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# Field Report on the 2015 Current Archaeological Works of the Joint Iran-French Project on Pasargadae and its Territory

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## Abstract

The Iranian-French project resumed its archaeological work on the site of Pasargadae in the latter half of 2015, the capital founded by Cyrus the Great in the center of the ancient province of Persia. It is the first step of a program that will span over several years and during which we will gradually enrich the Pasargadae archaeological map on a large scale. In the continuity of the previous 1999-2009 programs, we tried to have a better understanding of the layout of the Achaemenid city that was developed following a new pattern where the garden, the park, plays a prominent role. We also would like to further study the territorial changes just before the Achaemenid Empire as well as after its fall until the Islamic period. To approach these topics we gather a pluridisciplinary team that carried out complementary survey works (geophysics, topography, fieldwalking, surface ceramic collection, geoarchaeology) to build a comprehensive reconstruction of the Pasargadae cityscape from the early Achaemenid to Islamic periods. The works were performed inside the protected area of the site as well as in its nearby surroundings. This article presents our methodology as well as our preliminary results. The important 2015 achievements were to demonstrate that the south Tol-e Taḳt hillslope is built, to firmly show

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that the Achaemenid/post-Achaemenid occupation extended southeast of the Royal Garden and to shed light on the ancient settlement system some kilometers north of the city core part. In the same time an important topography work has been started to accurately document the whole visible archaeological features over the site. The main fallout of these surveys is to bring to light parts of the Cyrus project for Pasargadae as well as the complex and evolving landscape of the site and its territory before and after the Achaemenid period.

**Keywords:** Fars, Pasargadae, archaeology, survey, mapping, geophysics, topography, fieldwalking, Achaemenid, post-Achaemenid, Islamic, cityscape, territorial management.

## **Introduction**

The Iranian-French project “Shiraz” resumed fieldwork in the latter half of 2015 on the World Heritage Site of Pasargadae, the Achaemenid city founded by Cyrus the Great around 550 BCE. Our 2015 campaign continued and expanded upon an earlier archaeological fieldwork, which was begun in 1999 by Rémy Boucharlat in collaboration with the Iranian Centre for Archaeological Research (ICAR) and the Parsa-Pasargadae Research Foundation (PPRF) headed at that time by Dr. Mohammad Hassan Talebian. Considering the promising results obtained between 1999 and 2008, we decided to restart archaeological fieldwork with the goal to reconstruct the contents and boundaries of the Achaemenid landscape of Pasargadae and its nearby territory by means of complementary survey methods. Past work on the site has served to define new research topics and areas to explore the core, the buffer and the environment of the protected site. It led us to widen our approach with methods and new multidisciplinary approaches previously unexplored in research at Pasargadae.

The renewed five-year Iranian-French project is managed by Dr. Kourosch Mohammadkhani (Shahid Beheshti University) and Dr. Sébastien Gondet (UMR 5133 Archéorient – Maison de l’Orient et de la Méditerranée, CNRS/Lyon 2 University). It is implemented under

the agreement of the Iranian Cultural Heritage, Handicrafts & Tourism Organization (ICHTO) and in collaboration with the Iranian Centre for Archaeological Research (ICAR), headed by Dr. Hamideh Choubak, branch of the Research Institute for Cultural Heritage and Tourism (RICHT). The field research program has been built with the Parsa-Pasargadae Research Foundation (PPRF) and Hamid Fadaei, head of the Pasargadae office. The Pasargadae office also gives critical support to the work by providing access to infrastructure and by the active involvement of two additional archaeologists on the team. The project takes place within the framework of a Memorandum of Understanding for academic and research collaborations signed by the RICHT and the University Lyon 2 in 2015. Funding is provided by the French Foreign Ministry office for international archaeological collaborations. The project is supported by the French Research Institute in Iran (IFRI) and by the Lyon 2 University/National Centre for Scientific Research (CNRS) Archéorient team, a lab part of the Maison de l'Orient et de la Méditerranée Research Centre. The 2015 archaeological work of the Iranian-French mission to Pasargadae<sup>1</sup> and its environment was conducted between the 12<sup>th</sup> of November and the 6<sup>th</sup> of December.<sup>2</sup>

### **Revealing Pasargadae and its Territory: Recent Contributions (1999-2009)**

Past archaeological fieldwork at Pasargadae led by Ernst Herzfeld (Herzfeld 1929-30), Ali Sami (Sami 1956) and David Stronach (Stronach 1978) provided accurate mapping and reconstruction

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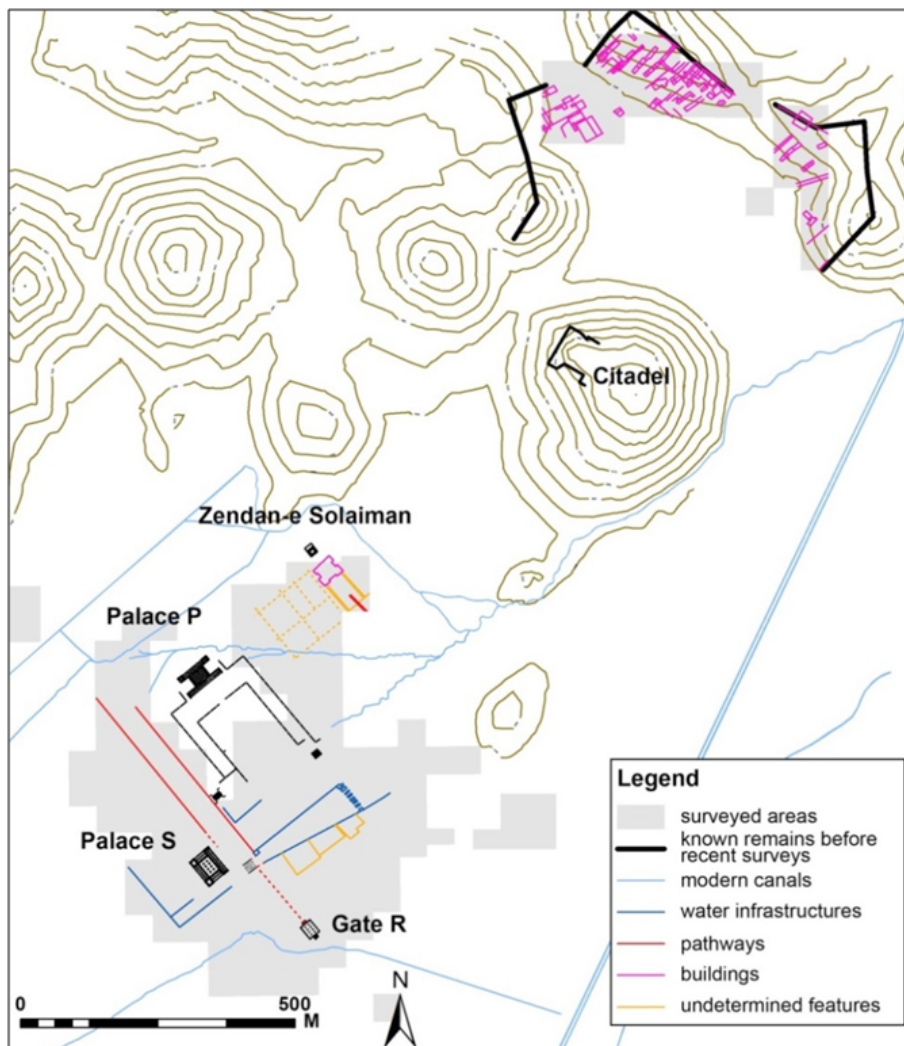
1. Our team consisted of 13 members. Aside from the authors of the present article, the team included 2 geophysicists and 4 undergraduate and graduate students in archaeology: Eng. Colas Finck (Pierre and Marie Curie University, Paris), Ebrahim Roustaei Farsi (Azad University, Tehran), Eng. Sare Ebrahimi Nia (Azad University of Abhar); Maryam Hoseini (Shiraz University); Fahimeh Shahvand (Isfahan University of Art); Tayebbeh Rahimi (Tehran University).

2. We would like to thank warmly Rémy Boucharlat for his relevant scientific remarks and generally speaking for his support to the project. This restarting program has been built together with him in the continuation of the mission he has established in the early 1990s. Many thanks also to Alexander Nagel and Alfred Booth for having kindly corrected the English text of this article.

of a number of monuments on the plain, of the layout of the Royal Garden encompassing several of these buildings, and of the citadel built on the Tol-e Takht. Taking into account only the maps published by Stronach, Pasargadae appeared as a rather empty city where monumental buildings were loosely distributed over a large area. It became evident that these constructions must be considered today the only visible parts remaining from Cyrus' project at Pasargadae as a capital for ruling the province of Persia as well as his residence and final resting place. After his reign, his successors continued to develop the site that probably remained a local administrative unit and where regular celebrations were performed (Henkelmann 2008, 433-441). That is to say that the site certainly sheltered a permanent population during the Achaemenid period and long after, as has been revealed by the excavation of Stronach. At the same time, however, it became evident that Pasargadae served as a central place for the surrounding Dasht-e Morghab plain. Its environment must have been managed to supply Pasargadae with various farming products, raw materials and water. An absence of sufficient data on these aspects prevented us from drawing more conclusions about the past. Thus, the image of an empty site placed in an empty region resembling the idea of a nomad camp (Herzfeld 1935, 28) has been transmitted for a while.

Until recently, archaeological fieldwork at Pasargadae and its territory has shown an important breakdown in the research strategies. The most recent contributions from Iranian teams as well as international research collaborations were firmly oriented towards a better understanding of the archaeological landscape of the city and its hinterland. Between 1999 and 2009, an Iranian-French project began mapping the site by means of innovative methodological approaches: geophysical surveys complemented by archaeological, topographical and aerial kite photography surveys.

The comprehensive study of the site enabled researchers to reveal parts of the city's layout (Boucharlat and Benech 2002, Mohammadkhani 2006, Boucharlat, Benech and Gondet 2012). The surveys have firmly demonstrated that Pasargadae extended far beyond the central Royal



**Fig. 1:** Interpretation map of the results obtained from the 1999-2009 magnetic surveys carried out on Pasargadae (adapted from Benech, Boucharlat, Gondet 2012, 29 Fig. 15).

Garden, the Tol-e Takht and the Cyrus tomb (Fig. 1). Based on the results of geophysical inspection, researchers were able to document other previously unknown built areas on the site. Within the polygonal wall to the north of the Tol-e Takht, a complex of buildings was partly mapped

within the fortified area. It has been demonstrated that the southeastern limit of the Royal Garden corresponds to a large elongated trapezoidal basin crossed by the bridge next to the Palace S. Also along the southeastern limits of this basin, some features indicate parts of a larger settled area extending further east on the plain. A series of ditches and/or a canal system was identified encompassing the so-called Zendan-i Soleiman tower and a related monumental building nearby (Boucharlat 2003, Benech, Boucharlat and Gondet 2012, 20-23). These ditches followed the same orientation as the stone canal networks known further south. This evidence draws a common layout encompassing all monuments and built sectors on the plain and brings to light the existence of a large park, i.e. the “paradise” of Pasargadae, extending beyond the Royal Garden (Boucharlat 2009, Boucharlat 2011). Taken together, these interrelated buildings and sectors, distributed over at least 300 ha, reveal the original settlement pattern, considered by Cyrus, as an open and diffuse cityscape without a densely built core defining the center of the city.

However, questions remained regarding the chronology of the built environment and the development which could have been different for each of the separate sectors documented. Generally speaking, the chronology of the sectors remains a subject of debate, since the publication of the excavations on the Tol-e Taht by Stronach. Then in 2006 and 2007, an Iranian-Italian team implemented several soundings in the west part of the Tol-e Taht. This work allowed them to better define the chronology of the Achaemenid/post-Achaemenid phases thanks to new radiocarbon dating (Askari Chaverdi and Callieri 2010) and to suggest, for example, that the Citadel might have seen changes at the end of the 5<sup>th</sup> century (Callieri and Askari Chaverdi 2013, 705-706).

During the 2000's, the hinterland of Pasargadae was also the object of important archaeological fieldwork. Data were retrieved from an international rescue excavation program carried in the Tang-e Bulaghi valley during the years 2005-2007 during the building of a recent dam across the Sivand River further to the south. These rescue excavations brought to light a vivid picture of what could be the settlement system

during the Achaemenid period in an area located next to Pasargadae and most probably placed under its administrative scope: several small rural settlements were excavated, including farmsteads (Askari Chaverdi and Callieri 2009), stock houses (Asadi and Kaim 2009, Helwing and Seyyedini 2009) and a pavilion (Atai and Boucharlat 2009, Boucharlat 2014a). It appears that long canals running along both sides of the valley supplied these structures with water (Atai and Boucharlat 2009: 23-32).

Achaemenid territorial development and expansion were based on water control and a network of interrelated small farming settlements. This pattern seems to have been established further on the Dasht-e Morghab plain, at least north of Pasargadae, as has been tentatively shown through the results of the large scale surveys from an Iranian-Japanese project (Yamauchi and Nishiyama 2008). The Iranian-Japanese team pointed out several new Achaemenid settlements associated with remains of ancient canals. At the same time, results from the Iranian-French comprehensive studies on the remains of dams and canals on two connected dams, located near the Shahidabad village thirty kilometers north of Pasargadae, provided evidence that the water was regionally controlled by the Achaemenids (Asadi *et al.* 2010, De Schacht *et al.* 2012). This water control was conceived at the scale of the Sivand upper catchment basin to supply Pasargadae and its territory with water and to protect it from floods. Geomorphological studies allowed us to assess the past variations of the Sivand River flow (Rigot 2010). Taken together, the hydraulic remains are proof that the foundation of Pasargadae required a monumental and complex reshaping of its nearby territory, which had probably been deserted before the Achaemenid period.

### **Aims and Methods of the Current Iranian-French Project**

During these recent fieldwork projects, new questions concerning the study of the Pasargadae city and its territory were developed as most of the issues raised above needed further investigations (Boucharlat, Benech and Gondet 2012, 28-35, Boucharlat 2014b). These new



questions formed the basis of our new research project which has now been calibrated by considering the necessity of the conservation of the site and the preservation of the heritage in its surrounding protection area (Talebian 2014, Nagel 2016). Our program can be divided into the six main following topics:

*1- Defining the urbanization processes and the town-planning layout:* after several years of geophysical surveys on Pasargadae, several blank areas still remain. They have to be filled in order to have a more comprehensive reconstruction of the Pasargadae cityscape. We need to complete the map of the city southwest towards the tomb of Cyrus in order to assess if it was placed within the “paradise” as asserted by the Greek authors. We also wish to extend the survey from the Royal Garden area towards the eastern slope of the Tol-e Taht and further beyond towards the fortified area that we intend to cover entirely. Finally, the presence of a built area east of the large trapezoidal basin needs to be better characterized. The geophysical surveys, using the routine magnetic method as well as innovative electromagnetic ones, will be carried out at the same time for more accurate topographic works. We intend to work on the base map of the site recently made by the Pasargadae office by surveying and drawing the entire remains visible on the surface.

*2- Limits of the Pasargadae urban area and settlement pattern of its nearby territory:* the cityscape of Pasargadae was very open, including parks, gardens, fields and/or orchards as well as built sectors within the same layout. This pattern questions our ability to delineate the city of Pasargadae. It is highly possible that the urban and rural spheres were fully integrated within a same, shared landscape. We should be able to reveal the extent of the urbanized area only by systematic archaeological surveys in the Pasargadae buffer zone and by accurately defining the dating, the plan and the function of all the settled places identified so far. At the same time, we will compare the farming management near Pasargadae with information revealed from the preventive excavations in the Tang-e Bulaghi. Finally, our other objective is to tackle the still enigmatic question of the burial customs during the occupation

phases of Pasargadae by visiting and recording all the funerary remains. Completing such an archaeological map is also closely linked to the objectives of the Pasargadae office in charge of the long term preservation of the heritage around the site.

3- *Chronological dynamics*: during the first phases of our extensive work, we approached only slightly the chronological aspects of the development of Pasargadae and its territory. Indeed, we needed first to get a better overview of the layout before carrying out more careful studies on the dating of the several settled areas revealed. However, our suggested reconstruction of the cityscape divided into separated sectors raises the question of their dating as they could have been developed in several stages and have been occupied before or reoccupied after the Achaemenid period. We will approach the question of the development dynamics of the Pasargadae urban space by systematic mapping and collecting the surface ceramic sherds on the site. At the same time the archaeological surveys in the Pasargadae buffer zone will allow us to insert the Pasargadae foundation into the long-term settlement dynamics of the Dasht-e Morghab plain.

4- *Water control in the Sivand catchment basin*: previous studies have revealed a lot of data concerning the Achaemenid regional water control customs. If we can rely upon a good general reconstruction of this system, more accurate data are needed particularly concerning the function and the dating of some of the dams and canals that formed the still visible framework of the wider Achaemenid territorial management of the Pasargadae region. As an example, we know a several-kilometers long canal network, known as Gur-e Dokhtar, running across the eastern part of the Dasht-e Morghab plain. It has been said that it must be dated back only to the Islamic era, but recent studies implemented by the Pasargadae office at a large Achaemenid site called Miyan Jade have demonstrated that it is probably linked to this canal. Further south this canal system seems to be linked to a long dam built at the southeastern end of the plain. Our works will include the accurate mapping of the hydraulic infrastructures and the dating by means of radiocarbon and/or

OSL methods. Thus the focus on the water control is also an entry point to consider the regional settlement pattern.

*5- Environmental characteristics and changes:* until now little is known concerning the past environmental background of the Pasargadae region. First, this question needs to be approached by a better defining the present day environmental settings: climate, hydrology, geology, soils, geomorphology, and vegetation. Data are already available but we lack a comprehensive study and model of the present environment. Based on this core work, we intend to gradually reconstruct the environmental background of past times by means of comprehensive and interdisciplinary geo-archaeological approaches. Following closely the former phases of the Iranian-French project, we have already studied the fluvial deposits and suggested a general reconstruction of the past river changes that still needs to be better defined. This question is critical because it concerns the water availability that will also be approached by studying the numerous springs of the Morghab plain. Another highly relevant topic, closely linked to the water availability and climate changes, is the region's history of vegetation that will be studied through palynology. It concerns the determination of the natural and the cultivated vegetation at the regional scale as well as, at the Pasargadae site scale, the study of the species growing in the Royal Garden.

### **Preliminary Results of the Fall 2015 Campaign**

The work implemented during the fall 2015 has mainly concerned points 1 to 3 of the program presented above. That is to say that we focused our works on the archaeology of the Pasargadae site and its surrounding territories. The wider survey of the Achaemenid water control system as well as the palaeo-environmental studies were the subject of a second mission carried out during the second half of June 2016 that brought together a team made up of a hydrologist, a geomorphologist and a palynologist. Writing the report concerning this second mission is still ongoing and several soil samples collected in the Royal Garden

as well as on several hydraulic constructions in the plain are still under examination in various laboratories.

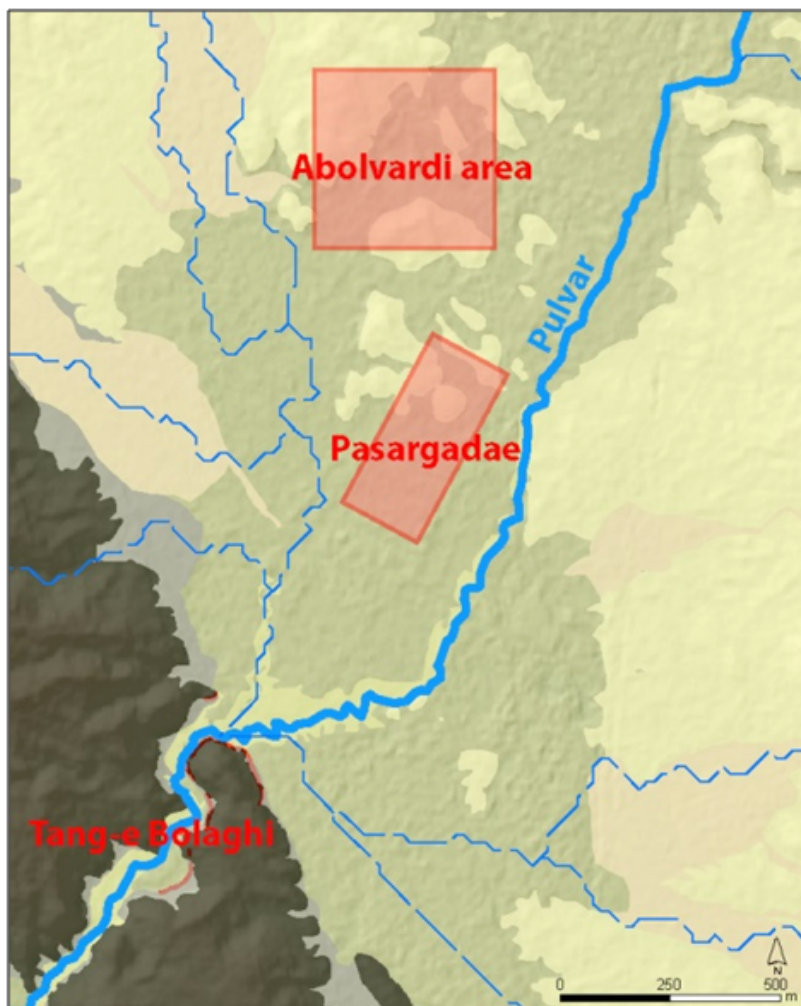
In fall 2015 we implemented various complementary survey methods: field-walking surveys, systematic mapping and collecting surface ceramics, topography, geophysics and aerial photography by kite. We focused on two areas (Fig. 2): (1) the Pasargadae protected site, and (2) its vicinity including the Abulvardi area, 3 km north of the Palace P, including the Tol-e Gholam hill range that surrounds a small plain located north of the Abulvardi village and west of the Dehno village. Within the general framework of our project, the main goals for the 2015 season were the following:

- To continue the mapping of Pasargadae by means of geophysical methods and at the same time to start the topographical survey of the remains visible on the surface of the site.
- To gain a better occupation chronology of some of the previously revealed settled sectors of the city by means of the mapping, the systematic collection and the study of the surface ceramics sherds.
- To start, in the Abulvardi area, the systematic archaeological survey of the Pasargadae's vicinity.

## **Mapping the Pasargadae City**

### Magnetic surveys

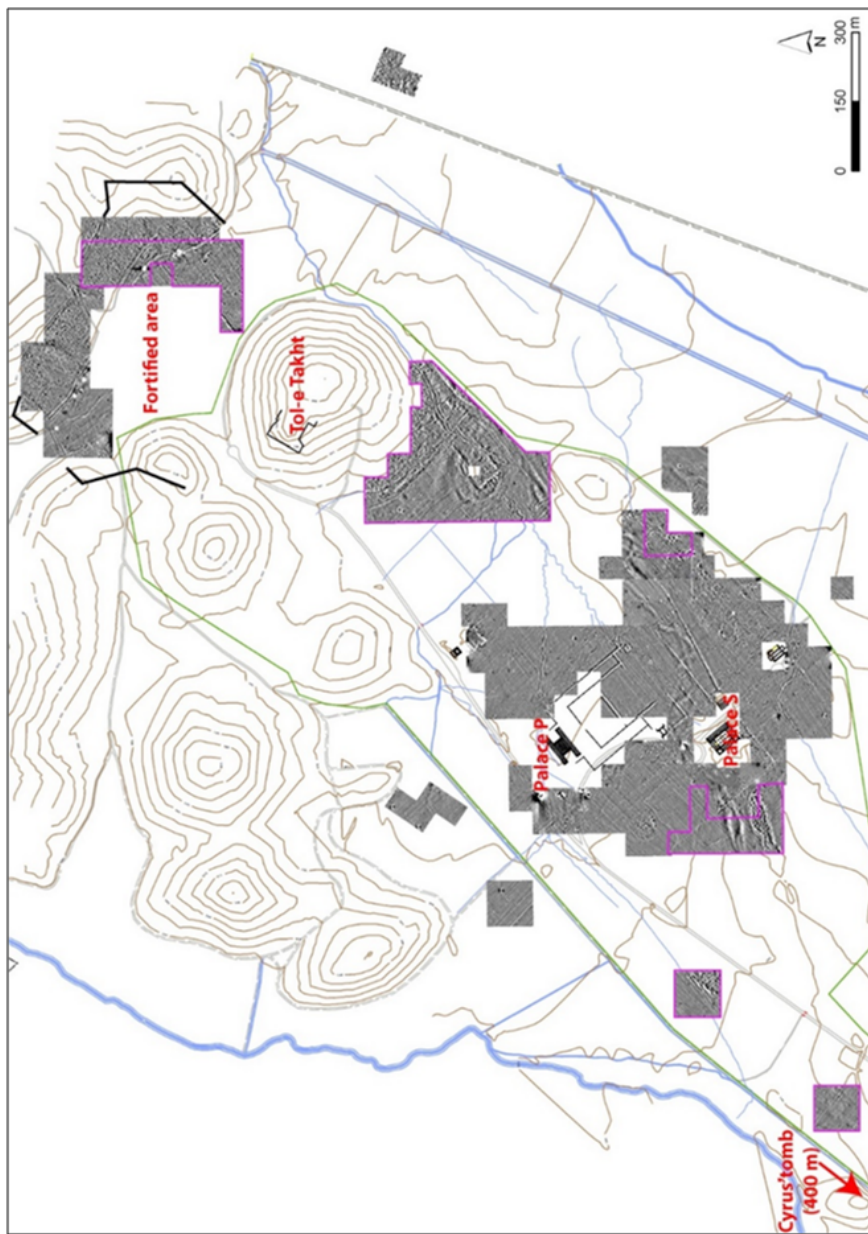
Encouraged by the promising results of the 1999-2008 geophysical survey campaigns (Benech, Boucharlat and Gondet 2012), we have decided to continue investigating the site using the same instrumentation, i.e. a cesium gradiometer providing magnetic maps of the subsoil. The 2015 surveys were carried out in three sectors (Fig. 3). The first corresponds to the fortified sector located to the northeast of the site, beyond the Tol-e Taht. The second is located southeast of the Tol-e Taht hill where we surveyed an area extending on the hillslope to the



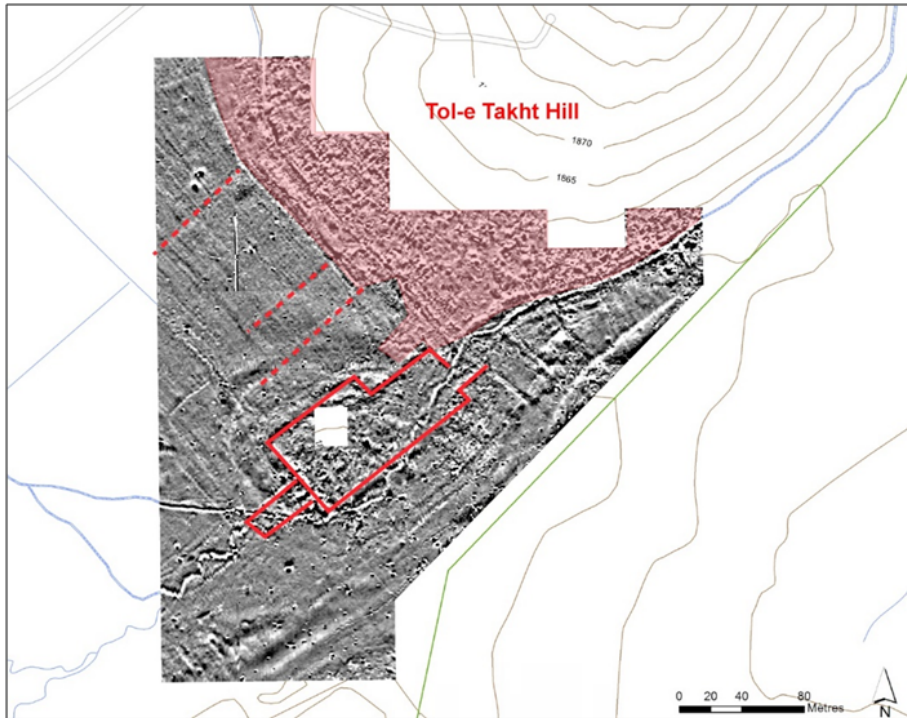
**Fig. 2:** Location of the studied areas during the 2015 season of surveys over Pasargadae and its nearby territory (red rectangles).

plain and encompassing a small hill located some hundred meters to the south of the Tol-e Takht hill. Finally, several areas chosen southwest of the Palace S, towards the tomb of Cyrus, were investigated.

The maps obtained within the fortified area have shown an extension of the architectural elements as revealed after our previous surveys.



**Fig. 3:** Magnetic surveys carried out at Pasargadae since 1999 (Benech, Boucharlat and Gondet 2011 for the surveys prior to 2015; the new areas surveyed in 2015 are outlined in purple. Magnetic map dynamics  $-2/+2$  nT from white to black. 2015 surveys carried out by C. Fink, S. Gondet, K. Mohammadkhani and E. Roustaei Farsi).



**Fig. 4:** Magnetic map of the sector surveyed southwest of the Tol-e Takht hill overlaid by an interpretative scheme. Red area = built slope, red plain lines = large features around the small hill, red dashed lines = long structures running towards the plain.

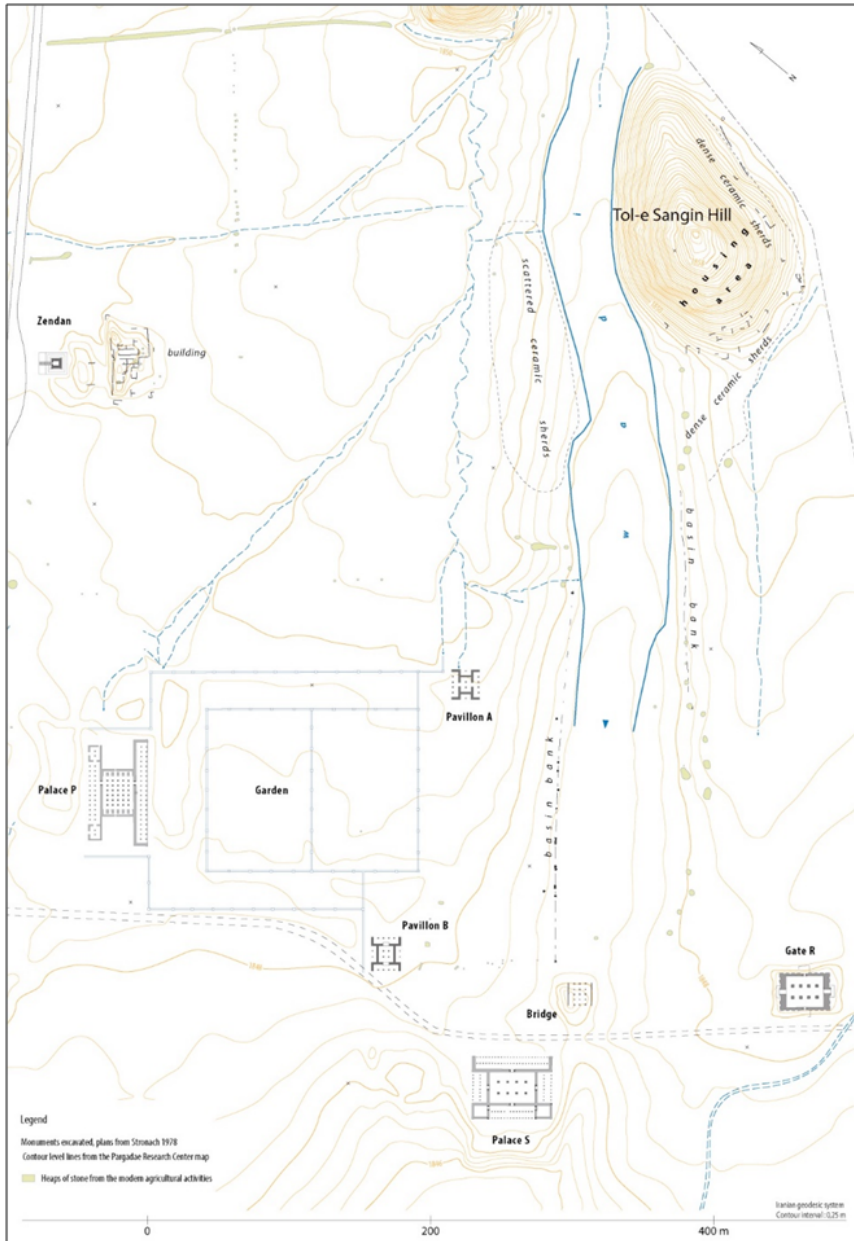
The neighboring buildings were made of lines of rooms, not larger than 100 m<sup>2</sup>, generally built parallel to the slope. The 2015 results attest that the hillslopes beyond the Tol-e Takht were densely built. Southwest of the Palace S the surveys were implemented to test several areas in the direction of the tomb of Cyrus. The results are promising because elements of a grid system (ditches or pathways) and a small part of a possible built area have been revealed. The surveys in that direction need to be extended during future campaigns to compile a more comprehensive map of this sector. Finally the most interesting results have been obtained southeast of the Tol-e Takht where almost 9 ha were mapped. We focused on this area since the team of the Pasargadae office discovered there, in 2012, several scattered Achaemenid architectural stone blocks (a threshold and a column fragment).

The map obtained southwest of the Tol-e Takht is very informative (Fig. 4). First, it demonstrates that the southern hillslope was densely built and parts of several quadrangle buildings are visible, particularly at the foothill. Another interesting result concerns the limit between the built slope and the plain that seems to be outlined by a long, linear and continuous feature. It might be a wall or a rampart that would be an extension of the fortification line running on the hilltops beyond the Tol-e Takht. This hypothesis needs to be confirmed with new surveys of that sector in a future season. If confirmed, previous reconstructions of the northeastern part of Pasargadae would need to be corrected: during a period that needs to be precisely dated and compared to the occupation phases brought to light on the Takht (from early Achaemenid to post-Achaemenid-Seleucid and later Islamic), the buildings standing on the platform of the Tol-e Takht would have overlooked a densely built and walled sector extending not only towards north but also onto the hillslopes. Towards the southwest, on the plain, we can observe several parallel lines in the similar orientation that some of the features revealed on the slope. They could correspond to pathways or drains running from the hill towards the plain. Finally, south of the hill, our map indicates long linear features, probably large walls that once encircled a small hill. Because of the recent agricultural activities in this area it is hard to determine if these features are connected to the possible above-mentioned wall, running along the hillslope. Nevertheless, a continuation of the built and walled area towards the south and the small hill is a hypothesis to take into account. In this place, the complementary topographical works will give us some answers as several wall basements are visible on the surface; they will be complemented by surveys of the surface ceramic which are needed to better date the occupation on this strategic area.

### Topographic Surveys

A part of the topographic plan of visible surface remains of the Pasargadae protected site was established in 2015 with a total station on an area of about 50 ha, ranging from north to south between the



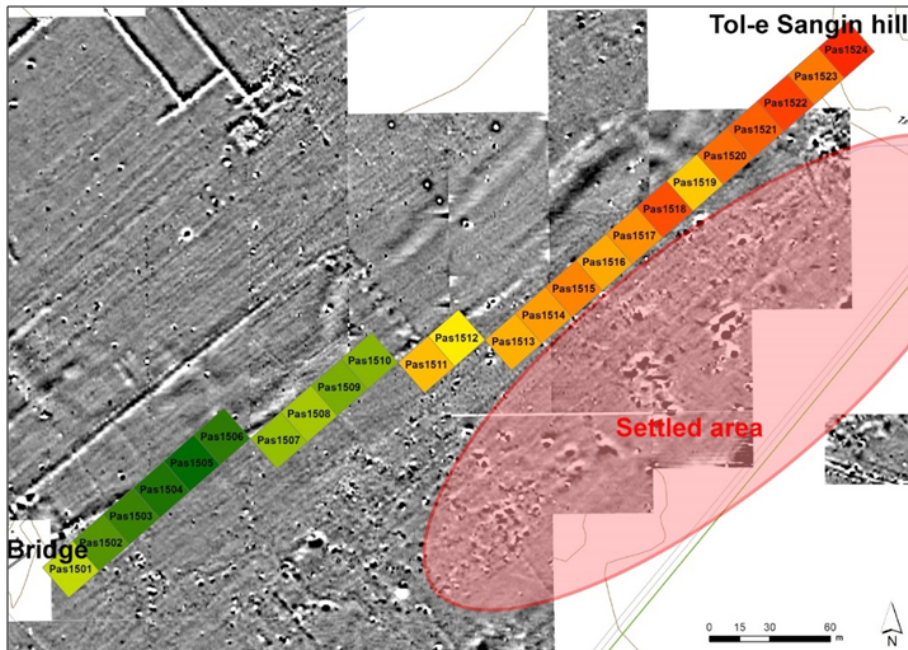


**Fig. 5:** Extract of the 2015 topographic map. Archaeological features are drawn on the topographic base map recently produced by the Pasargadae office (Topographic surveys: D. Laisney).

Tol-e-Takht foothill and the Palace S and from west to east between the asphalted road and the fence protecting the site. Traces of agricultural activities, like heaps of stones as well as canals (Fig. 5), have been drawn. Concerning the canals, we can distinguish that some have been abandoned more recently than others. In the future we need to assess which could have been in use during the Achaemenid period and were linked with the park. Built features have also been detected that echo the result of the geophysical surveys. Lines of limestone blocks north of the bridge correspond to the banks of the large basin southeast of the Royal Garden. Behind the tower of Zendan-e Soleiman, on a slight hill, several walls were identified and recorded with denser level points in order to draw an accurate topographic map of this zone with level lines. On this hill we found a large building linked to the tower, as mapped by geophysics, and lying southeast of it. Finally, new settled sectors were revealed. Several areas with ceramic sherds have been delineated. The ruins of walls were found and two housing areas with archaeological material (ceramic sherds, limestone blocks, grindstone, ...) have been identified, generally located on the foothills. They will need to be better dated during our future campaigns.

### Systematic Collection of Surface Ceramic Sherds

According to our previous results coming from the geophysical surveys, several questions have been raised concerning the exact nature and dating of several of the settled sectors revealed. One of the solutions to approach these questions is to accurately map and to collect the surface ceramics at strategic places. Two areas were surveyed in 2015: southeast of the large trapezoidal basin revealed by previous geophysical surveys; northwest of the fortified area beyond the Tol-e Takht. The sherds have been picked up at each meter along transects and within a 20x20 m grid. Afterwards the sherds have been sorted to select the diagnostic ones that have then been described and drawn. All sherds have been stocked in the storeroom of the Pasargadae office. We will focus on the results coming from the surveyed areas located to the southeast of the basin (Fig. 6). It ranges to the northeast from a hill named Tol-e Sangin towards the bridge spanning the basin and placed in the axis of the Gate



**Fig. 6:** Magnetic map (1999-2008 results) of the area located in between the bridge and the Tol-e Takht hill overlaid by the ceramic density map (from dark green 0.01 sherds/m<sup>2</sup> to red 2.5 sherds/m<sup>2</sup>). The location of the settled area revealed by geophysical surveys is outlined in red (Ceramic surveys: all team members).

R. The area has been chosen because the magnetic maps have shown that a settled sector would have spread along the southeastern bank of the basin. Then our goals were to firmly demonstrate the presence of a built sector by mapping the ceramics and eventually to date it.

The first information comes from the density map where it can be observed that the ceramic concentration increases from the southwest to the northeast. This increase is not steady and we can observe a sharp change 200 m northeast of the bridge. From almost no sherds as far as this point, the ceramics concentration reaches 2.5 sherds/m<sup>2</sup> and remains quite constant as far as the southern slope of the Tol-e Sangin hill. It means that a settled area stood there, a result that fits with the geophysical results that revealed a built area over the same place, the demonstration confirmed by overlaying the sherd density map and the magnetic map. We are now certain that a built sector of

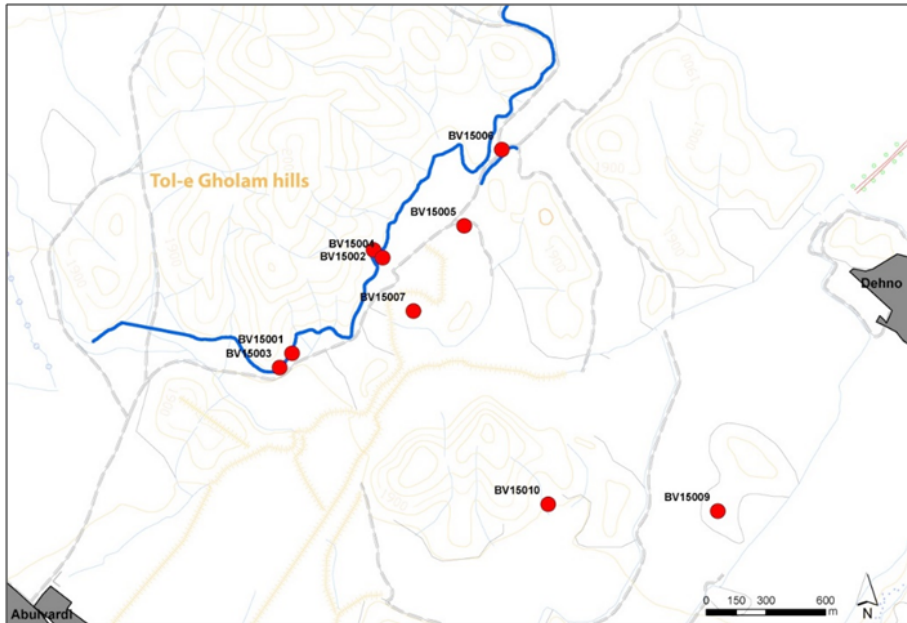
the city, probably of residential nature, stood there. The other important information comes from the type of ceramic we have collected. From the bridge as far as the three last squares, the types are comparable to those of the period 2 and 3 from the Tol-e Taḳt Citadel excavation, as described by Stronach. It means that the ceramics, as well as the settled sector, date back to the Achaemenid/post-Achaemenid period. On the three last squares, i.e. on the southern slope of the Tol-e Sangin hill, the ceramic assemblage changes. We can find some sherds dating back from the Sassanid period to the early Islamic that are probably linked to a housing area revealed during the topographic surveys (Fig. 5). They demonstrate that the hill was probably occupied long after the Achaemenid/post-Achaemenid period.

### **Survey of the Abulvardi Area**

Within the framework of our task to map the archaeological remains of the territory surrounding the Pasargadae protected site, we decided to focus our surveys (field-walking and topographic surveys as well as aerial kite photographs) on an area of approximately 10 km<sup>2</sup> located around a small plain northeast of the Abulvardi village. We chose this area because surveys in 2005 and 2007 from an Iranian-Japanese team (Yamauchi and Nishiyama 2008) demonstrated rich archaeological evidence of various natures: ancient canals, long walls, settlements including two dated back to the Achaemenid period, numerous burial cairn remains. If some of the archaeological evidence was known then, it has not been accurately studied and mapped until now and the area was not systematically surveyed during the former Iranian-Japanese campaigns, based mainly on satellite image interpretation. Two groups of our team were involved in the study of the Abulvardi area: one focusing on the settlements and infrastructure remains; the second surveying the burial remains.

### **Hydraulic Remains and Settlement Pattern**

One objective of the surveys in this area was to define the type and length of the canal located on the east side of Tol-e Gholam hills



**Fig. 7:** Location map of the sites surveyed in between in the Abulvardi area (red dots) and of the ancient canal course (blue line) (Surveys: N. Ibnoerida, F. Zare Kroshouli).

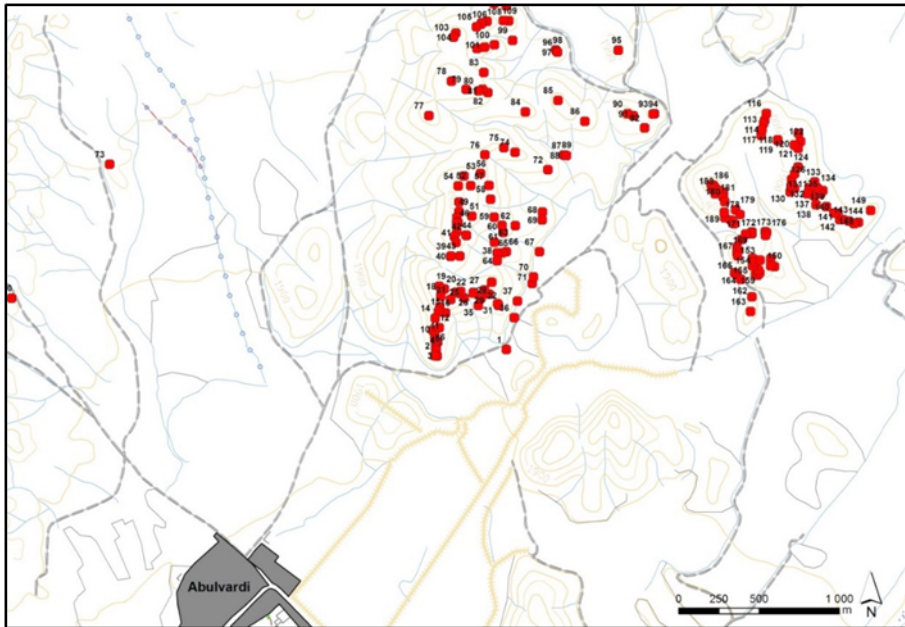
complex, partly drawn on the maps published by the Iranian-Japanese team. The canal is about 4.5 km long (Fig. 7), its width is between 1.40 m and 1.70 m and its depth is probably between 0.60-0.80 m. Connected to this main canal a number of smaller ones have been identified running towards the plain to irrigate it. Topographic measures have established that the canal has a relatively regular slope between 0.06 and 0.07 % from northeast to southwest. We have not been able to locate the origin nor the end of this canal. The hypothesis that could be advanced, after examining satellite imagery and reconnaissance on the ground, is that the canal is supplied by a spring located to the north of the Dehno village; but this needs to be studied during the next missions. The Iranian-Japanese team proposed that two other canals run parallel to the one mentioned above. After our reexaminations, we suggest that there is only one canal channel. What looked like other canals is in fact a terracing system used as a substructure for the canal and to contain possible landslides.

Linked to this canal we have surveyed several settlements. One would be Achaemenid in date (BV15007 on Fig. 7) and was identified by the Iranian-Japanese mission as a “watch tower” because the site is placed on the top of a hill. But we have observed that the hill where the so called “watch tower” was placed is lower than the other surrounding hills which dismisses a control function for this site. The survey on this 2.5 ha site has brought to light some interesting data: it would seem the type of soil located at the top is different from that below. It is produced from the erosion of clayish material and could come from a platform or structure that stood there. This upper part of the site has been subject to illegal excavations and in one trench some fragments of human bones have been identified. This might suggest that the building placed on the top of the hill was reused as a funerary place. Along the southeast side of the site, we have identified an area with potsherds dating back to the Achaemenid/Post-Achaemenid period as well as several wall or terrace sections spread over the entire lower part of the hillslope. A second Achaemenid “watch tower” (BV15008) was identified by the Iranian-Japanese team but it corresponds to an Islamic building located on a small hill. Finally, a multi-period site has been found southwest of Dehno (BV15009). The pottery on the surface testifies to various occupation periods from the protohistoric to Islamic periods. A small amount of Achaemenid/post-Achaemenid pottery was located on the east side of hill. The other settlements found in the area are often difficult to date, although one is certainly early Islamic (BV15002).

### Burial Remains

The Iranian-Japanese survey conducted on the Tol-e Gholam hills was resumed in 2015, focusing on the cairns and funerary landscape of the Abulvardi area with three main objectives:

- To complete the map of the burials
- To clarify the chronological and cultural contexts of cairns
- To study the nature of burial practice on the Morghab Plain during historical periods.



**Fig. 8:** Location map of the burial cairns surveyed in the North Abulvardi Plain area, on the Tol-e Gholam hills (Survey: M. Farjamirad, H. Karami).

Despite the fact that many of the cairns were completely ruined due to illegal excavations, our surveys allowed us to draw some interesting remarks and have highlighted the importance of funerary remains of Tol-e Gholam for further archaeological studies. Cairns at Tol-e Gholam (Fig. 8) were built with local stone blocks on a rocky surface. With no exception, all contained one or several rectangular burial chambers locked and sealed by several stone slabs and then covered by piles of stones. Preliminary observations indicate that burial chambers were not filled by soil after inhumation. Based on extent and dimensions, we were able to identify three groups of cairns:

1. Large cairns were only located on the highest parts of the hills with equal distances from each other. These cairns are between ca. 10.00 to 15.00 m in diameter. They consist of one, two or several rectangular burial chambers. The dimensions of the burial chambers within differ between ca. 1.50 m by 3.00 m and ca. 0.70 m by 1.00 m.



2. Medium-sized cairns were situated slightly below the large-sized cairns, mostly on the eastern slopes of the hills. Like the large-sized group, cairns of this group contain one or several burial chambers. These cairns are ca. 5.00 to 9.00 m in diameter. The size of the burial chambers varies between 1.00 m by 2.00 m and 0.50 m by 1.00 m.

3. The smallest cairns were mainly located on the foot of the slopes near the plain. Based on our preliminary observations, small cairns only contained one burial chamber that measured between ca. 2.50 and 4.50 m in diameter.

The positioning and distribution of the cairns may imply information about the social position of the tomb owners. The large-sized cairns with several burial chambers would suggest that the tomb owners were of a high-ranking social class while small-sized cairns on the foot slopes of the hills could have belonged to the middle class. However, other explanations must be considered, such as gender or age dictated distinctions. Further analysis and fieldwork will certainly enable us to answer these questions. The type of burial, the accurate orientations of the chamber (most often destroyed) and body treatments remains enigmatic, but the measurements of burial chambers in large and medium-sized cairns may suggest that body positioning was the same in all cairns. These hypotheses need to be further examined, taking into account the former studies on other cairn sites in Iran.

Material remains found during the surveys included potsherds scattered in the tomb chambers and around the cairns. While it proved difficult to determine precise chronologies, since most of the materials were not diagnostic, the evidence included types of pottery known as “festoon ware”. Parallel examples of “festoon ware” were reported from Nahavand in western Iran where they have been dated to the post-Achaemenid and Seleucid periods (Haerinck 1983, 98–100; Rahbar *et al.* 2014, 301-329). However, this single evidence can hardly offer a firm date to the funerary landscape of Abulvardi area and Tol-e Gholam. We also recorded and sampled bone fragments. Due to the poor preservation of the cairns, the bone materials had been severely



damaged and disturbed previously. Hence, we could only recover some partial bones and numerous teeth that possibly belonged to both human and domestic animals. These bones were sent to the laboratory of Tehran University for further studies. We are looking forward to the results of the laboratory analysis which might offer us insights into both the chronology and context of some of the cairns.

### **Conclusive Remarks**

In the Pasargadae protected site and thanks to the geophysical surveys, we have revealed a new settled area: the southern slope of the Tol-e Taḳt was certainly densely built and maybe fortified. Beyond the hill we have continued to demonstrate that the fortified sector northeast of the site was settled. Altogether, these results demonstrate that a single fortified settlement might have stood around the Tol-e Taḳt hill during a period that still needs to be better studied. The geophysical surveys to the southwest of Palace S enabled us to identify features which need to be better characterized by future works. Important results came from the systematic mapping and collection of surface potsherds. The presence of settled sectors beyond the Tol-e Taḳt as well as east of the Royal Garden has been confirmed. A more in-depth study of the ceramics from these sectors is planned in future seasons to add answers to the chronological question. Finally, the topographic work allows us to correct and enhance existing maps of the site, in order to gain a better understanding of the dynamics of its development.

The data gathered in the Abulvardi area are of particular interest. There is new evidence for irrigation works in this part of the Morghab plain which supplied water to several settlements and agricultural activities in the fields. The fact that a quite large Achaemenid settlement has been proven in the Abulvardi area shows that Achaemenid/post-Achaemenid occupation was not restricted to the supposed limits of Pasargadae's "Sacred Precinct". It is necessary to continue archaeological mapping of the Pasargadae vicinity in order to reveal the Achaemenid landscape on a larger scale. At the same time, a systematic survey of the funerary landscape is crucial, as evidence from the numerous burial remains in

the region would produce data to improve our knowledge about the funerary customs in the Central Fars for the 1<sup>st</sup> millennium B.C.E. The 2015 season has already demonstrated a spatial system of the cairns distribution and has allowed us to collect materials for further analyses.

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