A SUGGESTION FOR THE TOPONYMY OF SEVERAL ELAMITE REGIONS INCLUDING ZABSHALI, TUKRISH AND LU.SU

ZABŞALİ, TUKRİŞ VE LOSO BÖLGELERİNİ IÇEREN ALANDA İLAM DÖNEMİNE AİT TOPONİMİ ÇALIŞMASI İÇİN ÖNERİ

Ali AARAB
MA Student, University of Tehran, Institute of Archaeology, ali.aarab@ut.ac.ir

Mohammad Esmaeil ESMAEILI JELODAR
Dr., University of Tehran, Institute of Archaeology, jelodar@ut.ac.ir

Alireza KHOSROWZADEH
Dr., Shahr-e Kord University, Institute of Archaeology, akhosrowzadeh@yahoo.com

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Abstract

This study focuses on three regions namely Zabshali, Tukrish and LU.SU. So far, there have been no studies conducted extensively on the regions surrounding Elamite. One of the surrounding regions cover the north of present-day provinces Fars and Khuzestan as Elamite centres in the ancient era. The noteworthy point about these regions is their potentially rich metal mines. This has been mentioned in the Mesopotamian inscriptions, mainly explaining the link between the Mesopotamian plain and the highlands of Elam. The present-day provinces, Khuzestan and Fars, have small potentials for metal mines. Hence, they only served as surrounding regions supplying the metals. However, little investigation has been done on the archaeological data from the Elamite Era. It is crucial to carry out a historical study on these regions along with the archaeological data to enlighten the dark spots in the Elamite Era, and ultimately provide a toponymy of the Elamite cities. One instance of such archaeological data involves various types of local pottery in Khuzestan (as a central city of Elam), which was compared through petrography against the samples recovered in Isfahan and Chaharmahal and Bakhtiari (as two surrounding regions). Thus, this paper intends to discuss more confidently the era in which this type of pottery was built and its origin in order to provide a toponymy of the previously mentioned cities based on historical and archaeological data.

Öz

Bugüne kadar İlam merkezlerinin çevre bölgeleri üzerinde geniş çaplı bir araştırma çalışması yapılmamıştır. İlam merkezi olarak sayılan bu çevre bölgelerden biri, bugünkü Huzestan ve Fars illerinin kuzey bölgeleridir. Bu bölgelerle ilgili önemli bir özellik; metal madenlerinin bu alanlarda bulunmasının yüksek potansiyele sahip olması ve bu konuyla ilgili Miyan Rudan kitabelerinde de değinilmesidir. Ayrıca, İlam'ın dağlık alanları ile Miyan Rudan Ovası'nın ilişkisinin en önemli nedenlerinden biri de bu dağlık alanlarda bulunan metal madenleridir. Günümüzde Huzestan ve Fars illerinde metal madenlerinin yüksek potansiyeli bulunmamaktadır. Bu nedenle çevre bölgeler, bu metali temin etme rolünü üstlenen bölgeler olmuşlardır. Ancak bu bölgelerde İlam dönemine ait arkeolojik verilere çok fazla dikkat edilmemiştir ve İlam dönemindeki bu karanlık noktaları aydınlatmak ve bu bölgelerdeki İlam kentlerinin toponimi çalışmasını gerçekleştirebilmek amacıyla arkeolojik verilerinin yanında bu bölgelerde tarihsel incelemenin yapılması gerekir. Bu arkeolojik verilerden biri de bir çeşit yerel çömlektir. Bu çömlek üzerinde yapılan petrografi inceleme ile bu çömleğin Huzestan ili (Bir İlam merkezi olarak) ile İsfahan ve Çaharmahal Bahtiyari illerinin (çevre bölgeler olarak) karşılaştırma yapılmaya çalışılmıştır. Böylece tarihsel ve arkeolojik verilerin yanında belirtilen kentlerin toponimisi amacıyla bu çömlek türünün dönemi ve menşei hakkında daha kesin bir söz söylememizi mümkün olacaktır.

Introduction

The surrounding regions of Elamite centers (Susa and Anshan) have so far been rarely explored. One of such surrounding regions stretched across the norther of Elamite centers, covering certain areas of present-day provinces Isfahan and Chaharmahal and Bakhtiari. In addition, there are pottery samples from the Elamite Era found in Khuzestan (as one of the central districts of Elamite), even though they have rarely been explored in studies on the Elamite Era. This can be partly associated with the limited number of such pottery samples against their counterparts from the Elamite Era in Khuzestan.

Nonetheless, the noteworthy point about this pottery type is the great similarity (discussed later) in Khuzestan to those recovered in Isfahan and Chaharmahal and Bakhtiari. Therefore, this study attempted to explore these regions from the Elamite Era through an interdisciplinary approach involving archeology, archeometry and history of northern Susa and Anshan. Despite the importance of the regions surrounding Elamite centers (Susa and Anshan) based on the Mesopotamian inscriptions, insufficient effort has so far been made to investigate the Elamite Era in Isfahan and Chaharmahal and Bakhtiari as two surrounding regions. Nevertheless, the pottery type studied in this paper has been frequently found in Isfahan and Chaharmahal and Bakhtiari. In this study, great effort was made to review the geographical locations of the two provinces in Elamite Era according to written sources and archaeological evidence. Moreover, the pottery artifacts were petrographically examined to find out whether or not the samples recovered in Haft Tapeh, as a key central spot in Khuzestan during the Elamite Era, are congruent with the clay artifacts found in Isfahan and Chaharmahal and Bakhtiari from the perspective of appearance and textural characteristics. In fact, the discussion revolves around the possible involvement and predominance of the Elamite in Isfahan and Chaharmahal and Bakhtiari, while providing a toponymy of ancient Elamite regions in those provinces today.

Overview of the specific type of pottery and regions under study

The previous studies on the Elamite pottery generally focused on the form and shape of the artifacts (Carter "Elamite Pottery, Ca. 2000-1000 Bc") (Carter "Ceramics: Viii, the Early Bronze Age in Southwestern and Southern Persia") From the perspective of fabric, very few studies have explored the Elamite pottery. The pottery type studied in this paper is orange (ranging from light brown to red) composed of a tempering material, sand and white particles. The core of this non-ornamented, wheel-built pottery is black (Figure 1). In an investigation to outline the scope and boundaries of Haft Tapeh ancient city, a number of the Elamite pottery samples were recovered in certain layers dating back to the late ancient Elam (Sukalmah) and the Middle Elamite near the adobe structures of Haft Tapeh. Haft Tapeh refers to a structure belonging to the Elamite Era located in Khuzestan and south of Susa. One major finding in this city is a tomb from the Middle Elamite Era (Mofidi-Nasrabadi 161). Since 1965, this building has been investigated by Negahban and later by Mofidi-Nasr abadi. Thus, Haft Tapeh can undoubtedly be considered a city belonging to the Elamite Era. In this light, the pottery type in this

geographical scope can be particularly useful for comparison of similar artifacts found in Isfahan and Chaharmahal and Bakhtiari, both of which could be associated with the Elamite Era. This study focused on Asgaran and Saba as two regions in Isfahan and central part of Ardal in Chaharmahal and Bakhtiari. A total of 8 pottery samples were randomly selected from these regions. They were then compared in terms of fabric and composition against 4 counterparts found in archaeological layers of Haft Tapeh belonging to the Elamite Era.

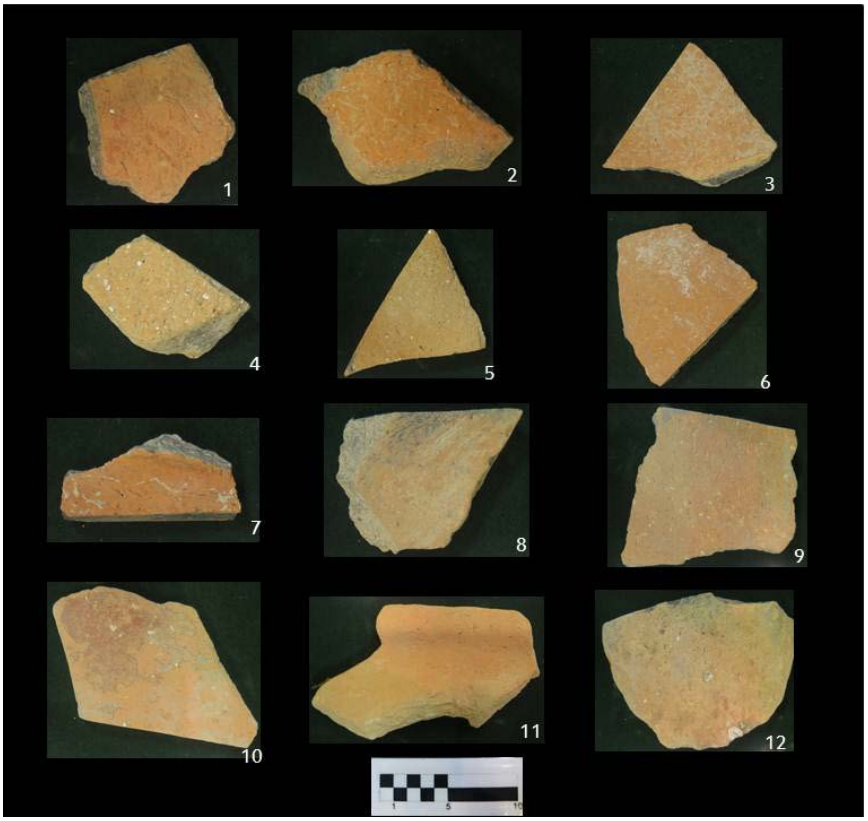

Figure (1). Pottery samples under study

Mesopotamian inscriptions belonging to the regions under study

This study focused on three regions namely Zabshali, Tukrish and LU.SU, which were considered toponymys for Chaharmahal and Bakhtiari and Isfahan according to an investigation on Mesopotamian inscriptions and environmental characteristics of those provinces belonging to the Elamite Era. It will be later discussed briefly why these Elamite toponymys were assigned.

Zabshali

First, we will explore inscriptions from ŠuSuen, the fourth king of Ur III dynasty, who ruled from 1943 to 1935 BC. This inscription speaks about six major cities across Simaški (Steinkeller, *New Light on Šimaški...* 216-217). The six cities listed

in order include Zabshali, Sigrish, Lapulmat, Alumiddatum, Garta and Shatilu (Potts 136). According to Steinkeller, Sigrist and Gomi, Zabshali was the most important Simaški land (Steinkeller, *On the Identity of…* 199; Sigrist, Gomi and Ozaki 327). Meanwhile, there are certain remnants from Shu-Sin referring to gold as pillage of Simaški (Steinkeller, *On the Identity of…* 199). There are varying opinions about the location of Simaški. Some scholars believe that Simaški should be somewhere neighboring the east of the Third Dynasty of Ur (Mesopotamia) (Stolper 46). Walter Hinz pinpointed Simaški upon the mountains of Lorestan in the north of Khuzestan, and more precisely Khorramabad (12-13). Kupper argued that Simaški's was a northern neighbor to Khuzestan (27). Pierre Amiet searched for Simaški and Awan in the east of Shushan Plain (4). Furthermore, de Miroschedji discussed the mountains of east and northeast of Shushan as the location of Simaški (137-138). Herzfeld believed that Simaški was situated between Golpayegan and Isfahan (179-180). At the same time, Zadok argued that Simaški lied between Fars and the Caspian Sea (Zadok qtd. in Potts 103); and Vallat regarded Kerman as the location of Simaški (*Eléments De Géographie Élamite…* 50-52). Meanwhile, A section of the script corresponding to the Isin-Larsa Era mentions the Ishbi Era War (1921-1889 BC), the first king of the first dynasty of Isin, the sixth king listed in Simaški, speaking about the vastness of the sovereign territory for Simaški's defeated king (Kindato) covering Peshimeh to Zabshali and from Arava to Marhashi. Steinkeller demonstrated that the Elamite borders in this scripture are approximately based on the north-south and east-west directions. Accordingly, Pashimeh was located in the south, Zabshali in the north, Arava in the west and Marhashi in the east of Elam (Steinkeller, *The Question of Marhaši…; New Light on Šimaški…*). At the same time, a scripture from ŠuSuen indicates that Zabshali stretched from the boundaries of Anshan to the Upper Sea (Vallat, *Les Noms Géographiques…* 305). Moreover, several inscriptions from ŠuSuen suggest that Zabshali was destroyed in its seventh year of reign (Potts 138). The royal inscriptions of Mesopotamia refer to tin as spillage from Zabshali and Simaški (Sollberger and Kupper). Ur Ninib, a king of Isin dynasty asserted to have conquered the lands of Zabshali and LU.SU with wild and nomadic peoples (Olmstead 82). The toponymy of LU.SU will be discussed in another section. According to the Mesopotamian inscriptions, Zabshali was the most important city of Simaški rich in metal mines such as tin situated in north of Anshan and near the Upper Sea. The location of Anshan in Tel-e Malyan is obvious according to previous

studies (Hansman). According to the Mesopotamian inscriptions, Zabshali should be regarded a northern neighbor of Anshan toward the Upper Sea, a place rich in tin sources. As one of the cities across Simaški, Zabshali neighbored LU.SU. Concerning the Upper Sea, it should be noted that some scholars argue it is the same as present-day Caspian Sea since ŠuSuen applied this name for waters beyond Anshan (Zadok, *Elamite Onomastics* 228). If the Upper Sea is considered the Caspian Seat, then the land of Zabshali, stretching Anshan borders to the Upper Sea according to ŠuSuen scripts, will cover the north central provinces of Iran today. However, Zabshali was a part of the land of Elam, and should be searched for in remote areas. Moreover, none of the previous studies on these regions have ever pointed to the Elamite site in the north central provinces of Iran today. It is also worth noting that the ancient cuneiform scripts list the names of 59 figures who can be deemed Simaški residents. Of this, 12 names are either Elamite or associated to Elamite, while a person from Zabshali is called "In Da Su" which is an Elamite name (Zadok, *Elamite Onomastics* 228). According to these facts, the Simaški lands were not far from the present-day Fars province, the capital of the Elamite language (Potts 141). The question still stands: where should we search for the Upper Sea? It can be suggested that present-day Gavkhouni drainage basin was the Upper Sea during the Elamite Era. This drainage basin extends today for about 47 thousand hectares (Zoufan and Noruzi 12); and it could have been far larger in the past. Another noteworthy point about Zabshali is its tin resources. Figure (2) illustrates the tin-rich resources across Iran marked by yellow, green and purple in order of abundance. In the north of Anshan, the Iranian tin-rich resources can be traced only in southeast of Isfahan (near Gavkhouni), northwest of Yazd (near Gavkhouni) and northwest of Isfahan. Relying on previous investigations of mines and written resources, it can be argued that Isfahan and northern regions of Yazd province today constituted the major northeast and north territories of the Elamite state, where Zabshali was located. In addition, a total of 19 Elamite sites were reported by Esmaeili within Saba a city southeastern of Isfahan (Esmaeili Jelodar) (Figure 3). Potteries in these sites are comparable with those in the Elamite centers.

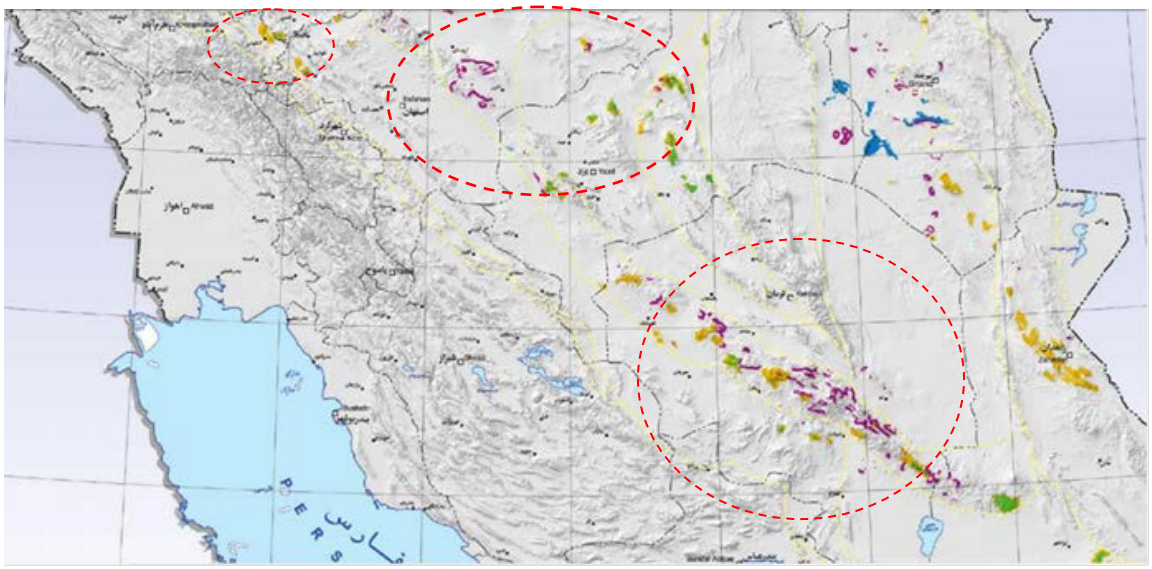

Figure (2). Iranian tin mines, the yellow and green represent desirable spots for tin, while purple represents spots with highly potential tin resources (Geological Survey & Mineral Explorations of Iran (GSI)).

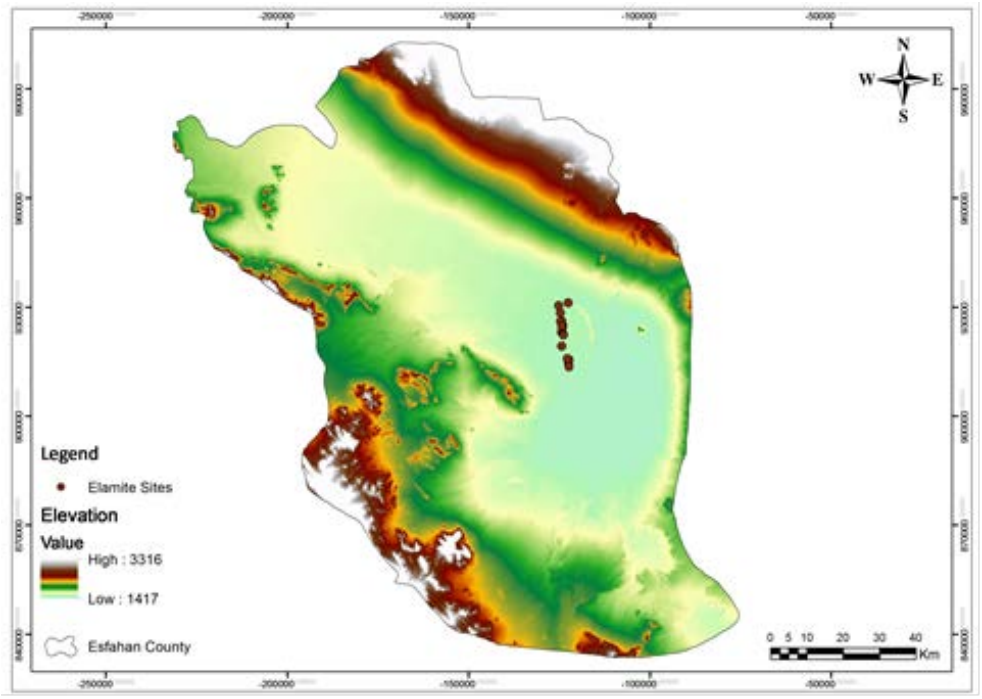

Figure (3). Elamite sites across Varzaneh

LU.SU

Steinkeller discussed the toponymical association of Zabshali and LU.SU, believing that LU.SU was the same as ancient Simaški. The name Zabshali has been mentioned alongside LU.SU because the former was the most important city in Simaški (Steinkeller, *On the Identity of…* 198-199). Perhaps the most fundamental

question raised to Steinkeller's idea is why only these inscriptions used LU.SU instead of Simaški, whereas other inscriptions have repeatedly mentioned Simaški itself And for what reason the name of Simaški, included at least six important cities, was mentioned instead of LU.SU next to the most important city in Simaški, (Zabshali) Additionally, there is an inscription from the year 47 Shulgi referring to some spillage from LU.SU. Only after 2 years (i.e. first ruling year of Emer-Sin) the name of Simaški is engraved on inscriptions instead LU.SU according to Steinkeller (Potts 138). Despite the historical proximity of the two inscriptions (about 2 years), if the names are assumed to be referring to an identical place, then why the Mesopotamian people used two different names for one single Elamite region within that short juncture? Moreover, one of the major explanations raised by Steinkeller for identical origins of Zabshali and LU.SU involves inscription dating back to seventh year of ŠuSuen (Potts 141). Steinkeller cited the translation version this way: "ŠuSuen defeated LU.SU which consists of Zabshali lands covering the borders of Anshan to the Upper Sea (genesis site) such as locusts, Nibulmat, Shigrish, Alumiddatim, Garta, Bulma, Nushushmar, Nishgelmum, Sisitum, Arahir, Shatilo and Tirmium." (Steinkeller, *More on Lû...* 10). Nevertheless, Zadok and Kutscher rendered another translation for the inscription: "ŠuSuen defeated LU.SU a part of Zabshali lands from the borders of Anshan to the Upper Sea (genesis site) such as {above mentioned names}" (Kutscher 90; Zadok, *Elamite Onomastics* 227). Moreover, Zadok suggested that there could be up to 16 lands under the ruling of Simaški, including LU.SU (not the land of Simaški) according to the Mesopotamian inscriptions (Zadok, *Elamite Onomastics* 227). In any case, the neighborhood of LU.SU and Zabshali can be proposed along with Steinkeller's view, arguing that is why the names of the two cities have been used together in several inscriptions noted above. In any case, whether Zabshali is assumed a neighbor of LU.SU or a part of LU.SU according to Steinkeller, that matters most is the nomadic population living in LU.SU (Olmstead 82). This should be studied along with archaeological data to determine in what regions nomadic sites during the Elamite Era were distributed more frequently as neighbors of Zabshali or its surrounding regions. With an average rainfall of 336 mm and an average temperature of 11 °C, Chaharmahal and Bakhtiari provide favorable conditions for growing forage crops and subsequently livestock. The area of pastures is estimated to be about 1 million hectares. In this regard, 1 million hectares of rich grasslands and forests noted above, in addition to inadequate suitable agricultural lands, prepare the region for

nomadic lifestyle (Young). In Miankooh, Ardal, more than 76% of Elamite sites have been reported to be nomadic (Khosrowzadeh, Heydarian and Mohammadi 75). This is highly important alongside the neighborhood of this province and Isfahan with regard to the toponymy of Zabshali and LU.SU. Meanwhile, there are a considerable number of pottery samples from this region comparable to their counterparts across the Elamite centers.

Tukrish

As for Tukrish, there are relevant resources dealing with the toponymy of this region. According to the story of Enki and Ninhursag from written sources of Ur, where gold is traded from Tukrish to Dilmun through Harali: "The land of Tukrish will send you (i.e. Dilmun) gold through Harali." (Davis 190). It can be deduced that Dilmun was a middle city by which goods produced in Tukrish were sent to Mesopotamia. A script from Ur also refers to melus as competing products for those offered in Marhashi and Tukrish (Mallowan 2). These may have been metal products in those regions. An inscription of Sargon also speaks of Tukrish next to Marhashi, Elam and Anshan (Cameron 29), while the Sumerian literary texts mention Tukrish as a source of gold and lapis lazuli (Michalowski 162-163). Furthermore, Tukrish was well known as a land for producing ornaments of gold and textiles after the second millennium BC (Michalowski 156-164). The four toponymys of Tilmun, Awal, Marhashi and Tukrish probably referred to a region, rather than a city, which were all surrounding the Elamite territory and occasionally a part of it (Rafiee Alavi 148). The scripts recovered at Marie Palace in the middle section of the Euphrates in Syria, dating back to the eighteenth century BC, mention metal beverage containers with dark streaks depicting animal heads imported from Tukrish (Dunham 213-220). Containers with such features are probably comparable to Lorestan pewter containers, which are deemed similar by Moorey to Marlik containers (134).

There are different opinions about the location of Tukrish. Thus, some scholars believe that Tukrish was probably in the north of Elam (Zadok "Peoples from the Iranian Plateau in Babylonia During the Second Millenium Bc" 21) (Vallat, *Eléments De Géographie Élamite…* 54). Some argue that Tukrish stretched the north or northeast of the Elamite state (Rafiee Alavi 148). Yet, others believe that Tukrish was situated in northwestern Iran near the present-day Tehran in the way of Khorasan, which constituted the primary route for East-West trade (Moorey 134;

Michalowski 64). Tukrish has been mentioned next to the Lulubi Kingddom in an old Houri scripture recovered at Boghazkoi. In this light, some scholars pinpoint Tukrish in the Zagros Mountains (north center of Elamite centers) (Cameron 29). Aside from these opinions, some researchers introduce the geographical location of Tukrish in Kerman province today (Peru and Dollfus 191). That could be associated with the abundant mines in present-day Kerman.

According to the above facts, the written sources suggest that Tukrish was a land near Lulubi (The Zagros Mountains) rich in metal mines and mentioned frequently next to Elamite toponymys, indicating how close it was to the Elamite centers. As mentioned earlier, there were references of metal trading from Tukrish to Marie over the second millennium BC. Peru and the Delphos believed that Tukrish should be found in Kerman given the mines mentioned in relevant sources (Peru and Dollfus 191). This idea, however, can be rejected for several reasons: 1) Kerman is far from the central Zagros Mountains as a region where Lulubis resided and neighbored Tukrish, 2) Kerman it too far from the ancient land of Marie for metal trading, and 3) the name of Tukrish has been mentioned in the second millennium BC as a city primarily for the production of metals and poor establishments over the second millennium BC in Kerman. Moreover, Moorey and Michalowski argued that Tukrish was located across the Iranian northwest roads given the business ties between Tukrish and Marie (Moorey 134; Michalowski 64). As for in the northwest, however, several facts should be considered: 1. Iran's northwest is too far from the Elamite centers. 2. There have been no reports on Elamite sites or in connection with Elam in the northwest of Iran. 3. Iran's northwest is remote from Dilmun and Magan across the south of Elamite centers, making it unfitting for the location of Tukrish which has been referred in several inscriptions as a region where metals are traded with Dilmun and Magan. Nonetheless, scholars such as Cameron argue that Tukrish was situated in the north of Elamite centers and not too far from them (Cameron 29). This idea seems more logical because: 1) it is consistent with the metal trade between Tukrish and Marie as well as with Dilmun and Magan, 2) there are mine-rich areas across Isfahan and partly the east of Lorestan all over the north of Elamite and partly in the Zagros Mountains (Figure 4), and 3) a few Elamite Sites have been discovered in present-day Isfahan, holding specific Elamite pottery from the Elamite Era. One of the regions covered in this paper was the west of Isfahan, i.e. Tiran and Karvan, covering Asgaran where there 14 Elamite sites discovered (Figure 5). Meanwhile, the

pottery from this region is comparable to its counterparts from the Elamite centers in terms of form. The next section will petrographically explore a number of potteries from this region and compare them against their similar counterparts found at Haft Tapeh.

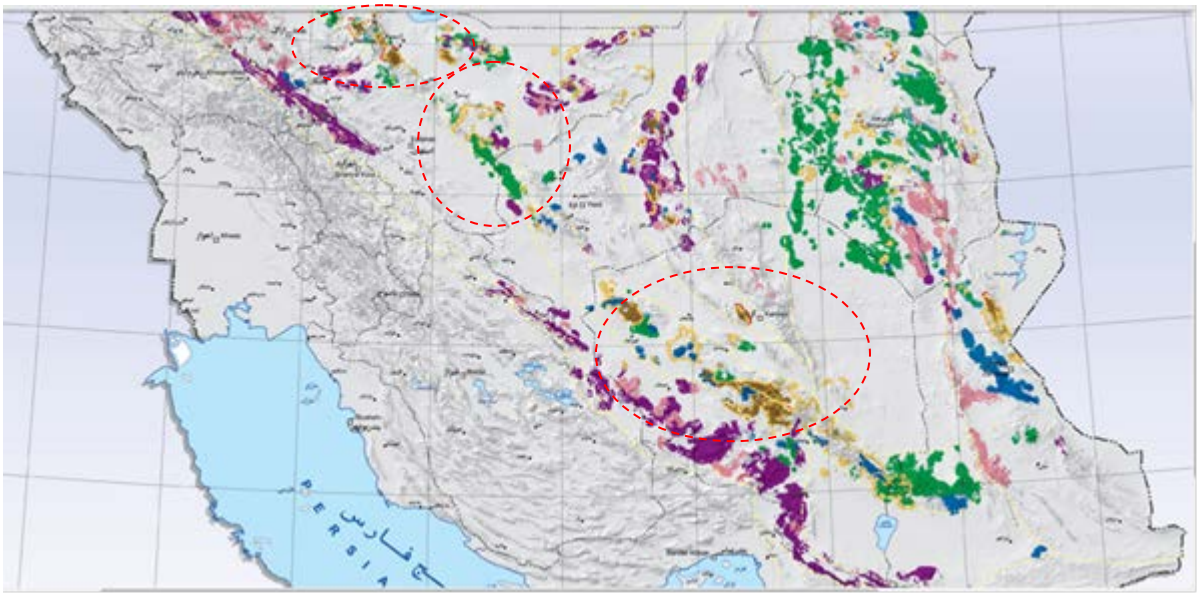

Figure (4). Gold and silver mines in Iran. Green and yellow represent spots suitable for gold and silver mines, while purple represents areas with great potential of mines (Geological Survey & Mineral Explorations of Iran (GSI)).

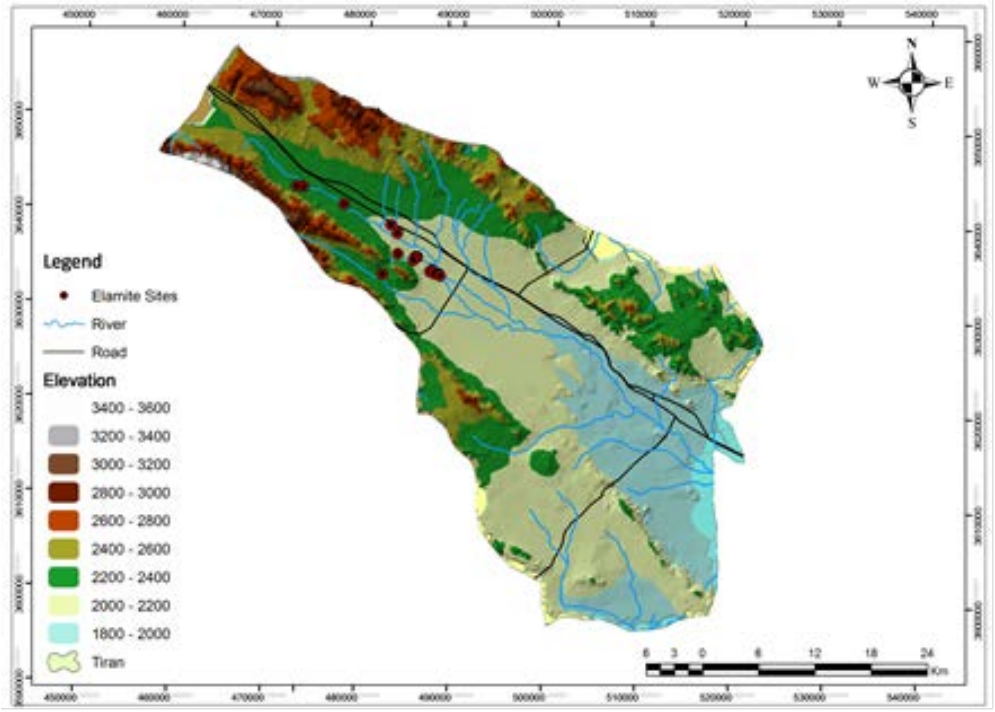

Figure (5). Elamite sites across Asgaran, Tiran and Karvan

Petrographical study on the specific pottery type

This section intends to determine whether there are any similarities between pottery samples from Isfahan and Chaharmahal and Bakhtiari against those recovered from Elamite centers (Khuzestan in this case) in terms of fabric, curing temperature, production technique aside from their form and appearance. In this procedure, we will be able to more confidently discuss the above comments on toponymys of several Elamite cities based on the Mesopotamian inscriptions.

Microscopic study on pottery samples:

At this stage, a binocular polarizing microscope James Swift model was employed to perform a microscopic examination of the samples. This study involved a 4X magnification. The results of petrography have been displayed in Table (1).

N. Sample	Qz (Clean)	Qz (Cloudy)	Plg	Am & Py	Fe-oxid	Mica	Cc(Mic)	chert	M.Rock	Silt Shale	*grog*	Texture
ES.1	*	*	tr	tr	*	tr	*	*	-	-	-	Silt
ES.2	*	*	tr	-	*	tr	*	-	-	tr	*	Silt
ES.3	*	*	tr	*	*	tr	*	-	-	*	-	Silt
ES.4	*	*	-	-	*	tr	*	-	-	-	-	Silt
ES.5	*	*	*	-	*	tr	*	-	*	*	-	Porphyries
KH.1	*	*	tr	*	*	tr	*	-	-	-	-	Porphyries
KH.2	*	*	tr	-	*	tr	*	-	-	-	-	Silt
KH.3	*	*	tr	*	*	tr	*	-	-	-	*	Porphyries
KH.5	*	*	-	-	*	tr	*	-	-	-	-	Porphyries
CH.1	*	*	tr	*	*	tr	*	-	-	-	*	Porphyries
CH.2	*	*	-	-	*	tr	*	-	-	-	-	Silt
CH.3	*	*	-	-	*	tr	*	-	-	-	-	Silt

Table (1). The results of petrographical study on Elamite pottery samples recovered in Khuzestan, Chaharmahal and Bakhtiari, Isfahan

Abbreviations: Qz (Clean)=quartz phenocrysts. Qz (Cloudy)=cloudy and polycrystalline quartz. Plg=plagioclase. Am&Py=amphibole and pyroxene. Fe-oxid=iron oxide. Cc=calcite. M-Rock=metamorphic rock. Silt&Shale=silt and shale rock fragments, Grog=clay parts added to pottery.

Table 1 provides the minerals and compounds of pottery context in the first row. The first column displays the sample names, where gray represents Isfahan samples, blue represents, Khuzestan samples and yellow represents Chaharmahal and Bakhtiari samples. The presence of any minerals in the context of pottery samples has been indicated by (*), while the absence of minerals has been indicated by (-). Very low frequency of a mineral has been indicated by (tr). The last column provides the fabric or texture of pottery samples.

In a general overview, the pottery samples can be classified into two main categories in terms of fabric (texture). 1) samples with porphyritic fabric and 2) samples with silt fabric. In the former, the grains are coarse to about 2 mm or larger lying within a fine crystal context. In the latter category, the constituent elements are typically as small as 5 mm. Accordingly, the pottery samples can be classified into porphyry-fabric and silt-fabric regardless of their discovery site (Figures 6 and 7).

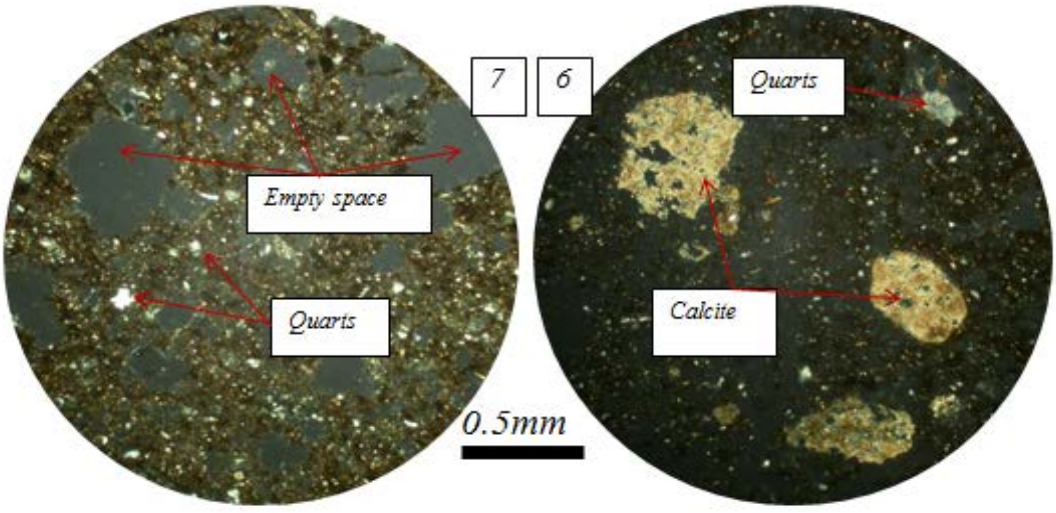

Figure (6). SEM image of Sample KH.2, 4X magnification, XPL, silty fabric (fine-grained), plethora of fragments and fine quartz together with iron oxide in the clay context. The fragments in the pottery context are smaller than 20 microns.

Figure (7). SEM image of Sample CH.1, 4X magnification, XPL, porphyritic fabric, coarse mineral fragments of pottery within clay calcite matrix. In addition to calcite, there is quartz in the mineral context.

The main mineral in these samples is quartz, visible in the form of fine-grain and monocrystalline. It has dimensions as small as a few microns, entailing angled to half-round edges, which have been deliberately included in the pottery composition and matrix. It also has a polycrystalline version with lower abundance (Figure 8).

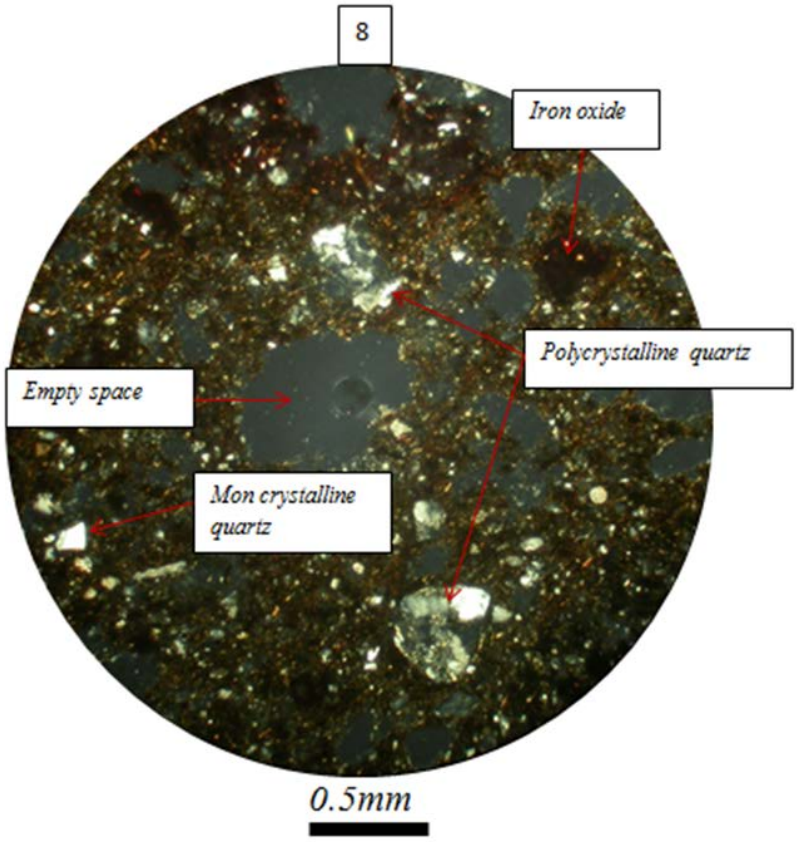

Figure (8). SEM image of Sample ES.2, 4X magnification, XPL, heterogeneous silty fabric (Immature), various fragments of quartz in the form of monocrystalline and polycrystalline along with iron oxide within the clay context of pottery. In the lighting, the dark empty space within the context is clearly visible.

There is usually coarse-grained calcite in these pottery samples, where calcite has been used as temper. Visible in all samples, calcite is particularly important in archeological and petrographical examinations. This mineral evaporates into secondary minerals at a temperature of about 800 °C. Hence, the presences of calcite in all samples suggest the fact that the curing temperature of pottery did not exceed 800 °C (Figure 9).

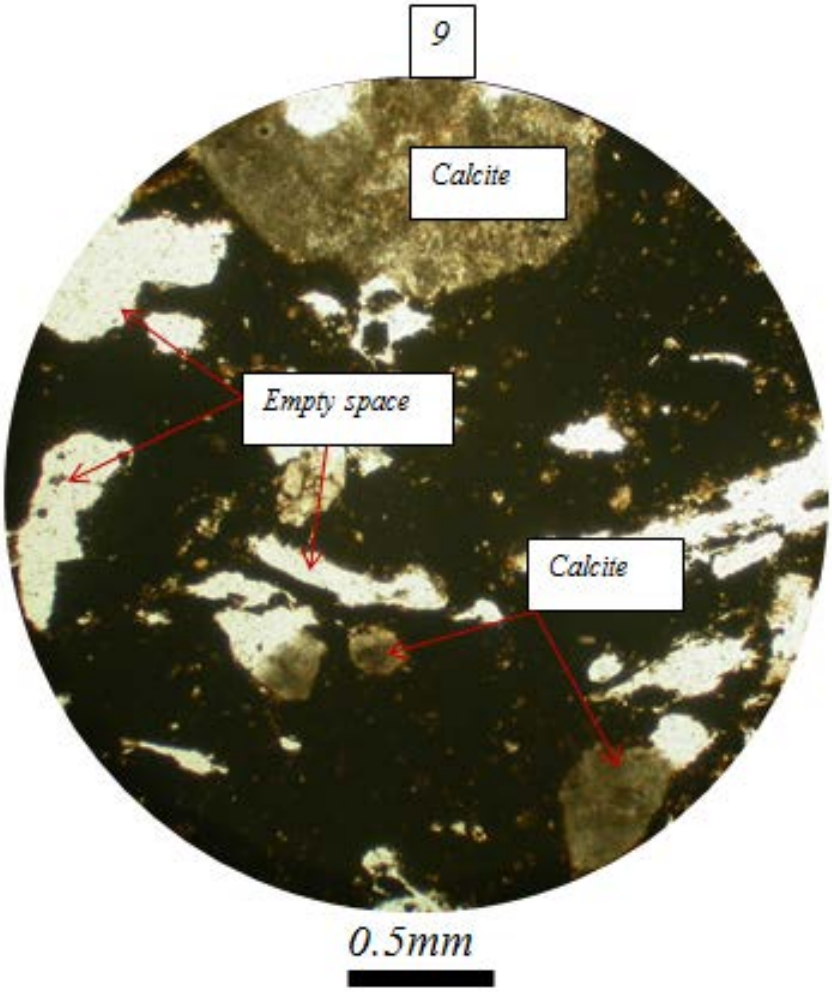

Figure (9). SEM image of Sample CH.3, 4X magnification, PPL, porphyritic fabric, coarse fragments of calcite within clay context. In this sample, the context is completely homogeneous and dark. There are numerous empty spaces visible in bright colors.

The additional constituent elements of pottery samples include mica, amphibole and peroxide visible in small quantities accounting for less than 1% of the total volume of each sample. One important point concerns Sample ES.5. This pottery is quite different from the others, since it embodies fragments of metamorphic rocks, siltstone and calcite as tempers. In contrast, the other samples do not contain any metamorphic rock fragments (Figure 10).

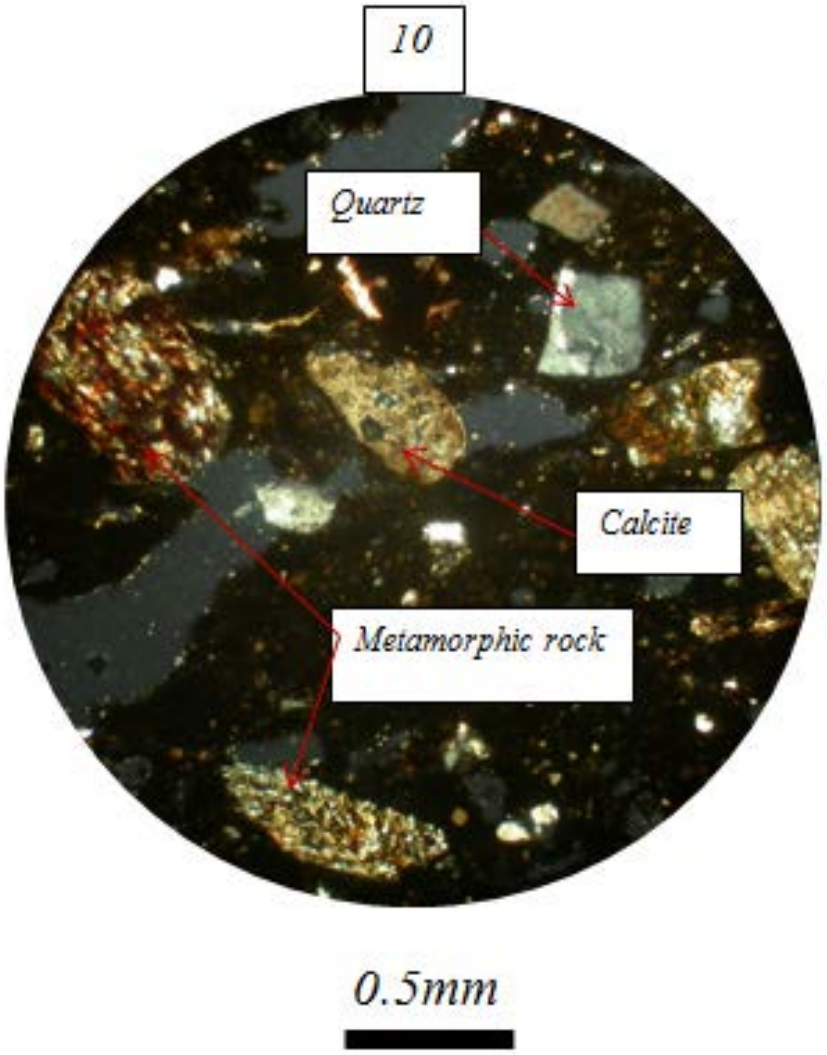

Figure (10). SEM image of Sample ES.5, 4X magnification, XPL, porphyritic fabric, large fragments of calcite, metamorphic rock and quartz in the clay context of pottery.

Moreover, there are fragments of grog (silt, clay or previous materials added to the context of pottery) visible in samples ES.2, KH.3 and Ch.1 (Figure 11).

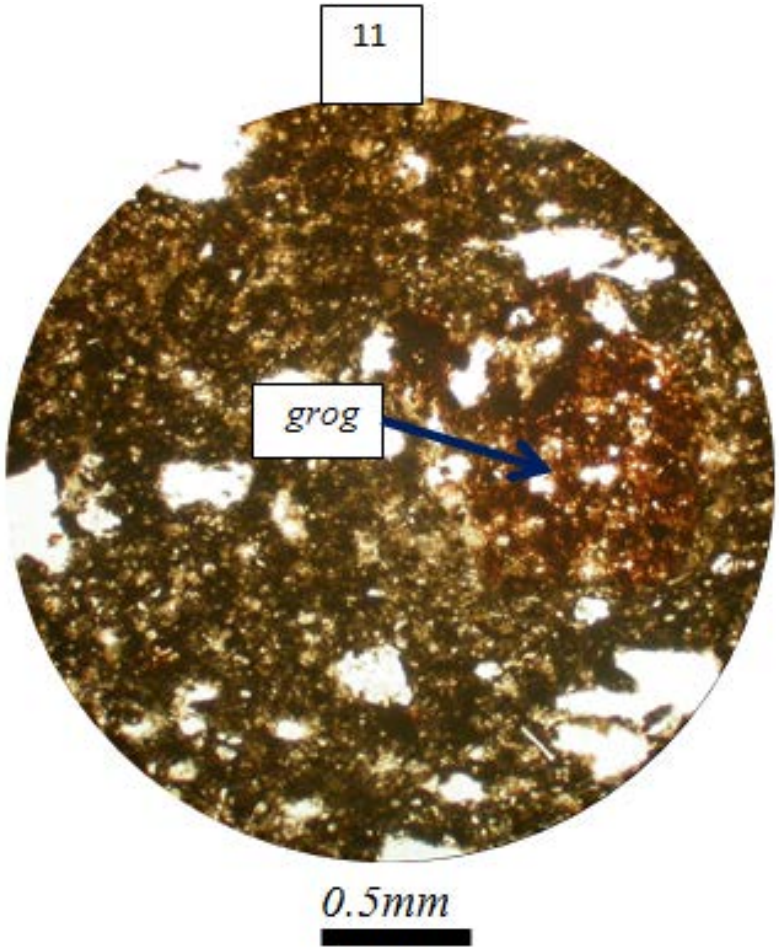

Figure (11). SEM image of Sample CH.1, 4X magnification, PPL, large red clay fragment (grog) within the context of pottery.

It should be noted that the two-color body in the pottery sample is not at all associated with the type of compounds or curing temperature, Since the two parts are identical in terms of composition (Figure 12). Moreover, it seems that the main reason for the two-color body lies in the curing conditions and techniques (oxidation and reduction) inside the furnace, leading to two different colors. Apart from that, there is a kind of orientation in the components of pottery samples, potentially indicating they were built on wheels.

Figure (12). SEM image of Sample ES.4, 4X magnification, XPL, image captured from the pottery edge (bright color) toward the central part (dark color). There is no compositional shift between the two parts, which might be due to chromatic shift under the curing conditions of the furnace.

Finally, the compositions of the pottery samples demonstrate their common origins except ES.5, whereas the difference between other pottery samples generally lies in the frequency of each constituent element (Figure 13). According to the constituent element of pottery samples, this pottery type does not originate from Khuzestan Plain, but it can rather be traced in Zagros Mountains.

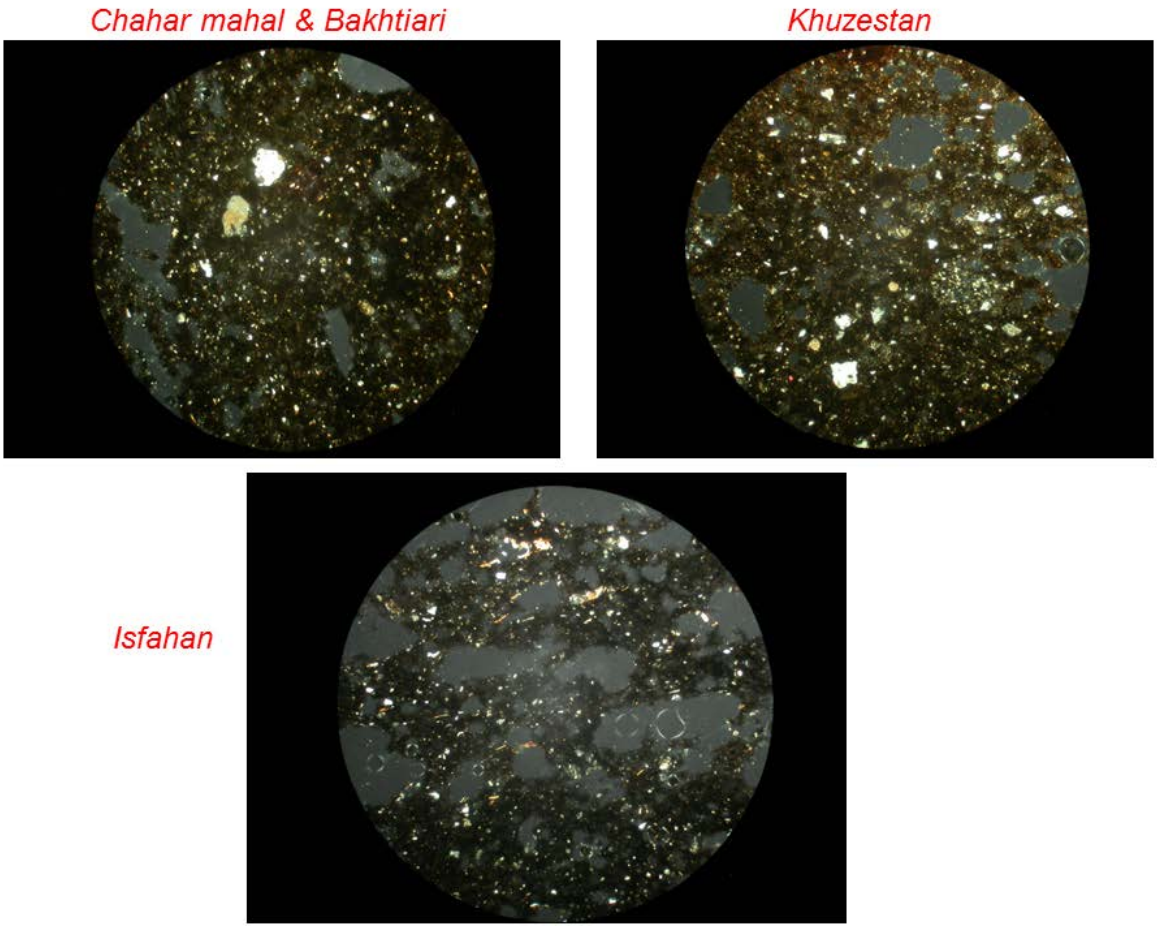

Figure (13). Fabric similarities between pottery samples recovered in Khuzestan, Isfahan and Chaharmahal and Bakhtiari.

Conclusions

According to the above discussion, the specific pottery type in this study indicated a remarkable frequency in Isfahan and Chaharmahal and Bakhtiari. Moreover, it proved to be similar to counterparts recovered at Haft Tapeh (Khuzestan) in terms of fabric, production technique and curing temperature. It is essential to point out the pottery types across the northern Elamite centers which have been rarely explored so far. The specific pottery type examined in this paper can definitely be considered an Elamite artifact. It should originate from the Zagros Mountains in the north of Khuzestan (Bakhtiari highlands). That is perhaps why this type of pottery is less abundant in Khuzestan as opposed to Isfahan and Chaharmahal and Bakhtiari. Therefore, it can be argued that the Elamite were involved in dominated Isfahan and Chaharmahal and Bakhtiari, while delving into the toponymy of Elamite cities such as Zabshali and Tukrish in certain parts of Isfahan and LU.SU in Chaharmahal and Bakhtiari. The regions never explored from

that very perspective can set out a new avenue of Elamite research into these Iranian provinces. Finally, it is recommended that future studies focus on northern regions of Elamite centers including the present-day Isfahan, Yazd and Chaharmahal and Bakhtiariti so as to clarify many of the archaeological ambiguities of Elamite Era. After all, an in-depth investigation of Mesopotamian inscriptions can help scholars realize the importance of these regions, while revealing their archaeological capacities.

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