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Exploring the biological bio-economy of the residents of the ancient resort of Tal-e-Sabz based on the study of animal bone remains

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ABSTRACT

To study the remains left of the pre-historical societies and learn about their bio-economy, utilizing various sciences including zoology is inevitable. Utilizing this science in present decade and studying the animal remains made it possible for archeology to identify hunting tools and techniques, hunt type, the role of various animals in biology-based economy, the process of taming various animal species, and the exchange of livestock among humans through studying the animals of a certain period. By introducing and studying the newly discovered area of Tal-e-Sabz in Marvdasht plain and exploring the bone remains of the animals in this area, this study aims to analyze the percentage and antiquity of the bones of tame and non-tame (hunted) animals, the gender, age, animal species, and, finally, the livelihood of the residents of this area based on the animal remains uncovered in this area.

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INTRODUCTION

The project of excavating the archeological area of Tal-e-Sabz was conducted with constant cooperation of the Cultural Heritage Bureau of Marvdasht and Fars province and Archeology institute with the goal of speculating about the unfavorable condition of this hill. Determining the boundary of Marvdasht green hill was conducted on September 3, 2012. This process began by first questioning the inhabitants of the area about the present and previous condition of the hill. To this end, 9 trenches were dug in the southern part of this hill so that a link may be established between the archeological phenomena inside the land and the extension level of Tal-e-Sabz establishment and also to help gain a better understanding of this area's extent. Among the other results of this archeological project were the discoveries of human and animal remains, animal clay effigies, and pieces of pottery.

Tal-e-Sabz and what was discovered there:

Tal-e-Sabz is located in the south west of Marvdasht to the north of Ferdowsi st. and to the west of Resalat st. between old and new residential buildings. The current dimensions of the hill measure 105 meters in length and 90 meters in width. The present height of the hill is 6 meters and the total area of the site is 9450 square meters. The longitude of the site is 52 degrees and 47 minutes and her latitude is 29 degrees and 52 minutes. The site's height from sea level measures 1590 meters.

This hill is one of the most important archeological hills in the north east of Marvdasht which is also known as Tal-e-Qal'e, Tal-e-Shaqa, and, in local dialect, Tal-e-Souz. This site was registered in the list of our national monuments. Considering the remains left on the surface of this area, this site is speculated to have establishments left from pre-historical era till the early stages of history (ancient Elam). The remains excavated in Tal-e-Qal'e represent an era which can be considered the dawn of urbanization in this part of Iran. This site has also been the inhabitant of pre-historical tribes till the beginning of the historical era, and it must also be stated that persistence of inhabitation in this hill is quite unique. Furthermore, the discovery of clay types known as "Jerry" which are known to be the oldest type of the clays discovered in Marvdasht plain doubles the value of this ancient hill. The persistence of inhabitation in this site is quite unique. Due to remains belonging to the 7th millennium B.C., this hill is considered to be one of the most important hills of Marvdasht plain and Tal-e-Sabz

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is one of the sedentarization on the bank of Kor river. The short distance between this hill and Bakoon Tal located in a distance of 1 km from Persepolis may indicate a cultural concurrency in one of the inhabitation eras. The surface of the hill exhibits the remains of historical graves which date back to the contemporary era and are covered with square-shaped bricks. The soil in this hill is mostly made of argil and camel's thorn is the dominant vegetation in the spot. It is necessary to say that this hill has been subject to human interference and erosion. Residential buildings have destroyed a portion of the hill and signs of unauthorized excavations are seen in various parts of the hill mostly in the form of shallow holes. Some grave stones have been displaced in search for treasures. Unfortunately, the extent of construction on the periphery of the hill increases every day and this can increase the destruction threat of the hill.



Fig. 1: the position of Tal-e-Sabz in the range of Marvdasht city



Fig. 2: a view of Tal-e-Sabz site

The results of the excavations conducted in Tal-e-Sabz bear signs of pre-historical eras (the Pigeon, Bansch and Bacon era) in this site.

The discoveries in Tal-e-Sabz site:

In the first chapter of excavations conducted for determining the territory of the hill, the remains of some brick kilns were discovered on the surface of the hill, but no signs of the kiln were found. According to cultural heritage bureau of Marvdasht, the surface of the hill had been leveled to prepare the brick kiln. For this purpose, trenches with dimensions of 2*2 were dug in the southern part of the hill. The surface soil included plenty of ash and soft soil and camel's thorn was covering the surface and the skirts of the hill. The clay pieces date back to the cultural eras of the 5th till the 2nd millennium B. C. Other things uncovered during the excavations included 2 animal effigies of glazed oxen, stone-bony tools, shells, the edge of stone dishes with grooved lines, copper pieces, burnt bones, some 1250 pieces of bone and tooth, PIT, ash and large amounts of coal.

The principle approach of this research is the study of animal remains in Tal-e-Sabz in order to identify the nutrition and livelihood patterns of the inhabitants in the 5th millennium B. C. This research has utilized laboratory and research methods in an attempt to explore the following matters:

- 1- stating the climatic conditions of the area and the site
- 2- stating the importance and preferability of animal husbandry economical system to hunting
- 3- identifying the pattern of animal husbandry based on the importance and priority of each animal used then (cow, sheep)
- 4- dating the remains of animal bones based on LSC method



Fig. 3: bones excavated from trench G

Analyzing the information of animal bones excavated from Tal-e-Sabz:

To conduct this research, the bones extracted from layers of various trenches during the excavation were carefully collected and sent to the workshop where they were counted and their information was registered. The number of animal bones extracted in this excavation numbered 1250 pieces and only a small number of them (around 70 pieces) had indexes for identifying species in terms of anatomical studies. As for DNA sequence experiments (PCR Polymerase chain) to determine the animal species of these remains, many of the bones had lost their DNA structure due to their great antiquity and only a few pieces had kept their DNA structure (in a very limited sense). A detailed description of the studies conducted on the animal bone remains of Tal-e-Sabz is presented here:

- first step: determining the half-life by LSC method
- second step: determining and identifying the species of bone remains using comparative anatomical study
- third step: determining and identifying the species of bone remains using PCR method

Based on the results of DNA experiment, the animal species detected were:

- 1- mammals (paired hoofs)
- 2- equidae (donkey)
- 3- suinas (hog)
- 4- Canidae (dog)

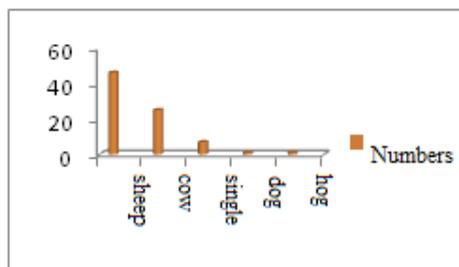


Chart 1: the number of bones discovered concerning the animal remains of Tal-e-Sabz

Killing age pattern:

It is necessary to mention that studying the killing age based on the erosion of teeth of animal groups in the area was impossible due to shortage of cow teeth and access to only a few teeth from the lower jaw of the sheep.



Fig. 4: comparison of the ancient sample with the sample stored in the veterinarian anatomy laboratory

Conclusion:

Based on the anatomical and laboratory studies conducted on the bone remains of the animals in Tal-e-Sabz site, a significant difference is observed between cow and sheep in this site. In terms of meat consumption of the inhabitants of Tal-e-Sabz, using lamb has the first ranking, while bacon is second. We must also add to this list species that prefer high mountains (leopard, Pazanan, Bezoar Ibex), species that live in mountainous jungles

(stag, bear, maral), and a group of animals that live in plains (deer, zebra, equidae). We can say that the presence of animal remains with varying settlements (like hog that prefers humid areas but can also change her settlement based on the conditions of food resources abundance and also safety) makes the presence and hunting of these animals in the spot quite possible. Studying the animal remains in Marvdasht plain shows that hunting wild animals such as hog and deer has been quite common in the 5th millennium B. C. [5].

It is necessary to mention that the settlement type of the inhabitants in Tal-e-Sabz in the 5th millennium B.C. has been studied merely based on the conclusions drawn from studying the animal remains of the site. Considering the relative abundance of bones of sheep and cow in Tal-e-Sabz, it seems like this area has been a sedentary society, but the settlement type of the inhabitants in Tal-e-Sabz (immigrant or sedentary) can not be determined with certainty for 2 reasons:

1- the presence of remains related to cows in this site can indicate both the sedentarization of Tal-e-Sabz inhabitants and also their immigration.

2- as the plant remains of the area are not studied yet, we can not decide if the area had agricultural activities besides animal husbandry.

In other words, the documents concerning the half-life experiments of animal bones and molecular experiments indicate that Tal-e-Sabz had animal husbandry system in the 5th millennium B.C. This means that the livelihood and nutrition pattern of the inhabitants was based upon consumption of domestic animals (firstly sheep, secondly cow).

Based on the above mentioned data, the following inferences can be made:

1- in the 5th millennium (at the same time with Bacon I period), the consumption percentage of domestic animals was much more than wild animals.

2- animal husbandry and consumption was more prominent than hunting and the basis of the nutrition system of the people of that age was based upon it.

3- the abundance of animal species of sheep and cow in the animal group of Tal-e-Sabz site, respectfully the first and second rank, and their importance among the inhabitants of the site.

4- the site studied dates back to the 5th millennium B.C. and is contemporary with Bacon I era.

Thus, we can observe that the livelihood and nutrition pattern of Tal-e-Sabz inhabitants in the 5th millennium B.C. was based upon nurturing and consuming meat of the tame animals.

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