مطالعات باستان‌شناسی پارسه ۳۵

فصلنامهٔ علمی مطالعات باستان‌شناسی پارسه
شاپای چاپی: ۵۰۴۸-۲۶۴۵، الکترونیکی: ۵۷۰۶-۲۶۴۵ سال دهم || شمارهٔ ۳۵ || ۱۴۰۵

بسم الله الرحمن الرحیم

مطالعات باستان‌شناسی پارسه

فصلنامهٔ علمی مطالعات باستان‌شناسی پارسه

شمارهٔ شاپای چاپی: ۵۰۴۸-۲۶۴۵
شمارهٔ شاپای الکترونیکی: ۵۷۰۶-۲۶۴۵
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ناشر: پژوهشگاه میراث‌فرهنگی و گردشگری، تهران، ایران

شیوه‌نامهٔ نگارش مقالات نشریهٔ «مطالعات باستان‌شناسی پارسه»

۱. موضوع مقالات در زمینه‌های گوناگون باستان‌شناسی و تاریخ هنر ایران، فرهنگ‌های همجوارِ مرتبط و تطبیقی با ایران و مطالعات میان‌رشته‌ای مورد پذیرش است.
۲. مقاله‌های ارسالی بایستی تحقیقی و نو بوده و نباید پیش‌تر در نشریه‌ای دیگر یا مجموعه مقالات همایش‌ها چاپ شده و یا هم‌زمان برای مجله‌ای دیگر ارسال شده باشند.
۳. گزارش‌های علمی فعالیت‌های میدانی و آزمایشگاهی بایستی در چارچوب شیوه‌نامهٔ نشریه تنظیم شوند.
۴. مقاله‌های مشترک پژوهشی بایستی با ذکر عنوان طرح تحقیقاتی و با قید شمارهٔ طرح و نام مؤسسهٔ سفارش‌دهنده باشند.
۵. مقاله اگر مستخرج از پایان‌نامهٔ کارشناسی‌ارشد و یا رسالهٔ دکتری باشد، قید گردد؛ و چاپ این‌گونه مقاله‌ها به‌شرط نو بودن موضوع، بلامانع است.
۶. نشریه از چاپ مقالات ترجمه‌شده معذور است.
۷. مقاله باید در حوزهٔ تخصصی نویسنده یا نویسندگان باشد.
۸. مسئولیت مطالب مطرح‌شده در مقاله به‌عهدهٔ نویسندهٔ مسئول یا نویسندگان است.

شیوهٔ نگارش مقالات

- **مشخصات نویسنده/ نویسندگان:** این صفحه باید بدون شماره، شامل عنوان کامل مقاله (عنوان مقاله باید کاملاً گویا و بیانگر محتوای مقاله باشد)، نام و نام‌خانوادگی نویسنده/ نویسندگان، همراه رتبهٔ علمی، نام مؤسسه یا محل اشتغال، کد ارکید، نشانی، شمارهٔ تماس و پست الکترونیکی باشد.
- **چکیدهٔ فارسی:** حداکثر در ۳۰۰ کلمه، با ذکر عنوان مقاله و کلیدواژگان (سه تا پنج کلمه) در یک صفحهٔ جداگانه تنظیم گردد؛ چکیدهٔ فارسی باید به‌تنهایی بیان‌کنندهٔ تمام مقاله و شامل: طرح و بیان مسأله، اهداف و ضرورت پژوهش، پرسش و فرضیهٔ (اصلی) پژوهش، روش تحقیق و مهم‌ترین یافته‌ها و نتیجه‌گیری باشد.
- **مقدمه:** شامل طرح و بیان مسأله، اهداف و ضرورت پژوهش، پرسش و فرضیهٔ (اصلی و فرعی) پژوهش، به‌صورت جامع و در یک صفحه تنظیم شده باشد.
- **روش پژوهش.**
- **پیشینهٔ پژوهش.**
- **متن مقاله:** شامل مبانی نظری، مطالعات و بررسی‌ها، یافته‌ها و نتیجه‌گیری تحقیق باشد.
- **نتیجهٔ تحقیق:** باید به‌گونه‌ای منطقی و مستدل همراه با جمع‌بندی موارد طرح‌شده و شامل پاسخ به پرسش‌ها و بررسی فرضیات تحقیق در قالب ارائه یافته‌های پژوهش باشد.
- **سپاسگزاری:** قدردانی از همکاری و راهنمایی کسانی‌که در تدوین مقاله نقش داشته‌اند (در صورت تمایل).
- **مشارکت درصدی نویسندگان:** مقالاتی که دارای بیش از یک نویسنده هستند باید درصد مشارکت هر نویسنده، نقش و سهم هریک به صورت مجزا توضیح داده شوند.
- **تعارض منافع:** در این بخش نویسنده ضمن رعایت اخلاق نشر باید تعارض منافع مقاله با مقالات، دستگاه‌های اجرایی و حمایت کننده را مشخص نماید.
- **پی‌نوشت:** شامل برابر نهادهای انگلیسی و توضیحات ضروری دربارهٔ اصطلاحات و مطالب مقاله است که باید به‌ترتیب شماره در متن و به‌صورت پی‌نوشت در انتهای مقاله درج گردد (از درج هرگونه پانوشت در داخل متن خودداری شود).
- **کتابنامه** (منابع و مآخذ)**:** به‌ترتیب حروف الفبا و برحسب نام‌خانوادگی نویسنده مرتب گردد (تمامی منابع فارسی و لاتین؛ همچنین تمامی منابع فارسی مورداستفادهٔ مقاله در بخش کتابنامه نیز باید به‌صورت انگلیسی ترجمه و بار درج واژهٔ "In Persian" آورده شوند).

بخش انگلیسی: این بخش باید به‌همراه مقاله در یک فایل جداگانه (Word) به دفتر نشریه ارسال شود؛ که دربردارندهٔ مشخصات نویسندگان و ترجمهٔ کاملی از خلاصهٔ مقاله (به‌صورت مقاله‌ای کوتاه) در ۱۲۰۰ کلمه، شامل: چکیده (۳۰۰ کلمه و شامل: طرح و بیان مسأله، اهداف و ضرورت پژوهش، پرسش و فرضیهٔ (اصلی) پژوهش، روش تحقیق و مهم‌ترین یافته‌ها و نتیجه‌گیری)، مقدمه (۳۰۰ 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 (۳۰۰ کلمه) و تمامی منابع فارسی (منابع فارسی نیز باید به‌صورت ترجمه شده) و انگلیسی مورداستفاده در تحقیق باشد.

شیوهٔ تنظیم مقالات

- **متن مقاله:** متن مقاله با تمام اطلاعات (متن، عکس/تصاویر، نقشه، طرح، جدول و نمودار)، حداکثر در ۲۰ صفحهٔ یک‌رو A4 (در هر صفحه ۲۴ سطر، متن فارسی با قلم B-Mitra اندازهٔ ۱۳ و فاصلهٔ سطرها ۱٫۵ پوینت، پی‌نوشت فارسی با اندازهٔ ۱۰؛ مطالب انگلیسی (رفرنس و...) با قلم Times New Roman اندازهٔ ۱۲؛ و پی‌نوشت انگلیسی با اندازهٔ ۸) تنظیم گردد. تأکید می‌شود در مجموع، بخش فارسی مقاله (چکیده، مقدمه، بدنه، نتیجه‌گیری و رفرنس‌ها) نباید بیشتر از ۷۰۰۰ کلمه باشد.
- **تصاویر، نمودار، طرح‌ها و جداول:** حداقل و حداکثر استفاده از تعداد ضروری تصویر، نمودار و جدول در مقاله حائز اهمیت است که باید با کیفیت مناسب (تصاویر با دقت ۳۰۰ dpi و با فرمت jpg)، ذکر منبع و تعیین محل مناسب باشند (تأکید می‌شود درمجموع، تعداد: عکس/تصاویر، نقشه، طرح، جدول و نمودار، نباید بیشتر از ۱۵ مورد باشد).
- **عنوان جدول:** بالا سمت راست به‌همراه مأخذ آن آورده شود (اگر جدول توسط نویسنده یا نویسندگان تنظیم شده باشد باید سال آن درج شود؛ مثال: (مأخذ: نگارنده / نگارندگان، ۱۳۹۶).
- **عنوان تصاویر، نمودار و طرح‌ها:** پایین سمت راست به‌همراه مأخذ آن آورده شود (اگر تولیدِ تصاویر، نمودار و طرح‌ها توسط نویسنده یا نویسندگان تنظیم شده باشند باید سال آن درج شود؛ مثال: (مأخذ: نگارنده / نگارندگان، ۱۳۹۶). همچنین تمامی عناوین تصاویر، نمودار و طرح‌ها به انگلیسی نیز آورده شوند.

شیوهٔ ارجاعات

- **درون‌متنی فارسی و انگلیسی:**

الف) ارجاع با یک نویسنده: (نام‌خانوادگی نویسنده، سال انتشار: صفحه)، مثال: (نیکنامی، ۱۳۹۶: ۲۷) و (Niknami, 2017: 27).
ب) ارجاع با دو نویسنده: (نام‌خانوادگی نویسندگان، سال انتشار: صفحه)، مثال: (نیکنامی و حصاری، ۱۳۹۶: ۲۷) و (Niknami & Hessari, 2017: 27).
ج) ارجاع با سه نویسنده و یا بیشتر: (نام‌خانوادگی نویسنده و همکاران، سال انتشار: صفحه)، مثال: (نیکنامی و همکاران، ۱۳۹۶: ۲۷) و (Niknami et al., 2017: 27).

- **پایان متنی (کتابنامه):**

کتاب:
نام‌خانوادگی نویسنده، نام نویسنده /نویسندگان (سال انتشار). *عنوان کتاب* (ایتالیک). جلد، نام مترجم یا مصحح، محل انتشار: نام ناشر، نوبت چاپ.
مثال: الف) ارجاع با یک نویسنده: شیپمان، کلاوس (۱۳۸۳). *تاریخ شاهنشاهی ساسانی*. ترجمهٔ فرامرز نجدسمیعی، تهران: انتشارات سازمان میراث‌فرهنگی، چاپ اول.
ب) ارجاع با دو نویسنده و یا بیشتر: مهریار، محمد؛ و کبیری، احمد، (۱۳۸۳). *کنکاش در معبد آناهیتا کنگاور*. تهران: انتشارات سازمان میراث‌فرهنگی و گردشگری، چاپ اول.
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مقاله:
نام‌خانوادگی نویسنده، نام نویسنده / نویسندگان (سال انتشار). «عنوان مقاله» (داخل گیومه). *عنوان مجله* (ایتالیک). محل نشر، شمارهٔ دوره یا سال مجله، شمارهٔ مجله، صفحه‌های مقاله در مجله، و کد DOI هر مقاله.
مثال:
الف) ارجاع با یک نویسنده: خسروزاده، علیرضا، (۱۳۹۲). «محوطه‌ها و استقرارهای اشکانی جزیرهٔ پ.م.». *پژوهش‌های باستان‌شناسی ایران*. ۲ (۵): ۷۹-۱۰۰. DOI: 10.66224/PJAS.8.29.7
ب) ارجاع با دو نویسنده و یا بیشتر: مترجم، عباس؛ و بلمکی، بهزاد، (۱۳۸۸). «بررسی و تحلیل استقرارهای اشکانی دامنه‌های شمالی الوند (همدان)». مجلهٔ *مطالعات باستان‌شناسی*، ۱ (۱): ۱۵۳-۱۳۵. DOI: 10.66224/PJAS.8.29.7
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پایان‌نامه، رساله و گزارشات:
نام‌خانوادگی نویسنده، نام نویسنده /نویسندگان (سال انتشار). «عنوان پایان‌نامه، رساله و گزارشات (داخل گیومه)». محل انجام پژوهش: نام دانشگاه یا دستگاه (منتشر نشده).
مثال پایان‌نامه یا رساله: رضالو، رضا، (۱۳۸۶). «ظهور جوامع با ساختار پیچیدهٔ سیاسی و اجتماعی در دوران مفرغ جدید در حوزهٔ جنوبی رود ارس با بررسی موردی داده‌های باستان‌شناسی قلعه خسرو». رسالهٔ دکتری، تهران: دانشگاه تربیت‌مدرس (منتشر نشده).
مثال گزارش: محمدی‌فر، یعقوب؛ و مترجم، عباس، (۱۳۸۲). «گزارش بررسی باستان‌شناسی تویسرکان». همدان: آرشیو اداره کل میراث‌فرهنگی، صنایع‌دستی و گردشگری استان همدان، (منتشر نشده).

چاپ نهایی مقاله مشروط به بررسی نهایی هیأت تحریریه و تأیید داوران نشریه است.

مطالعات باستان‌شناسی پارسه ۳۵

صاحب امتیاز و ناشر: **پژوهشگاه میراث‌فرهنگی و گردشگری**

مدیرمسئول و سردبیر: **مرتضی حصاری**

با همکاری: **دانشگاه بوعلی‌سینا، دانشگاه علم و فرهنگ، دانشگاه برلین، و انجمن علمی باستان‌شناسی ایران**

فصلنامهٔ علمی مطالعات باستان‌شناسی پارسه

سال دهم || شمارهٔ ۳۵ || ۱۴۰۵

آغاز انتشار: آذرماه ۱۳۹۶

شمارهٔ شاپای چاپی: ۵۰۴۸-۲۶۴۵

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شمارهٔ مجوز ارشاد: ۷۹۶۱۰

مدیر اجرایی و داخلی: **خلیل‌الله بیک‌محمدی [طلبک]**
مدیر ارتباطات بین‌الملل: **منوچهر مشتاق-خراسانی**
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فصلنامهٔ علمی «مطالعات باستان‌شناسی پارسه» دارای پروانهٔ انتشار شمارهٔ ۷۹۶۱۰ به‌تاریخ ۱۳۹۶/۰۴/۲۶ از کمیسیون بررسی نشریات وزارت فرهنگ و ارشاد اسلامی می‌باشد.

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چاپخانه: انتشارات پژوهشگاه میراث‌فرهنگی و گردشگری

بسمه تعالی

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وزارت علوم، تحقیقات و فناوری
معاونت پژوهش و فناوری
کمیسیون نشریات علمی

گواهی رتبه علمی

نشریه

مطالعات باستان‌شناسی پارسه

با صاحب امتیازی **پژوهشگاه میراث فرهنگی و گردشگری** بر اساس آیین‌نامه نشریات علمی مصوب ۱۳۹۸/۰۲/۰۹ در ارزیابی سال ۱۴۰۳، موفق به کسب رتبه **الف** شده است.

بی تردید تلاش دست اندرکاران آن نشریه سهم بسزایی در گسترش مرزهای دانش و ارتقای کیفی و کمی جایگاه علمی کشور خواهد داشت.

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35

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Colorimetric Analysis, Chemical Composition, and Mineralogical Characterization of Ceramics from the Tule'i Archaeological Site, Khuzestan: A Multidisciplinary Approach to the Study of Archaeological Materials

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Abstract

Tule'i Tepe, located in northern Khuzestan, is one of the key Neolithic sites on the Susiana Plain and has been dated to ca. 6200–5900 BCE based on previous studies. Although the site has been interpreted as a seasonal settlement or a mobile pastoralist camp with a relatively short occupation span, it is remarkably rich in material culture, particularly ceramics. Excavations at Tule'i have yielded a diverse ceramic assemblage, including both plain and painted Jaffar type pottery, as well as white and red wares decorated with various motifs, which show stylistic parallels with contemporary sites in Mesopotamia and southwestern Iran. Despite the significance of the site for studies of the Neolithic period and pastoralism, no comprehensive investigation has yet been conducted into the raw materials, production technology, or provenance of its pottery. The present study aims to address this gap by applying a multidisciplinary approach to the analysis of 41 ceramic samples from Tule'i Tepe. Three complementary analytical methods were employed: spectrophotometry for precise color measurement, portable X ray fluorescence (pXRF) for the determination of major and minor elements, and X ray diffraction (XRD) for mineralogical phase identification and the estimation of firing temperatures. Elemental analysis reveals that buff colored ceramic bodies contain the highest calcium (Ca) content, whereas red colored bodies show higher concentrations of iron (Fe) and aluminium (Al). Manganese (Mn) was identified as the primary coloring agent in the brownish decorations applied to the pottery. XRD analysis indicates the presence of minerals such as pyroxene and phlogopite, suggesting firing temperatures in the range of 600–700 °C. The presence of calcite in certain samples further indicates that firing temperatures remained below 800 °C, since calcite decomposes at higher temperatures. These findings suggest that Tule'i potters possessed considerable technical knowledge in controlling firing temperatures and selecting raw materials. A secondary aspect of this study compares the effectiveness of two color measurement methods: conventional visual comparison using the Munsell Soil Color Chart and instrumental analysis using reflectance spectrophotometry. The results indicate that the spectrophotometric method, owing to its higher resolution in distinguishing closely related colors (e.g., buff and light brown), can serve as an effective complement to non instrumental methods.

Keywords: Neolithic period, Tule'i pottery, spectrophotometry, mineralogy, chemical analysis, Munsell Soil Color Chart.

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Introduction

Tule'i Tepe, also referred to—sometimes erroneously—as Tuleiy or Tulai in the archaeological literature, is a small Neolithic site (ca. 6200–5900 BCE) located in northern Khuzestan (Fig. 1). It was excavated during a brief salvage operation in 1973 by Professor Frank Hole. The site takes its name from tuleh (tule'i), or wild mallow, a broad leaved plant that grows wild across much of southwestern Iran. A variety of ceramic types have been recovered from Tule'i Tepe. The pottery from this site has been classified using the same terminology applied to the Deh Luran region and includes the following categories: Jaffar painted ware, Jaffar plain ware, Khazineh red ware, white ware with red on buff decoration, white ware with black on buff decoration, painted white ware with black motifs, and white scratched ware. In addition, a grey ware—unknown in the Deh Luran region—has also been identified at Tule'i. The scratched painted wares from Tule'i resemble those of the Susiana A–B phases from Chogha Mish. Based on the ceramic assemblage, Frank Hole has suggested that the occupation of Tule'i Tepe falls chronologically between the Mohammad Jaffar and Sefid phases of Deh Luran (Malek Shahmirzadi, 1999: 232). The classification of pottery from this site, as outlined above, is based on macroscopic attributes such as color, texture, and decoration. Apart from clay preparation and processing, the quality of these ceramics—particularly their color—is largely determined by the early kilns used for firing (Rahimi and Mehran, 2003). These kilns, primarily fueled by plant materials, produced uneven temperatures within different parts of the firing chamber. Consequently, the quality of the pottery was influenced by its position in the kiln, the intensity of the heat, and the duration of firing (Ashurst and Ashurst, 2001: 47–48). Today, the attributes mentioned above can be examined and evaluated using scientific and instrumental methods, which allow for more precise data and refined classifications. This paper attempts to analyze and compare data from the various pottery types at this site through a multidisciplinary approach employing different instrumental techniques. The importance of colorimetric analysis, chemical composition, and mineralogical characterization in the study of ceramic samples highlights the necessity of employing such analytical methods (Stuart, 2007).

Research Background of Tule'i Tepe

In the spring of 1973, a small trench was excavated at Tule'i Tepe, revealing a temporary settlement interpreted as a campsite associated with a broader nomadic occupation. Chronologically, the site is comparable to the Sefid phase in the Deh Luran Plain. Tule'i may have been occupied for approximately 200 years, between 6200 and 5900 BCE. Excavations continued in several trenches and yielded dry stone wall foundations, pottery sherds, and T shaped figurines. Based on the Deh Luran chronology, Tule'i Tepe can be placed between the Mohammad Jaffar and Early Sefid phases. Although certain differences exist in the ceramics of the two regions (Fig. 2), other artifacts appear to

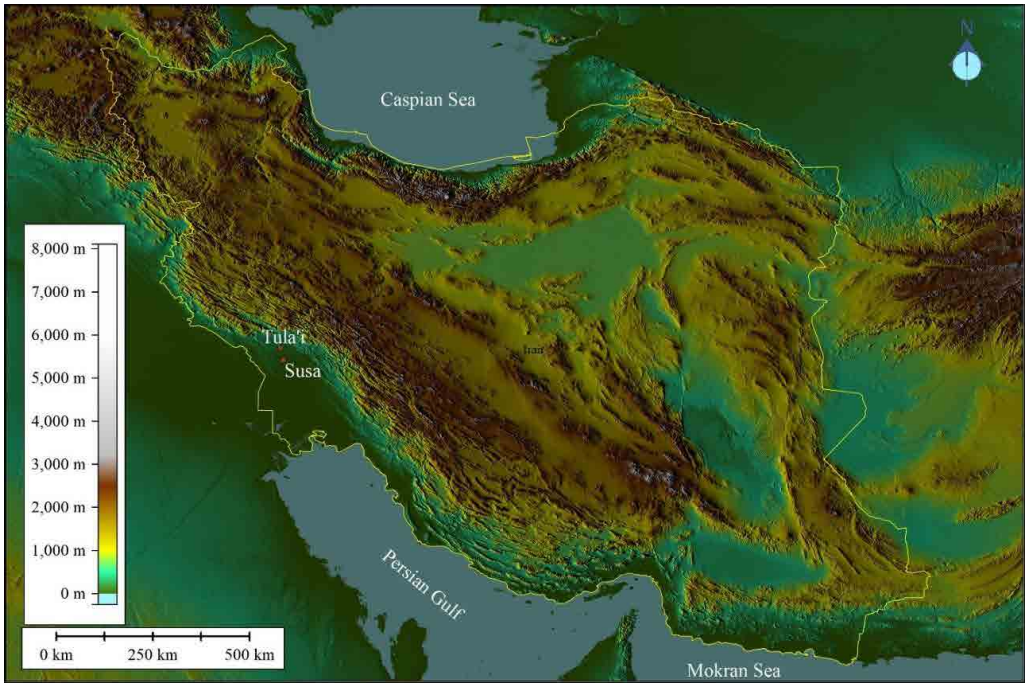

Fig. 1: Geographic location of the Tule'i site and its relative position to Susa (Author, 2025).

be identical. Changes in the two sequences—Deh Luran and Tule'i—follow the same general order; only the proportions and decorative designs of specific pottery types differ. At least part of Tule'i consists of a campsite whose layout is consistent with that of modern nomadic encampments. The arrangement and spacing of the stones leave little doubt regarding the nature of this portion of the site (Hole, 1974).

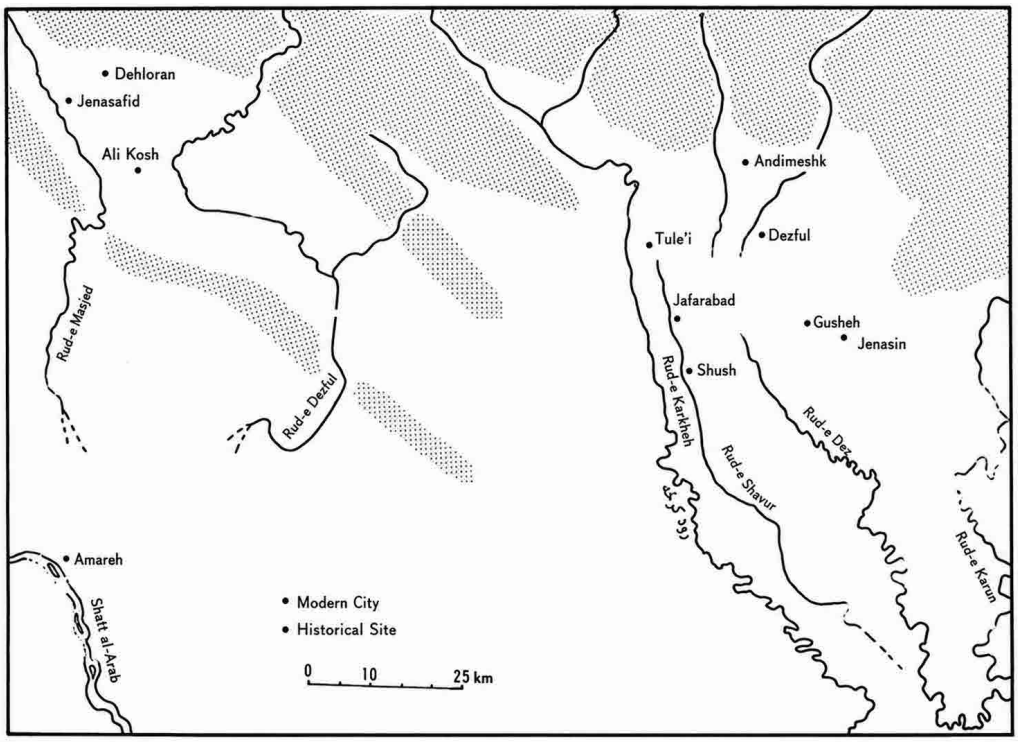

Fig. 2: Prehistoric sites of Deh Luran and Khuzestan (Hole, 1974: 220, Fig. 1).

Frank Hole's interpretations have been challenged by several scholars. Reinhard Bernbeck, in a paper entitled "Early Pastoral Patterns: A Reassessment of Tule'i Tepe," reanalysed the archaeological data derived from the material remains at Tule'i Tepe and argued that the site was occupied by village based herders who moved periodically along the Zagros foothills, exploiting favourable settlement locations. This type of mobility involved relatively long distance movements and differed considerably from the model proposed by Mortensen for earlier Neolithic sites (Mortensen, 1972). It also does not correspond to Henrikson's description of early Chalcolithic pastoral nomads in the Zagros Mountains (Henrickson, 1985: 27–33). It is possible that we are dealing with an intermediate type of subsistence pattern, one that lies between a "broad spectrum economy" and specialised mobile pastoralism combined with agriculture. Köhler Rollefson reached similar conclusions for the roughly contemporary "PPNC" village economy at 'Ain Ghazal in Jordan (Köhler Rollefson, 1988: 91). The Zagros region during the Late Neolithic may present a comparable example. At Qaleh Rostam, a village site, there is clear evidence for agriculture (Zagarell, 1989: 287). Risk reduction appears to have been one of the primary functions of the mobility described here. Pires Ferreira cites three reasons for maintaining fallow herds: (1) preventing overgrazing around the village; (2) enabling animals in fallow herds to benefit from better pastures; and (3) reducing the risk of losing a large portion of the herd to epidemic disease (Pires Ferreira, 1977: 279).

On the other hand, a pastoral economy based primarily on animal products is a high risk enterprise, involving periodic failures that could threaten the survival of entire groups (Barth, 1961: 108–109). Long term research shows that specialised nomadic groups are periodically compelled to purchase or obtain fodder from sedentary populations (Balland and Kieffer, 1979: 81). In some cases, raids by mobile pastoral communities on neighbouring sedentary populations may serve as a means of compensating for such shortages. In light of these perspectives, and according to the model proposed by Lees and Bates, specialised nomadic pastoralism is only feasible when combined with substantial surplus production by sedentary farmers (Lees and Bates, 1974). Hole proposed a slightly modified version of this modern nomadic model. According to this interpretation, the herders at Tule'i Tepe were able to live independently, relying on animal products and the surrounding natural environment. Such a subsistence strategy could theoretically have developed separately from agriculture. However, under this scenario it is difficult to explain the numerous connections between the inhabitants of Tule'i Tepe and the sedentary villages of the surrounding Deh Luran and Susiana plains. It has also been suggested that such herders might have reverted to hunting and gathering during periods of food shortage. Such periodic dietary shifts should be identifiable through variation in the animal remains consumed during lean periods (Colson, 1979: 22). In fact, there is no evidence at Tule'i Tepe for a diet different from that of its contemporary site, Chagha Sefid. At both sites, the faunal assemblages contain

less than 10% wild animals, with gazelle representing the primary non domestic meat source. These similarities instead point to a shared economic foundation, as well as comparable strategies for protecting villages and settlement sites (Pires Ferreira, 1977, Table 3). Daniel Potts, in his book Nomadism in Iran: From Antiquity to the Modern Era, also criticized Frank Hole's theory of nomadism (Potts, 2014). The episodic or discontinuous nature of the occupation at Tule'i Tepe has never been questioned, but it remains worth asking whether the identification of nomads in Iran during the seventh millennium BCE is justified. It is very likely that herders maintaining fallow herds used this site seasonally. However, Hole's primary aim was not merely to argue that "the site was temporarily and seasonally occupied" (Hole, 2004). Rather, his objective was to identify nomads in the archaeological record thousands of years before most scholars—aside from Elizabeth Bacon, whose writings on the origins of nomadism in the 1970s had little influence on archaeologists—considered such a possibility. Until 2004, the "full range of village material culture" that Hole identified in the Tule'i assemblage had been interpreted not as evidence of permanent settlement, but rather as indicating that "a stable and complete life was maintained in tent sites with the presence of all members of the nuclear family" (Ibid: 80). This interpretation presents a view of Tule'i Tepe that differs markedly from those proposed during the preceding three decades. No explanation was provided as to why the large quantities of pottery sherds; grinding stones (including mortars, querns, stone blades, discs, pounders, and weights); fired clay animal figurines; and sling bullets should be interpreted as evidence for the presence of all members of clusters of nuclear nomadic families. Undoubtedly, this represents a highly selective interpretation of the site's material culture. Moreover, as Bernbeck demonstrated, the pottery types present do not support a strictly vertical nomadic interpretation, because their decoration lacks characteristics typical of sites located at higher elevations in the Zagros—which might represent the summer territories of groups wintering at Tule'i—but instead shows closer affinities with lowland sites such as Chogha Bonut, Chagha Sefid, and Chogha Mish (Bernbeck, 1992). Donna J. Sutliff, in a paper entitled "On Neolithic Nomadism at Tule'i, Iran: A Re evaluation of the Evidence," also critiqued Frank Hole's theory (Sutliff, 2015). Frank Hole later responded to this critique in a 2023 article entitled "Tule'i and the Question of Mobile Herders" (Hole, 2023).

Research Methodology

A total of 41 pottery sherds, including red, buff, and brown painted wares, were selected for analysis (Fig. 3).

Colorimetry

Colorimetric analysis of the samples was conducted using the CIELAB color space (L*, a*, b*) and reflectance spectra in the visible range (400–700 nm), measured with a Konica Minolta CM 2600d spectrophotometer. In addition, color assessment was

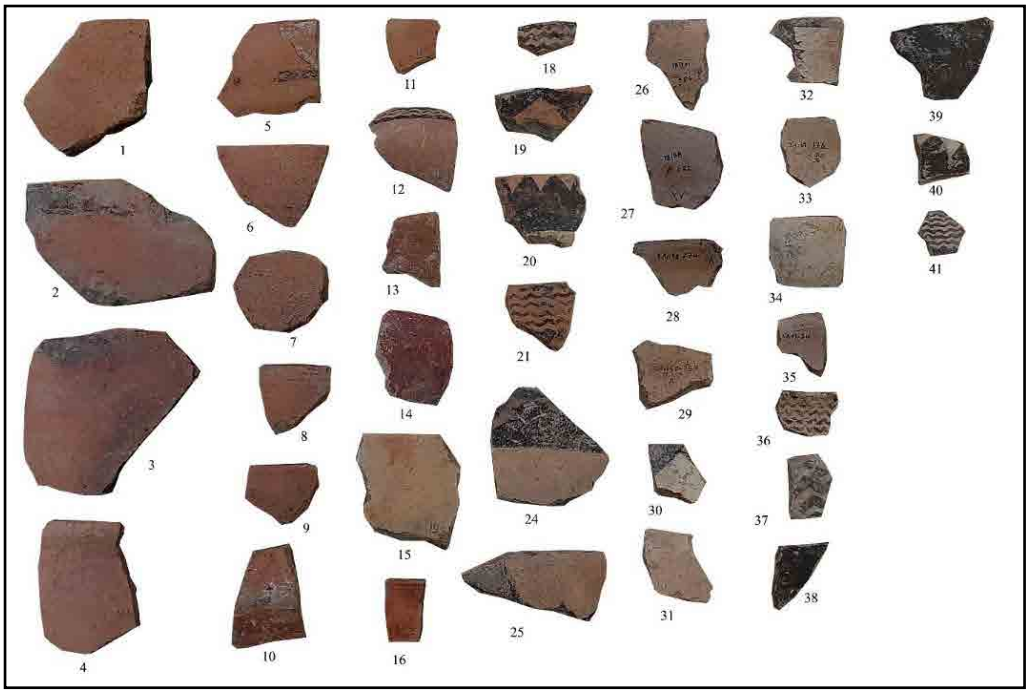

Fig. 3: The 41 ceramic sherds selected for analysis, including red, buff, and brown/black-painted wares (Author, 2025).

performed using the Munsell Soil Color Chart, based on the three attributes of hue, value, and chroma.

The CIELAB color model (L*, a*, b*) comprises the following parameters:

- L*: lightness (ranging from black to white)
- a*: the red–green chromatic axis
- b*: the yellow–blue chromatic axis

Chemical Analysis

Portable X ray fluorescence (pXRF) spectrometry was employed using a Thermo Scientific Niton XL3t GOLDD+ 950 instrument (USA). The technical specifications of the device are as follows: SDD detector; 6–50 kV / 0–200 µA; maximum power 2 W; Ag anode X ray tube.

Mineralogical Analysis

Mineral phase identification in the ceramic bodies was conducted using X ray diffraction (XRD) analysis with a Seifert 3000TT diffractometer. All of the above analyses were carried out at the Research Center for Conservation of Cultural Relics, Research Institute of Cultural Heritage and Tourism (RICHT), in collaboration with the Iranian Center for Archaeological Research (ICAR).

Results and Discussion

The CIELAB colorimetric data (L*, a*, b*) for the red-bodied ceramics are summarized in Table 1. As illustrated in Fig. 3, the L* (lightness) values for these samples range

predominantly between 42 and 64. The lowest lightness value was recorded for the exterior surface of sample Touleie-32-R, while the highest was observed in sample Touleie-4-R.

Table 1. Color data (L*, a*, b*) for the red-colored ceramic group (Author, 2025).

Row	Color code	L*	a*	b*
1	Touleie-1-R	57.86	18.71	25.99
2	Touleie-2-R	60.14	17.94	25.02
3	Touleie-3-R	62.24	18.99	23.5
4	Touleie-4-R	63.75	17.82	24.57
5	Touleie-5-R	58.76	17.08	24.89
6	Touleie-6-R	56.32	15.75	22.98
7	Touleie-7-R	58.5	16.17	25.48
8	Touleie-8-R	59.07	16.88	26.5
9	Touleie-9-R	58.03	16.65	24.06
10	Touleie-10-R	50.14	18.89	19.7
11	Touleie-10-R-I	58.76	16.41	25.51
12	Touleie-10-R-O	58.02	14.01	21.48
13	Touleie-11-R	49.36	15.55	20.23
14	Touleie-12-R	47.58	18.73	17.81
15	Touleie-13-R	58	24.75	27.93
16	Touleie-14-R	59.33	17.14	23.94
17	Touleie-16-R	61.06	14.59	21.56
18	Touleie-30-R	59.26	13.61	21.75
19	Touleie-32-R	42.42	17.05	16.95

The a* (red–green) chromatic values predominantly range between 13 and 25. The highest a* value (24.8) corresponds to sample Touleie-13-R, whereas the lowest (13.6) was recorded for the interior surface of sample Touleie-30-R. The b* (yellow–blue) values range between 16 and 28. The highest b* value (27.9), indicating a more pronounced yellow hue, was observed in sample Touleie-13-R; conversely, the lowest (16.9) was found on the exterior surface of sample Touleie-32-R, suggesting a relative shift towards the blue spectrum.

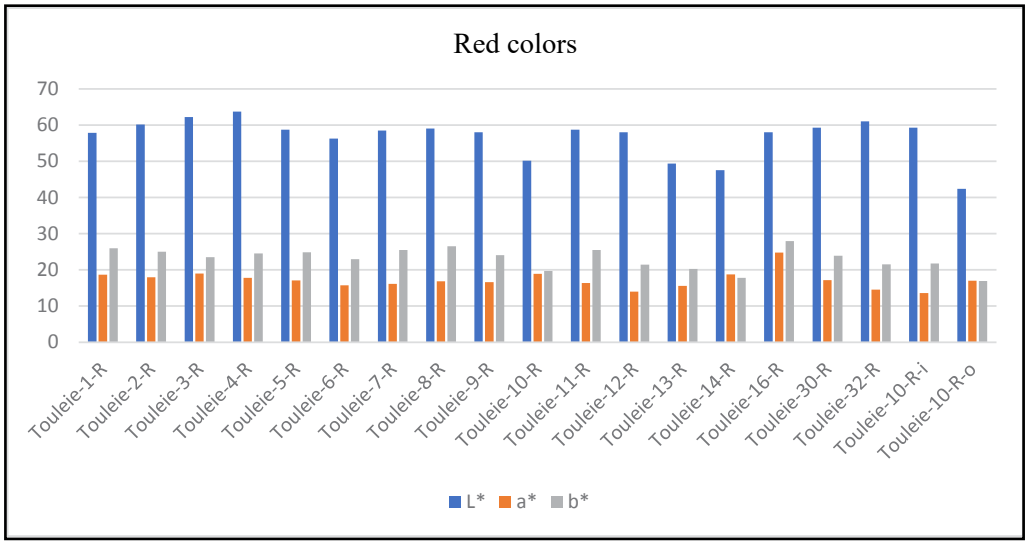

Fig. 3: Distribution of L*, a*, b* color data for the red ware group (Author, 2025).

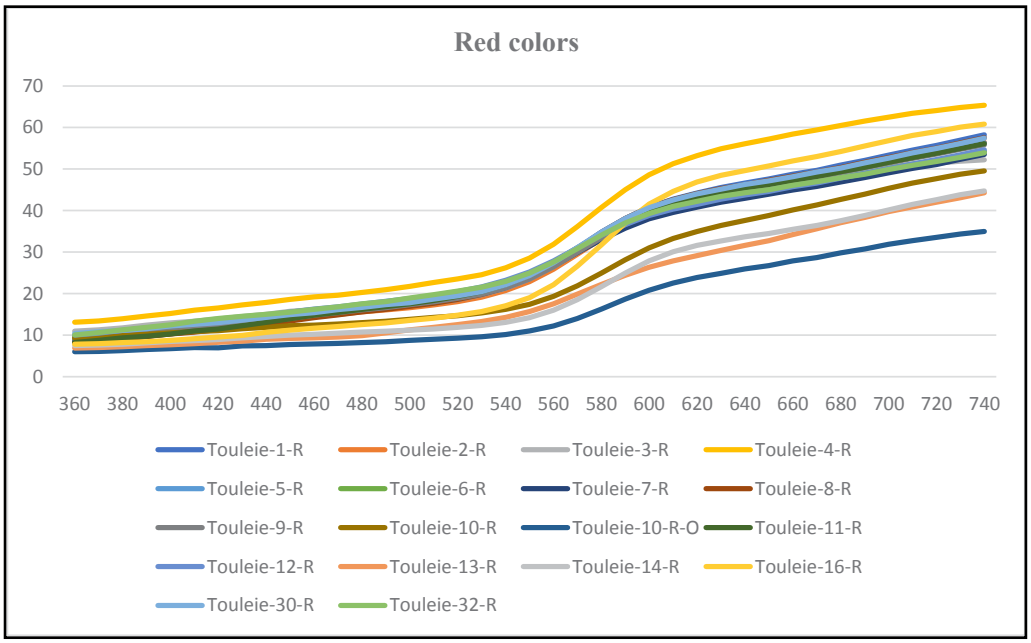

Fig. 4: Visible-range reflectance spectra of the red ware group (Author, 2025).

The CIELAB colorimetric data (L*, a*, b*) for the buff-bodied ceramics are summarized in Table 3. As illustrated by the quantitative values and Figure 8, the L* (lightness) values for these samples range between 59 and 75. The lowest lightness value (59.7), indicating the highest degree of darkness, is associated with sample Touleie-25-R, while the highest lightness (74.3) corresponds to sample Touleie-30-R. The a* (red–green) values for these samples range predominantly between 5.5 and 13.0. The highest a* value (13.1) belongs to sample Touleie-25-Y, and the lowest (5.7) was recorded for the interior surface of sample Touleie-30-Y. The b* (yellow–blue) values range between 19 and 27. The highest b* value (26.8) was observed in sample Touleie-15-Y, while the lowest (19.8) was found on the exterior surface of sample Touleie-35-Y.

Table 2. Color data (L*, a*, b*) for the buff-bodied or buff-surfaced ceramic group (Author, 2025).

Row	Color code	L*	a*	b*
1	Touleie-15-Y	65.06	11.07	26.83
2	Touleie-24-Y	60.4	10.78	23.93
3	Touleie-25-Y	59.68	13.12	23.7
4	Touleie-26-Y	61.65	10.19	23.01
5	Touleie-27-Y	61.75	10.54	23.13
6	Touleie-28-Y	65.35	9.84	21.84
7	Touleie-29-Y	61.79	12.4	23.9
8	Touleie-30-Y	74.29	5.69	20.97
9	Touleie-31-Y	66.91	10.5	21.73
10	Touleie-32-Y	67.35	7.53	21.02
11	Touleie-33-Y	70.03	6.8	21.87
12	Touleie-34-Y	63.57	8.67	21.44
13	Touleie-35-Y	66.25	11.7	19.75
14	Touleie-36-Y	60.36	11.76	23.33
15	Touleie-37-Y	66.55	8.16	23.27
16	Touleie-38-Y	63.49	9.61	22.17
17	Touleie-39-Y	61.1	9.48	21.66
18	Touleie-40-Y	69.67	8.42	22.13
19	Touleie-41-Y	66	12.26	28.55

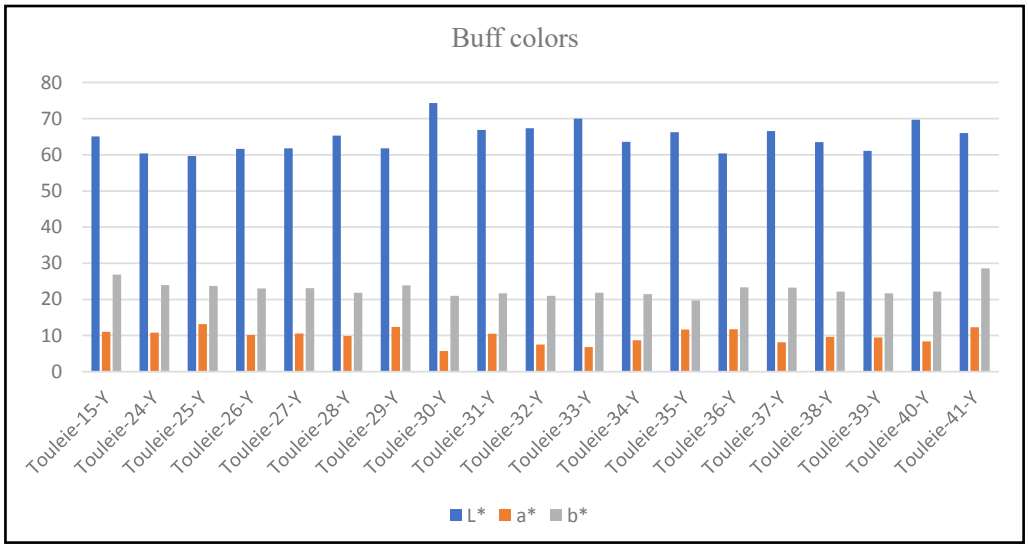

Fig. 5: Distribution of L*, a*, b* color data for the buff-colored ware group / buff-surfaced group (Author, 2025).

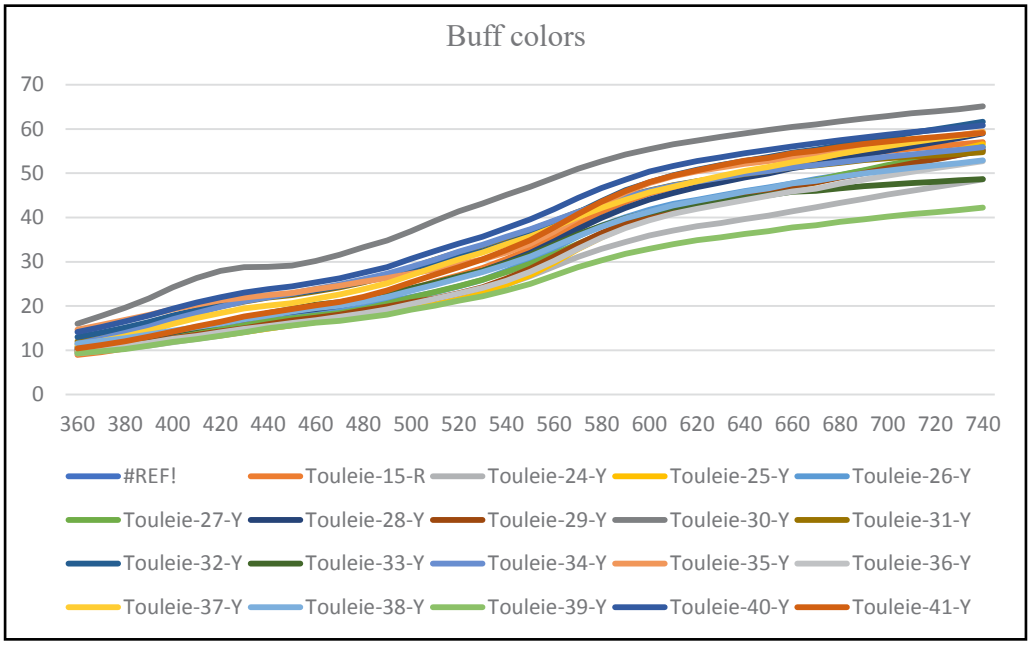

Fig. 6: Visible-range reflectance spectra of the buff ware group / buff-surfaced group (Author, 2025).

The CIELAB colorimetric data (L*, a*, b*) for the brown-surfaced ceramics are summarized in Table 4. As shown by the color parameters in this table and Figure 10, the L* (lightness) values for these samples range predominantly between 36 and 54. The lowest lightness value (36.9) corresponds to sample Touleie-19-B, while the highest (53.9) was recorded for sample Touleie-36-B. The a* (red–green) values for these samples range between 2.5 and 7.5. The highest a* value (7.3) belongs to sample Touleie-36-B, and the lowest (2.7) was observed in samples Touleie-20-B and Touleie-38-B. The b* (yellow–blue) values are predominantly between 8.0 and 16.5. The highest b* value (16.4), indicating a more pronounced yellowish hue, corresponds to sample Touleie-36-B, while the lowest (8.0), suggesting a shift towards the blue spectrum, was found on the exterior surfaces of samples Touleie-20-B and Touleie-38-B.

Table 3. Color data (L*, a*, b*) for the brown-painted decorations on the ceramics (Author, 2025).

Row	Color code	L*	b*	b*
1	Touleie-18-B	47.38	5.59	12.19
2	Touleie-19-B	36.9	4.05	9.3
3	Touleie-20-B	41.64	2.72	7.88
4	Touleie-21-B	44.31	6.89	11.55
5	Touleie-36-B	53.91	7.25	16.42
6	Touleie-37-B	52.34	5.01	13.75
7	Touleie-38-B	39.43	2.68	8.12
8	Touleie-39-B	43.93	3.78	9.47
9	Touleie-40-B	44.36	5.2	10.55
10	Touleie-41-B	50.38	3.27	8.5

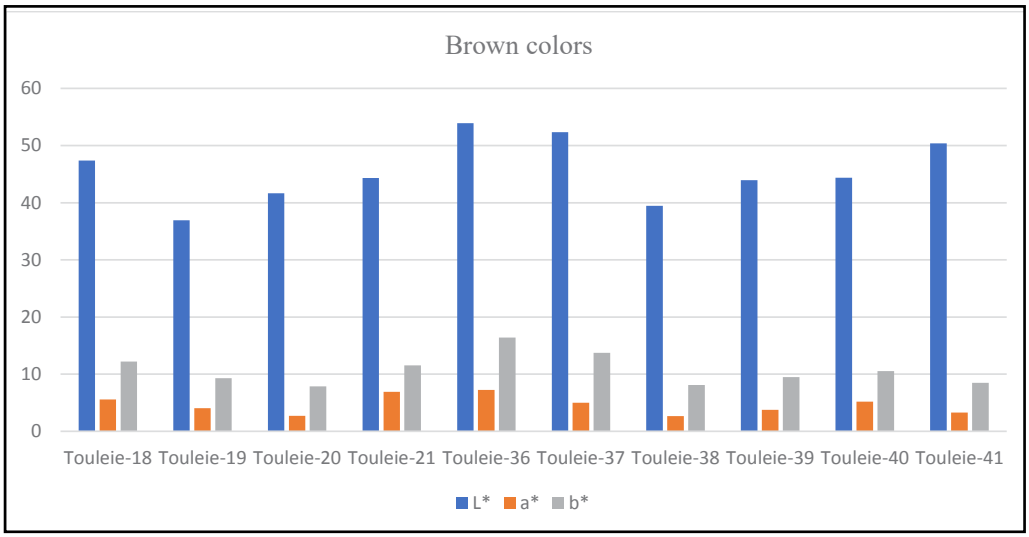

Fig. 7: Distribution of L*, a*, b* color data for the brown-painted ceramic decorations (Author, 2025).

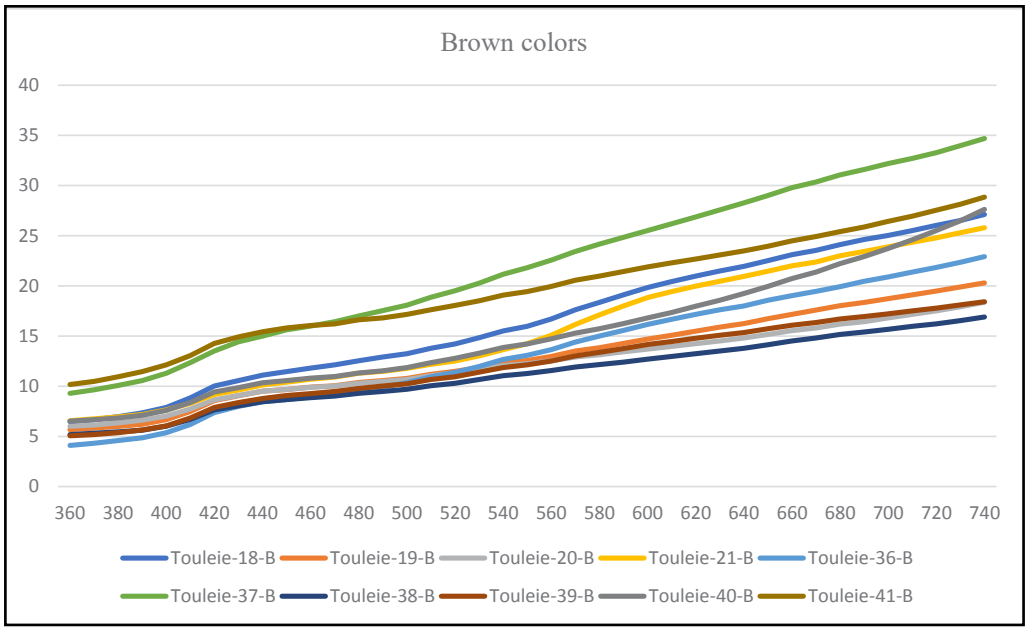

Fig. 8: Visible-range reflectance spectra of the brown-painted ceramic decorations (Author, 2025).

Munsell Color Chart

The ceramic samples were also examined using the Munsell Soil Color Chart. The results are summarised in Table 4.

Table 4. Results of colorimetric analysis of the ceramic color components using the Munsell Soil Color Chart (Author, 2025).

Row	Color code	Munsell color code	Row	Color code	Munsell color code
1	Touleie-1-R-M	2.5YR 6/6 light red	20	Touleie-15-Y-M	1.5YR 8/3 pink
2	Touleie-2-R-M	2.5YR 7/6 light red	21	Touleie-24-Y-M	5YR 7/3 pink
3	Touleie-3-R-M	2.5YR 7/6 light red	22	Touleie-25-Y-M	5YR 7/6 reddish yellow
4	Touleie-4-R-M	2.5YR 7/6 light red	23	Touleie-26-Y-M	5YR 6/2 pinkish gray
5	Touleie-5-R-M	2.5YR 6/6 light red	24	Touleie-27-Y-M	5YR 4/1 dark gray
6	Touleie-6-R-M	5YR 6/6 reddish yellow	25	Touleie-28-Y-M	5YR 5/1 gray
7	Touleie-7-R-M	5YR 7/6 reddish yellow	26	Touleie-29-Y-M	2.5YR 4/2 weak red
8	Touleie-8-R-M	5YR 7/6 reddish yellow	27	Touleie-30-Y-M	5YR 5/1 gray
9	Touleie-9-R-M	5YR 6/6 reddish yellow	28	Touleie-31-Y-M	7.5YR 8/3 pink
10	Touleie-10-R-M	2.5YR 6/6 light red	29	Touleie-32-Y-M	2.5YR 6/2 pale red
11	Touleie-10-R-I		30	Touleie-33-Y-M	5YR 6/2 pinkish gray
12	Touleie-10-R-O		31	Touleie-34-Y-M	7.5YR 8/3 pink
13	Touleie-11-R-M	2.5YR 6/6 light red	32	Touleie-35-Y-M	2.5YR 5/1 reddish gray
14	Touleie-12-R-M	2.5YR 6/6 light red	33	Touleie-36-Y-M	5YR 7/4 pink, 5YR 5/2 reddish gray
15	Touleie-13-R-M	2.5YR 6/4 light reddish brown	34	Touleie-37-Y-M	5YR 7/2 pinkish gray
16	Touleie-14-R-M	2.5YR 4/8 red	35	Touleie-38-Y-M	5YR 4/1 dark gray
17	Touleie-16-R-M		36	Touleie-39-Y-M	2.5YR 4/2 weak red
18	Touleie-30-R-M		37	Touleie-40-Y-M	7.5YR 8/2 pinkish white
19	Touleie-32-R-M		38	Touleie-41-Y-M	2.5YR 8/2 pinkish white

The color chips identified in Table 4 were also measured using the spectrophotometer. Figure 9 illustrates the colorimetric discrepancies between the visual and instrumental methods (calculated according to Equation 1) [21] (Johnston-Feller, 2001). As observed in the chart, the smallest differences between the two methods are associated with red tones, whereas the most significant discrepancies occur within the buff and brown hues.

$$\Delta E = \sqrt{(L2 - L1)^2 + (a2 - a1)^2 + (b2 - b1)^2}$$

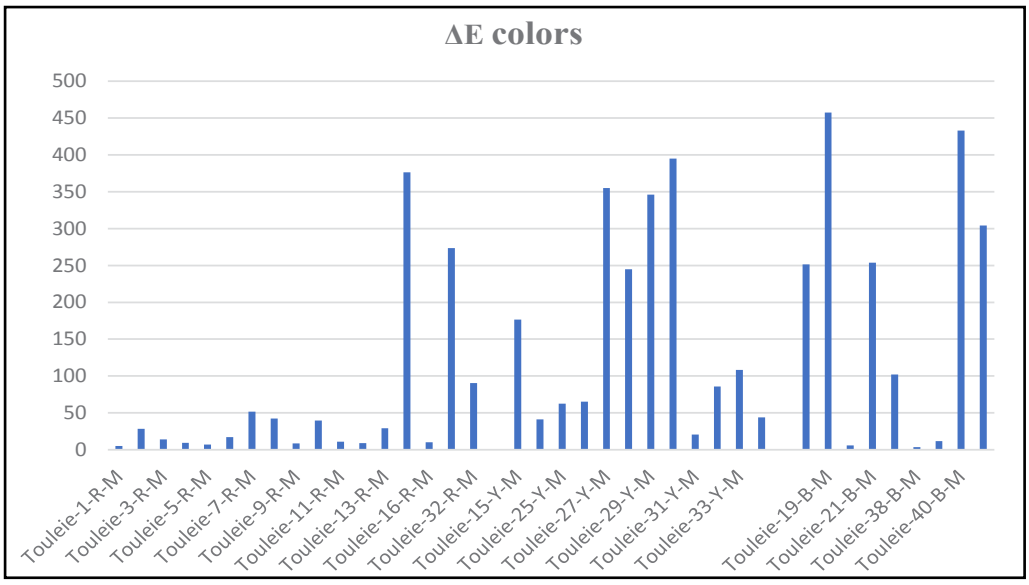

Fig. 9: ΔE color differences between the Munsell color chart and spectrophotometric measurements (Author, 2025).

Summary of Colorimetric Results

A comparison of the L*, a*, and b* color parameters across the three-color groups—red, buff, and brown—is summarized in Table 5. As shown in the table, the highest L* (lightness) values are observed in the buff group, whereas the lowest correspond to the brown group. In addition, the red group exhibits the highest a* values compared with the buff and brown groups. The brown group consistently shows the lowest values across all three parameters relative to the other two groups.

Table 5. Range of L, a, b color parameters for the three colors groups identified in the studied ceramics (Author, 2025).

Row	Color spectrum	*L range*	a range	b range
1	Red	42 – 64	13 – 25	16 – 28
2	Buff	59 - 75	5/5 – 13	19 – 27
3	Brown	36 - 54	2/5 – 7/5	8 – 16/5

The visible-range reflectance spectra (360–740 nm) of the three color groups reveal distinct patterns. The red ware group exhibits a shoulder in the region around 600 nm (Fig. 4). In contrast, the buff ware group shows a similar shoulder with a gentler slope at approximately 580 nm (Fig. 6). Unlike the first two groups, the brown ware group displays a shoulder in the region around 420 nm (Fig. 8). The slopes of these reflectance curves indicate that, at 740 nm, the red wares reach maximum reflectance values between 30% and 70%, while the buff wares range from 40% to 70%, and the brown wares fall within a narrower range of 15% to 35%. Furthermore, color naming and categorization are influenced by the semantic categories of the observer's native language [22] (Paramei et al., 2015: 159–170). In addition, visual comparison of colors with standard charts, such as the Munsell Soil Color Chart, may involve considerable discrepancies due to observer error. For these reasons, instrumental spectrophotometric methods can be considered more accurate for the colorimetric analysis of ceramic samples.

Chemical and Mineralogical Analysis of the Ceramics

Chemical Analysis

A total of 14 pigment samples taken from the surfaces of ceramics recovered from Tule'i Tepe in Khuzestan were analyzed non-destructively using portable X-ray fluorescence (pXRF). The resulting elemental data are summarized in Table 6.

Table 6. Elemental analysis of the ceramic bodies and surface color coatings from the Tule'i samples (Author, 2025).

Color	Element(%) Sample	Mg	Mn	Fe	K	Ca	Al	Si	S	Ti
Red	(body)R4	1.1	0.0	4.3	2.5	1.0	8.0	33.8	0.6	0.8
	(body)R5	2.1	0.1	5.3	2.5	3.7	7.7	36.9	0.3	0.6
	(body)R13	1.6	0.1	7.3	2.5	4.8	5.6	27.3	1.5	0.4
	(body)R14	1.5	0.1	6.4	2.0	5.0	4.2	31.2	0.8	0.4
	(body)R16	0.5	0.0	6.9	1.7	1.1	3.3	24.3	0.2	0.7
Buff	(body)Y15	2.2	0.1	5.9	1.3	4.8	5.5	34.4	0.4	0.6
	(body)Y25	1.2	0.1	4.6	2.0	9.3	5.1	26.3	0.3	0.4
	(body)Y28	1.5	0.1	5.0	1.6	11.0	4.0	22.8	0.2	0.5
	(body)R30	2.4	0.1	5.0	1.5	15.4	5.6	23.3	0.5	0.4
	(body)Y35	2.4	0.1	5.4	1.5	7.8	5.6	27.6	0.6	0.5
	(body)Y41	2.3	0.1	5.7	1.8	7.1	6.0	30.7	0.3	0.5
brown	(Motifs)B20	2.2	1.6	5.1	1.2	11.7	4.1	19.2	1.1	0.4
	Motifs) B38	1.0	4.4	5.2	1.0	8.5	4.1	17.2	1.5	0.3
	(Motifs)B41	2.3	0.8	5.6	1.1	8.4	4.8	28.9	0.9	0.5
	(Motifs)B41	1.2	1.1	5.5	1.1	8.0	4.4	27.2	1.0	0.5

The elemental analysis of the surface colors of the studied samples—both ceramic bodies and coatings—indicates that the concentrations of four elements (iron, manganese, calcium, and sulfur) show a significant correlation with the apparent color and the colorimetric results. Iron (Fe) was measured at 4–7% across all samples. Sulfur and manganese exhibit their highest concentrations in the brown samples, whereas the lowest calcium content is observed in the red samples. With the exception of sample R13, which has a reddish brown color and a sulfur content of 1.5%, the sulfur content in the red and buff samples remains below 1%, while the manganese content in these samples is approximately 0.1%. Manganese appears to be the primary element responsible for the dark and brown colors. The presence of high calcium compounds counteracts the red coloration produced by iron oxide, resulting in a lighter ceramic body (Ashurst and Ashurst, 2001: 48–49). Potassium, which acts as a fluxing agent in the brown coating of the ceramic samples, is present at approximately 1%, whereas in the buff and red samples this value ranges between 1.5% and 2.5%. Aluminium, the major constituent element of clay soils, is most abundant in the red bodies, followed by the buff bodies or coatings, and is lowest (approximately 4%) in the brown decorations.

Mineralogy

Mineralogical analyses were carried out on four ceramic samples (red and buff wares) using X ray diffraction (XRD). The results are summarized in Table 7 and the corresponding diffractograms (Fig. 10). Due to the limited quantity of black–brown pigments, XRD analysis of these decorations was not feasible.

Quartz and calcite were identified as the major phases in samples R4, R5, and Y28, whereas in sample R16 the principal phases were quartz and albite (a type of feldspar). The presence of pyroxene in samples R4 and Y28 suggests that these samples were fired at a higher temperature than the other two. However, the coexistence of pyroxene with calcite in the same samples indicates that the firing temperature could not have greatly exceeded the decomposition temperature of calcite, i.e., around 700 °C [24] (Khanzadi et al., 2021).

Phlogopite—a magnesium rich mica that ranges in color from brownish yellow to reddish brown and manganese bearing varieties, and is sometimes referred to as green mica—was identified in sample R4. This mineral forms at relatively high temperatures and occurs in dolomitic limestones; however, distinguishing it from biotite can be difficult [25] (Moezz Lesko, 2001: 131–132). Therefore, the biotite detected in sample R4 may in fact represent phlogopite. According to the literature, dolomitic compositions in the presence of silica form clino pyroxene like phases (Reaction 1), which transform into diopside (a pyroxene phase) at temperatures of approximately 500–600 °C (Reaction 2). Although pyroxenes are generally considered high temperature minerals, they may also form at lower temperatures in carbonate rich environments (Kharghani, 1988). The presence of non crystalline or amorphous silica, which is chemically more reactive than crystalline silica (quartz), plays a significant role in the complete sintering of dense ceramic bodies at temperatures around 600–700 °C. This phenomenon has also been documented in the bricks of Chogha Zanbil [27] (Hadian, 2015). Amorphous silica has been widely identified in riverine sediments such as those of the Dez River, and its presence in deposits from the Tule'i region is therefore plausible. As noted earlier, the high carbonate content in these ceramic bodies is responsible for the color shift from red to buff. In general, the studied ceramic bodies appear to have been well fired.

Equation 2: $CaCO3+SiO2 \longrightarrow CaSiO3 + CO2$

Equation 3: $CaMg(CO3)2+ SiO2 + CO2 \longrightarrow CaMgSi2O6$

Table 7. Mineralogical composition of the Tule'i ceramics determined by XRD analysis (Author, 2025).

Row	Sapmle	Detected phases
1	R4	Quartz, calcite, phlogopite, and diopside (pyroxene)
2	R5	Quartz, calcite, biotite
3	R16	Quartz and albite
4	Y28	Quartz, calcite, and pyroxene

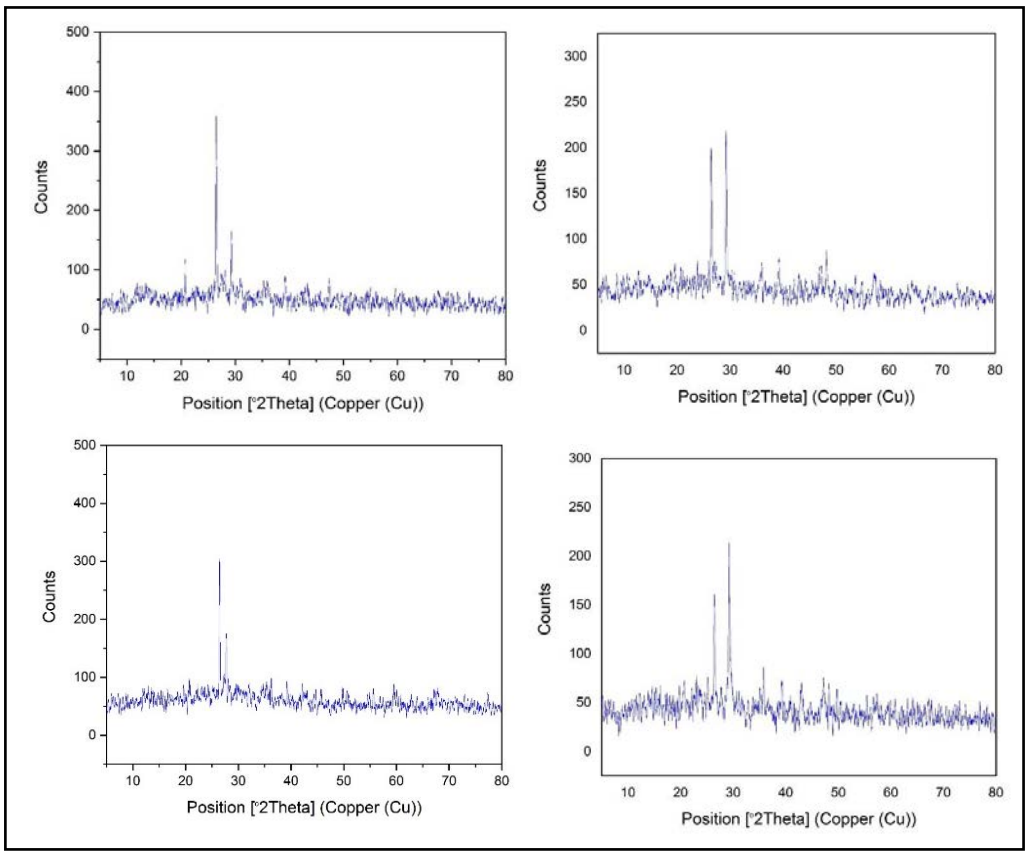

Fig. 10: X-ray diffraction (XRD) patterns of samples R4 (top-left), R5 (top-right), R16 (bottom-left), and R28 (bottom-right), (Author, 2025).

Conclusion

Based on the present investigation, a significant correlation is observed between the chemical composition and the apparent color of the ceramics. Manganese (Mn) plays the primary role in producing the brown coloration. Furthermore, sulfur (S) is more frequently detected in the brown coatings. The presence of high calcium compounds counteracts the red coloration produced by iron oxide, resulting in a lighter ceramic body. Accordingly, the highest Fe and Al contents occur in the red bodies, whereas

the buff bodies exhibit the highest calcium concentrations. Differences in firing temperature among certain samples are inferred from the presence of specific minerals, such as diopside (a pyroxene mineral), which forms at higher temperatures. The presence of this phase suggests that the ceramic bodies were fired at temperatures around 600–700 °C. However, the persistence of calcite in the bodies indicates that the firing temperature did not exceed 800 °C. The occurrence of phlogopite, a high temperature mineral, is also consistent with dolomitic compositions that facilitate the formation of pyroxene.

The observed differences and similarities in the color parameters and reflectance spectra of the three ceramic groups can serve as criteria for the accurate comparison and identification of archaeological ceramic colors, complementing conventional non instrumental methods such as the Munsell Soil Color Chart. The color discrepancies between spectrophotometric and Munsell based assessments are illustrated in Figure 9. These differences are minimal for red hues but more pronounced for buff and brown colors, largely due to human visual error. Additionally, the reflectance spectra allow for a more refined classification of the ceramics. This technique can also serve as an auxiliary method for the relative comparison and provenance assessment of ceramics based on their colorimetric properties.

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Author Contribution

The contribution of all authors to the writing of the article has been equal.

Conflict of Interest

In adherence to ethical publication standards, the authors affirm that there are no conflicts of interest, either personal or financial, that could have influenced the content or conclusions presented in this research.

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۳۵

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تحلیل‌های رنگ‌سنجی، تجزیهٔ شیمیایی و کانی‌شناسی سفال‌های محوطهٔ باستانی توله‌ای خوزستان: رویکردی چندرشته‌ای در مطالعهٔ مواد باستان‌شناختی

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چکیده

تپه توله‌ای، واقع‌در شمال خوزستان، یکی از محوطه‌های مهم دورهٔ نوسنگی دشت شوشان است که براساس مطالعات پیشین در فاصلهٔ حدود ۶۲۰۰ تا ۵۹۰۰پ.م. تاریخ‌گذاری شده است. این محوطه به‌عنوان یک استقرار فصلی یا اردوگاه کوچ‌روان با گاهنگاری نسبتاً کوتاه شناخته می‌شود؛ اما از نظر تنوع مواد فرهنگی، به‌ویژه سفال، بسیار غنی است. مجموعه سفال‌های به‌دست‌آمده شامل سفال‌های گونهٔ جعفر منقوش و ساده، و نیز سفال‌های سفید و قرمز با نقوش متنوع است که ازنظر سبکی با محوطه‌های هم‌عصر در بین‌النهرین و جنوب‌غرب ایران شباهت دارند. باوجود اهمیت این محوطه در مطالعات نوسنگی و کوچ‌روی، تاکنون پژوهش جامعی دربارهٔ ترکیب مواد، فناوری ساخت و منشأ احتمالی سفال‌های آن انجام نشده بود. پژوهش حاضر با رویکردی میان‌رشته‌ای به مطالعهٔ ۴۱ نمونه سفال از تپه توله‌ای پرداخته و از سه روش تحلیلی مکمل شامل طیف‌سنجی نوری مرئی (Visible Spectrometry) برای سنجش رنگ، طیف‌سنجی فلورسانس اشعهٔ ایکس قابل‌حمل (pXRF) برای تعیین ترکیب عنصری و پراش اشعهٔ ایکس (XRD) برای شناسایی فازهای کانی‌شناسی و تخمین دمای پخت استفاده کرده است. نتایج نشان می‌دهد که بدنه‌های نخودی بیشترین میزان کلسیم (CaO) را دارند، درحالی‌که بدنه‌های قرمز از غلظت بالاتری از آهن (Fe_2O_3) و آلومینیم (Al_2O_3) برخوردارند؛ هم‌چنین منگنز (MnO) عامل اصلی ایجاد رنگ قهوه‌ای در نقوش سفال‌ها تشخیص داده شد. داده‌های XRD حضور کانی‌هایی مانند پیروکسن و فلوگوپیت را نشان می‌دهد که بیانگر دمای پخت حدود ۶۰۰ تا ۷۰۰ درجهٔ سانتی‌گراد است، درحالی‌که وجود کلسیت در برخی نمونه‌ها نشان می‌دهد دمای پخت از ۸۰۰ درجهٔ سانتی‌گراد فراتر نرفته است. این نتایج حاکی از دانش فنی قابل‌توجه سفالگران در کنترل دما و انتخاب مواد اولیه است. هم‌چنین مقایسهٔ دو روش رنگ‌سنجی نشان‌داد که طیف‌سنجی بازتابی در تفکیک طیف‌های رنگی نزدیک، به‌ویژه میان رنگ‌های نخودی و قهوه‌ای روشن، دقت بیشتری داشته و می‌تواند به‌عنوان روشی مکمل در مطالعات سفال‌شناسی به‌کار رود.

کلیدواژگان: دورهٔ نوسنگی، سفال توله‌ای، اسپکتروفتومتر، کانی‌شناسی، تجزیه عنصری، جدول رنگ مانسل.

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35

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Early Stamp Seal Traditions in the Central Zagros (5000–2500 BCE): Continuity or Discontinuity?

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Abstract

Stamp seals constitute one of the most enduring elements of administrative traditions in the Central Zagros of western Iran. However, the uneven archaeological record has generated ongoing debate regarding continuity and discontinuity in their use, particularly during the late fourth and early third millennia BCE, when securely stratified evidence remains limited. Drawing on newly published materials from Tepe Tyalineh, Godin Tepe, Chogha Maran, and Dehsavar, this study reassesses the evolution of stamp seal traditions between ca. 5000 and 2500 BCE within an updated regional chronological framework. By examining the style, iconography, and archaeological contexts of stamp seals and seal impressions from a comparative perspective, the article evaluates competing interpretations of the development of administrative practices in the Central Zagros. The evidence indicates that stamp seals and seal impressions were employed in the region from the Early Chalcolithic (5000–4600 BCE) through Late Chalcolithic phases 1–3 (4600–3700 BCE), during which they continued to develop locally while interacting with broader supra-regional networks. Although the archaeological record suggests an apparent gap during Late Chalcolithic phases 4–5 (3700–3100 BCE), stamp seal traditions persisted into the Early Bronze Age (3100–2500 BCE). While these traditions underwent significant transformation and were increasingly overshadowed by cylinder seals and supra-regional administrative systems during the later fourth millennium BCE, they nevertheless continued to play a role in local administrative practices in the Early Bronze Age. The analysis suggests that this apparent gap is more plausibly explained by biases in archaeological visibility, preservation, excavation coverage, and chronological resolution than by an actual interruption in the production and use of stamp seals. Overall, the study supports a model of relative continuity accompanied by stylistic, iconographic, and administrative transformation within the Central Zagros glyptic tradition. These findings underscore the active role of Central Zagros communities in the development of administrative practices and contribute to broader discussions of cultural continuity, interregional interaction, and the emergence of sociopolitical institutions in prehistoric Southwest Asia.

Keywords: Central Zagros, Chalcolithic, Early Bronze Age, Stamp Seal Tradition, Administrative Practices, Cultural Continuity, Interregional Interaction.

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Introduction

Since the Late Neolithic period, stamp seals have been used to impress lumps of clay attached to storeroom doors and containers in order to regulate access to stored commodities (Akkermans, 2023). Prehistoric seal designs likely referred to individuals, groups, institutions, or administrative roles associated with sealing practices (Pittman, 1994: 1–16). These sealing practices formed part of a broader administrative system through which economic resources were stored, monitored, and redistributed. Such administrative mechanisms enabled different groups to control, mobilize, and redistribute economic resources within complex sociopolitical structures (cf. Frangipane, 2000; 2016; 2018). Seal imagery and administrative systems may therefore be regarded as material manifestations of sociopolitical organization and expressions of cultural identity in prehistoric societies (Pittman, 2001a).

Within the Central Zagros, stamp seals and seal impressions constitute one of the longest-lasting administrative traditions attested in the archaeological record (see: Fig. 1). Assemblages of stamp seals and seal impressions have been recovered from sites such as Tepe Giyan, Seh Gabi, Chogha Maran, Dehsavar, Hakalan and Parchinah, Godin Tepe, and Tepe Tyalineh (see: Fig. 1). However, many of these administrative artifacts lack contextual or stratigraphic data, rendering them chronologically ambiguous (Renette et al., 2021: 62). Although comparable corpora from surrounding regions provide sufficient data to date these materials more confidently, relying exclusively on interregional comparisons risks overshadowing local developments and producing flawed reconstructions of indigenous cultural trajectories. In other words, cultural materials may follow distinct local trajectories and remain in circulation long after they disappear in other regions. This pattern is illustrated by the incorporation of beveled-rim bowls into local ceramic assemblages across the Iranian Plateau (Potts, 2009: 12–14), as well as by the persistence of Glazed Steatite Style elements in later indigenous contexts at Chogha Maran in the Central Zagros (Renette et al., 2021: 32–33, pl. 39; Pittman, 1994: 213–229).

While stratified stamp seals and seal impressions are known from the Early Chalcolithic, Late Chalcolithic phases 1–3, and the Early Bronze Age, securely stratified and dated stamp glyptic artifacts from the late fourth millennium BCE remain scarce in the Central Zagros. Together with the stylistic and iconographic similarities between earlier and later stamp seals and seal impressions, this scarcity has complicated interpretations of continuity and discontinuity in the regional stamp seal tradition. The relative scarcity of mid-fourth millennium BCE lowland glyptic innovations—such as cylinder seals and the Baggy Style—combined with the abundance of unstratified stamp seals in the Central Zagros, initially suggested continuity of earlier stamp seal traditions into the Late Chalcolithic 3–4, followed by their abandonment in the Late Chalcolithic 5 (Pittman, 2001a: 414, 431). However, the publication of early third millennium BCE stamp seal impressions from securely dated contexts at Chogha Maran led some scholars to propose a discontinuity in the regional stamp seal tradition during the late

fourth millennium BCE. According to this interpretation, earlier Chalcolithic seals had been uncovered and subsequently reused at the site in later contexts (Pittman, 2014, p. 51; Renette et al., 2021: 43).

Within the archaeological literature on the Chalcolithic and Early Bronze Age of western Iran, traditional narratives of settlement decline and the rise of mobile pastoralism in the Late Chalcolithic and Early Bronze Age (e.g., Mortensen, 1976; Henrickson, 1989: 288; Abdi, 2003: 431–432) have long underpinned interpretations of cultural discontinuity and sociopolitical transformation in the Central Zagros (Renette, 2018). More recent reassessments of excavation and survey data in the western Central Zagros, however, have challenged these perspectives, suggesting instead that settlement systems expanded and indigenous social complexity increased during the late fourth and early third millennia BCE (Renette et al., 2021: 63–64). These revised trajectories challenge earlier models that linked perceived archaeological gaps to demographic decline or systemic collapse. At the same time, an alternative explanation for the apparent scarcity of stamp seals during this period emphasizes the increasing concentration of administrative activity within supra-regional centers during the late fourth millennium BCE, where new administrative technologies from Susiana and Mesopotamia—such as cylinder seals and proto-cuneiform tablets—were employed (Weiss & Young, 1975; Henrickson, 1988; Rothman & Badler, 2011; Rothman, 2013; Matthews, 2013; Khayani & Matthews, in press). From this perspective, the perceived discontinuity of the Central Zagros stamp seal tradition may reflect patterns of archaeological visibility and recovery rather than an actual interruption in production or use. New data from Godin VI: 1 (Khayani & Matthews, in press), Chogha Maran (Renette et al., 2021), Dehsavar (Pollock et al., 2020), and Tyalineh (Khosravi et al., 2024; Khosravi, 2026) provide an opportunity to reconsider the problem of continuity versus discontinuity in the Central Zagros stamp seal tradition.

Theoretical Framework

Continuity, change, and discontinuity are central concepts through which archaeologists seek to understand cultural transformations in prehistory (Frangipane, 2021). These issues are particularly relevant to the study of stamp seal traditions in the Central Zagros, where reconstructing the long-term trajectories of glyptic traditions and administrative practices is complicated by the uneven nature of the archaeological record. Determining whether observed patterns reflect genuine cultural developments or limitations in the available evidence is inherently difficult, as archaeological assemblages represent only a partial and filtered record of past human activities, shaped by depositional, post-depositional, and recovery processes.

Several factors contribute to this challenge. First, archaeological excavations provide access only to limited segments of long-term historical processes and to relatively short chronological intervals within them. Second, settlement systems within a given period may have included sites with different functions that employed partially

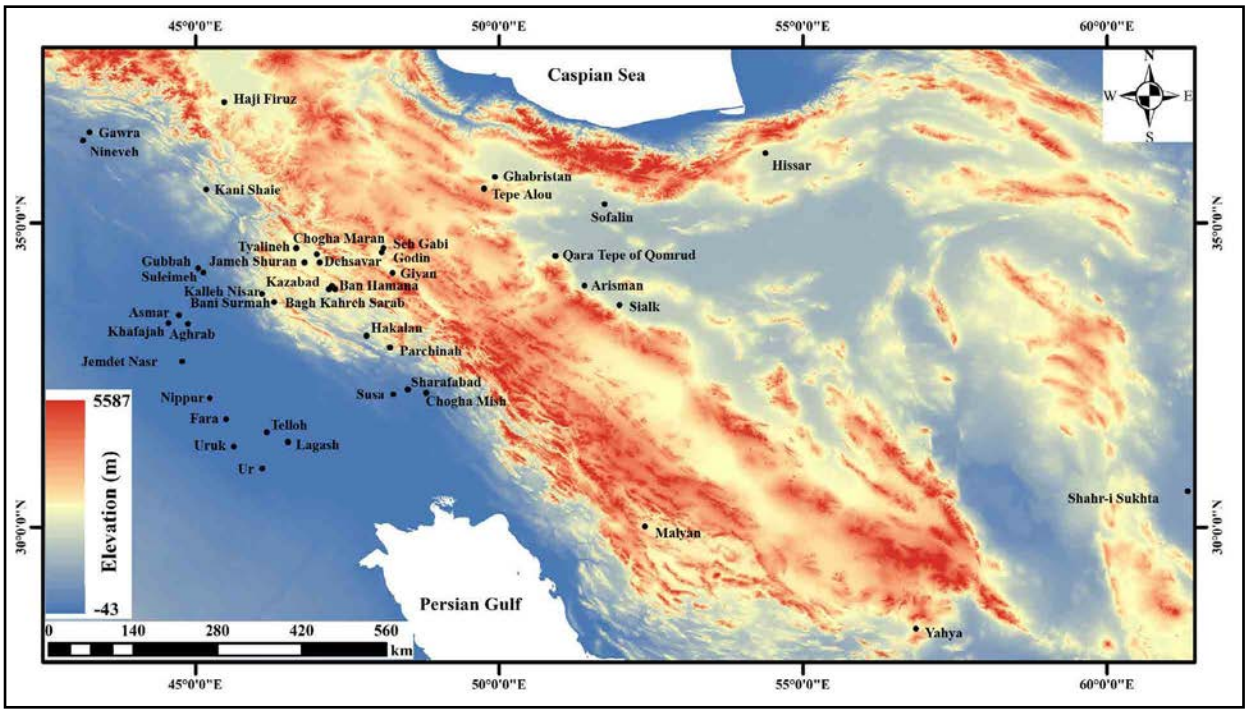

Fig. 1: Map showing sites discussed in the text (basemap by: Saham Mirzaei).

distinct categories of material culture, yet the available archaeological record does not necessarily capture the full extent of this variability. For example, although numerical and numero-ideographic tablets and cylinder seals were used at Godin Tepe as a supra-regional administrative and exchange center, there is no guarantee that comparable administrative tools were employed at contemporary settlements in the region, particularly at smaller rural communities.

Third, a substantial portion of archaeological deposits has been destroyed or displaced by post-depositional processes such as erosion, climatic factors, animal activity, and human intervention, rendering entire categories of evidence permanently inaccessible. Fourth, several important sites in the Central Zagros, including Tepe Giyan, were excavated without adequate stratigraphic control, resulting in the loss of significant contextual information (see: Herzfeld, 1933; Contenau & Ghirshman, 1935). This issue is particularly significant because the site contains the largest stamp seal assemblage in the region (Khayani, 2025, Table 2.1).

Finally, because archaeological excavation is inherently destructive and constrained by limitations of time and funding, only a small portion of any site can typically be investigated. Consequently, there is no assurance that excavated assemblages fully represent the range of artifacts once used by the inhabitants of a site and its surrounding region. As Frangipane (2021) has argued, archaeological sequences frequently preserve only selected moments within longer historical processes, making it difficult to distinguish genuine discontinuity from apparent gaps in the record. The developmental trajectory of stamp seals in the Central Zagros provides a clear example of a case in which these methodological and epistemological challenges must be carefully considered.

The present study therefore approaches apparent gaps in the archaeological record as problems requiring explanation rather than as self-evident indicators of discontinuity.

Methodology

This study first situates stamp seals and seal impressions recovered from archaeological sites in the Central Zagros—including recently published materials—within a coherent regional chronological framework in order to reconstruct the developmental trajectory of the regional stamp seal tradition. To achieve this goal, it adopts the revised chronological scheme originally developed for northern Mesopotamia and subsequently applied to western Iran (Rothman, ed., 2001; Renette & Mohammadi Ghasrian, 2020). According to this framework, the period spanning the fifth to the third millennia BCE is divided into the Early Chalcolithic (5000–4600 BCE), Late Chalcolithic 1 (4600–4200 BCE), Late Chalcolithic 2 (4200–4000 BCE), Late Chalcolithic 3 (4000–3700 BCE), Late Chalcolithic 4 (3700–3400 BCE), and Late Chalcolithic 5 (3400–3100 BCE). The subsequent period is classified as the Early Bronze Age and subdivided into Early Bronze Age I (3100–2800 BCE) and Early Bronze Age II (2800–2500 BCE).

Because many glyptic artifacts from the Central Zagros derive from poorly stratified or entirely unstratified contexts, chronological attribution cannot rely exclusively on excavation data. The study therefore combines contextual evidence from securely stratified assemblages with stylistic, iconographic, and comparative analyses of seal forms and motifs. Particular attention is given to continuities and transformations in seal imagery and administrative practices across successive chronological phases.

Comparative analysis with contemporaneous materials from Susiana, Mesopotamia, and adjacent regions is employed not as a simple diffusionist framework, but as a means of evaluating regional interaction, local adaptation, and divergent developmental trajectories. In this respect, similarities between assemblages are assessed alongside evidence for local persistence, hybridization, and divergence. At the same time, the study avoids assuming that the appearance or disappearance of specific glyptic traditions in neighboring regions necessarily corresponds to identical developmental sequences in the Central Zagros.

Given the uneven quality of the archaeological record, greater interpretive emphasis is placed on securely stratified materials, while unstratified artifacts are treated more cautiously and evaluated primarily through comparative and contextual analysis. Rather than assuming that the archaeological absence of stamp seals directly reflects their historical disappearance, the study examines the extent to which observed patterns may instead result from uneven excavation histories, depositional processes, preservation biases, and limitations in chronological resolution.

Research Background

Stamp seals and stamp seal impressions used to secure storerooms, vessels, sacks,

baskets, and other containers have been recovered from numerous archaeological sites across the Central Zagros. These include Tepe Giyan (Contenau & Ghirshman, 1935), Surkh Dum-i Luri in Kuhdasht (Talai, 2013: 70; Schmidt et al., 1989), Seh Gabi in Kangavar (Hamlin, 1973, 1974; Henrickson, 1988), Chogha Maran in Mahidasht (Pittman, 2014; Khayani & Niknami, 2020, 2023; Renette et al., 2021), the cemeteries of Hakalan and Parchinah in Pusht-i Kuh (Haerinck & Overlaet, 1996), Tepe Dehsavar in Kermanshah (Pollock et al., 2020), the sites of Kazabad, Bagh-e Sarab-e Kahreh, and Ban Hamaneh in Hulailan (Mortensen, 1976), Tepe Jameh Shuran in Mahidasht (Khayani & Abdolahi, 2025), Godin Tepe in Kangavar (Young & Levine, 1974; Weiss & Young, 1975; Young, 2004; Rothman & Badler, 2011), Tepe Gheshlagh (Sharifi & Motarjem, 2025), Tepe Nad Ali Beig (Bahranipoor, 2018), Tepe Kalanan in Bijar (Moucheshi et al., 2012), Site 11 of the Talvar Dam Project (Valipour et al., 2010), and Tepe Tyalineh in Kuzaran (Khosravi et al., 2024; Khosravi, 2026).

The contextual quality and chronological resolution of these assemblages vary considerably. Secure stratigraphic data are currently available primarily from Seh Gabi, Chogha Maran, Godin Tepe, Hakalan, and Parchinah, while Tepe Tyalineh has yielded securely dated administrative materials through ongoing excavations (Khosravi, 2026). Many other assemblages remain poorly stratified or derive from earlier excavations, requiring chronological attribution through comparative analysis with contemporaneous materials from western Iran and Mesopotamia.

Previous scholarship has generally examined Central Zagros glyptic materials within broader discussions of administrative development and interregional interaction across Southwest Asia. One of the earliest comprehensive studies was Mahmoud Rashad's doctoral dissertation, The Development of Prehistoric and Protohistoric Stamp Seals in Iran, published in 1990 as a supplement to the journal AMI (Rashad, 1990). Rashad analyzed stamp seals from across Iran—including those from the Central Zagros—using typological, technological, and iconographic approaches, situating them within broader chronological frameworks associated with the Ubaid, Uruk, and Jemdet Nasr periods through comparison with assemblages from Syria, Anatolia, and northern Mesopotamia.

Subsequent studies likewise emphasized supra-regional interaction and glyptic exchange. Caldwell (1976) explored connections linking Tepe Giyan, Tepe Gawra, and Susa during the Late Chalcolithic period, while Teissier (1987) examined wider glyptic interactions among Iran, Mesopotamia, Syria, Palestine, and Egypt during the fourth and third millennia BCE. Henrickson (1988) published the corpus of Early and Late Chalcolithic seals and seal impressions from Seh Gabi and interpreted the glyptic evidence of the Central Zagros within the broader socioeconomic and political networks of "Greater Mesopotamia". Similarly, Pittman (2001a) approached the glyptic traditions of the Central Zagros as part of wider interregional systems and suggested that varying degrees of stylistic similarity among assemblages may reflect differing forms and intensities of cultural interaction.

Although these studies made fundamental contributions to the study of Central Zagros glyptic traditions, they were necessarily shaped by the comparatively limited archaeological evidence then available and by broader interpretive models emphasizing supra-regional interaction. As a result, none of these studies directly addressed the long-term continuity of the Central Zagros stamp seal tradition. In recent years, newly recovered administrative materials (Pollock et al., 2020; Renette et al., 2021; Khosravi et al., 2024; Khosravi, 2026), together with ongoing reassessments of Chalcolithic and Early Bronze Age developments in western Iran (e.g., Renette, 2018; Renette et al., 2021), have substantially expanded the available evidence. These developments provide an opportunity to reconsider the continuity, transformation, and regional character of the Central Zagros stamp seal tradition from a broader and more critically contextualized perspective.

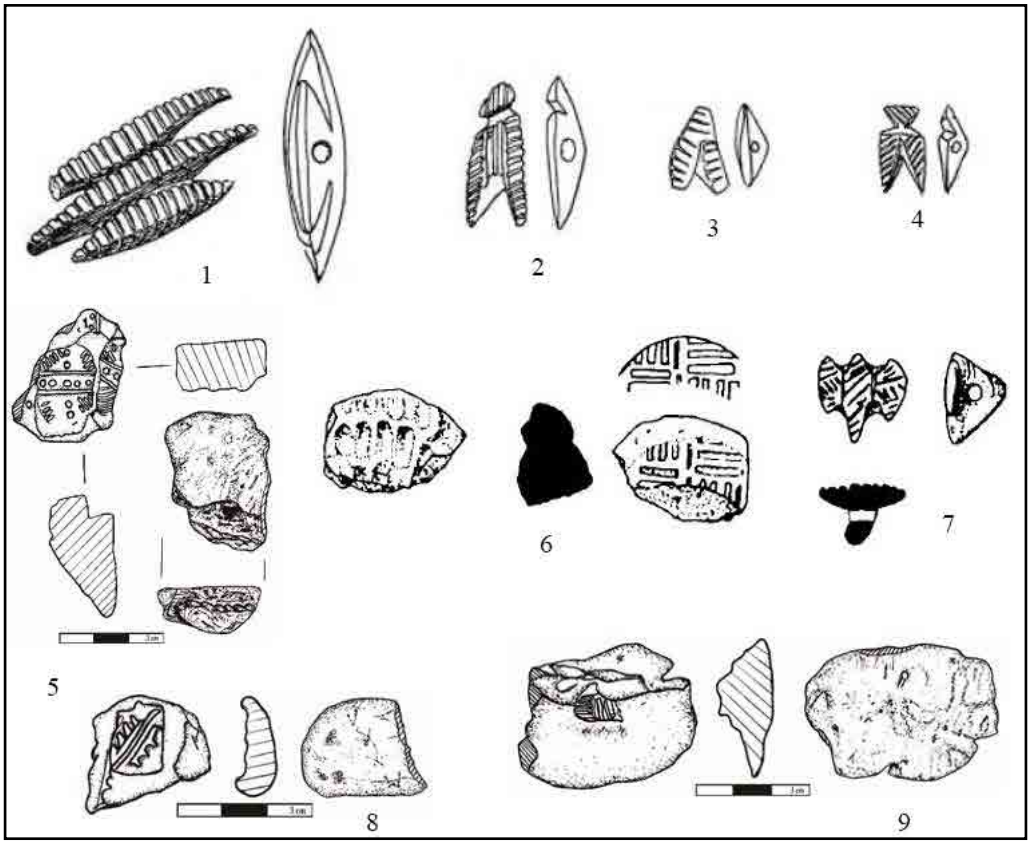

Fig. 2: Early Chalcolithic apotropaic pendants/stamp seals and seal impressions from Giyan (1–4; Herzfeld, 1933, fig. 13: EH TG 2686; 13: EH TG 2402; EH TG 2403; EH TG), Seh Gabi (6–7; Henrickson, 1988, table 1, fig. 2:SG 73–250; SG 73–100), and Chogha Maran (5, 8–9; Renette et al., 2021, pls. 28:1; 27:5; 27:7, drawing by Sahar Abdolahi).

Development of Stamp Seal Traditions in the Central Zagros

Early Chalcolithic (5000–4600 BCE)

Stratigraphic and comparative evidence indicates that the earliest evidence for stamp seal production in the Central Zagros derives from Tepe Giyan, Seh Gabi, and Chogha Maran (see: Khayani, 2025, Tables 2–1, 2–2, and 2–7)[1]. The available evidence includes

bird-shaped amuletic pendants (Fig. 2: 1–4, 7) as well as clay sealings bearing stamp seal impressions (Fig. 2: 5–6, 8–9). The glyptic assemblage from Seh Gabi includes both stamp seals and seal impressions (sealings), whereas Chogha Maran has yielded only seal impressions (see: Fig. 2). In contrast, the Giyan assemblage consists exclusively of stamp seals and/or amuletic seal-like objects, with no associated seal impressions.

It should be emphasized that, whereas the Seh Gabi and Chogha Maran materials derive from well-stratified contexts, the Giyan material published by Herzfeld is not securely stratified. Instead, it derives either from local acquisition or from limited sounding operations at the site, which complicates its contextual interpretation (Renette et al., 2021, pls. 27–28; Henrickson, 1988, fig. 2; Herzfeld, 1933, fig. 13).

These stamp seals and seal impressions, dating to the first half of the fifth millennium BCE, are associated with the Dalma cultural horizon, black-on-buff painted wares related to the Late Ubaid ceramic tradition of Mesopotamia, and the red-on-buff painted wares known as the Siahbid tradition (Renette & Mohammadi Ghasrian, 2020: 123–124). The impressions preserved on the clay sealings suggest the use of circular, oval, and rectangular stamp seals decorated with simple geometric motifs, including irregular hatching, crosses with quadrants filled by chevrons, parallel vertical, horizontal, or diagonal hatchings, and symmetrical zigzag patterns.

Comparison with seals from Susa, Bakun, Sialk, Hissar, Tepe Gawra, Tell Helawa, and Hamoukar demonstrates the existence of broad stylistic parallels linking the Central Zagros with neighboring regions during the Early Chalcolithic (Khayani, 2025, Tables 2–1 to 2–4 and 2–7; Renette, 2022: 146).

Late Chalcolithic 1–3 (4600–3700 BCE)

The assignment of stamp seals and seal impressions to the Late Chalcolithic 1–3 (4600–3700 BCE) is based on a combination of stratigraphic evidence from key Central Zagros sites, including Seh Gabi and Chogha Maran (Henrickson, 1988; Renette et al., 2021); associated ceramic assemblages from Dehsavar, Hakalan, and Parchinah (Pollock et al., 2020; Haerinck & Overlaet, 1996); and typological parallels in glyptic material from well-dated sequences across the Iranian Plateau and adjacent regions. These comparative sequences include Sialk, Hissar, Bakun, Susa, Jaffarabad, Tepe Gawra, Tell Helawa, and Hamoukar (Khayani, 2025, Tables 2–1, 2–2, 2–3, 2–4, and 2–7). Geometric motifs already attested in the Early Chalcolithic continue throughout this phase and become increasingly widespread (Fig. 3).

In addition to geometric imagery, anthropomorphic and zoomorphic motifs also became common during this period (Figs. 4–5). Such imagery appears at Giyan, Dehsavar, Hakalan, and Parchinah in the Central Zagros, as well as at Hajji Firuz, Qara Tepe of Qomrud, Susa, Tepe Gawra, Tell Asmar, and Tellul eth Thalathat (Voigt, 1989; Kaboli, ed., 2005; Amiet, 1972; Tobler, 1950; Rothman, 2002; Frankfort, 1935; Fukai et al., 1974). By contrast, assemblages from Sialk, Ghabristan, Hissar, and Bakun are

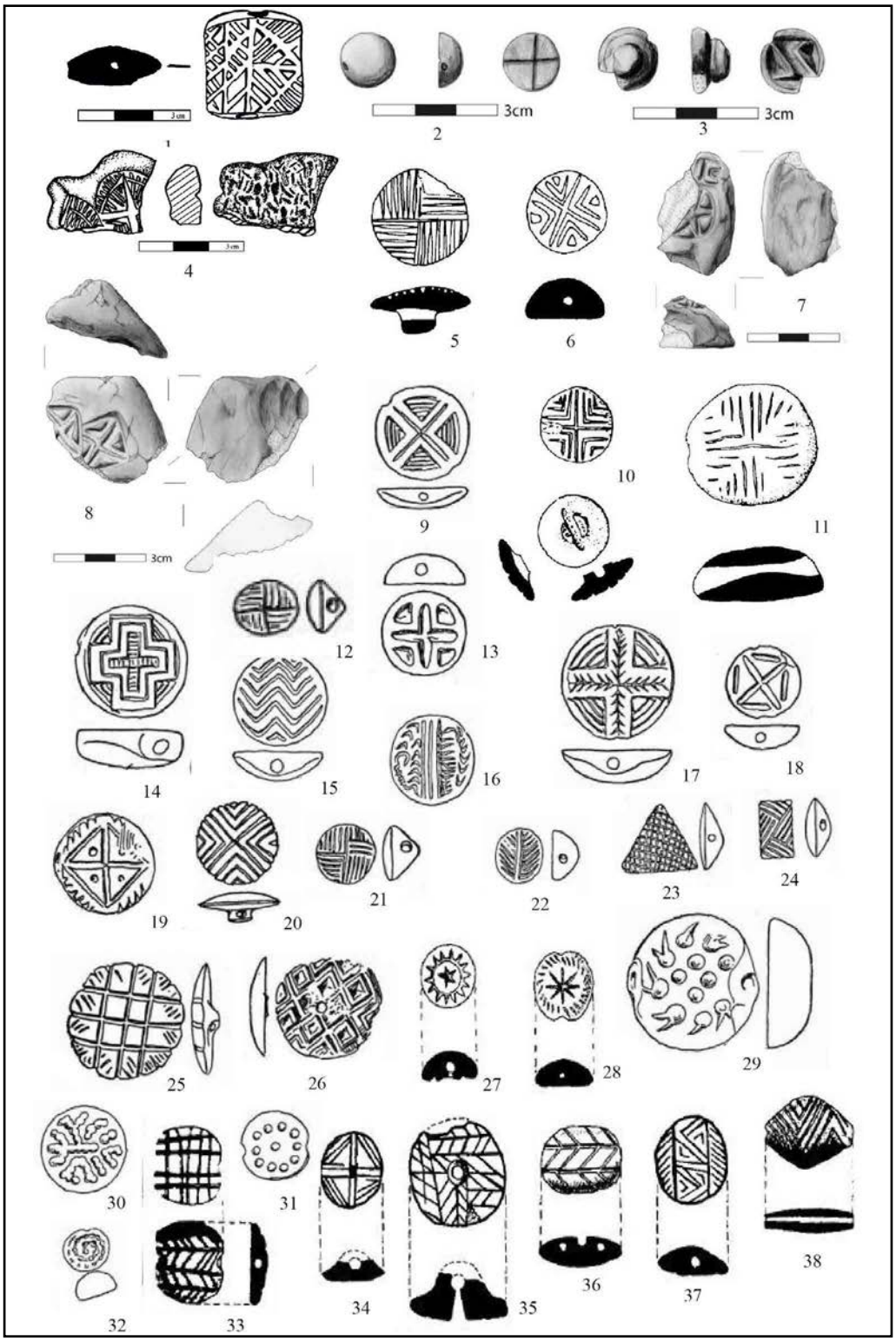

Fig. 3: Late Chalcolithic 1–3 stamp seals and seal impressions with geometric motifs from Chogha Maran (1, 4; Renette et al., 2021, pls. 26:3, 27: 3, drawing by Sahar Abdolahi), Dehsavar (2–3, 7–8; Pollock et al., 2020, figs. 4c:Ds–9; 4d:Ds–10; 2c:Ds–2; 2b: Ds–1), Seh Gabi (5–6, 10–11; Henrickson, 1988, figs. 2:SG 73–209; 3:SG 73–54; SG 73–180, SG 73–18), Giyan (9, 12–26, 29–32; Herzfeld, 1933, 16: EH TG 2359; 13: EH TG (IV 5 5. n); 16: EH TG 2684; 16:EH TG 2682; 18: TG 2679; 18: EH TG 2510; 16:EH TG 2683; 16:EH TG 2345; 15: EH TG 236i; 14:EH TG 2384; 13:EH TG 2387; 18: EH TG 2390; 13:EH TG 2392; 13:EH TG 2395; 14:EH TG 2381; 14:EH TG 2382; 28: EH TG 2347; 29: EH TG 2509; 27: EH TG2358; 29: EH TG 237i), and Hakalan and Parchinah (27–28, 33–38; Haerinck and Overlaet, 1996, figs. 56:5–6; 56:2; 85:3; 85:7; 56:3; 85:4; 56:1).

dominated primarily by geometric motifs (Ghirshman, 1938; Schmidt, 1937; Langsdorff & McCown, 1942; Alizadeh, 2006; Madjidzadeh, 2008).

Anthropomorphic motifs are particularly well represented at Tepe Giyan and include figures with elongated horned heads and claw like hands depicted in scenes of leaping, dancing, embracing, or interacting with animals (Fig. 4: 1–16). In some cases, the figures appear to hold staffs, daggers, or mace like objects. Similar motifs have previously been interpreted as representations of ritual specialists or shamanic figures within the broader Late Ubaid and Susa I glyptic traditions (Barnett, 1966; Porada, 2010: 67; Pittman, 2001a: 412–418; Hole, 1982; 2010).

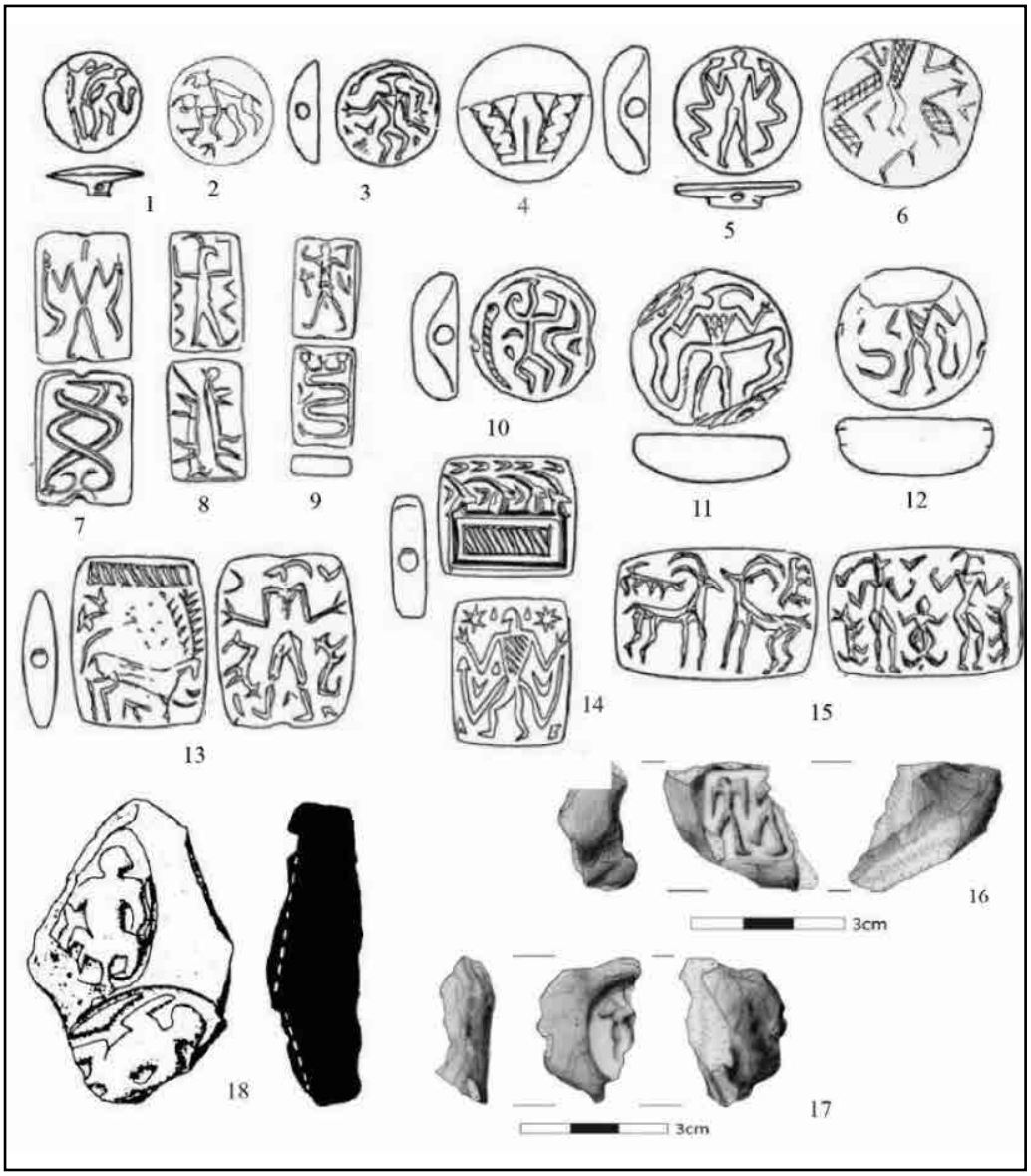

Fig. 4: Late Chalcolithic 1–3 stamp seals and seal impressions with anthropomorphic motifs from Giyan (1–15, Herzfeld, 1933, fig. 14:EH TG 2362; Contenau and Ghirshman, 1935, pl. 38:24; Herzfeld 1933, figs. 24:EH TG 2335; EH TG s. n; 14:EH TG 2352; Contenau and Ghirshman, 1935, pl. 38:36; Herzfeld 1933, fig. 25:EH TG 2340; EH TG 2375; EH TG 2377; 24:EH TG 2333; EH TG 233i; EH TG 2349; 25:EH TG 2506; EH TG 2505; EH TG 2373), Dehsavar (16–17, Pollock et al., 2020, fig. 4a:Ds–6; 4b: Ds–5), and Seh Gabi (18, Henrickson, 1988, fig. 1:SG 73–150).

Zoomorphic imagery recorded at Giyan, Seh Gabi, Hakalan, and Parchinah includes ibexes, cattle, snakes, lions, scorpions, leopards, birds, and fish arranged in both circular and linear compositions (Fig. 5; Khayani, 2025, Table 1: 90–120, 133–144; Table 2: 4; Table 3: 5–9). Several seals from Giyan depict scenes involving predatory animals, intertwined serpents, fenced animals, or combinations of geometric and animal motifs. Comparable imagery is particularly well attested at Susa I and Tepe Gawra XII–XI within the broader Late Ubaid and Susa I glyptic traditions (Amiet, 1972; Tobler, 1950; Rothman, 2002).

A number of seals from Giyan are engraved on both faces. One example depicts, on one side, a figure controlling snakes and animals and, on the reverse, domesticated animals enclosed within fenced compounds (Fig. 4: 13–14). Another seal shows anthropomorphic figures flanking a smaller hybrid figure on one face, while the reverse depicts pursuing animals (Fig. 4: 15). Such compositions suggest the emergence of increasingly complex symbolic and narrative imagery within regional glyptic traditions. The appearance of anthropomorphic, zoomorphic, and potentially narrative scenes represents a significant development from the predominantly geometric repertoire of earlier periods and demonstrates the growing diversity of visual expression within Central Zagros traditions.

Late Chalcolithic 4 (3700–3400 BCE)

Securely stratified Late Chalcolithic 4 stamp seals remain absent in the Central Zagros. This apparent absence should not necessarily be interpreted as evidence for a decline in the production and use of stamp seals but may instead reflect the limited availability of securely stratified contexts in the region. However, contemporaneous local stamp seal traditions characterized by simple geometric designs continued elsewhere on the Central Iranian Plateau, including at Sialk III: 6–7 and Tepe Alou (Rashad, 1990, fig. 9: 398–399; fig. 10: 400–401, 404; Moghimi & Davoudi, 2020).

Major transformations also occurred in Mesopotamian and Susiana glyptic traditions during the mid-fourth millennium BCE, which appear to have been only selectively incorporated into local Central Zagros administrative systems. These developments include the emergence of cylinder seals; zoomorphic and geometric stamp seals; increased use of drill carving; and the development of the so-called Baggy Style, characterized by thick and robust motifs (Pittman, 2001a: 419–421). Evidence for these developments in the Central Zagros remains comparatively limited. With the exception of a single unstratified cylinder seal from Tepe Giyan comparable to examples from Susa II and Middle Uruk contexts (Amiet, 1971, fig. 43: 10; Amiet, 1972, pl. 20: 768; Pittman, 2001a, pl. 11.8: e), unequivocal evidence for cylinder seal use in the Central Zagros first appears during the Late Chalcolithic 5 at Godin Tepe VI: 1 (Weiss & Young, 1975).

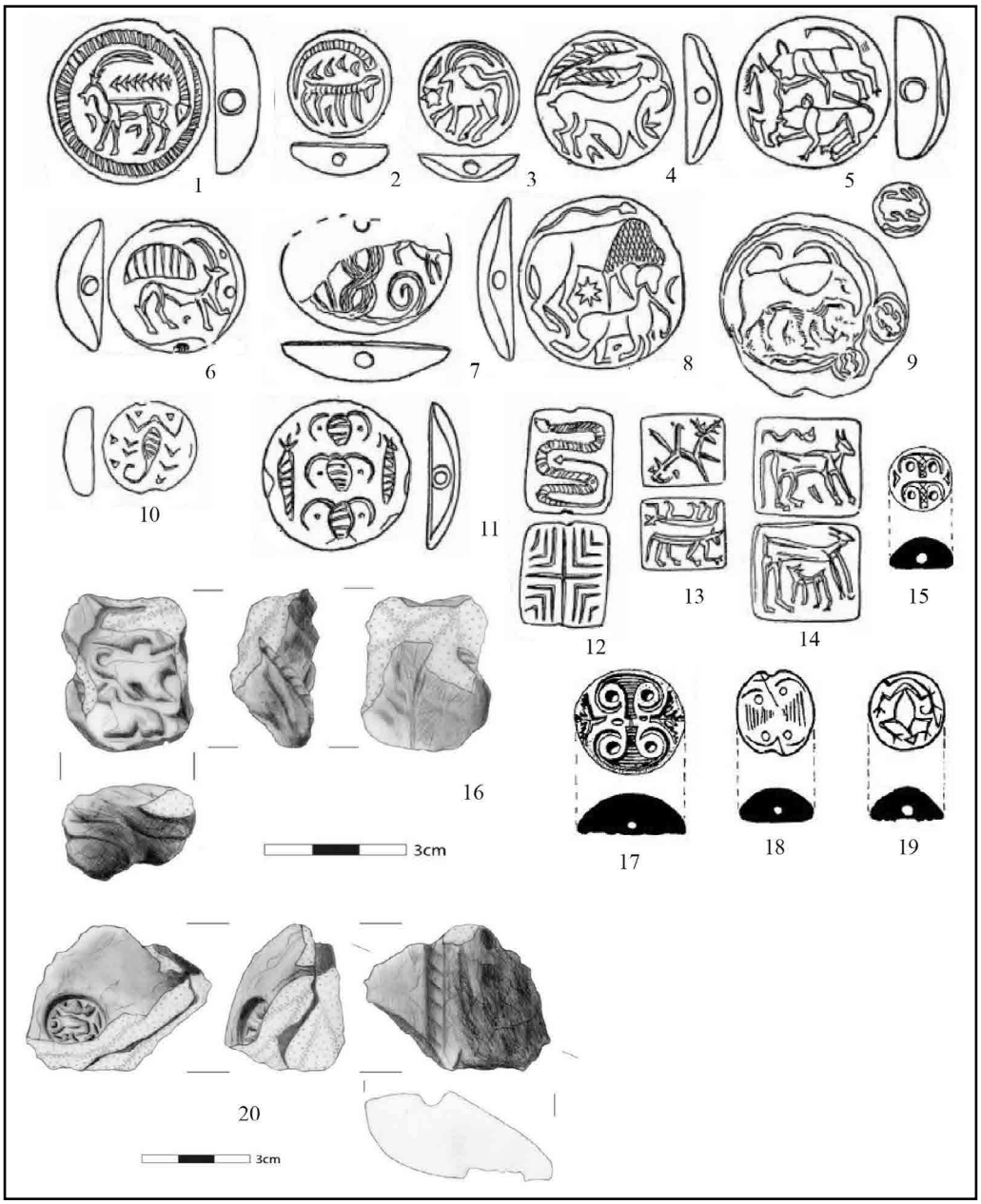

Fig. 5: Late Chalcolithic 1–3 stamp seals and seal impressions with animal motifs from Giyan (1–14, Herzfeld, 1933, figs. 22: EH TG 2330; EH TG 235i; EH TG 2339; EH TG 2504; EH TG 2677; EH TG 2332; 24:EH TG 2350; 22:EH TG 2503; EH TG 2612; 18:EH TG 2353; 24:EH TG 2678; 25: EH TG 2378; EH TG 2376; EH TG 2507), Dehsavar (16, 20, Pollock et al., figs. 3a: Ds–3, 3b: Ds–8), and Hakalan and Parchinah (15, 17–19, Haerinck and Overlaet, 1996, figs. 56:7, 8; 85:6, 8).

Two zoomorphic glyptic artifacts have been reported from the Central Zagros: a zoomorphic stamp seal from the Farash site of the Seymareh Dam and a zoomorphic stamp seal impression from Tepe Jameh Shuran in the Mahidasht (Khayani & Abdolahi, 2025; Niakan, 2015: 46). The Farash seal, although dated by Niakan to the late fourth and early third millennia BCE, finds close parallels among Late Chalcolithic 3–4 seals from Yorgan Tepe (Nuzi) in the Upper Tigris region and Tell Brak in the Khabur (Pittman, 2001, fig. 11.11b; fig. 11.20c). The Jameh Shuran seal impression has been dated to the Late Chalcolithic 3–4 based on parallels from Mesopotamia and Susiana.

Several drill-carved stamp seals and seal impressions from Giyan and Dehsavar find parallels in Late Chalcolithic 3–4 glyptic assemblages (Fig. 3: 29–30; Fig. 4: 17; Khayani, 2025, Tables 2.1: 88–89; 2.3: 10). These include dotted geometric designs and schematic anthropomorphic and zoomorphic motifs comparable to stamp seals from Susa (Le Breton, 1957, fig. 18: 5–6, 8; Amiet, 1972, pls. 53–55).

Three Baggy Style stamp seal impressions are currently known from Giyan, Seh Gabi, and Dehsavar. One example from Giyan preserves impressions from three different stamp seals on a single jar stopper (Fig. 5: 9). Comparable impressions occur at Susa, Hamoukar, and Tepe Gawra Level VIII (Pittman, 2001a, fig. 11.9: d–e; Reichel, 2002, figs. 11, 16; Rothman, 2002, pl. 60: 2918, 2947, 2953). Another example from Seh Gabi depicts a human figure beside a bow-like object (Fig. 4: 18), comparable to examples from Susa II and Sharafabad (Amiet, 1972, pl. 3: 239; Wright et al., 1980, fig. 6: 2; Pittman, 2001a, figs. 11.9–11.10). A third example from Dehsavar depicts vertically arranged large-bodied animals in the Baggy Style tradition (Fig. 5: 16), comparable to material from Sharafabad (Wright et al., 1980, fig. 6: 3, 4, 7). Nevertheless, in the absence of secure contextual data, the Giyan and Dehsavar examples can only be broadly assigned to the Late Chalcolithic 3–4 period. These examples suggest a limited and selective adoption of mid-fourth millennium BCE glyptic innovations in the Central Zagros.

Overall, while no securely stratified assemblages are currently available for the Late Chalcolithic 4, broader regional evidence suggests that local production cannot be ruled out. At the same time, the apparent scarcity of certain Late Chalcolithic 3–4 innovations—particularly cylinder seals—may partly reflect the current state of archaeological research rather than their actual absence. Evidence from Kani Shaie in the western Zagros foothills, where a numerical tablet bearing a cylinder seal impression has been recovered from a Late Chalcolithic 4 context (Renette, 2024: 180, fig. 2), indicates that cylinder seals had already reached parts of the Zagros Mountains during this period. Future investigations at both major regional centers and smaller contemporary settlements may therefore clarify the extent to which such administrative technologies were adopted and how they interacted with local traditions.

Late Chalcolithic 5 (3400–3100 BCE)

Evidence for glyptic production during the Late Chalcolithic 5 derives primarily from Godin Tepe and Tepe Giyan (Khayani, 2025: Tables 2–1 & 2–5). Apart from a single possible stamp seal from Godin VI:1 (Figs. 6: 1 & 7: 1), cylinder seals dominate the glyptic assemblages documented for this period, a pattern consistent with contemporary evidence from Susiana (Khayani & Matthews, in press). However, recently published evidence from Abu Fanduweh in Khuzestan (Alizadeh, 2026: 100, pl. 79: A & I), including two Late Susa II bone stamp seals decorated with geometric motifs resembling those from Dehsavar and Tyalineh (see: Figs. 3: 8, 7: 6), suggests that stamp seals were also present during this period, although apparently in much smaller numbers than cylinder

seals. This pattern reflects the broader administrative transformation associated with Late Uruk and Late Susa II interaction networks, within which cylinder seals emerged as the dominant administrative technology.

Early Bronze Age I (3100–2800 BCE)

The Tepe Tyalineh assemblage provides the most significant evidence for stamp seal use during the Early Bronze Age I. The initial Tyalineh assemblage included 76 sealings collected from the site's surface (Khayani, 2025, Table 2–6; Khosravi et al., 2024). Both glyptic and ceramic comparisons date the Tyalineh assemblage broadly to 3100–2800 BCE (Khosravi, 2026; Khosravi & Khayani, in press).

The Tyalineh sealings encompass multiple glyptic traditions, including glazed steatite style, Proto-Elamite classic style, wheel-cut style, incised style, Proto-Elamite stamp seals, Arslantepe-style stamp seals, and stamp seals closely resembling earlier Chalcolithic traditions (Fig. 6: 2–8). Of the 65 legible sealings, 30 belong to the glazed steatite style, 13 to the wheel-cut style, 12 to the Proto-Elamite classic style, 3 to the incised style, 5 to Proto-Elamite and Chalcolithic-related stamp seal traditions, and 2 to the Arslantepe VIA style (Frangipane & Pittman, 2007: 94–96). Although indigenous stamp seal traditions represent only a minority of the Tyalineh assemblage, they are proportionally more common than at several contemporary Proto-Elamite centers, including Susa, Tall-i Malyan, Tepe Yahya, and Shahr-i Sokhta (Khayani, 2025, Table 3–3; compare Pittman, 1997), suggesting the persistence and continued importance of stamp seal traditions within Central Zagros administrative practices. Subsequent excavations at Tyalineh yielded more than 7,000 clay sealings, including numerous additional stamp seal impressions, confirming that the initial surface assemblage represented only a fraction of the site's administrative record (Khosravi, 2026).

In addition to Proto-Elamite stamp seal impressions closely comparable to examples from Tepe Sofalin, Tall-i Malyan, and Tepe Yahya (compare Fig. 6: 3, 5–6 with: Hessari & Yusefi Zoshk, 2010, fig. 3; Sumner, 1976, fig. 5c; Pittman, 2001b, fig. 10.4), several seal impressions from Tyalineh find close parallels with earlier stamp seal traditions from the Central Zagros and the Central Iranian Plateau (Fig. 7: 2–7). These include geometric motifs such as chevrons, rayed circles, and abstract animal imagery comparable to examples from Giyan, Susa I, Hissar, Sialk III, Tepe Yahya, and Chogha Maran (cf. Herzfeld, 1933, fig. 18: TG 2679; Amiet, 1972, pl. 3: 238; Schmidt, 1937, pls. XV, XXVIII; Pittman, 2001a, fig. 10.4; Renette et al., 2021, pl. 35: 4–7). The Tyalineh assemblage therefore demonstrates the coexistence of Proto-Elamite administrative practices and stamp seal imagery rooted in earlier regional traditions, suggesting continuity rather than abrupt replacement in Central Zagros glyptic traditions.

Early Bronze Age II (2800–2500 BCE)

Chogha Maran has yielded the most extensive Early Bronze Age II administrative

assemblage currently known from the Central Zagros. Both glyptic and ceramic comparisons date the assemblage to ca. 2800–2500 BCE (Renette et al., 2021). The assemblage comprises 149 sealings, including 12 stamp seals and stamp seal impressions and 137 cylinder seal impressions (Renette et al., 2021, Tables 18–19). Of the Chogha Maran stamp seal impressions, four examples can be securely attributed to the Early Bronze Age II (Fig. 6: 9–12). Unlike many of the Proto-Elamite stamp seal impressions from Tyalineh, the Chogha Maran stamp seal impressions display stronger affinities with earlier Late Chalcolithic 1–3 stamp seal traditions. The motifs include geometric

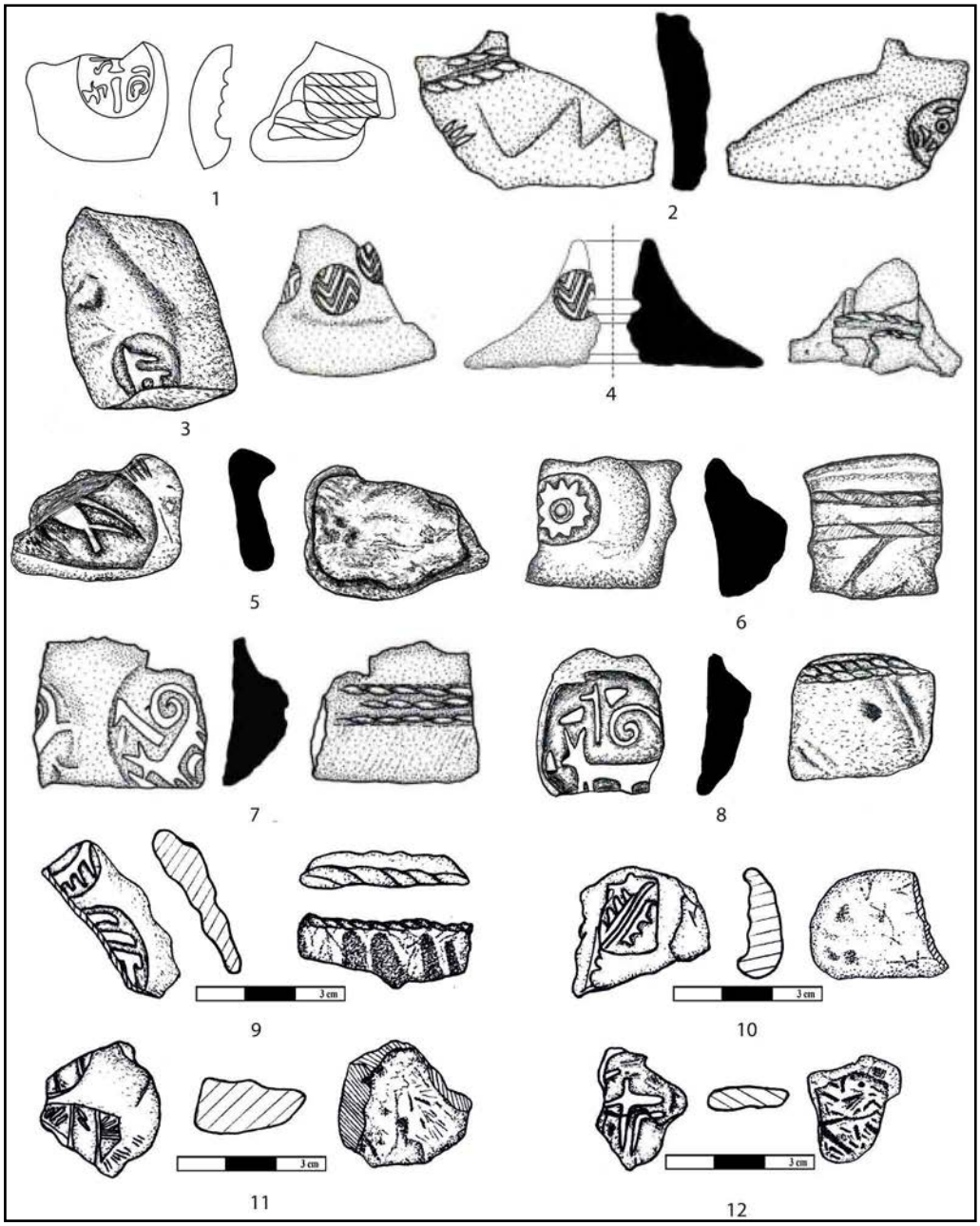

Fig. 6: Late Chalcolithic 5(?) and Early Bronze Age I–II stamp seal impressions from Godin Tepe (1 (?), Khayani and Matthews, in press, fig. 48:S327?, drawing by Ali Khayani), Tepe Tyalineh (2–8; Khosravi and Khayani, in press, table 1:37, 40, 45, 64, 20, 33–34, drawing by Sahar Abdolahi), and Chogha Maran (9–12, Renette et al., 2021, pls. 28:3, 27:5–4, 2) (drawing by Sahar Abdolahi).

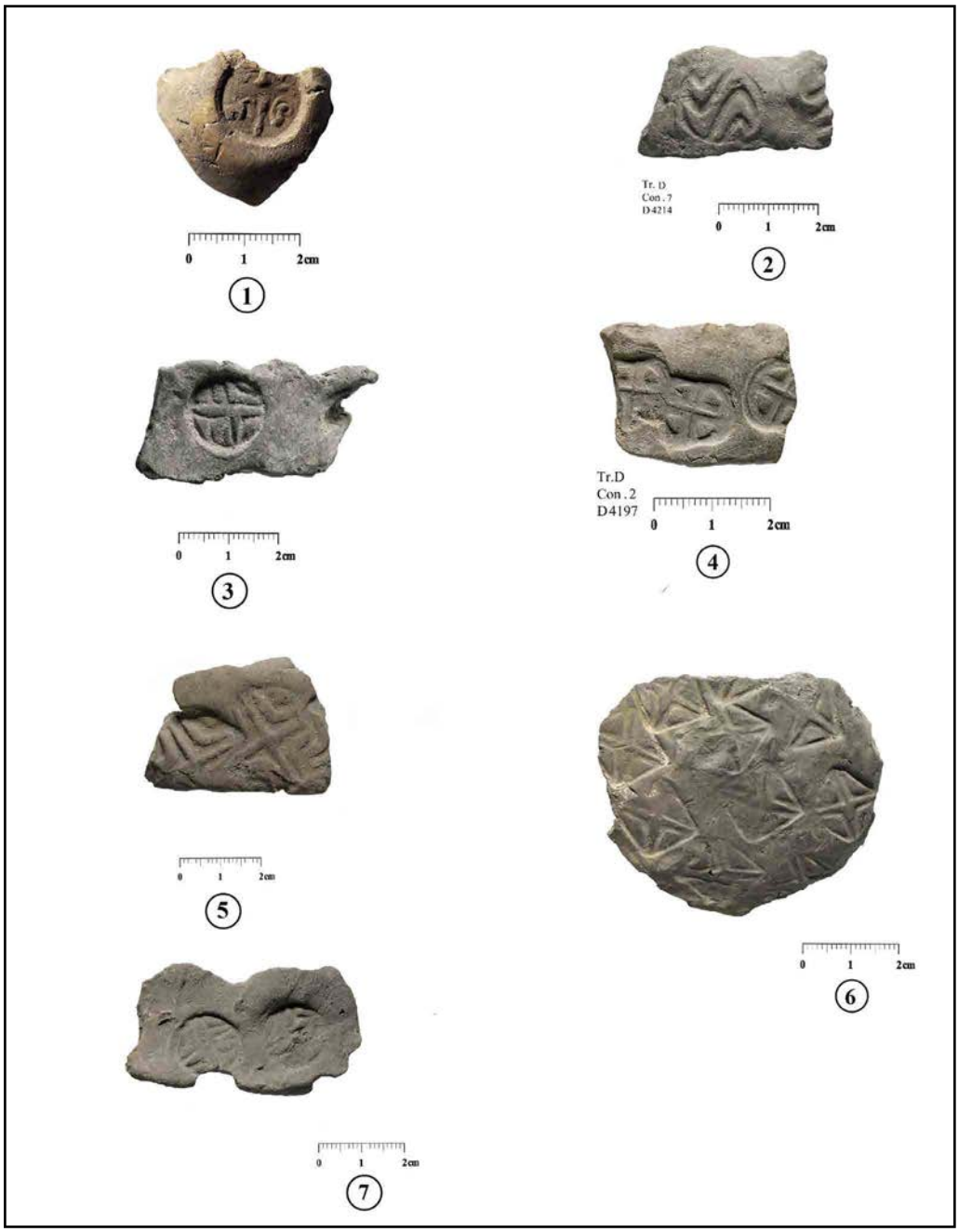

Fig. 7: Late Chalcolithic 5 (?) and Early Bronze Age I stamp seal impressions from Godin Tepe (1) and Tepe Tyalineh (2–7) (Photos by: Ludovica Lucentini (1) and Sara Fereidouni (2–7)).

crosses, zigzag designs, hatched quadrants, and schematic ibex imagery (compare Fig. 8: 1, 5, 6–7 with Figs. 3 and 5). These examples suggest that localized stamp seal traditions continued to circulate alongside cylinder seal administrative practices in the Central Zagros during the Early Bronze Age.

Discussion

The evidence reviewed above demonstrates that stamp seal production and use in the Central Zagros were attested from the Early Chalcolithic through the Early Bronze Age

Fig. 8: Early Chalcolithic (4, 8–9), Late Chalcolithic (2), Early Bronze Age II (1, 5 (?), 6–7), and Iron Age (3) stamp seal impressions from Chogha Maran (photos by: Sara Fereidouni).

II. Until the publication of the Tepe Tyalineh assemblage, together with new material from Godin Tepe, Chogha Maran, and Dehsavar (Pollock et al., 2020; Renette et al., 2021; Khosravi et al., 2024; Khayani, 2025), securely stratified stamp seals in the region were limited to Seh Gabi, where Early Chalcolithic and Late Chalcolithic 1–3 stamp seals and seal impressions were recovered (Henrickson, 1988). A small number of stamp seal impressions had also been reported from Chogha Maran, although their archaeological contexts were not fully documented (Pittman, 2014, fig. 4). As a result, a chronological gap of roughly nine centuries appeared to separate the latest Chalcolithic stamp seals from the earliest Bronze Age examples (Pittman, 2014: 51).

This apparent hiatus led Pittman to propose that the Bronze Age stamp seals from Chogha Maran represented earlier Chalcolithic objects redeposited into later contexts through site formation processes and secondary reuse (Pittman, 2014: 51). The subsequent publication of excavation data from Chogha Maran supported this interpretation by demonstrating extensive truncation, leveling, and reworking of earlier deposits—conditions that could have facilitated the intrusion of earlier materials into later contexts (Renette et al., 2021: 43–44, pls. 17–19).

However, the accumulation of new evidence substantially alters this picture. The publication of stratified materials from Godin Tepe and, especially, Tepe Tyalineh, together with newly published glyptic evidence from Dehsavar, significantly reduces the proposed chronological gap between Chalcolithic and Early Bronze Age stamp seals (Pollock et al., 2020; Khosravi et al., 2024; Khosravi, 2026; Khayani & Matthews, in press). Several Early Bronze Age stamp seals display close typological and iconographic affinities with Late Chalcolithic 1–3 traditions, a pattern consistent with longer trajectories of local continuity than previously assumed.

The Tyalineh materials provide evidence for the use of stamp seals rooted in earlier Central Zagros traditions, predating the Early Bronze Age II evidence from Chogha Maran by several centuries (see: Khosravi, 2026; Renette et al., 2021). Significantly, a proportion of stamp seal impressions from Tyalineh—found together with Proto-Elamite cylinder and stamp seal impressions (Fig. 6: 3, 5–6)—resemble Late Chalcolithic seal impressions from the Central Zagros (compare Figs. 3 and 6–8), although the site lacks earlier Chalcolithic strata from which such materials could have been redeposited (Khosravi, 2026). Even though the Dehsavar materials derive from excavation contexts, the absence of a fully published stratigraphic report limits precise contextual evaluation of the seals and sealings. Nevertheless, the Dehsavar assemblage includes several Late Chalcolithic 1–3–type seals and seal impressions (cf. Fig. 4: 16), along with examples resembling stamp seal impressions from Tyalineh (compare Fig. 3: 2–3, 6–7 and Fig. 7: 2–7).

Additional evidence for the continued production and use of local stamp seals in the Central Zagros during the Early Bronze Age may be provided by the Surkh Dum-i Luri assemblage, where several stamp seals from the Iron Age sanctuary exhibit archaic stylistic characteristics (Talai, 2013: 70; Schmidt et al., 1989). Although there is currently no stratigraphic basis for assigning these seals to the Chalcolithic period, the sanctuary at Surkh Dum-i Luri is situated adjacent to a Bronze Age settlement (Rashidi Arzandeh, 2019), raising the possibility that some of these seals may derive from later prehistoric phases rather than Chalcolithic contexts.

On the basis of the available evidence, four explanatory models may be evaluated regarding the developmental trajectory of stamp seals in the Central Zagros:

1. reuse and redeposition of earlier seals,
2. discontinuity followed by reintroduction,

3. replacement by external glyptic traditions, and
4. relative continuity accompanied by transformation.

Reuse and Redeposition

Although redeposition clearly occurred at Chogha Maran, recent discoveries from Godin Tepe and Tepe Tyalineh weaken the argument that all Bronze Age stamp seals represent reused Chalcolithic artifacts. Particularly significant is the absence of clearly earlier Chalcolithic deposits at Tepe Tyalineh (Khosravi, 2026), which makes systematic reuse of much older objects less likely. Overall, while redeposition may explain part of the evidence, it cannot account for the full range of securely contextualized materials.

Discontinuity and External Reintroduction

A second possibility is that stamp seal traditions disappeared during the Late Chalcolithic and were subsequently reintroduced from neighboring regions. Evidence from the Central Iranian Plateau demonstrates continuity of Chalcolithic-style stamp seals into later periods (Rashad, 1990; Moghimi & Davoudi, 2020; Nokandeh & Hosseinzadeh Sadati, 2024). However, the strong cultural and ceramic connections between the Central Plateau and the Central Zagros during the Late Chalcolithic make a complete regional disappearance in the Zagros comparatively difficult to sustain (cf. Rothman & Badler, 2011; Alizadeh et al., 2013: 149–150; Roustaei & Azadi, 2017). Moreover, Early Bronze Age II assemblages from Chogha Maran suggest increasing regional localization associated with Trans-Tigridian corridor networks rather than renewed intensive interregional transmission (Renette et al., 2021: 41). The available evidence therefore does not strongly support a complete regional discontinuity followed by external reintroduction of the stamp seal tradition.

Replacement by Supra-regional Traditions

The Early Bronze Age witnessed the expansion of several supra-regional glyptic traditions, including Proto-Elamite and Arslantepe-related styles. These traditions are clearly represented within the Tyalineh assemblage. Nevertheless, local stamp seal traditions continued alongside them (see: Fig. 7: 2–7). The coexistence of multiple glyptic repertoires suggests selective adoption and administrative diversification rather than complete replacement of earlier local practices, indicating the persistence of local visual repertoires within emerging supra-regional administrative networks.

Relative Continuity Accompanied by Transformation

Recent evidence increasingly supports the continuity of stamp seal traditions in the Central Zagros from the Early Chalcolithic through the Early Bronze Age. However, this continuity did not involve the uniform survival of all components of the Chalcolithic glyptic repertoire. The earliest stamp seal traditions of the Central Zagros were

dominated by geometric motifs, whereas Late Chalcolithic 1–3 assemblages witnessed the appearance of increasingly elaborate anthropomorphic and zoomorphic imagery, including figures commonly interpreted as ritual specialists or shaman-like beings, predatory and horned animals, and other potentially narrative or symbolic compositions. Many of these motifs emerged within broader interaction networks linking the Central Zagros with Late Ubaid and Susa I–related traditions and declined with the contraction of these interregional networks.

By contrast, the stamp seal impressions currently known from the Early Bronze Age I–II are dominated by geometric designs that find their closest morphological and iconographic parallels among earlier geometric stamp seal traditions (see: Figs. 7–8). This pattern supports sustained local transmission rather than isolated revival. It is particularly visible at Tepe Tyalineh and Chogha Maran, where localized stamp seal traditions coexisted with broader Proto-Elamite glyptic traditions. Comparable continuity in stamp seal traditions on the Central Iranian Plateau further strengthens this interpretation (Rashad, 1990; Moghimi & Davoudi, 2020; Nokandeh & Hosseinzadeh Sadati, 2024).

At the same time, the scarcity of securely stratified Late Chalcolithic 4–5 stamp seal assemblages in the Central Zagros (Khayani, 2025, Table 1–3) suggests that part of the perceived discontinuity may derive from archaeological visibility and uneven recovery rather than genuine cultural interruption. Securely stratified materials remain exceptionally rare for the Late Chalcolithic 4, and as a center integrated into supra-regional administrative networks, the Godin VI: 1 glyptic assemblage should not automatically be regarded as representative of the full range of administrative practices across the Central Zagros as a whole. Smaller contemporary settlements may have maintained locally embedded administrative traditions that are either poorly documented or absent from the currently available archaeological record. Nevertheless, the uneven distribution of securely stratified glyptic assemblages, particularly for the Late Chalcolithic 4–5, means that future excavations may substantially refine the chronology and developmental trajectory proposed here.

Overall, the developmental trajectory of stamp seals in the Central Zagros suggests that neither a complete rupture in the Late Chalcolithic nor a simple model of external replacement adequately accounts for the available evidence. Conversely, a model of uninterrupted and uniform continuity is also difficult to sustain given observable shifts in style, imagery, and administrative associations over time. The accumulated evidence instead supports a model of relative continuity, in which stamp seal traditions persisted in locally embedded forms while undergoing stylistic, iconographic, and functional transformations within changing administrative networks.

The apparent decline of stamp seals and seal impressions in the Central Zagros, particularly during the Late Chalcolithic 4–5 (3700–3100 BCE), is therefore more plausibly explained by uneven archaeological sampling, shortcomings of earlier

excavations, incomplete publication of archaeological data, and chronological uncertainties than by a genuine cessation of the tradition. As a further implication of this interpretation, some of the currently unstratified stamp seals and seal impressions from sites such as Giyan and Dehsavar may require chronological reassessment. Given their typological similarities to securely dated assemblages from Tyalineh and Chogha Maran, a Late Chalcolithic 4–5 or Early Bronze Age I–II attribution for at least part of these materials cannot be ruled out.

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Author Contribution

The contribution of all authors to the writing of the article has been equal.

Conflict of Interest

In accordance with ethical publication standards, the authors declare that they have no conflicts of interest, either personal or financial, that could have influenced the content or conclusions presented in this research.

Endnote

1. The earliest stratified stamp seal impression currently known from Iran comes from Tepe Khaleseh in northwestern Iran, and dates to ca. 6000 BCE (Valipour et al., 2013, figs. 11.39–11.40).

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۳۵

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سنت مُهرهای استامپی اولیه در زاگرس‌مرکزی (۲۵۰۰-۵۰۰۰ پ.م.): گسست یا تداوم؟

علی خایانی[I]، شکوه خسروی[II]

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چکیده

مهرهای استامپی از پایدارترین اجزای سنت‌های اداری زاگرس‌مرکزی به‌شمار می‌روند. با این‌حال، ناهمگونی داده‌های باستان‌شناسی و کمبود شواهد دارای لایه‌نگاری مطمئن، به‌ویژه برای اواخر هزارهٔ چهارم و اوایل هزارهٔ سوم پیش‌ازمیلاد به بحث‌های جالب‌توجهی دربارهٔ تداوم یا گسست این سنت‌ها دامن زده است. این پژوهش با بهره‌گیری از داده‌های تازه منتشر شده از: تپه تیلینه، گودین‌تپه، چغاماران و تپه دهسوار، سیر تحول سنت مهرهای استامپی در زاگرس‌مرکزی در فاصلهٔ حدود ۵۰۰۰ تا ۲۵۰۰پ.م. را در چارچوب یک گاهنگاری منطقه‌ای به‌روز بازنگری می‌کند. پژوهش ازطریق بررسی تطبیقی سبک، نگاره‌شناسی و بافت باستان‌شناسی مُهرها و اثرمُهرهای استامپی، تفسیرهای مختلف دربارهٔ تحول سنت‌های اداری در این منطقه را ارزیابی می‌کند. شواهد نشان می‌دهد که سنت مهرهای استامپی از دورهٔ مس‌وسنگ قدیم (۵۰۰۰-۴۶۰۰پ.م.) تا مس‌وسنگ جدید ۱-۳ (۴۶۰۰-۳۷۰۰پ.م.) در زاگرس‌مرکزی رواج داشته و ضمن تحولات بومی، با شبکه‌های فرامنطقه‌ای نیز در تعامل بوده است؛ هم‌چنین پس از یک شکاف ظاهری در شواهد مربوط به مس‌وسنگ جدید ۴-۵ (۳۷۰۰-۳۱۰۰پ.م.)، این سنت در عصر مفرغ قدیم (۳۱۰۰-۲۵۰۰پ.م.) نیز تداوم یافته است؛ بنابراین، هرچند ساخت و استفاده از مهرهای استامپی در اواخر هزارهٔ چهارم پیش‌ازمیلاد تحت‌الشعاع مهرهای استوانه‌ای و فناوری‌های اداری فرامنطقه‌ای قرار گرفت، سنت مهرهای استامپی زاگرس‌مرکزی در عصر مفرغ قدیم هم‌چنان به حیات خود ادامه داد. تحلیل مدارک موجود نشان می‌دهد که این شکاف ظاهری بیش از آن‌که ناشی از وقفه‌ای واقعی در تولید و استفاده از مهرهای استامپی باشد، نتیجهٔ رویت‌پذیری و شرایط بقای مواد فرهنگی و دامنه و دقت محدود کاوش‌های باستان‌شناسی در محوطه‌های کلیدی منطقه است. نتایج این پژوهش از الگویی مبتنی‌بر تداوم نسبی همراه با تحول سبکی، نگاره‌شناسی و اداری در سنت مهرهای استامپی زاگرس‌مرکزی حمایت می‌کند. این یافته‌ها نقش فعال جوامع زاگرس‌مرکزی در شکل‌گیری و تحول شیوه‌های اداری را برجسته می‌سازد و در بحث‌های گسترده‌تر دربارهٔ تداوم فرهنگی، برهم‌کنش‌های فرامنطقه‌ای و توسعهٔ نهادهای اداری و سیاسی در جنوب‌غرب آسیا در دوران پیش‌ازتاریخ سهیم می‌شود.

کلیدواژگان: زاگرس‌مرکزی، مس‌وسنگ، مفرغ قدیم، سنت مهرهای استامپی، فنون مدیریت، تداوم فرهنگی، برهم‌کنش‌های فرامنطقه‌ای.

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Beyond Accounting; Proto Elamite Tablet (MDP 17, 043) from Susa and the Layered Semantics of Registered Individuals

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Abstract

This article examines an exceptional Proto-Elamite tablet from Susa (MDP 17, 043) that departs from standard economic accounting texts by listing seventeen named individuals rather than commodities or labor quotas. A central problem addressed here is the apparent inconsistency between gender-marked signs within nominal chains and the uniform or contrasting classifications that conclude those chains, as well as the summary count on the reverse of the tablet. Through a close structural and contextual analysis of the tablet, this study argues that the text operates with a two-level semantic system. Signs such as (M388) and (M124) occurring within nominal chains function at a descriptive level, indicating roles or statuses that are not reducible to biological gender. By contrast, the final combinations |M217+M388| and |M217+M124| assign individuals to institutional categories that determine their treatment as countable administrative units. The reverse of the tablet therefore records not gender or functional roles, but the total number of registered individuals classified according to their final institutional status. This layered semantic structure reveals a sophisticated administrative logic in Proto-Elamite record-keeping and highlights the social and institutional dimensions of individual registration beyond purely economic accounting.

Keywords: Proto-Elamite, Administrative Classification, Social Identity, Institutional Semantics, Early Writing Systems, Susa, Individual Registration.

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Introduction

Proto Elamite tablets have conventionally been interpreted as instruments of early economic administration, designed primarily to record commodities, labor inputs, and numerical transactions within emerging bureaucratic systems of the late fourth millennium BC in Iran (Scheil, 1905; Englund, 2004; Damerow & Englund, 1989; Stolper, 1985; Dahl, 2005; Dahl, 2018; Dahl et al., 2012; Desset 2012; Yousefi Zoshk, 2010). Within this dominant framework, the Proto Elamite tablets have been approached as a functional precursor to later bookkeeping systems, its signs analyzed largely through the lenses of quantification, commodity classification, and labor management. Signs commonly interpreted as gender markers, most notably (M388) and (M124), have therefore been read in a direct and biologically grounded manner, assumed to encode male and female workers or sex differentiated labor categories (Dahl et al., 2018; Yousefi et al., 2019). While this model successfully explains a large portion of the corpus, it has increasingly been challenged by a number of tablets that do not conform neatly to standard accounting formats. These texts either marginalize commodities, foreground personal identifiers, or exhibit structural features that resist reduction to simple economic bookkeeping. Among these atypical documents, the tablet (MDP 17, 043) from Susa occupies a particularly distinctive position.

Unlike the majority of Proto Elamite administrative texts, which organize entries around goods, rations, or abstract labor units, this tablet records a sequence of seventeen individual persons, each registered as a single unit, without explicit reference to commodities or distributions. The structure of (MDP 17, 043) is striking. Each entry consists of a nominal chain; often complex and internally differentiated, followed by a terminal classificatory complex grapheme and a unitary numerical value (1 N01). The reverse of the tablet then summarizes the total number of individuals according to two final categories, marked by |M217+M388| and |M217+M124|, without preserving any of the internal distinctions articulated on the obverse. This format raises a fundamental interpretive problem that has not been adequately addressed in previous scholarship: how should we understand the function of signs such as (M388) and (M124) when they appear both within nominal chains and as final classificatory markers, often in apparently contradictory configurations? In several entries on the obverse, (M388) appears embedded within a nominal chain, while the entry concludes with the compound |M217+M124|; in one other, (M124) appears internally, yet the final classification is |M217+M388|. If these signs were functioning solely as markers of biological sex, such configurations would represent clear inconsistencies or scribal errors. Yet the systematic nature of these patterns, coupled with the coherent summary on the reverse, strongly suggests that a different interpretive framework is required.

This article argues that the contradictions observed in (MDP 17, 043) are not semantic failures, but rather the result of a layered administrative logic inherent to Proto Elamite writing system. Building on close structural analysis and comparative corpus

data, it proposes that signs such as (M388) and (M124) operate on at least two distinct semantic levels. At one level, they function as descriptive or relational markers within nominal chains, encoding aspects of social role, labor affiliation, or culturally gendered identity. At another level, when embedded in terminal compounds such as |M217+M388| and |M217+M124|, they serve as institutional classifiers, assigning individuals to administratively meaningful categories that enable counting, verification, and summary. This distinction is critical. The reverse of the tablet does not recount gendered persons, named individuals, or functional roles; instead, it enumerates registered administrative units, grouped exclusively by final classification.

In doing so, it collapses socially rich personal identities into standardized institutional categories. The tablet thus documents not merely people, but the process of their bureaucratic registration, revealing an administrative practice that mediates between social complexity and institutional abstraction (Scott, 1998). The implications of this interpretation extend beyond the analysis of a single tablet. They challenge the long standing assumption that Proto Elamite writing was primarily concerned with economic transactions narrowly defined. Instead, (MDP 17, 043) suggests that writing in late fourth millennium Susa was already being used to manage social membership, institutional affiliation, and administrative identity. This perspective aligns with broader evidence from Susa administrative practices, including the diversity of headers (Kelley, 2024; Yousefi zoshk et al., 2025a), the modular combination of signs (Etemadifar, 2025), and the complementary use of seals and writing to express economic and social responsibility (Pittman, 2013; Baghizadeh & Yousefi, 2024). By focusing on an anomalous yet structurally coherent document, this study contributes to a growing body of research that views Proto Elamite administration as decentralized, flexible, and conceptually sophisticated, capable of handling not only goods and labor, but also persons as institutional entities (Etemadifar & Ahmadi Afzadi, 2022; Afshari, 2019). In doing so, it reframes Proto Elamite writing as a medium through which early administrative systems articulated social order, negotiated identity, and established accountability; well beyond the confines of simple accounting.

Methodology and Analytical Framework

This study employs a qualitative, structural analysis of a single exceptional Proto-Elamite tablet (MDP 17, 043) from Susa, integrating epigraphic examination with contextual and comparative approaches. Rather than treating the tablet as a conventional economic document, the analysis proceeds from the premise that its atypical structure, specifically the predominance of personal names and the absence of commodity accounting, requires a reassessment of standard interpretive assumptions. The methodological approach consists of three interrelated analytical steps. First, a close reading of the obverse focuses on the internal structure of nominal chains, with particular attention to the position and distribution of signs conventionally interpreted as gender markers (notably M388

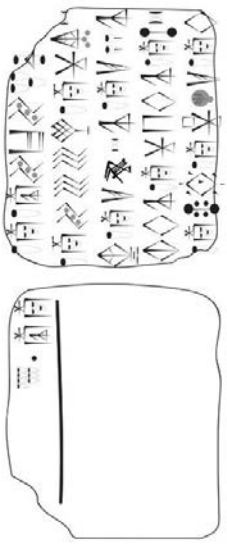
and M124). Their placement within nominal chains is analyzed independently of their traditional semantic assignments in order to identify recurring structural patterns. Second, the analysis examines the terminal sign combinations (|M217+M388| and |M217+M124|) as classificatory elements, assessing their consistency, markedness, and relationship to the summary notation on the reverse of the tablet. This step isolates the criteria by which individuals are rendered countable as administrative units. Third, the obverse and reverse are analyzed in conjunction to evaluate how individual entries are aggregated and summarized. Particular emphasis is placed on the numerical notation on the reverse, which is interpreted not as a demographic or functional count but as a total of registered persons categorized according to their final institutional status. Comparative reference is made to standard Proto-Elamite accounting tablets to highlight the structural and semantic divergence of the present text. Analytically, the study adopts a layered semantic framework that distinguishes between descriptive role markers and institutional classifications. This framework allows for the systematic resolution of apparent inconsistencies within the text without recourse to ad hoc explanations. By grounding interpretation in structural position, distributional patterns, and administrative logic, the methodology aims to produce a transparent and replicable reading that situates the tablet within the broader landscape of early administrative practices while recognizing its exceptional character.

The Tablet MDP 17, 043 (P008241)

The tablet examined in this study is a Proto-Elamite clay tablet catalogued as (MDP 17, 043) (P008241), currently housed in the Louvre Museum, Paris (Museum Number Sb 22238). The tablet was recovered from Susa during the early French excavations and was first published by Vincent Scheil in “Mémoires de la Délégation en Perse 17” (Scheil, 1923; MDP 17). As with a large portion of the Proto-Elamite corpus from Susa, the tablet lacks precise archaeological context, a circumstance attributable to the excavation and recording practices of the late nineteenth and early twentieth centuries. Chronologically, the tablet belongs to the Proto-Elamite period (ca. 3100–2900 BCE) and is manufactured from clay in the standard format characteristic of administrative documents of this phase (Fig. 1).

The numerical system employed in (MDP 17, 043) is the Proto Elamite decimal system (D), a counting system characteristically reserved for animate entities, including domesticated animals and human laborers (Friberg, 1978; Desset, 2016). In this tablet, each individual entry on the obverse is quantified by a single unit (1 N01), and the reverse summarizes the total number of persons, seventeen, using the same decimal notation. This consistent use of the decimal system confirms that the objects of enumeration are registered persons conceived as living administrative units, rather than commodities or abstract labor measures.

Within the broader Proto Elamite corpus, the decimal system is distinguished by its capacity to express large quantities through signs for 10, 100, 1,000, and even 10,000,

Image	Drawing
	

Transliteration

Obverse
1. [...], M387~hb# (Header)
2. M388 M057~a M029~b M057~a |M217+M124|, 1(N01)
3. |M217+M388|, [1(N01)]
4. M390# M128 M096 |M217+M388|, 1(N01)
5. M254~a M058 M058 M057~a |M217+M388|, 1(N01)
6. M124 M386~a M386~a M066 |M217+M388|, 1(N01)
7. M124 M390 M338~b M066 |M217+M388|, 1(N01)
8. M240~e M347 M371 |M217+M388|, 1(N01)
9. M124# M218# M032 M096 |M217+M388|, 1(N01)
10. M124 M218 M219 M218 |M217+M388|, 1(N01)
11. M066 M352~n |M096+M139| |M217+M388|, 1(N01)
12. M218~b M372 |M217+M388|, 1(N01)#
13. x x |M217+M388|#, 1(N01)#
14. [...] |M217+M388|#, 1(N01)#
(4 lines completely gone)

Reverse
column 1
1. |M217+M388|# |M217+M124|, 1(N14) 7(N01)

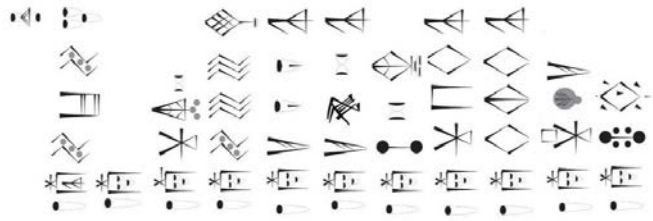


Fig. 1: Proto Elamite Tablet, MDP 17, 043, Image courtesy of the Cuneiform Digital Library Initiative (CDLI), (Drawing by: Hassan Afshari and Transliteration taken from CDLI).

indicating an administrative framework capable of managing substantial populations of humans (MDP 26, 220; MDP 26, 160) or animals (MDP 17, 85; MDP 17, 97), (Dahl, 2005; Yousefi Zoshk, 2010; Yousefi Zoshk et al., 2025b). Although only minimal numerical values are attested in this particular tablet, their deployment within the animate counting system underscores a fundamental conceptual distinction between living and non living resources, one that is not consistently maintained in contemporaneous Mesopotamian accounting traditions. The use of the decimal system in (MDP 17, 043) therefore reinforces the interpretation of the text as a document of institutional registration, in which individuals are counted, classified, and summarized according to administrative categories rather than economic output (Fig. 2).

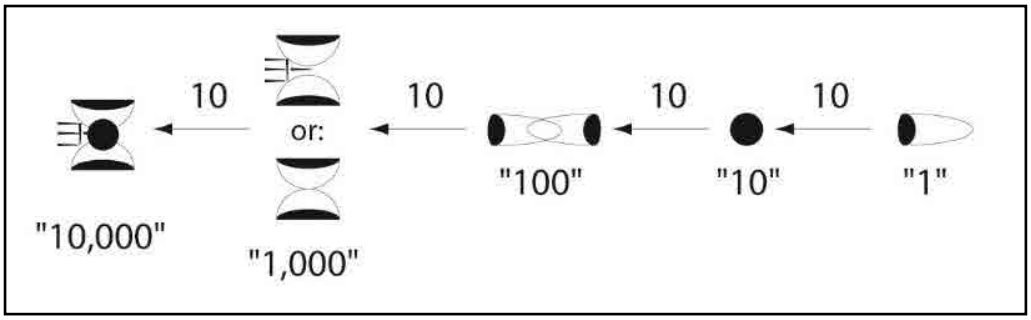


Fig. 2: Decimal Numerical System (D), (After: Desset, 2016).

Structural and Semantic Analysis of (MDP 17, 043)

The Proto Elamite tablet (MDP 17, 043) preserves a carefully structured administrative record whose internal organization becomes clearer when the text is examined as a coherent graphic system rather than as a series of isolated lines. Although the upper edge of the obverse has suffered significant damage, leading the transliteration to mark the opening as entirely fragmentary, the surviving traces allow for a more nuanced reconstruction of the tablet's original layout and scribal logic. In particular, the partially preserved sign (M387~hb#), visible at the beginning of the document, is best interpreted not as the beginning of a personal entry but as the final element of an institutional header. Such an interpretation aligns with broader patterns observed within the text itself and corresponds well with administrative conventions known from Proto Elamite documentation.

Several structural observations support this reading. First, throughout the legible portion of the obverse the nominal entries display a clear internal regularity in their initial signs. With only a minor exception, the preserved name chains in the central section of the tablet repeatedly begin with the sign (M124), suggesting that this sign functions as a consistent marker associated with the individuals recorded in the list. The isolated occurrence of (M387~hb#) in the damaged opening position therefore stands apart from the pattern governing the personal entries. Second, the nominal chains preserved on the tablet exhibit a pronounced brevity and regularity; most consist of three or four signs arranged in a linear sequence. Incorporating (M387~hb#) into the first entry would disrupt this otherwise consistent syntactic rhythm by producing an unusually long chain. Finally, Proto Elamite administrative tablets frequently begin with a heading that defines the institutional context, the authority responsible for the record, or the type of administrative event being registered. Interpreting (M387~hb#) as the closing component of such a header therefore restores a coherent documentary structure in which the tablet begins with a brief institutional designation before proceeding to a sequence of individual registrations. Within this framework, the opening header would have provided the qualitative context for the quantitative data summarized at the end of the document.

Following this introductory element, the main body of the obverse consists of a sequence of standardized entries that together form a roster-like register. Each entry

is organized around a nominal chain composed of two to four signs arranged linearly. Despite the variation in the internal composition of these chains, the entries share a highly consistent structural pattern: the nominal sequence is followed by a terminal complex grapheme, most commonly (|M217+M388|), and the entire entry is then concluded by the numerical sign 1(N01). This arrangement repeats systematically across the obverse of the tablet, indicating the use of a fixed graphic formula for recording individual administrative units. The complex grapheme placed at the end of the sequence appears to function as a closing marker or classificatory element that defines the administrative status of the entry, while the numerical sign 1(N01) operates not primarily as a quantifier but as a structural delimiter that separates one registered unit from the next. In effect, the numeral serves as a graphical boundary between entries, segmenting the text into discrete administrative records.

Within this standardized framework, the internal structure of the nominal chains exhibits limited but meaningful variation. Some entries consist of relatively simple sequences of two or three signs (Lines 3 and 12), while others extend to four signs and incorporate repeated elements (Lines 2, 5, 6, 7, 9, 10). Instances of sign duplication occur in several places, such as the repetition of (M058) within the chain (M254~a M058 M058 M057~a), the reduplication of (M386~a) in (M124 M386~a M386~a M066), and the symmetrical arrangement (M124 M218 M219 M218), where the sign (M218) appears both before and after (M219). These patterns suggest that repetition was an accepted morphological device within the Proto Elamite sign system and may have conveyed distinctions of identity, status, or phonetic structure . Regardless of their internal variation, however, all of these chains conform to the same overarching structural principle: they culminate in the terminal complex grapheme and are followed by the delimiter 1(N01).

A small number of entries illustrate how the scribal system accommodated deviations while still maintaining overall structural coherence. In one instance (Line 3) the entry consists solely of the complex grapheme (|M217+M388|) followed by the delimiter, with no preceding nominal chain preserved. The presence of the delimiter nevertheless confirms that the line was treated as a complete administrative unit within the sequence. In another case the nominal chain is followed by an additional complex grapheme (|M096+M139|) before the standard terminal element appears. Rather than disrupting the structure, this additional complex grapheme expands the internal composition of the entry while still preserving the same final closure pattern. These examples demonstrate that the Proto Elamite scribal system employed a flexible yet strongly regulated graphic syntax, capable of accommodating variation without abandoning its underlying organizational principles.

The physical layout of the tablet further reinforces this interpretation. The obverse surface contains twelve entries, after which the available writing space was exhausted. At this point the scribe continued the record on the reverse, rotating the tablet ninety

degrees along the horizontal axis. The surviving traces of the first two lines on the reverse preserve the same terminal grapheme and delimiter pattern seen on the obverse, confirming that the list continued uninterrupted across the two surfaces. Unfortunately, the following 4 lines are severely damaged or entirely lost, preventing the reconstruction of several entries. Nevertheless, the preserved elements are sufficient to demonstrate that the same administrative structure governed both sides of the tablet.

The document concludes with a final summary entry on the reverse. Unlike the preceding lines, this closing statement contains no nominal chains. Instead, it consists exclusively of two complex graphemes; (|M217+M388|) and (|M217+M124|), followed by the numerical notation 1(N14) 7(N01). This numerical expression corresponds to a total of seventeen individual persons and clearly functions as a collective tally of the entries recorded throughout the tablet. The summary therefore synthesizes the detailed individual registrations listed on the obverse and early reverse into a single quantitative statement. Such a bipartite organization, detailed qualitative records on the main surface followed by a numerical total, corresponds closely to the accounting logic characteristic of early administrative writing systems in southwestern Iran.

When considered as a whole, the tablet reveals a highly structured documentary format. The text begins with a probable complex institutional header, proceeds through a sequence of standardized personal or administrative entries, and concludes with a final numerical summary. The consistent placement of terminal complex graphemes and delimiters indicates the presence of a well defined graphic syntax governing the segmentation of the record. At the same time, the internal variation within the nominal chains demonstrates that the system allowed a controlled degree of flexibility in representing individual identities or titles. Together, these features illustrate the sophistication of Proto Elamite administrative notation and highlight the degree to which scribes relied on visual and structural conventions to organize complex bureaucratic information within a limited writing space.

Discussion

The obverse of (MDP 17, 043) presents a structurally coherent administrative document composed of a sequence of nominal entries, each followed by a single unit count (N01), with the notable exception of a small number of reduced or expanded cases. Lines 2–14 conform broadly to a recognizable Proto Elamite administrative template; a sequence of registered persons, each counted once, without explicit commodities or rations specified on the each counted once. Within this apparent in the composition of the nominal chains. Some entries consist of relatively compact sequences, while others, such as lines (2,5,6,7,9,10) show extended strings culminating in complex binary signs. Conversely, line 3 represents a maximally reduced entry, consisting solely of a final classificatory compound and a numerical count, entirely lacking an internal nominal chain. This variability is not random. Rather, it reflects a structured flexibility characteristic of Proto

Elamite administrative practice, in which the internal elaboration of an entry could be expanded or compressed without affecting its participation in the overall accounting logic. The consistency of the numerical values (uniformly 1 N01) strongly suggests that the tablet is not concerned with quantities of goods, but with individual persons as accounting units.

A central analytical problem raised by this tablet is the recurrent contradiction between some internal signs traditionally interpreted as gendered (M388, M124) and the final classificatory compounds (|M217+M388|) and (|M217+M124|). In line 2, (M388), commonly interpreted as "male" or a male coded worker category, appears at the beginning of the nominal chain, while the entry terminates with (|M217+M124|), conventionally associated with a female category. In some other lines (6,7,9,10), the inverse configuration occurs; (M124) appears early in the sequence, but the entry concludes with (|M217+M388|). These contradictions are systematic, not exceptional, and occur across several entries. If (M388) and (M124) were functioning solely and directly as biological sex markers, such configurations would be internally incoherent and administratively implausible. The repetition of this pattern across the tablet and its confirmation by the reverse summary requires a reassessment of the semantic roles assigned to these signs (Fig. 3).

The broader Proto Elamite corpus provides crucial context for understanding this phenomenon. (M124) is the fourth most frequent sign in the Proto Elamite corpus, attested approximately 330 times in about 136 texts, excluding variants and complex graphemes (Dahl et al., 2018: 30). It is widely documented in rationing texts (MDP 17, 45; MDP 26, 156), where it alternates systematically with (M388) and frequently appears in foreman like or supervisory contexts (Desset, 2016; Nissen et al., 1993). Its appearance in the complex grapheme |M217+M124| in (MDP 17, 043) aligns with this broader pattern of institutional categorization rather than individual description. (M388) is even more frequent, occurring approximately 620 times in around 345 texts, with an additional 70 attestations in complex signs (Dahl et al., 2018: 24). While often glossed as "man" or "male," its actual usage is demonstrably more flexible. (M388) can introduce long nominal strings, function as a category marker for unclassified groups of workers, summarize large decimal counts of individuals, and appear in positions structurally parallel to non gendered worker category signs.

Graphically, (M388) corresponds to proto cuneiform (KUR^{a}), though with an inverted orientation, while its presumed female counterpart (M72) aligns graphically and directionally with (SAL). The orientation discrepancy between (M388) and (KUR^{a}), contrasted with the stable alignment of (M72) and (SAL), strongly suggests a complex and non mechanical process of sign borrowing during the Uruk IV period, rather than a simple semantic transfer of "male" and "female" categories (Englund, 2004; Dahl, 2013; Yousefi Zoshk et al., 2019). To account for both the internal contradictions and the corpus level behavior of (M388) and (M124), this study proposes a two layer (layered)

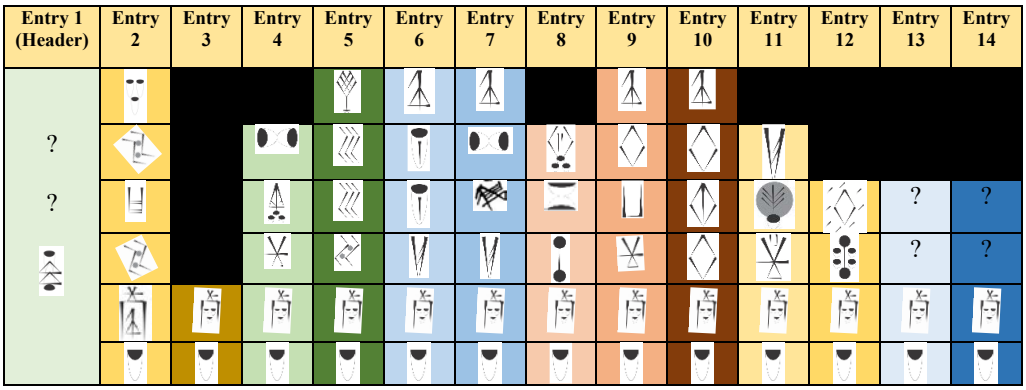


Fig. 3: Distribution of Nominal signs across entries; question marks (?) (denote uncertain readings or functions made by: Author, 2025).

semantic model for the interpretation of (MDP 17, 043). Within the nominal chains of individual entries, signs such as (M388) and (M124) function as descriptive or relational markers. At this level, they may encode social role, labor affiliation, household or dependency status, or culturally gendered roles without implying final administrative classification. At this layer, (M388) and (M124) are not mutually exclusive and can co occur within a single entry without contradiction. The final compounds (|M217+M388|) and (|M217+M124|) represent a distinct semantic layer. These are not extensions of the nominal chain, but terminal classificatory markers that assign the individual to an institutionally recognized category for the purposes of registration, accountability, and summation. Crucially, the reverse of the tablet confirms this interpretation. The reverse does not recount internal nominal distinctions; instead, it summarizes 17 registered individuals, grouped exclusively by the final categories of (|M217+M388|) and (|M217+M124|). The internal complexity of the obverse entries is entirely flattened at this stage. The evidence from (MDP 17, 043) demonstrates that Proto Elamite writing cannot be reduced to a simple system of economic bookkeeping or biological categorization. Instead, it operates as a multi layered administrative technology, capable of recording individuals as social persons rather than commodity units, distinguishing between descriptive identity and institutional classification, and collapsing complex social information into administratively actionable categories at the point of summary. This layered logic anticipates later Mesopotamian administrative practices, yet retains a distinctively Proto Elamite character, particularly in its tolerance for internal semantic plurality within a single entry. By resolving the apparent gender contradictions through a layered interpretive model, this analysis reframes (M388) and (M124) not as rigid sex markers but as flexible administrative signs whose meaning depends on structural position.

Conclusion

This study has examined the proto Elamite tablet (MDP 17, 043) through a close structural, contextual, and comparative analysis, with particular attention to the distribution

and function of the signs (M388) and (M124). By integrating line by line description with corpus level data and cross script comparison, the article has demonstrated that apparent contradictions in the internal use of these signs are not anomalies or scribal inconsistencies, but rather the outcome of a deliberately layered administrative logic. The primary contribution of this study lies in the identification and articulation of a two layer interpretive model. At the first layer, (M388) and (M124) operate within nominal chains as descriptive or relational markers, capable of encoding aspects of social role, labor affiliation, or culturally gendered identity without fixing an individual's final administrative status. At the second layer, the terminal compounds (|M217+M388|) and (|M217+M124|) function as institutional classifiers, reducing complex personal descriptions to stable categories suitable for enumeration, verification, and summary. The decisive evidence for this distinction is provided by the reverse of the tablet, which records only the final classificatory totals and entirely suppresses the internal descriptive complexity of the obverse.

This layered interpretation resolves a long standing tension in Proto Elamite studies between readings that emphasize gender as biological sex and those that treat signs such as (M388) and (M124) as worker categories. The evidence from (MDP 17, 043) shows that both positions are partially correct yet incomplete: these signs are neither purely biological nor purely occupational, but context dependent markers whose semantic value is determined by structural position within an entry. The frequent occurrence of (M388) and (M124) at the beginning of long nominal strings, its ability to summarize large groups of otherwise unclassified individuals, and its graphic and functional relationship to proto cuneiform signs all point to its role as a high level category indicator rather than a simple sex marker. From a broader perspective, this tablet supports the view that Proto Elamite writing was already capable of abstract institutional reasoning, extending beyond the recording of commodities and quantities. Individuals are treated here as administrative entities, whose socially complex identities could be recorded, manipulated, and ultimately collapsed into standardized categories. Such practices imply a bureaucratic environment in which writing served not merely to count, but to mediate between social reality and institutional order.

The structural and semantic observations outlined above give rise to several interrelated interpretive propositions regarding the administrative logic of tablet (MDP 17, 043). First, the document is best understood as recording a process of institutional registration rather than a simple demographic enumeration. The repeated terminal categories represented by the compound signs (|M217+M388|) and (|M217+M124|) suggest the existence of two overarching administrative classes into which individuals were formally entered. Within this framework, the tablet does not function as a census of biological males and females, but as a register that organizes individuals according to institutional affiliation. While gendered aspects of identity may be embedded within certain signs of the nominal chains, these elements appear to be subordinated to the

classificatory logic of the administrative system. A second interpretive possibility concerns the internal semantic role of the signs) M388(and)M124(within the nominal sequences. Their distribution suggests that they may encode culturally structured roles or social positions that were themselves gendered in practice, such as forms of labor participation or institutional function. Importantly, however, the presence of these signs within personal sequences does not necessarily determine the final administrative category to which an individual is assigned. Instead, they may reflect attributes of identity or activity that coexist with, but remain analytically distinct from, the formal classificatory categories represented by the terminal compounds. A third observation relates to the organizational logic visible on the reverse of the tablet. The concluding section exemplifies a clear administrative strategy of reduction; the complex nominal information present in the individual entries is systematically removed and replaced by a concise categorical and numerical summary. In this process, the detailed personal sequences recorded on the obverse are distilled into the two institutional categories and their associated totals. Such a transformation reflects a bureaucratic practice in which the richness of individual identification is progressively condensed into abstract units suitable for accounting, supervision, and archival control.

Taken together, these patterns indicate that Proto Elamite writing operated as a multi layered administrative system capable of sustaining several semantic registers simultaneously within a single document. At one level, the tablet records individual identities through structured nominal chains; at another, it classifies those individuals within broader institutional categories; and finally, it converts these categories into numerical summaries that serve the purposes of administrative accountability. Recognizing this layered structure not only clarifies the functional roles of the signs (M388) and (M124) within the document, but also contributes to a broader understanding of how early writing systems conceptualized persons, labor, and institutional belonging. In this sense, tablet (MDP 17, 043) constitutes an important witness to the emergence of writing in late fourth millennium Iran as a technology of social organization and administrative abstraction, extending beyond the narrow domain of economic accounting.

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Conflict of Interest

In adherence to ethical publication standards, the authors affirm that there are no conflicts of interest, either personal or financial, that could have influenced the content or conclusions presented in this research.

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فراتر از حسابداری: بررسی لایه‌های معنایی افراد ثبت شده در گل‌نبشته آغازایلامی (MDP 17, 043) به‌دست آمده از شوش

روح‌اله یوسفی‌زشک[I]

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چکیده

این پژوهش به بررسی یک گل‌نبشتهٔ استثنایی آغازایلامی از شوش (MDP 17, 043) می‌پردازد که از الگوی متعارف متون حسابداری اقتصادی فاصله می‌گیرد؛ زیرا به‌جای ثبت کالاها یا پرداخت جیره، نام ۱۷فرد را فهرست کرده است. مسئله محوری این پژوهش، ناسازگاری ظاهری میان نشانه‌های دارای بار جنسیتی در درون زنجیره‌های اسمی و طبقه‌بندی‌های یکنواخت یا متقابلی است که در پایان این زنجیره‌ها و نیز در شمارش نهاییِ پشت لوح مشاهده می‌شود. این مطالعه با تکیه‌بر تحلیل دقیق ساختاری و زمینه‌ای لوح نشان می‌دهد که متن برپایهٔ یک نظام معنایی دوسطحی عمل می‌کند. نشانه‌هایی مانند (M388) و (M124) که در درون زنجیره‌های اسمی ظاهر می‌شوند، در سطحی توصیفی عمل کرده و نقش‌ها یا جایگاه‌هایی را نشان می‌دهند که لزوماً به جنسیت زیستی فروکاستنی نیستند. در مقابل، ترکیب‌های پایانی |M217+M388| و |M217+M124| افراد را در قالب مقوله‌های نهادی طبقه‌بندی می‌کنند که براساس آن‌ها هر فرد به عنوان یک واحد اداری قابل‌شمارش ثبت می‌شود؛ از این‌رو، شمارش نهایی در پشت لوح نَه بیانگر جنسیت یا نقش‌های کارکردی افراد، بلکه نشان‌دهندهٔ تعداد کل افراد ثبت‌شده برپایهٔ جایگاه نهادی نهایی آنان است. این ساختار معنایی لایه‌مند از وجود منطقی اداری پیچیده در نظام ثبت و نگارش آغازایلامی حکایت دارد و نشان می‌دهد که ثبت افراد در این نظام صرفاً به حسابداری اقتصادی محدود نبوده، بلکه ابعاد اجتماعی و نهادی هویت افراد را نیز در بر می‌گرفته است.

کلیدواژگان: آغازایلامی، طبقه‌بندی اداری، هویت اجتماعی، معناشناسی نهادی، نظام‌های نوشتاری آغازین، شوش، ثبت افراد.

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35

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Analysis of New Findings from Stratigraphic Excavations at Qaleh Yeri–Kuraim, Ardabil, Iran

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Abstract

The archaeological sites of the Ardabil Plain provide essential evidence for understanding the cultural sequences of northwestern Iran and its interactions with the Iranian Plateau, the South Caucasus, and eastern Anatolia. Among these sites, the mound of Qaleh Yeri–Kuraim is of particular significance. This paper presents the results of the first season of stratigraphic excavations conducted in 2023, based on two test trenches. Test Trench I (TTI) was opened to establish a comprehensive cultural sequence at the site, while Test Trench II (TTII) targeted deposits associated with the Transcaucasian/Kura Araxes Early Bronze Age horizon. The excavations revealed substantial archaeological evidence, including dry stone and mudbrick architectural remains, industrial installations such as kilns, metallurgical evidence, and extensive ceramic assemblages. In TTI, a long and well defined stratigraphic sequence of approximately 14.6 meters was documented, containing successive and occasionally alternating layers with Islamic, historical, and Bronze Age pottery. This sequence represents one of the most continuous stratigraphic records in the eastern sector of northwestern Iran. TTII yielded significant evidence of metallurgical activities, including furnace remains, slag, copper ore fragments, ceramic molds, and crucibles, indicating metal smelting, refining, and production during the Early Bronze Age. Eco-factual evidence, including animal remains (primarily sheep and cattle) and plant remains (notably wheat and barley), reflects a subsistence economy based on mixed farming and animal husbandry. Special finds such as obsidian tools, spindle whorls, grinding stones, bone implements, and clay figurines demonstrate a range of domestic, economic, and symbolic activities from the Bronze Age through the historical and Islamic periods. In the absence of absolute dating, the site's chronology currently relies on relative dating and ceramic typology. The results indicate long term occupation interrupted by two major hiatuses, likely linked to tectonic, environmental, and historical changes.

Keywords: Ardabil Plain, Stratigraphic Excavation, Qaleh Yeri–Kuraim, Cultural Layer Sequence, Early Bronze Age, Ancient Metallurgy.

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Introduction

The eastern sector of northwestern Iran, owing to its favorable environmental conditions, strategic geographical position, and location along important communication corridors, has provided a suitable context for the emergence, development, and continuity of diverse cultural traditions throughout different archaeological periods. Archaeological surveys conducted in the region indicate the presence of numerous and varied sites that, if further investigated, could help fill existing gaps in the chronological framework of northwestern Iran. Although the general outlines of certain cultural developments—particularly during the Iron Age—have been clarified through previous research, the precise identification of cultural transitions, stratigraphic sequences, and continuity between different layers and periods remains difficult. This difficulty largely stems from the absence of absolute dating methods and the limited number of stratigraphic excavations in the region. Moreover, a coherent chronological framework has not yet been established, and consequently the relationship between excavated cemeteries and their associated settlement sites remains insufficiently understood (Abbasnejad Seresti, 2024: 10–15). Due to its strategic geographical location, the Ardabil Plain has long functioned as a corridor for cultural interactions between the Iranian Plateau and neighboring regions. However, the eastern part of this area, particularly the Qarasu River basin, has received relatively little attention in terms of systematic excavation and scientific investigation. In response to this gap, the stratigraphic excavation program at Qaleh Yeri–Kuraim was designed and implemented with three main objectives: 1) Reconstructing the regional cultural sequence based on stratigraphic evidence; 2) Clarifying the site's position within the transregional Kura Araxes cultural network; and 3) Examining the impact of environmental and tectonic factors on the continuity or disruption of settlement patterns. In line with these objectives, the present article introduces, describes, and analyzes the findings of the 2023 stratigraphic excavations at this archaeological mound. The aim is to contribute to the development of a more coherent chronological model for the region—one that may also be applicable to other less studied areas in the archaeology of northwestern Iran.

Location and Geographical Setting of the Site

The site is located 21 km from the center of Nir and 34 km from the city of Ardabil (Fig. 1a). It was registered on Iran's National Heritage List in 2007 under registration number 19392. The site consists of a circular mound covering an area of approximately 155.21 square meters, situated in the southern part of Kuraim City, with the Qori Chai River flowing about 110 meters to its east (Fig. 1b). The mound stands at an elevation of approximately 1,575 meters above sea level and rises about 15 meters above the surrounding terrain. Geographically, it is located at 48°30′21″ east longitude and 37°57′41″ north latitude. Several human activities have contributed to the destruction of the site, including the construction and expansion of a road around the mound, the

building of toilet facilities for the local mosque, the extraction of soil for construction and agricultural purposes, and illicit excavations (Fig. 1c). In addition, weathering and climatic conditions are among the natural factors contributing to the deterioration of this important archaeological site (Abbasnejad Seresti, 2024: 71).

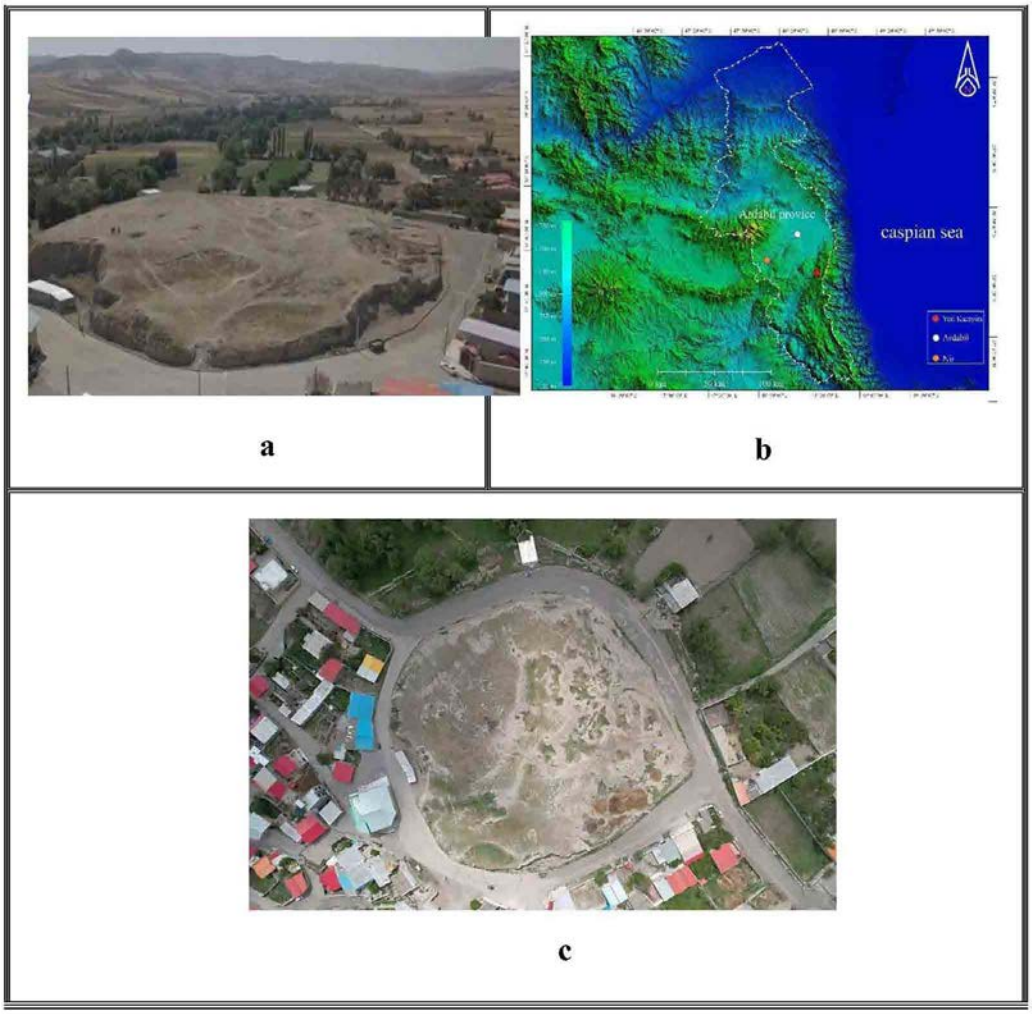

Fig. 1: a) Aerial image of the site, overhead view facing south; b) Location of the Qaleh Yeri site; c) View of the current state of the mound in 2023, vertical view from the northwest (Abbasnejad Seresti, 2024: 19).

Research Method

This study employs a descriptive–analytical approach and follows standard archaeological stratigraphic methods. Field investigations were conducted using a context based stratigraphic excavation strategy. Within this framework, each discrete stratigraphic unit—including deposits, walls, pits, and kilns—was recorded as an individual context and assigned a unique identification code. These contexts formed the basis for reconstructing the stratigraphic sequence and interpreting the occupational history of the site. All elevation measurements were calculated relative to a benchmark (BM) located in the southwestern part of each test trench. In addition, pottery typology constituted an important analytical method. Because absolute dating results (e.g., radiocarbon dating) are not currently available, pottery analysis was conducted based

on diagnostic assemblages. Technical characteristics such as firing technique, type of glaze, decoration, and vessel form were among the criteria used for selecting pottery samples for analysis. Architectural remains, faunal and botanical remains, evidence of metalworking, and selected special finds are briefly introduced in order to provide a general understanding of the stratigraphic conditions of the site and the results of the excavation.

Selection Criteria for Test Trench Locations

The locations of the test trenches were selected based on a morphological analysis of the mound and an assessment of visible surface damage. Accordingly, two test trenches were opened in the northern part of the site, where construction activities had created a relatively smooth and elevated exposed section. Test Trench I (TTI) was opened at the highest point of the mound, on its northern and eroded edge, at an elevation of approximately 1,554 meters above sea level. This location was selected to maximize the recovery of cultural deposits and to document relatively intact stratigraphic sequences that had experienced minimal disturbance from recent construction activities and unauthorized excavations. Test Trench II (TTII) was placed approximately 20 meters west of TTI in order to compare, correlate, and control the stratigraphic layers of the two trenches for the Bronze Age periods, as well as to access relatively undisturbed deposits. In this part of the mound, Bronze Age layers are visible in the exposed section created by earlier destruction and erosion (Fig. 2).

Regional Research Background

Although archaeological investigations in the Ardabil region began in the early twentieth century, research has largely relied on surveys and scattered excavations, while systematic studies focusing on stratigraphy and absolute dating have remained relatively limited. Moreover, much of the archaeological attention in northwestern Iran has traditionally been directed toward the Lake Urmia Basin. Jean Jacques de Morgan carried out excavations in the eastern foothills of the Ardabil Plain and at the Bronze Age cemeteries of Namin County between 1899 and 1901 (de Morgan, 1905). Claude F. A. Schaeffer later dated these remains to the fourteenth and fifteenth centuries BC (Schaeffer, 1948). In the 1960s, Mahmoud Kardovani and Ali Hakemi conducted archaeological research in the Moghan region (Hessari & Aliyari, 2012). Seifollah Kambakhsh Fard carried out investigations in Germi in 1965, and Charles McBurney conducted research in the Ardabil and Meshgin Shahr regions (Ingraham & Summers, 1979). German archaeologists were also among the first researchers to conduct archaeological surveys in northern Ardabil Province, excluding the Moghan region (Kleiss, 1969: 188–191). Germi County was later studied under the supervision of Houshang Sobuti during the 1980s and 1990s (Hessari & Aliyari, 2012), followed by additional research in Meshgin Shahr and Kohneh Qaleh. Between 2000 and 2004, a team

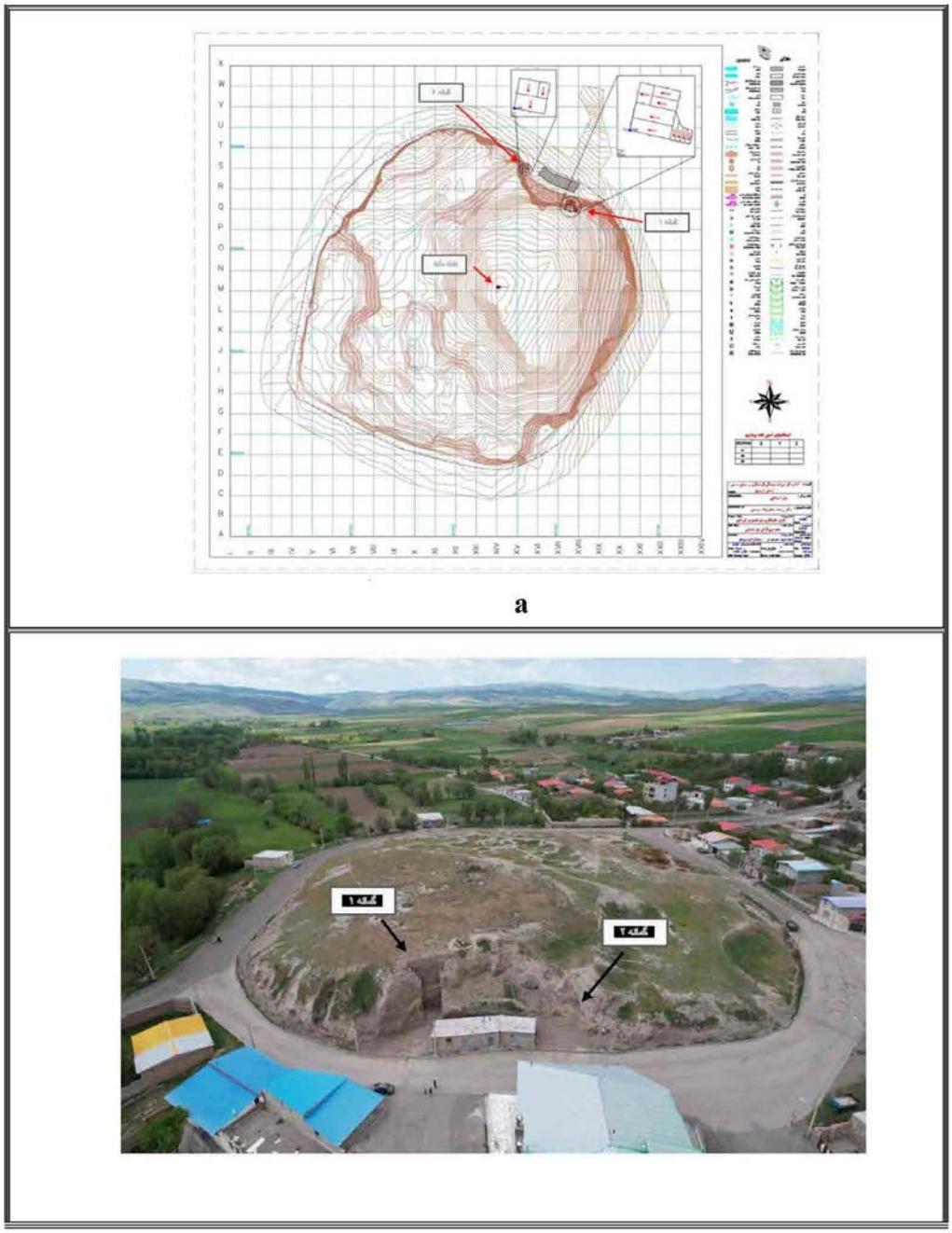

Fig. 2: Qaleh Yeri Kuraim Mound: a) Topographic map showing the locations of Trenches I and II and the datum point; b) Location of Trenches I and II, view from the north (Abbasnejad Seresti, 2024).

from the Archaeological Research Institute and the Central Office of Cultural Heritage surveyed the eastern areas of the Aras River, leading to the excavation of Idir Mound in 2004 (Hessari & Akbari, 2005). Further excavations in the Araxes Basin have continued to yield significant stratigraphic evidence for the Kura Araxes cultural horizon in northwestern Iran. One of the most notable examples is Kohne Tepesi, where systematic stratigraphic excavations documented multi period occupation spanning from the Early Bronze Age through the Parthian period (Zalaghi et al., 2021). In Meshgin Shahr, the Ieri site was excavated between 2003 and 2005, where archaeological remains dating from

the Neolithic period to the second millennium BC were identified (Hozhbari Nobari, 2005). The Moghan Plain Project was also implemented between 2003 and 2006 as the largest archaeological project in the region, including the excavations of Oltan Qalehsi (2003–2005) and Nader Tepehsi, Aslanduz (2006) (Alizadeh & Ur, 2007; Alizadeh et al., 2018; Alizadeh, 2022). In recent years, additional research has been conducted at several sites, including Qaleh Khosrow (Rezaloo, 2007), the Iron Age cemeteries of Khorramabad and Qizil Qiyeh Ahmadbeigloo (Rezaloo, 2012; Hajizadeh & Rezaloo, 2014), Qaleh Buini Mound (Tahmasbi, 2016), and the Oraq Artavil Tayr site in Ardabil (Sattaranejad, 2022).

Theoretical Foundations and Methodology

Relative chronology is an archaeological approach that reconstructs temporal sequences through the analysis of material culture and patterns of cultural change. Stratigraphic relationships constitute the primary basis for establishing relative chronology in archaeological research. In general, chronological frameworks are developed through two complementary approaches: relative dating and absolute dating. Among the methods used to establish relative chronology, ceramic typology and seriation are particularly valuable for identifying cultural sequences and temporal relationships. Since the results of absolute dating analyses are not yet available, the chronological framework of the present study is based on relative dating methods. These methods rely primarily on associated cultural materials—especially pottery—as well as on the reconstruction of stratigraphic relationships through the Harris Matrix. This approach provides the basis for establishing a relative chronology of the excavated sequence and for interpreting the occupational history of the site. The excavation strategy at the site was based on the context recording method. Each cultural find was first assigned an accession number and then fully recorded, with information regarding its condition (intact or disturbed), completeness, type, context number, and date of discovery carefully documented. Pottery and bone finds from each context were recorded collectively as assemblages, while other artifacts were recorded individually, with their precise dimensions and characteristics fully documented. After all cultural finds were recorded with separate accession numbers, they were also listed in a worksheet referred to as the Finds List. In Test Trench I (TTI), finds were assigned accession numbers beginning from 1000, and contexts were recorded starting from number 1. In Test Trench II (TTII), finds were assigned accession numbers beginning from 2000, and contexts were recorded starting from number 200. In the Finds List worksheet, one column was dedicated to the find number; additional columns recorded the spatial coordinates of each find: X (the distance from the western or eastern wall of the test trench), Y (the distance from the southern wall), and Z (the depth of each find relative to a fixed reference point). Additional columns recorded the date of discovery and brief descriptions of the finds. In the context recording worksheet, information such as the context number,

type, description, interpretation, and stratigraphic relationships with other contexts was documented. The analysis and interpretation presented in this article are based on the data recorded in the excavation report of the site.

Test Trenches and Finds

TTI and TTII

Two stratigraphic test trenches were excavated as part of this project. Test Trench I (TTI) was opened on the northern edge of the mound and initially measured 4×2 m (Fig. 3a). This location was selected because it represents the highest part of the mound and preserves the greatest thickness of cultural deposits. Its position along the eroded northern margin also exposed a vertical section suitable for stratigraphic investigation. Although the northern profile was initially irregular, erosion and soil removal had created favorable conditions for documenting the stratigraphic sequence. During the planning stage, a significant challenge arose concerning the excavation of a test trench measuring approximately 3–4 m in length, which is typically used in stratigraphic investigations. The existing vertical section and the cut described above were such that excavating a trench of this length would have created one or several promontories along the exposed section. These projections were highly unstable and posed a considerable risk of collapse, potentially resulting in both safety hazards and financial losses during the excavation process. Considering that the height from the trench surface to the surrounding ground was approximately 12 m, careful planning and precaution were required. For this reason, it was decided to extend the trench to a length of 7 m and, after removing the unstable promontories, reduce it to 4 m. The benchmark (BM) was established at the southwest corner of the trench (point A), which represents the highest elevation relative to the other points. All elevation measurements (Z values) were calculated relative to this benchmark. The benchmark is situated at an elevation of 1,554 m above sea level. In total, 113 contexts were identified and excavated in this trench, reaching a depth of 14.6 m below the benchmark.

The location of Test Trench II (TTII) was selected on the western side of the mound along its northern face, at the base of a cut and wall created by previous destructive human activities. This location was chosen because successive stratigraphic layers were clearly visible on the exposed wall of this part of the mound (Figs. 3b–c). The layers could be made even more distinct through careful cleaning using a pickaxe and trowel, which encouraged the excavation of a second test trench in this area. Another reason for selecting this location was that clarifying the stratigraphy in this section could help verify and complement the stratigraphic sequence identified in TTI. A considerable amount of debris and soil had accumulated at the base of the wall. After clearing and preparing the area, the exposed section was cleaned and made clearly visible through troweling. Test Trench II, measuring 3×3 m (Figs. 3d–g), was then excavated. The benchmark for this trench was established at the southwest corner (point A), which represents the

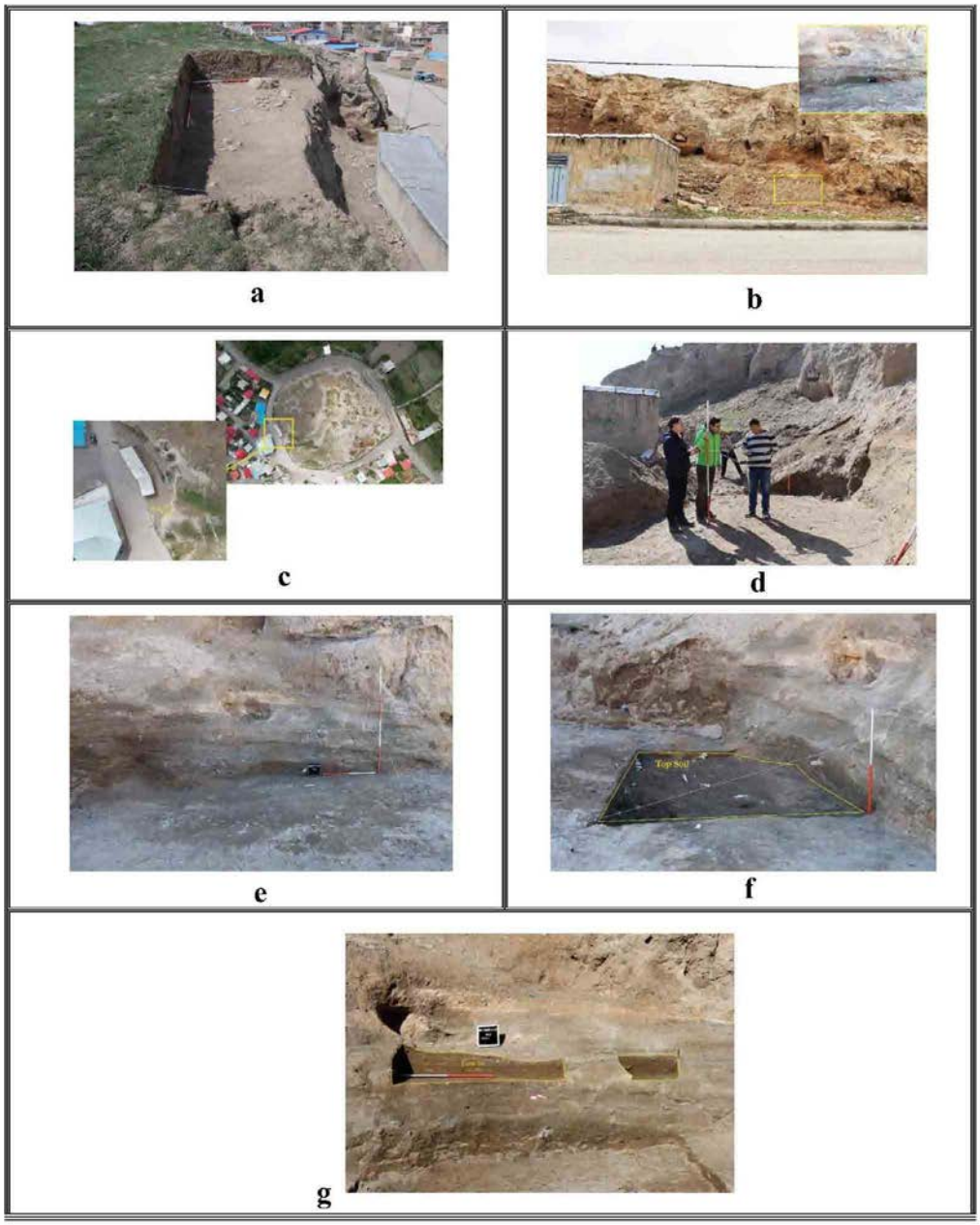

Fig. 3: a) Location of Trench I on the northern flank of the site, view from the east; Trench II on the northern flank of the site: b) Positioning of the trench, view from the north; c) Section wall and floor of the trench, view from the east; d) Establishment of Trench II, view from the north; e) Western section and floor of the trench, view from the east; f) Initial stage of excavation and the surface layer, view from the north; g) Scraping the western section of the trench with a trowel, view from the east (Abbasnejad Seresti, 2024).

highest elevation of the trench. All elevation measurements were calculated relative to this point. The benchmark is located at an elevation of 1,545 m above sea level. During excavation, the dimensions of the trench were modified. At a depth of 250 cm, the plan of the trench was adjusted to 300×160 cm, and at a depth of 460 cm, the dimensions of the northeastern corner were reduced to 100×150 cm. In total, 47 contexts were recorded in this trench. These included modern debris and waste deposits, settlement floors, kilns, mudbrick walls, pits, and areas associated with fire preparation. Additional

contexts consisted of cultural gaps, limestone and layered walls, deposits of river stones, rubble layers, ash filled spaces, heated soil deposits, and layers containing powdered organic remains. All stratigraphic layers identified in this trench date to the Bronze Age. Excavation ultimately reached virgin soil and river cobbles at a depth of 2.6 m.

Findings

Pottery:

Pottery dating to the Early Bronze Age (Kura Araxes), Iron Age, and the Historical and Islamic periods is scattered across the surface of the site. Similar materials were also identified and recorded during excavations in the two stratigraphic test trenches. In total, 1,663 pottery sherds were collected from these trenches. From Test Trench I (TTI), a total of 1,097 pottery sherds dating to different periods were recovered. These can be classified as follows:

1. 323 sherds originate from Contexts 1–42, primarily dating to the Islamic periods, although sherds from the Historical period are occasionally present.

2. 643 sherds, dating mainly to the Historical periods, were recovered from Contexts 44–88; some Iron Age pottery is also present in the later contexts, particularly in Context 88.

3. 131 sherds dating to the Bronze Age were collected from Contexts 93–113.

The distribution of pottery within the test trench is as follows. Islamic period pottery, with occasional Historical period sherds, was recovered from Contexts 1–29, extending to a depth of 350 cm. A clay oil lamp was discovered in Context 6, and a jar was recovered from Context 7 (Fig. 4). No pottery was recorded in Contexts 30–37, which correspond to architectural features. However, Islamic period sherds reappear in Contexts 38 and 42 (Fig. 5).

Fig. 4: Trench I: a) Ceramic brazier from Context 6; b) Single-handled ceramic jar from Context 7 (Abbasnejad Seresti, 2024).

Historical period pottery sherds were recovered from Contexts 44, 46, 47, 51, 52, 55, 56, 58, 59, 61, 63, 64, 66, 76, 79, 81, 82, 83, 84, 85, and 88 (Figs. 6–7). Context 88 represents the most substantial assemblage, containing 95 sherds distributed across the

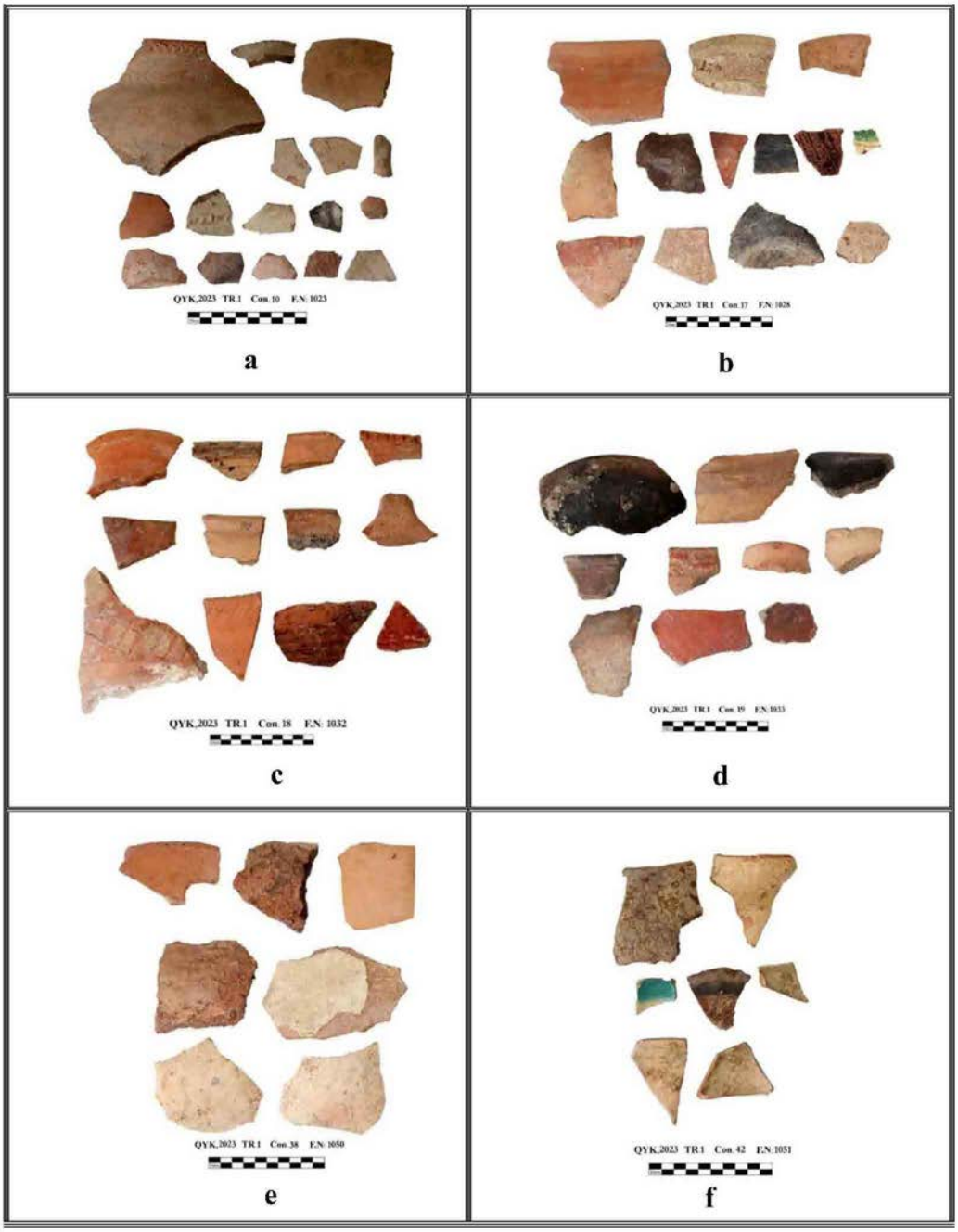

Fig. 5: Pottery sherds from Trench I: a) Context 10; b) Context 17; c) Context 18; d) Context 19; e) Context 38; f) Context 42 (Abbasnejad Seresti, 2024).

entire trench surface. This context is 15 cm thick and reaches a depth of 1,085 cm. In contrast, Contexts 89 (10 cm thick), 90 (13 cm thick), 91 (15 cm thick), and 92, which also extend across the trench surface, yielded no cultural materials and are therefore interpreted as natural deposits.

Below this 40 cm interval, Context 93 appears at a depth of 1110–1141 cm (31 cm thick). It consists of a soft, powdery brown deposit containing charcoal, animal bones, and five greyware sherds (Fig. 8). From this level onward, Early Bronze Age pottery was also recorded in Contexts 95, 99, 102, 107, and 108. Contexts 109–111

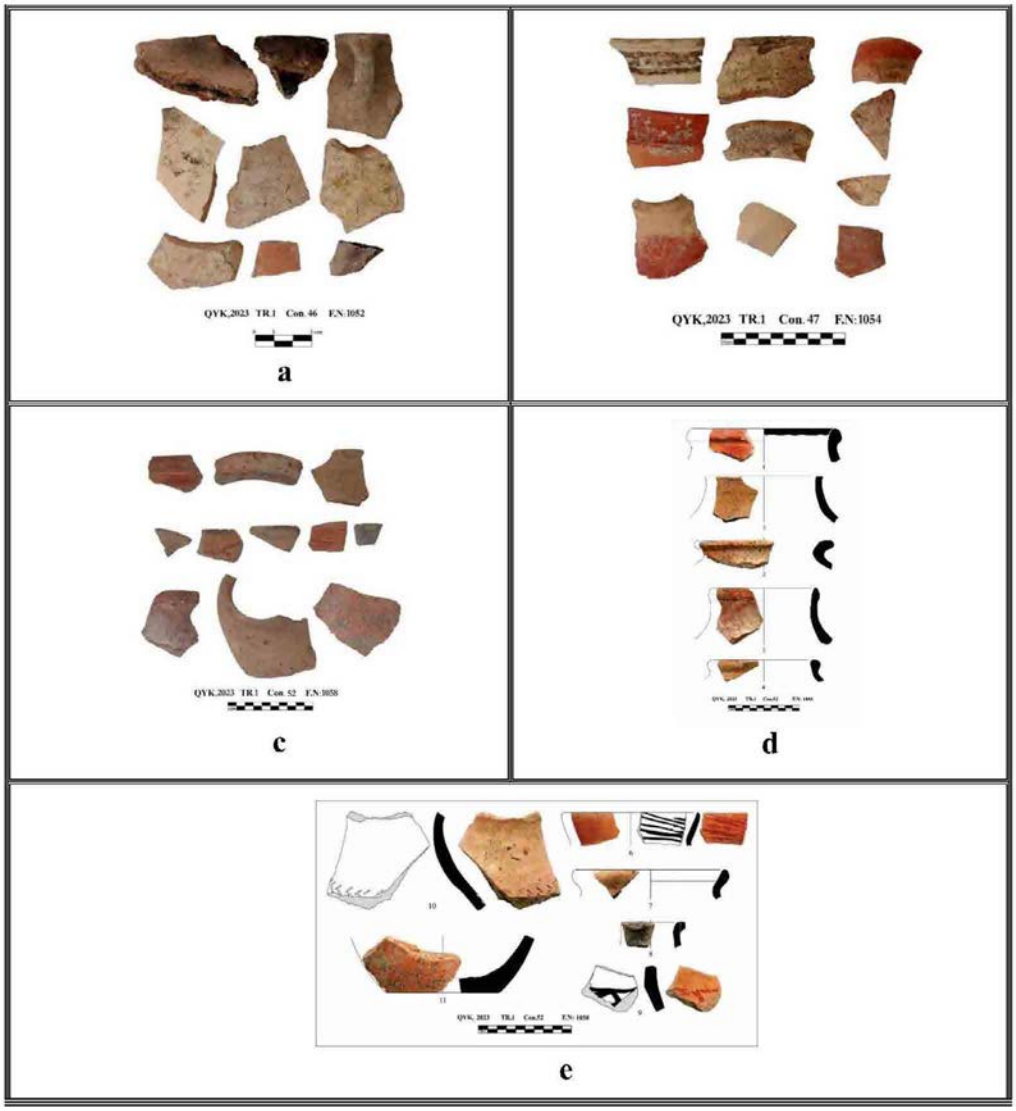

Fig. 6: Pottery sherds from Trench I: a) Context 46; b) Context 47; c) Context 52; d) Context 52; e) Context 52 (Abbasnejad Seresti, 2024).

(1360–1420 cm; 60 cm thick) yielded no cultural material. In contrast, Context 112 (1420–1440 cm; 20 cm thick) produced five buff to grey sherds and represents a burnt activity area characterized by ash, charcoal, heated soil, and a semicircular hearth feature. Context 113 consists of a kiln or hearth bed filled with ash and charcoal. The soil is very soft, powdery, and porous in texture. This deposit begins at a depth of 1441 cm and extends to 1460 cm, with a thickness of approximately 20 cm, and contains no cultural materials. Excavation in TTI was halted at a depth of 1460 cm due to time constraints. In addition, TTII, which was opened to investigate the lower (Bronze Age) layers of the site, corresponded stratigraphically with the lowest layers of TTI relative to the surrounding ground surface. Because excavation in TTII reached virgin soil at a stratigraphic level corresponding to the lowest layers of TTI, excavation in TTI was halted at 1460 cm, although virgin soil was not reached in that trench.

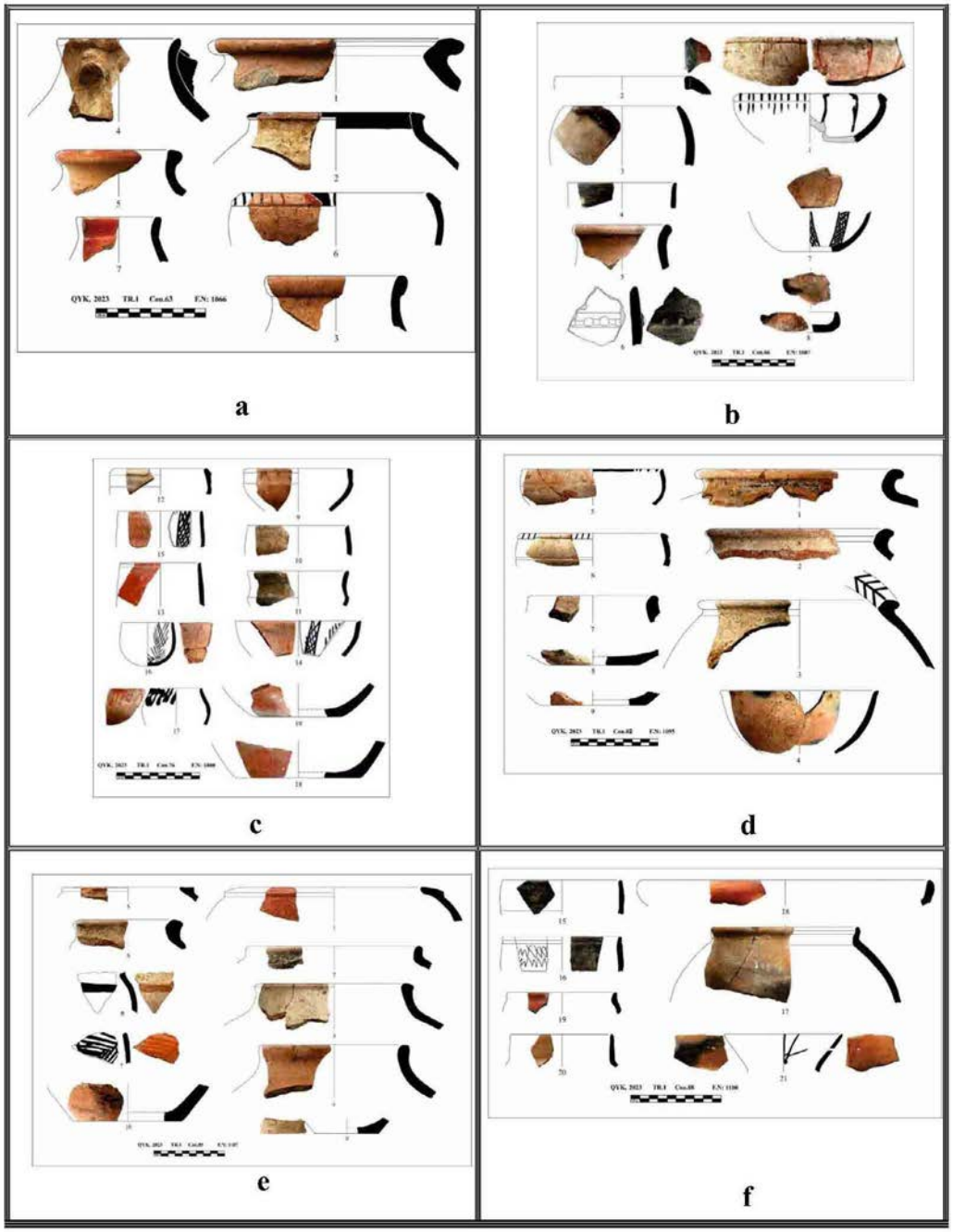

Fig. 7: Pottery sherds from Trench I: a) Context 63; b) Context 66; c) Context 76; d) Context 82; e) Context 85; f) Context 88 (Abbasnejad Seresti, 2024).

A total of 566 pottery sherds were also recovered from TTII. All pottery from the 47 contexts in this trench belongs to the Bronze Age, particularly the Early Bronze Age, and is identified as Kura-Araxes material. The assemblage ranges coarse to fine fabrics and shows a wide variety of colours (Figs. 9 and 10).

Architectural Structures

Remains of mudbrick architecture and stone walls, preserved in both intact and collapsed forms, were recovered from the Islamic and Historical-period contexts of TTI. The

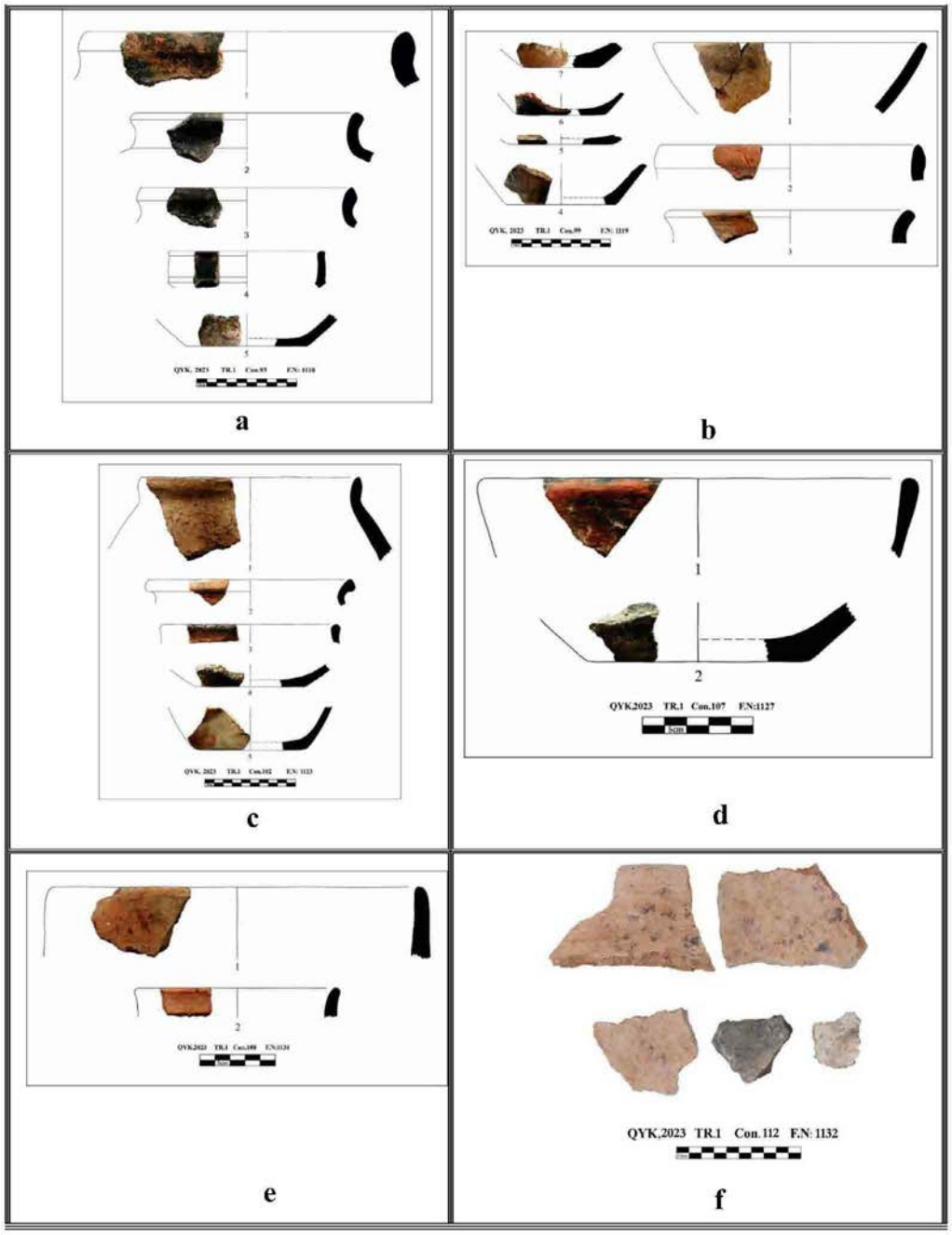

Fig. 8: Pottery sherds from Trench I: a) Context 93; b) Context 99; c) Context 102; d) Context 107; e) Context 108; f) Context 112 (Abbasnejad Seresti, 2024).

earliest architectural evidence in this trench was identified in Context 3, between depths of 44 and 280 cm. This context consists of stone rubble that appears to derive from an original architectural structure but was later disturbed and redeposited, most likely as a result of illicit excavation activities. At a depth of 300 cm below the benchmark, several small and large stone fragments were discovered. These stones were scattered and fragmentary in nature and were recorded as Context 9. Within this context, a regular stonemasonry texture (cairn), designated Context 13, was identified and documented.

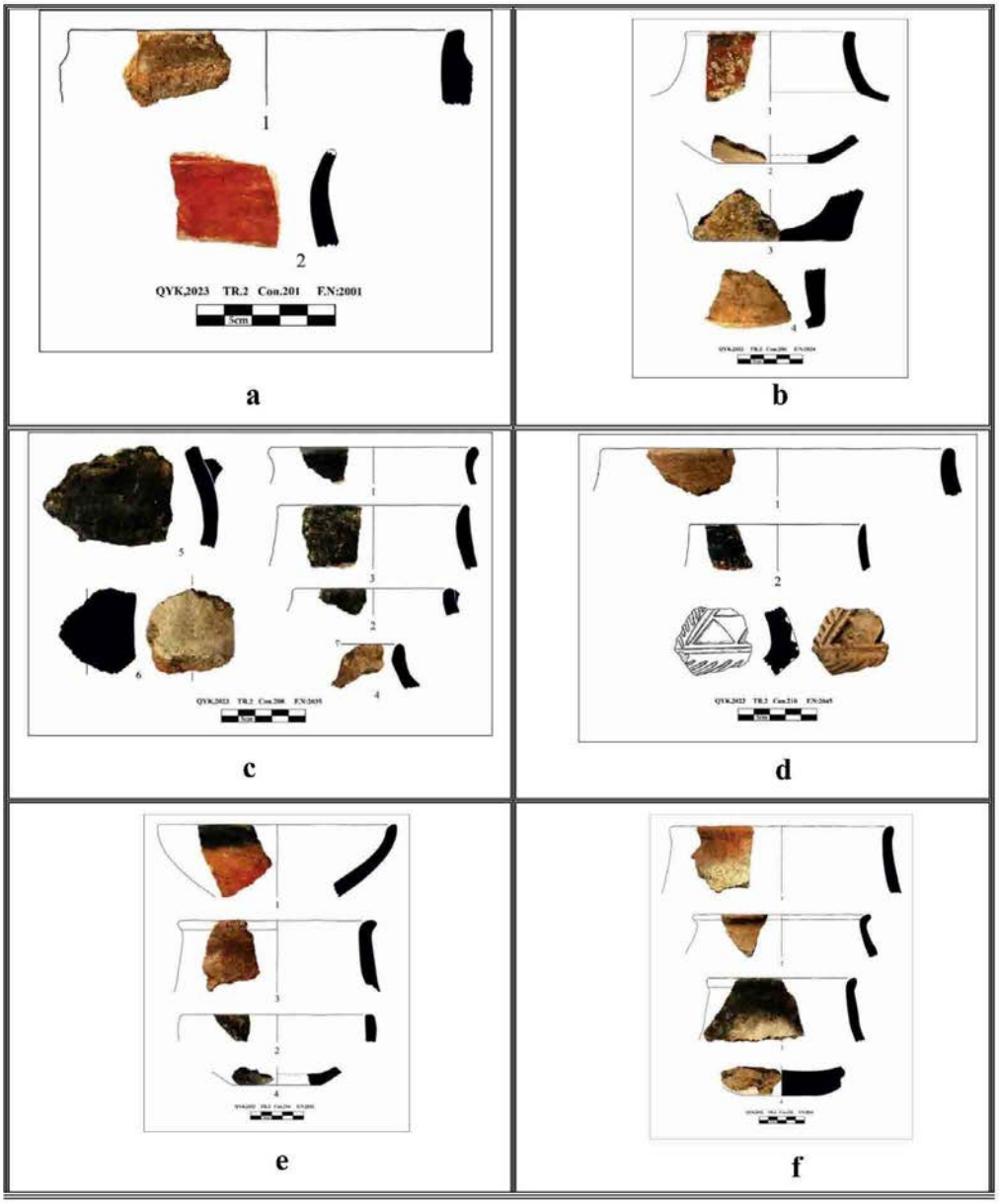

Fig. 9: Pottery sherds from Trench II: a) Context 201; b) Context 206; c) Context 208; d) Context 210; e) Context 214; f) Context 223 (Abbasnejad Seresti, 2024).

It is likely that these two contexts were originally connected and formed a coherent structural feature, with Context 13 remaining largely undisturbed by illicit digging. The presence of stone doorposts and occupation surfaces in several of these contexts indicates a clear association with the stone walls documented in the aforementioned layers. Context 22 contains a principal, well constructed wall that appears to form part of a stone architectural structure. This wall is overlain by the stone rubble of Context 24 (Fig. 11a). In Context 26, a deposit composed of various rock fragments associated with a detrital layer was identified. Contexts 27 and 28, located at depths between 305 and 328 cm, are associated with a settlement floor or a rubble-derived detrital deposit. Context 31 consists of a yellow, medium dense layer with no detectable moisture

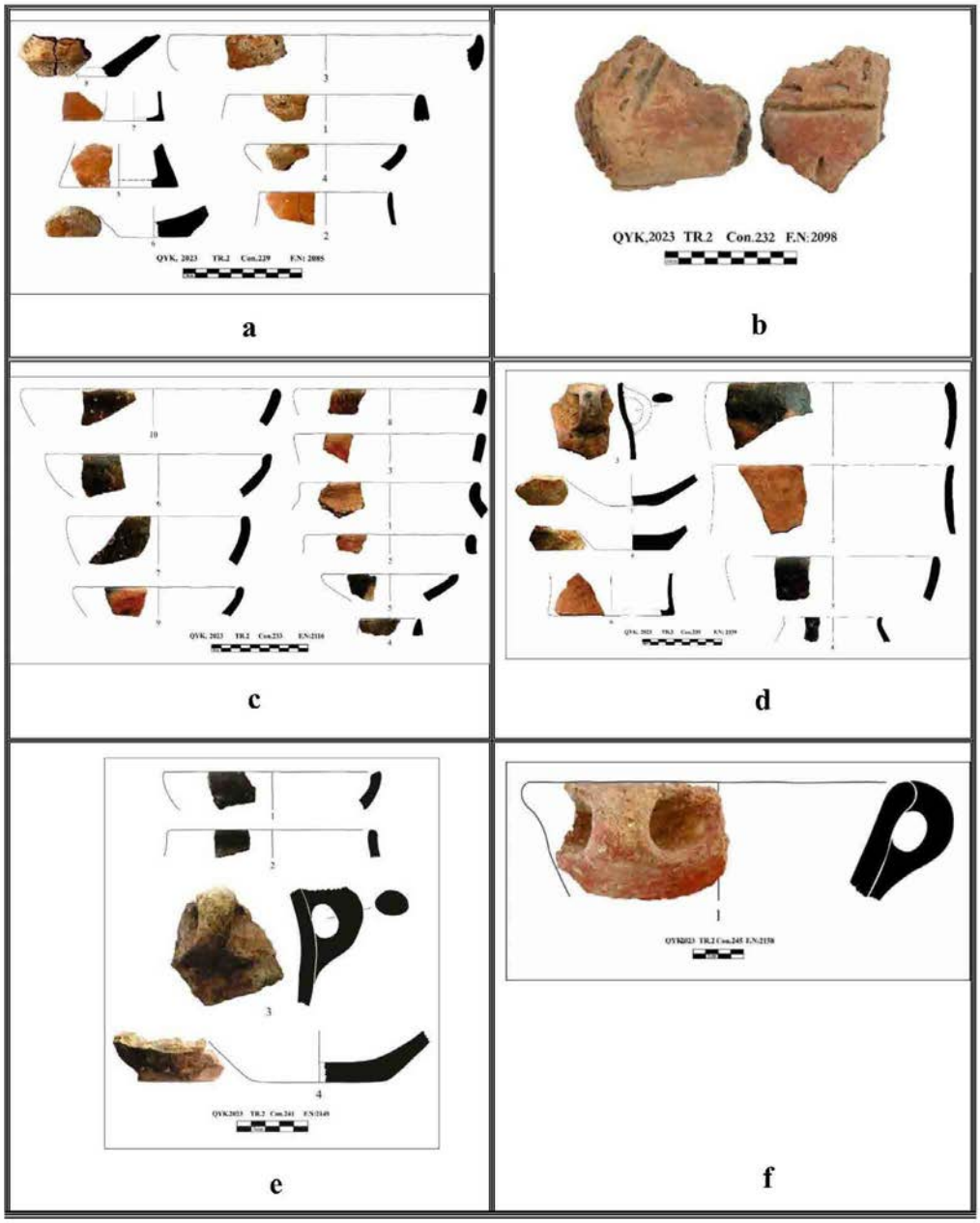

Fig. 10: Pottery sherds from Trench II: a) Context 229; b) Context 232; c) Context 233; d) Context 239; e) Context 241; f) Context 245 (Abbasnejad Seresti, 2024).

content. It appears to form part of a settlement area associated with the architectural remains and hearth related features recorded in Contexts 32, 33, 34, 35, 36, 37, and 38 (Fig. 11b–c). Context 33 contains the remains of a stone wall located in the western part of Test Trench I. This context includes two structural segments; however, because they are physically connected and share the same elevation and surface characteristics, they are interpreted as a single context. The feature consists of stones of varying sizes arranged in a dry stone construction, forming two rectangular spaces (Fig. 11d). Context 34 represents a compact and dense occupation surface containing vegetal inclusions and located within the stone wall of Context 33. It is composed of moist silty clay sediment

and displays traces of lime or lime plaster. Context 35 comprises an oval fire related installation surrounded by a limestone structure. A stone slab is positioned beneath the feature, while the interior is filled with ash, heat affected soil, and charcoal (Fig. 11e).

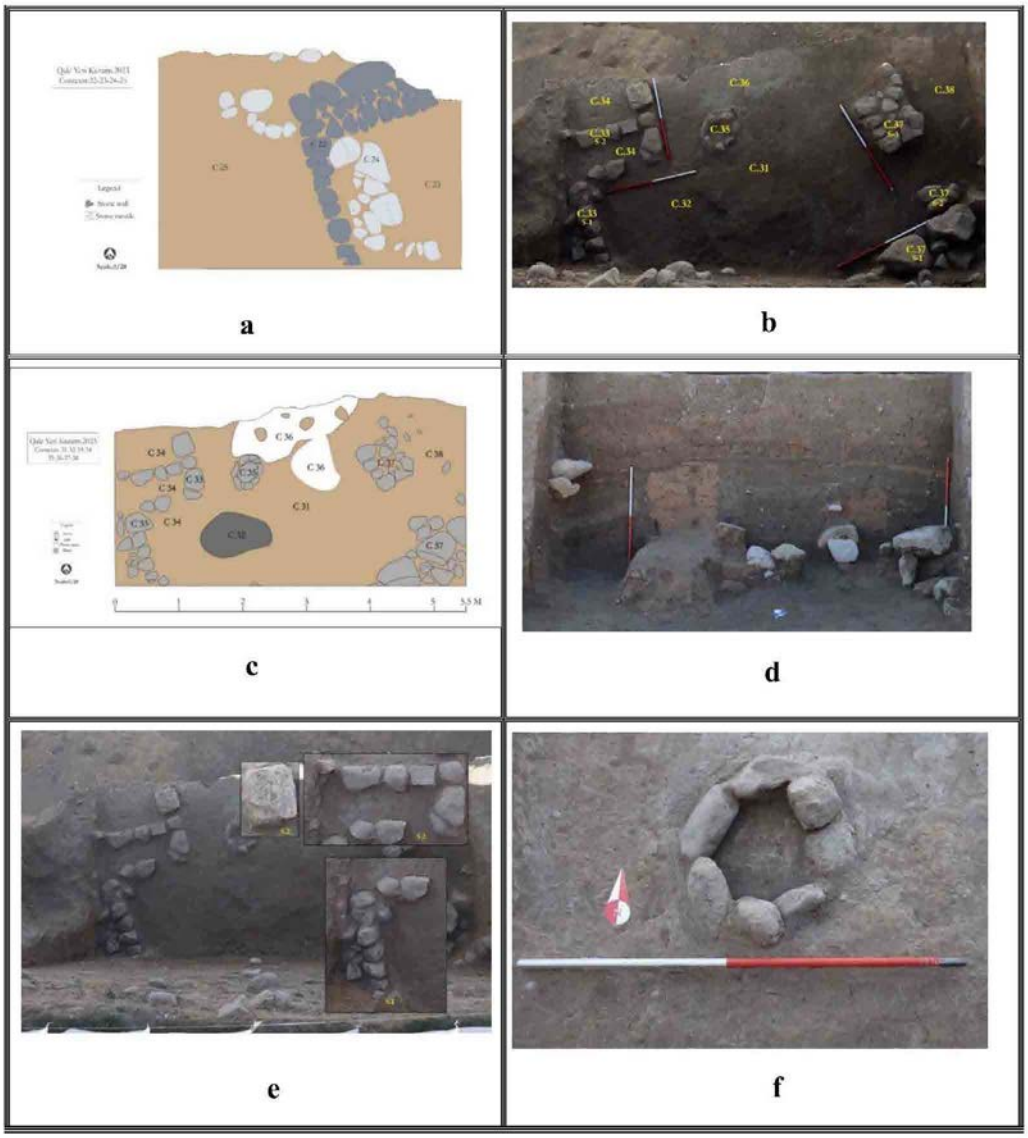

Fig. 11: Architectural remains from Trench I: a) Contexts 22–25; b) Layer 31 and adjacent contexts, viewed from above and facing north; c) Plan of Context 31 and adjacent contexts; d) Context 33, viewed from above and facing north; e) Context 35 (Abbasnejad Seresti, 2024).

Given the presence of Historical period pottery sherds in Context 42, the architectural remains from this level onward are tentatively attributed to the Historical period, pending confirmation through absolute dating. Context 46 consists of a dense, moist, buff brown semi crescent shaped deposit containing scattered fragments of mudbrick. This deposit begins at a depth of 477 cm and extends to 525 cm, with a total thickness of approximately 48 cm. Context 47 comprises a dense and compact settlement deposit located between architectural spaces 48 and 49. The context consists of moist, compact brown silty clay soil and represents an accumulated occupation layer associated with the adjacent

structural features. Mudbrick fragments were observed in parts of this deposit. Contexts 48–49 represent the remains of a dry stone wall located in the western part of the trench and aligned along a west–east axis, with associated mudbrick and mortar debris. Context 50 is a compact occupation surface located at a depth of 518–525 cm (c. 7 cm thick; Fig. 12a), from which several kitchenware sherds were recovered. In Context 52, mudbrick traces were recorded at a depth of 540 cm, while scattered lime traces in its western part may be associated with Context 57. This context consists of a reddish orange clay layer containing streaks of mudbrick. Context 56 consists of clay rubble extending across the entire surface of the test trench. It was identified between depths of 621 cm and 629 cm and has an approximate thickness of 8 cm. Context 57 comprises a fire preparation area characterized by ash deposits and thermally altered soil, situated adjacent to the remains of a rammed and plastered floor in Context 58. Context 63 is a rectangular pit measuring 88×88 cm. It contains very porous, soft, powdery soil with moderate moisture content. This context yielded numerous pottery sherds, bronze objects, metalworking molds, and animal bones. Mudbrick fragments were also recorded in Context 64. Context 65 represents a compact rammed occupation surface consisting of a 3 cm thick lime or lime render layer. Several rubble mudbricks were recovered from Contexts 66 and 68. Context 72 comprises a brown settlement deposit located between two areas of mudbrick architecture and a zone of stone rubble. It extends from a depth of 779 cm to 810 cm and is approximately 31 cm thick. The context includes a collapsed mudbrick feature measuring 43×40 cm, interpreted as the remains of a thick but collapsed wall located 60 cm from the western trench wall (Fig. 12b). Context 74 consists of orange coloured mudbrick fragments forming a thick wall of eight courses in the centre of the test trench. The mudbricks have regular dimensions of 10×40 cm, 12×39 cm, and 10×15 cm (Fig. 12c). The mudbricks are soft, dense, and moist, occurring as lumps and rubble. This wall, together with the underlying occupation surface, may represent the remains of an interior space later sealed by Context 75. Context 75 comprises a zone of dry stone architectural rubble. The stones were laid without mortar beneath a mudbrick wall and likely represent the collapsed remains of an associated architectural feature (Fig. 12d). Context 76 consists of a rammed settlement surface located within an area of rubble. The contexts identified between depths of 813 and 1085 cm are as follows: Context 77 is a rubble layer; Context 78 is a deposit containing calcareous nodules; Context 79 is a thin settlement layer; Context 80 represents a fire preparation area; Context 81 is a layer containing mudbrick traces; Context 82 is a 15 cm thick settlement deposit; Contexts 83 and 84 are sedimentary layers; and Context 85 is a pit containing cultural materials. Contexts 86 and 87 contain no cultural deposits. Similarly, Contexts 89–92 also lack cultural materials.

The final context (113) of Trench I contains evidence of Bronze Age activity. Context 94 comprises a rubble deposit containing soft, dense, lumpy mudbrick mortar, together with scattered stone fragments, ash, and traces of reed preserved on some mudbrick

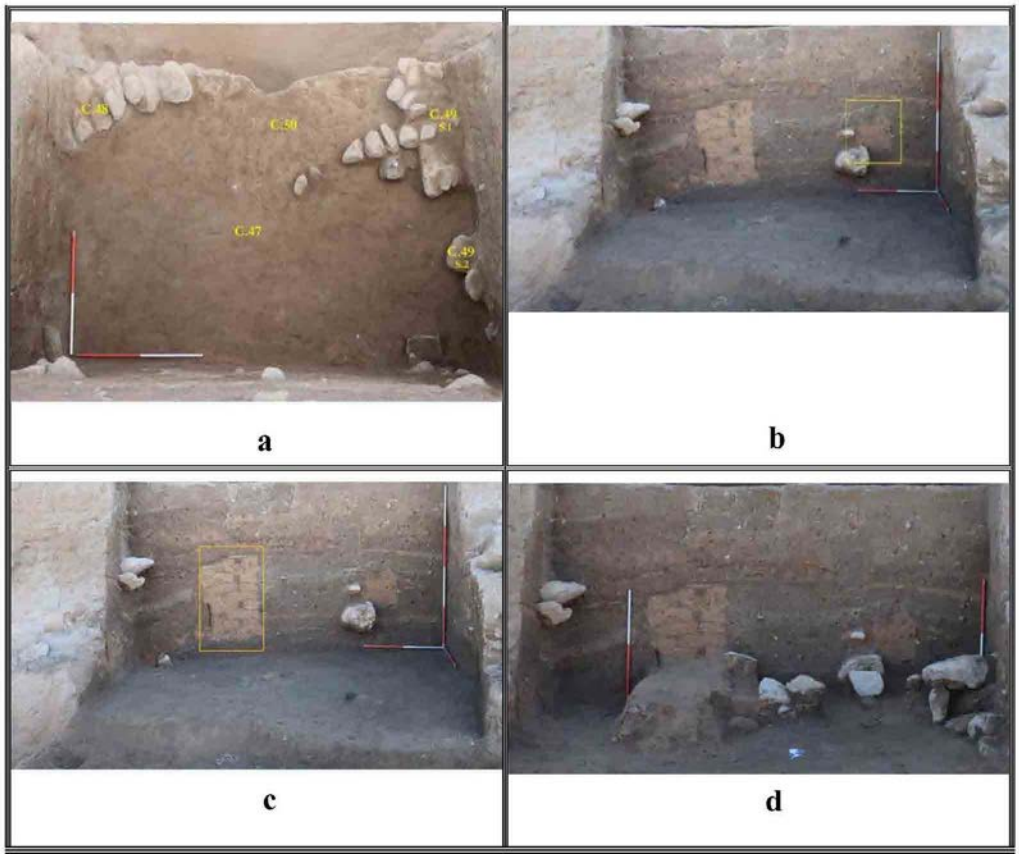

Fig. 12: Architectural features exposed in Trench I: a) Contexts 47–50, top view facing north; b–d) southern wall associated with Contexts 73, 74, and 75, viewed from the north (Abbasnejad Seresti, 2024).

pieces. Context 95 represents a brown occupation surface with inclusions of mudbrick rubble. Context 101 consists of a compact brown soil layer. Context 105 comprises a very dark brown, dense clay deposit embedded within a light brown compacted mud matrix. Its regular shape suggests a possible architectural feature or an organized space associated with a structure. Context 107 is a brown layer containing scattered mudbrick and rock fragments, charcoal, and heat altered soil. It extends across the entire surface of the test trench from a depth of 1287 to 1360 cm. Context 111 consists of stone rubble together with fragments of mudbrick and heat altered soil. This context extends from a depth of 1390 to 1420 cm and is approximately 30 cm thick. Context 112 comprises the remains of a heated area containing ash, charcoal, and heat altered soil, together with a semicircular hearth wall. It may represent a kiln or hearth, although its exact function remains uncertain. This context extends from a depth of 1420 to 1440 cm. Context 113 is associated with the base of the kiln (or hearth) and is rich in ash and charcoal. The soil is very soft, powdery, and porous. This context extends to a depth of 1460 cm and is approximately 20 cm thick. Architectural evidence in TTII begins with Contexts 204 and 205, which comprise a settlement floor containing compacted ash. Context 209 is associated with a fire preparation area. Context 210 consists of a layer containing plant fibres and reeds, with a dark grey layer observed between the two deposits. Contexts

216 and 217 are also associated with a fire preparation area extending from 150 cm to 161 cm below the test trench benchmark. Context 222 comprises a row of mudbricks arranged in a semicircle. The feature continues into the western and northern trench walls. The mudbricks are regular in form and occur in two sizes: 25×20 cm and 25×40 cm. The architectural remains of a metallurgical furnace were first identified in Context 226, while the associated finds are discussed in the section on Metallurgical Finds. Context 228 consists of a north–south aligned row of stone piles located in the eastern part of the test trench. The feature is constructed in dry stone technique (Fig. 13). Nine stone slabs are visible along the north–south axis. A second row of five smaller.

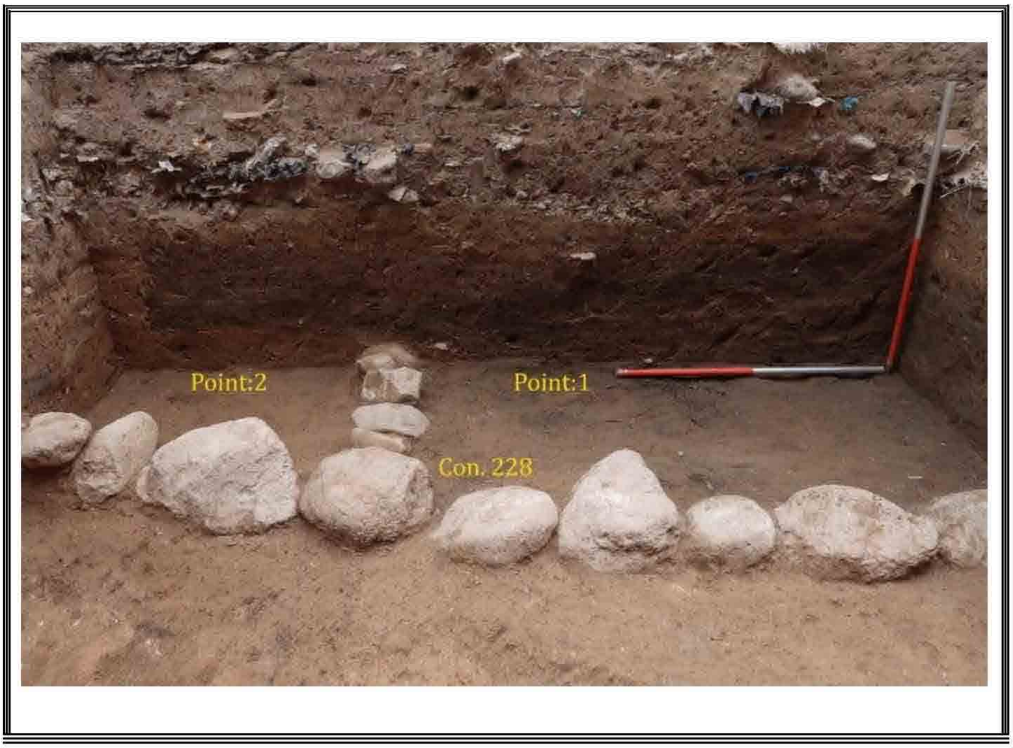

Fig. 13: Architectural feature exposed in Trench II (Context 228), viewed from the north (Abbasnejad Seresti, 2024).

Metallurgical Finds

Metalworking remains were recovered from various contexts in TTI and TTII, including slag, copper ore, fragments of metal tools and objects, and forge welding slag. A pottery vessel associated with metallurgical activity was identified and documented in Context 63 of TTI (Fig. 14a). More substantial evidence, however, was recovered from Context 226 in TTII and from several associated subsequent contexts (Figs. 14b–d). Context 226, which yielded cultural materials—particularly Early Bronze Age pottery—consists of a heat affected floor layer extending across the entire southwestern portion of the trench. The sediment ranges from dark to light brown in colour and shows clear evidence of heating. Because this context comprised several interconnected but distinct spaces, the entire heated area was recorded as a single context. For analytical clarity, the associated spaces were defined as separate features in order to better represent their spatial

relationships. Cultural materials recovered from this context include pottery sherds, animal bones, charcoal, and flotation samples. A centrally located oval furnace (50×25 cm) was identified within the heated floor and designated Structure 1, with upper and lower depths of 260 cm and 292 cm, respectively. The deposit is approximately 32 cm thick. The furnace floor is mud lined, and the surrounding heated area within the deposit was designated Structure 2. A large quantity of forge welding slag (Fig. 14e), green and red in colour and very lightweight, was recovered from the furnace, indicating an industrial function. The furnace structure itself is approximately 19 cm thick. A regular row of mudbricks (50×30 cm) forms the northern boundary of the furnace space. This row consists of five complete bricks and one partially preserved brick extending into the western trench wall. This feature was designated Point 3 and is associated with both the furnace and the heated floor. The mudbrick wall begins 70 cm from the southern trench wall and extends in a semicircular form into the southern section, terminating 30 cm from the eastern wall. Behind this wall, a space containing ash, heat affected soil, brick fragments, and soft powdery deposits was exposed. Abundant forge welding slag recovered from this area suggests that it functioned as an industrial waste zone associated with the furnace; this area was designated Point 4. In the southeastern part of the trench, a heat affected dark brown deposit lacking cultural materials was recorded behind the mudbrick wall and designated Point 5. Due to the stratigraphic nature of the excavation during this season and limitations in time and project objectives, excavation in this area was halted and the remains of the furnace were preserved. A number of small copper ore fragments and a metal object of unknown function were recovered from Context 232 of TTII (Figs. 14f–g). Several metallurgical casting mould fragments were also recovered and recorded from Context 239 (Fig. 14h).

Evidence of Geological Faulting

Evidence of geological faulting was recorded in TTI (Fig. 15). Several faults were identified, one of which—probably related to the Sangavar Fault—was recorded as Context 15 at a depth of 160 cm, with its trace extending to 450 cm below the fixed datum. Examination of the eastern trench profile further confirmed the continuation of this fissure within the upper deposits. The Sangavar Fault appears to have significantly disturbed the cultural sequence, contributing to occupational discontinuities during the Islamic and Historical periods.

Some evidence of environmental and climatic changes that caused both minor and major discontinuities during periods of settlement in this area has been identified and is currently under study. A similar break was observed in Context 226 of TTII, located at a depth of approximately 270 cm below the fixed datum, within the central area of the remains of an Early Bronze Age metallurgical furnace.

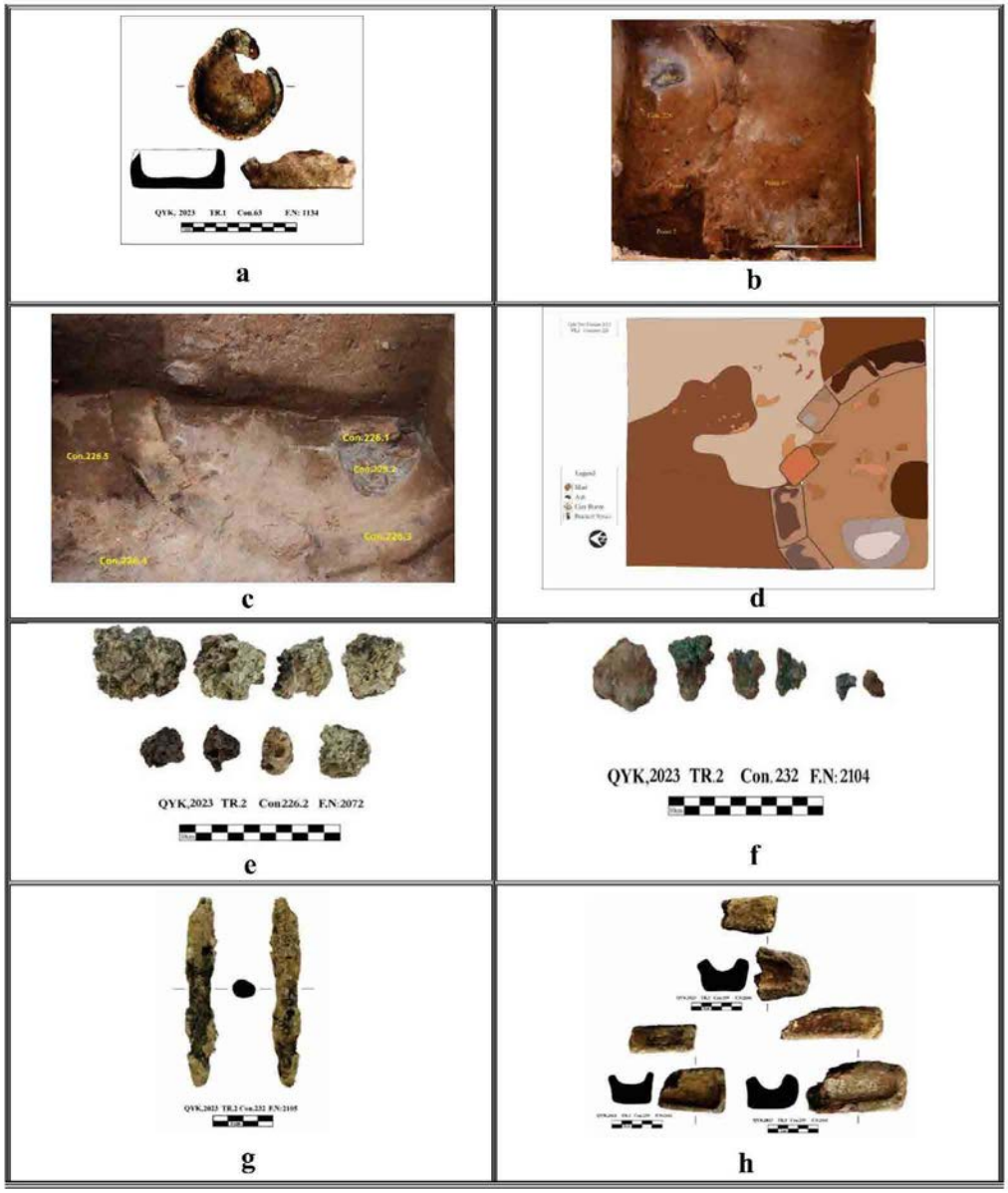

Fig. 14: Evidence of Archaeometallurgy; Trench I: a) Context 63, crucible; Trench II: b) Context 226, plan view, looking east; c) Contexts 226, 226.1, 226.2, 226.3, 226.4, and 226.5, viewed from the north; d) plan of Context 226, top view; e) Context 226, furnace-wall slag/vitrified furnace fragments; f) Context 232, copper ore fragments; g) Context 232, a metal object of unknown function; h) Context 239, casting molds (Abbasnejad Seresti, 2024).

Faunal Finds

A total of 476 and 307 animal bone fragments were recovered from the stratigraphic excavations of TTI and TTII, respectively (783 fragments in total) (Fig. 16). However, since nearly half of these finds belong to the Kura–Araxes period, a brief preliminary analysis of the bones from this period is presented here. Because all contexts in TTII belong to the Kura–Araxes period, all animal remains recovered from this trench (307 fragments) are included in the present analysis. In addition, based on the current relative chronology, Context 93 onward in TTI has also been assigned to this period; therefore, 54 additional fragments from these contexts have been included in the assemblage.

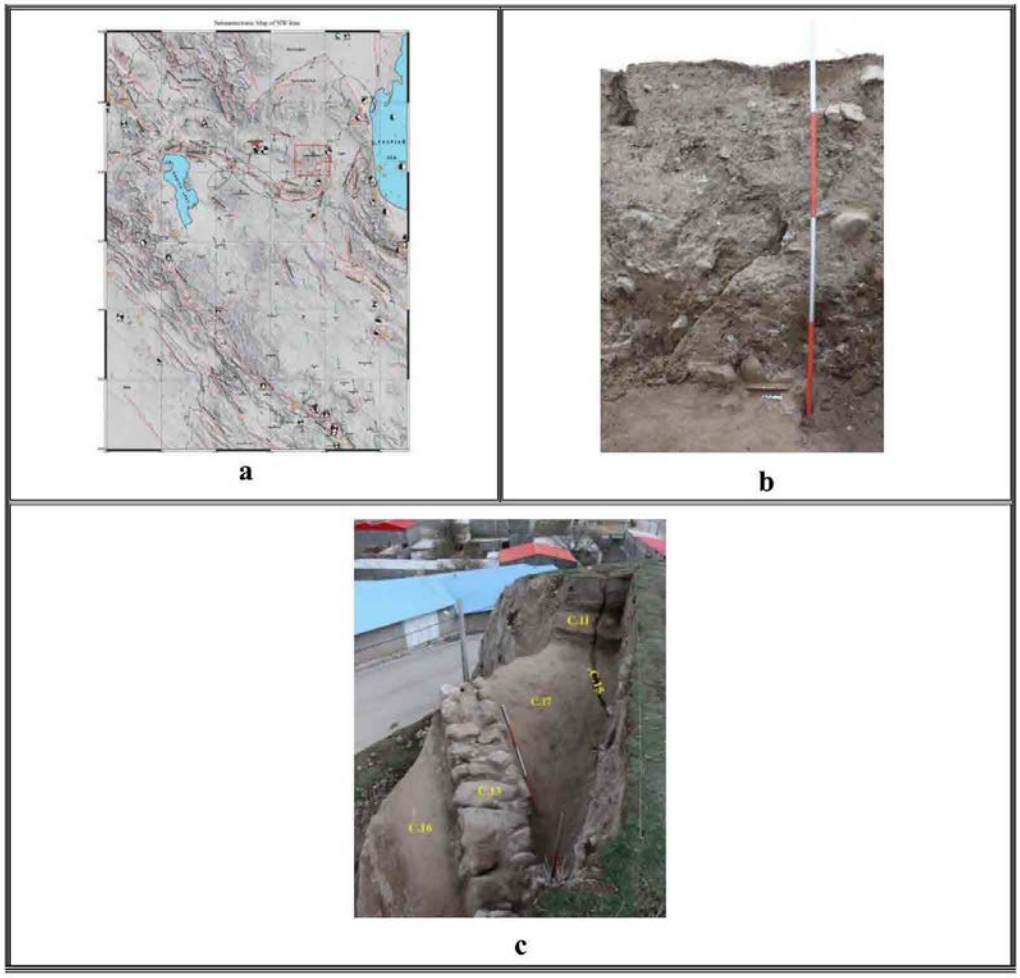

Fig. 15: Trench I: a) Seismicity map of northwestern Iran and the potential correlation between regional seismic activity and the fissures documented in the trench; b-c) fissures observed in the eastern and southern trench sections and on the trench floor, viewed from the west and north (Abbasnejad Seresti, 2024).

Preliminary analysis of the collection indicates that the identified faunal remains belong to mammalian and reptilian groups. The mammals include members of the ungulate order, with sheep constituting the largest assemblage, followed by bovines, boars, and cervids. The greatest number and weight of bones derive from Contexts 93 and 95 in TTI, as well as Contexts 232, 233, and 239 in TTII.

Flora Remains

Sampling for the identification and recording of plant remains was restricted to the Bronze Age layers, due to the specific characteristics of the site's contexts from this period. Approximately 255 liters of soil from 19 Kura–Araxes contexts were collected from TTI and TTII for flotation (Fig. 17). Of these, three soil samples (48 liters) were collected from TTI, while sixteen samples (207 liters) were collected from TTII. Approximately 80 percent of the plant remains derive from TTI, with the remainder originating from TTII. This distribution likely reflects differences in site activity areas. The TTI area was probably more closely associated with the daily activities and domestic

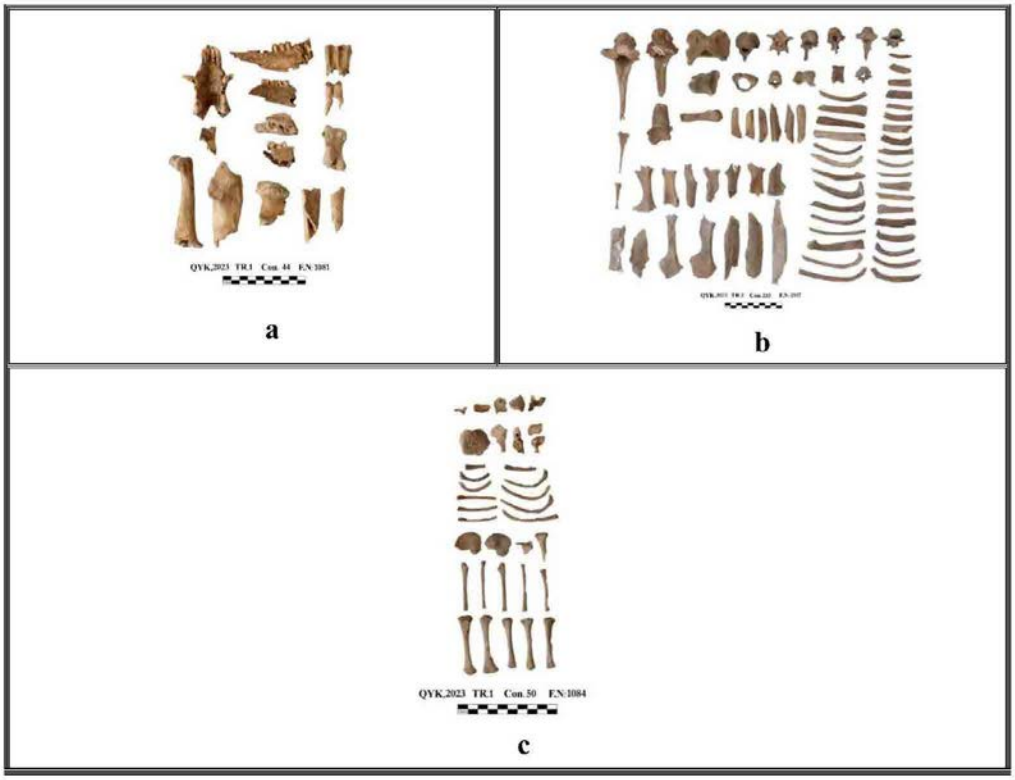

Fig. 16: Animal bone remains recovered from the excavation: a) Context 44, Trench I; b) Context 233, Trench II; c) Context 50, Trench I (Abbasnejad Seresti, 2024).

life of the site's inhabitants, whereas TTII appears to have been related to industrial or workshop activities. However, the large quantity of animal bones recovered from TTII (307 out of a total of 361 fragments) indicates a markedly different pattern.

The collected samples generally consisted of ash, heat affected soil, charcoal accumulations, pit fills, soil from inside the kiln, and soil associated with fire preparation areas. A total of 1,072 plant seeds were identified and recorded, including 338 complete seeds and 734 fragmented seeds. Because the type, species, and genus of most fragmented seeds could still be determined, they were considered to be of equal analytical value to the complete specimens. Preliminary identification suggests that these remains likely belong to various species of the Gramineae family, Galium (a type of weed), grape seeds, and lentils. The greatest abundance is associated with wheat and barley. Based on the size of the recovered grains, most appear to represent domesticated and cultivated varieties. Furthermore, as these remains were recovered from the settlement layers of the site, they are directly related to the subsistence economy of the Bronze Age community inhabiting the Kuraim site. The presence of large quantities of Galium seeds (Lady's Bedstraw), alongside barley and wheat, indicates that the inhabitants practiced agriculture and that cultivated fields likely existed around the site, since Galium commonly grows in cereal fields. Therefore, the presence of cultivated crops—including cereals, legumes (lentils), and fruit seeds—provides evidence for the predominance of an agriculture based subsistence economy in the region. By integrating the faunal and botanical evidence, a

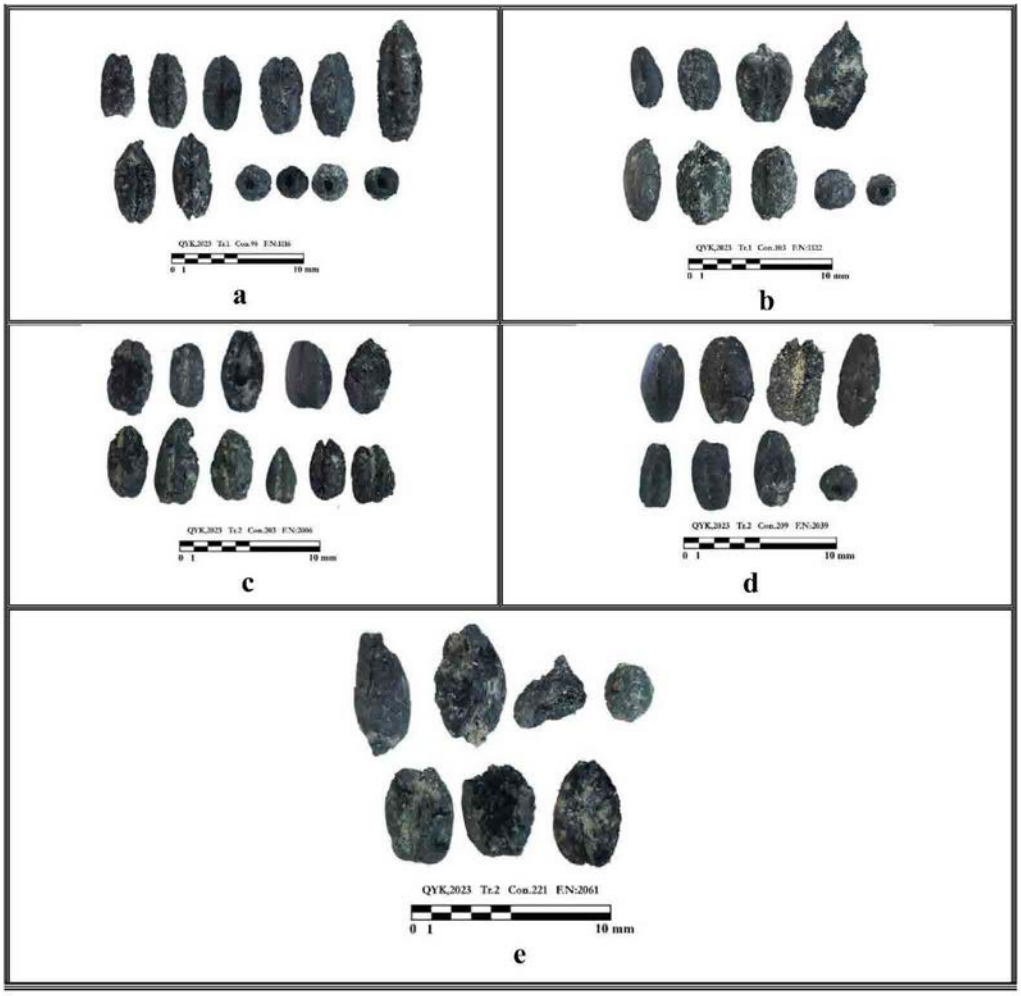

Fig. 17: Archaeobotanical remains recovered from the excavation; Trench I : a) Context 98; b) Context 103; Trench II: c) Context 203; d) Context 209; e) Context 221 (Abbasnejad Seresti, 2024).

preliminary conclusion may be drawn that the subsistence economy of this area during this period was based on agriculture and animal husbandry.

Human Burial

Context 91 consists of a soft, porous, powdery, olive coloured layer with moist, fine grained particles. A large concentration of river stone fragments of various sizes was observed within 210 cm of the western wall of the test trench. This context originated in the southwestern corner of the trench and extended across the entire trench surface. It began at a depth of 1,095 cm and ended at 1,110 cm, with an approximate thickness of 15 cm. Near the eastern wall of the test trench, adjacent to this context, the disturbed remains of a human burial were exposed; the burial had been damaged by the mechanical destruction of the mound. This burial was assigned to Context 91 due to its proximity to the aforementioned deposit. It appears to have been a simple pit burial, although the exact burial position could not be determined. Given the conditions in this part of the mound and the difficulty of excavation and documentation, only skeletal fragments and

associated grave goods were recovered (Fig. 18a). Theis included part of an engraved pottery vessel, a bronze ring, a glass paste bead, and a clay bead (Fig. 18b).

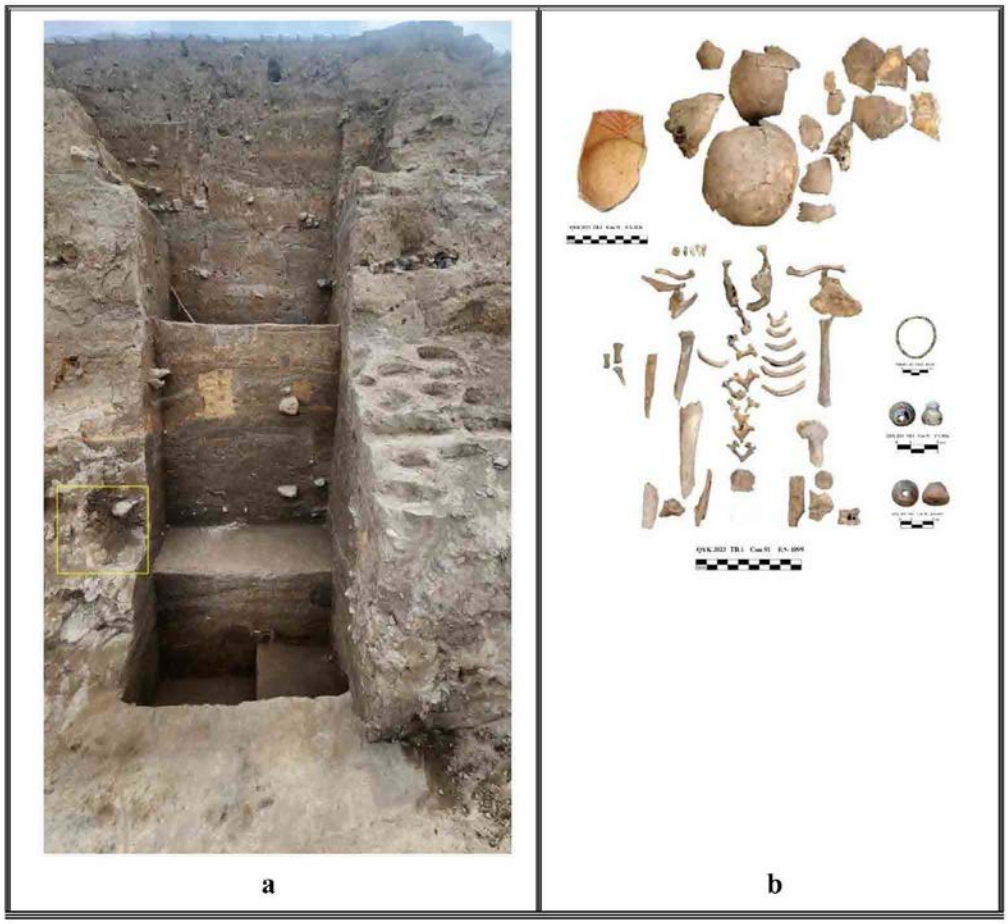

Fig. 18: Context 91; Trench I: a) Disturbed human burial identified in the eastern profile of the trench, viewed from the north; b) Human skeletal remains and accompanying grave goods, including a bronze ring, a glass-paste bead, and a ceramic bead (Abbasnejad Seresti, 2024).

Special Finds

Several obsidian pieces were recovered from Contexts 206 and 232 of TTII, including complete and fragmented lithic artifacts, as well as an unworked obsidian fragment (Figs. 19a–b). Two ceramic spindle whorls were discovered in Contexts 54 and 56 of TTI (Fig. 19c), and a stone pestle was recovered from Context 99 (Fig. 19d). Distinctive bone tools, attributable to the Bronze Age, were found at various depths in a nearly continuous sequence across several contexts in both trenches (Figs. 19e–l). In addition, an artifact made from animal antler was recovered from Context 209 of TTII (Fig. 19m).

A perforated clay disk was recovered from Context 81 of TTI. Adjacent to the burial—located at the same level as Context 91 of TTI—part of an incised pottery vessel, a bronze ring, a frit bead, and a clay bead were discovered (Fig. 18b), although these items were not examined in further detail. A sedimentary grinding stone was recovered from Context 223 of TTII; both ends are turned upward and may have functioned as handles (Fig. 20a). A broken clay figurine was retrieved during the sieving of Context 206, measuring 23×14×14 mm (Fig. 20b). The fragment represents the hind part of a

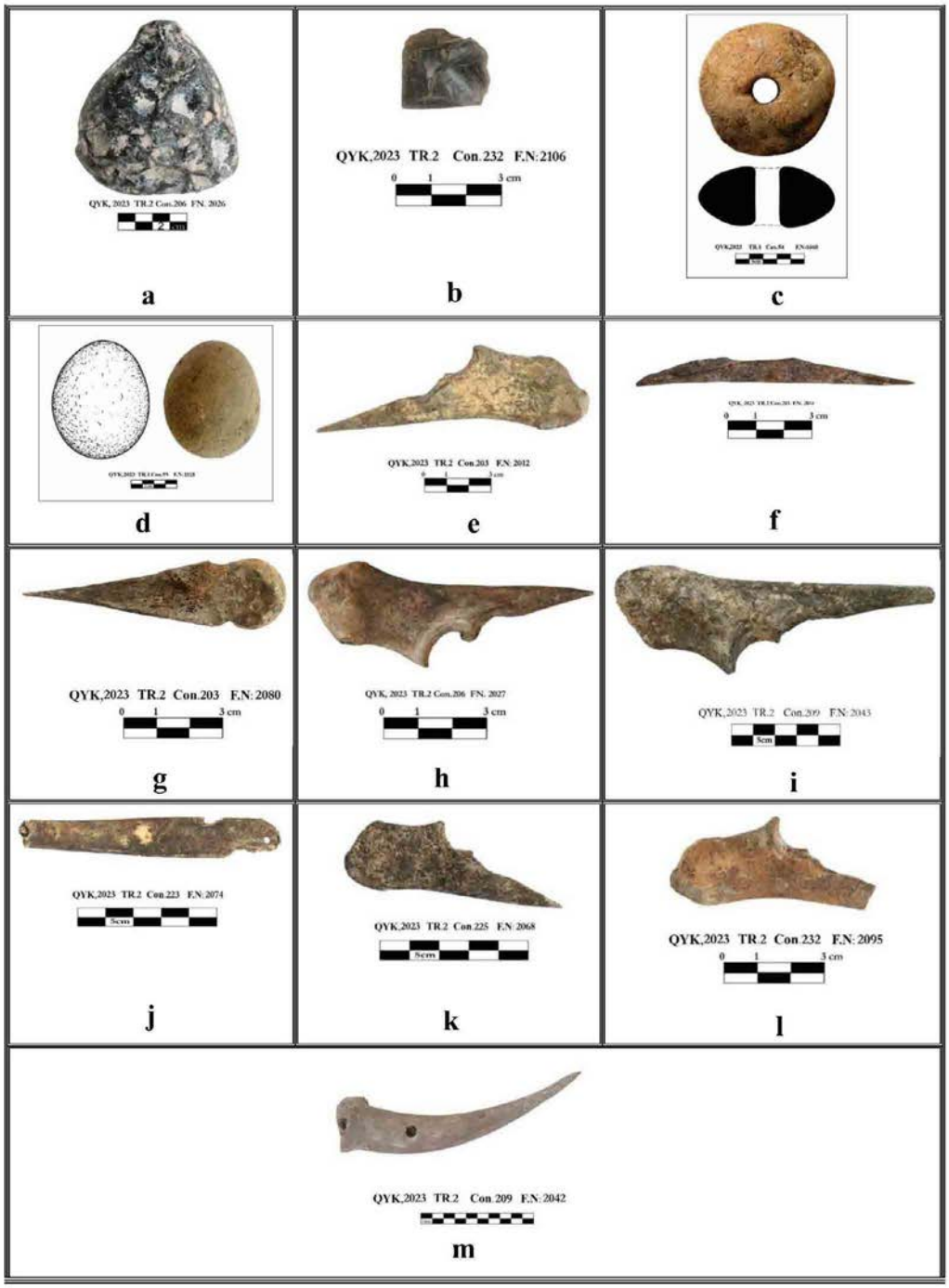

Fig. 19: a-b) Obsidian fragments from Contexts 206 and 232, Trench II; c) Ceramic spindle whorl from Context 54, Trench I; d) Stone pestle from Context 99, Trench I; Bone tools from Trench II: e-g) Context 203; h) Context 206; (I) Context 209; (J) Context 223, recovered through flotation; (K) Context 225; (L) Context 232; m) Antler tool from Context 209, Trench II (Abbasnejad Seresti, 2024).

probable bovine figurine; the central body and back are missing, but both hind legs are preserved. Another fragmentary clay figurine was also recovered from the same context. This second fragment measures 18×15×23 mm in maximum dimensions and preserves two intact legs. It appears to represent the forepart of a buffalo (Fig. 20c). The right ear is broken, and a perforation is visible beneath it. Another perforation appears in the nasal area, suggesting that the figurine may have been suspended. The figurine is made of

fired clay with a black paste. Another animal figurine, probably representing a buffalo, was recovered from Context 207 of the same pit. Although largely intact, both horns and the left leg are broken (Fig. 20d). Its maximum dimensions are 63 mm in length, 32 mm in width, and 50 mm in height. A mane like projection is visible on its back which, when reconstructed together with the horns, suggests that the figurine exhibits characteristics of a buffalo. A perforation is present beneath the left ear (front view), and the surface is covered with greenish mud that darkens along the flanks. Another figurine from Context 232 of TTII (Fig. 20e) has broken hind legs, a perforation beneath the right ear, visible burn marks, and broken horns. It measures 60×30×33 mm. A further animal figurine from the same context shows broken horns and legs, along with burn marks on half of the body (Fig. 20f), measuring 48×20×20 mm.

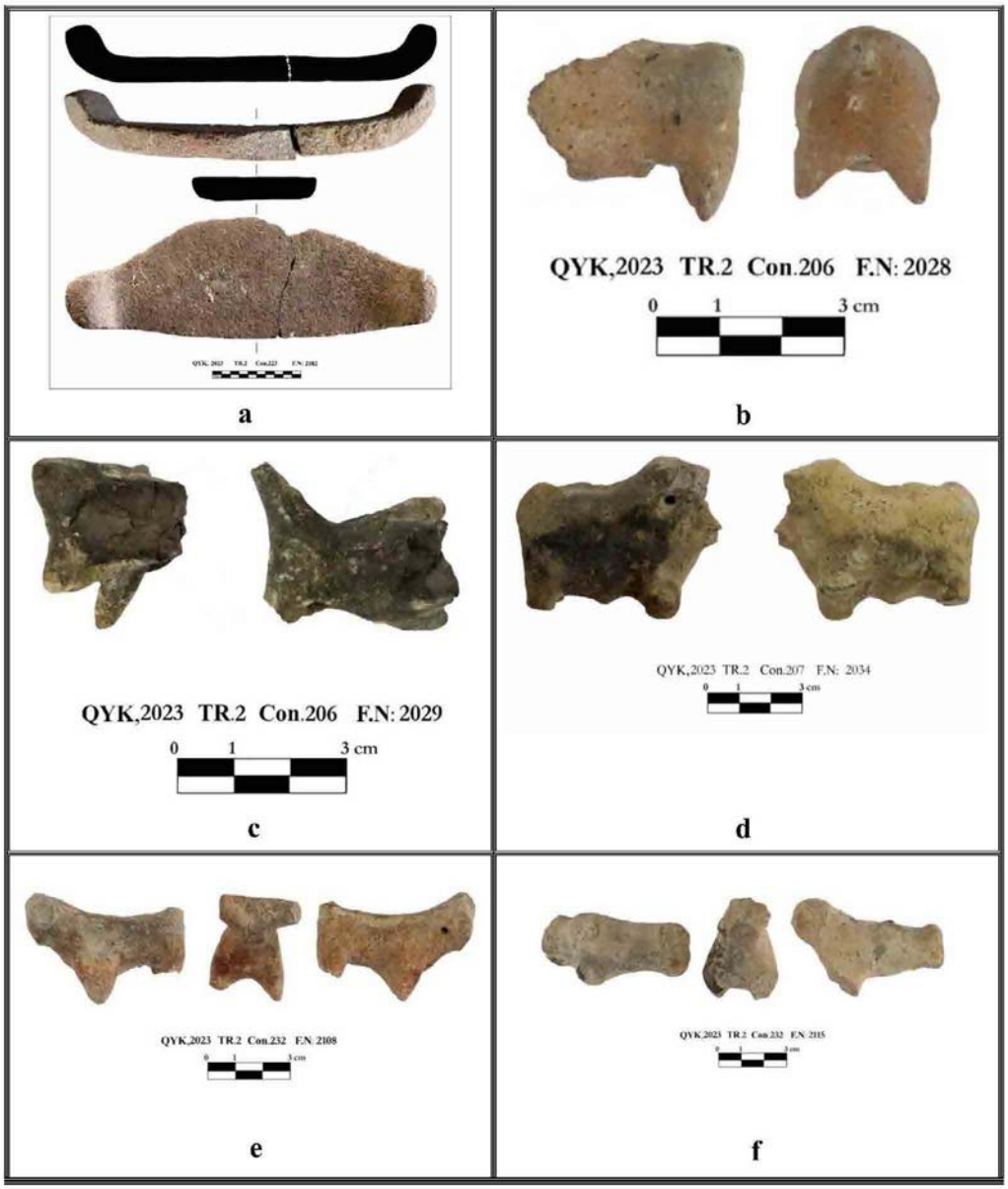

Fig. 20: Finds from Trench II: a) Grinding stone recovered from Context 223; Figurines: b-c) from Context 206; d) from Context 207; and e-f) from Context 232 (Abbasnejad Seresti, 2024).

Sampling

Numerous charcoal samples were collected from both test trenches for absolute dating, and preparations for laboratory analysis have been completed. Micromorphological analysis, a relatively recent method in the study of soils and archaeological deposits, contributes to the identification of constituent components and the reconstruction of the temporal and spatial relationships of deposits (Banerjea et al., 2015; Batiuk et al., 2022). Through micromorphological studies, it is possible to identify soil compositions, bone remains, animal dung, wood fragments, pottery, lithic materials, charred grains, sedimentary layers, and post depositional changes, as well as to distinguish between calcareous sediments and secondary calcium carbonate deposits (Goldberg, 1981). Accordingly, this method has been applied to the study of the site's deposits in order to improve understanding of both natural and anthropogenic depositional processes involved in the formation of cultural layers, as well as the human activities that took place at the site. A total of 13 sediment blocks were sampled from the western section of TTII for micromorphological analysis (Figs. 21a–c). The sampling strategy was specifically designed to investigate the nature, formation processes, and stratigraphic relationships of both cultural and natural depositional sequences. Soils can act as reservoirs of anthropogenic organic matter and may preserve mineral components as part of their geochemical signature. Consequently, past human activities are often reflected in soil properties and elemental concentrations, which may persist over long periods and thus provide evidence of human occupation (Heron, 2001). As discussed previously, the deposits within the layers of TTII are associated with a range of human activities. Evidence identified in these layers includes animal skeletal remains, industrial and metallurgical activities, and natural deposits influenced by fluvial sedimentation processes. For further analysis, 22 sediment samples were collected from different contexts and depths (Figs. 21d–e). Given the effectiveness of the geochemical methods mentioned above, the measurement of various elements can provide valuable information regarding the nature and extent of activities carried out at the site.

Discussion and Analysis

The upper three disturbed contexts of TTI yielded Safavid and Qajar pottery, together with associated finds including oil lamps, ceramic jars, a stone basin, a door pivot stone, grinding stones, and hammerstones. Evidence of the Sangavar Fault, recorded in TTI as Context 15, appears to have played a significant role in disturbing the cultural layers. Surface pottery recovered from the site dates to several periods, including the Bronze Age (particularly the Kura Araxes period), the Iron Age, the Historic period, and the Islamic period. This chronological pattern was investigated and documented through two stratigraphic test trenches. In TTI, Contexts 1–42 are predominantly Islamic in date. At a depth of 5.25 m below the fixed datum, pottery sherds dating to the Seljuk and Ilkhanid periods were recovered, together with architectural remains in the form of

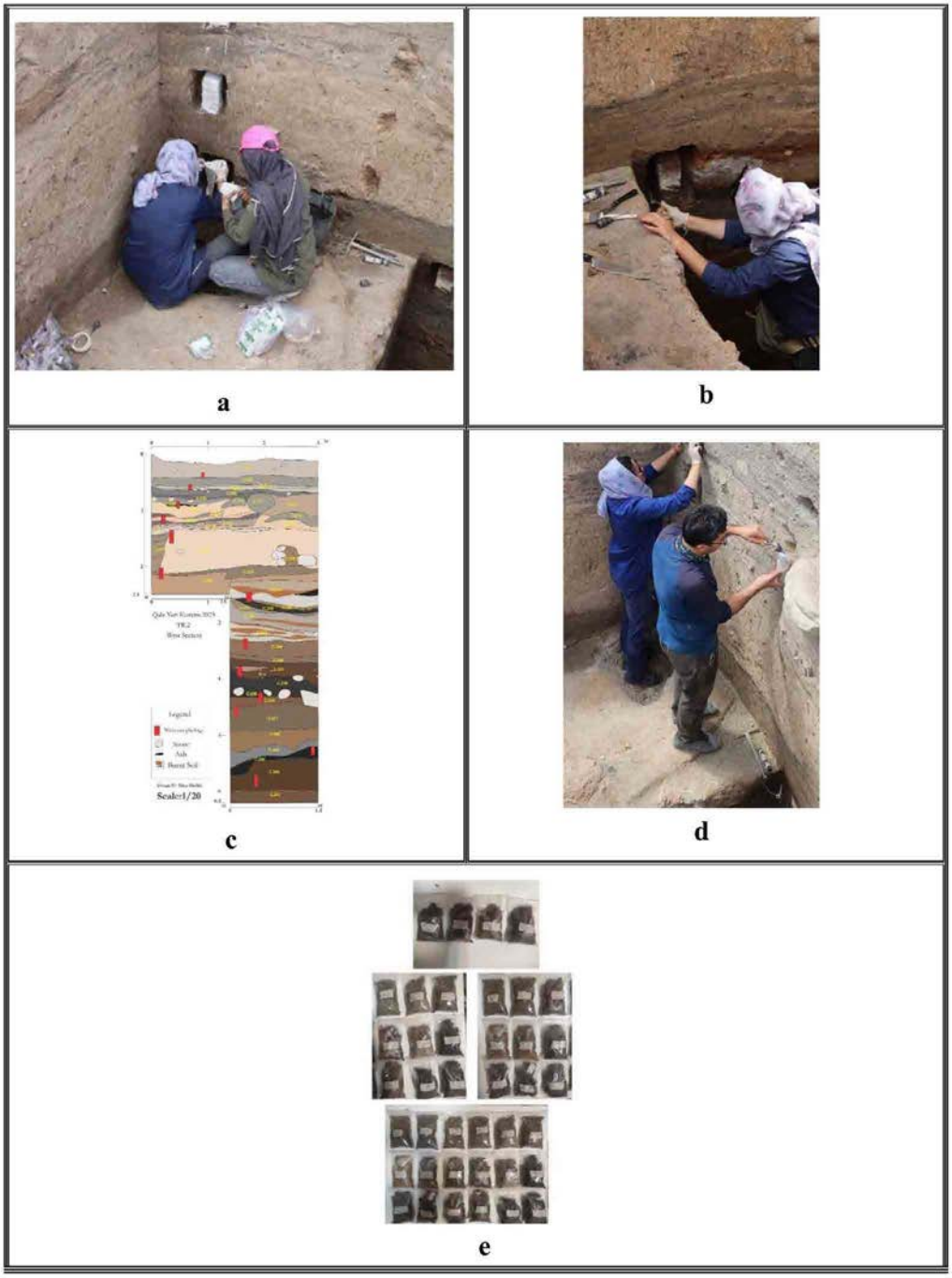

Fig. 21: Sampling from the western section of Trench II: a-b) Extraction and preparation of micromorphology samples; c) Sampling scheme indicating the positions of micromorphological samples; d-e) Extraction and preparation of samples for geochemical analyses (Abbasnejad Seresti, 2024).

rubble. Evidence of repeated occupation and abandonment during different phases of the Islamic period has been identified in this area. Contexts 44–88 are mainly attributed to the Historic period. The beginning of this phase is marked by the presence of Parthian pottery recovered beneath layers associated with a cultural discontinuity. Associated finds include clay spindle whorls, a clay disc, grinding stones, hammerstones, and a metallurgical mould. This occupational phase extends from approximately 5.5 m to 9

m below the fixed datum. A substantial mudbrick wall, preserved to eight courses with bricks measuring 40×10 cm and set in mortar, is also likely associated with this period. Beneath this structure, a sedimentary layer approximately 1 m thick was identified. Below these deposits, limited evidence of the Iron Age was identified. Iron Age pottery, post dating the Parthian period, was recovered at a depth of approximately 9 m below the benchmark, together with fragmentary stone and mudbrick architectural remains. Given the presence of Historic period pottery in Context 42, the overlying architectural sequence is cautiously attributed to the Historic period. Although the limited exposure of the stratigraphic trenches restricts detailed architectural interpretation, the presence of successive occupation layers allows for a preliminary assessment of spatial organization and functional variation across different periods. Layers of mudbrick and mudbrick rubble (Contexts 46, 56), compacted floors (Contexts 47, 50, 65, 72, 76), dry stone walls (Contexts 48, 49), and areas associated with fire and heat (Contexts 57, 80), together with evidence of additional activities such as rectangular pits, abundant pottery, bronze objects, metalworking tools, and clay remains extending into deeper contexts, support the interpretation of a multifunctional habitation and workshop area. Between approximately 8.10 m and 11 m below the fixed datum, a period of occupational hiatus appears to be represented in this area. Below this interval, evidence of the Bronze Age was identified. Contexts 93–113 mainly represent the Bronze Age, particularly its early phase. From Contexts 94 to 113 in this test trench, a sequence of mudbrick and stone collapse layers, together with compacted surfaces, ash, charcoal, and traces of burning, was identified, generally reflecting Bronze Age activities. The presence of the semicircular oven wall (Context 112) and the furnace bed (Context 113), together with layers containing burning and ash, indicates activities related to cooking or other thermal processes. TTII, which yielded 566 pottery sherds, is almost entirely associated with the Early Bronze Age (Kura Araxes period).

The deeper stratigraphic levels, together with the settlement patterns and activities of this period, are therefore more clearly represented in this trench. The pottery assemblages from both test trenches, in combination with the stratigraphic sequence, provide a coherent framework for understanding the development of occupation and site use over time. Although evidence of metalworking—including slag, copper ore, tools, and metal objects—was recovered from several contexts in both test trenches, the principal concentration of this material was identified in Context 226 of TTII. The heated floor, together with the presence of an oval shaped furnace, mud plastering, large quantities of coloured forge welding slag (green and red), copper ore, slag, and fragments of metal objects, indicates an industrial function and most likely reflects smelting and refining activities within this context. The discovery of additional tools, such as moulding implements and fragments of copper ore in Contexts 232 and 239, further highlights the importance of metalworking activities in this area during the Early Bronze Age. Multiple faults identified in TTI, including one associated with

the Sangavar Fault (Context 15) extending to a depth of approximately 450 cm, have displaced and disturbed the cultural layers and appear to have affected deposits dating to the Islamic and Historic periods. A similar fault was also identified in Context 226 of TTII within the remains of an Early Bronze Age kiln. The cut profile of the southern wall of the trench is illustrated in Figure 22.

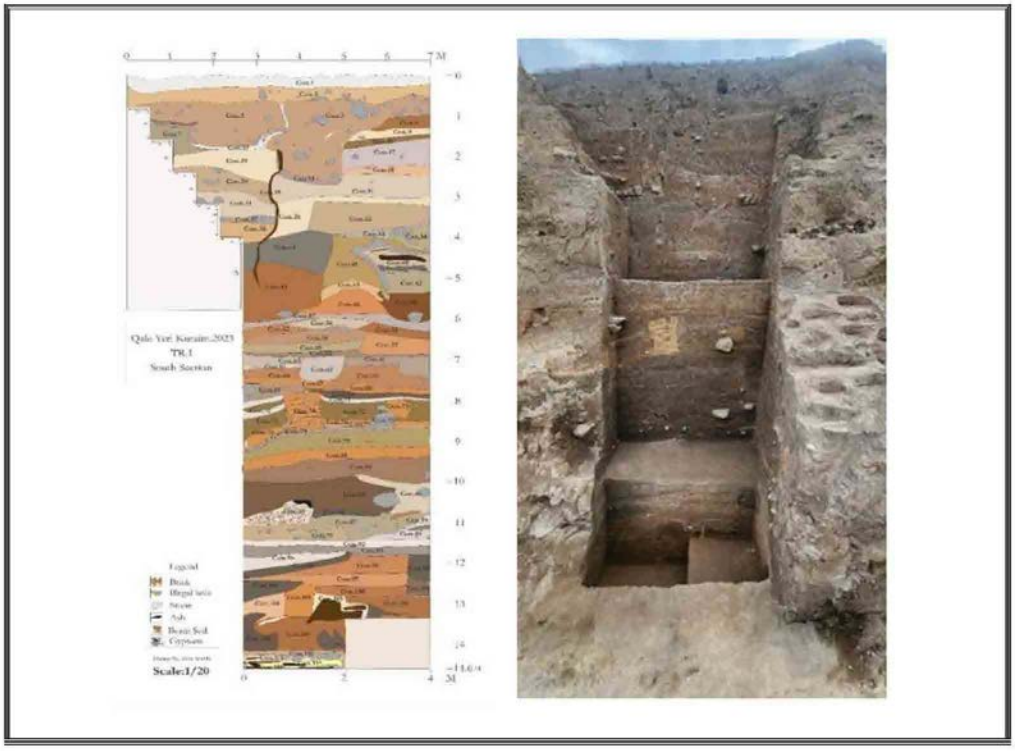

Fig. 22: South profile of Trench I; Section drawing and photograph (Abbasnejad Seresti, 2024).

Analysis of Bronze Age Faunal Remains

Analysis of Bronze Age faunal remains from both test trenches indicates the presence of a range of species, including mammals—primarily sheep, followed by bovids, boar, and deer—as well as reptiles. This assemblage suggests a subsistence economy largely based on animal husbandry. This pattern is further supported by preliminary archaeobotanical data. The presence of domesticated cereals within settlement layers indicates a mixed agro pastoral economy combining agriculture and livestock management. In the following discussion, the Early Bronze Age assemblage is examined in greater detail, given the significance of this period in the region. As noted above, TTII was placed in an area where successive stratigraphic layers were visible in the mound profile, allowing the excavation to complement the sequence documented in TTI and further clarify Early Bronze Age occupation. The 47 contexts recorded in TTII include settlement floors, kilns, mudbrick walls, pits, fire related installations, cultural gaps, limestone and rubble walling, river stone deposits, ash and heat affected layers, and deposits containing organic remains. These contexts reflect multiple phases of Bronze Age occupation, particularly during the

Early Bronze Age. Two seismic events are suggested within the sequence, possibly contributing to episodes of abandonment. Evidence of flood related deposits was also identified in contexts associated with these events, including Context 226. No evidence of metalworking was identified in the upper layers (Contexts 201–226). However, Context 226, with its metalworking furnace and associated finds, indicates the presence of this early industrial activity in the area. Evidence of such activity continues almost uninterrupted into the lower layers of this test trench. The Kura Araxes pottery recovered from this context downward indicates that these layers were contemporaneous with the metalworking activities described above. It is therefore highly likely that this furnace and its associated finds—including moulds, crucibles, and slag—belong to the well known metalworking tradition associated with the Kura Araxes culture. The available evidence suggests that the site was inhabited during the Early Bronze Age by a community familiar with the material culture of the Kura Araxes horizon, including its characteristic pottery and metallurgical practices. The cultural remains of the excavated contexts, especially Context 226 and the layers below, show similarities to the Shengavit IV phase—considered one of the developmental stages of the Kura Araxes (Old Transcaucasian) culture—as well as to Yanik Tepe VI (Sagona, 2023). These findings suggest that the Qaleh Yeri–Kuraim site was one of the active centers of the Kura Araxes cultural sphere in the easternmost part of northwestern Iran during this period. The profile of the western wall of TTII at the end of the excavation is shown in Figure 22.

Conclusion

The stratigraphic excavation at Qaleh Yeri–Kuraim Tepe demonstrates a long, multi layered, and complex occupational sequence, characterized by both continuity and fluctuations in settlement patterns from the third millennium BCE to the Middle Islamic period. The results of the first excavation season allow a relative reconstruction of the site's cultural and occupational development and provide important evidence for refining the regional chronology of the easternmost part of northwestern Iran. The significance of these findings lies not only in establishing the stratigraphic sequence but also in identifying phases of change, discontinuity, continuity, and reoccupation within the site. The finds from the deepest cultural layers—especially in TTII and in Contexts 101–113 of TTI—indicate that the earliest phase of occupation at the site dates to the Early Bronze Age and corresponds to the Kura Araxes (Old Transcaucasian) cultural horizon. The high concentration of burnished black and gray wares with geometric incised decoration, together with the remains of dry stone architecture and evidence of industrial kilns, points to the existence of an organized, active, and probably production

oriented settlement during the third millennium BCE. The similarity of these materials to assemblages from the South Caucasus, Eastern Anatolia, and the Lake Urmia basin places the site within the broader Kura Araxes cultural sphere and indicates that Qaleh Yeri–Kuraim was not a peripheral settlement but one of the important eastern centers of this cultural tradition. Accordingly, during the Bronze Age, Qaleh Yeri–Kuraim functioned not only as a habitation site but also as a place of production. Recent archaeometric studies of Kura Araxes pottery assemblages from northwestern Iran further support this interpretation, demonstrating that communities in this region maintained strong technological and cultural links with the core Caucasian zone while simultaneously developing localized ceramic traditions (Maziar & Erfurth, 2025).

Stratigraphic evidence indicates that occupation at the site was not continuous but was interrupted by at least two major hiatuses. The first, dated to the transition from the Bronze Age to the Iron Age at a depth of approximately 10.8–11 m, represents a significant break in occupation. The second occurs at depths of 5.25–5.5 m and marks the boundary between the Historic and early Islamic periods. These discontinuities suggest that the occupational history of the site was episodic rather than continuous and was shaped by changing environmental and cultural conditions. In addition, data from TTI—particularly from levels associated with the Iron Age and the Historic period—indicate that the site during these phases functioned as more than a simple residential settlement and may have developed industrial and possibly defensive characteristics. The presence of a substantial mudbrick wall, a metallurgical mould, and features associated with a furnace suggests that the area functioned as a combined settlement and production space and possibly as a fortified workshop during this period. From a methodological perspective, this study demonstrates that, even in the absence of absolute dating, a combined approach integrating stratigraphy, pottery typology, and interregional comparison can provide a reliable framework for constructing relative chronologies. The correspondence between the ceramic and architectural evidence from Qaleh Yeri–Kuraim and established cultural horizons in the South Caucasus, Eastern Anatolia, and northwestern Iran allows the site to be placed within a broader regional chronological context. Furthermore, the possible influence of tectonic factors—particularly the Sangavar Fault—may help explain some of the occupational discontinuities identified at the site, highlighting the importance of interdisciplinary approaches such as geoarchaeology and geomorphology in the analysis and interpretation of archaeological data. The site contributes to a better understanding of the Kura Araxes horizon in northwestern Iran and, by revealing patterns of continuity and interruption in settlement, provides a more realistic picture of the cultural and environmental dynamics of the region. Accordingly, the continuation of stratigraphic excavations, together with absolute dating and supplementary studies

in pottery typology, technical analyses, geoarchaeology, and laboratory investigations, will further refine this framework and improve the chronological understanding of both the site and the region.

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Author Contribution

The contribution of all authors to the writing of the article has been equal.

Conflict of Interest

In adherence to ethical publication standards, the authors affirm that there are no conflicts of interest, either personal or financial, that could have influenced the content or conclusions presented in this research.

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۳۵

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نویافته‌های کاوش لایه‌نگاری در محوطهٔ قلعه یئری کورائیم، اردبیل

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چکیده

محوطه‌های باستانی دشت اردبیل شواهدی بنیادین برای شناخت توالی‌های فرهنگی شمال‌غرب ایران و بررسی تعاملات این منطقه با فلات ایران، قفقاز جنوبی و آناتولی شرقی فراهم می‌کنند. درمیان این محوطه‌ها، تپهٔ قلعه‌یئری کورائیم از اهمیت ویژه‌ای برخوردار است. نتایج نخستین فصل کاوش‌های لایه‌نگارانه این محوطه در ۱۴۰۲هـ.ش. براساس داده‌های کاوش دو گمانه حاصل شده است. گمانهٔ I با هدف دستیابی به توالی کامل استقراری محوطه و گمانهٔ II با تمرکز بر نهشته‌های مرتبط با افق عصر مفرغ قدیم ماوراءقفقاز (کورا-ارس) ایجاد شد. کاوش‌ها شواهد باستان‌شناختی قابل‌توجهی شامل بقایای معماری سنگ‌چین خشک و خشت‌گلی، تأسیسات صنعتی نظیر کوره‌ها، شواهد فلزکاری و مجموعه‌های گستردهٔ سفالی را آشکار ساخت. در گمانهٔ I توالی لایه‌نگاری منسجم و نسبتاً کاملی به ضخامت حدود ۱۴٫۶متر مستند شد که دربرگیرندهٔ لایه‌های متوالی و گاه متناوب دارای سفال‌های دوران اسلامی، تاریخی و عصر مفرغ است. این توالی یکی از پیوسته‌ترین شواهد لایه‌نگاری شناخته‌شده در بخش شرقی شمال‌غرب ایران به‌شمار می‌رود. در گمانهٔ II شواهد مهمی از فعالیت‌های فلزکاری شامل: بقایای کوره، سرباره، قطعات سنگ معدن مس، قالب‌های سفالی و بوته‌های فلزگری به‌دست آمد که نشان‌دهندهٔ ذوب، پالایش و تولید اشیائ فلزی در عصر مفرغ قدیم است؛ هم‌چنین بقایای جانوری، عمدتاً گوسفند و گاو، و بقایای گیاهی به‌ویژه گندم و جو، بیانگر اقتصادی مبتنی‌بر کشاورزی و دامداری است. یافته‌های ویژه‌ای هم‌چون ابزارهای ابسیدینی، سردوک‌ها، سنگ‌ساب‌ها، ابزارهای استخوانی و پیکرک‌های سفالی نیز گویای فعالیت‌های معیشتی، اقتصادی و نمادین جوامع ساکن محوطه از عصر مفرغ تا دوره‌های تاریخی و اسلامی هستند. باتوجه به فقدان تاریخ‌گذاری مطلق، چارچوب گاهنگاری محوطه برپایهٔ گاهنگاری نسبی و گونه‌شناسی سفال استوار است. نتایج پژوهش، تداوم بلندمدت استقرار را نشان می‌دهد که با دو وقفهٔ عمدهٔ سکونتی، احتمالاً درنتیجه فعالیت‌های زمین‌ساختی مرتبط با گسل سنگاور و نیز تحولات محیطی و تاریخی منطقه، همراه بوده است.

کلیدواژگان: دشت اردبیل، کاوش لایه‌نگاری،قلعه‌یئری کورائیم، توالی لایه‌های فرهنگی، دورهٔ مفرغ قدیم، فلزگری کهن.

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Investigating Cultural Transformations of the Bronze Age along the Alborz Mountain Range

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Abstract

The transition from the late 4th millennium BCE to the Bronze and Iron Ages along the northern and southern slopes of the Alborz Mountains is a major topic in archaeology, closely linked to the emergence of urbanism. Archaeological research indicates that with the end of Sialk III, many settlements, including those on the Qazvin Plain, collapsed. Similar processes occurred during the early 3rd millennium BCE in regions such as Kashan and Tehran. Although new settlements appeared in the Qazvin Plain during the later 3rd millennium BCE, the areas of Tehran, Qomrud, and Kashan were reoccupied only after a significant gap. In contrast, the northern flank of the Alborz displays a settlement history distinct from that of the southern side. While evidence for the influence of Sialk III in the north is limited, substantial occupation during the 3rd millennium BCE suggests divergent cultural developments on the two sides of the Alborz. This study draws on archaeological data from excavations and surveys in the northern and southern Alborz Mountains to examine Bronze Age (3rd millennium BCE) cultural developments. It highlights interaction networks linking the Gorgan Plain, southern Turkmenistan, Mazandaran, northeastern Iran, and the Central Plateau through exchanges of raw materials, technologies, and pottery traditions. Evidence from sites such as Tepe Hissar, Tureng Tepe, Ghal e-Ben, Ghal e-Kash, Tepe Kalar, and Qoli Darvish demonstrates cultural diversity, overlapping ceramic traditions, and continuous or discontinuous occupational sequences. The article emphasizes a contrast between the cultural hiatus of the Iranian Central Plateau and the flourishing development of the northern Alborz, particularly eastern Mazandaran and the Gorgan Plain, where regional interaction networks expanded. By contrast, the southern Alborz reflects migration, settlement disintegration, and environmental adaptation. Overall, the study identifies the Central Alborz as a key corridor for cultural interaction and interregional networks during the Bronze Age.

Keywords: Bronze Age, North and South Central Alborz, Pottery/Ceramics, Trade and Cultural Networks, Cultural Continuity and Discontinuity.

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Introduction

During the Bronze Age, sedentary societies achieved significant advancements in technology, architecture, economy, and agriculture, leading to an expansion in the size of settlements (Basafa, 2024a: 50; Masson & Sarianidi, 1972: 113). Cultural interactions between adjacent regions began in the second half of the 4th millennium BCE (Oursaria, 2007: 141) and intensified throughout the Bronze Age until the mid 2nd millennium BCE. A complex trade network emerged, facilitating the transfer of raw materials, goods, people, and ideas (Vahdati, 2015: 38). This period is characterized by extramural relations, socio economic complexity, the formation of cities, urban economies, and increasing specialization (Garazhian & Lotfi Qaraei, 2015: 55). Regional cultures developed across different parts of Iran, and due to the proliferation of exchanges, some archaeologists have referred to this era as the "Period of International Trade" (Amiet, 1993). Archaeological evidence—including bronze artifacts, precious stones, counting devices (Schmandt Besserat, 1992), shaft hole axes (Basafa, 2024a), trade routes (Matthews & Fazeli, 2004), settlement hierarchies (Gibbon, 1984), and Painted Red and Gray wares—provides important indicators of cultural interaction during this period.

The study of cultural interaction gained prominence in the mid 20th century CE as scholars sought to reconstruct the social history of ancient societies through material evidence (Childe, 1951). Processual and evolutionary approaches explained cultural change in relation to environmental resources (Steward, 1942; White, 1959). Subsequently, scholars examined increasing socio economic complexity within ancient societies (Service, 1971). Ecological approaches also became important in the analysis of archaeological sites and materials (Clark, 1989). Influenced by the New Archaeology, topics such as the organization of production and distribution systems, as well as patterns of cultural interaction, were further explored (Peacock, 1981; Van der Leeuw, 1981, 1987; Rice, 1987; Arnold, 1991; Costin, 1991; Clark, 1995). In Southwest Asia, cultural interactions began in the second half of the 4th millennium BCE and continued until the mid 2nd millennium BCE. These interactions contributed to the establishment of trade networks, the exchange of raw materials and artifacts, extramural contacts, the movement of people and ideas, the formation of central institutions, increasing socio economic complexity, and greater specialization (Wright, 1984; Brumfiel & Earle, 1987; Earle, 1997; Wright & Johnson, 1975: 267). Within this broader context, the Iranian Plateau played a crucial role in the developmental processes of Southwest Asia during the 4th and 3rd millennia BCE (Tosi et al., 1992; Kohl, 1978; Karlovsky & Kohl, 1971; Thornton, 2013; Thornton et al., 2013).

Furthermore, the manner in which the 4th millennium BCE came to an end and urbanism began constitutes an important issue in the archaeology of both the northern and southern flanks of the Central Alborz. Although limited evidence exists for the influence of the Sialk III culture in the northern Alborz region, studies indicate that with the end of Sialk III many key settlements—such as those in the Qazvin Plain—collapsed. In

general, the settlement history of the northern flank of the Alborz during the 4th and 3rd millennia BCE differs significantly from that of the southern flank. Moreover, the level of cultural complexity among human societies in the 3rd millennium BCE varied across the two sides of the Alborz. This variation is partly related to the fact that contemporary civilizations both within and beyond the political borders of the Iranian Plateau, such as the Helmand and Jiroft civilizations, had already developed many characteristics associated with urbanism.

Research Questions and Hypotheses: The primary questions of this research concern the processes associated with the end of the 4th millennium BCE, the beginning of the Bronze Age, the development of urbanization, and ultimately the onset of the Iron Age across the northern and southern ranges of the Alborz Mountains. This study also seeks to clarify how these transitional processes unfolded and what characteristics accompanied them. The importance of these questions lies in the fact that this chronological span in Iranian archaeological studies—particularly in the northern and southern regions of the Central Alborz—still contains many ambiguities and shortcomings in terms of data interpretation and chronology. Fortunately, recent research has partially provided the means to identify the characteristics of cultural and social continuity or discontinuity during these periods. Building on these developments, the cultural dynamics of the 3rd millennium BCE on the southern and northern flanks of the Central Alborz can be examined and re evaluated with greater precision.

Methodology: The present study is based on a library and document based method of data collection. Relevant data were gathered through a review of scholarly sources and archaeological excavation reports from the study area—the northern and southern Alborz regions—as well as adjacent areas. Using a descriptive analytical approach, this study examines cultural trends, patterns of continuity or discontinuity, and both intra regional and interregional interactions within the northern and southern Alborz region.

Research Background

Data from excavations and archaeological research conducted over the past few decades demonstrate that extensive interactions occurred across the Iranian Plateau from the late 4th millennium BCE through the 3rd millennium BCE. It is likely that numerous communication routes, particularly those passing through desert margins, facilitated cultural connections among different regions. Excavations at Shahdad (Kaboli, 1973; Hakemi, 2006), Tepe Yahya (Lamberg Karlovsky, 1970; Lamberg Karlovsky & Tosi, 1973), and Jiroft (Majidzadeh, 2003) in the Kerman region; at Shahr e Sokhte in Sistan (Tosi, 1969, 1983; Seyed Sajjadi, 2002); at Tal e Malyan in Fars (Sumner, 1974); in southwestern Iran (Alden, 1982); at Godin Tepe (Young, 1969); and in northwestern Iran at sites such as Hasanlu (Dyson, 1967), Goy Tepe (Brown, 1951), Haftavan (Burney, 1970), and Yanik Tepe (Burney, 1961) have significantly transformed our understanding of the Bronze and Iron Ages on the Iranian Plateau. These investigations

have contributed to a clearer understanding of cultural processes during the late 4th, 3rd, and early 2nd millennia BCE. However, despite excavations at sites in the southern Alborz—including Tepe Sofalin (Hessari et al., 2007), Ozbaki (Majidzadeh, 2010), Shoghali (Hessari & Akbari, 2007), Sagzabad (Talaei & Aliyari, 2014), and Arisman (Helwing, 2007; 2011)—and in the northern Alborz region at sites such as Tepe Hissar, Damghan (Schmidt, 1937; Dyson & Howard, 1989); Tepe Chalow (Vahdati & Biscione, 2014; 2015); Shahrak e Firouzeh (Basafa, 2024b); Shah Tepe, Tureng Tepe, and Yarim Tepe (Arne, 1945; Deshayes, 1968a–b, 1976; Stronach, 1972); Narges Tepe in Gorgan (Abbasi, 2011); Gohar Tepe (Mahfrouzi, 2007); Yaghout Tepe, Behshahr (Mahfrouzi, 2006); Tepe Kalar, Kelardasht (Mousavi Kouhpar & Abbas Nejad Sarasti, 2007); Ghal e Kash, Amol (Amirkolaei, 2009); Ghal e Pay (Mahfrouzi, 2009a); Tarkam Tepe, Sari (Mahfrouzi, 2009b); Komishan Cave (Vahdati Nasab, 2009); Tepe Abbasi, Neka (Abbas Nejad Sarasti, 2009); and recent excavations at Ghal e Ben in Babol County (Fazeli Nashli, 2018; Safari et al., 2021; Fazeli et al., 2022a)—our understanding of these periods in the Alborz region remains limited. Consequently, the processes marking the end of the 4th millennium BCE, the emergence of the Bronze Age and urbanism, and the beginning of the Iron Age on both the northern/northeastern and southern sides of the Central Alborz (the Iranian Central Plateau) still contain significant ambiguities and gaps in terms of data interpretation and chronological frameworks.

The Bronze Age (3rd Millennium BCE) in the Northern Flank of the Central Alborz

The Bronze Age in the northern and northeastern flanks of the Central Alborz is represented by sites such as Anau III, Namazga IV–VI, Hissar II–III, Shah Tepe II, Yarim Tepe III, Tureng Tepe III–IIB, and Narges Tepe III. Evidence for the Early Bronze Age has been identified at sites including Namazga IV; the lower layers of Anau III and Altyn VIII–IV; Khabur Tepe XII–III; Ulug Tepe; Aq Tepe; Shah Tepe II; Tureng Tepe IIIA; Narges Tepe IIIC; Tepe Yam; Qaleh Khan, Shirvan; and the upper valleys of the Atrek, as well as Hissar IIB–IIIA and Chalow. In Mazandaran, archaeological layers corresponding to this phase have been identified at sites such as Gohar Tepe, Tepe Kalar, Ghal e Kash Tepe, Tarkam Tepe, Tepe Sad, Ghal e Pay Tepe, and Ghal e Ben in Bozrudpey. Middle Bronze Age layers are documented at Namazga V and in parts of Anau III and Altyn III–I, which are contemporary with Hissar IIIB, Yarim Tepe III, Shah Tepe II, Tureng Tepe IIIB, Narges Tepe IIIB, Chalow, and Shahrak e Firouzeh. Archaeological layers at Gohar Tepe, Tepe Kalar, Ghal e Kash Tepe, Tarkam Tepe, Tepe Sad, Ghal e Pay Tepe, and Ghal e Ben in Bozrudpey (Mazandaran) also correspond to this phase. Evidence of the Late Bronze Age has been identified at Namazga VI (the Gonur Phase), Hissar IIIC, Shah Tepe IIA, Narges Tepe IIIA, Tureng Tepe IIIC, as well as at the aforementioned sites in Mazandaran.

Cultural Interactions and Regional Dynamics

In general, during the late 4th millennium BCE, Tepe Hissar—unlike in earlier periods, when it was closely linked to the Central Plateau—established stronger cultural connections with northeastern regions, the Gorgan Plain, and southern Turkmenistan (Thornton, 2013; Thornton et al., 2013). During this period, the production of Burnished Gray Ware became widespread, creating a degree of homogeneity between the ceramic industries of Hissar and sites on the Gorgan Plain. In southern Turkmenistan, however, a distinct cultural divergence emerged through the production of two different pottery traditions: gray ware and buff ware (Turkmenian). The distribution of Gray Ware extended southwestward, reaching the Shahrud and Damghan plains, while Buff Ware spread toward the southeastern regions of Turkmenistan, including the Murghab and Tejen deltas (Garazhian, 2005: 69–98).

During the Bronze Age, cultural similarities can be observed between Central Asia and the eastern half of the Iranian Plateau. Despite limited evidence of Proto Elamite influence—such as a small number of tablets—both regions lacked a fully developed writing system, which represents a shared characteristic. Moreover, the use of non local stones such as marble and chlorite/steatite for producing tools, vessels, and ornaments suggests possible connections between these regions and Iran. One of the most significant aspects for examining these connections is the development of urbanism during the Middle Bronze Age in southern Turkmenistan, which may help clarify the cultural and social relationships between these areas.

During the initial phase of this period, urbanism reached a high level of development, and extensive interregional relations were established between major centers such as Altyn Tepe and Namazga with regions including Sindh, Afghanistan, Iran, and even Mesopotamia (Olson, 2003; Masson, 1988, 1992; Sarianidi, 1971; Kohl, 1978; Kirtcho, 2009). However, in the late Middle Bronze Age, some settlements were abandoned, and the size of large centers such as Namazga was significantly reduced, in some cases shrinking to the scale of villages. This crisis—likely related to environmental constraints—led to the migration of populations from Namazga V into the mountainous valleys of Khorasan (Garazhian, 2005: 69–98). The situation became more critical during the late Namazga V phase and the beginning of Namazga VI. Sites such as Khabur Tepe and probably Altyn Tepe were completely abandoned, and the Tejen region was depopulated. Nevertheless, exceptions such as Takhirbay and Togolok continued to be occupied from the Late Bronze Age into the Iron Age (Kohl, 1984: 195). In the final stages of the Late Bronze Age, contemporaneous with Namazga VI, the Bactrian–Margiana Archaeological Complex (BMAC), also known as the Greater Khorasan Culture, emerged. This development has generated significant discussion concerning the transition from the Late Bronze Age to Iron Age I (Yaz I), as well as the similarities and continuity of this process in both the eastern (Mary) and western (Bactria) regions of southern Turkmenistan and its connections with northeastern Iran (Iravani Qadim et

al., 2017; Tahmasbi Zaveh & Iravani Qadim, 2015). Although Masson and Sarianidi proposed a hiatus between Namazga VI and Yaz I (Masson & Sarianidi, 1972), Khlopin argued that no such break existed. According to his interpretation, the late Namazga VI phase represents both the final stage of the Late Bronze Age and the beginning of Iron Age I. He demonstrated the continuity of ceramic traditions across these periods and suggested that late Namazga VI should be considered the natural historical and cultural foundation of the Early Iron Age (Khlopina, 1981: 44).

The Gorgan Plain and Mazandaran

The Gorgan Plain occupies a particularly important position in the study of these processes because it represents a natural convergence zone linking the Iranian Plateau, the Turkmenian oasis belt, and the Trans Caspian steppes. Deshayes described this region as a frontier between the settled urban and rural populations of Iran and the nomadic groups inhabiting the adjacent and Trans Caspian steppes (Deshayes, 1968a). Evidence indicates that the Gorgan Plain experienced significant transformations in technological innovations—especially in ceramics—as well as in cultural and demographic interactions from the late 4th millennium BCE to the first half of the 2nd millennium BCE. The sudden or gradual abandonment of settlements during the Late Bronze Age (Masson & Sarianidi, 1972: 291–310), together with cultural homogenization, migration, and demographic shifts (Deshayes, 1968b; Mousavi, 2008), illustrates some of these developments. One of the most influential issues in this context is the emergence of Burnished Black and Gray Ware in the Gorgan Plain and its surrounding regions, a phenomenon interpreted in some cases as gradual and in others as abrupt.

Within this broader context, the eastern and central parts of Mazandaran—together with the Gorgan Plain forming an important section of the northern flank of the Central Alborz—are particularly significant for analyzing these developments. Archaeological data from sites such as Gohar Tepe, Ghal e Kash Tepe, Tarkam Tepe, Tepe Sad, Ghal e Pay Tepe, Ghal e Ben (Tepe Bozrudpey), and other sites provide valuable evidence for understanding these cultural processes. Recent studies at the sites of Ghal e Ben and Ghal e Kash in Mazandaran suggest that many settlements previously attributed to the Iron Age actually belong to the Late Bronze Age (ca. 1600–1500 BCE) (Safari et al., 2021). This conclusion is supported by stratigraphic evidence, absolute chronology, and ceramic comparisons. Of approximately 350 identified sites in Mazandaran, 15 have been attributed to the Bronze Age and 252 to the Iron Age. However, many of the sites classified as Iron Age—due to the absence of absolute dating, stratigraphic excavation, and systematic ceramic classification—may in fact belong to the Bronze Age (ca. 3200–1500 BCE) (Heydari, 2017; Heydari et al., 2018; Fazeli Nashli et al., 2023: 135). Tepe Sad in southern Sari has yielded Buff Ware (IIb) comparable to that of Hissar IB, as well as Gray and Black Burnished Ware in the upper layers. These ceramics are plain and lack incised decoration. Both wheel made and handmade pottery have

been identified at the site (Mahfrouzi, 2013). Gohar Tepe in Behshahr (ca. 3400–1900 BCE) contains occupational layers from the Late Chalcolithic, Bronze, and Iron Ages (Piller & Mahfrouzi, 2009: 3). Late Chalcolithic pottery of the Caspian type has been identified, although no associated architectural remains or tools have been discovered (Mahfrouzi, 2007: 351, 358). Middle Bronze Age burials (ca. 3100–2300 BCE) and a Late Bronze Age cemetery (ca. 1600–1500 BCE) have also been identified. The pottery associated with these contexts shows similarities to ceramics from Hissar IIIB–IIIC and the Parkhai cemetery in Turkmenistan (Piller & Mahfrouzi, 2009: 5).

At Tarkam Tepe in Sari, various pottery types dating from the Chalcolithic to the Late Bronze Age have been identified. Bronze Age ceramics include polished gray ware, polished black ware, and gray wares with geometric incised decoration. A notable example is a tall footed polished gray vessel with incised motifs on its body, comparable in style and form to tall footed vessels from the Hissar IIB and Shah Tepe IIA ceramic traditions (Early and Middle Bronze Age) (Mahfrouzi, 2009b). Ghal e Kash Tepe is an important Bronze Age settlement in the northern Alborz that, based on relative chronology, appears to have experienced continuous occupation from the Early to the Late Bronze Age. The Bronze Age pottery from this site is comparable to that of Hissar IIIC and Shah Tepe IIA (Safari et al., 2014).

Tepe Kalar in Kelardasht is another key Bronze Age site in Mazandaran, providing valuable information about the cultural developments and absolute chronology of the region. Excavations and radiocarbon dating indicate continuous occupation from the Chalcolithic through the Bronze Age, Iron Age, and Islamic periods (Mousavi Kouhpar & Abbas Nejad Sarasti, 2007: 127–128). Absolute dates include approximately 3723–3540 BCE, 2880–2830 BCE, and 2299 BCE. Evidence suggests a gradual transition to the Bronze Age and a degree of cultural continuity; however, the precise nature of continuity or discontinuity between certain occupational layers remains unclear (Heydarian, 2011). During the Early Bronze Age, Kura Araxes pottery characterized by gray and black fabrics with zigzag and linear motifs appears. In the Middle Bronze Age, an increase in dark gray and black pottery with incised decoration is clearly evident.

The site of Ghal e Ben (Bozrudpey) in Babol County, according to radiocarbon dating, was occupied from the late Chalcolithic period (ca. 3200–1450 BCE) and emerged as an important regional center by the end of the 4th millennium BCE. Occupation continued through the Middle and Late Bronze Ages but appears to have ceased during the transition to the Iron Age, possibly due to environmental changes. Late Chalcolithic pottery at the site is predominantly red, brown, and light gray, with brown to red or sometimes entirely gray fabrics (Fazeli Nashli et al., 2022a: 122). Typologically, this pottery shows similarities with ceramics from sites such as Gohar Tepe (Mahfrouzi, 2007), Ghal e Kash (Amirkolaei, 2009), and Komishan Cave (Zare Khalili, 2010). Ceramic typological analysis also indicates cultural connections between Ghal e Ben and northeastern Iranian sites such as Shah Tepe III–IIb (Arne, 1945), Tureng Tepe

IIA (Deshayes, 1968–1976), and Narges Tepe IV (Abbasi, 2011). Bronze Age pottery at Ghal e Ben is predominantly gray and includes a range of light and dark shades, with burnished, incised, and dotted decorative motifs. A small number of Kura Araxes type pottery fragments have also been identified, suggesting cultural connections with western and northwestern Iran. On this basis, Ghal e Ben may represent the easternmost extent of Kura Araxes cultural influence (Fazeli Nashli et al., 2022a: 124).

The Bactrian–Margiana Archaeological Complex (BMAC) and Northeastern Iran

During the second half of the 3rd millennium BCE (Namazga V), significant developments occurred in human societies in the oases of Bactria, Mary, and the foothills of the Kopet Dag. These developments gradually spread eastward and influenced the Bactria region of northern Afghanistan. This process ultimately led to the formation of a culture known as the Bactrian–Margiana Archaeological Complex (BMAC) (Masson, 1988; Sarianidi, 1998: 35). This culture, which continued the cultural traditions of the Kopet Dag foothills (Hiebert, 1994; Sarianidi, 1981), influenced important settlements in northeastern Iran during this period. These include sites such as Chalow Jajarm (Vahdati & Biscione, 2014; 2015), Jeyran Tepe in Esfarayen (Vahdati, 2016), Eshgh Tepe in Bojnurd (Vahdati, 2014), Shahrak e Firouzeh in Neyshabur (Basafa, 2024b), Kalat e Shouri (Qarachehmeh) in Neyshabur (Basafa, 2015), Damghani Tepe in Sabzevar (Vahdati & Frankfort, 2010), Fereizi Tepe in Sabzevar (Sabouri et al., 2015), Choupan Tepe in Bardaskan (Heydari & Babazadeh, 2016), and Naderi Tepe in Mashhad (Habibi et al., 2015), among other sites in the region.

BMAC influence can also be observed at major settlements in the Gorgan Plain, including Tepe Hissar in Damghan (Schmidt, 1937), Shah Tepe (Arne, 1945), Tureng Tepe (Deshayes, 1968a–b, 1976), Narges Tepe (Abbasi, 2011), Bazgir Tepe (Abbasi et al., 2012), and other sites in the region. A notable aspect of this period is the establishment of an extensive network of contacts with southern regions, particularly the Kerman region and the Shahdad and Jiroft cultural sphere, replacing earlier connections with the Helmand region. A similar pattern of interaction had already been observed during the Namazga III period (late 4th to early 3rd millennium BCE) (see: Hakemi, 2006; Pittman, 2014, 2019; Salvatori, 2008; Vidale, 2017). Cultural similarities between the BMAC and Hissar traditions became particularly apparent during the Hissar IIIC period (ca. 2300–1600 BCE). The differences between this phase and the preceding IIIB layer, together with the burning of the most important building of the IIIB phase (the "Burnt Building"), have been interpreted as evidence for a possibly non peaceful arrival of new populations associated with the BMAC or Greater Khorasan cultural sphere at this settlement. This phenomenon is often described as the expansion of the BMAC sphere of influence into northeastern Iran and its impact on Tepe Hissar (Tahmasbi Zaveh, 2015). The similarities between the cultural materials of the Gorgan Plain and those associated

with the BMAC have also been interpreted as evidence of trade and cultural interaction. Metal artifacts discovered at sites on the Gorgan Plain closely resemble the products of Hissar IIIC. At the same time, the absence of evidence for local metalworking activities in the Gorgan Plain and the lack of arsenical copper mines in the region suggest that these artifacts were likely imported from Tepe Hissar (Tahmasbi Zaveh, 2019: 243).

Gray ceramics discovered at Shahrak e Firouzeh, characterized by burnished gray surfaces, closely resemble the gray pottery traditions of northeastern Iran (Basafa, 2024b). These ceramics are particularly comparable to pottery from Hissar IIIB (Schmidt, 1937: 181) and settlements on the Gorgan Plain such as Tureng Tepe (Deshayes, 1965: 91). The presence of similar pottery types in Central Asia (Sarianidi, 2008: 63) further highlights the significance of these connections and suggests the existence of extensive interregional contacts. Between approximately 3200 and 1600 BCE, the northeastern regions of Iran and Central Asia appear to have been culturally interconnected, a relationship reflected in similarities in pottery, metal artifacts, beads, and various figurines.

The Bronze Age (3rd Millennium BCE) in the Southern Flank of the Central Alborz

Evidence for the Early Bronze Age on the southern flank of the Central Alborz has been identified at sites such as Qoli Darvish, Sialk IV, Arisman, Maral Tepe, Yousef Khan Khaveh, Kuopandeh Tepe, the Shizir site, Dowranabad, Shir Tal, Pardis Tepe, Arastou Tepe, and Meymandabad. Middle Bronze Age layers have been identified at Sagzabad, Qoli Darvish, and Estark Joushqan. Evidence of the Late Bronze Age has been documented at Tepe Qabrestan, Sialk A, Qoli Darvish, Shizar, and Qareh Tepe.

Cultural Hiatus and New Traditions

On the southern flank of the Central Alborz, which includes the plains of Tehran, Qom, Qazvin, and Isfahan, archaeological evidence indicates that the Early Bronze Age began with the end of the Sialk III period. Based on radiocarbon dating, Sialk IV 1–2—corresponding to the Early Bronze Age and the Proto Elamite culture (Proto Literate Period)—has been dated to 3300–2900 BCE (Fazeli Nashli et al., 2013; Pollard et al., 2013) and 3400–2900 BCE (Vidale et al., 2018) (see: also: Vatandoust et al., 2011; Noukandeh, 2010; Sarlak et al., 2013). Abrupt changes in pottery forms and types distinguish Sialk IV 1–2 from the final layers of Sialk III (III 6–7b).

Early Bronze Age pottery includes spouted pitchers, gray green globular jars, double handled jars, goblets, and handled goblets from Sialk IV 1 (Ghirshman, 2000: 68–69), as well as late painted vessels of Hissar IIB and gray vessels of Hissar IA (Schmidt, 1937). Additionally, beveled rim bowls recovered from Ozbaki (Majidzadeh, 2010: 51–52) and Meymandabad (Yousefi Zoshk et al., 2018: 240), together with similar examples from the sites of Shoghali and Sofalin (Hessari et al., 2007: 141–143), indicate new

cultural features during the late Chalcolithic and the beginning of the Bronze Age in this region. The most important sites representing the Proto Elamite period on the Central Iranian Plateau include Sialk IV 2, Arisman C3A–E, Maral Tepe (Ozbaki Layer VIII), Qoli Darvish (Layers II 5–1), and Tepe Sofalin. This period is characterized by the reappearance of specific geometric motifs—such as checkerboard and four square designs—the use of polychrome pottery, burial jars, beveled rim bowls, platters, pedestal vessels, open and closed mouth vessels, and nose lug jars. At sites such as Qoli Darvish and Sofalin, local varieties of gray, black incised, and brown pottery have also been identified (Helwing, 2011: 196; Sarlak et al., 2013). Evidence from recent excavations and studies suggests that the Central Plateau hosted large, multi period settlements whose material culture was influenced by three main cultural spheres: the Proto Elamite culture of southwestern Iran, the Kura Araxes culture from the Transcaucasus and northwestern Iran, and the Gray Ware tradition of northeastern Iran (Fazeli Nashli et al., 2022a: 154). The coexistence of local cultural traditions and the Kura Araxes culture is discernible in this region between approximately 3000 and 2400 BCE. In the Qazvin Plain, the Kura Araxes culture appears from the beginning of the 3rd millennium BCE, whereas in areas such as Yousef Khan Khaveh in the Qom Plain it appears around 2700 BCE (Sarlak, 2020). Clear cultural connections were also established during the Bronze Age between the Central Plateau and regions such as the Central Zagros, southwestern Iran, and eastern Iran within parts of the Zayanderud Basin (Ilkhan et al., 2019; Shojaee Esfahani & Rafiei Alavi, 2020; Rafiei Alavi & Shojaee Esfahani, 2020; Rafiei Alavi et al., 2021; Fazeli Nashli et al., 2022b).

With the end of Sialk III and the beginning of Sialk IV (Early Bronze Age), many settlements on the southern flank of the Central Alborz—particularly in the Qazvin, Kashan, and Rey Tehran plains—collapsed, and new settlement patterns emerged. The precise reasons for this discontinuity remain unclear, but settlement density appears to have reached a minimum during much of the 3rd millennium BCE, with signs of renewed occupation emerging only in the late 3rd and early 2nd millennium BCE. In the Qazvin Plain, the process of site abandonment began around 3400 BCE, and only a few sites maintained continuous occupation until the end of the 3rd millennium BCE. After the abandonment of Tepe Qabrestan around 3450 BCE (Pollard et al., 2012), a prolonged settlement hiatus occurred until sites such as Sagzabad were reoccupied during the Middle Bronze Age (Fazeli Nashli et al., 2022b: 155). In contrast, the Shizir site in the southwestern Qazvin Plain and the Zagros foothills remained continuously occupied throughout the 4th and 3rd millennia BCE, a pattern that continued into the 2nd millennium BCE (Pollard et al., 2012; Fazeli Nashli et al., 2022b: 155). Evidence from the Meymandabad site in the Tehran Plain suggests cultural continuity between the Sialk III 7 and Sialk IV 1 phases. This evidence also indicates connections between Meymandabad and settlements such as Sialk, Qabrestan, Hissar, and Ozbaki (Yousefi Zoshk et al., 2018: 243–244).

The Early Bronze Age sequence at Shizir and related sites, dated to approximately 3000–2500 BCE, begins with Kura Araxes style pottery. Shizir and sites such as Dowranabad demonstrate connections with northwestern Iranian sites including Yanik, Kul Tepe, Haftavan, and Goy Tepe, as well as with Central Zagros sites such as Godin, Pissa, and Garab (Fazeli Nashli et al., 2013). Shizir and Shir Tal in the Qazvin Plain were small villages that remained occupied throughout the 3rd millennium BCE. These sites suggest that the regional population shifted from a pre urban settlement structure to a small scale agro pastoral village economy (Vidale et al., 2018; Fazeli Nashli & Abbas Nejad Sereshti, 2005; Fazeli Nashli et al., 2022b).

Economic, social, administrative, political, religious, and environmental evidence from prehistoric sites on the Central Iranian Plateau suggests the existence of both intra regional and interregional systemic connections. Analysis of these data indicates that the subsystems of prehistoric societies in this region sometimes resisted, aligned with, or adapted to internal and external changes. The appearance of cultural phenomena such as Uruk pottery (in Sialk III 7b and Sialk IV 1) and Proto Elamite pottery and administrative elements (Sialk IV 2) on the Central Iranian Plateau can therefore be interpreted as responses to external influences. Major settlements such as Sialk IV, Arisman, Qoli Darvish, Maral Tepe, Tepe Hissar, and Sofalin likely functioned as primary centers with productive, distributive, and administrative roles. These centers probably supported and organized networks of smaller surrounding settlements, although at the peak of their development they experienced processes of fragmentation and displacement.

In this region, complex local societies experienced sudden collapse, a process that may be understood as a simplification of social structures and a reduction in levels of social stratification (Tainter, 1988: 193). Such collapse does not necessarily imply the disappearance of culture or civilization, nor the complete destruction of socio political groups (Zovar, 2012: 40–43). Rather, these groups likely continued to exist through processes of reorganization, displacement, and transformation (Yoffee, 1988; Janusek, 2005: 177). The social, economic, and political transformations of these societies during the Middle and Late Bronze Ages remain poorly understood, and the region appears to have experienced a long occupational hiatus during much of the 3rd millennium BCE (Talaei, 2011: 134).

One of the key sites on the southern flank of the Central Alborz where cultural sequences between the Middle and Late Bronze Ages can be studied is Sagzabad Tepe in the Qazvin Plain (Talaei, 2011). At this site, two contemporaneous ceramic traditions have been identified: Painted Red Ware with connections to northwestern Iran, and Gray Ware with decorative features comparable to northeastern Iran (Talaei, 2011: 135). At other sites in the Qazvin Plain, polychrome and monochrome ceramics—including gray wares and buff painted vessels, as well as Urumieh Ware (monochrome or polychrome decoration on a red or dark orange background)—were widely used during the first half of the 2nd millennium BCE in both the northern and southern parts of the Central

Iranian Plateau, including at Sagzabad, Shir Tal, and Qoli Darvish (Azizi Kharanaghi & Moradi, 2011; Velayati et al., 2017; Sarlak & Hessari, 2018).

The Tehran Plain, which had been occupied since the 6th millennium BCE and experienced increasing cultural complexity, population growth, craft specialization, and expanding interregional trade during the 5th and 4th millennia BCE, underwent a long occupational hiatus after the Proto Elamite period around 2900–2800 BCE. This hiatus lasted until approximately the 16th century BCE (Vidale et al., 2018; Fazeli Nashli et al., 2013; Fazeli Nashli et al., 2022b). One of the most important sites in this plain is Pardis Tepe, which indicates that the region was reoccupied during the first half of the 2nd millennium BCE. Evidence of cattle burial has been identified at this site, resembling Indo European traditions, along with what may represent the earliest evidence of horse burial on the Iranian Plateau. With the exception of a few buff and brown sherds, the pottery from this site is predominantly gray. These ceramics are comparable to those from sites such as Sagzabad, Khorvin, Qeytarieh, Sareh, Qoli Darvish V–VI, Sialk A–B, Hasanlu V, Godin, Giyan I, Dinkhah III, and Giveh Tepe, as well as more distant sites such as Bidak, Rezvan Tepe, Besh Darreh, Ashkhaneh, the Kalpush Plain, and Jeyran Tepe (Young, 1969; Danti, 2013; Medvedskaya, 1982; Sharifi & Motarjem, 2014; Hejabri Nobari & Dana, 2018; Vahdati, 2016, 2018, 2020; cited in Fazeli Nashli et al., 2022b: 157).

Evidence from sites such as Qoli Darvish, Yousef Khan Khaveh, Kuopandeh Tepe, sites 013 and 051, and especially the "Saba 9" site suggests that occupation existed in the southern Central Plateau from around 2700 BCE, with population growth continuing throughout the 3rd millennium BCE and regional as well as interregional exchanges becoming increasingly common. In general, the eastern part of the Zayanderud River Basin appears to have experienced a period of florescence between 2700 and 2200 BCE, while other regions of Central Iran experienced a sharp decline in the number of settlement sites (Fazeli Nashli et al., 2022b: 158).

The site of Qoli Darvish shows evidence of connections with southwestern Iran, Mesopotamia, and northeastern Iran during the Proto Elamite period. Following this phase and a hiatus of approximately 300 years, occupation resumed at the site between 2700 and 2500 BCE. During this phase, cultural similarities between Qoli Darvish, Godin, and the Kura Araxes cultural sphere suggest a form of cultural amalgamation in the Qom Plain during the second quarter of the 3rd millennium BCE. The importance of this plain increased during the Middle Bronze Age (2300–1900 BCE), accompanied by a rise in the number of settlements and population growth. During the first half of the 2nd millennium BCE (1900–1400 BCE), Qoli Darvish also maintained close connections with sites such as Hissar IIIB–IIIC and Shah Tepe IIa (Fazeli Nashli et al., 2022b: 156–163).

Excavations at the Estark Joushqan cemetery in the Kashan region have revealed evidence of occupation during both the Bronze and Iron Ages. The cultural materials

from this site resemble those from nearby sites such as Qoli Darvish, Sialk, Ozbaki, and Sareh. Possible connections with the Andronovo cultural sphere have also been suggested. The cemetery contains evidence of chamber or shaft graves similar to those identified at Shahr i Sokhta, Shahdad, and Tepe Hissar (Fazeli Nashli et al., 2022b: 164–167).

The Bronze Age of the Central Iranian Plateau—particularly the Middle Bronze Age—remains one of the least understood periods in the archaeology of the region due to the limited amount of available data. A general chronological framework divides the Bronze Age into four phases: Early Bronze Age 1 (Proto Literate Culture / Sialk IV), Early Bronze Age 2 (Kura Araxes Culture), Middle Bronze Age, and Late Bronze Age (Fazeli Nashli et al., 2022b). Early Bronze Age 1 (3400–2900 BCE) corresponds to the Sialk IV cultural horizon and is characterized by clay tablets with pictographic signs and pottery associated with the Proto Elamite tradition. The relative homogeneity of material culture during this period in the Kashan, Qom, and Tehran plains suggests cultural and political connections with southern, southwestern, and western Iran. Early Bronze Age 2 (2900–2200 BCE) corresponds to the expansion of the Kura Araxes culture, with evidence primarily from Shizir and some unpublished material reported from Arastou Tepe in the Tehran Plain. The Middle Bronze Age (2200–1800 BCE) and Late Bronze Age (1800–1500 BCE) have been identified at sites such as Qoli Darvish, Shizir, and Qareh Tepe Sagzabad; however, the available archaeological evidence for these periods remains limited (Fazeli Nashli et al., 2022b). Given the scarcity of well dated sites, this chronological framework should be regarded as provisional. The proposed dates—especially for the beginning and end of the Middle Bronze Age and the end of the Late Bronze Age—are largely relative, and future excavations will likely refine both the chronology and the cultural characteristics of these periods.

Analysis of the Bronze Age along the Central Alborz Mountain Range

Archaeological studies on the northern flank of the Central Alborz have reported evidence of Sialk III cultural influence; however, the transition from the Late Chalcolithic to the Early Bronze Age in this region remains ambiguous and suggests a possible cultural hiatus. At the same time, several key Early Bronze Age sites have been identified in this area, which are significant for understanding socio-economic systems and settlement patterns. Although eastern Mazandaran Province provides important evidence for the study of 5th- and 4th-millennium BCE settlements, the archaeological record of the 4th millennium BCE in the central and western parts of this region remains very limited. Thus, while the Central Iranian Plateau experienced cultural florescence and extensive interactions during the 4th millennium BCE, a period of stagnation is observed in the northern Alborz regions, especially Gilan. Nevertheless, scattered evidence of emerging cultural developments is visible in other parts of the northern Alborz.

Although eastern Mazandaran contains significant evidence from 5th- and 4th-millennium BCE settlements, archaeological evidence from its central and western areas remains limited, and targeted future research is needed to clarify the reasons for this gap. In eastern Mazandaran, sites such as Komishani, Tarkam, Tepe Sad, and Astankrud have yielded pottery related to Sialk III 4–7, dating to before 3400 BCE. The Sialk III culture appears to have entered this region through Damghan during Early Hissar II (3600–3400 BCE). However, scholars such as Helwing (2006) and Thornton (Thornton et al., 2013) have shown that, in the late 4th millennium BCE, the cultural orientation of Tepe Hissar shifted from contacts with the Central Plateau toward northeastern Iran, the Gorgan Plain, and southern Turkmenistan (Thornton, 2013; Thornton et al., 2013). The main reason for this shift appears to have been the site's natural position along the Greater Khorasan trade route and the formation of extra-regional connections with important settlements in Central Asia.

The production of Caspian Black-on-Red Ware at Tepe Hissar also supports this shift in cultural orientation on the northern flank of the Alborz, particularly in the Gorgan Plain. The emergence of "Caspian Type Pottery" can be observed at key sites in the Gorgan Plain, including Tureng Tepe, Narges Tepe, and Hosseinabad, which further supports this interpretation. The Gorgan Plain was the center of Caspian Black-on-Red Ware production, and this pottery gradually spread to Chalow Tepe in Jajarm, North Khorasan. Absolute dating of Chalcolithic pottery from Chalow Tepe places it between 3337 and 3208 BCE (Vahdati et al., 2019). In the late 4th millennium BCE, the southern and southeastern Caspian Sea region, especially Mazandaran Province, also established cultural interactions with the Gorgan Plain and northeastern Iran. One indicator of this interaction is Caspian Black-on-Red Ware. Since this red pottery with black motifs has been identified in the lower layers of sites such as Gohar Tepe, Ghal e-Kash, and Bozrudpey/Ghal e-Ben Tepe, which are associated with the late 4th millennium BCE in Mazandaran Province, it can be classified as Caspian Type Pottery. This pottery is similar to examples from the Gorgan Plain, including Shah Tepe III–IIb, Tureng Tepe IIA, Tepe Hissar, and the Sumbar cemetery, where it appears in the second half of the 4th millennium BCE (Olson & Thornton, 2019: 18). In the late 4th millennium BCE, Caspian Black-on-Red Ware gradually merged with the Gray Ware of the Gorgan Plain, indicating the gradual evolution of ceramic traditions in the region. Due to limited excavations, determining the exact time at which this pottery reached Mazandaran remains difficult. Furthermore, there is little evidence for 4th-millennium BCE culture in the central northern Alborz, and the key sites in this region appear primarily from the 3rd millennium BCE onward.

With the end of Sialk III (c. 3400 BCE) and the beginning of Sialk IV (3400–2900 BCE), which corresponds to Early Bronze Age 1 and the Proto-Elamite period, three main cultural spheres coexisted in the Qom, Qazvin, and Isfahan plains. During this period, a fundamental shift occurred in pottery technology and style. Changes in

ceramic forms and production techniques marked the beginning of a new phase of technical and aesthetic innovation. Unlike the previous period, painted forms related to Hissar IIB and IA, along with polychrome wares, emerged, indicating the expansion of cultural exchange networks with adjacent regions (Majidzadeh, 2010: 51–52; Schmidt, 1937). Key sites such as Qoli Darvish, Maral Tepe, and Arisman, each with local gray, black-incised, and brown ceramic industries, indicate the coexistence and interaction of local and imported cultural traditions (Helwing, 2011: 196; Sarlak et al., 2013).

Following the collapse of settlements in the Qazvin, Kashan, and Rey-Tehran plains, a period of hiatus (c. 3450–3000 BCE) dominated the region. Evidence such as the reoccupation of Sagzabad around 3000 BCE confirms the reconstruction of social structures in the form of agricultural villages (Pollard et al., 2012; Fazeli Nashli et al., 2022b: 155). The three main cultural spheres—the Proto-Elamite culture of the southwest, the Kura-Araxes culture of the northwest, and the Gray Ware tradition of the northeast—were integrated as regional subsystems on the Central Plateau. Remains of Uruk pottery and checkerboard geometric motifs suggest the selective adoption of external patterns and their adaptation to local needs (Fazeli Nashli et al., 2022b: 154). In the Qom Plain, the integration of local culture with the Kura-Araxes tradition around 2700 BCE led to the expansion of new technical and ritual traditions, as evidenced by the combination of motifs and decorative techniques on ceramic vessels from Qoli Darvish (Sarlak, 2020).

Based on Tainter's theory (1988: 193), the Sialk IV–Arisman–Qoli Darvish societies, when faced with environmental and social stresses, neither completely collapsed nor entered a state of absolute stagnation. Rather, their structures appear to have transformed into smaller and more localized units. This relative stability allowed cultural and social groups to reconstruct their structures through gradual migration and reorganization (Yoffee, 1988; Janusek, 2005: 177).

Throughout the 3rd millennium BCE, the production of Burnished Gray Ware became common, and a degree of homogeneity emerged between the ceramic industries of Tepe Hissar and the sites of the Gorgan Plain. Evidence indicates that the Gorgan Plain underwent significant developments in ceramic innovation, as well as in cultural and demographic interactions, from the late 4th millennium to the first half of the 2nd millennium BCE. In this context, chronological studies on the northern flank of the Central Alborz, especially in Mazandaran, have been conducted based on ceramic data and analyses of the technological trends and typologies of prehistoric pottery, particularly Bronze Age pottery (see: Heydari et al., 2018; Safari et al., 2021).

Excavation evidence suggests that while the Central Iranian Plateau experienced cultural and social crises and a decline in settlements during the 3rd millennium BCE, the northern flank of the Central Alborz was culturally connected to the northeastern Iranian sphere, especially the Gorgan Plain. Communities associated with the Gray

Ware tradition inhabited this region, and pottery comparable to that from sites such as Tepe Hissar, Tureng Tepe, Shah Tepe, Yarim Tepe, and other sites in the Gorgan Plain and Neyshabur has been identified in Bronze Age layers at key sites. Furthermore, Kura-Araxes-related pottery has been discovered at Ghal e-Ben, a phenomenon previously reported at Tepe Kalar (Mousavi Kouhpar & Abbas Nejad, 2007). The presence of such pottery indicates that, for the first time, the northern flank of the Central Alborz maintained cultural relations with both its western regions, particularly northwestern Iran, and its eastern regions, including the Gorgan Plain and northeastern Iran. It appears that later, during the 2nd millennium BCE, this region expanded its cultural connections to Central Asia and the Central Iranian Plateau, entering a new era of extra-regional interaction (Fig. 1, Table 1).

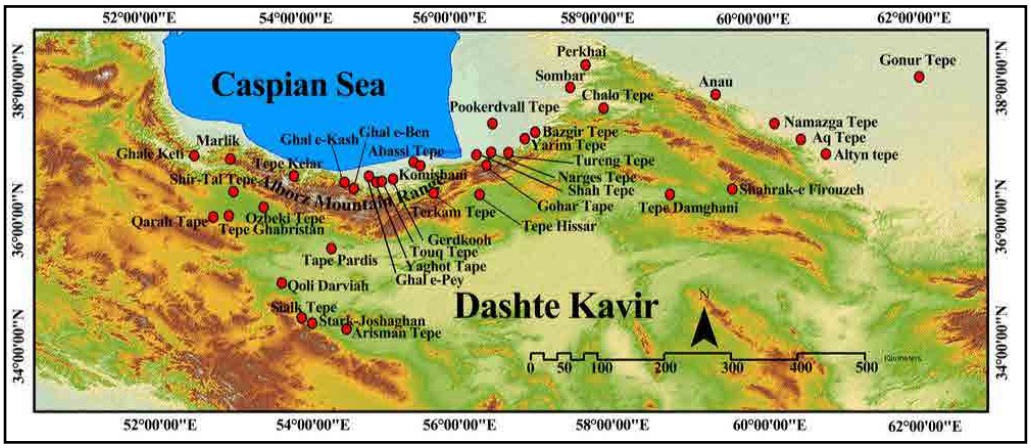

Fig. 1: Map of the location of Bronze Age sites in the northern and southern Alborz zones (Authors, 2025)

Conclusion

The analysis of Bronze Age cultural developments along the Alborz Mountain Range indicates that this region played an intermediary role during the 4th and 3rd millennia BCE among the cultural spheres of northeastern Iran, Central Asia, the Central Iranian Plateau, and northwestern Iran.

On the northern flank of the Alborz, particularly in the Gorgan Plain and eastern Mazandaran, clear evidence of continuous settlement, diverse pottery traditions, and expanding cultural interactions can be observed. The presence of ceramic traditions such as Burnished Gray Ware, Caspian Type pottery, and Kura-Araxes ceramics, along with connections to sites such as Tepe Hissar, Tureng Tepe, Narges Tepe, and Ghal e-Ben, indicates multidirectional regional interactions. At the same time, the production of specific ceramic types such as Black-on-Red Painted Ware, the emergence of new traditions during the Middle and Late Bronze Ages, and the relative stability of settlements in certain areas contributed to the formation of a distinctive regional cultural identity.

In contrast, the southern flank of the Alborz—particularly the plains of Qazvin, Qom, and Tehran—experienced settlement hiatuses, abrupt changes in ceramic technology,

Table 1. Chronology comparing the northern-southern Alborz zone with neighboring areas (Authors, 2025)

Period (BCE)	North Central Plateau	Gilan	Mazandaran			North-East Iran & Gorgan Plain	Southwestern Turkmenistan
			West	Center	East		
Chalcolithic–Bronze Transition (3200–3000 BCE)	-	-	Tepe Kalar	Ghal e-Ben I, Ghal e-Kash	Gohar Tepe, Tepe Abbasi	Hissar IIB, Tureng Tepe I, Shah Tepe III, Yarim Tepe II, Bazgir tepe V, Chalow, Tepe Dāmġānī	-
Early Bronze Age (3000–2500 BCE)	Qoli Darvish, Sialk IV, Arisman, Maral, Ozbaki, Tepe Sofalin, Shoghali, Yousef Khan Khaveh, Varzaneh (051-013), Kuopandeh, Shizir, Dowranabad, Shir Tal	-	Tepe Kalar, Astankroud II	Ghal e-Ben IIA, Ghal e-Kash	Tepe Abbasi, Gohar Tepe, Tepe Sad, Tepe Tarkam, Komishan Cave, Komishani Site, Ghal e-Pey	Hissar IIIA, Tureng Tepe IIA-IIB, Narges Tepe IIIc, Shah Tepe II, Yarim Tepe II, Bazgir IVB, Pokardwal IIA, Chalow, Damghani	Namazga IV, Parkhai II, Aq Tepe, Anau III, Altyn VIII–IV, Khabur Tepe XII–III
Middle Bronze Age (2500–2000 BCE)	Sagzabad, Qoli Darvish, Estark-Joushqan, Shir Tal, Kuopandeh	-	Tepe Kalar, Astankroud II	Ghal e-Ben IIB, Ghal e-Kash	Gohar Tepe, Tepe Abbasi, Tepe Tarkam, Tepe Sad, Ghal e-Pey	Hissar IIIB, Tureng Tepe IIIB-IIIA, Shah Tepe IIb, Yarim III, Narges Tepe IIIB, Pokardwal IIB, Chalow, Shahrak-e Firouzeh, Damghani	Namazga V, Parkhai Cemetery, Anau III, Altyn III–I, Gonur Tepe
Late Bronze Age (2000–1500 BCE)	Qabrestan, Sialk A, Sagzabad, Qoli Darvish, Shizar, Qareh Tepe, Estark-Joushqan, Kuopandeh Tepe, Pardis Tepe	Marlik I, Qaleh Kati I, Jamshidabad Cemetery	-	Ghal e-Ben IIC, Ghal e-Kash	Gohar Tepe, Tepe Abbasi, Tepe Tarkam, Tepe Sad, Ghal e-Pey	Hissar IIIC, Narges Tepe IIIA, Shah Tepe IIa2-1, Tureng IIIc1-2, Bazgir IVA, Pokardwal IIC, Chalow, Shahrak-e Firouzeh, Damghani	Namazga VI, Sumbar Cemetery, Parkhai I, Gonur Tepe

and chronological discontinuities associated with environmental and social disruptions. Settlements such as Qoli Darvish, Sialk, and Shizir underwent periods of collapse, integration, or reconstruction, reflecting diverse mechanisms of cultural adaptation and reorganization in response to internal and external pressures.

Based on these observations, the Central Alborz can be interpreted not merely as a geographical zone but as an active cultural arena that played a key role in the transfer of technologies, the development of artistic traditions, and the formation of economic and cultural networks. The cultural diversity of the region, the coexistence of indigenous and external traditions, and the temporal and spatial overlap of archaeological data indicate that the Bronze Age in this region was characterized by a complex system of interaction, adaptation, and innovation rather than a uniform developmental process. Consequently, more detailed investigation of lesser-known sites and the broader application of absolute dating methods will be essential for a more accurate reconstruction of this historical trajectory.

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Author Contribution

The authors contributed equally to this article.

Conflict of Interest

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

Endnote

1. Greater Khorasan Culture: The term “Greater Khorasan Culture” has gained significance in discussions of Bronze Age cultural developments following the excavations of two highly important sites: Shahrak e Firouzeh in Neyshabur (Basafa, 2023a) and Chalow in Jajarm (Vahdati & Biscione, 2015). Biscione and Vahdati first proposed this term as an alternative framework for interpreting Late Bronze Age cultural developments, suggesting that it could replace the established designations “Bactria–Margiana” and “Amu Darya” (Basafa, 2023b). The researchers justified this terminology based on the pattern of the culture’s formation, the mechanisms of its expansion and influence, and the cultural homogeneity observed across a vast area of eastern Iran that roughly corresponds to the historical domain later known as Greater Khorasan (see: Biscione & Vahdati, 2020).

2. BMAC Western Boundary: Archaeological surveys of Bronze Age settlements in the Gorgan Plain and regions associated with the Bactria–Margiana Archaeological Complex (BMAC) indicate that, despite cultural and trade connections between these areas, no archaeological evidence has been identified for settlements or cemeteries belonging to the BMAC in the Gorgan Plain. Accordingly, the western expansion of this culture appears not to have extended into the Gorgan Plain. Based on excavation results from North Khorasan, the western boundary of BMAC influence can be considered to correspond approximately with the present day border between North Khorasan and Golestan provinces (Iravani Qadim et al., 2017: 11–12).

3. Cultural Similarities between Hissar IIIC and BMAC: The cultural similarities between the material assemblages of Hissar IIIC and those of the Bactria–Margiana Archaeological Complex (BMAC) include miniature columns, circular marble plaques or discs, marble vessels, chlorite vessels, metal kohl tubes (cosmetic containers), adzes or picks, openwork metal seals, and trumpets (Sarianidi, 1998: 158).

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۳۵

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چکیده

پایان هزارهٔ چهارم پیش‌ازمیلاد، آغاز عصرمفرغ و شهرنشینی و شروع عصرآهن در دو جبههٔ شمال و جنوب البرز از موضوعات مهم باستان‌شناسی است. پژوهش‌های باستان‌شناسی نشان می‌دهد که با پایان سیلک III بسیاری از استقرارهای دشت‌های مهمی چون قزوین فروپاشیده‌اند و این روند در اوایل هزارهٔ سوم پیش‌ازمیلاد در دشت‌هایی مانند کاشان و تهران نیز رخ‌داده است؛ با این‌حال، در دشت قزوین از نیمهٔ دوم هزارهٔ سوم پیش‌ازمیلاد محوطه‌هایی دوباره ظهور کردند، درحالی‌که در دشت‌هایی مانند تهران، قمرود و کاشان این استقرارگاه‌ها دیرتر مسکون شدند. ازسوی دیگر، تاریخ استقرار در جبههٔ شمالی البرز طی هزارهٔ چهارم و سوم پیش‌ازمیلاد با جبهه جنوبی تفاوت دارد؛ هرچند شواهد اندکی از نفوذ فرهنگ سیلک III در این بخش دیده می‌شود، اما در هزارهٔ سوم پیش‌ازمیلاد استقرارگاه‌های مهمی شکل‌گرفت که بیانگر دو مسیر متفاوت تحول فرهنگی در شمال و جنوب البرز است. این پژوهش با تکیه‌بر داده‌های باستان‌شناختی حاصل از کاوش‌ها و بررسی‌های میدانی در نواحی شمالی و جنوبی البرز، به تحلیل تحولات فرهنگی عصرمفرغ (هزارهٔ سوم پیش‌ازمیلاد) می‌پردازد. در این دوره، شبکه‌های برهم‌کنش فرهنگی، تبادل مواد خام، فناوری و الگوهای سفالگری، ارتباطات میان دشت گرگان، جنوب ترکمنستان، مازندران، شمال‌شرق ایران و فلات‌مرکزی را گسترش داد. شواهد محوطه‌هایی چون: تپه‌حصار، ترنگ‌تپه، قلعه‌بن، تپه‌کلار و قلی‌درویش نشان‌دهندهٔ گونه‌گونی فرهنگی، هم‌پوشانی سنت‌های سفالگری و گاه‌نگاری متفاوت در این نواحی است. پژوهش تأکید می‌کند که درحالی‌که فلات‌مرکزی ایران در اواسط هزارهٔ سوم پیش‌ازمیلاد با فروپاشی و فترت روبه‌رو بود، جبههٔ شمالی البرز، به‌ویژه شرق مازندران و دشت گرگان، وارد مرحله‌ای از شکوفایی فرهنگی، پیوندهای منطقه‌ای و شکل‌گیری الگوهای شهری شد. هم‌زمان، در جنوب البرز نیز نشانه‌هایی از مهاجرت، تجزیهٔ ساختارهای پیشاشهری و سازگاری با فشارهای زیست‌محیطی مشاهده می‌شود. این مطالعه نشان می‌دهد که حوزهٔ البرز مرکزی در تبیین فرآیندهای انتقال فرهنگی، تنوع منطقه‌ای و شکل‌گیری شبکه‌های بین‌فرهنگی عصرمفرغ جنوب‌غرب آسیا نقشی کلیدی داشته است.

کلیدواژگان: عصر مفرغ، شمال و جنوب‌البرز مرکزی، سفال، شبکه‌های تجاری-فرهنگی، پیوستگی و گسست‌های فرهنگی.

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A Landscape Archaeological Approach to Sasanian Nomadic Settlements in Qasr e Shirin Region

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Abstract

The Qasr e Shirin region, located along the historic Khorasan trade route in western Iran, represents a significant cultural landscape that supported both sedentary agricultural communities and mobile pastoral groups during the Sasanian period. This study investigates the spatial organization, settlement patterns, and functional relationships of Sasanian-period sites within the Qasr e Shirin plain using a landscape archaeological approach that integrates Geographic Information Systems (GIS), remote sensing data, and archaeological survey evidence. Spatial analyses were conducted to examine the relationships between archaeological sites and environmental variables, including topography, land use, communication routes, water resources, and vegetation cover. The results indicate that the region was characterized by a dual settlement system consisting of a centralized administrative–agricultural complex and a network of dispersed pastoral settlements. Several sites display characteristics commonly associated with mobile pastoral lifeways, including ephemeral architectural remains, dry-stone constructions, extensive pottery scatters, and locations closely associated with seasonal grazing lands. GIS-based analyses further demonstrate that many of these settlements were located in elevated areas suitable for pastoral activities, whereas major administrative and agricultural centers were concentrated in the lower and more fertile sections of the plain. The distribution of sites, their proximity to communication routes, and their relationship to water resources suggest the presence of an integrated settlement network in which nomadic and sedentary communities interacted within a shared socio-economic landscape. This study argues that pastoral nomadic groups constituted an important component of the Sasanian cultural landscape of Qasr e Shirin and that their settlements formed part of a broader regional system closely connected to agricultural production, administrative authority, and long-distance communication networks. These findings contribute to a more comprehensive understanding of the diversity of settlement organization and human–environment interactions in the western Zagros during the Sasanian period.

Keywords: Landscape Archaeology, GIS; Remote Sensing, Pastoral Nomadism, Sasanian Period, Qasr e Shirin.

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Introduction

In recent decades, archaeological research has increasingly emphasized the complex relationships between human societies and their surrounding environments. Rather than viewing settlements as isolated entities, contemporary approaches seek to understand how social, economic, and political activities are embedded within broader landscapes. Landscape archaeology has emerged as a particularly valuable framework for investigating these interactions by examining the spatial organization of human activities and the ways in which communities utilized, modified, and perceived their environments over time (Gosden, 1999; Thomas, 1996; Tilley, 2006). Within this perspective, landscapes are understood as dynamic products of continuous interaction between people and the natural world. Human communities actively shape their surroundings through settlement construction, resource exploitation, mobility, and economic activities, while environmental conditions simultaneously influence patterns of habitation and land use. Consequently, the archaeological landscape preserves material traces of both cultural practices and environmental adaptations, providing an important source of information for reconstructing past lifeways.

The Zagros Mountains constitute one of the most significant ecological and cultural regions of the Iranian Plateau. Owing to their environmental diversity, abundant pasturelands, and varied topography, the Zagros have long supported multiple subsistence strategies, including both sedentary agriculture and mobile pastoralism. Throughout different historical periods, communities inhabiting this region adopted a variety of adaptive responses to environmental opportunities and constraints. Among these strategies, pastoral nomadism played a particularly important role in shaping settlement organization and patterns of land use (Gholami, 2024: 189). Pastoral nomadism is generally characterized by seasonal mobility, livestock husbandry, and the exploitation of geographically dispersed resources. Archaeological and ethnographic studies suggest that mobile pastoral lifeways emerged gradually during the Bronze Age and subsequently became a major component of social and economic systems throughout the Near East (Varjavand, 1965; Khazanov, 1986). In the Zagros region, pastoral communities developed highly flexible adaptive strategies that enabled them to utilize diverse ecological zones while maintaining economic relationships with sedentary agricultural populations. Consequently, sedentary and mobile populations should not be viewed as mutually exclusive social categories but rather as interconnected components of broader regional systems.

The Qasr e Shirin Plain, located in western Iran near the Iraqi border, provides an exceptional case study for examining these interactions. Situated along the historic Khorasan route—one of the principal communication corridors connecting Mesopotamia with the Iranian Plateau—the region occupied a strategic position throughout antiquity. Its geographical setting, characterized by river systems, fertile alluvial plains, extensive pasturelands, and access to major transportation routes, facilitated the development of

diverse settlement forms from prehistory through the Islamic period. Archaeological investigations have demonstrated that the Sasanian period represents one of the most significant phases in the cultural development of Qasr e Shirin. Monumental architectural complexes, hydraulic systems, military installations, and numerous smaller settlements attest to the importance of the region within the political and economic structure of the Sasanian Empire. Previous research has primarily focused on major architectural monuments, including the Palace of Khosrow, Chahār Qāpī, and associated hydraulic features. Comparatively little attention, however, has been devoted to understanding the role of smaller rural and potentially nomadic settlements within the broader regional landscape. Archaeological surveys conducted in Qasr e Shirin have identified a number of sites characterized by dispersed pottery scatters, ephemeral architectural remains, and dry stone constructions. These characteristics raise important questions concerning the existence and organization of pastoral nomadic communities during the Sasanian period. The spatial distribution of these sites suggests that they may have formed part of a wider settlement network closely connected to the region's administrative centers, agricultural zones, and communication routes.

This study employs a landscape archaeological approach combined with Geographic Information Systems (GIS), remote sensing data, and archaeological survey evidence to investigate the spatial organization of Sasanian period settlements in Qasr e Shirin. Particular attention is given to the relationships between archaeological sites and environmental variables, including topography, land use, vegetation cover, water resources, and transportation networks. The principal objective of this research is to evaluate whether a distinct system of pastoral nomadic settlement existed alongside the better known agricultural and administrative centers of the region during the Sasanian period. More broadly, the study seeks to contribute to ongoing discussions concerning human–environment interaction, mobility, and settlement organization in the western Zagros by examining how different modes of life coexisted and interacted within a shared cultural landscape.

Research Background

Qasr e Shirin has attracted the attention of historians, geographers, and travelers for centuries. From the third century AH onward, numerous Iranian and Arab scholars referred to the region and its architectural monuments in historical and geographical accounts. Among European travelers, Pietro Della Valle was the first to mention the ruins of the Qasr e Shirin complex during his travels in the seventeenth century. His observations were subsequently supplemented by those of Rich, Olivier, and Bayander, who also described the archaeological remains of the area. Systematic documentation of the monuments began in the late nineteenth century. In 1891, Jacques de Morgan recorded the principal architectural remains through detailed descriptions and architectural plans. This work was followed by Ernst Herzfeld's observations in 1910,

which provided additional information concerning the structure commonly known as the Palace of Khosrow. A significant contribution was made by Gertrude Bell in 1911, who not only documented the monuments architecturally but also prepared detailed plans and photographic records of the complex. Through comparison with Abbasid period architecture, particularly the Palace of al Ukhaidir in Iraq, Bell suggested an early Islamic date for the complex. Although she did not assign a specific function to the Palace of Khosrow, she identified Chahār Qāpī as a Sasanian fire temple. Her photographs constitute some of the earliest visual records of the monuments and preserve valuable evidence of their condition prior to the extensive destruction of the twentieth century (Hozhabri, 2005: 102).

The first comprehensive technical study of the monuments was undertaken by Oscar Reuther in 1938. His work provided detailed architectural descriptions of the Palace of Khosrow and Chahār Qāpī and established an important foundation for subsequent research. During the same period, Bayander investigated the hydraulic infrastructure and water management systems of the region, highlighting the significance of water resources in the development of the settlement complex (Bayander, 1991: 384). Throughout the twentieth century, the monuments of Qasr e Shirin continued to receive scholarly attention and were discussed by a number of researchers, including: Vanden Berghe (1958), Gullini (1964), Shipman (1971), Kleiss (1974), Herrmann (1977), Lassner (1978), and Bier (1986). restoration work was undertaken at Chahār Qāpī. However, the monument suffered substantial damage during the Iran–Iraq War, resulting in the loss of many architectural features visible in earlier photographs. Archaeological excavations conducted in 1992 under the direction of Naser Nouroozzadeh Chegini exposed portions of the monument and provided new information concerning its architectural layout. Later, in 2000, Yousef Moradi carried out a detailed investigation of the Sasanian remains of Qasr e Shirin, the results of which were partially published in The Sasanian Complex of Qasr e Shirin. A major advance in regional archaeological research occurred in 2005, when Ali Hozhabri directed a systematic archaeological survey of the entire Qasr e Shirin region under the supervision of the Cultural Heritage Organization of Kermanshah Province. This project documented major monuments, including the Palace of Khosrow, Chahār Qāpī, Bān Qal'eh, and the associated hydraulic system. In addition, fifteen archaeological sites containing diagnostic Sasanian period materials were identified and recorded. Subsequent excavations conducted between 2005 and 2006 under the direction of Yousef Moradi further expanded archaeological knowledge of the Palace of Khosrow and its surrounding landscape. More recent research has shifted attention from individual monuments toward broader questions of landscape organization and settlement dynamics. Since 2017, investigations employing a landscape archaeological approach have examined the spatial relationships between settlements, environmental resources, communication routes, and patterns of land use within the Qasr e Shirin Plain. These studies have drawn attention to the possibility

that, alongside major administrative and agricultural centers, the region also supported a network of seasonal pastoral settlements during the Sasanian period. Such interpretations have benefited from broader studies of pastoral nomadism and mobile lifeways in Iran conducted by scholars including Abbas Alizadeh, Hossein Papoli Yazdi, Eskandar Amanollahi, and others. Nevertheless, the role of nomadic communities within the Sasanian cultural landscape of Qasr e Shirin remains insufficiently understood and constitutes the primary focus of the present study.

Geographical and Archaeological Setting

Located along the historic Khorasan route, Qasr e Shirin occupied a strategically important position as one of the principal gateways connecting Mesopotamia to the Iranian Plateau. The region is traversed by the Alvand River, the most significant watercourse in the area, which has played a fundamental role in shaping patterns of settlement and land use throughout history. The city developed on the northern bank of the river, from which it derived its primary water supply. Originating in the Qal‘alan Highlands east of the Dasht e Zahab Plain, the Alvand River and its associated tributary system—historically known as the Hulwān River—contributed substantially to agricultural productivity and supported the extensive orchards for which the region became known.

Archaeological investigations have demonstrated the long term significance of this landscape. A systematic survey conducted by Ali Hozhabri in 2005 identified ninety two archaeological sites representing a broad chronological sequence extending from the Neolithic period to the Islamic era. These sites include evidence of Neolithic, Chalcolithic, Old Elamite, Protohistoric, Achaemenid, Parthian, Sasanian, and Islamic occupations, reflecting the continuous strategic and economic importance of the region over time.

Among the documented sites, fifteen contain diagnostic Sasanian period materials and constitute the primary focus of the present study. These include ‘Emārat e Khosrow, Chahār Tāqī, Bān Qal‘eh, Pol e Shirāzi, Qal‘eh Gūrī Dār e Balūt, Tappeh Qalāy e Somār, Qal‘eh Gūrī Fattāh Beg, Bābā Hādī, Hārūnī, Kūkū’ī, Tappeh Manba‘ e Āb, Masīl e Āb, Tappeh Khoshgīneh, Tappeh Zūleh, and the Seyyed Ayāz hydraulic system. The presence of diagnostic ceramic assemblages, together with associated cultural materials, indicates occupation during the Sasanian period, while evidence from several sites suggests continuity into the post Sasanian and Early Islamic periods (Hozhabri, 2005: 800).

Environmental conditions within the region have long favored pastoral activities. Extensive winter grazing grounds (qishlāq) surrounding the plain provided suitable conditions for seasonal livestock husbandry, making pastoral nomadism one of the dominant subsistence strategies in the area. Historical and archaeological evidence suggests that mobile pastoral communities formed an important component of the

regional economy and cultural landscape alongside sedentary agricultural populations (Table 1).

From a geomorphological perspective, the landscape is dominated by alluvial river plains characterized by gentle slopes, limited topographic variability, and generally low to moderate levels of erosion. These environmental conditions created favorable settings for both agricultural production and seasonal pastoral exploitation, contributing to the development of a diverse and interconnected settlement system during the Sasanian period (Statistical Yearbooks of Kermanshah Province, 2011).

Table 1: Names and geographical information of the areas and their breakdown by type of use (Authors, 2017).

Site Name	Time Interval	Functional Use	Site Features
Khosrow Fortress	Sasanian and Early Islamic	Administrative/Governmental Structure	Archaeological Evidence / Architectural Characteristics The governmental complex consisted of two sections: official and private sectors (Moradi, 2012: 323).
Chahar Qapi	Sasanian	Religious Structure (Fire Temple)	The structure demonstrates characteristic techniques of Sasanian religious architecture, including architectural units located on the eastern side of the chahartaq structure (Hozabari, 2012: 153).
Ban Qal'eh (Qal'eh-ye Khosrow	Sasanian	Military Fortress	The structure was built upon a square platform, with six square towers positioned along each side of the platform (Moradi, 2005: 13). Architectural similarities with the Siraf Fortress have been noted (Hozabari, 2005: 175).
Darbalut Gabri Fortress	Sasanian	Probable Military Fortress	Architectural remains are present, and the plan of the structure resembles a chahartaq (Hozabari, 2005: 207). The site contains remains of pastoral architecture and temporary occupation features (Hozabari, 2005: 361).
Fattah Beg Guri Fortress	Sasanian	Probable Religious Structure	Poor architectural remains accompanied by a large quantity of pottery sherds. Pottery ranging from the Elamite to the Sasanian periods was identified, although no architectural remains were recorded.
Baba Hadi Site	Sasanian	Seasonal Pastoral Site	The site contains pastoral architectural remains (Hozabari, 2005: 361).
Haruni Site	Sasanian and Early Islamic	Seasonal Pastoral Site	haracterized by rudimentary architecture and an abundant ceramic assemblage.
Kukuyi Site	Sasanian	Seasonal Pastoral Site	The surface evidence indicates a ceramic sequence dating from the Elamite through the Sasanian eras, inside a context lacking in situ architectural remains
Manba'-e Ab Mound	Sasanian		Numerous brick fragments consistent with Sasanian-period brick dimensions, along with abundant pottery sherds, were identified at the site (Hozabari, 2005: 637)
Pol-e Shirazi Site	Sasanian		The site is characterized by simple architectural remains and pastoral stone alignments/enclosures.
Watercourse Channel	Sasanian-Ashkani	Seasonal Pastoral Site	The archaeological evidence consists of dispersed Parthian and Sasanian ceramic sherds associated with pastoral stone-built structures and enclosures.
Qal'eh-ye Somar Mound	Sasanian		The site is characterized by simple architectural remains and pastoral stone alignments/enclosures.
Khashgineh Mound	Sasanian		The non-ceramic artifacts identified on the surface of the mound comprise iron slag, a stone door pivot, and a hand-operated millstone.
Zuleh Mound	Sasanian		Simple architectural remains and pastoral stone-built enclosures.

Archaeological Evidence for Nomadic Lifeways in Qasr e Shirin

The surviving Sasanian remains of Qasr e Shirin are situated among reed beds and palm groves along the northern outskirts of the city and on the banks of the Hulwān River (modern Alvand). This complex lies along a route that, during the medieval period, formed part of the Great Khorasan Road and later became known as the "Gateway to Asia" (Moradi, 2005: 1). During the Sasanian period, marked differences can be observed between alluvial plains and mountainous valleys in terms of ecological conditions and settlement patterns. Understanding the structure and dynamics of Sasanian society—and even earlier Parthian society—depends largely on our knowledge of how agriculturalists and pastoralists exploited upland zones and how these sectors were integrated and coordinated within the broader economic and political systems of the plains (Gholami, 2017: 16).

Archaeological surveys conducted in the Qasr e Shirin Plain indicate that most of the aforementioned sites consist of small rural settlements distributed across the plain and relatively poor in material culture. At many of these locations, including Tappeh Qalāy e Somār, the Pol e Shirāzi site, Tappeh Zūleh, Tappeh Khoshgīneh, Tappeh Manba' e Āb, and the Bābā Hādī site, architectural remains survive in the form of brick fragments or dry stone constructions. This architectural pattern is characteristic of pastoral occupation and may therefore be interpreted as reflecting a nomadic mode of life (Hozhabri, 2005: 98) (Fig. 1).

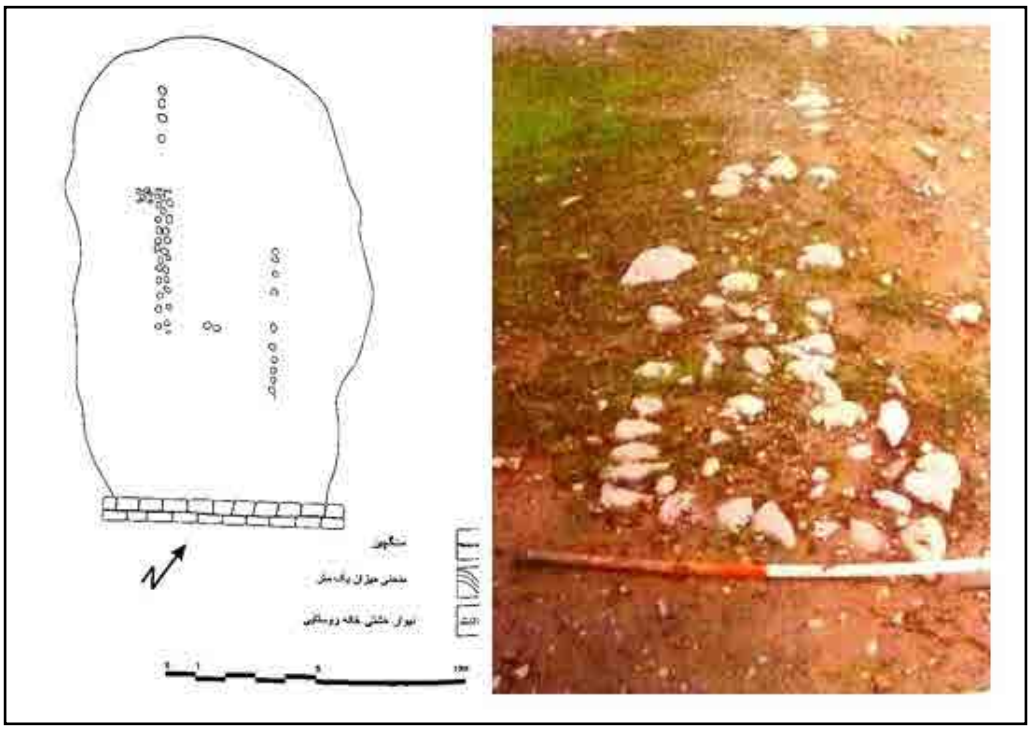

Fig. 1: Remains of dry-stone architectural structures (Hozhabri, 2005: 361).

A site such as Kūkū'ī, despite the abundance of pottery scattered across its surface, lacks any visible architectural remains. This type of depositional pattern reflects a

nomadic mode of life in which settlements lacked permanent architectural constructions, were seasonally occupied during winter, and were abandoned in summer. Consequently, for several months each year, these sites remained exposed to destructive environmental and erosional processes (Alizadeh, 2008: 46).

Based on architectural characteristics and associated cultural materials, the archaeological sites distributed across the Qasr e Shirin Plain may be classified into five categories. Approximately 6% consist of administrative or elite residential complexes (‘Emārat e Khosrow); 13% represent military sites (Bān Qal‘eh and Qal‘eh Gabrī Dār e Balūt); 13% comprise religious sites (Chahār Qāpī Fire Temple and Qal‘eh Gūrī Fattāh Beg); 13% correspond to service related structures such as dams and canals; and 53% consist of rural and nomadic settlements characterized by poor architectural remains and dry stone construction techniques (Bābā Hādī Site, Hārūnī Site, Kūkū’ī Site, Tappeh Manba‘ e Āb, Pol e Shirāzi Site, Masīl e Āb, Tappeh Qalāy e Somār, Tappeh Khoshgīneh, and Tappeh Zūleh). Some of these sites clearly reflect rural and/or nomadic lifeways (Gholami 2017: 265). Among these sites, evidence such as the extensive dry stone architectural remains at Tappeh Qalāy e Somār is particularly noteworthy. These remains became visible during the Iran–Iraq War, when trenches excavated for tank fortifications cut through parts of the mound and exposed underlying architectural features (Hozhabri, 2005: 861). At the Pol e Shirāzi Site, agricultural leveling operations revealed large quantities of displaced stone within embankments overlooking the river. The dry stone architectural style observed at the site is reminiscent of the masonry techniques employed in the Sasanian Shian Dam (Hozhabri, 2005: 818). At Tappeh Khoshgīneh, surface finds other than pottery include iron slag, stone door pivots, and grinding stones (Hozhabri, 2005: 683). At the remaining nomadic sites, poor architectural remains combined with dense pottery scatters constitute the primary archaeological evidence. Field surveys and direct observation further indicate that nomadic groups continue to use the region as winter pasturelands (qishlāq) to the present day. Two military fortresses are also present in Qasr e Shirin. Bān Qal‘eh, situated at the center of the administrative complex, occupies a commanding strategic position overlooking the surrounding landscape (Hozhabri, 2005: 128). Qal‘eh Gabrī Dār e Balūt, located near the final village of Qasr e Shirin toward Sarpol e Zahab, preserves the remains of another military fortress. In addition to architectural structures, other tangible evidence for the presence of nomadic communities in Sasanian period Qasr e Shirin includes pottery assemblages and iron slag deposits (Fig. 2).

Analysis of the Sasanian Sites in Relation to Geographical Factors

Pastures and Land Use

Alongside various geographical factors, land use patterns and the degree of soil fertility constitute important variables for understanding and analyzing the regional landscape. In addition, the application of remote sensing techniques has become highly influential

Fig. 2: Hand millstones associated with the remains of ephemeral pastoral structures (Hozhabri,2005: 683, 810).

in the field of landscape archaeology. Subsistence strategies have always represented one of the most fundamental factors shaping human life and the organization of settlements. The climatic and ecological conditions of Kermanshah Province, particularly its moderate annual precipitation and relative humidity, have created an environment in which mountain slopes and plains are generally covered with forests and pasturelands, while some areas also contain irrigated and dry farming agricultural fields. Nevertheless, elevations above 1,800 meters primarily consist of high quality summer pastures (yaylāq), where forests and cultivated lands are less common. The regions of Qasr e Shirin, Sarpol e Zahab, Naft Shahr, and Somar, located within the western border zone, are generally characterized by a warm climate. The western highlands terminate abruptly beyond Kerend, descending steeply into the plains and border lowlands (Semi Detailed Soil Studies, 1976: 60). The terrain is generally characterized by gentle slopes, although moderate gradients occur along foothill zones. Most of the land exhibits low to moderate topographical variation. In the northern sector of Qasr e Shirin, a narrow strip of irrigated agricultural land and orchards is present. Evidence suggests that these environmental conditions were already recognized during the Sasanian period, when canal systems were constructed to regulate and improve water management. The archaeological sites identified in this region are situated within Class I, II, and III agricultural lands.

Class I lands are fully cultivable and suitable for irrigated agriculture without significant limitations; these lands cover approximately 3,150 hectares, representing 2.93% of the total land area. Class II lands are cultivable areas with minor limitations for irrigated agriculture and encompass approximately 48,400 hectares, or 44.85% of the total land area. Class III lands are moderately cultivable and present greater limitations for irrigated farming; they cover approximately 27,300 hectares, accounting for 25.30% of the total land area. Additional Sasanian period sites have also been identified within this latter land use category.

The Normalized Difference Vegetation Index (NDVI) is regarded as one of the most widely used vegetation indices and constitutes a valuable method for assessing vegetation health through remote sensing techniques. With the increasing annual

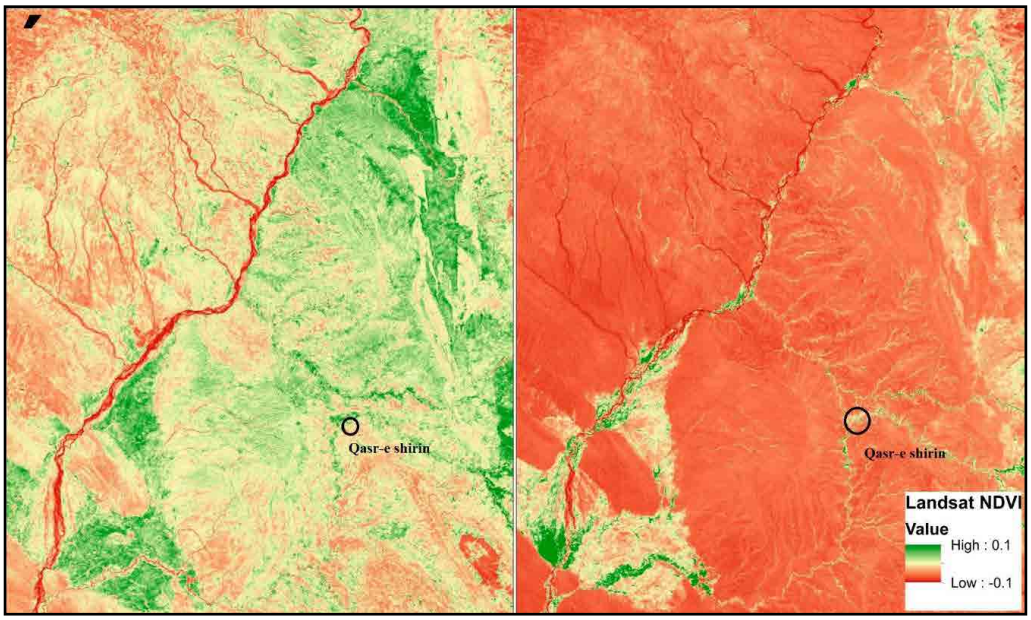

Fig. 3: Mean NDVI map of Qasr-e Shirin for spring 1985–2005 (left) and summer 1985–2005 (right) (Panahipour, 2019: 5).

availability of Earth Observation (EO) satellite imagery, practical indices such as NDVI have greatly facilitated the extraction and interpretation of environmental data. In such imagery, different types of vegetation cover can be clearly distinguished. More specifically, variations in vegetation growth or soil coloration observed in aerial and satellite imagery have long been employed to identify archaeological features (Wilson, 1982: 5).

In the Qasr e Shirin region, NDVI analyses indicate that areas lacking vegetation or subjected to environmental stress exhibit the lowest index values. Sparse vegetation, such as rangelands, corresponds to intermediate values, whereas dense vegetation cover—particularly cultivated agricultural fields—reflects the highest values. NDVI imagery reveals several important patterns related to agriculture and land use. In the northern part of the study area, small patches of level ground adjacent to larger streams or river branches appear suitable for cultivation. Higher NDVI values generally correspond to uncultivated natural vegetation. These zones lack clearly defined boundaries that would otherwise indicate extensive cultivable land.

Based on NDVI imagery, cultivated lands are concentrated in the lower sections of the plain, while the elevated steppe zones appear to have been used primarily as pastureland. Only narrow and relatively flat strips of land along streams or major tributaries were suitable for cultivation. Considering the regional topography, the scarcity of flat agricultural land, and the prevailing climatic conditions—particularly increased precipitation and lower temperatures—it may be inferred that large portions of the region functioned as non arable grazing lands rather than agricultural zones. Overall, the pastures of Kermanshah Province are traditionally divided into summer (yaylāq) and winter (qishlāq) grazing areas, a classification that also includes wooded rangelands

and forage producing forested territories. Extensive pasturelands cover the western parts of the province, including Sarpol e Zahab, Qasr e Shirin, Naft Shahr, Somar, and Gilan e Gharb (Statistical Yearbooks of Kermanshah Province, 2010: 7). In some areas influenced by the climatic conditions of the Iraqi plains, high evaporation rates, torrential rainfall, and insufficient vegetation cover have produced clear evidence of erosion and soil degradation. As illustrated in Fig. 4, the majority of the plain is covered by sparsely vegetated rangelands. Semi dense pastures are concentrated in the eastern parts of the plain, where they connect with the grazing lands of Gilan e Gharb. Interspersed among these pastures are areas characterized by sparse woodland vegetation. In northern Qasr e Shirin, where the greatest concentration of settlement is located, both sparse and semi dense pasturelands are present. The modern urban area of Qasr e Shirin is situated within the semi dense pasture zone. With the exception of the archaeological sites of Pol e Shirāzi, ‘Emārat e Khosrow, Bān Qal‘eh, and Chahār Tāqī, which are located within the urban area of Qasr e Shirin and fall within the semi dense pasture zone, all other archaeological sites are situated in areas characterized by sparse pasture cover (Map 2).

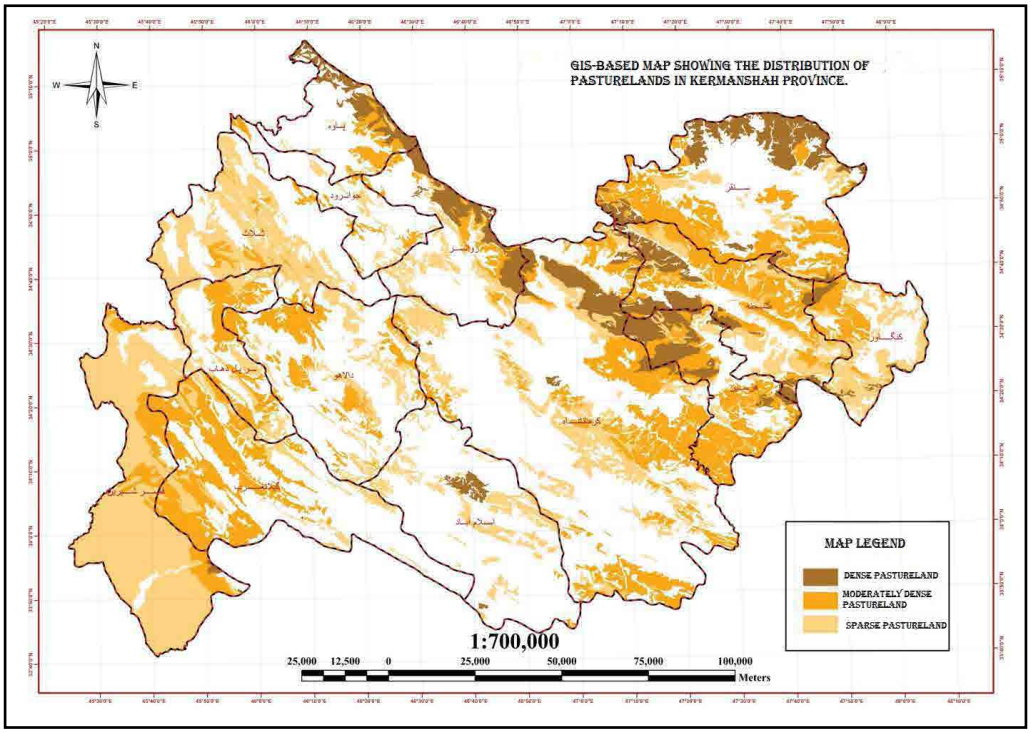

Fig. 4: GIS map of the pasturelands of Kermanshah Province (Authors, 2017).

Topography and Elevational Position of the Archaeological Sites

From a geomorphological perspective, Kermanshah Province may be divided into two principal zones. The first consists of a mountainous and elevated region characterized by folded anticlines and synclinal plains, encompassing the majority of the province’s highlands. The second comprises a zone of eroded mountains and relatively level terrain situated between these uplands, including Qasr e Shirin, Naft Shahr, and Somar. Qasr e Shirin itself consists primarily of alluvial river plains characterized by gentle slopes,

limited topographical variation, and low to moderate erosion. Analyses derived from NDVI imagery (Fig. 3) and GIS based topographical mapping (Fig. 5) indicate that pasturelands and sites associated with evidence of nomadic occupation were generally located in the more elevated sectors of the landscape. This pattern suggests that nomadic communities tended to exploit higher altitude areas to secure grazing resources and sustain pastoral subsistence activities. Conversely, the lower portions of the plain were more likely utilized for sedentary agricultural lifeways and farming activities.

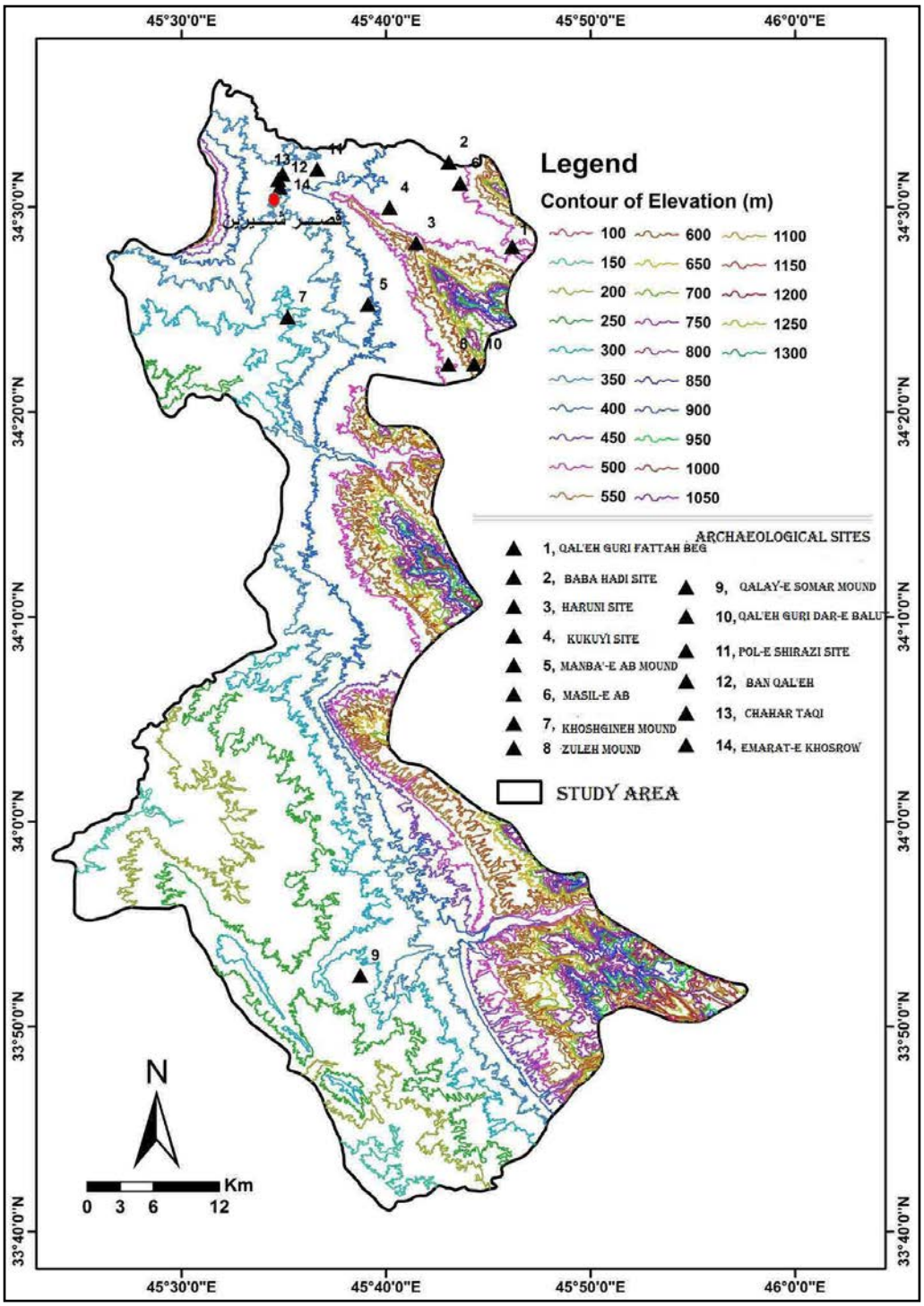

Fig. 5: GIS map of Sasanian settlements in relation to the topography of Qasr-e Shirin (Authors, 2017).

Figure 5 illustrates the spatial distribution of the archaeological sites in relation to elevation. The majority of the sites are situated at elevations between 300 and 400 meters above sea level, indicating relatively favorable environmental conditions, particularly the presence of sparse pasturelands in the northern sectors of the region. In northern Qasr e Shirin, small patches of level terrain are located adjacent to larger streams or river branches and possess potential for agricultural cultivation. The remaining areas primarily consist of natural and uncultivated vegetation cover. These zones lack clearly defined field boundaries that would indicate intensive agricultural activity. Overall, the evidence suggests that the elevated steppe zones were predominantly utilized as pasturelands.

Spatial Relationship of the Sites to Roads and Communication Routes

Map 6 illustrates the location and distribution of the archaeological sites in relation to the principal communication routes. Prior to the construction of modern transportation networks, interregional movement was possible primarily through natural corridors, particularly along river valleys and deep mountain passes (Alizadeh, 1992: 30). Because the present day main road still follows the course of the historic Khorasan route, all principal roads converge on the modern city of Qasr e Shirin, where the sites of Pol e Shirāzi, Bān Qal'eh, 'Emārat e Khosrow, and Chahār Tāqī are located. In other words, the routes connecting the dispersed sites across the plain ultimately lead toward the principal monumental complexes and settlements interpreted as administrative or governmental centers. Examination of this distribution pattern reveals an organized settlement network that may reflect communication routes linking nomadic and temporary encampments with administrative centers associated with sedentary agricultural lifeways. The existence of these routes, together with the close proximity of the two settlement systems to the major trade corridor, suggests the exchange of goods and products between nomadic pastoral communities and sedentary agricultural populations. Within nomadic systems, routes and communication corridors possessed significant political, cultural, and security related importance, as they connected cold upland zones with warm lowland regions. Local authorities therefore sought to maintain control over these routes and communication networks (Talayi et al., 2014: 187).

Spatial Relationship of the Sites to Rivers and Water Resources

According to Fig. 6, all of the archaeological sites are located in close proximity to water sources and river systems from which they derived their water supply. The rivers and their tributaries flow from the higher elevations—indicated in red on the map—toward the lower parts of the plain, represented in blue. One of the most significant observations concerning the Sasanian sites of Qasr e Shirin is that many of the settlements, despite having access to water resources, were situated in elevated areas and do not appear to have practiced irrigated agriculture. Instead, these sites were predominantly associated

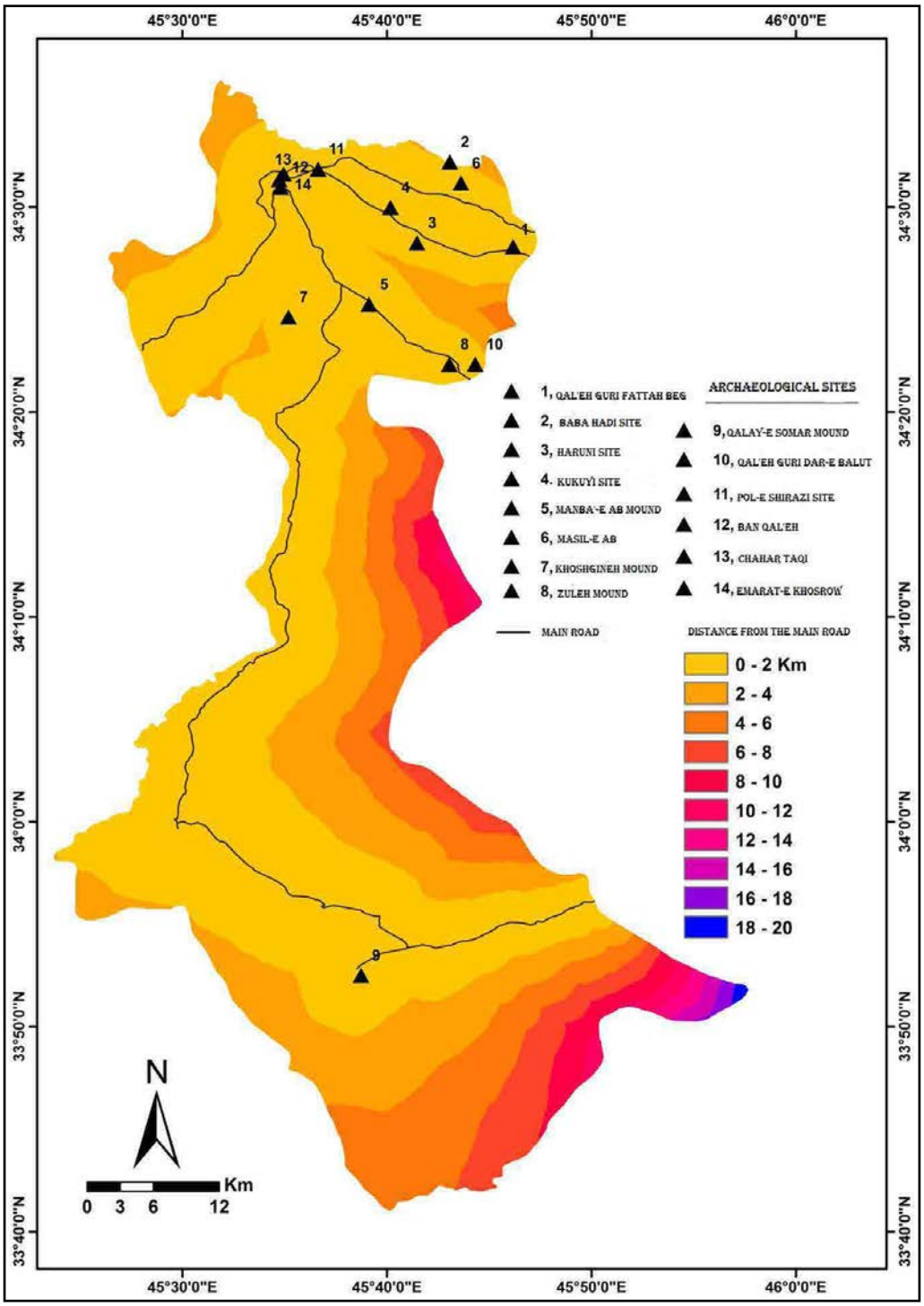

Fig. 6: GIS map of Sasanian settlements in relation to roads and communication routes (Authors, 2017).

with nomadic or mobile pastoral lifeways. Nomadic groups typically occupy lands that, due to limited rainfall or seasonal increases in temperature, are unsuitable for stable and permanent agricultural production. Consequently, they tend to select environmental settings incapable of supporting fixed agrarian communities with intensive subsistence systems (Hole, 2002: 262). In contrast, the settlement complex located near the Hulwān River and the Shāhgodar hydraulic system—which includes the administrative and

governmental complex—was situated in the lower sections of the plain. These areas were well suited for orchard cultivation, as well as for both irrigated and dry farming practices.

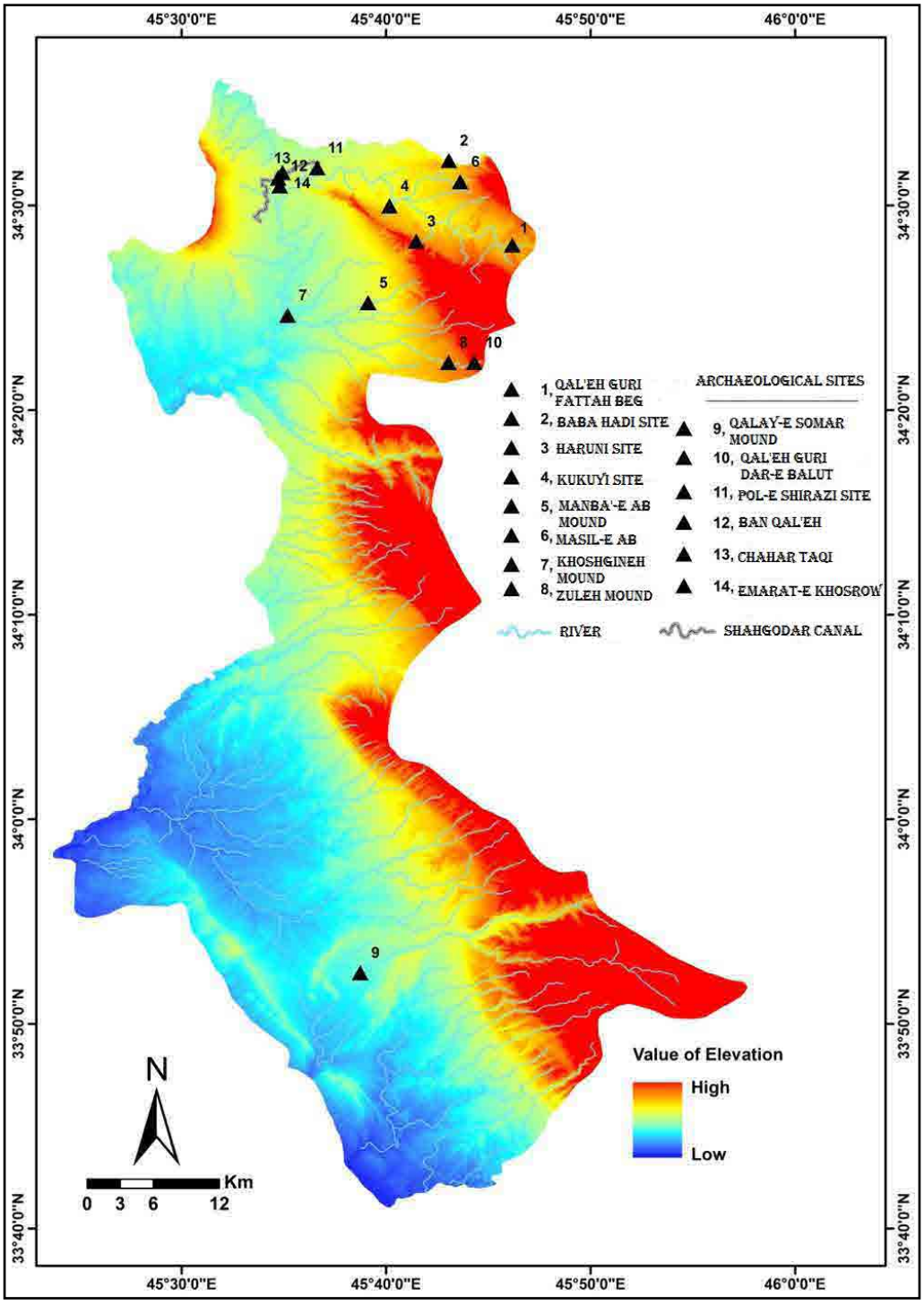

Fig. 7: GIS map of Sasanian settlements in relation to rivers and access to water resources (Authors, 2017).

Discussion of the Settlement Pattern Observed within the Landscape of Qasr e Shirin Pastoral Nomadism

Nomadism and mobile lifeways, alongside sedentary agricultural settlement,

may be understood as a second adaptive settlement pattern within the ecological landscape of Qasr e Shirin. Such a system enables the exploitation of spatially and temporally diverse resources—including water, pasturelands, and fertile soils—and takes advantage of environmental heterogeneity (Wendrich and Barnard, 2008: 89).

The spatial organization of each mobile pastoral settlement within a landscape generally follows a fundamental principle that can be defined through both spatial and temporal dimensions at every stage of the community's seasonal mobility cycle. The natural infrastructure of each settlement within the landscape—that is, its environmental setting—typically includes access to pasture and water (Dark, 2000: 146), appropriate elevation and slope to facilitate rainwater drainage, sheltered conditions that provide protection from wind, and adequate solar exposure to maximize heat retention during the winter months. Cultural and economic factors influencing settlement location include proximity to agricultural lands, economic and social interaction with nearby villages occupied during the summer season, issues of security, and social hierarchy. Such factors could, for example, lead to the establishment of settlements belonging to higher status groups in locations that differ from the dominant pattern of winter encampments (Aghaei et al., 2018: 25).

Both settlement systems observed within the region—agriculture based sedentism and nomadic pastoral lifeways (agro pastoralism)—may be interpreted as adaptive strategies responding to environmental and cultural conditions. While agricultural intensification could increase productivity, nomadic mobility enabled populations to exploit dispersed environmental resources. These two strategies, however, should not be regarded as mutually exclusive or fundamentally opposed. Rather, they could function in an integrated manner across a shared landscape and coexist simultaneously. Comparative case studies demonstrate that different forms of settlement organization may coexist contemporaneously within a single landscape. In the northern part of Qasr e Shirin, for example, approximately ten to twelve archaeological sites containing material evidence indicative of nomadic lifeways have been identified within a landscape that appears complementary and interconnected. Because nomadic lifeways depend on seasonal access to diverse micro environments, populations likely adopted this adaptive strategy in response to the ecological conditions of the region. The choice between sedentary and nomadic lifeways depended on both environmental and cultural contexts. It is important to emphasize, however, that when examining multiple land use strategies, the selection of one strategy over another—or the integration of several approaches—was not arbitrary. Rather, these were deliberate adaptations shaped by the specific environmental and socio cultural conditions of the time. Historical evidence further suggests that nomadic groups occasionally became sedentary either through pressure exerted by centralized political authorities or as a consequence of favorable climatic

and environmental conditions. Nevertheless, in many instances, when such groups were compelled toward reduced mobility, they returned to their traditional lifeways at the earliest opportunity. Conversely, under adverse environmental conditions, populations often preferred pastoralism over cultivation as a more reliable subsistence strategy (Cribb, 1991: 60).

In general, studies concerning transitions between different modes of subsistence and settlement organization must be analyzed alongside a precise understanding of local environmental conditions, as well as the broader socio political and economic circumstances of the period (Wossink, 2009: 148). The study area represents a dynamic ecosystem characterized by frequently fluctuating climatic conditions and a mosaic of micro environments. Although such conditions may have generated uncertainty and economic instability, they also encouraged the development of a mixed agro pastoral economy, thereby transforming the region into a zone of interaction between multiple modes of life.

Conclusion

Mobility and displacement represent adaptive strategies in response to topography, climate, livestock diversity, the quality of natural resources, interactions with other nomadic groups, local settlements, and broader socio economic and political forces. Within this framework, both environmental conditions and spatial distance play fundamental roles in shaping patterns of movement.

Nomadism and mobile lifeways, alongside sedentary agricultural subsistence, constituted a secondary mode of habitation within the ecological landscape of the Qasr e Shirin region. In nomadic systems, environmental diversity across micro regions renders particular locations seasonally accessible. Based on the data obtained through landscape analysis, and considering the hot and arid climatic conditions of Qasr e Shirin—including high temperatures and the prevalence of hot seasonal winds (samūm)—it may be inferred that the region functioned primarily as a seasonal and temporary habitation zone during the Sasanian and post Sasanian periods. Sasanian settlements in Qasr e Shirin are generally located adjacent to water resources and are characterized by relatively ephemeral and weak architectural remains. Consequently, it is plausible that these sites belonged to nomadic or semi nomadic communities. Furthermore, the presence of Sasanian and post Sasanian pottery and associated cultural materials, together with other environmental and archaeological indicators, reflects the existence of a nomadic mode of life within the region.

The establishment of the Sasanian administrative or governmental complex in the most favorable location within the plain, in terms of geographical and environmental factors, may have significantly influenced the formation and distribution of dispersed Sasanian settlements throughout the region. The study area possesses a dynamic

ecosystem characterized by fluctuating climatic conditions and a mosaic of micro environments. Although such environmental variability could have introduced uncertainty and instability into the local economy, it simultaneously encouraged the development of a mixed agro pastoral subsistence strategy, thereby creating a zone of interaction between different modes of life. Accordingly, it can be argued that all identified sites were located in close proximity to water sources and rivers from which they derived their water supply. The distributional pattern of dispersed sites across the plain appears to converge toward principal settlements and structures associated with administrative or governmental functions. Analysis of the spatial distribution map suggests the existence of communication routes linking sites characterized by nomadic or temporary occupation with more permanent, agriculturally based governmental centers.

Topographic analysis further demonstrates a correlation between site distribution and elevation. The majority of archaeological sites are situated between 300 and 400 meters above sea level, indicating relatively favorable environmental conditions, such as the presence of sparse pastures in the northern parts of the region. This pattern suggests that nomadic communities tended to utilize upland pastures and elevated zones for livestock grazing and subsistence purposes, whereas the lower sections of the plain were more suitable for sedentary agricultural lifeways. Most of the plain consists of sparse rangelands, while the eastern sectors contain semi dense pastures connected to the grazing lands of Gilan e Gharb. Interspersed among these pastures are areas with thin and open woodland vegetation. The northern parts of Qasr e Shirin, where the highest concentration of settlements has been identified, are likewise characterized by sparse and semi dense pasturelands. Moreover, NDVI imagery indicates that agriculturally suitable lands are primarily located in the lower portions of the plain, whereas elevated areas were predominantly exploited as pasturelands. Only narrow and relatively level strips of land along streams and principal water channels appear suitable for cultivation. Considering the regional topography, the scarcity of flat arable land, and the prevailing climatic conditions—particularly higher precipitation and lower temperatures in elevated zones—it may be concluded that large parts of the region consisted of non arable grazing lands that primarily served nomadic communities and seasonal patterns of occupation. Therefore, based on the available archaeological, environmental, and spatial evidence, it can be concluded that during the Sasanian period nomadic communities constituted an integral component of the cultural landscape of Qasr e Shirin.

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Author Contributions

This research is derived from the first author's M. A. Thesis. The primary data collection, encompassing all observational and analytical components, was conducted by the first author under the direct supervision and mentorship of the second and third authors.

Conflict of Interest

In adherence to ethical publication standards, the authors affirm that there are no conflicts of interest, either personal or financial, that could have influenced the content or conclusions presented in this research.

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۳۵

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نگاهی بر استقرارهای کوچ‌نشینی ساسانیان در قصرشیرین، با رهیافت منظرباستان‌شناسی

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چکیده

منظرباستان‌شناسی با مطالعهٔ داده‌های مادی و فرهنگی چگونگی شکل‌گیری و سامان‌یافتن اقتصاد، جامعه، مذهب و فرآیندهای فرهنگی انسان را بررسی می‌کند. به‌صورت کلی می‌توان گفت تحول فرهنگ‌ها، در رابطهٔ ارگانیک با تکنولوژی و محیط زیست است. منطقهٔ قصرشیرین بر سر شاهراه تجاری خراسان قرارگرفته است؛ دارای استقرارهای مبتنی‌بر رندگی کوچ‌نشینی و ثابت در دوران ساسانی و اوایل اسلام است. نحوهٔ قرارگیری محوطه‌ها، پراکندگی آن‌ها در دشت قصرشیرین، به‌گونه‌ای است؛ که نشان می‌دهد این منطقه مجموعه‌ای از استقرارهای کوچ‌نشینی را در دل خود در کنار یک مجموعهٔ حاکمیتی، در دورهٔ ساسانی، جا داده است. این پژوهش تلاش می‌کند که بامطالعهٔ منظرباستان‌شناسی منطقهٔ قصرشیرین و بررسی محوطه‌های ساسانی با استفاده از تصاویر ماهواره‌ای و تکنیک GIS نسبت به توپوگرافی دشت، راه‌های ارتباطی، بررسی منابع تأمین‌کنندهٔ آب، کاربری اراضی، پراکندگی و قرارگیری محوطه‌های باستانی به چگونگی شکل‌گیری استقرار در این منطقه در دورهٔ ساسانی و کاربری و ارتباط محوطه‌ها با یک‌دیگر پی‌ببرد. قصرشیرین منطقه‌ای بسیار مستعد برای شکل‌گیری و توسعهٔ جوامع انسانی با معیشت دام‌داری و کوچ‌نشینی است. در این منظرباستان‌شناسی دو الگوی زیستی مبتنی‌بر زندگی کوچ‌نشینی و دامداری و زندگی یکجانشین مبتنی‌بر کشاورزی وجود دارد. اطلاعات لازم برای این تحقیق براساس تحلیل بر مدل GIS و تصاویر ماهواره‌ای به‌دست‌آمده است. براساس مطالعات انجام‌شده بر روی اقلیم و عوامل جغرافیای منطقهٔ مذکور، موقعیت جغرافیایی و پراکندگی محوطه‌های ساسانی در این منطقه چنین نتیجه گرفته‌شده است که در دوران ساسانی و اوایل اسلام منطقهٔ قصرشیرین به‌جز آثار شاخص مجموعهٔ ساسانی که مربوط به کشاورزی و یکجانشینی است و استقرارهای کوچ‌نشینی که محوریت پژوهش را تشکیل می‌دهد، در اطراف آثار شاخص این منطقه به‌عنوان یک اقامتگاه فصلی و موقت استفاده می‌شده است.

کلیدواژگان: مدل GIS، تصاویر ماهواره‌ای، منظرباستان‌شناسی، قصرشیرین، کوچ‌نشینی، دورهٔ ساسانی.

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The Defensive Settlements of the Darab Plain in the Sasanian Period

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Abstract

Fars Province has been the cradle of two great Persian empires—the Achaemenid and the Sasanian—throughout Iranian history. The presence of significant historical monuments from these two periods clearly demonstrates the importance of this province. One such region within Fars is Darab, which was home to the city of Darabgerd during the Sasanian period. Despite the historical and archaeological significance of this area within Iran, the amount of research conducted there remains limited. Given the importance of this city in the Sasanian era, this article seeks to clarify the position of the city and the khurrah (or kūra, "administrative district") of Darabgerd and to reconstruct its defensive structure. Based on recent archaeological surveys in the Darab Plain, the study aims to determine the role Darabgerd played within the Sasanian administrative and political structure and to assess the duration of its importance. Furthermore, considering the fortresses and military fortifications surrounding the city of Darabgerd, the study examines how the defensive and monitoring system of the city and the Darab Plain functioned. At first glance, the ruins of Darabgerd—which testify to its former grandeur—along with the presence of a rock relief, a large and significant mint that remained active beyond the Sasanian period into the early Islamic centuries, and the discovery of seals and clay sealings, all attest to the importance of this geographical area during the Sasanian and early Islamic periods. For this reason, the existence of a coherent defensive structure for both the city of Darabgerd and the Darab Plain was essential. Based on the identification of fourteen fortresses during archaeological surveys of the Darab Plain, this research adopts a descriptive–analytical approach, integrating archaeological evidence with historical sources in order to provide a clearer understanding of the defensive structure of the Darab Plain during the Sasanian period. The results indicate that the geography of the Darab Plain played a decisive role in the formation of the city of Darabgerd and its defensive system.

Keywords: Darab County, Darabgerd, Defensive Settlements, Sasanians, Fars, Seals, Coins.

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Introduction

Despite the cultural richness of Fars Province and the extensive history of archaeological research conducted there, some regions have unfortunately been neglected or still require comprehensive and systematic surveys. Although several studies have been carried out in Darab County to date, they are not sufficient to fully illustrate the cultural and historical developments of the region from prehistoric times to the contemporary period. The lack of systematic archaeological research in Darab provides clear evidence of this gap.

The historic city of Darabgerd is located near the modern city of Darab in Fars Province. The earliest archaeological studies at Darabgerd were conducted by Stein in 1933 (Stein, 1936). Subsequently, De Miroschedji surveyed the prehistoric settlements of Darab and Fasa between 1971 and 1972; however, the final results of this survey have not yet been published, and only a general article has appeared (De Miroschedji, 1973). Morgan, from the British Institute of Persian Studies, later conducted a surface survey of the site (Morgan, 2003). Karimian and Seyedein analyzed and reconstructed the spatial organization of the Darabgerd site through a series of surface surveys based on archaeological findings (Karimian & Seyedein, 2009; 2010; 2011). Finally, Alamdari conducted a survey of the Rostaq rural district (Alamdari, 2010).

Given the importance of this city, an archaeological survey of the Darab Plain was conducted in 2018 (Khanipour, 2019)[1]. Despite numerous references to Darab in historical texts and the presence of significant historical and archaeological evidence in the region, the research carried out so far remains limited. Moreover, the current conditions of the Darab Plain—particularly the expansion of agricultural activities—have placed many sites located in the central plain and some foothill areas at risk of leveling and destruction. Consequently, focused research on this region is essential. The spatial distribution of Sasanian remains in this region includes settlement sites, fortresses (castles), and funerary structures. These remains are distributed across the central and foothill zones of the Darab Plain as well as the surrounding highlands. Given the importance of this region and the city of Darabgerd, the formation and distribution of defensive settlements around Darabgerd are clearly observable.

To reconstruct the defensive structure of Darabgerd, and based on the archaeological survey of the identified defensive settlements, this article first examines historical and geographical texts that provide valuable descriptions of this historic city during the Sasanian and early Islamic periods. It then investigates the economic and administrative activities of Darabgerd in order to demonstrate the city's status and significance. Finally, the study discusses the defensive settlements established around the city of Darabgerd.

The primary aim of this research is to present a clear picture of the historical landscape of Darabgerd during the Sasanian period. First, the study seeks to demonstrate the status that Darabgerd—and consequently the Darab Plain—held during the Sasanian era from historical perspectives, including political, economic, and administrative aspects, and to examine what information its historical landscape can provide. These findings will help us better identify, understand, and analyze archaeological evidence when it is encountered. Undoubtedly, for historical periods in which written sources and texts are available, it is both necessary and essential to make effective use of them in the analysis and interpretation of archaeological evidence.

Research Questions and Hypotheses: The first and most important question of this research concerns the status of Darabgerd within the Sasanian realm and within Fars—considered the heartland of the Sasanian kingdom—in light of historical and administrative evidence. Given the existence of other major Sasanian centers in Fars, what position did Darabgerd hold during the Sasanian period? How long did Darabgerd maintain its importance and status? What was the pattern of formation and spatial distribution of defensive settlements around the city of Darabgerd? Given the importance of this city, it appears that Darabgerd functioned not only as one of the major political and economic centers during the Sasanian period, but that this status continued even into the post-Sasanian era. This circumstance made the security of the city a matter of paramount importance. The topographical setting of Darabgerd—the dominance of the surrounding highlands over the city on the one hand, and its location along the east–west communication route on the other—provided suitable conditions for the establishment of military installations.

Research Methodology: The structure of this research is qualitative and strategic, and it has been organized and written with fundamental research objectives in mind. From the perspective of research methodology, the approach adopted in this article is descriptive–analytical. In this study, data collection was carried out through both library-based and field methods. Historical texts and published archaeological information related to administrative evidence (such as coins and seals) were examined. The data obtained from these sources were combined with information gathered through archaeological survey and subsequently analyzed and interpreted.

The Historic City of Darabgerd

Despite the scarcity of archaeological sources, many historians, geographers, and travelers have visited the city of Darabgerd throughout history or have recorded accounts of it based on what they observed or heard. Historical texts present various opinions regarding the name of Darabgerd and the date of its foundation. Some attribute it to Darab, the son of Darab, or to Darius the Achaemenid (Ibn Balkhī, 1995: 159;

Balʿamī, 1958: 82; Ibn Ḥawqal, 1987: 47; Muqaddasī, 1995: 508), thereby dating the foundation of the city to the Achaemenid period. Others have mistakenly interpreted the word "Dar" as meaning "to nurture," and consequently have taken Darabgerd to mean "nurturer" or "the god of water". According to this view, the name was given because of the abundance of springs and rivers in this kūra (administrative district) (Husaini Fasai, 1988: 1306). Ibn Ḥawqal considers the word "gerd" to mean "built" or "constructed," interpreting Darabgerd as "that which was built by the order of Darab" (Ibn Ḥawqal, 1987: 47). Ḥamza al Iṣfahānī interprets the word "gerd" as meaning "city," thus understanding Darabgerd as "the city of Darab (Darius)" (Ḥamza al Iṣfahānī, 1988: 39). Ferdowsi, in the Shāhnāma, explains the reason for this name as the circular form of the city's rampart: "When the city wall was made round, they named it Darabgerd". The site plan is circular, with a wall approximately 6 km in length encircling the city. A large moat also surrounded the city, although it is now completely dry (Fig. 1).

Fig. 1: Aerial photograph of Darabgerd (Khanipour, 2019: 14, Fig. 3).

A large circular rampart encircles the entire city. The height of the rampart from the interior of the city is approximately ten meters. Its original height was certainly greater, but it has gradually deteriorated over time. In the northwestern part of the city, a section of this rampart has collapsed, revealing clear remains of mud-brick courses set in clay mortar. The city had four gates, from which the main streets extended. Most historians have referred to the strong, circular rampart surrounding the city (Mustawfī Qazvīnī, 1983: 139; Jayhānī, 1989: 115; Ibn Balkhī, 1995: 309; Ibn Ḥawqal, 1987: 47; Muqaddasī, 1982: 638; Iṣṭakhrī, 1961: 110; Flandin, 1977: 397; Forsat Shirazi, 1998: 153; Husaini Fasai, 1988: 1311). Forsat Shirazi and Husaini Fasai recorded the length of this rampart as approximately one farsakh (about six kilometers) (Forsat Shirazi, 1998: 154; Husaini Fasai, 1988: 1311). At the center of the city lies a natural elevated outcrop upon which

the citadel (arg) was constructed. This rocky hill at the city's center has been mentioned by several geographers (Abu'l-Fidā, 1970: 379; Ibn Ḥawqal, 1987: 48; Jayhānī, 1989: 115; Iṣṭakhrī, 1961: 110; Forsat Shirazi, 1998: 154). According to Schwarz, the hill located at the center of Darabgerd is known as Kuh e Maʿdan ("Mountain of the Mine") and was presumed to contain copper and iron deposits (Schwarz, 1993: 129). However, geological surveys indicate that this elevated feature has a salt core[2]. Although historical and mythological texts attribute the foundation of this city to the Kayanid or Achaemenid period, no archaeological evidence—such as ceramic remains from the Achaemenid period—has yet been discovered on the surface of the site. Meanwhile, some archaeologists (Huff, 1995; Ghirshman, 2011: 324; Herrmann, 1994: 67; Porada, 2004: 263) date the city of Darabgerd to the Parthian period. In Seyedein's surface survey of the Darabgerd site, no Achaemenid-period pottery was recovered from the site surface, and only a small number of Parthian-period sherds were identified (Karimian & Seyedein, 2009). These limited remains of Parthian pottery suggest that the city was inhabited during the Parthian period. Ceramics dating from the Sasanian period through the early Islamic centuries are also visible on the site surface. Furthermore, buff-painted sherds comparable to those of the Bakun period, as well as stone artifacts from this period, have been observed on the site surface, particularly in its northern sector (Khanipour, 2019). Illegal excavations on the site surface, the movement of livestock across the area, and natural factors such as wind and rain have gradually contributed to the destruction of the archaeological remains at this site. Although the site was registered on Iran's National Heritage List in 1931 (AHS 1310), it still requires boundary delineation and effective protective measures to prevent further damage. Moreover, systematic scientific excavations could help establish the chronological sequence of this site.

The Administrative and Economic Status of Darabgerd in the Sasanian Period

When discussing the administrative and economic status of a region, it is necessary to rely on evidence related to such activities. For historical periods, sources such as economic texts, coins, and administrative seals are among the most valuable forms of evidence. In the case of Darabgerd and its administrative status, two categories of archaeological evidence demonstrate this position. The first category is numismatic evidence, which indicates the importance of Darabgerd during the Sasanian period. One of the major mints of the Sasanian era was located in Darabgerd. The presence of a mint in a city during various historical periods, including the Islamic period, generally signifies the administrative and economic importance of that city for the ruling authorities. The second category is sigillographic evidence (the study of seals). In this regard, administrative seals bearing the name of Darabgerd have been discovered, further confirming the

city's administrative status during the Sasanian period. Taken together, these sources and pieces of evidence indicate that Darabgerd during the Sasanian period not only functioned as an important city and kūra (administrative district) in eastern Fars but also possessed a prominent administrative and economic status. Accordingly, each category of evidence will be examined in detail in the following sections.

The Mint of Darabgerd (dʾlʾpklt) in the Sasanian and Early Islamic Periods (DA)

The number of Sasanian mints was relatively limited until the end of the fourth century CE and apparently never exceeded twelve (Schindel, 2013: 817). Over time, however, this number gradually increased, so that by the reign of Khosrow II approximately thirty-four mints were active (Heidemann, 2010: 25), or, according to another estimate, about forty mints (Gariboldi, 2010: 55). The name of the historic city of Darabgerd (dʾlʾpklt) does not appear in any Middle Persian inscription prior to the reign of Bahram IV (388–399 CE). Nevertheless, its importance and status are clearly reflected across the Darab Plain, where the ruins of the city remain distinctly visible in satellite imagery. Like Gur (the center of Ardashir-Khurrah), Darabgerd has a circular urban plan. It is also noteworthy that Ardashir I, before ascending to the throne, served as the argbed (fortress commander) of Darabgerd (Kārnāmag ī Ardašīr; Grenet, 2003). One of the most frequently used mint abbreviations is the sign DA (in Pahlavi script: 𐭣𐭀) representing the mint of Darabgerd. The Darabgerd mint is also indicated by the abbreviations DAL and DALAPKR (Schindel, 2004: 134–135), and more rarely by DALAPK. In some cases, the name even appears fully written as dʾlʾpkrt (/Dārābgird/) on coins of Bahram IV (Gyselen, 2019: 64). The name of Darabgerd, in slightly abbreviated forms such as DA/LAPKR and DA/LAPK, appears on coins of Yazdgerd I (399–420 CE), in addition to those of Bahram IV (388–399 CE), (Fig. 2).

Fig. 2: Sasanian coins minted at Darabgerd (Yazdgerd I and Bahram IV) (Gyselen, 2019: 64).

The mint of Darabgerd remained active after the fall of the Sasanian Empire, and numerous Arab-Sasanian coins were struck there. The abbreviated mint sign DA (in Pahlavi script: 𐭤𐭠) appears on many Arab-Sasanian silver drachms and copper pashīz. Some of these coins bear the names of Khosrow or Yazdgerd, while others carry the names of Muslim governors written in Pahlavi script. These include Muʿawiyya ibn Abī Sufyān, ʿAbd al-Malik ibn Marwān, ʿAbd Allāh ibn al-Zubayr, ʿAbd Allāh ibn ʿĀmir, Ziyād ibn Abī Sufyān, ʿUbayd Allāh ibn Ziyād, Qaṭarī ibn al-Fujāʾa, al-Muhallab ibn Abī Ṣufra, and ʿAbd al-Raḥmān ibn Muḥammad (see: Rezai Baghbidi, 2014: 26–29, 44–49, 54, 58, 60, 81, 83–84) (Fig. 3). In the Islamic period, the abbreviated sign DA is sometimes accompanied by an additional sign—either placed after it or inscribed on one side of the fire altar—to indicate a specific locality within the territory of Darabgerd. For example, DA+P, indicating Fasa in Darabgerd, appears on certain silver drachms of Ziyād ibn Abī Sufyān, Samura ibn Jundab, ʿAbd Allāh ibn al-Zubayr, and al-Ḥajjāj ibn Yūsuf (see: Rezai Baghbidi, 2014: 47, 49, 58). Similarly, DA+G or DA+ghlwm, indicating Jahrom in Darabgerd, appears on certain silver drachms of ʿAbd Allāh ibn al-Zubayr and Qaṭarī ibn al-Fujāʾa (see: Rezai Baghbidi, 2014: 49, 54). Occasionally, instead of DA+P (Fasa in Darabgerd), the abbreviated sign DP was used, for example on silver drachms of ʿAbd Allāh ibn ʿĀmir (see: Rezai Baghbidi, 2014: 25, 46; for Arab-Sasanian coins minted at Darabgerd, see also: Mochiri, 2006). These later coins suggest that districts such as Fasa and Jahrom were also considered part of the territory of the kūra (administrative district) of Darabgerd.

Fig. 3: Arab-Sasanian coins minted at Darabgerd (coin of Muʿawiyya ibn Abī Sufyān with the right-profile bust of Khosrow II, minted at Darabgerd, year 43 AH; and coin of ʿAbd al-Malik ibn Marwān with the right-profile bust of Khosrow II, minted at Darabgerd, year 60 Yazdgerdi (= 72 AH)) (Rezai Baghbidi, 2014: 26-27).

The Name of Darabgerd on Sasanian Seals

Seals and clay sealings constitute the largest group of cultural materials recovered from the Sasanian period and originate from a vast geographical area. In general, the function of clay sealings can be studied on the basis of their archaeological context, the remains preserved on their reverse sides, and historical texts. Harper, in his examination of the clay sealings from Qasr i Abu Nasr, classified some as sealings for goods and merchandise and others as sealings attached to documents (Harper, 1973: 43). Göbl rejected the hypothesis that they were used for sealing goods, arguing instead that Sasanian clay sealings were employed primarily for sealing documents. He maintained that, from a technical standpoint, clay sealings must be regarded as unsuitable for long-distance transport because of their fragility, particularly their susceptibility to abrasion and breakage in their unfired state, since they were attached without any special protective covering (Göbl, 1973). Gyselen, however, proposed that clay sealings were used both for sealing documents and for sealing goods, or for sealing documents attached to goods involved in long-distance trade (Gyselen, 2007).

To date, the name of Darabgerd has been identified on three surviving Sasanian seals. One of these is the seal of the ōstāndār (provincial governor) of Darabgerd, at the center of which appears the abbreviated sign DA, with the following inscription around it: dʾlʾpklty ʾwstʾndʾl /Dārābgerd ōstāndār/, meaning "Ōstāndār of Darabgerd" (Gyselen, 2007: 220; Gyselen, 2019: 437) (Fig. 4a). On two other seals belonging to āmārgars (tax officials), the name of Darabgerd is inscribed as dʾlʾpkrt (Gyselen, 2019: 425) and dʾlpkly (Yamauchi, 1993: 48; Gyselen, 2019: 429).

As can be seen, only a small amount of sigillographic evidence has been recovered. On one administrative seal, probably dating to the reign of Khosrow I, Darabgerd is confirmed as a khurrah (administrative district). The absence of a seal belonging to a mowūh (priestly official) from this province is likely coincidental. In the administrative context of the āmārgar, the name of Darabgerd appears either together with the name of Istakhr (Fig. 4b) or alongside the names of other districts of Pars—Ardashir Khurrah and (…?) (Fig. 4c).

No historiographical source clarifies the history of this region, nor can the relationship between Darabgerd and Nēw Darāb (nywdlʾp, "Good/Beautiful Darāb") be clearly determined. This name appears on an administrative seal of an āmārgar together with the names of two other districts of Pars, namely Ardashir Khurrah and Bishapur. The name Nēw Darāb is otherwise unknown in both primary and secondary sources. Its association with Ardashir Khurrah and Bishapur suggests that Nēw Darāb was located in Pars. The name itself recalls Darabgerd; however, Darāb is written with only one "ā". It therefore seems likely that Nēw Darāb ("Good Darāb") referred to a new settlement that borrowed its name from the older city of Dārābgerd/Dārāb. Daryaee has suggested that Nēw Darāb might represent a new name for Fasa, which in the tenth century was the second most important city of the Darabgerd district (Daryaee, 2003: 195). Based

on these interpretations, Nēw Darāb may have been a region distinct from Darabgerd, located to the south and southwest of Darabgerd and to the east of Ardashir Khurrah (Gyselen, 2019: 161) (Fig. 5).

Fig. 4: a: Administrative seal impression of the ōstāndār (Gyselen, 2019: 437); b: The name of Darabgerd on an administrative seal impression of an āmārgar, accompanied by the name of Istakhr (Ibid: 429); c: The name of Darabgerd on an administrative seal impression of an āmārgar, accompanied by the name of Ardashir-Khurrah (Ibid: 425).

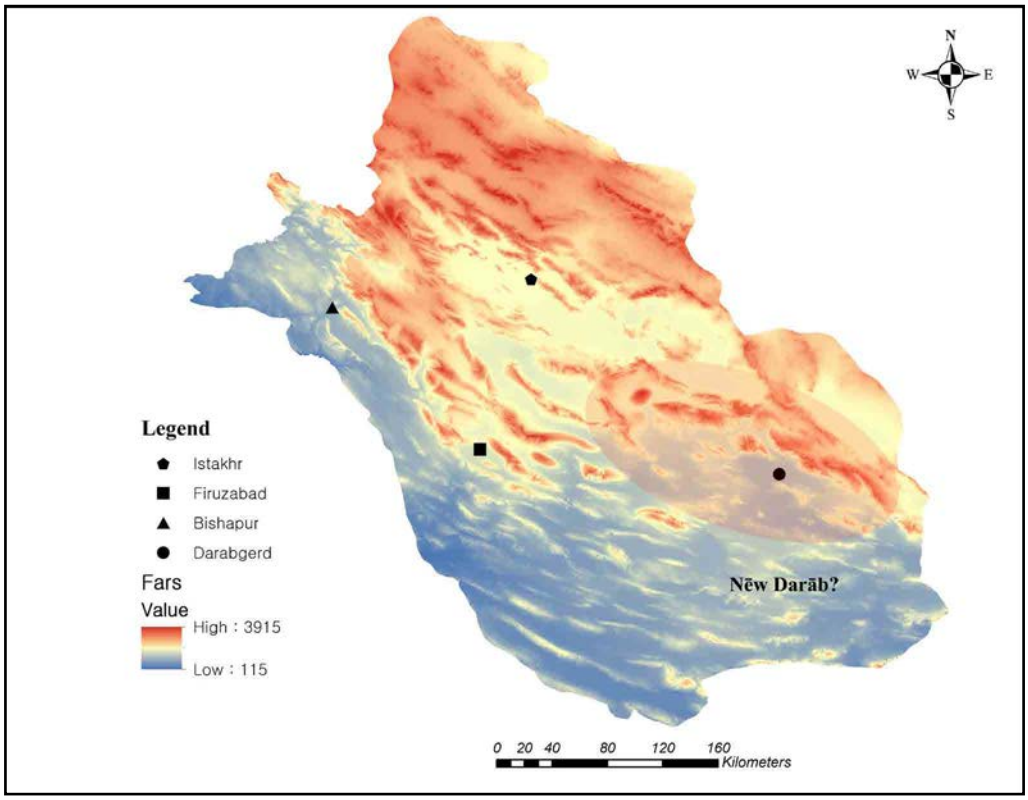

Fig. 5: Administrative district of Darabgerd (Authors, 2024).

The Defensive Settlements of Darabgerd in the Sasanian Period

Given the foregoing discussion, Darabgerd held considerable political and economic importance; consequently, ensuring its security was essential. Archaeological surveys conducted in the region support this conclusion (Khanipour, 2019). During the survey carried out in 2018 (1398 AHS), fourteen defensive settlements were identified in the Darab Plain (Fig. 6; Table 1).

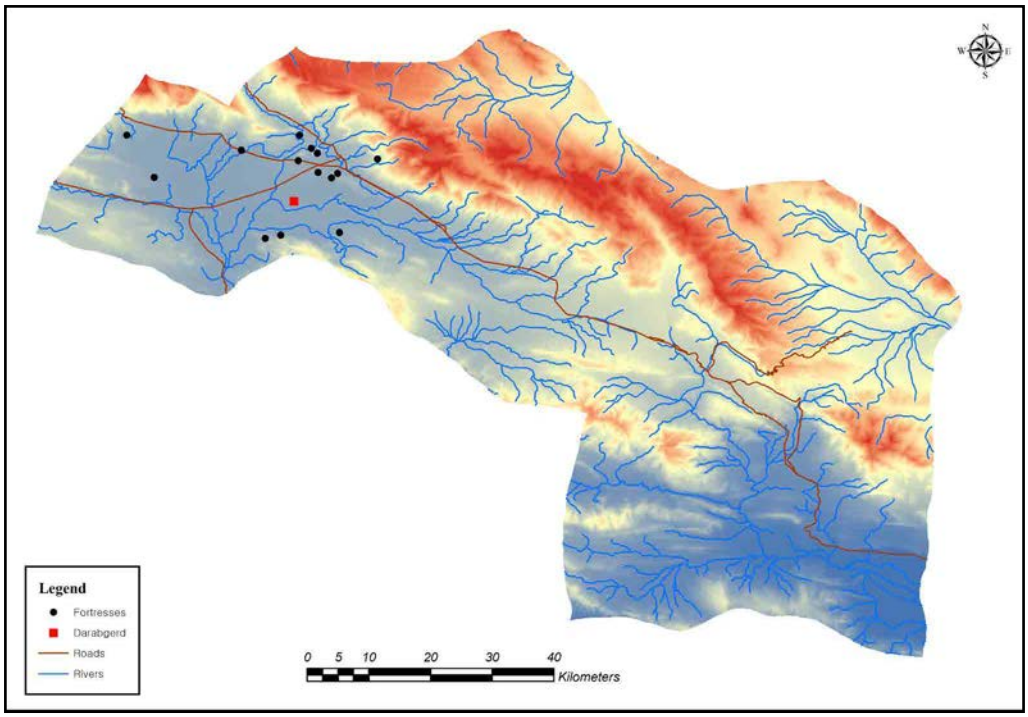

Fig. 6: Location of Sasanian fortresses in the Darab Plain (Authors, 2024).

Table 1: Specifications of the fortresses of the Darab Plain (Authors, 2024).

Area (m^2)	Length (m)	Width (m)	Elevation (m a.s.l.)	X_UTM	Y_UTM	Site Name	Site Code	No.
4771	95	80	1217	259032.8	3180052	Akbarabad Fortress	D29	1
3500	70	50	1149	259978.5	3171210	Kuh Chaleh Fortress	D66	2
47077	325	207	1310	257140.2	3180966	Sangi Fortress	D74	3
2628	60	50	1201	251587.3	3170944	Dahaneh Farakh Fortress	D107	4
2500	55	50	1390	249375.1	3170488	Shahneshin- e Padam Fortress	D108	5
61881	237	160	1198	254334.6	3182947	Pir Murad Fortress	D131	6
15079	160	70	1170	246270	3184807	Shahneshin-e Korsia Fortress	D148	7
650	35	27	1210	257100.1	3184109	Duban Fortress	D213	8
600	30	20	1265	256254	3184915	Qermezak Fortress	D214	9
9800	210	67	1250	230010.5	3187618	Shahrokhi Fortress	D224	10
10359	130	98	1144	233773	3180685	Briskan Fortress	D269	11
2000	45	45	1172	254623.1	3187074	Dashtzar Fortress	D302	12
2000	50	40	1455	265622.9	3182972	Chenari Fortress	D306	13
3100	80	50	1249	259917	3180749	Gabri Fortress	D344	14

In general, the building materials used in the Sasanian fortresses of the Darab Plain consist of stone and mudbrick. With the exception of Dashtzar Fortress (D 302), which is not located on elevated heights overlooking the plain, all the fortresses are situated on heights or natural rock outcrops that overlook the plain. These fortresses are generally constructed either on rock outcrops or on low ridges overlooking rivers or communication routes, such as Akbarabad (D 29), Pir Murad (D 131), Shahrokhi (D 224), and Briskan (D 269); or, like the fortresses of Kuh Chaleh (D 66), Sangi (D 74), Dahaneh Farakh (D 107), Shahneshin e Padam (D 108), Shahneshin e Korsia (D 148), Duban (D 213), Qermezak (D 214), Chenari (D 306), and Gabri (D 344), they are built on heights overlooking the entrances to the plain. Since one of the primary functions of fortresses and military fortifications was to monitor communication routes, it appears that such a function also applied to the fortresses of the Darab Plain. The presence of modern roads near some of these fortresses—such as Akbarabad (D 29), Pir Murad (D 131), Shahrokhi (D 224), Dashtzar (D 302), and Gabri (D 344), which are situated on rock outcrops and low ridges overlooking these roads—may indicate the continued use of these routes from the Sasanian period to the present day. Evidence of water management systems can also be observed at several of these fortresses, including Kuh Chaleh (D 66), Pir Murad (D 131), and Briskan (D 269).

Based on surface evidence—such as the remains of standing walls and the distribution of surface sherds—the approximate area of most of these fortresses is generally less than one hectare. However, four fortresses have areas exceeding one hectare (Table 1): Pir Murad (D 131), Sangi (D 74), Shahneshin e Korsia (D 148), and Briskan (D 269), with areas of 6.2 ha, 4.7 ha, 1.5 ha, and 1.1 ha, respectively. These are considered the largest fortresses of the Darab Plain. Mapping the locations of these four fortresses and considering their size suggests that they were the most strategic fortresses of the Darab Plain (Fig. 7). Based on the technical characteristics of the pottery and comparisons with key Sasanian sites—including the city of Darabgerd (Karimian & Seyedein, 2009), the city of Istakhr (Asadi, 2005; Schmidt, 1939), Qasr i Abu Nasr (Whitcomb, 1985), the Sasanian levels at Tall i Malyan (Alden, 1978), Ardashir Khurrah (Montazer Zohouri, 2015), and Qal'eh i Yazdgerd (Keall & Keall, 1981)—these fortresses can be dated to the Sasanian period (Fig. 8; Table 2).

Sangi Fortress (D 74)

This fortress is located approximately 500 meters from the modern city of Darab and is built on a high mountain beside which the modern Darab road passes. From this position, it overlooks the ancient city of Darabgerd. The fortress has an irregular circular plan, and the remains of its defensive walls are still visible. In some sections, these walls are double layered, with a narrow corridor approximately one meter wide running between them. The surviving walls have a thickness of roughly half a meter and are constructed of rubble stone, which is abundantly available on the mountain. The identifiable entrance

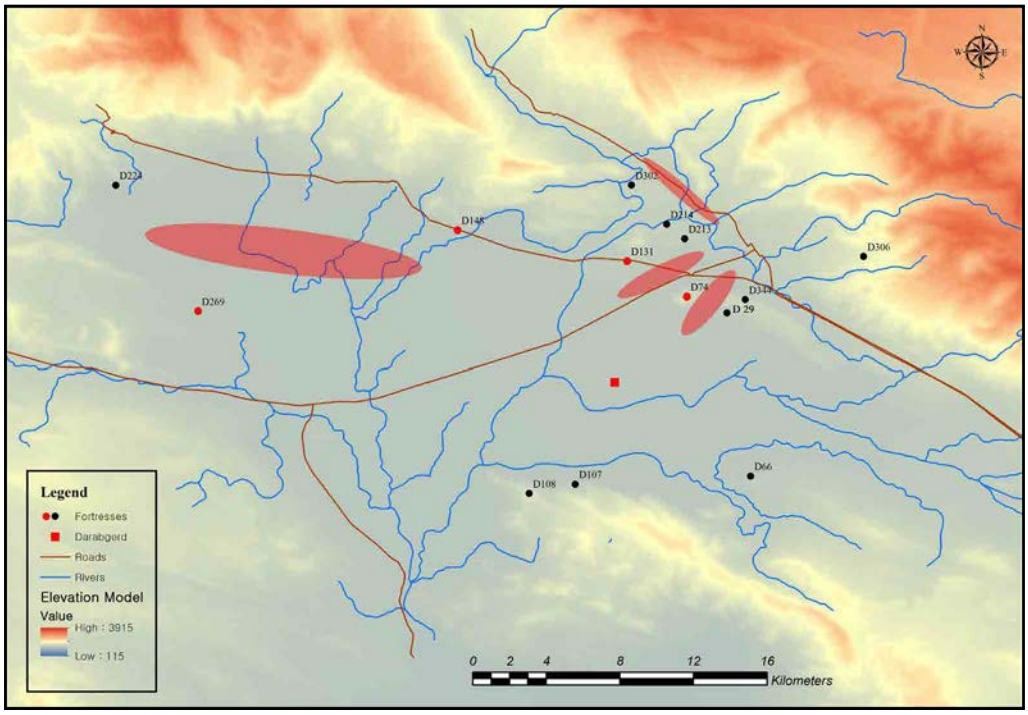

Fig. 7: Distribution of Sasanian fortresses in the Darab Plain; the main passes/routes are marked in red (Authors, 2024).

is located on the western side of the structure and is approximately one meter wide. Within the enclosed area, there is almost no clearly identifiable interior space. Only in the central part are a few small circular structures visible, built from the same stones found on the surface and probably constructed using dry stone (mortarless) masonry. Unfortunately, illegal excavations have been carried out inside these features, resulting in their destruction. To the west and southwest, near the mountain's promontory, there is a crescent shaped stone built feature that appears to have served as a water reservoir (Fig. 9).

Pir Murad Fortress (D 131)

Pir Murad Fortress is located 110 meters west of the shrine of Pir Murad and 300 meters north of the Darab–Fasarud road, overlooking the city of Darabgerd. It is built on a relatively low hill with steep slopes on the eastern, southern, and western sides; access is possible only from the northern side. Remains of a wall are visible on the northern side, which likely marked the entrance to the fortress.

The fortress consists of two parts. The upper part—the so called shahneshin—is situated on the relatively flat surface of the hilltop and is enclosed by a dry stone wall bonded with sāruj, approximately 1 meter wide, of which only the foundation survives (Fig. 10). In this section, a water basin measuring 3×2.5 meters, with walls approximately 70 cm thick, is located at the highest point of the hill. The basin is plastered and waterproofed with sāruj. Approximately 15 meters east of this basin, there is another basin that is now filled with soil. The upper part of its eastern wall, about

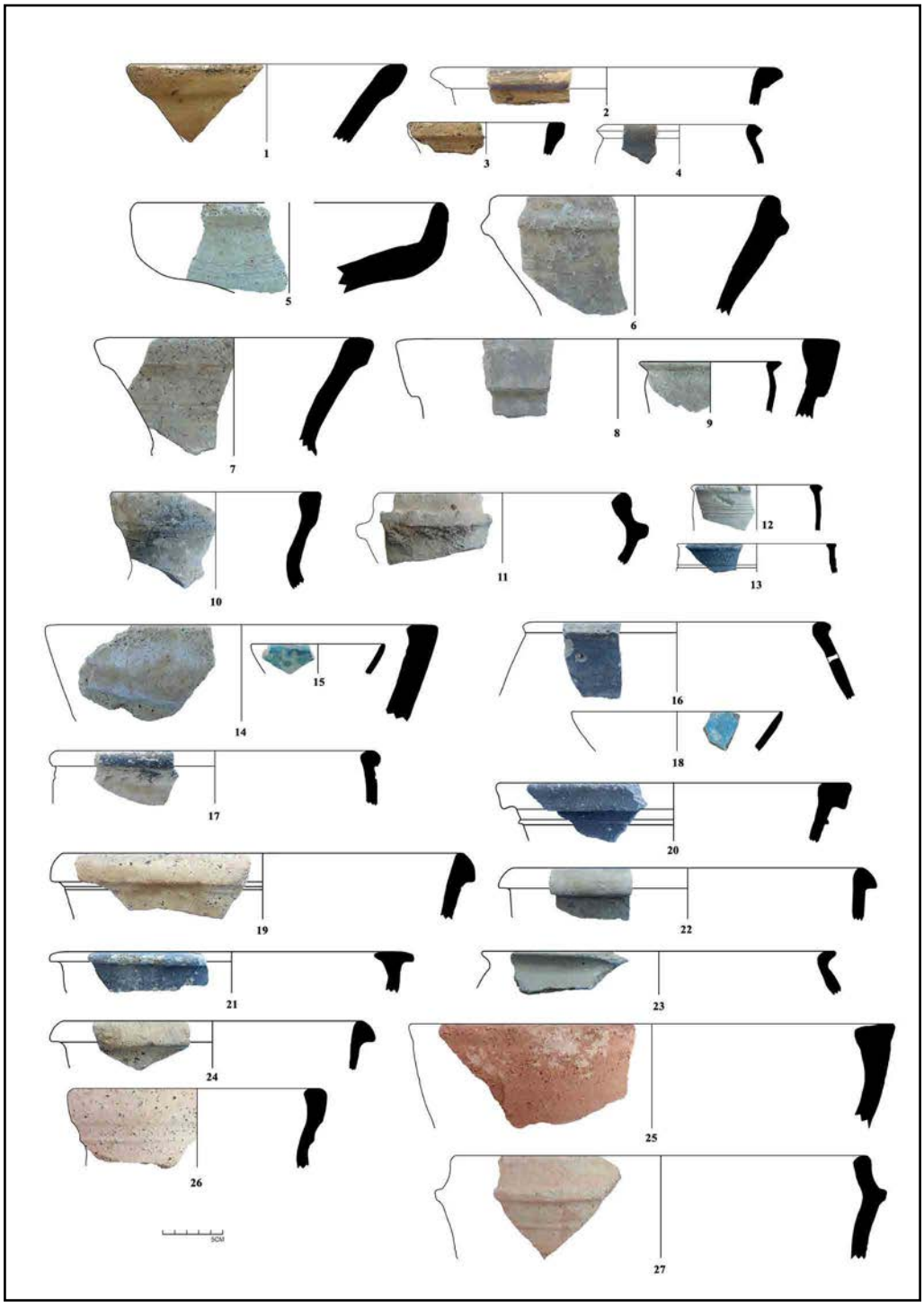

Fig. 8: Surface sherds from some of the fortresses of the Darab Plain (Authors, 2024).

60 cm thick, remains visible, and traces of sāruj plaster can still be observed. Due to the damage sustained in this shahneshin area, no other clearly identifiable architectural remains are visible.

The second part of the fortress lies at a lower elevation than the first and is enclosed by a wall, of which only the foundation remains. Most of this section extends across the western and northern slopes of the hill. The eastern and southern slopes, being precipitous,

Table 2: Technical specifications of surface sherds from some of the fortresses of the Darab Plain (Authors, 2024).

Period	Description	Fortress	No.
Sasanian	Rim, buff exterior, red paste, clay slip on interior and exterior, wheel-made, well-fired, coarse, mineral temper	Sangi Fortress	1
Sasanian	Rim, grey exterior, buff paste, clay slip on interior and exterior, wheel-made, well-fired, medium, mineral temper	Sangi Fortress	2
Sasanian	Rim, buff exterior, buff paste, wheel-made, well-fired, medium, mineral temper	Sangi Fortress	3
Sasanian	Rim, grey exterior, grey paste, wheel-made, well-fired, fine, mineral temper	Sangi Fortress	4
Sasanian	Rim, buff exterior, buff paste, clay slip on exterior, handmade, well-fired, medium, geometric decoration, mineral temper	Duban Fortress	5
Sasanian	Rim, buff exterior, buff paste, clay slip on interior, wheel-made, well-fired, medium, mineral temper	Duban Fortress	6
Sasanian	Rim, buff exterior, buff paste, clay slip on interior, wheel-made, well-fired, medium, mineral temper	Duban Fortress	7
Sasanian	Rim, buff exterior, buff paste, clay slip on interior, wheel-made, well-fired, medium, mineral temper	Duban Fortress	8
Sasanian	Rim, buff exterior, buff paste, clay slip on interior, wheel-made, well-fired, medium, mineral temper	Duban Fortress	9
Sasanian	Rim, buff exterior, buff paste, clay slip on interior and exterior, incised decoration on exterior, wheel-made, well-fired, medium, mineral temper	Qermezak Fortress	10
Sasanian	Rim, brown exterior, brown paste, clay slip on interior and exterior, incised decoration, impressed on exterior, wheel-made, well-fired, medium, mineral temper	Qermezak Fortress	11
Sasanian	Rim, buff exterior, buff paste, clay slip on interior and exterior, incised decoration on exterior, wheel-made, well-fired, fine, mineral temper	Qermezak Fortress	12
Sasanian	Rim, grey exterior, grey paste, clay slip on interior and exterior, incised decoration on exterior, wheel-made, well-fired, fine, mineral temper	Qermezak Fortress	13
Sasanian	Rim, buff exterior, buff paste, clay slip on exterior, handmade, well-fired, coarse, mineral temper	Shahrokhi Fortress	14
Sasanian /Islamic	Rim, green exterior, buff paste, green glaze slip on interior and exterior, wheel-made, well-fired, fine, mineral temper	Shahrokhi Fortress	15
Sasanian	Rim, grey exterior, grey paste, clay slip on interior and exterior, wheel-made, well-fired, medium, mineral temper	Shahrokhi Fortress	16
Sasanian /Islamic	Rim, brown exterior, buff paste, clay slip on interior and exterior, incised decoration on exterior, wheel-made, well-fired, medium, mineral temper	Shahrokhi Fortress	17
Sasanian /Islamic	Rim, green exterior, buff paste, green glaze slip on interior and exterior, wheel-made, well-fired, fine, mineral temper	Shahrokhi Fortress	18
Sasanian	Rim, buff exterior, red paste, wheel-made, well-fired, medium, mineral temper	Briskan Fortress	19
Sasanian	Rim, grey exterior, grey paste, wheel-made, well-fired, medium, mineral temper	Briskan Fortress	20
Sasanian	Rim, grey exterior, grey paste, wheel-made, well-fired, medium, mineral temper	Briskan Fortress	21
Sasanian	Rim, grey exterior, grey paste, wheel-made, well-fired, medium, mineral temper	Briskan Fortress	22
Sasanian	Rim, grey exterior, grey paste, wheel-made, well-fired, medium, mineral temper	Briskan Fortress	23
Sasanian	Rim, buff exterior, buff paste, wheel-made, well-fired, medium, mineral temper	Briskan Fortress	24
Sasanian	Rim, red exterior, red paste, wheel-made, well-fired, coarse, mineral temper	Gabri Fortress	25
Sasanian	Rim, buff exterior, buff paste, relief decoration on exterior, wheel-made, well-fired, medium, mineral temper	Gabri Fortress	26
Sasanian	Rim, buff exterior, buff paste, clay slip on interior and exterior, incised and relief decoration on exterior, wheel-made, well-fired, medium, mineral temper	Gabri Fortress	27

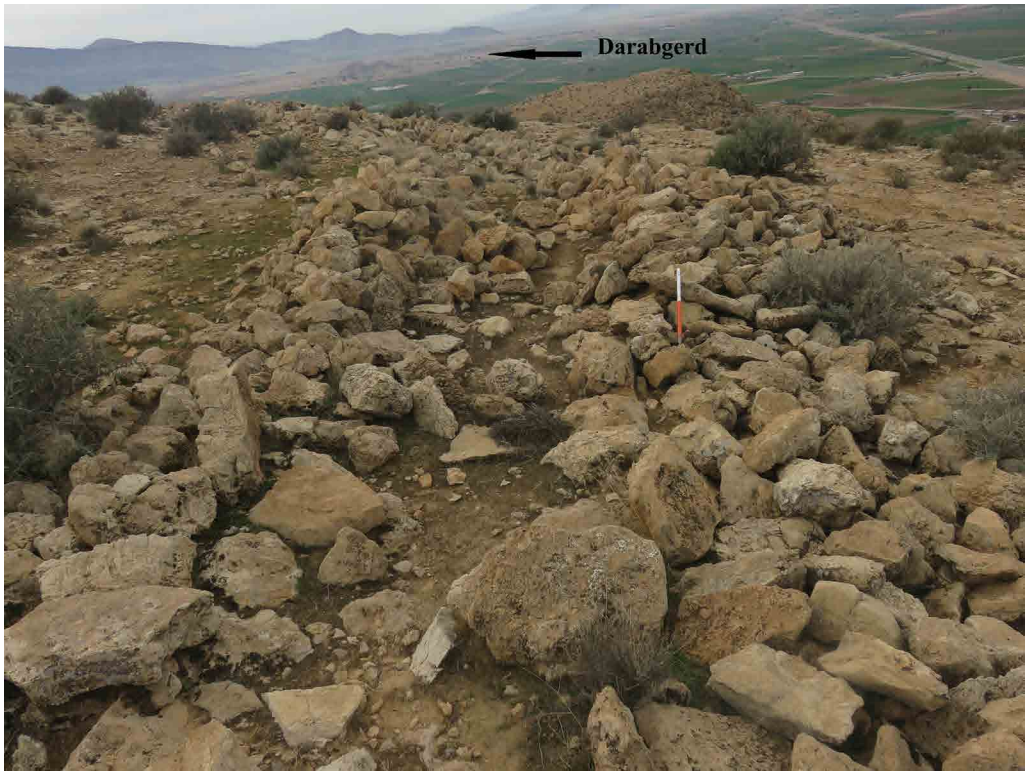

Fig. 9: Remains of the wall of Sangi Fortress; the city of Darabgerd is visible in the background (Khanipour, 2019).

were not suitable for extensive construction; the limited remains in these areas consist of traces of spaces with unrecognizable plans. In the southern part, several interconnected basins are located along the edge of the precipice and were used for collecting and storing water. These basins were constructed on a bedrock foundation, with the natural bedrock of the mountain forming the floor. The walls of these basins are approximately 30 cm thick and were plastered with sāruj. The largest basin in this complex, located at the edge of the precipice, is oriented northeast–southwest, with its southern corner projecting over the precipice. The interior of this basin measures approximately 8 meters in length and 2.5 meters in width and contains six semi circular buttresses. This fortress is located on the northern side of the Darab Plain, approximately 5 kilometers from the city of Darabgerd. Based on its location and construction techniques, it likely had a military function, serving to protect the entrance leading into the Darab Plain (Fig. 10).

Shahneshin e Korsia Fortress (D 148)

On the northern mountain overlooking the village of Korsia, approximately 1,176 meters west of the city of Darab, there are architectural remains that local inhabitants refer to as Shahneshin. Access to this site is possible only from the northeast. This structure can be considered the largest fortress in the Darab Plain and, after Bahman Furg Fortress, the second largest fortress in Darab County. The site was visited by Huff and De Miroschedji (Huff, 1995: 416; De Miroschedji, 1980), and Mortezaei and Zabanavar have suggested that the structure functioned as a fortress protecting the Āzarju Fire

Fig. 10: Architectural remains of the upper part (right) and remains of water reservoir basins of Pir Murad Fortress (Authors, 2024).

Temple (Mortezaei & Zabanavar, 2017). Given the topography of the mountain, the fortress was constructed on several levels according to a specific plan. The westernmost section lies at a lower elevation, where remains of a wall-oriented east–west are visible; this wall is approximately 40 meters long and includes three semi circular towers. At a higher elevation, remains of another wall with semi circular towers can be seen. In this section, a flat surface is visible where the main central building of the fortress once stood. Today, this area is completely covered with rubble, although stone architectural remains are still clearly visible.

On the northern side, where the mountain slope is gentler, two massive stone walls can be identified. The outer wall measures approximately 170 meters in length and about 2 meters in thickness and incorporates five circular towers. Although Huff depicted the main platform as square with an extension to the south, it should be noted that, due to the uneven terrain, the overall plan of the fortress is polygonal. The fortress has a maximum length of 320 meters, a maximum width of 170 meters, and an area of approximately 27,250 m², oriented east–west. It appears that the fortress contained a central space surrounded by several peripheral spaces, each separated by walls and towers, so that access to the central area required passing through multiple defensive walls. The fortress completely overlooks the southern plains, while the Darab salt dome lies to the west of the site (Fig. 11).

Huff visited this site and described it as follows: “The doubt that the rock fortress in the circular city of Darabgerd was truly the original seat of the ruling prince of the region is further increased by the fact that about 12 km northwest of the circular city, on a rock at the edge of the mountains, there is a large, strategically situated fortress. This fortress is distinctly named Shahneshin; it has also been called Gur, most likely because of the large tombs (dakhmas) on the side of the rock. The extensive platform on the summit is covered with the debris of a stone building. From the east, south, and west, platforms with large circular fortresses, situated at a lower level, are attached to it. To the southwest of the large platform there is a gateway with two circular towers on either side. Below it lies another fortress that extends to the foot of the mountain. Since

abundant springs flow from the foot of the rock, it is clear that this place is among the most important and oldest inhabited sites of the Darab Plain. It is probable that in the pre Islamic and historical periods this was the seat of the ruling prince of the region, meaning that this was where the young Tira and Ardashir had their seat of government". Huff provided a detailed description of the fortress and produced a plan of the site. Although Mortezaei and Zabanavar interpret this structure as a military fortress associated with the Āzarju Fire Temple, the architectural layout suggests that—consistent with Huff's interpretation—the fortress more likely served as a governmental seat rather than as a purely military installation intended to protect the fire temple.

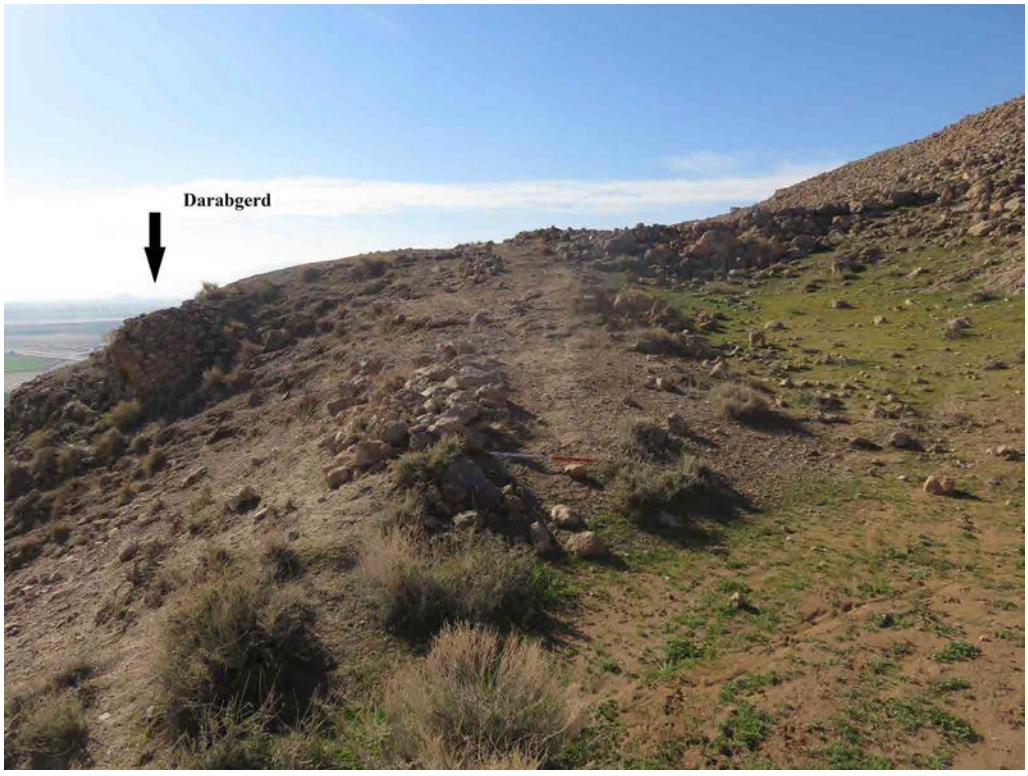

Fig. 11: Remains of the wall and tower of Shahneshin-e Korsia Fortress, and the view of the city of Darabgerd from atop this fortress (Authors, 2024).

Briskan Fortress (D 269)

This fortress is located near the village of Owbad, approximately 500 meters west of the village, on the summit of Kuh e Briskan at an elevation of 1,144 meters above sea level. The cemetery and the chahartaq of Owbad are situated on its southern slope. Among the surviving remains are two well shafts located at the highest part of the peak, one on the eastern side and the other on the western side. Around the eastern well shaft, traces of a wall approximately 37 cm thick are visible. This wall extends from the north of the eastern well shaft toward the southwest and then turns at a right angle westward across the site. At the lower slopes of the fortress, an unpaved road runs from the west and connects to the main road linking Briskan to Dowlatabad (from the south) and Briskan to the Fasārud region. On the northern side, an asphalt road connects the site to the main

communication route. Illegal excavations have been carried out along the eastern and southeastern slopes up to the main fortress. In addition, a deep well shaft approximately one meter in diameter has been created on the western side of the mountain. Another deep illegal excavation has been made on the northern side of the fortress, where solid rock has been cut to form a large pit. Kuh e Briskan forms part of a mountain range that begins in the northwest and extends across the plain through a series of small and large hills, terminating near the village of Briskan (Fig. 12).

Fig. 12: Remains of the wall of Briskan Fortress (Authors, 2024).

Discussion and Analysis

Sasanian imperial investment led to an unprecedented increase in the number of settlements in Mesopotamia, the Khuzestan Plain, and Fars. Kilometers of qanats, large irrigation canals, and massive stone dams were constructed to secure and expand agricultural production and to supply the needs of newly established urban centers. Much of the work on the design and construction of these irrigation systems was carried out by captured Roman engineers. Extensive agricultural investment also occurred in the Dehloran region, where the population reached unprecedented levels (Johnson, 1987: 291). These developments demonstrate the Sasanian ambition to establish themselves as a major world power. Therefore, it is not surprising that in Fars we also encounter cities which, at first glance, appear truly magnificent.

As discussed above, Ardashir, the founder of the Sasanian Empire, served as the argbed of Darabgerd before ascending to the throne as Sasanian king. This fact itself indicates the importance of Darabgerd within the Sasanian administrative structure. The circular city of Darabgerd was probably the third experiment in Sasanian circular

urban planning. Surface pottery indicates that occupation of the city continued until the twelfth century CE (Morgan, 2003: 333). Although the circular plan offered certain military advantages and was more economical in terms of building materials, it also created challenges for architectural organization within the city. Consequently, most later cities adopted rectangular urban plans. It is likewise unsurprising that the Darab region, given its strategic location along the communication routes leading to the eastern and southeastern parts of the Sasanian realm, as well as its natural resources—such as water sources and fertile agricultural land—received considerable attention from the Sasanian kings and later from Islamic caliphs. An examination of the map of the Sasanian kūras (administrative districts) in the province of Fars—the heartland of the Sasanian Empire—shows that Darabgerd, together with Istakhr, Bishapur, and Ardashir Khurrah, forms the vertices of a quadrilateral that appears to have been strategically positioned to protect the province of Fars. In light of this, it becomes clear that Darabgerd and the Darab Plain occupied an important position within the political, security, and economic structure of the Sasanian Empire. Historical sources, including the accounts of travelers and geographers preserved in historical texts, further support this interpretation.

Additional evidence supporting this interpretation is the presence of a royal mint at Darabgerd. Together with the city's distinctive circular layout, this suggests that Darabgerd functioned not only as the administrative center of the kūra of Darabgerd but also maintained close administrative connections with other important provincial and imperial centers. Consequently, ensuring the security and protection of the city was of paramount importance.

An examination of the distribution of the fortresses indicates that their primary function was to protect Darabgerd and to monitor the communication routes. Sangi Fortress (D 74), Pir Murad Fortress (D 131), Shahneshin e Korsia Fortress (D 148), and Briskan Fortress (D 269) were the largest and most important fortresses of the Darab Plain. In addition to monitoring communication routes, they were responsible for protecting both the plain and the city of Darabgerd (Fig. 8). These fortresses commanded extensive views over the Darab Plain and were positioned in such a way that their garrisons could observe the status of neighboring fortresses and communicate with one another in the event of danger.

The fortresses of Dahaneh Farakh (D 107) and Shahneshin e Padam (D 108), located in the southern part of the Darab Plain, not only overlooked the plain but also had a clear view of the important northern fortresses of Darab, including Pir Murad (D 131), Qermezak (D 214), Duban (D 213), Sangi (D 74), Akbarabad (D 29), Gabri (D 344), and Chenari (D 306) (Fig. 13). Thus, during the Sasanian period the Darab Plain appears to have contained a coordinated network of fortresses arranged within a complex defensive system designed to ensure the security of the city of Darabgerd.

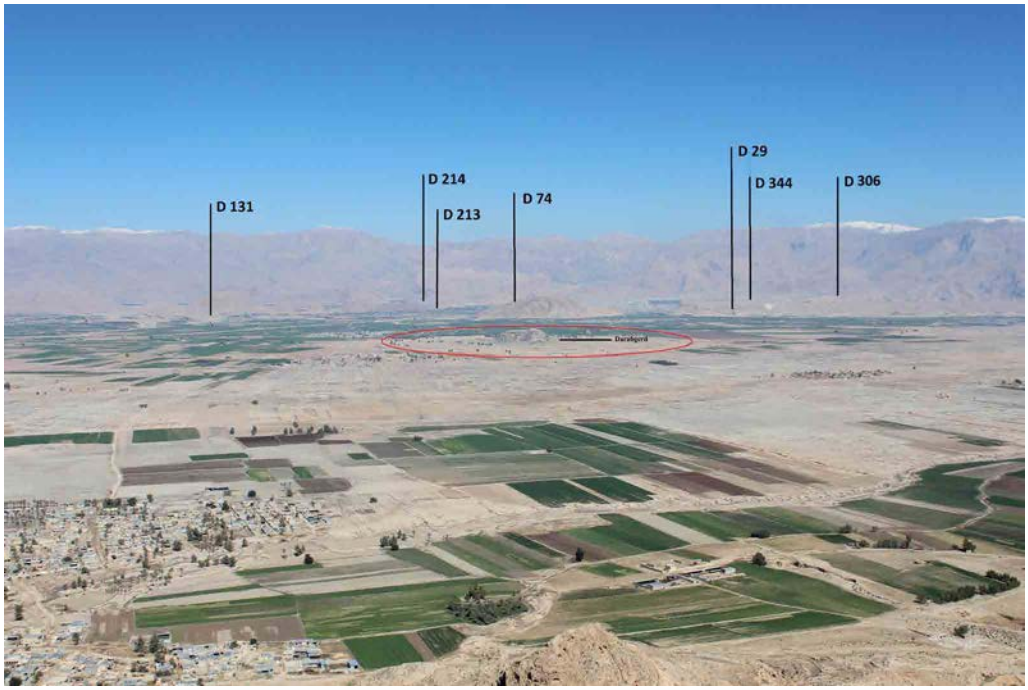

Fig. 13: View of the Darab Plain, Darabgerd, and its key fortresses from Shahneshin-e Padam (Authors, 2024).

Conclusion

Based on the foregoing discussion, the Darab Plain, owing to its strategic geographical location, attracted the attention of the Sasanian kings from the early stages of the formation of the Sasanian Empire. The presence of a large salt formation (diapir) in the Darab Plain—providing a source of salt on the one hand and serving as the central core of a major city on the other—further enhanced the importance of both the plain and the city of Darabgerd. For these reasons, Darabgerd, as one of the Sasanian administrative centers in Fars alongside Ardashir Khurrah, Bishapur, and Istakhr, became the site of one of the major Sasanian mints. Historical texts from the Islamic period indicate that this status continued even into the post Sasanian era. Surface ceramic remains likewise attest to this continuity.

These factors made the security of the city a matter of paramount importance. The topographic setting of Darabgerd—the dominance of surrounding highlands over the city on the one hand and its location along the east–west communication route on the other—provided favorable conditions for the establishment of military settlements. The distribution pattern of these fortresses was also influenced by the location of the city of Darabgerd and by the geographical features of the plain. The primary function of these fortresses was to protect the routes leading to Darabgerd and to control the east–west communication corridors.

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Conflict of Interest

The authors declare that they have adhered to ethical standards in publishing and referencing and confirm that there are no conflicts of interest.

Endnote

1. During this survey, diverse cultural remains including settlement sites, burials (tombs/graves), and military fortresses were identified. The examination of these findings, together with the previously identified rock reliefs of Sasanian kings, can provide researchers with a clear picture of the cultural events that took place on this plain during the Sasanian period.

2. When salt is displaced under the influence of applied forces, it creates large-scale landforms studied within the fields of structural geomorphology and tectonics. The upward movement of salt from depth to the Earth's surface produces distinctive topographic features known as salt diapirs or salt domes (see: Belenitskaya, 2018). The Darab Plain, with its six salt domes named Sachun (southeast of the plain), Baynuj (south), Darabgerd (center), Korsia (north), Tang-e Charkhi (southwest), and Gud-e Shaneh (west), is among the regions exhibiting this phenomenon. The Darabgerd salt dome has two peaks, with the height of the taller peak rising approximately 50 meters above its base. Its composition consists of dark-colored, malodorous dolomites, formed through evaporitic processes. Like other salt domes of the Hormuz Series, the Darabgerd salt dome dates to the Cambrian geological period (approximately 550 million years ago), having penetrated through the overlying sediments and layers to reach the surface. Given that the Hormuz Series is a complex assemblage of evaporitic and magmatic rocks, magmatism has also played a role in the formation of this phenomenon (Shayan et al., 2011: 7) (Fig. 1).

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۳۵
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استقرارهای دفاعی دشت داراب در دورهٔ ساسانی

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چکیده

استان فارس خاستگاه ظهور دو شاهنشاهی هخامنشی و ساسانی در تاریخ ایران بوده است. وجود آثار تاریخی مهم از این دو دوره در فارس آشکارا جایگاه این استان را نشان می‌دهد. یکی از این مناطق در فارس، داراب است که محل قرارگیری شهر دارابگرد در دورهٔ ساسانی بوده است. به نسبت اهمیت این منطقه در سپهر تاریخی و باستان‌شناسی ایران، پژوهش‌های صورت‌گرفته، اندک به‌نظر می‌رسد؛ با توجه به اهمیت این شهر در دورهٔ ساسانی، در این پژوهش تلاش گردیده تا تصویری روشن از جایگاه شهر و خوره دارابگرد ترسیم و ساختار دفاعی آن بازسازی گردد؛ این پژوهش بر آن است تا با توجه به بررسی‌های باستان‌شناسی اخیر در دشت داراب دریابد که دارابگرد دارای چه جایگاهی در ساختار اداری و سیاسی ساسانیان بوده است و تا چه زمانی این اهمیت تداوم دارد؟ هم‌چنین باتوجه به‌وجود قلاع و استحکامات نظامی پیرامون شهر دارابگرد، ساختار دفاعی و نگهبانی از شهر و دشت داراب چگونه عمل می‌کرده است؟ در نگاه نخست مشاهده ویرانه‌های شهر دارابگرد که بیانگر شکوه گذشته آن است از یک‌سو و وجود یک نقش‌برجسته، ضرابخانهٔ بزرگ و مهم که پس از دورهٔ ساسانیان و در قرون نخستین دورهٔ اسلامی نیز فعالیت داشته و هم‌چنین مُهرها و گِل‌مهرهای به‌دست آمده اهمیت این محدودهٔ جغرافیایی را طی دورهٔ ساسانی و اوایل دوران اسلامی نشان می‌دهد. به‌همین دلیل وجود یک ساختار دفاعی منسجم برای شهر دارابگرد و دشت داراب ضروری است. باتوجه به شناسایی ۱۴ قلعه در بررسی‌های باستان‌شناسی دشت داراب، این پژوهش با رویکرد توصیفی-تحلیلی شواهد باستان‌شناسی را در کنار شواهد تاریخی قرار داده است تا بتواند درک درستی از ساختار دفاعی دشت داراب در دورهٔ ساسانی ارائه کند. این پژوهش نشان می‌دهد که جغرافیای دشت داراب در شکل‌گیری شهر دارابگرد و ساختار دفاعی آن مهم‌ترین نقش را داشته است.

کلیدواژگان: شهرستان داراب، دارابگرد، استقرارهای دفاعی، ساسانیان، فارس، مهرها، سکه‌ها.

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Archaeological Analysis of the Architectural Structure Depicted on the Coins of the Frataraka of Pars and Its Comparison with Ritual Architecture (Case Study: Collections of the Sepah Bank Museum and the Tamashagah-e Pol)

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Abstract

The coins of the local rulers of Pars (the Frataraka) are among the most significant archaeological sources for reconstructing the political, religious, and cultural conditions of the region during the Seleucid period. Beyond their economic value, these coins contain visual and symbolic elements that reflect the continuation of Achaemenid traditions and the formation of the political identity of the local rulers. One of the most prominent iconographic elements is the depiction of a building on the reverse of some of these coins, a motif that has long attracted scholarly attention. Despite previous studies, the architectural nature and function of this structure remain subjects of debate in Iranian numismatic and archaeological research. This study aims to examine and clarify the architectural identity and function of the structure depicted on the coins of the first and second groups of the Frataraka rulers. To this end, the study introduces the relevant coin groups and analyzes their visual features in order to resolve existing ambiguities regarding the nature of the structure. The central research question asks what type of building is represented on these coins and to what extent it can be compared with known examples of ancient Iranian ritual architecture. The methodology is descriptive-analytical and based on a comparative approach. Data were collected through museum-based study of the coin collections housed in the Sepah Bank Museum and the Tamashagah-e Pol, in addition to library research and previous scholarly works. These data were then compared with known architectural examples from the Achaemenid and post-Achaemenid periods. The findings indicate that the depicted structure has a ritual and religious character and, in certain structural and symbolic aspects, is comparable to the Kaaba-ye Zarthosht monument at Naqsh-e Rostam. Furthermore, the study shows that over time, due to technical changes in minting methods, the artistic quality and architectural detail of the motif gradually diminished. These results suggest that the depiction of this structure not only reflects ancient Iranian religious and architectural traditions but may also signify the continuity of religious and political legitimacy among the local rulers of Pars in the post-Achaemenid period.

Keywords: Frataraka of Pars, numismatics, ritual architecture, Sepah Bank Museum, Tamashagah-e Pol, Kaaba-ye Zarthosht.

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Introduction

Numismatics is the discipline devoted to the study and collection of various media of exchange, including coins, banknotes, tokens, and other instruments of trade (Borumand, 2012: 2). In French, this field is referred to as Numismatique (Shahbazi Farahani, 2007: 15). Numismatics is considered one of the significant branches of archaeological studies (Sarfraz & Avarzmani, 2008: 3) and represents a prominent example of interdisciplinary research. The study and analysis of coins draw upon diverse fields such as semiotics, linguistics, chronology, and geography, as well as natural sciences including chemistry and physics (Borumand, 2012: 2). Nevertheless, the data obtained from numismatic studies are not always entirely clear or definitive. Therefore, their use in reconstructing historical events must be approached with considerable caution (Frye, 2003: 294–296). However, this does not diminish the importance of numismatic research. Coins constitute some of the few surviving material remains from the past that provide valuable information about history, the economy, and political structures. Numismatic studies are conducted on the basis of scientific methods, logical analysis, and inference; yet, due to the scarcity of written historical sources, many conclusions derived from such studies remain at the level of hypotheses that require further examination and verification (Frye, 2007: 271–272). The term "coin" in Persian carries several meanings, including a device for striking money, minted metal currency, the second nail, the dinar, and also a straight and smooth path. In a more technical sense, a coin is a piece of metal—usually disc-shaped—made of materials such as gold, nickel, copper, or aluminum, which is minted by governments in a specific form and size. The issuing authority determines and guarantees its value and circulates it as money (Shahbazi Farahani, 2007: 13). Bayani defines a coin as a piece of metal of a specific weight upon which an official or governmental mark is engraved, guaranteeing its standard and weight (Bayani, 2010: 18). Tabatabaei describes a coin as the impression produced on pieces of metal by means of a die (a negative mold made of a hard metal such as iron), which is stamped onto the metal through the pressure of a lever or hammer (Torabi Tabatabaei, 1992: 172). Abdi similarly notes that "a coin is usually a round metallic object with a standard weight that is generally minted in large quantities by governments" (Abdi, 2012: 50). Coins of the local rulers of Pars constitute valuable documentary evidence for reconstructing what is often regarded as a "dark" or obscure period in the history of the region. These coins belong to a transitional era in which Pars stood between the legacy of Achaemenid traditions and the political and cultural transformations of the Seleucid and Parthian periods. Accordingly, an examination of the motifs and symbols employed on these coins can provide significant insights into the political thought, religious beliefs, and artistic tendencies of the local rulers of Pars. One of the most important iconographic elements appearing on certain coins of the Frataraka of Pars is the depiction of a structure or building on the reverse. This motif has long attracted the attention of numismatists, archaeologists, and historians, and diverse interpretations have been proposed regarding

its nature, function, and symbolic meaning. Some scholars have regarded it as the representation of a religious building; others have interpreted it as a symbol of political authority and local legitimacy; and still others have examined it in connection with architectural and ritual traditions inherited from the Achaemenid period. The diversity of these perspectives suggests that the structure was not merely decorative, but rather carried substantial meaning and function within the ideological and symbolic system of the Fratarakā rulers. The importance of this issue becomes more evident when the depicted structure is compared with examples of ritual architecture in ancient Iran, particularly monuments such as the Kaaba-ye Zarthosht at Naqsh-e Rostam and the Zendan-e Soleyman. The formal and conceptual similarities between the motif on these coins and certain ritual structures may indicate the continuity of political and religious traditions in the region of Pars. Through such associations, the Fratarakā rulers may have sought to link their authority to the Achaemenid heritage and thereby reinforce the legitimacy of their rule. In this context, coinage—serving as an official and widely circulated medium—would have been an effective instrument for communicating these ideological messages to society.

The present study aims to conduct an archaeological analysis of the architectural structure depicted on the coins of the Fratarakā of Pars and to compare it with examples of ritual architecture. Drawing upon numismatic evidence, archaeological data, and comparative analysis, the research seeks to clarify the nature and function of this structure. The main research question is: what type of building is represented on these coins, and to what extent can it be associated with known patterns of ritual architecture in ancient Iran? Addressing this question may open new perspectives for understanding the religious worldview, strategies of political legitimation, and the continuity of artistic traditions during the period of the Fratarakā rulers of Pars. The main issue addressed in this study concerns the nature and function of the structure depicted on the coins of the Fratarakā of Pars and the extent to which it can be associated with the ritual architecture of ancient Iran. In addition, it is necessary to examine whether this motif served merely as a decorative element or whether it conveyed deeper meanings such as political legitimacy, the continuation of Achaemenid traditions, religious beliefs, and the local identity of Pars. Therefore, an analysis of this motif can contribute significantly to a better understanding of the position of the Fratarakā rulers, their religious beliefs, and their relationship with the traditions of ritual architecture in ancient Iran.

Research Objectives and Significance: The primary objective of this research is to analyze the coinage of the Fratarakā of Pars. These coins constitute rare surviving visual and material evidence from a region and period for which historical documentation is relatively limited and fragmented. Consequently, they serve as vital primary sources for reconstructing the political and cultural history of Pars during the post-Achaemenid period. The architectural motif depicted on these coins is among their most significant iconographic features; its careful examination may help clarify aspects of ritual belief

and the strategies of political legitimation employed by local rulers. Furthermore, comparing this structure with examples of ritual architecture in ancient Iran—particularly monuments such as the Kaaba-ye Zarthosht—may indicate the continuity of religious and architectural traditions from the Achaemenid period into later eras. This is a crucial area of inquiry, as it suggests that the Frataraka rulers sought not only to maintain political continuity with the Achaemenid past but also to reinforce religious and symbolic connections to that heritage through artistic expression. The necessity of this research is underscored by the existence of diverse and sometimes contradictory interpretations regarding the nature of the depicted structure. A comparative archaeological analysis of this motif will help synthesize existing viewpoints and provide a more precise interpretation of the building's function and symbolic meaning. Moreover, this study will contribute to broader scholarship in numismatics, art history, ritual architecture, and ancient Iranian studies.

Research Question and Hypothesis: To gain a clearer understanding of the Frataraka coinage preserved in the Sepah Bank Museum and the Tamashagah-e Pol, the following research question is proposed: What type of structure is depicted on these coins, and to what extent can it be associated with known patterns of ritual architecture in ancient Iran? Addressing this question will contribute to reconstructing the history of the local rulers of Pars (the Frataraka) during the Seleucid and Parthian periods. The hypothesis of this study is that the structure depicted on the coins likely represents a symbolic rendering of a ritual or religious building, such as a fire temple or sanctuary. In terms of form and function, it may be related to established models of ritual architecture in ancient Iran, particularly monuments such as the Kaaba-ye Zarthosht and the Zendan-e Soleyman. This relationship does not necessarily imply a precise architectural depiction; rather, it suggests the continuity of Achaemenid architectural traditions, religious practices, and legitimizing symbols under the rule of the local dynasts in the post-Achaemenid period. The main objective of this research is to identify and analyze the structure depicted on the reverse of the coins belonging to the first group of the Frataraka. The collections of the Sepah Bank Museum and the Tamashagah-e Pol were selected for several reasons: they are state-owned collections that deserve wider academic introduction; they contain a rich assemblage of coins attributed to the local rulers of Pars; they are accessible for study; and, importantly, no independent research focusing specifically on the architectural motif within these collections has previously been conducted.

Research Method: The research employs a descriptive–analytical method with a comparative approach. In the first stage, samples of Frataraka coins that depict an architectural structure are examined regarding their form, composition, architectural details, and the placement of the motif on the surface of the coin. Subsequently, the characteristics of this structure are compared with known examples of ritual architecture in ancient Iran, such as the Kaaba-ye Zarthosht at Naqsh-e Rostam and other stone monuments in the region of Pars. Data have been collected through library sources,

scholarly articles, archaeological reports, numismatic catalogs, and museum records. The literature review encompasses historical sources, western-language references, and recent numismatic studies. Key sources include the catalogs of the Sepah Bank Museum and the Tamashagah-e Pol, specifically those detailing coins attributed to Bagadat, Vohubarz (Oborzos), Ardeshir I, Autofradat I, Darius I, and Autofradat II. This methodology integrates numismatic and archaeological data to present a precise interpretation of the structure depicted on these coins.

Literature Review

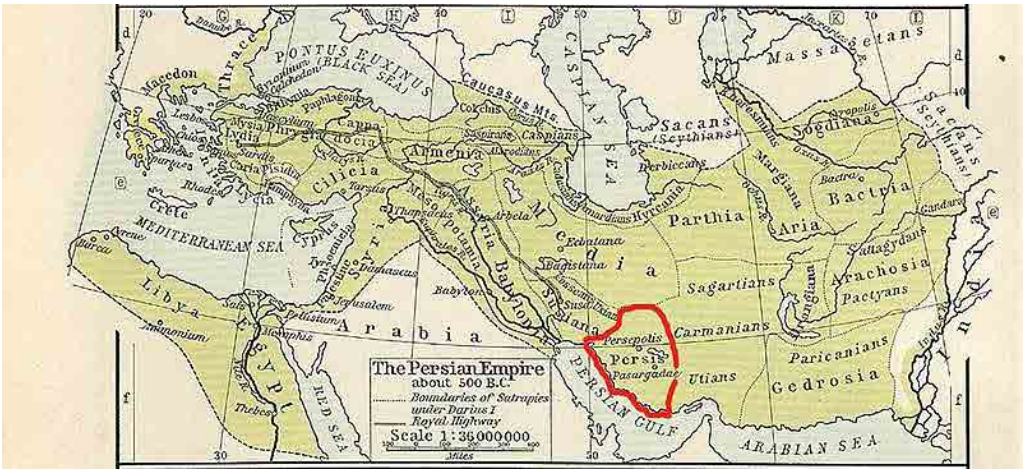
The earliest systematic study of Persid coinage appeared in Joseph Pellerin's nine-volume work, Recueil de médailles de peuples et de villes (1763–1770). Subsequently, Joseph Hilarius Eckhel (1794) expanded the corpus of known Persid coinage in his three-volume work, Doctrina Numorum Veterum. Nearly fifty years later, Wilson (1841) published a study on coins from Afghanistan in which, due to the presence of Aramaic inscriptions, he erroneously attributed Persid coins to the Sasanian period (Potts, 2007: 272–273). The French scholar Allotte de la Fuye (1906) made one of the first attempts to classify these coins in his research. Later, George Hill (1922) published the first relatively comprehensive catalog in Volume 28 of the Catalogue of the Greek Coins in the British Museum (section titled "Arabia, Mesopotamia and Persia"). Hill divided the coins of Pars into four periods: the first period comprises the coins of the Frataraka; the second period includes coins in which the title Frataraka changes to mlkʾ ("king" in Aramaic); the third period begins with the conquest of Pars by Mithridates I of Parthia; and the fourth period concludes with the coins of Ardeshir IV, son of Manuchehr III. Almost simultaneously with Hill's catalog, Jacques de Morgan (1923) published a work on the numismatics of the Middle East in antiquity and the medieval period (RezaKhani, 2012: 29–30). Since then, research on Persid coinage has continued intermittently. Naster (1968) discussed the etymology of the term Frataraka, while Robert Göbl (1983) published notes on the numismatics of Pars. In 1983, David Sellwood contributed a discourse on the coinage of Characene, Elymais, and Pars to The Cambridge History of Iran. Subsequently, Michael Alram (1986) published Nomina Propria Iranica in Nummis, a comprehensive study focusing on Iranian proper names found on coins. Josef Wiesehöfer's Die 'dunklen Jahrhunderte' der Pars (1994), translated into Persian by Hooshang Sadeghi in 2009, utilized available numismatic and historical evidence to establish a chronological framework for the region. In 2008, Oliver D. Hoover published a study on the chronological sequence of the rulers of Pars. Other scholars—including Antonio Panaino, Arthur Houghton, Catharine Lorber, and Vesta Sarkhosh Curtis—have contributed studies on the style and iconography of Persid coinage, exploring their links to Parthian and Hellenistic numismatics and their iconographic connections to Achaemenid traditions. Among Persian-speaking scholars, researchers such as Yaghoub Mohammadifar & Alireza Khounani (2014), Amir Amirinejad,

Salahuddin Maroufi, Maryam Rahman Setayesh, Sahar Rastegarinejad, and Masoumeh Bagheri Hassan Kiadeh have investigated various aspects of Persid coins. However, none have addressed the specific core subject of this study. Bahramzadeh et al. (2018), in their article "Archaeological Analysis of the Structure Depicted on the Coins of the Local Rulers of Pars (Frataraka)," examined the visual characteristics of these coins and proposed a hypothesis regarding the nature of the depicted structure. Their work is the closest in scope to the present research, as it focuses on the same architectural element. The current article, however, introduces the specific Frataraka collections held in the Sepah Bank Museum and the Tamashagah-e Pol and, by integrating historical and archaeological evidence, aims to reach a more comprehensive conclusion regarding the function of the building engraved on these coins.

Analysis of Research Findings

Political Geography of Pars

A small region adjacent to the Persian Gulf was known in antiquity as Pars and is today called Fars. During the reign of the Achaemenid kings, Pars was one of the important provinces of the empire, bounded by the Persian Gulf to the south, Khuzestan to the west, Media to the north, and Baluchistan to the east (Sami, 1954: 21). During the Seleucid and Parthian periods, this region enjoyed a certain degree of autonomy, to the extent that its rulers minted coins in their own names and exercised considerable authority (Harper, 2013: 98). In the Seleucid period, the administration of Pars was entrusted to rulers who referred to themselves as Frataraka; however, during the Parthian period, with the expansion of their political power, they adopted the title of "king". These local rulers, who regarded themselves as the successors of the Achaemenids, maintained a semi-independent form of government (Rastegari-Nejad et al., 2013: 47). Since they ascended the throne with the approval or appointment of Seleucid and Parthian monarchs, they have also been referred to in the sources as the "local rulers of Pars".



Map 1: Map of the empire of the local rulers of Pars (Bahramzadeh et al., 2018: 39).

Coins of the Local Rulers of Pars

Study and Analysis of the Coins of the First Group of the Local Rulers of Pars

- Coins of Ardeshir I

Obverse: The coin depicts the bust of the king wearing a distinctive cap with a projecting brim. This felt headdress covers not only the forehead but also the cheeks and neck. In the lower part of the face, this covering functioned as a padām (mouth-cover), intended to prevent human breath from polluting the sacred fire. The edges of the cap extend down to the chin; however, the mouth itself is not covered. It appears that during religious ceremonies, this lower section of the covering would have been drawn upward (Hill, 1967: 199; Bahramzadeh et al., 2018: 39). Reverse: The reverse motif corresponds to the patterns of the "second series of Bagadat" and depicts the king in an attitude of worship before a structure (Hill, 1967: 199; Bahramzadeh et al., 2018: 39).

Fig. 1: Coins of Ardeshir I (Sepah Bank Museum).

- Coin of Vohubarz

According to the research of the late Shapur Shahbazi, the coin under discussion (Fig. 2) has been attributed to Vohubarz (Shahbazi, 1999/1378: 22). The coinage attributed to Vohubarz includes tetradrachms, silver drachms, and fractional denominations (Ibid: 22). In terms of physical form, these coins display a markedly dish-shaped (concave-convex) fabric; that is, the obverse surface is concave, while the reverse is convex (Hill, 1967: 199). Despite this characteristic, these specimens may be regarded as among the most beautiful and symbolically meaningful Iranian coins. On the obverse, the bust of Vohubarz appears in right profile. He wears the Iranian headdress known as the tiara, which typically covers the head, ears, and chin and is adorned with a diadem band. On the reverse, an image of a sanctuary with a double-leaf door is depicted. The large roof beams (farasps), with their projecting rounded ends, are clearly shown, and the cornice of the structure is decorated with a row of circular motifs. Above the sanctuary, the head of a fire altar with blazing flames is represented. According to Shahbazi, this image may symbolize the threefold sacred fires of the Iranians—fires associated with the three traditional social classes: warriors, artisans, and priests. On the tetradrachms, a winged human figure is shown flying above these three fires; this crowned and winged figure resembles those depicted on the tombs of the Achaemenid kings. In this composition, Vohubarz himself—wearing the same headdress—stands to the left of the sanctuary. He raises his right hand in a gesture of reverence toward the fire altars, while holding a

bow in his left hand, with one end resting on his foot. To the right of the altar appears a standard with a square panel decorated with a four-pointed star and pendant, bell-like ornaments. Between the standard and the sanctuary, an Aramaic inscription is engraved, read as: "WHWBRZ PRTRKʾ ZY ʾLHʾ," meaning "Vohubarz, frataraka of the gods" (Shahbazi, 1999/1378: 22–23; Bahramzadeh et al., 2018/1397: 38).

Fig. 2: Coins of Vohubarz (Tamashagah-e Pol).

- Coins of Autofradat I (Vadfradad I)

On most coins issued by this ruler, he is depicted raising his right hand toward a structure, while holding a double-curved bow in his left hand, with one end resting on the ground. Above this structure, the figure of a winged man is visible, appearing either to rise from it or to hover above it. This motif is well known from the Achaemenid period. Some scholars have interpreted it as a representation of Ahura Mazda, while others, citing the coins of Vadfradad and other later rulers of Pars, interpret it as a symbol of khvarenah or "Divine Glory".

Calmeyer and Shahbazi have further emphasized that whenever the crown of this monarch differs from that of the winged figure depicted above him, the hovering being is, in fact, an embodiment of the khvarenah—the royal glory of one of his ancestors. On this basis, the winged man depicted on the Frataraka coins can be understood as a symbol of the new ruler's claim to the legitimate succession of the Achaemenid kings in Pars. In this context, it is important to note that the winged man wears the Achaemenid crenelated crown, whereas the king himself is depicted wearing the tiara. As noted above, the scene depicted on the reverse of this ruler's coins clearly recalls the façade of the tomb of Darius I at Naqsh-e Rostam, where the three elements—the king, the fire altar, and the winged man—appear in a tripartite composition (Wiesehöfer, 2009/1388: 81–82).

Fig. 3: Coin assemblage of Autofradat I (Vadfradad I), (Sepah Bank Museum).

- Coin of Bagadat

Bagadat, who is regarded as the first local ruler of Pars, issued two types of coins. The coin examined in this study (Fig. 4) belongs to the second type. Obverse: The king's portrait, with a short beard and moustache, is depicted in right profile. His headgear, on both the obverse and the reverse, is distinguished by its pointed tip. A comparable example of this type of headgear can be observed in the relief on the sarcophagus of the satrap of Sidon (Gall, 1972: 278; Bahramzadeh et al., 2018: 37). Reverse: According to Wiesehöfer, Bagadat on the obverse still wears the "royal" tiara adorned with a diadem, whereas on the reverse he is depicted with a projecting tiara (Wiesehöfer, 2009: 77). Examination of the sequence and varieties of Bagadat's coinage indicates that the coins whose reverse shows the ruler standing before a "structure" are later than those depicting the ruler seated on a throne. It is also noteworthy that on the reverse of the second type of coins, Bagadat wears a tiara decorated with a diadem—an element that later became a common feature among all rulers of the first period. Moreover, the image of the ruler standing before a "structure," appearing in this or similar forms, is repeated on nearly all coin types of the Frataraka rulers (Ibid: 77). In studies of the development of the Urchīn dome and the factors influencing the formation of an architectural symbol, this motif has been interpreted as originally representing a fire altar depicted on a coin dating from the sixth to the fourth centuries BCE. Furthermore, on one Seleucid coin, three fire altars of the same form appear on top of a structure that has been suggested to represent the Kaaba-ye Zarthosht. Likewise, on the reverse of a coin of Vohubarz, the ruler is shown standing before a large building with three fires burning on its roof, while performing an act of reverence toward them (Saeidian et al., 2012: 121; Bahramzadeh et al., 2018: 37). Ghirshman also writes that the triad of Ahura Mazda, Mithra, and Anahita—worshipped during the Achaemenid period—apparently remained important during the Parthian era. According to him, although explicit textual evidence from within Iran is lacking, positive written testimony has been preserved in Armenia, where ancient historians mention temples containing three altars dedicated to these three deities. If this tradition is traced back to the Achaemenid period, it may be suggested that the two altars located in the open spaces of Naqsh-e Rostam and Pasargadae, together with a third altar erected near the tower-temple, belonged to the same triad. Likewise, the three fires burning on the three altars depicted atop the tower-temple on the coins of the kings of Pars under Parthian suzerainty may represent this very triad (Ghirshman, 2011).

Fig. 4: Coin of Bagadat (Sepah Bank Museum).

Analysis of the Coins of the First Group of Local Rulers of Pars

The coins of the first group of local rulers of Pars include those of Bagadat, Vohubarz, Ardeshir I, and Autofradat I. In this group, the depiction of the structure appears relatively clear and is rendered in greater detail.

A) Coin of Ardeshir I

Recent studies have identified Ardeshir I as the first local ruler of Pars, while Autofradat I and Bagadat have been presented as rival claimants.

Table 1: Analysis of the Coin of Ardeshir I (Authors, 2026)

Section	Feature	Interpretation
Obverse	The ruler wearing a projecting (distinctive) cap	Indicates the political–religious status of Ardeshir I; it may also allude to ritual purity and respect for the sacred fire.
Reverse	The ruler shown in prayer before a structure	Represents the early formation of the visual tradition of Frataraka coinage; it signifies an act of worship and the king's connection with sacred affairs.
Ruler's attire	A head covering that conceals the mouth and chin	Associated with the performance of religious rituals; the *padām* was used to prevent the pollution of the sacred fire.

In Zoroastrian tradition, the padām was a type of mouth covering used when approaching the sacred fire in order to prevent human breath from polluting it. If the king's head covering on the coin of Ardeshir I is related to this concept, the depiction of the king standing before the structure and the fire acquires an even stronger ritual character. Thus, this coin places particular emphasis on the relationship between the king, the sacred fire, and the ritual of purity.

B) Coin of Vohubarz

The coin of Vohubarz is among the most significant examples in this study, since the image depicted on its reverse is highly meaningful and complex.

Table 2: Analysis of the Coin of Vohubarz (Authors, 2026)

Visual Element	Description	Meaning and Interpretation
Ruler's portrait	Right-facing profile with a distinctive cap and diadem	Indicates the political–religious status of Vohubarz
Sanctuary / temple structure	A building with a double-leaf door, pilasters, and a decorative cornice	Suggests ritual architecture, possibly reflecting Achaemenid architectural traditions
Three fire altars	Placed above the sanctuary with rising flames	Symbol of three sacred fires or a ritual triad; possibly associated with Ahura Mazda, Mithra, and Anahita, or with social classes
Worshipping king	Vohubarz standing on the left with his right hand raised	Represents the act of worship and the king's connection with sacred matters; continuation of the visual tradition and consolidation of religious imagery on Frataraka coins
Standard (banner)	Positioned to the right of the fire altar	Symbol of political authority
Aramaic inscription	"Vohubarz, Frataraka of the gods"	Indicates the ruler as a representative of Ahura Mazda on earth and emphasizes his divine legitimacy

The coin of Vohubarz represents one of the strongest pieces of evidence for interpreting the structure as having a ritual character. Several significant elements appear together on this coin: the worshipping king, the structure or sanctuary, three fires, a winged figure, a

standard, and a divine inscription. These features show that the reverse does not depict an ordinary scene, but rather a highly symbolic one. The king stands before the building and the fires in an attitude of worship. This image may indicate that the Fratarakā regarded himself not only as a political ruler but also as the guardian of the religious and ritual traditions of Pars. The inscription "Fratarakā of the gods" further reinforces this interpretation, as it presents the rule of Vohubarz as having a divine origin.

C) Coin of Autofradat I / Vadfradad I

On the coin of Autofradat I, the depiction of the winged figure and its connection with Achaemenid traditions is of particular importance.

Table 3: Analysis of the Coin of Autofradat I / Vadfradad I (Authors, 2026)

Element	Description	Interpretation
Ruler / worshipper	The ruler raises his right hand toward the structure while holding a bow in his left hand	Indicates the political–religious status of Autofradat I; a combination of worship and martial power
Structure	A ritual building depicted on the reverse of the coin	Serves as the central element of the religious scene
Winged Fig	Positioned above the structure	Symbol of *khvarenah* (royal glory), Ahura Mazda, or royal legitimacy
Crown of the winged Fig	A crenelated Achaemenid crown	Emphasizes the connection with Achaemenid royal tradition
Visual resemblance	Reminiscent of the façade of the tomb of Darius I at Naqsh-e Rostam	Indicates the continuation of the iconographic pattern of king–fire–winged Fig
Bow	Held in the king's left hand	Symbol of royal, martial, and military power

In this coin, the image of the winged human figure appears for the first time. This element may represent the khvarenah (royal glory), that is, the sacred force that makes the ruler worthy of kingship. By depicting himself standing before the structure and beneath the presence of the winged figure, Autofradat I asserts both political and religious legitimacy. The presence of the winged figure wearing the crenelated Achaemenid crown recalls Achaemenid reliefs and imagery, suggesting that Autofradat I sought to present himself as a continuation of the Achaemenid tradition. In this way, he intended to demonstrate that his rule possessed divine legitimacy and represented a continuation of Achaemenid royal heritage.

D) Coin of Bagadat

The coin examined here belongs to the second type of his coinage.

Table 4: Analysis of the Coin of Bagadat (Authors, 2026)

Coin Section	Features	Interpretation
Obverse	Right-facing portrait of the king with a short beard and mustache and a pointed cap	Depicts the ruler with Iranian and local attributes, expressing his independent or semi-independent political identity
Reverse	The ruler standing before a ritual structure	The presence of the king before the structure indicates that political authority is connected with ritual and sacred tradition

Cap / Bashlyk	A bashlyk decorated with a diadem	The diadem is a symbol of royal status and political legitimacy
Structure	A sacred or ritual building	Possibly representing a fire temple, a place of worship, or a structure similar to the Kaaba-ye Zarthosht

On the coin of Bagadat, the shift in imagery from the "ruler seated on a throne" to the "ruler standing before a structure" is highly significant. This change suggests that, at a certain stage in the minting of these coins, the emphasis shifted from purely political power to ritual and religious authority. In other words, the king is no longer depicted merely seated on a throne; instead, he is shown in interaction with the sacred. This indicates that Bagadat sought to legitimize his rule in opposition to Autofradat I and, in doing so, employed religious and ritual symbols to strengthen the legitimacy of his authority.

Study and Analysis of the Coins of the Second Group of Local Rulers of Pars

Coin of Darius I

Obverse: On the obverse of the coin, the ruler is shown in right profile. He wears a distinctive cap whose straps are tied at the back of his head. His face is depicted with open eyes, a beard, and a circular earring. The beard is rendered in a dotted style, which gives the portrait a distinctive appearance. Reverse: At the center of the reverse appears a fire altar composed of two main sections. The lower section represents the body of the altar and is decorated with geometric motifs, probably square forms, as well as circular ornaments. This section lies beneath the place where the fire is set. The upper part of the altar consists of two crenelated elements that indicate the place where the fire burns. Beside the fire altar stands a worshipping figure, most likely Darius I. He is dressed in a long garment and wears a cap resembling a bashlyk. His hand is raised in a gesture of reverence or prayer. On the right side of the image, a square banner mounted on a pole is also depicted (Karmajani, 1993: 87–88; Bahramzadeh et al., 2018: 40). In fact, the image on the reverse of the coin may be interpreted as a representation of the structure associated with the Kaaba-ye Zarthosht, with the difference that the fire altars seen on the coins of the local kings of Pars are rendered here in crenelated form. Moreover, the section beneath the crenellations should not be understood as the container of the altar; rather, it most likely represents the entrance door and the body of the building itself (Bahramzadeh et al., 2018: 41).

Fig. 5: Coin of Darius I, (Sepah Bank Museum).

Coin of Autofradat II

Obverse: On the obverse, the ruler is depicted with large, open eyes, a prominent nose, and a long beard. He faces right, and the arrangement of his hair resembles that of Mithradates I on Parthian coins, with the hair extending to the beginning of the ears. A royal diadem is placed on his head, and above it a crescent moon symbol is depicted. Two necklaces are also shown hanging around his neck. Crown: From the reign of Mithradates I onward, the crown was depicted as a simple or lined band tied at the back of the head, with its ends hanging down behind the shoulders (Bayani, 2010, vol. 2: 49). This band or headband may be regarded as a type of semi-crown (Sarfaraz and Avarzamani, 2008: 34). It is highly probable that the semi-crowns of Parthian kings were made of gold, as such crowns correspond well to the status of the rulers of the powerful Parthian Empire (Makvandi and Dadvar, 2012: 37; Bahramzadeh et al., 2018: 41–42). The diadem was regarded as a symbol of divine glory (farrh-e izadi) and had already been in use prior to the Sasanian period. Examination of Parthian coins shows that the diadem appears around the heads of several kings. This sacred symbol was also significant among the local rulers of Pars. The concept of farrh (divine glory) has deep roots in ancient Iranian culture and was associated with Ahura Mazda, the major deities of the Zoroastrian religion, and with kings. At times, this symbol was represented as part of royal attire or adornment (Avarzamani, 2013: 40–41; Bahramzadeh et al., 2018: 41–42). Crescent Moon: The crescent motif follows the same visual tradition as the crescent depicted above the distinctive cap of Darius I (see: Amiri Parian, 2009; Bahramzadeh et al., 2018: 41–42). Reverse: Religious Figure: On this coin, the head of the religious figure appears somewhat detached from the body and is depicted almost as an independent image, thereby emphasizing the distinctive expression of the face. This figure wears a long garment and raises one or both hands in a gesture of prayer toward the fire altar structure. Bird: The bird depicted on the reverse may be interpreted as an eagle or a falcon, an animal associated with Verethragna (Bahram), the god of victory. The bird may also represent the physical manifestation of farrh (divine glory), the sacred force that grants its bearer power and status. From this perspective, the individual standing before the religious structure can be understood as the possessor of farrh. Farrh functions as a symbol of both political and religious authority, and a religious figure is considered worthy of receiving it because of qualities such as truthfulness and trustworthiness. No inscription appears on the reverse of this coin; however, a winged bust is placed above the scene, spreading its wings in a manner that evokes the form of fire (Boyce, 1996: 136; Bahramzadeh et al., 2018: 41–42).

Fig. 6: Coin of Autofradat II (Tamashagah-e Pol).

Structure: The depiction of the structure on this coin cannot be considered a direct continuation of the structure shown on the coin of Darius I, as there are clear differences between them. The building represented on the coins of Autofradat II has a cylindrical form. Its fire altar appears to emerge from the two main columns of the structure and lacks a crenelated form. Moreover, no doorway is visible; instead, two vertical columns are depicted in place of a door. In addition, the farrh or winged symbol in this example has a distinctive form. By contrast, the structure depicted on the coin of Darius I, in addition to the crenelated fire altar, clearly shows an entrance door. Horizontal motifs also appear on its body at regular intervals, which may recall the blind windows of the structure associated with the Kaaba-ye Zarthosht (Bahramzadeh et al., 2018: 41–42; Fig. 7).

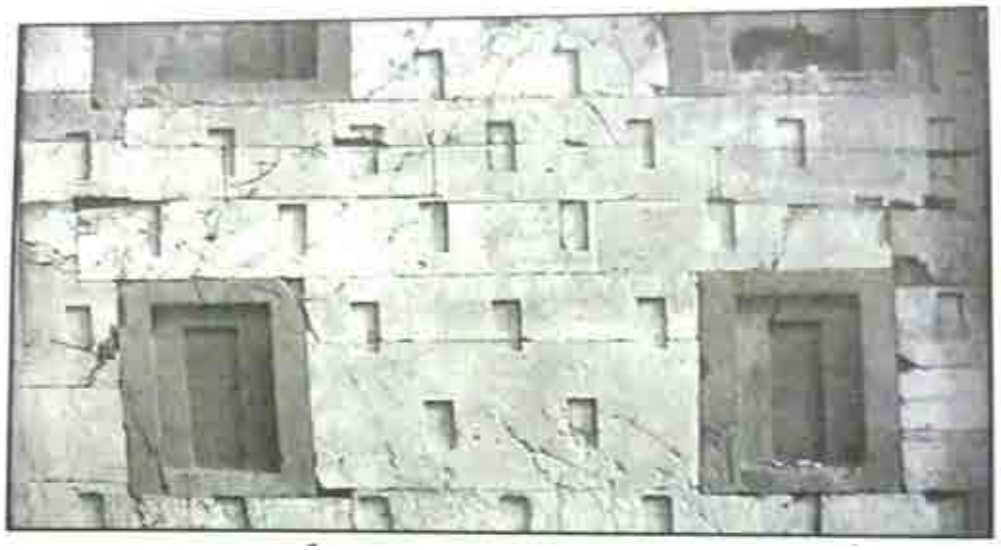


Fig. 7: Decorative elements of the Bon khaneh building (Kaaba-ye Zarthosht) (Mousavi, 2011: 119).

Review of the Views of Iranian and Foreign Scholars on the Imagery of the Coins of the Local Rulers of Pars and the Structure Attributed to the Kaaba-ye Zarthosht

One of the important and still unresolved issues in studies of Achaemenid architecture and religious ritual is determining the function of two prominent structures at Pasargadae and Naqsh-e Rostam, namely the "Prison of Solomon" (Zendan-e Soleyman) and the Kaaba-ye Zarthosht (Wiesehöfer, 2009: 43–44). Various interpretations of the function of these buildings have been proposed by both Iranian and foreign scholars, each offering different explanations based on architectural evidence, historical texts, or archaeological data. Some researchers attribute a religious function to this structure. Ghirshman, citing Wikander, considers it a sanctuary associated with Anahita, in which the statue of this goddess may have been placed. In his view, the worship of Anahita could have created a form of religious cohesion among the various peoples of the Achaemenid Empire (Ghirshman, 2011: 228). Ghirshman also emphasizes the religious character of the building and identifies it as a fire temple where the sacred and eternal fire was preserved,

although he simultaneously raises the possibility of its association with the worship of Anahita (Ibid: 228). In the same context, Arthur Upham Pope likewise regarded the structure as a place for keeping the sacred fire and interpreted it within the framework of the fire-worship tradition of ancient Iran (Pope, 1987: 23).

In contrast, some scholars have proposed other functions for this structure. Wiesehöfer, citing Sancisi-Weerdenburg, suggests that the building was originally constructed for coronation rituals and ceremonies of royal consecration. In such rituals, symbolic elements of death and rebirth were present, and the "royal fire" played a significant role. At the same time, he also raises the possibility that in later periods—particularly during the Sasanian era—the structure may have been used as a place for keeping documents; however, he considers this function secondary (Wiesehöfer, 2009: 44). The inscriptions of Shapur I and Kerdir on the walls of the Kaaba-ye Zarthosht have also provided the basis for another interpretation of the function of this structure. In the third section of Kerdir's inscription, the term bun xānag is mentioned: "This foundation house belonged to you; act as you know to be better for the gods and for us" (Rajabi, 1971: 16). On this basis, some scholars, including Sprengling, Walter Hinz, and Walter Henning, have regarded the building as a place for preserving documents and religious texts. According to this interpretation, bun xānag, or "foundation house," may refer to a structure in which charters, religious decrees, royal proclamations, and even a copy of the Avesta were kept (Sami, 2010: 42). Henning, in particular, argues that the term "foundation house" in Kerdir's inscription refers to the very building on whose wall the inscription was carved; that is, the Kaaba-ye Zarthosht itself (Ibid: 41). However, Walter Hinz emphasizes that applying the name bun xānag to the Kaaba-ye Zarthosht is acceptable for the Sasanian period, but that its use for the Achaemenid period still requires further investigation (Ibid: 42).

Some historical sources also point to a possible connection between this structure and the preservation of sacred texts. Ibn al-Balkhi, in the Fārsnāma, relates that the book of the Zand was written on twelve thousand cowhides and kept in Istakhr of Fars, in a place called "Kuh-e Nefesht" (Ibn al-Balkhi, 1984: 49–50). On the basis of such accounts, it has been suggested that the Kaaba-ye Zarthosht, or a similar building, may have served as a repository for religious texts. Alongside these interpretations, some scholars have proposed a funerary function for the structure. Herzfeld regarded these tower-like buildings as a type of tomb that, in structural terms, bore some resemblance to residential houses (Herzfeld, 2002: 219). By contrast, Richard Frye, examining the architectural characteristics of the building, considered this hypothesis less convincing. In his view, the presence of stone doors and the absence of windows are not compatible with either a funerary or a fire-temple function. He therefore suggested that these buildings may have been used as places for keeping royal objects or as fortified storehouses associated with the court (Frye, 2003: 203). Part of this discussion is also connected with the images of architectural structures depicted on the coins of the Fratarakā rulers of Pars. In their

study of these coins, Ernie Haerinck and Bruno Overlaet refer to the architectural features of the structure represented on them. According to them, the building has a broad double-leaved door that occupies almost the entire front façade. On both sides of this doorway, three block parapets with horn-shaped elements can be observed—features that appear only on the coins of the first group (Haerinck & Overlaet, 2008: 209–210). They compare these characteristics with the entrances of the Achaemenid royal tombs at Naqsh-e Rostam and Persepolis, where tall doors are carved into the upper part of the rock façade and the lower part is enclosed by stone (Ibid: 210; Fig. 7). In this context, some scholars have also pointed to the connection between this image and known Achaemenid buildings. David Stronach regards the structure depicted on the Fratarakā coins as a post-Achaemenid example of Achaemenid fire sanctuaries (Stronach, 1986: 220–221). By contrast, Shapur Shahbazi associates it with the fire sanctuary on the terrace of Persepolis and emphasizes the presence of a double-leaved door, projecting roof beams, and cornice decoration consisting of a row of circles. In his view, the three fire altars shown above the building symbolize the three sacred fires of the social classes of ancient Iran—warriors, artisans, and priests (Shahbazi, 1999: 22; Fig. 8). Amiri Parian likewise considers this structure to be a reflection of Achaemenid architectural traditions and religious beliefs. He points to its similarity to the gateways of Achaemenid palaces, as well as to the stone doorway discovered during Stronach's excavations in the Dasht-e Morghab. In his opinion, the building was probably similar to the Kaaba-ye Zarthosht at Naqsh-e Rostam or the Zendan-e Soleyman at Pasargadae; fires may have been kindled on its summit, and the Fratarakā rulers of Pars may have performed devotional rituals before it (Amiri Parian, 2009: 12). Overall, a review of these various interpretations shows that no definitive scholarly consensus has yet been reached regarding the actual function of the Kaaba-ye Zarthosht and similar structures. Some scholars have identified it as a fire temple or sanctuary; others have interpreted it as a repository for documents and religious texts; and still others have proposed functions such as a tomb, ceremonial building, or royal storehouse. This diversity of views demonstrates that the structure remains one of the major enigmas of the architecture and religious practices of ancient Iran.

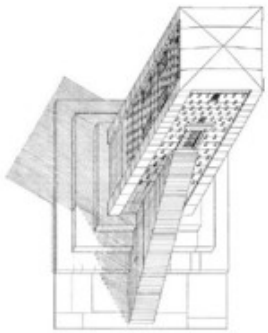


Fig. 8: Three-dimensional reconstruction of the Kaaba-ye Zarthosht, viewed from the north (Haerinck & Overlaet, 2008: 225).

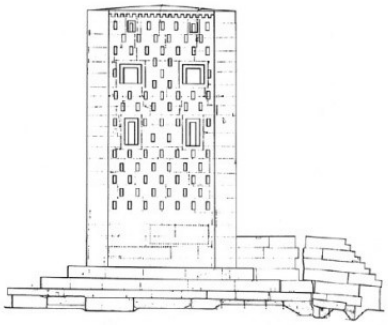


Fig. 9. Reconstruction of the southeastern façade of the Kaaba-ye Zarthosht (Haerinck & Overlaet, 2008: 226).

In conclusion, considering the range of views proposed regarding the function of structures such as the Kaaba-ye Zarthosht (Figs. 8 & 9) and Zendan-e Soleyman, it may be said that none of the existing theories alone is capable of fully explaining all the architectural, historical, and archaeological evidence. Nevertheless, a comparison of the architectural features of these structures with the images depicted on the coins of the Frataraka rulers of Pars suggests that these buildings likely had a ritual and religious function. The presence of fire altars, the depiction of a ruler or religious figure praying before the structure, and the continuation of certain Achaemenid architectural elements in these images all indicate a connection between these structures and religious practices, as well as symbols of political legitimacy.

Therefore, it may be assumed that, in addition to their symbolic aspect, these buildings served as places for the performance of certain religious rites or ceremonies associated with political authority. Consequently, these structures should be examined within the framework of the religious and political traditions of ancient Iran and in relation to the concept of farrh-e izadi (divine glory) and the legitimization of rulership—an idea that is also reflected in the images and symbols appearing on the coins of the Frataraka.

Analysis of the Coins of the Second Group of the Local Rulers of Pars

In the second group, the depiction of the structure undergoes certain changes. On some coins, the structure appears simpler, more abstract, or somewhat different from the examples seen in the first group.

A) Coins of Darius I

Table 5. Analysis of the Coin of Darius I (Authors, 2026).

Element	Description	Analysis
Obverse of the coin	Profile portrait of the ruler with a distinctive cap, dotted beard, and an earring	Representation of royal status and local identity
Reverse of the coin	A fire altar or structure placed at the center	The ritual focal point of the scene
Worshipper	A Fig wearing a long garment and a bashlyk-like cap	Probably Darius I himself shown in the act of worship
Standard (flag)	Located on the right side of the image	A symbol of political authority and ceremonial power
Structure	Featuring an entrance doorway and horizontal decorative elements	Resembling the Kaaba-ye Zarthosht and its blind windows
Farrh (Divine Glory)	Above the altar/structure, depicted as spread wings and suggesting flames	Symbol of *farrh*, Ahura Mazda, or royal legitimacy; also evoking the sacred fire

Based on the available evidence, it is emphasized that the image on the reverse of the coin of Darius I represents the structure attributed to the Kaaba-ye Zarthosht. What some scholars interpret as a "crenellated fire altar" is, in fact, part of the building itself; the lower section is not a fire-altar base or container, but rather the entrance doorway of the structure.

B) Coin of Autofradat II

Table 6: Analysis of the Coin of Autofradat II (Authors, 2026).

Element	Description	Analysis
Obverse of the coin	Portrait of the ruler with large eyes, a prominent nose, long beard, and diadem	Influence of Parthian art and continuation of royal symbols
Crescent moon	Above the ruler's head	Religious or royal symbol; continuation of the crescent motif on earlier coins
Religious Fig	On the reverse, with hands in a gesture of prayer	Continuation of the theme of worship
Bird	Eagle or falcon	Symbol of Verethragna (Bahram), *farrh*, and victory
Farrh or winged bust	Above the scene	Indication of sacred authority and divine legitimacy
Structure	Cylindrical, without a doorway, with two vertical columns	A change in form compared with the structure on the coin of Darius I

The coin of Autofradat II reflects a transformation in the depiction of the structure. Unlike the coin of Darius I, on which the building more closely resembles the Kaaba-ye Zarthosht, the structure on the coin of Autofradat II appears cylindrical and more simplified. The entrance doorway is omitted, and two vertical columns are depicted instead. This change may have several possible explanations: a decline in artistic precision and detail in the minting of the coin; a stylistic shift from realism toward symbolism; a movement away from the direct representation of the Kaaba-ye Zarthosht; or the influence of Parthian artistic traditions on later coinage. The presence of a bird, possibly an eagle or falcon, is also significant. The falcon may symbolize Verethragna/ Bahram, the deity associated with royal glory (farrh) and victory. Therefore, even if the representation of the structure changes, the central theme—namely, religious and political legitimacy—remains preserved.

Identification of the Structure Depicted on the Coins of the Local Rulers of Pars and the Kaaba-ye Zarthosht Based on Archaeological Evidence

The hypothesis that these structures functioned as fire temples or fire sanctuaries is noteworthy to some extent. This is because the fire shrines depicted on the reverse of some coins of the Fratarakā—the local rulers of Pars after the Achaemenids—closely resemble the two monuments known as the Kaaba-ye Zarthosht and Zendan-e Soleyman. Moreover, the ground plans of these two structures do not differ significantly from those of the Achaemenid fire temples at Susa, which were constructed as small spaces built above four columns and surrounded by an enclosed corridor (Mousavi, 2011: 117).

Ancient Iranians believed that heat existed in three forms and in three realms: on earth in the form of fire, in the space between the earth and the sky as warmth, and in the heavens in the form of the world-illuminating sun (Sami, 2010: 288). Reverence for fire was of such importance that the local rulers of Pars, the Fratarakā, during the Seleucid and Parthian periods, held not only political authority but also leadership over fire temples and considered themselves guardians of the sacred fire. For this reason, images of fire or fire altars were depicted on their coins. Some of these coins also bear inscriptions indicating that the reigning kings were regarded as protectors and custodians of the sacred fire (Ibid: 289). In the early Achaemenid period, another type of tower-like structure also appears to have been in use. It has been suggested that such buildings may have had roots in earlier architectural traditions. For instance, in one of the Assyrian reliefs from the reign of Ashurbanipal (668–627 BCE), an example of tower-like sacrificial altars can be observed. Since no fully identified examples of this type of structure from pre-Achaemenid periods in Iran have been discovered, the possibility that they were influenced by earlier architectural models appears plausible (Prada, 2007: 210). Considering the evidence of door-pivot sockets at the entrances of both structures—which indicates that the doors were repeatedly opened and closed—the hypothesis that they functioned as places of worship or fire temples seems more plausible than the idea that they served as tombs. Nevertheless, it is also possible that these buildings, especially the so-called “foundation house” (bon khāneh), were used for storing highly important objects. In contrast, some scholars have suggested that the tower-like form of these structures may have been derived from the model of ancient houses. For example, a small stone model from Samos depicting a house corresponds, to some extent, with this hypothesis (Mousavi, 2011: 117; Fig. 10).

Fig. 10: Stone tower model, or house model, from Samos, height 24 cm (Mousavi, 2011: 117).

However, it may be more appropriate to compare these structures with much earlier remains as well. Evidence can also be found among indigenous Iranian materials; for instance, representations or forms of prehistoric temples and houses appear on stone artifacts from eastern and southeastern Iran. One example is a vessel made of chlorite, or soapstone, whose lower part, with its rectangular cubic structure—even in its underside

view or plan—closely resembles the so-called bon khāneh and the Zendan-e Soleyman (Fig. 11).

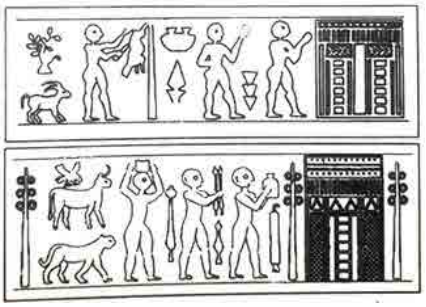


Fig. 11: Two depictions, or seals, showing the presentation of offerings to a tower-like temple in the city of Uruk (Mousavi, 2011: 117).

In Mesopotamia as well, there are comparable examples. In some depictions on prehistoric or early historic seals from this region, men are shown bringing offerings to a temple. Some of these sanctuaries are represented as tall rectangular structures whose overall form—and, to some extent, even their decorative elements—recall the two Achaemenid buildings under discussion (Ibid: 118; Fig. 12).

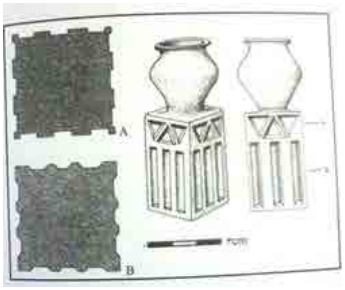


Fig. 12: Model of a house or temple made of chlorite, or soapstone, from Shahdad, third millennium BCE (Mousavi, 2011: 118).

The building materials used in these structures include white limestone for the walls and black stone for the frames, doors, and windows, which imitate the mudbrick walls and wooden doors and windows of actual houses (Herzfeld, 2002: 219). Moreover, the square projections on the four sides of these buildings, made of carefully cut stones, bear similarities to the gate towers of the Urartian fortress of Teishebaini in the Karmir Blur region of Armenia (Fig. 13).

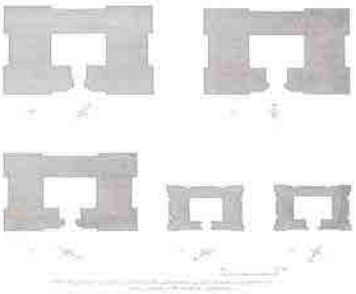


Fig. 13: Plans of Urartian and Achaemenid tower-like structures: a) plan of the Altintepe tower; b) Toprakkale; c) Kayalıdere; d) Pasargad; e) Naqsh-e Rostam (Stronach, 2000: 187).

On the other hand, the dark stone used in the tower of Karmir Blur resembles the black limestone employed in the frames of the blind windows in the towers at Naqsh-e Rostam and Pasargad (Sarfaraz and Firouzmandi, 2007: 143). In fact, before the Achaemenid period, tower-like buildings were mainly known in the land of Urartu and were generally associated with religious architecture (Ibid: 135). Urartian temples with square plans and projecting corners have been identified at sites such as Altintepe, Patnos, Toprakkale, Çavuştepe, and Kayalıdere. The dimensions of these temples usually ranged from approximately 10×10 meters to 13.80×13.80 meters; in particular, the temples of Khaldi at Toprakkale and Altintepe reached sizes close to 14×14 meters (Hajizadeh, 1995: 110–111). These temples were generally single-chambered, lacked side rooms, and were built in open spaces. Their structure consisted of a stone foundation made of finely cut blocks and a mudbrick superstructure, which was sometimes decorated with wall paintings depicting religious themes (Behboudi, 2001: 146). Regarding the height of these buildings, Firouzmandi notes that, given the strength of their stone foundations and the considerable thickness of their walls, their height was probably comparable to that of the Kaaba-ye Zarthosht at Naqsh-e Rostam or the similar structure at Pasargad. It is therefore possible that the Achaemenids drew inspiration from Urartian temples-particularly the temple of Altintepe—when constructing these buildings (Firouzmandi, 1997: 135).

Apart from the general form of the structure, the decoration of its façades is also of particular importance. The most prominent external feature of these two buildings is the presence of small and large decorative recesses in their façades, known as “blind windows”. The use of black stone in constructing these elements gives the buildings a multi-tiered appearance and was probably intended to emphasize the symbolic aspect of the architecture (Mousavi, 2011: 119–120). Examples of such decorative elements can also be observed in Elamite architecture, especially in the ziggurat of Chogha Zanbil, as well as in Achaemenid architecture, such as the crenellations of Persepolis. Similar blind windows are also known in Median architecture, particularly in the temples of Nush-i Jan Tepe and Baba Jan Tepe, where, in addition to their decorative role, they may also have served as niches for placing objects (Mousavi, 2011: 121).

Evidence of similar elements also appears in Urartian architecture. For example, blind windows have been included in the reconstruction plans of the temple at Toprakkale. Furthermore, on a bronze plaque from Toprakkale—now kept in the British Museum—the image of a fortress with rows of blind windows is depicted, showing a notable resemblance to the decorative features of the Kaaba-ye Zarthosht (Klais, 1988: 89).

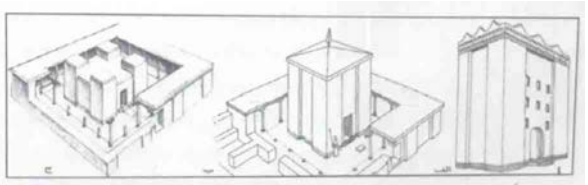


Fig. 14: Reconstruction plan of three Urartian temple structures: a) Toprakkale; b–c) Altintepe (Mousavi, 2011: 118).

Based on this evidence, it may be concluded that the structure depicted on the coins of the local rulers of Pars most likely represents the monument known as the Kaaba-ye Zarthosht. The reasons supporting this hypothesis are as follows:

Iconographic similarity: In terms of visual resemblance, the structure shown on the coins corresponds more closely to the Kaaba-ye Zarthosht than to any other known building. It appears that the die engravers attempted to reproduce its image as faithfully as possible within the limits of coin design. Spatial limitations of the coin surface: The restricted space available on the coin likely prevented the full depiction of certain architectural elements, particularly the tall staircase of the monument; therefore, these features were represented only in a symbolic or abbreviated manner. Portable fire altars: The fire altars depicted on the coins were probably portable. In unfavorable weather conditions, they could have been moved into the inner chamber of the structure. Therefore, the absence of a fixed altar on top of the Kaaba-ye Zarthosht does not necessarily invalidate the hypothesis that it functioned as a fire temple. Architectural differences across periods: It should not be assumed that Achaemenid fire temples were architecturally identical to those of the Sasanian period. Architectural differences between these periods are natural and cannot, by themselves, refute the interpretation of this structure as a fire temple. Moreover, Achaemenid architecture possessed a cosmopolitan character and was influenced by the architectural traditions of neighboring civilizations. Consequently, comparing this monument with religious structures from adjacent cultures may further support the fire-temple hypothesis regarding the Kaaba-ye Zarthosht.

Analysis of Scholarly Views on the Structure

The perspectives of both Iranian and foreign scholars can be classified into several main groups.

Table 7: Analysis of Scholars' Views on the Structure (Authors, 2026).

Viewpoint	Scholars / Sources	Analysis
Fire sanctuary or fire temple	Ghirshman, Pope, Christensen, some Iranian scholars	The structure is interpreted as a place for keeping the sacred fire.
Temple of Anahita	Wikander, to some extent Ghirshman	The building is associated with the worship of Anahita.
Tomb	Some scholars such as Herzfeld	The structure is considered a tower-like mausoleum.
Treasury / repository of documents	Henning, Hinz, Sami	The building served as a place for storing religious texts, the Avesta, or religious and royal documents.
Coronation and royal ritual structure	Sancisi-Weerdenburg	The structure is connected with coronation ceremonies, concepts of death and rebirth, and the royal fire.
Example of post-Achaemenid ritual architecture	Stronach, Potts, Haṭkamp (Hatkamp/Houtkamp)	The structure depicted on the coins represents a type of ritual building related to the Kaaba-ye Zarthosht and Zendan-e Soleyman.
Difference from Achaemenid towers	Herrmannk / Hrynck and Oertel (often cited as Herringk and Orel)	There are differences between the structure shown on the coins and the Kaaba-ye Zarthosht; therefore, they should not be considered completely identical.

Based on the views of Iranian and foreign scholars, there is no definitive consensus regarding the function of the Kaaba-ye Zarthosht and the structure depicted on the coins. However, most interpretations emphasize the ritual, religious, or ceremonial aspect of the building. Even if the structure was not a fire temple, it was most likely connected with sacred matters, kingship, religion, or the preservation of ritual texts and documents.

Comparative Analysis of the Coin Depictions and the Kaaba-ye Zarthosht

Based on the available evidence and the views of both Iranian and foreign scholars, the structure depicted on the coins of the local rulers of Pars may be identified as the Kaaba-ye Zarthosht itself or as a representation of it.

Table 8: Comparative Analysis of the Coin Structures and the Kaaba-ye Zarthosht (Authors, 2026).

No.	Reason(s)	Analysis
1	General resemblance of the image	The structure depicted on the coins shows the closest overall similarity in form to the Kaaba-ye Zarthosht.
2	Limited space on the coin	Because of the small surface of the coin, it was not possible to represent all architectural details of the building.
3	Omission of the large staircase	The massive staircase of the Kaaba-ye Zarthosht is omitted or greatly simplified in the coin depictions.
4	Enlargement of the entrance	The doorway is depicted larger so that it can be clearly recognized on the small coin surface.
5	Portable fire altars	Fire altars are shown on the roof of the structure, though in reality they may have been movable.
6	Architectural differences between Achaemenid and Sasanian periods	One should not expect an Achaemenid fire sanctuary to be architecturally identical to a Sasanian fire temple.
7	Influence of earlier architectural traditions	Achaemenid structures may have been influenced by Urartian, Elamite, and Mesopotamian architectural traditions.

Considering the available coins and the analysis of their motifs, there is an iconographic resemblance between the structures depicted on the coins and the Kaaba-ye Zarthosht, although certain differences are also observable. In particular, scholars such as Haerinck and Overlaet have emphasized that the structures shown on the coins differ from the Achaemenid towers in several respects, including the type of doorway, parapets, the location of the stairways, and the form of the roof. Therefore, the structure depicted on the Fratarakā coins is not necessarily an exact or realistic representation of the Kaaba-ye Zarthosht; rather, it may be a symbolic representation of a type of tower-like ritual building, of which the Kaaba-ye Zarthosht and Zendan-e Soleyman are the best-known examples. In the following section, in order to better identify the structure shown on the coins, it is compared with various examples.

Table 9: Analysis of the Structure in Comparison with Similar Architectural Examples (Authors, 2026).

No.	Relation to the Discussion	Architectural Example
1	The main comparative example	Kaaba-ye Zarthosht
2	A similar Achaemenid example at Pasargad	Zendan-e Soleyman
3	Possible ritual examples	Achaemenid fire sanctuaries at Susa

4	Pre-Achaemenid tower-like examples	Urartian temples
5	An example of architectural recesses and decorative elements	The ziggurat of Chogha Zanbil
6	A precedent for tower-like ritual buildings	Mesopotamian temples
7	Median examples with blind windows and ritual spaces	Nush-i Jan Tepe and Baba Jan Tepe
8	Earlier examples of house/temple forms	Chlorite/soapstone artifacts from Shahdad

This comparative scope indicates that the structure present on the coins belongs to a long tradition of ritual architecture in the ancient Near East and Iran. From the perspective of both Iranian and foreign scholars, the Kaaba-ye Zarthosht is not an entirely unique or unprecedented structure, but rather a continuation of an ancient tradition of tower-like sacred buildings. The structure depicted on the coins of the local kings of Pars reflects a real and sacred building, which could be the Kaaba-ye Zarthosht itself or at least a related example. This structure is shown on the coins alongside fire, a worshipper, a winged man, a banner, and a bow, and therefore must be understood in a ritual-political context.

In the coin imagery of the local kings of Pars, we are not merely confronted with an administrative or military ruler, but with a guardian of sacred traditions, a preserver of fire, a legitimate heir to the Achaemenid tradition, and one who possesses divine glory (farrh). In this regard, the coins served as a medium for displaying the religious and political identity of the Fratarakā. Therefore, the depiction and role of the structure on these coins can be seen as a sign of the continuation of ritual architecture, the persistence of Achaemenid memory, and the link between religion and politics, with the Fratarakā using these motifs to legitimize their local rule.

Analysis

Based on the analysis in the table below, the depiction of the structure on the Fratarakā coins of Pars cannot be considered merely a decorative image. This structure held ritual, religious, and political significance. Its similarity to buildings such as the Kaaba-ye Zarthosht suggests that the Fratarakā used recognizable patterns of sacred and Achaemenid architecture to express their identity and legitimacy.

In essence, coinage during this period was not just a medium of economic exchange but also a formal means of conveying political and religious messages to society. Therefore, the image of the structure on the reverse of the coins can symbolize sanctity, the continuation of Achaemenid traditions, the legitimacy of rule, and the local identity of Pars.

Table 10: Analysis of the Structure's Depiction on the Fratarakā Coins of Pars (Authors, 2026).

No.	Analysis Axis	Analysis and Review	Archaeological Interpretation
1	Type of Study Object	Coins of the Frataraka of Pars, which bear an architectural structure on their reverse.	Coins, as material and visual documents, provide important information about the politics, religion, and art of the post-Achaemenid period.

2	Historical Period	The period of rule of the local kings of Pars during the Seleucid era.	This period signifies the continuation of the local identity of Pars after the collapse of the Achaemenids.
3	Location of Sample Storage	Some samples are kept in the Bank-e Sepah Museum and the Museum of Coinage.	The presence of these artifacts in museum collections allows for comparative and documented studies on actual specimens.
4	Position of the Structure's Depiction on the Coin	The structure is usually depicted on the reverse of the coins and holds a significant place in the pictorial composition.	The reverse of the coin served as a space for displaying symbols of identity, religion, and politics.
5	Visual Characteristics of the Structure	The building is depicted as a tower-like, cubic, or architecturally rendered structure.	The form of the building likely refers to a ritual or sacred edifice, not an ordinary building.
6	Similarity to Ritual Architecture	In its general form, this structure is comparable to buildings such as the Kaaba-ye Zarthosht at Naqsh-e Rustam.	Formal similarity can indicate the continuation of Achaemenid ritual architectural traditions under the rule of the Frataraka.
7	Probable Function of the Structure	It was likely a religious, ritual building, a fire temple, a sacred place, or a symbol of sanctity.	The depiction of the structure reflects the connection of the local rule of Pars with the religious and ritual beliefs of the society.
8	Symbolic Meaning	The structure can symbolize legitimacy, sanctity, the continuation of the Achaemenid tradition, and the local identity of Pars.	By using ritual symbols, the Frataraka presented their political power as legitimate and rooted.
9	Connection to the Kaaba-ye Zarthosht	The similarity of the structure's depiction to the Kaaba-ye Zarthosht has led some researchers to consider it a reflection or symbol of that type of architecture.	This connection highlights the importance of Naqsh-e Rustam and sacred architecture in the cultural memory of Pars.
10	Religious Aspect	The depiction of the structure, alongside other symbols on the coins, may signify beliefs related to Iranian and Zoroastrian rituals.	Coins can be a reflection of the official religion or dominant beliefs in the local society of Pars.
11	Political Aspect	The display of such a building on a coin, in addition to its religious aspect, could also carry a political message.	The Frataraka likely utilized religious symbols to bolster their political power and legitimacy.
12	Continuation of Achaemenid Tradition	The use of depictions of ritual buildings is reminiscent of the architecture and symbolism of the Achaemenid period.	This indicates that the Frataraka presented themselves as cultural and political heirs of the Achaemenids.
13	Evolution of the Depiction Over Time	In some examples, the structure's depiction is rendered with greater detail, while in others, it is simpler with fewer details.	These variations could indicate the evolution of artistic style, a decline in minting quality, the absence of a skilled die-cutter, or a change in the significance of the symbol.
14	Artistic Value	In terms of composition, detail, and rendering style, the depiction of the structure showcases a part of the local art of Pars coinage.	The coinage art of this period is a blend of Iranian traditions and the political-cultural influences of the era.
15	Research Significance	The study of this depiction aids in understanding the religion, politics, architecture, and cultural identity of the Frataraka.	These coins are key resources for reconstructing the cultural and ritual history of post-Achaemenid Pars.

Conclusion

The study of the coins of Ardeshir I, Vohubarz, Autophradates I, Bagadat, Darius I, and Autophradates II indicates that many of these coins feature a ritual scene on their reverse. This scene typically consists of several core elements: the figure of the ruler or worshipper, an architectural structure, fire or an altar, a banner, a bow, and occasionally

a winged figure representing farrh (divine glory). The combination of these elements implies that the imagery on the reverse carries a multi-layered message.

On the obverse of the coin, the ruler is depicted in specific attire, signifying his political status, while his particular clothing indicates his religious standing. In essence, the image on the obverse represents the highest authority in Pars. The reverse of the coin elaborates on how this position is attained. The ruler's presence before the structure, fire, and sometimes the farrh symbol, portrays him as a devout worshipper and guardian of religious rites. Conversely, the inclusion of symbols such as a diadem, bow, banner, and winged man reinforces his political, military, and sacred status. Therefore, the coins reflect the intrinsic connection between religion and politics in the ideological framework of the Frataraka of Pars.

One of the most significant findings of this research is that the structure depicted on the Frataraka coins likely represents a ritual or sacred building. In several examples, particularly in the coins of the first group, this building is rendered with significant detail, featuring elements such as a double-leaved door, architectural reliefs, a cornice, altars, and occasionally battlements or tower-like sections. In examples such as Vohubarz's coin, the presence of three fires atop the structure, the ruler's adoration, an Aramaic inscription, and a winged man strongly emphasize the ritualistic and religious nature of the scene. This imagery clearly indicates that the building is not merely an ordinary structure but a sacred site, a place of worship, or a representation of ritual architecture.

Comparing this structure with monuments such as the Kaaba-ye Zarthosht at Naqsh-e Rostam and Zendan-e Soleyman at Pasargad is crucial to understanding its nature. Although there are discrepancies in detail between the coin depictions and these Achaemenid buildings, the general similarities in their tower-like form, symbolic significance, association with fire, and presence within a ritual context have led many researchers to evaluate these structures in relation to one another. From a comparative perspective, the structure on the coins may be a direct representation of the Kaaba-ye Zarthosht or, at the very least, a symbolic representation of a related type of ritual building. It should be noted that the limited space on a coin did not allow for the precise depiction of all architectural details; therefore, the die engraver was necessitated to represent the essential and recognizable features of the building in a concise and symbolic manner.

Within this context, the depiction of fire holds particular importance. In ancient Iranian religious traditions, fire occupied a sacred position, associated with concepts such as purity, truth, light, divine power, and political legitimacy. The display of altars atop the structure or at the center of the scene indicates that this building was likely connected to fire-related rituals. The three fires observed on some coins could refer to the three fires of social classes—associated with religious leaders, warriors, and artisans—or to a ritual and religious trinity. In any case, the recurrence of this symbol

on the Frataraka coins suggests that fire was a primary element in their structure of legitimacy and religious identity.

Another element of significant importance in the analysis of these coins is the winged man, or the symbol of farrh. This motif, reminiscent of Achaemenid art and reliefs, appears on the coins of several local rulers of Pars, positioned above the structure or the fires. The interpretation of this symbol has been linked to Ahura Mazda, the Fravahar, or royal farrh. Regardless of differing scholarly opinions, the presence of this symbol alongside the king and the ritual structure signifies the ruler's connection to celestial and sacred power. Through this imagery, the Frataraka sought to present their rule as divinely sanctioned and a continuation of the Achaemenid royal tradition.

Examining the evolution of the structure's depiction on the coins of the first and second groups of local kings of Pars reveals a significant trend. In the coins of the first group, such as the issues of Ardeshir and Vohubarz, the structure is depicted with relatively greater precision, coherence, and fidelity to the patterns of ritual architecture. In these examples, ritual elements—the altar, banner, worshipping king, and winged man—are harmoniously arranged. However, in some coins of the second group, such as those associated with Darius I and Autophradates II, the depiction undergoes simplification. At times, the entrance or architectural components are less distinct, and the building assumes a more abstract or symbolic form. These changes could be attributed to a decline in artistic precision, a shift in aesthetic taste, a lack of specialized personnel in die-cutting, influence from Parthian art, or a gradual departure from the initial model.

Despite these changes, the central message of the depictions remains constant: the ruler is connected to the sacred, and his authority is inextricably linked to ritual, fire, and farrh. Even when the form of the building becomes simplified or stylized, the presence of the worshipper, fire, banner, or symbols of farrh indicates that the core theme remains politico-religious. Thus, the coins are semantically consistent, despite their stylistic and artistic transformations.

From an architectural perspective, comparing the structure on the coins with examples such as the Kaaba-ye Zarthosht, Zendan-e Soleyman, Achaemenid fire temples, Urartian temples, Elamite ziggurats, and Mesopotamian ritual buildings demonstrates that this type of architecture did not emerge in a vacuum. Tower-like structures, elevated sacred spaces, blind windows, distinctive doorways, high platforms, and the building's connection to religious rituals are all elements rooted in pre-Achaemenid and Achaemenid architectural traditions. Therefore, the structure in question is a reflection of a long-standing architectural tradition in Iran and the ancient Near East—a tradition that continued symbolically in the art of coinage during the rule of the Frataraka.

In evaluating existing scholarly viewpoints, it can be concluded that no single theory fully explains all aspects of this structure. The theory that the building functioned as

a fire temple is highly significant, given the presence of fire and the scene of worship. The theory identifying it as a treasury or a repository for religious documents is also compelling, considering Sasanian-era inscriptions and interpretations such as the "foundational house". The view of it as a sanctuary, particularly in connection with Anahita or royal rituals, cannot be overlooked. Furthermore, the theory of it being a tomb, although inconsistent with some evidence, has been raised in the history of research on the Kaaba-ye Zarthosht. Based on this, the most plausible interpretation is to consider this building as a multi-functional structure or at least one of profound ritual-royal significance; a monument that may have served different functions in different periods or been associated with various sacred and royal concepts in the collective consciousness.

Another important conclusion is that the Frataraka of Pars, through these motifs, sought to reconstruct and represent an Achaemenid identity. They governed in a period when the primary political power was held by the Seleucids and later the Parthians, yet a form of Achaemenid cultural and political memory remained vibrant in the region of Pars. The use of symbols such as the winged man, specific crowns and diadems, banners, bows, ritual structures, and fire indicates that the Frataraka considered themselves heirs to ancient Persian traditions. These symbols served as tools to assert their local identity and political legitimacy against external powers.

Therefore, the coins of the Frataraka should be considered multi-dimensional documents—evidence that provides historical data regarding the local rulers of Pars, testifies to the continuity of religious and artistic traditions, and reflects the identity politics of these rulers. The depiction of the structure on the reverse lies at the center of this semantic system. This building is not merely an architectural image but a symbol of sanctity, legitimacy, historical memory, and the king's connection to the divine realm.

Ultimately, the archaeological investigation of the structure's depiction on the coins of the local kings of Pars shows that this motif is among the most important pieces of evidence for the continuation of ritual architecture and religious symbolism in post-Achaemenid Pars. Although it cannot be stated with absolute certainty that the structure on the coins is precisely the Kaaba-ye Zarthosht, the visual, comparative, and symbolic evidence suggests that this depiction belongs to the same architectural and ritual tradition. Therefore, the structure depicted on the coins should be considered a symbolic representation of a sacred building deeply connected with fire, worship, farrh, kingship, and the continuation of Achaemenid identity. Such an interpretation not only aids in a better understanding of the Frataraka coins but also enhances our comprehension of the relationship between religion, politics, architecture, and art in ancient Iran.

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Conflict of Interest

In adherence to ethical publication standards, the authors affirm that there are no conflicts of interest, either personal or financial, that could have influenced the content or conclusions presented in this research.

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چکیده

سکه‌های حاکمان محلی پارس (فرترکه‌ها) از مهم‌ترین اسناد باستان‌شناختی برای بازسازی اوضاع سیاسی، مذهبی و فرهنگی ایالت پارس در دورهٔ سلوکی به‌شمار می‌آیند. این مسکوکات افزون بر ارزش اقتصادی، حاوی عناصر تصویری و نمادینی هستند که بازتاب‌دهندهٔ تداوم سنت‌های هخامنشی و شکل‌گیری هویت سیاسی حاکمان محلی در این دوره‌اند. یکی از شاخص‌ترین عناصر تصویری بر این سکه‌ها، نقش بنایی است که در پشت برخی از آن‌ها مشاهده می‌شود و از دیرباز توجه پژوهشگران را به خود جلب کرده است. باوجود مطالعات انجام‌شده، ماهیت معماری و کارکرد این سازه هم‌چنان از مسائل بحث‌برانگیز در مطالعات سکه‌شناسی و باستان‌شناسی ایران به‌شمار می‌رود. پژوهش حاضر با هدف بررسی و تبیین هویت معماری و کارکرد بنای نقش‌شده بر سکه‌های گروه نخست و دوم شاهان محلی پارس انجام شده است. در این‌راستا تلاش شده است تا با معرفی این گروه از سکه‌ها و تحلیل ویژگی‌های تصویری آن‌ها، ابهامات موجود دربارهٔ ماهیت این سازه تا حد امکان روشن شود. پرسش اصلی پژوهش آن است که، سازهٔ نقش‌شده بر سکه‌های فرترکه‌ها چه نوع بنایی را بازنمایی می‌کند و تا چه اندازه می‌توان آن را با نمونه‌های شناخته‌شدهٔ معماری آئینی ایران باستان مقایسه و تفسیر کرد؟ روش پژوهش توصیفی-تحلیلی و مبتنی‌بر رویکرد تطبیقی است. داده‌های مورداستفاده ازطریق مطالعات موزه‌ای بر مجموعه سکه‌های موجود در موزهٔ بانک سپه و موزهٔ تماشاگه پول، همراه با بررسی منابع کتابخانه‌ای و پژوهش‌های پیشین گردآوری شده است؛ سپس این داده‌ها با نمونه‌های معماری شناخته‌شده از دورهٔ هخامنشی و پساهخامنشی مورد مقایسه و تحلیل قرار گرفته‌اند. نتایج پژوهش نشان می‌دهد که بنای تصویرشده بر سکه‌های فرترکه‌ها دارای ماهیتی آئینی و مذهبی است و ازنظر برخی ویژگی‌های ساختاری و نمادین با بنای کعبهٔ زرتشت در نقش‌رستم قابل مقایسه است؛ هم‌چنین بررسی سکه‌ها نشان می‌دهد که در گذر زمان و درپی تغییرات فنی در شیوهٔ ضرب، کیفیت هنری و دقت در نمایش جزئیات معماری این نقش کاهش یافته است. این یافته‌ها نشان می‌دهد که نقش این بنا نه‌تنها بازتاب‌دهندهٔ سنت‌های معماری و مذهبی ایران باستان است، بلکه می‌تواند نشانه‌ای از تداوم مشروعیت دینی و سیاسی حاکمان محلی پارس در دورهٔ پساهخامنشی نیز تلقی شود.

کلیدواژگان: فرترکه‌های پارس، سکه‌شناسی، معماری آئینی، موزهٔ بانک سپه، موزهٔ تماشاگه پول، کعبهٔ زرتشت.

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Archaeological and Ethnoarchaeological Perspectives on the Zich Site: A Seasonal Nomadic Campsite of the Early Islamic Period

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Abstract

The archaeological excavation of the Zich site formed part of the salvage archaeology program conducted in the reservoir area of the Kangir Dam, located in the Zarneh district of Iwan County, in the northwestern part of Ilam Province. The results of this investigation, based on the systematic survey of nine 100×100 m grid units, the excavation of eight test trenches measuring between 2×2 m and 3×3 m, and the excavation of four trenches ranging in size from 5×5 m to 10×10 m, ultimately led to the identification of a temporary settlement, or nomadic campsite. The study of the architectural remains and surviving architectural features exposed in the excavation trenches, together with their comparative analysis against contemporary regional examples, indicates that Zich was a single-phase, short-term temporary settlement used by mobile pastoralist groups. The settlement pattern at the site appears to have consisted of tents, each enclosed by one- or two-course dry-stone walls and separated from one another by the same one- or two-row stone alignments. Comparative analysis of the ceramics and other materials recovered from all four excavation trenches dates the occupation of the site to the early Islamic centuries, specifically the 2nd to 3rd centuries AH. Zich appears to have developed because of several favorable locational factors; its suitable topographic setting, proximity to a perennial spring and the Kangir River, nearness to the Guriyeh structure, the presence of dense pastureland, and its position along one of the old tribal routes running parallel to the Kangir River, which connected the Kermanshah region to the warmer areas south of Iwan County. The study of the structures and built remains of present-day nomadic communities constitutes one of the most effective and precise scientific approaches for achieving a better understanding of the architectural organization of ancient mobile pastoralist societies, and it falls within the scope of ethnoarchaeological research. On the basis of the settlement practices of a contemporary tribal community, the present study examines the settlement pattern of a nomadic campsite within its local landscape. The data were collected through field survey and excavation, following the conventional methods of archaeological and ethnoarchaeological research carried out in the region.

Keywords: Zich Site, Salvage Excavation, Kangir Dam, Nomadic Campsite, Early Islamic Period.

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Introduction

Across the broad expanse of the Iranian plateau, communities may be classified into three subsistence-based categories: urban, rural, and mobile pastoralist (nomadic/tribal). The first two are found throughout the world; the third, however, whose economy is primarily grounded in traditional pastoralism and livestock products, has a historical presence extending from Central Asia to the Middle East and adjacent regions, a legacy that has persisted from the distant past to the present (Safinejad, 2019: 21). Iran's tribal nomadic population occupies a distinctive position in global scholarship; consequently, numerous researchers from different countries have traveled to Iran to study such communities. In recent years, however, Iranian nomadic groups have increasingly abandoned pastoral mobility under the influence of various factors and have become sedentary in villages or cities. In the not-so-distant past, these communities sustained themselves without dependence on urban society or modern technology. Drawing upon the accumulated knowledge of their forebears, they endured some of the most difficult natural constraints and overcame them through considerable hardship and resilience. Although the development of this way of life proceeded gradually prior to the advent of modern technology, its relative stability and close coexistence with nature generated valuable experiences and innovations that could be transmitted to subsequent generations.

Until only a few decades ago, seasonal migration was one of the fundamental requirements of nomadic life and played a central role in the subsistence of mobile pastoralists. This was largely due to climatic fluctuations and the need for access to water and fodder for herds. Migration enabled both pastoral communities and their livestock to escape extremes of heat and cold and to exploit pastures in different regions during different seasons of the year. At first glance, the migration of pastoral nomads may appear to be a form of wandering, as if they were moving from place to place in search of grazing land; in reality, however, nomadism constitutes part of a highly organized system. Each tribe possesses its own clearly defined summer and winter pastures. Frederik Barth (1965) compares this system to the movement of trains, noting that each train has the right to travel along a designated route and to stop at specific stations at a particular time and for a specified duration (Mansuri-Moqaddam, 2019).

This way of life has a long history in the Zagros and continues to the present day (Yousefvand, 2022: 330[1]). Nomadic lifeways, whether fully mobile or semi-mobile, began in the Central Zagros and Northern Khuzestan during the Aceramic Neolithic and still persist across substantial parts of the region (Hole, 2023; Gilbert, 1983; Bernbeck, 1992). Of the two principal forms of migration, vertical and horizontal, the nomads of Lorestan have more commonly practiced vertical migration (Alizadeh et al., 2004; Alizadeh, 2010). Vertical migration refers to the movement of pastoralists between lowland plains and higher elevations. In seasonal terms, these groups spend part of the

year in low-lying warm regions (garmsir/qeshlaq, winter quarters) and another part in upland mountainous zones (sardsir/yeylaq, summer quarters). This pattern is linked to the elevational difference between the two zones, which averages up to 1,200 m. The route followed during migration is known as an il-rah, or migration route (Shishehgar, 2005: 40). In most cases, these routes represent the most suitable, convenient, and direct passages for movement between summer and winter pastures, having developed in accordance with geographical conditions and factors such as proximity to and access to basic resources for habitation and subsistence. Archaeological excavation at this site identified evidence of a nomadic campsite dating to the early centuries of the Islamic period. The present article reports the results of the archaeological investigations conducted at this site. This campsite still lies along a tribal migration route currently used by groups moving from Kermanshah toward Ilam. Contemporary nomadic communities likewise construct features using the same materials and substances that were employed in the more distant past.

Research Questions and Hypotheses: He primary aim of this study is to introduce and document this newly identified nomadic campsite and the architectural remains and associated installations located along its migration route, while critically evaluating the available material evidence to establish a reliable chronological framework. To achieve these objectives, the research is guided by the following core questions: What is the nature and extent of the archaeological remains and material evidence preserved at this campsite? What are the structural characteristics of these remains, and to what extent do they demonstrate continuity or variation when compared to contemporary nomadic architectural practices? Correspondingly, this study operates under the hypothesis that the site functions as a specialized, seasonally occupied installation within the long-term tribal migration network of the region. We further hypothesize that the structural remains identified at the site, despite being from the early Islamic period, will exhibit a high degree of technological and functional congruence with the traditional nomadic architectural forms still utilized by modern pastoral communities in the Zagros. Establishing this potential continuity is essential for understanding how nomadic subsistence and land-use patterns have persisted, and adapted, over the longue durée.

Methodology

In terms of its scholarly nature, the present study is designed as basic, evidence-based research. The methodological framework integrates a multi-scalar approach, combining rigorous field investigation with comparative ethnoarchaeology. Data collection was executed through a systematic two-phase process: First, field survey and controlled excavation were conducted at the site, adhering to standard archaeological protocols. This involved precise site inspection, mapping of surface features, and excavation to recover diagnostic artifacts and architectural data. This phase was focused on documenting

the archaeological signature of the site, including identifying the spatial distribution of residential and auxiliary features. Second, the archaeological data were synthesized with ethnographic evidence gathered through direct observation of contemporary nomadic campsites currently active along the same migration routes, specifically those used by groups moving between the Kermanshah and Ilam regions. By adopting a dual lens, anthropological and archaeological, this study examines the material culture of the region's nomadic communities not merely as static remains, but as living manifestations of a dynamic, historically grounded tradition. This integrated methodology allows for a more nuanced interpretation of nomadic land-use strategies and site function than would be possible through archaeological analysis alone.

Location and Environmental Setting of the Zich Archaeological Site

The Zich archaeological site is situated at the geographical coordinates of (33° 54' 54.2" N) latitude and (46° 08' 32.6" E) longitude. Politically division, the site is located 700 meters east of the dam wall and 2 kilometers from the village of "Sartang-e Olya", within the "Sartang" District of "Zarneh", "Iwan" County (Figs. 1 and 2). The site stands at an elevation of (1,014) meters above sea level and lies approximately 16 kilometers northwest of the city of "Iwan" in a straight line.

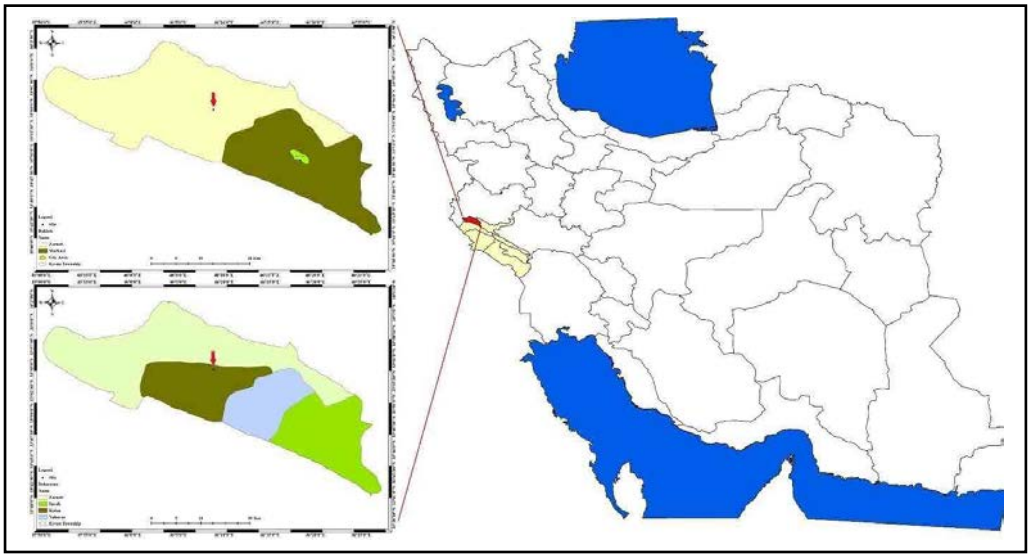

Fig. 1: Location of the Zich site on the political administrative map (Author, 2021).

The Zich site is situated on the southwestern foothills of the mountains, along the margin of the "Kangir River", within a relatively enclosed valley of the same name. Geological studies indicate that the area lies within the folded Zagros range; the surrounding geological context is characterized by the "Asmari-Shahbazan" and "Gachsaran" formations, alongside Quaternary deposits (Darvishzadeh, 2004: 80). The local bedrock consists of the "Asmari" and "Gachsaran" formations. The site is characterized by a rocky, uneven surface located on a slope with an average gradient of 7.8 degrees. Soil and land resource studies identify five major land types in the region;

mountains, hills, plateaus and upper terraces, piedmont plains, and gravelly alluvial fans. Historically, water for the site was supplied by a perennial spring located to its southeast, with a seasonal watercourse passing near the site. The “Kangir” River served as an additional water source; originating from the “Manesht” and “Shareh-Zol” highlands, the river flows through the city of “Iwan”, irrigating extensive agricultural lands before entering the “Sumar” Plain. Within this plain, the construction of numerous barrages significantly reduces the river’s flow before it enters Iraq through a narrow gorge.

In terms of climatic classification, the region is categorized as semi-arid to temperate Mediterranean (Darvishzadeh, 2004: 81). Meteorological data indicate significant annual fluctuations; the absolute minimum temperature is (15°C) in February (Bahman), and the absolute maximum temperature reaches (47°C) in August (Mordad). Annual rainfall averages (595 mm), with winter being the wettest season. There are 51 frost days per year, accounting for approximately (13.9%) of the year. Mean relative humidity ranges from (21.8%) to (58.9%) (minimums) and (37.4%) to (73.9%) (maximums), while the overall mean relative humidity varies between (25.1%) and (71.3%). The maximum wind speed recorded is (21.4 m/s) in December, blowing from the west. The annual potential evapotranspiration is (1,423.5 mm) (Tamava Consulting Engineers Co., 2005: 3–26). These natural features have facilitated the growth of semi-dense vegetation in the plains and foothills, as well as a semi-dense distribution of oak forests at higher elevations. The favorable environmental conditions, combined with an ancient migration route (il-rah) running parallel to the “Kangir” River, which connects the Kermanshah region to the warmer lowlands (garmsir) south of “Iwan”, provided an ideal setting for the formation of human settlements, particularly temporary encampments.

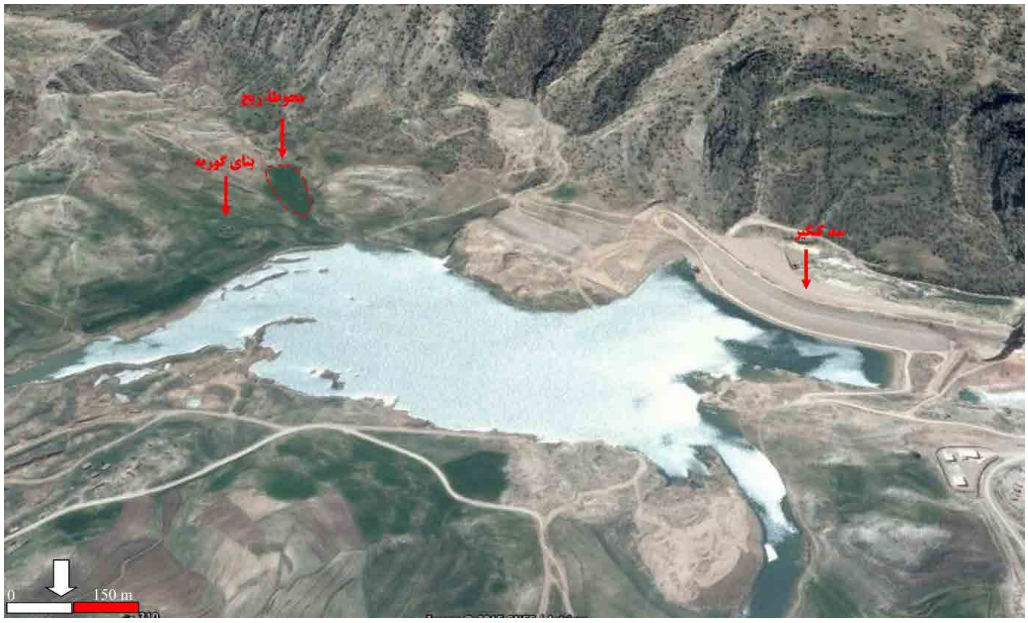

Fig. 2: Location of the Zich site (Google Earth, 2019).

Research Background

Due to its proximity to the "Guriyeh Structure" (Banā-ye Guriyeh), the "Zich" site had long been regarded as part of that complex. In general, from the perspective of archaeological research, the "Zich" site had been investigated in two phases prior to the present study. It was first identified and introduced by "Pīrānī" in (2001) during the first season of the archaeological survey and identification of "Iwan" County, in which the "Guriyeh site" of which "Zich" was considered a component, was recorded (Pirani, 2001: 159–183). Subsequently, the archaeological survey of the "Kangir" Dam reservoir basin in (2004), conducted by "Ebrāhīm Morādī" as a rescue operation prior to inundation, marked a new stage in the study of the sites in this area; during this survey, "Zich" was introduced as an independent site separate from the "Guriyeh structure" (Moradi, 2004: 40–53). In 2014, "Shahla Ahmadi" carried out research for her MA thesis, entitled "A Study and Survey of Archaeological Sites of the Sasanian-to-Islamic Transitional Phase around the Kangir River in the Iwan Plain". As part of that research, she examined the "Guriyeh structure", of which the "Zich" site had been regarded as a component (Ahmadi, 2014: 125–129). A report on the "Guriyeh" ceramics has also been published (Bagh Sheikhi et al., 2015[2]). None of the aforementioned studies, however, addressed the architecture of nomadic groups or offered any interpretive framework in this regard. In the field of ethnoarchaeological studies, particularly on the subject addressed in the present research, an article entitled "Typology of the Architecture of Qashqai Mobile Pastoralist Communities" has been published (Aghaei et al., 2018). The studies by "Lafāfchī" (2012) and "Afshari" and "Pourdeyhimi" (2014) should also be noted. The archaeological excavation of the "Zich" site, carried out as a rescue operation, constituted another step toward its scientific introduction prior to the flooding of "Kangir" Dam and the destruction of the site. This excavation was conducted in October and November 2015 (Lashkari, 2016).

Archaeological Research on the Zich Site

The archaeological investigation of the "Zich" site was carried out in several stages. One of the first activities was the archaeological survey of the site and the determination of its extent, with the aim of identifying the different areas and any possible surrounding remains, as well as establishing the site's surface area. These activities showed that the "Zich" site covered approximately (0.45) hectares and that the "Guriyeh" structure was the only visible feature in its vicinity. A large-scale excavation designed to obtain more extensive and scientifically robust data was the final phase of the fieldwork. Accordingly, four excavation trenches measuring (10×10 m) were initially established. Ultimately, of these four trenches, two trenches (O17 and P13) retained dimensions of (10×10 m), while the other two trenches (T17 and Q15) were reduced to (5×5 m) in response to the cultural stratigraphy encountered during excavation.

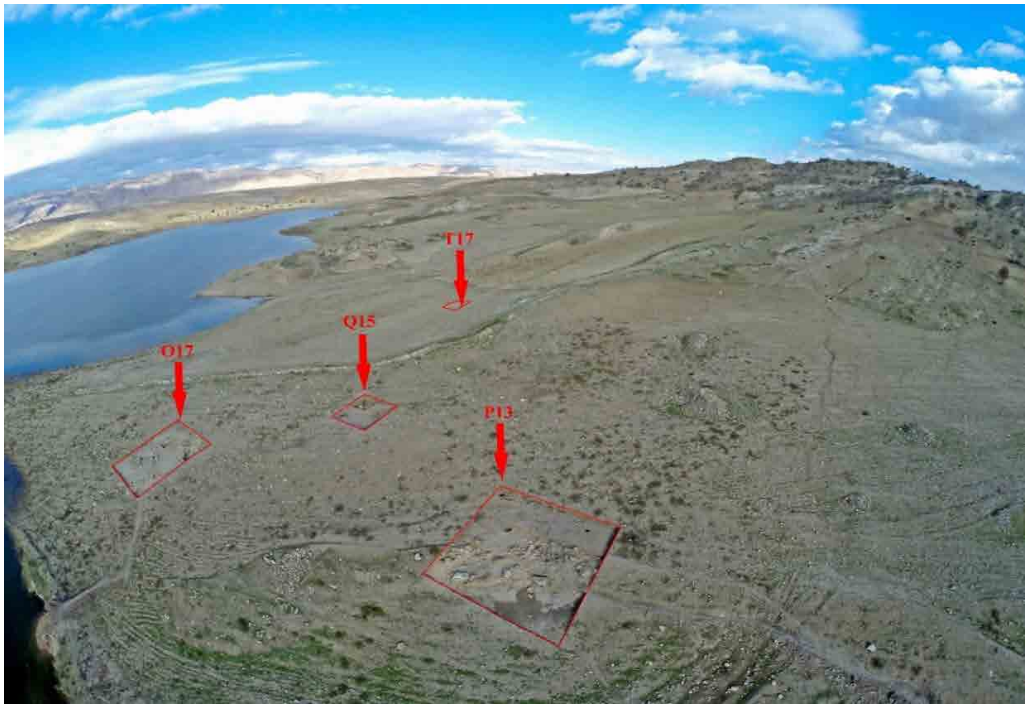

Fig. 3: Distribution of excavated trenches at the Zich site (Author, 2021).

Trench O17

Excavation in Trench (O17) ultimately led to the identification of a series of spaces composed of roughly rectangular, right-angled enclosures, separated from one another by dry-stone walls constructed in one or two courses and, likewise, in one or two rows (Figs. 5 and 6). These spaces were arranged in a stepped manner across three terraces. The investigations demonstrated that all of the partition walls defining these spaces were constructed contemporaneously and, on the basis of the finds recovered from this trench, belong to a single occupational phase dating to the early Islamic centuries (second to third centuries AH). The principal architectural remains identified in Trench (O17) consisted of three stepped terraces, several spaces intended for the erection of tents, and one area containing an accumulation of ash and heat-altered soil together with three hearths. It is likely that the architectural remains in this trench represent the winter occupation architecture of the site, characterized here by relatively solid and more permanent construction.

Trench P13

Excavation in Trench (P13) ultimately resulted in the identification of only a single architectural space (Figs. 7 and 8). This space appears to have formed part of an open area located on the slope of the hill-and-foothill terrain (i.e., the mountain flank). No wall or partition wall constructed specifically to delimit or create an enclosed space was recovered in this trench. Owing to the trench's position on the slope, excavation was carried out in a stepped manner. The investigations indicated that all of the stone features defining this space were constructed contemporaneously and belong to a

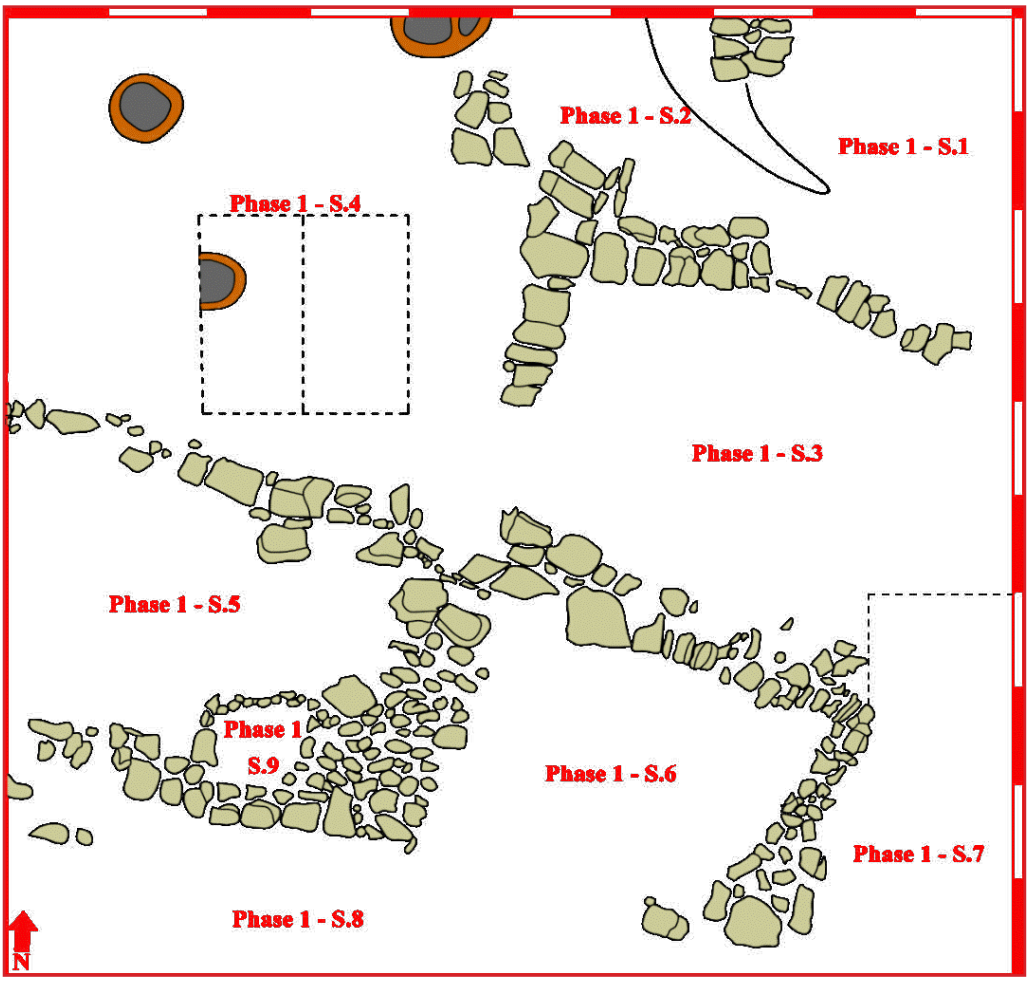

Fig. 4: Plan of Trench O17 (Author, 2016).

Fig. 5: Architectural features in Trench O17 (Author, 2016).

single occupational phase dating to the early Islamic period (second to third centuries AH). Several dry-stone features, together with three hearths, constituted the principal architectural remains identified in Trench (P13).

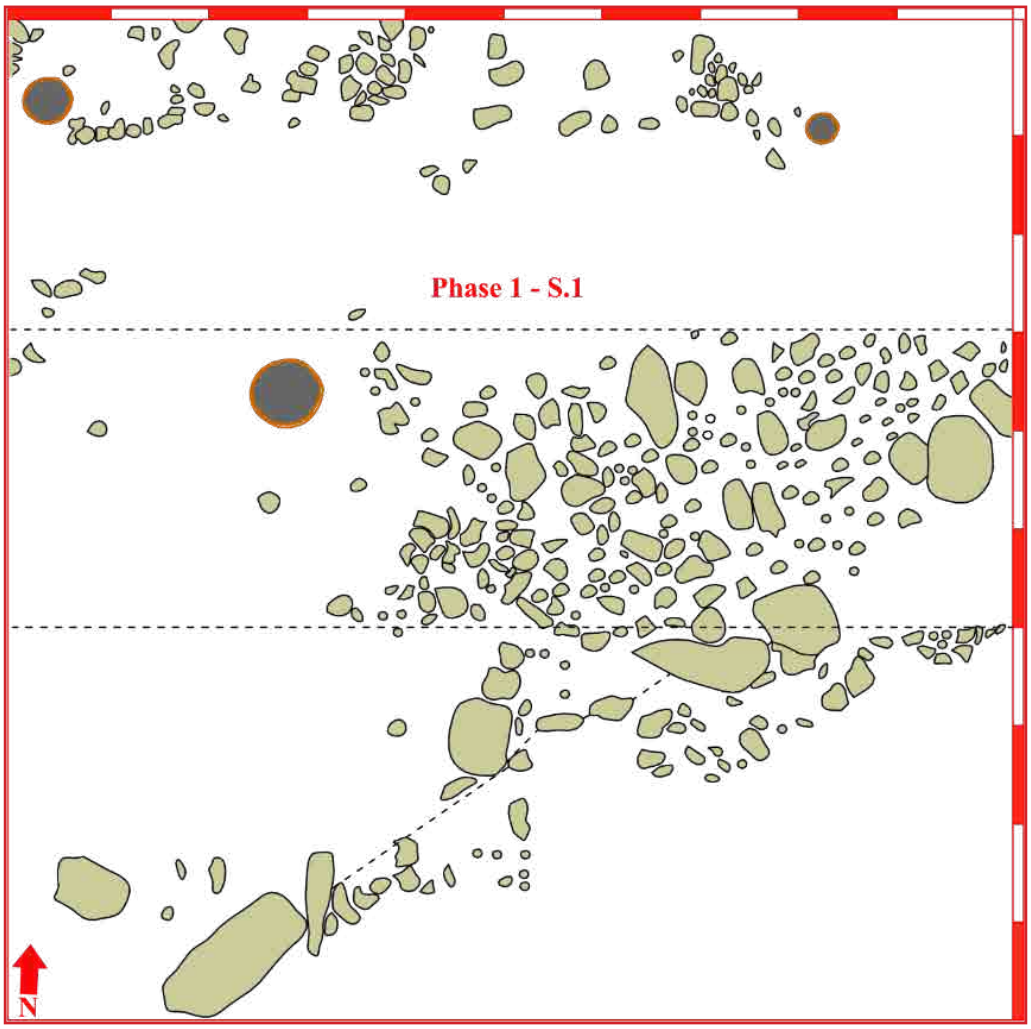

Fig. 6: Plan of Trench P13 (Author, 2016).

Fig. 7: Features recovered in Trench P13 (Author, 2016).

Trench T17

The excavations conducted in Trench (T17) did not reveal any architectural remains or identifiable architectural spaces (Figs. 9 and 10). This area appears, in fact, to have constituted part of the peripheral zone surrounding the "Guriyeh" Structure and the "Zich" site. Comparative analysis of the ceramics recovered from the trench indicates that they date to the early Islamic period (second to third centuries AH).

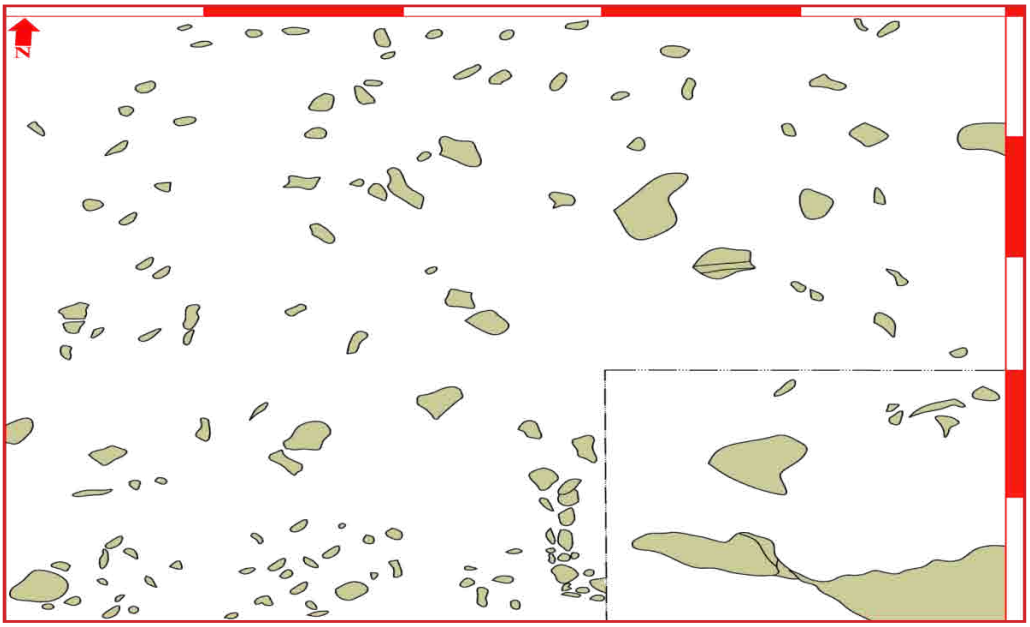

Fig. 8: Plan of the trench (Author, 2016).

Fig. 9: View of Trench T17 (Author, 2016).

Trench Q15

Excavation in Trench (Q15) resulted in the identification of a total of three architectural spaces (Figs. 11 and 12). These spaces consist of rectilinear and approximately rectangular enclosures, separated from one another by double-course, double-row dry-stone partition walls. The analyses undertaken indicate that all of the structural elements forming these spaces were constructed contemporaneously and belong to a single occupational phase dating to the early Islamic period (second to third centuries AH).

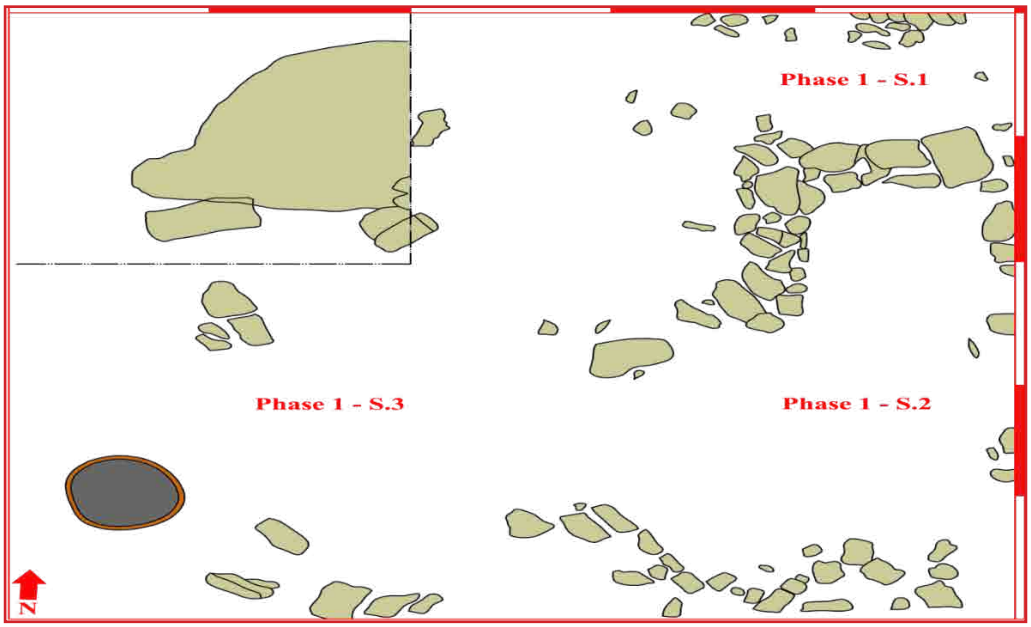

Fig. 10: Plan of Trench Q15 (Author, 2016).

Fig. 11: Architectural structure in Trench Q15 (Author, 2016).

Findings

Excavations in the four trenches at the "Zich" site yielded a total of (1,496) ceramic sherds, while survey of the site produced an additional (734) sherds. In addition, (1058) bone fragments, with a total weight of (7,997 gr), were recovered. Approximately 90 percent of these bones derive from animals such as goats and sheep, which are still kept and herded by nomadic pastoralists in the region today. The remaining 10 percent of the faunal remains belong to domestic fowl and equids. Comparative analysis of the ceramic assemblage against parallel examples demonstrated that all of the pottery finds are contemporaneous and date to the early Islamic period (second to third centuries AH) (Fig. 13 and Table 1).

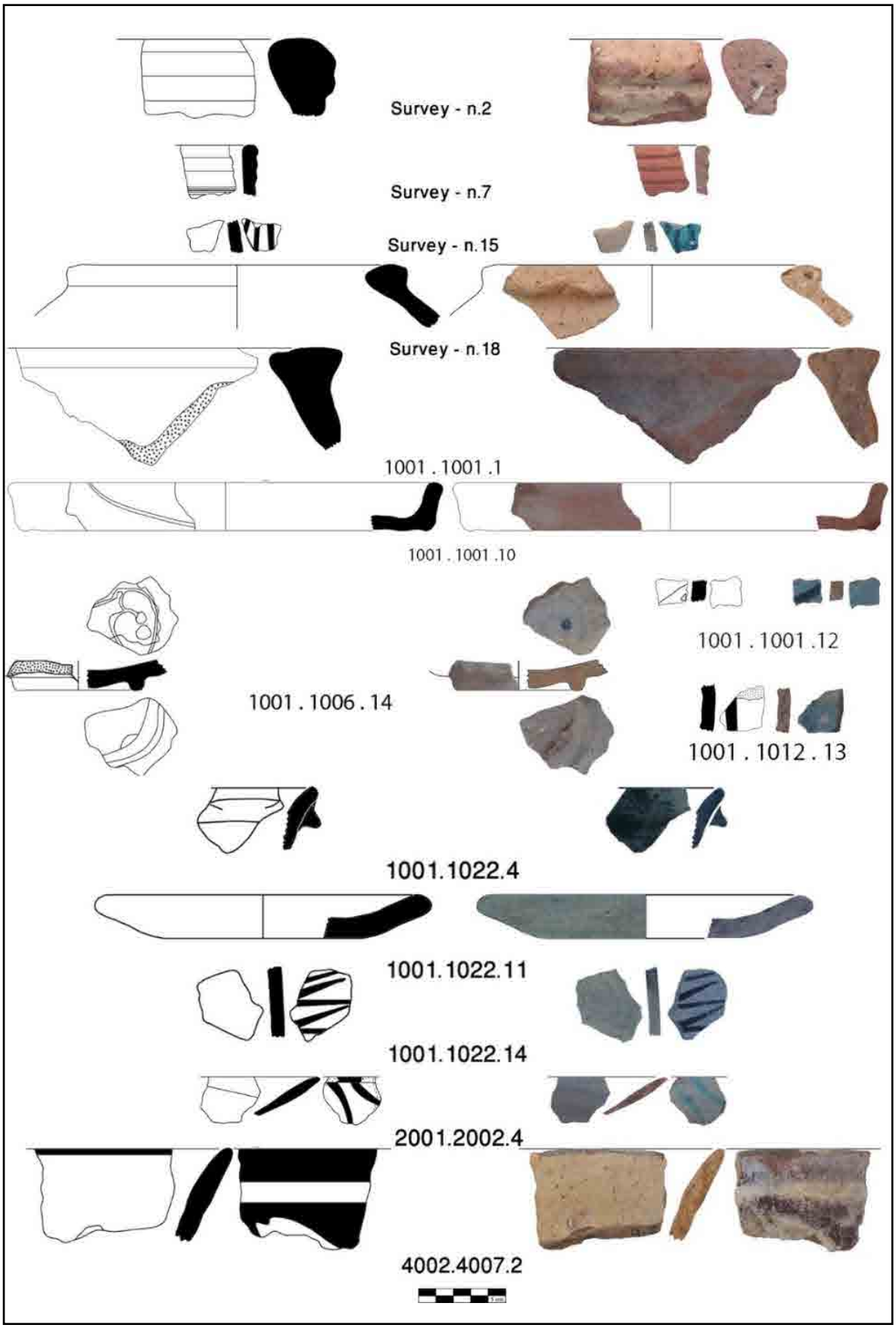

Fig. 13: Sample ceramics from the Zich site (Author, 2016).

Table 1: Technical specifications of ceramic samples from the Zich site (Author, 2016).

Technical Specifications of Ceramic Samples from the Zich Site									
Sherd No.	**Context No.**	**Registration No.**	**Sherd Type**	**Fabric Texture**	**Location of Decoration**	**Manufacturing Technique**	**Temper**	**Cultural Period**	**References (Remarks)**
n.2	Surface Survey		Rim	Coarse	Oblique	Hand made	Grit/Lime	Late Sasanian	Hasanpour & Sadeghi-Rad (2013, p. 202, Plan 18, No. 6)
n.7			Rim	Medium	Oblique	Hand made	Grit/Lime/Mica	2nd c. AH	Lakpour (2010, p. 597, Plan 43, No. 278)
n.15			Body	Medium	Paint	Hand made	Sand	2nd 3rd c. AH	Rosen-Ayalon (1974, fig. 483)
n.18			Rim	Coarse	***	Hand made	Grit/Lime	2nd 3rd c. AH	Lakpour (2010, p. 649, No. 232
n.1	1001	1001	Rim	Coarse	***	Hand made	Sand/Lime	2nd 3rd c. AH	Wilkinson (1973, p. 248, fig. 39
n.10		1001	Complete profile	Medium	***	Hand made	Grit/Lime	2nd 3rd c. AH	Lakpour (2010, p. 571, Plan 17, No. 90)
n.12		1001	Body	Medium	Incised	Hand made	Grit/Sand	2nd 3rd c. AH	Lakpour (2010, p. 575, Plan 21, No. 116)
n.14		1006	Base	Medium	Glazed/Painted	Hand made	Grit/Sand	2nd 3rd c. AH	Kleiss & Kalmayer (2006, p. 161, No. 15)
n.13		1012	Body	Medium	Paint	Wheelmade	Sand	2nd 3rd c. AH	Lakpour (2010, p. 575, Plan 23, No. 126)
n.4		1022	Rim	Medium	***	Hand made	Grit/Lime	2nd 3rd c. AH	Kleiss & Kalmayer (2006, p. 323, No. 45)
		1022	Complete profile	Medium	***	Hand made	Grit	3rd c. AH	Lakpour (2010, p. 649, No. 232)
n.11		1022	Body	Medium	Paint	Wheelmade	Sand	2nd 3rd c. AH	Wilkinson (1973, p. 248, fig. 39)
n.14	2001	2002	Rim	Medium	Paint	Wheelmade	Sand	2nd 3rd c. AH	Lakpour (2010, p. 618, Plan 64, No. 415)
n.4	4002	4007	Rim	Medium	Paint	Hand made	Sand	2nd 3rd c. AH	Lakpour (2010, p. 586, Plan 32, No. 195)

Ethnographic Data on Nomadic Dwellings in Iwan County

The nomadic community, as one of the three principal social formations in Iran, possesses forms of dwelling that are both adapted to its subsistence system and shaped by the natural environment (***). In this way of life, shelter is selected in accordance with environmental conditions and the practical requirements imposed by the mode of production and the geographic setting. Dependence on housing in this form of life does not carry the same meaning that it does in sedentary contexts. Over many centuries, the "Kalhor" tribal nomads of "Iwan" County have acquired, through processes of trial and error, a body of experience closely tied to local climatic conditions and their way of life. These experiences have enabled them to develop a deeper understanding of their living environment, acquire the skills necessary for survival, and choose forms of shelter appropriate to their mode of life and subsistence practices. The nomads of the region refer to every type of dwelling they use as a "mal", a term that, given its broader semantic associations, may also be understood as a form of property or asset. Among the nomads of this region, dwelling space is not merely, as in urban contexts, a place for family gathering and activities related to food preparation and household hygiene. In addition to these functions, it also serves as a place for drying fruit and vegetables, storing provisions, accommodating both humans and animals, housing livestock, storing agricultural produce, and functioning as an animal pen and poultry shelter.

The nomads of "Iwan" County select a natural setting for their settlement locations according to several essential criteria: a suitable slope to allow the passage of rainwater runoff, enclosure by natural features to protect against the prevailing regional winds, which generally blow from specific directions, and adequate exposure to sunlight, especially in winter encampments, in order to benefit from freely available thermal energy. Influenced by their subsistence strategy, the nomads of this region have long favored portable dwellings, namely the "black tent" (siah-chador), and this clearly demonstrates the effect of livelihood patterns on architectural choice. Indeed, this may be regarded as evidence of the full adaptation of this form of shelter to a migratory way of life. Over long periods of time, no substantial changes have occurred either in the "black tent" itself or in the materials used for its construction. It may therefore be argued that nomadic groups have long prepared the tent covering in the form of woven strips, which are joined together when the tent is erected; because these components are relatively lightweight, they are easily transported and do not create particular difficulties during seasonal movement. Based on the foregoing, it may be concluded that freedom of movement, ease of transport, and adaptation to a nomadic way of life are the principal requirements

that, over the course of history, have made it possible to rely on soft and flexible materials to meet the needs of this mode of existence.

For nomads, making minor adjustments to the tent is generally sufficient to adapt it to changing weather conditions. When the weather is warm, three sides of the tent are opened widely, and its front awning is extended to its maximum size. During strong winds and rainfall, the front poles of the tent are set at an oblique angle and the lateral poles are removed, so that the edges of the tent hang downward. The orientation of the tents in relation to one another is such that the entire surrounding landscape remains under observation" (Mansuri-Moqaddam, 2010).

Nomads require one another's assistance in erecting and dismantling the black tent and in carrying out seasonal migration, since these tasks cannot be performed individually. At the same time, because both they and their herds are exposed to various dangers, they must pitch their tents in close proximity to one another. In general, the nomadic dwellings used in "Ilam" Province may be classified into three categories; "Siyah-mal"; This is the black tent itself, which is used by nomads during most seasons of the year. "Kula and Kapar"; These are summer dwellings of the nomads and are sometimes erected alongside the black tent as complementary structures. This type of architecture was not identified at "Zich". "Zamgeh"; This is the winter dwelling of the nomads and serves as a measure for coping with "veshkeh-zaqam", that is, severe, bone-piercing cold.

Ethnoarchaeological Framework for Interpreting Zich Architecture

Nomadic dwellings in the "Iwan" region provide an important ethnographic framework for interpreting the archaeological remains at the "Zich" site. Among these, the black tent (siyah-mal) represents the principal mobile dwelling of pastoral nomads and is especially relevant for understanding the organization of temporary encampments. Because the structural elements of the black tent were made largely from perishable materials, including goat-hair textiles, wooden poles, and woven screens, their direct archaeological visibility is extremely limited. As a result, the principal material traces likely to survive are stone arrangements, hearths, and partition features associated with the tent and its immediate surroundings.

The internal organization of the black tent is also significant for archaeological interpretation. Ethnographic observations indicate that the area around the hearth formed the main domestic space, used for cooking, food preparation, eating, and everyday social interaction. In this respect, the hearths identified in Trenches (Q15) and (P13) may represent spaces within, or immediately adjacent to, black tents. Other internal divisions, such as storage areas or enclosed spaces for young animals,

may also be reflected archaeologically in small partitioned spaces. In Trench (Q15), Spaces (S1) and (S2) may tentatively be interpreted as belonging to such functional subdivisions, possibly related to storage or the keeping of newborn livestock. By contrast, more formal and socially differentiated spaces known ethnographically from some tents could not be identified with confidence in the excavated remains.

Seasonal variation in nomadic architecture is likewise important. In addition to black tents, nomads of the region used lightweight summer shelters made of wood, branches, or reeds, but these were constructed almost entirely from perishable materials and are therefore unlikely to leave clear archaeological traces. No unequivocal evidence for such structures was identified at "Zich".

Of greater relevance to the excavated evidence is the winter dwelling known as "zamgeh". This type of structure was built for protection against severe cold and typically made use of more durable materials, especially stone, combined with wood and branches. Ethnographic examples show that such dwellings could include substantial dry-stone walls, hearths, and enclosed spaces arranged to provide shelter for both people and livestock. This pattern offers an important comparative model for interpreting Trench (Q17), where the presence of a hearth, relatively thick rectilinear walls, and stone arrangements possibly associated with a tent suggests a form of winter occupation. Accordingly, (Q17) may represent a more substantial seasonal installation comparable to a "zamgeh", whereas the lighter architectural traces in other trenches are more consistent with temporary occupations centered on black tents.

Conclusion

The archaeological investigation of the "Zich" site was carried out in three distinct yet interrelated stages: systematic survey, trial sounding for the determination of site boundaries, and extensive excavation across the site. Taken together, the results of these investigations led to the identification of the site as a temporary settlement, that is, a seasonal occupation. Study of the architectural remains and the architectural character of the spaces uncovered in the excavated trenches, together with their comparative assessment against contemporary regional examples, indicates that "Zich" was a temporary settlement or, more precisely, a nomadic campsite, belonging to mobile pastoral groups. The site appears to have been occupied in a single phase over a short-term span, seasonally but recurrently over a number of years. Among the defining features of this settlement was residence in tents, the surrounding spaces of which were demarcated by one or two-course, and likewise one or two-row, dry-stone walls separating them from one another. Outside the tented areas, hearths had been constructed for cooking and other daily activities. In order to mitigate the natural

slope of the hillside and facilitate habitation, the occupants created stepped terraces on which they erected their tents. Notably, well-preserved and complete examples of such settlement forms, associated with the lifeways of contemporary nomadic groups, have continued in use in essentially the same manner up to the present, and their traces remain clearly visible around the site.

Comparative analysis of the ceramics and other finds recovered from all four excavated trenches dates the occupation of the site to the early Islamic period, specifically the second to third centuries AH. Accordingly, the flourishing phase of the "Zich" site may be placed within an interval of approximately (10 to 20) years between the second and third centuries AH, although a shorter duration is also possible. Chronologically, this period corresponds either to the final phase of occupation at the "Guriyeh building" or to a point shortly after its abandonment. To date, 11 sites contemporary with "Zich" have been identified in the "Kangir River basin". These settlements were predominantly permanent in character. The presence of a perennial spring and the stream flowing from it along the southwestern part of the site, command over the horseshoe-shaped valley and location at its entrance, the shelter of the southwestern slope from strong winds, proximity to the "Gouriyeh building" as a permanent and secure center, nearness to the "Kangir" River, the existence of dense pastureland, and the site's position along an ancient "il-rah" (tribal migration route), together with similar factors, may be regarded as the principal reasons for the formation of the "Zich" site in this location.

The ancient "il-rah" along which the archaeological site of "Zich" is situated continues to be used today by the nomads of "Iwan" County, especially groups affiliated with the "Kalhor tribe". During the cold seasons, the mobile pastoralists of "Iwan" leave the elevated mountain zones and migrate to the lower winter pastures located in "Somar", "Tang-e Kushk", "Kiyaneh", "Charowzard", "Shireh-Paneh", "Shavaleh", "Dalgān", and other such areas. Conversely, during the warm seasons they move to the upland summer pastures of "Bankul", "Shivereh Zivol", "Gamiyar", and elsewhere, while some also take refuge in the environs of villages. These movements, and the necessity of adapting to climatic conditions, are likewise governed by the condition of pasture vegetation. Because the permanent residence of human populations in high mountain zones is extremely difficult under severe winter conditions, population concentration in these upland areas has remained very limited. The influence of nomadic life on the settlement system is therefore evident; given the necessities of migration and the movement of people and livestock in order to exploit seasonal pastures, settlement was predominantly temporary, resulting in the formation of small and dispersed habitations across the territory of the county and other parts of the province, particularly in the lower wintering zones and the upland summer pastures.

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Conflict of Interest

In accordance with ethical publication standards, the author declare that they have no conflicts of interest, either personal or financial, that could have influenced the content or conclusions presented in this research.

Endnote

1. see: Yousefvand, Y., (2022). "The Khalilabad-Nomkol tribal route: A Safavid-period migration route in eastern Lorestan (Aligudarz County)". *Parseh Archaeological Studies,* 6(22): 329-349. https://doi.org/10.30699/PJAS.6.22.329 (In Persian).

2. see: Bagh-Sheikhi, M., Esmaeili-Jelodar, M. E., Khosravi, L. & Khosrozadeh, A., (2024). "Classification and typology of Sasanian ceramics from the Guryeh site, Ilam Province". *Parseh Archaeological Studies,* 8(29): 75-104. https://doi.org/10.22034/PJAS.8.29.75 (In Persian).

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۳۵

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واکاوی باستان‌شناختی و قوم‌باستان‌شناختی محوطهٔ زیچ: سکونتگاه فصلی جوامع کوچ‌رو در سده‌های نخستین اسلامی

آرش لشکری[I]

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چکیده

کاوش‌های باستان‌شناسی محوطهٔ زیچ، بخشی از برنامهٔ باستان‌شناسی نجات‌بخشی در محدودهٔ مخزن سد کنگیر، واقع‌در بخش زرنه از شهرستان ایوان (شمال‌غربی استان ایلام) است. نتایج این بررسی که بر پایهٔ پیمایش سیستماتیک ۹ واحد ۱۰۰×۱۰۰ متری، کاوش هشت گمانهٔ آزمایشی (۲×۲ و ۳×۳ متر) و چهار ترانشهٔ اصلی (۵×۵ تا ۱۰×۱۰ متر) به‌دست آمده، منجر به شناسایی یک سکونتگاه موقت یا اردوگاه عشایری شد. مطالعهٔ بقایای معماری مکشوفه و تحلیل تطبیقی آن‌ها با نمونه‌های هم‌عصر در منطقه، نشان می‌دهد که زیچ، یک سکونتگاه تک‌دوره‌ای و کوتاه‌مدت متعلق به گروه‌های کوچ‌رو (دامداران متحرک) بوده است. الگوی استقراری در این محوطه شامل چادرهایی بوده که هرکدام با یک یا دو ردیف چینش سنگ‌های خشکه‌چین محصور شده و به‌وسیلهٔ دیواره‌های سنگی مشابه از یک‌دیگر تفکیک شده‌اند. تحلیل تطبیقی سفال‌ها و یافته‌های فرهنگی حاصل از ترانشه‌ها، تاریخ‌گذاری استقرار در این محوطه را به سده‌های نخستین اسلامی (به‌ویژه قرون دوم و سوم هجری‌قمری) قطعی می‌کند. شکل‌گیری استقرار در زیچ مرهون عوامل مساعد محیطی ازجمله موقعیت توپوگرافی مناسب، دسترسی به چشمهٔ دائمی و رودخانهٔ کنگیر، مجاورت با بنای گوریه، وجود مراتع غنی و قرارگیری در مسیر ایل‌راه قدیمی موازی با رودخانهٔ کنگیر (که کرمانشاه را به مناطق گرمسیر جنوب ایوان متصل می‌کرده) بوده است. مطالعهٔ ساختارها و بقایای معماری جوامع عشایری معاصر، یکی از کارآمدترین و دقیق‌ترین روش‌های علمی برای درک سازمان معماری جوامع کوچ‌رو باستانی و در زمرهٔ مطالعات قوم‌باستان‌شناسی است. پژوهش حاضر برپایهٔ شیوه‌های استقراری جوامع عشایری معاصر، به بررسی الگوی استقراری این اردوگاه کوچ‌رو در بستر طبیعی آن پرداخته است. گردآوری داده‌ها با استفاده از روش‌های متداول پیمایش میدانی و کاوش‌های باستان‌شناسی و قوم‌باستان‌شناسی در منطقه صورت گرفته است.

کلیدواژگان: محوطهٔ زیچ، کاوش نجات‌بخشی، سد کنگیر، اردوگاه عشایری، سده‌های نخستین اسلامی.

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An Archaeological Study of the Ismaʿili Fortresses of Dāmḡān with Emphasis on Geographic Variables

Homayoun Khosheghbal[1], Majid Montazer Zohouri[2]

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Abstract

This study examines the relationship between geographic variables and the location, architecture, and long-term occupation of the Ismaʿili fortresses of Dāmḡān County in northeastern Iran. During the Islamic period, Dāmḡān formed an important sector of the Ismaʿili defensive network in the historical region of Qūmis, containing several major fortresses and outposts, including Gerdkūh, Mehrnegār, Mansūrkūh, Qalʿa-ye Doḵtar, Stīvhād, and Shīr. The primary objective of this research is to evaluate the extent to which environmental and geographic factors influenced the selection of fortress locations and the persistence of occupation at these sites. The study employs a descriptive–analytical methodology that combines archaeological field survey, historical and textual evidence, satellite imagery, and Geographic Information Systems (GIS) analysis. A range of environmental variables—including elevation, topography, slope, hydrology, climate, geology, mineral resources, vegetation, and communication routes—were examined and compared with the spatial distribution of the Ismaʿili fortifications. The results demonstrate that the distribution of the fortresses followed a deliberate and non-random pattern closely associated with strategic environmental conditions. Most sites were established on elevated terrain overlooking the Čašma-ye ʿAlī River corridor, major communication routes connected to the Great Khorasan Road (Silk Road), agriculturally productive plains, and mineral-resource zones. The fortresses also maintained visual interconnectivity and benefited from favorable defensive topography, reliable water supplies, and access to economic resources. Architectural evidence further indicates that these sites were adapted to local environmental conditions through the construction of cisterns, defensive walls, towers, and multi-level architectural complexes. The study concludes that geographic variables played a decisive role in the location, architectural organization, and long-term viability of the Ismaʿili fortresses of Dāmḡān. These fortifications constituted an integrated territorial network designed to support the military, economic, administrative, and religious objectives of the Nezārī Ismaʿili state in northern Iran.

Keywords: Dāmḡān, Nezārī Ismaʿilism, Ismaʿili Fortresses, Gerdkūh, GIS, Cultural Landscape, Geographic Variables.

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Introduction

The relationship between human societies and their surrounding environment has long been recognized as a fundamental factor shaping settlement organization, architectural forms, and the development of political landscapes. Geographic variables—including topography, elevation, climate, geology, water availability, mineral resources, and communication networks—not only influence patterns of human occupation but also affect the sustainability and long-term continuity of settlements. In fortified landscapes, these environmental conditions become particularly significant, as decisions regarding site selection and architectural organization are closely connected to issues of defense, economic control, access to resources, and territorial administration. The Ismaʿili fortresses of Iran provide an important case through which to investigate the interaction between environmental conditions and political organization. During the fifth to seventh centuries AH, the Nezārī Ismaʿili state established an extensive network of fortifications across different regions of Iran. These fortifications functioned not merely as military structures but also as administrative, economic, and religious centers. The selection and development of these fortified landscapes reflected deliberate strategies that enabled long-term occupation under changing political and environmental circumstances.

Among these regions, Dāmḡān County occupies a particularly significant position. Located within the historical region of Qūmis and situated along major east–west and north–south communication corridors, Dāmḡān served as an important crossroads linking central Iran with Khorasan and neighboring regions. Its strategic position along the Great Khorasan Road (Silk Road), together with access to agricultural lands, water resources, and mineral zones, made the region an important center of Ismaʿili activity (Saber & Khosheghbal, 2023). In particular, Gerdkūh Fortress constituted one of the principal Ismaʿili strongholds and played a major role in the political and economic dynamics of the region due to its strategic position along the Khorasan Road. Other Ismaʿili fortresses and outposts in Dāmḡān similarly occupied locations that suggest careful consideration of environmental and strategic conditions. Although the history and political development of the Ismaʿilis have received considerable scholarly attention, the relationship between the Ismaʿili fortresses of Dāmḡān and their surrounding landscape has not yet been systematically investigated. Consequently, the broader spatial logic governing the organization of the Ismaʿili defensive landscape in Dāmḡān remains insufficiently understood.

To address this gap, the present study adopts a landscape archaeology approach and combines archaeological field survey, historical and textual evidence, satellite imagery, and Geographic Information Systems (GIS) analysis to investigate the Ismaʿili fortresses of Dāmḡān. Particular attention is given to the role of geographic variables—including elevation, climate, geology and mineral resources, hydrology, and regional and transregional communication routes—in shaping fortress location, architectural organization, and patterns of long-term occupation.

Research Questions: This study seeks to answer two principal questions: 1) How did geographic variables influence the selection of locations for the Ismaʿili fortresses of Dāmḡān? and 2) To what extent did environmental and geographic conditions contribute to the continuity of settlement and the long-term functionality of these fortifications?

It is hypothesized that the distribution of the Ismaʿili fortresses of Dāmḡān followed a deliberate and non-random spatial pattern shaped by environmental opportunities and strategic considerations. By examining the interaction between geography and architecture, this study aims to provide a more comprehensive understanding of the cultural landscape of Dāmḡān during the period of Nezārī Ismaʿili presence and to contribute to broader discussions concerning fortified landscapes and settlement systems in medieval Iran.

Historical and Archaeological Background of Dāmḡān and Previous Research

Numerous studies have examined the historical, cultural, social, and political structures of the Ismaʿilis in Iran. Given the focus of the present article, however, only those works that directly concern the region under investigation are considered here. Because several of the Ismaʿili fortresses in the study area were also occupied during earlier periods, a brief overview of human presence in the region across different historical eras is first provided before turning to the Ismaʿili period itself.

Archaeological evidence indicates that the history of settlement in Dāmḡān County dates back to the Paleolithic period. A field survey conducted in the Chah Jam region, located approximately 6 km south of the city of Dāmḡān, recovered a total of 525 Paleolithic lithic artifacts (Vahdati Nasab & Hashemi, 2018: 10–14). The recovered evidence suggests that human occupation in this region can be attributed to the Middle and Upper Paleolithic periods (Alibeigi & Khosravi, 2009; Berillon et al., 2007; Biglari & Shidrang, 2006; Biglari et al., 2009; Chevrier et al., 2010; Heydari Guran et al., 2014; Rezvani & Vahdati Nasab, 2010; Vahdati Nasab et al., 2010).

At present, however, no evidence of Neolithic occupation has been reported from Dāmḡān itself (Sharifi, 1997; Dyson & Thornton, 2009; Roustaei, 2016: 35). Nevertheless, Neolithic settlements have been identified in the neighboring plains of Shāhroud and Bastām, both located adjacent to Dāmḡān (Roustaei, 2016). During an archaeological survey conducted in 2006 by Kourosh Roustaei, 270 ancient mines—including copper, lead, iron, gold, and turquoise deposits—were identified. The resulting data indicate that these mines were exploited across various historical periods, from prehistory through the Islamic era, by the inhabitants of the Shāhroud and Dāmḡān regions (Roustaei, 2012). Due to its strategic geographical position, Dāmḡān consistently attracted the attention of successive political powers throughout history. One of the most significant events associated with the Achaemenid period in this region is the death of Darius III, the last Achaemenid king, and Alexander's temporary residence in the city of Hecatompylos. According to historical and archaeological hypotheses, both of these events took place

within the territory of ancient Qūmis (Jafarpour et al., 1989: 13). According to most scholars, the archaeological site of Qūmis, near the modern village of Qūsheh, can likely be identified with ancient Hecatompylos. Covering an area of approximately 3×7 km (Stronach et al., 2019: 185), it represents the largest contemporary settlement in the region, and its importance during the Arsacid period is well established. Excavations were carried out there over four seasons—in 1967, 1971, 1976, and 1978—under the joint direction of John Hansman and David Stronach (Hansman, 1968; Hansman & Stronach, 1970a, 1970b, 1974; Stronach et al., 2019). Overall, archaeological surveys documenting Parthian–Sasanian settlements across the Dāmḡān plain (Sharifi, 1997; Trinkaus, 1981), along with two excavation seasons at the Kesht Dasht site (Sharifi, 2019), indicate that these settlements were distributed linearly along water sources and the Khorasan Road communication network.

During the Sasanian period, Qūmis was of considerable importance. It is mentioned in the Middle Persian text Šahreštānīhā ī Ērānšahr as follows: "The city of Kūmīs of five towers Aži Dahāg made it his own harem. The abode of the Parthians was there. In the reign of Yazdgird, the son of Šabuhr made it during the invasion of the Čōl, at the boundary of the Gruznian Guard" (Daryaee, 2002: 18). The most significant archaeological evidence from the Sasanian period in Dāmḡān is associated with the site of Tepe Hissar (Dyson & Howard, 1989; Trinkaus, 1981, 1985). During his visit to the site, Masʿūdī identified the structure as a fire temple. The monument was later examined by archaeologists such as Vanden Berghe, Herzfeld, and Ritter (Vanden Berghe, 1968; Herzfeld, 1994; Ritter, 2019). Herzfeld (1994) interpreted the building as an early Sasanian palace (p. 309), whereas Schmidt, based on comparisons between its stucco decoration and other Sasanian examples, assigned it to the late Sasanian period (Schmidt, 2012). In contrast, Bussagli and Scerrato, drawing on comparisons with Hatra, proposed a Parthian date for the monument (Bussagli & Scerrato, 2004: 50). More recent studies, however, indicate that the structure was in fact a fire temple dating to the late Sasanian period (Hozhabri & Mortazavi, 2022: 125). Compared with other regions of the Alborz Mountains or Khorasan, the Ismaʿili fortresses of Dāmḡān have received relatively limited scholarly attention. More than any other researcher, Manouchehr Sotoudeh focused on the fortresses of Qūmis, discussing these strongholds extensively in The Ismailia Fortresses in the Alborz Mountains as well as in several of his other works. His studies remain highly valuable within the broader field of Ismaʿili studies (Sotoudeh, 1961, 1983; Sotoudeh et al., 1988). Farhad Daftary, who has conducted extensive research on the history of the Ismaʿilis, has also referred to the Ismaʿili fortresses of Qūmis in his scholarly works (Daftary, 1997, 2001). Among his focused studies on this subject is the entry on Gerdkūh in the Encyclopaedia Iranica, authored by him (Daftary, 2001).

Peter Willey devoted a chapter of his book Eagle's Nest: Ismaili Castles in Iran and Syria to the Ismaʿili fortresses of Qūmis. However, he only visited the Mehrnegār

outpost and merely reported the existence of several other fortresses in the Āhvānū Valley; due to time limitations, he was unable to examine them in detail or complete his investigations in Qūmis (Willey, 2005: 205–229). In both Geschichte der Architektur Irans and his article on Ismaʿili fortresses, Wolfram Kleiss briefly examined Ismaʿili strongholds (Kleiss, 2017). In his critique of Kleiss's article, Mohammad Yusef Kiani also made brief references to the Shīr outpost (Kiani, 2000). In Defensive Fortifications in Islamic Iran and in his article "Gerdkuh or Gonbadan Dezh," Naser Pazouki focuses exclusively on Gerdkūh Fortress and examines aspects of its architectural structure (Pazouki, 1988, 1997). In his article "Ismailis in Qūmis," Azim Hamzeian refers to Ismaʿili control over the fortresses of Gerdkūh and Mansūrkūh but remains uncertain regarding their control of Mehrnegār Fortress (Hamzeian, 2000: 75–91). In a detailed study of the ancient fortresses of Dāmḡān, Mohammad Rezaei sought to establish connections between these structures and Iranian mythology. In this context, he presented numerous photographs of the fortresses in the Āhvānū region, north of Dāmḡān (Rezaei, 2005: 425–484).

In Fortresses and Military Fortifications, Mollazadeh and Mohammadi briefly discuss the well known Mehrnegār Fortress and provide a concise description of the site (Mollazadeh & Mohammadi, 2006: 133–134). Drawing on historical sources, Hassan Shadpour, in his article "Qoomes and the Isma'iliyyah," refers to the Ismaʿili conquest of the fortresses of Gerdkūh, Mansūrkūh, and Mehrnegār, although his primary focus is on Gerdkūh Fortress (Shadpour, 2006: 119–138). Archaeological excavations at the Ismaʿili strongholds in Qūmis have been extremely limited. In this regard, only the test trenches and rescue operations carried out at the foot of Mehrnegār Mountain by Ali Akbar Moradan can be mentioned (Moradan, 2009).

Kourosh Roustaei also conducted a limited survey in southern Dāmḡān, during which evidence for 270 ancient mines was identified along the southern mountain slopes of the Dāmḡān plain (Roustaei, 2012). Based on surface evidence, some of these mines can be dated to the Islamic period. In his book The Fortresses and Peaks of Dāmḡān, Mostafa Saeidi introduced several of the county's fortresses and sought to make them better known to the general public (Saeidi, 2013). Seyyed Mohammad Seyyed Yazdi and his colleagues, in an article entitled "The Role of Qūmis in the Nezari Ismaʿili State of Iran," also examined the Ismaʿili fortresses of this region. Their study focused primarily on the better known strongholds, and they remained unaware of several other sites. Nevertheless, they correctly observed that the number of Ismaʿili fortresses in Qūmis is far greater than previously recognized (Seyyed Yazdi et al., 2017: 169–184). In his article "Qale Dokhtar of Bidestan: Ismaʿili's Newly Discovered Castle in Qūmis," Mohammad Saber introduces an Ismaʿili fortress in southern Dāmḡān. Owing to its geographical position and the communication routes it controlled, this fortress appears to have held considerable strategic importance for the Ismaʿili state (Saber, 2021).

In 2022, with the aim of conducting a comprehensive investigation of the mountain fortresses in Dāmḡān County, a three member interdisciplinary team—comprising Mohammad Saber (historian), Ruhollah Khalil Nezhadi (architect), and Homayoun Khosheghbal—was formed. Through several phases of survey and research, a total of nine mountain fortresses were identified and documented, some of which were introduced for the first time into the archaeological literature of Iran. In addition, eight fortresses, covering a total area of approximately 104 hectares, were mapped and systematically recorded (Saber, 2023). The final processed results will be presented in forthcoming publications and made available to researchers. What distinguishes the present article from previous studies is its focus on the geographical setting of Ismaʿili fortresses and their role as understood through landscape archaeology, both within the territorial domain of the Ismaʿili state and within the broader context of their presence in Dāmḡān. The authors seek to examine the influence of environmental and geographical factors on the formation of the Ismaʿili fortresses of Dāmḡān and to clarify the position of these fortresses within the historical context of the period under study.

The Presence of the Ismaʿilis in Dāmḡān

In 471 AH, after returning from Egypt, Ḥasan Ṣabbāḥ began to propagate the Ismaʿili daʿwa in Iran (Lewis, 2016: 271). He achieved notable success in the cities of Isfahan, Yazd, Kerman, and Ray, after which he expanded his missionary activities further (Mashkour, 1976: 224). In 485 AH, he dispatched Ḥusayn Qāʾenī to the regions of Qūmis (Fig. 1) and Quhestān to supervise missionary efforts and administer the Ismaʿili fortifications in eastern Iran (Hamadānī, 1976: 103).

During this period, Rāʾis Moayyad al-Dīn Moẓaffar Mostawfī, an official of the Saljuq ruler Malekšāh, converted to Ismaʿilism at the invitation of ʿAbd al Malek b. ʿAṭṭāš after assuming the governorship of Dāmghān following the death of the Saljuq sultan. He subsequently succeeded Amīrdād Ḥabašī b. Altūntāq as commander of the fortress of Gerdkūh. However, in 489 AH Barkīāroq granted the fortress of Gerdkūh to Amīrdād (Hodgson, 1987: 179). With the rise of Sanjar to power and the support of Moḥammad Tapar, a fierce conflict broke out at the fortress of Gerdkūh, during which Amīrdād was killed. Rāʾis Moẓaffar then assumed control of the fortress and openly declared his conversion to Ismaʿilism, subsequently surrendering it to the Nezaris (Hamadānī, 1976). This explicit alliance brought considerable attention to the daʿwa of Ḥasan Ṣabbāḥ in the region and attracted numerous new followers (Shadpour, 2006: 130). As a result, the Ismaʿilis in Dāmghān were able to dominate the trade routes and, as Saljuq authority in the region declined, to collect tribute from peasants, merchants, and travelers (Jovaynī, 1976: 213). In 537 AH, the Bāvandid ruler Rostam b. ʿAlāʾ al Dawla, known as Shāh Ghāzī, succeeded in besieging the principal Ismaʿili fortresses in Dāmghān (Āmolī, 1969: 131). This confrontation between the Bāṭenīs and the Bavandid dynasty generated prolonged unrest and instability in Dāmghān and its surrounding areas, confining the

Ismaʿilis to their fortresses and preventing them from entering the city. These conditions persisted until the rise of Moḥammad Khwarazmshah, who defeated the Bavandids and took control of Dāmghān.

The ascendancy of the Khwarazmshahids, however, proved short lived. Between 616 and 618 AH, the Mongols under the command of Subutai clashed with the Khwarazmshahs, and the Ismaʿilis exploited this situation by fomenting disorder and seizing Dāmghān along with its surrounding territories (Hodgson, 1987: 457). With the expansion of Ismaʿili power and the intensification of Mongol campaigns in the region, one of the sons of Moḥammad Khwarazmshah, Rokn al Dīn, sought refuge in the fortress of Gerdkūh (Mostawfī, 1983: 459).

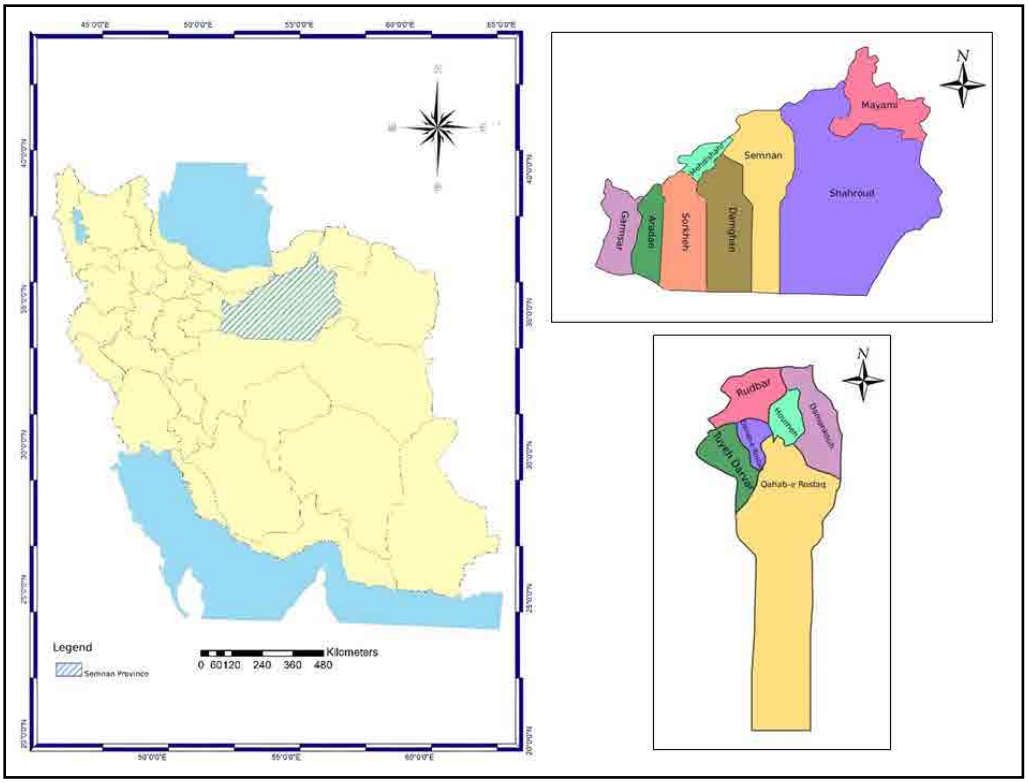
During the reign of Solṭān Jalāl al Dīn Menkobernī, stability in the region was maintained until 625 AH through the annual payment of a tribute of thirty thousand dinars from the fortress of Gerdkūh to Jalāl al Dīn. In that same year, however, acting on orders from Alamut, the fortress of Gerdkūh ceased paying tribute and seized control of Dāmghān (Nasawī, 1965: 164). The Mongols, who regarded both the Ismaʿilis and the Abbasid Caliphate as obstacles to their expansion, resolved during the reign of Möngke Qāʾān to eliminate them (Eqbal, n.d.: 484). Consequently, the fortress of Gerdkūh was besieged in 651 AH and, after nearly twenty years of resistance, finally surrendered to the Mongols in 670 AH (Hamadānī, 1976: 766). This fortress therefore stands as a notable example of a seemingly impregnable stronghold that resisted the Mongols for many years (Jamal, 2003: 57).

Ismaʿili Fortresses of Dāmghān

Among the Ismaʿili fortresses examined in the present study, Qalʿa-ye Doḵtar, located near the village of Bīdestān, lies within the administrative boundaries of present-day Shāhroud County (Fig. 2). Nevertheless, because this study focuses on the historical landscape of Dāmḡān during the period of Ismaʿili presence, and because of the fortress's significant spatial position and its relationship to the Ismaʿili fortresses of present-day Dāmghān County—which will be discussed in the relevant section—it has been examined alongside the Ismaʿili fortresses of Dāmghān and is treated as an integral component of the cultural landscape of the study area. Surface sherds recorded and studied during repeated visits to these sites indicate that some of the Ismaʿili fortresses discussed in this study have occupational histories extending into the pre-Islamic period. Most of these fortresses appear to have been permanently abandoned during the Middle Islamic centuries following the collapse of the Ismaʿili state in the region (Table 1). Their geographical setting and architectural evidence help clarify their functions. In the following sections, each fortress is discussed and analyzed individually.

Gerdkūh

The fortress of Gerdkūh (Fig. 3) is located approximately 18 km west of Dāmḡān,



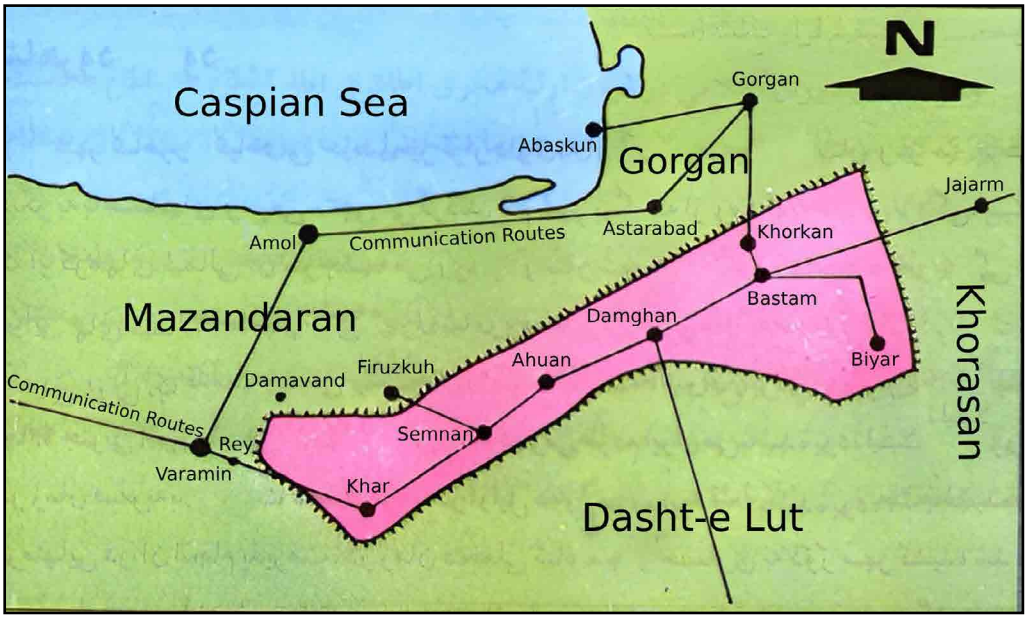


Fig. 1: Top- Location of Dāmḡān County in Iran (Authors, 2024); Bottom- Qūmis during the Islamic Period (Bani Asadi, 1995).

Tab. 1: Known Ismaʿili fortresses of the study area (Authors, 2024).

Site	Function	Chronology
Gerdkūh Fortress	Military-Residential	Arsacid, Sassanid, Early, Middle and Late Islamic
Mehrnegār Fortress	Military-Residential	Arsacid, Sassanid, Early and Middle Islamic
Mehrnegār Outpost	Military	Arsacid, Sassanid, Early and Middle Islamic
Qaḷʿa-ye Doḵtar	Military	Early and Middle Islamic
Mansūrkūh Fortress	Military-Residential	Arsacid, Sassanid, Early and Middle Islamic
Stīvhād Watchtower	Watchtower	Middle Islamic
Shīr Outpost	Military-Watchtower	Early and Middle Islamic

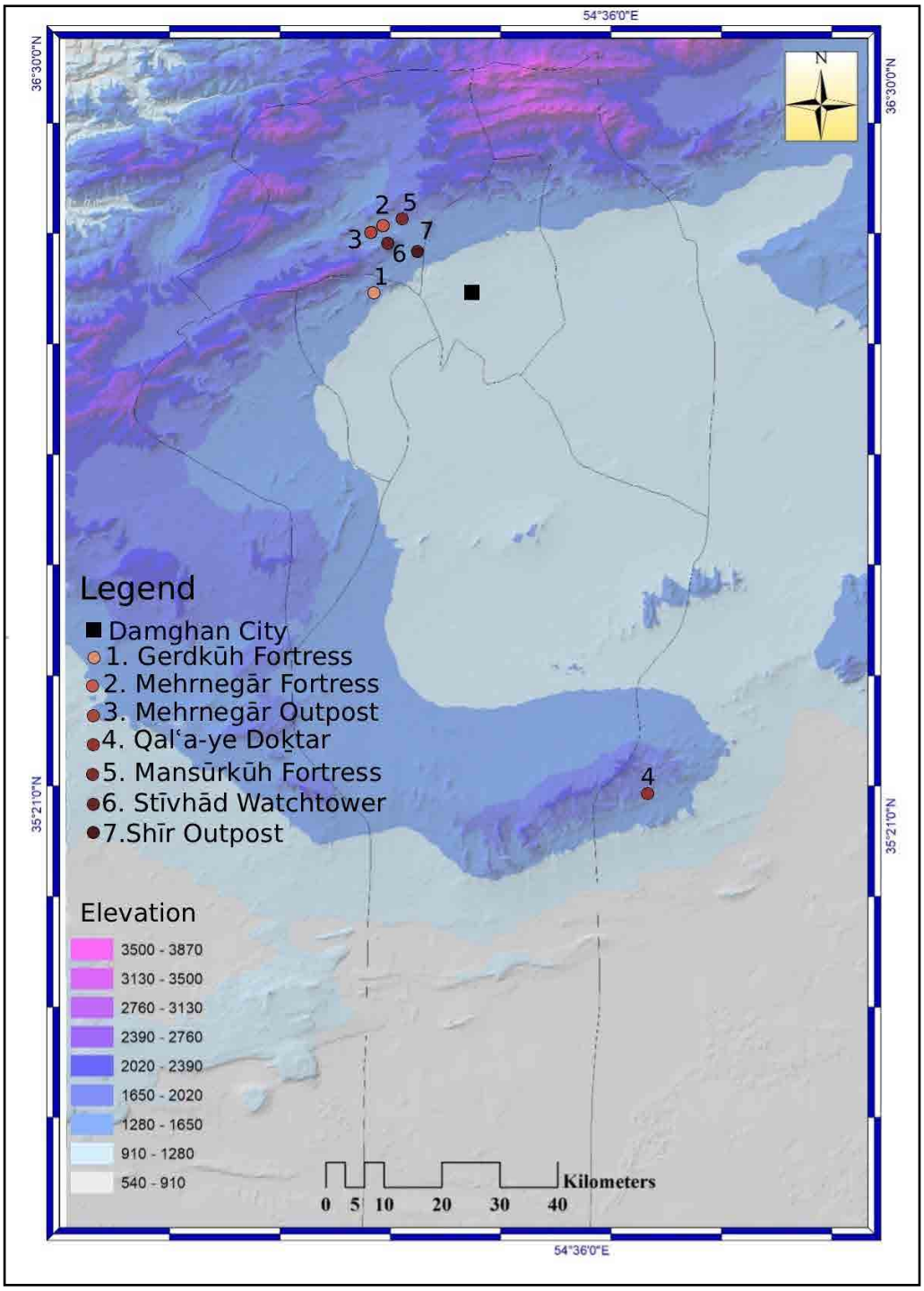


Fig. 2: Elevation and distribution of the discussed Ismaʿili fortresses (Authors, 2024).

near the village of Hājīābād i Raḍavī, at an elevation of 1,594 m above sea level (Fig. 2), and covers an area of approximately thirteen hectares. The fortress commands an unobstructed view of the Khorasan Road. The surviving remains include multiple courses of citadel walls in various parts of the site, several cisterns, the southern wall of a dovecote in the eastern sector of the fortress, towers and other defensive structures, two wells, as well as dams and water channels. Most of the architectural remains of Gerdkūh, however, remain buried beneath the surface. In addition, traces of the moat,

stone walls, and small outposts constructed by the Mongols around the mountain to ensure a complete siege of the fortress are still visible. In total, fourteen cisterns were constructed within the fortress. The larger cisterns were built along the mountain slope in a stepped arrangement; that is, they were constructed successively at different elevations, descending from higher to lower levels in a terraced configuration. To ensure more effective water management, the inhabitants also constructed two dams in the western and northwestern sectors of the fortress. These structures functioned both as reservoirs and as defensive barriers, preventing attackers from accessing these parts of the stronghold (Fig. 3). The remains of a deep well commissioned by Rāīs Moẓaffar can also be identified. According to historical sources, this well was constructed at a cost exceeding thirteen thousand gold dinars (Ḥāfeẓ e Abrū, 1985). In the central and eastern sectors of the fortress, the architectural remains are densely concentrated. Based on the surviving evidence and textual references from the Islamic period, these structures may be identified as the residential and public quarters of the fortress, including a mosque, a madrasa, and military barracks. One of the most remarkable engineering features of the site is its sanitation system. In the western and central sectors, it is possible to reconstruct the fortress's sewage network and its associated terracotta pipelines. Kiani has argued that the origins of Gerdkūh may date back to prehistoric times (Kiani, 2000: 184). Daftary (2001) notes that both the date and the circumstances of the construction of Gerdkūh—possibly a pre Islamic site—remain uncertain, and that the earliest known reference to the fortress dates to the early 4th century century in connection with the early Ismaʿili movement in the Jebāl. Based on visits to the site by the authors and the archaeological survey conducted in 2022 mentioned above, and considering the architectural remains and surface sherds, it may be suggested that the origins of the fortress likely date to the Arsacid period, with further evidence of occupation attested from the early Islamic centuries.

Gerdkūh remained inhabited between the fifth and seventh centuries AH during the period of Ismaʿili presence (Table 1), and both historical accounts (Daftary, 1997) and archaeological evidence indicate that it played a central role throughout this era. The fortress is explicitly mentioned in several Islamic texts, where it is also referred to as Dež-e Gonbadān (Mostawfī, 1983: 201; Hamadānī, 1959: 117; Ferdowsī, 1884). In 613 AH, Ḥamawī visited the fortress and noted that it could easily be distinguished from the surrounding mountains (Ḥamawī, 2001: 539). During the reign of the Saljuq ruler Malekšāh, Gerdkūh was administered by an individual named Ḵordak. Following Malekšāh's death, control of the fortress passed to Amīrdād and Rāīs Moẓaffar, and from 493 AH onward it came under Ismaʿili administration (Sotoudeh, 1983: 157–159). Reports in Islamic historical sources attest to the fortress's great importance for the Ismaʿilis, to the extent that it may be regarded as the principal center of Ismaʿili fortresses in Qūmis (Mostawfī, 1983). According to one account, the wife and children of Ḥasan Ṣabbāḥ resided in this fortress (Mostawfī, 1983).

Gerdkūh was the last Nezārī stronghold in Iran to surrender to the Mongols. The fortress was besieged for seventeen consecutive years, beginning in Rabīʿ I 651 AH (May 1253). The garrison of Gerdkūh finally surrendered due to a lack of clothing in Rabīʿ II 669 AH (December 1270), some thirteen years after the fall of Alamūt (Daftary, 2001). The Mongols did not demolish Gerdkūh, and some historical reports from later periods indicate continued habitation at the site (Daftary, 2001). Surface sherds from Gerdkūh also provide evidence of later occupation. It appears that Gerdkūh was completely abandoned by the early Safavid period (Daftary, 2001).

Fig. 3: Gerdkūh: Left- View of Gerdkūh from the southwest (Saber, 2023: 50); Right- Dam on the northern slope (Authors, 2024).

Mehrnegār (Fortress and Outpost)

The stronghold of Mehrnegār was constructed in two sections on two adjacent peaks that complemented one another. The Fortress of Mehrnegār occupies the summit of Jeshnegān to the east and served as the residential sector, while the Mehrnegār Outpost is located on the summit of Mehrnegār Peak to the west, immediately adjacent to the Čašma-ye ʿAlī road (Fig. 2). Mehrnegār is situated 19 km northwest of the city of Dāmghān, at elevations of 1,667 m above sea level for the fortress and 1,507 m for the outpost.

In both sections of the site, construction and restoration materials commonly used by the Ismaʿilis are evident, including stone, gypsum mortar, brick, and sarooj. The eastern residential sector of Mehrnegār covers an area of approximately 1,820 m² and, based on its structural layout, has a rectangular plan oriented east–west (Fig. 4). The fortress features a central corridor running along its longitudinal axis, allowing rapid and efficient access to all parts of the complex and creating an organized spatial arrangement. The site also includes several cisterns, storage areas, and residential structures. The most notable feature of the eastern sector of Mehrnegār is the relative absence of defensive structures. This characteristic may support the interpretation that the complex primarily served residential and storage functions, while defensive responsibilities were likely assigned to the Mehrnegār Outpost to the west.

The Mehrnegār Outpost (Fig. 4) covers an area of approximately 1,000 m² and contains numerous towers and defensive walls. In the eastern section of the outpost, a tower rising to a height of four meters remains visible, while room-like structures covering approximately 60 m² can be observed in the northwestern part. The remains of

a small cistern are also located on the western slope of the fortress. In addition to this cistern, three others were constructed in the central part of the outpost adjacent to the northern defensive wall, and two more were built below the western defensive wall. The layout of the outpost suggests that its entrance was probably located on the eastern side.

Based on architectural and archaeological evidence, Mehrnegār appears to have been occupied from the Arsacid period through the Middle Islamic period (Table 1). Moreover, the architectural evidence clearly indicates that the two sections formed a single integrated complex (Saber & Khosheghbal, 2023). Thus, the eastern sector (Mehrnegār Fortress) contained cisterns and residential structures, whereas the western sector (Mehrnegār Outpost) was equipped with towers and substantial military fortifications.

Mehrnegār was probably captured and restored by the Ismaʿilis during the Middle Islamic period, following the conquest of Gerdkūh, sometime between 494 and 501 AH. The fortress derived its importance from its control over Čašma-ye ʿAlī, the largest water source in the region; the fertile Āhvānū Valley; the trade route of the Khorasan Road; and its communication with other major fortresses in the region. As a result, the Ismaʿilis were frequently engaged in conflicts with regional powers in order to maintain control of the site (Ebn al Aṯīr, 1992: 17; Qazvīnī Rāzī, 1979; Sotoudeh et al., 1988: 47; Saber & Khosheghbal, 2023: 126). Historical sources from after the sixth century AH also refer to this fortress by the name Mehrīn (Ebn Esfandīār, 1987: 35–95; Qazvīnī Rāzī, 1979: 345). Islamic textual sources indicate that in 651 AH, Kītbūqā, the Mongol military commander, captured Mehrnegār after a siege lasting five months, thereby bringing Ismaʿili rule at the fortress to an end (Hamadānī, 2014: 871). Archaeological investigations conducted at the base of Mount Jeshnegān, upon whose summit Mehrnegār Fortress is situated, have yielded evidence of military conflict, including arrowheads (Saber & Khosheghbal, 2023: 127). The last known historical reference to the fortress appears in the travel account of Clavijo from the Timurid period. He mentions the fortresses surrounding Čašma-ye ʿAlī and describes them as ruined and no longer usable (Clavijo, 1987: 181).

Fig. 4: Mehrnegār Fortress and Outpost: Left- Aerial image of the Mehrnegār Fortress; Right- Aerial image of the Mehrnegār Outpost (Saber & Khosheghbal, 2023: 132).

Qalʿa-ye Doḵtar

Qalʿa-ye Doḵtar near Bīdestān covers an area of approximately 3,000 m² and is situated at an elevation of 1,643 m above sea level. According to current administrative divisions, the fortress lies within the boundaries of Shāhroud County, near the present

day political border between Dāmḡān and Shāhroud (Fig. 2), in the upland area above the villages of Satveh and Bīdeštān. However, given its proximity to Dāmḡān and its location along the Dāmḡān–Jandaq road, it should be considered within the cultural landscape of Dāmḡān as part of the Ismaʿili fortification network. This fortress was first introduced by Sven Hedin under the name Qalʿa-ye Doḵtar, and later reports were provided by Rajabi, Saeidi, and Saber (Hedin, 2015; Rajabi, 2004; Saeidi, 2013; Saber, 2021). The importance of Qalʿa-ye Doḵtar for the Ismaʿilis lay in its control over the mineral resources of the surrounding mountains, including several copper mines and Kūh Zar (Gold Mountain), a gold mine located northwest of the fortress and one of the largest ancient gold mines in Iran. Evidence of copper smelting furnaces has also been recovered from the site (Stroeva, 1992: 167). Moreover, as noted above, the fortress controlled the communication route from Dāmḡān to the south. Saber argues that this fortress is probably identical with the Vanda mentioned in Islamic textual sources (Saber, 2021: 5–6; Eṣṭaḵrī, 1968; Ebn Ḥawqal, 1938; Maqdesī, 1982). The remains of the fortress include five towers, substantial defensive walls, several cisterns, and internal architectural structures extending from the northwest to the southeast of the mountain summit (Fig. 5). Access to the fortress is possible from the south and southeast. The available evidence indicates that the fortress was constructed using brick, stone, gypsum, timber, and sarooj mortar. Although the architectural layout of the site remains discernible, extensive destruction—including the earthquake of 1952 CE—precludes a complete reconstruction of its original form. Architectural remains indicate that the southern wall of the fortress was approximately three meters wide and forty meters long and was flanked by circular towers. These towers were constructed on multiple levels using wooden frameworks in combination with stone. The internal structures of the fortress include a rectangular architectural space measuring approximately 5×4 m, as well as a central corridor extending forty meters from north to south. Additional architectural remains and rooms are arranged around this corridor, although their precise function cannot be determined on the basis of the surviving evidence. In the eastern part of the fortress, there was probably a defensive wall; however, because of extensive destruction, its original form cannot be reconstructed. As in other Ismaʿili fortresses, spaces for water and food storage were incorporated into the architecture of the site. In this regard, two storage areas can be identified in the northern half of the fortress, constructed of stone, gypsum, brick, and sarooj mortar. Architectural evidence and surface archaeological data confirm occupation during the early and Middle Islamic centuries (Table 1).

Mansūrkūh

Mansūrkūh Fortress covers an area of approximately 5 hectares and is located northwest of the city of Dāmḡān, adjacent to the present-day village of Mansūrkūh, at an elevation of 1,768 m above sea level (Fig. 2). In contrast to the other Ismaʿili fortresses of Dāmḡān,

Fig. 5: Qalʿa-ye Doḵtar: Left- Architectural structure of Qalʿa-ye Doḵtar; Right- The communication corridor between the southern towers (Saber, 2021: 11).

Mansūrkūh has suffered less destruction, and its architectural remains have survived in relatively good condition.

The remains of the fortress include several layers of defensive walls, four towers, and a number of other substantial structures. Evidence indicates that, like Gerdkūh, the fortress was constructed on multiple levels (Fig. 6), and some of its buildings were multi-storied. As in other Ismaʿili fortresses of the region, the primary construction materials consisted of stone, gypsum mortar, and sarooj, although brick was also employed in certain sections. All of the towers were constructed on the mountain slope and integrated into the defensive wall circuit. Narrow arrow slits have been well preserved in some of them, clearly indicating their defensive function. The tower located in the northern part of the fortress, however, differs from the others in that it was built on the mountain ridge itself (Fig. 6). Given its elevation and relative inaccessibility compared with the rest of the fortress, it is difficult to attribute a defensive purpose to this structure. This tower has a circular plan, and its walls have survived to a height of approximately seventeen meters. The interior space is divided into separate compartments by internal walls. Near the upper section of the outer wall, a series of upward-inclined openings has been incorporated. This type of aperture is unique among the Ismaʿili fortresses of the region and is likely the reason why the structure has become known as the "Observatory".

A noteworthy aspect of Mansūrkūh is that, in addition to the visible architectural remains on the surface, a substantial portion of the fortress's architectural features and communication routes remains buried. On the mountainside, the roof of one of these underground corridors has partially collapsed. This passage is approximately ten meters long and is intersected by another corridor that leads to a chamber containing a water well. This well, located beneath the mountain, was constructed above the course of a spring. The spring's outlet is situated approximately five hundred meters from the fortress and would have been easily accessible—and thus vulnerable—to enemy forces during a siege. The internal well, however, ensured a reliable and secure water supply for the inhabitants of the fortress. Unlike other Ismaʿili fortresses of the region, Mansūrkūh contains relatively few storage facilities and water cisterns, suggesting that the well served as the primary water source.

Surface sherds indicate that Mansūrkūh Fortress was occupied from the Arsacid period through the Middle Islamic period (Table 1). The fortress was constructed near Mehrnegār, and direct references in Islamic textual sources confirm that it remained under Ismaʿili control (Ebn Esfandīār, 1987). The Bāvandīd ruler Shāh Ghāzī Rostam b. ʿAlī succeeded in capturing the fortress for a time; however, according to Islamic sources, this occupation was brief. During the Mongol invasion and the reign of the Ismaʿili ruler ʿAlāʾ al-Dīn Moḥammad, the fortress remained in Ismaʿili possession before eventually falling under Mongol siege (Ebn Esfandīār, 1987: 111–112; Daftary, 1997: 426; Sotoudeh, 1983: 160–161).

Fig. 6: Mansūrkūk Fortress: Left- View of Mansūrkūh Fortress from the southwest; Right- The structure known as the Observatory (Authors, 2024).

Stīvhād Watch tower

The Stīvhād Watchtower is located northwest of the city of Dāmḡān, adjacent to the village of Āhvānū, at an elevation of 1,403 m above sea level (Fig. 2). Locally, the site is also referred to as Āsīābād. Its location provides exceptional command over the Čašma-ye ʿAlī and the Āhvānū Valley. The watchtower also occupied a key position within the communication network between Gerdkūh in the west and the other Ismaʿili fortresses located east of Čašma-ye ʿAlī, as it maintains clear lines of sight to all the fortifications surrounding the spring. This limited function—namely, its role as a communication and observation post—likely explains why, unlike the other Ismaʿili structures in the region, the site occupies only a small area. The surviving remains consist of a stone tower situated on the ridgeline, several small mudbrick chambers on the lower slope, and a wall located farther downslope at a considerable distance (Fig. 7).

The stone tower, which represents the best preserved element of Stīvhād, was constructed using materials similar to those employed in the other fortresses examined in this study. However, the wall on the western part of the mountain and the small mudbrick chambers were probably built at a different time. These structures do not correspond to the other known Ismaʿili architectural remains of the region and show no visible structural connection with the tower. For this reason, the authors argue that the term “fortress” should be avoided for this site and that, given its strategic function, it is more appropriately classified as a watchtower. The watchtower was probably constructed by the Ismaʿilis between 494 and 501 AH and, like the other fortifications

in the Čašma-ye ʿAlī region mentioned by Clavijo (1987), was probably destroyed in the eighth century AH by order of Tīmūr (pp. 180–181).

Fig. 7: Stīvhād Watchtower: Left- Architectural structure of Stīvhād; Right- View of the Stīvhād Watchtower from the south (Saber, 2023: 53).

Shīr Outpost

The Shīr Outpost, also known as Labrūd, is located northwest of the city of Dāmḡān at the base of the Shahīd Shāhcherāghī Dam (Fig. 8), at an elevation of 1,388 m above sea level (Fig. 2). The outpost is larger than the Stīvhād Watchtower but smaller than the Mehrnegār Outpost. Based on the architectural evidence and the scale of its structures, the site was likely not capable of accommodating a large permanent garrison. Furthermore, given its commanding view over the city of Dāmḡān, it most likely functioned primarily as a communication and observation post. The surviving remains indicate that the Shīr Outpost was a small Ismaʿili military observation and communication post northwest of Dāmḡān. Although much of its architecture has been destroyed, the remaining structures suggest that the site originally included several towers, defensive walls, and small storage spaces constructed of stone, gypsum mortar, and sarooj, consistent with other Ismaʿili sites in the region. Archaeological evidence, including pottery sherds and architectural remains, indicates that the outpost was occupied during the early and Middle Islamic periods. The pottery sherds and architectural remains recovered from the Shīr Outpost further indicate that the site was occupied during the early and Middle Islamic centuries (Table 1). Kiani (2000) dates the Shīr Outpost to the sixth century AH (p. 184).

Fig. 8: Shīr Outpost: Left- View of the Shīr Outpost and the Shahīd Shāhcherāghī Dam; Right- Shīr Outpost, viewed from the west (Authors, 2024).

Geographic and Environmental Variables

Dāmḡān is one of the counties of Semnān Province and comprises two districts and six rural districts (Iran Statistical Yearbook, 2021). The geographic and environmental variables associated with the Ismaʿili fortresses of Dāmḡān are discussed below.

Slope, Faults, and Topographic Relations

From a topographic perspective, Dāmḡān County can be divided into three elevational zones. The northern and northwestern parts consist of highland areas aligned along the east–west axis of the Alborz Mountain Range. Moving from north to south and from west to east, the landscape gradually transitions into foothill zones and ultimately into desert regions (Mahmoudi, 1999: 100–110). Mount Sartangeh, with an elevation of 3,813 m above sea level, constitutes the highest point in the county (Iran Statistical Yearbook, 2021). The Ismaʿili fortresses of Dāmḡān County are situated within an elevational range of approximately 1,400–2,000 m above sea level. The elevations of the individual sites are as follows: 1) Gerdkūh Fortress, 1,594 m; 2) Mehrnegār Fortress, 1,667 m; 3) Mehrnegār Outpost, 1,507 m; 4) Qalʿa-ye Doḵtar, 1,643 m; 5) Mansūrkūh Fortress, 1,768 m; 6) Stīvhād Watchtower, 1,403 m; and 7) Shīr Outpost, 1,388 m above sea level (Figs. 2 and 9).

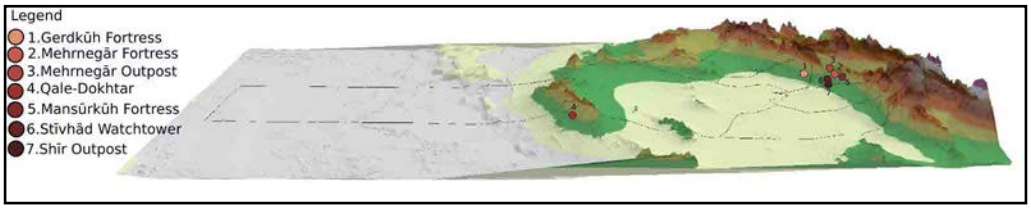


Fig. 9: Three-dimensional elevation, east–west orientation (Authors, 2024).

The slope of Dāmḡān County is strongly influenced by the region's topography and generally decreases from north to south. In the highland areas, slopes reach up to 55 degrees, whereas in the Dāmḡān Plain and the Zardāyneh–Dāmḡān desert basin, slopes of approximately 1–5 degrees are observed (Fig. 10). Slope aspect further indicates that the fortresses are predominantly aligned along an east–west axis (Fig. 10). Dāmḡān contains numerous active and inactive faults, which generally trend north–south. However, the largest fault in the region enters from the east and is known as the Tarzeh Fault. Other active faults in the area include the Attāri Fault, the Dāmḡān Fault, and the Āstāneh Fault (Fig. 10). In 242 AH, following the activation of the Qūmis Fault, the city was destroyed. Islamic sources report that repeated earthquakes occurred in Qūmis in the same year, resulting in the deaths of more than 45,000 people beneath the rubble of collapsed houses (Ebn al Aṯīr, 1992: 247; Ḵᵛāndamir, 2001: 521; Yaʿqūbī, 1977: 521; Masʿūdī, 2002: 48–49). The variables of topography, slope, and faults are conceptually interconnected in relation to the distribution of the Ismaʿili fortresses in Dāmḡān. Elevational and point based spatial data indicate that these fortresses exercised extensive visual control over the surrounding plains and landscapes (Figs. 2 and 9). This visual dominance enabled the monitoring of communication routes, subsistence resources, and mining activities, as well as the establishment of defensive and offensive systems by the fortress inhabitants.

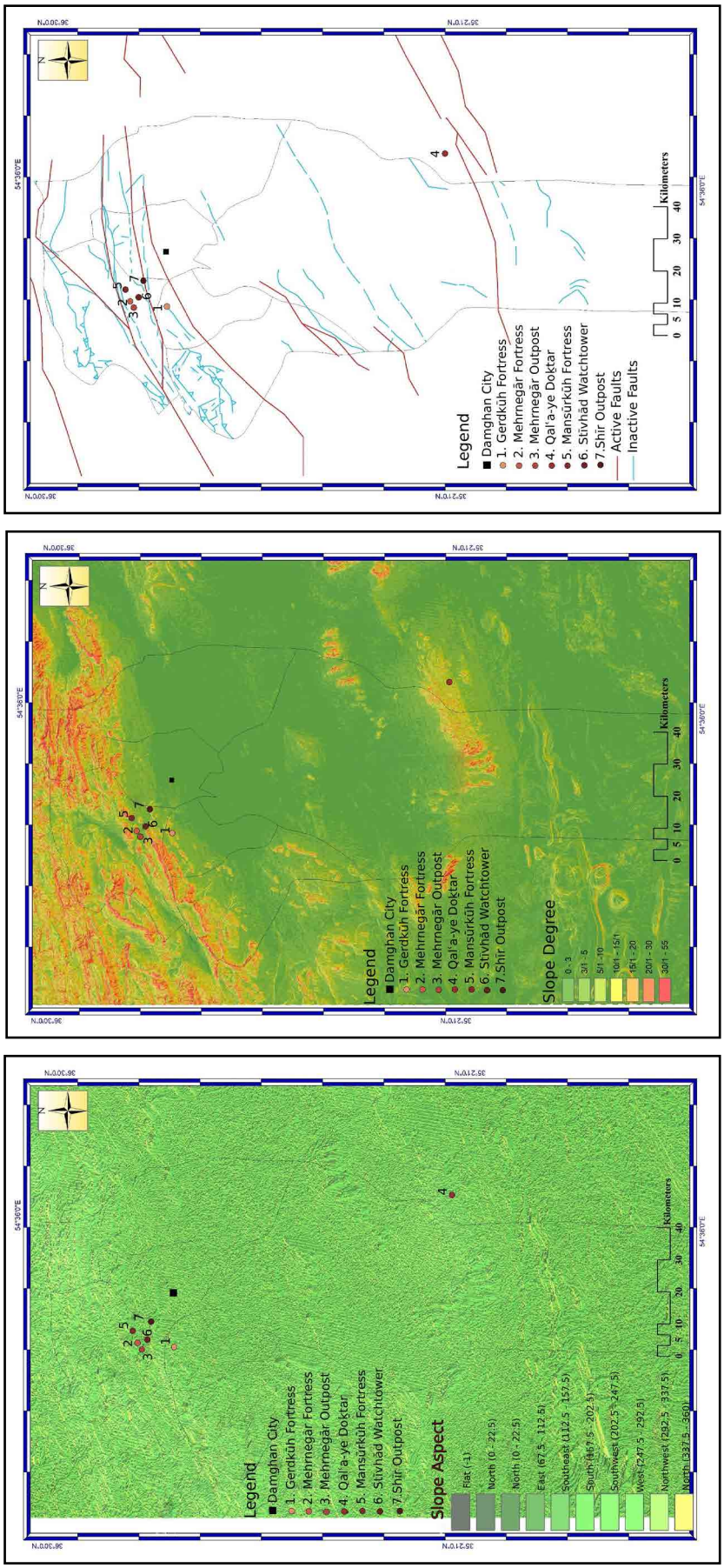


Fig. 10: Map of slope and faults of the study area: Left- Slope aspect; Center- Slope gradient; Right- faults (Authors, 2024).

Slope gradients further indicate that the Ismaʿili fortresses in the region are generally located on inclines of 20–30 degrees. Such steep slopes made access to the fortresses difficult while facilitating their defense and protection; consequently, the inhabitants likely faced lower defensive costs in safeguarding the sites against external attack. Moreover, these steep gradients facilitated the construction of water retention dams for water storage and for reducing flood damage in the downstream foothill areas. These dams may also have served defensive purposes by obstructing access routes to the fortresses. An example of such a water retention structure has been documented at Gerdkūh Fortress (Fig. 3).

Slope aspect also indicates that the fortresses were primarily constructed along an east–west axis. This geographical orientation suggests that the inhabitants optimized solar exposure, thereby maximizing the use of daylight and reducing heating requirements during the winter months.

The spatial distribution of the fortresses in relation to fault lines shows that they are located near both inactive faults and active fault zones. It appears that the fortress inhabitants attempted to reinforce defensive walls against potential seismic activity by constructing supporting buttress walls. Examples of such supporting walls have been documented at the fortresses of Gerdkūh, Mehrnegār, and Mansūrkūh. However, it is also possible that these buttress walls were constructed primarily for military purposes and to strengthen the defensive structures.

Climate and Water Resources

The most important surface water resource of the county is Čašma-ye ʿAlī. This relatively large freshwater spring is located at the base of a hill approximately 24 km north of Dāmḡān (Alizadeh, 1990). Flowing southward through the Āhvānū Valley and past the Ismaʿili fortresses, it follows a gentle gradient before reaching the Shahīd Shāhcherāghī Dam (Figs. 8 and 11). Čašma-ye ʿAlī irrigates the Dāmḡān Plain watershed, which covers an area of approximately 1,300 km² (Iran Statistical Yearbook, 2021). Although the principal source of Čašma-ye ʿAlī lies in the northern and northwestern highlands of the county, seasonal waters are also present in the northern half of the county, particularly in the mountainous areas surrounding the Ismaʿili fortresses (Fig. 11). Groundwater resources in the county can be divided into three categories: wells, qanāts, and springs. Water from this and several similar springs, supplemented by numerous qanāts, supplies the domestic and irrigation needs of Dāmḡān and the surrounding villages (Alizadeh, 1990).

The geographic variables of climate and water resources show a significant relationship with the distribution of the Ismaʿili fortresses of Dāmḡān. From a climatic perspective, most of the county is characterized by arid and hyper arid conditions, particularly in the southern and central regions. Within these two climatic zones, however, only one fortress is present: Qalʿa-ye Doḵtar (Fig. 11), which was strategically established to

maintain proximity to the mining districts of southern Dāmḡān and to control the route connecting Dāmḡān with the southern regions. In contrast, the northern part of the county contains semi arid, Mediterranean, and humid climatic zones, and the majority of the Ismaʿili fortresses are concentrated within the semi arid zone (Fig. 11). Based on the county's climatic map, it may therefore be argued that the Ismaʿili fortresses of Dāmḡān were well positioned to withstand climatic hazards, including severe winter frosts and summer water shortages.

Based on the county's topographic map, both permanent and seasonal rivers can be identified. Čašma-ye ʿAlī constitutes the only permanent river in the county, whereas seasonal streams originate in the highlands and form during the winter months as a result of rainfall and flooding. The distribution of the fortresses indicates that the Ismaʿili strongholds were situated in close proximity to Čašma-ye ʿAlī. Gerdkūh Fortress lies less than 10 km from Čašma-ye ʿAlī, Mansūrkūh Fortress less than 5 km away, and the remaining Ismaʿili fortresses within 2 km of the permanent watercourse (Fig. 11). In contrast, the inhabitants of Qalʿa-ye Doḵtar likely relied on seasonal streams, wells, and springs to secure their water supply.

Although Čašma-ye ʿAlī constituted the principal water source in the region, an irrigation network existed during the Ismaʿili period that can be reconstructed through textual sources, archaeological evidence, and geographic data. This irrigation system consisted of artificial canals, dams, and qanāt networks. It had originally been constructed by the central government, although its use required the payment of taxes (Eṣṭaḵrī, 1968: 124; Ḥodud al ʿĀlam, 1362: 385; al Maqdesī, 1982: 520; Qazvīnī, 1979: 121; Ḥamawī, 2001: 358; Mostawfī, 1983: 200; Le Strange, 1958: 389).

One of the principal challenges faced by the inhabitants of the Ismaʿili fortresses was securing adequate water supplies during the warm season and during periods of warfare and siege. Consequently, water storage played a crucial role in the maintenance and survival of the fortresses. In general, the Ismaʿilis employed several methods of water procurement, including large cisterns, wells, dams, the use of seasonal springs in the mountains, proximity to rivers, water channels designed to collect rainwater, and the conveyance of water uphill from the ground to the mountaintop through terracotta pipes.

Cisterns were of great importance in the architecture of Ismaʿili strongholds, and this architectural feature is present in all major Ismaʿili fortresses. The cisterns were lined with sarooj mortar to facilitate the storage of water and other liquids while preventing leakage and loss. The construction of wells to secure water supplies within Ismaʿili fortresses is also documented in historical sources (Ḥāfeẓ-e Abrū, 1985: 209). A notable example is Gerdkūh, where, according to historical reports, a considerable budget was allocated for the construction of a well. Although springs and rivers constituted important water resources, hydrological conditions prevented the inhabitants from relying exclusively on them. Consequently, these natural resources were supplemented by cisterns and other water management facilities.

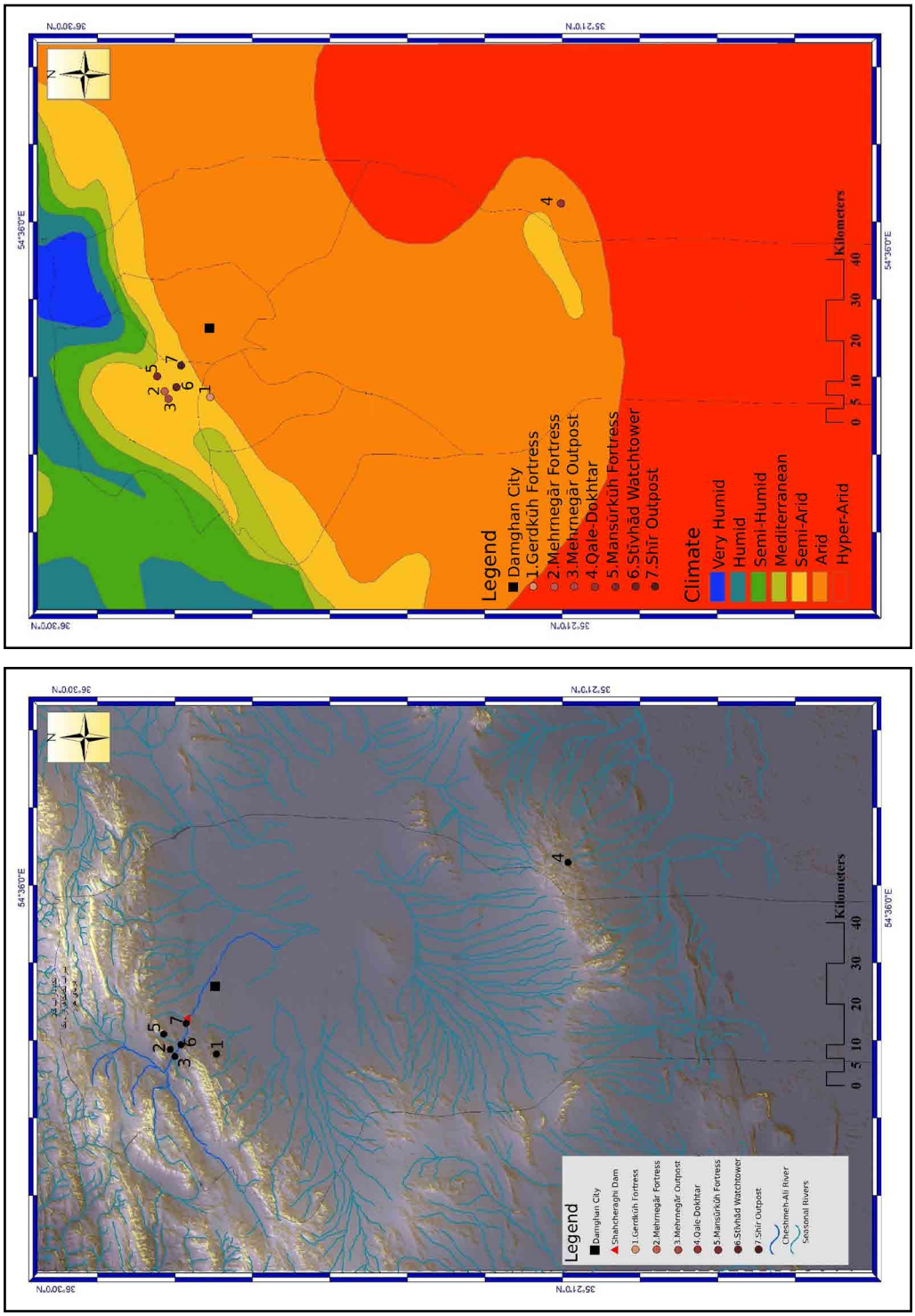


Fig. 11: Map of the climate and water resources of the study area: Top- Climate zones; Bottom- Seasonal water resources and tributaries and course of the Čašma-ye ʿAlī (Authors, 2024).

Soils and Vegetation Cover

The soils of Dāmḡān County are strongly influenced by the region's elevational structure. As one moves from the highlands toward the lowlands, coarse grained soils gradually give way to fine grained soils. This shift in soil texture has a substantial impact on soil quality. Consequently, most of the county is dominated by sierozem soils, which

are poor in organic matter. Although agriculturally suitable soils occur in parts of the northern and central regions (Fig. 12), the Kavīr Chāh-e Jam area and regions farther south are characterized by saline soils and extensive salt flats (Soleimani Nejad, 2017).

The interaction of elevation, soil, and water resources has produced a distinctive vegetation cover across the county. In the mountainous areas and along the southern and southeastern slopes of the Alborz Mountains, relatively dense vegetation is present, including trees (Juniperus and Pistacia), shrubs, and scattered grasslands. In the intermediate zone between the highlands and the desert, vegetation is dominated by wormwood species (Artemisia sieberi), whereas the southern part of the county, owing to its unfavorable climatic conditions, is characterized by halophytic vegetation (Fig. 12).

An examination of regional soils in relation to the distribution of the fortresses reveals that the Ismaʿili fortifications were situated within desert soil zones. Although such soils were not particularly suitable for agriculture, the vegetation cover of northern Dāmḡān indicates that the Ismaʿili fortresses were located adjacent to agricultural lands and overlooked plains suitable for dry farming production. This advantage enabled the fortresses to meet their subsistence needs during periods of political and economic crisis by drawing upon the agricultural resources of the surrounding plains.

Mineral Resources

Dāmḡān's known mineral resources are concentrated primarily in the southern part of the county. An archaeological survey conducted by Kourosh Roustaei identified 270 mines in the region, including copper, lead, iron, gold, and turquoise deposits. The available data indicate that these mines were exploited during various historical periods—including the Bronze Age, the Iron Age, and the Islamic period—by the inhabitants of the Shāhroud and Dāmḡān regions (Roustaei, 2012).

Historical sources likewise refer to the county's mines and particularly emphasize the importance of the region's gold deposits, which were actively exploited (Ḥamawī, 2001, vol. 2: 358; Abū Dolaf, 1975: 82; Mostawfī, 1983: 201; Stroeva, 1992: 167). Among the fortresses examined in this study, Qalʿa-ye Doḵtar is situated near the rich mineral resources of Dāmḡān County, and the survey of the site revealed the presence of slag on the surface. In addition to controlling the southern communication route linking Dāmḡān to Isfahān through Jandaq, this fortress appears to have played an important role in the Ismaʿilis' control over the region's mineral resources. This may explain the considerable distance between Qalʿa-ye Doḵtar and the other Ismaʿili fortresses of the region (Fig. 2).

Road Network

The most important route in the region was the Great Khorasan Road, or Silk Road, which extended for more than 13,000 km and was systematically used from the middle Arsacid period onward. Originating in eastern China, it passed through Iran and

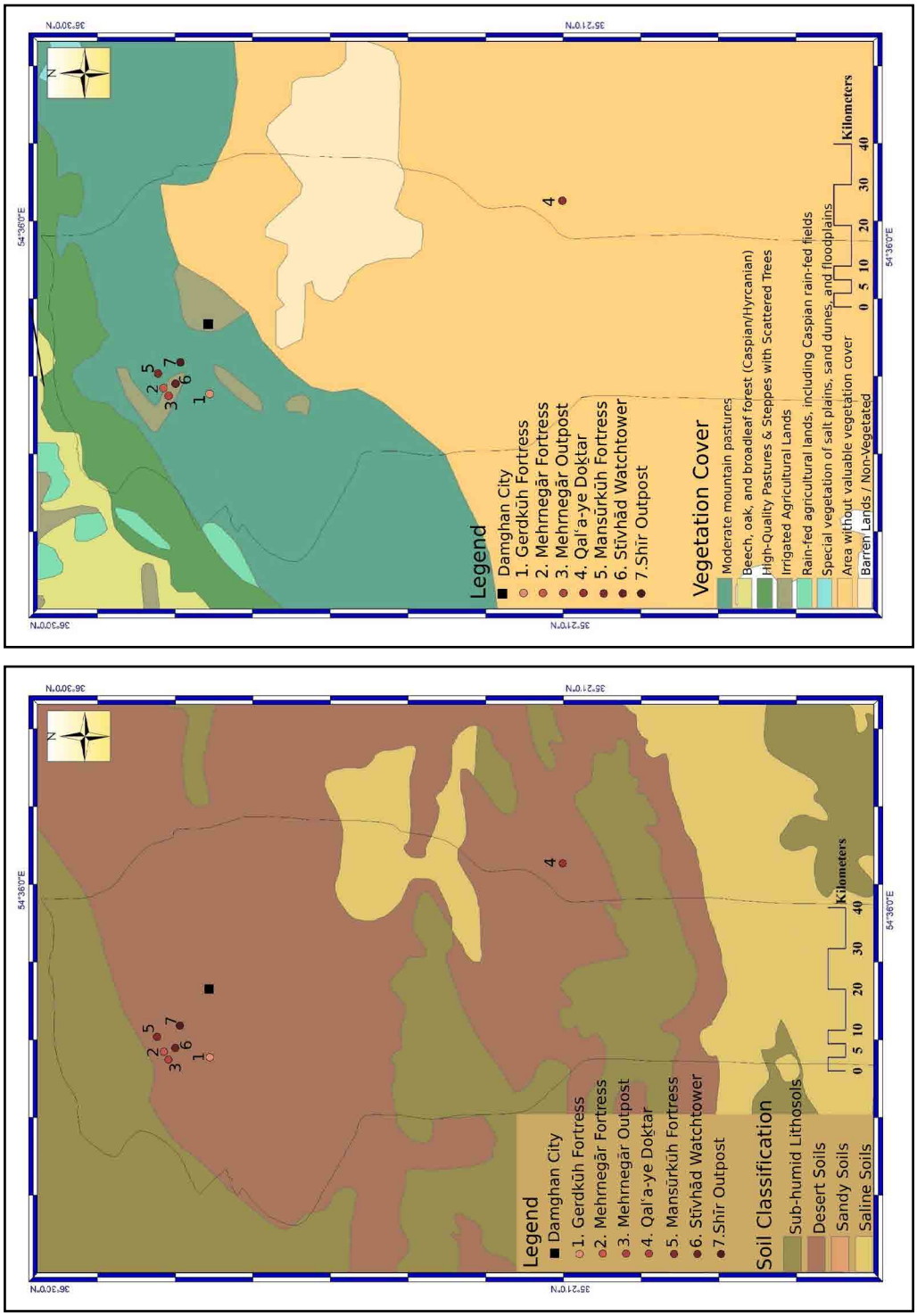


Fig. 12: Map of vegetation cover and soil types of the study area: Top- Vegetation cover; Bottom- Soil types (Authors, 2024).

ultimately connected with the Roman world (Franck & Brownstone, 1997: 12; Montazer Zohouri & Sharahi, 2020: 237; Zekrgoo, 1999; Dahpahlavan & Niknami, 2013: 231; Sharifi, 2019: 146; Hiebert & Dyson, 2002: 116). Numerous subsidiary routes branched off from this main road and were used during different historical periods (Gharchanlou & Hatami, 2012: 80).

Historical texts and archaeological evidence indicate that this route was used by both merchants and governments and that its security was maintained by regional and supra regional powers. This security was ensured through an extensive network of fortresses, defensive installations, and caravanserais designed to protect merchants and travelers, safeguard political frontiers, and sustain and stimulate local, regional, and interregional economies (Dahpahlavan & Niknami, 2013: 238; Dahpahlavan, 2006: 266; Khosheghbal et al., 2022). Al Yaʿqūbī (1977), in describing the route through Dāmḡān, states that there were twelve stages along the main road between Ray and Qūmis, some of which passed through desert regions (p. 52).

With the exception of Qalʿa-ye Doḵtar, the fortresses of the Dāmḡān region were constructed adjacent to the Khorasan Road (Fig. 13). The Ismaʿili fortresses in the northern part of Dāmḡān County are situated in close proximity to this route. In contrast, the southern route extending toward Isfahān and beyond was probably controlled by Qalʿa-ye Doḵtar. It may therefore be argued that the commanders of these fortresses were fully aware of the strategic importance of communication routes and sought to maintain control over them. Such control enabled them to use these routes both as leverage against regional and supra regional powers and as an effective means of strengthening their own economic position. The control and management of road networks and mineral resources were therefore of fundamental importance to the Ismaʿilis, as they constituted the basis of their economic power.

As noted above, mining constituted one of the principal economic resources of the Ismaʿilis. However, historical texts also explicitly describe the politico economic policies of the Ismaʿilis regarding the use of communication routes for textile trade, the collection of tribute and taxes, and raids on commercial and pilgrimage caravans. To better understand the Ismaʿili economy, which was strongly shaped by both roads and mineral resources, it should be noted that the period of Ismaʿili presence in Iran coincided with severe socio economic difficulties. Disease, warfare, and famine were widespread; nevertheless, unlike many of their contemporary rivals, the Ismaʿilis experienced a period of economic prosperity in the middle of the sixth century AH (Avarzamani, 2012: 99; Hamadānī, 1976: 83).

During the initial formation of Ismaʿili power in Iran, the principal objective was to capture fortresses and expand a politico religious territory under the leadership of Ismaʿili authorities. During this period, one of the most important functions of the fortresses was the acquisition of material resources, much of which was derived from commercial caravans (Hamadānī, 1976: 90). Furthermore, once the fortresses had been captured, their surrounding territories contributed to the material needs of the Ismaʿili state, and the combined revenues from these sources enabled the consolidation of the Ismaʿili economy in Iran (Daftary, 1997; Farjami, 2017: 89).

The most sustainable source of Ismaʿili income derived from the principle of economic self sufficiency advocated by Ḥasan Ṣabbāḥ. Islamic sources report that the

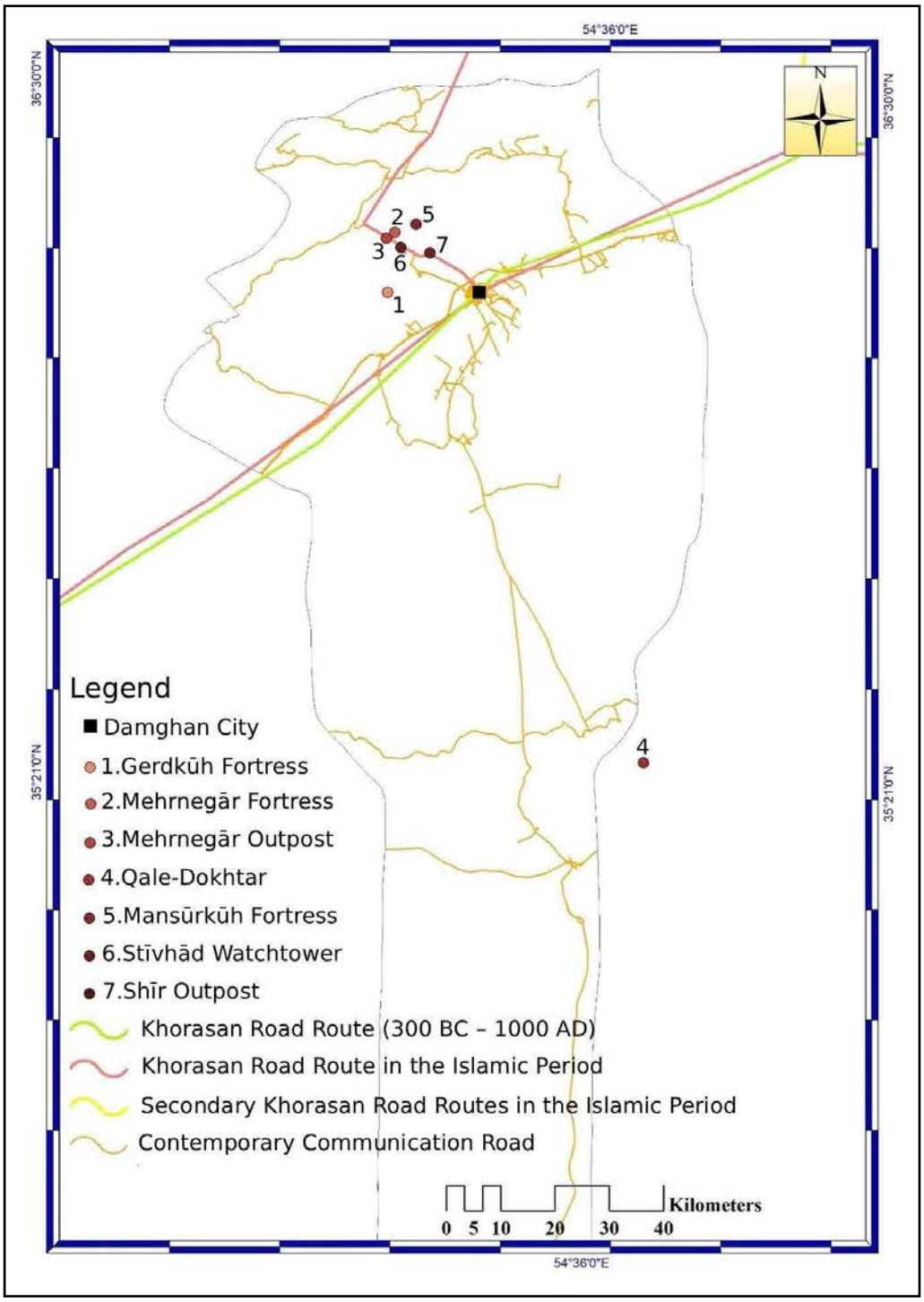


Fig. 13: Road network of the study area (Authors, 2024).

Ismaʿili imam ʿAlāʾ al Dīn Moḥammad worked as a shepherd (Stroeva, 1992: 206; Kāshānī, 1987: 223). Likewise, the wife and children of Ḥasan Ṣabbāḥ were engaged in weaving at Gerdkūh Fortress in order to meet their daily needs. At the same time, trade, craftsmanship, textile production, and weaving flourished along the eastern and northern margins of the desert along the Khorasan Road (al Maqdesī, 1982: 471; Jayhānī, 1989).

War booty constituted another source of income. Owing to the strategic strength of their fortresses, the Ismaʿilis were able to acquire wealth through attacks on commercial caravans, local conflicts, irregular warfare, and surprise raids. Ebn al Aṯīr (1992) reports that in 552 AH a pilgrimage caravan traveling from Khorasan to Mecca was attacked by the Ismaʿilis after passing through Basṭām. He further states that all the travelers were massacred and their property was plundered (pp. 16–17). Qazvīnī Rāzī (1979) also mentions this event but places the massacre and plunder in 553 AH, during the pilgrims' return journey from Mecca (p. 344).

The combination of an economy dependent on road networks and control over mineral resources (Hamadānī, 1976; Jovanī, 1976; Stroeva, 1992) enabled the Ismaʿilis to mint their own coinage (Farjami, 2017).

Conclusion

The spatial distribution of the Ismaʿili fortresses in Dāmḡān County was not accidental but reflects a deliberate strategy shaped by both environmental conditions and socio economic considerations. The integration of archaeological evidence, historical sources, satellite imagery, and GIS based spatial analysis demonstrates that these fortifications formed a coherent and highly organized defensive landscape. Their distribution follows a predominantly linear pattern concentrated along the Čašma-ye ʿAlī river corridor and the major communication routes of the region, particularly the Great Khorasan Road (Silk Road), while maintaining access to agricultural lands, water resources, and mineral deposits.

The geographical setting of the fortresses reveals a consistent preference for elevated locations between approximately 1,400 and 1,800 m above sea level, overlooking strategically important routes and fertile plains. Their placement near permanent and seasonal water sources within semi arid environmental zones provided favorable conditions for long term occupation while minimizing vulnerability to climatic hazards. At the same time, steep slopes, natural topographic barriers, and extensive visual command over the surrounding landscape enhanced their defensive capabilities and facilitated communication between neighboring strongholds.

Architecturally, the fortresses share several common characteristics, including the use of rubble stone, gypsum mortar, and sarooj; the construction of cisterns and storage facilities; reinforced defensive walls; and circular towers designed for surveillance and defense. These recurring features indicate the existence of a shared architectural tradition adapted to local environmental conditions. The morphology of the surrounding mountains directly influenced fortress design, producing distinctive spatial solutions such as central circulation corridors at Mehrnegār and Qalʿa-ye Doḵtar and multi tiered architectural complexes at Gerdkūh and Mansūrkūh.

The evidence further demonstrates that the Dāmḡān fortress network served purposes extending well beyond military defense. Control of communication routes, access to

mining districts, supervision of agricultural production, and the management of regional resources formed the economic foundation of Ismaʿili authority in the region. The proximity of several fortresses to major transportation corridors and mineral resources, together with archaeological evidence such as metallurgical remains at Qalʿa-ye Doḵtar, suggests that these sites played a significant role in sustaining the economic autonomy of the Ismaʿili polity. At the same time, their strategic locations enabled the monitoring of movement across the landscape and strengthened the political and military presence of the Ismaʿili state in northern Qūmis.

The spatial organization of the fortresses also reflects the broader ideological and administrative objectives of the Ismaʿili state. Historical sources indicate that major strongholds functioned not only as military centers but also as places of religious instruction, administration, and intellectual activity. Consequently, the fortress network of Dāmḡān should be understood as an integrated system designed to support the interconnected goals of security, economic sustainability, political control, and religious propagation.

The results of this study confirm the central hypothesis that geographical variables—including topography, climate, hydrology, geology, mineral resources, and communication routes—played a decisive role in both the location and architectural development of the Ismaʿili fortresses of Dāmḡān. More broadly, this research demonstrates that the success and longevity of the Ismaʿili presence in the region depended on the effective exploitation of environmental opportunities and the strategic organization of a fortress network capable of controlling both the natural and human landscapes of northern Qūmis. The Dāmḡān fortresses should therefore be understood not as isolated defensive structures but as components of a carefully planned territorial system that underpinned the political, economic, and religious power of the Ismaʿili state in northern Iran.

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Author Contribution

This research is derived from the first author’s doctoral dissertation. The primary data collection, encompassing all observational and analytical components, was conducted by the first author under the direct supervision and mentorship of the second author.

Conflict of Interest

In adherence to ethical publication standards, the authors affirm that there are no

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۳۵

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چکیده

این پژوهش به بررسی رابطهٔ میان متغیرهای جغرافیایی و مکان‌گزینی، معماری و تداوم استقرار در قلاع اسماعیلی شهرستان دامغان در شمال‌شرق ایران می‌پردازد. دامغان در دوران اسلامی، به‌عنوان بخشی مهم از شبکهٔ دفاعی اسماعیلیان در منطقهٔ تاریخی قومس، دربرگیرندهٔ مجموعه‌ای از قلاع و پاسگاه‌های مهم ازجمله: گردکوه، مهرنگار، منصورکوه، قلعه‌دختر، استیوهاد و شیر بوده است. هدف اصلی این پژوهش ارزیابی میزان تأثیر عوامل محیطی و جغرافیایی بر انتخاب محل استقرار این قلاع و تداوم سکونت در آن‌ها است. این پژوهش با بهره‌گیری از رویکرد توصیفی-تحلیلی و با تلفیق داده‌های حاصل از بررسی‌های میدانی باستان‌شناسی، منابع تاریخی و متنی، تصاویر ماهواره‌ای و تحلیل‌های مبتنی‌بر سامانه اطلاعات جغرافیایی (GIS) انجام شده است. در این‌راستا، مجموعه‌ای از متغیرهای محیطی شامل ارتفاع، توپوگرافی، شیب، منابع آب، اقلیم، زمین‌شناسی، منابع معدنی، پوشش گیاهی و مسیرهای ارتباطی مورد بررسی قرار گرفته و با الگوی پراکنش قلاع اسماعیلی مقایسه شده‌اند. نتایج پژوهش نشان می‌دهد که پراکنش این قلاع از الگویی هدفمند و غیرتصادفی پیروی می‌کرده و به‌طور مستقیم با شرایط راهبردی محیطی ارتباط داشته است. بیشتر این محوطه‌ها بر ارتفاعات مشرف به حوضهٔ رودخانهٔ چشمه‌علی، مسیرهای ارتباطی مهم مرتبط با جادهٔ خراسان بزرگ (جادهٔ ابریشم)، دشت‌های مستعد کشاورزی و نواحی دارای منابع معدنی احداث شده‌اند. این قلاع علاوه‌بر برخورداری از ارتباط بصری متقابل، از مزایایی هم‌چون موقعیت‌های دفاعی مناسب، دسترسی پایدار به منابع آب و بهره‌مندی از ظرفیت‌های اقتصادی منطقه نیز برخوردار بوده‌اند. شواهد معماری نیز نشان می‌دهد که ساختار این استحکامات با شرایط محیطی سازگار شده و ازطریق احداث حوض‌انبارها، دیوارهای دفاعی، برج‌های دیده‌بانی و مجموعه‌های معماری چندسطحی به نیازهای زیستی و دفاعی پاسخ‌داده است. این پژوهش نشان می‌دهد که متغیرهای جغرافیایی نقش تعیین‌کننده‌ای در مکان‌گزینی، سازمان فضایی معماری و تداوم حیات قلاع اسماعیلی دامغان داشته‌اند. این استحکامات را می‌توان بخشی از یک شبکهٔ سرزمینی یکپارچه دانست که در راستای تحقق اهداف نظامی، اقتصادی، اداری و مذهبی دولت اسماعیلیهٔ نزاری در شمال ایران شکل‌گرفته و توسعه یافته است.

کلیدواژگان: دامغان، اسماعیلیهٔ نزاری، قلاع اسماعیلی، گردکوه، سامانه اطلاعات جغرافیایی (GIS)، منظر فرهنگی، متغیرهای جغرافیایی.

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Contents

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In The Name of GOD

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