

A MESOPOTAMIAN TRADITION? AN ANCIENT MAP RELATED TO THE IRRIGATION SYSTEM OF THE OLD ELAMITE PERIOD FROM TAPPEH GĀRĀN, DEH LURAN PLAIN, IRAN

By MOHSEN ZEYNIVAND AND FERESHTEH SHARIFI

To Professor James Neely
In respect and admiration

Almost 50 years after landmark archaeological activities in the Deh Luran plain in southwestern Iran by Frank Hole, Kent Flannery, James Neely, and Henry Wright, the area was re-surveyed in 2016 and 2019 to assess the destruction of archaeological sites as a result of agricultural and expanded irrigation activities. During the surface survey on Tappeh Gārān two inscribed objects were found. The inscriptions yield some information on the economic and political importance of Tappeh Gārān in the Old Elamite Period. Textual evidence indicates that throughout the 3rd to the 1st millennia BCE, Mesopotamian rulers frequently invaded Elam and seized its principal centres, especially Susa. As the main corridor between Elam and its western neighbors, the Deh Luran plain is a major route between the two, especially in regards to the acquisition of raw materials by the Mesopotamians, including different kinds of stone and bitumen. Further, the abundance of water and fertile soil made the Deh Luran plain a desirable target for Mesopotamian polities. The inscribed objects from Tappeh Gārān consist of writings in Akkadian and geometric patterns that we think illustrate the outline of an agricultural scheme.

Introduction

The Deh Luran plain is a low plain along the foothills of the Hamrin ridge, i.e., the westernmost ripple of the Zagros Mountains. The Plain links Susa and Mesopotamia by an east-west route along the foothills of Zagros. Given the strategic location of the plain, it functioned as a corridor between Mesopotamia and Elam through the 3rd to the 1st millennia BCE (see Zeynivand 2019b). Michalowski and Wright (2010: 109) have focused on highlighting the importance of Deh Luran and the town of Arawa/Urua¹ (written URU×A^{ki}) in the second half of the third millennium BCE, discussing how this area played an important role as a centre of coalition and confrontation both in times of peace – as a commercial centre – and during times of war.

Some 50 years after joint research activities on the Deh Luran plain by Rice University and the University of Michigan Museum of Anthropological Archaeology (Hole, Flannery, and Neely 1969; Neely 1969; Hole 1977; Wright 1981; Neely and Wright 1994; Wright and Neely 2011), this area was re-surveyed in 2016 by an expedition from the Iranian Centre for Archaeological Research (ICAR) as part of a comprehensive exploration program entitled “the *Garmsiri* project”. The latter program was sponsored by the ICAR in order to assess the impact of extensive agricultural and irrigation activities on archaeological remains in southwestern Iran, including the Deh Luran plain.

The sad state of the Deh Luran plain and nearby plains as a result of the Iran-Iraq War of 1980–1988 and the ensuing construction and agricultural activities (see Abdi 2001; Zeynivand 2016a) is the outcome of irreversible damage to natural and human habitats, irrigation canals and ancient *qanat* systems. Many archaeological sites can no longer be located. Given the fact that the watercourses were the only variable component on the plain, Neely (1969: 9–24) carried out an intensive survey of the area and identified several locations in the centre of the plain in order to discern traces of

¹ The name of Arawa is mentioned in Mesopotamian texts throughout the second half of the third millennium BC. Steinkeller (1982) first proposed a range in the northwest of Khuzestan as a location for this city, based on Sumerian texts translated by Van Dijk (1978), and considering the term “The bolt of Elam” as well as bitumen sources —

there is a large bitumen spring, Ain Qir or Chesme Gir, on the north of the Deh Luran Plain. Then, Elizabeth Carter (Carter and Stolper 1984: 212, n. 275) considered Tappeh Musiyan in Deh Luran plain as an option for this city. However, we believe that Tappeh Gārān could also be another candidate.

ancient irrigation management in the area. Neely and Wright presented a preliminary reconstruction of the irrigation management scheme on the Deh Luran plain in prehistoric (Neely and Wright 1994) and historical (Wright and Neely 2010; Neely 2011) periods, thus demonstrating the potential for further research in the area.

Tappeh Gārān

Tappeh Gārān (locally pronounced Gharrān) is a large mound in Deh Luran plain, about 3 km east of the Dawairij River and 2.8 km north/northwestern of Tappeh Musiyan (Fig. 1). Tappeh Gārān now consists of a major conical mound of some 20 m height and five smaller mounds between 3–6 meters high in the eastern, western, and northern side of the site (Fig. 2), occupying a total area of about 17 ha (Wright and Neely 2010: 58). Tappeh Gārān is as large as Tappeh Musiyan but the colossal height of the main mound dwarfs Tappeh Musiyan in comparison. Surrounding the main mound are a series of rolling hills some 20 m wide, between which there is a depression that could be the remnant of a moat (Jotheri and Zeynivand 2021: 22).

Over 50 years ago, James Neely carried out an intensive survey on Tappeh Gārān and its vicinity in order to locate the possible ancient canals before modern agricultural expansions could damage them (Neely 1969). These activities included leveling of the land and digging of irrigation canals that have irreversibly changed the landscape. Today two small structures, a small room and a sheepfold, are visible on a small hill on the northern side of the site. Additionally, some fox-holes were dug on the northern and eastern marginal sides during the Iran-Iraq War, causing some damage to the site.

The material collected during the 2016 survey confirms that Tappeh Gārān was continuously occupied from the Early Dynastic Period to the late historical period, i.e. the time of the Parthians. Wright and Neely (2010: 59) estimate that the site was about 1.5 ha during the Early Dynastic period, 1.8 ha during the Sukkalmaḥ phase, 12 ha during the Middle Elamite period, and 17 ha during the Achaemenid period.

The human and natural disturbances to the site include the fox-holes and dense vegetation. The sampling was conducted in a different way on the main mound. The collection indicates that a larger area of the site was occupied in the Middle Elamite period than the area proposed by Wright and Neely. It seems that during the Neo-Elamite period, the site covered more than 12 ha (Wright and Neely 2010: 92; 97). Wright and Neely had already acknowledged that pottery styles

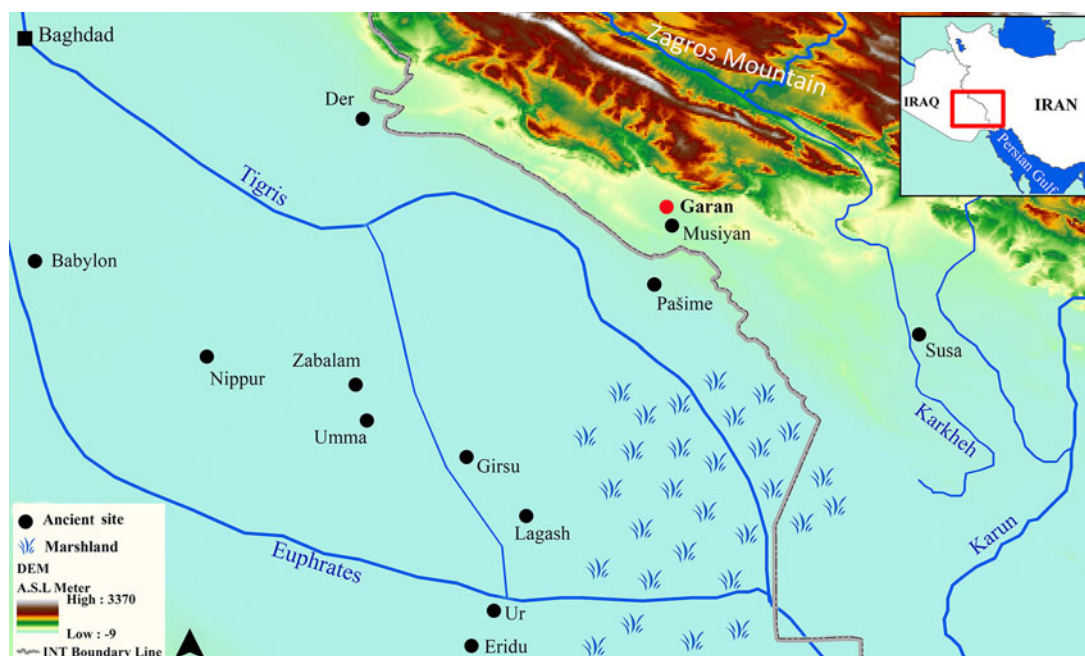


Fig. 1. Location of Tappeh Gārān in the Deh Luran Plain and Iran's southwest (Jotheri and Zeynivand 2021; Fig. 1)



Fig. 2. Aerial photograph showing of Tappeh Gārān (The view from the North)

of the Neo-Elamite and the Achaemenid periods are not readily distinguishable, specifically on the western edge of the Susiana, including the Deh Luran plain.

It seems that research at Tappeh Gārān, Musiyan, and Patak is particularly important for our understanding of complex issues in different periods of Elamite history, especially on the Deh Luran plain. Researchers have made great efforts to link these sites to the cities of Urua (Carter and Stolper 1984: 212) in the second half of the third millennium BCE or Madaktu during the Neo-Elamite period (de Miroschedji 1986). It is worth noting that Tappeh Gārān played an influential role in the plain because of its stratified sequence. Tappeh Gārān was the only occupied site on the plain during the end of the Middle Elamite period. Excavation at this site might therefore provide us with valuable information on the enigmatic Middle-Neo-Elamite transition to the Neo-Elamite period I. This latter period is particularly obscure due to the lack of textual information even at sites as important as Susa.

The Finds

A fragmentary inscribed brick was found during the 2016 survey on Tappeh Gārān (Zeynivand 2016b). Another fragmentary brick with an Akkadian inscription was found in a gully on the eastern side of the main mound. The transcription, translation, function, and ultimately, the possible dating of these two finds are discussed below.

In addition, more intensive survey was carried out in conjunction with the first season of “The Deh Luran Archaeological Project (DAP)” in 2019. In this season of surface surveys, we found more than 10 fragments of baked bricks (see Fig. 7b), some of which bear inscriptions, although these are heavily weathered and are not readable (Zeynivand 2019a). The general shape of these bricks suggests that they ought to belong to the time of the Third Dynasty of Ur as a large number of similar bricks have been discovered in Mesopotamia which date to this period. The baked bricks seem to all have come from the main mound (Area A) (Fig. 3), suggesting that we are dealing with a monumental building in this area.

In 2019, we carried out excavations at Tappeh Gārān, including Operation A1, a step trench on the northwestern top of the High (main) Mound to explore the stratigraphic layers, and Operation J1 to the west of the Main Mound to explore the so-called “moat hypothesis”. We also cleaned one of the fox-holes from the time of the Iran-Iraq War at the lowest part of the main Mound to study the lower

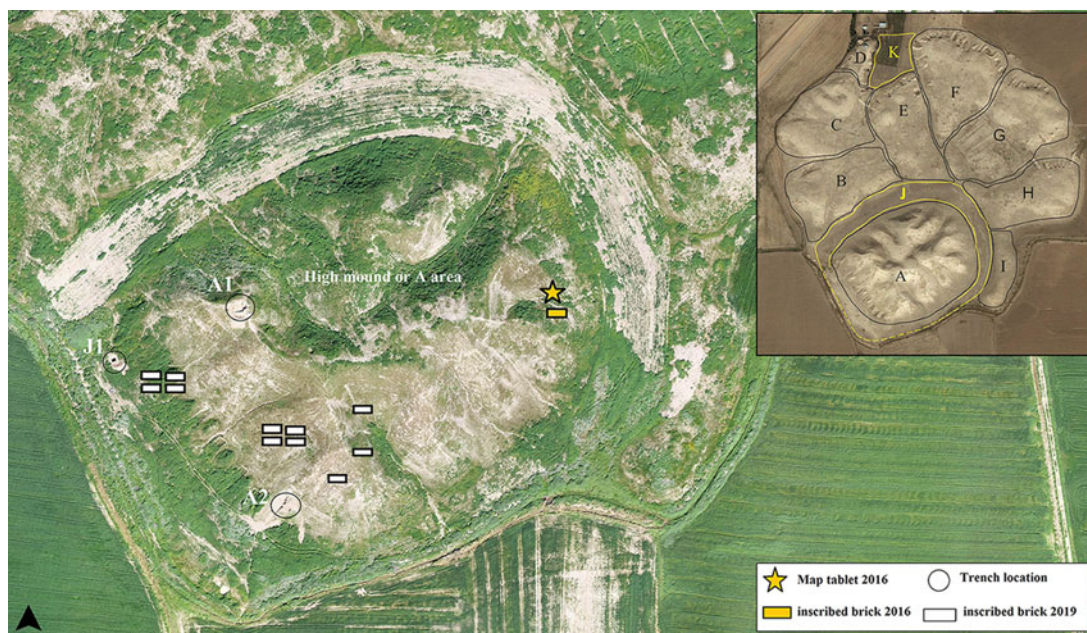


Fig. 3. Locations of the inscribed bricks found on the main mound

and earlier levels of the main Mound. In the two major operations on the main mound, free of the low occupation of the more recent periods (Achaemenid, Seleucid/Parthian), we found a large-scale mass of mud-bricks, presumably part of a massive construction that we mean to further explore in future seasons (Fig. 4). The surface pottery dates this area to the third to first millennium BCE (Fig. 5).

The first incised brick measures $12 \times 9 \times 3$ cm (Fig. 6). It is poorly preserved and broken on all sides. The brick was found on the eastern slope of the main mound of Tappeh Gārān. It was made of straw and sand tempered clay and its porous surface is heavily weathered. The modest but interesting marks on the brick are comparable to construction and irrigation plans from Mesopotamia in the second and third millennium BCE (cf. Liverani 1996). It seems that geometric intersecting lines on the main surface were depicted in a meaningful pattern. Outline 1, which seems to be the most important one, starts from the left side of the tablet and follows to the lower right side. Outline 2 includes straight lines intersecting in acute angles. The lines might be relevant to the line 1. Outline 3 includes two triangular shapes in the left part of the tablet. Outline 4 includes a few vertical lines crossed by a long diagonal line.

The second object is a partly broken inscribed brick (Fig. 7a). It was found close to the first brick on the eastern slope of the main mound. It measures $16 \times 8/5 \times 3$ cm in size. It seems that the object is the smaller part of a larger inscribed brick, which was exposed as a result of the erosion of the main mound. Transcription of the writings is difficult due to the eroded condition of the surface. However, some words could be transcribed and translated. The text is written in Akkadian and on the fourth line, the words of “son?”, “ruler’s name?”, “ruler?”, and “his chief” can be identified. A further PN may have been inscribed on the fifth line, but it is hardly discernible:

Beginning broken

1. DU[MU² ...]
2. [i]n- [...]
3. LU[GAL? ...]
4. *be-li₂-[šū]*
5. *i-x¹- [...]*

Rest broken

Translation:

Son/Daughter of ([...]) (2) [i]n- [...] (3) the ruler of ([...]) (4) his/her chief (5) i-x- [...].



Fig. 4. Massive mud-brick structures in two Operations A1 (a) and A2 (b) (Photograph by. Ramin Yashmi and Mohsen Zeynivand)

The Possible Function of the Drawing on the Brick

The Tappeh Gārān inscribed bricks bring up questions as to their possible functions. First, what was the initial intention of the incision of simple straight lines in a complex pattern on a clay brick? Does the historical evidence provide us with a probable clue of its function? Are we looking at something like an economic tablet that shows the economic/ political mechanism of a society or is it just an evidence of an



Fig. 5. A selection of Early Elamite Ceramics from operation A2



Fig. 6. Brick with incised map of Gārān

infant's playful game? Setting all the evidence together, we could arrive at a fairly reasonable hypothesis about the function of the object. Its resemblance to Mesopotamian multifunctional maps or plans is the first indication that might lead us to its function. These maps were utilized as the proposed plan of urban facilities, constructions, irrigation management, agricultural activities, etc. (cf. Liverani 1996). The earliest example of a regional map dated to the Old Akkadian period, is generally known as the 'Gasur Map' (CDLI no. P213268 = HSS 10/1). The map shows an agricultural estate situated between two rivers in the middle of a mountainous region where the Akkadians had expanded their cultural leverage. The possibility exists that similar plans and maps were drawn (Millard 1987: 115). We should note that no examples of geographical maps have yet been found in the area neighboring Mesopotamia, i.e. Elam.

We tried to orient and locate the lines of Brick No. 1 (Fig. 6) according to the actual geographical features of the area surrounding Gārān in the Deh Luran Plain. Interestingly enough, the lines showed similarities with the current geographical features of this place (Fig. 8). First, we needed to locate the



Fig. 7. Inscribed bricks from Tappeh Gārān (Photograph by. Ramin Yashmi and Mohsen Zeynivand)

main water resources on the drawing. The Dawairij river was chosen as the first indicator due to the fact that it is the major south-flowing river in the Deh Luran plain. It flows from north to the south, through the Deh Luran and Musiyan regions and finally meets the Tigris in the territory of present-day Iraq. This river flows on the eastern side of Tappeh Gārān. We assumed that the first line of Outline 1 was a representative of the Dawairij. Outline 2 includes lines forming a geometric pattern. This too could be considered either as the irrigation canals or borders of agricultural fields. The triangular shapes (Outline 3) might signify the mountains where the rivers flow from. Outline 4 could represent mathematical accounts or the *wood-line system*,² or perhaps, it is a barrage of wood and reed that raises the water level (Fig. 8). The last option seems to make more sense. These barrages were created when the river's water level was low, and such techniques have

² The wood-line system refers to the contractual water division of agricultural fields. The system has been applied by local farmers until modern times.

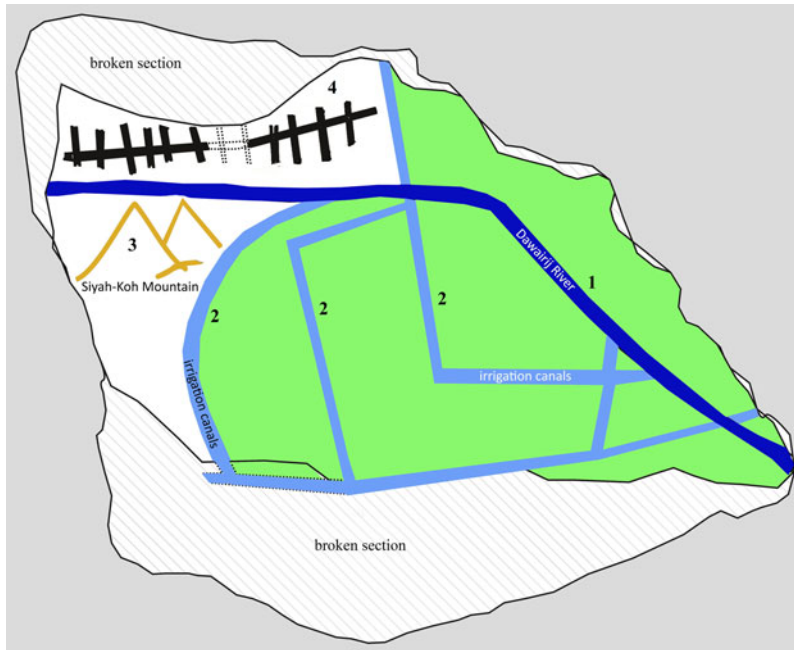


Fig. 8. Drawing of the map outlines (Drawing by. Fereshteh Sharifi)

been reported both in the Northern Khuzestan plain (Lambton 1953: 216; Graadt van Roggen 1905: 168–169) and southern Iraq (Rost 2019: 35–36) in contemporary centuries. Study of the Ur III texts provides convincing evidence that the water levels in the ancient Tigris were controlled by devices very similar to the barrages documented for the early twentieth century AD (Rost 2019: 36). Thus, the above method is considered a possible option due to the deep bed of the Dawairij River and its lack of water for more than half of the year.

The river Dawairij rises in the Siah-Kouh region of the Zagros Mountains and passes through the plain (see Fig. 9). Based on the remains of irrigation systems such as the canals and *qanats* (Wright & Neely 2010: 104), people supplied their needed water in this area during the Elamite Period by such means. Hence, a process of careful planning of irrigation management was needed by people living on the plain.

To date, four maps inscribed on tablets pertaining to irrigation systems in Mesopotamia have been recorded from Larsa (?), Nippur, Sippar, and Babylon (Wheat 2012: 79–80). The maps share similar lines in common. The canals and rivers represented with the lines in the Mesopotamian maps are also similar to the Gārān map. We also should note that a great majority of maps, specifically the constructional ones, were depicted without lines during the Old Babylonian Period. The Gasur map dating to the Old Akkadian period (Meek 1931: 2) also shares common features with the Gārān map. The Gasur map depicts rivers rising in the mountains. However, the styles of depiction of the maps differ in the shape of the mountain.

Water Resources and Water Management on the Deh Luran plain

The lowlands of southwestern Iran referred as “Greater Susiana” cover many smaller plains and river valleys that lie north of the Persian Gulf (Kouchoukos 1998: 80; Moghaddam 2012: 1–2). This region extends from the Mehran Plain on the west side to the Zohreh Plain on the east side and shares many similar cultural and natural features. The Deh Luran plain lies within the semi-arid steppe of the Zagros foothills (cf. Hatt’s 1959 “Assyrian Steppe”) being a biotic province at an elevation of about 150–300 m asl (Neely 2011: 21). The similarity of climatic and environmental conditions of the Deh Luran plain and other parts of Greater Susiana caused human communities to create the first simple water supply canals from the end of the sixth millennium BCE.



Fig. 9. Satellite image of the location of Tappeh Gārān toward the Dawairij River, Mountains and Tappeh Musiyan. The lines that are numbered are the ancient channels that James Neely identified (courtesy Google Earth 2018)

The earliest evidence for irrigation farming in the Deh Luran plain is known from botanical samples from Tappeh Sabz (Hole, Flannery and Neely 1969) and dates back to the second half of the 6th millennium BCE. The Dawairij, Meimeh, and Ab-i Garm springs are considered to be the principal irrigation arteries on the plain. Despite its bitter and meagre amount of water, the Cheshmeh Ghir is another major source of water on the plain.

Kirkby (1977: 286) points out that climate changes during the 3rd millennium BCE instigated the down-cutting process of the Deh Luran riverbeds. Remnants of dams, built to raise water up to the level of intake canals, have been attested throughout Khuzestan (Graadt van Roggen 1905). Kirkby provided evidence for a similar phase of down-cutting river systems in upper Khuzestan after 2000 BC and suggested this was a regional rather than local phenomenon. The requirement of such dams across all rivers in Khuzestan strongly supports Kirkby's case (Heyvaert *et al.* 2013). However, Wright and Neely (2010: 104) suggest that *qanats* possibly began to be used during the 2nd millennium BCE, in order to access the Dawairij water resource which supplied enough fresh water for agricultural activities. They state that Tappeh Gārān was the only site that supplied its water by *qanats* and canals from the Dawairij, at the Ab-i Gram spring, and the Ain Qir spring during the Elamite and Achaemenid periods. Inscriptions discovered from the Elamite period in Susa show that several princes built bridges and irrigation canals (see Graadt van Roggen 1905).

It seems that the course of the Dawairij River changed during the 4th to 2nd millennium BCE. Tappeh Gārān is located where the Dawairij merges with the Meimeh. If this change in their path occurred as described by Kirkby (1977: 287), it would suggest that environmental change may have been the initial motive for settlement formation at Gārān. Replacement of Musiyan by Gārān, as the major site on the plain in the second half of the 2nd millennium BCE was therefore a side-effect of the change in the course of the Dawairij. Durable human settlement like in ancient Mesopotamia was only possible along river channels and canals, and changes in watercourses would be accompanied by changes in settlement locations (Altaweel *et al.* 2019). Careful management of Gārān's water resources was therefore necessary in order to satisfy the daily use of

inhabitants as well as agricultural consumption. Nevertheless, new studies about palaeo-channels in the region are needed, in the spirit of Jafar Jotheri's (Jotheri 2016) work in southern Mesopotamia, including relict rivers, canals, and Qanats, through imagery analysis and using AMS dating, among other dating methods.

Conclusion

Cuneiform texts show that during the third millennium B.C., channel cleaning was taking place, and we now find unequivocal evidence of the presence of major excavated canals (Nissen 1988: 96). From the period of Akkad until the middle of the first millennium B.C., in addition to the textual evidence, drawings on clay tablets indicate that a predetermined plan had been devised to manage the construction of temples, houses, land, farms, and so on. Some of the plans are no more than sketches, perhaps school exercises, but others are carefully drawn, with detailed measures of the walls and the measurements of the rooms marked precisely in cubits (Millard 1987). Based on the existence of similar geographical features, comparable samples from the neighboring area in Mesopotamia, and the inscribed bricks discovered in our 2019 excavation that are similar to those found in Mesopotamia, we suggest that the drawing on this brick may have been a preliminary 'map'. One might consider this as comparable to a school tablet due to the blank spaces and line drawings. With regard to the current samples of school tablets, we have not yet witnessed such depictions as scribal school exercises on school tablets. Further archaeological excavations are needed to expose the layers in which these inscriptions and drawings were found. The currently observable remains on this part of the mound's surface show a large structure of the early second and late third Millennium BCE. Brick No. 1 accompanied by the illegible writing of No. 2 near this area might be an indicator of the building's function as a temple or a governmental citadel.

The Akkadian inscribed brick, as well as our interpretation of the irrigation system, underline the importance of Tappeh Gārān as a political and economic centre in the western borders of Elam. The strategic location of Gārān, easy access to the main road from Susa to Mesopotamia, adequate water resources, abundance of mineral materials, including bitumen and a wide variety of stones, and the alluvial sediments suited for agricultural purposes encouraged Elamites to settle in the area and establish a centre here.

Tappeh Gārān is considered a major centre during the Elamite and Achaemenid periods in Deh Luran plain. This centre was established in the time of the glory of Arawa/Urua known from the Mesopotamian inscriptions during the second half of the 3rd millennium BCE. Since some researchers contend that Arawa/Urua was located on the Deh Luran plain, this highlights the need for future research at Gārān as well as Musiyan. Gārān, in particular, grew rapidly during the Elamite period and became a large settlement on the plain. The new finds discussed in this paper imply the administrative, political, and economic systems presumably centred at Tappeh Gārān.

Future archaeological activities at Tappeh Gārān will shed light on social, cultural, political, and economic interactions between the Susiana plain and Mesopotamian polities. Additionally, we need to augment our archaeological knowledge about Deh Luran plain during the Elamite period.

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Mohsen Zeynivand
 Department of Archaeology
 University of Tehran Tehran, Iran
Zeynivand@gmail.com

Fereshteh Sharifi
 Department of Archaeology
 Bu-Ali University Hamedan, Iran
fereshtesharifi86@gmail.com

تقليد بلاد ما بينالنهرين؟

خريطة قديمة متعلقة بنظام الري في العصر العيلامي القديم من تابی كاران، سهل دهلوران، إيران
 بقلم: محسن زینینوند و فرشته شریفی

بعد ما يقرب من 50 عامًا من النشاطات الأثرية التاريخية في سهل دهلوران Deh Luran في جنوب غرب إيران التي قام بها كل من فرانك هول وكنت فلنري وجيمس نيلي وهنري رايت، تمت إعادة مسح المنطقة في عامي 2016 و 2019 لتقييم تخريب المواقع الأثرية نتيجة للزراعة والتوسع في أنشطة الري. خلال المسح السطحي تابی كاران تم العثور على لوحين. تقدم الألواح بعض المعلومات عن الأهمية الاقتصادية والسياسية تابی كاران القديم. تشير الأدلة النصية إلى أنه خلال الفترة الممتدة من الألفية الثالثة إلى الألفية الأولى قبل Elamite في العصر العيلامي Tappeh Gārān الميلاد، غزا حكام بلاد ما بين النهرين Mesopotamia بشكل متكرر عيلام واستولوا على مراكزها الرئيسية، وخاصة سوسة. باعتبارها الممر الرئيسي بين عيلام وجيرانها الغربيين، إن سهل دهلوران هو طريق رئيسي بين هاتين المنطقتين، خاصة فيما يتعلق بحصول بلاد ما بينالنهرين على المواد الخام، بما في ذلك أنواع مختلفة من الحجر والبييتومين. علاوة على ذلك، فإن وفرة المياه والتربة الخصبة جعلت سهل دهلوران هدفًا مرغوبًا للأنظمة السياسية في بلاد ما بينالنهرين. تتضمن الألواح من تابی كاران كتابات باللغة الأكادية Akkadian وأنماط هندسية نعتقد أنها توضح الخطوط العريضة لمخطط زراعي.