerd, Gowdiz Village	3355661m N	40R0566977m E	770
2	Gowdiz Chahartaqi	Shd 035	Shahdad, Anduhjerd, Anduhjerd Village	3355666m N	40R0566977m E	603
3	Qal'eh Dahane Taru	Shd 036	Shahdad, Anduhjerd, Anduhjerd Village	3357064 m N	40R0567878m E	598
4	Jahr Cemetery	Shd 039	Shahdad, Anduhjerd, Jahr Village	3330944m N	40R0594772m E	541
5	Qal'eh Ramouk	Shd 044	Shahdad, Central District	3377993m N	40R0560676m E	480
6	Qal'eh Choqouki	Shd 066	Shahdad, Central District	3364054m N	40R0569074m E	434
7	Qal'eh Kohne	Shd 075	Shahdad, Central District	3366084m N	40R0569038m E	416
8	Dastjerd Qal'eh	Shd 067	Shahdad, Central District	3363824m N	40R0569790m E	420
9	Kushk-e Ramouk	Shd 065	Shahdad, Central District	3369118m N	40R0567120m E	422
10	Hematabad-E Paeen I	Shd 018	Shahdad, Takab, Hematabade Paeen I	3374160m N	40R0574620m E	350
11	Dastkand Qal'eh Hashtadan	Gbf010	Golbaf, Jowshan, Hashtadan Village	3330560m N	40R0561043m E	1703

positioned along the routes, as crucial elements for triumph in their military expeditions to distant territories. Shahdad, with its advantageous location and efficient communication infrastructure, exemplified these vital attributes (Mostoufi 1972: 70; Najmi & Rafieezadeh 2002: 14). Based on this, the diversity and distribution of Islamic period sites in Shahdad are remarkable. Out of 72 Islamic sites, 46 are from the later Islamic centuries, 15 from the middle centuries, and 11 from the early Islamic centuries, with some sites encompassing multiple cultural periods (multi-period sites). Given that the majority of the recognized sites are situated along the edges of drifting sands, a significant number of these settlements have either been buried already or are on track to be buried soon, making their re-identification a formidable task (Fig. 8).

◄ Fig. 8: Examples of Islamic sites in the western margins of the Lut Desert buried under drifting sands (Authors, 2011).

- The Early Islamic Centuries

Subsequent to the collapse of the Sasanians and the Arab invasion of Kerman and Sistan (32 AH), Abdullah Ibin-e Amer traveled to Bam with the intention of subduing Khorasan. His army then proceeded to Khorasan via the Lut Desert. Along the way, Khabis (Shahdad2) was captured by this Arab general (Tabari 1975: 213). Remains of forts (e.g., Kushk-e Ramouk and Qal'eh Choqouki), caravanserais, or houses in abandoned villages from the early or middle centuries of Islam show that the city was destroyed by floods several times during this period, and the people of Shahdad had to leave their houses.

Despite all the mentioned natural hazards, due to the economic and agricultural importance of Shahdad, the attention of many historians and geographers of the Islamic period has been drawn to this area. In Masalik va Mamalik (1994: 246), Istakhri mentioned Khabis as one of the small cities by the desert and described it as having enough water, many trees, and affordable prices. Qazvini (1994: 243) and Moqdisi (1982: 680) have discussed the favorable hue and superior quality of henna originating from Khabis, as well as the plentiful palm groves and exceptional dates found in the district. Maqdisi (1982: 684) has also named the smaller towns of Khabis as Nask, Keshid, and Kouk Kathrowa and added '… Khabis has a fort with four entrances, good dates, and a vibrant society that uses the water of streams and qanats. The towns are next to the desert but prosperous. Known as a hub for dates and silk production, Khabis is also adorned with an abundance of berries.'2

In the early Abbasid era, trade caravans used to pass through the Lut Desert via Khabis and Mahan, near Kerman, heading towards Sirjan, which was a prominent city in southeastern Iran at that time. In the early 3rd century AH, Ibn Khordadbeh (1992: 231) mentioned a trade route from Fahraj to Nosratabad was almost the main corridor between Kerman and Zahedan, passing through the Lut towards the north. This route started from

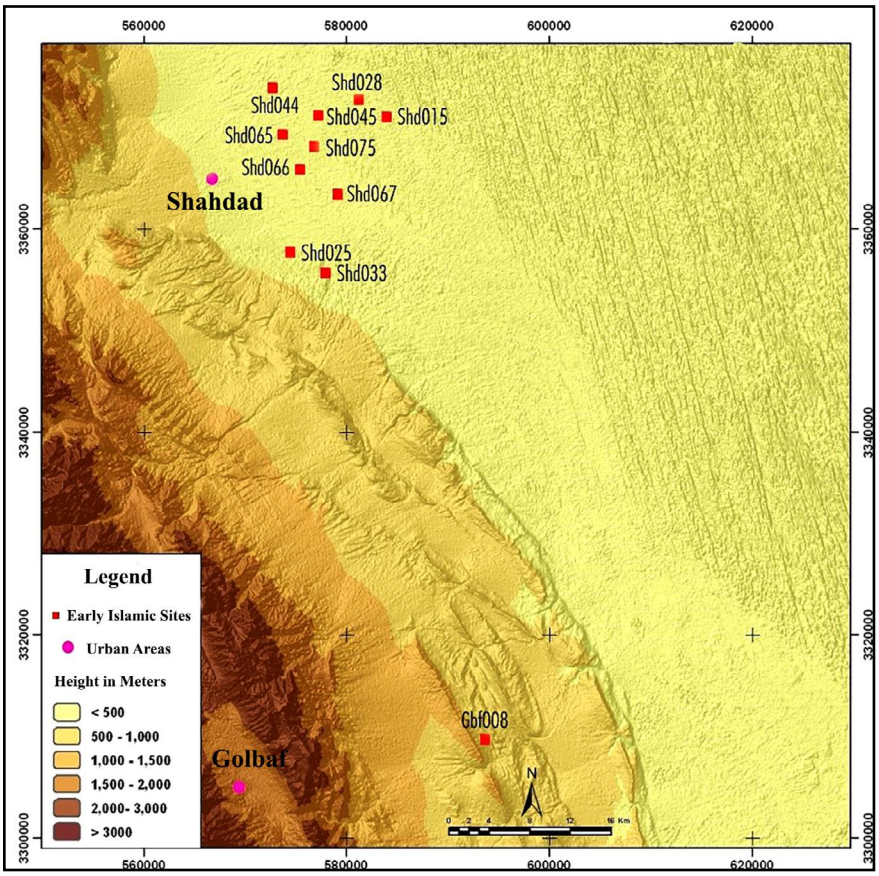


Fig. 9: Distribution of early Islamic sites in the western margins of the Lut (Authors 2022). ▶

Narmashir to Darestan, and finally reached Ras Al-Ma (same as Baluchab or Ab Shirinak). Mostoufi (1972: 367) also provided information about another road that extended from the above-mentioned route from Pay-e Kalut towards Keshit.

Eleven early Islamic sites display evidence of pottery, as depicted in Fig. 9 and Table 3. These sites were commonly found in conjunction with Sasanian settlements, suggesting a continuation of culture during the early Islamic era in the area. The early Islamic potteries from the 3rd and 4th centuries AH were wheel-made with a buff-colored fabric and sand temper. They were decorated with geometric and floral motifs in multi-colored brown and black, or single-colored brown, on a glaze coating referred to as Slip glaze or 'Gelabe-ie'. One specimen, with a Slip or Gelabe-ie glaze coating (Fig. 10, sample Shd015), featured inscriptions or inscription-like writing on the glazed surface, which had become unreadable due to degradation, resembling findings from Neyshabur excavations from the 3rd and 4th centuries AH (Wilkinson 1961: 102-115).

Samples adorned with Gelabe-ie glaze (motifs on a slip surface and covered by a transparent lead glaze) exhibit similarities to the potsherds unearthed from historical sites such as old (Choubak 2012: 105, plate 27),

Table 3: Location of the early Islamic sites in the western margins of the Lut Desert (Authors, 2011). ▼

No	Site	Code	Location	East Longitude	North Latitude	Altitude
1	Hojjatabad	Shd 015	Shahdad, Takab, Hojjatabad Village	3375651m N	40R0574475m E	347
2	Shahr-E Mohreiye Rudkhane	Shd 025	Shahdad, Takab, Rudkhaneh Village	3355666m N	40R0566977m E	330
3	Dehno Village Site	Shd 028	Shahdad, Takab, Dehno Village	3377292 m N	40R0572293m E	350
4	Shahr-E Islami Shahdad	Shd 045	Shahdad, Central District	3372829m N	40R0564036m E	443
5	Qal'eh Ramuk	Shd 044	Shahdad, Central District	3377993m N	40R0560676m E	480
6	Kushk-E Ramouk	Shd 065	Shahdad, Central District	3369118m N	40R0567120m E	422
7	Qal'eh Choqouki	Shd 066	Shahdad, Central District	3364054m N	40R0569074m E	434
8	Dastjerd Qal'eh	Shd 067	Shahdad, Central District	3363824m N	40R0569790m E	420
9	Qal'eh Kohne	Shd 075	Shahdad, Central District	3366084m N	40R0569038m E	416
10	Qal'eh Kotkotu	Shd 033	Shahdad, Anduhjerd, Gowdiz Village	3355661m N	40R0566977m E	770
11	Qal'eh Nask	Gbf 008	Golbaf, Keshit, Nask Village	3301753 m N	40R0591356m E	909

Qal'eh Ardeshir, Kerman (Tahmasbizadeh et al a., 2022: 368, plate 11), Narmashir Plain, Kerman (Amirhajloo & Saqai 2019: 215), and the old city of Esfarayen (Zarei et al., 2016: 70, plates 9 & 10). The likelihood of an economic exchange during the early Islamic centuries can be attributed to the trade route linking Narmashir and the southern part of Shahdad, along with the shared pottery tradition observed in both regions. Additionally, the pottery samples show resemblance to pottery from Baluchestan (southern Makran) (Mousavi Haji et al., 2013: 130, plates 9 & 10), Siraf (Mason & Keall, 1991, Fig. 3: 536, P 60), and Ras al-Khaimah in Mesopotamia (Kennet 2009, Fig. 37, k434, p. 161, Fig. 39, k6129, P16).

- Middle Islamic Centuries

There are 15 middle Islamic sites in the western part of Lut, with 7 from the Seljuk period, 5 belonging to the Ilkhanid, and 3 to the Timurid period (Fig. 11 and Table 4). The recovered potteries include unglazed ware made with molded techniques and incised motifs. These wheel-made Seljuk potteries generally have buff-colored fabric with sand temper and decorated with

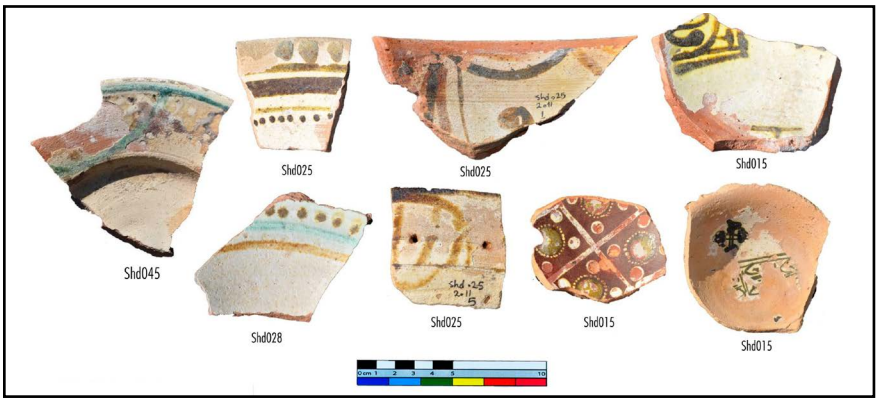
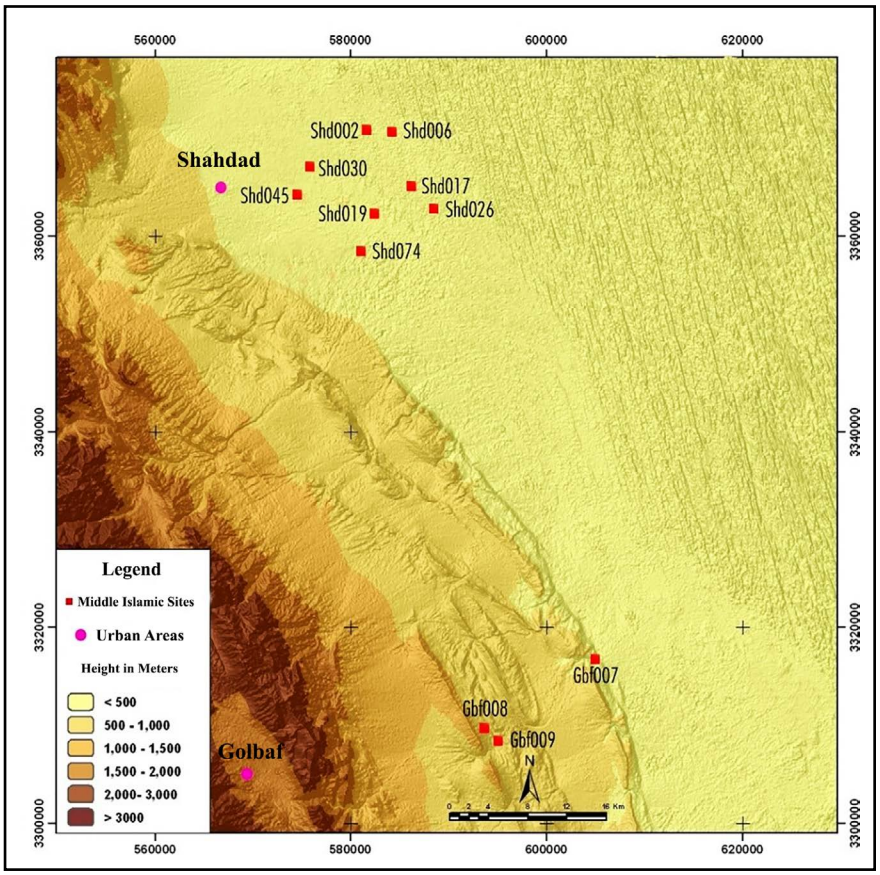


Fig. 10: Potsherds belonging to the early Islamic centuries as recovered from the survey (Authors, 2011). ▶

geometric and floral motifs. These samples are comparable to the molded ware of the 5th and 6th centuries AH from Jiroft (Choubak 2012: 103-104, plates 23 & 24), Qal'eh Sang, Sirjan (Amirhajloo & Sedighian 2020: 163, plate 5), Narmashir, Kerman (Amirhajloo & Saqai 2019: 213), and Dasht-e Gazak Rayen Kerman (Heidari Babakamal 2018).

Another important Seljuk type pottery is 'splashed glaze' ware with polychrome glaze, generally created with black, brown, and green colors sprinkled on a cream-colored background. These samples can be compared with splashed-glaze wares from Narmashir (Amirahajlo & Saqai 2017: 215), Dasht-e Gazak Rayen (Heidari Babakamal 2018), and samples from Neyshabur (Wilkinson 1963: Figs. 33 & 37) (Fig. 13). Among other types is turquoise black underglaze painted ware (Firouzeh Qalam Meshki) which is related to this period. They are typically wheel-made sand- and grit-tempered with buff

fabric. The painted decoration usually features geometric and floral motifs in black on a blue or white background. These pieces can be compared with the samples from Narmashir (Amirhajloo & Saqai 2017: 216), Qal'eh Sange, Sirjan (Amirhajloo & Sedghian 2019: 170, plate 7), Qal'eh Dokhtar, Kerman (Tahmasbizadeh b et al., 2022: 307, plate 7), Tous (Haddon 2011: 104), and Jahan Nama Palace, Isfahan (Shojaei 2018: 130, plate 6, No. 13-16). The Timurid samples are wheel-made, with buff and lateritious fabric, sand to grit temper, and decorated with black or turquoise blue motifs on a white glazed background (Fig. 12). According to the distribution map of the sites (Fig. 11), Shahdad had been more prosperous in the early Islamic centuries and the Sasanian period compared to the medieval centuries, and the distribution of sites confirms it. The environmental conditions and human factors have almost equally influenced the distribution of sites, so that a similar trend in the life and growth of settlements can be observed from the Sasanian period to the end of the middle Islamic Centuries.



◄ **Fig. 11: The distribution of middle Islamic sites in Shahdad (Authors 2022).**

The architectural structures from the Seljuk and Ilkhanid periods, such as mausoleums3 , indicate the importance of these types of monuments in the social background of the society over time. Two octagonal monuments, dated to the Seljuk and Ilkhanid periods and named 'Keshit' and 'Nask'—referred to as "Hashtdar or eight doors" among local residents- are among such evidence in the studied area (Zarei et al., 2014: 132-12) (Figs. 13 & 14).

- The Late Islamic Centuries

There are 46 sites with evidence from the late Islamic periods in the western margins of the Lut Desert (Fig. 15 and Table 5). Examples of blue and white pottery from the Safavid period have been discovered in 16 sites. The blue and white pottery features a white background adorned with geometric and floral motifs (similar to Chinese examples in some cases). These pieces are wheel-made with sand and grit temper. They bear resemblance to pottery findings from various locations such as Narmashir (Amirhajloo & Saqai, 2019, 216), Qal'eh Sang, Sirjan (Amirhajloo & Sedghian, 2020: 170, Plate 7), Ardabil (Pope 1981: 118), Kerman (Fehervari & Garner, 2000: 140), and Sar Qal'eh, Tehran (Nemati et al., 2020: 90, Plate 4) (Fig. 16). The

Table 4: The location of medieval Islamic sites in the western margins of the Lut (Authors, 2011). ▼

No	Site	Code	Location	East Longitude	North Latitude	Altitude
1	Posht-e Gozargah-e Abolfazl Site (Seljuk)	Shd 026	Shahdad, Takab, Rudkhaneh Village	3369087m N	40R0580168m E	312
2	Shahr-e Islami Shahdad (Seljuk)	Shd 045	Shahdad, Central District	3372829m N	40R0564036m E	443
3	Qal'eh Nask (Seljuk)	Gbf008	Golbaf, Keshit, Nask Village	3301753m N	40R0591356m E	330
4	Hashtdar Nask (Seljuk)	Gbf009	Golbaf, Keshit, Nask Village	3301406m N	40R0591404m E	930
5	Hematabad-e Paeen II (Seljuk-Ilkhanate)	Shd 019	Shahdad, Takab, Hematabad-E Paeen Village	3371976m N	40R0574053m E	356
6	Hasanabad Site (Seljuk-Ilkhanate)	Shd 030	Shahdad, Takab, Hasanabad Village	3379002m N	40R0566914m E	379
7	Dehseif Site (Seljuk-Ilkhanate)	Shd 002	Shahdad, Takab, West Of Dehseif Village	3387131m N	40R0568171m E	357
8	Pir Baba Mosafer Mausoleum (Aqous Building) (Ilkhanate)	Shd 074	Shahdad, Central District	3365863m N	40R0569377m E	416
9	Hashtdar-e Keshit (Ilkhanate?)	Gbf007	Golbaf, Keshit, Keshit Village	3302680m N	40R0609555m E	451
10	Shahr-e Mohreiye Dehseif (Timurid)	Shd 006	Shahdad, Takab, Dehseif	3387474m N	40R0570092m E	359
11	Akbarabad-E Bahri Site (Timurid)	Shd 017	Shahdad, Takab, Akbarabad-E Bahri	3373983m N	40R0579205m E	304

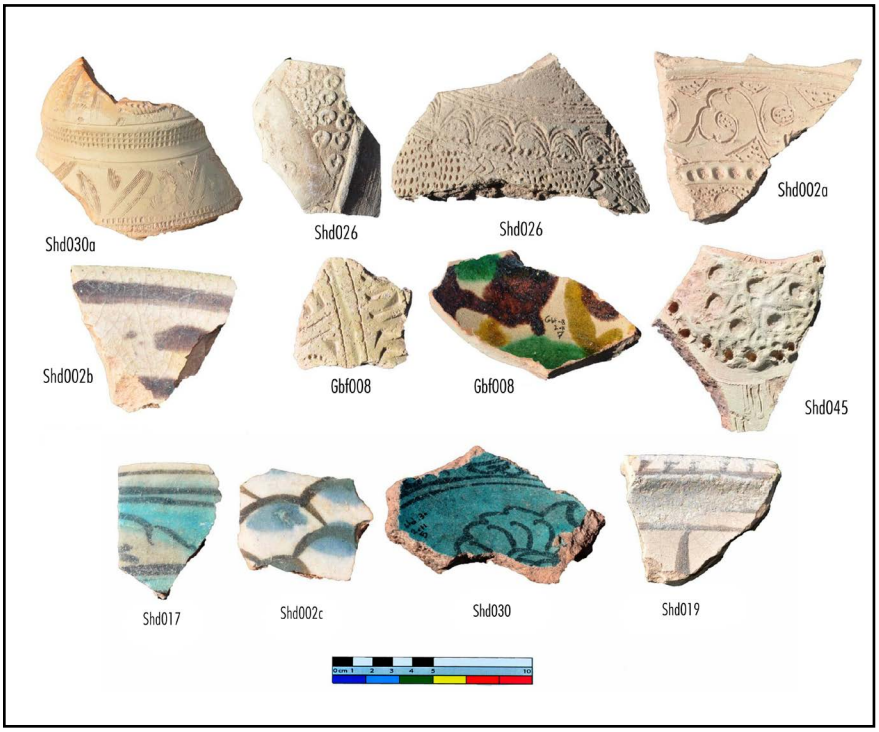
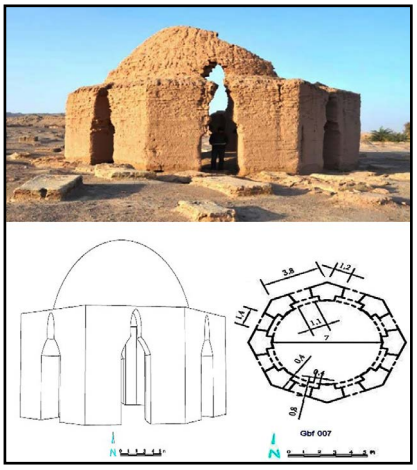


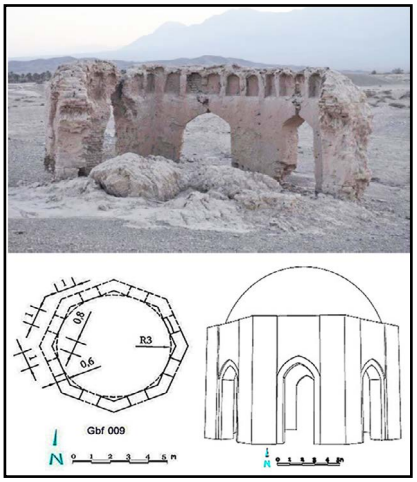
Fig. 12: The distinguished pottery samples dated to the Seljuk (Shd002a, Shd026, Shd030a, Shd045, Gbf008), Ilkhanid (Shd002b, Shd019, Shd030) and Timurid periods (Shd002c, Shd017) (Authors, 2011). ▶

analysis of the distribution pattern of settlements during the late Islamic centuries (Fig. 15) reveals the clear evidence of relative prosperity and the re-establishment of sites. The majority of these settlements took the form of forts, which also functioned as caravanserais. The refurbishment and multi-functional use of these structures during the Qajar period facilitated the passage of trade caravans from this area to Bam and Narmashir, as well as to the eastern areas in the north of Shahdad. Since the recent centuries have not witnessed the same level of prosperity and activity, the downward trend in Shahdad is expected to persist.

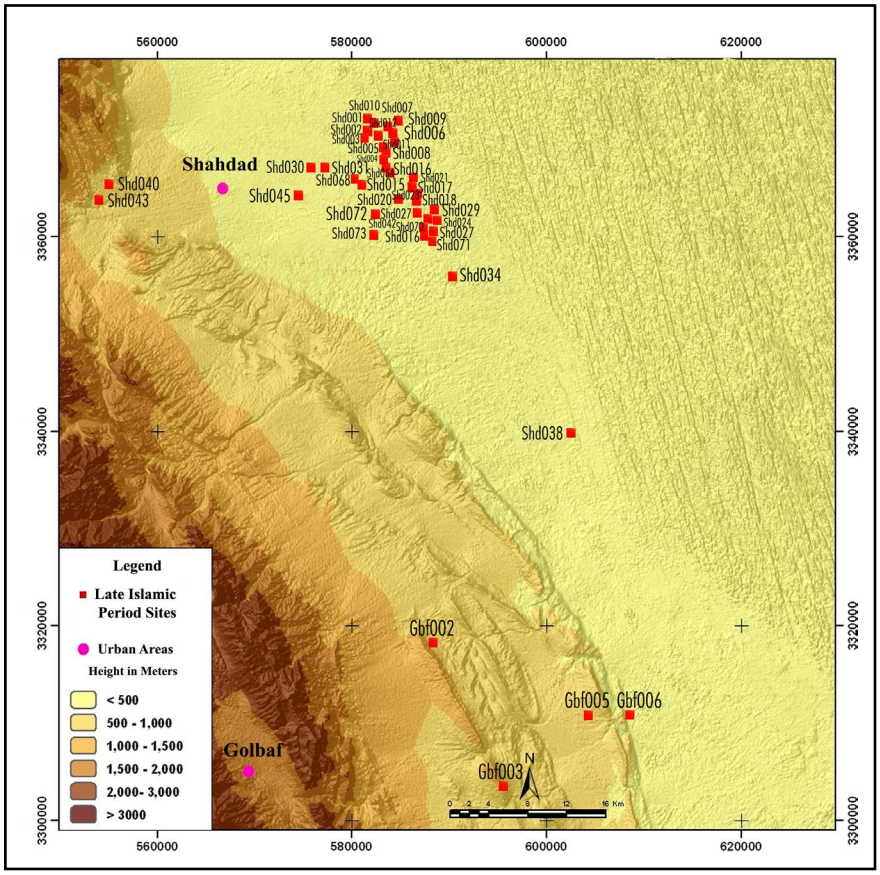
There are a total of 30 Islamic sites, with the majority of them, specifically 17, being forts. The prevalence of forts indicates the emphasis on enhancing communication and security for caravans in the later Islamic eras, particularly in the Qajar period. Shahdad and the surrounding areas of the Lut, which served as a trade route from Kerman to Khorasan, faced various security challenges during this period, prompting the construction of forts and defensive structures. The spatial distribution of these forts along the trade route further supports this assertion, with some of these structures still intact while others have been lost to time. Some areas are marked by the presence of ruined forts, which are the last remnants of the previous



▲ **Fig. 13: Top: The current situation of 'Hashtdar', Keshit. Down: Plan and the current restored profile of the building (Authors, 2011).**



▲ **Fig. 14: Top: The current situation of 'Hashtdar', Nask. Down: Plan and the current restored profile of the building (Authors, 2011).**



◄ **Fig. 15: The distribution of late Islamic period sites in the western margins of the Lut (Auhtors, 2022).**

Fig. 16: Blue and white pottery samples from the Safavid sites (Authors, 2011). ▶

Table 5: Location of late Islamic period sites in the western margin of Lut (Authors, 2011). ▼

No	Site	Code	Location	East Longitude	North Latitude	Altitude
1	Dehseif Site (Safavid)	Shd 002	Shahdad, Takab, west of Dehseif village	3387131m N	40R0568171m E	357
2	Shahr-e Mohreie, Dehseif (Safavid)	Shd 006	Shahdad, Takab, Dehseif village	3387474m N	40R0570092m E	359
3	Mahdiabad site (Safavid)	Shd 008	Shadad, Takab, Mahdiabad	3387735m N	40R0567179m E	387
4	Hojjadabad Site (Safavid)	Shd 015	Shahdad, Takab, Hojjatabad village	3375651m N	40R0574475m E	347
5	Safavid Structure of Shahre-e Mohreie	Shd 016	Shahdad, Takab, Hojjatabad village	3366315m N	40R0580884m E	328
6	Hematabad-e Paeen I (Safavi)	Shd 018	Shahdad, Takab, Hematabad-e Paeen I	3374160m N	40R0574620m E	350
7	Rashidabad site (Safavid)	Shd 020	Shahdad, Takab, Rashidabad village	3371265m N	40R0579348m E	305
8	Posht-e Gozargah-e Abolfazl (Safavid)	Shd 026	Shahdad, Takab, Rudkhaneh	3369087m N	40R0580168m E	312
9	(Shahr-e Mohreie Dehghazi (Safavid)	Shd 027	Shahdad, Takab, Rudkhaneh	3368509m N	40R0585520m E	291

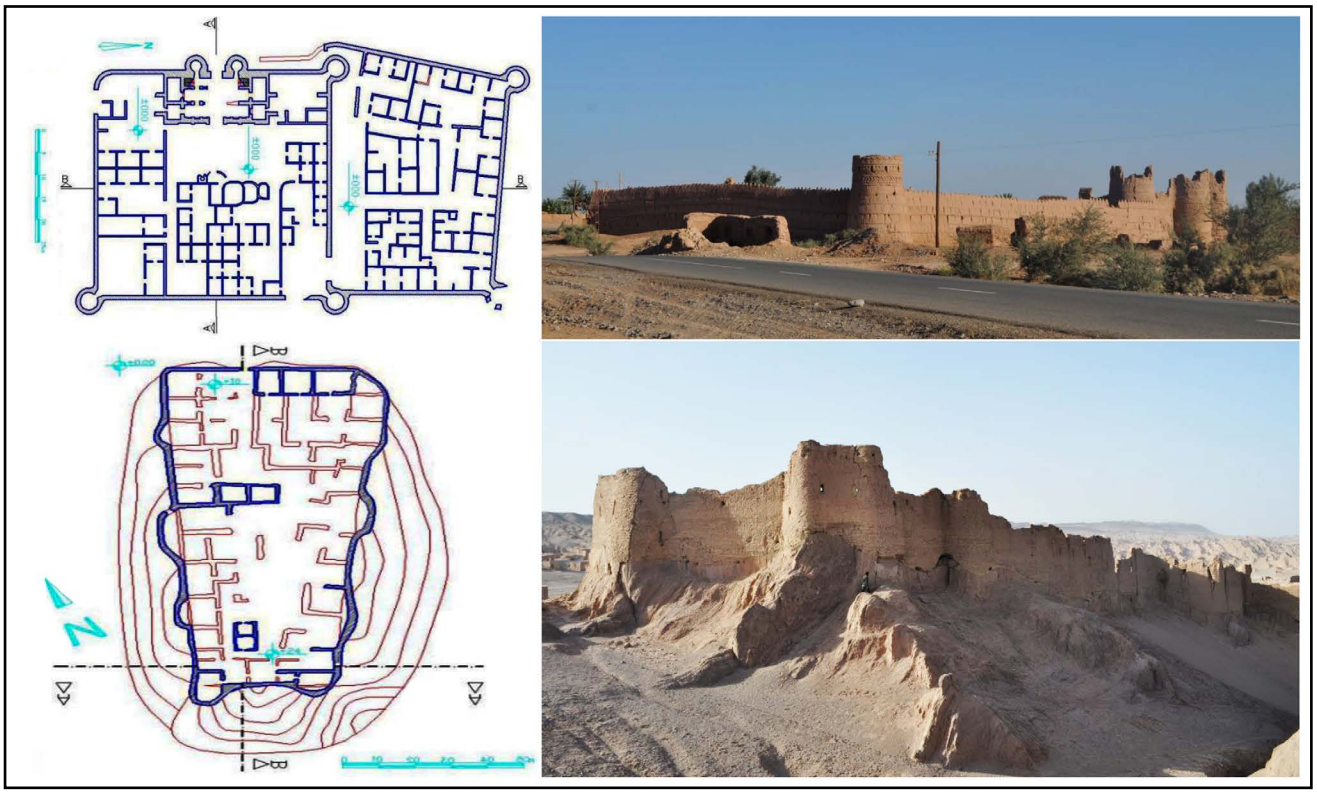
10	Hasanabad site (Safavid)	Shd 030	Shahdad, Takab, abandoned village of Hasanabad	3379002m N	40R0566914m E	379
11	Shd 031 (Safavid) S	Shd 031	Shahdad, Takab, Dehno	3376910m N	40R0568208m E	363
12	Shahr-e Eslami Shahdad (Safavid)	Shd 045	Shahdad, Central District	3372829m N	40R0564036m E	443
13	Carvansaraye Sangi Kashitouiye (Safavid)	Shd 043	Shahdad, Sirch, Bagh-e Houtak	3364012m N	40R0544512m E	1284
14	Kalaghun Cemetery (Safavid)	Gbf 002	Golbaf, Central District	3305704 m N	40R0572204m E	1719
15	Qal'eh Golbaf (Qal'eh Khandaq) (Safavid-Qajar)	Gbf 001	Golbaf, Central District	3305424 m N	40R0572136m E	1701
16	Qal'eh Sangi Hormak (Safavid-Qajar)	Gbf 003	Golbaf, Central District	3279439 m N	40R0588243m E	1313
17	Qal'eh Dehseif (Qajar)	Shd 001	Shahdad, Takab, Dehseif Village	3380399 m N	40R0574188m E	454
18	Qal'eh Shafiabad-e Paeen (Qajar)	Shd 005	Shahdad, Takab, Shafiabad Village	3386491 m N	40R0566855m E	382
19	Qal'eh Borj Mahdiabad	Shd 007	Shahdad, Takab, Mahdiabad village	3385082 m N	40R0570311m E	385
20	Ziyaratagah Qal'eh (Qajar)	Shd 009	Shahdad, Takab, North of Ziyaratagah village	3386966 m N	40R0568004m E	362
21	Qal'eh Hosseinabad (Qajar)	Shd 010	Shahdad, Takab, Hosseinabad village	3386966 m N	40R0568004m E	362
22	Qal'eh Houshangabad (Qajar)	Shd 013	Shahdad, Takab, Malekabad village	3384955 m N	40R0570794m E	359
23	Northern Shoja-abad Qal'eh (Qajar)	Shd 012	Shahdad, Takab, Northern Shoja-abad village	3381711 m N	40R0572887m E	338
24	Qal'eh Rashidabad (Qajar)	Shd 021	Shahdad, Takab, Rashidabad Village	3370658 m N	40R0577197m E	329
25	Qal'eh Rudkhaneh (Qajar)	Shd 023	Shahdad, Takab, Rudkhaneh village	3368695 m N	40R0580595m E	317
26	Qal'eh Mohammadabad-e Rudkhaneh	Shd 024	Shahdad, Takab, Rudkhaneh village	3369193 m N	40R0579435m E	324
27	Qal'eh Hasanabad (Qajar)	Shd 029	Shahdad, Takab, Hasanabad village	3380491 m N	40R0566571m E	385
28	Qal'eh Gowdiz (Qajar)	Shd 034	Shahdad, Anduhjerd, Gowdiz village	3349044 m N	40R0568997m E	785
29	Qal'eh Rudkhaneh Pashouiye (Qajar)	Shd 038	Shahdad, Anduhjerd, Pashouiye	3330763 m N	40R0594095m E	572
30	Qal'eh Feizabad-e Chaharfarsakh (Qajar)	Shd 040	Shahdad, Sirch, Feizabad Village	3367792 m N	40R0545405m E	1600
31	Shafiabad Caravanserai (Qajar)	Shd 004	Shahdad, Takab, Shafiabad village	3387314 m N	40R0567717m E	370
32	Malekabad Caravanserai I (Qajar)	Shd 011	Shahdad, Takab, North of Malekabad	3388309 m N	40R0569958m E	365
33	Malekabad Caravanserai I (Qajar)	Shd 012	Shahdad, Takab, North of Malekabad	3385270 m N	40R0571419m E	355
34	Shahdad Bazar (Qajar)	Shd 068	Shahdad, Central District	3365369 m N	40R0568133m E	439
35	Pir-e Saba Mausoleum (Qajar)	Shd 003	Shahdad, Takab, North of Dehseif village	3388382 m N	40R0565104m E	407
36	Imamzadeh-Zeyd Complex (Qajar)	Shd 064	Shahdad, Central District	3366013 m N	40R0568417m E	422

37	Bagh-e Houtak Bath of Chaharfarsakh (Qajar)	Shd 042	Shahdad, Takab, North of Houtak	3369513 m N	40R0545985m E	1900
38	Haj Amin cistern (Qajar)	Shd 070	Shahdad, Central District	3365494 m N	40R0568193m E	435
39	Haj Mohammad Taghi Cistern (Qajar)	Shd 071	Shahdad, Central District	3365033 m N	40R0567689m E	456
40	Sadeqi House (Qajar)	Shd 069	Shahdad, Central District	3365301 m N	40R0568129m E	441
41	Twin Water Mill	Shd 073	Shahdad, Central District	3361313m N	40R0566182m E	492
42	Shahdad Qadir Bath (Qajar)	Shd 072	Shahdad, Central District	3364064m N	40R0567369m E	465
43	Qale Keshit (Qajar)	Gbf005	Golbaf, Keshit, Keshit Village	3302967m N	40R0609686m E	441
44	Keshit Village (Qajar)	Gbf006	Golbaf, Keshit, Keshit Village	3302951m N	40R0609604m E	445

life. The defensive walls of certain forts in the region have been destroyed, leading to their demolition as the residential locations gradually covered by drifting sands. As a result, most settlements are concealed, with only the main forts or structures of greater heights remaining visible. Notable examples include Ghal'eh Shahr-e Shahdad, Qal'eh Keshit Golbaf, and Qal'eh Dehseif in Takab (Fig. 17). Nevertheless, the fortresses located in the western Lut Desert, along with the few remaining buildings in such conditions, have now become a safe haven for bandits. These people have made modifications to the buildings in order to protect themselves from both internal and external threats. Furthermore, environmental factors have also contributed to the deterioration of these structures. Out of the 13 other identified buildings, three caravanserais (which also functioned fortresses), two reservoirs, two baths, a marketplace, a historical village complex, a historical residence, a pair of water mills, and two tombs indicate a certain level of prosperity in Shahdad during the Qajar era. The fact that most of these buildings were still in use during the Pahlavi period suggests that similar circumstances persisted in Shahdad throughout the past century.

Discussion

Providing an opinion on the formation, distribution, growth, development, and decline of the areas under study is a challenging task due to various obstacles. Nonetheless, it is plausible to suggest certain hypotheses. The region is confronted with significant challenges such as the constant threat of shifting sands, severe wind erosion, and the vast expanse and notable insecurity of the area, all of which make conducting a thorough analysis difficult. An important consideration is that further archaeological exploration in the documented Islamic sites is largely unattainable due to the



▲ Fig. 17: Examples of documented forts in the archaeological survey. Top: Qal'eh Dehseif. Down. Qal'eh Keshit (Authors, 2011).

current environmental conditions. Furthermore, the region lacks substantial superimposition of in-situ cultural strata that could offer valuable insights for stratigraphy and dating purposes. Numerous archaeological sites have been affected by wind erosion, resulting in a decrease in their original height. The only remnants left behind are scattered potsherds, serving as the sole evidence of past human activities. Through the analysis of pottery fragments, a total of 72 sites with historical and Islamic significance have been identified. Out of these, 14 sites date back to historical periods, with 3 belonging to the Parthian era and 11 to the Sasanian era. The remaining 59 sites are attributed to the Islamic period, further categorized into various sub-periods. Specifically, there are 11 sites from the early Islamic centuries, 7 from the Seljuk period, 5 from the Ilkhanid period, 3 from the Timurid period, 16 from the Safavid period, and 30 from the Qajar period (Chart 1). These cultural discoveries are spread across the Takab region to Keshit and Pashitouiye, extending 80 km south of Shahdad. The graphical representation of these sites indicates a continuous growth and prosperity from the Sasanian era to the middle Islamic centuries.

Historical and archaeological evidence, along with the accounts of geographers and travelers, highlight the significance of the trade networks in Shahdad. In fact, the silence of sources regarding Shahdad during and after the Ilkhanid period is noticeable, indicating a lack of vitality in life

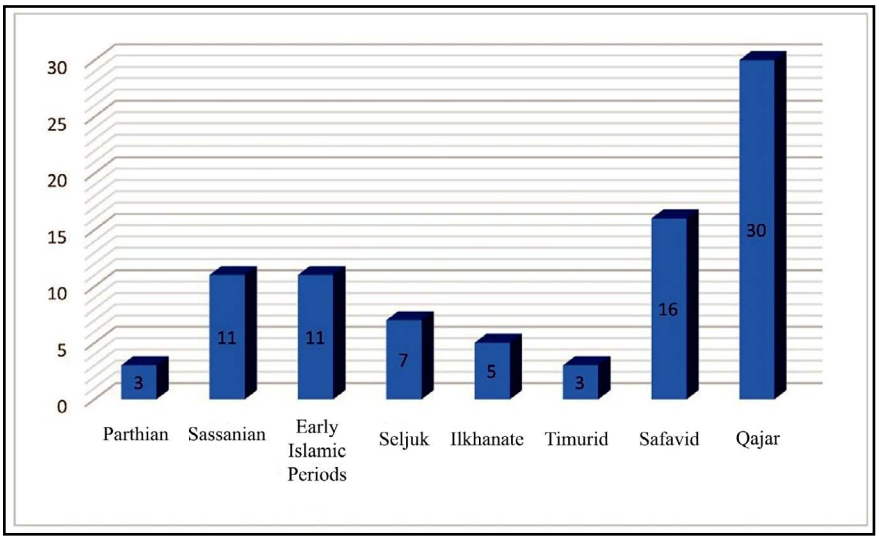
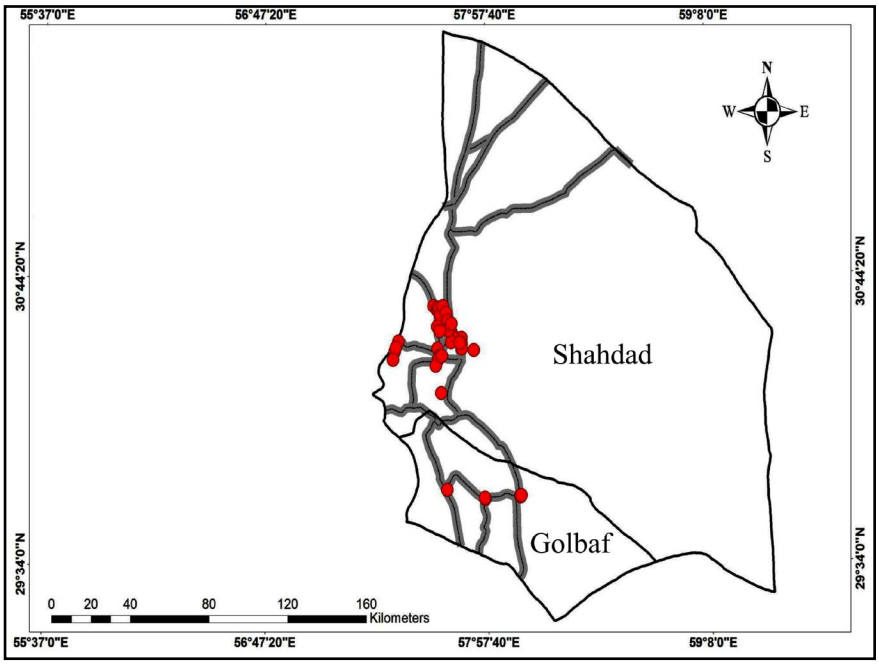
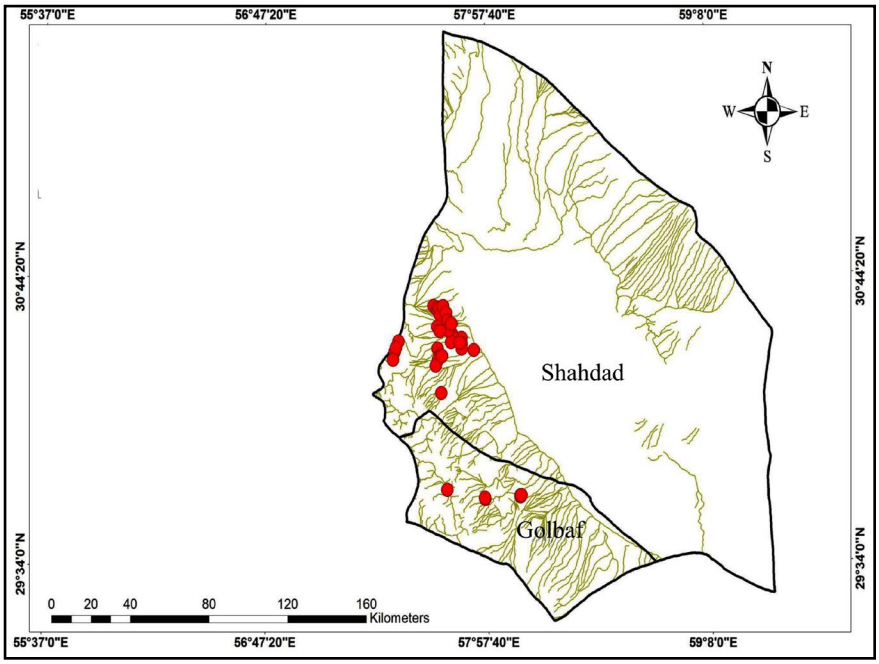


Chart 1: The frequency of historical and Islamic sites in the western margin of the Lut Desert (Authors, 2020) ◄

during the 8th and 9th centuries AH, which aligns with the results obtained from the field surveys. While the area experienced a decline after the Ilkhanid period with fewer settlements during the Timurid era, it saw a resurgence during the Safavid period. This revival was attributed to the Safavid rulers' focus on developing trade routes and ensuring caravan security, continuing through the Qajar period. These mentioned routes connected the south-eastern areas of Iran to the eastern and northern areas of Kerman. The region's connection to trade routes is evident through the numerous forts and caravanserais identified along these paths. The Qajar rulers concentrated on fortifying the western margins of the Lut Desert, emphasizing security and trade in the area. The map displaying these sites and their alignment with road maps effectively illustrates the strategic positioning of Islamic sites along trade routes (Fig. 18). An additional complex aspect highlighted in the examination of the western fringes of the Lut Desert is the method by which water provision is managed. The region of Shahdad and the western margins of the Lut Desert in Kerman province receive the lowest annual precipitation in the area, with approximately 30 to 46 millimeters and an average yearly temperature of 27.5 °C (Kerman Meteorological Organization, 2020). Ensuring water supply to this region has been crucial, despite the fact that historical climate conditions were more favorable compared to the present. Apart from utilizing qanats, the local population's water requirements are met through both permanent and seasonal rivers originating from the highlands to the west. The Shahdad alluvial fan acts as the primary water collection point in the area, fed by four springs at its highest point and flowing eastward across the plain. The abundant water supply and fertile soil in this area have facilitated the growth of Islamic and historical settlements (Fig. 19).



◄ Fig. 18: The alignment of historical and Islamic period sites with the trade routes of Shahdad and Golbaf (Authors, 2020).



◄ Fig. 19: Historical and Islamic sites in Shahdad alluvial fan in relation to the water's braided channels (Authors, 2020).

The combination of water availability and Shahdad's strategic location fueled the city's growth and prosperity from prehistory to the late Islamic centuries. Despite the region's reliance on water for sustenance, Shahdad and its neighboring villages face recurrent challenges from devastating floods. Sudden rainfall transforms numerous streams into destructive floods, leading to the repeated relocation of settlements over the centuries. This cycle of destruction and rebuilding highlights the ongoing struggle of Shahdad and its inhabitants against the forces of nature. While historical

texts do not address this matter, rounded boulders weighing from kilograms to tons in the region where streams descend from the Sirch and Jaftan mountains, approximately 1 km west of present-day Shahdad, suggests the risks associated with intense yearly rainfall and the occurrence of massive floods in the alluvial fan leading to Shahdad and its surrounding villages on the eastern side of the streams. The establishment and lack of prosperity in Shahdad and Golbaf are also influenced by sandstorms and the movement of drifting sands, causing destruction to settlements and rural residents' sources of income (e.g., their agricultural activities). This destruction often leads to the abandonment and migration of residents to more suitable areas, resulting in the disappearance of settlements over time. Only the remnants of sand-covered houses remain as evidence of these once-thriving communities (Fig. 20).

▲ Fig. 20: Abandonment and disappearance of settlements in the Lut Desert as a result of flowing sands (Authors, 2011).

Analyzing the spatial distribution of settlements in historical periods poses challenges due to the absence of a clear pattern in their establishment and the overall lack of settlements. This limits the ability to conduct a thorough analysis of their distribution. With the arrival of Islam in the region, although it is challenging to understand the growth and development of settlements, most settlements in Shahdad have been shaped near or connected to pre-Islamic settlements, particularly Sasanian heritage. Historical sources describe the continuity of life in the early Islamic centuries. However, during the middle centuries and from the Ilkhanid to the Safavid period, settlements experienced a decline due to

a lack of necessary conditions for growth and development. The Safavids and Qajars worked to control and secure trade routes and caravans, leading to relative prosperity in the late Islamic centuries. Along with all the mentioned political factors, the role of the Shahdad alluvial fan and access to water sources in different periods (located in the headwaters of Derakhtangan and the highlands of Sirch and Joftan) played a significant role in the establishment of settlements over time.

Conclusion

The archaeological research carried out in the Lut Desert demonstrates a change in the focal points of civilization, suggesting the emergence of fresh settlements as one moves from the Takab plain towards the western boundary of the desert, with the settlements becoming increasingly recent. Despite facing difficulties such as scarce water and vegetation, the early inhabitants of the Takab plain were compelled to migrate towards the desert's periphery where natural resources were more abundant. Indeed, the examination of prehistoric sites in conjunction with historical and Islamic records corroborates this finding. Due to the water supply in the Takab Plain being sourced from the western mountains, along with intermittent flooding of the riverbed and the encroachment of the desert to the west, the inhabitants of the plain were compelled to relocate towards the west. This situation led to the development of a unique settlement pattern characterized by a lack of hierarchy across different cultural periods, which subsequently influenced the distribution of settlements on the plain. For example, in Shahdad, newer sites have shifted approximately 7 kilometers from the locations where prehistoric people originally settled. This shift has connected these sites to communication routes leading to forts and caravanserais in the western margins over the past few centuries, leaving faint traces of past life in some settlements. Few Parthian sites in Shahdad have been identified through this study, with a notable increase in prosperity from the Sasanian period onwards. Despite facing natural challenges, settlements continued to exist until the Ilkhanid period. The relocation of the current Khabis settlement marked the final move endured by the region's inhabitants towards the end of the Ilkhanid period. The destruction of Shahdad settlements across various historical eras can be attributed to a combination of natural factors and human-induced threats, including strong winds, drifting sands, floods, extreme temperatures, and the lack of secure transportation routes. Furthermore, it was highlighted that the Shahdad alluvial fan, situated at the western boundary of the Lut Desert, along with the region's historical significance in terms of communication,

played crucial roles in shaping the growth and development of settlements in the area.

Endnote

1. Considering that some are multi-period, the overall number is more than the identified sites.
2. Dehkhoda (1998: 1282) stated: Located in the eastern region of Kerman, Khabis is surrounded by the Lut Desert to the north and east, while Narmashir and Bam lie to the south. The prevailing weather in this area is warm, and it has been renamed Shahdad.
3. Memorial monuments to house the deceased.

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Observation Contribution

Conceptualisation,methodology, investigation, writing original draft, writing review and editing,:Yadollah Heidari babakamal Funding acquisition, investigation, project administration, supervision: Nasir Eskandari.

Conflict of Interest

The authors declare that there are no conflict of interest.

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انجمن علمی باستان‌شناسی ایران

بررسی الگوی استقراری محوطه‌های دوران تاریخی و اسلامی حاشیهٔ غربی بیابان لوت

یداله حیدری‌باباکمال[I]، نصیر اسکندری[II]

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چکیده

حاشیهٔ غربی بیابان لوت، به‌لحاظ موقعیت جغرافیایی ویژه‌اش، از دیرباز نقش مهمی در تبادلات فرهنگی جوامع داشته است. وجود شهر شهداد -متعلق به هزارهٔ سوم پیش‌ازمیلاد- در این منطقه، بر اهمیت دشت لوت در مطالعات باستان‌شناسی جنوب‌شرق ایران گواهی می‌دهد؛ بدین‌سبب بود که در سال ۱۳۹۰هـ.ش. بررسی هدفمند باستان‌شناختی با هدف تعیین الگوی استقراری محوطه‌های دوران تاریخی و اسلامی در حاشیهٔ غربی دشت لوت آغاز گردید. دستاورد این بررسی، شناسایی ۹۴ اثر باستانی توسط نگارندگان مشتمل‌بر تپه‌ها، بناها، گورستان‌ها، دستکندها و نگارکندها از هزارهٔ پنجم پیش‌ازمیلاد تا دورهٔ متأخر اسلامی بود. هدف اصلی پژوهش میدانی، بدان‌دلیل بود تا الگوی استقراری محوطه‌های دوران تاریخی و اسلامی حاشیهٔ غربی دشت لوت را معیّن و نقش عوامل زیست‌محیطی و انسانی را در پراکنش محوطه‌ها بازیابی کند؛ در این‌راستا، پرسش اساسی پژوهش عبارت است از: توزیع مکانی و زمانی محوطه‌های باستانی در ادوار تاریخی و اسلامی در این منطقه از کشور چگونه بوده و از چه مؤلفه‌ها و عواملی تأثیر پذیرفته است؟ پس از اتمام بررسی روشمند منطقه مشخص گردید که مجموعاً ۷۲ اثر به ادوار تاریخی و اسلامی و بقیه به دوران پیش‌ازتاریخ تعلق داشتند. هم‌چنین، ضمن معرفی استقرارهای دوران تاریخی و اسلامی حاشیهٔ غربی دشت لوت، الگوی پراکنش آن‌ها در پهنهٔ فرهنگی بیابانی این‌دشت تحلیل شده است. نتایج پژوهش نشان می‌دهد که وجود مخروط‌افکنهٔ شهداد، شکل طولی حاشیهٔ غربی کویر لوت -شمال به شمال‌شرقی- و استمرار نقش ارتباطی منطقه از دوران تاریخی تا قرون متأخر اسلامی بر رشد و توسعهٔ سکونتگاه‌ها و الگوی استقراری زیستگاه‌ها تأثیر به‌سزایی داشته است. به‌نظر می‌رسد هم‌سو با استقرارهای پیش‌ازتاریخ حاشیهٔ غربی کویر لوت، رونق زندگی در ادوار تاریخی و اسلامی نیز برروی مخروط‌افکنهٔ شهداد تداوم داشته است؛ اگرچه این تداوم در دوره‌های موردمطالعه به یک‌میزان و کیفیت نبوده است.

کلیدواژگان: حاشیهٔ غربی بیابان لوت، دوران تاریخی، دوران اسلامی، محوطه‌های باستانی، بررسی باستان شناختی.

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Classification, Typology and Chronological Analysis of the Islamic Middle Ages Pottery from Robāt-e Āghāj, Khomeyn County

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Abstract

The troglodytic complex of Robāt-e Āghāj, nestled within a 50-meter-tall hill, holds great historical importance in Khomeyn County. The inaugural archaeological excavation season of this site occurred in 2015, unearthing a variety of architectural spaces and archaeological findings. Notably, the most abundant findings at this site consist of diverse unglazed and glazed potsherds belonging to the Islamic era. A diverse array of pottery types has been unearthed from the site, ranging from plain unglazed pieces to those adorned with impressed patterns, as well as pottery featuring incised and excised motifs, molded motifs, monochromatic glazed pottery, blue-and-white porcelain, lusterware, and enamelware. The significance of addressing these findings lies in the fact that all these types are linked to the Islamic Middle Ages, suggesting that they were crafted and employed during that specific era. Through the current research, a comparative source on medieval pottery in Markazi Province and Iran can be established. The primary focus of this study revolves around the comparative chronology of these pottery items and their potential production centers. Employing a descriptive-comparative method, data collection involves field surveys and desk research. The findings indicate that the majority of the potsherds discovered likely dates back to the 6th and 7th centuries AH. Furthermore, similarities were observed between these artifacts and those from production centers like Zolfabād, Moshkoye, Kāshān, and Ray, suggesting a possible exportation to Khomeyn, as archaeological studies have confirmed this claim. These similarities were also noted in historical sites such as troglodytic complexes at Tahyaq-e Khomeyn, Sāmen-e Malāyer, and Arzānfud in Hamadān.

Keywords: Pottery, Troglodytic of Robāt-e Āghāj, Khomeyn, Seljuk and Ilkhanid Periods.

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Introduction

Throughout history, the inhabitants of the Iranian Plateau have chosen different ways to live according to the climate, economic, political and social conditions. Given its position at the nexus of political and cultural interactions in the Middle East, Iran has faced periodic threats that have necessitated its population to adopt diverse living strategies to address these challenges. Doing so, the development of usually underground troglodytic complexes is a method that has been employed, with visible traces of such structures scattered across different areas of Iran. A notable instance of this can be identified in the location of the contemporary village of Robāt Āghāj, an associated village with Khomeyn County. Within this village, a historical mound (Tepe) stands, showcasing evidence of a fortress, as well as the presence of a subterranean troglodytic complex.

The examination of Robāt Āghāj Tepe in 2015, authorized by the Research Institute of Cultural Heritage & Tourism, facilitated the exploration of its architectural spaces (Montazarzohori, 2015). Following a surface survey and archaeological excavation, it was inferred that both the fortress and subterranean structures were utilized simultaneously. The excavation of the troglodytic complex unveiled a range of architectural spaces with distinct functions. Noteworthy archaeological discoveries, particularly various types of unglazed and glazed pottery dating back to the Islamic era, were uncovered within the site. The substantial quantity and diversity of pottery findings, in conjunction with other artifacts like decorative items linked to women, indicate a continuous habitation of the site. The primary focus of this study revolves around the diversity and abundance of clay findings at the site, along with the exploration of their comparative chronology. Furthermore, the research aims to investigate the connections of the site with other locations based on the pottery evidence and try to guess their potential production centers. The hypothesis posits that the potteries discovered at this site, much like other troglodytic sites in Markazi and Hamadan provinces, largely belonging to the Islamic Middle Ages and may have been brought to the region from nearby centers such as Kāshān and Ray.

Research Questions: What is the range of diversity and abundance of Robāt Āghāj Tepe pottery and how is its comparative chronology explained?

Research Method: The study presents the results of the description and classification of the pottery discoveries within the troglodytic complex of Robāt Āghāj in Khomeyn. Following the descriptive examination, the potsherds underwent comparative analysis. Initially, the potsherds

discovered at the site were attempted to be correlated with the study samples of similar pottery findings in Khomeyn, such as those in Tahyagh, from the same period, and subsequently assessed with the findings from other identified locations. Ultimately, the findings were described, compared, and analyzed by utilizing additional written resources through the library method. Consequently, the current research approach is descriptive-comparative, and the data collection method is based on field and library investigation.

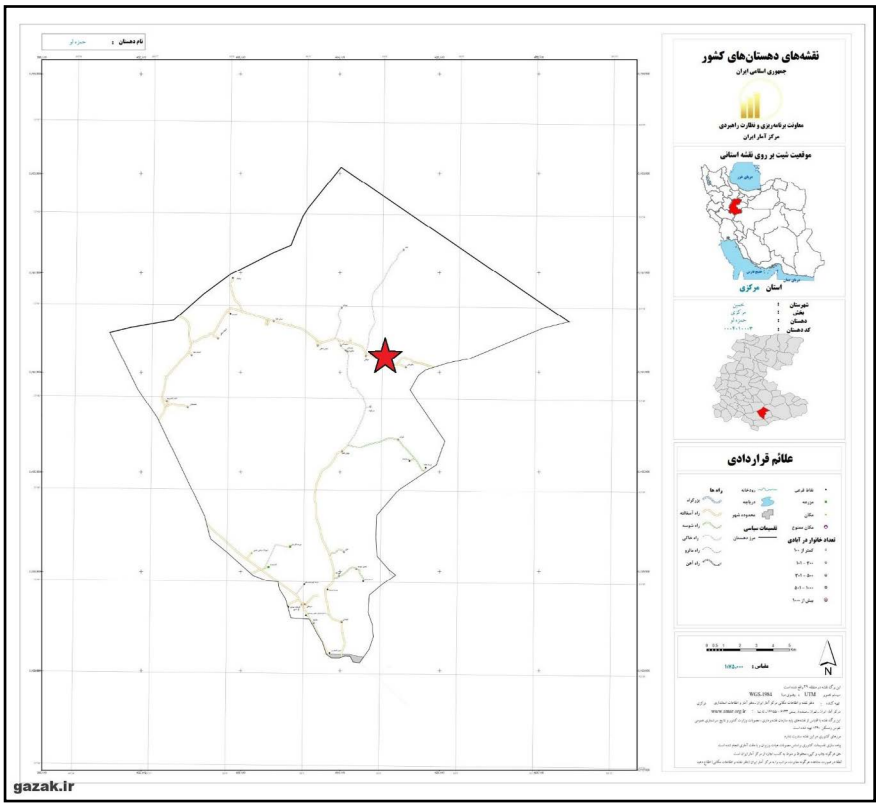
Research background

To date, minimal research has been conducted on the pottery unearthed in the troglodytic archaeological digs of Robāt Āghāj (Montazar Zohori, 2015). The Unpublished report of this site solely documents the potsherds recovered from the excavation, providing images and a table of technical-stylistic specifications. Furthermore, two separate studies have analyzed fragments of lusterware and enamelware pottery recovered from the excavation, determining the potential origin of these pieces through PIXIE analysis (Montazar Zohori, 2019 & Nikbakht & Montazer-Zohouri, 2021). With the exception of these cases, no other independent research has been conducted on the recovered potsherds, resulting in a lack of information about the different types of pottery from Robāt Āghāj prior to this research.

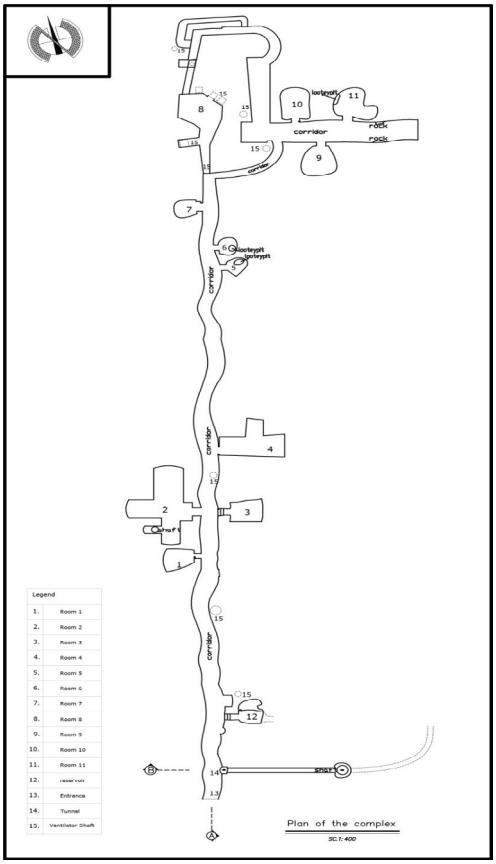
Introduction of the Site and Excavation in the Troglodytic Complex

Situated in the north of Robāt Āghāj village, within the Hamzehlu district of Khomeyn County, lies the troglodytic complex of Tepe Qale. This unique complex is nestled within a sandy mound that stands at an impressive height of 50 meters. At the summit of the Tepe, one can observe the remains of a defensive castle, clearly visible in aerial photographs showcasing its rectangular dimensions of 100 by 150 meters. Through excavations of the troglodytic architecture at Tepe Qale, it was discovered that the complex comprises two main corridors, one running from north to south and the other from east to west.

At the conclusion of the two mentioned corridors lies a narrow-arched passageway that connects them. A total of 12 rooms have been identified along the sides of these corridors, with rooms 5 and 6 likely serving as small storage areas due to their compact dimensions, while the remaining rooms were utilized as living spaces, each likely belonging to a distinct family (Montazar Zohori, 2015). The presence of various artifacts within these rooms, such as pottery of different varieties and unique objects like beads,



◄Map 1. The loacation of Robāt Āghāj village in Markazi Province (Cultural Heritage archive of Markazi Province).



◄ Fig. 1: Plan of the troglodyitic complex ar Tepe-e-Qale Robāt Āghāj village (Authors, 2022).

▲ Fig. 2: Samples of unglazed pottery from Robāt Āghāj with impressed patterns, incised and excised motifs (Authors, 2022).

glass fragments, bracelets, and metal items, serves as tangible evidence supporting this assertion. Additionally, the discovery of an adult female skull within room #1 of the north-south corridor raises questions about the reasons behind her burial in this specific location (Sołtysiak et al., 2017).

Unglazed pottery

During the initial phase of the archaeological dig at Robāt Āghāj, a diverse array of unglazed pottery was discovered. The pottery exhibited a paste that ranged in color from buff to red and brown, and predominantly featured a closed mouth shape. While the majority of the unglazed wares at this site were plain, there were occasional pieces that showcased decorative motifs and molded patterns. The majority of these artifacts were crafted using a pottery wheel, although a few samples were identified as handmade kitchen ware.

The kitchen ware found in the site is primarily found inside a few rooms space, these specimens are characterized by a smoky dark brown paste and a mineral mixture of grits and mica as temper. They are handmade and have a closed shape. Similar pottery can be seen in the troglodytic complex of Tahyaq-e Khomeyn from the 6th-7th century AH (Sharahi & Sedighian, 2019: p146, fig. 1). Additionally, Unpublished reports indicate that deposits from the 4th to 6th centuries AH at Palang-Gerd site in Islamabad-e Gharb and layers from the Islamic Middle Ages at the Laodicea in Hamadan share similarities with the kitchen ware recovered from Robāt Āghāj (Alibaigi, 2021: p38, no2 & p43, no12). Therefore, the kitchen ware of Robāt Āghāj can also be dated to the Islamic Middle Ages.

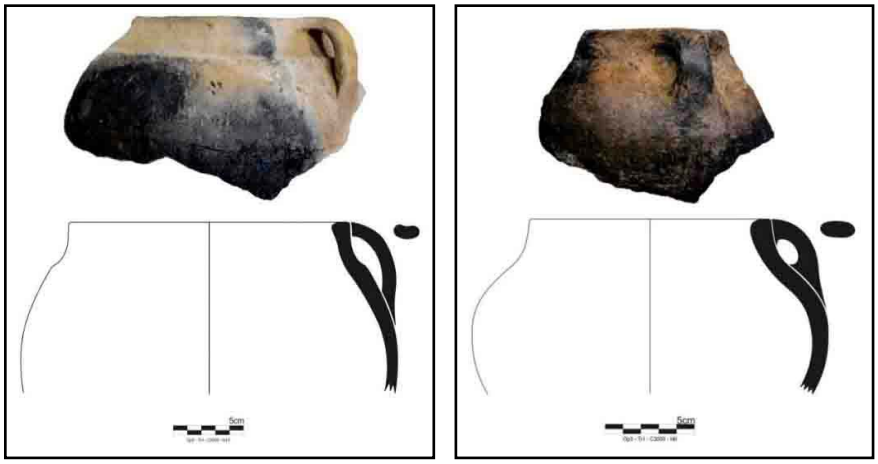


Fig. 3: Samples of kitchen ware from Robāt Āghāj (Authors, 2022). ▶

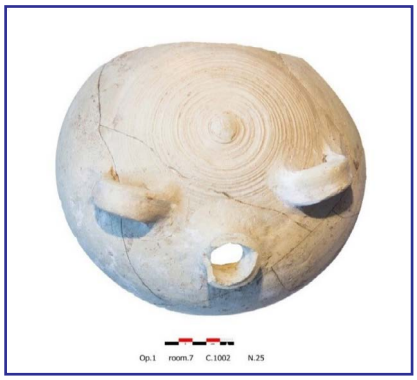
Another category of unglazed pottery discovered at the site consists of items featuring molded decorations. These artifacts were found in nearly all areas excavated at the site. They exhibit a closed form and were created

using a potter's wheel. Almost all the external surfaces of these pieces are adorned with distinct geometric molded decorations. These specimens bear a striking resemblance to the pottery recovered from the excavation of the troglodytic complex at Tahyaq Khomeyn, the Zolfabad site, Rayy, and Ojan site (Sharahi & Sedighian, 2019: p146, fiig12; Nemati, et.al. 2020: 132; Mahjour & et.al. 2011: 171; Velayati & et.al. 2019: 110). It is worth noting that the decoration of pottery with the molding technique was common in Iran mainly during the Seljuq period until the beginning of the Ilkhanid era and was produced in many centers such as Nishapur, Kāshān and Jiroft (Dezhamkhooy, 2007; Yuosefvand, 2015; Kambakhshfard, 1967: 350; Bahrami, 1992: 190; Chubak, 2012: 89; Wilkinson, 1959). This pottery which belongs to the Seljuk period was produced in the Markazi Province in sites such as Zolfabad and Moshkoye (Nemati et al., 2020; Mahjour & Sedighian, 2009). Therefore, due to the close similarity of the motifs of the molded samples of Rabat-Aghaj and Zolfabad, it is possible that the molded pottery of Rabat-Aghaj was produced in site such as Zolfabad.

◄ **Fig. 4: Samples of pottery with molded motifs obtained from Robāt Āghāj excavations (Authors, 2022).**

 Zolfabad, Seljuk era (Nemati et al., 2020)	 Ojan, Seljuk era (Velayati et al., 2019)	 Tahmigh-e Khomeyn troglodytic complex of 6-7th AH (Sharahi & Sedighian, 2019)

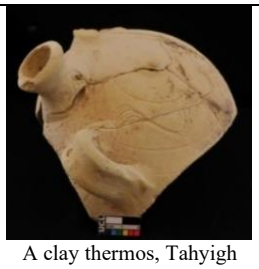
◄ **Table 1: Pottery from the other archaeological sites with molded decorations similar to Robāt Āghāj (Authors, 2022).**



▲ **Fig. 5: A clay thermos obtained from the Robāt Āghāj complex (Authors, 2022).**

The unglazed pottery discovered at this site, particularly in trench number 7, yielded fragments of a clay mug with dual handles on both sides. This thermos, composed of mineral temper and buff paste, features minimal decorations in the form of a comb-like motif encircling the vessel's midsection (belly). Although this style of pottery container is relatively uncommon in archaeological excavations from the Islamic era in Iran, similar examples have been found at sites such as Tahyaq Khomeyn and Tepe Sabz Poshan Nishapur, both dating back to the 6th-7th centuries AH (Sharahi & Sedighian, 2019: p146, fiig6 & Wilkinson, 1973: 323 & 352). Among other samples similar to this vessel obtained by non-scientific methods, it can be mentioned the flasks identified from the village of Farhadgerd in Fariman City and the Seljuk-period molded sample obtained from the Ali-Sadr Cave (URL1 & 2). It must be noted that the production of clay flasks in Iran started at least from the second millennium BC onwards and continued until the late Islamic centuries (Ghezelbash et al., 2016: 184).

Table 2. Several samples of thermos comparable to Robāt Āghāj (Authors, 2022). ▶

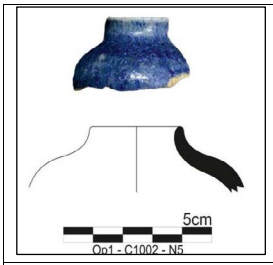
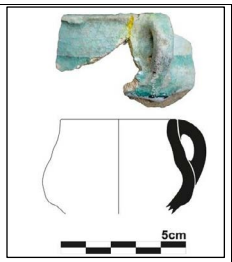
 A clay thermos obtained from Farhadgerd-e Fariman (URL 2)	 A clay thermos obtained from Ali Sadr Cave; Seljuk era (URL 1)	 A clay thermos, Tahyigh troglodytic complex; 6-7 AH

Glazed pottery

Robāt Āghāj's glazed pottery displays a wide range of motifs and decorations, making it the most diverse type of pottery found at the site. These artifacts have been discovered in various areas of the excavation site. Due to their significant diversity, they have been categorized into three subgroups: monochromatic glazed, painted underglaze, and painted on-glazed. Among these, the monochromatic glazed pottery is the most prevalent, with most samples featuring white frit paste, although some oil lamps are made from reddish clay paste.

1) Monochrome glazed pottery: The potsherds found at the site exhibit a wide range of forms, including both open and closed mouth varieties. While most of these items are crafted using a potter's wheel, it is believed that some clay oil lamps may have been handmade. Frit paste pottery comes in either turquoise or lapis lazuli colors, while clay paste pottery is available in turquoise and dark green hues. The majority of

monochromatic pottery discovered at this location is plain and undecorated, although some pieces feature incised or excised decorations, as well as one specimen with molded underglaze motifs, all of which showcase simple geometric decoration. Various potsherds resembling those described have been documented at numerous Islamic Middle Age sites in Iran. Examples include Amir-Sharloq Tepe in Shahrud (Zarei & Sharifi, 2019: 93), the Bozanjerd site in Hamedan (Rezaei, et.al, 2021: 27), Zinu-Abad in Hamedan (Mohammadi & Shabani, 2015: 144), Samen-e Malayer (Hemati Azandaryani, et.al. 2016: 195), Jurjan (Qaini, 2004: 48) and Qale-Sang Castle in Sirjan (Amirhajloo & Sedighian, 2020: 166). According to the published sources, such vessels were crafted in centers such as Moshkoyeh and Zolf-Abad Farahan (Mahjour & Sedighian, 2009: 112 & Nemati, et.al. 2012: 133). Among the monochromatic ceramics of Robāt Āghāj, parts of a small miniature vessel with simple turquoise color and frit paste were obtained. This utensil, which has an almost closed mouth shape, was probably used as an inkwell and oiler in the past. Similar samples can be seen among the findings of the Tahyaq of Khomeyn and Qale-Yelsui-e-Germi, which are dated to the 6th-7th century AH (Sharahi & Sedighian, 2019: 151; Tahmasbi, et.al. 2022: 129, No13 & URL7).

			Robāt Āghāj
 Miniature utensil (Yal Soei) (Tahmasebi et al., 2022)	 A molded underglazed fragment from Arzanfud, (Hemati Azandaryani & Khaksar, 2022)	 A potsherd of the 6-7 AH (Hemati Azandaryani et al., 2017)	Comparable evidence

◀Table 3: The monochromatic glazed pottery from Robāt Āghāj and some comparable specimens from the other sites (Authors, 2022).

Among the monochrome glazed pottery of the site, a number of tallow-burner have been identified, most of which have a frit paste. Samples of frit paste come in two colors, turquoise and lapis lazuli, and are made in two shapes, simple bowl or based (leggy). However, the samples of the clay paste have two colors, dark turquoise and dark green, and they are simply made in the form of a two-part tube with a base. It should be noted that the bowl-shaped oil lamp is one of the common forms of pottery in Iran, whose history goes back to the Achaemenid period (Rezazadeh,

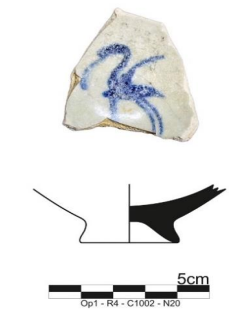
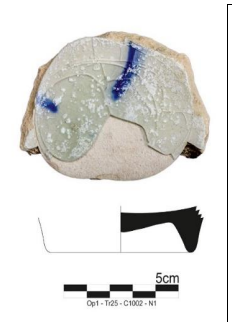
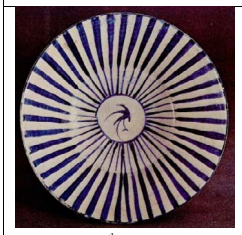
2020:120). Similar examples of these pottery have been identified in sites such as Troglodytic Structure of Tahyagh and Rayy city, which are dated to the 6th-7th centuries AH (Sharahi & Sedighian, 2019: 153-154; Treptow, 2007: 20).

Fig. 6: Samples of oil lamps obtained from troglodytic complex of Robāt Āghāj (Authors, 2022). ▶

2) Underglaze decorated ware: A different set of glazed pottery unearthed at the site comprises pieces featuring painted underglaze patterns. These specimens which are all made from frit paste exhibit diverse types and designs, including blue and white vessels, black painted decorations under a turquoise glaze, and silhouette ware. Detailed descriptions of each type are provided separately:

Blue and white ware: Numerous pottery fragments with white frit paste and blue and white linear designs in an open mouth shape were discovered during the excavations at Robāt Āghāj. It is important to highlight that the tradition of blue and white pottery decoration in Iran can be traced back to the early Islamic era, persisting until the later Islamic centuries. However, it was during the 6th and 7th centuries AH that this technique was innovatively combined with frit paste, featuring underglaze alkaline glaze drawn in linear patterns with various orientations (Salehi Kakgki, et.al. 2013: 4-5). According to the evidence obtained in archaeological excavations, it seems that this decorative method was produced in several

different centers such as Moshkoyeh in Saveh, Zulf-Abad in Farahan, Jurjan, Nishapur and Jiroft (Nouri Shadmahani, 2010; Nemati, et.al. 2012: 133; Mortrzaei, 2004: 64; Choubak, 2012: 94; Kiani, 1984: 48 & Wilkinson, 1973: 280). Similar artifacts have also been unearthed in Tahyaq in Khomeyn (Sharahi & Sedighian, 2019: 150), Qoroq Dasht in Hamedan (Rezaei, et.al, 2023: 225), Poinak in Varamin (Choubak, 1997: 54), Ardabil (Yousofi, 2006: 127), Bisotun (Klaise, 2006: 224) and Qale-Sang in Sirjan (Amirhajloo & Sedighian, 2020: 170), suggesting a widespread distribution throughout Iran. Within the collection of blue and white frit ware, there exists a piece of an open-mouth utensil painted underglaze with a bird motif resembling a stork. This particular motif was not frequently found in the blue and white ware of the Islamic Middle Ages. However, it has been discovered in sites such as Jurjan, the eastern region of Iran, and Zolf-Abad in Farahan. Several similar evidence of this specific find dates back to the late 6th to the 7th century AH (Murgan, 2005: 177; Nemati, 2019: 39 & Kiani, 1978: 249).

			Robāt Āghāj
 Jurjan, 7th century AH (Kiani 1978)	 Blue-white (linear) pottery produced in Rayy 7-6th centuries AH (Treptow, 2007)	 Blue-white (linear) pottery produced in Moshkoyeh 7-6th centuries AH (Mahjour & Sedighian, 2008)	Comparable items

◄ Table 4: Samples of blue-white decorated ware from Robāt Āghāj and some comparable items from the other archaeological sites (Authors, 2022).

Black painted ware under a turquoise glaze: Among the pottery findings at the site, a notable group is the black painted ware under alkaline turquoise glaze, all featuring a white frit paste. The motifs found on these pieces exhibit a wide range, including various geometric shapes of plants, animals, as well as inscriptions or pseudo-inscriptions. Notably, one item bears the personal signature “Abdul Saki”, likely indicating the name of the artist. This marks one of the unique instances of personal names appearing on Iranian pottery, a singular occurrence not found in other samples from

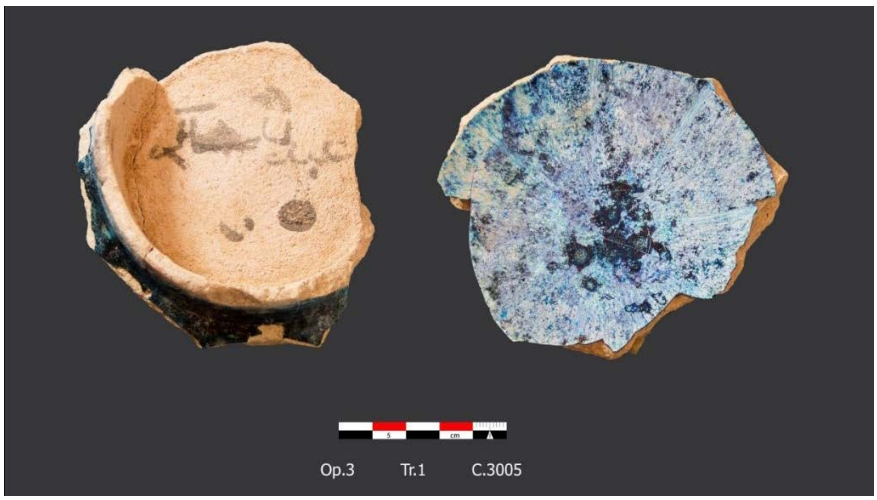
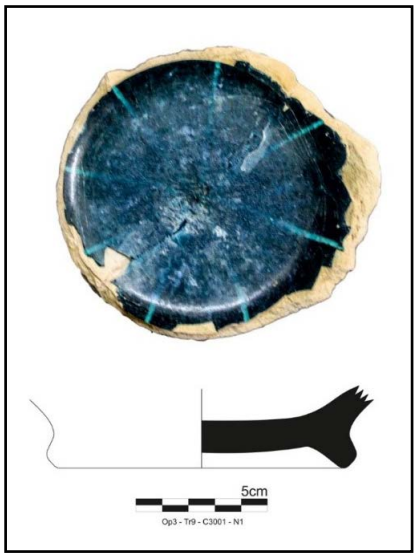


Fig. 7: A painted vessel under a turquoise glaze (with the signature of Abdul Saki on the bottom of the utensil) (Authors, 2022). ▶

Table 5: Robat Aghaj painted underglaze Pottery and samples comparable to them (Authors, 2022). ▶

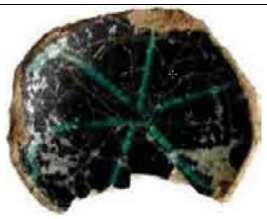
			Robāt Āghāj
 Kashan, 6-7th centuries AH (Grube, 1976: 189)	 Tahyagh, 6-7th centuries AH (Sharahi & Sedighian, 2019 150; Sharahi et al., 2023: 66)	 Tahyagh, 6-7th centuries AH (Sharahi & Sedighian, 2019: 150; Sharahi et al., 2023: 67)	Comparable items



▲ Fig. 8: The base of a glazed ware with silhouette decoration (Authors, 2022).

our site. The black underglaze technique was prevalent in Iran during the late 6th to early 7th century AH, with key production centers located in Kāshān and Rayy (Pope, 2008: No4, p1839 & Watson, 2004: 343).

Silhouette ware: During the excavations carried out at Robāt Āghāj, archaeologists were able to identify only a single fragment of pottery belonging to the decorated Silhouette type. This particular item is an open vessel characterized by a white frit paste and intricate carvings on the slip, featuring black and turquoise motifs under the glaze. The motifs consist of radial linear designs drawn inside the vessel. Such decorative techniques were commonly employed in the carving of ceramics dating back to the 6th-7th centuries AH, with numerous examples on display in museums both within and outside the country. Kāshān is believed to have been one of the key production centers (Morgan, 2005: 138; Gerab, 2005: 129; Barand, 2004: 86; Fehérvári, 2009: 37 & Watson, 2004: 333-334). for this type of pottery, with similar samples discovered in locations like Qorogh Dasht and

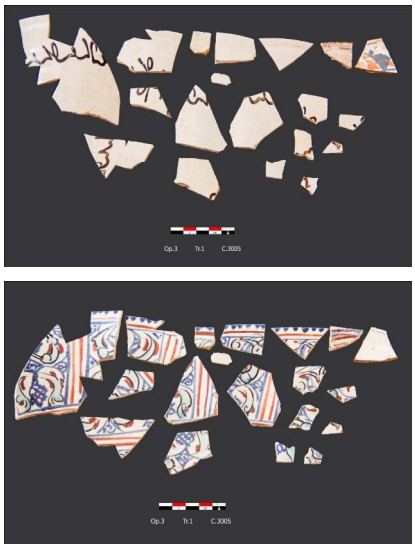
 An item in Ashmolean Museum from the second half of the 6th AH; No. Obj. EA1956.92 (URL6)	 An item from Hegmataneh, Hamedan (Rezaei et al., 2023)	 An item from Qorogh Dasht in Hamedan, 6-7th centuries AH (Rezaei et al., 2023)

◄ **Table 6: Fragments of utensils with silhouette ware decoration comparable to the sample recovered from Robāt Āghāj (Authors, 2022).**

Hegmataneh in Hamadan (Rezaei, et.al, 2023: 225), Tahyaq in Khomeyn (Sharahi & Sedighian, 2019: 150) and Qale-Sang in Sirjan (Amirhajloo & Sedighian, 2020: 170).

3) Painted-on-glaze ware: The final category of glazed pottery discovered at the site consists of pieces adorned with painted designs on the glaze, including enamel and lusterware. A detailed account of each of these varieties is provided individually in the following sections:

Enamelware: Unearthed in trench number 3 were fragments of an enamelware piece, regrettably, the inability to piece together the item is attributed to the loss of numerous fragments (Nikbakht & Montazer Zohouri, 2021). The object showcases a white frit paste and a layer of matte white tin glaze, embellished with intricate geometric and floral motifs in blue, turquoise, black, and reddish brown. Evidence indicates that the inner and outer surfaces of the vessel feature decorative frames adorned with floral motifs, separated by three rows of vertical lines. This particular decorative technique is seldom observed in enamelware artifacts, although there are comparable specimens dating back to the 6th to 7th centuries AH (Karimi & Kiani, 1985: 249 & Yazdani, 2015: 243). The exterior of the enamelware artifact from Robāt Āghāj displays an inscription in a Talīq-like style, with words connected together. Unfortunately, due to the fragmented nature of the pottery, the inscription cannot be read correctly. This vessel, which is open in shape, is believed to have been part of a small bowl or cup in the past. Historical sources, such as Arayis al-Jawahir va Nafayis al-Atayib, suggest that enamelware ceramics were only produced in Kāshān for a brief period before the Mongol invasion (Kashani, 2006: 347). While other regions like Rayy and Saveh are said to have also manufactured such pottery, there is a lack of solid archaeological evidence to support this claim (Salehi Kakhki, et.al. 2015 & Kambakhshfard, 2010: 464). The production of enamelware ceramics likely flourished between 575-640 AH, ceasing thereafter (Fehérvári, 2009: 39; Bahrami, 1948: 113; Yazdani, et.al., 2015: 53;



▲ **Fig. 9: Exterior and interior parts of potsherds belonging to a lusterware recovered from Robāt Āghāj (Authors, 2022).**

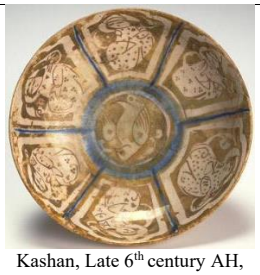
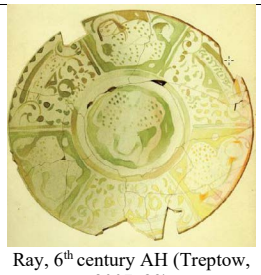
Table 7: Enamelware specimens similar to Robāt Āghāj sample in figure 8 (Authors, 2022). ▶

 A sample from Victoria & Albert Museum. No. Obj. C.379-1919 (Pope 1971: VolX, p695)	 An enamelware sample available at Christine's ceramic auction; belonging to the late 7th century AH (Yazdani, 2015: 103)	 An enamelware sample, probably produced in Ray. Available in the National Museum of Iran (Karmi & Kiani, 1985: 249)

▲ Fig. 10: Samples of lusterware items recovered from Robāt Āghāj (Authors, 2022).

Watson, 1982: 178 – 180 & Lane, 1971: 42). Laboratory analysis of the Robāt Āghāj samples indicates a connection between the enamelware specimen found at the site and those associated with Kāshān (Nikbakht & Montazer-Zohouri, 2021).

Lusterware: Numerous fragments of Lusterware artifacts are scattered throughout various sections of the underground troglodytic complex, some of which could be pieced together with other damaged vessels (Nikbakht et al., 2019). These potsherds exhibit a white body with a matte or tin glaze, all in the shape of an open-mouthed vessel. Laboratory analysis indicates the presence of magnesium in the glaze composition, a characteristic not found in comparable samples from Kāshān, Jurjan, and Rayy, but present in some samples from Kerman (Amirhajloo, et.al. 2020: 17 & Kemshaki, et.al., 2020: 95). While the predominant background color of most pieces is white, some feature a lapis lazuli background on both the exterior and interior surfaces. Gold was the primary color used for decoration, although lapis lazuli or turquoise hues were occasionally employed. Notably, the ceramics are distinguished by motifs depicting various forms of a seated human figure alongside geometric designs. Figurative motifs are a prevalent type of motifs found on lusterware from the Islamic Middle Ages in Iran. Similar items can also be observed in other Iranian sites dating back to the 6th-7th centuries AH, such as Aveh, Kāshān, and Rayy (Lashgari, 2017: 122 & Treptow, 2007: 29). Various opinions have been put forward regarding the production centers of lusterware pottery during this period. Recent research and archaeological excavations point to cities like Kāshān, Jurjan, Jiroft, and Kerman as key centers for producing this type of ceramics between the 6th and 7th centuries AH (Amirhajloo, et.al. 2020; Kemshaki, et.al., 2020: 97-98; Choubak, 2012: 94; Kiani, 1984: 49; Bahrami, 1988: 81 & Mason, 2004: 487 - 492). PIXIE tests conducted on pottery samples from Robāt Āghāj indicate a closer connection to Kāshān production samples from the 7th-6th centuries AH compared to other sites (Montazerzohori, et.al., 2020: 218).

 Kashan, Late 6th century AH, No. Ob.j: B60P2003 (URL5) Asian Art Museum	 Kashan, Late 6th century AH, The Fitzwilliam Museum, (URL3)	 Ray, 6th century AH (Treptow, 2007: 29)
 Ray Or Kashan, 6-7th centuries AH, Asian Art Museum, No. Obj: B60P1987	 Kashan, 1170-1200 AD (Watson, 2004: 351)	 Kashan, Glassware and Ceramic, National Museum of Iran, Late 6th century AH (Nasri, 2021)

◄ **Table 8: Lusterware items similar to the samples from Robāt Āghāj in figure 9 (Authors, 2022).**

Conclusion

The Iranian Plateau during the Islamic Middle Ages witnessed a tumultuous period characterized by significant political and religious turmoil, culminating in numerous violent conflicts and massacres. The invasion of the Mongols stands out as a particularly devastating event, resulting in the destruction of many cities and the loss of countless lives.

The historical and archaeological evidence indicates that the inhabitants of certain regions in central Iran constructed troglodytic complexes, or underground shelters, as a defense against the Mongols' assaults. One such shelter is located in the present-day Robāt Āghāj village in Khomeyn County. The archaeological excavations at this site yielded a large quantity of potsherds dating back to the Islamic Middle Ages, which necessitated further investigation. Despite the abundance of unglazed pottery, there was limited diversity in terms of motif type and decoration. Notably, the mold decorations produced during the 6th-7th centuries AH are closely linked to ceramic products from Zolf Abad in Farahan and Moshkoyeh in Saveh. Additionally, fragments of a clay thermos from the 6th-7th centuries AH were discovered, although the exact production center remains unidentified, similar samples were found in other centers.

The diverse range of glazed pottery predominantly utilizes frit paste in its composition. Based on the comparative chronology, the majority of these ceramic pieces were crafted and utilized in the 6th century AH. The pottery discovered at the site indicates that it predominantly dates back to

a specific period, namely the Seljuk era until the early Ilkhanid rule in Iran. These ceramics exhibit a wide range of styles, including monochromatic glazed, painted underglaze, and painted on-glaze varieties. The decorative elements found on these pottery items are reminiscent of those seen at contemporary sites in Markazi Province, such as Tahyaq, Zolfabad, and Moshkoyeh, as well as in other areas like the troglodytic sites at Samen in Malayer and Arzanfod in Hamedan, and the pottery samples from Kāshān and Ray. Some of the glazed pottery pieces at this site bear similarities to the monochrome and blue and white linear decorated ware found at Zolfabad and Moshkoyeh, while others, like the lusterware and enamelware samples, are more akin to the pottery produced in Kāshān.

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Observation Contribution

This article was a collaborative effort between the two Authors, reflecting equal participation and input from both.

Conflict of Interest

In commitment to publication ethics, there are no conflicts of interest to declare for this research.

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۴۱ پژوهش‌های باستان‌شناسی ایران

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طبقه‌بندی، گونه‌شناسی و گاهنگاری سفال‌های قرون میانی اسلامیِ دست‌کند زیرزمینی رباط آغاج، شهرستان خمین

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چکیده

مجموعه دست‌کند زیرزمینی رباط آغاج، یکی از محوطه‌های تاریخی شاخص در محدودهٔ شهرستان خمین است که در دل تپه‌ای شنی به ارتفاع ۵۰متر ایجاد گردید است. فصل اول کاوش‌های باستان‌شناسی این اثر در سال ۱۳۹۵ صورت‌پذیرفت. در نتیجهٔ این کاوش‌ها، فضاهای معماری مختلف و یافته‌های متنوع باستان‌شناسی به‌دست آمد. بیشترین فراوانی یافته‌های شناسایی شدهٔ این محوطه را انواع متنوعی از سفال‌های بدون لعاب و لعاب‌دار دوران اسلامی تشکیل می‌دهد. سفال‌های ساده بدون لعاب، سفال‌های بدون لعاب با نقوش فشاری، کنده و افزوده، سفال با نقش قالبی و هم‌چنین سفال‌های لعاب‌دار تک‌رنگ، آبی سفید، زرین‌فام و قطعات ظروف مینایی از انواع سفال‌های شناسایی شده در دستکند رباط آغاج است. نظر به این‌که تاکنون پژوهش مستقلی درمورد این آثار صورت نپذیرفته بود، ضرورت‌داشت که بدان‌ها پرداخته شود؛ چراکه تقریباً تمامی سفال‌های به‌دست آمدهٔ این محوطه مربوط به قرون میانی اسلامی هستند و احتمالاً تنها در یک دورهٔ زمانی تولید شده و مورداستفاده قرار گرفته‌اند؛ بدین‌سبب با انجام پژوهش حاضر می‌توان یک منبع مطالعاتی و مقایسه‌ای در زمینهٔ سفال‌های این دوران استان مرکزی و حتی ایران را ارائه داد. با توجه به این موارد، مهم‌ترین پرسش پژوهش حاضر در زمینهٔ گاه‌نگاری مقایسه‌ای این سفال‌ها و مراکز تولیدی احتمالی آن‌ها است. روش پژوهش حاضر توصیفی-مقایسه‌ای و شیوهٔ گردآوری اطلاعات در آن بر پایهٔ مطالعات میدانی و کتابخانه‌ای است. در نتیجهٔ پژوهش حاضر، چنین مشخص شد که بیشتر سفال‌های این محوطهٔ احتمالاً مربوط به بازهٔ زمانی قرن ۶-۷هـ.ق. هستند؛ هم‌چنین برخی از این گونه‌های سفالی با بعضی مراکز تولیدی هم‌چون: ذلف‌آباد، مشکویه، کاشان و ری، تشابهات بسیاری داشته که احتمال دارد از این مراکز به خمین صادر شده‌اند، چنان‌چه مطالعات باستان‌شناختی نیز این ادعا را تصدیق می‌کند. علاوه‌بر این، با نمونه‌های مشابه در برخی محوطه‌های تاریخی مانند: دست‌کند تهیق خمین، سامن ملایر و ارزانفود همدان، تشابهات بسیاری دارند.

کلیدواژگان: سفال، دست‌کند رباط آغاج، شهرستان خمین، دوران سلجوقی و ایلخانی.

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Investigating the Development of State Economy under the Ilkhanid Dynasty by Employing John Hicks' Theory of "Economic History"

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Abstract

The examination of the economy under the Ilkhanid Dynasty encounters certain limitations when relying on economic theories and archaeological data simultaneously. By considering the perspectives of the adherents of the "Historical School" in general and John Hicks' theory of "Economic History" in particular, this study categorizes the economy of historical period and the Mongols into three general phases: the "customary economy", the "military economy," and the "command economy." This categorization is further explored through a descriptive-analytical approach and the utilization of a library method to address the following inquiries: What political-military events of the Ilkhanid period coincide with the aforementioned phases? And how do these stages manifest in various aspects of this period? The findings of this research reveal the presence of all stages of this theory during the establishment of the Ilkhanid economy, and their alignment with political and economic developments. In the customary economy, population growth and the emergence of social classes disrupt the natural order and equilibrium. The military economy phase (615–658 AH, 1218–1260 AD) was characterized by a distinct lack of political aims in the creation of new administrations in conquered lands, an incapacity to enforce tribal ways of life, and the prevalence of autocracy at the pinnacle of the power hierarchy. During the period of the feudalistic command economy (658–694 AH, 1259–1294 AD), a notable aspect was the Mongols' positive outlook on urban lifestyle, despite their significant regard for the Ilkhanate-style horde. Additionally, this era witnessed the emergence of commercial activities alongside a stagnant agricultural sector. During the bureaucratic command economy phase (694–736 AH, 1259–1335 AD), economic concerns took precedence over military considerations. This was evident through the emphasis placed on the development of economy-related architecture and the formation of economic unions among Genghis's Uluses. The impact of the bureaucratic command economy can be seen in the architectural styles, coinage, and artistic creations of this particular period.

Keywords: Mongol, Ilkhanid Dynasty, History of Economy, John Hicks, Custom, Command.

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Introduction

Although the field of economics as a formal discipline has only emerged in the past two centuries, a deeper examination of the history of economic ideas reveals their ancient origins, dating back to the times of Plato and Aristotle in ancient Greece (Plato 2022: 114). However, it is crucial to recognize the inherent challenge and intricacy involved in distinguishing economic issues from political matters and historical events related to past centuries. Our knowledge regarding the economic conditions of cities and life during the 7th and 8th centuries AH (Hijri year) is quite limited. It is often clouded by vague and biased perceptions influenced by the Mongols' invasion and its aftermath. Nevertheless, by employing "analytical philosophy of history" and incorporating "theoretical philosophy", we can mitigate these biases and gain valuable insights from diverse and sometimes conflicting sources. The predominant approach in the philosophy of history has traditionally been "theoretical philosophy", which views history as "a series of events". However, in recent years, "the critical philosophy of history", which treats "history as a narrative", has gained prominence and often complements or replaces the former approach (Razavi 2012: 114). The critical philosophy of history aligns closely with the postmodernist perspective, which posits that truth is a subjective concept and relative (Sokolowski 2019: 48–68). This perspective not only represents a philosophical standpoint but also serves as a research method employed in various disciplines, including humanities and social sciences, utilizing descriptive, interpretive, and social approaches (Ghaffari Nasab 2019: 1–4).

The early Mongols were exposed to commercial activities through interactions with Muslim merchants in the steppe regions, although their nomadic lifestyle limited their understanding of agriculture and urban life (Barthold 1997: 151). Following the consolidation of power and the unification of tribes under Genghis (Temüjin), more opportunities for trade development emerged, with the establishment of new fields and roads to facilitate caravan passage (Ibn Ibri 1985: 301–302). Genghis Khan's outreach to Khwarezmshah aimed at initiating trade relations and securing the opening of trade routes for merchants, as detailed by Nasawi (1986: 213). The Mongol conquests left a trail of destruction in their wake, particularly impacting the agricultural economy in the eastern parts of Iran. The aftermath of these attacks witnessed a decline and destruction of the agricultural sector. However, a period of relative peace, known as the "Mongolian peace," emerged, allowing for the establishment of direct contacts between Europe and Asia. This newfound connection between the

two continents resulted in a surge in travel across Eurasia, an expansion of trade exchanges, and the integration of various technological, industrial, and artistic practices (Turnbull 2017: 117). Similarly, in Iran, the Mongols played a pivotal role in the advancement and modernization of the country's economic landscape. They achieved this by adopting Persian approaches, assimilating tribal traditions, embracing Islamic political thoughts, and even incorporating Chinese customs.

In the theory of Economic History, John Hicks has proposed a classification for the economies of various societies prior to the emergence of European mercantilism that thrived from 1500 to 1750. Hicks categorizes these pre-modern societies into three distinct periods, two of which are primary and one that serves as an intermediary phase. The initial stage, referred to as the "customary economy," exists between the stages of a "military economy" or "looting" and a subsequent "command economy." The command economy is further divided into two subdivisions: feudalistic and bureaucratic. The customary economy, also known as the tribal economy, represents a military system characterized by a stagnant state and governed by an unconscious order. Due to insufficient resources, fluctuations in climate, and population pressure, the customary economy will experience turmoil, which Hicks identifies as an interim phase within the military economy. Conflict, plunder, disorder, and confusion are common in a military economy. Once the needs of the conquerors are met or if the looting and conquests can no longer be sustained, and the power structure stabilizes its political and administrative situation to some extent, the foundation for the emergence of the command economy is gradually laid. Hicks categorizes the command economy into two segments: "feudalistic" where the "custom" aspect is dominant, and "bureaucratic," where the "order" element holds more sway (Hicks 1976: 1–31). The theory proposed by Hicks is of a broad nature, enabling its generalization to various historical societies (Razavi 2011: 79). It shares notable similarities with the theories of economic history put forth by the "German Historical School". Hence, the objective of this research is to analyze the diverse economic, political, social, and artistic expressions of this theory during the Ilkhanid Period using the divisions established within this theoretical framework (Razavi 2012). The authors posit that, despite the limited historical window available to the Ilkhanid Mongols, they managed to progress rapidly by assimilating the advancements of more sophisticated societies. The authors contend that Hicks' economic history theory can be effectively applied to the economic and political

transformations of Ilkhanid society. This study aims to explore how the various stages in John Hicks' Theory of Economic History manifest in the economy of the Ilkhanid era. In doing so, it seeks to address the following inquiries: What are the ways to identify the instances of the various phases of John Hicks' "Theory of Economic History" within the economy of the Ilkhanid Period? Which political events correspond with each phases of the Hicks' scheme? Which stages in Hicks' economic model are associated with the "natural" and "monetary" economy? Despite previous debates and categorizations regarding the economy of the Ilkhanid Period, researchers have not thoroughly examined the manifestations of different stages of Hicks theory across various aspects of the Ilkhanid era in a detailed and analytical manner.

Research Background

The historical records related to the Mongols predominantly center on their military exploits and conquests, with relatively little exploration of their societal and economic organization. These investigations are largely theoretical and have been influenced by the Mongols' actions during their military campaigns. Within Mongol historical sources, despite the plethora of available material, discrepancies and contradictions exist, necessitating careful consideration by historians. To avoid falling prey to false information, historians must exercise caution and employ various methods of historical understanding, such as "Historical Verstehending," as well as critical methods. They should also compare texts with other sources of data, including archaeological findings. In the context of the Ilkhanid period, the book "Nuzhat al-Qulūb" serves as the primary historical source concerning its economy. Numerous authors, including Petrushevsky, have cited this work and drawn conclusions from it. It provides crucial information about the amount of taxes and facilitates a comparison between the taxes of the Ilkhanid and Seljuk periods (Mustawfi 1983). Another significant work is "Tajzīyeh al-Amsār va Tazjīyah al-A'sār," also known as "Tārīkh-e Wassāf," written by Wassāf-e Shirazi in 712 AH (1312 AD). This text gains importance due to its detailed account of the history and organization of Fars during the Ilkhanid Period, with the support of Khwaja Rashīd al-Dīn Fazlullāh Hamadānī and his son Ghiyāth al-Din Muhammad (Wassaf 1959). The book "Tārīkh-e Mukhtasar Al-Duwal" stands out as an additional source that has been translated from Syriac to Arabic. It offers valuable and at times contrasting information in relation to the themes addressed by Rashīd al-Dīn and Atā-Malek Juvaynī. This

particular text plays a crucial role in uncovering essential data concerning the customary economy of the Ilkhanid Period (Ibn Ibri 1985).

Barthold, a celebrated Russian Mongol scholar in the work "History of the Turks in Central Asia" (Barthold 1997), and Vladimirtsov, another Russian scholar in the book "Le régime social des Mongols" (Vladimirtsov 1986), meticulously examined the political and military history of Iran during this time period by consulting historical sources and making connections to the social and economic conditions of the Mongols. René Grousset in "L'empire des steppes" (Grousset 1989), Spuler in "History of the Mongols" (Spuler 1989), and David Morgan in the book "The Mongols" (Morgan 1992) have extensively examined the Mongols' conquests and campaigns while occasionally alluding to their economic state as well. In his book "City, Politics and Economy in the Age of Ilkhans," Seyyed Abulfazl Razavi explores the topics of markets, taxes, and merchants during this era. He highlights how, following the devastating attacks of the Mongols, there was a period of relative calm and peace in trade and urban life in Iran. Razavi's work is significant as he builds upon John Hicks' theory, which suggests that the emergence of Genghis Khan led to a shift from a traditional economy to a military-focused one. By applying Hicks' theory to the entire period of the Ilkhanid Mongols, Razavi offers a fresh perspective on this historical period (Razavi, 2011). He examined the urban economy of the Ilkhanids and analyzed their economic process in three distinct phases. However, he failed to provide a clear delineation of these stages.

The current article aims to explore the theory of economic history proposed by John Hicks and its application in various fields such as economics, agriculture, industry, and economy-related architecture during the Ilkhanid Period. By utilizing the adaptations and explanations derived from Hicks' research, this study seeks to identify and analyze the manifestations and examples of this theory. Consequently, the economics of the Ilkhanid Period will be examined and evaluated in four distinct stages. In a related article titled "The Status of Bazaar during the Ilkhanid Period," Razavi delves into the significance of markets in the urban life of this period. Furthermore, the author delves into a comprehensive analysis of the commercial endeavors undertaken by the Ortoghs (Razavi 2009). In addition to what has been mentioned, Petrushevsky's book, "Agriculture and Land Relations in Iran during Mongol Era," provides valuable insights into the developments of this era, although it is not without its limitations (Petrushevsky 1978). The author has made a sweeping generalization

by attributing the decline of the agricultural economy this time period to the entire economy of Ilkhanid society, leading to inaccurate results and figures in the field of the economy during that time. In the analysis of tax computations for the given period, the author utilized the figures provided in "Nuzhat al-Qulūb" to compare the tax revenue between the Seljuk and Ilkhanate eras. The primary objective was to demonstrate the economic decline experienced during the Ilkhanid Period. Notably, the author neglected to give due consideration to the income generated from agricultural activities, trade, and similar sources. Furthermore, he failed to acknowledge that, during this period, a portion of the taxes were collected in the form of goods, in accordance with the Mongol's traditions and the needs of time. Additionally, the tax revenues from Khorasan, Mazandaran, Tabarestan, Gorgan, and Sistan were not accounted for in the Central Court's income, nor were they mentioned in Hamdallāh Mustawfi's calculations. Consequently, the Petrushevsky overlooked the economic growth that transpired during this particular period.

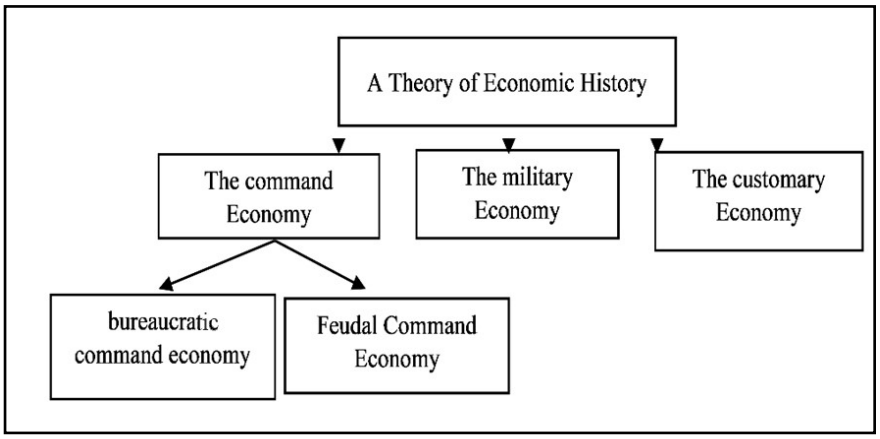
John Hicks' Theory of Economic History

John Hicks (1904–1989) dedicated years of study and reflection to develop the theory of economic history, which he first presented in a lecture at the University of Wales in 1967 under the title "Theory of Economic History." This theory was subsequently elaborated in a book. Hicks classifies the economic history of societies before the mercantilism era into two distinct stages and one interim phase as follows: customary economy, military economy, and command economy, while the military economy is the interim phase. The command economy is further segmented into customary and military economies, characterized by a uniform state and governed by an unconscious order based on customs, habits, and traditions (Razavi 2011: 70). The continuity of the traditional economy is contingent upon the ability of tribal communities to sustain their livelihood using traditional methods. However, when faced with resource scarcity, climate-related challenges, and population pressures leading to encroachment on neighboring territories, conflicts and disruptions in the economic system ensue. John Hicks characterizes this period of disorder and chaos as an interim phase, as it is unsustainable in the long term and requires reorganization. In what Hicks terms as a "military economy," an autocratic regime typically assumes the apex of the power hierarchy, with power being wielded within a rigidly hierarchical and militaristic framework. It is a common occurrence to witness looting, unrest, and disorder within

the military economy. Once the invading population's primary needs have been fulfilled or when the looting and conquests become unsustainable, and the power structure stabilizes its political and administrative situation to a certain extent, the groundwork for the emergence of the "command economy" stage is gradually laid. Hicks classifies the command economy into two distinct categories, namely "feudalistic" where the customs are more pronounced, and "bureaucratic" where the element of command holds greater significance. In a customary economy, the organization is structured from the bottom up, whereas in a command economy, the organization is established from the top down. During the command economy phase, particularly, the central government employs the bureaucratic system for the governance of state affairs. Agriculture emerges as a prominent feature of the economy with the extensive involvement of the government (Hicks 1976: 1–31). Hicks classifies early civilizations as adhering to a customary economy. He categorizes the period of disorder in the traditional economy within the Bantu communities in Africa, the ascension of Chuka, and the Genghis Khan's conquests into military economy (Ibid, 20). Additionally, he underscores the bureaucratic systems of ancient Egypt, the Chinese Empire, and the Mughal Empire of India as successful instances of a command economy (Ibid, 27–28).

Adapting the aforementioned theory to the economic growth of the Mongols initially and the Ilkhanid Dynasty subsequently, while taking into account the intricacies and uncertainties in the economic and social history of the Middle Ages in Iran, may offer solutions to certain issues. These stages align with the concepts put forth by the proponents of the "German historical school" regarding the phases of economic progress. The scholars of the historical school emphasize examining economics through a historical lens, emphasizing the interconnectedness of economic, social, and political aspects (Tafazzoli 2019: 246). A significant theory within the historical school concerning this subject is Frederick Smith's "economic evolution of nations" theory. Smith categorizes the economic advancement of nations into 5 stages, with the 4th and 5th stages pertaining to the post-medieval era, or the era of mercantilism. These stages include: 1. Savagery, 2. Pastoralism stage, 3. Agricultural stage, 4. Agricultural and industrial stage, 5. Agricultural, industrial, and commercial stage (List 2000: 355–379). Various historical approaches have been proposed to analyze the different stages of economic growth. Walt Whitman Rostow, for instance, categorized human societies into five stages based on historical events, economic progress, and social changes. These stages include "traditional

society," "pre-economic leap," "economic leap," "maturity stage," and "mass production and high consumption" (Rostow 1961: 2–16). Similarly, Ibn Khaldūn explored the social and economic advancements of societies in his work "Kitāb al-ʿIbar," introducing the theory of "ups and downs of civilizations" (Ibn Khaldun 2003: Vol. 1/ 64–76). It is important to note that not all societies follow a linear progression through these stages, as some may still be in early phases while others might have experienced decline and collapse. Nevertheless, the stages outlined in these historical theories can be applied to various societies, considering the unique historical contexts of each.



◄ **Fig. 1: John Hicks' theory of economic history (Authors, 2024, taken from Hicks 1976).**

Discussion: Formation and development of Ilkhanid Economy

- The early period: manifestations of customary economy

The early period referred to in this research pertains to the time before the Mongol tribes were unified under the leadership of Genghis Khan. However, there exists a divergence of opinions among scholars regarding the ancestral homeland of the Mongols. Based on Chinese sources, a significant number of researchers argue that the initial location of the Mongols was in the regions of Siberia and Manchuria (Bayani 2018b: 9). Conversely, some scholars propose that the grasslands situated between western Mongolia and the Hungarian plain served as the primary territory of the Mongols (Morgan 1994: 40). Based on their economic activities, primitive Mongols were broadly categorized as either forest hunters or steppe shepherds (Fazlullāh Hamadānī 1983: Vol. 1/20–117). The political, economic, and social structure of the steppe peoples in Central Asia was characterized by simplicity due to harsh climatic and natural conditions. This, coupled with their high mobility and its specific needs, hindered the establishment of centralized settlements and the accumulation of population (Razavi 2011:

59). Currently, Mongolia's arable land accounts for only 1% of its total lands, with 8% covered by forests, while the rest is comprised of pasture, desert, and frozen lands (Turnbull 2017: 14). Despite climate change, the weather in Mongolia today is not expected to differ significantly from that of the 6th century AH. The primitive Mongols sustained themselves through hunting, animal husbandry, and even consuming plant roots during harsh times (Juvaynī 1991: Vol. 1 / 10). Trade and industry in this era were characterized by simplicity and primitiveness among the Mongols (Ibid 15). In the early stages, Mongol tribes lived communally in harmony with nature (Razavi 2011: 61), and according to Ibn Khaldūn and John Hicks, their society maintained an unconscious equilibrium (Ibn Khaldun 1985: Vol. 1/ 44–236; Hicks 1976: 1–33). From the late 5th century to the early 6th century AH, significant transformations occurred within Mongol society. These changes led to the fragmentation of existing tribes and the emergence of new groups. However, the period of division was short-lived as the tribal community quickly began to coalesce and foster a sense of unity and solidarity. Certain tribal chiefs exerted greater influence and successfully united multiple tribes under a single banner. This trend ultimately led to the unification of all clans under the authority of Genghis Khan, resulting in the integration of the entire steppe region under a unified identity (Fazlullāh Hamadānī 1983: Vol. 1/ 57–58). As the size of these larger groups grew, a more complex social order became necessary, with a small group of aristocratic tribal leaders occupying the highest positions within the social structure (Turnbull 2017: 23). Loyalty among the elite class towards their leaders is primarily rooted in personal and individual relationships rather than an abstract notion of loyalty. The harsh climatic conditions in Mongolia, such as drought in the southern areas and frost in the north, posed challenges to agricultural activities. Consequently, the Mongols turned to trade early on, acquiring trade skills through interactions with Chinese and Muslim merchants. Although there is a lack of sources on this subject, it is likely that pastoralist groups needed to possess market knowledge to sell their livestock and animal products to meet their various needs. As long as these groups could sustain their traditional way of life by providing sufficient goods to support their livelihood, the traditional economy would endure. Nonetheless, the encroachment on neighboring lands due to limited resources resulted in the collapse of the established order within the customary economy (Hicks 1976: 21). This disruption can be attributed to the amalgamation of various tribes under the leadership of Genghis Khan, the subsequent population surge, the emergence of

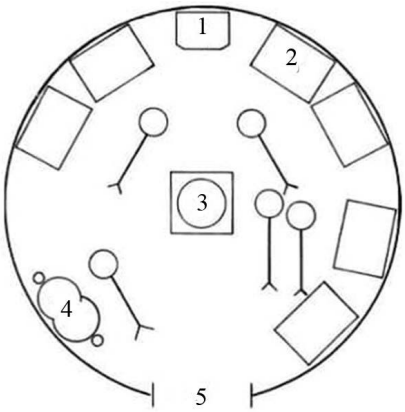
social hierarchies, and the aspiration to familiarize oneself with the diverse products of settled societies. In his book "Turkestan Down to the Mongol Invasion," Barthold, -with citing "The Secret History of the Mongols,"- sheds light on ten court-related positions primarily associated with military affairs, which gained prominence from 604 AH onwards. Furthermore, Barthold mentions the great Kurultai and the election of Genghis as the supreme khan of khans (Barthold 1997: 173). The disruption in the customary economy, coupled with the failure to address the subsistence needs of the united tribes and Genghis' imperative to maintain the loyalty of the nobles, effectively facilitated the transition towards a military economy.

The strategic placement of the Mongols in the steppes along the east and west trade routes provided them with a significant advantage in terms of sustenance and trade opportunities. Leveraging the expertise and cultural richness of the Uyghur people, who had acquired a refined culture through interactions with Iranians, Chinese, and Indians, enabled the Mongols to effectively navigate the existing circumstances (Eqbal Ashtiani 2010: 30). Chinese historical accounts mention the involvement of Muslim traders in Mongolia dating back to 302 AH (Kashghari 2005: 150–151), underscoring the economic interactions between Muslims and Chinese. Despite the limited productivity of the steppe inhabitants, they supplied merchants with essential raw materials sourced from animal husbandry and hunting, thereby fulfilling their basic requirements and playing a modest role in the East and West trade.

- Manifestations of customary economy in archaeological data

In the early era, the Mongols dedicated their days to the steppes, an environment that provided ideal conditions for raising livestock such as cows, sheep, and goats (Pelliot et al., 2018: 49). Their lifestyle revolved around constant movement, as they tirelessly searched for new and fertile pastures. They spared no effort in raiding unexplored regions, always seeking to expand their territories. The Mongols possessed the remarkable ability to swiftly set up their tents in any location, allowing them to promptly relocate as needed. When embarking on a journey, they efficiently packed up their tents and utilized specialized carts to transport their belongings, alongside their animals (Marco Polo, 1971: 87) (Figs. 1 & 2).

Analyzing the economic history of the Mongols through the lens of John Hicks' theory reveals a transformation from a traditional, primitive, and



▲ Fig. 1: Structural elements of a Mongolian yurt (original source: Herbert Harold 1962, citing from Moradi 2013); 1. praying room and the sacred place for keeping Mongolian idols; 2. Location of wooden chests for storing clothes; 3. fireplace; 4. waterskin; 5. entry.

customary economic system to a more centralized and organized structure under Genghis Khan's rule. The challenges posed by high population density, scarcity of resources, harsh climate, social class disparities, and the allure of luxury goods from outside regions highlighted the limitations of the customary economy in satisfying the needs of Genghis Khan's allied tribes. Consequently, the transition towards a "military economy" became inevitable with the initiation of invasions into neighboring territories.

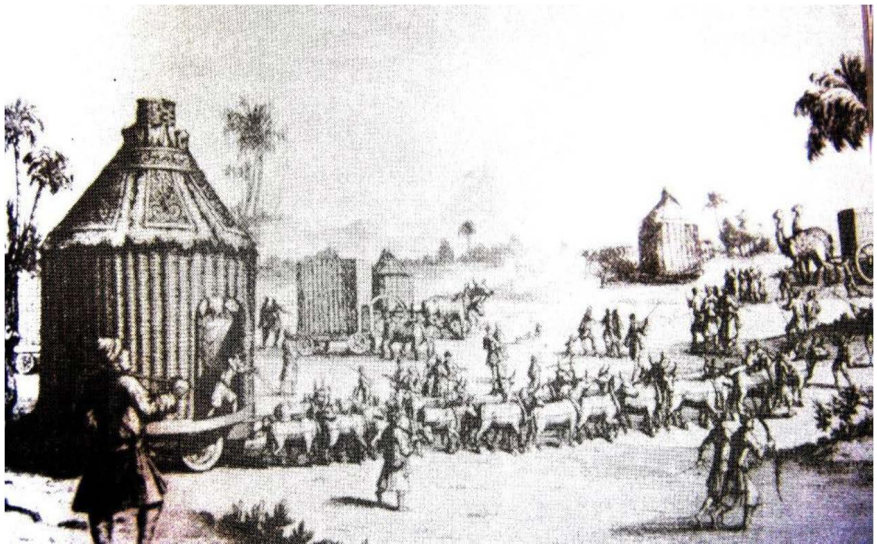


Fig. 2: A Mongolian yurt, a chiaroscuro engraving of the original drawings made by William Rubruck in 1253 AD (Bawden 1968: 45). ▶

The Interim Phase (Military Economy) - Genghis Khan's conquests; First stage of military economy (looting)

At the onset of Genghis Khan's conquests, trade played a crucial role within his court. Historical sources suggest that Genghis Khan's domain ensured the safety of trade caravans and had guards protecting the trade routes. The Mongols had a particular fondness for textiles and weapons, a fact that can be gleaned from the accounts of Ibn Ibri's travels. Nevertheless, agriculture and settled life did not hold much appeal for them (Ibn Ibri 1985: 301–302). After establishing a regional government in Central Asia, the Mongols made their initial foray into regional politics and economy, capitalizing on their victories and securing a share of the global trade routes, thus entering the Asian trade network, which though nascent, held promising prospects (Bayani 2018b: 22). Upon the establishment of a regional government in Central Asia, the Mongols embarked on their foray into regional politics and economics by tasting victory, securing vital trade routes, and becoming integrated into the Asian trade network, which displayed promise for future development (Bayani 2018b: 22). The military campaigns orchestrated by Genghis Khan's administration were driven by

the imperative to achieve economic objectives, with the massacre of 500 of Genghis Khan's emissaries in Otrār acting as a precursor to subsequent military endeavors. However, it can be argued that the Mongol conquests of new territories were not solely motivated by the pursuit of material gains, but rather a fusion of economic and political ambitions, as during the era under consideration, the dichotomy between economics and politics was practically non-existent. The newly established government under Genghis Khan resorted to limited attacks at the regional level, primarily aimed at looting resources and bolstering the military, as well as gaining the support of the aristocracy. Nevertheless, it was the subsequent endeavors to construct infrastructure such as bridges, roads, and warehouses in Central Asia that marked the initial signs of a more structured and organized governance. However, due to the uncertainty surrounding the transfer of power in Iran to Genghis Khan's uluses, the process was delayed until Hülegü Khan's expedition to the west. Nonetheless, the territorial expansions under the rule of Ögedei Khan in Russia and Eastern Europe were primarily driven by political and economic motives.

- Manifestations of military (looting) economy

In a military economy, the highest position of authority is typically held by an autocratic leader, and the wielding of power is confined to an authoritarian structure that strictly follows military ranking. Turmoil, plunder, chaos, and confusion are prevalent in such an economy. Nevertheless, once the demands of the conquerors are met or if the ability to plunder and conquer wanes, social order and structure emerge (Hicks 1976: 21). The state of the military economy during the invasions of Iran by Genghis Khan and later Hülegü Khan can be depicted as follows:

1. The absence of distinct political aims for the government during the initial stages of the conquests is notable: The motivation behind Genghis Khan's incursions into Central Asia and Khorasan was primarily rooted in his desire for vengeance against Sultan Muhammad Khwārezm-Shāh. Nevertheless, the inherent military and aristocratic characteristics of Genghis Khan's new empire also played a significant role in shaping the course of these attacks. Historical evidence suggests that Genghis Khan's initial objective was to amass wealth through these military campaigns, rather than establishing permanent control over the conquered territories. The cities of Bukhara and Samarkand, pivotal centers of trade along the Silk Road, fell to Genghis Khan's forces in 617 AH (1220 AD) after brutal sieges. Accounts by Juvaynī detail the plundering and destruction of these

cities, including the sacrilegious acts committed against religious sites such as mosques and Qurans (Juvaynī 1991: Vol. 1 / 75–76).

Based on our knowledge of Genghis Khan's character, these actions, which provoked the people's animosity, were executed without any intention of establishing a governing system in those regions. Genghis Khan himself was likely aware that such deeds would deprive the conquered people of a legitimate government. Additionally, the relentless pursuit of Sultan Muhammad Khwārezm-Shāh from east to west and the conquest of cities along the way in western Iran serve as evidence of Genghis Khan's disinterest in assimilating western territories into his central government. Historical accounts indicate that Genghis' soldiers were solely focused on eliminating Sultan Khwārezm-Shāh and pillaging the cities along the route (Nasavi 1986: 68; Juvaynī 1991: Vol. 1/ 83).

2. Dispatching letters to the leaders of the urban centers, urging them to comply with the demand for tribute payment and surrender: From the outset, the Mongol armies engaged in diplomatic efforts by sending letters to local rulers, giving them the opportunity to surrender. Those who acquiesced were spared from destruction and violence. For example, following Sultan Mohammad's escape from Hamedan, the city surrendered and was consequently saved from being ruined (Juvaynī 1991: Vol. 1/ 115). Ray also chose to surrender voluntarily (Ibn Athir 2004: Vol.. 12/ 244). Cities such as Urkand, Zarnūgh, Badakhshān, Havalī, and Tirmidh survived by agreeing to pay tribute. Tolui, emulating Genghis Khan's approach, treated cities that accepted the Ulus' terms with leniency (Heravi 1973: 52). It is evident that during this period, the Mongols emphasized the collection of ransom and tribute in their conquests, allowing rulers who accepted the Ulus' demands and paid tribute to maintain their rule (Ibid).

3. The position of Iran in the division of Genghis Khan's four uluses is shrouded in ambiguity: The invasions of Iran during Genghis Khan's rule were driven by the dual objectives of acquiring plunder and exacting revenge upon Sultan Khwārezm-Shāh. Consequently, the division of Iran within Genghis Khan's quadripartite system remained indeterminate following his demise. This state of ambiguity persisted throughout the reigns of Ögedei and Güyük. Initially, Ögedei delegated authority over eastern Iran to Jin Timūr, and subsequently to Korgöz (Spuler 2018: 41–42). In accordance with the newly enacted tax laws, the Mongol rulers periodically remitted the revenues and taxes collected to the central treasury, employing diverse designations for these remittances (Bayani 2018b: 101). Amir Arghūn, who resided in Tabriz, was responsible for maintaining order and peace

in the region, as well as overseeing the collection of taxes and tributes in western Iran (Juvaynī 1991: Vol. 2/ 244). Noteworthy events during this time included sporadic attacks from the Bādghis garrison, plundering in eastern Iran, quelling of uprisings, and the gathering of spoils and taxes in the period between Genghis Khan's departure and the rise of the Ilkhanids (Ibid 222). The dynamics shifted with the dispatch of Hülegü to the West and Kublai to China.

- Sending Hülegü to West Asia; The second stage of military economy (looting)

The failure of the Mongol princes and armies to sustain their conquests and accumulate spoils, which served as the cornerstone of the Mongol military economy, resulted in the dispatch of Hülegü towards the Western territories. Sorghaghtani Beki emerges as a renowned figure from the Mongol era. She was the spouse of Tolui and the mother of Hülegü, Möngke, Kubilai, and Ariq Böke (Juvaynī 1991: Vol. 3/4). All historical sources unanimously lauded her significance, intellect, and merit. Influenced by Chinese institutions (Turnbull 2017: 65), she provided her sons with the essential training for governing settled communities, and subsequently, the rule of three out of her four sons in different regions of the Mongol Empire represented one of the most splendid periods in the empire's history. The woman is lauded by Mirkhvānd for her role in imparting literary and cultural knowledge to her children, all the while ensuring a harmonious environment devoid of conflicts (Mirkhvānd 1983: Vol. 4/ 167). In return, the boys exhibited profound respect for her authority and dutifully followed her commands (Bayani 2018a: 143). Nevertheless, despite the primary objective of Hülegü's mission being the eradication of the Nizari Isma'ilism and the overthrow of the Abbasid caliphate, his extensive training in governance since childhood proved invaluable. The meticulous preparations made for his military offensives serve as a testament to his capabilities. Hülegü's mission was executed with utmost precision, as evidenced by the provision of military escorts by the Qara Khitai community, the restoration of vital infrastructure such as roads and bridges spanning from Qara Qorūm to Jayhūn, and the procurement of substantial quantities of flour and wine. These measures starkly contrasted with previous incursions, highlighting the meticulousness and thoroughness of Hülegü's strategic approach. Undoubtedly, it is indisputable that the attack carried out did not have any economic objectives. As stated by Ibn Ibri, Möngke Khan, "…orchestrated the destruction of the western cities alongside his brother, intending to

utilize the acquired properties for the benefit of the state treasury" (Ibn Ibri 1985: 338). Nevertheless, the available evidence suggests that the Hülegü attack on the West encompassed more than just a punitive measure against the rebels and the establishment of a military stronghold for tax collection purposes. Consequently, alongside the economic motives, the establishment of a political entity in a prosperous region, which had not been explicitly addressed in Genghis Khan's uluses, was implicitly acknowledged by Hülegü and his brother Möngke.

Möngke Khan dispatched a decree that encompassed both occupied and non-occupied regions, spanning from Turkestan to Khorasan and from Khorasan to Rome. This decree delineated the precise route that Hülegü was to undertake, as documented by Bayani (2018b: 104). This decision not only facilitated Hülegü's preparations for warfare but also served as a form of recognition for potential future territories. It is evident that these grandiose plans were not merely aimed at acquiring spoils or establishing a temporary presence. According to Rashīd al-Dīn, Hülegü ascended the throne in Dhu'l-Hijjah of 653 AH (1255 AD) in the Shaburghān meadow. During a ceremonial gathering, he officially declared war on in the name of the future ruler of Iran and made ready to embark on this military campaign (Fazlullāh Hamadānī 1983: Vol. 2 / 687–689). It is important to consider that Sorghaghtani Beki and her children believed that the younger son, Tolui, had the rightful claim to the throne after Genghis Khan, in accordance with Mongolian laws. Hülegü, therefore, sought to establish his family's authority in West Asia. Following the conquest of the Ismaili castles, Hülegü distributed the spoils among his troops and initiated a widespread campaign of looting and destruction (Ibid Vol. 1/ 189–192; Mirkhvānd 1983: Vol. 3/ 231–232). Notably, Hülegü's inclination towards a new political vision is evident in his acceptance of prominent figures such as Nasir al-Din al-Tūsi and Atâ-Malek Juvaynī, as well as his interest in the scientific books of the Ismailis. During this period, China was completely subjugated, leading to the relocation of the empire's center from Karakorum to Beijing. With the conquest of Baghdad, the Silk Road would connect Beijing to various cities including Samarkand, Herat, Neishabur, Damghan, Hamadan, Baghdad, and Damascus. This marked the first time in history that such a vast region came under the rule of a centralized power. Following the acquisition of the immense treasures from the Ismaili forts, Hülegü Khan launched an attack on Baghdad through Hamedan in 654 AH or 1256 AD (Fazlullāh Hamadānī 1983: Vol. 2 / 697). The city was plundered for a week, with Juzjani noting that "the extent

of the looted treasures was so vast that it cannot be adequately described, leaving people astonished" (Juzjani 1984: Vol. 2/ 198). The center of the empire received the most superior and prized spoils. The conquest of the wealth of Baghdad, the ancient capital of the Abbasid caliphs, represented the zenith of plundering and military expansion during the era of the Ilkhanid Mongols. Upon designating Marāgheh as the new capital, Hülegü decreed the melting of all the treasury's currency, which was then stored in a fortified fortress in Selmas (Banakati 1969: 419). Simultaneously, he launched a large-scale invasion of Syria and Egypt, advancing towards Damascus. However, the Mongols suffered a defeat at the hands of the Mamluks in Ain Jalut, Syria, thwarting their further conquests (Fazlullāh Hamadānī 1983: Vol. 3/ 65). This decisive battle shattered the myth of Mongol invincibility and deeply impacted the superstitious Mongols, who attributed their successes to the eternal blue sky. George Lane posits that had Hülegü succeeded in subjugating the Syrians and Egyptians, the issue of settling in the northwest of Iran might not have been raised. In such a scenario, it is plausible that the capital of the Ilkhanids would have been established either in the vast Beqaa Valley or in the hills of northern Mesopotamia (Lane 2011: 119). However, despite numerous conflicts and wars that followed, the Euphrates River, which has historically served as Iran's western border, continued to demarcate the western boundaries of the Ilkhanate state. Consequently, the Mongols were unable to fulfill their aspiration of reaching the Mediterranean Sea. As the era of extensive conquests drew to a close and further territorial gain proved elusive, the economy of the Mongol Empire underwent a transition from a predominate looting-based system, which had propelled Genghis Khan's ascent to power, to a feudalistic economy. Although warfare and plundering persisted, other economic sectors, such as foreign and domestic trade as well as industry, experienced substantial growth. However, the agricultural economy remained stagnant due to ongoing attacks and invasions.

Late Era (Manifestations of Command Economy) - From the end of the reign of Hülegü to the beginning of the reign of Ghazan; Feudalistic Command Economy

Ibn Ibri suggests that the primary motive behind Möngke's dispatch of Hülegü to West Asia was economic, aiming to secure economic benefits (Ibn Ibri 1985: 338). Conversely, Rashīd al-Dīn Fazlullāh claims that the Khan endeavored to enlarge the Ilkhanate territory and ensure economic gains by sending him (Fazlullāh Hamadānī 1983: Vol. 2/ 687). However,

according to Razavi, the impasse in further Ilkhanid conquests in the Levant and their continuous conflicts in the east and northeast territories quickly alerted the Ilkhanid leaders to the impracticality of long-term economic sustenance through warfare. Despite the significant roles of political and military factors in this new approach, economically determinative factors steered towards novel re-organization (Razavi 2011: 199). It is imperative to consider that the economic and political structures of past societies were closely interconnected. Furthermore, it should be noted that the presence of a well-functioning state was essential for the prosperity of dynamic economies. By exerting control over the excesses of the Mongols and incorporating the administrative techniques and methods of governance from Iran, adjustments were made to the economic orientations, resulting in a more orderly conduct by the rulers. Khwaja Nasir al-Din Tūsi and the Juvaynī house were prominent figures who served the Mongols and played a significant role in influencing their behavior. Khwaja Nasir, despite following the political philosophy of renowned thinkers like Fārābi and Miskawayh al-Rāzī, challenged them and placed Sharia law on an equal or even higher footing than reason (Pouladi 2019: 90). However, despite these intellectual debates, the Mongols' religious tolerance meant that there was no substantial transformation in practice. According to Hicks, the economic structure can be categorized into two main types: the feudalistic command, where "custom" plays a significant role, and the bureaucratic command, where "order and command" are of utmost importance. In this particular context, the Mongols' approach to urban life and their emphasis on the Ilkhans' army, along with noble men and women (Mongol elites), highlights the prevalence of custom over commerce in this specific economic system.

Following the establishment of the state and the selection of Azerbaijan as the capital, the Mongols, known for their expertise in trade, witnessed the emergence of the first signs of a command economy. Upon the conquest of Baghdad, merchants were granted immunity from murder and plundering (Fazlullāh Hamadānī 1983: Vol. 2/ 710). Hülegü promptly initiated trade relations with the rulers of Armenia and Antioch (Abolfada 1970: 271). The thriving commercial activity in the Black Sea region and key ports like Trabzon and Constantinople held significant appeal for Hülegü (Runciman 2014: Vol. 3/ 425). The involvement of Venetian and Genoese traders in Iran during the era of Hülegü Khan serves as further proof of the economic advancements towards the conclusion of his rule. The surge in commerce and manufacturing during this period is documented in the text Athar al-

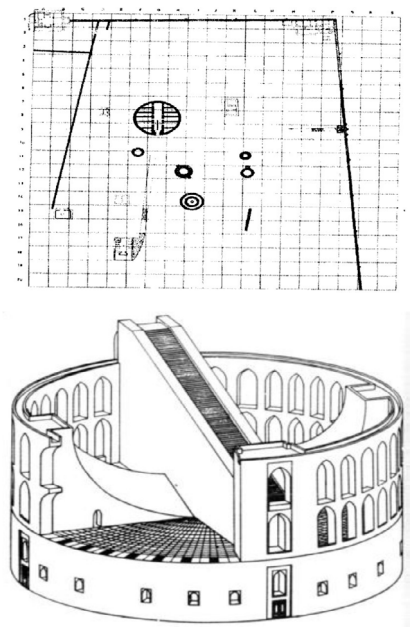
Bilad by Qazvini, penned shortly after the reign of Hülegü Khan (Qazvini 1987). Commercial operations, manufacturing hubs, and industrial zones thrived under the rule of Abaqa Khan (1267–1281 AD). Marco Polo's travelogue vividly describes the export of goods from various regions of the Ilkhanate, highlighting its economic prosperity (Marco Polo 1971: 36). Arghun (1284–1291 AD) displayed a keen interest in urban development and was credited with founding cities like Soltaniyeh and Shanb Ghazan. Throughout this era, the strategy of fostering closer ties with European nations and engaging in conflicts with the Mamluks was primarily driven by economic and commercial considerations, spearheaded by the Jewish Minister Sa'd al-Dawla. Notably, trade connections with India and the Kipchak Plain (Cumania) experienced significant growth during this time (Javadi 1999: 98–99). Prior to Ghazan Khan's reign, there was a lack of a coherent agricultural policy, leading to a period of agricultural decline in the pre-Ghazan Ilkhanid era. Nevertheless, there are indications of agricultural resurgence with the involvement and backing of local governors. Atamelak Juvaynī established 150 settlements along the river's coastline, extending from the Euphrates to Kufa and Najaf (Juvaynī 1991: Vol. 1/ 29), suggesting Abagakhan's inclination towards agriculture, as mentioned by Kashani (1969: 107). The agricultural economy faced a decline due to multiple factors, including the devastation caused by the Mongol invasion and prolonged periods of drought. Wassaf's records indicate a severe three-year drought and subsequent famine in Fars between 1284 and 1286 AD (Awliya Allah 1969: 204). Yet, in certain regions like Yazd, agricultural investments were made, leading to the cultivation of crops and fruits such as cotton and pomegranate (Mustawfi 1983: 74). In his analysis, Petrushevsky examined the village counts in different areas of Iran both before and after the Mongol invasion. His research revealed a significant decline in village numbers, with the exception of Isfahan (Petrushvsky 1978: 496–497). It appears that he failed to take into account the potential development of new settlement patterns during the Ilkhanid period. It is plausible that new settlement patterns emerged during this time as settled populations sought enhanced security by dispersing themselves across agricultural fields. It should be noted that even midst the reign of the feudalistic command economy in Ilkhanid society, the presence of custom and militarism remained prominent alongside the command economy. Consequently, the lack of emphasis on agriculture can be attributed to this coexistence. However, a transformative period ensued after Ghazan Khan's ascension to the throne and the subsequent implementation of his

reforms. This marked the initiation of a new stage, commonly referred to as the "bureaucratic command economy" within the scope of this study.

Manifestations of the Feudalistic Command Economy in Archaeological Data

The Mongols' architectural and artistic achievements in Iran gained significance after the period highlighted in this study, which aligns with the economic disparities discussed. The Mongols turned their attention to northwestern Iran and the city of Marāgheh during this era. While information on Islamic architecture, particularly the Ilkhanid structures in Marāgheh, is scarce, it is evident that the city, chosen as the capital by Hülegü Khan, emerged as a pivotal and progressive urban center in Iran (Pakzad 2013: 339). With the decline of the Abbasid Caliphate and the shift in political ideologies in the Islamic world, the establishment of Marāgheh and its observatory can be interpreted as a move to distance from the Abbasid Sunni realm and embrace the new circumstances brought by the Mongol conquests and their religious tolerance. The broad range of subjects taught in Marāgheh's educational institutions and observatory, along with the revival of observatories, indicate that these advancements were essentially reflections of the emerging feudalistic command economy manifested through architectural designs (Fig. 3).

Throughout the reign of Abaqa Khan, the architectural style of this period remained faithful to the same principles and objectives that were observed at Takht-e Soleyman. The selection of this specific site for the construction of the palace, which had previously served as the ceremonial grounds for the Sasanian kings, was a deliberate move by the Ilkhans to establish their connection to the ancient rulers of Iran. Consequently, Abaqa Khan's primary political motive for erecting his palace in this region was to gain legitimacy and showcase his power by associating himself with the pre-Islamic rulers of Iran. The presence of vivid verses and images from Ferdowsi's Shahnameh, intricately portrayed on the palace's finest tiles, serves as compelling evidence that supports the Ilkhan's propaganda and substantiates their claims of allegiance to the pre-Islamic rulers of Iran. Due to the brevity of Abaqa Khan's reign, it is probable that Takht-e Soleyman functioned primarily as a summer palace in the Ilkhanid period, albeit for a short duration (Grabar et al., 2010: 227). The inclusion of tiles illustrating tales from the Shahnameh in the palace indicates that the Ilkhans strategically utilized this form of decoration to link themselves to the Sasanian rulers, seeking to legitimize their rule by establishing a connection to the Sasanian emperors.



▲ **Fig. 3: Plan (right) (Varjavand 1987: 169) and reconstruction plan of the Marāgheh Observatory's Great Tower (left) (Shekari Nayyeri 2016: 95).**

▲ Fig. 4: The tiles found in the Ilkhanid palace of Takht-e Soleyman showcase narrative motifs and themes that are intricately connected to the stories found in Shahnameh (Shekarpour 2013: 65).

During the rule of Hülegü and Abaqa, the coins minted during what we call "the feudalistic command economy" featured specific religious inscriptions. The most common phrases found on these coins were "La ilah-a ill-allah, wahdah-u la sharik-a lah, Muhammad rasul Allah"1 and the text from verse 26 of Surat Al-Imran which includes "Qul Allahuma malik al-mulk t'oti al-mulk man tisha'u wa tazeu' al-mulk mimman tisha'u wa ta'izzu man tisha'u wa tadhill-u man tisha'u biyadak al-khayr inkka ala kulli shay'in qadir2 ". These inscriptions held significant religious meanings and were carefully chosen to reflect the beliefs of the time (Torabi Tabatabaee 1968: 18–19; Sarfaraz & Avarzamani 2009: 215–217). The true purpose behind these gestures was to legimitize the Ilkhans' rule in Iran. Jenkins (2015: 46–50) argues that the national or political identity holds utmost importance as a collective social identity, with territory, government, and nation being integral components (Alam 2019: 136–148). Establishing a state and securing national and international acceptance necessitates harmonizing these elements to transition power into legitimate authority. The Mongol Ilkhans undertook substantial reforms, including modifications in coinage, which served as a means of communication, to enhance their legitimacy (Fig. 5).

◄ Fig. 5: The front and back of a coin issued during Hülegü Khan's reign, as well as a visual representation (http://ilkkans.altaycoins.com).

- From the reforms of Ghazan Khan to the extinction of the Ilkhanid government; bureaucratic command economy

After the disintegration of the Abbasid Caliphate and the subsequent relaxation of religious practices among the Mongols, a sense of void

permeated the Iranian religious community. This void persisted until Ghazan ascended to power and embraced Islam, thereby bestowing official legitimacy upon the sultans. The Ilkhanate Muslim Khans could then be referred to as sultan-caliphs. This state of affairs endured until the Safavid era, which witnessed the formalization of the Shiite branch of Islam (Tabatabaee 2016: 80). Kwaja Rashīd al-Dīn Fazlullāh Hamadānī, a key intellectual figure during Ghazan Khan's reign, synthesized Iranian ideas with Islamic traditions, playing a pivotal role in Ghazan Khan's reforms. It is also important to note that Ghazan himself actively participated in the implementation of these reforms. According to Jāmi al-Tavārīkh, he addressed the Mongol commanders with the intention of appeasing them regarding economic and social reforms. He expressed the following sentiments: "I harbor no fondness for the Tazi (Arab) people. Should the situation call for it, we shall plunder all. I am more adept at this than anyone else. Together, we will raid them. Yet, if even after the looting, you continue to ask for supplies and yearly tributes and plead for them, I will hold you accountable; for you must also ponder what you will do if we are too severe on the people and consume all their cattle, eggs, and herds." (Fazlullāh Hamadānī 1983: Vol. 2/ 1044).

The reforms implemented by Ghazan Khan marked a significant turning point in the history of the Ilkhanid government. These reforms aimed to address the economic, social, cultural, and political challenges faced by the Ilkhanid territory, resulting in a substantial transformation of the situation. Notably, the reforms initiated by Ghazan Khan were carried forward during the reigns of Öljaitü and Abu Sa'id. Even on his deathbed, Ghazan Khan emphasized the importance of continuing these reforms to the nobility and rulers, highlighting their enduring significance (Wassaf 1959: 457–458; Kashani 1969: 12–14). The manifestations of the bureaucratic command economy after Ghazan's reforms are as follows:

- Within a command economy, a top-down approach is implemented to organize and make decisions. The bureaucratic command economy, on the other hand, is characterized by the central government's utilization of a bureaucratic system to administer governmental affairs, rather than resorting to traditional methods or exploiting subjugated populations. Notably, government involvement in trade, agriculture, and industry are prominent aspects of the command economy (Hicks 1976: 1–31). Ghazan's decrees, as suggested by Lambton and Carl Jahn, can be interpreted as an endeavor to reconcile Genghis Khan's legal framework with Islamic jurisprudence. The inclination to establish compatibility between Mongolian law and

Islamic jurisprudence was a prominent aspect of Ghazan's domestic politics (Boyle 2018: Vol. 5/ 188–193; Petrushevsky et al., 2015: 60).

- Forming a cultural unity: Ghazan initiated the process of eliminating cultural diversity within society by embracing Islam and imposing restrictions on non-monotheistic religions in the Ilkhanate realm. This measure was put into effect at the beginning of his reign in the month of Sha'ban in the year 604 AH (Fazlullāh Hamadānī 1983: Vol. 2 / 900–904). By doing so, Ghazan established a sense of cultural unity between himself as the ruler and the general populace. This period also witnessed the abolition of the caliphate, paving the way for the intertwining of religion and politics. The interplay between religion and politics is evident in the utilization of the waqf (endowment) system as a religious command, coupled with governmental endorsement of it as a political decree (command). Following the Ghazan period, endowment complexes were founded with the patronage of the sultan and the royal family, serving diverse functions encompassing religious, scientific, economic, social, and political realms, all geared towards achieving political aims (Karimian & Mehdizadeh 2017: 155–165). These initiatives have had a notable impact on the physical structure and appearance of cities, leading to the decline of numerous urban classes and fostering a closer relationship between the ruler and the ruled, as well as among different social strata.

- Conveying the benefits of reforms to the nobility: Ghazan Khan made it clear to the Mongol tribes that his reforms were not intended to benefit the Iranians but rather to ensure the continuity of Mongol rule. He stressed the significance of agriculture and regular tax collection as essential for maintaining governance. By cautioning against the plundering of farmers, he underscored the negative consequences on agriculture and the state's finances. This strategy appeared to resonate with many Mongol rulers, leading to widespread adoption of these reforms (Fazlullāh Hamadānī 1983: Vol. 2/ 1039). Furthermore, Ghazan motivated the Mongols by granting them unproductive lands for cultivation (Ibid 1106).

- Organizing the tax collection system: Prior to Ghazan Khan, farmers and peasants were burdened with the Qabchūr and tribute taxes, which were imposed on them up to twenty times a year (Ibid 1024–1028). However, Ghazan Khan implemented significant reforms in the tax collection system, including the consolidation of taxes, the establishment of a single annual payment, and setting deadlines for payment. Additionally, he introduced a new calendar system based on solar calculations to determine the time for tax collection (Birashk 1997: 201). In certain regions, Ghazan Khan

abolished the Qabchūr tax and replaced it with the Tamghā tax (Mustawfi 1983: 603–604). Furthermore, he eliminated the practice of paying taxes in the form of Hirz and Moqāyeseh, which involved contributing a specific portion of the agricultural yield as a tax (Fazlullāh Hamadānī 1983: Vol. 2 / 1035–1043).

- Revitalization of agricultural infrastructure and restructuring of land ownership regulations: Prior to Ghazan's reign, numerous farmers had abandoned their homeland and sought refuge in the surrounding regions. However, with the implementation of a new law, property owners were obligated to repatriate fugitive individuals and villagers back to their respective provinces and lands (Ibid 1107). As part of Ghazan's reforms, a portion of the tax revenue generated from each province was designated to cover the expenses associated with acquiring seeds and necessary capital for agricultural purposes. This initiative aimed to revive agricultural activities and foster development within the provinces (Ibid 1101–1102). Ghazan and his successors undertook extensive measures to restore irrigation networks and establish a multitude of streams and canals, further enhancing the agricultural landscape. Among these streams (canals) were two large ones in the Mesopotamia region that carried Euphrates water to the Karbala region. Rashīd al-Dīn Fazlullāh also built streams, canals, villages, and settled farmers in them (Ibid 157–158; 244–245). In addition, some other agents and Ilkhanate government officials each took their own development measures in this regard (Yazdi 1961: 81–83). Ghazan divided the royal arid lands into several categories and handed over each of them under special conditions to those who were able to revive and develop it (Fazlullāh Hamadānī 1983: Vol. 2 / 1105–1107; Spuler 2018: 319). Ghazan subsequently established the "organization of net revenues" with the purpose of overseeing the administration of these territories and focusing on matters pertaining to them (Ibid 1107–1108). A considerable number of such measures persisted unchanged during the time of Öljaitü and Abu Sa'id, subsequent to Ghazan's rule.

- Market regulation: In order to foster a thriving trade environment both domestically and internationally, various measures were implemented. These included addressing the market situation, ensuring uniformity and standardization of weights and units of measurement, overseeing the organization of artisans and guilds, curbing the ambitions of government officials, regulating the operations of guilds and commercial enterprises, closely monitoring the issuance of government permits (yārliq), maintaining order in postal affairs, attending to the state of roads and their maintenance,

and combating the proliferation of usury. Through these concerted efforts, trade flourished on both local and global scales (Wassaf 1959: 345).

- Aiding for architectural projects, urban development, and road construction: Numerous architectural works from the Ilkhanid era are associated with the period following the Ilkhanid adoption of Islam. The establishment of settlements like Ghāzānīyeh, Rab'-e Rashīdī, Ojan, and Soltāniyeh exemplifies this trend. The development of caravanserais near urban centers, along with the provision of amenities like baths for merchants prior to entering cities, contributed significantly to the prosperity and renown of centers such as Tabriz and Soltāniyeh (Fazlullāh Hamadānī 1983: Vol. 1 and 2 / 995–996). Apart from serving religious, political, scientific, and social purposes, the architectural ensembles of this era also fulfilled economic roles. Notably, several complexes were constructed solely for economic purposes, including the Ghiyāthīyeh, Dameshqīyeh, and Sahibiyeh complexes in Tabriz, as well as hospitals (Dar al-Shifā) and Ribāts in Kerman, and architectural complexes in Yazd. The complexes were primarily situated within urban areas and were financially backed by donations from nearby villages, impacting the economy of the region (Karimian & Mehdizadeh 2017: 159). Despite Ghāzānīyeh having its own tower and rampart, it was constructed and expanded beyond the main fortifications of Tabriz. Ghazan Khan personally oversaw the development of the Ādelīyeh garden and pavilion (kūshk) as well as the town's gardens. Under Ghazan's directive, various fruit trees, fragrant flowers, and legumes that were not native to Tabriz were brought to the region and cultivated in Tabriz and Shanb-e Ghāzān (Fazlullāh Hamadānī 1983: Vol. 2/ 116; 131; 160; 174). The decision to establish a new town in the western pastures of Tabriz reflects the impact of Mongol laws, which favored a lifestyle closer to nomadic traditions and away from urban centers. It is apparent that the western part of Tabriz, particularly with its entrance and exit to the west, was deemed the most appropriate location for this purpose. According to Marco Polo, merchants arriving from Byzantium and Europe were mandated to unload and engage in trade solely in the markets of Shanb-e Ghāzān (Polo 1971: 10–20). The impact of Ghāzānīyeh on international trade is undeniable. It is plausible that the commercial routes connecting Ghāzānīyeh to the West fostered the exchange of various customs, techniques, and artistic practices. The construction of a settlement outside the city fortifications, accompanied by the establishment of gardens and orchards in its vicinity, can be interpreted as an attempt to recreate and embody the nomadic lifestyle prevalent in the western region of Tabriz.

This deliberate embrace of "customs" despite the prevailing dominance of the "command" element exemplifies Ghazan's dedication to upholding cultural traditions.

- Prioritizing trade issues in relations with countries: Ghazan Khan, in a letter, encouraged the Mamluk sultan to swear loyalty to him, highlighting the importance of commercial ties and articulating his wish for trade to remain unaffected by political disputes (Wassaf 1959: 372). Alongside economic motivations, endeavors to establish partnerships with European authorities often included the recruitment of envoys from merchant backgrounds. An illustration of this approach is the assignment of "Buscarello," a Genoese entrepreneur, to engage with European courts (Javadi 1999: 94). The marriage of Ghazan to the daughter of Andronikos II, the Byzantine emperor, facilitated the Ilkhanids in capitalizing on the commercial interests of the Black Sea and the Mediterranean (Fazlullāh Hamadānī 1983: Vol. 2/ 951). Furthermore, trade links with China and India were established, resulting in a notable expansion of trade and maritime routes (Spuler 2018: 271). During the reigns of Öljaitü and Abu Sa'id, the focus of their interactions with the Mamluks and neighboring regions shifted towards economic interests. Öljaitü, at the onset of his rule, dispatched messengers to Egypt with a message of peace and friendship. However, alongside this amicable gesture, he also made a demand for the opening of trade routes and the provision of support for his kingdom (Wassaf 1959: 472). During this period, the coalition of the Uluses led to a system where merchants were granted the privilege of unrestricted movement and transportation of goods without the burden of taxes or obligatory fees (Ibid, 475–454). Additionally, there were established trade connections with European authorities, particularly with Genoese and Venetian traders (Javadi 1999: 112–113), marking the pinnacle of the command economy in that era.

Petrushevsky posits that the economic structure during the Ilkhanid era was inherently linked to the diminishing urban life due to Mongol influence. He supports his argument by pointing out that the government's taxation in the form of goods aligns with this natural system (Petrushevsky 1978: 211). Nevertheless, Petrushevsky fails to consider the taxes collected as goods in both the Ilkhanid and pre-Mongol periods when analyzing the tax revenue received by the Ilkhanid Central Court. In his work Nozhat al-Qulūb, Hamdallāh Mustawfi presented an estimation of the total tax revenue received by the Central Court prior to the Mongol invasions, which amounted to approximately one hundred million dinars. Following

the Mongol conquests, this figure dwindled to about twenty million dinars. It is worth noting that Mustawfi's calculations excluded the tax revenues from regions like Sistan, Ghohestan, Khorasan, Gorgan, and Mazandaran, as these areas operated under local budgets and did not contribute to the Central Court's finances. Consequently, Mustawfi's analysis did not encompass these territories due to the lack of available data (Mustawfi 1983: 147). Furthermore, taxes collected in the form of goods played a significant role in financing military and state expenditures, especially during the military economy era, a factor that was not considered in Petrushevsky's findings. For instance, as per Nakhjavāni, the Khuzestan region's tribute was collected in goods during Ghazan's reign (Nakhjavani 1964: Vol. 1/ 199). Therefore, Petrushevsky's perspective on the Ilkhanate economy's natural state resulting from the agricultural economy's decline is relevant only during the "military economy" era and not for all periods and regions. Subsequent to the devastation of infrastructure and economic foundations caused by the Mongol invasion, the central court of the Ilkhanid dynasty witnessed a significant increase in growth and attained a certain level of prosperity under the feudalistic and bureaucratic command economy systems. Nonetheless, overall revenue generated was noted to be lower compared to the pre-Mongol era, particularly when contrasted with the Seljuk period.

Manifestations of beaucratic command economy in archaeological data

The architecture and currency of the Ilkhanids underwent significant transformations after their conversion to Islam, signifying a departure from the preceding era. These changes align with our expectations of a "bureaucratic command economy" during this period. Among the notable complexes from this time are Shanb-e Ghāzān, Rab-e Rashīdī, Arg-e Alishāh, and Soltāniyeh Dome. These architectural marvels exemplify the Sultan's authority, encompassing political, economic, and religious realms. Shanb-e Ghāzān, for instance, incorporates various elements such as the congregational mosque (Jāmi Masjid), educational institutions for the Shafi'i and Hanafi schools of thought, the law house or Beit al-Qānūn (Fazlullāh Hamadānī 1983: Vol. 4/ 1378), and other components that pertain to the religious aspect. Additionally, the positioning of the Sultan's tomb at the center (Boroushaki 1986: 41–65) signifies its paramount importance. This exemplifies Ghazan Khan's endeavor to consolidate and centralize political power and religion within the government apparatus and his own persona, following the decline of the Abbasid caliphate and the Sunni worldview. The urban complexes of Shanb-e Ghāzān and Rab-e Rashīdī showcase the

influence of power-maker elements and the new political thought of the Ilkhanid society (Fig. 6). Towards the end of this period, the juxtaposition of elements associated with political power alongside examples of religious and economic power became fully apparent in Arg-e Alishāh and Soltāniyeh Dome. Arg-e Alishāh, for instance, showcases a harmonious coexistence of various power-maker elements, each representing different facets of power. These include mosques and monasteries (symbolizing religious power), governmental buildings and palaces (political power), and markets (signifying economic power) (Fazlullāh Hamadānī 1983: Vol. 4/ 117, 997, 1173, 1373). This amalgamation of power is a testament to the overall structure of the citadel. The locus of power lies within the patriarchal government, and the strategic arrangement of these power symbols within the spatial organization of the Soltāniyeh Citadel further reinforces this notion. The presence of the palace and the royal court, the establishment of schools aimed at promoting the Shi'i branch, the influential figure of Allāmeh Hellī, the Chalabioghlou Mausoleum, and the rerouting of commercial highways all reflect the prevailing discourse of the society in this period. These elements are deeply rooted in the architectural principles and urban planning of the Ilkhanid period (Fig. 7 & 8).

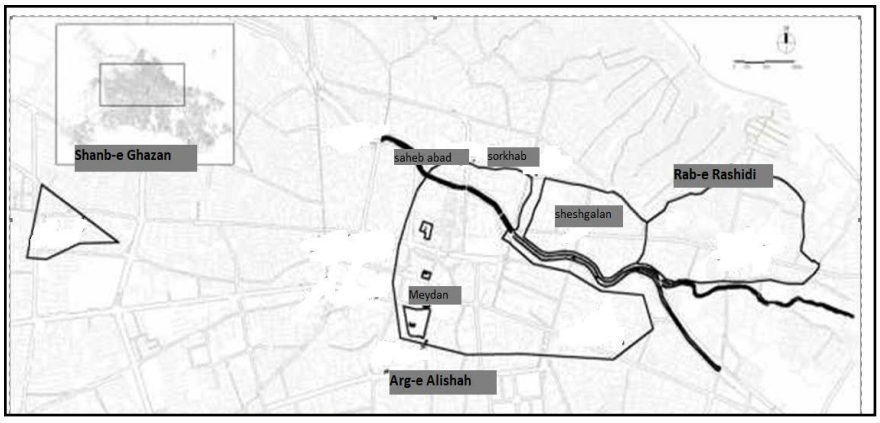
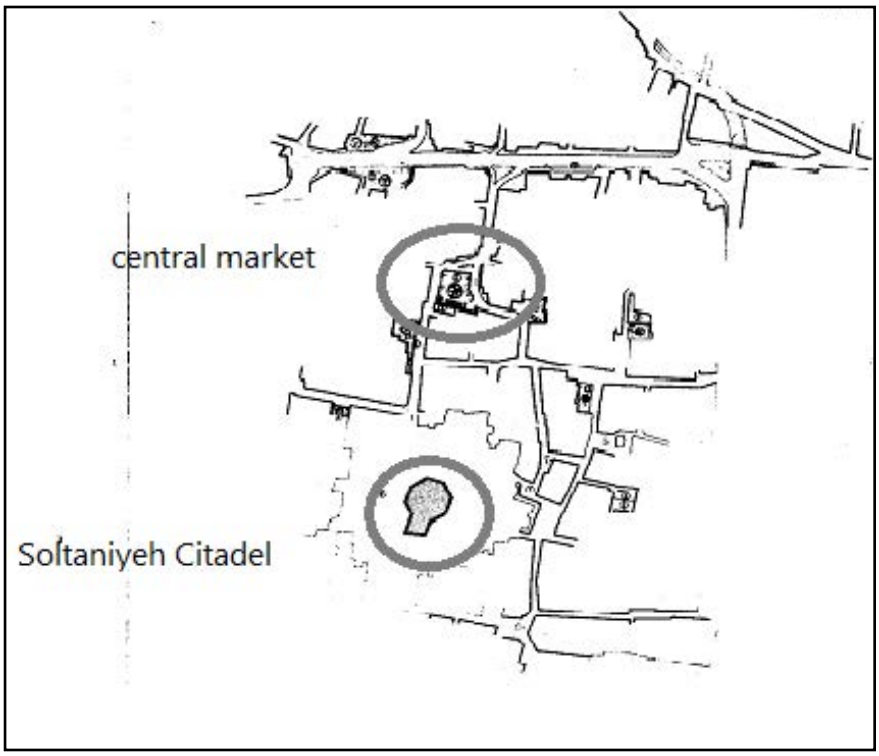


Fig. 6: Reconstruction of the spatial location of the Shanb-e Ghāzān, Rab-e Rashīdī, and Arg-e Alishāh complexes and their relationship with other historical complexes in the city of Tabriz during the Ilkhanid period (Authors 2024; the location of Shanb-e Ghāzān is measured based on Fazlullāh Hamadānī 1983: 117, 997, 1173, 1373; Rab-e Rashidi, based on Fazlullāh Hamadānī 1977: 21-32; Arg-e Alishāh based on Mustawfi 1983: 87; Ibn Battūta 1980: 233; Mirkhvānd 2001: vol. 4: 600–610; Contarini & Zeno Caterino 2002: 383). ▶

Following his acceptance of Islam, Ghazan Khan's era saw the use of Quranic verses on coins for religious purposes. The coins also displayed motifs inspired by Iranian customs, such as "King Ghazan the Just," "King of Islam," "Supreme Emperor," and the representation of the rising sun. Moreover, the coins bore inscriptions in Uyghur script "Taghriin Gojundor" and Chinese script "Sultan" on their obverse and reverse sides, respectively (Alaeddini 2016: 25; Shamsi et al., 2018: 114; Torabi Tabatabaee 1972: 47–50; Sharafi 2017: 124). Indeed, under the guidance of Rashīd al-Dīn Fazlullāh, Ghazan not only sought to legitimize his rule through religious means, but also recognized the significance of meritocracy and Iranian

▲ Fig. 7: The miniature of Soltāniyeh Citadel by Matrāqchī; 1. Soltāniyeh Dome; 2. Congregational Mosque; 3. Building associated with Khwaja Rashid al-Din; 4. Marketplaces? 5. Citadel towers (left side) (Topkapi Palace Museum, Istanbul, highlighted sections by the authors).



◄ Fig. 8: Roads leading to the center of Soltāniyeh from all corners of the empire (Mehryar et al., 1985: 261).

policies. By doing so, he actively worked towards fortifying the very core of his monarchy on a global scale. The presence of Islamic phrases alongside Iranian customs on the coins is a tangible manifestation of the harmonious coexistence of these two dimensions within the society of that era. The use of terms like "bazar" underscores the economic significance of markets during this era. While it is probable that Ghazan genuinely embraced Islam and held a specific interest in Shi'ism (Fazlullāh Hamadānī 1983: 900–904), his coins do not contain any motifs promoting a particular religion. On the other hand, the coins of Öljaitü include phrases associated with both Sunni and Shia Islam, such as "Abu Bakr al-Siddiq, Umar al-Faruq, Uthman Dhu'l-Nurayn, and Ali Abu'l-Sebatayn, peace be upon them all" and "La ilaha illallah, Muhammad rasul Allah, Ali wali Allah." In a similar vein, the coins of Abu Sa'id feature inscriptions such as "Allah, La ilaha illallah, Muhammad rasul Allah, wa sallam" and "Abu Bakr, Umar, Uthman, Ali" (Fig. 9). Furthermore, during the third period, Uyghur concepts and Iranian traditions frequently coexisted with Islamic concepts. It is worth noting that the Mongol khans not only gained full legitimacy among the Iranian people, but also within the Islamic world and among the Mamluks of Egypt during this period, particularly in its later stages (Eqbal Ashtiani, 2010: 355). Moreover, with the adoption of the Iranian bureaucracy (Spuler, 2018: 315), the society transitioned into the "command" stage, as defined by John Hicks's theory of economic history.

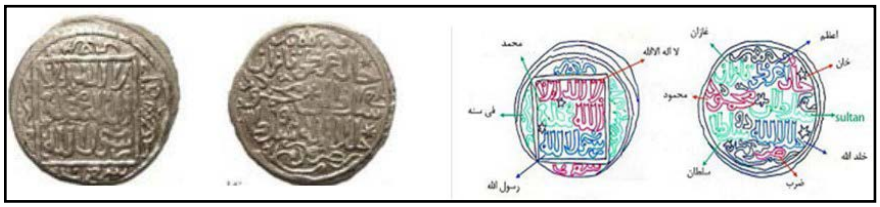


Fig. 9: The left and right sides of a Ghazan Khan coin and its drawing (http://ilkkans.altaycoins.com). ▶

Following the aforementioned elucidations, to provide a concise overview of the discussion, the development of the Ilkhanid economy can be effectively summarized through the lens of John Hicks' theory of "economic history." The various stages of this theory are exemplified in different spheres, as delineated in Table 1.

Conclusion

Despite the plethora of available sources, discussions regarding Mongol rule in general and the Ilkhanid Dynasty in particular have consistently been marked by ambiguity and contention. The complexities of the economic dynamics during this time exceeded those of earlier periods,

Table 1: Manifestations of different stages of John Hicks' theory of economic history during the Ilkhanid period (Authors, 2024). ▼

Type of economy	Time span	Manifestations
Customary economy	The emergenge of the Mongols in Mongolia until the unification of the tribes by Temujin	Life as a commune and based on natural order Society has a state of unconscious balance. Tribal decentralization because of climatic conditions Economy based on hunting and animal husbandry Limited acquaintance with the concepts of trade through Muslim and Chinese merchants Division of tribes and the emergence of new tribes because of extra-tribal marriages Emergence of social classes and the necessity for tribal unity Population growth and aristocracy inclination as a result of familiarity with the luxury products of Muslims and the Chinese Lack of resources and lack of response to the needs of the united tribes and the inevitability of attacks on neighboring areas
Military economy	From about 1218 AD and Genghis Khan's invasion on Iran until 1259 AD and the first great defeat of the Mongols in Ain Jalut	- Authoritarianism at the top of the pyramid and the rise of the Mongol aristocracy's power and the necessity of continuously supporting the aristocracy by Genghis Khan - Invasion on the rich cities of Central Asia and East Iran - Lack of political goals to establish a government in new territories at the beginning of the attacks and being satisfied in looting cities such as Bukhara, Samarkand and Neishabour - Sending letters to city governors requesting tribal admission and paying tribute - Uncertainty about the situation of Iran in the division of Genghis Khan - Sending Hülegü to the west and conquering and accumulating the wealth of the Ismaili crowd and Baghdad - Recognizing the impossibility of continuing conquests in West Asia after the first great defeat of the Mongols in Ain Jalut and changing the formulation of power in West Asia with the presence of the Mamluks
Feudalistic Command economy	From 1259 AD and the establishment of Hülegü's power in Marāgheh to the beginning of Ghazan's reign in 1294 AD	- Deadlock in conquests in the Levant and clashes in the north with *Altin Urdu* and northeast with *Ulus Jaghtaei* - Employing Iranian bureaucrats such as Khwaja Nasir al-Din Tūsi and the Juvayni family - The positive attitude of the Mongols to urban life - The choice of Azerbaijan as the capital and the development of science and culture in Marāgheh, the capital of Hülegü - Opening of trade relations with the kings of Armenia and Antioch and the Europeans in the time of Hülegü, Abaqa Khan and their successors - Continued recession in the agricultural economy despite the relative improvement of the commercial economy - Continuing the wars and looting, especially on the western borders, with no significant results for the Mongols
Bureaucratic command economy	From the beginning of Ghazan's reforms in 1294 AD and the Significant role of Khwaja Rashīd al-Din Fazlūllāh to the extinction of the Mongol dynasty in 1335 AD	- Creating cultural unity as a result of Ghazan Khan's tendency to Islam; From this time on, Khans can be called sultan-caliphs. - Efforts to bring politics and religion closer to each other by Khans and ministers such as Khwaja Rashīd al-Din Fazlūllāh and Tāj al-Din Jilāni with the support of the *Waqf* Foundation; These two made significant efforts to bring the government and politics and religious elements closer together. Architectural complexes called *Abwāb al-Barr* are examples of such efforts. - Creating compatibility between the Mongol law and Islamic jurisprudence - Ghazan Khan's efforts to make the Mongol nobility aware that the reforms were beneficial - Reviving the agricultural economy by helping to rebuild irrigation networks and reorganizing the land ownership laws - Organizing the tax collection system - Regulating the market situation and establishing order in the affairs of artisans and different guilds - Support for architecture, urban planning and road construction - Prioritizing economic interests over military issues in relations with the countries of Egypt, especially in the time of Oljāitū and Abu Sa'd, based on the approaches of the Khans and the contents of the exchanged letters - Establishment of an economic coalition between the uluses to facilitate trade and transportation of various goods from China to Anatolia

largely due to the epistemological challenges faced by researchers in this field. Examining the Mongols' economic evolution from its inception to its zenith during their reign in Iran, this study draws upon John Hicks' theory of "economic history" and the various manifestations of this theory in the economic framework of that era, which often intersected with the principles of the "Historical school of Germany". Embracing these ideas, John Hicks divides the economic history of societies prior to the era of mercantilism into three distinct periods: the "customary economy", the "military economy", and the "command economy", each with its own subcategories as mentioned earlier. Notably, the Mongol Empire and the Ilkhanid government rapidly progressed through these stages of growth and development, assimilating the knowledge and achievements of civilized nations and attaining remarkable levels of culture, industry, and more in their newly acquired territories.

The economic progress and development during this era can also be observed through an analysis of the existing documents and data. The traditional economy of this time period revolved around tribal life centered on hunting, animal husbandry, and fishing, starting from its inception in Mongolia up to the consolidation of the tribes under Temujin. During this period, there existed an inherent and organic order that regulated relationships, leading to a stagnant economy. The shift towards a military or plundering economy was triggered by the militaristic and aristocratic nature of Genghis Khan's rule, population pressures, and limited resources, which served as justification for the Mongol merchants' retaliation following the massacre in Otrār. This phase endured until 1260 AD, marked by the first significant defeat at Ain Jālūt, which shattered the Mongols' aura of invincibility.

The presence of military economy is apparent through various means, including the exploitation and plundering of the countries that have been conquered. Moreover, the absence of clear political objectives in establishing a government in the occupied territories at the onset of invasions, the uncertain situation of Iran within the Mongol political divisions, and the retention of local governors as long as tribute payments are received all serve as indications of this phenomenon. Following the Mongols' defeat at Ain Jālūt, the halt in conquests necessitated the establishment of civil order and organization in the vast conquered territories. This circumstance compelled the Mongols to adopt centralization strategies and a combination of Iranized (Irānshahrī) and Islamic Shari'a political concepts. The economic developments during this era can be traced

back to the rise of Hülegü's authority in Marāgheh and the initiatives of Khwaja Rashīd al-Din in 658 AH, persisting until the commencement of Ghazan's reign. During this particular era, which coincides with Hicks' "feudalistic command economy," the presence of both custom and plunder persists alongside the element of command. However, it is the commercial economy that emerges as the primary economic source for the government. The bureaucratic command economy, on the other hand, spans from the initiation of Ghazan's reforms in 1294 AD and the appointment of the vizier Khwaja Rashīd al-Dīn Fazlullāh until the downfall of the Ilkhanid dynasty and a bit thereafter. Throughout this period, the element of command surpasses the influence of custom, which is evident in the flourishing agricultural sector, the rise in agricultural land prices, the cultivation of diverse crops, the growth of domestic and foreign trade (both over land and sea), the establishment and restoration of trade routes, and the construction of architectural complexes with economic purposes. Additionally, there were tax and monetary reforms implemented, resulting in an increase in treasury revenues and the development of a monetary economy. The manifestation of custom in an authoritarian society (with the dominance of command economy) can be observed through various elements at this particular stage. These elements include the establishment of out-of-town settlements or hills, the creation of gardens and parks surrounding them, the depiction of Uyghur themes on coins like Tagrin Gujundor, and the concentration of foreign trade in markets located outside the cities, such as the market of Shanb-e Ghāzān.

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Observation Contribution

The contribution of the authors is the same.

Conflict of Interest

Authors declared no conflict of interest.

Endnote

1. Meaning: there is only one God, Allah which is singular with no associates and Muhammad is the messenger of Allah.

2. Meaning: "Say, 'O Allah, Master of all sovereignty! You give sovereignty to whomever You wish, and strip of sovereignty whomever You wish; You make mighty whomever You wish, and You degrade whomever You wish; all choice is in Your hand. Indeed You have power over all things.

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انجمن علمی باستان‌شناسی ایران

مطالعهٔ تکوین اقتصاد ایلخانان مغول با تحلیل نمودهای مراحل مختلف نظریهٔ «تاریخ اقتصادی» جان هیکس

فرزاد فیضی[I]، حمید خانعلی[II]

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چکیده

مطالعهٔ اقتصاد ایلخانان مغول با تکیه‌بر نظریات اقتصادی و بهره‌گیری توأم از داده‌های باستان‌شناختی با کاستی روبه‌رو است. این پژوهش با نظر به دیدگاه پیروان «مکتب تاریخی» به‌طور عام و نظریهٔ «تاریخ اقتصادی» «جان هیکس» به‌طور خاص، اقتصاد جوامع تاریخی و نیز مغول‌ها را به سه مرحلهٔ کلی «اقتصاد عرفی»، «اقتصاد نظامی» و «اقتصاد امری» تقسیم می‌کند. پژوهش زیر با رویکرد توصیفی-تحلیلی و با استفاده از روش کتابخانه‌ای درصدد پاسخ‌دهی به این پرسش‌ها است که این مراحل با کدام تحولات سیاسی-نظامی دورهٔ ایلخانان مغول هم‌پوشانی دارد و نمودهای آن در عرصه‌های مختلف این دوره به چه صورت بوده است؟ نتایج پژوهش نشانگر ظهور تمام مراحل این نظریه در تکوین اقتصاد ایلخانان و تطابق آن با تحولات سیاسی و اقتصادی است. در اقتصاد عرفی افزایش جمعیت و بروز طبقات اجتماعی نظم و تعادل طبیعی را به‌هم می‌زند. از نمودهای اقتصاد نظامی (۶۱۵ تا ۶۵۸هـ.ق.) نبود اهداف سیاسی برای تأسیس حکومت در سرزمین‌های جدید، درخواست پذیرش ایلی و خودکامگی در رأس هرم قدرت است. وجه‌تمایز اقتصاد امری فئودالی (۶۵۸-۶۹۴هـ.ق.) نسبت به گذشته رویکرد مثبت مغول‌ها به زندگی شهری باوجود اهمیت بالای اردوی ایلخان و رشد اقتصاد تجاری در سایهٔ رکود اقتصاد کشاورزی است. در اولویت قرارگرفتن مسائل اقتصادی بر نظامی ازقبیل رواج معماری اقتصادی و ایجاد نوعی اتحادیه اقتصادی بین اولوس‌های چنگیزی از مشخصات اقتصاد امری دیوان‌سالاری (۶۹۴-۷۳۶هـ.ق.) در دورهٔ ایلخانی می‌باشد. مظاهر اقتصاد امری دیوان‌سالاری در معماری، سکه‌ها و سایر هنرهای این دوره مشهود است.

کلیدواژگان: مغول، ایلخانی، تاریخ اقتصاد، جان هیکس، عرف، امر.

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