



Caspian Neolithic Software vs. Djeitun Pottery: New Absolute Dating from the Pottery Neolithic of Eastern Mazandaran

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Article Info	Abstract
<p>Pp: 69-93</p> <p>Article Type: Research Article</p> <p>Article History:</p> <p>Received: 27, January, 2023</p> <p>Revised form: 16, March, 2023</p> <p>Accepted: 2, May, 2023</p> <p>Published online: December 2024</p> <p>Keywords: Neolithic, Caspian Neolithic Software, Pottery Neolithic, Hotu, Kamarband, Djeitun, Chakhmaq, Touq Tappeh, Tappeh Valiki.</p>	<p>After 70 years we still have very little knowledge about the Epi-Paleolithic, Pre-pottery Neolithic (PPN), and Pottery Neolithic (PN) periods in the eastern Mazandaran plains. Unreliable excavation methods, the application of personal taste in collecting data, and uncertain analyses are among the issues we face in Coon's excavations at the Hotu and Kamarband caves. Additionally, there are no detailed reports of pottery from the caves by Coon. In the following years, only general information and a few pictures and drawings by archaeologists were published, which, although helpful, weren't enough. In the last two decades, despite the excavations and field surveys that have been carried out, there have been no attempts to reinterpret the Caspian Neolithic Software (the CNS pottery type). Touq Tappeh and Tappeh Valiki, located in the Neka Plain, are two CNS sites that yielded over 2500 sherds belonging to the PN. Analysis of the pottery assemblage suggests a need to revise our assumptions about the CNS type. The diversity in production and decoration reflects household production, although they show a specific pattern at regional and inter-regional levels. It has come to our attention that while some researchers have referred to this pottery as the Djeitun/Chakhmaq style, new absolute dates tell a different story. The sherds presented in this paper can be categorized into two groups - regional and inter-regional - with the majority belonging to the CNS type. The dating of Touq Tappeh suggests that the PN layers belong to 6250-5800 BC. Meanwhile, dating from Hotu indicates that the PN began around 6400 BC, and at Tappeh Valiki, it started around 6600 BC. Consequently, the CNS culture in the eastern region of Mazandaran is now considered the oldest Pottery Neolithic culture in northeastern Iran.</p>

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1. Introduction

The southeastern littoral of the Caspian Sea encompasses a wide area including the Neka, Behshahr, and Gorgan plains. Despite archaeological field projects in Behshahr and Neka plains, there is little understanding of settlement patterns, cultural processes, economic and social developments, and regional and inter-regional interactions during prehistoric periods. In addition, we still do not have an absolute chronological sequence from different prehistoric periods of this region, and our knowledge about cultural gaps and continuity, especially the transition from the Epi-Paleolithic to the Neolithic, the PPN and PN periods, and the transition from PN to Chalcolithic, is very limited (Abbasnejad Seresti, 2020). Pottery, as one of the most important pieces of data in archaeological analysis and interpretations, plays a crucial role in understanding the Neolithic developments of this region and clarifying some of the aforementioned ambiguities.

Archaeological excavations in the Hotu and Kamarband caves, as well as field surveys in the Neka and Behshahr plains, have led to the discovery and introduction of Neolithic pottery types in this region. However, we are still striving to better understand the sequence of technology and typology of this pottery. In recent years, the study of the CNS type and its relationship with adjacent regions has become an important topic. Researchers, such as Roustaei (2013, 2015, 2016a), have interpreted the spread of Neolithic packages to the eastern Mazandaran plains based on the analysis of Neolithic sherds. Therefore, it is necessary to carefully analyze and compare the CNS type and its relationship with adjacent regions.

2. Research Background

Carlton S. Coon excavated the Hotu and Kamarband caves in 1949 and 1951, identifying the Epi-Paleolithic, PPN, PN, Chalcolithic, Iron Age and Historic-Islamic periods (Coon, 1951, 1952). Later, Charles McBurney excavated Ali Tappeh Cave, a few kilometers east of Hotu and Kamarband and all of its layers belonged to the Epi-Paleolithic (McBurney, 1968). The excavation at Komishan Cave in 2009 led to the discovery of Epi-Paleolithic and PPN deposits. Unlike the Epi-Paleolithic layers, the PPN layers were disturbed (Vahdati Nasab, 2009). The site of Touq, which was identified along with several other Neolithic sites during an archaeological field survey, was excavated to understand the early stages of the PN in the region (Mahfrouzi, 2007). To study the Neolithization process in eastern Mazandaran, an archeological field survey was conducted in the Neka and Behshahr plains (Ramezani et al., 2013). However, the data from this survey, including the pottery, have not been well studied and introduced (Asadi Ojaei et al., 2024a). The excavation of the Komishani open site in Neka in 2017 is another field program that was conducted to determine the chronological sequence of the Epi-Paleolithic and Neolithic, to study the Neolithization process in the region (Fazeli Nashli, 2017). Stratigraphic excavations of Touq Tappeh and Tappeh Valiki have been carried out to achieve the chronological sequence of the Neolithic period and to study the Neolithization process (Abbasnejad Seresti, 2020; Abbasnejad Seresti & Nemati Loujendi, 2022). In recent years, Hotu and Kamarband were re-excavated (Fazeli Nashli, 2021a, 2021b). Also, in the most recent field survey, with an emphasis on the PN period, new evidence of Neolithic settlements in the region (plains and highlands) has been recorded (Asadi Ojaei, 2023).

3. Research Problem

Since the first excavations by C.S. Coon, the Neolithic pottery from eastern Mazandaran has not been introduced as thoroughly as those of the adjacent regions (e.g., Djeitun type). What features does the CNS type have? By comparing the form and decorations of new pottery assemblages from Touq Tappeh and Tappeh Valiki with regional and inter-regional collections, what common and different features can be recognized? Where does the CNS type originate, and finally, what can the pottery tell us about the end of the CNS culture?

4. Research Methods

Excavations at Touq Tappeh and Tappeh Valiki (see below) are the first systematic excavations of PN sites in the plain (Abbasnejad Serešti, 2020; Abbasnejad Serešti and Nemati Loujendi, 2022). From Touq Tappeh and Tappeh Valiki, 1,506 and 1247 sherds, respectively, were recovered from Neolithic layers and have been primarily studied. The absolute dating of these sites has been used to construct a technological and typological sequence. Although, the technical features recognized by visual observation, we are waiting for the petrographic analysis. Additionally, the results will be compared with published regional and inter-regional pottery collections.

5. Geography and Environment

Geographically, the region is located at the eastern end of Mazandaran province, in the Behshahr and Neka plains. In the southeastern Caspian Sea, the presence of both the Sea and the Alborz Mountains has prevented moisture exchange between the northern and southern regions, creating two completely different climates on the northern and southern slopes. The plains and northern Alborz slopes are very rich in plants, animals, marine resources, food and raw resources compared to the southern slopes. Human traces in this region can be seen from the Epi-Paleolithic period to today.



Fig. 1: General view of Touq Tappeh and Tappeh Valiki

Touq Tappeh (41.90° 42' 36" N and 54.79° 20' 53" E) and Tappeh Valiki (36° 42' 57.74" N and 53° 17' 29.64" E) are located in the Neka plain, about 15 km from the Caspian Sea coast and 7 km from the northern Alborz slopes, at heights of 6 meters asl¹ and 5

meters above the surrounding lands (Fig. 1 and 2). The sites are 5 kilometers apart, with Tappeh Valiki to the east and Tappeh Touq to the west. As mentioned, Tappeh Touq was first discovered in 2007 by Ali Mahfrouzi under the ASEC project titled 'Educational Excavation of Undergraduate Students'. The sequence of the PN, the Bronze Age, and the Iron Age was proposed (Mahfrouzi, 2007). In 2020, this site was excavated under prehistoric archaeological research of eastern Mazandaran to study the Neolithization and food production process in this region. During this excavation, the PN (the CNS culture), Chalcolithic along with PN, the Bronze Age, and the Iron Age were identified through pottery assemblage (Abbasnejad Serešti, 2020). Meanwhile, the first excavation of Tappeh Valiki in 2022 indicated the presence of the PN (the CNS culture), Chalcolithic along with PN, and the Iron Age mixed with the historical period (Abbasnejad Serešti & Nemati Loujendi, 2022).

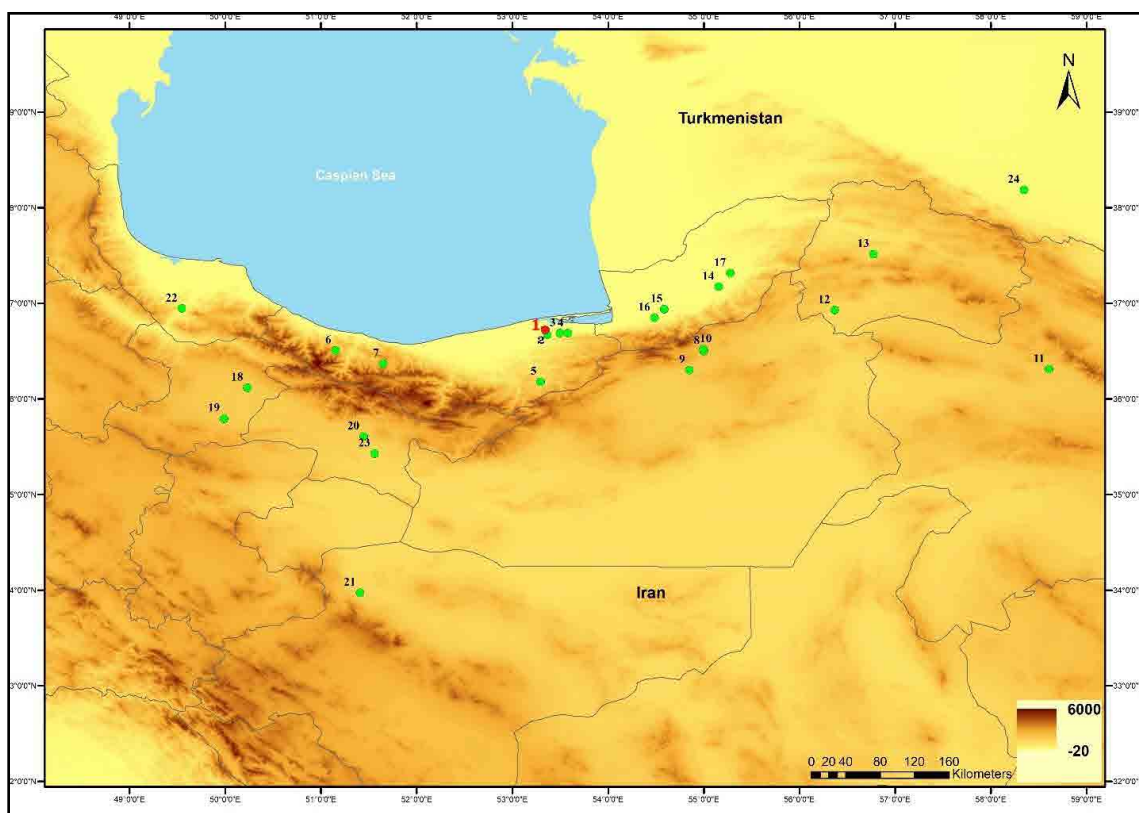


Fig. 2: Map of the PN sites of eastern Mazandaran and adjacent regions: 1) Touq Tappeh and Tappeh Valiki; 2) Komishan Cave and Komishani open site; 3) Hotu and Kamarband caves; 4) Ali Tappeh Cave; 5) Qale'pey; 6) Rashak III Cave; 7) Ashkul Cave; 8) Sang-e Chakhmaq; 9) Klatah Khan; 10) Deh Kheir; 11) Tappeh Baluch; 12) Pahlevan; 13) Qale Khan; 14) Yarim Tappeh; 15) Tureng Tappeh; 16) Pookerdval; 17) Aq Tappeh 18) Ebrahim Abad; 19) Chaharboneh; 20) Cheshmeh Ali; 21) Tappeh Sialk; 22) Shahran; 23) Tappeh Pardis; 24) Djeitun.

6.A Glance at Epi-Paleolithic to PN Dating in Eastern Mazandaran

Since the first excavations carried out by Coon, different dates have been presented. These dates can be divided into two stages through the 75 years history of Mesolithic and Neolithic studies in eastern Mazandaran. According to the new dates, a chronological table can be presented for the Epi-Paleolithic, the PPN, and PN (Abbasnejad Serešti *et al.*, in press).

1) The dating of charcoal samples obtained from the excavations of Hotu and Kamarband caves (Ralph, 1955) was the first absolute dates in the region. However, this

dating faced problems such as the use of non-scientific methods and personal taste in recovering and recording materials (Gregg & Thornton, 2012: 56), which were not very reliable despite recalculation and calibration (Table 1). According to these calibrated dates, the Epi-Paleolithic in Hotu and Kamarband started from 14000-11000 and ended in 8000-7600 BC; the PPN was dated from 7940 to 6465 BC, and the PN from 7140 to 5050 BC (Ralph, 1955; Gregg & Thornton, 2012; Thornton, 2013). In Ali Tappeh Cave, all its layers belong to the Epi-Paleolithic (McBurney, 1968); the re-calibration of the previous dates provides an average of 10991-11510 BC². According to new dating (2-sigma), the Epi-Paleolithic in Hotu Cave began at c. 11945-11800 BC and ended at c. 8130-7960 BC. The oldest Pre-Pottery Neolithic layers are dated to c. 7948-7653 BC. The Pottery Neolithic started from c. 6449-6351 BC (de Groene *et al.*, 2023). Two C14 dating samples from the Epi-Paleolithic layers of Komishan Cave have suggested a date around 12069-10632 BC. Since the Neolithic layers of this cave were extremely disturbed, the Pre-Pottery Neolithic has been identified only through the study of lithic assemblages (Vahdati Nasab *et al.*, 2011). The oldest date from the Komisani open site is c. 9256-9242 BC, which belongs to the Epi-Paleolithic. Additionally, the oldest Pre-Pottery Neolithic layer is dated 8634-8529 BC (Leroy *et al.*, 2019).

Table 1: Chronological table of the Epi-Paleolithic and Neolithic based on old dates and their calibration (Abbasnejad Serešti *et al.*, in press)

Period	The old dating (BP) (after Ralph, 1955)		The new dating (BC) (after Gregg & Thornton, 2012)		Sample
	Kamarband	Hotu	Kamarband	Hotu	
The oldest level of Mesolithic	12215±865	11900±775	13920-11350	13210-11000	Charcoal
The oldest level of PPN	8310±515	8140±490	7940-6650	7630-6465	Charcoal
The oldest level of PN	6575±440	7620±510	5975-5050	7140-6000	Charcoal

The most recent absolute dates were obtained from the two sites of Touq Tappeh and Tappeh Valiki. Two trenches, TT1 with dimensions of 1×4 meters and TT2 with dimensions of 2×3 meters, were opened for stratification in Touq Tappeh. 220 cm of the 4 m layers in this site belong to the PN. Four trenches, Tr1, Tr2, Tr3, and Tr4, were opened in Tappeh Valiki with dimensions of 4×2, 4×1, 2×3, and 5×2 meters, respectively. In this site, except for a thin layer of the Historical and Chalcolithic periods, the rest of the layers belong to the PN, covering about 200 cm in thickness. Nineteen and twelve charcoal samples were collected from the PN layers of Touq Tappeh and Tappeh Valiki, respectively, and finally, 12 samples were selected and sent to Peking University for AMS 14C dating; the results were calibrated with Calib Rev 8.1.0 software. Based on the dating, the TT1 and TT2 in Touq Tappeh show date ranges from 6250-6050 BC and 6000-5800 BC, respectively. Therefore, the PN in this site started by the late 7th millennium BC (Table 2). Based on dated samples from Tr3 and Tr4, and disregarding wayward sample XA57731, the PN layers of Tappeh Valiki show date ranges between 6400 and 5900 BC. Therefore, the early PN in this region started at least by 6400-6300 BC (Table 3). These dates show that the stage of the PN in eastern Mazandaran, which is known as the CNS culture, began at least from the mid-7th millennium BC and continued until the early 6th millennium BC (Abbasnejad Serešti *et al.*, in press).

Table 2: dating of the PN layers at Touq Tappeh (Abbasnejad Serešti *et al.*, in press)

Lab No.	Sample No.	Material	Trench-Context (Depth)	Radiocarbon Age (BP)	1-sigma Date BC	2-sigma Date BC
XA57717	TT-2020-6	Charcoal	TT1- Con 13 (225 cm)	7269±17 BP	6204-6073 cal. BC	6212-6069 cal. BC
XA57719	TT-2020-9	Charcoal	TT1- Con 16 (237 cm)	7334±17 BP	6233-6098 cal. BC	6235-6094 cal. BC
XA57725	TT-2020-14	Charcoal	TT1- Con 19 (267 cm)	7250±17 BP	6197-6058 cal. BC	6209-6050 cal. BC
XA57728	TT-2020-20	Charcoal	TT1- Con 22 (307 cm)	7351±17 BP	6242-6102 cal. BC	6247-6093 cal. BC
XA57724	TT-2020-(9)	Charcoal	TT2- Con 15 (233 cm)	7022±17 BP	5972-5884 cal. BC	5984-5853 cal. BC
XA57726	TT-2020-16	Charcoal	TT2- Con 16 (292 cm)	6973±17 BP	5889-5824 cal. BC	5908-5774 cal. BC
XA57727	TT-2020-17	Charcoal	TT2- Con 16 (315 cm)	6997±17 BP	5907-5842 cal. BC	5972-5819 cal. BC

Table 3: dating of the PN layers at Tappeh Valiki (Abbasnejad Serešti *et al.*, in press)

Lab No.	Sample No.	Material	Trench-Context (Depth)	Radiocarbon Age (BP)	1-sigma Date BC	2-sigma Date BC
XA57732	TV-2022-410	Charcoal	Tr4 – Con 6 (110 cm)	7097±19 BP	6011-5925 cal. BC	6019-5912 cal. BC
XA57730	TV-2022-404	Charcoal	Tr4 – Con 6 (130 cm)	7048±17 BP	5975-5914 cal. BC	5994-5891 cal. BC
XA57731	TV-2022-407	Charcoal	Tr4 – Con 9 (168 cm)	7663±18 BP	6499-6457 cal. BC	6566-6449 cal. BC
XA57733	TV-2022-302	Charcoal	Tr3 – Con 14 (178 cm)	7258±18 BP	6201-6065 cal. BC	6210-6060 cal. BC
XA57734	TV-2022-305	Charcoal	Tr3 – Con 22 (234 cm)	7520±18 BP	6424-6392 cal. BC	6441-6276 cal. BC

7. The CNS Type vs Djeitun type

Unfortunately, Coon published little about the Neolithic sherds from the caves in his publications except for a short 1-page report and drawing of two sherds. One of his colleagues, Matson, wrote a short report on only four sherds; Matson attributes three of them to the early pottery horizon, which we believe might be the beginning of the CNS type. These sherds are between 5 and 10 mm thick, and their mixture is organic material. Their slips are light yellowish brown (2.5YR6/4), olive brown (2.5YR4/4), and yellowish olive (2.5YR6/6) in Munsell's color chart. According to Matson's report, the gray core indicates they were fired at low temperatures. The holes, with widths between 0.5 to 4 mm, indicate different degrees of the pottery porosity (Matson, 1951). Robert Dyson (1991) was the first person to examine the Hotu and Kamarband pottery assemblages, which were kept in the University of Pennsylvania Museum. Based on these assemblages, Dyson proposed three horizons; the first two belonging to the Pottery Neolithic, and the

last horizon belonging to the Cheshmeh-Ali ware of the Sialk II period (ca. 5300-4400 BC)³. Dyson introduced the oldest as the CNS type, which he dated to ca. 6600 BC (Thornton 2013: 243); Fired at low temperatures, handmade, chaff tempered, thick and fragile bodies, with a light buff-brown, chocolate-brown, and red-washed slip, are the features that Dyson listed for the CNS type; although the Neolithic sherds in almost all of cultures are handmade, but to confirm, on some of the sherd's body (in Touq Tappeh and Tappeh Valiki), especially the thick ones, we can clearly observe the traces of fingers (Fig. 3) The most common form was a deep bowl, more like a beaker, with slightly concave walls and a rounded rim (Fig. 4). He then introduced the next horizon, the Djeitun type, which according to Harris, dates to 6100 BC (Harris, 2010: 120); the features are fired at low temperatures, chaff tempered, thick pinkish-buff slip, and decorated with simple linear motifs (Fig. 4: NO. 7). On the other hand, Masson and Sarianidi described Djeitun type as a yellowish-white slip, chaff tempered, handmade, with a carefully polished surface (Masson and Sarianidi, 1972). Coolidge, following Berdiev, attributes the Djeitun potteries to have buff and red slips; she also states that it is not clear if Berdiev refers to the colors of the paste or slip. However, in her thesis the slips of the Djeitun sherds are mostly buff and red. Coolidge introduces the Djeitun culture as an exchange culture (except pottery) that produced pottery at the household level. According to her, the potteries were fired in quite low temperatures and probably in open kilns. She believes that there are generally two pottery types in the Djeitun culture sites: 1) potteries with chaff temper, which were made in the Early and Middle phases (final 7th to mid-6th millennium BC); and 2) potteries with mineral temper (sand), which appeared in the Late phase (late 6th millennium BC). She states that the use of sand as a temper was related to annual production, while the chaff tempered, mostly of stalks and straw of wheat and barley as well as some grains and grass, were produced after harvesting and indicated seasonal production (Coolidge, 2005: 110).

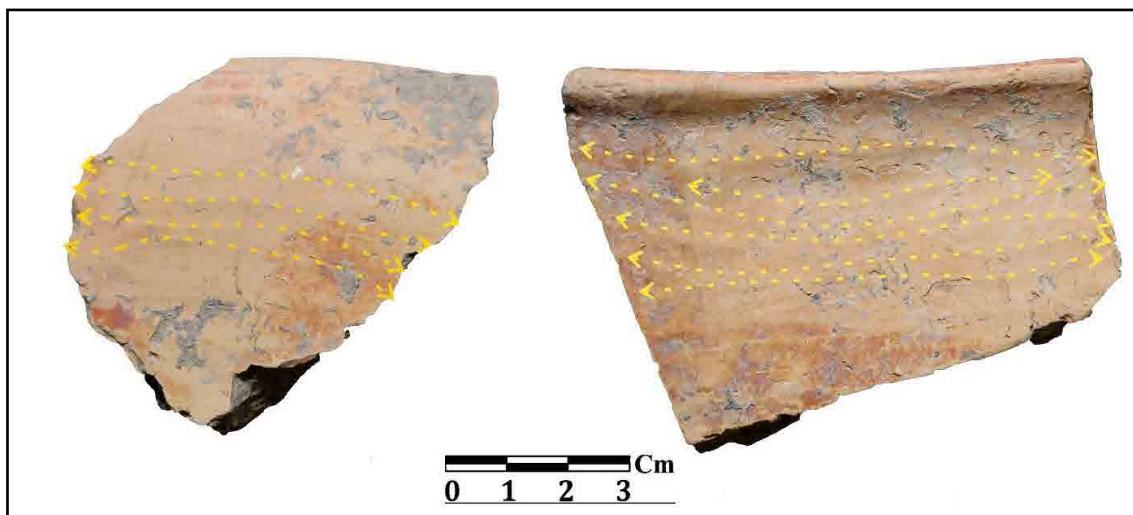


Fig. 3. Sherds with traces of fingers from Tappeh Valiki

Excavations at two PN sites, Touq Tappeh and Tappeh Valiki, have brought us new data to understand the early pottery production in eastern Mazandaran. Compared to the features that Dyson listed for the CNS type, we are observing more varied details in these assemblages. Starting from the oldest date, 6600 BC at Tappeh Valiki, the sherds

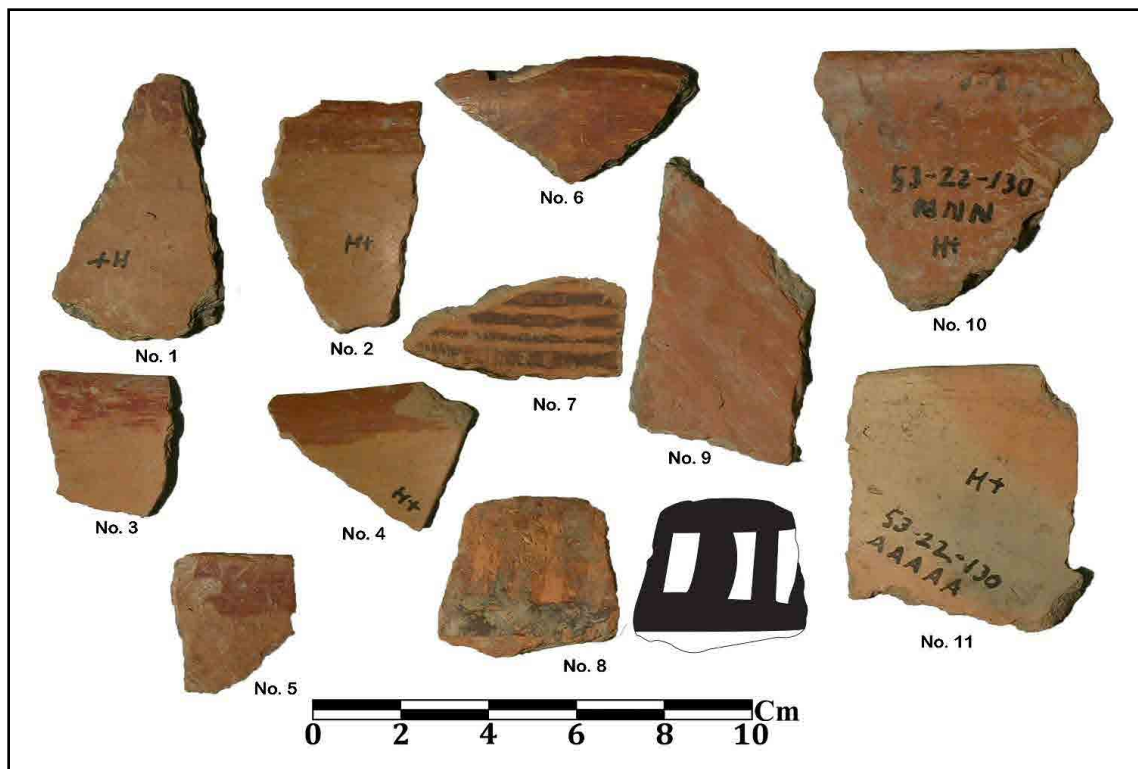


Fig. 4: Neolithic sherds from Hotu Cave (photo by Christopher P. Thornton).

are handmade and mostly thicker than 7 mm, up to 3 cm, though there are sherds as thin as 3 to 4 mm too. All the sherds have chaff temper; although they have been rated from coarse to fine, a few sherds have a mineral temper too; the mineral temper can be because of either lacking chaff in temper or added by potters to temper specifically, although we need petrographic analysis for more reliable results. Using coarse chaff in the majority caused high porosity of the sherds; however, there are sherds with low porosity as well due to the use of fine chaff. Almost 90% of the sherds were fired at low temperatures. Besides beakers, rim sherds show forms such as shallow open-mouth bowls, deep bowls, pots with a baked rim, and deep closed-mouth bowls. Base sherds show forms such as shallow flat-bottomed bowls, deep flat-bottomed bowls, and shallow dishes (Tables 4 and 5). The slips are varied, including pink, red, brown, yellow, white, and a grayish-brown spectrum, with pinkish, yellowish, reddish, and brownish being more frequently used. These features continued to appear until the end of the PN at Tappeh Valiki (6600-5900 BC) and Touq Tappeh (6250-5800 BC).

Pottery from Djeitun have been already described (see above); however, it is worth looking at the pottery features of a few other Djeitun sites in northeastern Iran. At Pookerdvall in Gorgan Plain, Neolithic sherds are all handmade, chaff tempered, with thick yellowish-buff (mostly), brown, and red slips; most of the sherds have complete firing (Zeyghami, 2009). Neolithic sherds from Aq Tappeh, another PN site in this region, are handmade, sand tempered, and low-fired; there is no mention of slip, although the excavators proposed two different slip colors on some of the sherds (Malek Shahmirzadi & Nokandeh, 2000). Recent excavation at Eastern Sang-e Chakhmaq yielded 2,900 Neolithic sherds which, according to the excavator, indicate the same features in all

layers. The majority of the sherds have incomplete firing which causes a grey or black core; all are handmade and chaff tempered (coarse to fine). The most frequent slips are light brownish-cream, cream, orange, or buff-cream (Roustaiei *et al.*, 2015; Roustaiei, 2014). Pottery from two other PN sites, Deh Kheir and Kalateh Khan, are the same as the Eastern Sang-e Chakhmaq type; however, at Deh Kheir, the majority of the sherds are well-fired (Rezvani and Roustaiei, 2016; Roustaiei, 2016b). Looking at Tables 4 and 5 and comparing the forms from PN sites (including eastern Mazandaran), we observe that the forms remain the same from the earliest time and even continued into the Chalcolithic periods.

Since the forms and production methods of pottery in these sites show almost the same pattern from the lower to the upper layers, it seems that decoration is more suitable for comparing the CNS and Djeitun types. Regarding the motifs on pottery, three groups can be identified in the Touq Tappeh and Tappeh Valiki assemblages. The first two groups are the CNS type with differences in motifs. The first painted sherds group includes colored bands on the rim that Dyson mentioned as one of the specific features of the CNS type (Fig. 4: No. 1-5). At Tappeh Valiki's earliest PN layers, 6600 BC, this motif appeared (Fig. 5: No. 1, 2, 5, 6) and continued until the end of occupation in both sites (Fig. 6: No. 16, 18; Fig. 7: No. 18; Fig. 8: No. 6, 33), although there are other motifs too (Fig. 5: No. 3). Note that the color bands also appear on the interior part of the rim and mixed with other motifs as well (Fig. 6; Fig. 8; Fig. 9). Another painting method is the Decorative Outer Slip (DOS); it seems that very thin layers of color have been added to sherds using feathers or plants (Asadi Ojaei *et al.*, 2024a). This method appeared for the first time at Tappeh Valiki, context 23, belonging to 6450 BC (Fig. 7: No. 6); this method continued to appear on the sherds until the end of occupation in both sites. The only comparable examples outside eastern Mazandaran were found at Pookerdvall and Aq Tappeh in the Gorgan Plain (Table 6). This method has not been reported from other PN sites in northeastern Iran.

The second group was thought to have been seen only in sites inside the plain, by excavations at Tappeh Valiki and Touq Tappeh. However, a similar sherd was also recognized from Coon's excavation's pottery assemblage of Hotu Cave (Fig. 4: No. 8). The motifs of this group include various types of horizontal ladder on the rim, and some include colored bands on the inner part of the rim (Table 7). While some are very accurate and fine, others show inaccurate painting by carelessness and poor quality. This group was recovered in contexts 15 and 16, TT2, at Touq Tappeh, and context 6, Tr4, at Tappeh Valiki, and according to the dating, they appeared in both sites from 6000 BC until the end of their occupations. Unfortunately, we do not know the date for the sherd from Hotu cave.

The third group is inter-regional sherds, due to similarities with the Djeitun type, and has been recognized in Gorgan Plain sites such as Aq Tappeh and Pookardvall, on the plateau at sites such as East Sang-e Chahmakh, Kalateh Khan, and Deh Kheir, as well as at Djeitun culture sites in southern Turkmenistan (Table 8). The first inter-regional group is the shady motif^f recovered from Touq Tappeh and Tappeh Valiki, dating to 6000 BC. This motif in the Djeitun culture appeared from Phase I, which belongs to the final 7th and early 6th millennium BC (Coolidge, 2005). Another motif is the crossed lines in the form of grid designs or, as Coolidge named it, net designs. The motif has only been found at Touq Tappeh and dates back to 6250-5800 BC. Similar sherds have been observed

Table 4: common forms of rim sherds

Form	Touq Tappah	Tappah Vahis	Hetu	Pookeravall	Sag-e Chokhamaq	Kalateh Khan	Deh Kheir	Djerun
Shallow and Open Mouth Bowl								
Beaker								
Pot with Beaked Rim								
Deep and Closed Mouth Bowl								
Deep Bowl								

Table 5: common forms of base sherds

Form	Tong Tuppeh	Tuppeh Vahki	Horu	Pookardvall	Sang-e Chakhmaq	Kalahet Khan	Dah Kheir	Djeitun
Shallow Flat-Bottomed Bowls								
Flat-Bottomed Deep Bowls								
Shallow Dishes								

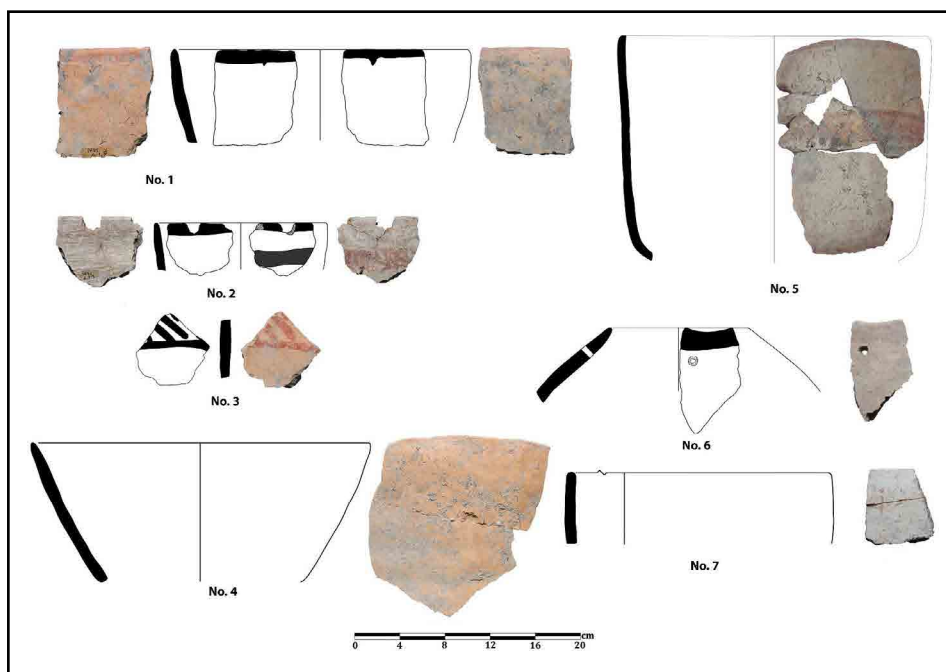


Fig. 5: Selections of Neolithic sherds from Tappeh Valiki, context 9.

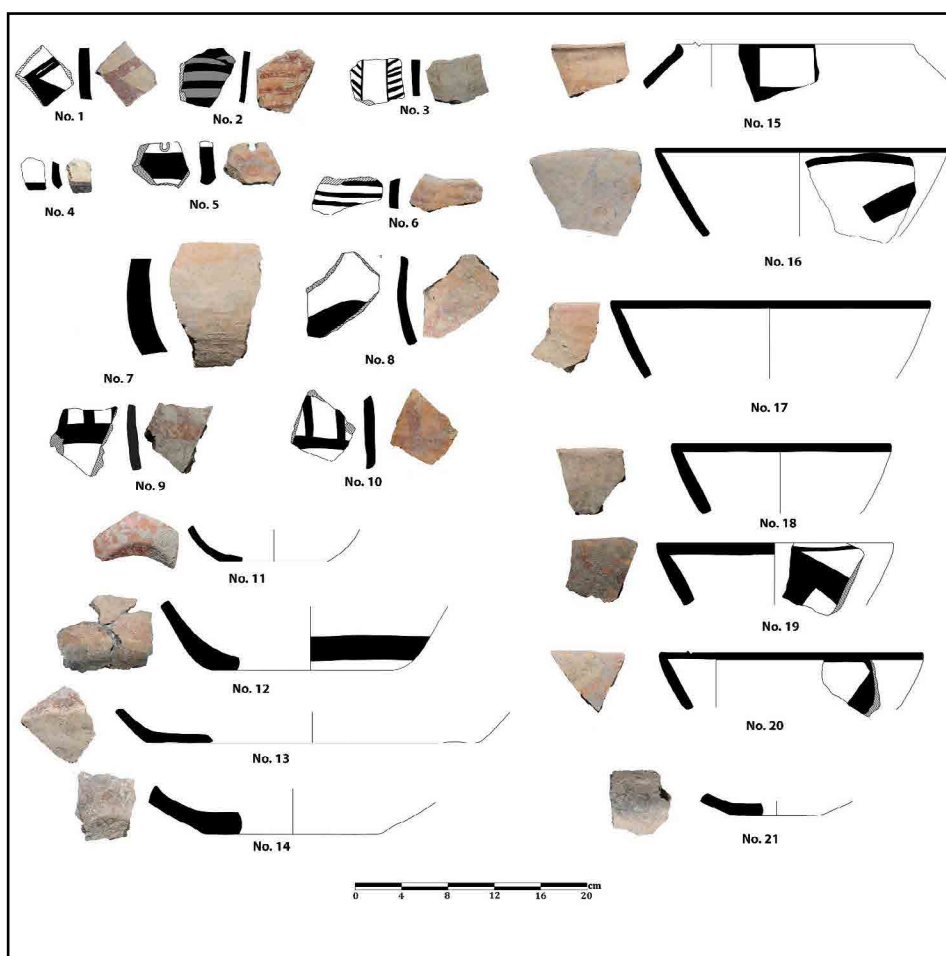


Fig. 6: Selections of Neolithic sherds from Tappeh Valiki, context 6

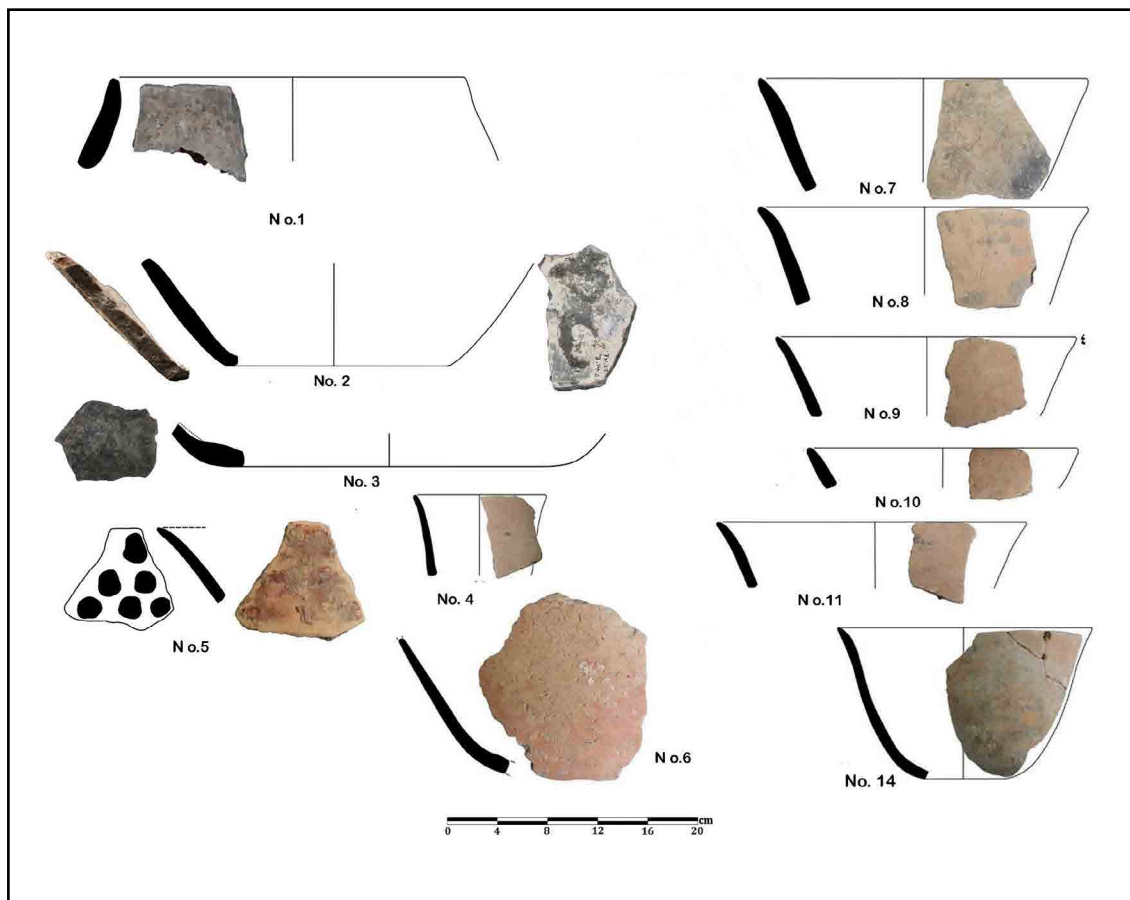


Fig. 7: Neolithic sherds from Tappeh Valiki, Tr3; context 14 (1-3); context 21 (4, 5, 14); context 22 (7-11); context 23 (6).

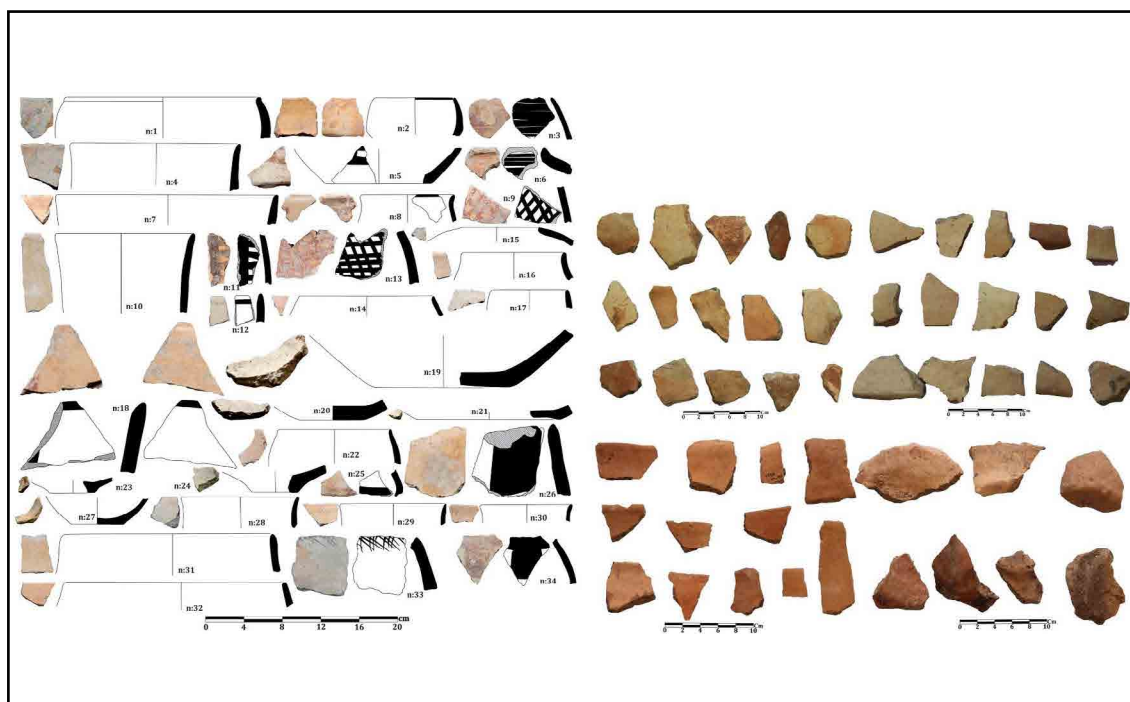


Fig. 8: Neolithic painted and plain sherds from Touq Tappeh, TT1

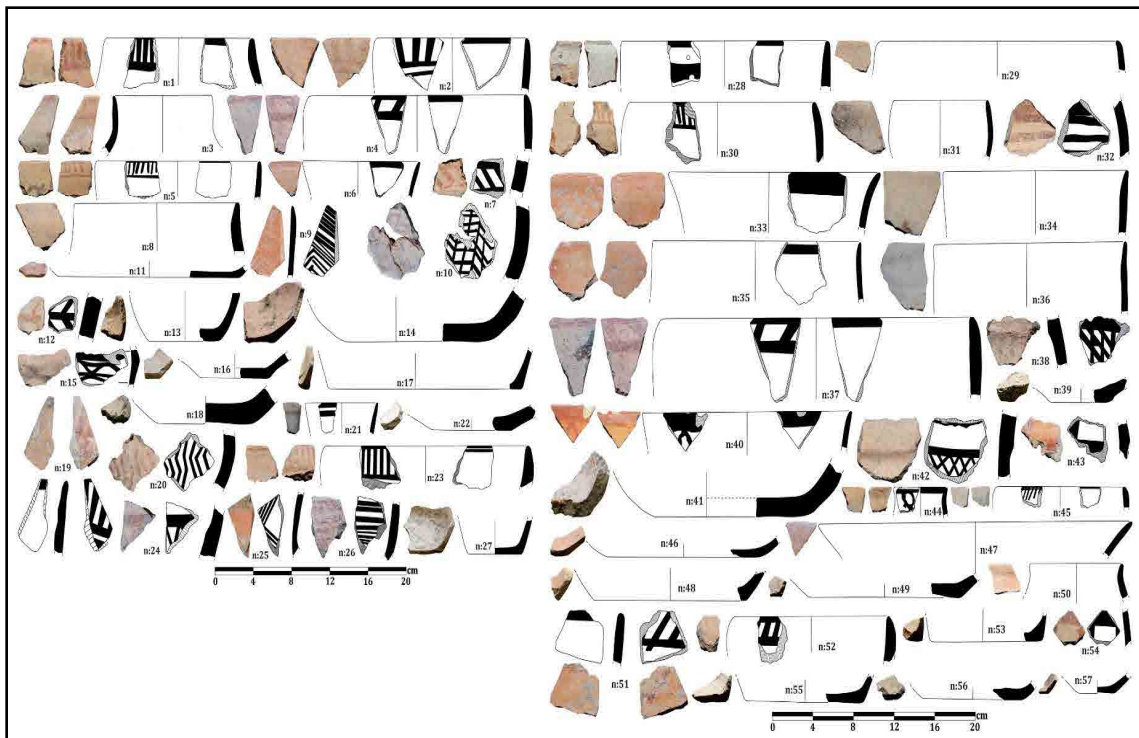


Fig. 9: Neolithic painted and plain sherds from Touq Tappeh, TT2

Table. 6: Sherds with the DOS decoration method

Touq Tappeh (Abbasnejad Seresti, 2020)	Tappeh Valiki (Abbasnejad Seresti and Nemati Loujendi, 2022)	Tappeh Abham (Abbasnejad Seresti, 2009)	Eastern Mazandaran (Atadi Ojsei <i>et al.</i> , 2024a)	Tappeh Pookerdvill (Zeyghami, 2009)

Table 7: Regional ladder motif sherds

Touq Tappeh (Abbasnejad Seresti, 2020)	Tappeh Valiki (Abbasnejad Seresti and Nemati Loujendi, 2022)	Seyed Qasim (Asadi Ojaei et al., 2024a)	Homa Cave (Photo by C.P. Thornton)

at Pookerdvall and Togolok (Fig. 10). Pookerdvall has no reliable dating, and Togolok belongs to Phases I and II of the Djeitun culture. However, according to Coolidge, the grid motif appeared from Phase II, which belongs to the middle 6th millennium BC. At Tappeh Valiki, context 21, a dots motif sherd was recovered. The dating of context 21, which is concurrent with context 22, is 6450-6300 BC. This motif has been observed in PN sites such as Sialk in the central plateau, East Sang-e Chkhmaq in the Shahrud plain, Dik Seyyed in the Gorgan plain, and Djeitun sites in southern Turkmenistan like Pessedjik, Togolok, Chopan, and Bami (Fig. 11). According to Coolidge, this motif, along with grid design, appeared from Phase II in Djeitun sites, which belongs to the middle 6th millennium BC. More sherds can fit into this group; however, due to the lack of proper pottery references, we cannot be sure yet (Fig. 12).

8. Discussion and Results

In recent decades, pottery connections between these regions in northeastern Iran and southern Turkmenistan led to the introduction of Sang-e Chakhmaq as the origin of the spreading Neolithic lifestyle (Roustaei, 2013; 2016a). The Western mound, due to only six sherds recovered in old and new excavations of the site (Masuda et al., 2013;

Table 8: Inter-regional group

Touq Tappeh		Tappeh Valiki	
Deh Kheir (Rezvani and Roustaei, 2016)	Kheir Abad (Roustaei 2014)	Aq Tappeh (Malek Shahmirzadi and Nikandeh, 2000)	Djeitun (Coolidge, 2005)
Yarim (Roustaei, 2016a)	Eastern Sang-e Chakhmaq (Roustaei et al., 2015)		Deh Kheir
Pookerdvall (Zeyghami, 2009)	Kalateh Khan (Roustaei 2016b)	Muzzafar Tappeh (Asadi Ojaei et al., 2024a)	Tappeh Fakhi (Asadi Ojaei et al., 2024a)

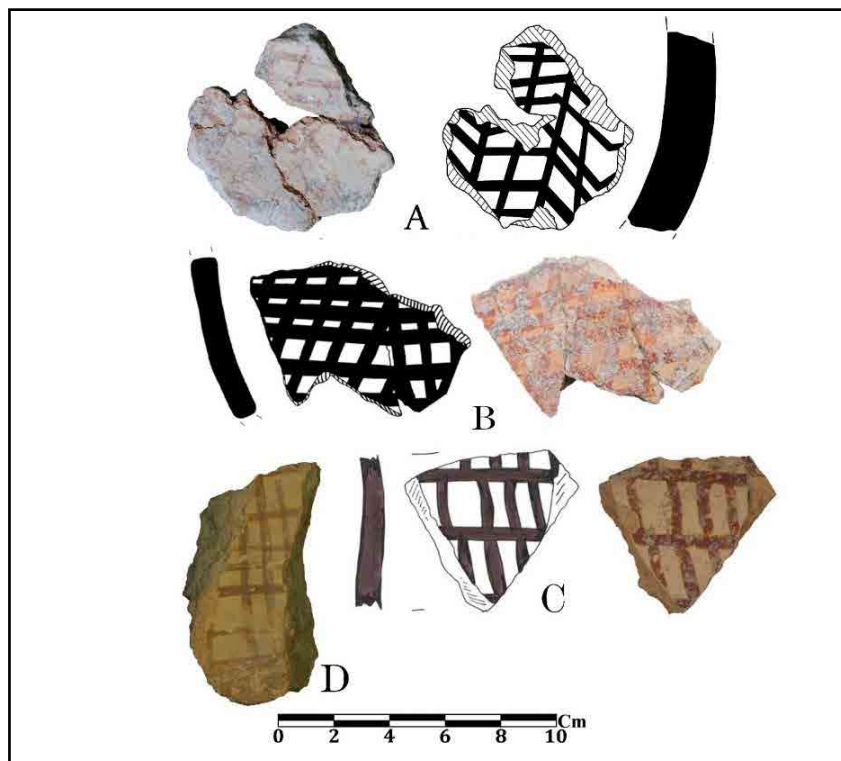


Fig. 10: Sherds with a grid pattern: A) Touq Tappeh, TT2, Context 16; B) Touq Tappeh, TT1, Context 13; C) Pookerdvall (Zeyghami, 2009); D) Togolok (Photo by S. K. Asadi Ojaei)

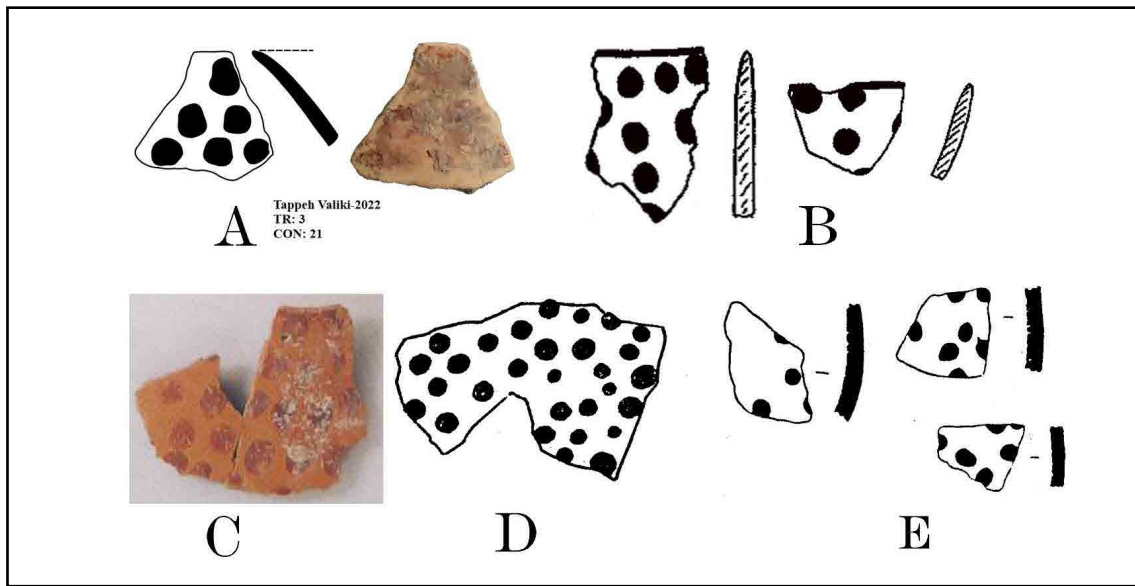


Fig. 11: Dot motif sherds: A) Tappeh Valiki; B) Sialk I (Ghirshman, 1938); C) East Snag-e Chakhmaq (Tsuneki, 2014); D) Togolok Phase 2 (Coolidge, 2005); E) Pessedjik (Coolidge, 2005)

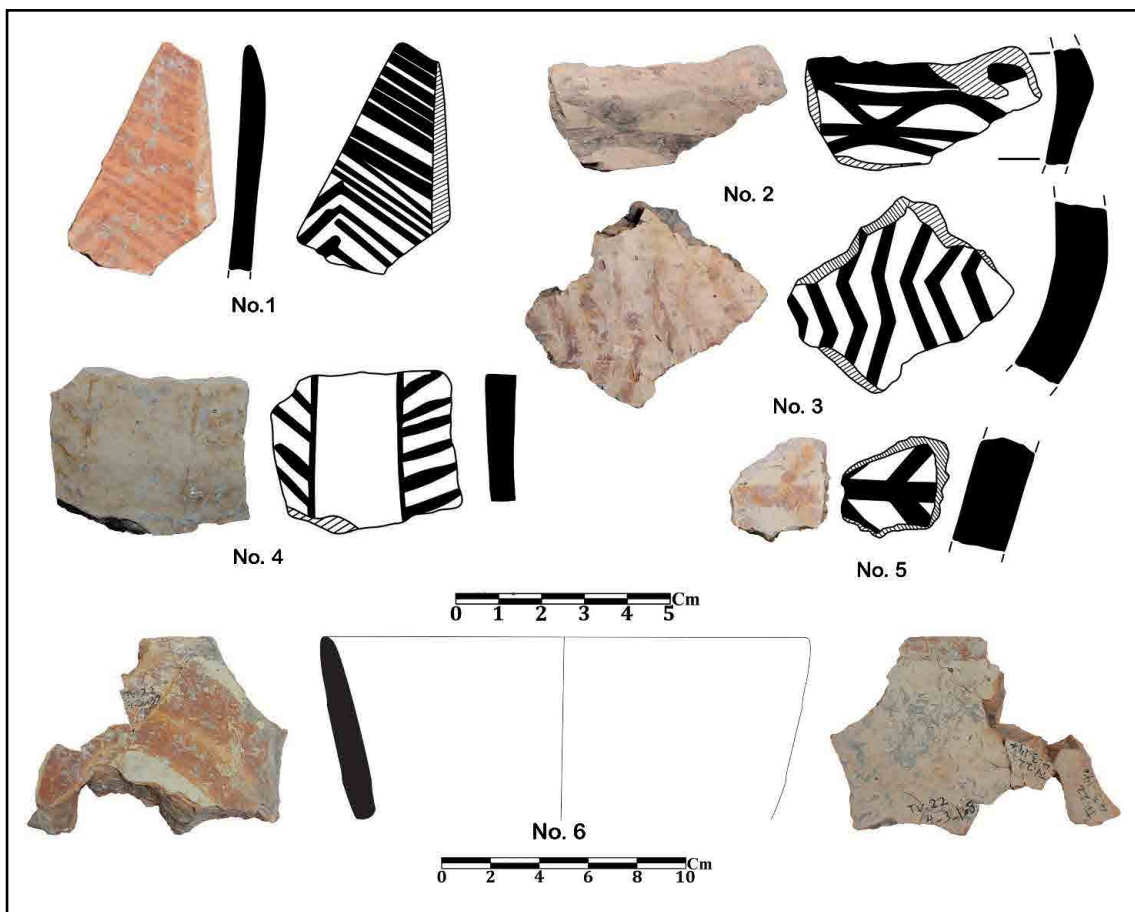


Fig. 12: Sherds that possibly belong to the inter-regional group: Touq Tappeh (NO. 1, 2, 3, 5); Tappeh Valiki (No. 4 and 6)

Tsuneki, 2014; Roustaie *et al.*, 2015), has been introduced as Aceramic/Proto-ceramic Chakhmaq and the Eastern mound as Ceramic Chakhmaq (Roustaie and Rezvani, 2021: 256). Additionally, Christopher Thornton stated that the origins of the Djeitun type probably should be sought in northeastern Iran, and at the time of publishing his paper, Sang-e Chakhmaq was a suitable nomination (Thornton, 2013), probably because the CNS type was not well described, and there weren't reliable dates from the PN sites of eastern Mazandaran. First, it should be stated that pottery and clay firing techniques did not appear suddenly in this region; Coon mentioned a baked clay figure and several pieces of baked clay in the Epi-Paleolithic layers of Hotu (Dupree, 1952: 253, 257). Also, Coon points out that, unlike a baked conical clay found in layer 10, the other ones in levels 11 and 12 are raw (Coon, 1951: 78). In the excavation of the Komishani open site, a few pieces of baked clay were found in the Epi-Paleolithic layers (Fazli Nashli *et al.*, 2017: 362). Therefore, the technology of pottery production was probably achieved gradually by the inhabitants before the PN started. The features that Dyson described for the CNS type were very general, while we can observe more detailed features by looking at the Touq Tappeh and Tappeh Valiki sherds. The slips are in the pink, yellow, red, and brown range; the temper is mostly chaff, which differs from coarse to fine, and also mineral. Likewise, the thickness differs from 3 cm to 3 mm, and the porosity differs from high to low. The firing also differs from low firing to well-firing and probably was done in open kilns. The forms mentioned above from Tappeh Valiki and Touq Tappeh, compared with the Hotu and Kamarband pottery assemblages (Gregg and Thornton, 2012; Fazli Nashli, 2021a) and other Neolithic sites of eastern Mazandaran (Asadi Ojaei *et al.*, 2024a), show many similarities. In the inter-regional scope, such forms can also be seen in sites such as Pookerdvall, Eastern Sang-e Chakhmaq, Deh Kheir, Kalateh Khan, and Djeitun type sites.



Fig. 13: The CNS type sherds gathered by Dyson from Sang-e Chakhmaq (Thornton, 2013: 248, Fig. 15.10⁵)

In his book *Cave Explorations in Iran 1949*, Coon reported the discovery of 174 pottery sherds from Kamarband Cave, all of which—except for a few pieces found at level 10 (the boundary between the Epi-Paleolithic and the PPN)—were obtained from level 7. Coon stated that level 7 is the period when the “Software type” (the CNS) was used, dating back to before 5000 BC (Coon, 1951: 78). The old dating of Hotu and Kamarband has shown that the PN culture exhibits the oldest Neolithic pottery in northeastern Iran. In Kamarband Cave, three dates from Trench C, 95-105 cm depth, for the PN layers have been presented. Greg and Thornton, with 68% confidence, recalibrated these dates to: 1) 8285-6466 BC 2) 7140-6000 BC 3) 7125-6030 BC (Gregg and Thornton, 2012: 91, Table 2).

Eventually, the date of 6610 BC was proposed by Dyson for the beginning of the PN. Another reason for this date can probably be seen in the paleo-climatic studies of the Caspian Sea. Alluvial and wetlands resulting from the Neo-Caspian transgression at 10,200 BP along with the warm and humid climate of the Holocene appeared after the 8.4k regression of the Caspian Sea in 8800-8400 BP, making the plains a very suitable environment for settling (Kakroodi *et al.*, 2015; Kakroodi, 2012). Preliminary sedimentological studies in the Tappeh Touq and Tappeh Valiki show that these areas were formed on these swampy and wetland sediments. Since both sites belong to the PN, it can be said that communities in the plains knew the pottery production technique very well; therefore, a relative date of 6600-6400 BC can be proposed for the start of the PN in the eastern Mazandaran. However, as mentioned, Coon’s dating and its calibration is not very reliable, and relative dating does not solve much of a problem for us. Therefore, it was necessary to gain new absolute dates from the PN sites. The new dating of the PN levels of Hotu shows a date between 6450-6350 BC, which is equal to the minimum relative dating we considered; however, C14 dating from Touq Tappeh and Tappeh Valiki shows a date between 6600-5800. Therefore, it seems likely that the CNS type is the oldest PN culture in northeastern Iran.

8. Conclusions

The excavations of Touq Tappeh and Tappeh Valiki are the first systematic excavations of the PN sites of the eastern Mazandaran plains carried out to study Neolithization and the food production process. Materials such as plants, bones, lithics, paleo-climatology data, and of course pottery were recovered for this study. Some of these materials have been studied, while others are ongoing. The necessity of studying Neolithic pottery at this site arose because there is no access to the CNS type of Hotu and Kamarband from Coon’s excavations. Therefore, the excavations of these PN sites are currently the only source providing knowledge of the CNS type. A preliminary study has shown that the majority of the sherds are similar to the features Matson and Dyson described from the CNS in the Hotu and Kamarband assemblage. However, they show more detailed features, such as mineral temper observed along with chaff temper, and despite the coarse and thick sherds, there are also very thin and fine ones.

The painted sherds can be divided into two categories, geometric and DOS based on the painting method, and based on motifs, they can be divided into two regional and inter-regional groups. The horizontal ladder motif that was previously thought only to be found in plains, had a similar sherd in Hotu assemblages from Coon’s excavation. The inter-regional group, which includes a few pieces, is comparable to sherds from sites

Also, regarding other physical features such as temper, slips, firing, porosity, and thickness, the CNS and Djeitun types show many similarities. In addition, the pottery gathered from Sang-e Chakhmaq during Robert Dyson's visit to the site was analyzed petrographically by Christopher Thornton. He stated that in the uppermost layer of the Western Sang-e Chakhmaq, which is highly disturbed, a large number of reddish-brown sherds with a highly burnished slip were gathered, indicating the initial stages of pottery production. Dyson (Dyson, 1991: 226) without a doubt, considers them to be the CNS type (Fig. 13). Thornton stated that in general, there is not much difference between the materials of the CNS and Djeitun type sherds from Sang-e Chakhmaq. The only distinguishing feature is the white to cream slip in the Djeitun sherds and the pinkish-buff slip in the CNS sherds (Thornton, 2013).

However, comparing the motifs between these two types indicates very little connection between eastern Mazandaran and adjacent regions. So far, dots, shady, and grid patterns have been introduced as motifs that establish this poor connection, although other sherds might show more similarities. The Djeitun type motifs (Fig. 14) compared to the CNS type are very different; in phase I, the motifs generally include wavy or straight horizontal stripes on both sides of parallel vertical lines, bracket-like designs, and rarely triangular motifs. In phase II, the previous motifs were replaced with delicate grid and dot patterns, and triangular patterns increased as well. In phase III, smaller and more crossed motifs appeared, and also for the first time, the insides of the sherds were painted. The motifs are in the form of horizontal wavy patterns, vertical zigzags, and tree-shaped patterns (Masson and Sarianidi, 1972; Coolidge, 2005). So far, none of these motifs have been observed in Neolithic pottery collections from the excavations in eastern Mazandaran.

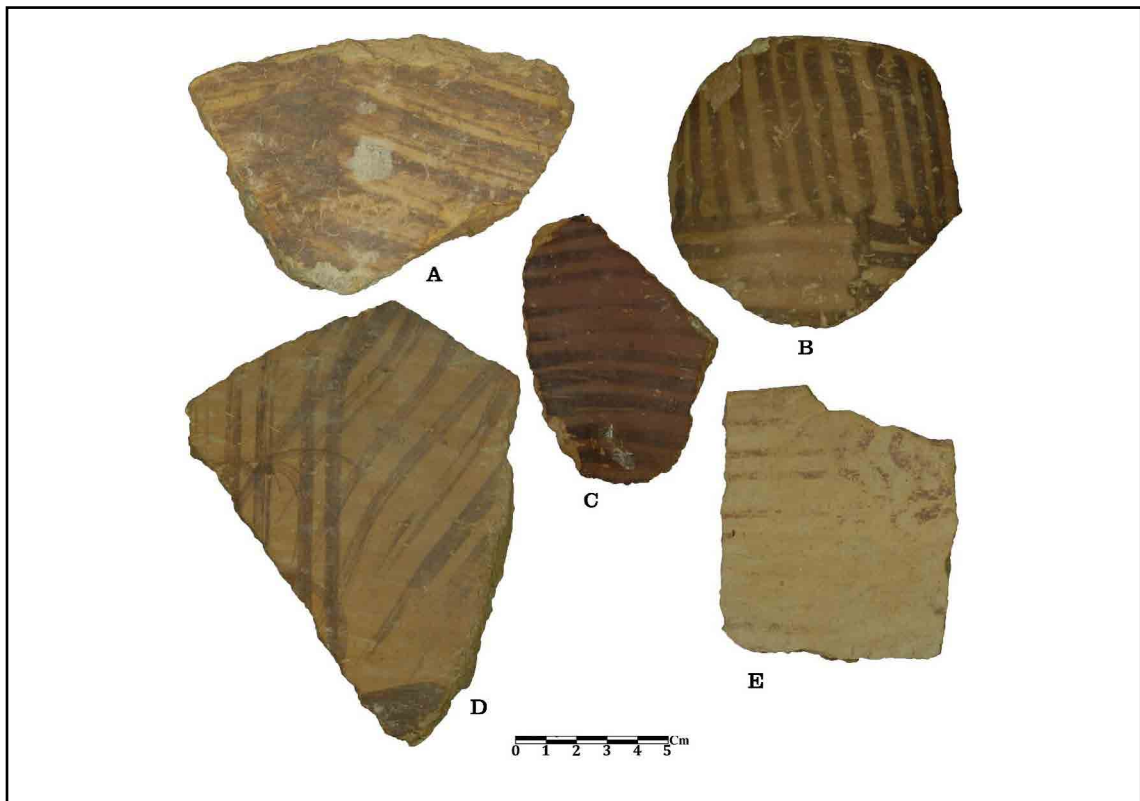


Fig. 14: Selections of the Djeitun type sherds: Djeitun (A, D, E); Togolok (B); Pessedjik (C) (photo by S. K. Asadi Ojaji)

such as Eastern Sang-e Chakhmaq in Bastam Plain, Pookerdvall, Yarim, and Aq Tappeh in Gorgan Plain and Djeitun sites in southern Turkmenistan. Although they have been introduced as inter-regional sherds, it does not mean that they are imported. Rather, the Touq Tappeh and Tappeh Valiki assemblage show a local and regional type, which we have called the CNS type, and they can be seen in all PN sites of eastern Mazandaran, both in the plains and highlands.

Relative dates show that the CNS type was produced in the first half of the 7th millennium BC and its roots can be seen in the fired figurines and clays in the Epi-Paleolithic of Hotu, Kamarband, Komishan, and the Komishani open site. The oldest dates presented for the PN sites in the adjacent regions belong to the end of the 7th and early 6th millennium BC, which is contemporary with the dating of the PN layers of Touq Tappeh. However, looking at the new dates from Hotu and Tappeh Valiki, the date of pottery production in the region has been pushed back to 6600-6400 BC. Also, designs such as dots indicate this motif might have been applied on sherds from Tappeh Valiki earlier than the Djeitun type. It is not known when and how the production of the CNS type began and spread in eastern Mazandaran and probably northeastern Iran, but now it can be said, with more certainty, that the CNS type is the oldest PN culture in northeastern Iran (Table 9).

Table 9: Chronology of Epi-Paleolithic and Neolithic of northeastern Iran and southern Turkmenistan

Region	Southeast Caspian Sea	Central Plateau (Chahar Boneh)	Semnan Plain (Sang-I Chakhmaq)	Northeast Iran (Qaleh Khan)	South Turkmenistan (Djeitun)
Period					
Epi-Paleolithic	14000-8600 BC	-----	-----	-----	-----
Pre-Pottery Neolithic	8600-6700 BCE	-----	7200-6600 BCE	-----	-----
Pottery Neolithic	6600-5800 BCE	6000 BCE	6200-5700 BCE	5800 BCE	6100 BCE

However, to answer the big questions, such as the origin of the PN of eastern Mazandaran (the CNS type) and northeastern Iran (Djeitun type); what happened to the CNS culture after the early 6th millennium BC; and the nature of pottery connections between eastern Mazandaran, northeastern Iran, and southern Turkmenistan; we need more excavations as well as petrographic studies of Neolithic sherds of Touq Tappeh and Tappeh Valiki sherds to compare them with other assemblages of regional and inter-regional sites. Another issue we face is the lack of absolute dates from the Gorgan Plain, as one of the possible paths of connection between eastern Mazandaran (the CNS type) and south Turkmenistan (Djeitun type). Finally, we need to collectively study and analyze the Neolithic pottery findings from eastern Mazandaran, northeastern Iran, and south Turkmenistan as a comprehensive dataset to gain insights and address the mentioned problems.

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10. Endnote

1. Above Sea Level
2. Calibrated by Calib Rev 8.1.0, based on dating provided by Coon for Kamarband Cave and McBurney for Ali Tappeh Cave (Asadi *et al.*, 2024b).
3. Dyson introduces the same pottery sequence in the Eastern Chakhmaq (Thornton, 2010)
4. This motif is formed by parallel color bands and between them is filled by very thin lines which are the same color but very pale. The name shady is translated from the Persian word
5. The photo on the original paper is black and white

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سفال پوک نوسنگی کاسپی در مقابل سفال جیتونی: تاریخ گذاری مطلق جدید از دوران نوسنگی باسفال شرق مازندران

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چکیده	تاریخچه مقاله
پس از گذشت ۷۰ سال هنوز اطلاعات بسیار اندکی در مورد دوره های فراپارینه سنگی، نوسنگی بدون سفال و نوسنگی باسفال در دشت های شرق مازندران داریم. روش های کاوش غیرقابل اعتماد، اعمال سلیقه شخصی در جمع آوری داده ها و تحلیل های نامشخص از جمله مسائلی است که در کاوش های کوون در غارهای هوتو و کمر بند با آن مواجه هستیم. علاوه بر این، هیچ گزارش دقیقی از سفال غارها توسط کوون وجود ندارد. در سال های بعد نیز تنها اطلاعات کلی و چند تصویر و طرح توسط باستان شناسان منتشر شد که اگرچه مفید بود، اما کافی نبود. در دو دهه اخیر با وجود کاوش ها و بررسی های میدانی انجام شده، تلاشی برای معرفی سفال پوک نوسنگی کاسپی صورت نگرفته است. توت تپه و تپه ولیکی، واقع در دشت نکا، دو محوطه فرهنگ سفال پوک نوسنگی کاسپی هستند که بیش از ۲۵۰۰ قطعه متعلق به دوره نوسنگی از آن ها به دست آمده است. تجزیه و تحلیل این دو مجموعه سفال نوسنگی نیاز به تجدیدنظر در مفروضات ما در مورد گونه سفالی را نشان می دهد. تنوع در تولید و تزئین منعکس کننده تولیدات خانگی است، اگرچه آن ها الگوی خاصی را در سطوح منطقه ای و فرامنطقه ای نشان می دهند. ما تصور می کنیم، در حالی که برخی محققین از این سفال با عنوان جیتونی/چخماقی یاد کرده اند، مقایسه آن ها با استفاده از تاریخ گذاری های مطلق جدید، احتمالاً داستان دیگری را بیان می کند. قطعات ارائه شده در این پژوهش را می توان به دو گروه تقسیم کرد؛ منطقه ای و فرامنطقه ای، که اکثریت آن متعلق به نوع پوک نوسنگی کاسپی هستند. قدمت طوق تپه حاکی از آن است که لایه های نوسنگی باسفال مربوط به ۵۸۰۰-۶۲۵۰ پ.م. است. در حالی که، تاریخ گذاری از هوتو نشان می دهد که این دوره در حدود ۶۴۰۰ پ.م. و در تپه ولیکی حدود ۶۶۰۰ پ.م. آغاز شده است. در نتیجه فرهنگ سفال پوک نوسنگی کاسپی در منطقه شرق مازندران در حال حاضر قدیمی ترین فرهنگ نوسنگی در شمال شرق ایران محسوب می شود.	صص: ۹۳-۶۹ نوع مقاله: پژوهشی تاریخ دریافت: ۱۴۰۳/۰۷/۰۱ تاریخ بازنگری: ۱۴۰۳/۰۷/۲۵ تاریخ پذیرش: ۱۴۰۳/۰۹/۱۸ تاریخ انتشار: ۱۴۰۳/۰۹/۳۰ کلیدواژگان: نوسنگی، سفال پوک کاسپی، نوسنگی باسفال، هوتو، کمر بند، جیتون، سنگ چخماق، توت تپه، تپه ولیکی.

ارجاع به مقاله: عباس نژادسرستی، رحمت؛ اسدی اجایی، سیدکمال؛ ژو، شیینگ؛ و خیری ملکشاه، هنگامه، (۱۴۰۳). «سفال پوک نوسنگی کاسپی در مقابل سفال جیتونی: تاریخ گذاری مطلق جدید از دوران نوسنگی باسفال شرق مازندران». *مطالعات باستان شناسی*، ۱۶(۲): ۶۹-۹۳. <https://doi.org/10.22059/jarcs.2024.382716.143299>