

Introduction

Shahr-i Sokhta (E: 30° 35' 38" N: 61° 19' 40") and is located in southeast Iran in Sistan-o Baluchistan Province. It is situated at a distance of 55 km to the southwest of Zabol and lies along Zabol- Zahedan road. This historical hill rises 19m above the surrounding lands and lies on the Ramrud Terrace belonging to the Pleistocene period. This city was founded around 3200 B.C. and was populated during four main periods stretching from 3200 B.C. to 1800 B.C. Today it is surrounded by an arid desert; but in the past a fertile plain surrounded this proto-historic settlement which was irrigated by the Biaban River (one of the branches of Hilmand which is dry today). Cultural and archaeological artifacts are scattered over an area of 151 hectares in this site. Shahr-i Sokhta has a north-west axis and is nearly 2220 meters long and 1090m wide (Biscione et al., 1977, p. 104). Such large dimensions have made Shahr-i Sokhta the biggest proto-historic human settlement in the Eastern Iranian Plateau. After being abandoned around 4000 years ago, it has been subject to erosive factors such as the fearful winds of Sistan and seasonal rains. These factors have changed the face of this ancient city.

The low hills surrounding the delta of Biaban River are considered the most important centers belonging to the Bronze Age. West-east winds have lowered the height of the eastern parts of the city as compared to its western parts. Furthermore, water erosion has cut vertical gullies on the sides of the hill. Shahr-i Sokhta grew due to its geographical location, which made it ideal for gaining control over the production and distribution of raw materials across Sistan and its neighboring regions. The cultural, political, social and industrial development of Shahr-i Sokhta transformed it from a small 15-hectare town to one of the most important Bronze Age cities in the Middle East with an area of 151 hectares.

After painstaking and detailed investigations, archaeologists have divided Shahr-i Sokhta into the following parts: 1. Southern parts with the centrality of the Kakh-i Sokhta, 2. Eastern

Residential Area, 3. Central Quarters, 4. Monumental Area, 5. Northwestern Industrial Zone, 6. Southern Industrial Area, 7. Graveyard.

Shahr-i Sokhta is a big laboratory in a small desert. The study of artifacts found in this site will help to create a better understanding of the evolution of sciences, the evolutionary of religions, history of urban and urbanization, evolution of architecture, evolution of traditional arts and technologies, history of writing, history of medicine and its related sciences, the process of animal domestication, dietary conditions, agriculture, animal husbandry, entomology, botany, geology, metallurgy, pottery, weaving, woodworking, and woodcarving in the Iranian Plateau.

Shahr-i Sokhta was undoubtedly among the most advanced cities of its time. This can be concluded not only because of its architecture and finely made marble, pottery, clay and wicker artifacts, but also through its social organization. The city had an unprecedented organization, so that in 3000 B.C. it had a water and sewage system.

More than half of the surface of the city is covered with broken pottery, stone, metal, semi-precious stones, and other ancient artifacts; while on the surface of the graveyard there are few artifacts or cultural signs. Architectural studies show that residential buildings were categorized and separated by streets and alleys. The building materials were stratum, adobe, wood and wicker mats.



Photo 1. General view of Eastern Residential Area, 2012

Country (and State Party if different)

Islamic Republic of Iran



Map 1. Iran (ICHHTO archive)

State, Province, or Region

Sistan-o Baluchestan Province



Map 2. Location of the Sistan-o Baluchestan province (ICHHTO archive)

Name of Property

Shahr-i Sokhta

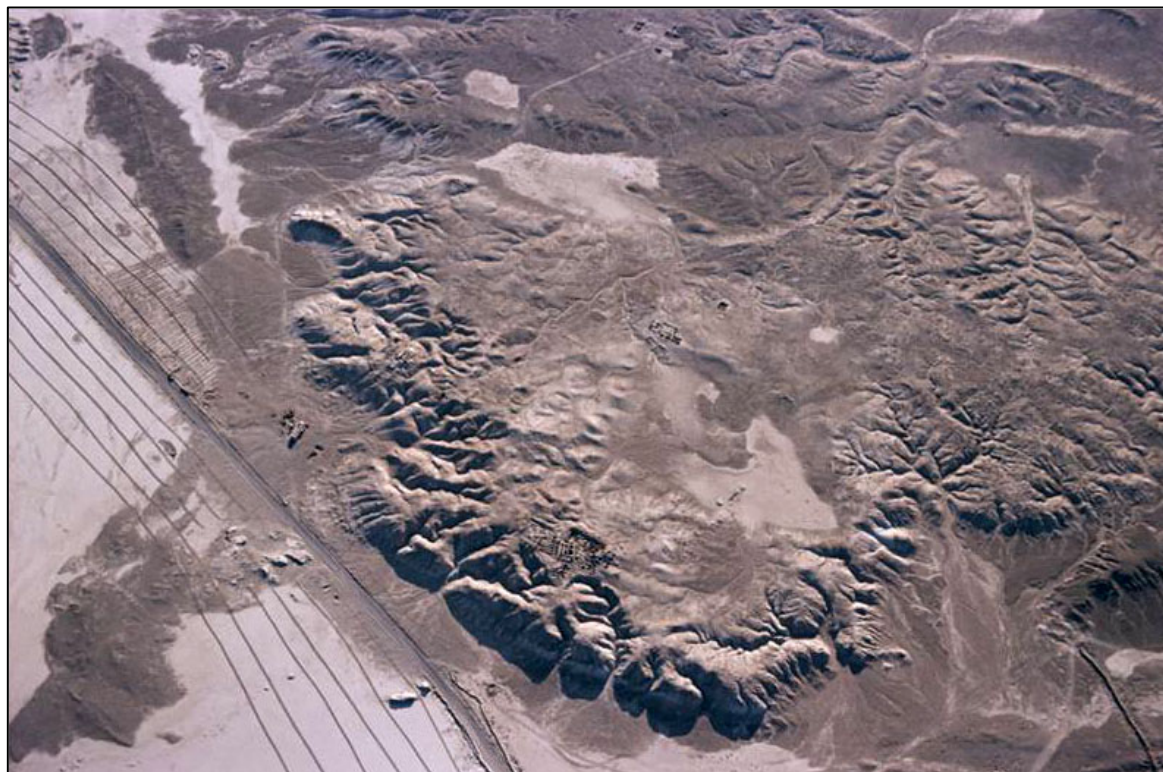


Photo 2. General view of Shahr-i Sokhta

Geographical coordinates to the nearest second

No	Site Name	Region/District	Geographical Coordinates	Area of Core Zone (ha)	Area of the Buffer Zone (ha)	Area of the Landscape (ha)	Map no
1	Shahr-i Sokhta	Sistan-o Baluchestan	N: 30°35' 38" E: 61°19' 40"	275	2200	11507	I II III



Photo 3. General view of Kakh-i Sokhta, 2012

Maps and plans, showing boundaries of the nominated property and buffer zones

Please see maps in map vol.

NO	Map Title	Map ref.	
1	Base Maps	Landscape zone	I
		Buffer zone	II
		Core zone	III
		Identification	IV
2	IV-A (zone 21)	General Map (Zone 21)	IV-A
		Kakh-i Sokhta	IV-A-1 IV-A-2 IV-A-
3	IV-B (zone 16)	General Map (Zone 16)	IV-B
		Eastern Residential	IV-B1-1 IV-B1-2 IV-B1-3 IV-B1-4 IV-B1-5 IV-B1-6
		Central Quarters	IV-B2-1
4	IV-C (zone 10)	General Map (Zone 10)	IV-C
		Monumental Area	IV-C-1 IV-C-2
5	IV-D (zone 20)	General Map (Zone 20)	IV-D
		Graveyard	IV-D-1 IV-D-2 IV-D-3 IV-D-4 IV-D-5

1.b. Area of nominated property and proposed buffer zone

Name of the nominated	Province	Geographical coordinates	Area Core zone (ha)	Area Buffer zone (ha)	Total (ha)
Shahr-i Sokhta	Sistan-o Baluchestan	N: 30°35' 38" E: 61°19' 40"	275	2200	2475

Textual description of the boundaries of the nominated property

Description of Core Zone

The core zone line starts from point C1 (N: 30° 35' 36.3", E: 61° 19' 56.1") at a distance of 253 meters from the main road of Zabol-Zahedan and east of Shahr-i Sokhta. The line continues to south west and after passing the rolling hills it reaches point C2 (N: 30° 35' 23.3", E: 61° 19' 34.3"). Then it extends south to C3 (N: 30° 35' 05.3", E: 61° 19' 32.1") and C4 (N: 30° 34' 58.4", E: 61° 19' 18.9") at the southernmost part of the city and after turning its course to north west and leaving behind point C5 (N: 30° 35' 09.4", E: 61° 19' 04.7"), it diverts north and after passing C6 (N: 30° 35' 20.8", E: 61° 19' 02.0"), the line reaches point C7 (N: 30° 35' 35.9", E: 61° 19' 05.4"). Afterwards moving at the same direction, it reaches point C8 (N: 30° 35' 46.5", E: 61° 19' 12.1") at a distance of 577 meters from the cemetery of Shahr-i Sokhta and by extending north east, it reaches C9 (N: 30° 36' 06.2", E: 61° 19' 15.3") at a distance of 447 meters from the industrial area of Shahr-i Sokhta, west of the monumental buildings. Then following its course to north, the line reaches C10 (N: 30° 36' 24.8", E: 61° 19' 33.1") which is the northernmost point of the city. From here, it changes course to south east and passes through bush lands as far as C11 (N: 30° 36' 06.7", E: 61° 20' 03.4") and then C12 (N: 30° 35' 52.0", E: 61° 20' 13.1") near the Zabol-Zahedan road. It should be noted that the eastern residential zone of Shahr-i Sokhta is located southwest of this point. Finally after shifting direction to southwest, the core zone line terminates at its start point of C1.

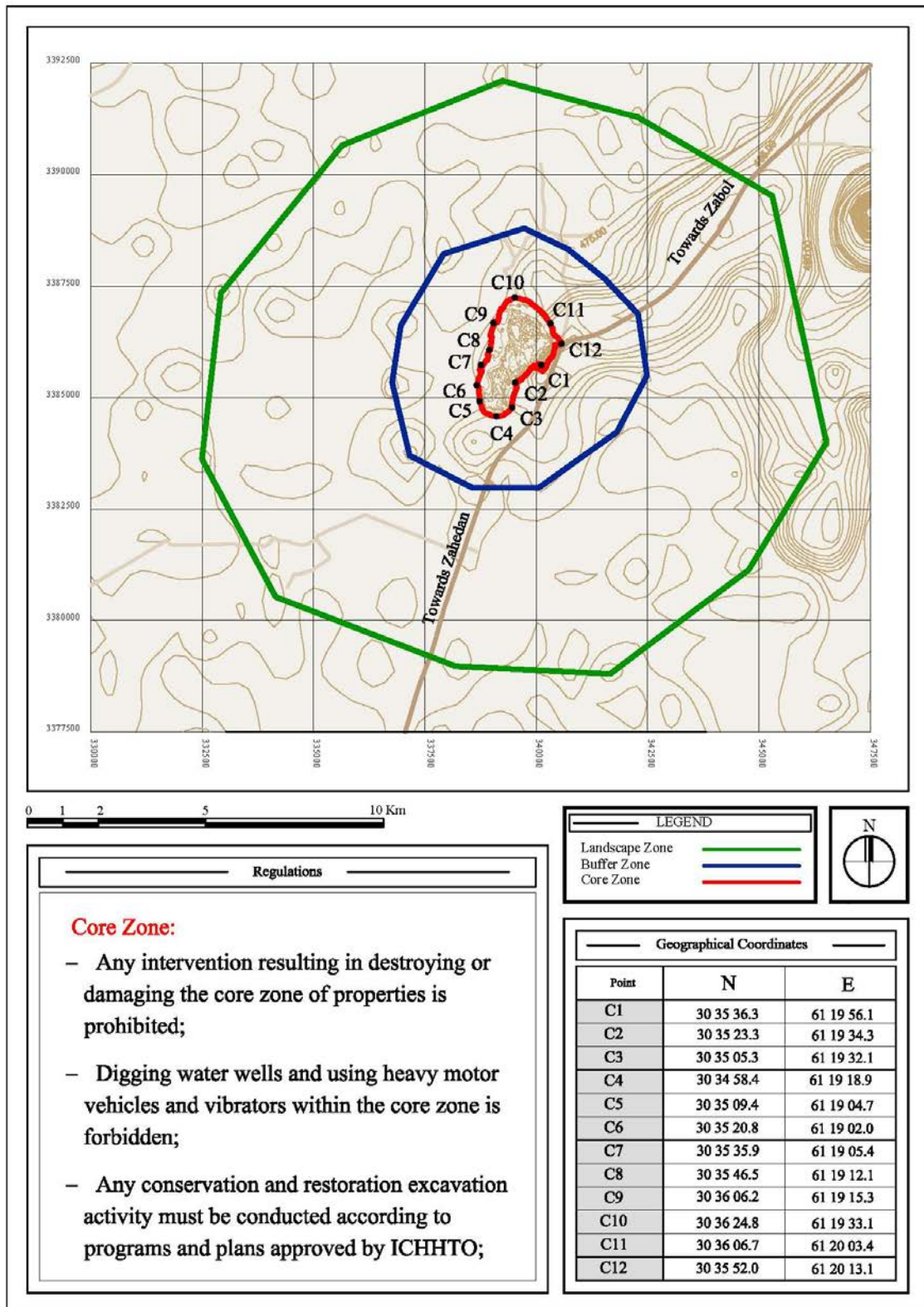
Description of Buffer Zone

Point B1 (N: 30° 34' 06.4", E: 61° 18' 59.2") as the beginning of the buffer zone of Shahr-i Sokhta is located at a distance of 262 meters from the main road of Zabol-Zahedan. The buffer zone line extends in the direction of northwest along rolling hills as far as point B2 (N: 30° 34' 28.9", E: 61° 18' 06.4"). Then extending north, it passes through a few ancient mounds and point B3 (N: 30° 35' 21.9", E: 61° 17' 50.8"). Afterwards with a slight deviation east the line reaches B4 (N: 30° 36' 03.5", E: 61° 17' 57.4"). From this point it travels northeast and after crossing a plain joins point B5 (N: 30° 36' 56.1", E: 61° 18' 32.5"). Then continuing at the same direction it reaches B6 (N: 30° 37' 15.5", E: 61° 19' 40.1") in close proximity to Gaz shrubs and bush lands. After changing course toward southeast, it passes point B7 (N: 30° 37' 00.8", E: 61° 20' 17.3") opposite the police station and then after traversing about one kilometer to south east it reaches B8 (N: 30° 36' 40.0", E: 61° 20' 48.6"). Further away, it crosses a rugged plain as well as the main road of Zabol-Zahedan until reaching B9 (N: 30° 36' 14.6", E: 61° 21' 17.0") then turns south and running the length of natural rolling hills, it joins B10 (N: 30° 35' 29.9", E: 61° 21' 25.3").

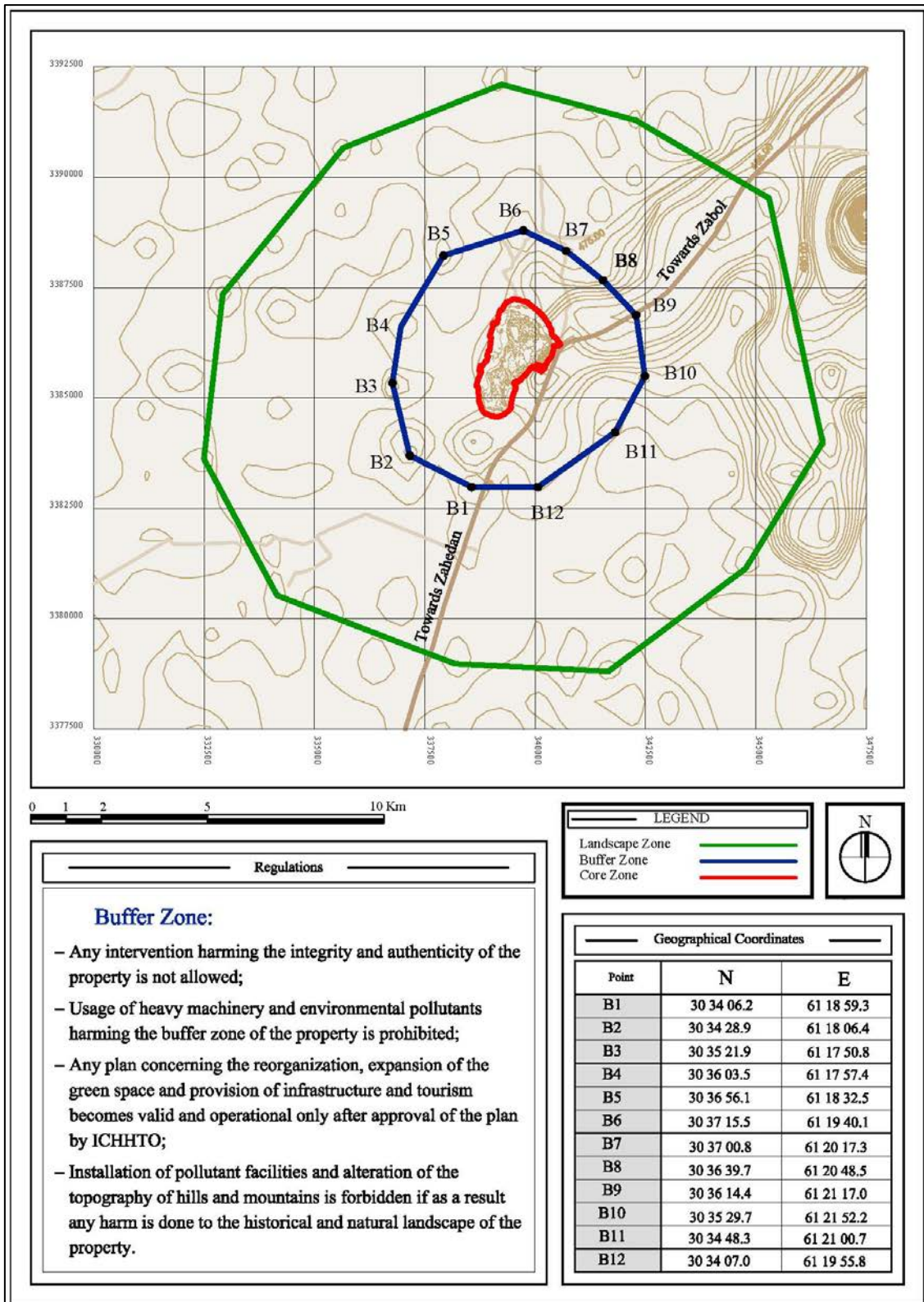
Then changing course toward south west and passing through a flat land, the line reaches B11(N: 30° 34' 48.1",E: 61° 21' 00.9") and by continuing a south-westward path it joins B12 situated near ancient mounds; then it reaches B13(N: 30° 34' 07.0",E: 61° 19' 55.8") opposite brick kilns and the residence of Shahr-i Sokhta Base experts; finally extending from this point the buffer zone line joins the start point.

Description of Landscape Zone

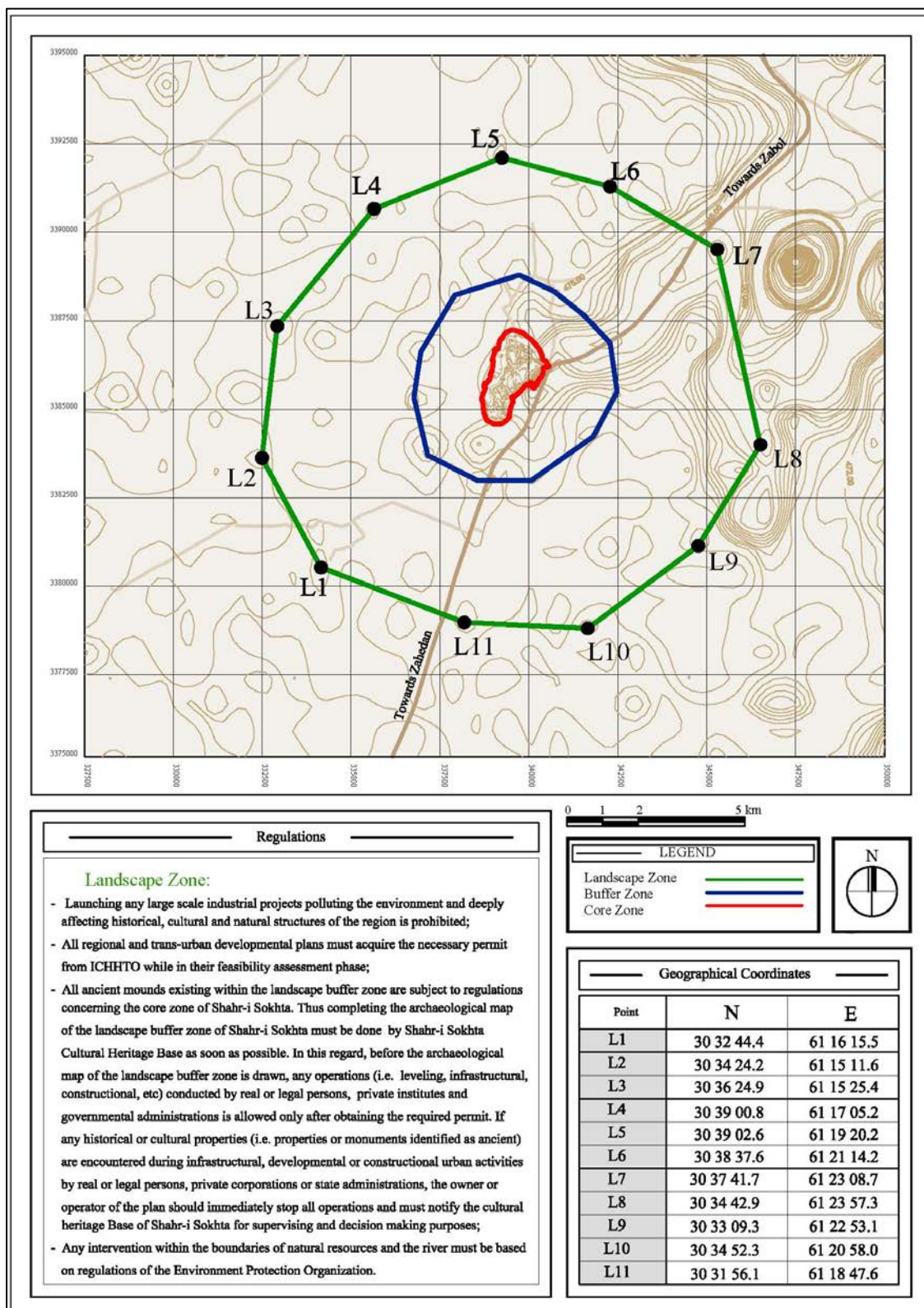
The landscape zone line of Shahr-i Sokhta starts at point L1(N:30° 32' 44.4",E:61° 16' 15.5") located in a district called Houzdar at a distance of 3700 meters from the main road of Zabol-Zahedan. The point is situated in the vicinity of the ancient mound and historical properties such as Moch castle and asbad. Then the line extends northwest from L1 and after passing the ancient mound and the mud brick historical building and crossing the trench surrounding Houzdar district, it reaches L2 (N:30° 34' 24.2",E: 61° 15' 11.6"). From here it traverses a distance of about 3.7 kilometers north and slightly eastwards as far as point L3(N:30° 36' 24.9",E:61° 15' 25.4"); then traveling a distance of 4.3 kilometers to north east it reaches L4(N:30° 39' 00.8",E:61° 17' 05.2") situated opposite the bush lands and from here it diverts to northeast and after traversing a distance of 3.8 kilometers and crossing trenches, bush lands and waterways, the line reaches L5(N:30° 39' 02.6",E:61° 19' 20.2") in the vicinity of Qale Rostam Village. From this point, it turns southeast along natural rolling hills as far as L6. Then by moving southeast and crossing the main road of Zabol-Zahedan road again, it reaches L7(N:30° 37' 41.7",E:61° 23' 08.7") which is 3.5 kilometers away from last point. From here it passes through the plain in a south eastern direction as far as L8; then by turning south west and passing through existing ancient mounds, the landscape zone line reaches L9(N:30° 33' 09.3",E:61° 22' 53.1"). Finally by extending west and passing through rolling hills, it comes to L11(N:30° 31' 56.1",E:61° 18' 47.6") situated 607 meters away from Zabol-Zahedan road and the extension of the line to north-west reaches the start point of L1.



Map. 3. Core Zone



Map. 4. Buffer Zone



Map. 5. Landscape Zone

Criteria under which property is nominated

Criterion (ii): Exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design;

Shahr-i Sokhta is an exceptional testimony to the interchange of human values and influences during 3200-1800 BCE in the east of the Iranian Plateau. It exhibits a transition from the village habitation to urbanized community, accompanied by significant cultural, social and economic achievements and developments from late Chalcolithic to early Bronze Age. In the third millennium BCE, the ancient city was a strategic place and served as the link between the civilizations in the east and west, connecting cities in the Indus Valley to those in Mesopotamia.

In fact, Shahr-i Sokhta displays a variety of cultural interactions on a very large scale in ancient times because it was a venue for: creation, expansion and transfer of traditional knowledge, technologies, sciences and arts in the fields of architecture, urbanization, medicine, nutrition, agriculture, animal husbandry, as well as a place for the production and expansion of arts and crafts, such as metallurgy, jewellery, weaving, pottery, wood inlaying and basket weaving.



Photo 4. Outstanding Archaeological Findings of Shahr-i Sokhta

Criterion (iii): To bear a unique or at least exceptional testimony to a cultural tradition or to a civilization that is living or which has disappeared;

Shahr-i Sokhta displays an exceptional and even unique testimony to the development of a human settlement in a specific geographical location during the Bronze Age in the eastern part of the Iranian Plateau. For more than a thousand years, from 3200 BCE to c. 2000 BCE, the proto-urban site of Shahr-i Sokhta was the capital of a region ranging from Kandahar to Makran shores. It serves as an exceptional witness to a magnificent civilization and a cultural tradition linking trade and cultural relations with ancient sites and cultures in Indus Plain, southern shores of the Persian Gulf, Makran Sea, south western Iran, Mesopotamia as well as Central Asia. Architectural remains and archaeological finds indicate the key role of the city on a very large scale in terms of working with metals, stone vessels, gems and pottery.



Photo 5. Outstanding Archaeological Findings of Shahr-i Sokhta

Criterion (iv): Be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history;

The ancient site of Shahr-i Sokhta is an outstanding example of an ancient city pertained to a multi-cultural society during the third millennium BC enjoying a unique settlement model. In this city, various parts of the settlement have been separated clearly. Shahr-i Sokhta serves as a prototype of architecture and urban planning in the region and has been designed and developed according to a predetermined plan. It represents an important stage in urban planning and architectural development expressed in the spatial organization of the urban fabric and facilities, and the separation of different functions, such as the graveyard and the residential and industrial areas. There is also evidence of the existence of a system of drainage and sewage.

In fact, Shahr-i Sokhta displays a variety of cultural interactions on a very large scale in ancient times because it was a venue for: creation, expansion and transfer of traditional knowledge, technologies, sciences and arts in the fields of architecture, urbanization, medicine, nutrition, agriculture, animal husbandry, as well as a place for the production and expansion of arts and crafts, such as metallurgy, jewellery, weaving, pottery, wood inlaying and basket weaving.

Statement of Outstanding Universal Value

Brief synthesis

The archaeological site of Shahr-i Sokhta (the ‘Burnt City’) is located in southeast Iran in Sistan-o Baluchistan Province. It was founded around 3200 BCE and was populated during four main periods stretching from 3200 to 1800 BCE. During this time, Shahr-i Sokhta grew into an important city, but then, associated with the changes in water courses and consequent climate change, lost its importance and was abandoned in the early 2nd millennium. The geographical location of the Iranian plateau made it a bridge connecting the civilizations of South-western Asia with the civilizations of the Indian Subcontinent. While the site was already known in the 19th century and even earlier, the history of systematic inter-disciplinary archaeological studies in Shahr-i Sokhta goes back to mid-1960s. The ancient name of Shahr-i Sokhta is still unknown.

Shahr-i Sokhta is the only city in the Iranian Plateau which contains the remains of a transition from rural to urban life along with its astounding cultural, social, and economic upheavals during late Chalcolithic Period and early Bronze Age. Therefore, the emergence of the first complex societies in the form of cities in eastern Iran can be clearly reconstructed through archaeological discoveries in Shahr-i Sokhta. This city reveals the creative methods used by its population to adapt to a dry and difficult environment during the third millennium B.C. The manner in which local environmental resources and raw materials coming from outside of the Sistan region were used, gives a unique picture of this proto-historic settlement.

Archaeologists have articulated Shahr-i Sokhta into the following parts: Southern parts with the centrality of the Kakh-i Sokhta (‘Burnt Building’), Eastern Residential Area, Central Quarters, Monumental Area, North-western Industrial Zone, Southern Industrial Area, Graveyard. The construction materials used in Shahr-i Sokhta are a reflection of its geographical setting. The sedimentary plain of Sistan lacks mountains and stones. Therefore, the main construction material is mud brick. Huge amounts of cultural and archaeological artifacts, especially pottery, are scattered over an area of 151 hectares in this site.

The discoveries in Shahr-i Sokhta are of paramount significance to the study of various aspects of Iranian culture, including the history of the migration of Aryan tribes to the Iranian Plateau. Latest studies suggest that prior to their migration to this region some Proto-Indo-Aryan tribes were living there, some of whom remained and were assimilated with the new

comers. Culturally, Shahr-i Sokhta is one of the most prominent sites in Sistan belonging to the early urbanization period.

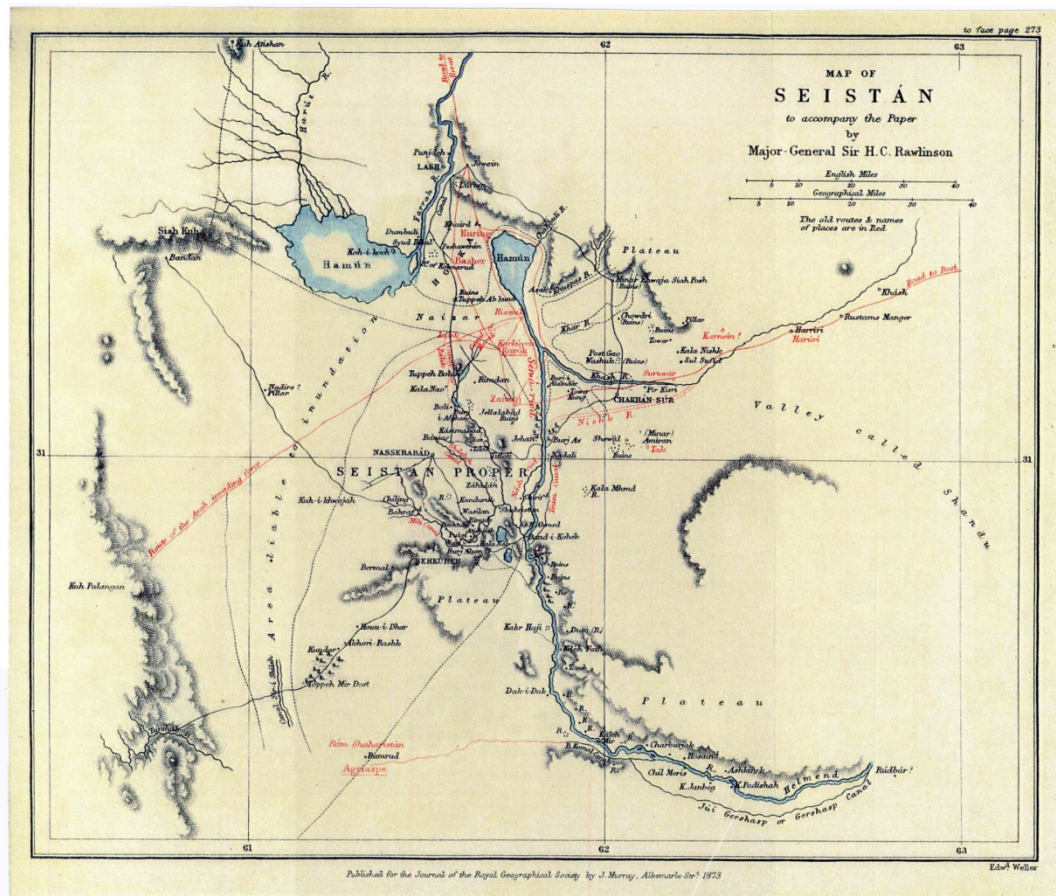
Before the discovery of this city, our knowledge regarding the economic, social and political evolution of this part of the Iranian Plateau during the fourth and third millennium BCE was insufficient.



Photo 6. Outstanding Archaeological Findings of Shahr-i Sokhta

Proposed Statement of Outstanding Universal Value

The archaeological site of Shahr-i Sokhta (the ‘Burnt City’) is located in southeast Iran in Sistan-o Baluchistan Province, 55km southwest of Zabol, 215 km northeast of Zahedan, the present-day capital of the province. Shahr-i Sokhta was founded around 3200 BCE and was populated during four main periods stretching from 3200 to 1800 BCE. During this time, Shahr-i Sokhta grew into an important city, but then, associated with the changes in water courses and consequent climate change, lost its importance and was abandoned in the early 2nd millennium. Geographically speaking, Sistan is the easternmost part of the Iranian Plateau bounded by mountainous regions. In the past, a fertile plain surrounded this proto-historic settlement, which was irrigated by the Biaban River, one of the branches of now dry Hilmand River. Today the site is surrounded by an arid desert.



Map 6. Sistan's map drawn by Henry MacMahon during the years 1903-1905. This map shows the political boundaries of Sistan agreed in the Paris Treaty between the governments of Iran and Afghanistan

The cultures of the mid-eastern parts of the Iranian Plateau, such as those of the Helmand Basin (with Shahr-i Sokhta as their centre), were located between the two most important civilization centres of the third millennium BCE; i.e., the civilizations of the Mesopotamians and Elamites in the west and the Indus Valley civilization in the east.

The formation of human settlements in Sistan can be considered as a function of Hilmand's hydrographic and geo-hydrologic evolution. The prehistoric civilization of Sistan, itself a constituent part of the greater Hilmand Basin, is considered a result of social and economic adaptation of man with difficult environmental conditions. Due to an agrarian economy, ancient human settlements were developed along Hilmand and its tributaries.



Photo 7. Shahr-i Sokhta was excavated (Laura Fogini, 1972)

While the site of Shahr-i Sokhta was already known in the 19th century and even earlier, the history of systematic inter-disciplinary archaeological studies in Shahr-i Sokhta goes back to mid-1960s. The ancient name of Shahr-i Sokhta is not yet known. Although the locations of many lands or places such as Anshan, Aratta, Meluhha, Marhashi, Dilmun, Makkan have been named in Mesopotamian texts, no mention of Shahr-i Sokhta has been found so far. Preliminary excavations have revealed that this ancient site was extremely vast and rich in cultural materials. Compared to the huge size of the site the area so-far excavated is still relatively small. Shahr-i Sokhta is a key point in eastern Iranian Plateau, and its study is an important factor in understanding the cultural evolution of eastern Iranian people in the third millennium B. C. The same preliminary investigations have shown that the site had great advantages in terms of conserving organic materials. In fact, this proto-historic site can be considered an open-air laboratory in which organic specimens have been preserved to an unprecedented degree.

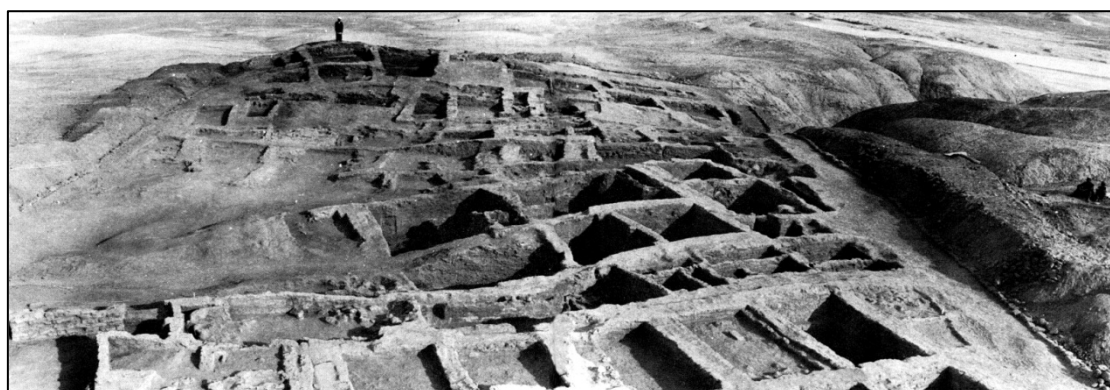


Photo 8. General view of Eastern Residential Area, 1968, Photographer: F. Bonardi

Innovations in architecture and urban planning, and their impact on the formation of archaeological sites in the region, were considered the prototypes for architecture and urban planning all over the region. The city grew on the basis of a pre-planned model.

The juxtaposition of neighbourhoods, urban utilities, separation of various parts of the settlement (such as the graveyard and residential areas), and the existence of sewage and drainage systems all tend to support this claim. Archaeologists have articulated Shahr-i Sokhta into the following parts: Southern parts with the centrality of the Kakh-i Sokhta ('Burnt Building'), Eastern Residential Area, Central Quarters, Monumental Area, Northwestern Industrial Zone, Southern Industrial Area, Graveyard.

The construction materials used in Shahr-i Sokhta are a reflection of its geographical setting. The sedimentary plain of Sistan lacks mountains and stones. Therefore, the main construction material is mud brick. These sun-dried mud bricks have a light grey colour, and contain organic materials such as straw. No fired bricks were used in the buildings of Shahr-i Sokhta. Mud bricks were of various sizes, and were made by the use of wooden frames with specific dimensions. So far, no building with a function other than a residential function has been observed in Shahr-i Sokhta. Although there is some evidence suggesting that the monumental zone had a public function, it cannot be definitely considered a temple, an archive, a storage place, or other public function. Excavations have shown that there was a system of water distribution and sewage in the urban area. It can also be noted that the graveyard has been one of the vastest proto-historic graveyards. It contains at least 20,000 to 37,000 graves, probably an underestimation considering the 1000-1200 years of habitation in Shahr-i Sokhta.

Fortunately, some of the discovered artefacts illustrate the early stages of agriculture, sciences, culture, industry, animal husbandry, human migrations, human palaeopathology, palaeoparasitology, etc. This gives a clear social and economic picture of that period. There is ample evidence providing information about various social classes. The existence of professional, career craftsmen can be proven through various means, such as through the

tools buried along with these craftsmen, or through artefacts such as marble vessels manufactured by them. There is also the existence of wealthy and poor classes and a hierarchical society deduced from the investigation of burials in Shahr-i Sokhta. This point proves that this ancient city had a complex political-bureaucratic system and enjoyed a high degree of urbanization.

This city is one of the few archaeological sites where artefacts, especially organic materials, have been preserved in the best possible condition due to special environmental and climatic conditions. The discovery of these artefacts during the excavations shows the existence of unique technologies in various fields including manufacture of beautiful alabaster vessels, manufacture of ornaments from semi-precious stones such as lapis lazuli, a relatively advanced metallurgy, an evolved and advanced architecture, manufacture of high quality pottery, unrivalled handicrafts (including the earliest instances of wood inlay and wood carving in the ancient world). All of these prove the artistic and industrial genius of the people of Sistan and Shahr-i Sokhta during prehistoric times.



Photo 9. Prosthetic eye & Operation skull in Shahr-i Sokhta

Archaeological discoveries show the importance of medical fields; so that at that time the physicians of Shahr-i Sokhta dared to diagnose and treat illnesses which even in today's standards are considered complicated and difficult ones. The evidence showing the traces of a skull surgery on a 13-year-old girl suffering from hydrocephalus signifies one of these daring attempts. The creation of a prosthetic eye is another attempt which is rare, if not unique, in the whole world. All these information's have been the result of a limited amount of archaeological excavations; further investigations could in all probability unveil more surprising aspects of this ancient civilization.

By using the data coming from Shahr-i Sokhta, it is possible to understand cultural interactions with other societies and human adaptations to the environment in this part of Iran. This proto-historic settlement needs to be studied in more detail to acquire a better

understanding of its conditions. Huge amounts of cultural and archaeological artefacts, especially pottery, are scattered over an area of 151ha in this site. The low hills surrounding the delta of Biaban River are the most important centres belonging to the Bronze Age. It is estimated that more than 4,000 million artefacts could exist in this ancient city. Sistan's dry climate and the presence of salt layers have helped preservation and have led to the discovery of organic materials, such as remains of cereals and other food, which are rarely found in other archaeological sites.

The discoveries in Shahr-i Sokhta are of paramount significance to the study of various aspects of Iranian culture, including the history of the migration of Aryan tribes to the Iranian Plateau. Latest studies suggest that prior to their migration to this region some Proto-Indo-Aryan tribes were living there, some of whom remained and were assimilated with the new comers. Culturally, Shahr-i Sokhta is one of the most prominent sites in Sistan belonging to the early urbanization period. Before the discovery of this city, our knowledge regarding the economic, social and political evolution of this part of the Iranian Plateau during the fourth and third millennium BCE was insufficient.

Statement of Integrity

The archaeological explorations that have been undertaken since the 1960s have shown that the city of Shahr-i Sokhta extended to some 151ha. So far only a small part of this has been systematically excavated. However, this has already given enough understanding of the site and its outstanding value. The site has been articulated by archaeologists into several sections according to their functions. Together, these include all the elements that express its Outstanding Universal Value. At the same time, the nominated area is considered of adequate size to ensure the complete representation of the known features and processes that justify its importance. The site is located in an arid area with geological conditions that have favoured the preservation of the structures and artefacts, including even organic materials that are rarely found in such sites. Apart from the impact of climate, the site is not subject to any development pressures that could undermine its integrity. The area of Shahr-i Sokhta is far from the modern city, and no interventions have taken place within the core zone and buffer zone that could damage its visual integrity.



Photo 10. General view of Monumental

Statement of Authenticity

The archaeological excavations carried out on the site so far have provided extremely important information about the cultural development, traditions, crafts and other functions in the region concerned. The architectural and urban features and structures built in mud brick are original and have maintained their authenticity.

Requirements for Protection and Management

The proposed core zone of the property includes the ancient mounds registered in the list of national properties of Iran as no. 542, in 1966. The nominated site and its buffer zone are under the conservation and management by the Iranian Cultural Heritage, Handicrafts and Tourism Organization (ICHHTO). At the time of listing, the outstanding importance of Shahr-i Sokhta was already understood by experts. This has been confirmed by later archaeological excavations and research aiming at the conservation and restoration of the site, and the information has also further contributed to the better understanding of the historical and structural integrity of the place.

Contact information and responsible authorities

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Official Local Institution/Agency

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Contents

Chapter 1. Identification of the Property
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Chapter 6. Monitoring.....

In the name of god



Chapter 1 : Identification of the Property

1.a. Country (and State Party if different)

Islamic Republic of Iran



Map

1.b. State, Province, or Region

Sistan-o Baluchestan Province



Map

1.c. Name of Property

Shahr-i Sokhta



Map



1.d. Geographical coordinates to the nearest second

No	Site Name	Region/District	Geographical Coordinates	Area of Core Zone (ha)	Area of the Buffer Zone (ha)	Area of the Landscape (ha)	Map no
1	Shahr-i Sokhta	Sistan-o Baluchestan	E: 61°19' 40" N: 30°35' 38"	275	2200	11507	I II III

**Photo**

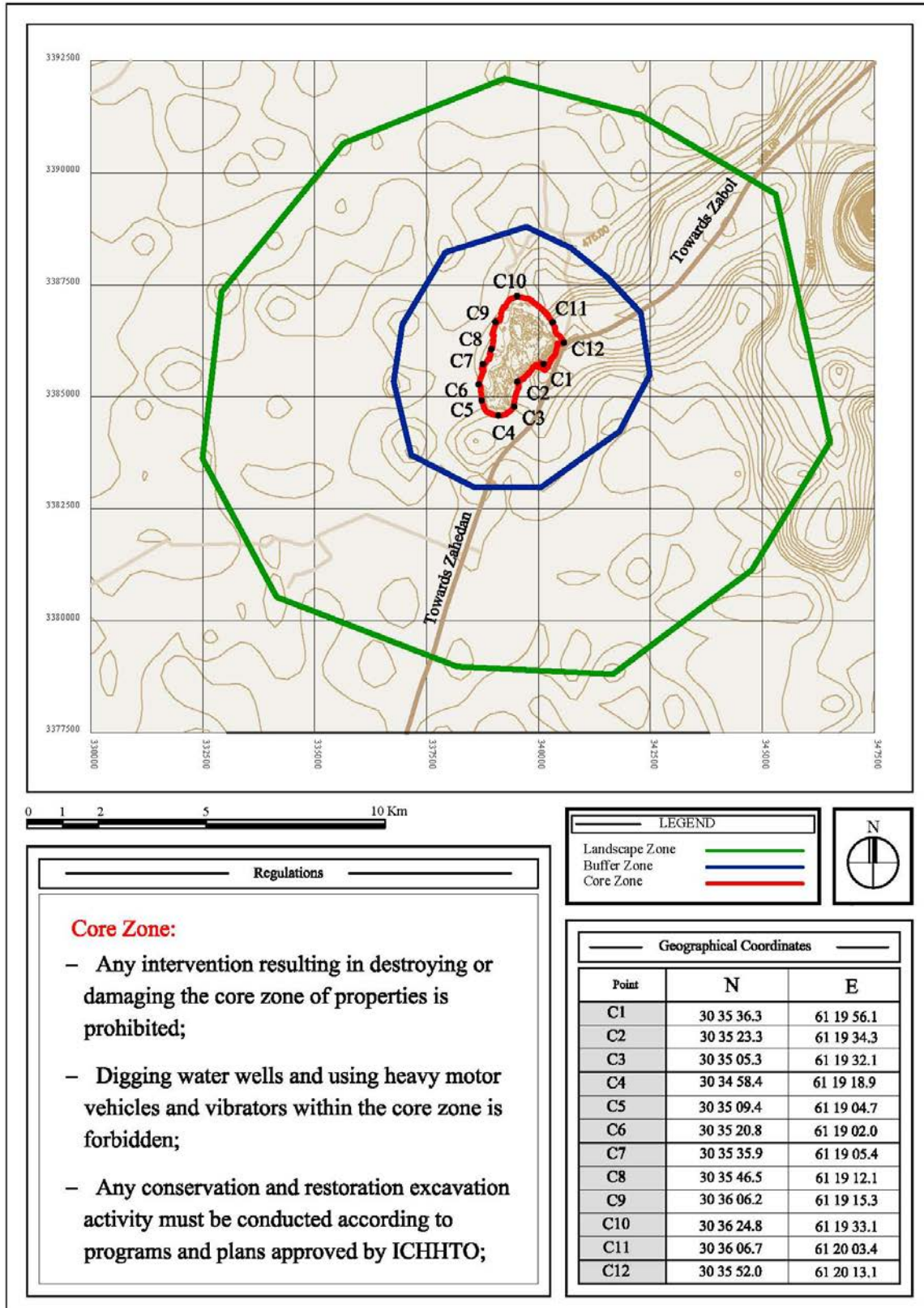
1.e. Maps and plans, showing boundaries of the nominated property and buffer zones

Please see maps in map vol.

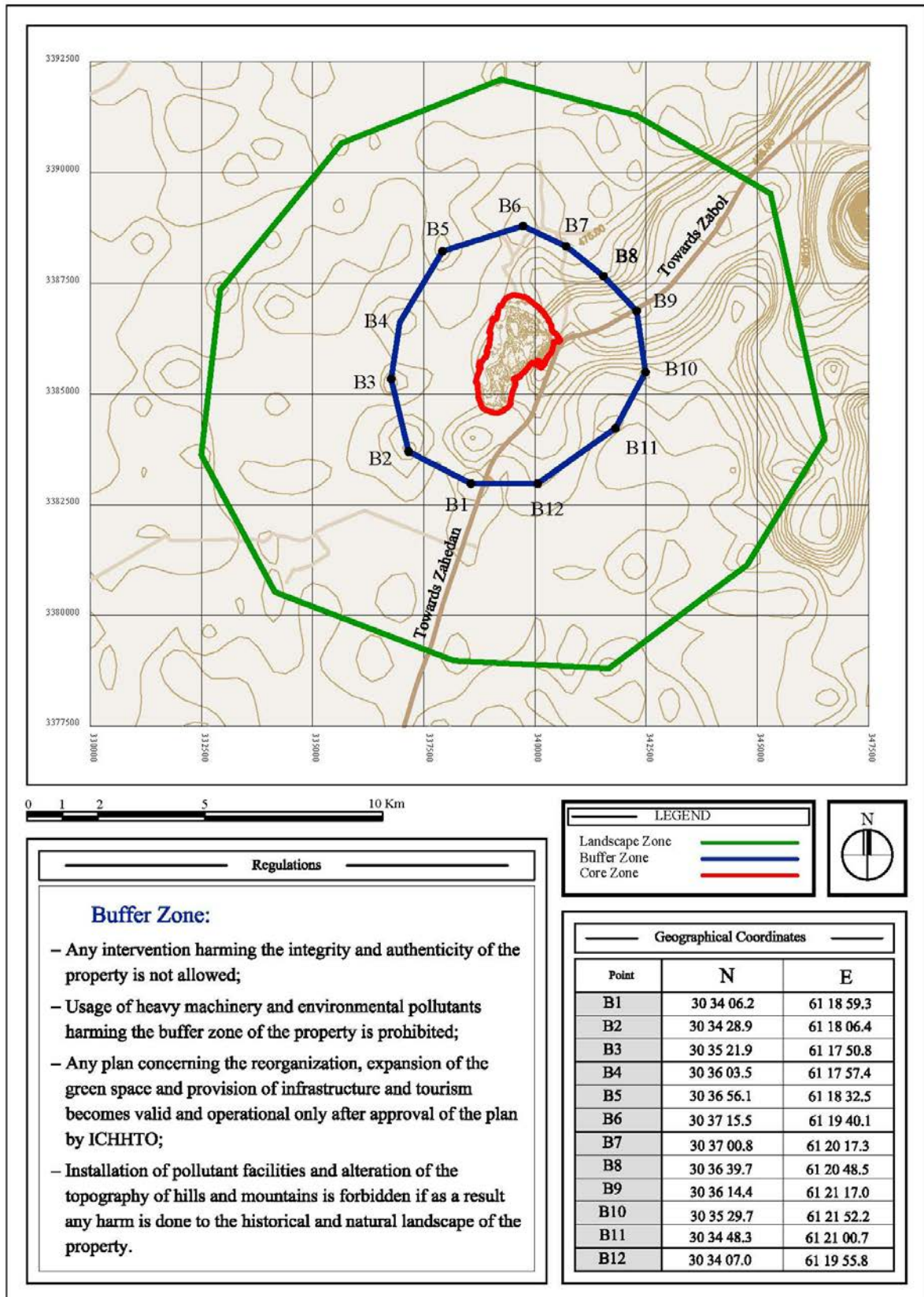
NO	Map Title		Map ref.
1	Base Maps	Landscape zone	I
		Buffer zone	II
		Core zone	III
		Identification	IV
2	IV-A (zone 21)	General Map (Zone 21)	IV-A
		Kakh-i Sokhta	IV-A-1 IV-A-2 IV-A-
3	IV-B (zone 16)	General Map (Zone 16)	IV-B
		Eastern Residential	IV-B1-1 IV-B1-2 IV-B1-3 IV-B1-4 IV-B1-5 IV-B1-6
		Central Quarters	IV-B2-1
4	IV-C (zone 10)	General Map (Zone 10)	IV- C
		Monumental Area	IV- C-1 IV- C-2
5	IV-D (zone 20)	General Map (Zone 20)	IV-D
		Graveyard	IV-D-1 IV-D-2 IV-D-3 IV-D-4 IV-D-5

1.f. Area of nominated property and proposed buffer zone

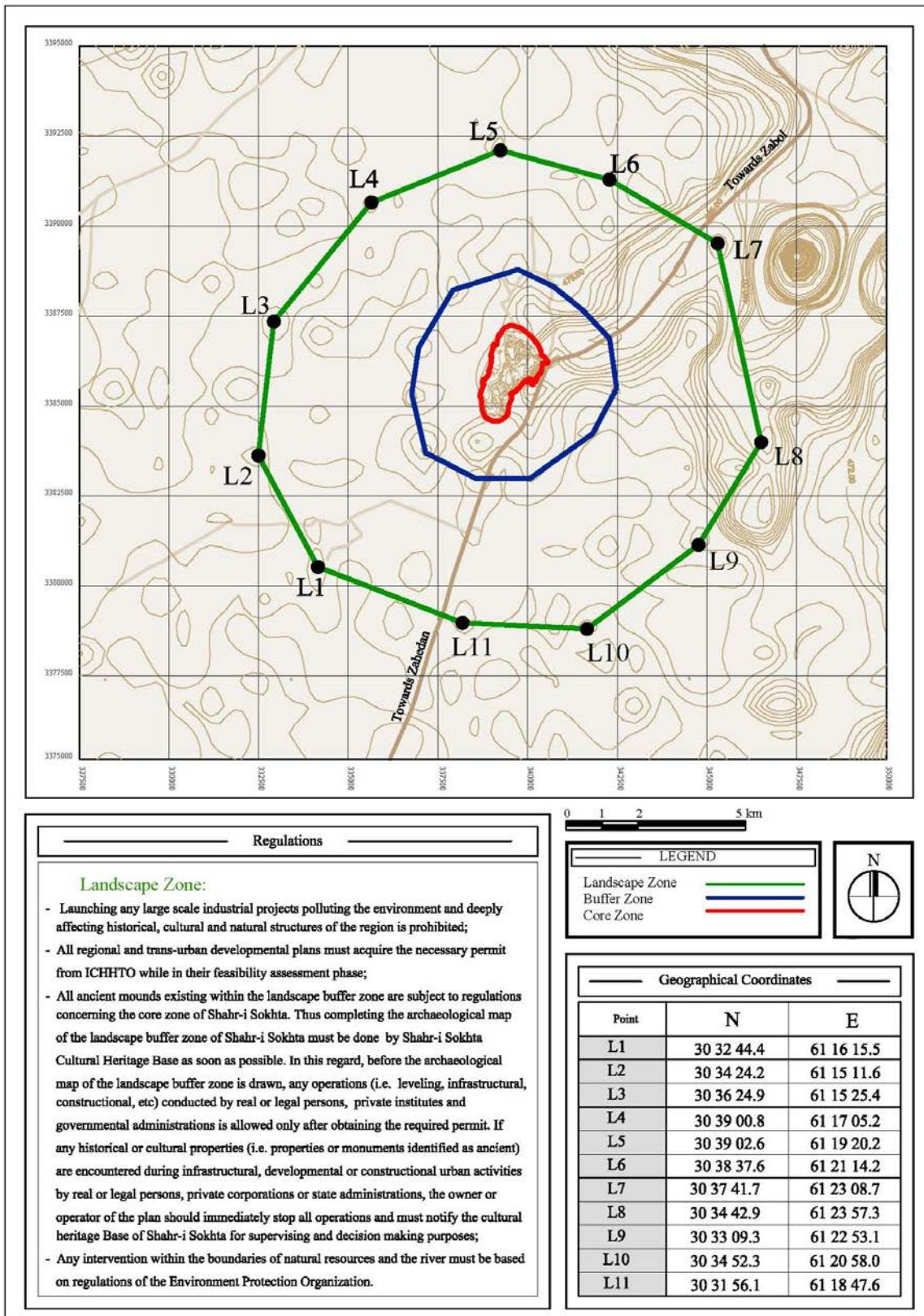
Name of the nominated	Province	Geographical coordinates	Area Core zone (ha)	Area Buffer zone (ha)	Total (ha)
Shahr-i Sokhta	Sistan-o Baluchestan	E: 61°19' 40" N: 30°35' 38"	275	2200	2475



Map



Map



Map

Chapter 2 . Description

2.a. Description of the property

"The eleventh of the good lands and countries which I, Ahura Mazda, created, was the bright, glorious Haetumant"

Geographically speaking, Sistan is the easternmost part of the Iranian Plateau. Bounded by mountainous regions, Sistan is 400 km long and 200 km wide, and can be divided into two distinct parts: the Rigestan desert in the southwest, which includes lands covered mostly with gravel, and Sistan proper to the northeast, which includes sandy deserts (Meder, 1977). This vast region is located to the southwest of Baba and Suleiman mountain ranges (in the Hindu Kush), and to the east of the great Lut Desert (Dasht-e Lut).

The Iranian part of Sistan, coupled with Baluchistan, forms the second biggest Iranian province after Kerman. Archaeological studies and excavations performed in the southern parts of the region show that around third millennium B.C. the Ramrud terrace, across which at those times the Rud-i Biaban flowed, hosted human settlements, attesting the prosperity and the glory of that part of Sistan during various eras.

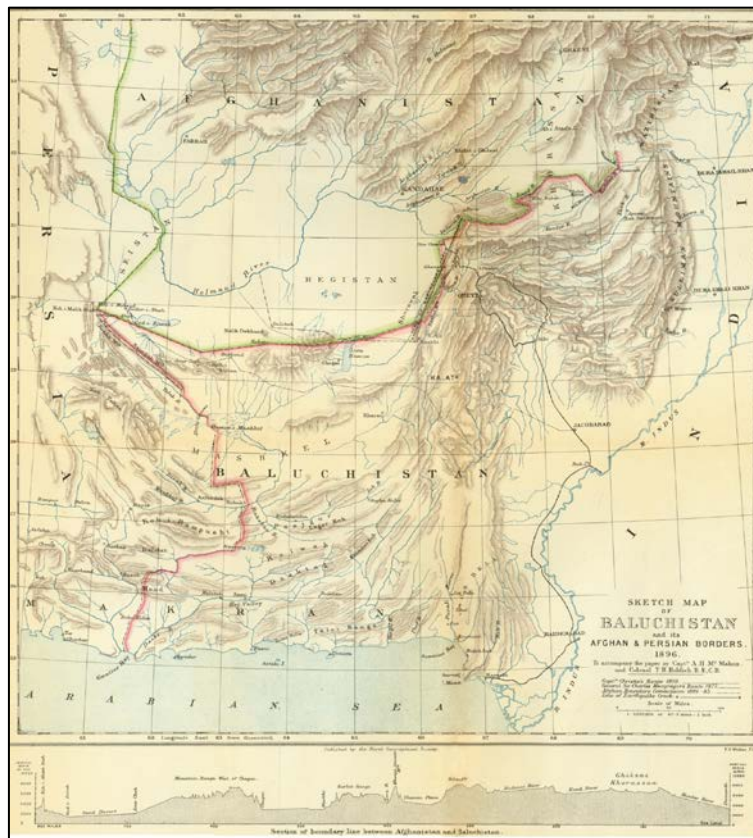
2.a.1.1. Geographical location and extent

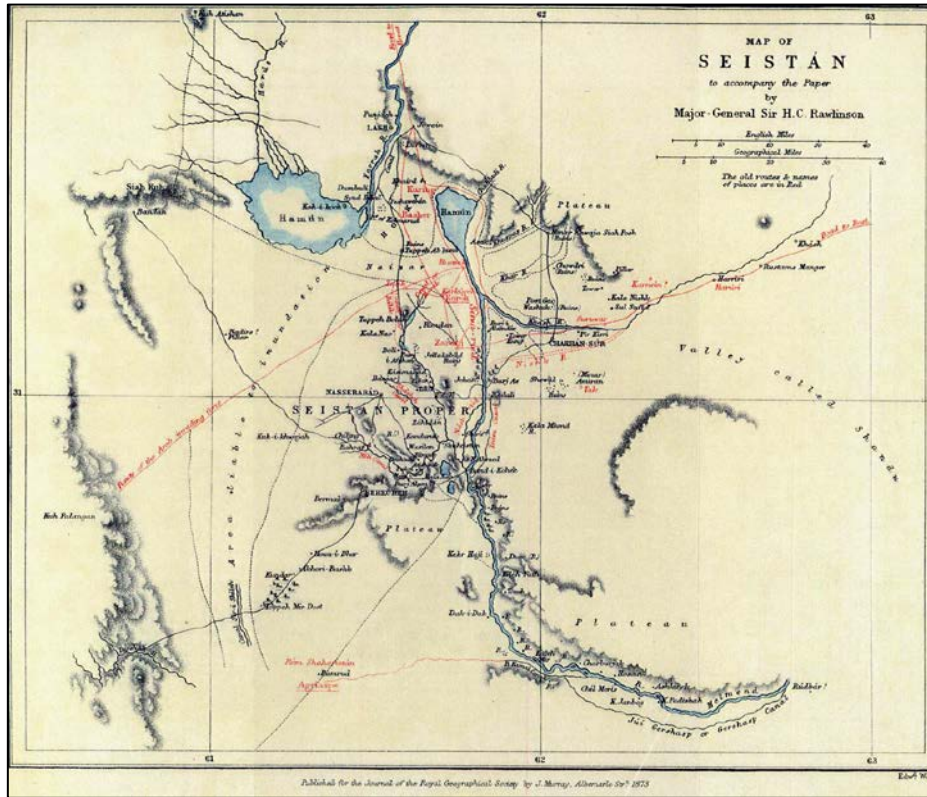
Sistan (30° 5' N - 31° 28' N and 61° 15' E - 61° 50' E) comprises the southeastern parts of Iran. Its population density is higher than other parts of the province, and most of its population is composed of rural dwellers. About half of these rural dwellers earn their living through agriculture, and the other half through animal husbandry.

In the Sistan Basin, life is dependent on the Hilmand delta and its related wetlands. In this basin, the water level covers a vast area but is very shallow, so that in its deepest parts it's three meters deep. The vast area of the water in a dry land leads to much higher rates of evaporation, which in turn cause ecologic crises across the region and make the region vulnerable against environmental hazards. However, such vast waters cause the growth of reeds and other wetland plants, which in turn freshens the air and helps the population earn a living. Due to being situated at the center of a vast desert, the Hamun wetland is a safe destination for migratory birds that spend the winter months on this lake.



Map



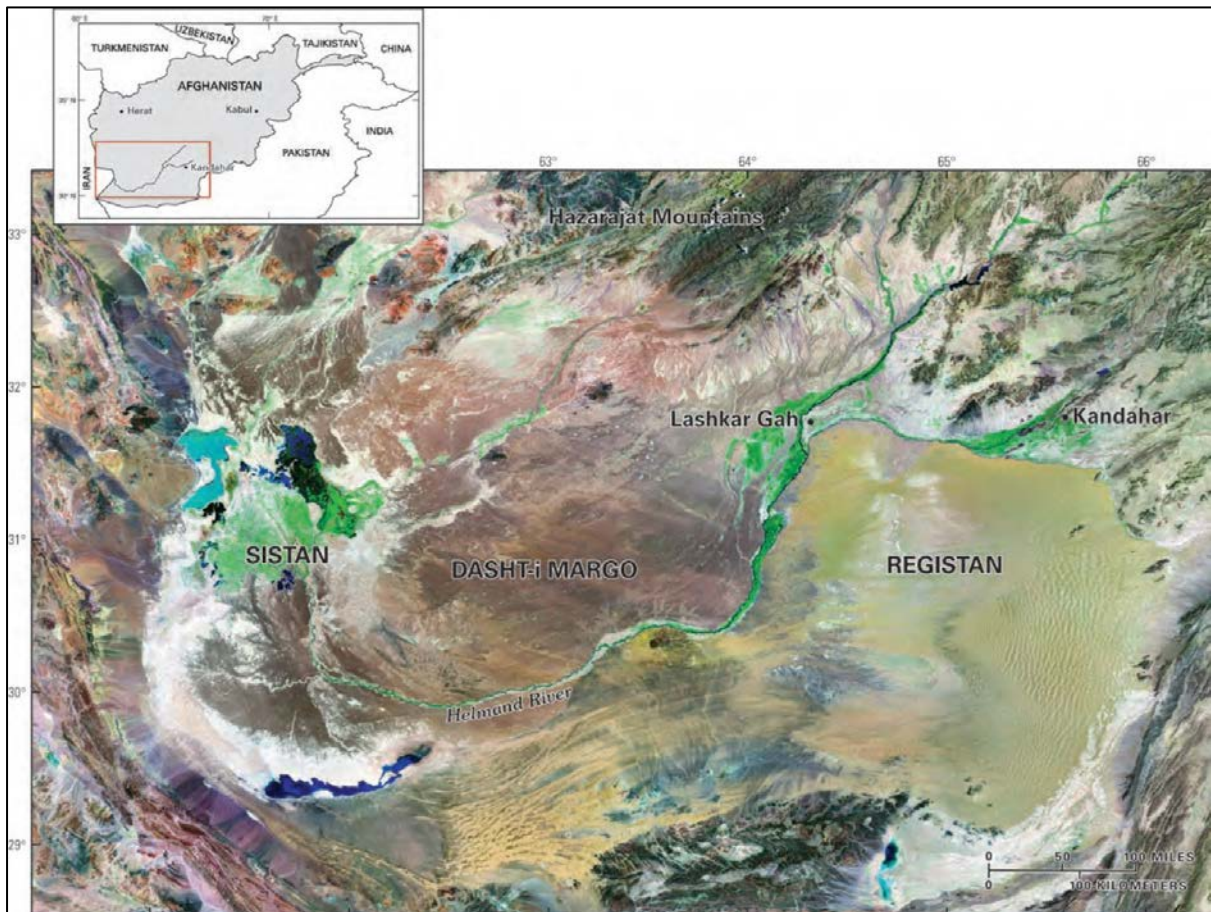


Map



2.a.1.2. Geomorphology of Sistan

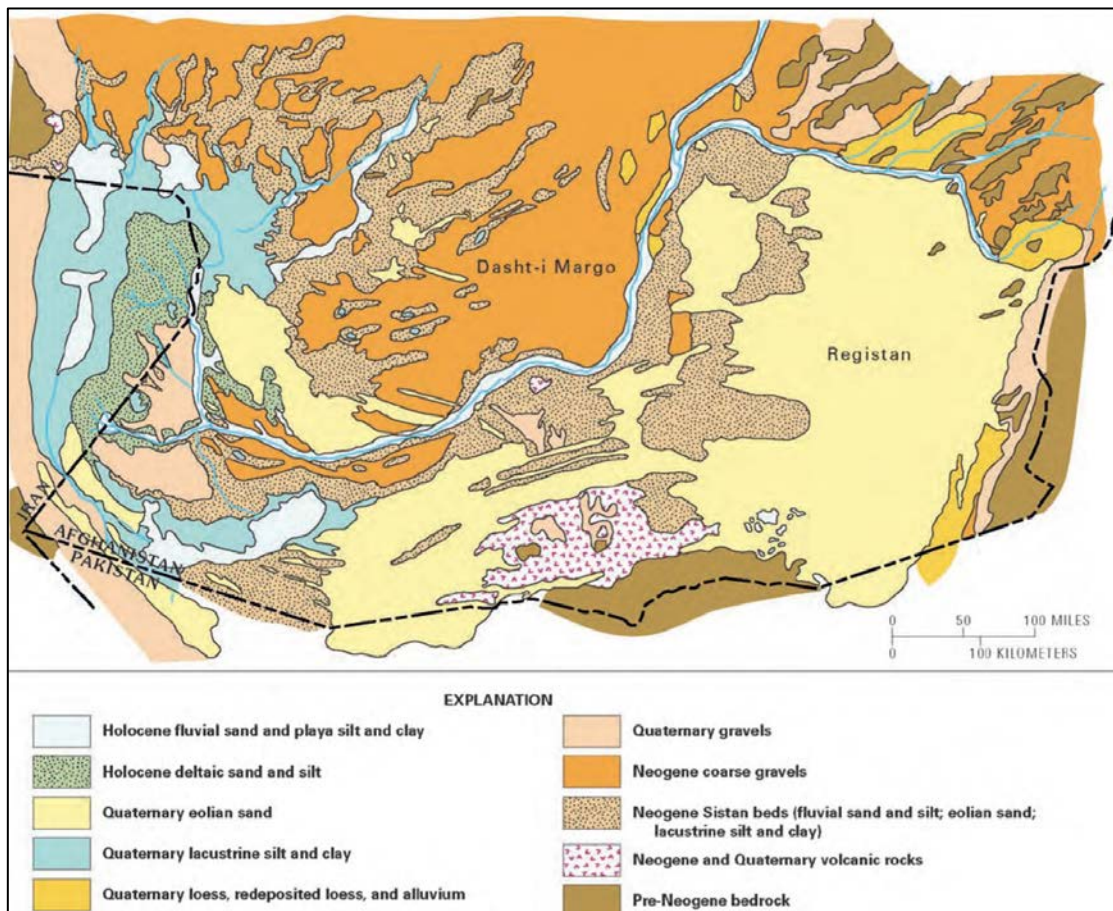
The sandy plains of eastern Iran are mostly created through wind erosion. A notable example is the Sistan region, which is an alluvial plain. Each year, the flooding Hilmand deposits new amounts of alluvium which are shaped into sand dunes. In fact, after the receding of floodwaters on the delta of Hilmand many sickle-shaped sand dunes are formed as the result of water and wind erosion. Many dunes of this type can be found to the south of Lake Hamun Hilmand (near Gardan Rig), and to the south of Lake Hamun Pouzak. The sands of Gardan Rig eventually move through Gaud-i Zirreh to the eastern parts of Rigestan Desert and accumulate there in the shape of huge hills.



Map

Some other landforms, such as Kuh-i Khan Neshin, are aged between 1.4 and 2.8 million years. Apart from that, the other geomorphological features of Sistan are the triple terraces which are located at different elevations and show the layers of Quaternary Period. The first terrace is formed near Chahar Burjak in Afghanistan. Its elevation from the sea level is 600m and it creates a relatively vast delta. The second terrace is the Ramrud Terrace which is 10m higher than the level of Lake Hamun waters during summer. The last terrace in Sistan is the Nimruz Terrace, which is the lowest of the lot. This terrace is only 3m higher than the level of Lake Hamun waters during summer, and continues up to the current location of Hilmand's delta (near Nimruz Province in Afghanistan).

The oldest geological features encountered in Sistan go back to the Cenozoic era. Three different deposits belonging to this era can be found in Sistan: deposits of clay sediments of the river bed, deposits of conglomerates and mid-sized and bigger gravel, and finally fine sand caused by wind erosion. Conglomerates can be found in the Margo desert, bigger grained gravel is seen in Rigestan Desert, and clay sediments are encountered around Zaranj and Iran's Sistan.



Map

During the Tertiary period the process of deposition continued in the region. This can be realized by observing the accumulation of sediment layers over each other in the closed Sistan Basin. Aeromagnetic surveys show that the sediment layers over Precambrian blocks varies from 300 to 5000 meters (Whitney, 2006); and the thickness of Neogene and Quaternary periods is estimated to be approximately 1000 meters, with the thickest parts in the west (Weippert et al., 1977). In the northern margins of the Sistan Basin mixed layers of oxidized units (pink or tan in color) and non-oxidized units (light-green in color) of clay silt can be found. Some units of water-borne sand can be found in the basin of Gaud-i Zirreh (Whitney, 2006).

Jux and Kemf found some evidence in Sistan which showed the presence of Ostracods in the sediment layers of Lake Hamun. The existence of these creatures, with their peculiar environmental needs, suggests that at those days the region must have a climate similar to its current one (Jux & Kemf, 1983). More information on various geological periods can be found in the geological map of the region which is presented below. According to what was discussed above, there have been no changes in the landscape and sediment deposits of Sistan region and Hilmand Basin during the last 10 million years.

2.a.1.3. Climate

Sistan is situated within the Asian desert belt below the temperate zone of the northern hemisphere. Its climate is semi-arid with hot and dry summers and cold winters. Sistan proper has a semi-arid climate and Rigestan Desert has an arid climate.

Precipitation rate in this part of the Iranian plateau is very low; for example, Zabol's meteorological station has recorded a mean annual precipitation of 50 millimeters. The rains usually fall from December to March and the other months are nearly dry and rainless. Since annual precipitation is less than 300 millimeters, it cannot be used for dry farming. As we mentioned before, the arid climate and high temperatures are factors which cause climatic difficulties for the region; however, some of these difficulties are ameliorated through the waters of Lake Hamun. Apart from those, there are the strong and rough winds which blow over Sistan during summer and have a prominent impact on the environmental and climatic characteristics of the region. These winds, which begin to blow from May onwards, decisively affect the region's plant cover and landscape. The only plant resisting these winds is the Tamarix.

2.a.1.3.1. Temperature and Precipitations

The hottest months of the year are July to August with an average temperature of 32 °C and coldest months are January with an average of 7.5 °C. The aridity of climate and high temperatures in summer are the main ecological features of Sistan. These unsupportable climatological conditions became tolerable only by the evaporation of the waters of Hilmand River and Hamun Lake.

2.a.1.3.2. Raining

The plain of Sistan suffers terribly from the dearth of rainfall. The rainclouds which are supposed to unload their water over Sistan originate from eastern Mediterranean. On their long journey over mountainous regions (Zagros Mountains) and the hot and dry deserts of central Iran, these clouds lose a great part of their humidity (Ganji, 1968). According to the records of Zabol's meteorological station for the last 33 years, the mean annual rainfall is 75 millimeters, most of which happens during autumn and winter. Annual precipitation in other parts of Sistan which belong to Afghanistan is as follows: 72mm for Chakhansur, 72 mm for Deshou, 77mm for Farah, 211mm for Herat. Sistan's mean temperature during summer (especially July and August) is 45° C, while during winter months it drops to 7.5 (Meder, 1977).

2.a.1.3.3. Winds

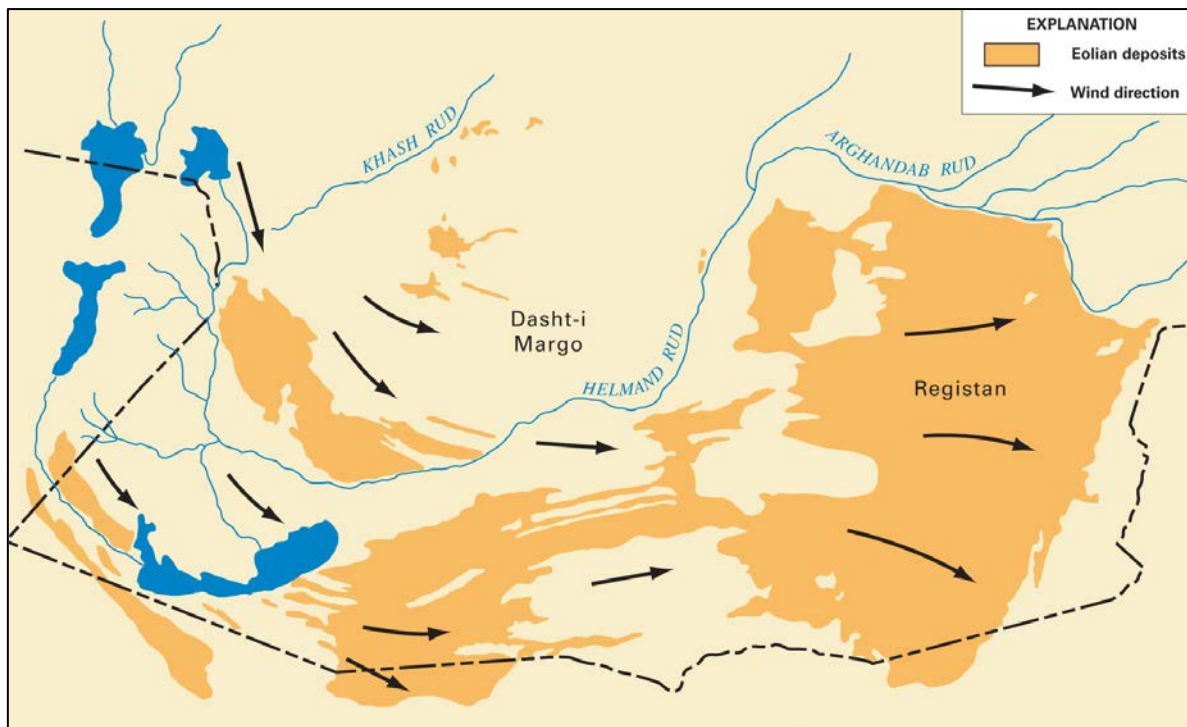
The Iranian Plateau is very vast, and this vastness has endowed it with a great variety of environments and climates. Wind is one of the climatic and environmental features of Sistan and the Hilmand Basin. In all seasons, very strong and rough dust storms can occur. Among the various winds in Sistan, the 120-day wind is the most important. This wind blows from the northwest from May to mid-September and sometimes reaches a speed of 150km per hour. It has a strong impact on the landscape, plant cover and human life in the region. This wind is directly caused by the penetration of low pressure systems from western Afghanistan, which gain momentum while passing over western Afghanistan and eastern Iran (Ganji 1968).

There are two different theories regarding the causes of this wind. Ganji and Kendrew maintain that the summer low pressure system (monsoon) formed over mountains in Pakistan pushes high pressure systems from the Caspian Sea region towards Sistan and creates strong winds over that region (Ganji, 1968 & Kendrew, 1961). On the other hand, Silva believes that the heat generated by sunlight over Margo Desert creates movement of air in western parts of the region, especially in places with higher altitudes (Whitney, 2006).

Winds are stronger and more persistent in the Sistan region as compared to other parts of the Hilmand Basin. This wind moves a great amount of dust and sediments (Merder, 1977).

The impact of wind on the natural landscape of Sistan can be seen around Shah-i Sokhta in the form of yardangs created through wind erosion. Furthermore, constant wind over the summer months accelerates the rate of evaporation of Lake Hamun waters. This fact leads to somewhat tolerable temperatures in Sistan.

Sistan winds play a key role in the movement of sand dunes across Sistan and the Hilmand Basin. If we look at the landscape in southwestern Afghanistan and eastern Iran, we will find huge sand dunes which are formed across the path of these winds. Map 2-7 clearly shows the amount and location of sand dunes in the Rigestan Desert. Studies show that there is a direct relation between the drying out of Lake Hamun and the increase in the movement of sand (Rajabi et al, 2006).



Map

2.a.1.4. Water resources, rivers

On the dry lands of Sistan, water is considered a valuable and vital element. Making use of groundwater in this region is very difficult; and due to the lack of natural slope, it is impossible to use *Qanat* systems in the area. The water resources of the region are exclusively flowing bodies of water which originate from neighboring regions.

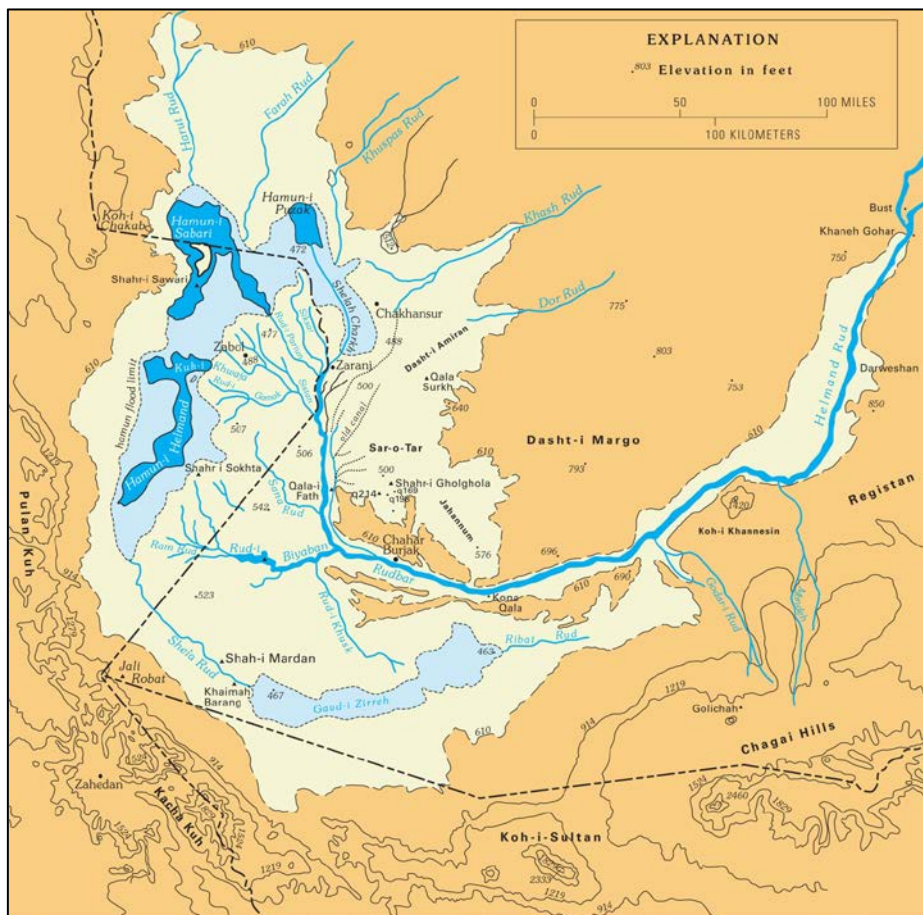
The most important flowing body of water is the Hilmand River which originates from Bābā Yaghma mountains (in the Hindu Kush) and after a long journey flows into Lake Hamun in Sistan. After the spring thaw in the Hindu Kush, the waters of Hilmand are considerably augmented and in the wet years the river remains flooded up to August and September. But on average it remains flooded from late March till May. What eventually determines the amount of water entering Sistan is the temperature in the Hindu Kush Mountains. Higher temperatures in late winter and early spring mean more snowmelt and more water entering Sistan; while lower temperatures let the snow remain on the mountains and decrease the amount of water entering the Sistan Basin (Merder, 1977). At approximately 1,300 kilometers, the Hilmand River is the longest river in Afghanistan and Iran. Originating from the Kuh-i Bābā heights of the Hindu Kush mountain range (about 40 km west of Kabul), the Hilmand receives five tributaries- Kajrud (Kudrud), Arghandab, Terin, Arghastan, and Tarnak (Hanifi, 2003).

Draining the entire southwestern portion of Afghanistan, the river moves southwest towards the Iranian border, passing through the provinces of Wardak, Oruz-gan, Helmand, and Nimruz in Afghanistan (Gazeteer of Afghanistan II, pp. 114-15). South of Zaranj, near the Iranian border, the river splits into two separate waterways. One of these flows northward (for about 55 kilometers) forming the Iran-Afghanistan borderland, and later splits into three branches of Sistan River, Hilmand River, and the boundary river of Parian, which are split themselves and flow into the triple Hamuns (lakes). The other main waterway, called Rud-i Biaban, used to continue south and irrigate the southern delta of Sistan (Dupree, 1973, p. 37). This branch is now dry but during the third millennium B.C. provided water for irrigation and other uses for the population of the southern delta of Sistan. In historical times (during the Achaemenid period) there was another waterway flowing parallel to the course of Rud-i Biaban which was called Sana Rud.

The deltas of Rud-i Biaban to the west of Shahr-i Sokhta and Sana Rud to the north east of it have probably moved as the result of fluctuations in flow rate and wind erosion during the Subatlantic and Subboreal periods. It should be especially noted that Sena River probably flowed for only a short time, because on its course there are no groundwater resources to help the growth of plants.

During the Little Ice Age, which occurred from 1650 to 1550 B.C., and concurrent with a dry period in Europe, Rud-i Biaban was dried out and Shahr-i Sokhta and its satellite settlements were abandoned and became strongly affected by wind erosion (Meder, 1977 & Scerrato, 1965).

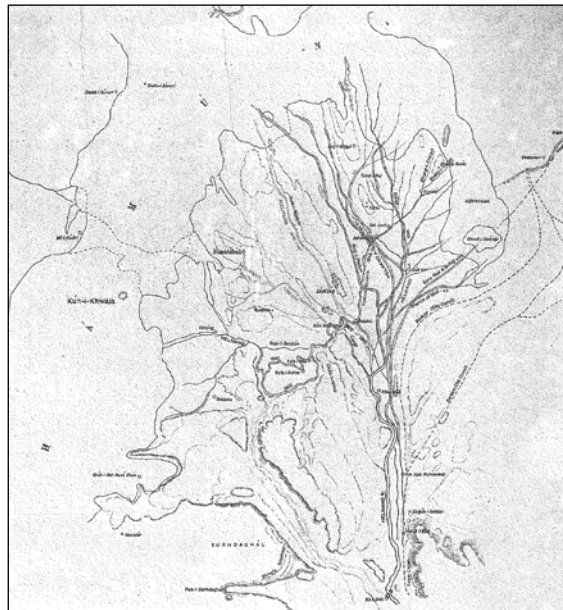
Hilmand's median annual water output is 2,200 million cubic meters. When passing through Margo Desert, the river loses a considerable amount of its water (25%) to evaporation. Although for most of its length Hilmand passes through Afghan soil, most of the land that can be irrigated by its waters lies within Iran. During the seasonal floods of the river, the delta of Sistan and the areas surrounding Lake Hamun are covered by plants and a lot of agricultural products are grown. But this situation is not permanent and can change very rapidly; this fact indirectly helps to keep the population below a certain level. Nevertheless, since ancient times the people of Sistan have challenged the environment, while also recognizing its crisis-prone nature.



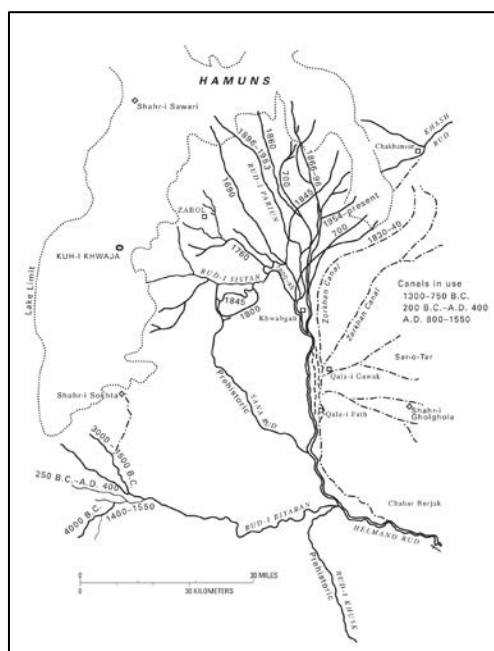
Map

Recently, Hilmand's water output (or at least that part of it which enters Iran) has drastically decreased. According to studies, this amount dropped from 2211.7 million cubic meters in 1991 to 48 million cubic meters in 2001 (see: <http://portal.unesco.org>).

Apart from Hilmand, other rivers of Sistan are *Farahrud* (Farah River) and *Harutrud* (Harut River) which originate from Band-e Baian mountain range in northwestern Afghanistan. Another important river is called *Khashrud* (Khash River), which gets its waters from Hindu Kush in the north (Fischer, 1983).



Map



After reaching Sistan, Hilmand River helps the creation of two other natural phenomena: a lake and a delta. Both these phenomena have a deep impact on the evolution of human settlements across the Sistan Plain and the ability of the people to make a living through agriculture, animal husbandry, fishing, and bird-hunting. They have had the same impact in the creation of the same jobs in ancient times.

According to the geography of the *Avesta*, the basin of Haetumont (Hilmand) River in the southwest stretched from Arghandab to Sistan. Since ancient times, this river has held a prominent position in the religious traditions of Zoroastrianism (Gnoli 1980, p. 66). In Zoroastrian yashts (Hymns) Hilmand has been mentioned and its purity praised. Other rivers of Sistan have also been mentioned in yashts; rivers such as Farahrud (*Fradaθā*), Khashrud (*X^vāstrā*), Harutrud (*X^varənahvaitī*), Rakhdrud (*Harax^vaitī*), and Khoshkrud (*Uštavaitī*). Some of these Zoroastrian names are similar to the current names of these rivers and they are also encountered in Pahlavi scripts and ancient histories of Sistan (Bahār, 1935, p. 15).

Hilmand River and its surrounding lands have played a key role in Zoroastrian traditions. This importance is due to the fact that Sistan represented a major part of Aryan Lands (





Map

Table 1

Water Flow of the Helmand River, 1991-2001

Year	Million m ³
1991-92	2221.7
1992-93	1783.8
1993-94	529.5
1994-95	829.7
1995-96	1023.8
1996-97	908.7
1997-98	2193
1998-99	258.8
1999-2000	114.1
2000-01	48

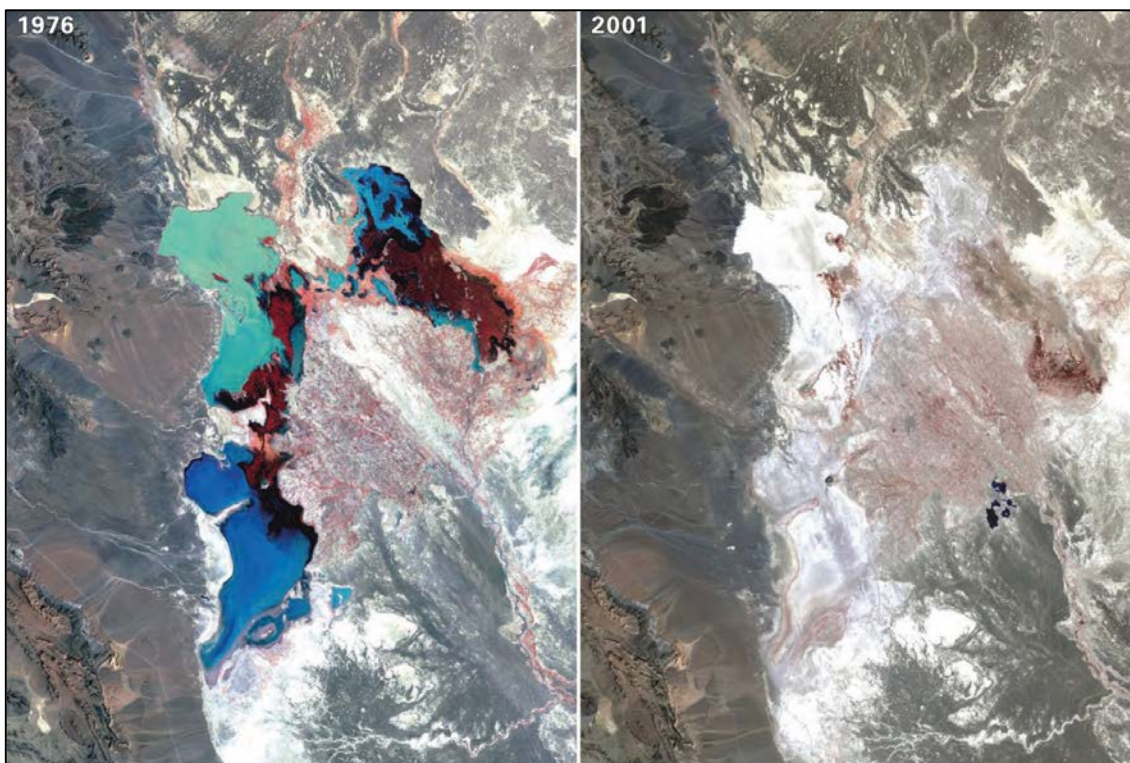
Source: United Nations Interagency Assessment Report on the Extreme Drought in the Islamic Republic of Iran. Tehran, Islamic Republic of Iran, July 2001 (see <http://portal.unesco.org/en>)

2.a.1.4.1. Lake

Lake Hamun is situated at the extreme end of Hilmand's delta to the north of Sistan. This lake is the largest fresh-water lake in Iranian Plateau and according to the Ramsar Convention is among protected wetlands (Noriet al., 2008). The depth of the lake very rarely goes higher than 3m but its area is variable from year to year and season to season.

This lake is another crucial water resource for Sistan. Most of the population in Iranian Sistan lives around this lake. In the past, a major part of the people's economic life was dependent on the lake. It not only provided opportunities for fishing and water-birds hunting, but also produced great amounts of reeds as fodder for the cattle breeders of the region. In the last 10 years, the Sistan Basin has suffered from a severe drought which has affected the lives of the local people both in Afghanistan and Iran.

This lake, which is a terminal lake, is not too big, considering the amount of water flowing into it. Lake Hamun is, in fact composed of three large depressions which at the end of spring (with the spring snow melting in the Hindu Kush and spring rains) and in wet years create a large lake (with the dimensions of 160 km in length, 5 to 80 km in width, an area of 4500 square kilometers and a volume of 13000 million cubic meters). During summer, Sistan's 120-day wind evaporates the major part of Lake Hamun's water and splits it into three separate parts (Fisher, 1968, p. 78).



Map

These three parts have their own names which are: Lake Pouzak (Hamun-e Pouzak) with an area of 480 square kilometers, which is wholly within Afghanistan; Lake Sabouri (Hamun-e Sabouri) with an area of 800 square kilometers part of which is in Iran and another part in Afghanistan; Lake Hilmand (Hamun-e Hilmand) with an area of 650 square kilometers, which is wholly within Iran. Apart from these three lakes, there is another depression to the south of Sistan which is called *Gaud-i Zirreh* (Zirreh Depression) and in wet years is filled with surplus water from Lake Hamun through Shilleh River (Fischer, 1983, p. 10). In ordinary times this lake is dry and covered with salty soil. As a result of persistent droughts in Sistan, these lakes, which have already partially dried up, may soon completely dry up. During the last 40 years, in order to counter the effects of droughts, several natural depressions to the south of Zabol near Zehak district have been turned into water reservoirs to provide water in times of drought.

In Iran's mythology, Lake Hamun and Hilmand River have a special eschatological importance (Bartholomae, 1924, p. 9 & Nyberg, 1938, pp. 304-5). This religious significance is the reason why this lake is mentioned recurrently in Avesta and especially in yashts with the title of *Kasaoya*. In Pahlavi scripts and especially in Bundahishn the name of this lake is *Kayānsīh* which is a clear reference to the mythological and folkloric Kayanid dynasty. According to Pahlavi texts, the significance of Sistan and Lake Hamun is due to the birth of *Saošyant* (the future Savior of Zoroastrianism) from the Zoroaster's sperm in these parts (Bundahišn [TD2], pp. 220, ll. 6-15, 89, ll. 6-11).

2.a.2. Archaeological and historical geography of Sistan

The formation of human settlements in Sistan should be considered as a function of Hilmand's hydrographic and geo-hydrologic evolution. In fact, the prehistoric civilization of Sistan, which is itself a constituent part of the greater Hilmand Basin, should be considered a result of social and economic adaptation of men with difficult environmental conditions. Due to an agrarian economy, ancient human settlements were always centered along Hilmand and its tributaries. It's isn't without reason that since 4000 years ago each change of course by the rivers of Sistan has been coupled with the movement of ancient cities and villages to new places.

There's a famous saying that "if Egyptian Civilization is the gift of Nile, Sistan's ancient civilization is also a gift of Hilmand". The two main water resources of Sistan, Hilmand and Lake Hamun, are the mainspring of prehistoric and historical civilizations in Sistan. "Concerning the significance of the river and the lake for the creation of ancient civilizations in Sistan, it's enough to take a glance at the list of archaeological sites studied and excavated by archaeologists in the past several decades to realize that up to the 18th century A.D. these parts have always been the location for numerous human settlements ... the remains of which are scattered all over this region" (Sajjadi, 1997).

Greater Sistan has always been a suitable place for the creation of permanent settlements along the life-giving course of Hilmand. Archaeological studies of southern parts of Iran's Sistan show that during the third millennium B.C., the sedimentary terrace of Ramrud with its Biaban River (which is dry today) was heavily populated. Researchers have pinpointed 298 archaeological sites only in Qal'e Rostam with an area of a mere 664 square kilometers. Of this number, 260 sites belong to the Bronze Age and the rest belong to the historical and Islamic periods. This fact reflects the prosperity and glory of Sistan across the ages (Moussavi Haji & Mehrafarin, 2008).

In historical periods, especially during the Achaemenid Empire, this region hosted human settlements. The proof for this statement is the Achaemenid city of Dahane Gholaman which was probably the government seat of Sistan and whose name can be coupled to Drangiana mentioned in Achaemenid scripts. Many sites belonging to the Parthian Empire have been discovered in region, the most prominent of which are Kuh-i Khwaja and Qal'e Sam. Regarding the importance of Sistan during the Sassanid Empire it is enough to say that the fire temple (*Atash kadeh*) of Karkouyeh, which was probably one of the most important fire temples in Sassanid Empire, was located in this region.

But Sistan's importance in ancient times is not only due to its plentiful historical sites; it is also due to the prominent position of Sistan, Hilmand, and Lake Hamun in Iran's ancient religions, especially Zoroastrianism. This region is a place of important events which had a big share in the evolution of Iran's ancient culture, events such as the formation of early Iranian mythology and the appearance of Iranian mythological heroes such as Rostam and his family.

During Islamic times the prosperity and glory of towns in Sistan increased. Early Islamic explorers and geographers, whether Persian or Arab, have attested to this fact. It is enough to point out that for a long time Sistan was known as "Iran's granary" or "Khorasan's breadbasket" (Mojtahedzadeh, 1995). A glance at the list of historical cities of the region tells us that numerous human settlements were prospering in Sistan. These cities include Zaranj, Kass, Nah, Tagh, Gharnein, Khash, Farah, Jazeh, Bast, Rozan, Sarvan, Saleghan, Baghnin, Deraghsh, Tall, Beshlang, Benjovai, Kahak, Ghazneh, Ghasr, Sivi, Esfanjai, and Jaman.

However, it should be noted that while the glory and prosperity of Sistan's civilizations across the ages has been linked to the water resources and climate of the region, their destruction and disappearance has also been linked to the same natural features. Archaeological studies show that one of the reasons for the abandonment of Shahr-i Sokhta at the end of the second millennium B.C. was a change of course by Hilmand. In addition, the destruction and abandonment of the Achaemenid city of Dahane Gholaman can be mentioned, which was probably due to an increase in the frequency of dust storms. The same thing can be said regarding the disappearance of the Islamic Era cities of Sistan which was the result of either frequent droughts or extensive flooding of Hilmand.

2.a.3. The role of Shahr-i Sokhta in the cultural evolution of Western Asia

In order to recognize the true role of Shahr-i Sokhta in spreading the urbanization across the eastern parts of the Iranian Plateau during the third millennium B.C., it is necessary to know more about the archaeology of eastern, southeastern and northeastern parts of this plateau. Where Shahr-i Sokhta is located is itself a part of the vast region situated between Amu Darya in Central Asia and the Oman Sea in the south. The civilization of Shahr-i Sokhta and the Hilmand Basin is related to the other cultures existing in Afghanistan, Baluchestan, the Indus valley, and the northern coasts of the Persian Gulf, the Oman Sea and Central Asia.

Across these regions urbanization had spread as the result of an increase in economic production, population, long distance interactions and environmental adaptation. The high mountains and arid deserts covering most of the region are not the only natural features of the eastern part of the Iranian Plateau. The great and small lakes and rivers (Amu Darya, Tedjen and Murghab in the north, and Arghandab and Hilmand in the south) flowing in the region make at least 10% of its area suitable for human habitation and agriculture.

The cultures of the mid-eastern parts of the Iranian Plateau, such as the cultures of the Hilmand Basin (with Shahr-i Sokhta as their center), were located between the two most important civilization centers of the third millennium B.C.; that is, the civilizations of Mesopotamia and Elamite to the west and the Indus civilization to the east. In this way the geographical location of the Iranian plateau made it a bridge connecting the civilizations of Southwestern Asia with the civilizations of the Indian Subcontinent. Based on existing documents and clues, it can be claimed that this connection was not limited to trade relations but also included the exchange of thoughts and ideas.

With the discovery of Mesopotamian civilizations during the 17th and 18th centuries, archaeologists of that period came to the conclusion that Mesopotamia was the birthplace of human civilization through the advent of the Sumerian Civilization. Later archaeological discoveries in the Iranian Plateau, however, showed that this theory was false, and that it is possible for urbanization to appear in smaller units. What was discovered in these eastern lands wasn't the result of Mesopotamian ideas; in fact it was possible that Mesopotamia itself borrowed materials and technologies from eastern lands such as Central Asia, the Hilmand Basin and Sistan. Archaeological evidence shows that communication between Mesopotamia and northern India passed through Kabul, Kandahar, Herat, Khorasan, and Rey; while in late third millennium B.C. a sea route through the Strait of Hormuz and the Persian Gulf was also used.

Initially, it was the quest of scientists and archaeologists to find the eastern cultural borders of Mesopotamia that led them to study the eastern lands (Cleuziou & Tosi, 1989; Sariadini 1971, pp. 291-310).

In 1904 American researchers under the direction of Raphael Pumpelly began the first archaeological excavations using new methods in Anau Tepe in Ashgabat (Pumpelly, 1908). Later on, these investigations (providing useful information about the early historical period) were continued in archaeological sites in Altyn Tepe and Namazga (Masson, 1988), Tureng Tepe (Deshayes, 1976), Tepe Hissar (Schmidh, 1937; Dyson & Howard, 1989), Mundigak (Casal, 1961) on the banks of the Arghandab River, Shahdad (Hakemi, 1997) in Kerman, Tall-i Iblis (Caldwell, 1967), Bampur (De Cardi, 1966), Tepe Yahya (Lamberg-Karlovsky, 1971, pp. 87-98), and Shahr-i Sokhta. These explorations showed also that during this period the whole eastern part of the Iranian Plateau was dotted with heavily populated cities and villages enjoying advanced cultural and industrial structures.

Some of these urban centers with their industries and great populations can be called cities even under the modern definition of a city. The existence of workshops for pottery, basketry products, metallurgical products, carpentry, and also the presence of large public buildings and heavily populated residential zones, and the division of these cities into residential areas, industrial areas, agricultural and animal farms, graveyards and etc. proves the presence of permanent, professionals and specialized experts. It was within this geographical and cultural environment that Shahr-i Sokhta appeared, grew, and disappeared.

2.a.3.1. Description of Shahr-i Sokhta

Shahr-i Sokhta (N: 30° 35' 38" and E: 61° 19' 40") is located in southeast Iran in Sistan-o Baluchistan Province. It is situated at a distance of 55 km to the southwest of Zabol and lies along Zabol- Zahedan road. This historical hill rises 19m above the surrounding lands and lies on the Ramrud Terrace belonging to the Pleistocene period. This city was founded around 3200 B.C. and was populated during four main periods stretching from 3200 B.C. to 1800 B.C. Today it is surrounded by an arid desert; but in the past a fertile plain surrounded this proto-historic settlement which was irrigated by the Biaban River (one of the branches of Hilmand which is dry today). Cultural and archaeological artifacts are scattered over an area of 151 hectares in this site. Shahr-i Sokhta has a north-west axis and is nearly 2220 meters long and 1090m wide (Biscione et al., 1977, p. 104). Such large dimensions have made Shahr-i Sokhta the biggest proto-historic human settlement in the Eastern Iranian Plateau. After being abandoned around 4000 years ago, it has been subject to erosive factors such as the fearful winds of Sistan and seasonal rains. These factors have changed the face of this ancient city.



Photo



Photo

These include data about the reasons for mass mortalities, age and dietary conditions, prevalent diseases, race and probable routes of migration, professions (the graves of animal herders and craftsmen), architecture of the graves, crafts and industries, family relationships, evolution of medicine (skull surgery and orthopedics), and social classes (the graves of the rich and the poor, commissioned funereal vessels). In addition, the discovered artifacts shed light on the social conditions and position of the people and also on prevalent beliefs and ceremonies of the society.



Photo

There are various theories regarding the reasons for the abandonment and disappearance of Shahr-i Sokhta. The possibility of foreign invasion and sacking of the city has been rejected due to the lack of compelling evidence; neither did what some researchers call the appearance of the Aryans have a role in the fall of the city. Although the city has experienced several destructive fires, but on the one hand the time gap for the incidence of these fires is so great that they couldn't have been intentional, and on the other hand they were not so extensive as to make them attributable to a foreign invasion.

The most credible hypothesis regarding the reason for the abandonment of the city is the drying up of the Hilmand River and the displacement of its delta which made the people leave in search of water to new places, of which we are currently unaware. It should be added that the eastern parts of Iran seem to have experienced a huge crisis during the early centuries of the second millennium B.C. We know nothing of the nature of this crisis; the only thing we know is that during this millennium other important cities, such as Tepe Hissar near Damghan, were destroyed and abandoned simultaneously with Shahr-i Sokhta (Sajjadi, 2007).

We don't know the ancient name of Shahr-i Sokhta. Although the exact or approximate location of many lands or cities such as Anshan, Aratta, Meluhha, Marhashi, Dilmun, Makkan has been named in Mesopotamian texts; due to the lack of any documents referring to Shahr-i Sokhta we are not aware of its ancient name. While many years ago Shahr-i Sokhta was considered one of the places that could be ancient Aratta (Hansman, 1972., Id. 1973; Id., 1978) with the determination of other places, such as Shahdad or Jiroft, as the location of Aratta this theory was rejected (Majidzadeh, 1980, pp. 1-10; Kaboli, 1986, pp. 50-62). Therefore, as long as no new evidence regarding the ancient name of this city, we can give no opinion in this respect. The current name of Shahr-i Sokhta is a modern name which doesn't seem to be older than 150 to 200 years. Since the traces of ash and fire can be seen in various places, the local people have called it Shahr-i Sokhta (burnt city).

Several English explorers who have visited Sistan in the last two centuries have mentioned this place. Captain Owen Smith in his report on Sistan, written in 1872, writes: "About 10 miles to the east of Howzdar there is another complex of very ancient ruins called Shahr-i Sokhta. It is said that it was Rostam's famous city and Bahram used petroleum to burn it down" (Smith, 1876). Sir Charlse E. Yate also mentions a hill which the people of Sistan call Shahr-i Sokhta. When he goes there he sees that the ground is covered with broken pieces of pottery, and his guide shows him the soil which is blackened with fire. He writes: "we were really standing over a burnt city" (Yate, 1900).

2.a.3.2. Architecture in Shahr-i Sokhta

Shahr-i Sokhta was undoubtedly among the most advanced cities of its time. This can be concluded not only because of its architecture and finely made marble, pottery, clay and wicker artifacts, but also through its social organization. The city had an unprecedented organization, so that in 3000 B.C. it had a water and sewage system. More than half of the surface of the city is covered with broken pottery, stone, metal, semi-precious stones, and other ancient artifacts; while on the surface of the graveyard there are few artifacts or cultural signs. Architectural studies show that residential buildings were categorized and separated by streets and alleys. The building materials were stratum, adobe, wood and wicker mats.

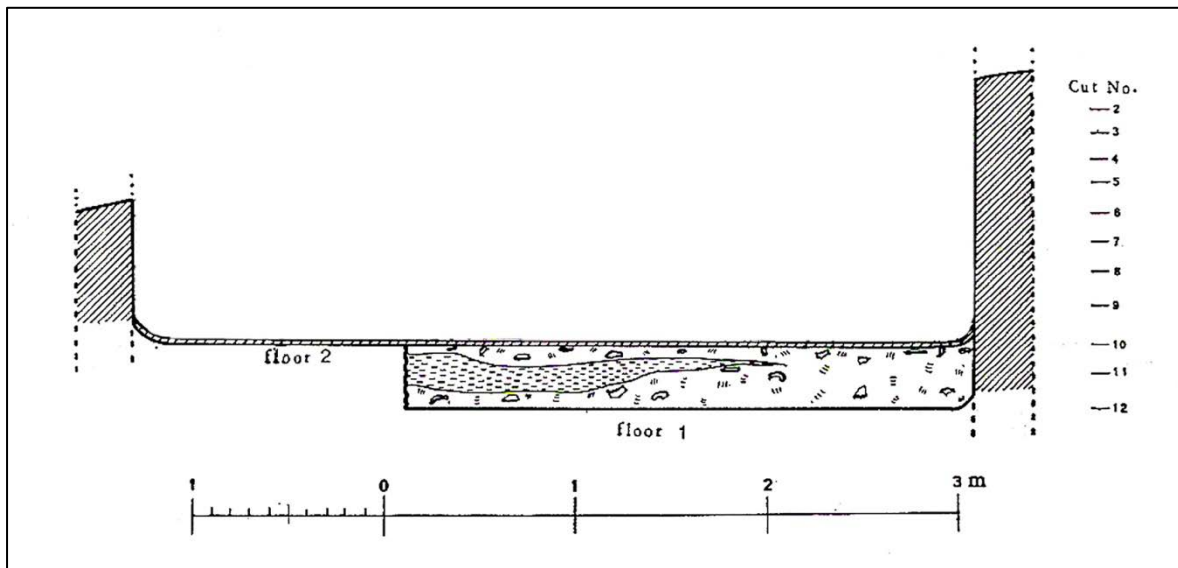
The following building materials, architectural plan and elements of Shahr -i Sokhta are described.

I. Building materials

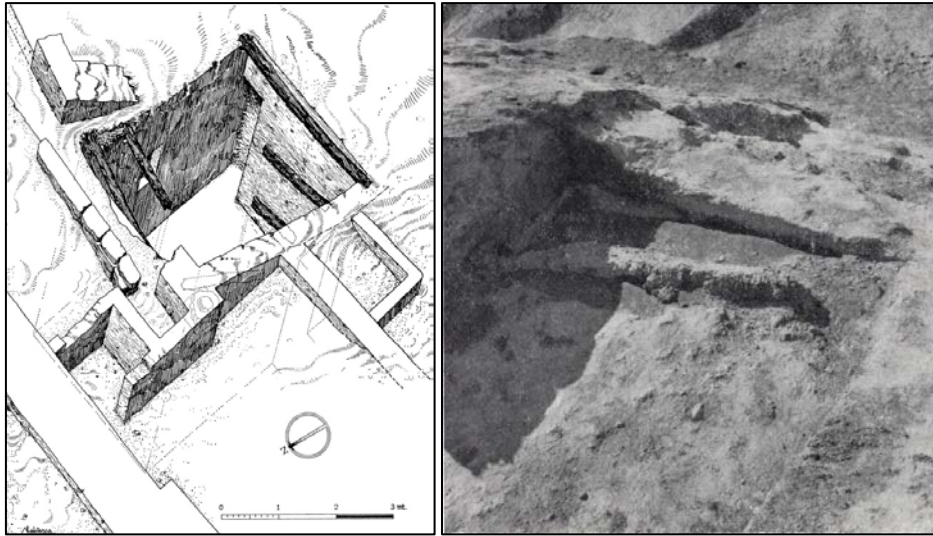
The building materials used in Shahr-i Sokhta are a reflection of its geographical setting. The sedimentary plain of Sistan lacks mountains and stones. Therefore, the main building material is mud brick. These sun-dried mud bricks have a light grey color, and contain organic materials such as straw. No fired brick has been used in the buildings of Shahr-i Sokhta. Mud bricks had various sizes, and were made by the use of wooden frames with specific dimensions. Mud brick dimensions range from 40×20×10cm to 50×25cm. It seems that there were three standard dimensions for mud bricks at Shahr-i Sokhta.

- 10×20×40 cm, used in the Eastern Residential Area, period I, III;
- 40×20×45cm, mostly used in the Monumental Zone;
- 10×25×50 cm, used in the Building no. 20.

Clay was used both in making the mud brick and in coating the inside walls of the building. In some cases this wall coating has gone on to cover the floor as well. This was done in such a way that the walls joined the floor in a curve rather than a right angle. The thickness of this mortar ranged from 3 to 6 cm. Another use of clay was in the construction of some inner structures of a residential building with mud layers. One such layered construction was the oven. The main body of the oven was made from layers of mud which were later coated.



Photo



Photo

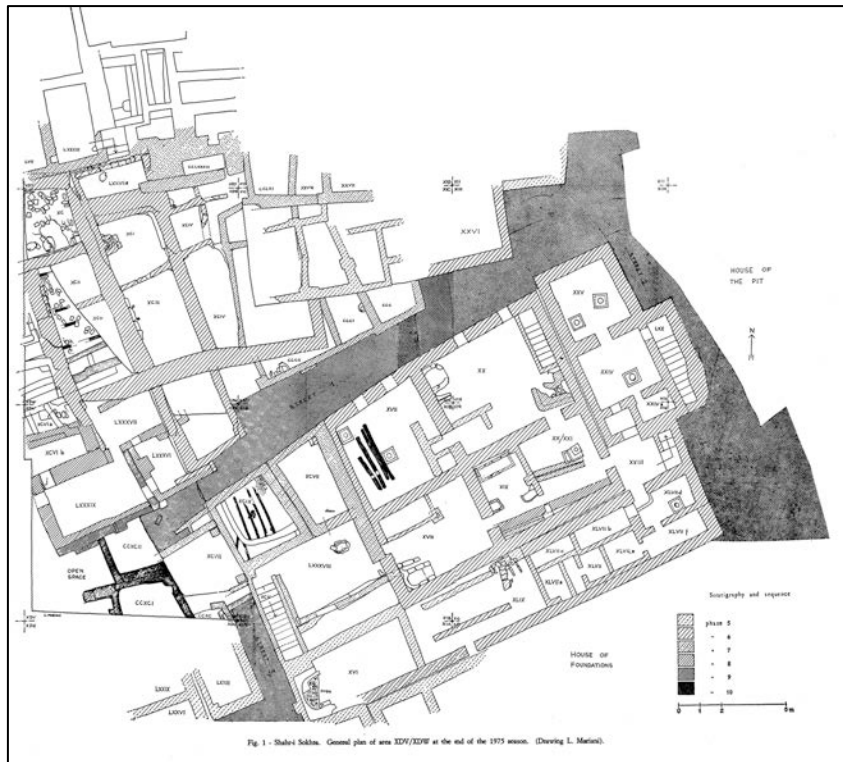
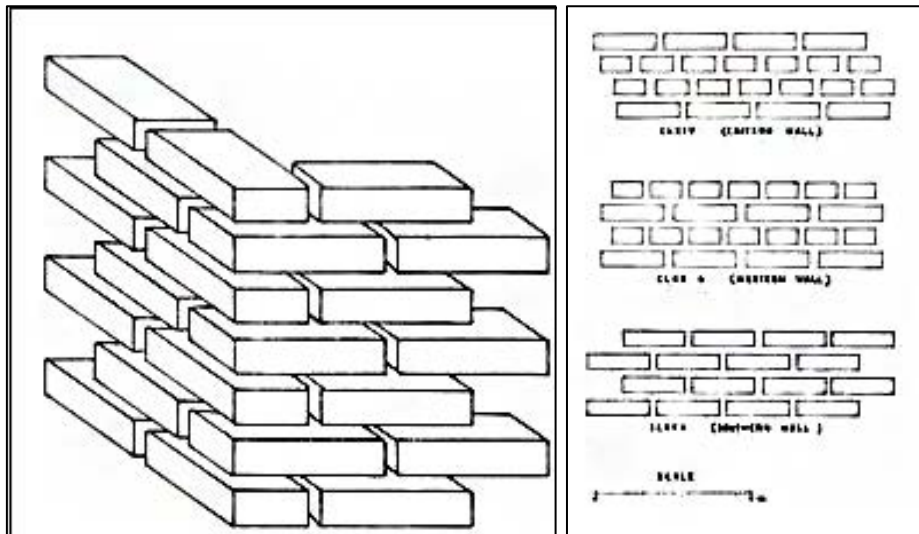


Fig. 1 - Shah-i Sokhta. General plan of area XXV/XXIV at the end of the 1975 season. (Drawing L. Maricic).

II. Architectural techniques

By considering the shape and dimensions of the rooms and analyzing their length and width, a general pattern emerges. An analysis of the standard dimensions of mud bricks reveals a clear relation between planning and execution methods. All walls are made of two parallel, length-wise rows of mud bricks with the dimensions of 10×20×40 cm.

Three factors made the use of two parallel rows of mud bricks desirable: first, the use of two parallel rows is much simpler than other methods, and it makes it easier to follow a designated path on the ground. In addition, in this method the length of mud bricks formed the outer or inner surface of the wall, which could then be filled with mud plaster as a strengthening agent. Second, a wall made in this way is more pliant in cases of disorganization in the construction process. Third, it had a protective role, because the space between the two rows acted as insulation and regulated the temperature difference between the outer and inner surfaces of the wall. It was the same as insulating against the damp by the use of compacted crushed pottery on the foot of walls prone to dampness.

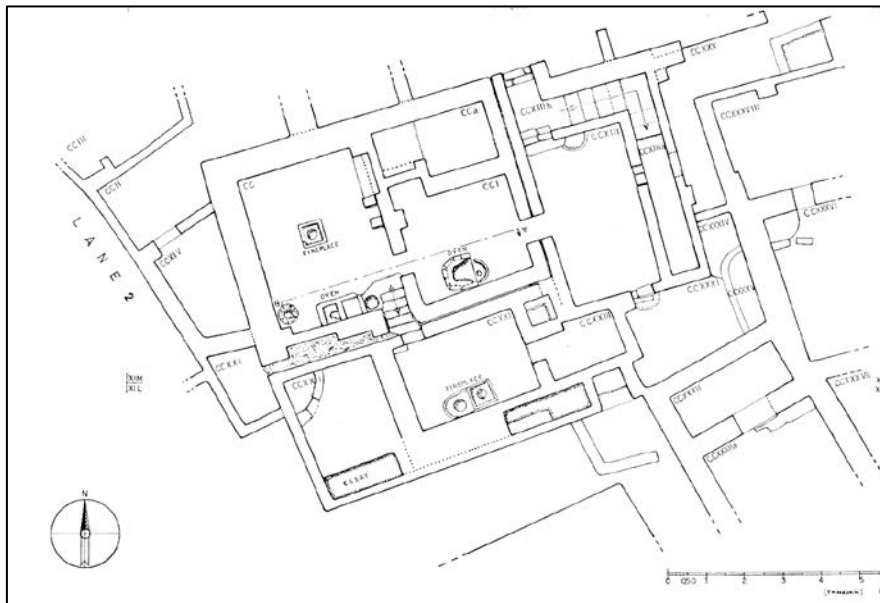


Figure

A wall made of one row of mud brick was obviously the simplest type of construction, and was usually used to partition a room into smaller spaces or create a small space within a room. Finally, the mortar used in the construction of walls strengthened two walls joining at a right angle, because these walls didn't merge into each other.

III. Building plans

So far, no building with a function other than a residential function has been observed in Shahr-i Sokhta. Although there is some evidence suggesting that the monumental zone had a public function, it cannot be definitely considered a temple, an archive, a storage place, or any other public place. All the buildings in Shahr-i Sokhta from all four settlement periods are quadrangular with right angles.



Map

In some buildings there were one or more staircases at the corners or sides of the inner space, which either led to a second floor or to the roof. The empty space under these staircases was used as a storage place.

IV. Architectural elements and structures

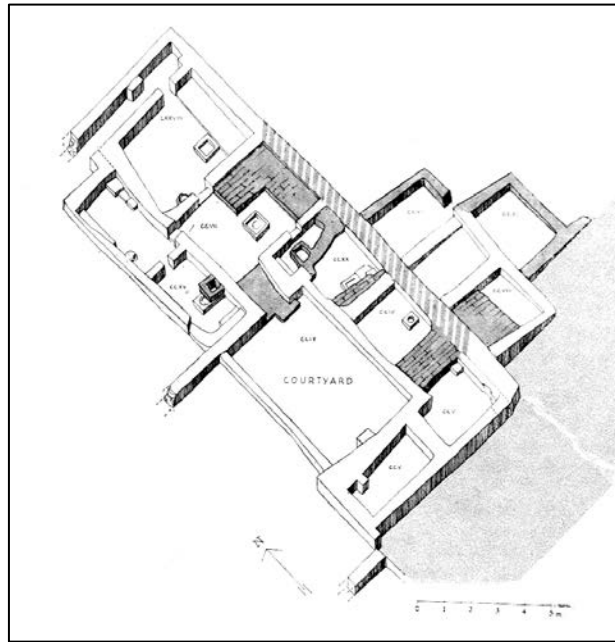
IV-1. Walls

The walls of the buildings in Shahr-i Sokhta can be categorized into three types:

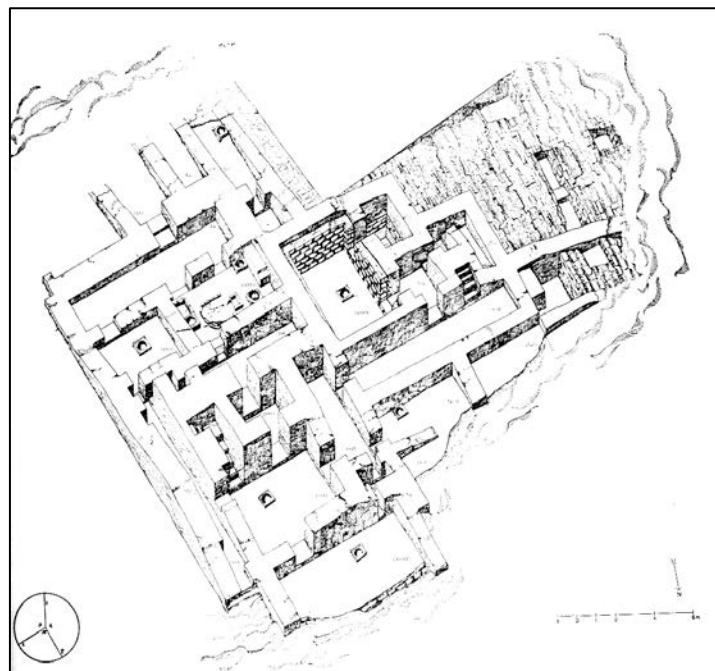
- **Load-carrying walls:** These walls supported part of the load exerted by the weight of the roof. The thickness of these walls varied between 20 to 40 cm. Thicker walls were very rare, and have only been observed in huge buildings such as the Kakh-i Sokhta or the Monumental Building with a thickness of 60, 80, 100, or 120 cm. Most load-carrying walls were between 2.5 to 3m high. There were three main types of wall construction in terms of the arrangement of mud bricks: a single row of lengthwise mud bricks, two parallel rows of lengthwise mud bricks, and one row of lengthwise and another row of crosswise mud bricks. In the case of walls thicker than 40 cm, a combination of the lengthwise-crosswise method was used, which gave the wall greater thickness and thus higher strength.



Photo



Figure



IV-2. Doorframes

The doorframe or entrance linked the inner spaces with the outer spaces, and its width depended on the type and function of the spaces it linked together. The doorframes in Shahr-i Sokhta can be divided into two general categories:

- The main entrance, which linked the outside with the inner space of the building. This entrance provided the main access route to the inner space of the building and was placed opposite to the direction of the wind. This entrance was wider than other entrances, and had a wooden door with a stone base. The approximate width of the main entrance was from 80 to 120 cm. In most cases, the main entrance opened into a court or a large roofless room, but in some cases, such as the case of building no. 20, this entrance opened into a kind of vestibule. In the latter case, access to the building was only possible through this vestibule.
- Inner doorframes, which linked inner rooms and spaces. These doorframes had a vaulted ceiling, but didn't have wooden doors with stone bases. These doorframes were placed immediately after the main entrance, and each room or storage place had one of them. They were from 60 to 80 cm wide.

IV-3. Courtyard

At Shahr-i Sokhta, by the terms "courtyard" or "court" we mean a large, quadrangle, roofless space which is located immediately after the main entrance or in another corner of the building, and has taken up a considerable portion of the building as compared to the area of other spaces. Courtyards usually had thick walls, and by being situated right after the main entrance provided access to the other parts of the house. It means that a person entering from the outside would first step into the courtyard and only then would go into the roofed parts of the house.

IV-4. Rooms

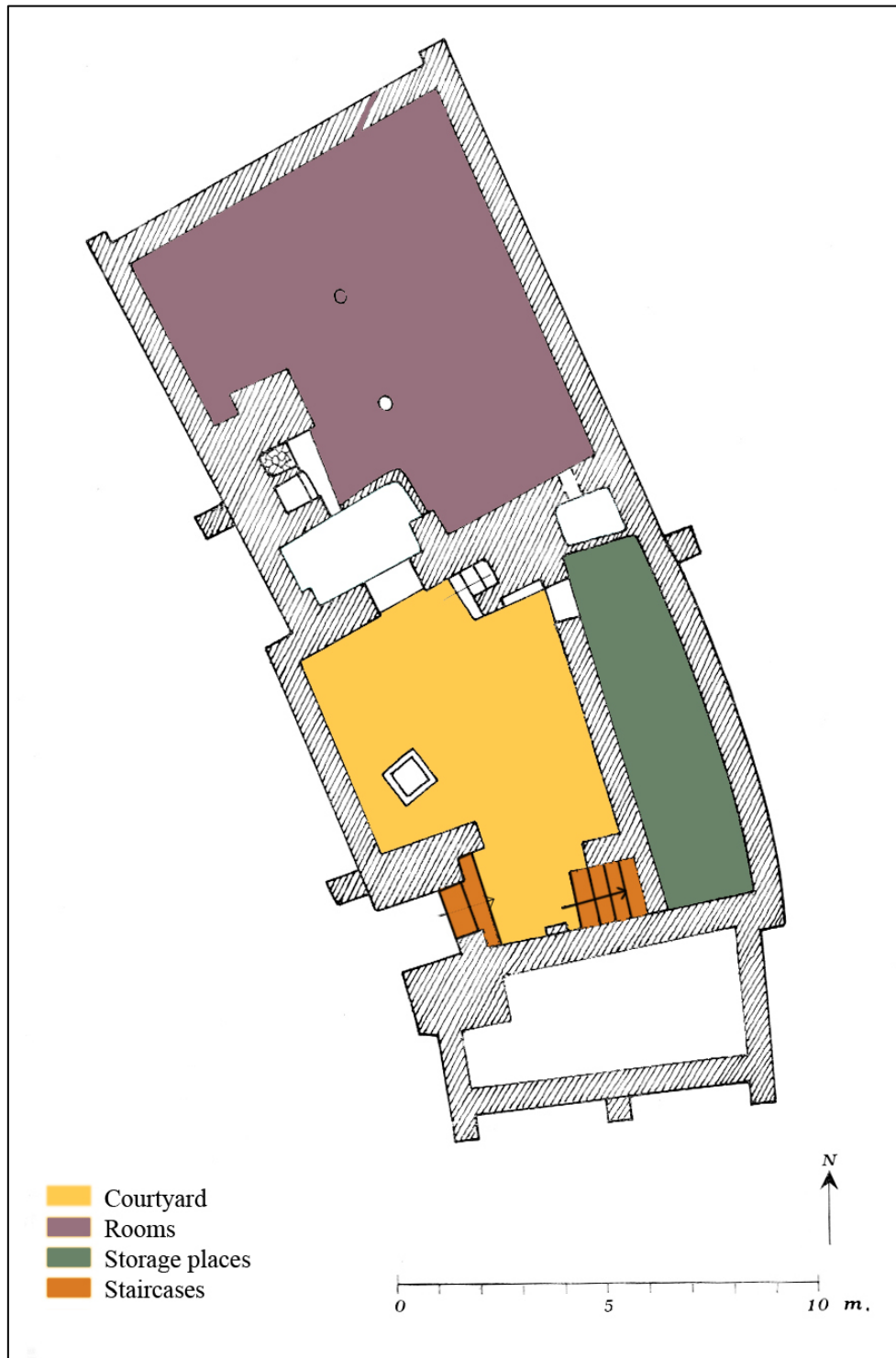
Any quadrangle, roofed space with at least one doorframe is considered as a room. Rooms in Shahr-i Sokhta have a quadrangular shape and come in different sizes. What distinguishes this type of space from storage spaces is the suitability of its dimensions for everyday life. Usually, there are one or two cooking oven in each room. Therefore, the distinguishing features of a room are ovens, recesses and terraces. In terms of the number of doorframes, rooms have one, two, three, or four doorframes. Rooms with a single doorframe can be called individual or marginal rooms, and in many instances are used as storage places.

IV-5. Storage places

Storage places were used to store goods and products. There is not much difference in shape between a storage place and a living room; the only minor distinguishing features of a storage place are the following points. One of the specific features of a storage place is the presence of recesses and other structures used for more storage space. Storage places are usually located at the corners or sides of the building; this fact can be especially observed in the memorial building. Another distinguishing feature of a storage place is its doorframe, which was sometimes sealed by the store's manager with a clay seal; thus the traces of such seals are more numerous on the doorframes of storage places than on other doorframes. The following process happened when the sealing was performed: after the storage place's door was shut, the manager or the owner of the storage place covered the door and its frame with mud and then imprinted his personal seal, which was the sign of his ownership, on the drying mud. The dimensions of storage places depended on the types of goods to be stored; and even more so, on the amount of goods to be stored. But it should be kept in mind that the storage places were never bigger than a normal living room, and in fact were often very narrow places with a width of 1.5 to 2 m.

IV-6. Staircases

Staircases were mud brick structures that provided access to the roof or to a putative second floor. They were located at the margins of the buildings and led to the roof through a narrow corridor with the same width as the staircase. Not all the buildings had this structure. The number of stairs depended on the height of the ceiling. The height of each individual stair was equal to the thickness of a mud brick, which was 10 to 15 cm. The depth of an individual stair was equal to the width of mud brick, which was around 20 cm; the width of stairs was variable, but was usually equal to the length of two lengthwise mud bricks, or around 80 cm. Another type of staircase, which has been found only in the Memorial Building, was used not to provide access to the roof, but as the entrance to the building. This staircase is very long, has a width of 180 cm, and is bounded on the sides with protective walls. This staircase is located at the southern side of the Monumental zone and belongs to the latest construction period in the building.



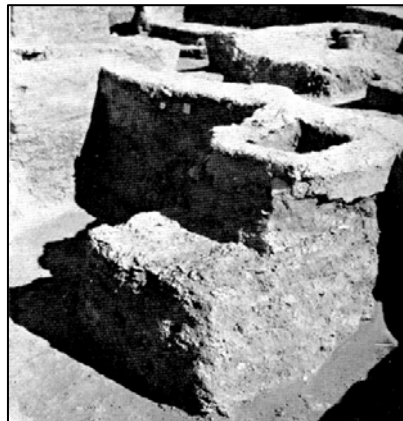
Map

IV-7. Hearths

Hearths in Shahr-i Sokhta were made by clay. The structure of these hearths is very simple and is composed of a platform and a hole. Around and inside these hearths, materials such as charcoal, ash, scorched animal bones, and heated pieces of pottery are observed. Some triangular earthen mounds have also been observed at the sides of the hearth which were probably used to provide a level surface for the cooking vessels. There's no special place for the hearth in the rooms, but its usual place was at the center of the room to provide heat and light for the occupants. However, cases of hearth located inside the walls have also been found.



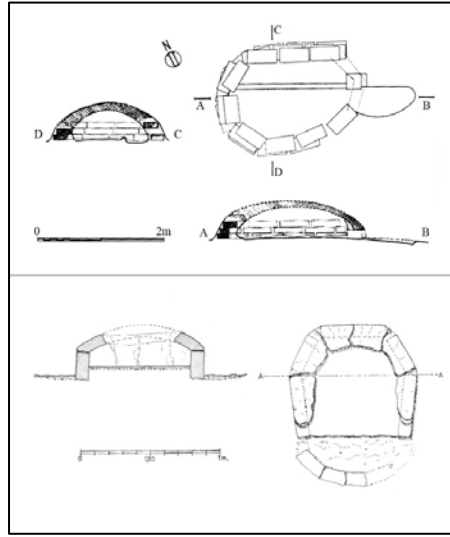
Photo



- **Circular hearth:** With an average diameter of 40 cm and a central hole with a diameter of 15 to 20 cm and a depth of 10 to 15 cm, these hearths were made of earthen layers in which a hole was created to light a fire;



Photo



Photo

IV-10. Mud bin (Lavak)

Mud bins were structures made of clay, built on the floor of storage places in order to hold some products. They were rectangular (80×40 cm with a depth of 20 to 25 cm), circular, or semi-circular. They were located either at the center or at the corner of storage rooms. They were made of earthen layers and their floor was coated. Rectangular Mud bins are divided into two categories based on their position: free-standing Mud bins, which were located at the center of the room or storage place; and Mud bins adjoining a wall on one side.

IV-11. Floors

Floors in the buildings of Shahr-i Sokhta had various structures. They varied according to the function of the room, its location, and other factors, such as the social position of the owner of the house. After the floor was built, it was covered with mats. Beaten floors were the most prevalent type of floor in Shahr-i Sokhta. They were built by the following process. After the construction of the room, a layer of sifted clay was poured on the floor and pounded until it became hardened. Later on, other structures such as hearths were built over this hardened floor.

Mud-plastered floors were another type of flooring in Shahr-i Sokhta. In order to build them, the primary floor was pounded until it became hardened; then the walls and the floor were coated with mud. It seems that this type of floor was mostly used in storage places, because they experienced less traffic so the mud coating was better protected.

Floors made of potsherd were another type of flooring used in Shahr-i Sokhta. In order to build them, the floor of the room was first watered, and then the pieces of pottery were arranged on the ground in such a way that their concave sides were facing the earth. Later on, these pieces were beaten until they became level. This flooring of crushed pottery acted both as a mat or carpet, and as an insulation against the damp.



Photo

V. Construction centers in Shahr-i Sokhta

Residential areas or construction centers can be found in various parts of the city, especially those belonging to the second and third settlement periods. In all, the parts containing architectural remains cover an approximate area of 80 to 90 hectares, spread over the eastern residential area, central area, memorial buildings area and industrial area.

VI. Various quarters of the settlement

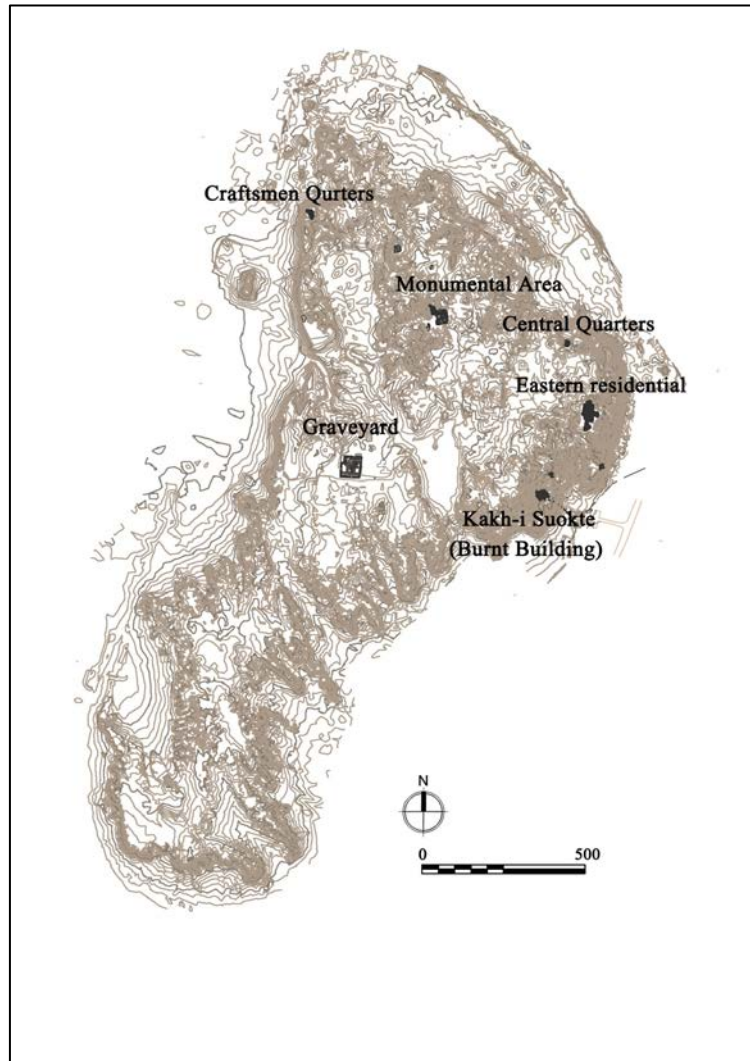
After painstaking and detailed investigations, archaeologists have divided Shahr-i Sokhta into the following parts (Photo 2-21): 1. Southern parts with the centrality of the Kakh-i Sokhta, 2. Eastern Residential Area, 3. Central Quarters, 4. Monumental Area, 5. Northwestern Industrial Zone, 6. Southern Industrial Area, 7. Graveyard. It should be mentioned that compared to the huge size of the site the excavated area is very small, therefore the information gleaned from such scanty excavations should be considered preliminary.



Photo



Photo



VII. Description of various parts

VII-1. Southern parts with the centrality of the Kakh-i Sokhta (Burnt Building)

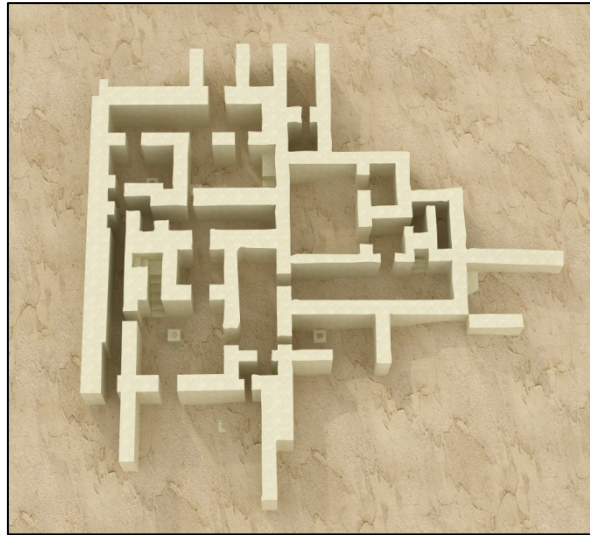
This part, the excavation of which began in 1969, contains the buildings and artifacts of last period of occupation of site (period IV). The Italian team, succeeded in revealing a huge and vast building which was later called the “Kakh-i Sokhta”.

This building is situated in the eastern part of Shahr-i Sokhta and to the south of the eastern residential area. At present, it is considered the largest building in the city. Its current area is 560 square meters. This building has 25 rooms and other spaces in various sizes and shapes, and there is also an adobe mastaba. The reason for its abandonment is a terrible conflagration that destroyed it around 3800-3900 years ago. Although objects from all four periods have been found in this building, most of the objects remaining on the surface belong to the period IV from 2100 B.C. to 1800 B.C. Like other buildings of Shahr-i Sokhta, this building is made of brick and the walls are coated. The traces of burnt wooden beams in some rooms show that these rooms had a ceiling; although there are other parts which were obviously roofless.

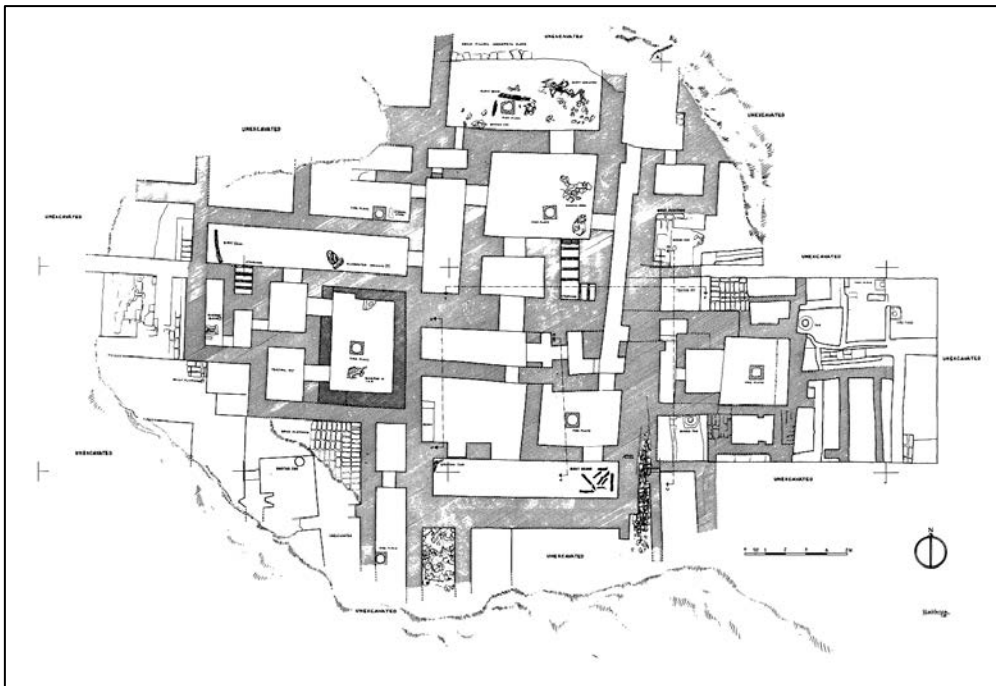


Photo

The voluminous main walls of the building are made with two to five rows of huge bricks. The building's entrance was probably on the north side, but there is no trace of it today. The palace has two staircases which led to hypothetical second floor or to the roof. The existing parts of the building suggest that it included various distinct units which were linked together.



Photo



There are six fireplaces in the roofless parts of the building which are made in the shape of rectangular boxes. However, in a long room on the south side there is a horseshoe-shaped oven whose domed ceiling is partly intact. This building, considering its huge size, couldn't have functioned as a private residence, and most probably was a public building. The existence of such a huge building during the last period of occupation, which was a time of decline and destruction, has posed many questions which will remain unanswered until the new excavations of the site.

VII-2. Eastern residential area

The Eastern Residential Area (ERA) occupies the eastern part of the mound. It is in the shape of a long, narrow ribbon adjoining the pit no. 1 to the west. It was being used as a settlement area from the first days of settlement in Sistan Plain, that is, the first settlement period of Shahr-i Sokhta around 3200 B.C., to the latest settlement period, that is, the fourth settlement period around 1800 B.C. In other words, this area contains the highest density of architectural remains in the city.



Figure

Various architectural structures, each with its own special features, have been discovered in this area. A number of these structures are centered in a residential neighborhood containing houses which are named House of foundations, House of Pits, House of Stairs, XH House (a large building of period III), and Kakh-i Sokhta (period IV). There are also two paths or alleys in this neighborhood which are called Alley no. 1 and alley no. 2. These buildings and alleys formed a quarter with two alleys joining at a right angle.



Photo



Map

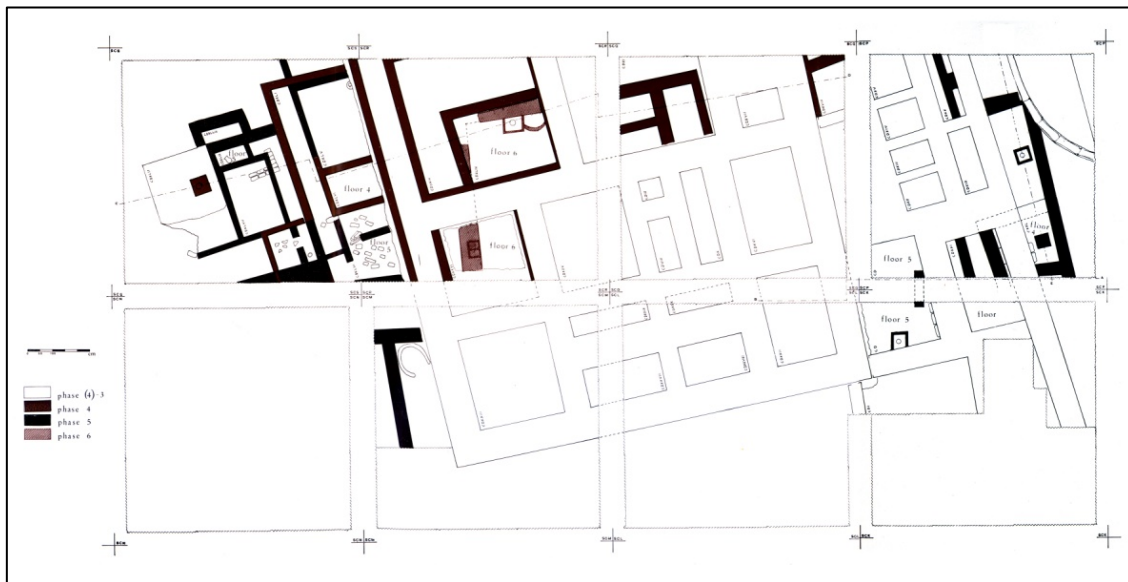


Photo



VII-3. Central Quarters

This part, which is located at the center of the site, is separated from the eastern residential area by a small valley, and has an area of 20 hectares if we add the western part of the Kakh-i Sokhta. This part of the settlement was developed during the first half of the third millennium B.C. and apparently hosted human activities from phase 7 to phase 4. Archaeological investigations and aerial photography have revealed a huge building complex about 300 m away from the eastern residential area. This complex has thick outer walls enclosing an area of 5000 square meters. The building contains residential rooms and probably a central courtyard. From 1975 to 1978, the Italian team first investigated about 800 square meters of its southeastern part and later about 300 square meters of its western part to acquire a clearer notion of its architectural spaces (Salvatori & Vidale, 1997, p. 7).



Map

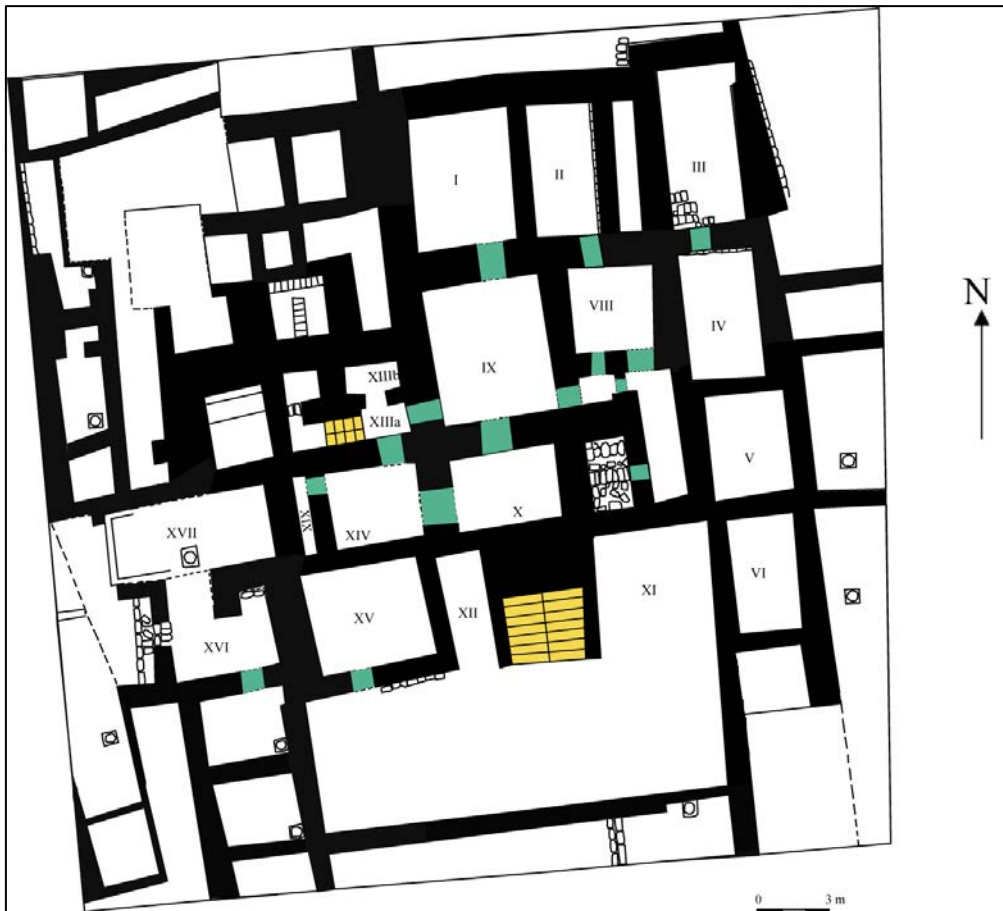
VII-4. Monumental Area

This area is situated in the northwestern part of the site and between the Eastern Residential Area and the Western Industrial Area. It is separated from the Western Industrial Area by a small sedimentary valley, while it borders other parts to the south and the east. This area is composed of several small hills which are probably the remains of buildings from different periods. All over the surface of this area various artifacts such as pieces of pottery, flat stamps and stone vessels are scattered. In addition, the remains of an industrial workshop have been identified in this area.



Map

In autumn 1999 a preliminary archaeological survey was begun on this area to find a suitable place for opening of a trench. As a consequence, the following year the highest point of this area (which is now called workshop no. 1) was chosen for excavation. After the beginning of excavations, the remains of a huge building were discovered.



Map

Unfortunately, the outer boundaries of the building still remain unidentified, but it seems that due to the climatic conditions of Sistan (especially the northwest summer winds) the entrance of the building must be to its south.



Photo



The objects found in the rooms and open spaces of the building are made of stone, bones, metal, wood, pottery, and mud. Objects discovered in various spaces of building no. 1 are of the following categories: everyday objects (such as ceramic and stone vessels), ritual objects (such as human and animal figurines made of clay or terracotta), objects with economic or administrative functions (such as flat stamp seals, cylindrical seals, the lids), disc-like objects made of baked clay, pieces of cloth, wooden and stone objects, pieces of baskets made of reeds, accounting objects, wooden combs, and stone and metal tools and molds.



Photo

VII-5. Northwestern Industrial Area

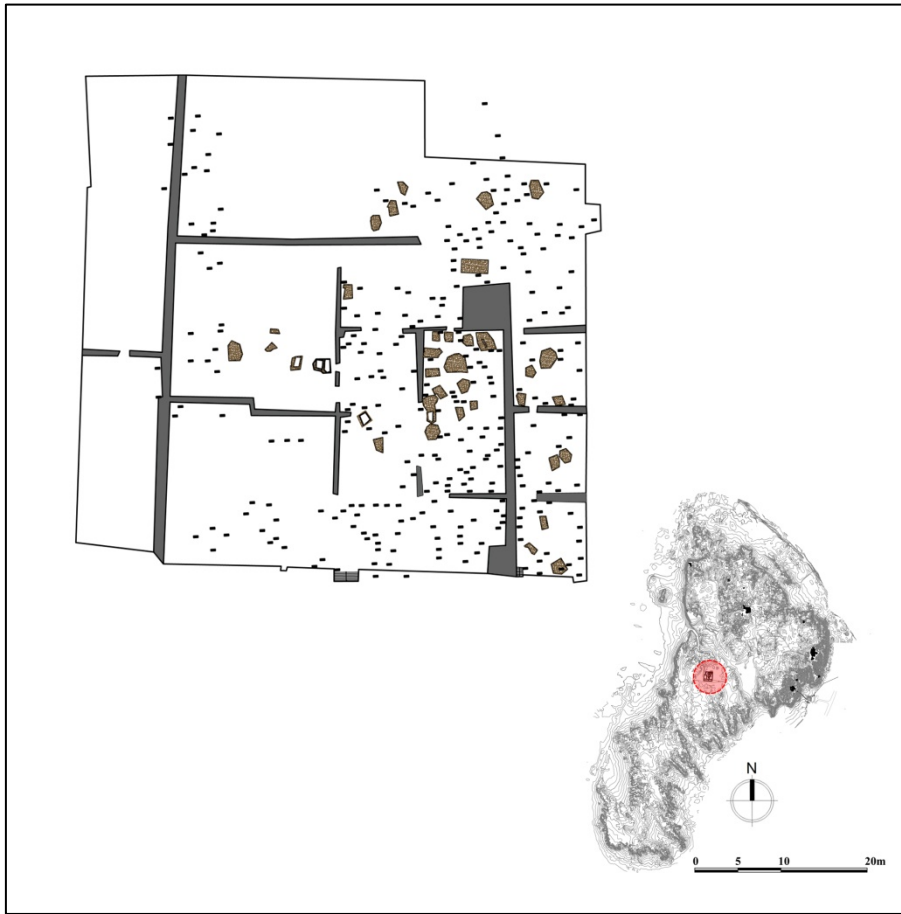
This triangle-shaped area is situated at the northwestern corner of Shahr-i Sokhta and is separated from the graveyard, the memorial buildings area and central area by three natural diaphragms. It has an area of 6 hectares, and in 1972 workshops for the manufacture of beads made of lapis lazuli, agate and other semi-precious stones were discovered there (Piperno & Tosi, 1973, p. 18). Here, the Italian team discovered several rooms that belonged to the period II (Phase 7) and were used as workshops for the manufacture of ornamental beads made of lapis lazuli, agate and turquoise. The evidence for this conclusion is the thousands of finished and unfinished beads and other materials associated with the manufacture of these beads. It should be mentioned that during the new round of excavations some limited work was performed on this area, which resulted in the discovery of residential rooms showing traces of craftsmanship activities (Sajjadi & Casanova, 2006, p. 356-57).

VII-6. Southern Industrial Area

So far, no field work has been performed in this part of Shahr-i Sokhta. But preliminary surveys suggest that craftsmanship activities related to the manufacture of stone tools made of flint have been widespread in the area. At this juncture it is impossible to determine the scope of these activities. In order to do that, we should wait for extensive excavations in this part of Shahr-i Sokhta.

VII-7. Graveyard

The graveyard of Shahr-i Sokhta was discovered in 1972 completely by accident. It is located at the southern and southwestern parts of the site and covers an area of 20-25 hectares. The density of graves in the graveyard is estimated at 13 graves per 100 square meters. Studies show that this graveyard has been one of the vastest proto-historic graveyards. It contains 20,000 to 37,000 graves, but still seems inadequate for 1000-1200 years of habitation in Shahr-i Sokhta. The Italian team excavated 3000 square meters of this area and found 230 graves. In addition, the team of the Cultural Heritage Organization headed by S. M. S. Sajjadi excavated around 2500 square meters of this graveyard and discovered 450 burials.

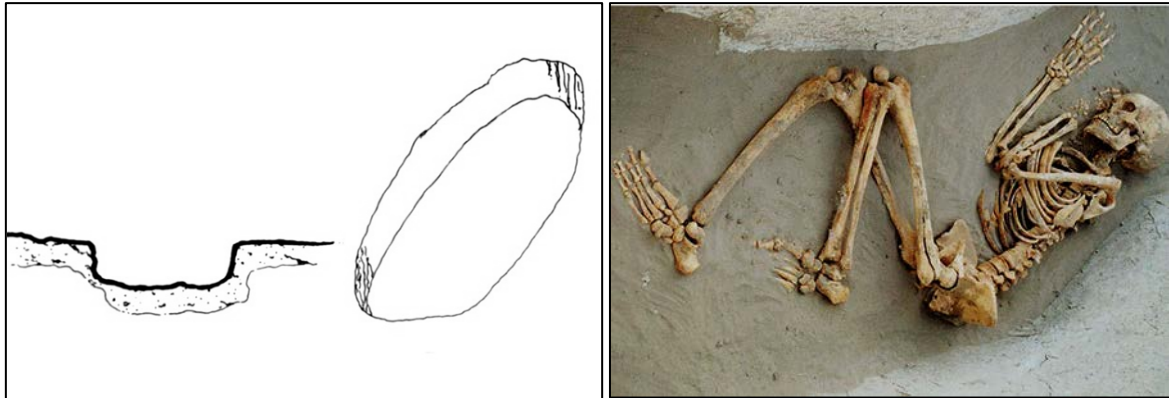


Map

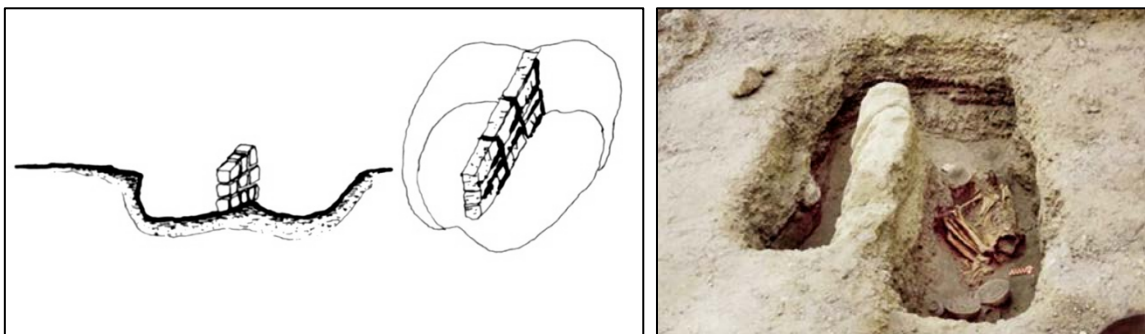


Photo

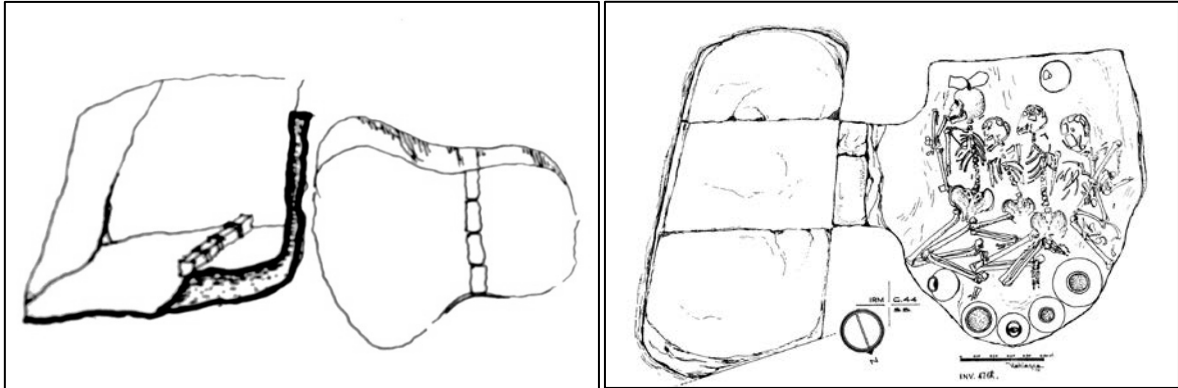
Thus the body would be in contact with the soil, and the process of decomposition would be accelerated. These graves were used for once or twice, and in some cases multiple bodies would be put in them. They were used more frequently than any other type except for the double pit graves.



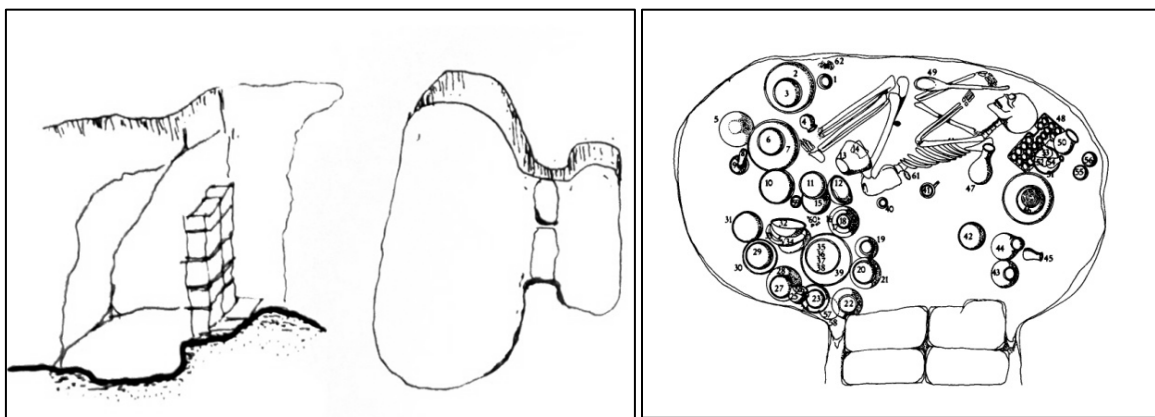
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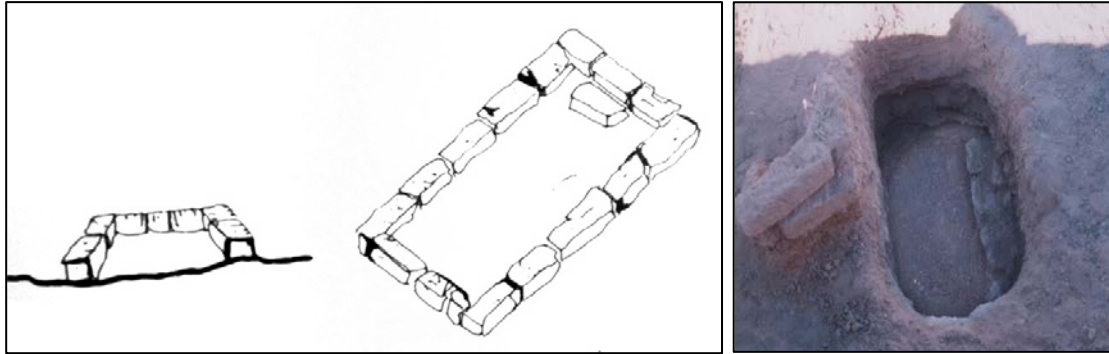
iii. **Pseudo-catacomb graves:** These graves are similar to catacomb graves with the difference that a wall separates the shaft-hole and the burial chamber, so that the entrance would remain nearly open and the dead were penetrated in the burial chamber.



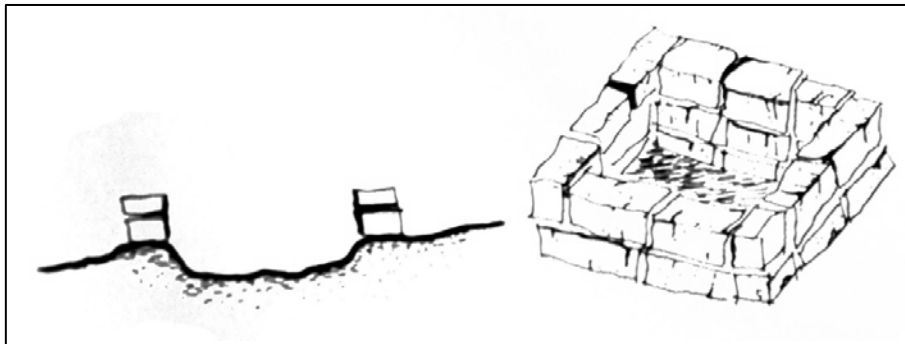
Figure



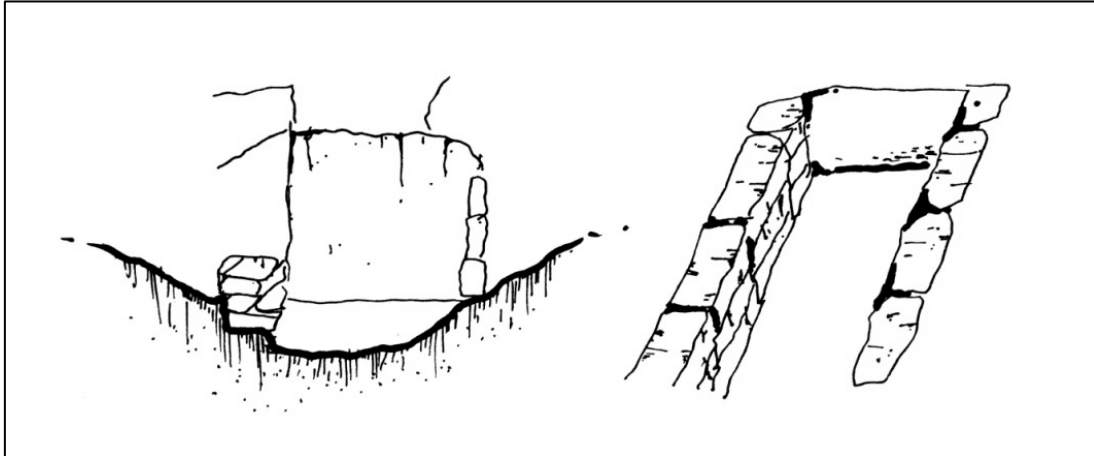
v. **Rectangular brick graves:** These graves have a brick walls in the shape of a rectangle.



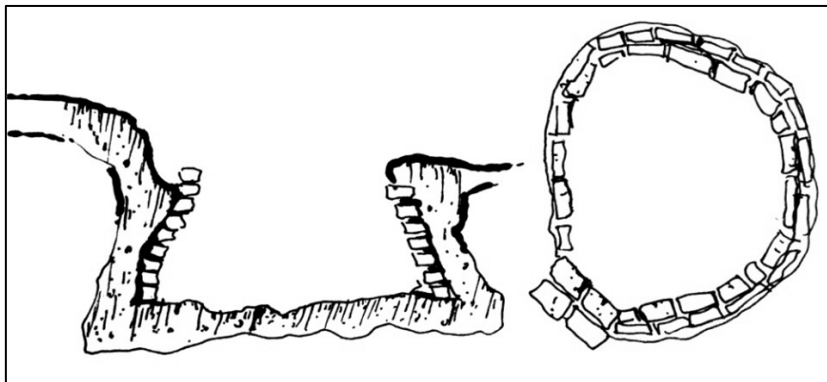
Figure



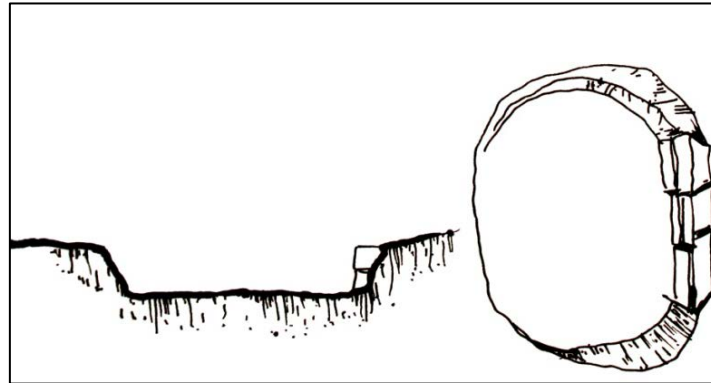
vii. Double-walled graves: These graves have two walls on two sides and the other two sides are left in their natural condition.



Figure



ix. Circular pits with a blocked door: these graves are similar to simple pits and are either circular or elliptical. Their only difference is that on their wall a door has been cut out, and then blocked by several rows of brick. In circular pits with a blocked door the burial is exactly the same as burial in simple pit graves and double pit graves, and the body and its accompanying objects are in direct contact with the soil.



Figure



x. **Bowl graves:** These graves have been exclusive to new-born children. The body of the child would be put in a simple hole and a ceramic bowl placed over it, and then everything covered with earth.



Photo



The bricks used in catacomb graves are the same size as those used in residential buildings of the city. The smallest of these bricks are 10×20×20 centimeters in size, and the largest ones are 10×25×50 centimeters in size, but their usual size is 10×20×40 centimeters.

In each burial usually same-size bricks are used, but there are also some exceptions. For example, in burials numbers 2700 and 2701, bricks of two different sizes are used.

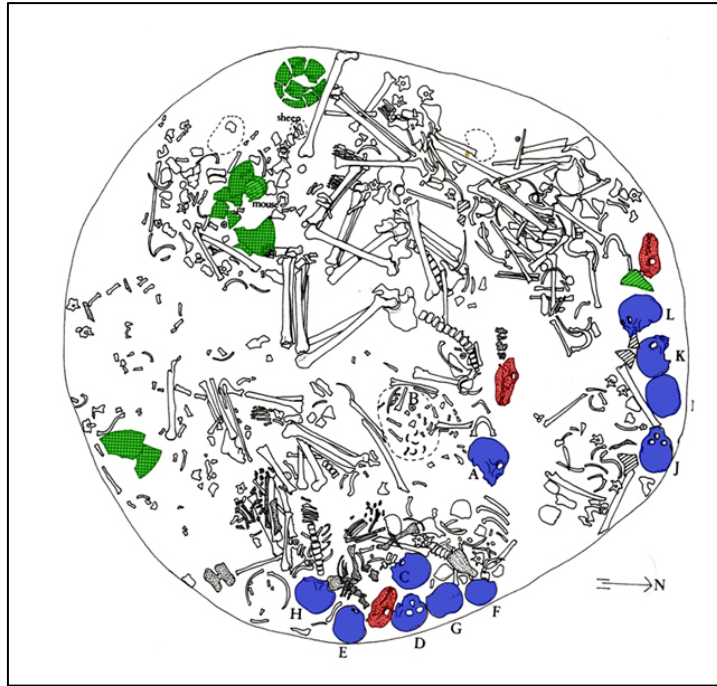
Apart from the difference in the construction methods of graves, which are probably linked to racial and migration factors, we should also pay attention to burial methods which are important factors in determining social beliefs and traditions. The existence family graves, empty graves, and twice-used graves is an indicator of particular social traditions and ceremonies in Shahr-i Sokhta.

Some of the people in Shahr-i Sokhta were buried in their clothing or wrapped in a hemp fabric. In several graves traces of cloth have been discovered on the bodies. In Shahr-i Sokhta fabrics have been discovered in three forms:

- In the form of a cloth in which a corps was wrapped. This type of fabric is the most common.
- As a quilt. The quilt were rougher than the quilts. First the floor of the grave would be covered by a mat and the corpse put on it; later the body would be covered with the quilt which had a finer texture. Of the 22 burials in which mats and quilts have been observed, 6 belong to the burial of males and the rest belong to the burial of women and children.
- In the form of garments.

The graves in Shahr-i Sokhta have no specific direction, and the bodies are buried haphazardly in all directions. It seems that the position of the sun in the sky at the time of the burial has been an important factor in determining the direction of the grave, and thus the direction of the body. Burials were done in agreement with the direction of the rays of the sun; even in a couple of instances where the body is on its back and the face towards the sky, it can be conjectured that burial was being performed at noon when the sun was exactly overhead.

One of the oldest graves discovered in Shahr-i Sokhta is a multi-burial grave in which a great number of bodies have been found. Among the objects in this grave there is a cylindrical seal, which is rare in the city. This seal is similar to the Jemdet Nasr type seals, and belongs to the early decades of the third millennium B.C. Regarding its construction method, the grave is the only instance of a circular grave with an brick entrance. The diameter of this circle is three meters and its depth is one meter. The discovery of three dog skeletons, two of them complete and the other incomplete, and also the discovery of a skull, which is very important to the history of medicine in the Iranian Plateau (collection of essays on Shahr-i Sokhta, 2009), are other special characteristics of the burial no. 1003.



Figure



Most of the graves in this graveyard have been used just once, but there are some graves which have been used several times. In most burials various objects and offerings such as vessels (pottery, stone, metal), ornamental beads (agate, lapis lazuli, tortoise), stamp and cylindrical seals, mats, baskets, textile, sacrificial animals, make-up tools and materials (kohl, kohl containers, cosmetics, mortars for the grinding of cosmetics, bronze mirrors, wooden combs, etc.), and craftsmanship tools were buried along with the body. Among the objects which can be attributed to the social beliefs of individuals are numerous stone beads. Studies show that these beads apart from their ornamental use also had religious functions. In a considerable number of graves beads made of various stones have been discovered. In some cases the number of these beads reaches 200, which is more than the number needed for a bracelet or a necklace (usually between 10 to 25 beads). In some cases, these beads have been obviously used to be sewn onto the garments. In other cases, the juxtaposition of the beads and their limited number indicate an ideological or religious function.

A preliminary investigation has shown that in graves with a limited number of beads, usually two beads are placed near the head or the knee, or at the two sides of the body. Vessels for offerings usually contain wheat, barley, grapes, remains of animal bones and meat, garlic, coriander, pistachio nuts, lentil, etc.

Therefore, the graveyard of Shahr-i Sokhta is an abundant source of information which can be used to reconstruct the environment, and the cultural and historical evolution of this ancient settlement (Sajjadi et al, 2003).

2.a.3.3. Urban characteristics

i. Administrative and bureaucratic system at Shahr-i Sokhta

Shahr-i Sokhta has always been recognized as a city. However, the meaning of this title has never been clearly explained by archaeologists. None of the researches in this field has clearly said whether Shahr-i Sokhta was merely a city or a city-state according to the Mesopotamia's city-states pattern.

Archaeological excavations at Shahr-i Sokhta have shown that this site was a large, powerful city which controlled vast regions between Kandahar and the Oman Sea. But the urbanization model in Shahr-i Sokhta was different from the prevalent models in the Indus Valley and Mesopotamia. Considering the absence of public buildings, central temple, grain silos, palaces, defensive wall, central archive, or royal cemetery in Shahr-i Sokhta, probably indicate that Shahr-i Sokhta had a feudalistic system and was governed by a tribal system rather than a centralized system.

The study of burial traditions and the distribution of burial objects and offerings in the catacomb graves of Shahr-i Sokhta can provide us with valuable information regarding this subject. The scarcity of catacomb graves in Shahr-i Sokhta (less than 6% of the whole) and their qualitative and quantitative richness suggest that they belonged to the tribal chiefs of Shahr-i Sokhta.

Up to now, 34 catacomb or pseudo-catacomb graves containing 54 bodies have been found in Shahr-i Sokhta. The gender distribution in these graves is as follows: 12 graves contained male, 8 graves contained female, 2 graves contained children, and the skeletons in three graves were of indeterminate gender. Five graves contained two skeletons: one contained two females, one contained a male and an indeterminate skeleton, one contained a female and a child, one contained a male and a child, and one contained two indeterminate bodies. In all cases it cannot be determined whether burials were simultaneous or happened at different periods; but considering the gender distribution, specially the presence of young children, it can be said that these graves were family graves.

24 graves of the 34 catacomb graves, or a little more than 70% of the whole, contained only one skeleton. Only less than 30% were mass graves, 50% of which only contained two skeletons. There is a strong possibility that some of them, for example burial 1404, were not used twice, but were used once to bury two bodies simultaneously, for instance to bury the bodies of a father and son who died at the same time.

Two graves contained four skeletons. In case of grave 44 it seems that initially it was prepared for the burial of a 16-year-old woman. It was later opened again and the bones of the old skeleton swept into a corner to make room for three simultaneous burials. Therefore, it has been clearly used twice.

Thus, most of these graves show the evidence of being used once, and this in turn is an indication that catacomb graves belonged to individuals with religious or social and economic importance. Burial 1400 is an obvious example of mass and family burials. It has been used at least four times. The remains of a jaw and other bones of a body are gathered at a corner of the grave, and the more distinct remains of another skeleton are gathered in another corner; however, separating these remains was a difficult task. At a later stage the third burial happened, and even later the remains of the third burial were covered with a mat and the last body, which belonged to a very rich 18 to 20 years old woman, placed on top of it. However, such instances are very rare, and in general can be attributed to the high-ranking families of the society.

Burial 311 was used at least twice. This grave contained the remains of three men and three women, all them older than 30 years. At first two skeletons along with some offerings were placed in the grave, at a later time the bodies of four other individuals were placed inside. These latter bodies had remained anatomically intact.

Investigations in Shahr-i Sokhta have shown that the differences in grave structure had nothing to do with the gender of the dead person, but were more related to religious beliefs, social position, and probably ethnicity of the individual. This is also suggested by the analysis of burial offerings. Children were usually buried along with adults, and burials of individual children are rare.

Of the 855 objects discovered in catacomb burials, 383 objects were discovered in 12 burials containing male skeletons and 286 objects were recovered from 9 multi-burial graves. 137 objects came from 8 graves containing female skeletons, and another 6 objects were discovered in the graves of children. Finally, 43 objects were recovered from three graves containing skeletons of indeterminate gender. This fact attests to the importance and wealth of the individuals buried in these graves. That's why we can accept that these graves belonged to people at the top of the social pyramid.

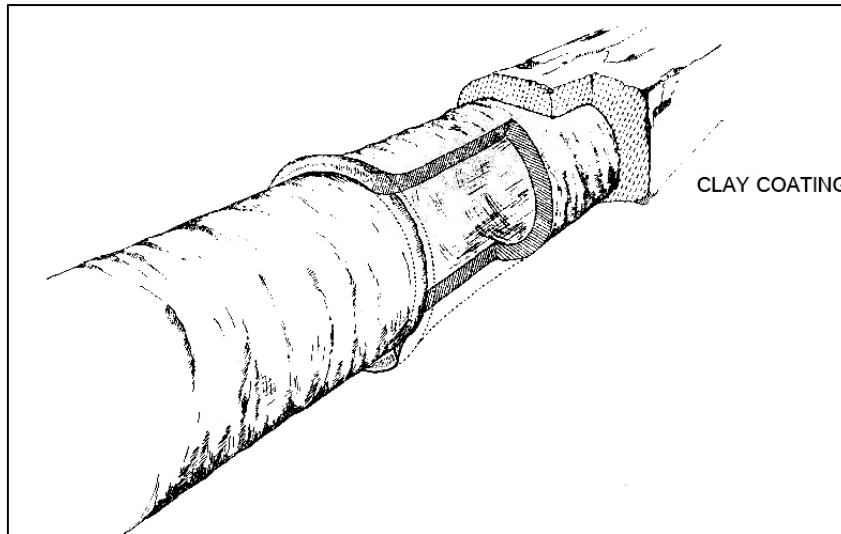
Burial 731 is one of the most significant burials found so far in Shahr-i Sokhta. This significance is due to the fact that it provides information regarding the bureaucratic and governmental system of Shahr-i Sokhta. It contains the skeletons of a 25-30 years old male and 61 burial offerings. As we mentioned earlier, these objects are the most important objects ever found not only in Shahr-i Sokhta, but all over the eastern parts of the Iranian Plateau. These objects include pottery vessels, numerous baskets, a wooden vessel, a wooden spoon, baskets containing grape remains, a metal seal, birds remains, other organic materials, and a game board. One of the objects is a wooden spoon, no. 49, of the type that is used in Africa even today. The discovery of this wooden spoon or ladle beside of other vessels made of alabaster and pottery proves a degree of social development that is unknown even today for some societies. In addition, two other very significant objects have been discovered there. The first is a ceramic cup, no. 42, which might be the first attempt by the residents of the Iranian Plateau at representing movement, or what is called "animation" today. The other object is a wooden game board with its pieces (Piperno & Salvatori, 1983) and dices. In the following parts these two objects will be described in more detail.

ii. Water and sewage systems

During the Italian excavations, remains of ceramic pipes, which were probably parts of the water and sewage system of this ancient city, were accidentally discovered. These pipes, which lay in an east-west direction, carried the water used in the eastern and higher parts of the settlement to an elliptical basin at the center of the hill.

The main structure of the system contained a series of ceramic pipes of one meter long. At one end they had a diameter of 17.6 cm, while at the other end their diameter was 13.9 cm. The pipes were joined together by pushing the smaller end of one pipe into the larger opening of another for a depth of 1 cm.

It seems that before joining the pipes, a type of bedding was constructed for them, because underneath and around the pipes, a layer of soft soil, can be found. There are no signs of sealing the pipes with bitumen, but in order to protect the pipes a layer of mud was applied over them. In its undamaged parts, this layer has a thickness of around 8 cm. Another function of this layer was probably prevention of leakage at the joints or the cracking of pipes. As a result of erosion, many of the pipes are broken or dislocated (Tosi, 1983, p. 123 & 125).



Figure

2.b. History and Development

Shahr-i Sokhta is one of the most prominent sites in Sistan belonging to the early urbanization period. Before the discovery of this city, our knowledge regarding the economic, social and political evolution of this part of the Iranian Plateau during the fourth and third millennium B.C. was insufficient. By using the data coming from Shahr-i Sokhta, we can reconstruct cultural interactions with other societies and human adaptations to the environment in this part of Iran. Thus, this proto-historic settlement will be studied in more detail in order to acquire a better understanding of its conditions.

2.b.1. History of archaeological investigations in Sistan

Before being studied by archaeologists, the ancient sites of Sistan were visited and introduced by a number of western explorers, political and military officials, and orientalists during the last two centuries. Today, although their observations lack archaeological value but since they include drawings, maps and descriptions of the ancient ruins, they can be used in the scientific and archaeological studies of Sistan as historical documents. These data can help us to determine the impact of wind and seasonal rains erosion on the deterioration of historical sites. Many ancient sites introduced and described by such people have either been buried as a result of 120-day winds and the displacement of sand dunes, or destroyed through the passage of time and human activity. For example, today nothing but a heap of broken bricks and bricks remains, exist from the Mil-i Ghassem Abad to the northwest of ancient Zahedan, while Owen Smith in 1871 described it as rising to a height of 70 feet (Smith 1999, pp. 189-190). Also McMahon in 1903 provides a photograph of this monument in his report (McMahon, 1906, p. 219).

Apart from Stein who in 1915 and 1916 traversed the plain of Sistan and took the first archaeological step in the identification and introduction of many historical sites in the region, the most important archaeological activities performed in Iran's Sistan are the following:

In 1925 the German archaeologist Ernst Hertzfeld visited the historical sites of Sistan, especially Kuh-i Khwaja. Four years later, in 1929, he once again travelled to the region with a small team and began surveying, mapping and excavating there. During February and March 1929 he managed to uncover part of Kuh-i Khwaja's mural paintings, which he took with himself to Berlin. Initially, Hertzfeld published the results of his investigations in Sistan in a book called "Sakkestan" (Hertzfeld, 1932). He later on published a more detailed report in 1941 in a book called "Iran in the Ancient East" (Hertzfeld, 1941).

In 1952 after the signing of a bilateral cooperation agreement between Iranian Center for Archaeological Research and IsMEO² from Italy, Giuseppe Tucci, who at that time was the head of IsMEO, travelled to Sistan and paid a preliminary visit to the ancient sites of the region. In 1960 an Italian team headed by Umberto Scerrato began archaeological investigation of Sistan, and managed to identify previously unknown sites such as Dahan-i Gholaman (Achaemenid), Qala Tepe (Parthian), and Qala Sam (Parthian, Sassanid) (Scerrato, 1962).

In 1961 another Italian archaeologist called Giorgio Gullini travelled to Kuh-i Khwaja at the head of a team and began his investigations by excavating a number trenches. The results of his investigation were published in a book (Gullini, 1964). At the same time and simultaneously with Gullini's excavations in Kuh-i khwaja, Umberto Scerrato performed limited excavations in Qala Sam and Qala Tepe, the results of which have not been published yet (Sajjadi, 2000, p. 178).

In 1967 excavations in the prehistoric mound of Shahr-i Sokhta began with the cooperation of Iranian Center for Archaeological Research and IsMEO. An archaeological team headed by M.Tosi started the excavations continued until 1978. The result have been published in tens of articles and books in various languages.

The interesting point about these excavations in Shahr-i Sokhta was the presence of a considerable number of scientists and experts from various disciplines other than archaeology. The high significance of artifacts discovered during the preliminary investigations of Shahr-i Sokhta convinced the officials of the Italian Institute for Oriental Studies to provide maximum capabilities so that the excavations and the interpretation of the discoveries could be done at the highest scientific level. Thus, a number geologists, paleobotanists, anthropologists, palezoologists, and nuclear physicists were sent to the site in order to make the discovery, study, and interpretation of artifacts as efficient and scientific as possible. Outstanding among these was the work of Japanese scientists who made a great contribution in the dating of artifacts by using high-tech methods such as pale magnetism, Uranium 238 dating, carbon 14 dating, and nuclear fission (Tosi, 1983).

After the Islamic Revolution, which put a stop to the work of all foreign archaeological teams, excavations in Sistan were also ceased. In 1991, Iran's Cultural Heritage Organization sent a team of Iranian experts headed by S. M. Mousavi to the region in order to do some archaeological investigations while at the same time teaching field work and excavation techniques to the students of archaeology who had to pass some mandatory courses in the field. For three years (1991-1993) and each year for one month this team continued surveying and excavating in Kuh-i Khwaja and Bibi Doust.

The results of this work were only published in an article titled “the brick monument of Zabol’s Kuh-i Khwaja” (Mousavi, 1995, pp. 67-98).

The year 1997 should be considered as a time of renewal for archaeological studies in Sistan. In this year, a team of Iranian experts from Iran’s Cultural Heritage Organization and the University of Sistan-o Baluchestan headed by S. M. S. Sajjadi were sent to the area in order to do preliminary studies and surveying in Shahr-i Sokhta and Kuh-I Khwaja, and prepare the ground for extensive archaeological studies in Sistan. The implementation of this huge undertaking was begun in 1997 through detailed surveying in Shahr-i Sokhta and in 2000 in DahaneGholaman. The results of these studies by the team headed by S. M. S. Sajjadi have been published and described in several articles and books.

In 2004, S. R. Mousavi Haji performed a systematic field survey in the huge site of ancient Zahedan. Through this study, which formed the basis of his doctoral thesis titled “a Study in the Archaeology of Zarang in the Islamic Period” (Mousavi Haji, 2003), he succeeded in revealing the identity of this great Islamic city of Sistan.

Following this research, in 2005 R. Mehrafarin finished his doctoral thesis under the title “Archaeological survey and Analysis of Zahak District in Sistan” in which he identified and analyzed more than 40 ancient sites (Mehrafarin, 2005).

In the same year, a team composed of archaeology students of the University of Zabol headed by M. Miri began their mandatory field work courses by surveying and studying the strata of TepeTale bkhanalong the Zabol - Zahedan road. As the first excavation in Shahr-i Sokhta’s satellite sites, this excavation was very important. This excavation continued without halt up to 2007 and provided considerable information about Sistan during the Bronze Age

In 2005, R. Mehrafarin finished his surveying and excavation work in Tepe Gauri. According to the published results, this site was settled during two periods, one in the Parthian era and the other in the Islamic period. It should be mentioned that up to that time this site was the only site which had been exactly dated (Mehrafarin, 2007).

In 2007 and 2008, the first and second phases of the project for the archaeological survey of Sistan Plain was begun, headed by S. R. Mousavi Haji and R. Mehrafarin. It led to the identification of more than 1645 ancient sites including hills, fortresses, towers, caravanserais, etc (Mousavi Haji & Mehrafarin, 2008).

In the autumn of the same year, another team headed by S. R. Mousavi Haji determined the boundaries of the ancient city of Zahedan. During this project, in addition to the exact delimitation of the boundaries of the ancient city, the ground was prepared for the implementation of a conservation program for the site.

In the winter of the same year, M. Mortazavi attempted to excavate another satellite site to Shahr-i Sokhta called TepeDasht. These activities provided valuable information (Mortazavi, 2009). TepeSadegh about 20 kilometers to the west of Shahr-i Sokhta is another ancient site in which archaeological activities have been performed. This site was for the first time identified in 2008, and in 2009 archaeological excavations began their headed by R. Shirazi and M.Tavassoli. In 2010 and 2011 these excavations were continued by the members of the faculty of archaeology in the University of Sistan-o Baluchestan (Mohammadmehdi Tavassoli, Mo'azzam Khosrowjerdi, and Mahdi Mortazavi).

2.b.2. Shahr-i Sokhta, from foundation to today

So far four main settlement periods, covering 1200 years, have been identified for Shahr-i Sokhta.

Period I, 3200-2800 B.C. (Phases 8-10)

During this period the main settlement areas were the eastern residential area and the central area. At that time, Shahr-i Sokhtafunctioned as an economic and cultural crossroads. The reason for this conclusion is the type of artifacts belonging to this period. These artifacts include cylindrical seals similar to those in Jemdet Nasr period and Elam (Amiet&Tosi, 1978, p. 24-25), a proto-Elamitee tablet, and pottery similar to those found in southern Central Asia and Pakistan. At this period, the city had an area of 16 hectares (Biscione et al. 1974).

Period II, 2800-2500 B.C. (Phases 5-7)

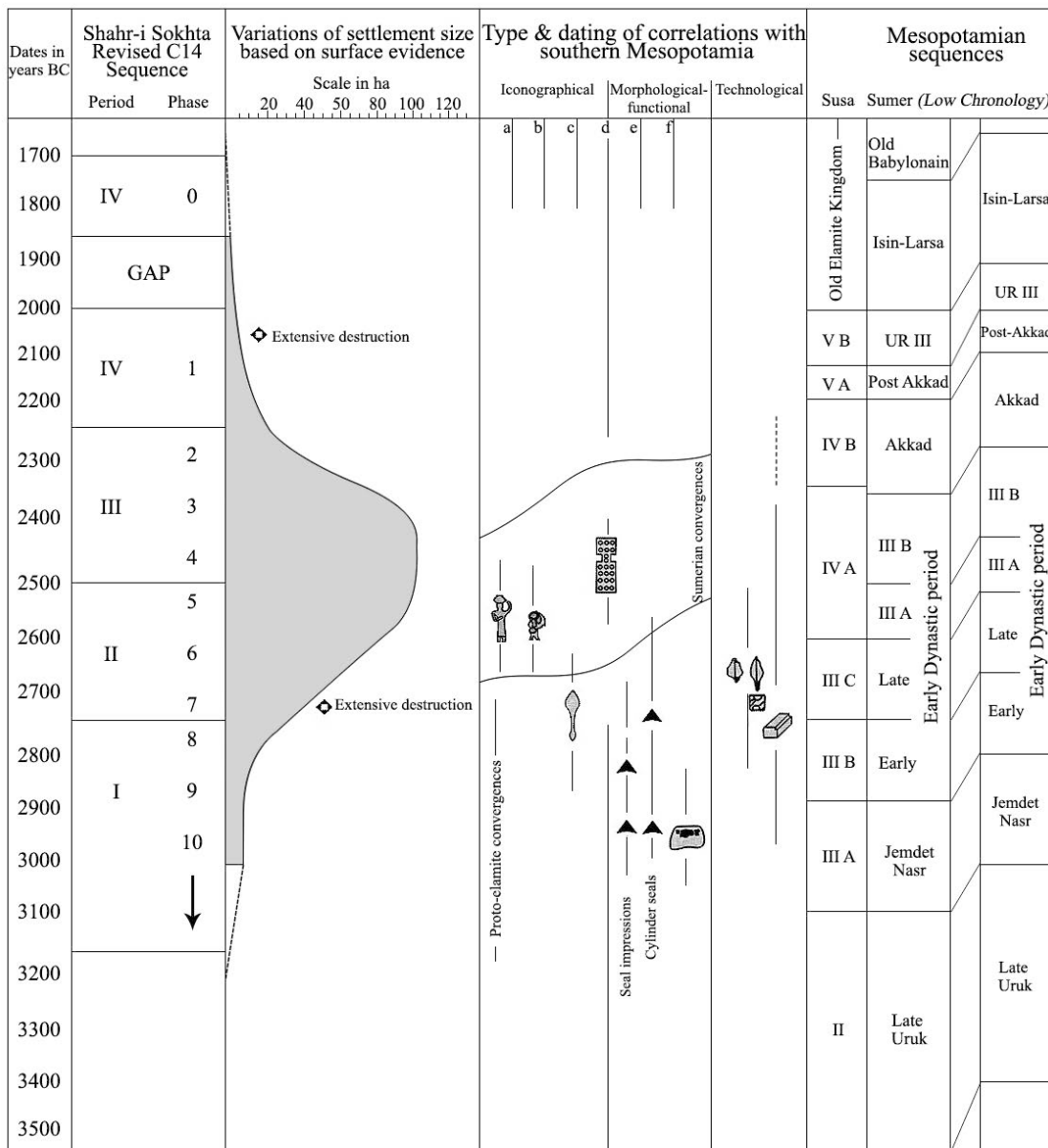
During this period, the settlement grew larger and expanded towards the northwest, where memorial buildings are situated. At this period, the city reached its largest size and covered an area of more than 80 hectares.

Period III, 2500-2300 B.C. (Phases 2-4)

Unfortunately, the third settlement period is comparatively unknown due to lack of enough scientific investigations in the various parts of the site which contain the remains of this period. Nevertheless, based on the available information, some remains belonging to this period have been identified in the central area (which was settled up to the end of the third settlement period), in the graveyard, and in RudBiabanTepe (RudBiaban Hill). The overall area of the settlement during this period reached 20 hectares (Biscione et al., 1974).

Period IV, 2300-1850 B.C. (Phases 0-1)

Artifacts belonging to the fourth settlement period have been found in the southern and southwestern parts of the site, including the Kakh-i Sokhta. After this period, Shahr-i Sokhta was completely abandoned. At present, we have no information about the period between the abandonment of Shahr-i Sokhta and the renewal of urbanization in Sistan during the Achaemenid Empire.



Chronological table: Shahr-i Sokhta Periods and Phases, settlement size, correlations with southern Mesopotamia and Khuzistan.

Table

It should be kept in mind that this chronology has been suggested by Italian archaeologists and has been revised several times by them. In the last article published by M. Tosi, 1850 B.C. has been announced as the date for the complete abandonment of Shahr-i Sokhta (Tosi & Salvatori 2005). However, it seems that to reach a newer and more certain chronology we should wait for more extensive excavations in the southern parts of Shahr-i Sokhta. What we can currently say about the last period of Shahr-i Sokhta that artifacts belonging to this period found in Phase 1 show a close resemblance with artifacts from periods V and VI in Bampur (Biscione, 1979, p. 294-295), and also artifacts from the Umm an-Nar culture in Oman (Tosi, 1976, p. 84-86). Of course, new archaeological studies performed in the Makran region in Baluchestan around the ancient site of MiriQalat tend to support this dating. According to carbon 14 dating on artifacts recovered from period IIIC in MiriQalat, this period was concurrent with the Phase 1 of the period IV in Shahr-i Sokhta (Besenval, 1997, p. 33).

an/av. J.-C.	Turkménie méridionale		Bactriane		Sogdiane	La vallée de l'Hilmand		Baluchistan	Indus
	Piémont du Kopet-Dagh	Margiane	Méridionale	Septentrionale		Séistan/Shahr-i Sokhta	Mundigak	Mehrgarh	
6200	Néolithique/ Djitoun					?	?	I A, I B, ↑	?
4500								II A, II B	
4000	Transition/Anau IA	?	?	?		?	I	III	
3800	Chalcolithique ancien/NMZ I								
3600		Chalcolithique moyen/NMZ II							III, 1-6
3400	Chalcolithique récent/NMZ III								
3200		Bronze ancien NMZ IV							IV
3000	Bronze moyen NMZ V						NMZ V, Gonur, Togolok, Azhi- Kui, Kelelli	Dashli 1 et 3	
2800		Kuzali	Dashli, 17 et 19	Dzharkutan	Shahr-i Sokhta II				3
2600	Bronze récent NMZ VI						NMZ VI, Gonur, Azhi-Kui, Togolok		
2400		Fer Yaz I, II/III	Yaz I-III, Yaz-Dépé	Tillia	Kuchuk	Shahr-i Sokhta IV			
2200									
2000									
1800									
1600									
1400									

Table

2.b.3. The main archaeological characteristics of Shahr-i Sokhta

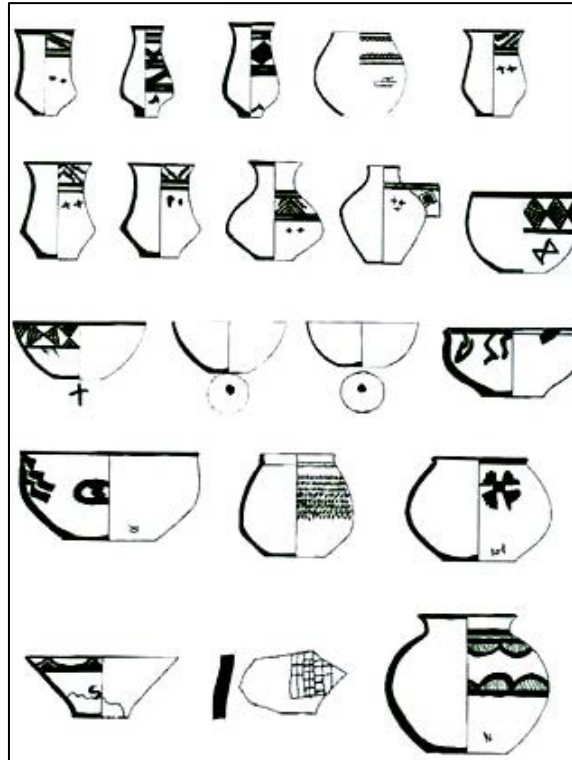
The discoveries in Shahr-i Sokhta are of paramount significance to the study of various aspects of Iranian culture, including history of the migration of Aryan tribes to the Iranian Plateau. Latest studies regarding the migration of Aryan tribes to the Iranian Plateau suggest that before their migration to this region some Proto-Indo-Aryan tribes were living there. The great similarity of artifacts and religious ceremonies between the people of Central Asia and the Indian Subcontinent on the one hand and the people of Shahr-i Sokhta on the other shows that the people of these regions have had more or less similar racial characteristics. Even after the entrance of Iranian tribes into Sistan around 1600 B.C., these earlier people didn't become completely extinct; some of them joined the newly migrated communities and assimilated with them.

The ethnical composition of Shahr-i Sokhta was very diverse. This can be deduced by studying the artifacts recovered from graves in the city. The racial and cultural evidence from these graves along with artifacts found in residential buildings all attest to the fact that the population of Shahr-i Sokhta belonged to Proto-Indo-Aryan tribes who had migrated to the region from Central Asia (Frouzanfar, 2009).



Photo

signs which are also similar to those found in the Indian Subcontinent and southwestern Iran. Whenever the population of Shahr-i Sokhta couldn't use images to convey their ideas, they used other methods. The existence of artifacts inside the graves which showed the profession and social position of the dead was one of these methods.



Figure

they were numerous in Hamun wetlands (Tate, 1999, p. 765). These boars might have been worshiped in the ancient world. It should be noted, however, that in spite of so many boar figurines, no bones belonging to these animals have been discovered in Shahr-i Sokhta (Caloi & Compagnoni, 1977, p. 192).

Unusual methods of interment in Shahr-i Sokhta suggest that a special kind of human sacrifice may have been practiced among the population. There are graves that contain a single skull which has been buried with full religious ceremony. In some instances no trace of other bones is encountered. Among interments of this kind in some cases several skulls have been arranged in particular shapes. In two graves of this type, no. 609 (Piperno & Salvatori, 1983) and no. 2301, the skulls are arranged in a circle and other bones are buried in a pit at the center of the circle. Grave no. 1003 is a very interesting instance of such mass graves. This grave contains 13 human skulls on its walls, and the remains of a 45-year-old man and three dog skulls in the middle (Piperno & Salvatori, 1983).

Further studies on the objects in these graves show that food remains were placed beside the head and hands, and other objects were placed in other parts of the grave according to their importance and function. Ornamental objects are usually found in the graves of women and are placed near the head or hands. Stamp seals, which were a sign of power and economic control, are usually placed beside the bodies of women and beside the arms or the torso of male bodies. In numerous instances an animal (a lamb or a kid) is also sacrificed and placed within the grave. The sacrifices are placed over or under the head or very near to it. Among the objects in the graves tools and make-up materials have also been observed. Ornamental beads made of semi-precious stones such as lapis lazuli, agate and turquoise have been found in these burial places.

In some cases the number of these beads in a single grave reaches 200. So many beads are too numerous for the making of a necklace or a bracelet, so they were probably sewn on the garments.

2.b.4. Technological aspects

I. Pottery

High distribution and density of potsherds in Shahr-i Sokhta is not exclusive to the surface, and is observed in all ancient layers of the city. The density of surface finds goes down in the industrial area and reaches zero in the graveyard. The density of pottery in the eastern residential area and monumental area is very high, so that in OYL square estimation it reaches 210 pieces of pottery per cubic meter.

This is the result of high rates of pottery production, especially during the second and third settlement periods (when the city had reached the climax of its growth and glory). Based on the pottery found in Shahr-i Sokhta, it can be said that during these periods the city had links with its neighboring regions such as Bampur in Baluchestan, Mundigak in Afghanistan, Umm an-Nar in Oman, and to the north with Central Asian sites in the Murghab Plain and oases on the delta of the Tedjen River.

This pottery was produced within Shahr-i Sokhta and in surrounding towns and villages (in Tepe Dasht 3km to the southwest of the city and in Rud-i Biaban Hills 25km to the south of the city, which are typical pottery production centers in the third millennium B.C.), in workshops that had turned into specialized industrial workshops for the production of pottery during the second and third settlement periods. The pottery was produced by the use of slow and fast wheels (Vidale & Tosi, 1996). The slow wheel was probably used during the first period, and the fast wheel during the second and third periods.

Shahr-i Sokhta's pottery can be divided into four main groups; namely, buff ware, grey ware, red ware, and polychrome. The great majority (more than 90%) of pottery found in the city is of the buff ware; but they show a great variety in terms of form and structure. The pottery of the period I is divided into two categories: buff ware and grey ware.

Studies show that buff ware potteries were more widespread than grey ware, and that the tradition of pottery production was continued during later periods (Sarianidi, 1983). The buff ware pottery of first period of Shahr-i Sokhta shows more decorations. These decorations include geometrical, plant and animal patterns and motifs. The main difference between these potteries and that of other periods is the color of their decorations.



Photo

Probably because of higher urbanization and more population, which led to higher demand for pottery vessels, and mass production (Tosi, 1983).

Polychrome pottery of Shahr-i Sokhta have a buff surface and show little difference with buff ware potteries in terms of production and heating methods. The only difference is the variety of colors in their decorations (Mugaveero & Vidale, 2003). The percentage of polychrome pottery in Shahr-i Sokhta is not high, and complete specimens of such pottery have mostly been discovered in the graveyard of the city. The colors used in the decoration of this type of pottery are mostly green, white, black, red, and yellow.

These vessels are mostly in the form of bowls and conical jars. These vessels are very significant because they provide us with valuable information regarding the transport and exchange of polychrome pottery across eastern Iran and Baluchestan. Similar pottery vessels have been found in the Nal site in southern part of Baluchestan in Pakistan; this shows that it had a link with the Sistan region (Franc-vogt, 2005).



Photo

pottery vessels in Shah-i Sokhta was the use of incision method, which is mostly observed on jars. Biscione and Bullgarelli have divided the motifs on the pottery vessels of Shah-i Sokhta into five categories: simple functional, mixed, hanging; decorated ribbons, and multiple decorated ribbons (Biscione & Bullgarelli, 1983).

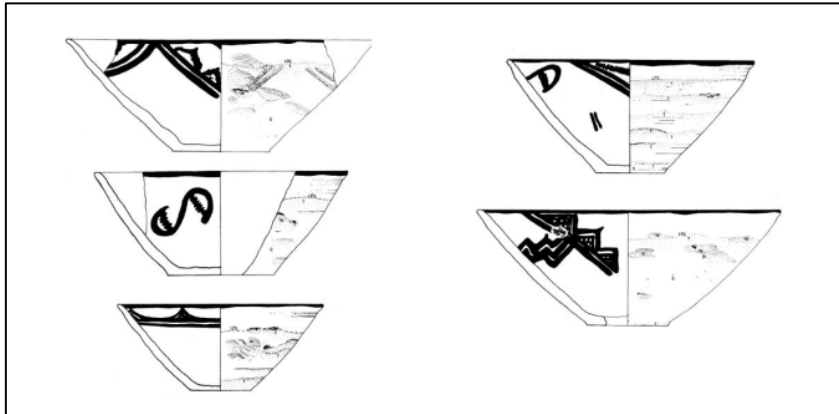


Photo

Baluchestan. These beakers are the result of evolution in the shape of cylindrical beakers, which in earlier times were made due to technological limitations (especially in the potter's wheel).



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Photo

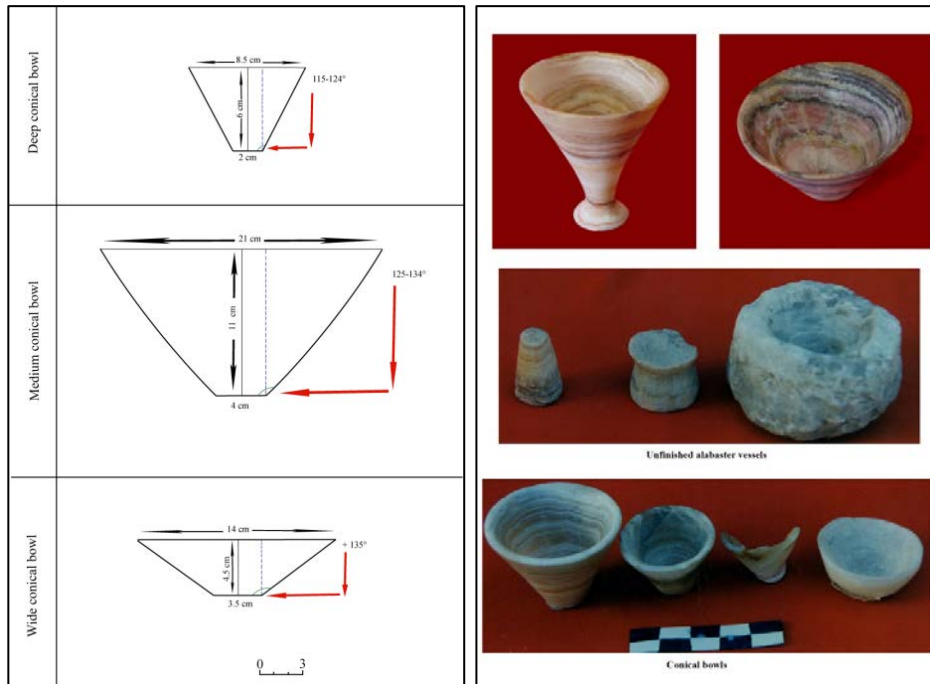
Vessels similar to the high conical bowls of Shah-i Sokhta have also been found in Susa and southern Mesopotamia (the Royal Cemetery at Ur) (Shirazi, 2008).

The production process of alabaster vessels can be divided into the following four stages:

- Creating a rough form on a block of stone, probably with a bronze hammer and chisel;
- Hollowing out the stone by making use of a wide-pointed drill which had a turning movement. The hollowing out of the inner space of the vessel was done with drills which were specialized for the manufacture of each type of vessel. For example, in order to make small stone mortars, first a thin drill was used to create a hole in the stone, and then this hole was enlarged with a thicker drill. However, it seems that other methods were used in the manufacture of conical bowls which were simpler in practice. The reason was that these vessels provided more working space;
- The third stage in the manufacture of alabaster vessels in Shah-i Sokhta was the polishing of their walls by the use of abrasive tools including coarse-grained and fine-grained abrasive finishers;
- In the last stage, the vessel was completely polished and probably heated (Shirazi, 2007).

In general, alabaster vessels of Shah-i Sokhta can be divided into the following three groups:
 a. conical bowls, b. stemmed cups, c. cylindrical mortars.

a. Conical bowls: This group of finds constitutes the majority of alabaster vessels discovered in the site. More than 90 percent of discovered alabaster vessels belong to this group.



Photo

The minimum height of such vessels is 1.1cm and the minimum diameter of their mouth is 2.2cm, while their maximum height is 13cm and the maximum diameter of their mouth is around 19.5cm. These vessels usually have a flat base, and flat, or in some cases sharp, rims.

- b. Stemmed cups:** These vessels include bi-conical shapes. They are specific to the eastern parts of the Iranian Plateau and Central Asia. Similar vessels have been found in Central Asia (in sites such as Gunor Tepe), in Afghanistan (south of Bactria), in Pakistan (Quetta treasure), and in southeastern Iran (Shahdad). Chronologically speaking, the stemmed cups of Central Asia, Afghanistan and Pakistan belong to the Bactria–Margiana Archaeological Complex (Middle Bronze Age). Stemmed cups from Central Asia, Afghanistan and Pakistan have long stems and their upper body is semi-spherical or cylindrical, while those of Shahr-i Sokhta have very short stems and their upper part is conical.
- c. Cylindrical mortars:** a great number of these vessels have been found in the catacomb graves of Shahr-i Sokhta which belong to the third settlement period. These mortars can be divided into large mortars and small ones. So far, one cylindrical mortar with a handle has been found in burial no. 1615. Such mortars were probably used to prepare food or grind grains. Today, these mortars are used in the region for grinding grains. Small mortars have mostly been found in catacomb graves. Among these artifacts, simple cylindrical vessels, concave-body cylindrical vessels, raised-base cylindrical vessels, and finally cylindrical vessel with beveled rims can be observed. Regarding the function of these vessels, it should be said that they were probably used to prepare cosmetics. As an example we can point to the catacomb grave no. 1400, where five vessels of this type were found. These vessels, along with a bronze mirror, a wooden comb and a alabaster kohl flacon were put in a wicker basket (as the make-up bag of the dead woman) and placed inside the grave.

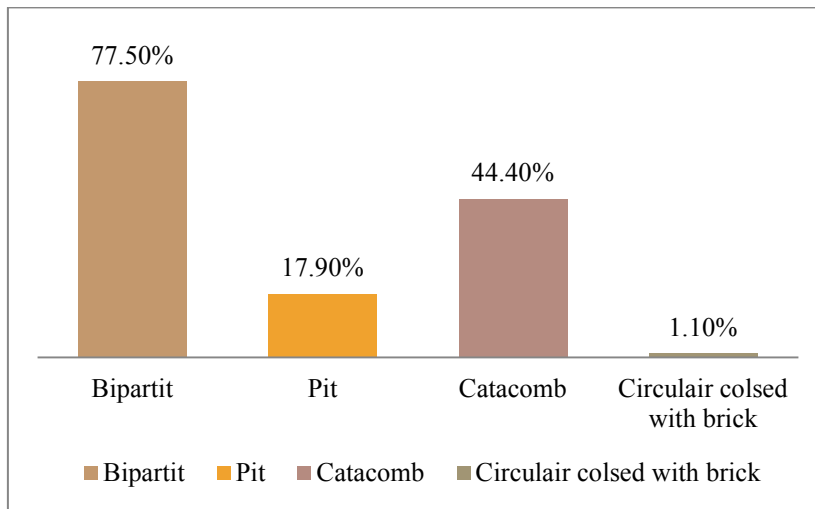
In eastern Iran and Central Asia numerous instances of such vessels have been found in layers belonging to the Middle Bronze Age. Artifacts similar to the cylindrical vessels of Shahr-i Sokhta have been found in Shahdad on the margins of the Lut Desert and also in the basin of Halil Rud (Halil River).

Of the more than 310 excavated graves, 90 graves contained alabaster vessels. These graves usually contain more luxury artifacts as burial offerings, including numerous pottery vessels, metal objects, and ornamental beads made of agate, lapis lazuli, and turquoise, and in some rare instances even gold objects (necklaces, bracelets and sometimes belts). In some instances, one or two sacrificed animals were also put in such graves.

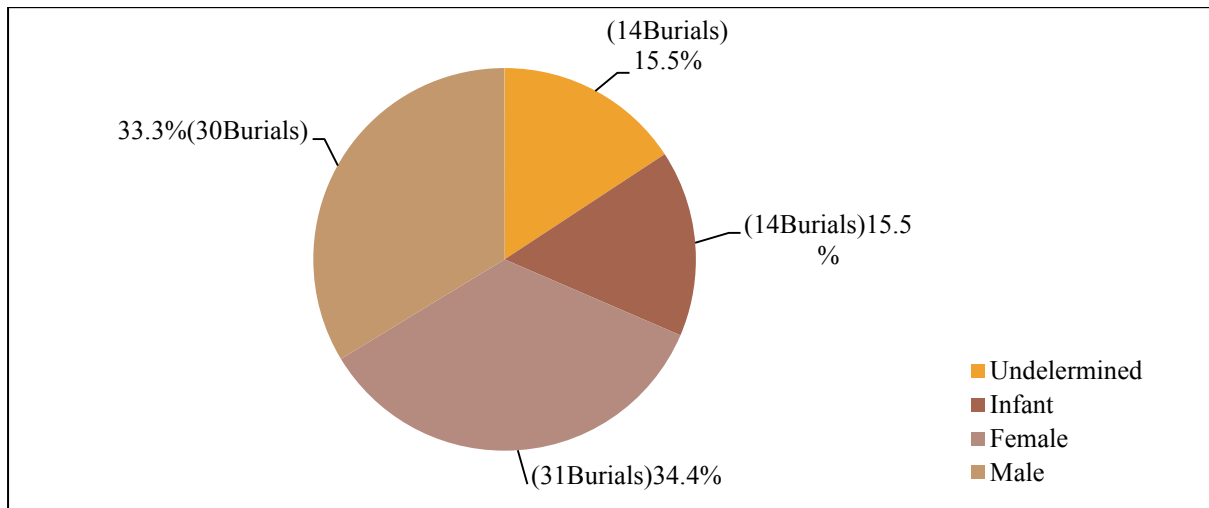
Based on statistical data, it seems that graves of males and females were of equal importance regarding alabaster vessels put in them. But these vessels were rarely put inside

graves of children, because only in 15% of children graves alabaster vessels have been found (Chart 2-1). Statistical study of alabaster vessels from the perspective of grave construction reveals interesting points.

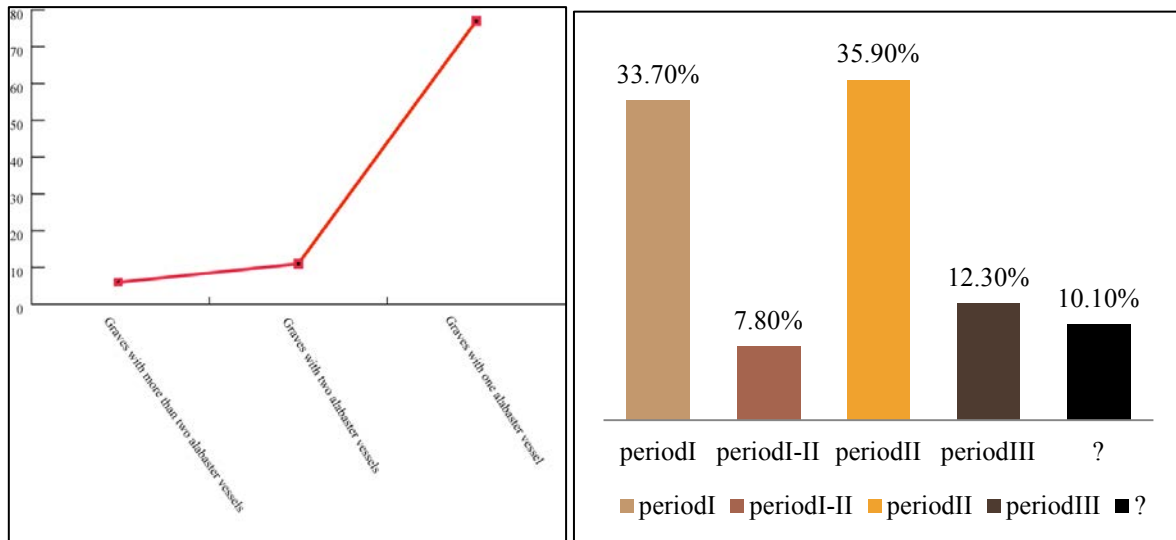
More than 77% of graves belong to the double pit group, 17% to the simple whole group, 4% to the vaulted group, and only a little more than 1% belong to other types (Chart 2- 2).



Chart



The study of the chronological distribution of vessels shows that a considerable percentage of them were found in graves which belong to the first and second settlement periods. This probably shows that the production of these vessels was more widespread during these periods than during other settlement periods. Only 12% of alabaster vessels found in the site belong to the period III (Chart 2-3). In more than 90% of graves containing alabaster vessels only one vessel has been found, and only 10% of these graves contained two, three, or four vessels (Chart 2-4).



Chart

This geographical distribution is quite vast; apart from Susa and Mesopotamia, these vessels have been found in Central Asia (Alagh Tepe, Altyndepe, Geoksyur), Afghanistan (Mundigak and south of Balkh), and Pakistan (Quetta region and Makran).

Thus, it can be concluded from the above-mentioned facts that during periods II and III, Shahr-i Sokhta had a diversity of burial traditions. One of these traditions was placing pottery, metal and alabaster vessels, and also cylindrical and flat stamps, personal ornaments such as necklaces and bracelets (and in some rare instances, belts) made of lapis lazuli, agate, turquoise, and limestone, and finally sacrificial animals within the grave. However, we should keep in mind that these are preliminary results, and for complete results we should wait for the investigation of all burials containing alabaster vessels.

III. Small stone tools

Stone tools were widely used in Shahr-i Sokhta, and the manufacture of stone tools was one of the most complex and specialized crafts in the city. Small stone objects encompass a variety of objects including blades (leaf-shaped stone blades and toothed stone blades), stone drill heads, and stone stamp or cylindrical seals.

IV. Seals

In the absence of detailed, written texts, there is no other way to reconstruct the bureaucratic organizations and administrative of ancient societies but to investigate the economics-related evidence and tools such as seals. Researchers have always emphasized that there is a direct relationship between the specialization of industrial and manufacturing activities in a society and the complexity of society. One of the consequences of these two phenomena is the creation of a hierarchical social model based on the horizontal and vertical separation of individuals according to their wealth and economic production. This wealth is accrued through either agricultural or industrial production (Tosi, 1984).

The appearance of economic and bureaucratic complexity, and also a social hierarchy, during the pre-urbanization period is the characteristic of complex societies. From the first days of its inception, the society at Shahr-i Sokhta, as a complex society, gives us a clear picture of this tendency to become more complex. The appearance of professional, full-time specialists, the division of labor in the economy of the city, and its bureaucratic organization and central power of control are the topics that help us to understand the social, political, and economic characteristics of this society. Since the first days of excavations at Shahr-i Sokhta more than 230 broken or complete seals, either cylindrical or stamps, have been discovered at the site. The study of these seals can help us to reconstruct the economic processes within the society.

For this purpose, we will first study stamp seals, and later we will analyze cylindrical seals (Ferioli et al., 1979; Amiet & Tosi, 1978; Sajjadi et al., 2007; Sajjadi et al., 2009).

IV-1. Stamp Seals

Most stamp seals of Shahr-i Sokhta are of the compartmented seals type. The majority of these seals have been discovered on the surface of the site, but the number of seals recovered from archaeological contexts is not inconsiderable. The study of seals recovered from archaeological contexts enables us to understand their typological evolution and determine the periods in which they were in use. These seals have been discovered in various archaeological contexts. They have been discovered both in the rooms inside the Residential Area (Tosi, 1968 & 1969) and in the building no. 1 in the Memorial Buildings Area, a building which was most probably a public building. Numerous stamp and cylindrical seals have been discovered in the ancient burials of Shahr-i Sokhta, which proves that according to the people of the city the use of seals was not exclusive to the material world. This might also have been a way of putting these seals (which were deemed private and exclusive) out of circulation. The seals discovered at Shahr-i Sokhta are especially useful in providing information regarding the relationship of the individual with his seal. According to observations in the graveyard, there was a very close relationship between a seal and its owner; so that even in the grave, the seals were found near the hand, the neck, or the hip of the skeleton. This suggests that the seals were hanging from the neck, the wrist, or the waist of the corps. The seals of Shahr-i Sokhta usually have two holes, which were used to let the seal hang from a body part.

IV-2. Raw materials and manufacturing techniques

The materials generally used to make seals were chlorite, calcite, and bronze. Chlorite and calcite were easily obtained from the mountains around Shahr-i Sokhta, including Malek Siah Mountain (Ferioli et al., 1979). Apart from these, other materials such as bones, seashells (*Xancus pyrum*), agate, lapis lazuli, and clay were also used to make seals. Seals found during surface investigations are mostly metal stamp seals, a fact which indicates the increased use of metals in the manufacture of seals during the latest settlement period at Shahr-i Sokhta. The seals belonging to the second settlement period, especially phase 6, are mostly made of chlorite (Ferioli et al., 1979). This period was the peak of the stone industry and the manufacture of objects made of hard and soft stones such as lapis lazuli and marble. It was also a time when urbanization flourished in the settlement.

The techniques used at Shahr-i Sokhta for the manufacture of seals were diverse and complex. This diversity of techniques was the result of the diversity of raw materials. Compartmented seals were generally made by the lost-wax casting method.

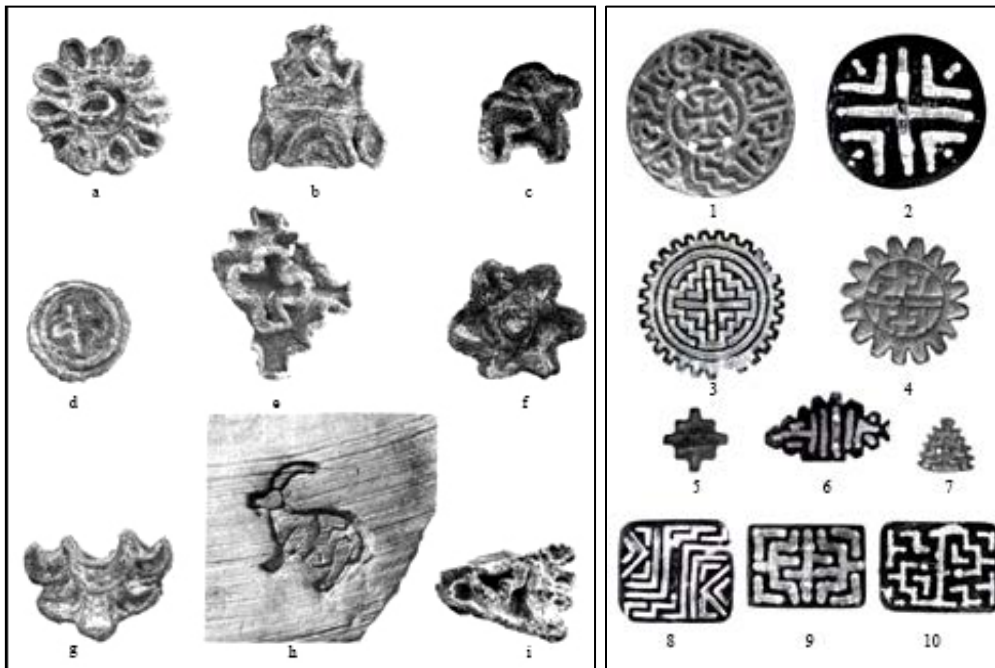
These seals had various forms. Metal seals had geometrical shapes (such as circle, rectangle, rhombus and square); but there are instances where the shape of the seal was inspired by the animal, plant, and human worlds. There are instances of seals in the shape of full-petalled flowers; animals such as goats, *houbara bustard*, and eagles; and the human foot. There are also seals with shapes different from anything known before, which can be categorized as unconventionally-shaped seals.

Two different techniques were used to make soapstone seals. In the first technique continuous points created with drills shaped the desired image on the seal and later these points were joined together. We can easily reconstruct the process by studying seals recovered during previous excavations. In the second technique, which is somewhat simpler, the images were created on the surface of chlorite by means of a blunt object, such as a light stone hammer. In some cases, circular seals had a serrated rim; this feature was exclusive to the Hilmand Basin and similar seals have been discovered in Mundigak (Casal, 1961). The motifs on the seals of Shahr-i Sokhta are also interesting. Almost 90 percent of these motifs are geometrical shapes, especially cross-like shapes. Apart from that, spiral shapes were also used on the stone seals of the city. Another interesting point is that some of these motifs resemble the geometrical patterns used in the decoration of pottery vessels.

Regarding the size and dimensions of seals from Shahr-i Sokhta it should be mentioned that their size varied between 2 to 7 centimeters. The smaller seals were probably private seals, and the larger ones belonged to the central authority of the society and used by the government.



Photo



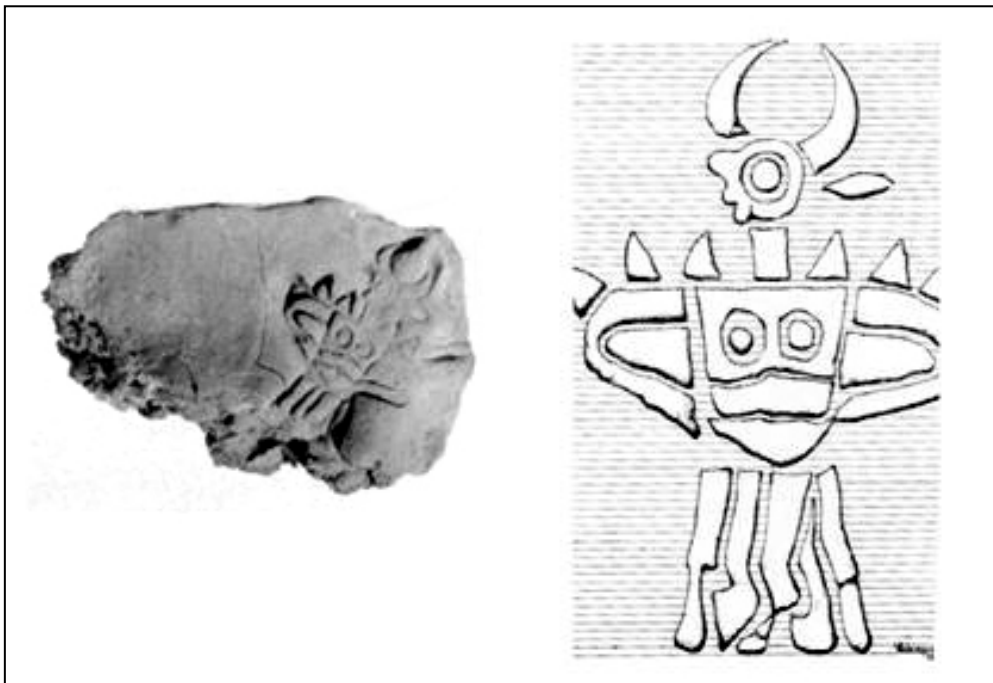
Photo



IV-3. Cylindrical seals

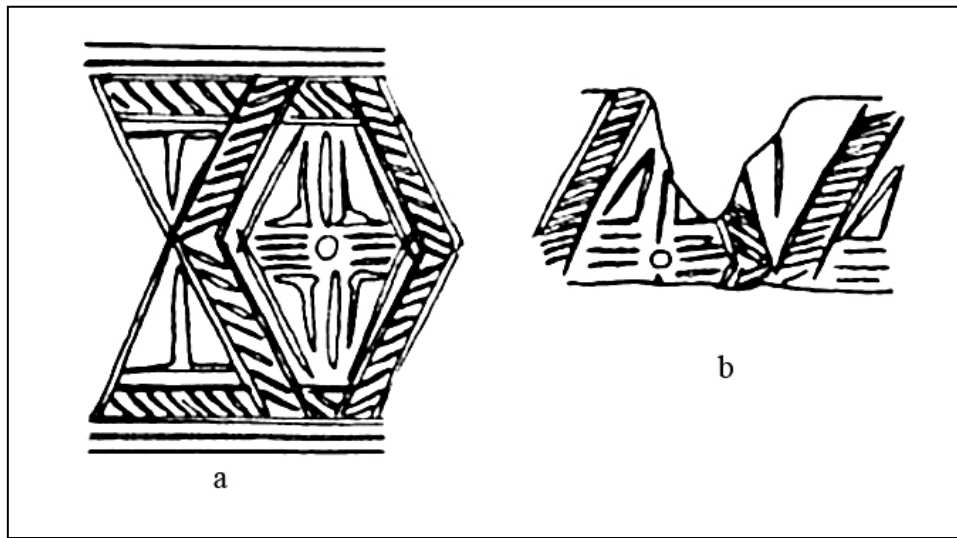
We have more information regarding the cylindrical seals of Shahr-i Sokhta. All these seals are made of stone. The types of stone used for this purpose included limestone, marble, chlorite, and lapis lazuli. Only one instance of a lapis lazuli cylindrical seal has been discovered at Shahr-i Sokhta so far. This rarity of lapis lazuli seals also holds true in case of stamp seals. This can be easily explained: since lapis lazuli was a rare stone, it was used in exceptional circumstances and only by wealthier individuals who could afford it (Sajjadi, 2009).

Most cylindrical seals of Shahr-i Sokhta contain geometrical patterns, but some of them also contain animal motifs. One example of this type is a seal impression discovered by the Italian team during excavations in the Eastern Residential Area which shows the picture of animals like canidae family, birds, and snakes. This seal impression belongs to the first settlement period and closely resembles seals recently discovered at Konar-Sandal site in Jiroft and also Susa seals (Tosi, 1983). In room CCLXV in the eastern residential area several seal impressions have been found which show the image of a mythological creature. This creature has a human head and torso and hooved feet. It's wearing a horned hat, has his hands on his waist, and his torso is shown in profile. This mythological creature is female because its female breasts are easily distinguishable.

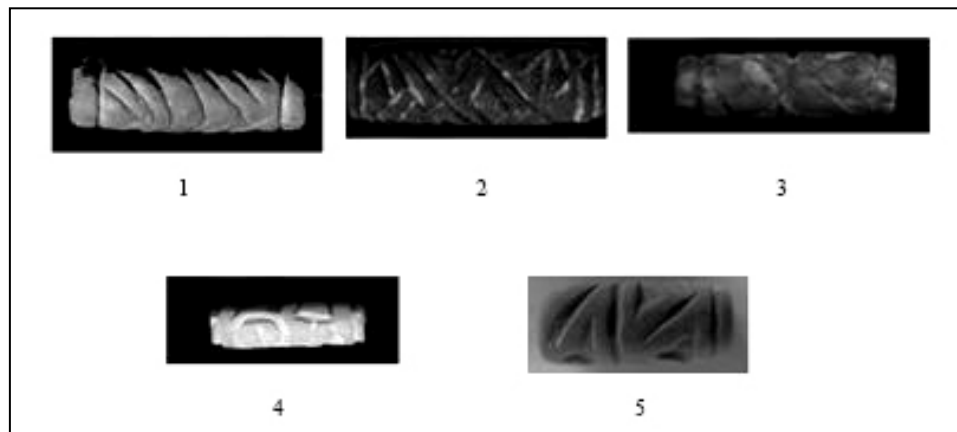


Photo

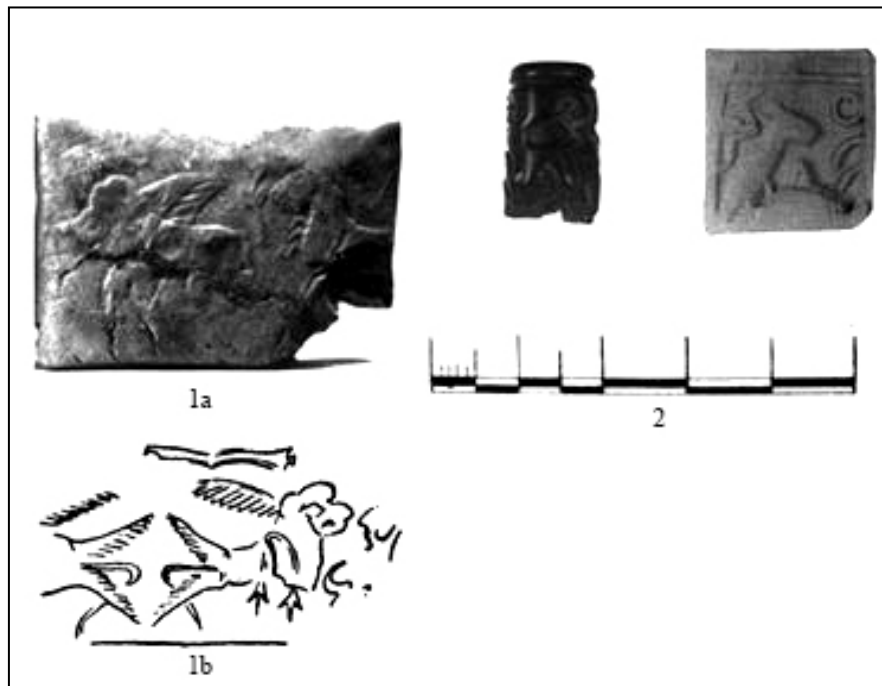
The first settlement period at Shahr-i Sokhta was the zenith of cylindrical seals and their diversity of motifs. The seals of this period mostly indicated links with regions to the west. Several seal impressions have been discovered in Ur in Mesopotamia belonging to the early third millennium B.C. which shows motifs exactly similar to the images on a cylindrical seal found at Shahr-i Sokhta. This indicates the existence of trade links between these two regions (Collon, 1999).



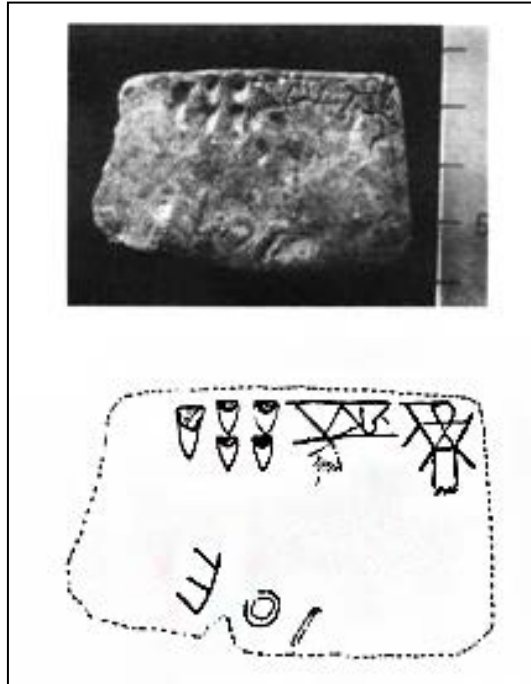
Figure



At Shahr-i Sokhta, fewer cylindrical seals than stamp seals have been discovered. As researchers generally consider western regions, especially Mesopotamia, as the origin of such seals, their presence in the eastern regions of the Iranian Plateau is an indication of trade links with western regions (Possehl, 2007). This is more apparent in the case of the first settlement period. From this period, apart from cylindrical seals of the Jemdat Nasr type, another proto-Elamite tablet has also been discovered which can be placed within the proto-writing cultural horizon and especially the cultural horizon of Uruk (Amiet & Tosi, 1978). The motifs of imaginary or probably mythological animals on the seals of the first settlement period of Shahr-i Sokhta closely resemble seals from the Jemdat Nasr Period in Mesopotamia. These seals along with the proto-Elamite tablet can be easily placed within the proto-Elamite cultural horizon (Amiet & Tosi, 1978).



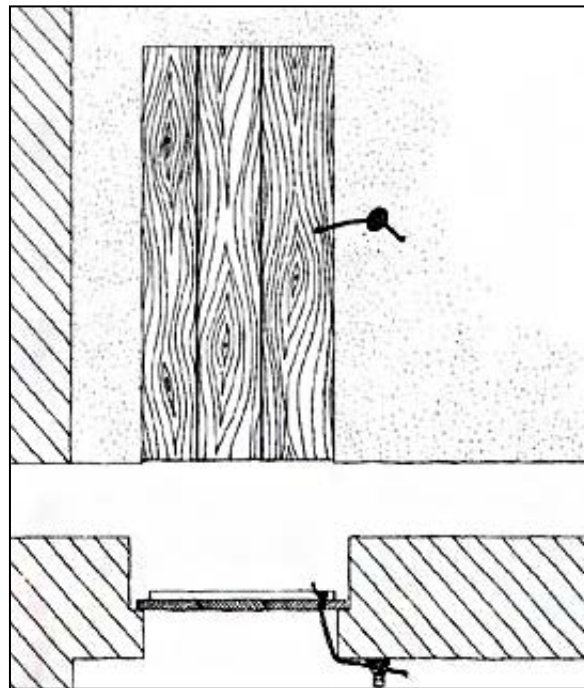
Photo



Photo

IV-5. Sealing in Shahr-i Sokhta

Another type of evidence which can provide us with information about economic activities and economic control at Shahr-i Sokhta are the impressions of the seals on the doors of warehouses and the mouths of large pottery vessels such as long and medium jars. Numerous seal impressions have been found beside the door of some rooms at Shahr-i Sokhta, which obviously indicates that they were sealed. The sealing of doors and large vessels in pre-historic societies is a sign of complex social and economic organizations. The performance of this act means that a central power has controlled a place for the keeping of a product or a set of products, and has made sure to prevent theft. Therefore, one or more individuals are responsible for the act of sealing and elimination of other individual's access to a certain place or a certain vessel. As we can see in the picture below, the act of sealing was performed by means of a rope and a piece of mud.



Figure

Most of these impressions indicate the geometric patterns of the seals, especially squares and rectangles. The images on metal seals are mostly geometrical, but on other types of seals images of plants, animals and birds can also be observed (Sajjadi, 2004).

V. Human and animal Figures

Numerous animal and human figurines belonging to the Neolithic Period have been discovered in various archaeological sites across the Iranian Plateau. A glance at this collection of figurines tells us that various geographical locations had different figurine making traditions. It can be surmised that figurines were closely interwoven with the religious beliefs of sedentary, agrarian societies. In order to reconstruct the religious beliefs and ceremonies of societies without a written language we have no recourse but to study and analyze the objects (such as figurines) that illustrate various aspects of their religious behavior.

Since the figurines of Shahr-i Sokhta have long been considered religious objects, they can be useful in helping us find the answers to important questions regarding the religious evolution of ancient societies. From the first days of archaeological excavations at Shahr-i Sokhta a considerable number of animal and human figurines were discovered there that closely resemble to the figurines found in southern Turkmenistan. These figurines are particularly useful in providing us with information about the ancient religions of the people of Sistan.

The manufacturing techniques of human figurines were quite simple. According to the studies performed over these figurines, the manufacturer took a lump of soft mud in his hands and created his desired shape. These manufacturers didn't aim to show a detailed human anatomy, but to create a general form. By taking account of these characteristics, it can be surmised that non-professional individuals attempted to make these figurines and that there was no workshop for their manufacture.

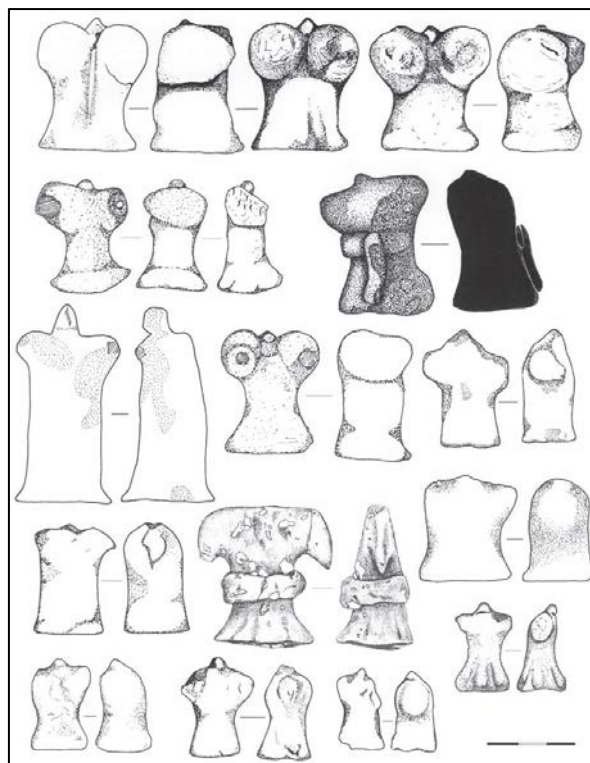
Most figurines were discovered among the trash or within the fillings of the rooms. Only a few figurines were recovered from specific archaeological layers. So far not a single human figurine has been discovered in the burials of Shahr-i Sokhta.

V-1. Various types of human figurines

Providing a clear-cut classification of human figurines of Shahr-i Sokhta is not an easy task, because there was no standard technique for their manufacture.

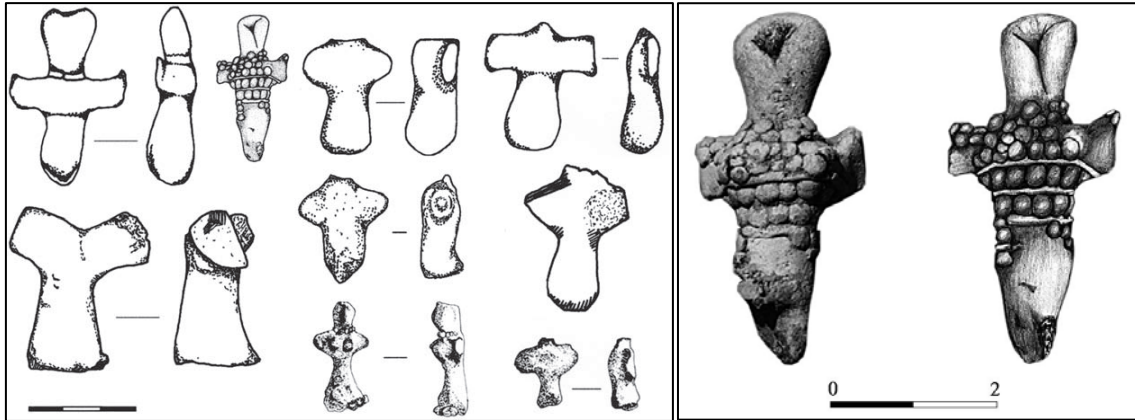
V-1.1. Cylindrical figurines

These figurines are between 5 to 10 cm tall and are made of heated mud and formed by hand. The facial and body details are not shown, and the head of the figurine is represented by a conical blob of mud. The figurine's torso is cylindrical and its thick arms stick straight out. Although female and male distinguishing parts are not shown, indirect evidence suggests that these figurines mostly represented males. Furthermore, the strongly muscled figurines suggest that the main aim was to show male strength. There is evidence suggesting that these figurines belong to the 2880 to 2500 B.C. period.

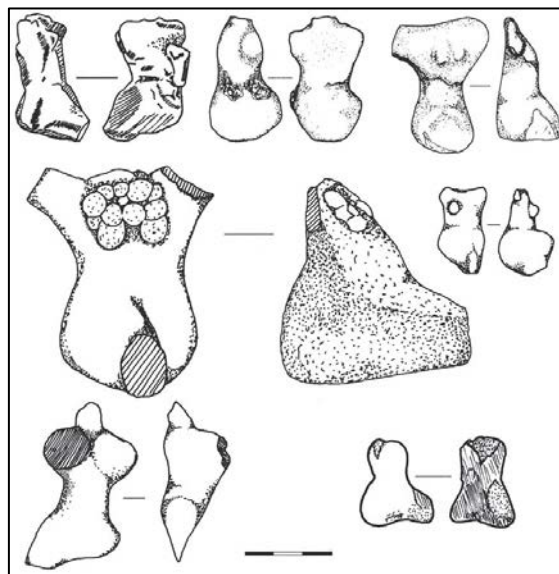


Figure

Two rows of earthen beads surround the figurine's neck, which probably represent a necklace. Such figurines have only been discovered in Sistan, and no similar one has been found anywhere else. Chronologically speaking, these figurines belong to the second settlement period.

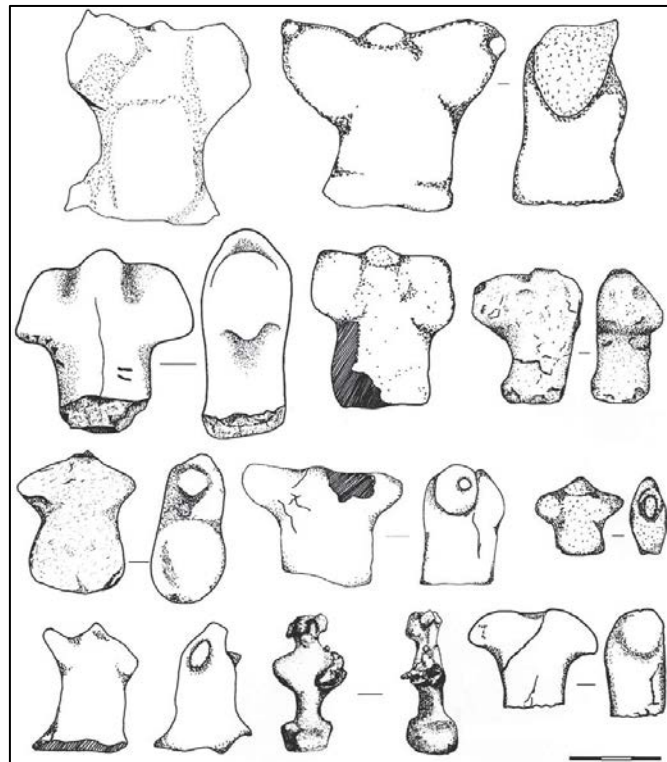


Figure

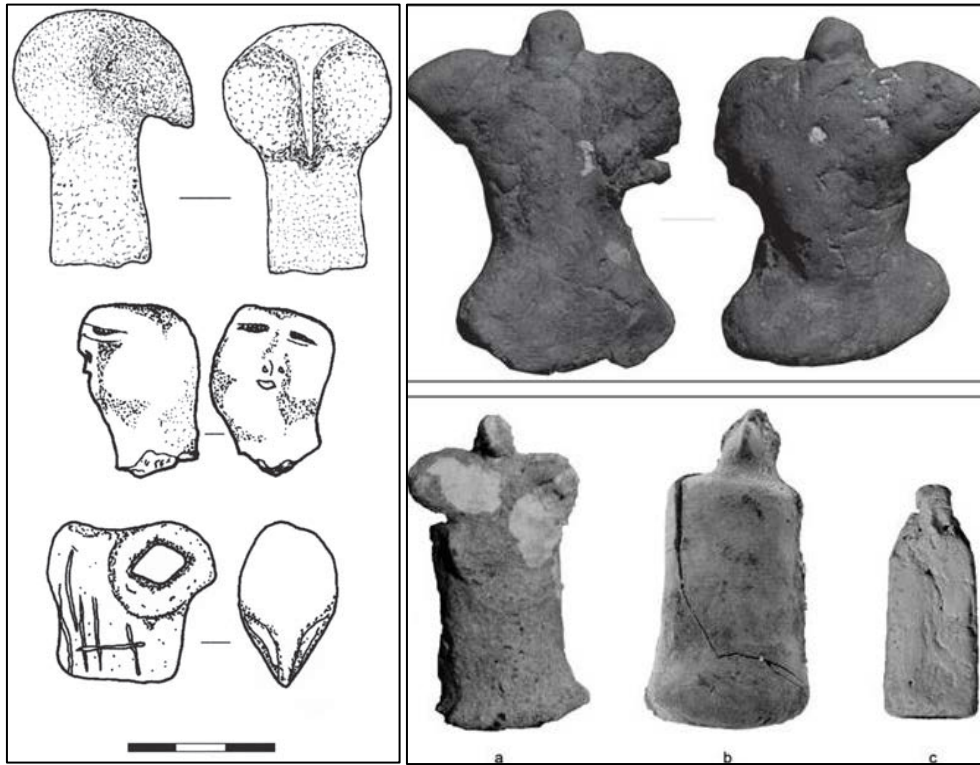


V-1-4. Torsos

Human torsos of Shahr-i Sokhta are from 2 to 8 cm tall, and can be divided into three general categories. The first category shows individuals who have stretched out their arms. The second category is composed of torsos with their arms hanging down at the sides. And finally the third category includes torsos with one arm hanging down and one arm raised up. Chronologically, they belong to the second settlement period.



Figure



Photo

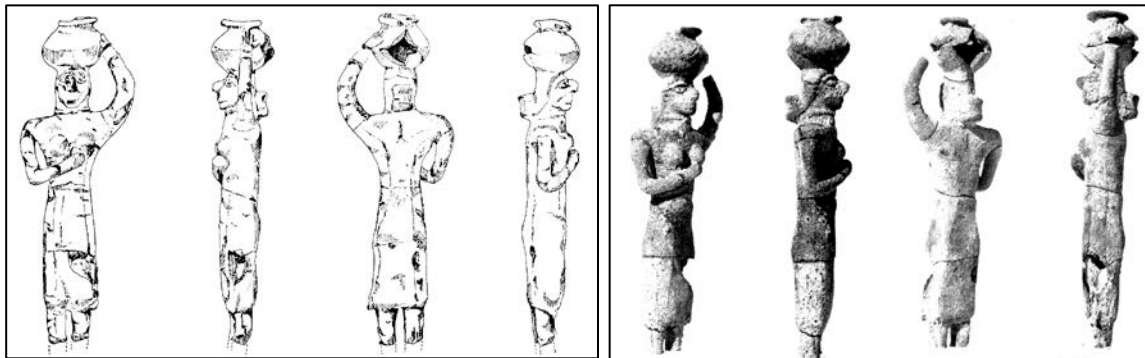
V-1-6. The bronze figurine

Among the human figurines of Shahr-i Sokhta, which are mostly earthen, there is a unique figurine made of bronze. This small bronze figurine was discovered on the surface of the site. It was found in a location containing the pottery of the second, third, and fourth settlement periods; so it cannot be dated exactly (Tosi, 1983).

This figurine shows a standing woman whose right hand is resting on her chest and her left hand is holding a large vessel on her head. This woman is dressed in a simple, long, close-fitting dress coming to just below her knees. Her hair is gathered behind in a chignon.

In the center of the hair there is a ribbon that suggests that the woman's hair under the vessel is split in the middle into two equal halves. The hair is gathered behind in a way that the ears can be clearly seen on the two sides.

The facial details have scrupulously depicted. The eyes are round and protruding, the eyebrows are curved, and the nose is long and prominent. The mouth is depicted as a straight line and seems small in comparison to the nose. Her breasts are small and conical. A part of the lower portion of the dress and also a part of the vessel are missing. This figurine is 15.2cm tall, 5.32cm wide at the shoulders, and 1.86cm wide at the waist.



Figure

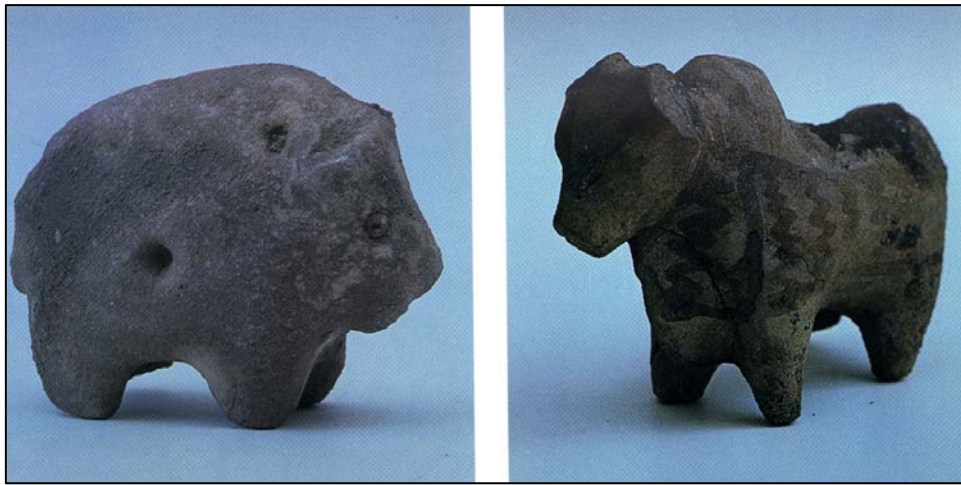
Other animals depicted by these figurines include wild boar, wild ass, the felidae family, sheep, camel, dog, birds, and small rodents and mammals. The figurines of the humped bull, dogs, and boars are easily distinguishable; but recognizing other animals is not easy, and can be approximately done only on the basis of the figurine's superficial shape. Hyenas, panthers, buck, camels and birds are among the latter category (Sajjadi, 2007).

Human figurines are made roughly and inexpertly, mostly out of mud. But the important point is that unlike human figurines, animal figurines are made of terracotta; although some instances of animal figurines made of unbaked, pounded mud have also been observed. Apart from mud and terracotta, stone was also used to make small animal figurines. A small figurine of a humped bull made of lapis lazuli has been discovered at Shahr-i Sokhta, which shows the importance of this animal for the residents of the city, because there is a direct relationship between the importance of a concept and the material used to make an object symbolizing that concept. This lapis lazuli figurine has been pierced in the hump, so it was as an ornamental object to be worn around the neck or the wrist. In addition, we can mention two small humped bull figurines made of marble which were probably used as talismans or amulets (Santini, 1987).

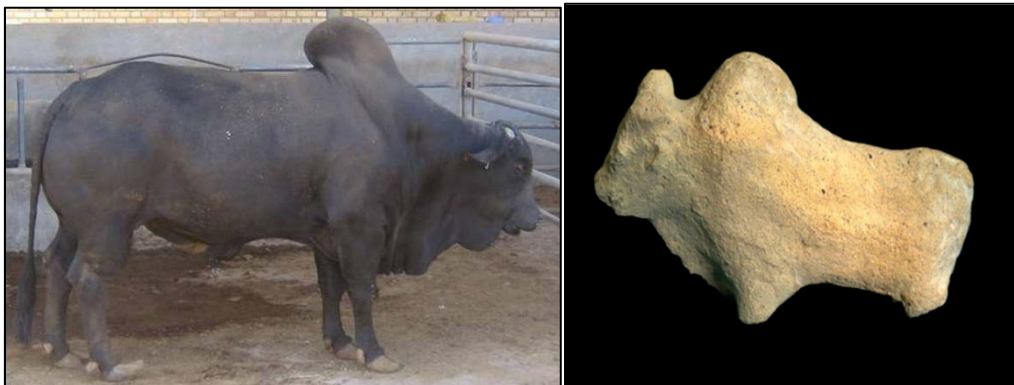
As we see, cows were very important for the residents of Shahr-i Sokhta; their meat was used as food, their power was used in agricultural tasks, and their idea in religious and ceremonial beliefs. It's interesting to note that these cow figurines depict a race of cow which still lives in the region and is known as the Sistani Cow. The animals depicted by the figurines usually have either of two positions; they are either shown standing peacefully, or in an attacking position with their body arched (specially the boar figurines) (Tosi, 1969).

Animal figurines in some cases have been carved over or painted. The carved images have been created by means of human nails, and mostly consist of crescent shapes, parallel lines, and continuous dots. Paint has been mostly applied to pottery figurines. In some cases the anatomical details in the head of the animal, such as the eyes, the snout, etc. have been painted (Tosi, 1969). Furthermore, several animal-shaped vessels were also discovered by the Italian team, which is a further confirmation of extensive links with the animal world. These vessels are made in the shape of a bull. M. Tosi has found at least three complete vessels of this type (Tosi, 1983). These vessels depict the animal while it is standing and has raised its head. There is a hole in the middle of the hump, which was probably a receptacle for liquids. The whole body of these animal-shaped vessels has been painted and decorated. The decorations of these vessels consist of the same motifs used to decorate pottery vessels. In some cases anatomical details have been shown by means of paint. The largest vessel of this type is 16.6×24.6cm (Tosi, 1969). It should be mentioned that while numerous bones belonging to cows and other ruminants have been discovered during excavations at Shahr-i Sokhta, no boar bones has ever been found there; this might have been due to religious considerations (Tosi, 1983).

Animal figurines have been recovered in diverse archaeological contexts. In the Eastern Residential Area, they have been mostly found among the earthen fillings of the rooms and other spaces. A great number of animal figurines and a number of human figurines have been recovered from building no. 1 in the Monumental Area. Finally, just the same as human figurines, no animal figurine has been discovered in the burials of Shahr-i Sokhta. Animal figurines of Shahr-i Sokhta also show a strong resemblance to those discovered in Mundigak in Afghanistan, in southern Turkmenistan, and in eastern parts of Iran (Shirazi, 2007).

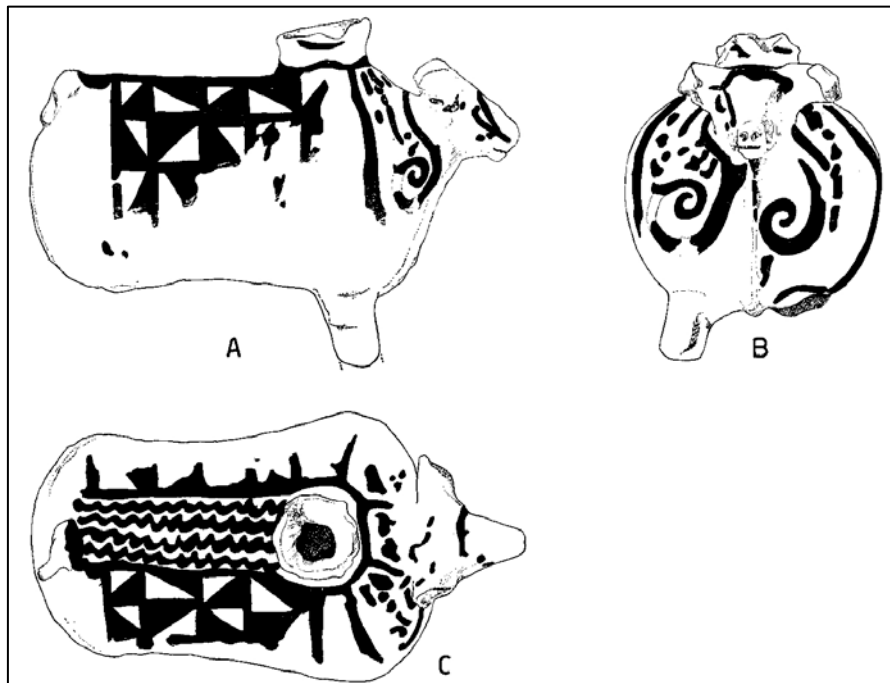


Photo





Photo



2.b.5. Jewelry industry in Shahr-i Sokhta

Many different objects have been found in Shahr-i Sokhta which directly or indirectly play a role in the manufacture of jewelry. Most ornamental objects found in the city are made of semi-precious stones such as lapis lazuli, agate and turquoise imported from distant quarries. These stones, especially lapis lazuli, after coming into the city were either cut and formed into ornamental objects, or cut into stone blocks and exported to lands on the other side of the Persian Gulf or to midway stations on the route to these lands. These objects on the one hand prove the existence of links with satellite villages which produced some essential materials, and on the other show the existence of trade links with regions farther away.

The graves in Shahr-i Sokhta provide valuable clues for the reconstruction of jewel making processes in ancient times. During excavations in Shahr-i Sokhta graves belonging to craftsmen such as jewelers, painters and stone-cutters have been discovered. The tools of a craftsman have been discovered under the feet of a skeleton in burial no. 2701. In this grave, apart from stone shavings and other pieces of stone, five cylindrical drill head made of jasper and two flint stone blades with triangular cross-sections have been found. Similar objects have been found in burials no. 12 and no. 77 which belonged to a “jeweler” stone-cutter (Piperno, 1976). The abundance of graves of craftsmen in Shahr-i Sokhta is a sign of economic growth and prosperity of this society.

Kohl sticks have been found in seven burials in Shahr-i Sokhta which belonged to all four settlement periods. Four sticks belonged to four women between the ages of 18 to 50, one stick belonged to a child, and the other two belonged to two men aged 45 and 47. All these sticks were accompanied by stone kohl flacon (cylindrical, cubic, or horn-shaped). This proves their make-up function. The length of these sticks ranges from 12.5 to 18 cm. Kohl containers have been usually discovered in the graves of women, but they have also been found in the grave of a child and the graves of two men.



Photo

The ornamental beads of Shahr-i Sokhta are made of various materials, especially semi-precious stones such as lapis lazuli, agate, onyx, turquoise, and probably jasper. Other raw materials used in the manufacture of these beads include alabaster, calcite, bones, seashells, and pottery. Gold, which has been in some cases used to decorate lapis lazuli beads, is rare. Except for gold, lapis lazuli and turquoise, most other semi-precious stones were quarried in nearby mountainous regions. Petrologic studies of pieces of stone recovered from the industrial areas of Shahr-i Sokhta show that lapis lazuli was imported from ancient mines in Pamir Mountains, Badakhshan's Sar-i sang (in Afghanistan) and Chagai Mountains in Pakistan. However, the usage of ancient turquoise mines near Nishabur at the eastern foothills of Elborz Mountains and in the mountainous areas of Kyzyl Kum in Uzbekistan during the fourth and third millennia B.C. hasn't been proven yet.



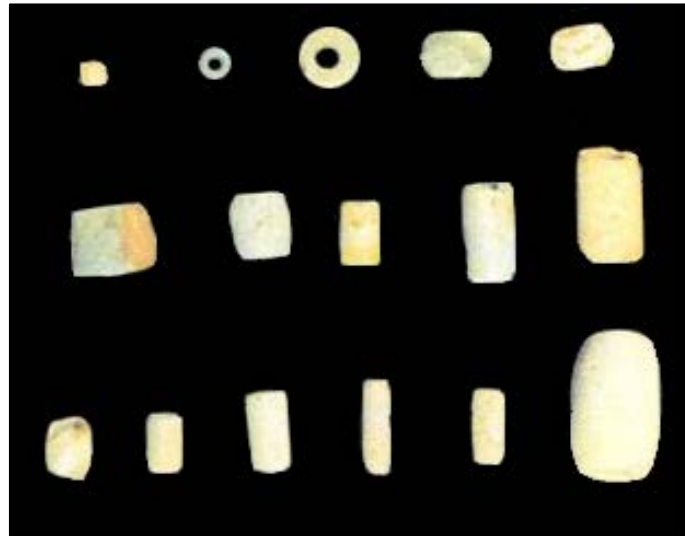
Photo

Although some of these beads are made of seashells, the use of natural materials such as bones and seashells in making the beads is very rare. Except for a few small golden beads found during previous excavations, in the second round of archaeological excavations in Shahr-i Sokhta two concave golden beads were found in the grave of a female (no. 1703), one seemingly golden bead, which is in fact a white bead (probably made of limestone) finely coated with gold, was found in the grave of a child (no. 1515), and another lapis lazuli bead coated with gold has also been found. Three similar beads were found in burial no. 2809, while the two lapis lazuli beads found in burial no. 1607 were also coated with a golden ribbon. The most interesting golden beads were discovered in 2002, these included seven golden beads and two lapis lazuli beads coated with gold (Sajjadi, 2009).



Photo

Such beads have been found either singly (2501/3), or as the middle bead of a necklace (1810/13).



Photo

Such beads have been found either singly (2501/3), or as the middle bead of a necklace (1810/13).

Some graves contain necklaces. A considerable number of these necklaces have been discovered in the graves of men. The number of beads in the necklaces varies from 12 (burial no. 2812) to 91 (burial no. 2801, which belongs to a female). There is a certain method in the choice of colors. The combination of red (onyx) and white (limestone or calcite), sometimes coupled with a single bead of lapis lazuli, Yemeni agate, or even gold, constituted a necklace (burials 1408 and 2801), the lapis lazuli beads were often placed between the transparent beads of Yemeni agate (white agate).

We know that graves in Ur and Mesopotamia temples during the Early Dynastic Period (2800 to 2350 B.C.) contained abundant objects made of stones and precious metals which couldn't be found in the sedimentary lowlands of Mesopotamia (Woolley, 1955). In fact, an extensive trade network imported these materials through intermediary stations or distribution centers to Mesopotamia cities and western Iran. There is a strong probability that Shahr-i Sokhta was such a center. Lapis lazuli, turquoise, agate, calcite, soapstone, limestone, chlorites and other stones were the raw materials which were transported over long distances to the distribution centers in the shape of small blocks or cut pieces, and after some preliminary work they have been exported to consumer markets.

Access to turquoise was easier because turquoise quarries were found in numerous locations. We will see that while turquoise was not as coveted as lapis lazuli in Mesopotamia cities, it was used along with other ornamental and ceremonial objects in the graves of Mehgarh in Pakistan during period III in the fifth millennium B.C (Jarrige et al., 1995/6).

The position of turquoise in the Iranian Plateau, especially its eastern parts, and specifically in Shahr-i Sokhta, which was one of the main distribution centers for lapis lazuli, was different from its position in Mesopotamia cities. Although in these cities lapis lazuli objects are more numerous than turquoise objects, it seems that turquoise was more valuable than lapis lazuli.

2.b.6. Semi-precious stone's quarries and production centers

According to archaeological evidence, lapis lazuli has been used in Egypt, Central Asia and Iran since around 3500 B.C. and although its use declined in the second millennium B.C., it never completely disappeared. The significance of lapis lazuli lies in the scarcity of its quarries and the very long distances (more than 2000 km) it had to travel to reach the markets of Mesopotamia in ancient times.

Some small lapis mines reportedly in Chagai Mountains on the northwestern borders of Pakistan with Afghanistan, between Quetta and the Iranian border. These sources were nearer to Shahr-i Sokhta than Badakhshan quarries. Considering all the above-mentioned fact, it seems that contrary to the previous views of researchers regarding the exclusivity of Badakhshan's mines, the lapis lazuli used in Iranian and Mesopotamian markets could have equally come from Chagai Mountains sources. Two French researchers, Casanova and Dalmas, ran some tests on twenty specimens including six pieces of shaving from Shahr-i Sokhta and Tepe Sialk, and 14 specimens from four different quarries in the Urals, Pamir, Sara-sang, and Chagai. According to their test report, they tried to choose specimens with the least amount of impurities. These tests showed that there is no difference at all between the components of lapis lazuli from Badakhshan, Chagai and Pamir (Delmas & Casanova, 1990).

The same tests showed that the specimens from Shahr-i Sokhta could have equally come from Pamir, ancient quarries of Chagai, or Sara-sang in Badakhshan. In other words, the result of these tests is to a certain extent at variance with traditional views that considered Badakhshan quarries as the only source of lapis lazuli used in the third millennium B.C. However, the main point, which is the existence of a network of trade in these and other stones, remains valid.

Known turquoise resources in the Middle East are located in four main regions: the Sinai Peninsula, eastern parts of Elborz Mountains, the mountainous parts of Kyzyl Kum, and the mountains of Ilak in ancient Khujand and along the Syr Darya River. Within the Iranian Plateau, apart from the quarries in Nishabur, other quarries in Damghan, in Sarcheshmeh in Rafsanjan, and in Shiraz have also been reported. According to archaeological evidence, during the third millennium B.C. only the quarries in the Sinai Peninsula and Kyzyl Kum were used. Although it seems certain that Nishabur quarries were also used, the lack of enough scientific studies in these mines has led to uncertainty as to the date of their being used in prehistoric and proto-historic times. However, the geographical location of Nishabur between two main centers of civilization in Gorgan to the west and southern Turkmenistan to the northeast makes it more probable that the turquoise used in Altyndepe and Tepe Hissar came from there. So it seems logical to suppose that the turquoise used in Tepe Hissar and Shahr-i Sokhta, and other cities of eastern Iranian Plateau such as Tall-i Iblis, Tepe Yahya and Shahdad, was supplied from the Nishabur quarries.

Although the demand for turquoise was less than the demand for lapis lazuli, it existed nevertheless. According to published reports regarding excavations in various sites belonging to the third millennium B.C., including Shahr-i Sokhta, turquoise played an important role in the trade of those times (Tosi, 1974). It seems that turquoise was only used to make beads of various shapes. There is a possibility that these beads had a certain place in funeral and burial ceremonies in Iranian cities.

Since the eastern and northern parts of Iran had the capability of producing and distributing raw materials such as lapis lazuli, agate, copper, gold, silver, and turquoise coveted by urban markets of the Early Dynastic Period, the cities of the Iranian Plateau were the main trade centers for the exchange of raw and half-processed materials, which were later perfected in Mesopotamia and sent to consumer markets. During the first half of the third millennium B.C., at the time when the volume of trade through the Persian Gulf was small and the conquests of Sargon of Akkad hadn't yet opened trade routes to Eastern Mediterranean and Anatolia, trade relations with the Iranian Plateau had an huge impact on the growth of Mesopotamia.

The period IIIB in Tepe Hissar, periodes II and III in Shahr-i Sokhta and Shahdad show the important role of the cities of the Iranian Plateau in these trade links. It is not only due to the considerable number of objects found at these sites made of metals or semi-precious stones (some of which were imported from more eastern regions) that this can be claimed. It is also because of the great amount of waste materials, semi-polished and broken pieces, and various tools that prove there was a great industrial complex for doing preliminary work on these materials. Numerous tests and analyses have shown that all the lapis lazuli stones found in Ur, Tepe Hissar, Shahr-i Sokhta and Badakhshan came from a single source. But proving the same point about agate is very difficult, because this stone can be found everywhere from Yemen to Himalayas.

At Shahr-i Sokhta, pieces of lapis lazuli and turquoise have nearly always been found in layers belonging to the same period. Both are discovered in period II layers, or more exactly phases 5 to 7 going back to the first half of the third millennium B.C., in the Eastern Residential Area in the form of finished and half-finished beads. However, some semi-precious stones have also been found in other parts of the city which belong to the third settlement period. Beads-making workshops linked to the second settlement period and phase 6, around 2600 to 2500 B.C., were located in the area called Industrial Zone in the western and northwestern parts of the city.

By recovering all pieces of stone in a certain place and counting them, it has been determined that turquoise constituted the smallest share of these stones (with only %2) while lapis lazuli accounted for %90 of stones, and agate and other stones accounted for the remaining %8. If we count the stones recovered from the surface of other parts of the city, the share of turquoise specimens will go up to 5 or 6% of semi-precious stones, which is still a small share. On the other hand, due to the nature of the soil in Shahr-i Sokhta, it cannot be supposed that with the passage of time turquoise stones have turned to powder and disappeared, because the nature of the soil is so that it has even preserved bird's egg shell, human hair and plants.

After studying the objects found in one hundred graves in Shahr-i Sokhta, it was found that 557 beads (more than %37 of them) were made of turquoise, after that came 432 beads made of agate, third in line were 236 lapis lazuli beads (which constituted %16). In other words, the majority of beads were made of turquoise. If we disregard other stones, the proportion of turquoise beads to lapis lazuli beads would be 70% to 30 %. Thus we see that the proportion of stones found in the graveyard is the reverse of the proportion of stones found in residential and industrial parts of the city. It is also interesting to know that lapis lazuli has been discovered across 75% of the industrial and residential parts of the city, while turquoise has only been found in the graves and has nearly never been found in residential and industrial areas. These numbers strongly suggest that turquoise was more precious and important than lapis lazuli, and thus it was scarcer and was only used in important ceremonies. Since the craftsmen of Shahr-i Sokhta possessed the necessary technology to make beads out of stones even harder than turquoise, the scarcity of this stone at Shahr-i Sokhta cannot be attributed to technological difficulties. These craftsmen used flint, with a hardness of 7 on the Mohs scale, to pierce the softer lapis lazuli with a hardness of 5.5; therefore they could do the same with turquoise, which has a hardness of 5.4 to 6.

2.b.7. Techniques of manufacturing stone goods

The remains of the tools and handicrafts of jeweler craftsmen, who as a result of urbanization had turned from part-time workers to full-time craftsmen, can be found in various layers of Shahr-i Sokhta in the form of tools, saws, arrows, arrowheads, and the broken pieces of various stones.

As was mentioned before, from the graves of Shahr-i Sokhta the tools of craftsmen and their products, whether finished or half-finished, have also been recovered.

i. Techniques of working on lapis lazuli

The process of working on lapis lazuli had several distinct stages. After being quarried, stone blocks were first cut into easily transportable smaller blocks and their coating of lime and crystalline layers scraped off. During the next stage, the stone was given the rough shape of the desired object, usually a bead, and a saw was used to create a shallow groove on the stone, with a depth of just over one millimeter, and then the stone was divided into smaller pieces. These pieces were then filed and cut into desired sizes for the making of the beads. Later on, the corners of the small stone block were cut away using the same technique, and the resultant angles filed away, so that the outside surface of the stone took the desired shape. After this stage and before the final polish, came the most difficult and technical part of the process, which was the piercing of the stone. In many cases, the craftsmen failed to pierce the stone, and left the work unfinished, or broke the stone in the

process and threw it away. Today, with the help of these same pieces, we can reconstruct the various stages of the manufacturing process of lapis lazuli beads. Many instances of such half-finished or broken pieces have been discovered in Shahr-i Sokhta. The piercing was done from both sides of the bead with the aid of revolving drills with very fine drill heads. These drill heads had an average length of 11 mm and were used with extreme caution. In order to reduce the risk of breaking the stone, craftsmen divided the piercing process into two separate stages. After the piercing was done, the beads were given their final polishing and cleaning. All the stages of this process have been observed in Shahr-i Sokhta.

ii. Techniques of working on turquoise

The techniques of working on turquoise were nearly similar to that of lapis lazuli, and it was probably done in the same workshops. But as we mentioned before, the amount of turquoise in Shahr-i Sokhta was much less than the amount of lapis lazuli. The process of piercing turquoise stones was the same, and the same drills and drill heads were used for the process.

iii. Techniques of working on agate

In order to work on agate, other tools and processes than those used for lapis lazuli and turquoise were needed. In spite of the widespread use of agate in ancient societies due to the relative abundance of its quarries, the techniques of making agate artifacts were the same from the Indus Valley to Mesopotamia, including Shahr-i Sokhta. In order to make agate beads, first the pebbles found on river beds and in layered blocks were gathered and categorized according to their size. Then they were formed into roughly cubic pieces. These cubes were later filed into cylindrical, spherical, or disc-like shapes.

These stones were filed by rubbing them on hard metamorphic polishers, and the trace of such rubbing has been discovered on unfinished or broken agate beads. The piercing stage of these agate beads was once again done before their final polishing and finishing. For this purpose, drill heads with a length of 2 to 4 cm and a thickness of 2 to 4 mm were used. These drill heads were much harder than those used for lapis lazuli and turquoise. With the passage of time and recurrent use of these drill heads, they became more functional because they became smoother cylinders and more elongated. Once again, piercing was done from both sides of the bead, which enabled the craftsmen to pierce agate beads up to 10 cm thick. At the first stage, holes with a depth of one centimeter were created on both sides of the bead, and then drill bits were used in alternation in the two holes until they reached each other. The reason for this technique was to avoid putting too much pressure on one side of the bead, and thus reduce the risk of its breaking.

2.b.8. Mat-weaving in Shahr-i Sokhta

In burial 2701, the traces of a material have been detected that seems to have been a kind of leather pouch filled with stone-cutting pieces and shavings. In another place, two wickerwork remains have been found which seem to have been something like baskets. In burial 1400, the remains of a young woman of 17 to 20 years old have been put on a mat; and her complete make-up set has been put in a basket. In many burials wickerwork objects of different shapes have been discovered, in many cases in fairly good conditions of preservation. The use of mats for covering the floor of graves was widespread in Shahr-i Sokhta.

Circular baskets of various sizes have been found in graves belonging to the second, the third, and the fourth settlement periods. The largest basket was found in burial 1400 and had a diameter of 33 cm. Of the height of the basket in burial 1404, only 12 cm have been preserved. Of the other wickerwork objects discovered, we can mention a small saucer recovered from a child's grave. In burial 1400, the remains of four baskets were found, two of which were filled with pottery and other objects.

2.b.9. Long distance trade and Exchange

Evidence gathered through archaeological excavations at Shahr-i Sokhta, the discovery of a great amount of surplus material, shavings, unfinished and finished beads made of lapis lazuli, agate, turquoise and other semi-precious stones, and also the discovery of various tools such as drill bits, blades, and various saws have suggested the theory that this ancient site was a center for working on these stones and their transit to inter-regional markets of the third millennium B.C. (Casanova, 1994).

In the ancient world, the ownership of objects brought social prestige. It was considered one of the characteristics of the new urbanization system in ancient South Asia from the fourth millennium B.C. to the second millennium B.C. This phenomenon was the result of the establishment of the first city-states in Mesopotamia, which tried to regulate economic and social interactions, and created a demand for raw materials for the manufacture of luxury goods. Therefore, the governing dynasties and temples were the largest sources of demand for ornamental and luxury goods (Casanova, 1997). One of the main reasons for the creation of trade networks in the ancient world was the existence of large cities in the sedimentary lowlands of Mesopotamia which had an economy based on agriculture, and traded their surplus agricultural products with semi-precious stones from highlands in the Iranian Plateau. Thus, the raw materials needed by the occupants of the lowlands were found in the highlands, and the goods needed by the occupants of the highlands (agricultural products) were found in sedimentary lowlands. This mutual need linked these two populations and laid the ground for the formation of a supra-regional trade network.

The highlands had rich resources of gold, copper, turquoise, agate, lapis lazuli, soapstone, wood, etc. There is nearly enough archaeological evidence to prove the existence of such trade between Mesopotamia and the Iranian Plateau (Woolley, 1955). There is enough written and physical evidence attesting to the presence of people from eastern regions in Mesopotamia; but the evidence showing the presence of Mesopotamian traders in the eastern regions is more scant, and is limited to a 100 to 150 year period in Tepe Yahya and the presence of a tablet and a few proto-Elamite traces in Shahr-i Sokhta (Amiet & Tosi, 1978).

Lapis lazuli, turquoise, agate, calcite, soapstone, limestone, and other types of stone were the raw materials which were mostly carried in the shape of small blocks over long distances to the primary distribution centers, and after some preliminary work were exported to consumer markets. Among these, lapis lazuli had a special position, because it was the rarest and most precious, and was procured from a very long distance (Sar-i Sang quarries in Kuh-i Baba in Badakhshan in eastern Hindu Kush at an altitude of 3000m above sea-level).

This stone reached the cities of Mesopotamia after traveling over a long route, and seems to have had extensive ceremonial functions in addition to its ornamental ones. During the third millennium B.C., there was a high demand for lapis lazuli in the international markets of those days.

Herman (1967), Sarianidi (1971), Tosi (1974), Majidzadeh (1982), and Casanova (1992, 1994, 1995, 1997, and 2000) have had studies regarding lapis lazuli, its mines, its mining techniques, and its export routes. They have shown that during the third millennium B.C., lapis lazuli was used and traded over trade routes and distribution centers in the Iranian Plateau, or in other words between northern Afghanistan and Mesopotamia.

Lapis lazuli has been found in great amounts in Shahr-i Sokhta. At the northwestern parts of the city (the industrial area), great amounts of lapis lazuli waste, unfinished and finished beads have been found. Lapis lazuli and turquoise have been found in layers belonging to the same period. Both these stones have been found in phases 5 to 7 of the period II, or the first half of the second millennium B.C. (2600 to 1500 B.C.), in the Eastern Residential Area. However, they have been found in other parts of the city belonging to the third settlement period. Bead-making workshops were scattered over a 20-hectare area in the northwestern industrial area.

Objects made of lapis lazuli and turquoise have also been found in the graves of Shahr-i Sokhta. Most of the ornamental objects found in the graves of Shahr-i Sokhta were made of imported semi-precious stones. The craftsmen turned these stones, especially lapis lazuli, either into ornamental objects, or into carved blocks to be exported to distant regions beyond the Persian Gulf or to Mesopotamia. Traces of work on semi-precious stones have been found in the graves of craftsmen.

More than 70% of the graves in Shahr-i Sokhta belong to the second settlement period. It becomes more interesting if we consider the fact that most pieces of lapis lazuli and turquoise found during archaeological survey in the industrial area also belong to the same period.

2.b.10. Economic subsistence and environmental studies at Shahr-i Sokhta according to archaeobotanical evidences

I. Archaeobotanical botany

The history of systematic inter-disciplinary studies in the archaeology of Iran goes back to mid-1960s, when excavations began at Shahr-i Sokhta (Tosi, 1968). Preliminary excavations here revealed that this ancient site was too vast and too rich in cultural materials and that its excavation and investigation would take more than a couple of seasons. Shahr-i Sokhta is a key point in eastern Iranian Plateau, and its study is an important factor in understanding the cultural evolution of eastern Iranian people in the third millennium B. C. The same preliminary investigations showed that the site had great advantages in terms of conserving organic materials. In fact, this proto-historic site can be considered an open air laboratory in which organic specimens have been preserved to an unprecedented degree.

The reasons for this unrivaled state of preservation at Shahr-i Sokhta are the high concentration of salt in the soil, and the dry and hot climate. The remains of wood (charred or intact), fabrics, ropes, animal bones, crustacean shells, and other organic materials have been recovered from Shahr-i Sokhta. Each of these materials can provide valuable information about the history of environment and economic subsistence in this region. According to archaeobotanical investigations, during the fourth and third millennia B.C. this region had a more temperate climate and enough water for agriculture. During these investigations several categories of botanical remains such as cereals (grains and legumes), fruits, spices and wood were studied.

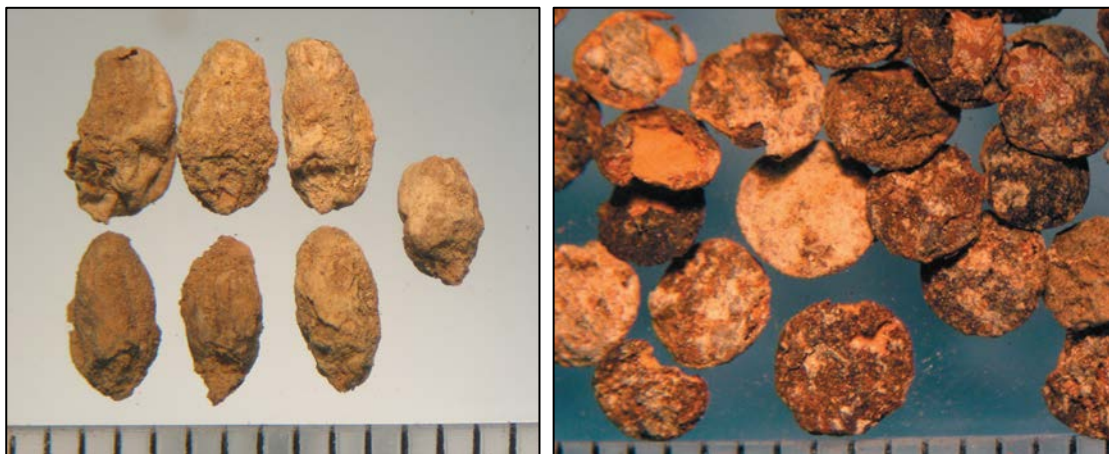
I-1. Cereals and grains

The main species of cereals grown at Shahr-i Sokhta were three species of wheat (*Triticum sphaerococcum*, *Triticum compactum*, *Triticum dicoccum*), two species of barley (*Hordeum vulgare*, *Hordeum distichum*), and one species of millet (*Riticum aestivum*). In addition to these cereals, lentil (*Lens culinaris*), mung bean, vegetables, and flax were also cultivated. Flax was used both for industrial purposes (making fabrics) and as food/medicine (Costantini, 1977).

During these archaeobotanical studies, the remains of pest insects, which contaminated the houses and storage places and fed on these grains, were also found (Costantini et al, 1975 - 1977). In the small space of the graves, especially catacomb graves, these insects remained active for some time. These insects were transferred along with the food into the grave; and due to the dry and hot nature of the space inside the graves, they managed to feed on the food and procreate for a time after the burial. One species of fly (*Dipter Cyclorrhapha*), one species of beetle (*Coleoptera anobiidae*), one species of pest insect (*gibbum psylloides*) and one species of double-winged insect were the organisms most found along with vegetal remains in the graves.



Photo



Analysis performed on materials found at Shahr-i Sokhta has shown that the principal foods were cereals such as wheat and barley, and also birds' eggs. The same investigations have shown that the residents of Shahr-i Sokhta, besides using cereals and fruits as food, also paid attention to beverages. This fact was established by running tests on the materials stuck to the bottom of pear-shaped beakers or cylindrical vessels with narrow mouths, which turned out to be the remains of a malt drink. The information gleaned from the flora of the region has made possible an approximate reconstruction of agricultural conditions in proto-historic Sistan. It has also led to a suggested model regarding the use of available natural resources by the people of Shahr-i Sokhta and its agrarian satellite villages (Costantini et al. 1987, 1997 & Costantini et al & Tosi, 1978).

I-2. Fruits

The traces of the use of fruits have been discovered in various layers of Shahr-i Sokhta, and also in the graves of the city. The discovery of small pieces of palm wood proves that the fruit and wood of this valuable tree were used in Sistan. These specimens are the earliest ancient specimens of date palm (*Phoenix dactylifera*) observed in Sistan and Baluchestan. It is interesting to note that Kerman, a neighbor of Sistan-o Baluchestan, has been designated as one of the most, or maybe the most, ancient center of date palm cultivation in the world by paleobotanists. The charred stones of dates found during the excavations at Tepe Yahya are the first and earliest traces of this beneficial fruit ever found. As in the case of Shahr-i Sokhta, this discovery proves the use of date palm and its fruit at that site (Costantini, 1985). At Shahr-i Sokhta, besides fruits, the remains of wild pistachio (*Pistacia atlantica/Pistacia khinjuk stock*), water melon seeds, melon seeds, and squash have also been found, which shows the existence of vegetable farms.

The cultivation of grapevine (*Vitis vinifera*) in order to use its wood, leaves, and fruit (in the shape of raisin or grape juice) was also widespread. The remains of the wood, grape seeds, grape skin, and grape clusters have been analyzed and it has been established that grapevine was the most cultivated plant in proto-historic Sistan.



Photo



Cumin is another edible seed found at Shahr-i Sokhta. Cumin and coriander belong to the same family. The special aroma of cumin (Vavilov, 1949/50; Zeven Zhukovsky, 1975) distinguishes it from other aromatic seeds. Researchers believe that cumin originally came from Asia, but today the best type of cumin comes from Ethiopia (Dioscoride, p.63). Vavilov believes that this plant originated in the Mediterranean Basin and central India; while Zhukovsky maintains that it came from a much vaster area encompassing the Mediterranean Basin, Near East and Central Asia. Archaeobotanical studies concerning cumin have been limited to specimens discovered in Jordan belonging to the second millennium B.C. and Egypt belonging to the first millennium B.C. Once again, the specimens discovered at Shahr-i Sokhta are the earliest instances of cumin in the world.



Photo

I-4. Woods and shrubs

Remains of wood in the shape of broken pieces, branches, wooden objects, and charcoal have been discovered in all layers of the city. The main types of wood found at Shahr-i Sokhta belong to the following trees: poplar (*Populus*), Saxaul (*Haloxilon*), ash (*Fraxinus*), tamarix (*Tamarix*), maple (*Acer*), Pyrus glabara, betoum (*Pistacia*), elm (*Ulmus*), grapevine (*Vitis*), hackberry (*Celtis*), ebony, and rarely non-native woods. Studies on the remains of charcoal recovered from hearthes have shown that poplar and tamarix were the main sources of firewood for the residents of Shahr-i Sokhta, while in rare instances the wood from hackberry and ash trees was also used for burning. Poplar wood was also used as a roofing material (Costantini, 1979a).

Other types of wood from trees not native to Sistan have been discovered at Shahr-i Sokhta; trees such as sissoo (*Dalbergia sisso*), red sandalwood (*Adenantha pavonina*), and *Adina cordifolia*. The people of Shahr-i Sokhta used these woods to make precious objects such as combs, boxes, and small wooden figurines (Costantini, 1977b & 1979). Indian rosewood probably grew in the neighboring regions of Sistan in the fluvial plains of southeastern Iran and western Pakistan, so its presence at Shahr-i Sokhta attests to the presence of trade roads over short or medium distance routes. But the other two types, red sandalwood (*Adenantha pavonina*) and *Adina cordifolia*, could never have been cultivated in Sistan and its neighboring regions, their natural habitat was the wet and hot climate of northwestern India. These woods travelled about 5000 kilometers to reach Shahr-i Sokhta, so they prove the existence of trade links over very long distances (Costantini, 1985).

Some of the most prominent wooden objects from Shahr-i Sokhta are two wooden combs with traces of wood inlay on them. They are very fine and have a crescent-shaped backside. These two combs could well be the earliest instances of wood inlay working in Iran or even the whole world. A most interesting point about these combs is the woodworked motifs carved and stuck on their handles. These motifs are quite similar to geometrical and stepped motifs found on pottery vessels of the first settlement period at Shahr-i Sokhta, parallel with Namazga III period in Turkmenistan. Numerous instances of these motifs have been observed on pottery vessels from Shahr-i Sokhta and Central Asia, and also on pottery known as Quetta ware from Pakistan, all of them going back to around 3000 B.C. Before the discovery of these combs, it was thought that the history of wood inlay in Iran go back only to the Safavid Period, or about 300 to 400 years ago.

Another interesting wooden object found in this burial is a circular mirror box composed of two parts, the box and the top. This box was found inside a basket together with a comb with a crescent handle. Such a comb was also found in burial 1404. Similar combs were found mostly in the eastern and central residential areas of the city. The discovery of a comb made of ivory in the Harappan layer of Miri Kalat (stage 4) of Pakistanin Makran tends to confirm the dating of Shahr-i Sokhta's combs (Besenval, 1997).

The study of the plant species of Shahr-i Sokhta has greatly helped the reconstruction of the environment of Sistan and the lands surrounding Hirmand River and Lake Hamun. These archaeobotanical investigations have shown that during the third millennium B.C., southern Sistan was covered with a much denser and more diverse flora than today, and was a host to species such as willow, poplar, maple, elm, and ash, which are all hydrophilic plants. The discovery of the remains of wetland plants such as common reed (*Phragmites*) and bulrush (*Typha*), which grow today at Lake Hamun, in the ancient layers of Shahr-i Sokhta tends to suggest that in ancient times the region was covered with vegetation. In ancient times these plants, along with rushes (*Juncus*) and papyrus sedges (*Cyperus*), created large fields surrounding the lake; something they still do so today.

The presence of numerous pieces of rope made of plant fibers (reeds along the shore of Lake Hamun), the remains of baskets and mats made of reeds (Sajjadi e al., 2008), pieces of fishing nets and hooks, the remains of freshwater fishes and also the bones of birds that made their nests among the reeds are other clues that confirm the existence of a lush environment at that period (Costantini & Tosi, 1978).

Archaeobotanical data show that the region's ecosystem was more diverse in ancient times; and the existence of Lake Hamun and perennial rivers made the growth of wetland plants, tamarix forests, and a halophyte plant cover possible.

The writings of past geographers suggest that this region used to be much greener due to the presence of Hirmand River. Today, Sistan's vegetation is severely affected by long droughts in the Hirmand Basin; and only in some small parts can shrubs such as tamarix and teeth-brush tree (*Salvadora persica*) still be found. Today, the general profile of the Sistan Plain is denuded of trees, and in some parts is covered with sand dunes. Many of the trees that grew here in ancient times have disappeared due to human overconsumption.

The analysis made on charcoal samples gathered by means of the dry sieving method from various parts of Shahr-i Sokhta, including Monumental Zone, Eastern Residential Area, Western Industrial Area, the Graveyard show that around 4500 years ago the trees in the Sistan Plain were much more diverse.

Studies show that there were two main vegetal formations in Sistan: the riparian vegetal formation and the steppe-arbustive vegetal formation. The riparian vegetal formation is the type of plant cover that grows in wet environments and on the banks of perennial watercourses. It includes plants such as tamarix (*Tamarix* sp.), willow (cf. *Salix*), and ash (cf. *Fraxinus*). In Iran, tamarix grows in steppes and regions with saline soil. These riparian species form long forests in which other plant and animal species can also thrive. Various species of tamarix (especially *Tamarix aphylla*) grow in the region today; these plants have adapted themselves to the dry, saline conditions, and are used both as fuel and as building material.

Studies on the remains of the steppe- arid plant cover discovered at Shahr-i Sokhta show that it included the goosefoot Family *Chenopodiaceae* and *Sasola*, which grow all over the Sistan Plain and are the sign of a dry environment. A comparison between these two ancient vegetal formations on the one hand and the current plant cover of Sistan on the other, proves the existence of environmental changes over time, which led to droughts and a saline soil. Today, saline soil is endemic in Sistan, and the white layers of salt can be observed (especially during the autumn and winter) over agricultural lands. The current absence of species such as willow and ash, the existence of which around 4500 years ago has been proven, can be attributed to environmental changes and their resultant drought over time (Shirazi, 2012).

II. Hunting and animal husbandry

Paleozoological studies performed during 1970's at Shahr-i Sokhta have greatly contributed to the reconstruction of the fauna in Sistan during proto-historic times. According to these studies, animals living in Sistan during that period were very diverse, and even included species that no longer live in the region.

More than 99% of animal bones discovered in excavations belong to domesticated animals such as cattle, sheep, goats, and camels. This shows that animal husbandry played a key role in the economy of Shahr-i Sokhta (Caloi et Compagnoni, 1977, p. 204). Besides animal husbandry, hunting provided another source of food for the population of the city. The animals hunted for food included gazelle, ovis, wild goats, and zebras. It should be mentioned that dogs were also domesticated and helped the humans in hunting (Caloi & Compagnoni, 1977, 205-211). Among discovered animal remains, the traces of various species of shellfish such *asancus Pyrum*, *Fasciolaria trepezium*, *Pinctada margaritifera*, *Arca* sp., and *Callista* sp. can be observed (Durante, 1977, P. 225).

II-1. Fishing

In ancient times, when today's dams were not built on the course of Hilmand in Afghanistan, Lake Hamun was always turbulent and full of water. As we mentioned before, Hamun is a vast lake with an approximate area of 4000 square kilometers, an average length of 30 kilometers, and an average width of around 7 kilometers. It is the largest freshwater lake in the Iranian Plateau. The area of the lake is variable, and depends on Hirmand's discharge.

In ancient times, the shores of Lake Hamun were an important source for animal feeding from reeds, and activities such as basket weaving, boatbuilding, fishing, and hunting of migratory aquatic birds. Due to its freshwater nature, great numbers of migratory birds come

each year to the shores of this lake, and many of them are hunted by local hunters. The vegetation and pastures around Lake Hamun are very rich.

Shahr-i Sokhta had a local, self-contained economy. It had a population of 5000 to 8000 at the height of its glory and prosperity. This population was active in different jobs. Fishing and bird hunting were among these jobs. In general, it can be said that fishing, bird hunting, and animal husbandry, especially cattle breeding, were pursued around the eastern shores of Lake Hamun; while agricultural activities were performed on the delta.



Photo

Based on this, it seems that nearly 76% of protein consumed in the city was supplied by cattle, and the remaining 24% came from sheep and goats. In addition to meat, these animals provided dairy products such as milk, cheese, yoghurt, butter, and animal oil. Use of milk or animal oil cannot be rejected (Caloi & Compagnoni, 1977).

As we mentioned, a major part of the protein consumed in Shahr-i Sokhta was provided by large animals, although the share of large wild animals such as zebras and deer of this amount was insignificant. But still birds and fish were widely used for food. The bones of coots and ducks constitute the major part of bird bones found in the city. As we shall see, the presence of bones belonging to non-edible birds such as cormorants can be attributed to their use for fishing.

The high number of fish bones discovered in the city shows that the consumption of fish was widespread at Shahr-i Sokhta and its neighboring villages. The discovery of fishing equipments such as nets and metal hooks tends to confirm this hypothesis. Various techniques were used in fishing. The use of nets, hooks, bare hands, arrows, baskets, and birds such as cormorant were among these techniques. The great amount of fish bones found at Shahr-i Sokhta can also pose the possibility of the use of fish for the exchange. If this hypothesis holds true, this exchange might have been done with relatively faraway regions; in which case, the population of Shahr-i Sokhta must have been acquainted with techniques of preserving fish, such as salting, drying, or smoking.

The ancient fishes discovered at Shahr-i Sokhta are of the same species that can be found in many Iranian rivers and lakes; but considering the size of fish bones found in the city, it can be said that the fish consumed by the population were small fish with lengths of 11 to 30 cm. These fish belonged to the family Cyprinidae, genus *Barbus* or genus *Varicorhinus*, or *Cyprions*.

II-3. Birds

The hunting of migratory or local birds was common at Shahr-i Sokhta. Their eggs and meat were used for food, their bones for making tools, and their feathers for other purposes such as making ornaments or in religious or magic rites. These birds were hunted using three hunting tools: clay slingshots, stone arrows, or nets.

2614 bones belonging to birds have been discovered at Shahr-i Sokhta, most of which are leg or wing bones. By studying these bones, 41 bird species belonging to 10 families have been identified. A major part of these bones belong to coots, and after that come various species of the family Gruidae, and in the end come birds of prey such as eagle.

The main types of bird bones found at Shahr-i Sokhta belong to the following birds: 1- Podicipediformes order, including great crested grebe (*Podiceps cristatus*) and black-necked grebe (*Podiceps nigricollis*), 2- Pelecanidae family, 3- Ardeidae family, 4- Birds of prey, 5- Phasianidae family, 6- Anserinae family, 7- Gruidae family, 8- Columbidae family, 9- Picidae family, 10- Perching birds or songbirds from the Passeriformes order (including swallows and crows).

It is obvious that most birds at Shahr-i Sokhta were aquatic birds, or at least birds which live in wet habitats, especially wetlands. The number of bones belonging to birds with habitats other than wetlands has been very small.

Studies performed on bird bones from Shahr-i Sokhta have shown that if we disregard pelicans and falcons, which are inedible, 95 percent of the rest of the bones belong to the subfamily Anserinae, which were hunted as food, so their bones are more numerous.

This view is confirmed by the fact that the bones of these birds have been found not only in garbage dumps, but also in residential areas. This means that they were hunted around the lake and the river and brought to the city.

The last point to be mentioned concerns the bones of cormorants, which are quite inedible due to their indigestible and malodorous flesh. But this bird has now been domesticated and used in fishing in the Far East. China is said to have a long history of this type of fishing. Therefore, it's not impossible that five thousand years ago the people of Shahr-i Sokhta used the same method for fishing (Cassoli, 1977).

III. Medicine and sciences at Shahr-i Sokhta

The discovery of a proto-Elamite tablet at Shahr-i Sokhta, and also the remains of seals and other cultural objects, shows that this society had controlled trade roads and the economy of the whole region. Other evidence shows that the people in this society were so prosperous that they probably became the first inventors of entertainment games similar to chess and backgammon.

By the extensive use of interdisciplinary research during the excavations at Shahr-i Sokhta, we have gained great insights into the physical conditions of the society's members. During preliminary anthropological studies considerable data was gained showing contagious diseases, awful health conditions, and mass fatalities, which lowered the life expectancy of the people. The life expectancy at birth at Shahr-i Sokhta was 41.5 for males and 33.5 for females. Although due to chemical reactions the remains of individuals older than 50 or 60 have disappeared, the rare instances of people older than 60 show the existence of healthy people in the society. The high number of graves containing infants of up to 3 years old confirms the presence of contagious diseases.

Concerning the height of male and female individuals (according to nine criteria), the average height of males is 166.8 centimeters, the average height of females is 150 cm, the tallest man is 192.5 cm tall, the tallest woman is 180 cm tall (and has a prosthetic eye), the shortest man is 151 centimeters tall, and the shortest woman is 144 cm tall. Thus, it can be concluded that males at Shahr-i Sokhta were relatively short (160 to 165 cm). The average height of females was 150 cm, and their height ranged from the very short (140 to 145 cm) to relatively tall (165-170 cm).

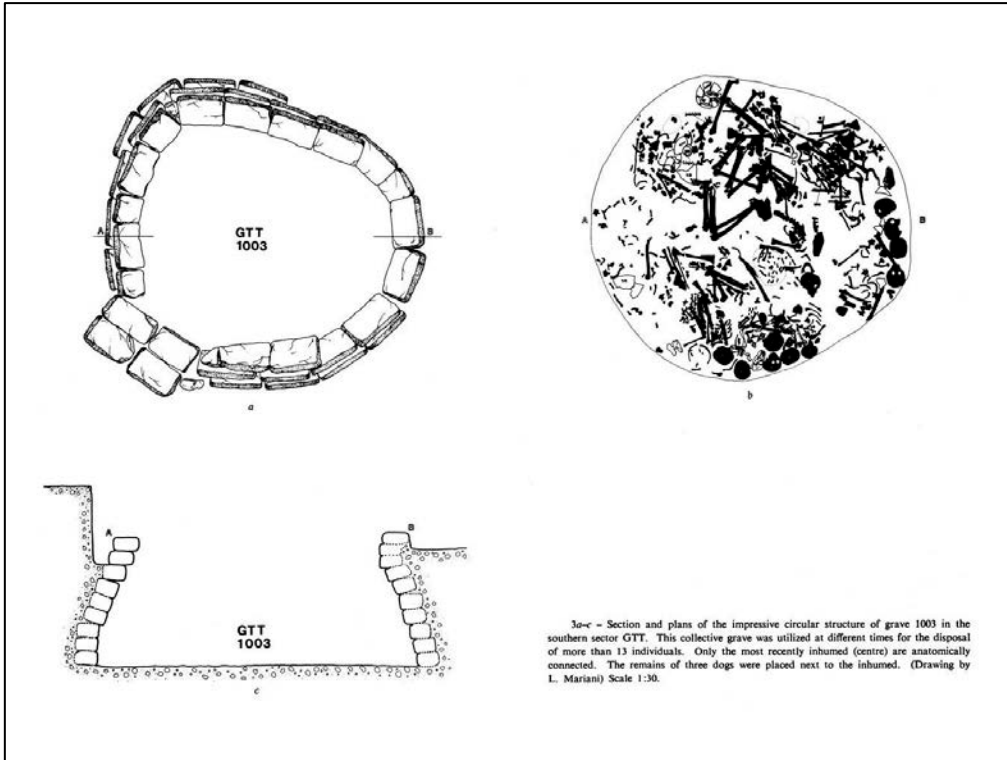
The oldest identified male died at around 60 years of age, while the oldest female was older than 60. A majority of males died at the range of 26 to 53 years of age, and a majority of females died at 26 to 46 years of age (about 8 years less than males).

Among the acute diseases that can be diagnosed through the study of bones from Shahr-i Sokhta, three cases of hydrocephalus have been observed, which is a high number considering the limited number of skulls examined. Other bone diseases include: prognathism of the upper jaw, traces of abscess in the jaw, traces of degeneration of vertebrae, yellowed teeth, dental plaques, teeth abrasion, microdentia, broken forehead and orbit, traces of physical trauma on the forehead, sacralization, cracks on the endocranium, enlarged skull, degeneration of the inner shell of the occipital bone, degeneration of inner and outer surfaces of the skull, wide and deep palate, deviation of the cheek, the orbit and the occipital bone; thickening of the skull, stunted skull, signs of trauma on the forehead and temples (Sajjadi & Frouzanfar, 2000).

Studies show premature loosening of vertebrae and deterioration of the teeth, especially molar teeth. Naturally, many of these abnormalities were due to hard physical labor. Another interesting point is that monks or witch physician at Shahr-i Sokhta undoubtedly made attempts at curing these diseases; but apart from their knowledge and experience, they were in need of appropriate tools and drugs (Frouzanfar, 2009). Below you will be acquainted with three outstanding cases of medical procedure at Shahr-i Sokhta:

III-1. Piercing of the skull in order to drain excess fluids

The first case concerns a 13-year-old girl suffering from hydrocephalus (Macchiarelli & Passarello, 1988). Her skull was discovered in the mass grave no. 1003. This grave is one of the oldest burials discovered at Shahr-i Sokhta and goes back to about 4800 years ago (i.e. 2800 to 2700 B.C.). Due to its special structure, this burial carries some type of social or religious connotation. The burial contained 13 human bodies and three dog skeletons arranged in a particular configuration. 12 human skulls were arranged in a near circle around the walls of the burial chamber, while a complete human skeleton of a 45-year-old man and the skeletons of three dogs were placed at the center of the chamber (Piperno & Salvatori, 1983).



3a-c - Section and plans of the impressive circular structure of grave 1003 in the southern sector GTT. This collective grave was utilized at different times for the disposal of more than 13 individuals. Only the most recently inhumed (centre) are anatomically connected. The remains of three dogs were placed next to the inhumed. (Drawing by L. Mariani) Scale 1:30.

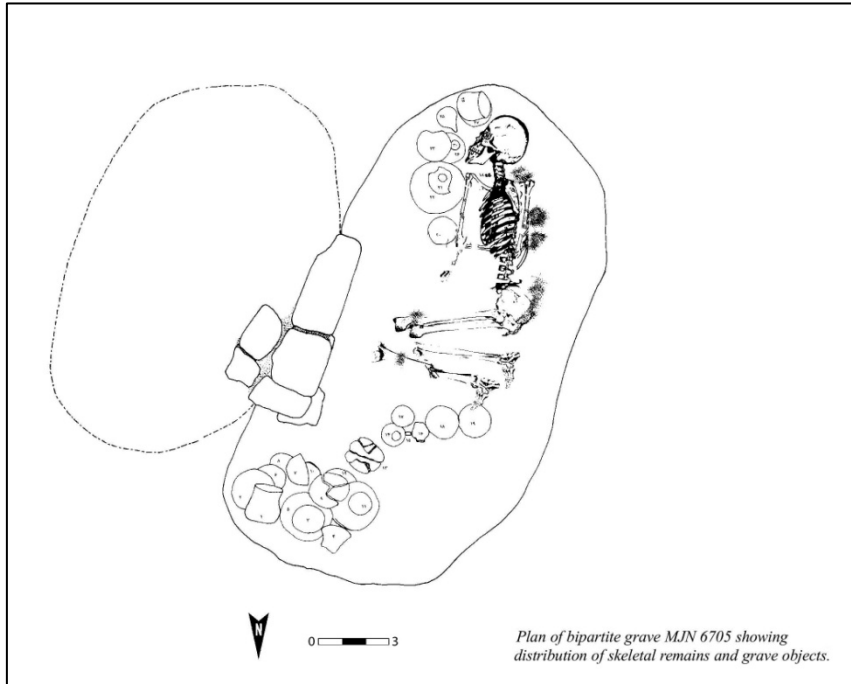
Figure

Although no evidence confirming the use of these products has been found in the city, the The triangular hole created on this individual's skull to drain excess fluid added up to six months to her life. The evidence for this claim is that the bone adjacent to the triangular cut has grown at a fraction of the thickness of the skull; and the traces of this re-growth are especially apparent on the parts adjacent to the parabolic cut. By looking from the parabolic cut towards the center of the hole we realize that the initial size of the hole had been 60 percent larger than its size at the time of death.



Photo

object. This object weighs 6.9 grams and the capillaries of the eye have been drawn on it using gold wires thinner than half a millimeter. The pupil has been drawn at the center of the object; in addition to that, a series of parallel lines forming a rhombus can be seen around the pupil. Minute traces of white paint can be found on the place where the whites of the eye should have been.



Figure



Photo

Tooth wear is caused by chemical agents in the food or by biological-mechanical contacts at the time of chewing; while tooth decay is the result of using the teeth as a tool or a “third hand”, or putting non-food materials inside the mouth and over the teeth. By studying 37 tooth specimens, it was revealed that antemortem tooth loss affected back teeth, front teeth, and incisor teeth. Here, we mention a couple of cases (Sajjadi et al., 2006).

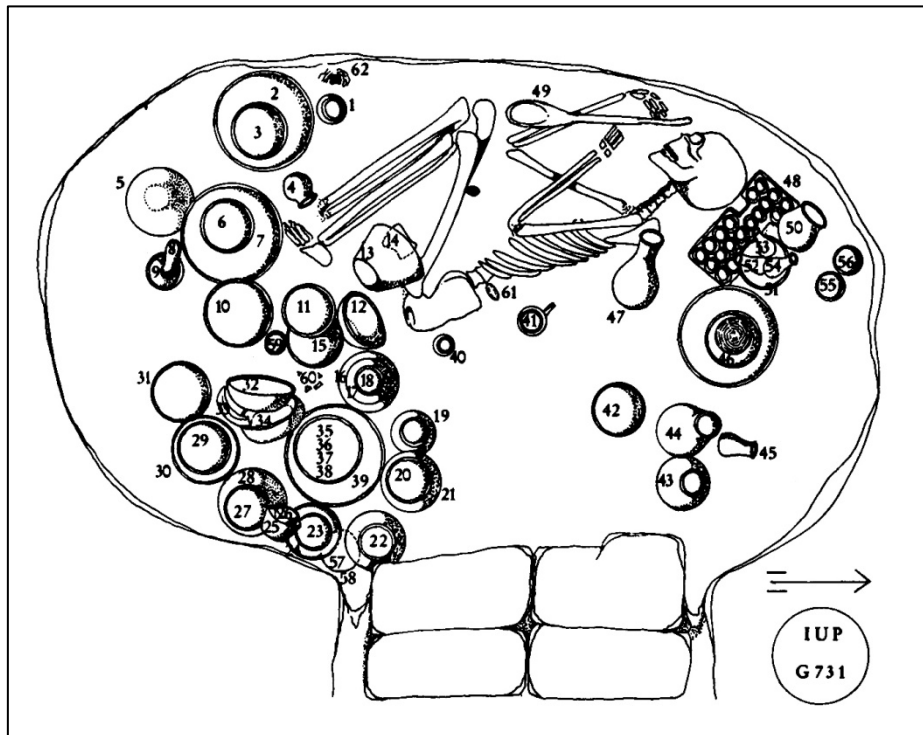
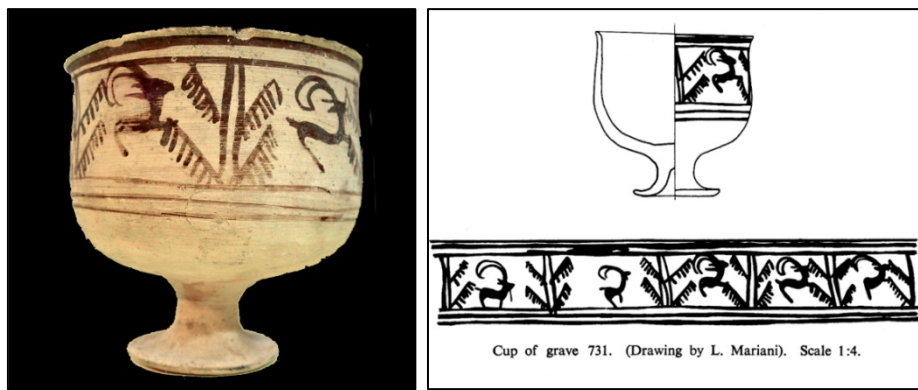
The general rate of incidence for antemortem tooth loss is very high among the specimens from Shahr-i Sokhta; i.e. 15% of all teeth have this condition. The pattern for this condition at Shahr-i Sokhta cannot be explained by normal dental diseases and tooth decay.

In this regard, 9 cases out of 29 male and female individuals with relatively complete sets of teeth, but eroded due to their use as a tool, were chosen for investigation. Serious tooth wear in frontal teeth as compared with back teeth may be due to the former’s functioning as a tool. Front and incisor teeth were often used for two purposes: eating and working; while back teeth (molars and pre-molars) were only used for chewing food. The functions of front teeth among the Inuit people have been studied in detail; and it has been revealed that the main functions of front teeth included “holding and tearing” (i.e. using the teeth as a pair of pliers), crushing, holding arrow sticks while making cloths, stretching strings, softening and stretching the soles of boots, and extracting fat for lamps.

Such non-chewing activities lead to considerable abrasion and breakage of front teeth, and are the main cause of antemortem tooth loss. The tooth decay observed in burial 4309 mentioned above may be the result of the lateral passage of some materials between incisor, canine, and premolar teeth of the lower right jaw on the one hand and the molar teeth of the lower left jaw on the other. This abrasion pattern may be due to working on fibers (by holding them by hand and pulling them downward over the teeth). The presence of cavities or cleavages on the surface of the first premolar of the lower jaw tends to confirm this theory. When the high rate of antemortem tooth loss at Shahr-i Sokhta is coupled with uneven tooth wear, it proves the use of teeth in non-chewing activities; that is, using the teeth as a “third hand” (Sajjadi et al, 2006).

IV. Animation ceramic cup

The craftsman making the buff ware cup no. 42, recovered from burial 731, while drawing a naturalistic picture, attempted to represent the movement and animation of a goat. The drawing on the goblet portrays a goat and a plant. The drawing has five friezes; in the first frieze the goat is looking at a plant, in the second the goat is nearer to the plant and has raised its forelegs to make a jump, in the third frieze it has jumped over the plant, in the fourth it is eating the leaves of the plant, and in the last frieze it has turned back and is coming down the plant.



Figure

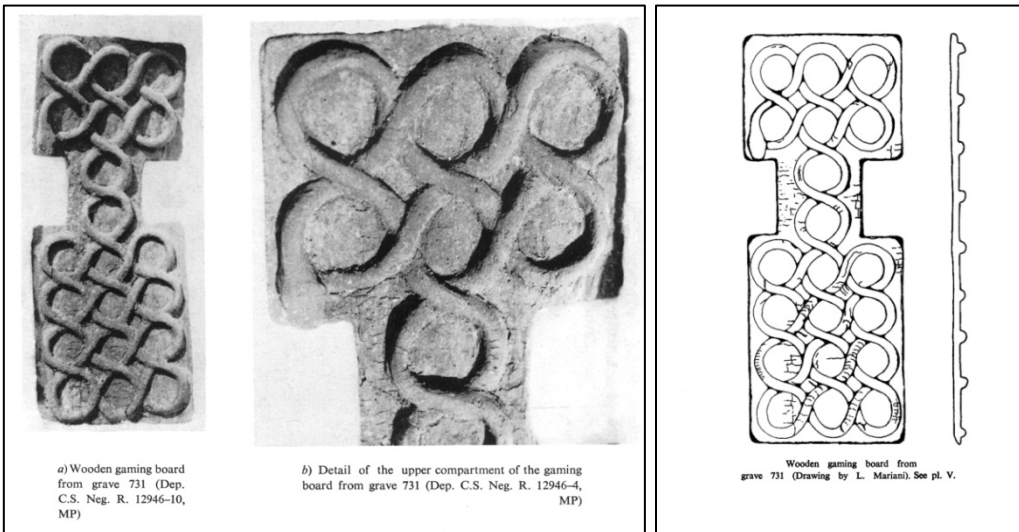
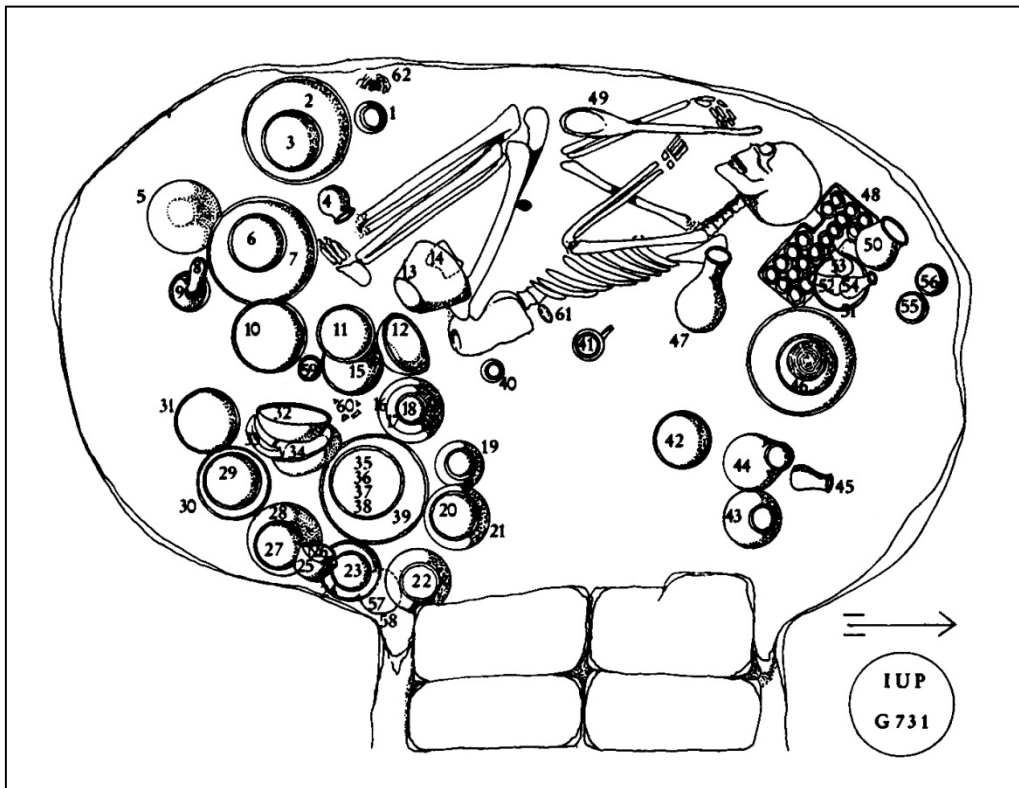
So far, on pottery vessels, murals paintings, seals (especially cylindrical seals), and stone vessels innumerable drawings telling a story from ancient times have been found, but none of them show the concept of movement. So this image might be the most ancient pictorial representation of movement or “animation”.

V. The game board

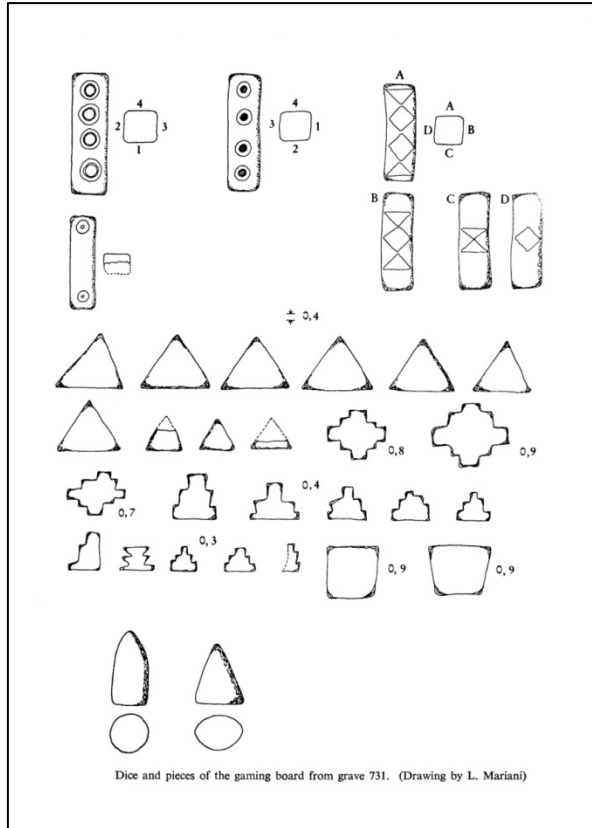
The second object, or in fact group of objects, found in this exceptional proto-historic burial is a backgammon board with its pieces. This board is made of ebony, and is 33.4 cm long, 12.7 cm wide and 6 mm thick. Similar game boards had been previously discovered in the Royal Cemetery at Ur (Woolley, 1934) in Mesopotamia and later in Jiroft (Majidzadeh, 2003) (made of chlorite). The board was placed above the head of the buried person and its dices and pieces were placed in a basket at some distance with the board. Its general shape is rectangular, and it depicts the image of a snake biting its own tail. The boards discovered in Shahr-i Sokhta and Ur show many similarities. Both have three parts: the start position containing 6 points, the link, and the main arena containing 12 points. The game board found at Jiroft is made of soapstone (or chlorite) and depicts four interwoven snakes. The board from Ur is a precious board made of wood, bones/ivory and precious stones.

The game pieces from Shahr-i Sokhta are the following: Dice no. 1 with a square cross section, depicting numbers 1 to 4, made of bone or ivory, with the dimensions of 1.2×1.1 cm, Dice number 2 with a square cross section depicting numbers 1 to 4, made of seashells, with the dimensions 4.4 by 1.2×1.1 cm, Dice number 3, broken, with the dimensions 3.5×1 cm, Dice no. 4 with the dimensions 1×1.1×3.7 cm.

The numbers have been depicted by the use of rhombuses and triangles and also numbers 1 to 4 (side A contains one rhombus, side B two triangles, side C one rhombus at the center and two triangles above and below the rhombus, side D two central rhombuses and two triangles above and below them) 5- 10 triangular, broken wooden pieces with a thickness of 2 to 4 mm, 3 stepped wooden pieces, 8 triangular stepped wooden pieces, 1 triangular stepped wooden piece, 1 wooden piece, 2 conical calcite stones.



Figure



Figure

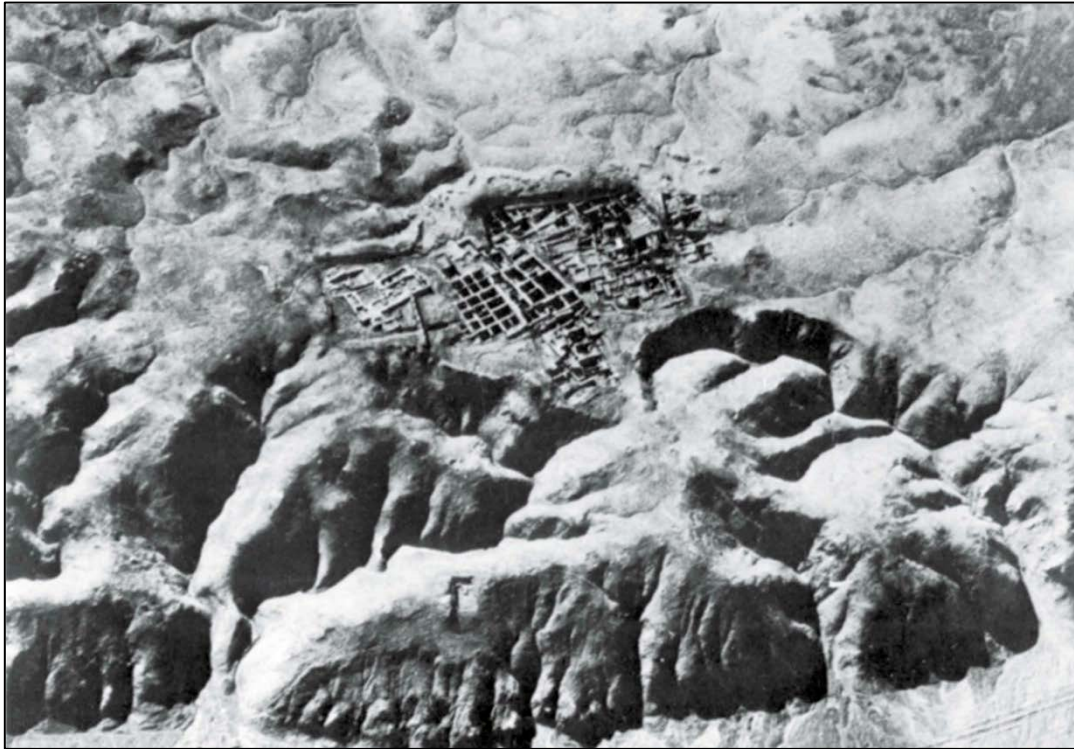
Chapter 3 . Justification for Inscription

Brief synthesis

The archaeological site of Shahr-i Sokhta (the ‘Burnt City’) is located in southeast Iran in Sistan-o Baluchistan Province. It was founded around 3200 BCE and was populated during four main periods stretching from 3200 to 1800 BCE. During this time, Shahr-i Sokhta grew into an important city, but then, associated with the changes in water courses and consequent climate change, lost its importance and was abandoned in the early 2nd millennium. The geographical location of the Iranian plateau made it a bridge connecting the civilizations of South-western Asia with the civilizations of the Indian Subcontinent. While the site was already known in the 19th century and even earlier, the history of systematic inter-disciplinary archaeological studies in Shahr-i Sokhta goes back to mid-1960s. The ancient name of Shahr-i Sokhta is still unknown.

Shahr-i Sokhta is the only city in the Iranian Plateau which contains the remains of a transition from rural to urban life along with its astounding cultural, social, and economic upheavals during late Chalcolithic Period and early Bronze Age. Therefore, the emergence of the first complex societies in the form of cities in eastern Iran can be clearly reconstructed through archaeological discoveries in Shahr-i Sokhta. This city reveals the creative methods used by its population to adapt to a dry and difficult environment during the third millennium B.C. The manner in which local environmental resources and raw materials coming from outside of the Sistan region were used, gives a unique picture of this proto-historic settlement.

Archaeologists have articulated Shahr-i Sokhta into the following parts: Southern parts with the centrality of the Kakh-i Sokhta (‘Burnt Building’), Eastern Residential Area, Central Quarters, Monumental Area, North-western Industrial Zone, Southern Industrial Area, Graveyard. The construction materials used in Shahr-i Sokhta are a reflection of its geographical setting. The sedimentary plain of Sistan lacks mountains and stones. Therefore, the main construction material is mud brick. Huge amounts of cultural and archaeological artifacts, especially pottery, are scattered over an area of 151 hectares in this site.



Photo

3.a. Criteria under which inscription is proposed (and justification for inscription under these criteria)

Criterion (ii): Exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design;

Shahr-i Sokhta is an exceptional testimony to the interchange of human values and influences during 3200-1800 BCE in the east of the Iranian Plateau. It exhibits a transition from the village habitation to urbanized community, accompanied by significant cultural, social and economic achievements and developments from late Chalcolithic to early Bronze Age. In the third millennium BCE, the ancient city was a strategic place and served as the link between the civilizations in the east and west, connecting cities in the Indus Valley to those in Mesopotamia.

In fact, Shahr-i Sokhta displays a variety of cultural interactions on a very large scale in ancient times because it was a venue for: creation, expansion and transfer of traditional knowledge, technologies, sciences and arts in the fields of architecture, urbanization, medicine, nutrition, agriculture, animal husbandry, as well as a place for the production and expansion of arts and crafts, such as metallurgy, jewellery, weaving, pottery, wood inlaying and basket weaving.

Criterion (iii): To bear a unique or at least exceptional testimony to a cultural tradition or to a civilization that is living or which has disappeared;

Shahr-i Sokhta displays an exceptional and even unique testimony to the development of a human settlement in a specific geographical location during the Bronze Age in the eastern part of the Iranian Plateau. For more than a thousand years, from 3200 BCE to c. 2000 BCE, the proto-urban site of Shahr-i Sokhta was the capital of a region ranging from Kandahar to Makran shores. It serves as an exceptional witness to a magnificent civilization and a cultural tradition linking trade and cultural relations with ancient sites and cultures in Indus Plain, southern shores of the Persian Gulf, Makran Sea, south western Iran, Mesopotamia as well as Central Asia. Architectural remains and archaeological finds indicate the key role of the city on a very large scale in terms of working with metals, stone vessels, gems and pottery.

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Photo

The area of Shahr-i Sokhta is far from the modern city, and no interventions have taken place within the core zone and buffer zone that could damage its visual integrity.



Photo



3.a.1.3. Functional Integrity

Although the ancient city of Shahr-i Sokhta has had a variety of functions at different scales in the region during the settlement of various civilizations, today after the passage of 3000 years, it is clear that the continuance of such function is no longer feasible. But generally, based on values of the contemporary times, it has kept its scientific and museum role as a reference for Bronze Age in Central Iranian plateau and its region.

3.a.2. Statement of Authenticity

The archaeological excavations carried out on the site so far have provided extremely important information about the cultural development, traditions, crafts and other functions in the region concerned. The architectural and urban features and structures built in mud brick are original and have maintained their authenticity.

3.a.2.1. Authenticity in design

Given the fact that Shahr-i Sokhta is an important and ancient archaeological site, it is under conservation using scientific and archaeological methods and approaches. Therefore, preserving the authenticity design of architectural remains has always been prioritized. For this reason, the architectural design in various periods as well as urban planning in excavated parts has been stabilized and conserved at its original form.

3.a.2.2. Authenticity in materials

Shahr-i Sokhta has been built from mud bricks materials during four historical eras. In fact, keeping the historical value of various layers has a direct relation with preserving their building materials. Thus during restorations conducted, preserving original building materials has been given priority which still continues.

3.a.2.3. Authenticity in techniques

Easy access to local master workers and traditional techniques has led to the applying of restoration methods and techniques at the ancient site of Shahr-i Sokhta following historical methods and experiments.

3.a.2.4. Authenticity in setting

Present location and setting in the archeological site of Shahr-i Sokhta is the same as its historical setting. Because Shahr-e Sokhta is also considered as the center of satellite ancient

mounds, archaeological studies and investigations are underway regarding the relation between the center and its surrounding satellite mounds.

3.b. Protection and Management requirements

The proposed core zone of the property includes the ancient mounds registered in the list of national properties of Iran as no. 542, in 1966. The nominated site and its buffer zone are under the conservation and management by the Iranian Cultural Heritage, Handicrafts and Tourism Organization (ICHHTO). At the time of listing, the outstanding importance of Shahr-i Sokhta was already understood by experts. This has been confirmed by later archaeological excavations and research aiming at the conservation and restoration of the site, and the information has also further contributed to the better understanding of the historical and structural integrity of the place.

3.c. Comparative analysis

Introduction

Shahr-i Sokhta has offered not only a proto type of urbanization and domestic architecture to the concomitant settlements but also to the future generations in the eastern Iran and the beyond. In comparison of the architectural data of Shahr-i Sokhta and other archaeologically well known we can obtain a clear image of the genuine civilization of Sistan and Shahr-i Sokhta in the proto historic period.

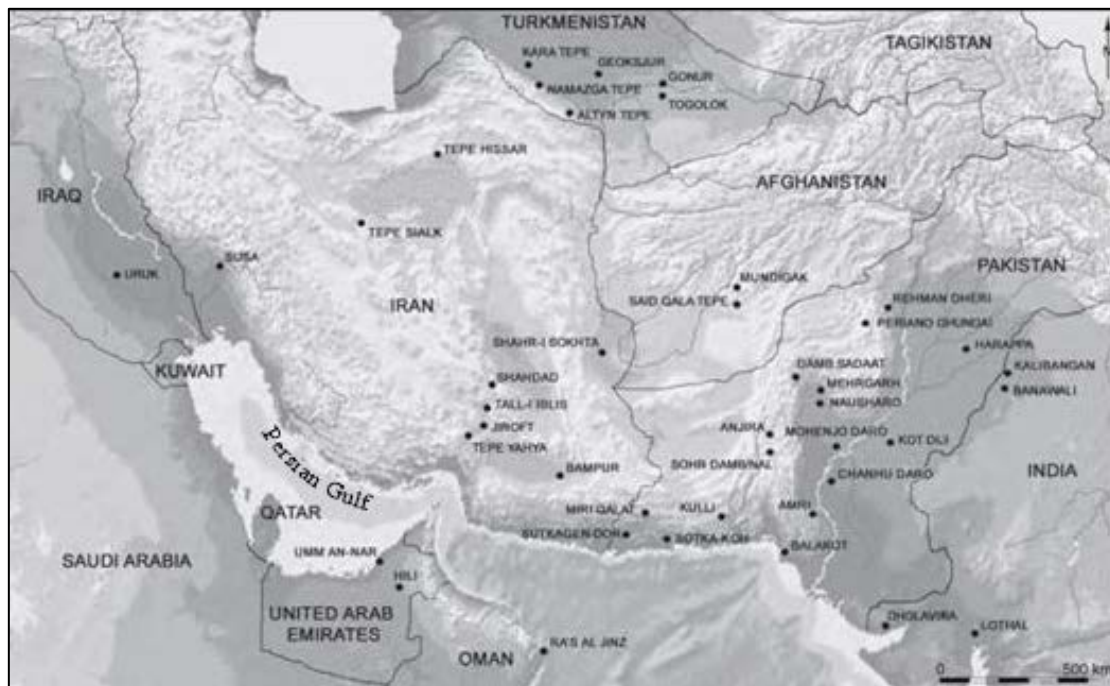
The archaeological evidences support also, for the end of the 4th millennium B. C., the existence of two main interaction spheres in the Iranian Plateau. The first one is what that we can called it "Eastern Iranian interaction sphere". This interaction sphere headed by a huge proto-urban settlement (Shahr-i Sokhta), extending in the north to Central Asia and in the east to the Quetta Valley and even more. In this vast region the archaeological material evidences show a great degree of integration reflected in architecture, certain types of ceramics, seals, figurines etc. All of these elements indicate that Shahr-i Sokhta had a considerable influence on the adjacent settlements. The second interaction sphere is the "Jemdat Nasr interaction sphere" which could include Mesopotamian world, southern shores of Persian Gulf, south and south eastern Iran extending to Tepe Yahya somehow related to the so-called Uruk expansion and its later developments.

Shahr-i Sokhta as the most important eastern commercial and cultural pivot, exchanged with the external world not only the goods and raw materials but also cultural and human values. There is any trace of violence in the life of society.

Any kind of arms or weapons, defensive structures or defensive wall (reminding an open society), inordinate or massacre have not been reported in archaeological findings.

Thanks to its unique geographical position, Shahr-i Sokhta gained a strong power on the control of the distribution of the most demanded raw materials such as lapis lazuli and turquoise. In this way, Shahr-i Sokhta played a vital role in the formation of the terrestrial trade networks and economic integration on the Iranian Plateau as early as the end of the 4th millennium B. C. that has been developed in the 2nd millennium B. C. via maritime routes by others.

In below, we will try to show the similarities between Shahr-i Sokhta and other contemporaneous sites to put in preeminence the integrity and cultural innovation of Shahr-i Sokhta and Sistani people in the proto - historic era.



Map

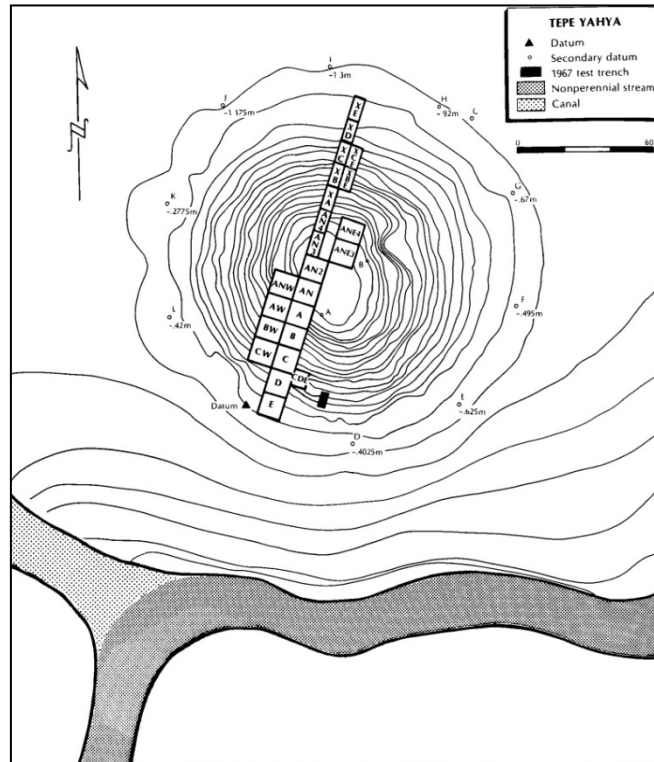
Tepe Yahya

The site of Tepe Yahya was discovered on a survey done in 1967. The mound is located in the Soghun Valley, at 28°50' longitude, approximately 225 km. directly south of Kerman and 30 km. north-east of the present town of Dolatabad. The Soghun Valley is one of several intermountain valleys located between Jiroft to the east and the Dolatabad plain to the west. A direct route provides access to the Dolatabad plain. In all areas of the Jiroft, Dolatabad and the Soghun, the prehistoric settlements are located in direct proximity to seasonal and perennial streams. Situated at the approximate center of a mountain valley, about 1200 m. above sea level, the site stands to a height of 19.8 m. and measures 187 m. in diameter. Ceramics are spread from the mound to a distance of 2 km. along the Kish-i Shur River. The Soghun Valley itself is no more than 35 km. in width and 50 km. in length (Lamberg-Karlovsky, 1986).



Photo

It is now evident that there are a relatively large number of sites of different size and period within a one- or two-day walk of Tepe Yahya (Lamberg -Karlovsy & Tosi, 1973). From 1968 to 1971 the site has been excavated for four campaigns of approximately 11 weeks each. A main step trench have been excavated on the south side of the mound of five 10 × 10 m. squares, horizontally expanding the uppermost two (A and B) squares by another 10 × 10 m.



Map

Chronology of Tepe Yahya	
Period VII	4900-3900 B. C.
Period VI-VC	3900-3700 B. C.
Period VA-B	3700-3300 B. C.
Gap	Gap
Period IVC	2850-2750 B. C.
Period IVB	2400-1800 B. C.
Period IVA	1700-1400 B. C.
Period III	700-525 B. C.
Period II	475-275 B. C.
Period I	200 B. C.-225 A. C.

We briefly summarize here three ancient periods (Neolithic to the early Iron Age) of Tepe Yahya.

Period VI

The earliest remains of village settlement in south-eastern Iran are known from this period. Radiocarbon determinations have dated Period VI to the mid- 5th millennium for the earliest of its five directly superimposed mud-brick building levels and to the early 4th millennium for its latest construction. The typical pottery of this period is a coarse handmade chaff tempered ware in the form of bowl and large jars. Though never exceeding 5%, there is an increase in the appearance of Burnishing on a red or brown slipped finer chaff-tempered ware within the five levels of Period VI.

Period V

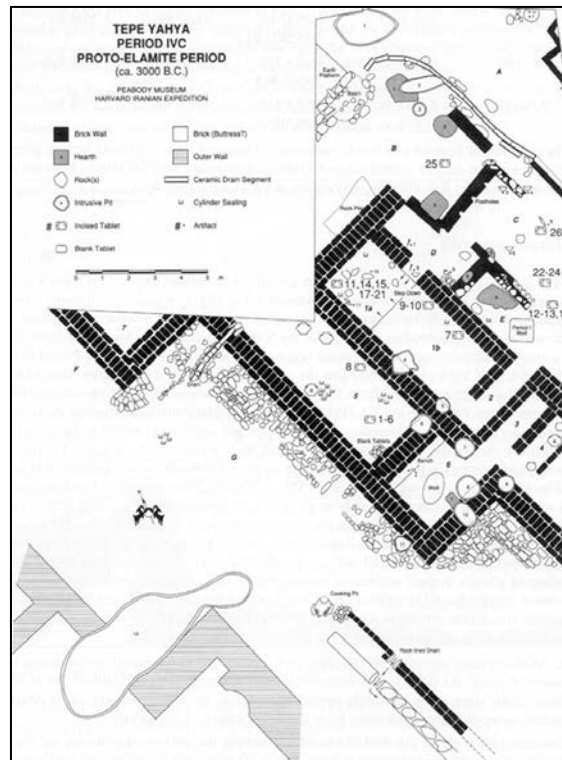
The transition to Period V at Tepe Yahya occurs without any break in cultural continuity. This is clearly evidenced in architectural, ceramic and lithic remains. There are quantitative changes, however, with a decrease in the coarse chaff-tempered wares of Period VI and an increase in painted wares, principally Black on Red and Black on Buff (in a 10: 1 ratio). The ceramics throughout the three building levels of Period VA-C at Yahya can be paralleled Chah Huseini and Tall-I Iblis II and III.

Period IV

Period IVC consists of a single building complex which contains a remarkable association of cultural materials. There is a continuity of the Black on Buff Painted Wares of Period V, the Black on Grey and bevelled-rim bowls. The characteristic Black on Red seems to have disappeared. New wares include Jemdet Nasr polychrome, club-rim bowls, snakes applied in relief and burnished wares.



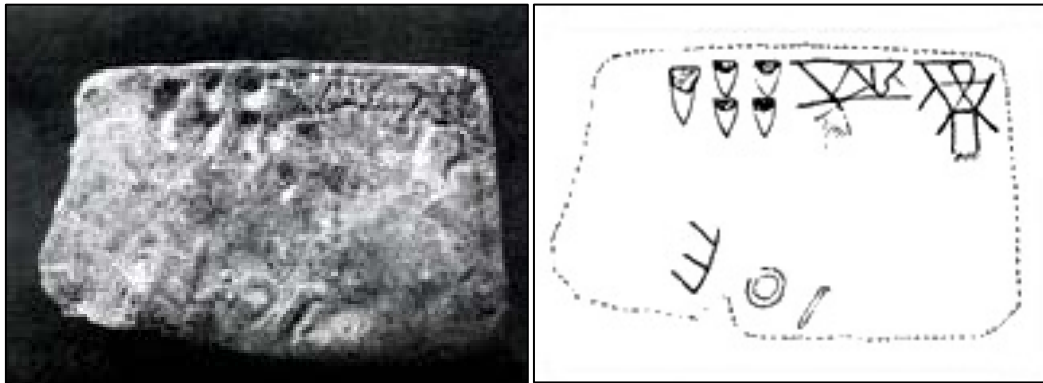
Photo



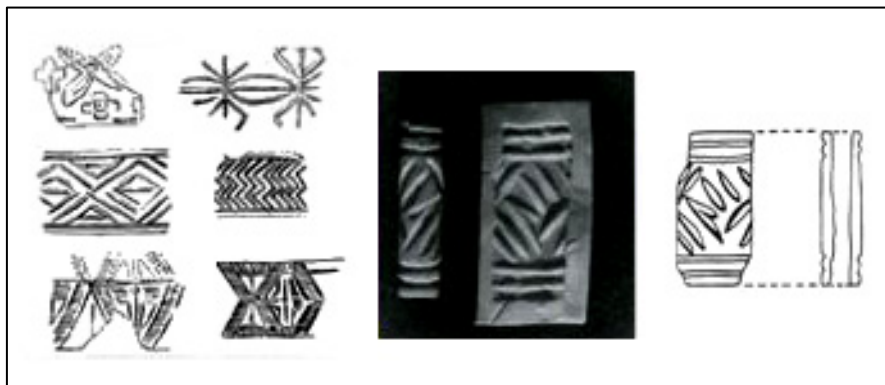
Comparison of Data:

The incontestable evidence for connections between Mesopotamian and the eastern Iranian Plateau is strengthened by the association of ten Proto-Elamite tablets and other glyptique materials at Tepe Yahya IVC and Shahr-i Sokhta. Identical tablets have been found in Susa Cb, Sialk IV and Tal-i Ghazir in association with polychrome bi-conical jars, solid-footed conical goblets, beveled-rim bowls, naturalistic and geometric-decorated seals. This discovery marks the easternmost extension of proto-elamite culture on the Iranian Plateau. The nature of basic continuity from Yahya V to IVC and the existence of a remarkable Ubaid horizon along the northern Arabian coast provide evidence of a multi-directional cultural influence. The developing cultural uniformity evident all over the south-western plateau and the Persian Gulf from Godin to Tepe Yahya and from Oman to Shahr-i Sokhta is to be seen as the result of an increasing cultural interaction over a large territory between areas previously less well integrated (Lamberg -Karlovsky & Tosi, 1973). In this regard Shahr-i Sokhta had a key role in the integrating of urban settlements of the Bronze Age on the Iranian Plateau by controlling the main interregional trade routes.

**Figure**



Figure



Although the three sealing's have no exact Jemdet Nasr comparisons, the cylindrical seal with hatch-edged triangles is readily paralleled at the Sin Temple IV at Khafajeh.

Both sites represent the best detailed sequence of stratified materials available within their respective areas. Although there are generalized similarities in the technological, metallurgical, ceramic, architectural and lithic industries, we will concentrate on specific items that directly link the sites.

The periods involved are Shahr-i Sokhta I-IV and Yahya IVC-B. One of the major types of ceramic uniting Shahr-i Sokhta and Yahya is a painted black on gray ware. This type of pottery is, in fact, a horizon style for the total of the north-east Iranian-Baluchistan interaction sphere.

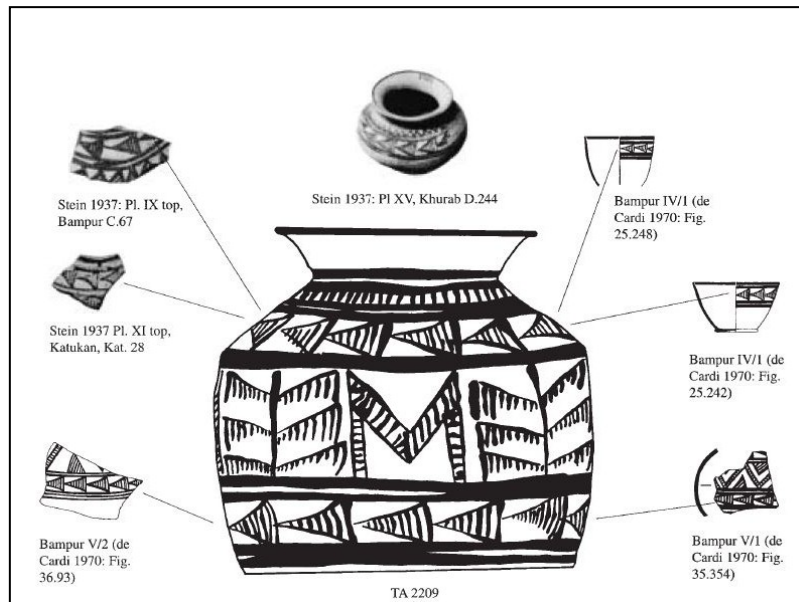


Photo



There is evidence that the dark red on grey is an earlier variant at Shahr-i Sokhta and Tepe Yahya. Painted, geometric, horizontal bands, restricted to the upper half of the vessel, are the most common motif on the bi-conical jars. This type was first recognized by W.A. Fairservis, as Faiz Mohammed Grey Ware in the Quetta Valley of Pakistan and later more generally defined as Faiz Mohammad Painted Ware.

The remarkably wide distribution of this pottery with similar painted motifs has not been fully appreciated. Stein recorded the presence of this type of both site surfaces and in his excavations at Bampur, Khurab, Damin and Shah-i Temp. Fairservis has noted Black on Grey Wares in the Quetta Valley (Period Damb Sadaat II/III1), on the major sites of the Zhob and Lorelei Valleys of north Baluchistan and in Afghan Baluchistan. It has been also found at Tall-i Abraq.



Photo

We note that not a single sherd of this distinctive and widely distributed ware is known from the Indus, Mesopotamia or southern Turkmenia. Its distribution defines it as a horizon style within a single interaction sphere. At Shahr-i Sokhta and Yahya the earliest appearance of this type is characterized by dark red point (incompletely fired) though in later times both dark red paint and evidence of poor firing disappear. These two stages of development in technology and/or style are duplicated in the Faiz Mohammed Grey Ware of Damb Sadaat I/III in association with Quetta and Namazga III patterns.

Lapis was mined in Badakhshan and passed from there to sites such as Shahr-i Sokhta. At Shahr-i Sokhta the lapis was locally worked and consumed. However, the abundance of lapis at Shahr-i Sokhta suggests that it acted as an intermediary, trading lapis further to the west (123). The presence of large pieces of unworked stone at Shahr-i Sokhta and Mesopotamia suggest that the lapis was shipped in a raw state. Shahr-i Sokhta acted as an intermediary in the transshipment of this material from Badakhshan to the demand centers of Mesopotamia. There is no evidence to suggest that Shahr-i Sokhta had Direct-Contact trade relations with Mesopotamia. The same model can be advanced for trade in steatite, with the difference that there is ample evidence for steatite vessels originally manufactured at Yahya. Identical and complex iconic motifs suggest that a shared ideology was manifest in the meaning of these motifs, distributed from Mari to Yahya and Tarut. The shared iconography on these vessels suggests an unexpected degree of ideographic integration over a very wide area. There is no comparable evidence, however, to support the idea that political, social or economic integration was also present. Thus, between Yahya and sites in Mesopotamia it would appear that there was greater integration, at least in the ideographic (religious?) realm, than existed between Shahr-i Sokhta and Mesopotamia. There is no evidence to suggest that Yahya's production and export of steatite was anything other than indirect - through the Persian Gulf sites, Malyan, Susa, etc (Lamberg -Karlovsy, 1973).

Incised grey ware is not found west of Tepe Yahya where only two surface sherds of this type are reported. Several hundred pieces of steatite vessels with identically incised motifs are present from Yahya, however. At Bampur IV - VI and at Shahr-i Sokhta the situation appears to be reversed: incised Grey Ware is dominant with respect to incised steatite (see below for further discussion on steatite).



Photo

Ancient Site	Area & dimension	Type	Settlement Duration	Cultural periods	Elements of Site	History of Researches
Shahr-i Sokhta (Iran)	151 ha Highest level: 35m	Mound	1200 years: four period Period I (3200-2800 B. C.) Period II (2800-2500 B. C.) Period III (2500-2200 B. C.) Period IV (2200-1850 B. C.)	Late Chalcolithic Early Bronze Age Middle Bronze Age	Eastern Residential Area Central Quarters Monumental Zone Industrial Zone Graveyard	1967-1978 (by IsMEO under the direction of M. Tosi) 1997-2009 (by Iranian Cultural Heritage expedition, under the direction of S. M. S. Sajjadi).
Tepe Yahya (Iran)	Diameter 180m Highest	Mound	About 5000 years	Neolithic, Chalcolithic Bronze Age, Iron	Residential Area	1967-1971

Bampur

The position of Bampur site near a river and major routes explains the presence of several prehistoric settlements at the foot of a fortress on a high mound. Sir Aurel Stein carried out few excavations nearby during reconnaissance in the Bampur valley in 1932 (Stein, 1937). In 1966 Beatrice de Cardi initiated further excavations to establish a ceramic sequence for the region, trenches Y and Z producing consistent results within six successive occupational phases designated Periods I-VI (de Cardi, 1967).

The site is located in the north of modern town of Bampur, near Iranshahr, and has an oval shape (about 400×600 m). A historical fort has been constructed over the artificial mound probably in the Parthian period. This a key site in the south eastern Iran in the Baluchistan region for understanding the cultural evolution in Baluchistan and the interactions of human societies in this part of Iranian Plateau.

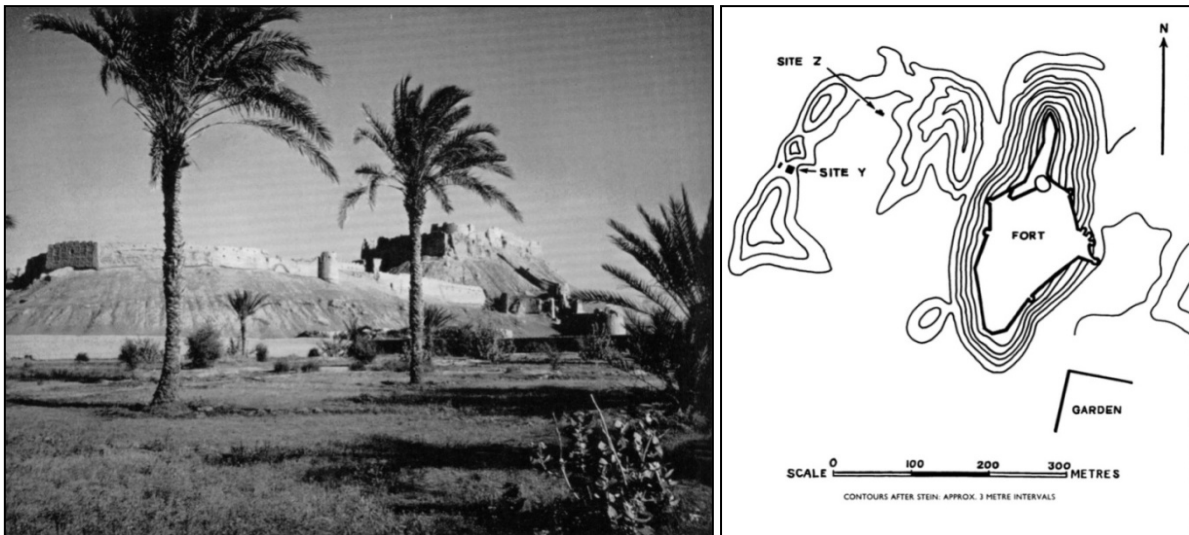
The site was chosen for excavations because its location near the intersection of several routes, with perennial water at hand, suggested that it might have been a settlement of major importance as early as prehistoric times. As such, it seemed more likely than the smaller sites in the valley to provide the evidence of contact with adjacent regions which we were seeking. The settlement lies on the outskirts of the village to the north-west of a fort built on a large mound, which towers over a debris shelf lying above the level of the encroaching dunes. We were not able to test the nature of this mound, but it is possible that debris from a series of mud forts encases the nucleus of a settlement which may predate the Period I levels revealed by our excavations.

Since Beatrice de Cardi's excavations at Bampur in 1966 (de Cardi, 1968; *idem*, 1970) few new work has taken place there (Sajjadi, 2005). Nevertheless, objects recovered at Bampur in the 1960s can now be better dated and understood, thanks to discoveries in recent years at sites in Central Asia, the Indo-Iranian borderlands, and southeastern Arabia.

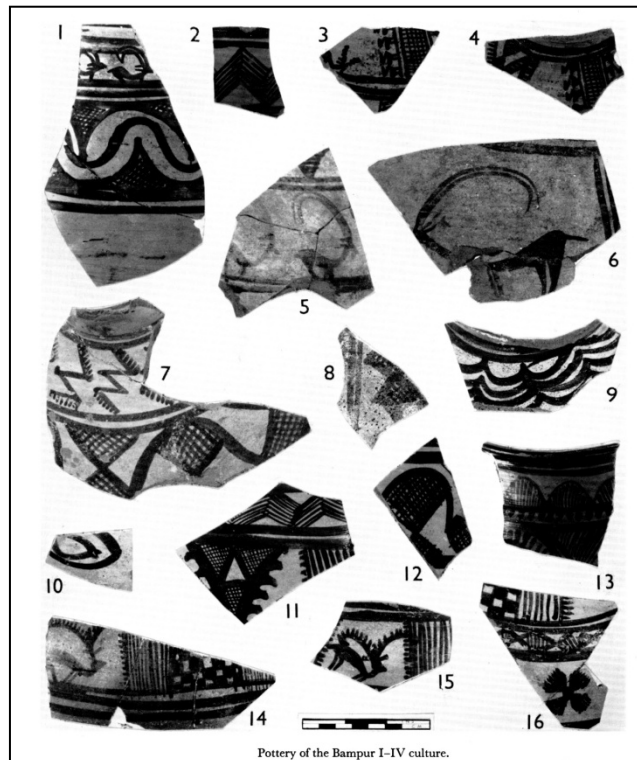
Six main cultural periods of been identified in the sequence of Bampur dating back to the mid-3rd millennium B. C. to the early 2nd millennium B. C.

Because the chronology of Bampur was disputed in the late 1960s and early 1970s, with some scholars favoring a 'high' chronology beginning in the mid-4th and ending in the mid-3rd millennium B. C., and others favoring a 'low' chronology extending from the mid-3rd to the very early 2nd millennium B. C., the Omani sites are important for dating purposes, particularly since several of them provide calibrated radiocarbon dates. Very similar sets of dates, clustering between 2100 and 2000 B. C., come from Tell Abraç. In this regard, however, it is also important to note that the closest parallels between Bampur and Tell Abraç appear in sherds from Bampur IV-V contexts (Potts, 2003), whereas the black-on-gray ware vessels from sites like Al Sufouh and Umm an-Nar probably represent earlier material coeval with the older levels at Bampur (I-III).

Bampur VI, on the other hand, must consequently post-date 2000 BCE, judging by the Tell Abraq evidence, thus confirming de Cardi's original chronology (Potts, 2003, p. 9). A re-analysis of the ceramic and chlorite evidence from Tepe Yahya (Tappe Yahyā) (Potts, 2001, pp. 195-207), moreover, confirms the lower date for Bampur favored by de Cardi.



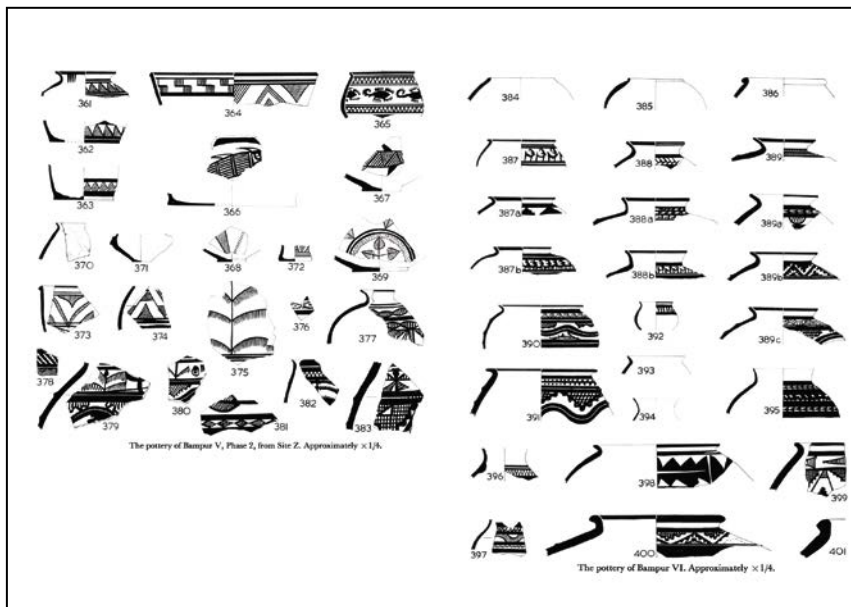
Photo



BAMPUR SEQUENCE AND THE CHRONOLOGIES OF ADJACENT COUNTRIES

S. E. Iran	Afghanistan	Baluchistan	Indus Valley	India	Oman	Bahrain				
Bampur	Mundigak	D. Sadaat and Kile Gul Mhd	Anjira	Kulli and Nal	Mohenjo-daro	Amri	Chanhu-daro	Lothal		
VI				Kulli-Mehi		IV	III		B	
V	V				Late	III	II		A	Um an-Nar culture
3	3	DS.III			Intermediate		I			
IV, 2	IV, 2									
1	1	DS.II	IV	Kulli	Early	II				
III				Nal						
II	III	DS.I	III			I				
I	II	KGM.IV								
	I	KGM.III	II							
		KGM.II	I							
		KGM.I								

Table

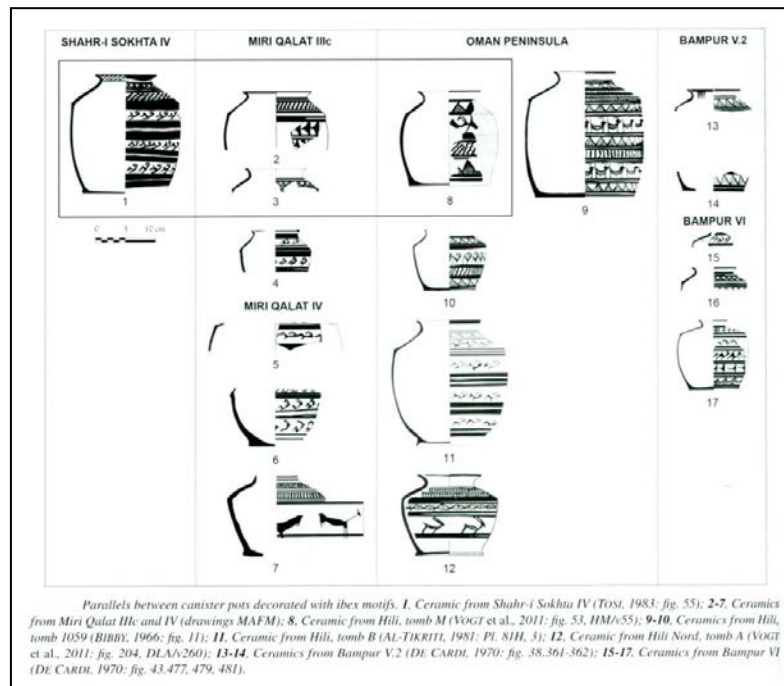


Comparison of data:

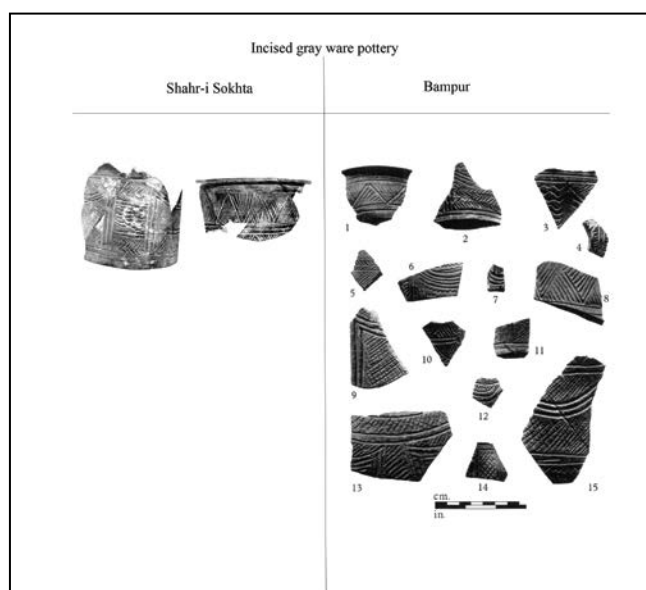
A canister jar was discovered at Shahr-i Sokhta in 1969 on the floor of the room CXXXIX in the last occupation phase of the Kakh-i Sokhta. It is a medium size vase with a cylindrical body and a raised short neck with everted rim. The decoration painted in dark brown on the whole external surface consists of three superimposed friezes of stylized goats separated by sets of two horizontal bands. The goat's posture is characteristic of the mid-3rd millennium B. C. figurative system in the iconography of south-eastern Iran and south-western Pakistan. As we can see in below for the canister jar of Shahr-i Sokhta, we can establish direct connections with Bampur V, 2, in Iranian Baluchistan, Miri Qalat IIIc, in Pakistani Makran and also Umm an-Nar graves and Hili in the Oman (Jarrige et al., 2011).

The most distinctive ceramic classes attested at Bampur were the fine black-on-gray ware and the incised gray ware found in the Y and Z soundings. As de Cardi and others noted, similar ceramics had been found in 3rd millennium B. C. graves at Umm an-Nar in the Oman and, in a context dated to the late 3rd or early 2nd millennium BCE (ca. 2200-1800 B. C.), in the period IV at Shahr-i Sokhta.

Subsequent analyses of black-on-gray ware and incised gray ware from sites in the Oman peninsula have confirmed that all of the analyzed material of this type found on Arabian sites (e.g., Umm an-Nar, Hili, Shimal) was manufactured in the Indo-Iranian borderlands (Potts 2004).



Table



Table

Ancient Site	Area & dimension	Type	Settlement Duration	Cultural periods	Elements of Site	History of Researches
Shahr-i Sokhta (Iran)	151 ha Highest level: 35m	Mound	1200 years: four period Period I (3200-2800 B. C.) Period II (2800-2500 B. C.) Period III (2500-2200 B. C.) Period IV (2200-1850 B. C.)	Late Chalcolithic Early Bronze Age Middle Bronze Age	Eastern Residential Area Central Quarters Monumental Zone Industrial Zone Graveyard	1967-1978 (by IsMEO under the direction of M. Tosi) 1997-2009 (by Iranian Cultural Heritage expedition, under the direction of S. M. S. Sajjadi).
Bampur (Iran)	5 ha Highest level: 6m	Mound	About 700 years	Bronze Age	Citadel Lower City	1966-1968

Mohenjo-daro

Mohenjo-daro¹ is an archeological site situated in the province of Sindh, Pakistan on a Pleistocene ridge in the middle of the flood plain of the Indus River Valley, around 28 kilometers from the town of Larkana. Built around 2600 BC, it was one of the largest settlements of the ancient Indus Valley Civilization, and one of the world's earliest major urban settlements, existing at the same time as the civilizations of ancient Egypt, Mesopotamia, and Crete.

Mohenjo-daro was abandoned in the 19th century BC, and was not rediscovered until 1922. Significant excavations have since been conducted at the site of the city, which was designated a UNESCO World Heritage Site in 1980². Mohenjo-daro, the modern name for the site, simply means Mound of the Dead³.



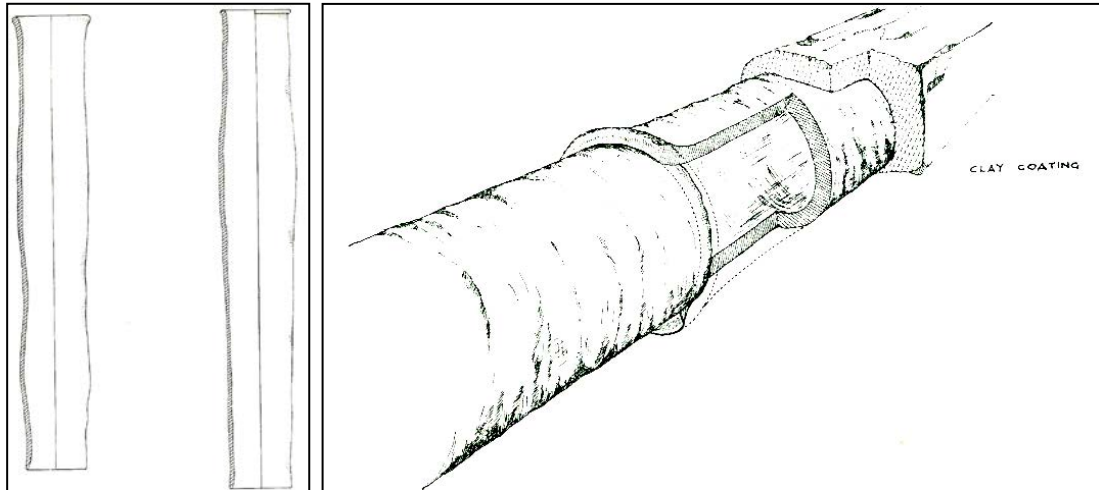
Photo

Contemporary with Mohenjo-daro, Susa was also a pioneer of its time regarding urban planning. Street layout networks and plans of big houses in existing layers of Ville Royal workshop reveal cultural relations and transfer of ancient engineering traditions between Susa and Mohenjo-daro with Shahr-e Sokhta serving as their link.



Photo

The duration of urban life in Shahr-i Sokhta (about 1000 years) is longer than Mohenjo-daro (about 700). This situation had an important impact on the development of urban mind of inhabitants of Shahr-i Sokhta.



Figure





Photo



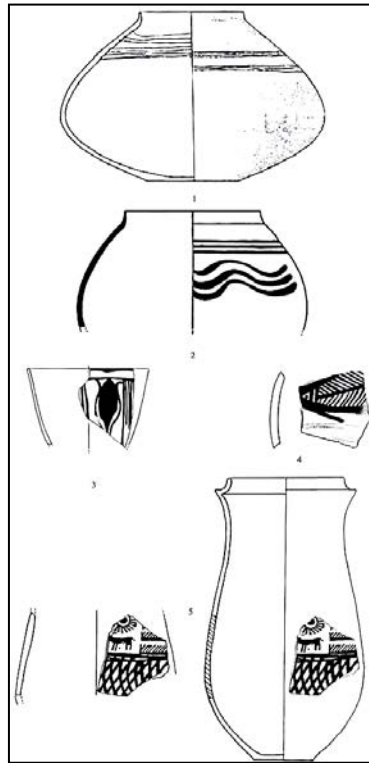
Pottery

The record of possible ceramic imports or vessels imitating types from the Indus basin found at Shahr-i Sokhta includes ten fragments and vessels close to the Nal production as well as a more limited and heterogeneous group of four ceramic finds similar to other types of products from the same area.

A fragment of a black-on-red painted vessel collected from the surface of Shahr-i Sokhta may be related to the Indus valley both on stylistic and technical grounds. The fine reddish yellow paste shows a limited amount of pores and rare white inclusions, and is covered inside and outside by a yellowish red slip, with irregular horizontal-oblique burnishing marks. Technical features suggest a coiling and wheel-throwing process each coil of the wall being about 3.5 cm high.

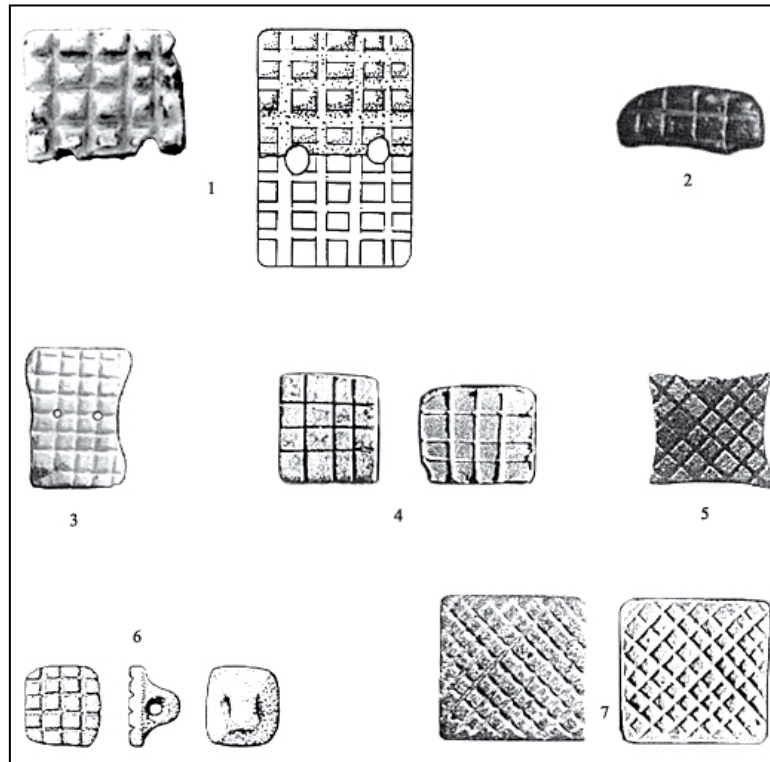
This potsherd, too, finds no comparison with the local buff ware production. It belonged to an elongated, probably pear-shaped jar, about 17 cm wide at its maximum diameter, originally located at the lower edge of the preserved sherd portion, where a coil joint is still visible. The outer surface of the vessel was painted with a dark reddish grey pigment in superimposed registers or friezes. The upper frieze retains part of a quadruped, most probably a male goat or an antelope, below a sun-like radiating circle filled with a dot; to the right one sees what is left of three superimposed “combs” with oblique teeth, turned upside down. The lower register, separated by the upper one by a double line, is covered by a cross-hatched pattern. The vessel is easily distinguished from the local product because of its form, technical features and painted figuration. The only possible match is an Indus pear-shaped jar the most intensively decorated vessel of the Indus valley ceramic repertory.

Another potsher found on the surface of Shahr-i Sokhta and presently on exhibit at the Museo Nazionale d'Arte Orientale in Rome, provides a link with northern Baluchistan during the Kot-Dijian phase. It belonged to a globular buff ware jar painted on the exterior with an “X-rayed” fish design. Such a motif is well known at Rehman-Dheri. The details of the eye, placed in the extremity of the head, and its proximal fins are identical (Cortesi et al., 2008).

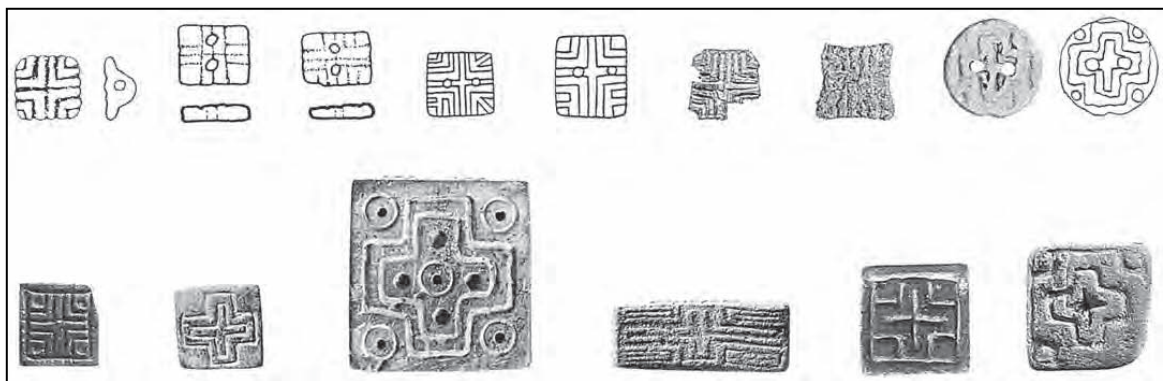


Figure

Although the earliest specimens at Shahr-I Sokhta date back to Period I (like the lapis lazuli seals), other seals of this type come from middle Period II or late Period II-early Period III contexts. The use of this geometric pattern at Shahr-i Sokhta thus seems to spread between 2600 BCE and the following centuries, in correspondence with the main urban peak of the Integration Era in the Indus valley (Cortesi et al., 2008).



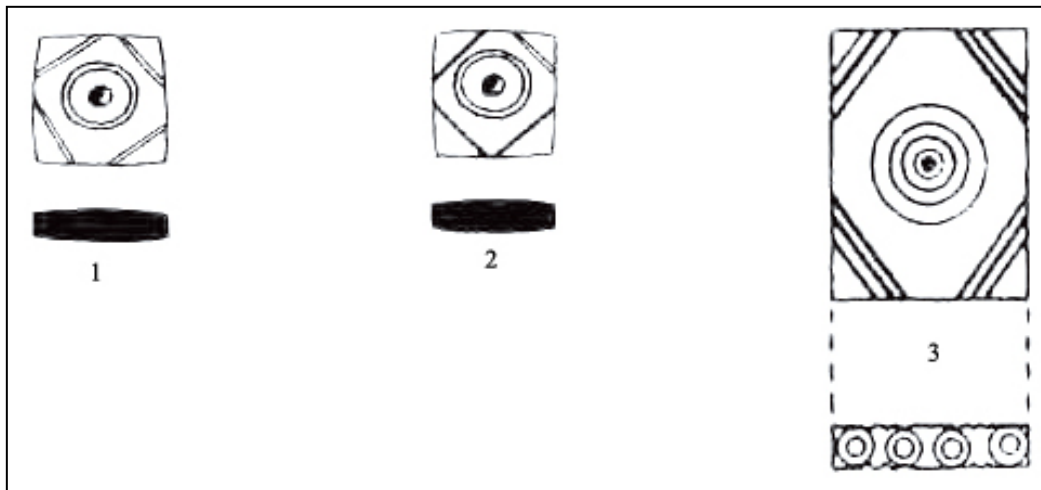
Figure



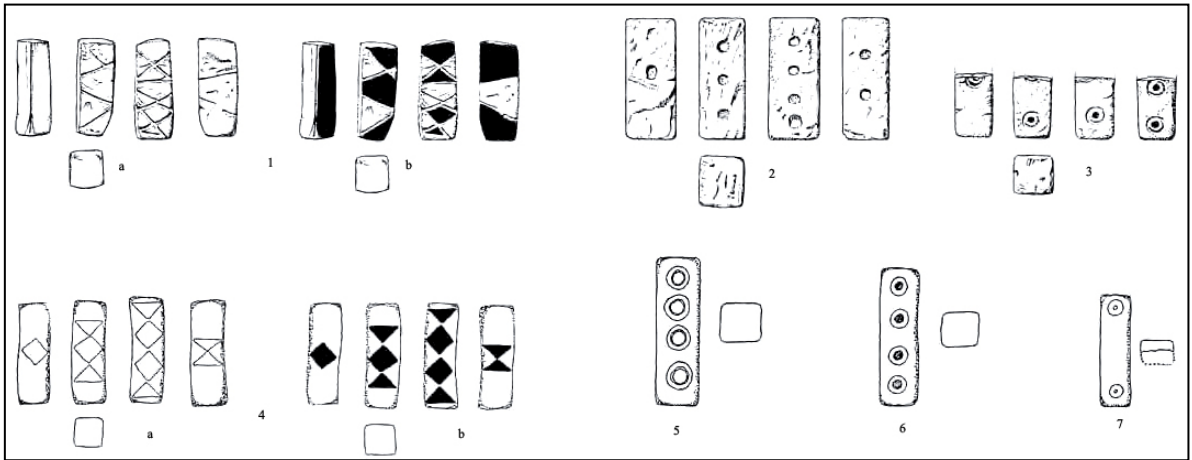
Gaming pieces and dice

A type of gaming piece in a bluish green stone, found in Grave 12 of the Shahr-i Sokhta graveyard, dated to the beginning of Period III, may be compared to ivory pieces, having presumably the same function, found at Mohenjo-Daro. In spite of the different base material, the shape of the gaming pieces and their decoration are very similar. There is a hypothesis that the shape of dice might reflect early contacts between Mesopotamia and the Indus civilization. Actually, at Mohenjo-daro dice in the form of cubes, tablets, long parallelepipeds, and prism-like pieces with triangular section were unearthed. Although cubic dice (seven specimens known) are less frequent than the other types, they were found at variable depths. The standards envisaged 1 opposed to 2, 3 to 4 and 5 to 6, although there are variations.

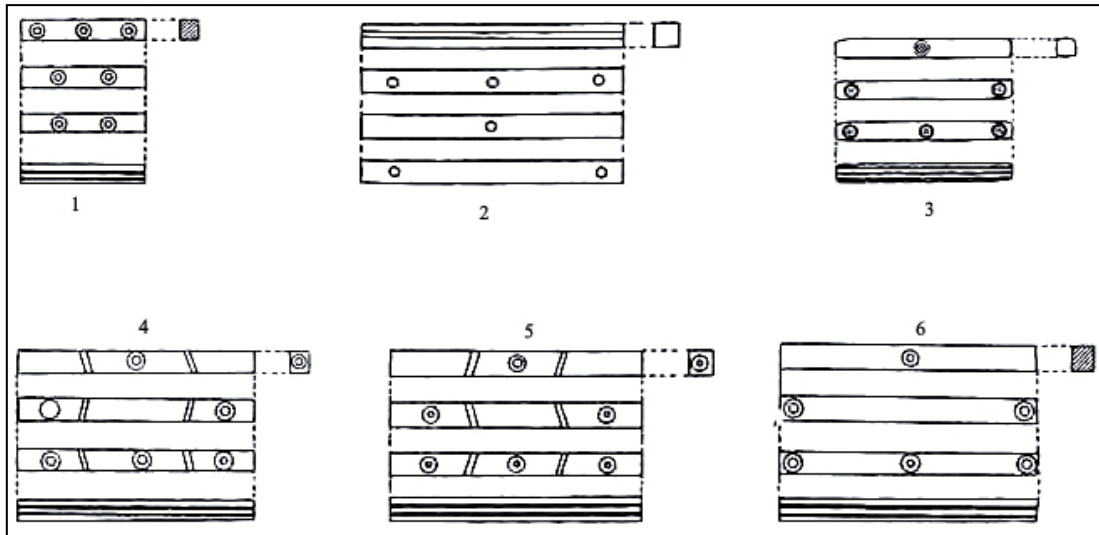
At Shahr-i Sokhta, while a cubic dice was found in a layer datable to Period IV, parallelepiped-like pieces (or rectangular dice) are more common. The inventory includes three specimens from the settlement area and four from Grave 731, where they accompanied the famous gaming board in *Dalbergia sissoo* wood carved with a snake motif and a complete set of gaming pieces (Period III, phase 4). These dice belong to a single type. In three specimens, the faces are marked by drilled holes filled with bone, ivory or shell inlays, possibly set with bitumen or another glue.

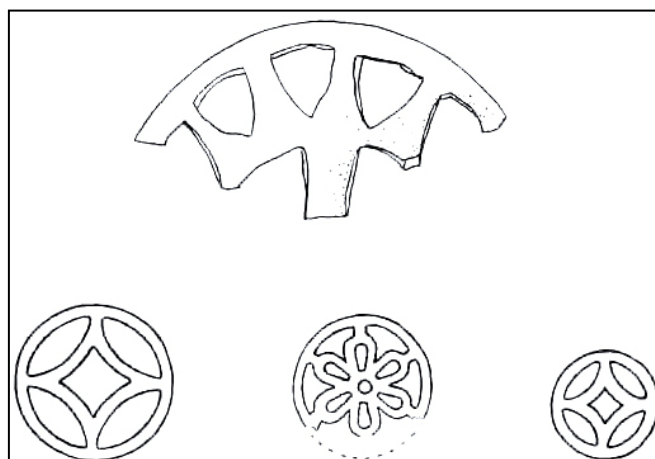


Figure



Figure





Figure

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Mohenjo-daro (Pakistan)	280 ha Highest level: 12m	Mound	700 years	Bronze Age	Citadel Lower City	1930-1945 1964-1980 (by John Marshal)

Altyn Tepe

Altyn Tepe is a settlement of the Neolithic period and Bronze Age located on the Piedmonts of Kopet Dagh in the south of Turkmenistan near the village of Miana. Extensive excavations have been carried out there since 1965 by the South Turkmenistan Archeological Complex Expedition of the Academy of Sciences of the Turkmen SSR (YuTAKE) and of the Leningrad Archeological Department of the Academy of Sciences of the ex-USSR. The now shapeless ruins cover an area of 25 hectares and rise to a height of 22 m. Strata containing traces of human habitation extend 8 m deeper than the surrounding plain, so that the total thickness of the stratification reaches 30 m.



Map

During the early Bronze Age (middle of the 3rd millennium B.C., complex of the Namazga IV type), the potter's wheel came gradually into use, and in the A 6 stratum most of the pottery is mechanically produced. The painting becomes coarser, and the number of decorated vessels decreases. To that time belongs the concentration in one of the quarters of Altyn Tepe of small temple buildings with rectangular hearths (*podia*), and toward the end of this period the main entrance, 15 m in width, was given shape by massive pylons and decorated pilasters (Masson, 1981).

Altyn Tepe reached its most flourishing stage at the end of the 3rd-early 2nd millennium B.C. (complex of the Namazga V type), when it was a settlement of the early urban type. Various handicrafts achieved considerable development, concentrated in the northern part of the settlement ("artisans' quarters"), where some sixty two-tiered kilns have been discovered. A religious complex emerged consisting of a four-stepped tower reminiscent of the Mesopotamian ziggurats, spacious storerooms, and a priest's tomb in which objects of great value have been found, among them the gold heads of a wolf and of a bull. Excavations of inhabited quarters and of tombs situated there make it possible to distinguish three groups of inhabitants according to their way of life and degree of wealth. The "artisans' quarter" is characterized by massive blocks, containing many rooms calculated for a community of large families with a common household economy, and by poor tombs. The quarters of wealthy citizens consisted of houses for small families with separate courtyards containing household buildings. Beads and seals were found in the tombs there. The upper society of Altyn Tepe was represented by the inhabitants of the "quarter of the nobility," which had regularly planned streets along which were situated neatly built houses occupying an area of 80 to 100 square m. The tombs in this quarter have yielded many ornaments of silver and precious stones, as well as seals and female terracotta statuettes (Masson, Encyclopedia Iranica).

The culture of Altyn Tepe during the developed Bronze Age is characterized by artistic pottery, stone vessels, hafted bronze and copper daggers with flat blades, tabbed silver and bronze seals showing cross-shaped figures and animals (goats, eagles, panthers, a three-headed dragon).

The female terracotta statuettes are shaped in a conventionalized, flat style with long, plaited hair; some of them bear scratched signs which can be classified in groups and may possibly be symbols of various female deities. During the excavation of the "quarter of the nobility" a seal was found with two signs of proto-Indian lettering. It is not impossible that the culture of Altyn Tepe may have belonged to a population using a language of the proto-Dravidian type.

Altyn Tepe was closely linked with the contemporary ancient East. Vessels of black clay have been found originating from northwestern Iran (Hessar & Shah Tepe), as well as ivory artifacts imported from the Harappa. The culture of Altyn Tepe reflects the process of the formation in southern Turkmenistan of a local civilization of the Ancient Oriental type.

The abandonment of the site appears to have been connected with the exhaustion of the soil and climatic changes. Definite genetic links with the culture of AltynTepe appear in objects of the Bronze Age from Murgab, southern Uzbekistan (Sappali), and northern Afghanistan (Dashli Depe), and Sistan (Shahr-i Sokhta).

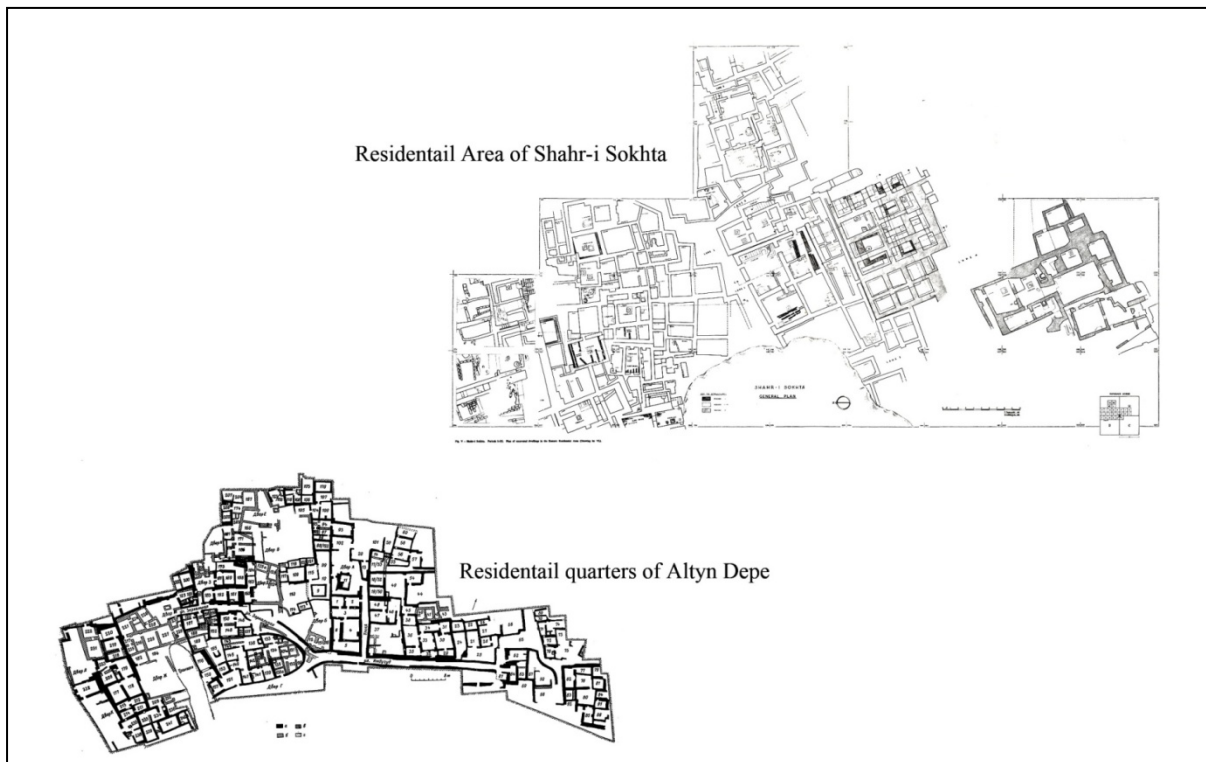
Data comparison:

An analysis of data concerning Shahr-i Sokhta reveals that during its formation period, its links to other contemporary settlements were mostly with settlements located at the southern foothills of Kopet Dag in southern Turkmenistan. Of these settlements, Altydepe shows the most number of links with Shahr-i Sokhta. Shahr-i Sokhta's artifacts and data can be compared with those of Altyn Tepe from various aspects, which are mentioned below:

Architecture and city planning

The architecture of Shahr-i Sokhta is comparable to that of Altyn Tepe from several aspects. The manner of locating a home in a neighborhood and the arrangement of different neighborhoods beside each other are a couple of these aspects. Excavations performed in the residential area of Shahr-i Sokhta suggest that there were various houses in this area which could each house an extended family or several nuclear families. The House of Stairs and the House of Foundations, the plans for which can be seen below, are examples of such buildings. They show clearly that the inhabitants of Shahr-i Sokhta used high standards in building their houses. Although several houses can also be distinguished in Altyn Tepe, the preserved condition of Shahr-i Sokhta houses enables us to reconstruct the various phases of the building process. Houses were built according to a single, unchanging plan, and the techniques of using adobe remained unchanged all along the history of the settlement. Apart from what was mentioned above, some city-planning features of Shahr-i Sokhta were unique to this site, features such as wastewater disposal installations using large pottery pipes.

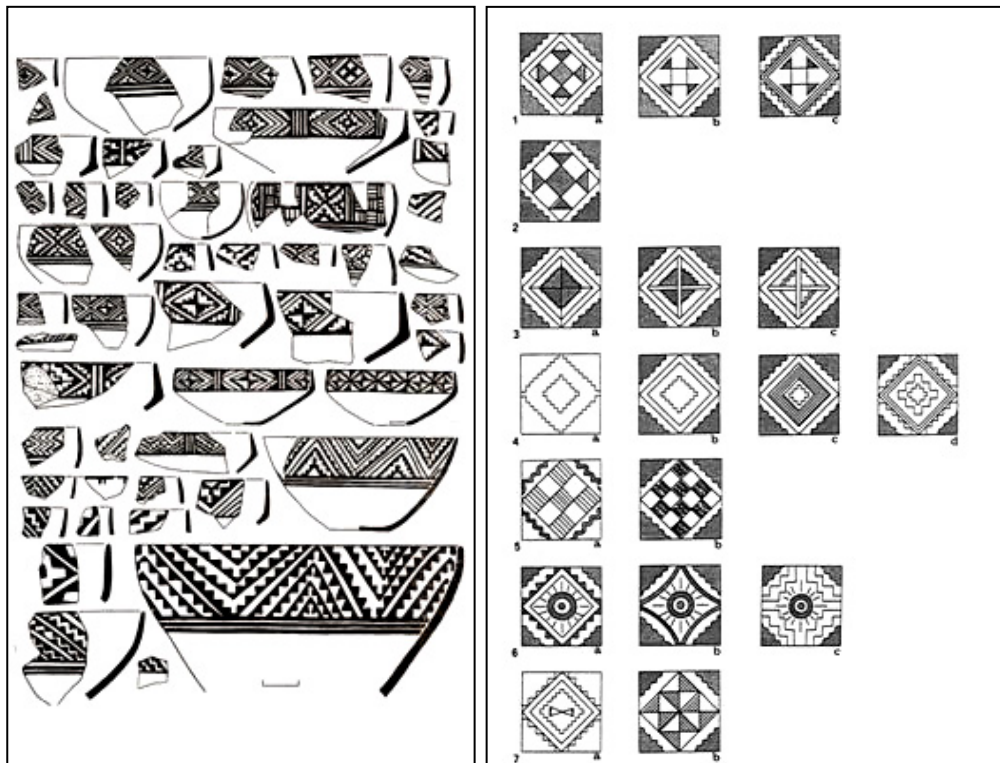
The results of excavations performed in the eastern residential area and the central parts of the settlement suggest that the city grew in accordance with a pre-determined master plan and the infrastructure installations were allocated to various parts of the residential neighborhoods. All urban services were within the city or in its immediate vicinity. The area covered by Shahr-i Sokhta reached 80 hectares during the second settlement period, while the area of all parts of the Altyn Tepe settlement didn't exceed 50 hectares. This proves that Shahr-i Sokhta was a metropolis with hundreds of satellite villages surrounding it. This condition is not observed in Altyn Tepe.



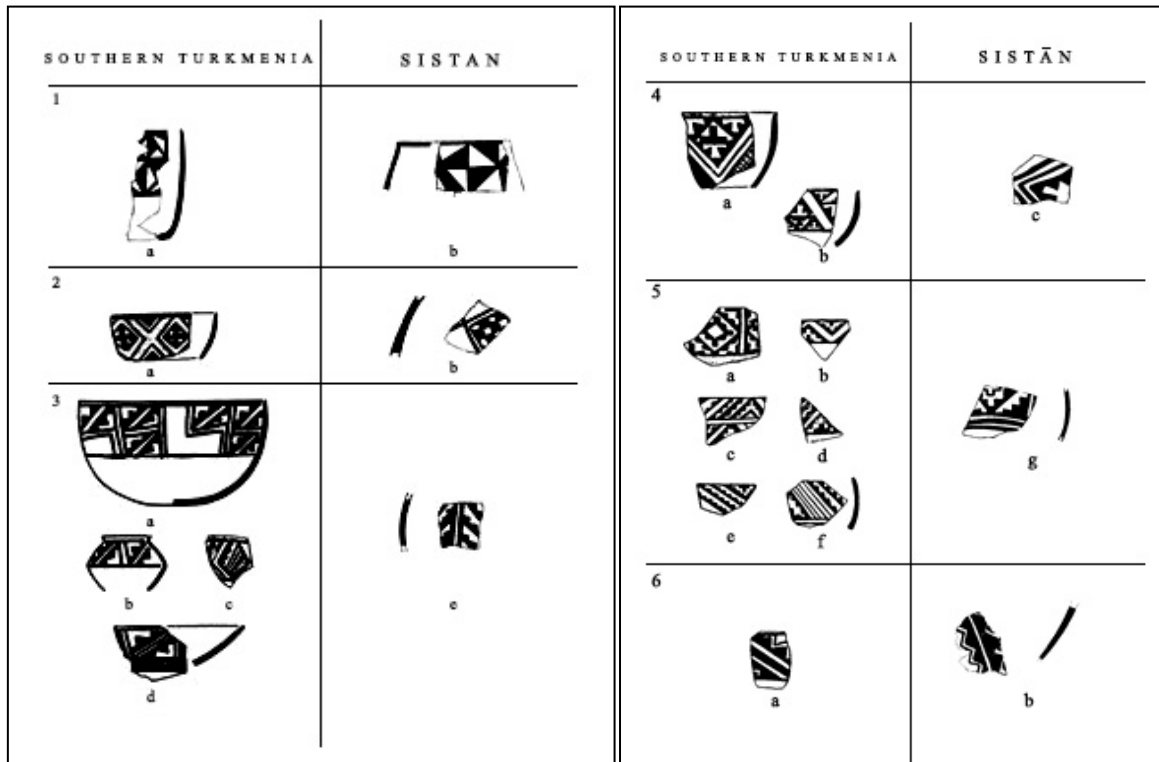
Map

These beige potteries, which are also called the Geoksyur tradition potteries, have been unearthed in various ancient sites in southern Turkmenistan including Khapuz Tepe, Ulug Depe (Lecompte et al., 2001), Altyn Tepe (Masson,1988), Karatepe (Masson & Sarianidi, 1972), and Geoksyur (Sarianidi, 1965).

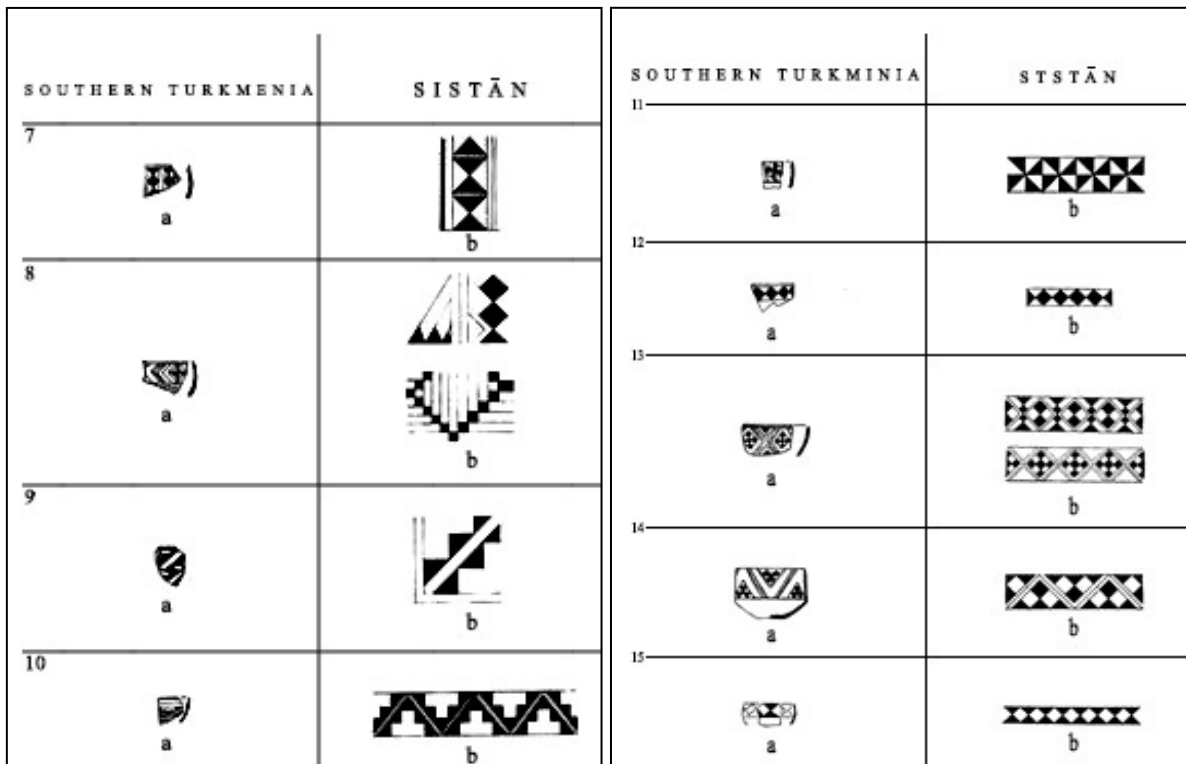
At the same time, archaeologists have discovered potteries in the Quetta Valley in Pakistan which have decorations quite similar to the decoration of potteries from the first settlement period in Shahr-i Sokhta and potteries from Central Asia, southern Turkmenistan, and especially Altyn Tepe (Fairservis, 1956). The Quetta potteries are more recent than those of Shahr-i Sokhta; so it means that during pre-historic times Shahr-i Sokhta acted as a link that joined the two important regions of Central Asia and Pakistan. There's convincing evidence that Shahr-i Sokhta was one of the main origins of the pottery-making tradition in Quetta. In fact, the artifacts unearthed in Shahr-i Sokhta reflect the first phases of the formation of the Quetta complex over a vast region from Baluchistan to Kandahar.

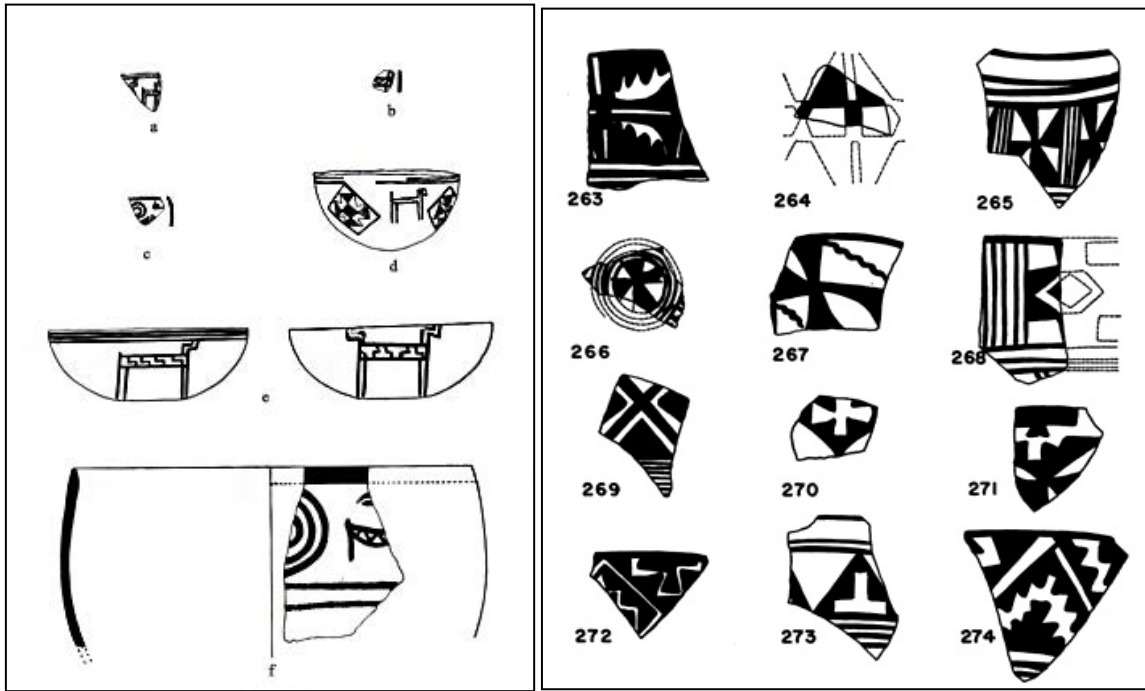


Figure

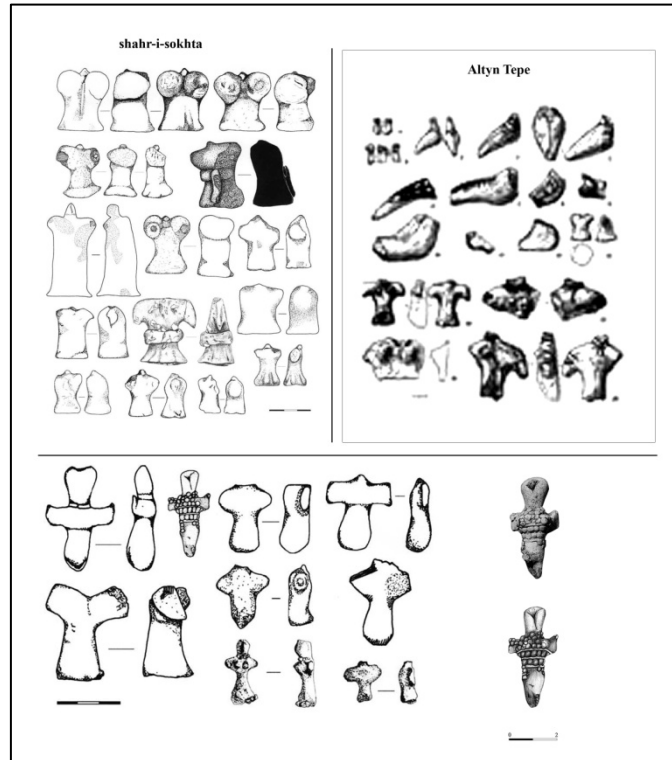


Figure





Figure

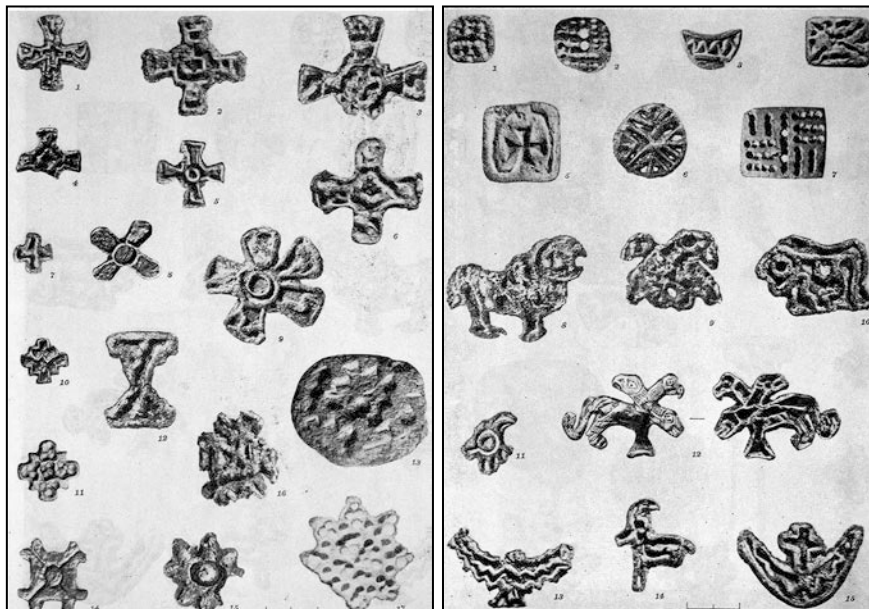


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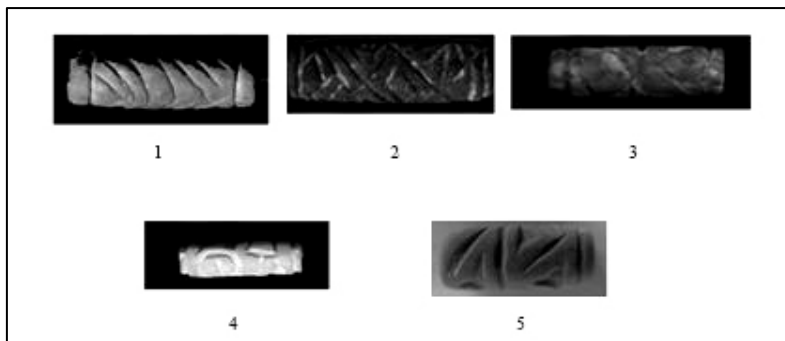
The study of cylindrical seals and their impressions discovered in the earliest layers of Shahr-i Sokhta clearly proves that during its first settlement period, the city had extensive links with the cultures of southern and southwestern Iran. A good example is the impression of a cylindrical seal discovered by the Italian team during excavations in the eastern residential area which shows the images of species of the canidae family, birds and snakes.

This seal impression belongs to the first settlement period and strongly resembles the seals of Susa (Tosi, 1983) and some specimens recently discovered at Kenar Sandal in Jiroft (Majid zadeh & Pittman, 2008). In room CCLXV in the eastern residential area several seal impressions have been found which show the image of a mythological creature. This creature has a human head and torso and hooved feet. It's wearing a horned hat, has his hands on his waist, and his torso is shown in profile. This mythological creature is female because its female breasts are easily distinguishable. Several seal impressions have also been discovered at the Mesopotamian city of Ur which belong to the early third millennium B.C. and show images exactly similar to the images on a cylindrical seal from Shahr-i Sokhta. This proves the existence of trade relations between these two regions (Collon, 1999).

No evidence for a proto-Elamite culture has been found in Central Asia and Altyn Tepe. But from the earliest layer of Shahr-i Sokhta a proto-Elamite tablet has been discovered, which marks the easternmost boundary for the discovery of proto-Elamite tablets in the Iranian Plateau.



Figure



Figure

Ancient Site	Area & dimension	Type	Settlement Duration	Cultural periods	Elements of Site	History of Researches
Shahr-i Sokhta (Iran)	151 ha Highest level: 35m	Mound	1200 years: four period Period I (3200-2800 B.C.) Period II (2800-2500 B.C.) Period III (2500-2200 B.C.) Period IV (2200-1850 B.C.)	Late Chalcolithic Early Bronze Age Middle Bronze Age	Eastern Residential Area Central Quarters Monumental Zone Industrial Zone Graveyard	1967-1978 (by IsMEO under the direction of M. Tosi) 1997-2009 (by Iranian Cultural Heritage expedition, under the direction of S. M. S. Sajjadi).
Altyn Tepe (Turkmenista)	25-26 ha Highest level: 12m	Mound	700 years	Chalcolithic Bronze Age	Lower City Elits quarter Artisanal quarter Defensive wall	1929-2001 (but not regularly)

Sohr Damb/Nal

Sohr Damb is the type site of the Nal complex, located in Central Baluchistan in western Pakistan, in the region bordering on Iran and Afghanistan. The area is the junction of travel routes to the north, to the coast in the south and to the Indus valley in the east. At 1250 m, the site covers an expanse of 4 ha and is 13m high, the tell site itself covers.

Excavations are concentrated on the investigation of the cemetery that is dated to period I, and on the habitation, dated to periods II and III. Well preserved contexts and room inventories with up to 300 vessels, figurines, tools and jewellery provide insights into the function of the buildings and show changes in technology and style over the course of time.

After 1 season of excavation by H Hargreaves in 1924, which made the polychrome Nal pottery widely known (Hargreaves, 1929), no further work took place until the Joint German-Pakistani Archaeological Mission resumed excavations in 2001. So far, 4 seasons of excavations have been undertaken, which have revealed 4 periods of occupation, dated from about 3800 to 2000 BC. The well-stratified assemblages provide new insights into cultural processes and developments, and enhance the comparative frameworks through typological series and a comprehensive set of radiocarbon dates (Görsdorf & Franke-Vogte, 2007).

Period I (Togau), this period was discovered under the still undisturbed stone foundations of buildings of period II, which were uncovered during the excavations of 1925. There a cemetery with fractional, secondary burials came to light. The grave chambers contained up to sixteen individuals of all age groups as well as numerous grave goods, mainly pottery and beads made of semi-precious stones and shell. At that time the settlement extended over the entire northern part of the tell, but it is superimposed by later cultural layers of more than 6 m in height.

Period II, with the beginning of period II (Nal) the architecture, burial customs and many technological and stylistic features change. Now all of the deceased are buried in single graves, and the number of grave goods decreases to a few vessels. Rooms in the mud brick houses are small and exhibit the typical signs of domestic activities, such as storage bins, numerous vessels, grinding stones, stone and bone implements, bull figurines and beads. Aside from the polychrome 'luxury ware', Nal ceramics also comprises many kinds of domestic pottery.

Period III, this chronologically disputed horizon is evidenced in Sohr Damb by 6-m thick cultural layers. Their large-scale excavation has contributed to the dating of this important time and shown that the cultural landscape was more strongly diversified than hitherto assumed. Once again, there is a change in architecture, technology and stylistic features. Polychrome painting and typical Nal vessels no longer appear. The houses and rooms are larger, typically with clay or plaster floors, gravel foundations, and wood used for foundations and roofs.

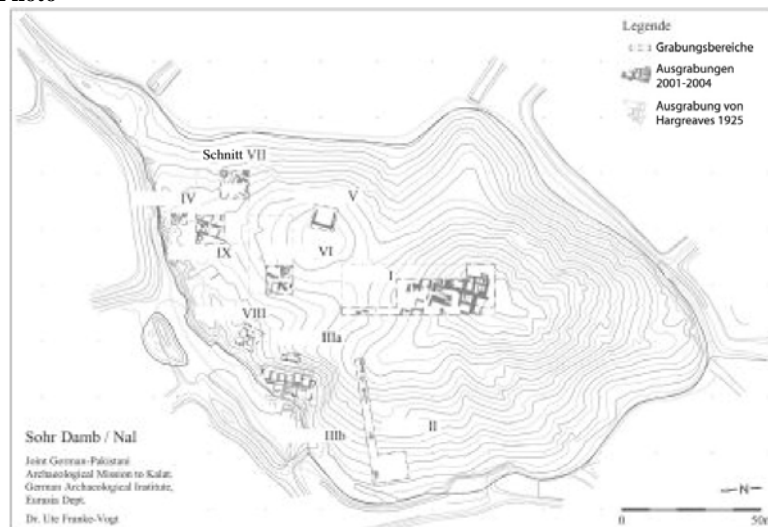
All rooms still revealed an all-inclusive inventory, such as implements made of stone and bone, pottery, beads, figurines and also some copper seals. Kilns, misfirings, auxiliary means and casting crucibles show that the pottery was produced locally and that copper, perhaps also silver, were processed at the site.

Period III has several links to sites in Pakistan, Afghanistan, and Iran, such as Miri Qalat IIIb–c, Mehrgarh VI–VII/ Nausharo I, Quetta III, Mundigak IV, and Shahr-i Sokhta II–III. Period IV represents a Kulli-Harappan occupation, which is dated to the second half of the 3rd millennium BC.

The final period IV is severely eroded. It can be assigned to the Kulli-Harappa-horizon, which is linked by features shared with the Indus culture and the regional Kulli complex.



Photo



After that the history of settlement of the mound as well as the entire region ceases for almost 1500 years. The reason for this discontinuation is a point of controversy. Palaeobotanical and palaeozoological studies in Sohr Damb imply that the environment has not changed essentially. Abandonment and water shortage are, thus, unlikely factors, and a proposed shift in the course of the rivers can be ruled out as an explanation here, in contrast to the Indus valley proper.

Current research in Nal has provided the grounds for a new interpretation of the cultural development in the region and their far-reaching relations. Of particular importance is the recognition that many of the known culture complexes did not appear in succession, but were coexistent, and that the changes between the periods go beyond a gradual change.

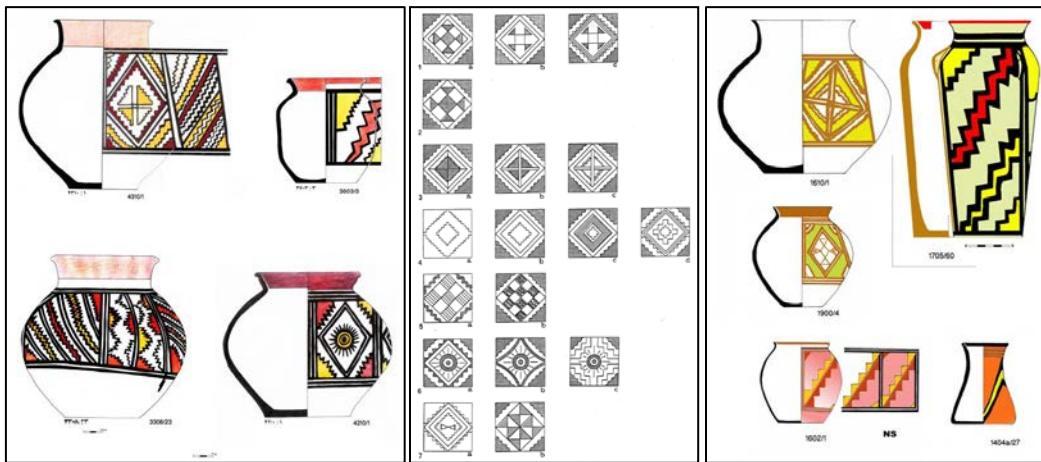
Comparative dates:

A comparison of artifacts unearthed during excavations in Shahr-i Sokhta with specimens discovered in Sohr Damb/Nal shows that during the third millennium B.C., these two ancient sites had contact with each other. Polychrome potteries recovered from the graveyard and residential areas are an example of outstanding artifacts of Shahr-i Sokhta. These pottery vessels, which are usually in the shape of spherical or cylindrical jars, have been decorated with polychrome colors (yellow, orange, red, black, and green) motifs. Such potteries are known as Sohr Damb/Nal ware in the Indo-Iranian Borderlands culture. The Sohr Damb/Nal ware have been recovered from period II of this ancient site. This period ranged from 3100 to 2700 B.C.; the former date coincides with the beginning of the first settlement period of Shahr-i Sokhta, and the latter date corresponds with the beginning of the second settlement period at Shahr-i Sokhta. Nal potshards have been discovered in layers belonging to the first settlement period in Shahr-i Sokhta (Amiet & Tosi, 1978). This shows that the tradition of making polychrome ceramics was simultaneously present in Shahr-i Sokhta from the first settlement period. In addition, although the history of Nal polychrome pottery is older than Shahr-i Sokhta's, but the craftsmen and potters of Shahr-i Sokhta improved the manufacturing techniques of polychrome vessels and created new types (Jarrige et al., 2011). Spherical jars from Shahr-i Sokhta are a good example of such new types which have not been found in any other ancient site. The Shahr-i Sokhta's specimens which closely resemble those of Nal have been recovered from the first settlement period, while the potteries from the second settlement period are considered domestic creations of Shahr-i Sokhta. Another point regarding the relations between the inhabitants of Nal and Shahr-i Sokhta is that since Shahr-i Sokhta was the focal point of route for semi-precious stones trade such as lapis lazuli, The residents of Nal were obliged to have contacts with Shahr-i Sokhta in order to satisfy their need for raw materials. Shahr-i Sokhta was the most important, or the only source for lapis lazuli all across the Iranian Plateau.

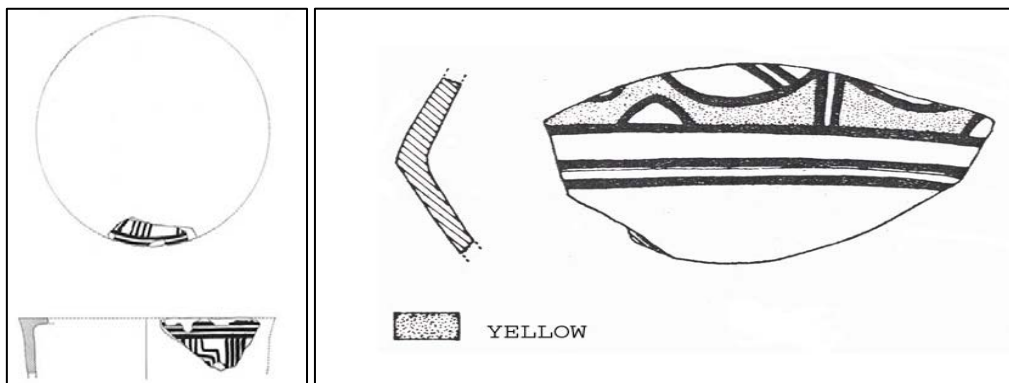
Another advantage of Shahr-i Sokhta was a big city with an area of at least 150 hectares, while Sohr Damb was a small, probably rural settlement with an area of 4 hectares. In addition, archaeological investigations prove that professional craftsmen in Shahr-i Sokhta

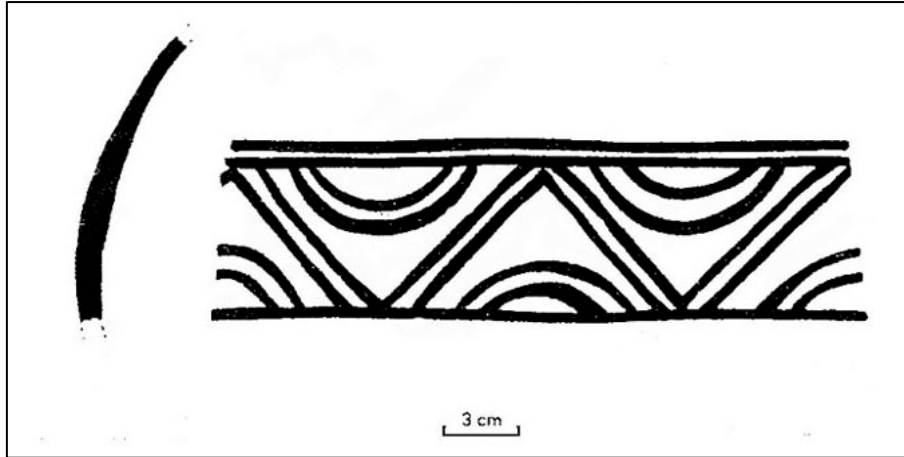
spent all their time at their craft and mass-produced products such as pottery and marble vessels, while no such evidence has been found in Sohr Damb.

It should be mentioned that the cultural and economic relations of Shahr-i Sokhta with the outside world was not limited to Baluchestan, but included contacts with various parts of the ancient world in Central Asia, Indus, the shores of the Makran Sea and western regions.

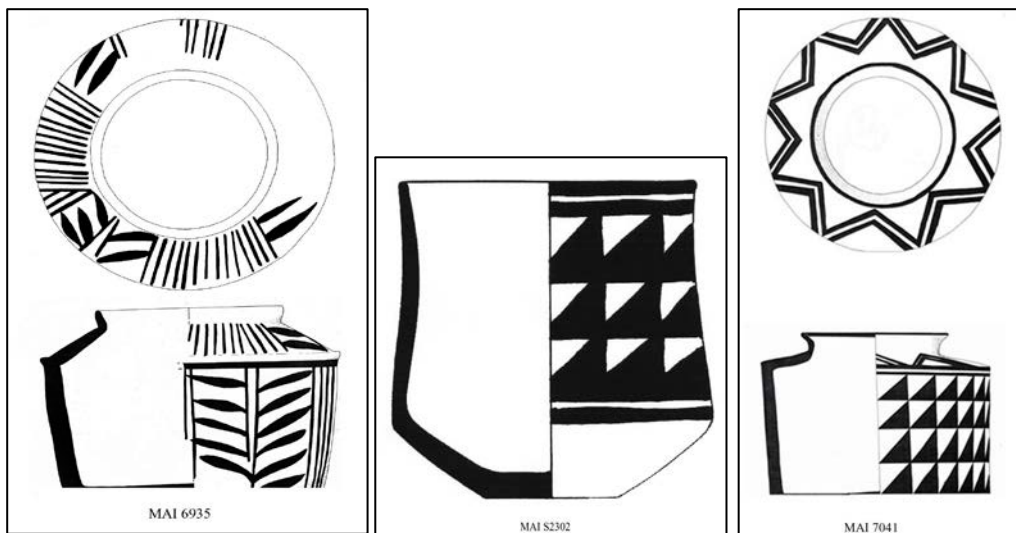


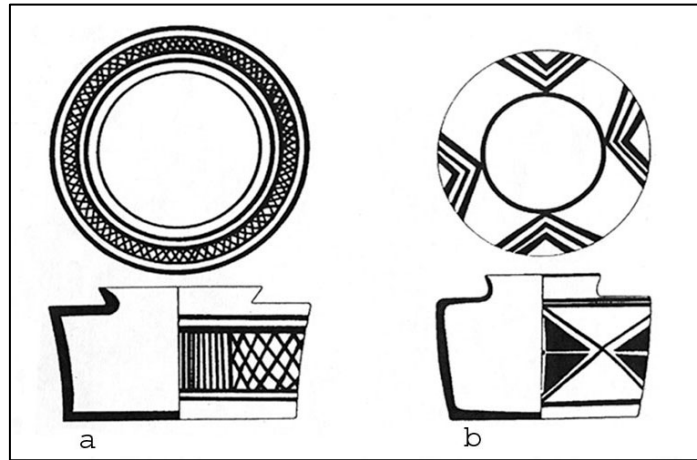
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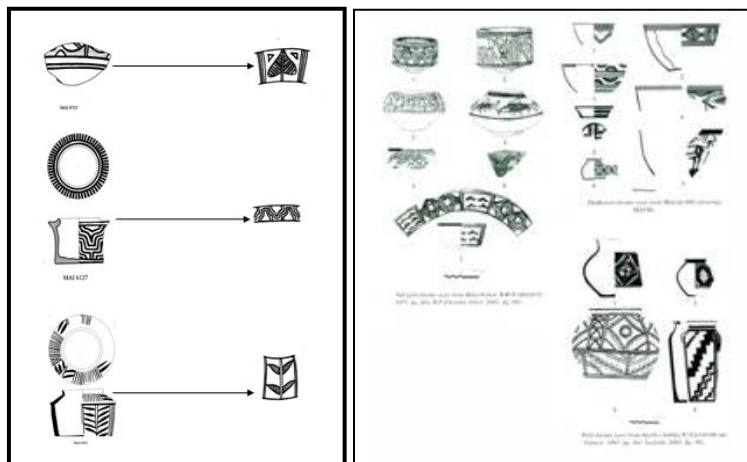
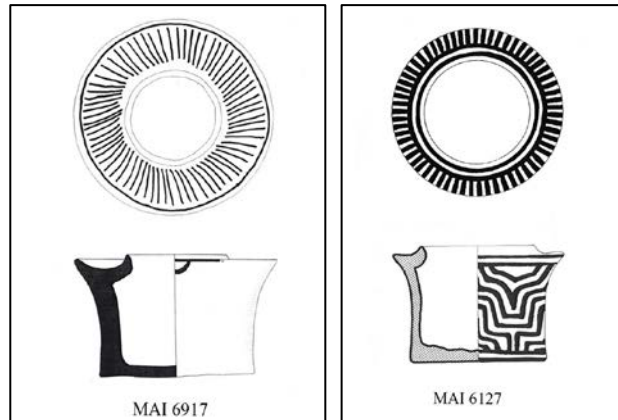


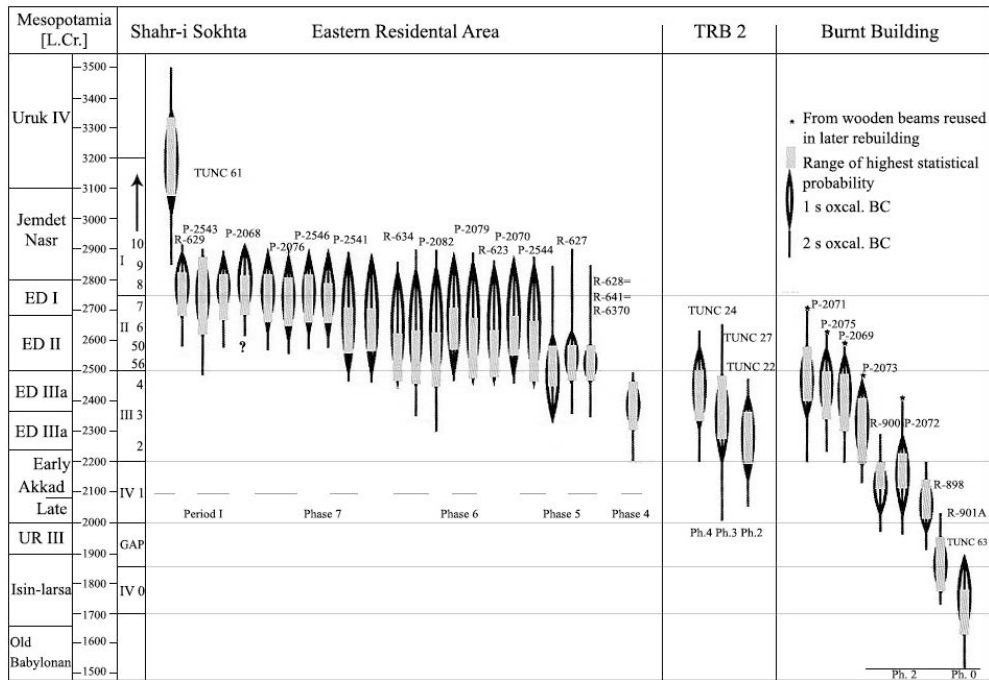
Figure





Figure





Table

Ancient Site	Area & dimension	Type	Settlement Duration	Cultural periods	Elements of Site	History of Researches
Shahr-i Sokhta (Iran)	151 ha Highest level: 35m	Mound	1200 years: four period Period I (3200-2800 B. C.) Period II (2800-2500 B. C.) Period III (2500-2200 B. C.) Period IV (2200-1850 B. C.)	Late Chalcolithic Early Bronze Age Middle Bronze Age	Eastern Residential Area Central Quarters Monumental Zone Industrial Zone Graveyard	1967-1978 (by IsMEO under the direction of M. Tosi) 1997-2009 (by Iranian Cultural Heritage expedition, under the direction of S. M. S. Sajjadi)
Sohr Damb (Pakistan)	4 ha Highest level: 13m	Mound	1800 years	Chalcolithic Bronze Age	Citadel Lower City	2001-2008

Mundigak

The site of Mundigak near Kandahar in Afghanistan was the first settlement of the “Hilmand Civilization” to be subjected to thorough research and excavation work. The Tepe is situated near the junction of the Arghandab and the Hilmand River in the Kishk-I Nakhod Rud valley. It is an extensively eroded mound some twenty meters high and about 150 meters in diameter. It is surrounded by numerous secondary Tepes, the largest of which is no more than 5-6 meters high (Casal, 1961, p.1, 22).

The sequence of the site was reconstructed during ten excavation campaigns directed by J. M. Casal. It goes from the beginning of the 4th millennium B. C. to mid- 1st millennium B. C. and is divided into seven periods, at least one of which is a long period of abandonment and occasional frequentation. Period I, divided into 5 phases, is characterized by wheel-turned pottery with painted decoration resembling that of Amri. This period also saw the introduction of bronze. Period II has three phases during which the population density increased. In most cases, the pottery is handmade. The first stone seal dates back to this period.

The following period, Mundigak III, with six phases, is characterized by the introduction of the so-called “Quetta” pottery which was actually due to strong South-Turkmen influences (H. 1, 4 a).

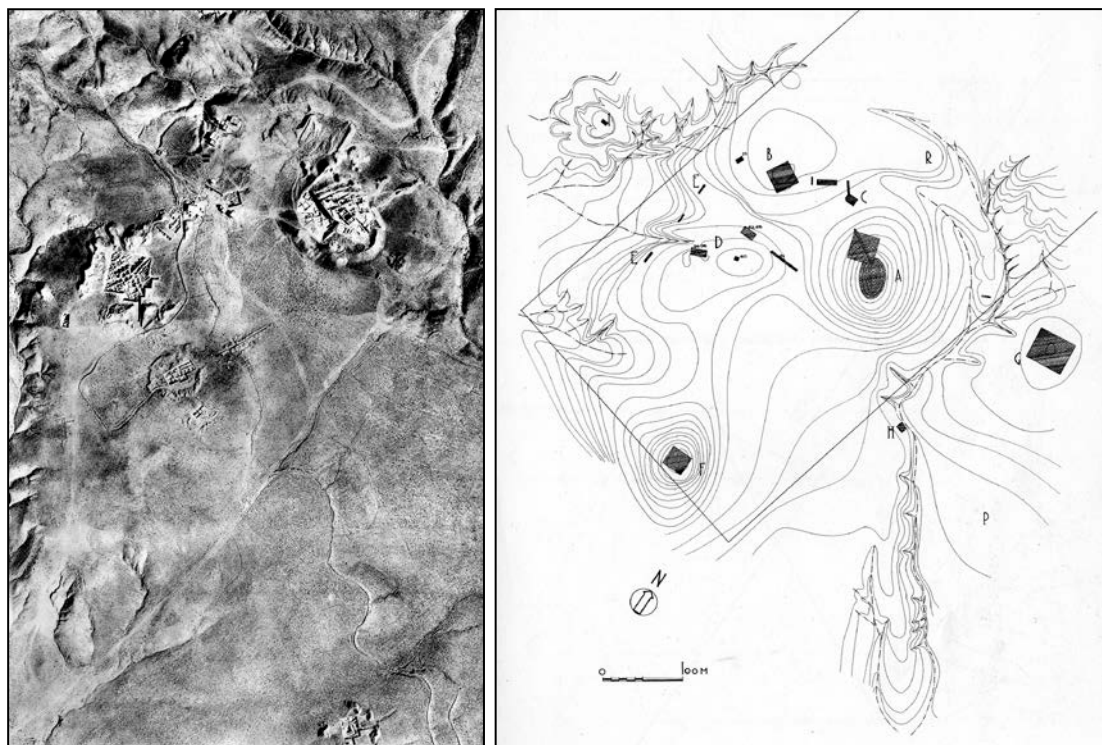
The general impression given by this period is one of over-population and innovation. New pottery and decorative types are introduced and the number of seals, copper remains and microliths increases. The impression is one of an increase in the city's wealth which is a prelude to the expansion occurring in the following period (Casal, 1961). The dating suggested by Casal for the end of this period is the first quarter of the 3rd millennium.

In period IV the village was transformed into a city covering the whole area of the Tepe including the smaller mounds. The city has a palace decorated with semi-columns, a defensive wall, a temple and statues, an example of which is represented by a biconical limestone head (Biscione, 1974).

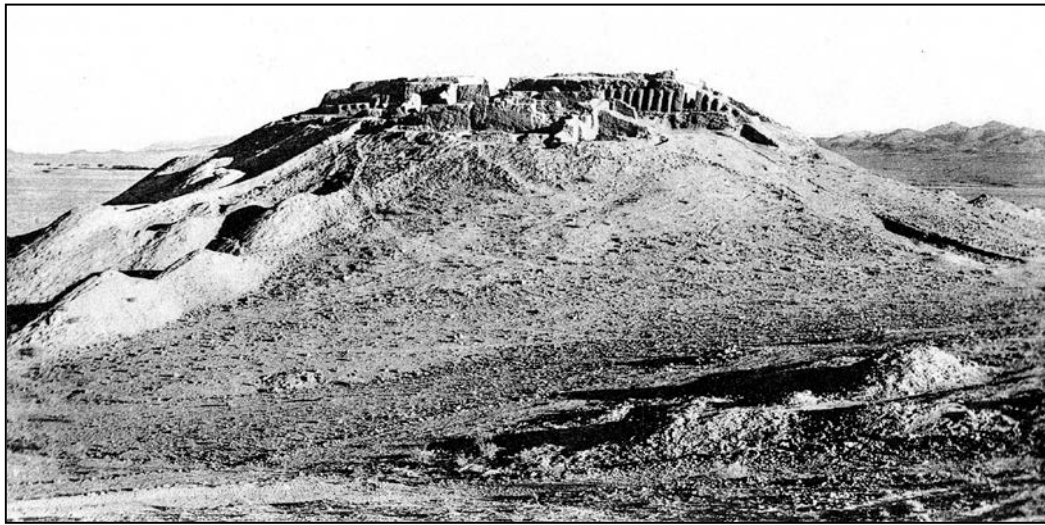
During this period the Turkmen type pottery disappears and shapes and decorations typical of the “Hilmand Civilization” return definitively, characterized by naturalistic motifs goats, pipal leaves and brandy cup shapes. Bronze stamp seals are widely used. Period IV has been divided into three phases which are differentiated by statistical variations in the basic pottery types connected with different structural phases (Casal, 1961). Casal dates this period as the second quarter of the 3rd millennium for phase IV, 1 (3000-2800 B. C.) and the end of the 3rd millennium for the end of Mundigak IV, 3, (2800-2500 B. C.). In the following period, Mundigak V, the cultural continuity of periods III and IV is interrupted. Period V follows period IV after abandonment and is characterized by pottery with red slip and purple decoration.

The decorative motifs have very little in common with those of the preceding period as they are based almost entirely on cross-hatched bands and extremely elongated pendant triangles. The comparisons possible again point towards Central Asia, towards Fergana, where the Khust culture has similar shapes and motifs.

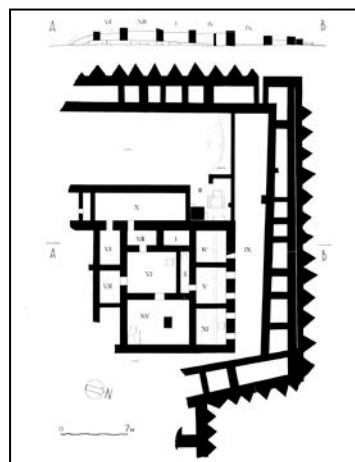
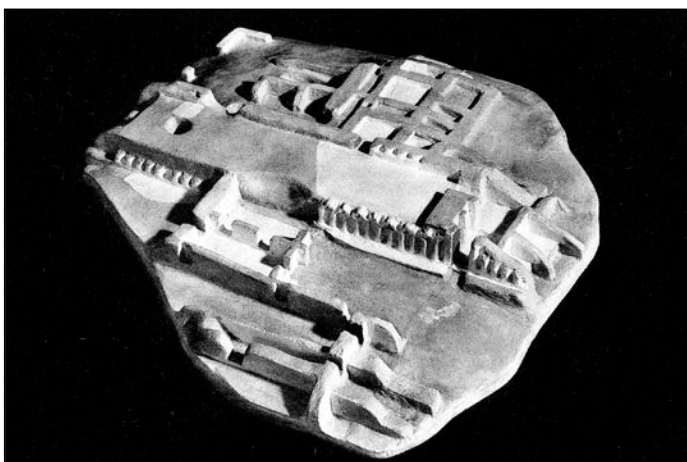
The following period was one of abandonment with sporadic frequentation. According to Casal the pottery displays continuity with period V. Recent excavations in southern Turkmenistan and northern Afghanistan have revealed the existence of a cultural complex with pottery very similar to that of Mundigak VI. The proposed dates for this period are last quarter of the 2nd millennium or the beginning of the 1st millennium. The last period in the life of Mundigak is period VII; it was characterized by the use of iron and the appearance of trilobite arrows. Initially painted, the pottery towards the end of the period has only incised decoration. The structures assigned to this period are a series of low walls and small rooms which are believed to be grain store-rooms. After the mid-first millennium B. C. there are no further traces of settlements or occasional frequentation (Biscione, 1974).



Photo



Photo



Comparison of data:

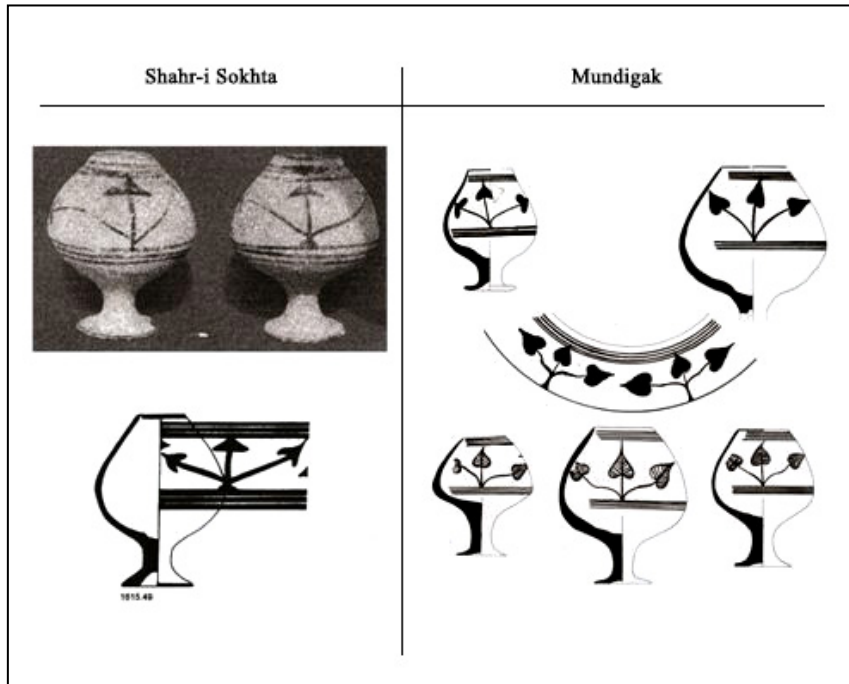
Mundigak and Shahr-i Sokhta are the main proto-urban centers of the "Hilmand culture", on the Iranian-Afghan border. The sequence of Mundigak ranges from early IV to mid-1st millennia B. C., being divided in 7 periods, while Shahr-i Sokhta's sequence is limited to 3rd millennium B. C. In spite of the common basis of an almost completely identical material culture, there are a number of differences between the two cities. Mundigak, a smaller settlement on the upper reaches of the river, may give the impression of being a town of secondary importance, cut off from long-range trade and open only to influences from Central Asia. Contrarily, Shahr-i Sokhta is much larger and open to international trade. In addition to showing the Turkmen influences observed also at Mundigak, it communicates with Mesopotamia, Persian Gulf and south Iran (Lamberg –Karlowsky & Tosi, 1973).

First of all, we will examine the most typical pottery shapes and decorations of the two Hilmand valley towns to make a more precise importance of Shahr-i Sokhta and relative chronology of the two sites. Here, a chronological table is given precisizing the contemporary periods at two sites of "Hilmand civilization".

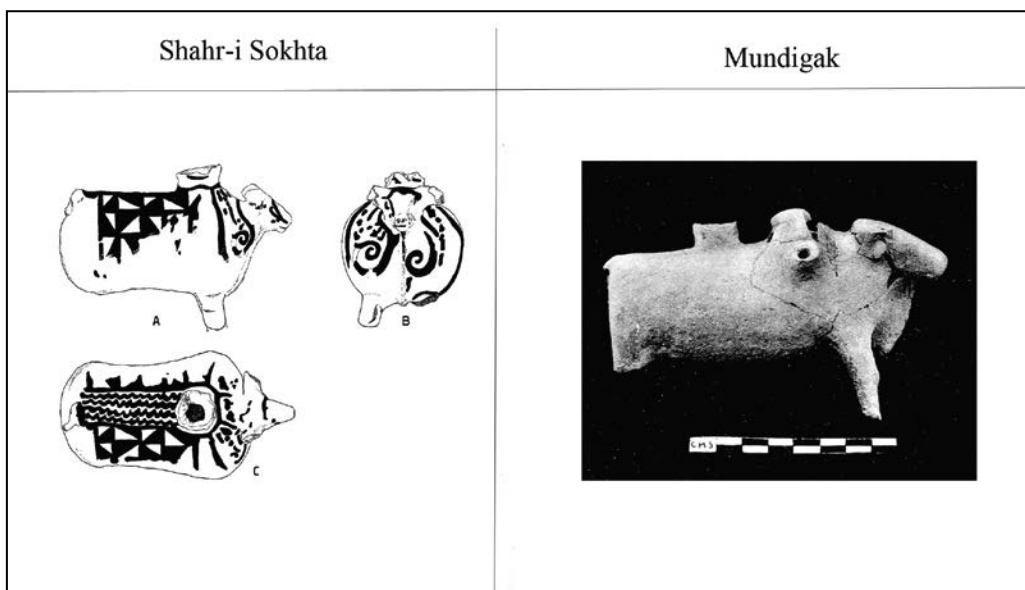
Comparative chronological table of Shahr-i Sokhta & Mundigak	
Shahr-i Sokhta	Mundigak
Period IV	Period IV, 3
Period III	Period IV, 2
Period II	Period IV, 1
Period I	Period III

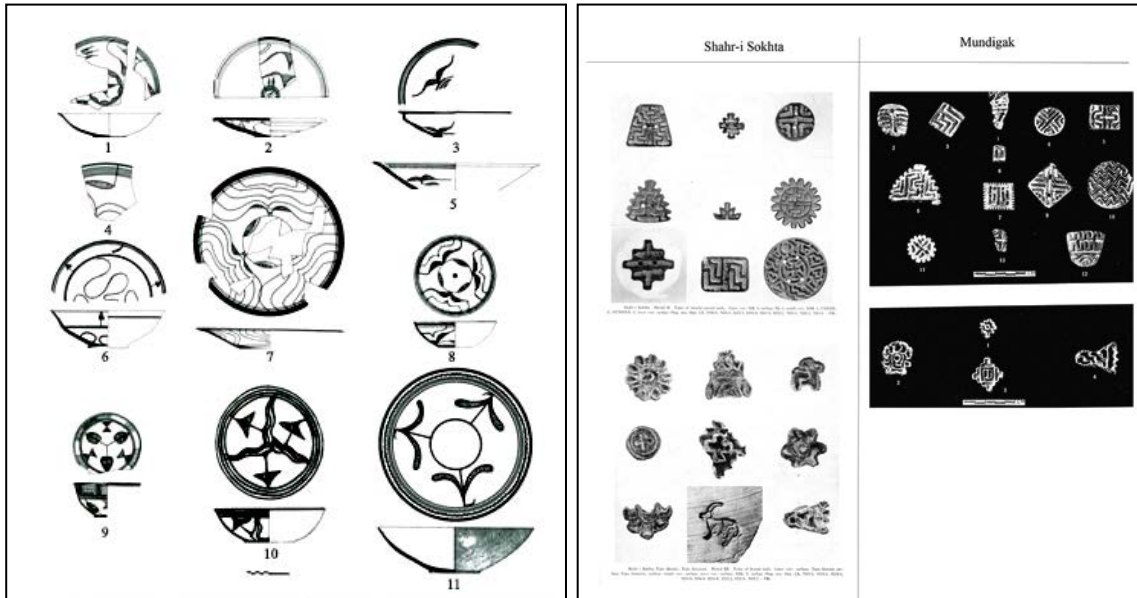
At Shahr-i Sokhta, during phases 10-9, Turkmen type decorations account for about 40% of all motifs, the Kechi Beg type 16% and other typical decorations of the period about 44% of the finds (Lamberg –Karlowsky & Tosi, 1973) and they have not been found in more recent levels. At Mundigak they pervade all the phases of period III. No statistical data have so far been published on the percentage of finds made of this ceramic class and so there are no data available for precise comparisons. However, the situation at Mundigak differs partly from that of Shahr-i Sokhta. In the latter site, in the period I pottery, decorative motifs typical of later phases are very rare, and the decorated pottery almost exclusively shows Turkmen and Kechi Beg type decorations based on festoons hanging from the rims of bowls. Also other kinds of decorations are found but they are usually motifs that are not present in the later phases. At Mundigak, however, as early as period IV, 1, motifs begin to appear which are found also in the lateral phases (Casal, 1961). At Mundigak 10.34% of the potsherds and whole vessels is of the Turkmen type; 3.44% is of Kechi Beg style and 4.31 % shows affinities with elements of Shahr-i Sokhta period I contained in the two types described previously.

A further fact, whose significance is, however, not completely clear, is the presence at Mundigak of decorations which are also found in Shahr-i Sokhta periods II-III and Mundigak IV. For the period of Mundigak IV, the cases of total identity are represented by numerous sherds similar to 38 decorative motifs from Shahr-i Sokhta, mainly concentrated in phases IV, 1 and IV, 4 (Biscione, 1974).



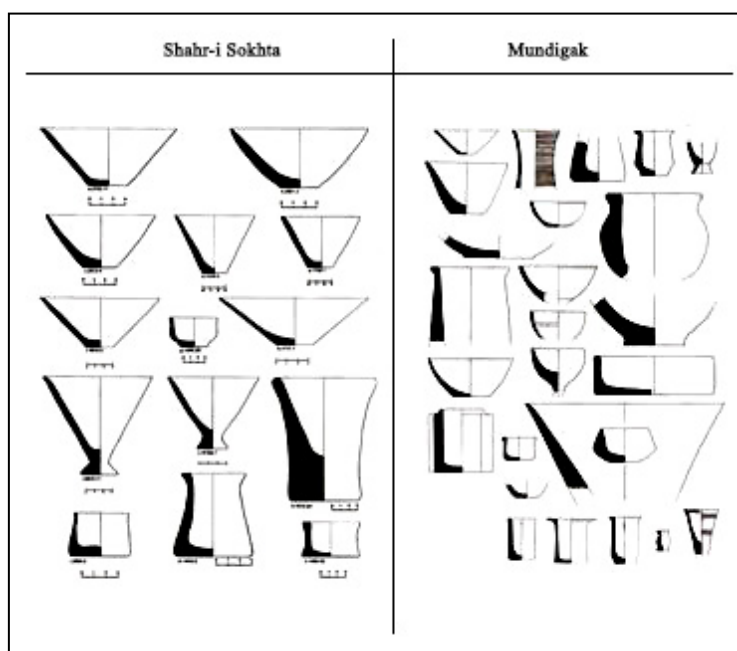
Figure





Figure





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Shahr-i Sokhta (Iran)	151 ha Highest level: 35m	Mound	1200 years: four period Period I (3200-2800 B. C.) Period II (2800-2500 B. C.) Period III (2500-2200 B. C.) Period IV (2200-1850 B. C.)	Late Chalcolithic Early Bronze Age Middle Bronze Age	Eastern Residential Area Central Quarters Monumental Zone Industrial Zone Graveyard	1967-1978 (by IsMEO under the direction of M. Tosi) 1997-2009 (by Iranian Cultural Heritage expedition, under the direction of S. M. S. Sajjadi)
Mundigak (Afghanistan)	150 m Highest level: 20m	Mound	3000 years	Chalcolithic Bronze Age	Lower City Temple Palace	1950-1951

Sarazm

Sarazm, which means “where the land begins”, is an archaeological site bearing testimony to the development of human settlements in Central Asia, from the 4th millennium B. C. to the end of the 3rd millennium B. C. This archaeological site is located near Durman (N: 39°31' E: 67°34'), a town situated in the Zarafshan Valley of north-west Tajikistan and situated only 15 km in the west of Penjikent, in the Soghd province near the border with Uzbekistan. The ruins demonstrate the early development of proto-urbanization in this region, reflected in the sophistication of the dwellings, infrastructures, and archaeological findings. It came into being as the result of the complementarily initially between pastoralist and early agrarianism, and subsequently between the exploitation of mineral resources in the Bronze Age and the development of handicrafts, like making tools, ceramics, and jewellery. Sarazm is a key site for understanding the relations between Central Asia, north-eastern Iran, Sistan region and Baluchista in the 3rd millenium B. C (Besenval, 1987).



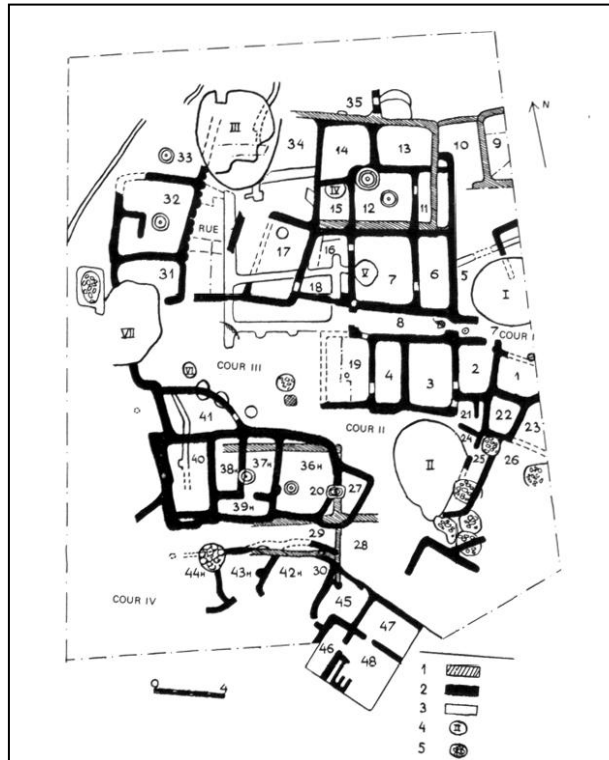
Photo

This center of settlement, one of the oldest in Central Asia, is situated between a mountainous region suitable for cattle breeding by nomadic pastoralists, and a large valley favorable to the development of agriculture and irrigation by the first settled populations in the region. The mountains that frame the main valley, to the north and south of Sarazm, are rich in a variety of mineral raw materials and metal ores. They can be crossed by high valleys and passes which are accessible in the summer, particularly to the south. The resources, such as gold, silver, copper and lead came from mines in the nearby Zerafshan Mountains.

The proto-urban settlement of Sarazm dates back to the first half of the 4th millennium B. C. It may have been established on an earlier village of farmers dating back to the Neolithic. In its earliest level, a particularly rich funerary circle testifies to the existence of an important settlement in around 3500 B. C. Among the remnants of private houses and public buildings there were also found the foundation of several big temples on the city's territory. The most remarkable finding, though, was the burial place of a young woman surrounded by remnants of jewelry, beads and baubles.

from the start of the 3rd millennium B. C, Sarazm also demonstrates the existence of inter-regional commercial and cultural exchanges with peoples over an extensive geographical area, extending from the steppes of Central Asia and Turkmenistan (extending as far as the Aral Sea) to the Iranian plateau, from Eurasian steppe as far as Siberia to Mesopotamia and from Bactria, to Baluchistan, Persian Gulf and the Indus Valley. The Proto-urban site of Sarazm is one of the places that gave birth to and saw the development of the major trans-Eurasian trade routes. This site was a long-lasting and prosperous proto-urban metropolis, at the north-eastern extremity of Iranian plateau exactly like Shahr-i Sokhta in the south eastern extremity of the Plateau. Findings at Sarazm in particular confirm the permanency of interchanges with the mountains of the Hindu Kush.

During the 3rd millennium B. C., Sarazm was an important center for tin and bronze, and for copper and lead, in Central Asia. In addition, Sarazm developed production of manufactured goods: ornaments, ceramics, and tools in metal. It also drew its prosperity from the exploitation of other regional resources: semi-precious stones such as turquoise, agate, and lapis lazuli, and also wool and leather.



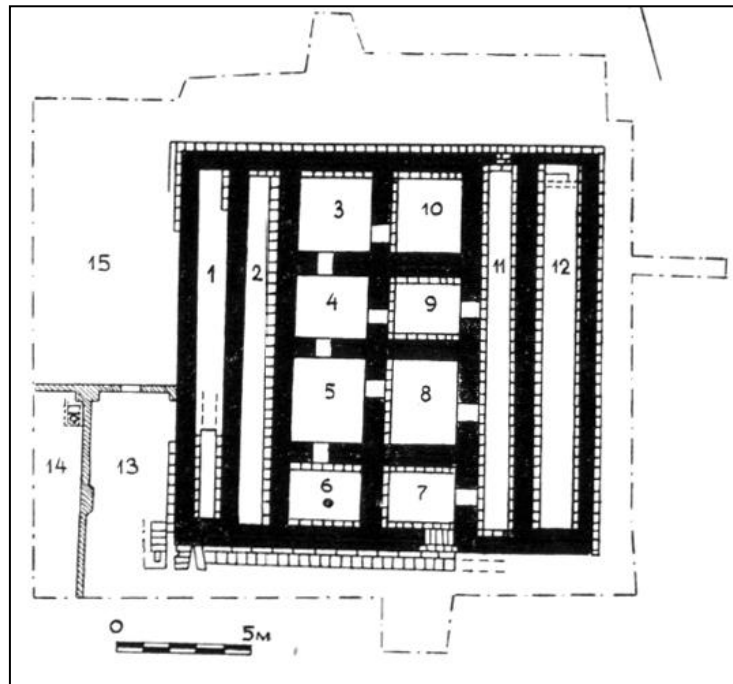
Map



In the trench III, a large rectangular building, 14×15 m. with parallel rooms and store rooms has been found very similar to the building indentified at Altyn Tepe (Besenval & Isakov, 1989).

Sarazm seems to have declined between the middle and end of the 3rd millennium B. C. No evidence of occupation has been found for subsequent periods, and it seems likely that nomadic shepherds then once again inhabited the region. The reasons why Sarazm was abandoned by its inhabitants have not yet been identified. Various scholarly hypotheses have been advanced: a population migration, an epidemic, or military attacks on a settlement which was prosperous but which was located in a non-fortified urban ensemble or arrival of the Indo-Iranians. It was abandoned after the, around 2000 B. C.

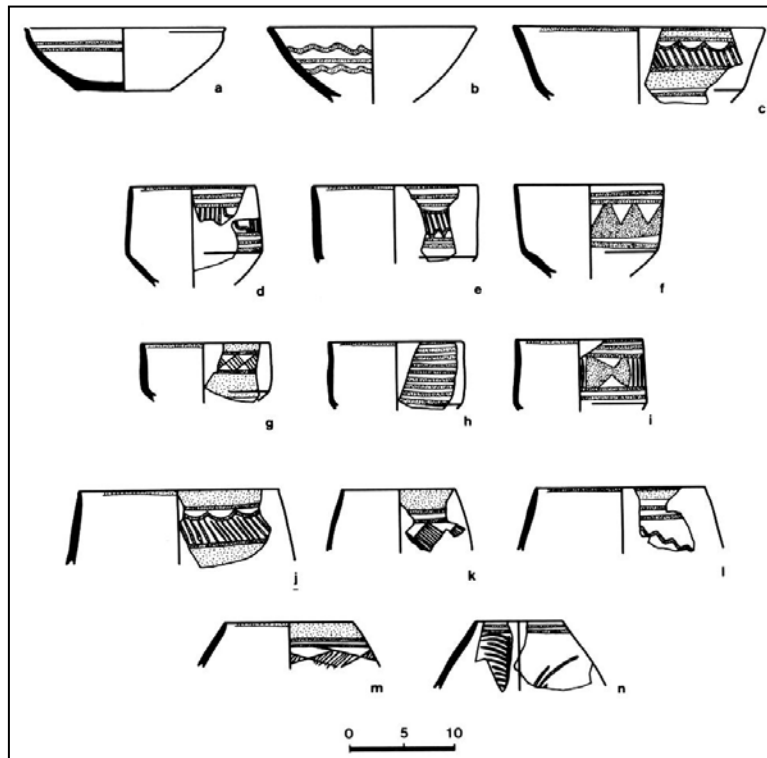
The proto-urban site of Sarazm was inscribed on the World Heritage List in July 2010 as “an archaeological site bearing testimony to the development of human settlements in Central Asia, from the 4th millennium B. C. to the end of the 3rd millennium B. C.”. It is the first World Heritage Site in Tajikistan.

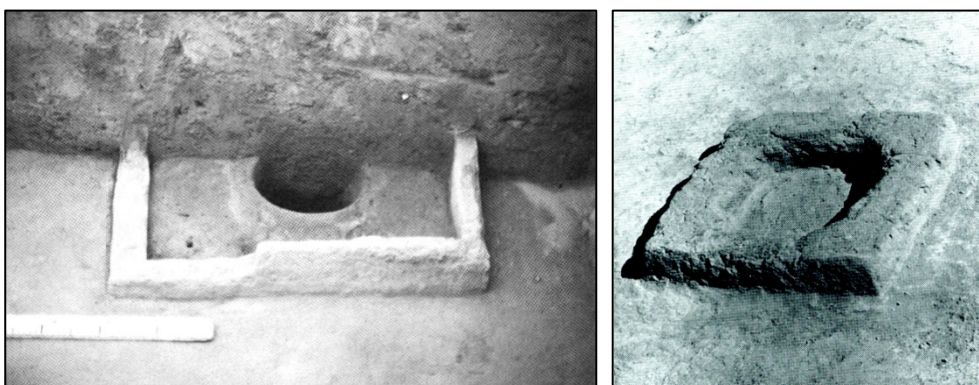


Map



Photo





Photo

Ancient Site	Area & dimension	Type	Settlement Duration	Cultural periods	Elements of Site	History of Researches
Shahr-i Sokhta (Iran)	151 ha Highest level: 35m	Mound	1200 years: four period Period I (3200-2800 B. C.) Period II (2800-2500 B. C.) Period III (2500-2200 B. C.) Period IV (2200-1850 B. C.)	Late Chalcolithic Early Bronze Age Middle Bronze Age	Eastern Residential Area Central Quarters Monumental Zone Industrial Zone Graveyard	1967-1978 (by IsMEO under the direction of M. Tosi) 1997-2009 (by Iranian Cultural Heritage expedition, under the direction of S. M. S. Sajjadi)
Sarazm (Tajikistan)	47 ha Highest level: / m	Mound	About 1500 years	Chalcolithic Bronze Age	Settlement	1977-1991 (by Isakov, Francfort, Besenval)

Conclusion

According to the comparisons, the archaeological evidences show a great degree of integration in a vast region reflected in architecture, certain types of shared ceramic, seals, figurines etc. in this context, Shahr-i Sokhta is the most ancient and best preserved urban ruins on the eastern part of Iranian Plateau, dated back to the end of 4th millennium B. C. this site exercised a considerable impact on the subsequent development of Urbanization patterns and architectural characteristics not only on the Iranian Plateau but also in neighboring regions like Indus Valley (For example, the sewage system at Shahr-i Sokhta is more ancient than Mohenjo-daro) and southern Turkmenia.

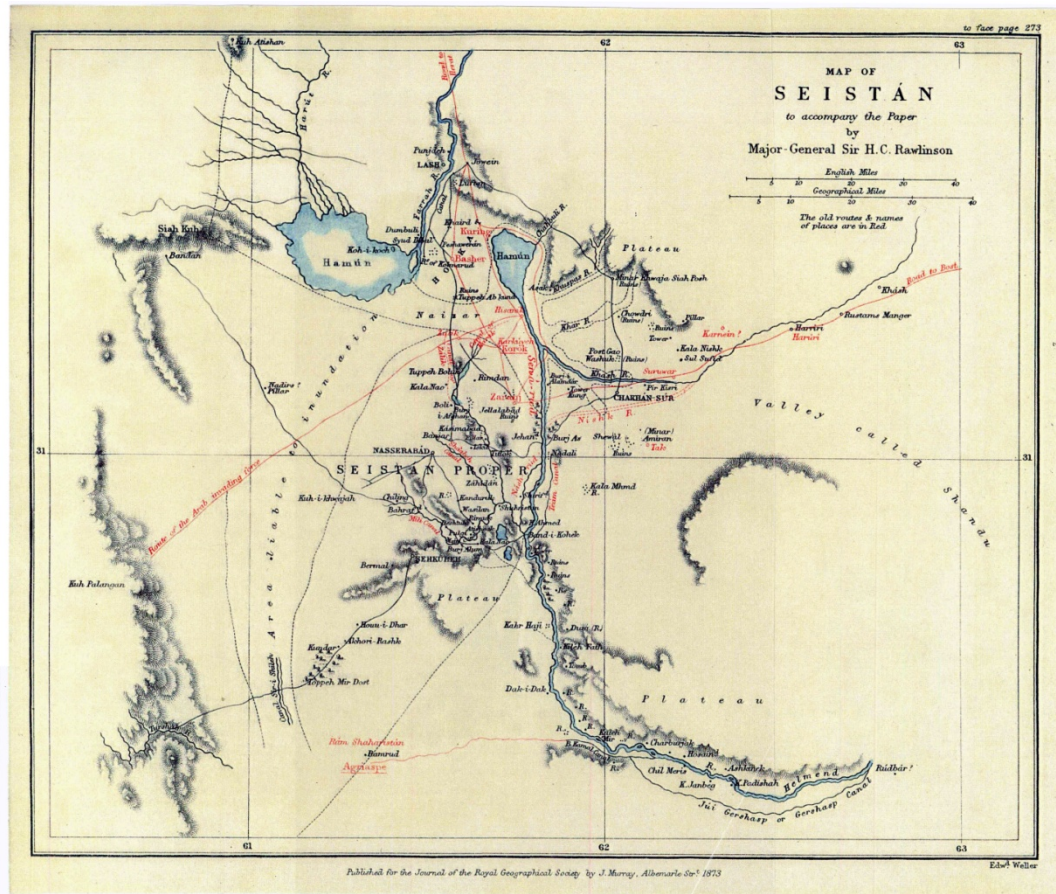
This site has offered to the future generations of peoples inhabited in eastern part of Iranian Plateau a proto-type of architectural model and organization of urban spaces and domestic house making, based on the adaptation with environmental and climatic conditions, moral values and durable development.

As pointed out in the comparative study, the resemblances in the cultural materials of Shahr-i Sokhta and neighbor sites are very clear, bearing in mind the cultural and economical supremacy and there for a considerable influence of the site on the adjacent settlements. This dominance was insured thanks to its unique geographical position and the control of circulation of the raw material, especially (semi-precious stones like lapis lazuli).

Moreover, the continuation of architectural traditions of Shahr-i Sokhta until present day in Sistan is visible. The use of the same material construction, separation of the interior privacy and exterior access to the courts and the rooms in a house, environmental and natural adaptation organization, canalization of the wind for a good aeration of the rooms are some of demonstrations of this continuation.

3.d. Proposed Statement of Outstanding Universal Value

The archaeological site of Shahr-i Sokhta (the ‘Burnt City’) is located in southeast Iran in Sistan-o Baluchistan Province, 55km southwest of Zabol, 215 km northeast of Zahedan, the present-day capital of the province. Shahr-i Sokhta was founded around 3200 BCE and was populated during four main periods stretching from 3200 to 1800 BCE. During this time, Shahr-i Sokhta grew into an important city, but then, associated with the changes in water courses and consequent climate change, lost its importance and was abandoned in the early 2nd millennium. Geographically speaking, Sistan is the easternmost part of the Iranian Plateau bounded by mountainous regions. In the past, a fertile plain surrounded this proto-historic settlement, which was irrigated by the Biaban River, one of the branches of now dry Hilmand River. Today the site is surrounded by an arid desert.



Map

The formation of human settlements in Sistan can be considered as a function of Hilmand's hydrographic and geo-hydrologic evolution. The prehistoric civilization of Sistan, itself a constituent part of the greater Hilmand Basin, is considered a result of social and economic adaptation of man with difficult environmental conditions. Due to an agrarian economy, ancient human settlements were developed along Hilmand and its tributaries.



Photo



Photo



The juxtaposition of neighbourhoods, urban utilities, separation of various parts of the settlement (such as the graveyard and residential areas), and the existence of sewage and drainage systems all tend to support this claim. Archaeologists have articulated Shahr-i Sokhta into the following parts: Southern parts with the centrality of the Kakh-i Sokhta ('Burnt Building'), Eastern Residential Area, Central Quarters, Monumental Area, Northwestern Industrial Zone, Southern Industrial Area, Graveyard.

The construction materials used in Shahr-i Sokhta are a reflection of its geographical setting. The sedimentary plain of Sistan lacks mountains and stones. Therefore, the main construction material is mud brick. These sun-dried mud bricks have a light grey colour, and contain organic materials such as straw. No fired bricks were used in the buildings of Shahr-i Sokhta. Mud bricks were of various sizes, and were made by the use of wooden frames with specific dimensions. So far, no building with a function other than a residential function has been observed in Shahr-i Sokhta. Although there is some evidence suggesting that the monumental zone had a public function, it cannot be definitely considered a temple, an archive, a storage place, or other public function. Excavations have shown that there was a system of water distribution and sewage in the urban area. It can also be noted that the graveyard has been one of the vastest proto-historic graveyards. It contains at least 20,000 to 37,000 graves, probably an underestimation considering the 1000-1200 years of habitation in Shahr-i Sokhta.

Fortunately, some of the discovered artefacts illustrate the early stages of agriculture, sciences, culture, industry, animal husbandry, human migrations, human palaeopathology, palaeoparasitology, etc. This gives a clear social and economic picture of that period. There is ample evidence providing information about various social classes. The existence of professional, career craftsmen can be proven through various means, such as through the tools buried along with these craftsmen, or through artefacts such as marble vessels manufactured by them. There is also the existence of wealthy and poor classes and a hierarchical society deduced from the investigation of burials in Shahr-i Sokhta. This point proves that this ancient city had a complex political-bureaucratic system and enjoyed a high degree of urbanization.

This city is one of the few archaeological sites where artefacts, especially organic materials, have been preserved in the best possible condition due to special environmental and climatic conditions. The discovery of these artefacts during the excavations shows the existence of unique technologies in various fields including manufacture of beautiful alabaster vessels, manufacture of ornaments from semi-precious stones such as lapis lazuli, a relatively advanced metallurgy, an evolved and advanced architecture, manufacture of high quality pottery, unrivalled handicrafts (including the earliest instances of wood inlay and wood carving in the ancient world). All of these prove the artistic and industrial genius of the people of Sistan and Shahr-i Sokhta during prehistoric times.



Photo

Chapter 4 : State of conservation and factors affecting the property

Cultural Heritage Base of Shahr-i Sokhta is responsible for conservation, restoration, documentation and research activities. All public and private organizations are obliged to carry out the legal protection of boundaries and core zone.

4.a. Present state of conservation

At present, all the activities related to the conservation of Shahr-i Sokhta are performed by Shahr-i Sokhta Base under the supervision of ICHHTO. Shahr-i Sokhta which dates back to the pre-historical times until the Islamic period was registered in the list of national properties of Iran in 20th April (1st *Ordibehesht*) 1966 as number 542.

Due to the importance of the site, all archaeological excavations are conducted at the request of Shahr-i Sokhta Base following the confirmation of the Archaeology Center of Iran. Therefore, the proposition for conducting conservation, restoration, reorganization and archaeological excavation was initially prepared at Shahr-i Sokhta Base by experts of the technical committee and was sent to the central bureau of bases in order to be discussed at the technical council of ICHHTO deputy and the Archaeology Council and to be communicated to the Base.

The annual documentation, monitoring, maintenance, conservation and restoration are conducted by Shahr-i Sokhta Base which has experts in various fields such as: archaeology, architecture and restoration.

Structures discovered during excavations are protected either by temporary roof or by *Kahgel* plaster. Both of them are applied regularly by a number of master workers and skilled laborers over the year and under the supervision of experts of the Base. Moreover, surface water disposal routes as well as site sloping are reorganized systematically during the course of the year.

Monitoring and recording changes in various parts of the site is done regularly, periodically or alternatively. Site monitoring consists of controlling the condition of mud brick walls, effect(s) of the elements on site properties as well as monitoring of excavated parts. Details of monitoring have been discussed in chapter 6. In addition to activities performed within the core zone for conservation of the property, the buffer and landscape zone of Shahr-i Sokhta is protected by the security unit of cultural heritage according to relevant regulations.

Not only experienced specialists in restoration, conservation and archaeology are present at site but also students of various fields of archaeology, restoration, architecture and anthropology cooperate part time with Base. After acquiring necessary skills they can join the Base as an expert.

Despite the far distance of the site from any town, thanks to the existence of a permanent base for Shahr-i Sokhta, consideration and partnership of locals, universities and various scientific centers as well as the support of the government, the conservation and protection of the site is relatively appropriate. In the following, mention has been made of conservation activities performed in Shahr-i Sokhta in the past and during recent years.

4.a.1. Restoration activities

The oldest report available about Shahr-i Sokhta dates back to the year 1871 and was prepared by Captain Owen Smith. Quoting a local man he named the place, Shahr-i Rostam which was apparently set on fire by Bahram after he poured oil all over it. Another report comes from Sir Charlse E. Yate who hinting at its burnt soil said that “The local guide took us to a certain place and claimed that we are standing on a burnt town. In fact concerning the presence of burn scars all over the place, it was as if we were really on a burnt town.”

Thus since the middle of the 19th century AD, Shahr-i Sokhta has been frequently visited and investigated but no scientific or technical identification or comment and no dating has been done by its visitors.

Because Shahr-i Sokhta as one of the important ancient cities has always been given attention by the archaeology society of the world Archaeological excavations here date back to about 80 years ago in 1928 when Sir Aurel M. Stein conducted limited excavations at the ancient site.

In the year 1960 the Italian Institute of Studies in the Middle and Far East (IsMEO) managed to obtain the required permit for survey and excavation in Sistan from the incumbent government of Iran. Afterwards a mission from the Orientalism University of Naples was sent to Sistan under the supervision of Umberto Scerrato. The most major activity of the group was to discover the Achaemenid town at Dahaneh-e Qolaman south of Zabol. Later another mission from the same institute embarked on widespread excavations between years 1967-78 in residential areas and the graveyard of Shahr-i Sokhta under the supervision of M.Tosi. After abundant soundings they managed to identify the core and buffer zones of the ancient town.

The interesting point about these excavations in Shahr-i Sokhta

The high significance of artifacts discovered during the preliminary investigations of Shahr-i Sokhta

arranging of cultural materials existing in reservoirs, reorganization and restoration of studied objects present in the Base, cleaning and restoring 61 piece of cloths found, issuing a conservation ID for them, patching and restoring of 108 objects found from excavations, reorganization of earthen figurines and making a data bank of them, classification and documentation of stone tools as well as setting up a data bank of them and finally issuing IDs for architectural properties existing at site.

Moreover, cleaning of the core zone is regularly done throughout the year. Among other operations conducted in the historical complex mention can be made of the executive plan of reorganizing tourism in Shahr-i Sokhta, installation of an illumination system in situ, designing a tourist path as well as designing an appropriate entrance space. It should be mentioned that in 2012, the Shahr-i Sokhta Base performed archaeo-geophysics studies at the site using the magnetometer method. These studies were done in an area of more than ten hectares extending from western parts of the monument building as far as east of the eastern residential grounds also including whole of the central residential grounds as far as north of the graveyard. A report on geophysical investigations has been included in the attachment.



Photo





Photo



Some of the previous operations are as follows:

2011-2012

- Launching archaeo-geophysical studies in parts of Shahr-i Sokhta;
- Continued conservation and *kahgel* plastering at site;
- Mapping the whole site;
- Creating an appropriate tourism route.

2009-2010

- Second phase of reorganizing earthen figurines and creating a data bank of them;
- Continuation of reorganizing and encoding sample cloths found during excavations;
- Preparing IDs for all sample cloths reorganized;
- Collecting statistics, designing, taking pictures and classifying stone tools and making a data bank of them;
- Immediate conservation and restoration of ceramic objects found during excavations;
- Patching and restoring of 108 objects found from diggings (pottery, earthen figurines and stamps);
- Issuing methodological and pathological IDs for ceramics, earthen figurines and stamps;
- Conservation and *Kahgel* plastering at site;
- Conservation of the cemetery area during excavations;
- Collecting statistics and reorganizing of stone tools and objects.

2008-2007

- Organizing and categorizing animal bones;
- Clearing, identification and reorganization textiles and categorizing;
- Base general cleaning;
- Residential area, Monumental area, Industrial area and workshop number 4 &6: conservation, Restoration, maintenance and *kahgel* plastering;

2006-2003

- Excavation in western part of Monumental building;
- Preparing photographic album of the base and its reservoirs;
- Organizing an exhibition of excavated artifacts in the corridor leading to the reservoir;
- Making model of a catacomb grave belonging to 3000 BC;
- Preparing a classified treasury to preserve excavated textiles;
- Organization and classification of anthropological documents;
- Establishment library and document center;
- Establishment of electronic archive for cultural objects;
- Preparing dossier of 384 surrounding ancient mound for national registration;
- Documentation of more than seventy thousand terracotta pieces.

1967- 1978

- Excavation in the area of the graveyard and the central mound;
- Excavation in the southern part and discovery of the Kakh-i Sokhta;
- Discovering ceramic objects in red, grey and buff colors;
- Discovering bone and stone objects, marble vessels and stamps;
- Launching anthropological studies by Professor Eduardo Berdini;
- Launching botanical studies and preparing IDs by Professor Marco Du.

4.b. Factors affecting the property**4.b.1. Development pressures**

As a matter of fact, the remote location of Shahr-i Sokhta at a spot 56km from Zabol has kept it safe from effects of urban development projects; fortunately the only developing activity conducted nearby was the transit road of Milak- Chabahar in 1971. Planning and constructing the road has taken into account an appropriate space from the core zone and has acquired an official permission from cultural heritage authorities of the time. The road not only contributes to regional security but also is important from a tourism point of view.

4.b.2. Environmental pressures

Fortunately, Shahr-i Sokhta is free from environmental pollutions and damages too. It should be pointed out that harms incurred in Shahr-i Sokhta site were only by natural elements such as wind blowing, sand storms and rolling sands which have caused the erosion of mud brick

walls of the complex. The main reason for erosion done to Shahr-i Sokhta is the 120 days wind of Sistan¹. Another kind of erosion results from biological factors and seasonal precipitations. But these can be prevented by routine operations such as using conservation plasters like *Kahgel*, roofing of fragile structures and constructing supportive walls.

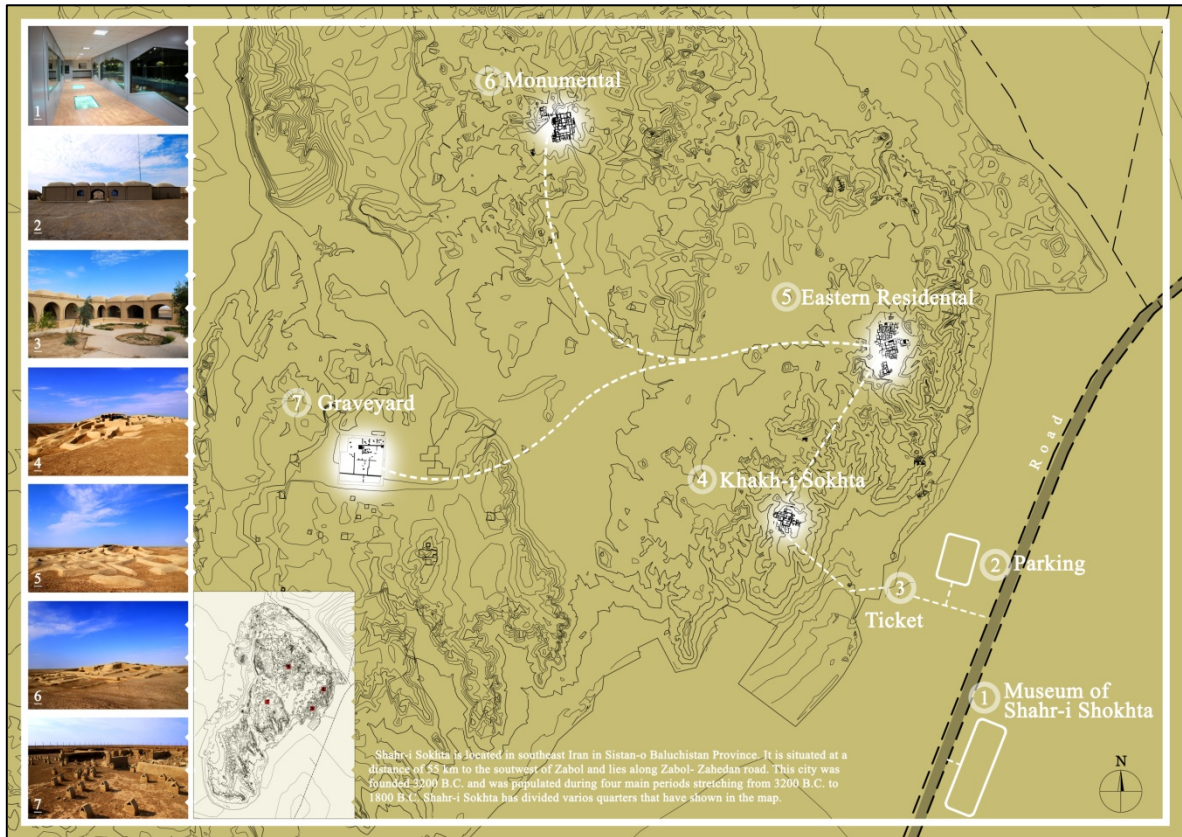
4.b.3. Natural disasters and risk preparedness

Based on studies conducted at the historical site of Shahr-i Sokhta, no report of natural disasters like earthquake is at hand.

4.b.4. Visitors/tourism pressures

The number of annual visitors also indicates a lack of pressure from them. During *Noruz* when the number of visitors goes up, taking measures such as designing a tourist path as well as increasing the number of local guides and students has decreased the pressure of visitors.

1



Map

Chapter 5 : Protection and Management of the property

5.a. Ownership

Shahr-i Sokhta is possessed by the government of the Islamic Republic of Iran, and the Iranian Cultural Heritage, Handicrafts and Tourism Organization (ICHHTO) is in charge of its management and protection on behalf of the government.

5.b. Protective designation

The national and universal laws, regulations and constitutions to preserve and support the property:

5.b.1. Cultural heritage law in Iran

There are different laws and regulations for protection and conservation of cultural heritage in Iran. These are in the following categories:

- Legislation governing general cases in the country, including cultural heritage;
- Legislation specifically concerning cultural heritage;
- International legal instruments, recommendations and guidelines that are integrated within the national legislation.

5.b.2. General regulations

Article 558: Anybody who partially or totally damages cultural-historical religious complexes or buildings, places, sites registered in the National Properties List of Iran and/or harms installed or existing decorations, annexations, facilities, objects, scripts and motifs which also individually enjoy cultural, historical or religious prestige, will be sentenced to one to ten years imprisonment in addition to compensation of the damage sustained.

Article 558: Anybody who steals objects, accessories as well as materials and pieces of cultural- historical properties from museums, historical, religious and other places under state protection or anybody who hides or buys such stolen objects, will be sentenced to one to five years of jail in addition to compensation of the damages done.

Article 560: Anybody who without the permission of the Cultural Heritage Organization of the country or irrespective of regulations approved by the above mentioned organization, engages in activities within the buffer zone of cultural-historical properties cited in the article that damage or harm the above said buildings and properties, will be sentenced to one to three years imprisonment as well as compensating damages incurred and removing traces of the offence.

5.b.3. Specific regulation for cultural heritage

Samples of the regulations specifically dealing with cultural heritage are explained below:

1. The Law for Protection of National Heritage (1930) is the first comprehensive law concerning various aspects cultural heritage. This Law defines the procedure for identification of cultural heritage property (Article 1). It further mandates the government to prepare a National Heritage List (Article 2), sets the criteria and legal protection for properties on this list, and stipulates legal provisions for archaeological excavations.
2. The bylaw Concerning Prevention of Unauthorized Excavation (1980) stipulates punishments for excavation and/or purchase of excavated historic objects. The provisions of this Law are further elaborated in the Islamic Penal Law mentioned above. There is further regulation limiting production, purchase, use or advertisement of metal detectors.
3. The Law Concerning Acquisition of Land, Building and Premises for Protection of Historic Properties (1969) stipulates further regulations for acquiring property with historic or cultural significance.
4. The Law for Establishing Iranian Cultural Heritage Organization (1979) is another powerful legal instrument depicting a comprehensive picture for managing cultural heritage of the country.
5. The Law for Establishing the Higher Council for Architecture and Urban Planning (1987), which concerns with both cultural and natural heritage.

5.b.4. Regulation regarding the movable and immovable properties

Regulations of cultural, historical and artistic properties of government organization (number 50446 T 25214, ratified on March 4, 2004 by the Cabinet Council):

In their meeting on February 26, 2003, following the proposal number 5461-1/1 dated September 2, 2001 presented by the ICHTO, and in conformity with article 9 of the chapter on culture, art and physical education of Iran's Third Development Plan, and in compliance with the Decree Number 49454/ T/ 523269 dated January 22, 2001, by virtue of Article 122 of the National Audit Law passed in 1987, the Cabinet ratified the Regulations of Cultural and Historical Properties of Public and Government Organizations as follows:

5.b.4.1. Regulation of Cultural and Historical Properties

Article 1: cultural, historical and artistic properties are defined as those of scientific, historical, cultural, archaeological and paleontological significance, and are more than one-hundred years of age; they should fall in one of the following categories:

a. Historical and cultural properties: they are defined as those properties that are indicative of evolution of life, historical and cultural identity of man, or the historical events of certain period(s) which, in one way or another, demonstrate the historical and cultural devilmment of man on the national, regional, or international scale, or show the emergence, life, and extinction of civilizations. Such properties should be excavated and found in archeological; sites on the land or the seaside through scientifically conducted excavations or other means.

b. Historical properties: such properties are objects from historical events, science and technology, military and social history, and the lives of leaders and significant historical, scientific, religious, cultural and artistic figures.

c. Cultural properties: it refers to movable properties which demonstrate various aspects of human life in the more recent eras where research helps with understanding of historical and cultural features of human societies. These include ethnography, anthropology, native arts and culture, voice and image libraries, stamps, etc.

d. Artistic properties: this is used to refer to all pieces of artwork in different fields of visual arts including traditional, native or contemporary arts, either Iranian or non-Iranian, which are created by the distinguished artists of the given field, or are listed among the prominent pieces of artwork, or are indicative of the birth of a certain artistic style, school, or era.

e. Research properties: it is a piece of a cultural, historical or artistic object which does not carry a full motif, writing or an independent cultural identity, or lacks any features worth protection; such objects are only valuable for the evidence they provide for the research and recognition of the historical era, materials and their combination.

Article 4: Organizations subject to this regulation are expected to take due measures to renovate, protect, introduce, conduct research works, and organize the structure and data related to the cultural, historical and artistic properties they possess.

Article 5: The ICHHTO is obliged to decide the emergency measures in order to restore and protect the properties, and to notify the organization which would be bound to putting the regulation into practice.

Article 6: The organization in possession of the properties mentioned in the regulation is in charge of protection and conservation of them. Iran's Ministry of Economic Affairs and Finance would be in charge of the accounts of such properties.

Article 7: Categorization of artistic, historical and cultural properties included in this regulation would be carried out based on instructions prepared and announced by the ICHHTO. The categorization will be binding upon ratification of the ICHHTO.

Article 8: The ICHHTO is obliged to notify the instruction for categorization of the properties mentioned in this regulation and their related data to all relevant organizations and entities in order for them to produce and document data regarding the research work, restoration and protection of the properties as well as their structural information all included in general and specialized identification of the property.

Article 14: All organizations subject to this regulation are required to open the specialty museum of their field of activity. Such museums will be managed under supervision and authorization of the ICHHTO.

5.b.5. Higher Council for Architecture and Urban Planning [HCAUP]

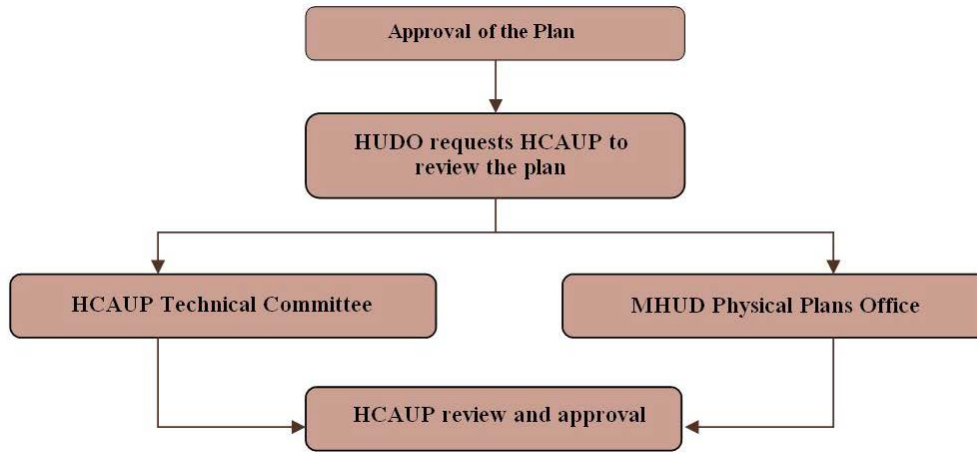
All urban plans in Iran should be confirmed by Higher Council for Architecture and Urban Planning [HCAUP], before their approval.

Higher Council for Architecture and Urban Planning (HCAUP) was established under the law of February 1973. Ministry of Housing and Urban Development [MHUD] is responsible for managing housing development as well as for developing master plans for urban and semi-urban areas. This includes the historic urban areas, where a large proportion of the Iranian cultural heritage is located. The HCAUP is presided by the Minister of MHUD. The Deputy Minister for Urban Development and Architecture is the Secretary of HCAUP, under whom a Director-General manages the Secretariat. Other members of HCAUP include the Ministers of Interior; Economy and Finance; Culture and Islamic Guidance; Education; Power; Jihad Agriculture; and Defense.

In addition to these ministers, three Vice-Presidents are voting members of the HCAUP: (i) Head of Management and Planning Organization, (ii) Head of ICHHTO, and (iii) Head of Department of Environment. HCAUP has four main functions:

- Overall urban development policies;
- Commenting on by-laws affecting zoning, land use, and determining main functions;
- Adoption of urban master plans; and
- Adoption of urban criteria, regulations, by-laws, etc.

The approval of master plans by HCAUP has an established process. A qualified consultant is commissioned by the provincial Housing and Urban Development Organization (HUDO), which is the provincial office of MHUD.



Chart

- Convention Concerning the Protection of the World Cultural and Natural Heritage (1972);
- Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1954) and its Protocol I (1954) and Protocol II (1999);
- Convention for the Safeguarding of the Intangible Cultural Heritage (2003).

5.b.7. Regulations of core zone

- Any intervention resulting in destroying or damaging the core zone of properties is prohibited;
- Digging water wells and using heavy motor vehicles and vibrators within the core zone is forbidden;
- Any conservation and restoration excavation activity must be conducted according to programs and plans approved by ICHHTO;

5.b.8. Regulations of buffer zone

- Any intervention harming the integrity and authenticity of the property is not allowed;
- Usage of heavy machinery and environmental pollutants harming the buffer zone of the property is prohibited;
- Any plan concerning the reorganization, expansion of the green space and provision of infrastructure and tourism becomes valid and operational only after approval of the plan by ICHHTO;
- Installation of pollutant facilities and alteration of the topography of hills and mountains is forbidden if as a result any harm is done to the historical and natural landscape of the property.

5.b.9. Regulations of landscape zone

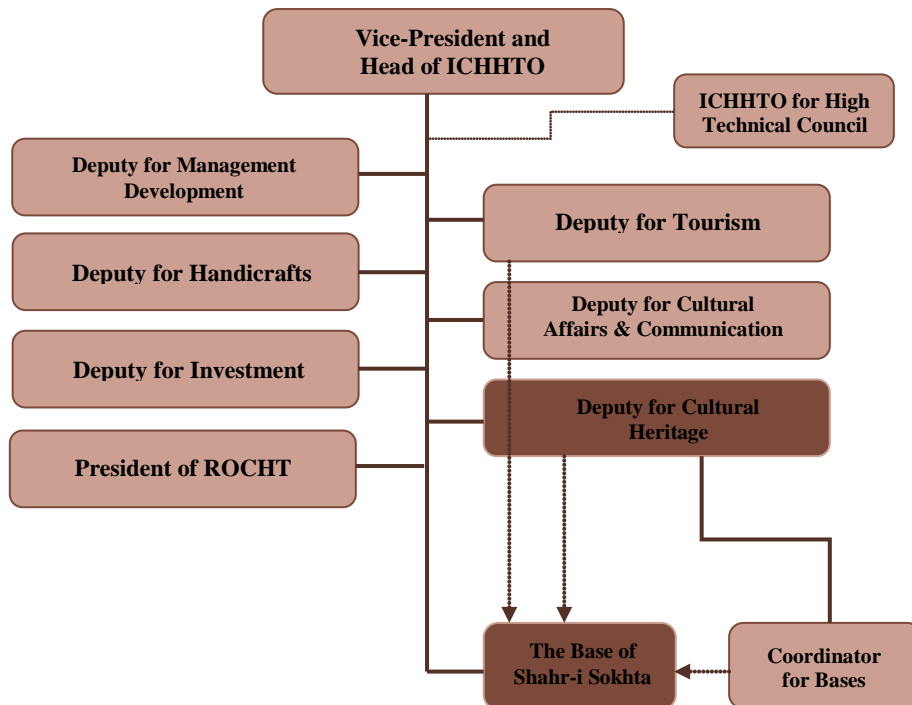
- Launching any large scale industrial projects polluting the environment and deeply affecting historical, cultural and natural structures of the region is prohibited;
- All regional and trans-urban developmental plans must acquire the necessary permit from ICHHTO while in their feasibility assessment phase;
- All ancient mounds existing within the landscape buffer zone are subject to regulations concerning the core zone of Shahr-i Sokhta. Thus completing the archaeological map of the landscape buffer zone of Shahr-i Sokhta must be done by Shahr-i Sokhta Cultural Heritage Base as soon as possible.

In this regard, before the archaeological map of the landscape buffer zone is drawn, any operations (i.e. leveling, infrastructural, constructional, etc) conducted by real or legal persons, private institutes and governmental administrations is allowed only after obtaining the required permit. If any historical or cultural properties (i.e. properties or monuments identified as ancient) are encountered during infrastructural, developmental or constructional urban activities by real or legal persons, private corporations or state administrations, the owner or operator of the plan should immediately stop all operations and must notify the cultural heritage Base of Shahr-i Sokhta for supervising and decision making purposes;

- Any intervention within the boundaries of natural resources and the river must be based on regulations of the Environment Protection Organization.

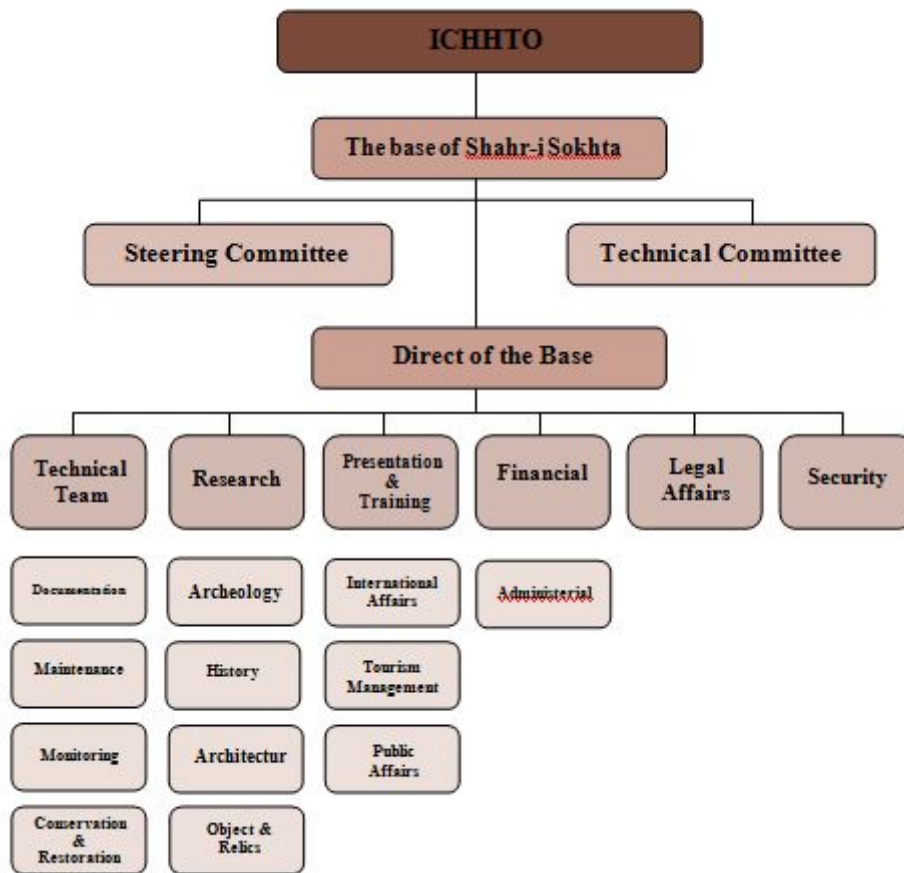
5.c. Means of implementing protective measures

According to the civil law, the Cultural Heritage, Handicrafts, and Tourism Organization (ICHHTO) is the authority responsible for conservation and protection of all the artistic, historical and cultural monuments and Sites



5.c.1. Supervisory systems

The Base of Shahr-i Sokhta is responsible for conservation activities within the core and buffer zones of the property. Regular meetings of steering committee provide the opportunity for the members to share their ideas and interests.



Chart

5.c.2. Members of the technical committee

- Dr. R. Shirazi, Director of Shahr-i Sokhta Base
- M. Arbabnia, Deputy of ICHHTO of Sistan-o Baluchestan province
- M. Kalanuri, Deputy of Shahr-i Sokhta Base
- Mr. A.R. Khosravi, Director of ICHHTO of Zabol
- Mrs. T. Shahraki, expert of museum
- Mr. Gh. Barahubi, archeology

5.c.3. Members of steering committee

- Dr. M. Alavian sadr, Deputy of ICHHTO
- Mr. H. Nārubi, Governor of Sistan-o Baluchestan province
- Mr. M. Sanjarani, Director of ICHHTO of Sistan-o Baluchestan province
- Mr. Kh. Āli, Mr. S. B Hoseini Tabatabaei, Members of Parliament from Zabol
- Dr. S.M.S. Sajjadi, Director of Archaeological mission of Shahr-i Sokhta
- Dr. R. Shirazi, Director of Shahr-i Sokhta Base
- Dr. M.H. Talebian, Architect
- Dr. R. Mehrafarin, Archeologist, Zahedan University

5.c.4. Local and regional management contact

Dr. Ruhollah Shirazi, Director of Shahr-i Sokhta

Tel:

5.e. Property management plan or other management system

5.e.1. Main Goal

Conservation of the outstanding values of Shahr-i Sokhta while keeping its authenticity and integrity together.

5.e.2. Management approach

Inside the ancient site of Shahr-i Sokhta, multidisciplinary operations as well as permanent and integrative conservation as the main approach of management have great importance.

5.e.3. Management strategy and guideline

- Improving the quality of education, training system and also promote capacity building;
- Improving the quality of monitoring of the site;
- Improving the quality of conservation and restoration plan of the Shar-i Sokhta;
- Encouraging public cooperation in application of regulations regarding the restoration and conservation of site;
- Directing and setting targets for scientific, cultural, social and tourism-related events in the site;
- Improvement of tourist services and facilities;
- Development of educational plans and training at various scales;
- Carrying on with documentation and preparation and development of databank for various audience;
- Further cooperation with national and foreign universities and other scientific centers and institutions;

5.e.4. Action plan

5.e.4.1. Short Term Plans (two years)

• Research & Documentary

- Improving the research works and furthering cooperation with universities and scientific institutions;
- Holding expert meetings and training workshops;
- Scientifically improving the Shahr-i Sokhta website;

- Forming the pottery bank of south eastern Iran;
- Creating the data bank of movable and immovable objects;
- Continued documentation and catalogue publication for objects existing at the site;
- Continued identification operation of the core zone based on geophysics.

- **Conservation & Restoration**
 - Regular monitoring;
 - Emergency restoration of ancient remains;
 - Carrying out maintenance plans including drainage systems;
 - Providing guide signs inside the site and museum and standardizing such signs;
 - Perfection of electronic protection systems in museum and site.

- **Tourism Management, Presentation & Education**
 - Providing specialty brochure and guidebook for site and museum;
 - Preparing a model of the site;
 - Holding local, national and international exhibitions;
 - Installing warning signs and providing explanations for visitors in order for them respect the regulations and values of the site;
 - Installing an opinion box and providing feedback forms;
 - Creating an electronic multi-lingual guiding system;
 - Completing the tourist path of Shahr-i Sokhta;
 - Designing and launching one day local tours;
 - Providing tourism facilities

- **Conservation & Restoration**

- Continuation of cooperation with local, national and international universities in restoration and conservation of site;
- Conducting timely measures for restoration and conservation of the site based on the results of research and monitoring;
- Completing the lighting of the site and museum;
- Reorganization and restoration of cultural objects like clay figures, stone tools, pottery and textile;

5.f.2. Local and National universities

There are some local universities such as the Zahedan university, Zabol university, Shahid Bahonar University of Kerman, Tehran University, Science & Technology University, Tehran Islamic Aazad University, Tarbiyat Modares University and Art University of Isfahan which at present their students work and study in Shahr-i Sokhta in their internship courses.

In addition, the Higher Education Centre of ICHHTO and other national universities provide sources of expertise and training in conservation and management techniques.

5.f.3.Short term training workshops

Short term training and workshops are being held in local, national and regional levels with cooperation of universities.

- Participation in the biannual international European conference of South Asian Archeology (Italy-France), 1971-2012 ;
- Presenting reports on excavations in Shahr-i Sokhta following each excavation season, Zabol and Zahedan Universities, 1996-2009;
- Holding the biannual international conference of archaeology in southeastern Iran, Zahedan University, 2001;
- Holding workshops introducing Shahr-i Sokhta to local schools of Sistan-o Baluchestan, Zabol, 1996-2009;
- Holding an assembly named:”with history in the land of Nimrooz”, Zahedan, 2003;
- Congress of Restoration: a Sustainable Identity” during the week of research, Zahedan, 2005;
- Holding an exhibition in the congress named:”Handicrafts: from *Qorban* until *Qadir*”, Zahedan, 2006-2011;
- Introduction of the culture and civilization of eastern Iran, Shahr-i Sokhta, Italy, 2007;
- Holding an exhibition about achievements of Shahr-i Sokhta, Tehran, 2007;
- Holding provincial handicrafts exhibitions during *Nowrouz* in Shahr-i Sokhta, 2007-2012;
- Holding the Shahr-i Sokhta Exhibition during the cultural week in Sistan-o Baluchestan Province, 2010 & 2012;
- Holding the biannual international conference of South Asian Archaeology, Zahedan University, 2012.

5.g. Sources of expertise and training in conservation and management techniques

Since its establishment until now, Shahr-i Sokhta Base has been engaged in effective interaction with the Ministry of Road, the Natural Resources Organization as well as Zahedan and Zabol Universities. Additionally, it has taken measures aimed at increasing the quality of knowledge level of experts. This can serve as an effective factor in generating incentives for furthering the goals of the Base. A selection of the arrangements is as follows:

- Holding educational workshops about archaeology at national and regional levels;
- Holding workshops about restoration of properties in particular pottery at a national and regional level;
- Holding the first workshop of restoration of cultural properties in Sistan-o Baluchestan Province with cooperation of Zabol University (restoration of 22 objects);
- Training of experts aimed at educating theoretical and practical subjects of archaeology and restoration of properties in Zabol and Zahedan universities as well as Shahr-i Sokhta site;
- Deployment of master worker teams at a regional level (Bam, Kerman, Khorasan and Yazd);
- Attending in workshops related to the world heritage;
- Attending training workshops about earthen structures of Bam and Choghazanbil.

5.h. Visitor facilities and statistics

Shahr-i Sokhta benefits from basic and necessary visitor facilities. However, due to significance of presenting outstanding values of the elements, promoting visitor facilities inside the property and in the buffer zone is one of the main priorities in the management framework. Knowledgeable visitor guides, guards as well as personnel trained to act in emergency times, Guiding signboards in the Shahr-i Sokhta, visitors' paths in the Shahr-i Sokhta and Introductory booklets and brochures as well as tourist maps.



Photo

- Publishing scientific researches and books of compiling a multilingual guide containing introduction of the Shahr-i Sokhta and its objects.

Some of programs:

- Preparing a model of the Shahr-i Sokhta and setting it in a proper location at the beginning of visitors' path;
- Creating a Bluetooth center for providing the visitors with information about the site in English and Persian;
- Providing audio guide in English and Persian for the visitors in the site;
- Preparing the site for participation of children as well as school and university students aimed at publicizing values of the site, education and partnership in conservation;
- Creating a network of so-called Shahr-i Sokhta friends at different ages;
- Planning for expanding publications, making short films and multimedia as well as its distribution at national, regional and international levels in various languages;
- Launching joint research and educational programs especially on archaeology at national and international levels;
- Establishing scientific and research relations with similar sites as well as with local, regional and international scientific-research institutes;
- Exchange of students and experts with similar sites, universities as well as official centers for education and research;
- Establishing a comprehensive databank of Shahr-i Sokhta;
- Optimization lighting systems;
- Improving the quality of bulletin boards.



Map

5.j. Staffing levels (professional, technical, maintenance)

positions		Name
Director of Base		Dr. Rouhollah Shirazi
Director of Archaeological mission of SIS		Dr. Seyed Mansour Seyed Sajjadi
Deputy of Base		Mr. Majid Kalanuri
Technical	Conservation & Restoration	Mr. Mehdi Arbabnia
	Documentation	Mr. Reza Keikhah aria
	Monitoring	Mr. Nasrollah Kuhkan
	Maintenance	Mr. Mojtaba Shahrekei
Research	Architecture	Mr. Majid Kalanuri
	Archeology	Dr. Lorenzo Costantini, Dr. Rafael Biscione, Ms. Masoumeh Shahi, Mr. Ghafur Barahuei
	Relics	Mr. Reza Keykhah aria
Presentation & Training	Presentation & Training Affairs	Mr. Ali reza Khosravi
	Public Affairs	Mr. Mojtaba Shahraki
	Documentation center	Mr. Reza Ganjali
	Librarian	Mr. Siyavash Sanjarani
	Museum Affairs	Mrs. Tahereh Shahraki
Financial & legal affairs		Cultural Heritage Organization
Financial Affairs		Mr. Mehdi Naseri
Security		Mr. Hosein Azarnoush, Mr. Hamzeh Madadi, Mr. Ali Bakran
Services		Mr. Mohsen Rangreiz, Mr. Mohammad Ali Lakzadi, Ahmad Ali Lakzaei
Vehicles		Mr. Mojtaba Shahrekei

Chapter 6 : Monitoring

Shahr-i Sokhta was grown in the east part of Iran's plain and dates back to 3000 BC.

According to archeological and urbanism values the mentioned civilization is assumed as a one of world archeological recourses. Since the excavation done by Italian committee of IsMEO till now that ICHHTO and Base of Shahr-i Sokhta are responsible for conservation of this archeological site, various studies in the fields of pathology, strategies of restoration and monitoring are done regularly.

As it was mentioned in chapter 5, the most prevailing acute threats are divided to natural causes and human factors, while winds of 120 days and seasonal rain falls are the most dominant natural threats tourism is regarded as the most important part of human factors. Therefore in here monitoring focuses on wind, seasonal falls and tourism. It should be mentioned that as Shahr-i Sokhta is located out of rural and urban boundaries pollutions and construction development are not reported.

6.a. Key indicators for measuring state of conservation

As explained before, Shahr-i Sokhta is in suitable state of conservation. The outstanding values of the site are monitored through physical inspections, regular surveys, and documentation. The monitoring of affecting factors is being implemented through cooperation responsible authorities in various scientific centers, labs and specially the Shahr-i Sokhta Base. Based on the identification of the affecting factors in the site a number of indicators that are monitored by responsible authorities are identified for the conservation and preservation of various parts of the site. Below are the details:

CATEGORY	INDICATORS	PERIODICITY	ANNUAL PERIOD	TOOLS
Conservation & Restoration	Extent of erosion of kahgel coating the ancient remain	As per case (weekly or monthly)	Through out the year	Field visit& photo taking
	Inspecting the condition of covers over excavated Trenches	As per case (monthly)	Through out the year	Field visit& photo taking
	Cleaning & maintenance condition of trenches & ancient remains	As per case (monthly)	Through out the year	Field visit& photo taking
	Quality state of visitor Paths across the site	As per case (weekly or monthly)	Through out the year	Field visit& photo taking
	Monitoring the condition of buffer zone according to buffer zone legislations	Monthly	Through out the year	Field visit & photo taking
	Monitoring the synoptic weather maps of the nearest local weather station in Zabol (inspecting velocity & continuity of seasonal winds	Seasonal	Winds of 120 days June- Sep	Statistic method
	Condition of biologic harms and their effects on the extent of erosion of kahgel coating the ancient remains	As per case (monthly)	Through out the year	Field visit & Lab tests
	Monitoring the climate condition (assessment of humidity& and difference in temperature)	Monthly	Through out the year	Statistic method
	Condition of drainpipes, waterways and slope of the lands around the excavated trenches	Seasonal	During the seasonal rain falls	Field visit
	Erosion process of Kahgel ; caused by human factors (vandalism, walking on the edges of walls, abrasion)	As per case (monthly)	Through out the year	Field visit
Security & Facilities	Entrance complex and its' facilities (light, cooling & heating facilities)	As per case (monthly)	Through out the year	Field visit & Questionnaire
	Performance of projects installed across the site	As per case (weekly or monthly)	Through out the year	Field visit
	Controlling the state of security system and guarding personnel	As per case (daily, weekly, monthly)	Through out the year	Field visit & CCTVs

CATEGORY	INDICATORS	PERIODICITY	ANNUAL PERIOD	TOOLS
Research and Education	Number & quality of researches, books, articles, and student thesis produced about Shahr-i Sokhta	Twice a year	April- October	Statistic method
	Awareness level of different audience about OUV of the Shahr-i Sokhta	Annual	May	Questionnaire
	Number and quality of training workshops	Annual	Throughout the year	Field visit & Statistic method
	Number of trained tour guides	Annual	April	Statistic method
Tourism facilities	Assessing the rate and quality of services given by experts, guides and guards to the visitors	As per case (monthly)	Throughout the year	Field visit & Statistic method & Questionnaire
	Present tourist facilities	As per case (monthly)	Throughout the year	Field survey
	Quantity & quality of Iranian and foreign visitors (Assessment of population, their age, level of education, nationality, etc.)	As per case (daily, weekly, monthly)	Throughout the year	Statistic method & Questionnaire
	Hygienic condition (Lavatories)	As per case (daily, weekly, monthly)	Throughout the year	Field visit
	Extent & quality of exclusive services for tourists (guides, books, brochures)	Annual	April	Statistic method & Questionnaire
	Monitoring the state of tourist signboards and symbols across the site	As per case (weekly or monthly)	As per case (weekly or monthly)	Field visit & photo taking

CATEGORY	INDICATORS	PERIODICITY	ANNUAL PERIOD	TOOLS
Shahr-i Sokhta Base & Museum	Extent and quality of updated data collection	Annual	April	Field visit & Statistic method
	Number & quality of collected researches, books, articles, and student thesis produced about Shahr-i Sokhta	Annual	April	Field visit & Statistic method
	Extent and quality of archive and data bank	Twice a year	April-October	Field visit
	Condition of the museum in terms of existence of pests and insects	As per case (weekly or monthly)	Through out the year	Lab tests
	Improving the condition of textiles and woven texture including aeration and cleaning	As per case (weekly or monthly)	Through out the year	Field visit
	Presiding over periodical clean up of the complex including the museum, inside its show cases as well as its objects and treasury (This should be done under the supervision of museum curator)	As per case (weekly or monthly)	Through out the year	Field surveying
	Environmental condition of the museum hall (assessment of the effect of fluctuation in temperature, humidity and light on objects)	Daily	Through out the year	Hygrometer surveying
	Monitoring the decaying terracotta wares, textiles and the other objects held in the museum treasury	Weekly	Through out the year	Field surveying
	Statistic survey of existing objects	Twice a year	April	Statistic method
	Condition of audio- visual room	Weekly	Through out the year	Field visit

6.b. Administrative arrangement for monitoring property

The Iranian Cultural Heritage, Handicrafts and Tourism Organization (ICHHTO) has overall administrative and financial responsibilities toward conservation, preservation and protection of historic monuments and sites in Iran. ICHHTO has its branches in every Province of the country. Some major historic sites such as Persepolis, Chogha Zanbil, Meidan-e Emam in Isfahan, Bisotun, Soltanieh, Takht-e Soleyman, Armenian Churches, Shushtar Hydraulic System, Susa, Bazaar of Tabriz, Bam, Pasargadae, Masjed-e jame of Isfahan, Gonbad-e Qabus and Shahr-i Sokhta have their own Research Bases at the site so that constant monitoring of the state of the conservation of the property could be achieved. In the case of Shahr-i Sokhta, the Sistan-o Baluchestan Cultural Heritage, Handicrafts and Tourism Organization is the Provincial affiliate of ICHHTO. There is also the Research Base for the Shahr-i Sokhta.

Apart from the national and provincial experts a number of monitoring experts work on a permanent basis at the Research Base of Shahr-i Sokhta. They are all working under supervision of Director of the Base who is responsible to the Head of ICHHTO of Sistan-o Baluchestan province. They are not only responsible for the monitoring of different constituents of the Monitoring Program but also for planning and giving training workshops to the relevant individuals as well as providing sufficient information to the responsible authorities with regards to the quality and quantity of monitoring programs so that they all can be a part the overall comprehensive monitoring system. They also take necessary actions to be in continuous contacts with relevant research and educational institutions, whether public or private, so that their knowledge and expertise could be used for enhancing the monitoring of the site. Following are the professional details of some of the experts including their skills and contact details who are included in the monitoring unit of the research section of Shahr-i Sokhta Base:

Name and contact information of the personal

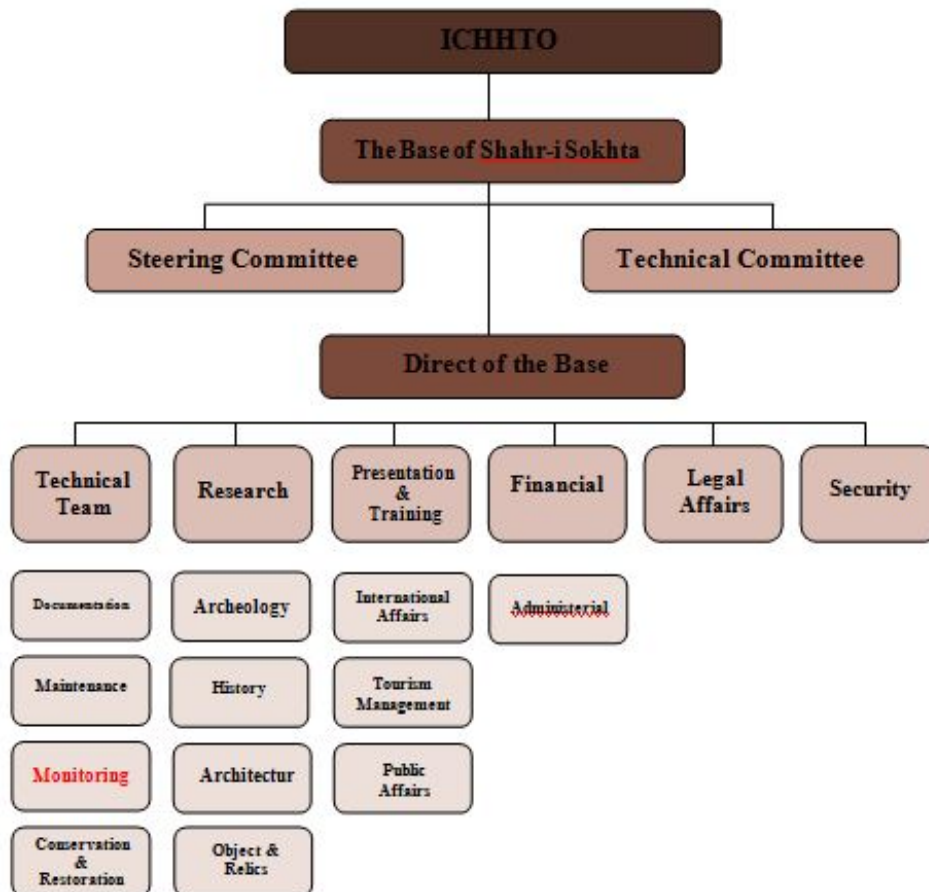
Majid Kalanuri, Architect
E-mail: majid_7061@yahoo.com
Tel: + 989155437061

Reza Keikhah aria, expert on restoration of relics
E-mail: reza_aria@yahoo.com
Tel: 09366227030

Dr. Reza Ganjali, expert on documentation
E-mail: reygey83@yahoo.com
Tel: +

Following organizations are in close contact and collaboration with the ICHHTO of Sistan- o Baluchestan, particularly Shahr-i Sokhta Base for implementation of monitoring programs. In addition, the Shahr-i Sokhta Base has close collaboration with the private sector in monitoring activities.

- Zahedan University
- Zabol University
- Shahid Bahonar University of Kerman
- The Tehran University
- Tehran Islamic Aazad University
- Science and Technology University
- Tarbiyat Modares University
- Art University of Isfahan



Chart

6.c. Result of previous reporting exercises

When Italian committee of IsMEO excavated Shahr-i Sokhta under the supervision of Dr. Tosi between 1964 and 1973, ministry of culture and art was responsible for restoration and conservation of this archeological site. After Islamic revolution, conservation and safeguarding of this site was transferred to ICHHTO. Shahr-i Sokhta was inscribed on the list of national properties in 1966 under number 542, and was subject to all rules and regulations of conservation. Conservation, restoration and monitoring plans have been regularly reported by Shahr-i Sokhta Base, ICHHTO and the steering committee every six months. As a matter of fact, conservation, restoration and monitoring plans have been regularly reported on a six-month basis by Shahr-i Shokhta Base, ICHHTO and the Steering Committee. Results of a number of former operations conducted in various years are as follows:

- Proper maintenance of historical mud brick remains from excavations;
- Kahgel plastering of low mud brick walls over various years on a regular basis;
- Protecting the site from human damages caused by creating a proper tourist path at the site;
- Providing optimal conditions for research activities, pathology and appropriate methods for restoration of objects;
- Creating a data bank of archaeological findings for easy access.

6.c.1. Illustrative monitoring of state of conservation and alterations in the complex according to historic photographs

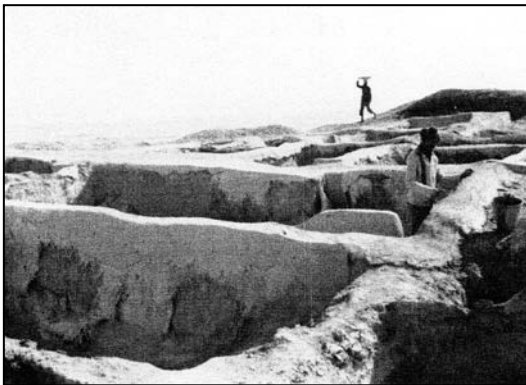


Map

Alteration made in the Eastern Residential Area in the course of time:

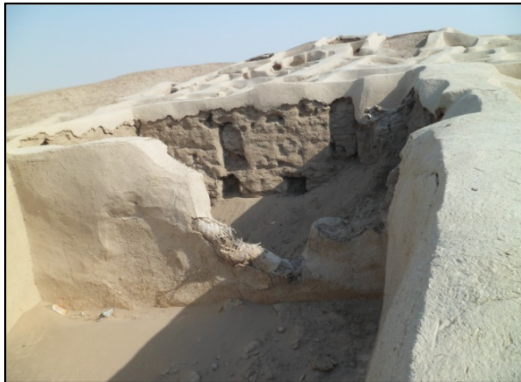


Photo





Photo

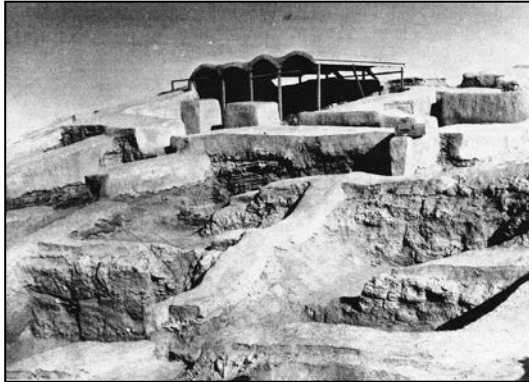




Alteration made in the Kakh-i Sokhta (Burt Building) in the course of time:



Map

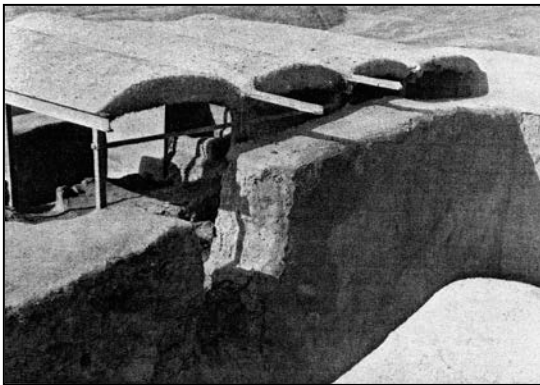


Photo





Photo



Alteration made in the Monumental Area, in the course of time:



Map



Photo

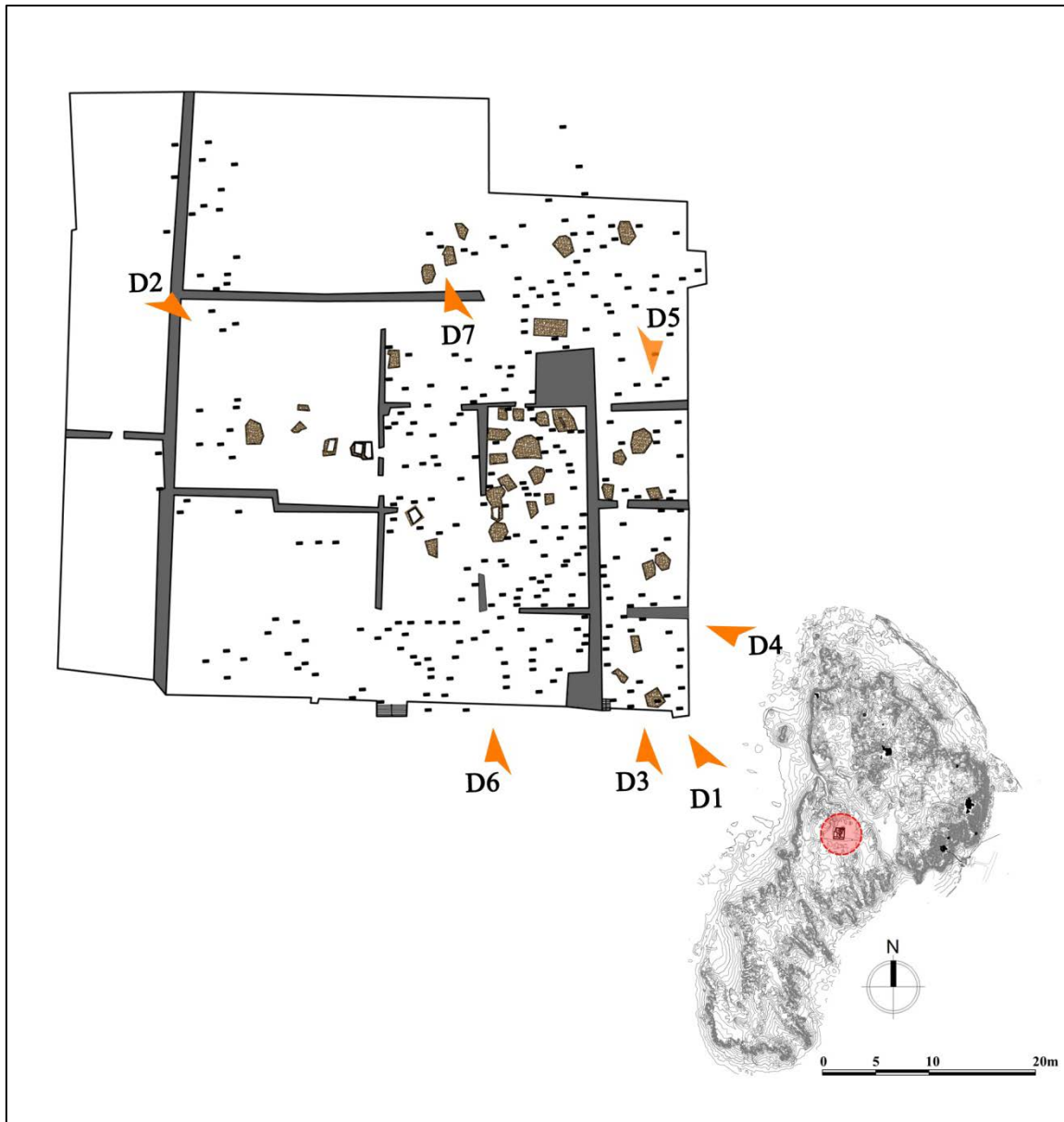




Photo



Historic documentation of the Graveyard, in the course of time:



Map



Photo





Photo





Photo

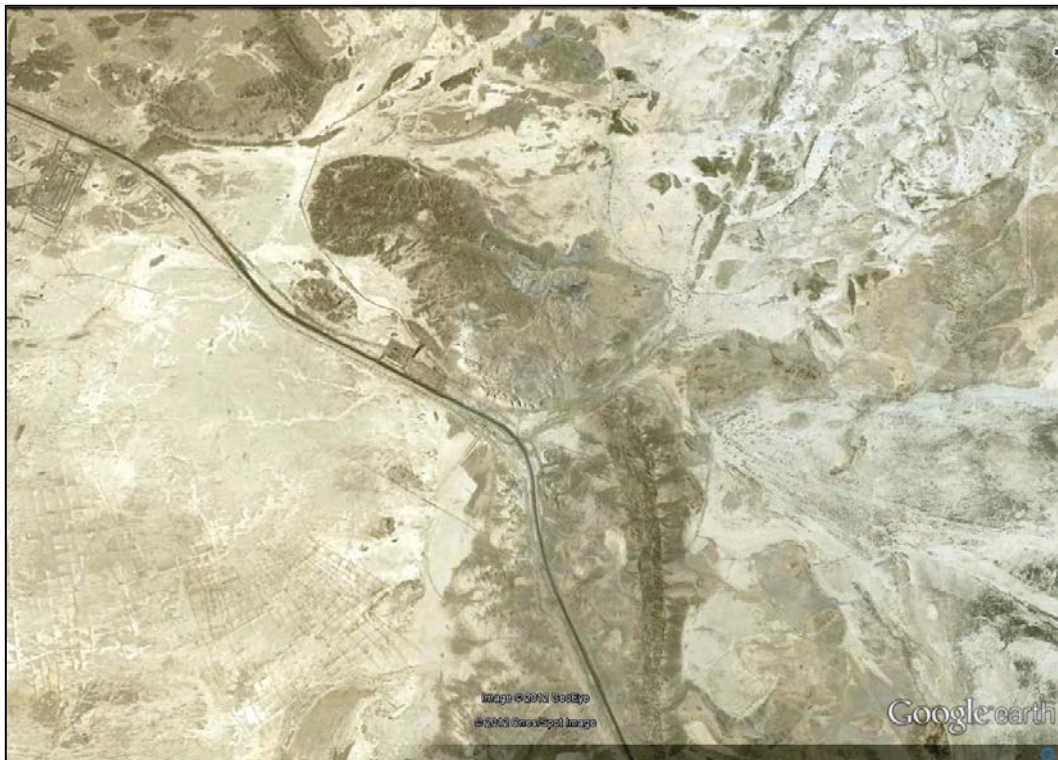


6.c.2. Monitoring of Development

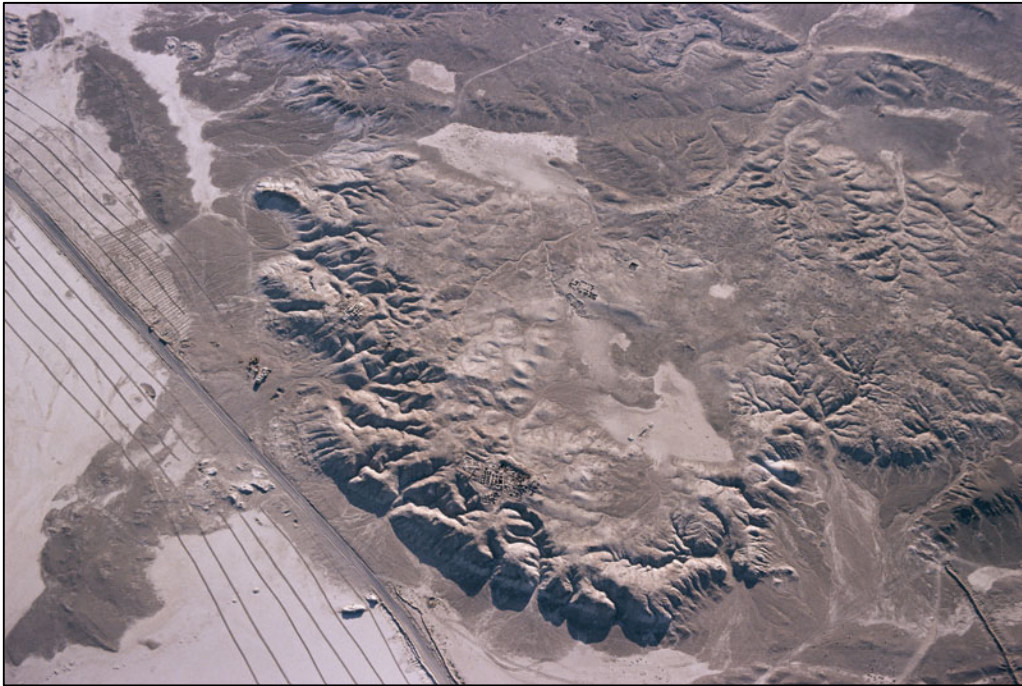
Buffer zone



Photo

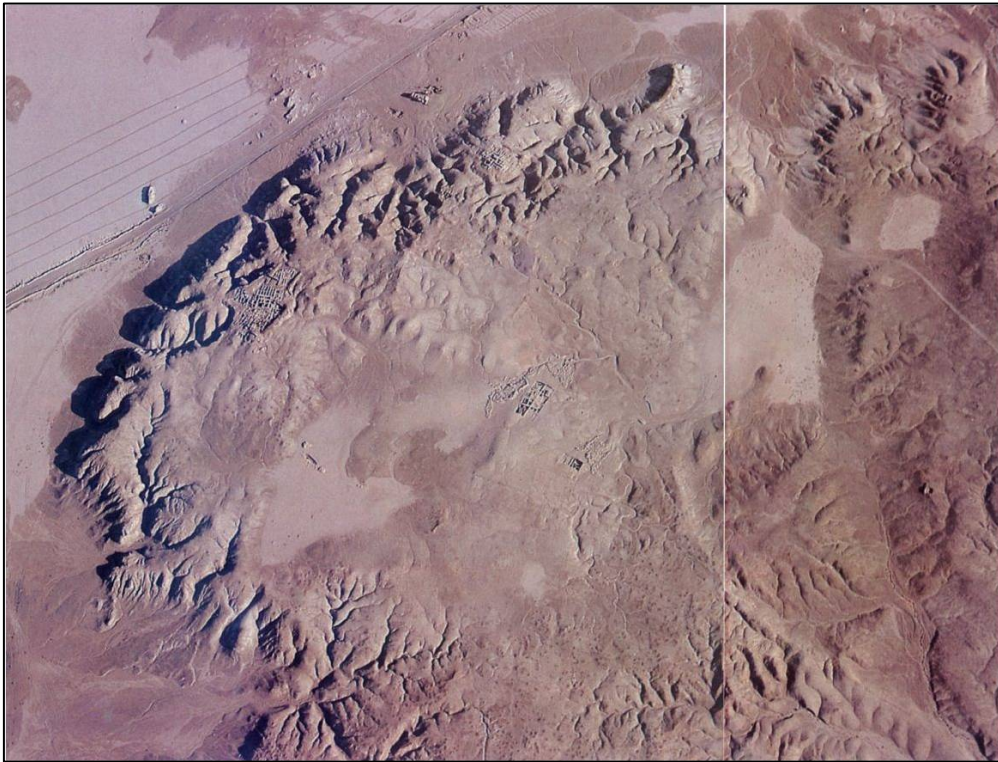


Core zone



Photo





Photo



6.c.3. Monitoring of tourism



Photo





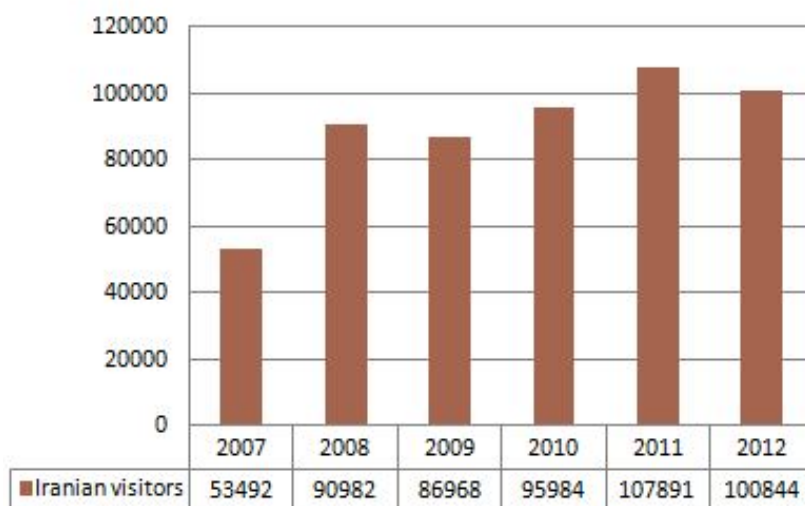
Photo

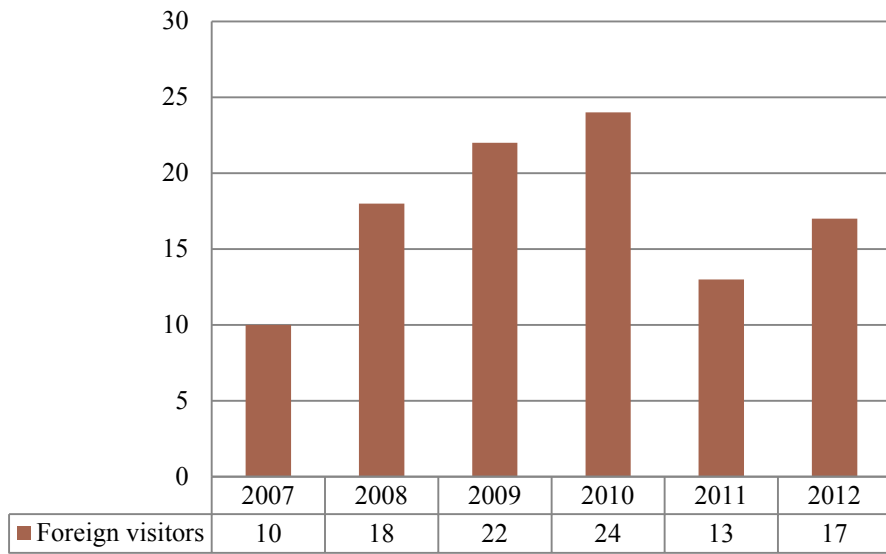


6.c.4. Statistic on the number of visitors in Shahr-i Sokhta

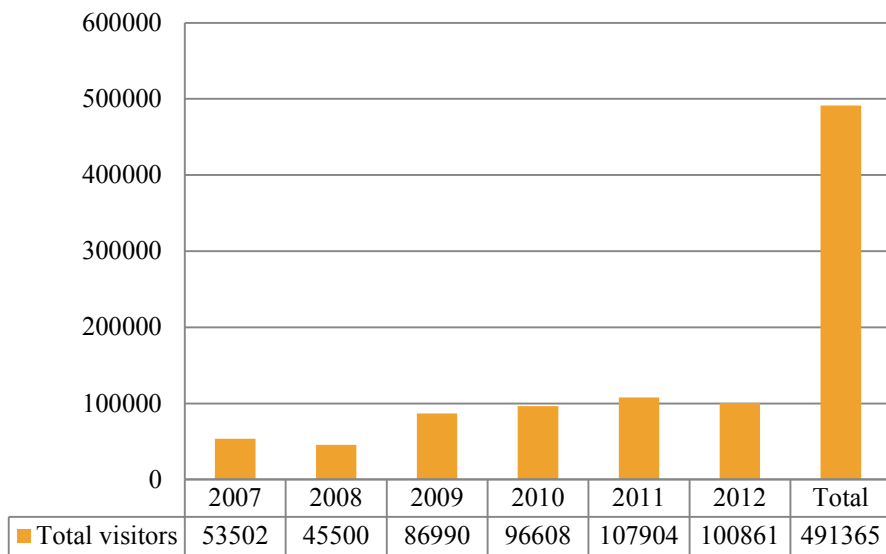
	Year	Iranian visitors	Foreign visitors	Total visitors
1	2007	53492	10	53502
2	2008	90982	18	45500
3	2009	86968	22	86990
4	2010	95984	24	96608
5	2011	107891	13	107904
6	2012	100844	17	100861
Total		536161	104	527370

Table





Chart

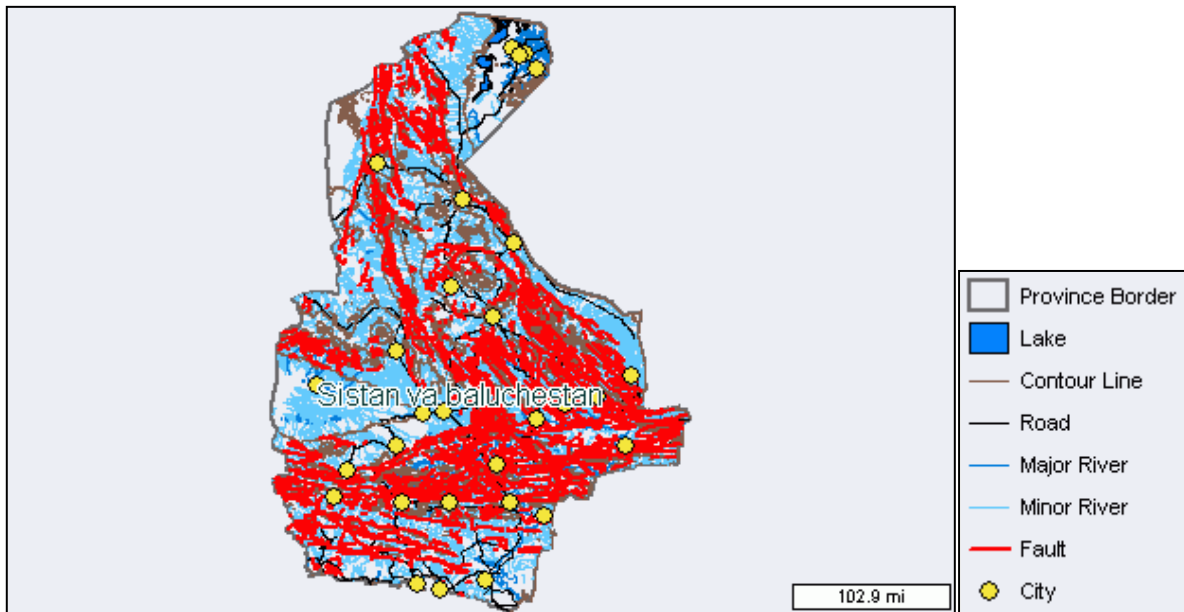


6.c.5. Major earthquakes in Sistan -o Baluchestan

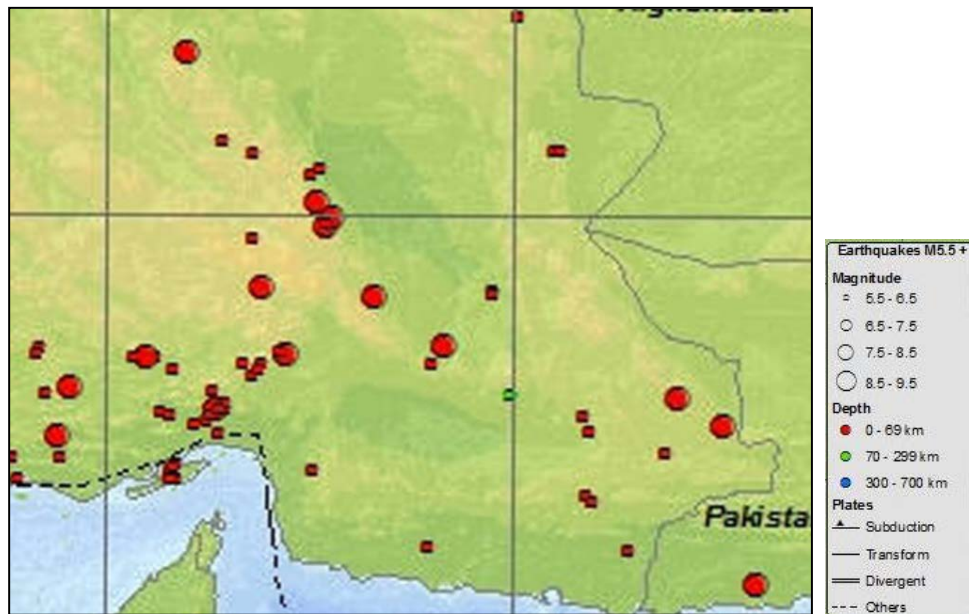
Date	Lat.	Long.	Magnitude	Ref.	Region
1927	27	62.26	6.4 mb	AMB	South of Saravan
1929	26.59	62.07	5.9 mb	AMB	North-East of Rasak
1934	27.63	62.64	6.9 mb	AMB	North-East of Saravan
1960	29.09	59.85	5.6 M	EHB	South-West of Zahedan
1968	27.55	60.89	5.7 mb	EHB	North-East of Iranshahr
1969	27.82	59.98	6.1 mb	EHB	North-West of Iranshahr
1979	26.49	60.99	6.1 Mw	EHB	North-West of Rasak
1983	27.77	62.05	6.7 Mw	EHB	North-West of Saravan
1990	29.05	60.9	5.6 Mw	EHB	South of Zahedan
2003	29.02	59.74	5.9 Mw	EHB	East of Bam, Kerman Province
2005	27.32	61.54	6.2 ML	IIEES	West of Saravan

Table

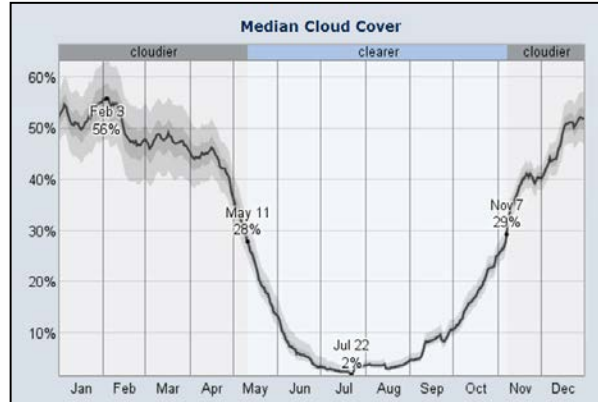
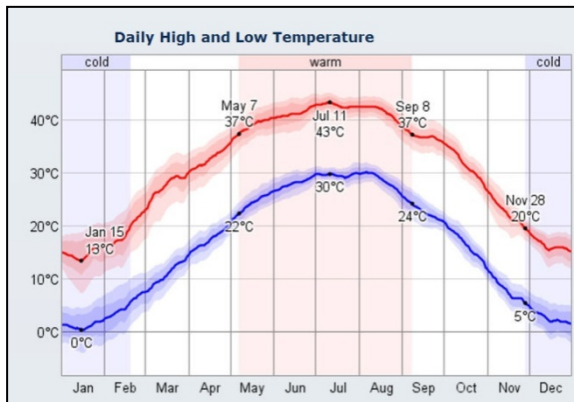
6.c.6. Schematic diagram of the faults in the region



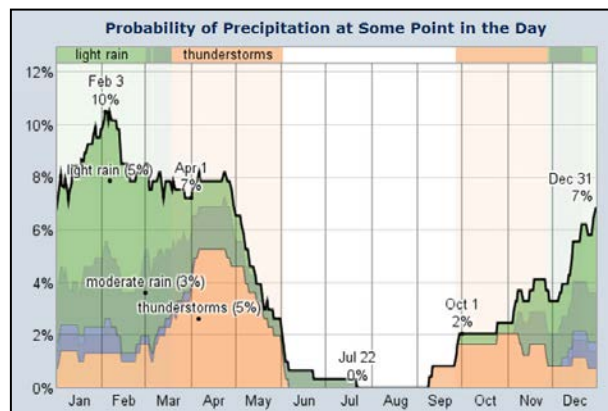
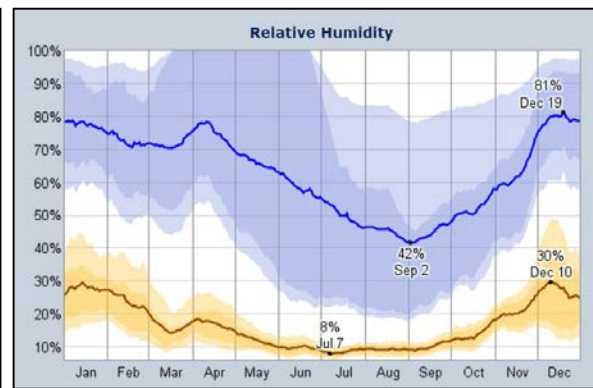
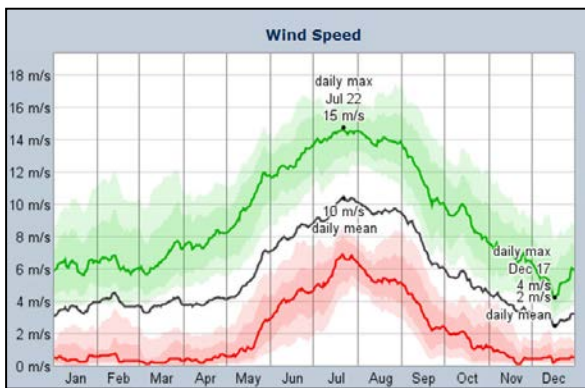
Map



6.c.7. Statistic on the meteorology of Zabol



Chart



Chapter 7 : Documentation

7.a. Photographs, slides, image inventory and authorization table and other audiovisual materials

Photo

Photo

Photo2-38. Stamp seal made of chlorite, Shahr-i Sokhta

Photo

Photo

Figure

Map

Chart

Chart

7.b. Text relating to protective designation, copies of property management plans or documented management systems and extracts of other plans relevant to the property

In the fifth chapter of this document the management framework of Shahr-i Sokhta is discussed. The short, mid and long term programs which mainly focus on conservation and presentation of special values of Shahr-i Sokhta are as follows:

7.b.1. Short term plans (two years)

- **Research & Documentation**
 - Improving the research works and furthering cooperation with universities and scientific institutions;
 - Holding expert meetings and training workshops;
 - Scientifically improving the Shahr-i Sokhta website;
 - Forming the pottery bank of south eastern Iran;
 - Creating the data bank of movable and immovable objects;
 - Continued documentation and catalogue publication for objects existing at the site;
 - Continued identification operation of the core zone based on geophysics.

- **Conservation & Restoration**
 - Regular monitoring;
 - Emergency restoration of ancient remains;
 - Carrying out maintenance plans including drainage systems;
 - Providing guide signs inside the site and museum and standardizing such signs;
 - Perfection of electronic protection systems in museum and site.

- **Tourism Management, Presentation & Education**
 - Providing specialty brochure and guidebook for site and museum;
 - Preparing a model of the site;
 - Holding local, national and international exhibitions;
 - Installing warning signs and providing explanations for visitors in order for them respect the regulations and values of the site;
 - Installing an opinion box and providing feedback forms;
 - Creating an electronic multi-lingual guiding system;
 - Completing the tourist path of Shahr-i Sokhta;
 - Designing and launching one day local tours;
 - Providing tourism facilities

7.b.2. Middle term plans (five years)

- **Research & Documentation**
 - Furthering interactions with research groups inside the country and abroad;
 - Improving the knowledge of local and foreign tour guides;
 - Monitoring the quality of cultural products;
 - Continuance multidisciplinary researches;
 - Completing the geophysical study at the ancient site of Shahr-i Sokhta;
 - Continuance archeological researches;
 - Continuance cultural objects researches related to excavations;
 - Completing the data bank of movable and immovable objects.

- **Conservation & Restoration**
 - Continuation of cooperation with local, national and international universities in restoration and conservation of site;
 - Conducting timely measures for restoration and conservation of the site based on the results of research and monitoring;
 - Completing the lighting of the site and museum;
 - Reorganization and restoration of cultural objects like clay figures, stone tools, pottery and textile;

- **Conservation & Restoration**

- Continuance conservation and restoration activities for museum objects and site;
- Continuance monitoring;
- Updating security systems in site and museum;
- Continuance of holding educational and training workshops.

- **Tourism Management, Presentation & Education**

- Continuance of holding training workshops with the participation of universities and scientific institutes in the fields of conservation, restoration and archaeology;
- Holding national and international exhibitions;
- Continuance of training program for different level of audience;
- Continuance of raising awareness of variety audience by mass media;

7.c. From and date of most recent records or inventory of property

- Updating of architectural maps of Shahr-i Sokhta, 2012
- Surveying and reviewing of buffer zone and conservation, regulation of Golestan, 2012
- Photography and documentation, 2011 & 2012
- The geophysic report of Shahr-i Sokhta, 2012
- Mapping the whole site, 2012
- Creating an appropriate tourism route, 2012

7.d. Address where inventory, records and archives are held

Shahr-i Sokhta Base

Shahr-i Sokhta, Zabol- Zahedan Road, Zabol, Sistan-o Bluchestan, Iran,

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7.e. Bibliography

- Amiet P. and Tosi M. (1978); *Phase 10 at Shahr-i Sokhta: Excavations in Square XDV and the Late 4th Millennium B.C. Assemblage of Sistan, East and West*, vol. 28, pp. 9-31.
- Baghestani S. (2003); *small finds*, in: *Sajjadi et al. Excavations at Shahr-i Sokhta, first preliminary report on the excavations of the graveyard 1997-2000*, Iran, vol. XLI, pp. 21-97.
- Bartholomae C. (1924); *Zarathuštras Leben und Lehre*, Heidelberg.
- Besenval R. (1987); *Découvertes récentes à Sarazm (R.S.S. du Tadjikistan): attestation des relations au III^e millénaire entre l'Asie centrale, l'Iran du Nord-Est et le Baluchistan*, Comptes-rendus des Séances de l'Académie des Inscriptions et Belles-Lettres, N. 2, pp. 441-456.
- Besenval R. (1997); *Entre le Sud-Est iranien et la plaine de l'Indus: le Kech-Makran, recherches archeologiques sur le peuplement ancien d'une marche des confins indo-iraniens*, *Arts Asiatiques*, vol. 52, pp. 5-36.
- Besenval R. and Isakov A. (1989); *Sarazm et les débuts du peuplement agricole dans la région de Samarkand*, *Arts asiatiques*, Tome 44, pp. 5-20.
- Biasini Costantini L., Costantini L. and Sajjadi S.M.S. (2003); *Le spezie nella documentazione archeologica: Coriandolo, cumino e terebentino nel site protostorico di Shahr-i Sokhta, Sistan, Iran*, *AROMATICA, Essenze, profumi e spezie tra Oriente e Occidente*. Pp. 37-41. Elio de Rosa editore. Roma.
- Biscione R. (1973); *Dynamics of an Early South Asian Urbanization: The First Period of Shahr-i Sokhta and its Connection with Southern Turkmenia*, in: N. Hammond (ed.). *South Asian Archaeology I*, London. pp. 105-118.
- Biscione R. (1974); *Relative chronology and pottery connections between Shahr-i Sokhta and Mundigak, Eastern Iran*, *Memorie dell'Istituto Italiano di Paleontologia Umana*, Vol. II, pp. 131-145.
- Biscione R. (1984); *Baluchistan Presence in the Ceramic Assemblage of Period I at Shahr-i Sokhta*. In: Allchin B. (ed.), *South Asian Archaeology 1981*: 69-80, Cambridge University Press, Cambridge.
- Biscione R. (1990); *The Elusive Phase 2 of Shahr-i Sokhta Sequence*. In: Taddei M. (ed.), *South Asian Archaeology 1987*: 391-409, Roma, IsMEO.
- Biscione R. and Bullgarelli M. (1983); *Painted geometrical decoration on the Shahr-i Sokhta buff ware: approach to a systematic classification*, in: M. Tosi (ed.), *Prehistoric Sistan I*, pp. 200-211, IsMEO, Roma.
- Biscione R., Bulgarelli M., Costantini L., Piperno M. and Tosi M. (1974); *Archaeological Discoveries and Methodological problems in the Excavation of Shahr-i Sokhta, Sistan*, in: J. V. van Lohuizen- De Leeuw & J.J.M. Ubaghs (eds.), *South Asian Archaeology 1973*. Leiden .pp. 12-52.

- Bulgarelli M. (1998); La Lavorazione delle perle in pietre dure nel III millennio a.C.: testimonianza da Shahr-i Sokhta (Sistan,Iran), *Perle Orientali*, Museo Nazionale d'Arte Orientale, Roma. pp. 57-70.
- Caldwell, J. R. (1967); *Investigations at Tall-I Iblis*. Illinois State museum. Preliminary report No. 9. Springfield, Illinois.
- Caloi L. and Compagnoni B. (1977); I mammiferi, *La Citta Brusciata*

- Costantini L., Costantini Biasini L. and Lentini A. (1997); Indagini archeobotaniche sul contenuto dei vasi di corredo di due tombe della necropoli di Shahr-i Sokhta , Sistan, Iran : Mossa L. E Bacchetta G. (a cura di), *Atti del 92 Congresso della Societa' Botanica Italiana*, p. 171.
- Costantini L., Tosi M. and Vigna Taglianti A. (1975-1977); Typology and Socioeconomical Implications of Entomological Finds from some Ancient Near eastern Sites, *Paleorient*. 3. pp. 247-258.
- Costantini L. and Tosi M. (1978); The Environment of Southern Sistan in the Third Millennium B.C., and its Exploitation by the Proto-urban Hilmand Civilization : Brice W.C. (ed.), *The Environmental History of the Near and Middle East since the Last Ice Age*, pp. 168-183, Academic Press, London.
- De Cardi B. (1967) The Bampur Sequence in the Third Millennium B.C., *Antiquity* 41, 1967, pp. 33-41.
- De Cardi B. (1968); *Excavations at Bampfir, S.E. Iran: A Brief Report*, Iran, vol. 6, pp. 135-154.
- De Cardi B. (1970); Excavations at Bampur, a Third Millennium Settlement in Persian Baluchistan. *Anthropological Papers of the American Museum of Natural History*, Vol. 51.
- Delmas A. B. & Casanova M. (1990); The Lapis Lazuli Sources in the Ancient East, in M. Taddei (Ed.), *South Asian Archaeology 1987*, Venice, Rome, p. 493-505.
- Deshayes J. (1976) ; Les fouilles recents de Tureng Tepe, La Terrass e haute de la fin du IIIe millenaire, *Comptes – Rendus des Seances de l'Academie des Inscriptins et belles-lettres*. pp. 522-530.
- Dioscoride; *Materia medica*, III, 63.
- Dupree, L. (1973); *Afghanistan*, Oxford University Press, London.
- Dyson H.R. and Howard S.M. (eds.) (1989); *Tappeh Hesar. Reports of the Restudy Project, 1976*. Torino.
- Faccenna D. (1981); A New Fragment of Wall-Painting from Chaga Sahr (Kuh-i Khvaga - Sistan, Iran), *East and West*, Vol. 31/ 1-4, pp. 83-97.
- Fairservice W. (1956); Excavations in the Quetta Valley, west Pakistan, Vol. 45/2, *Anthropological Papers of The American Museum of Natrul History*, New York.
- Fairservice W. (1961); Archaeological Studies in the Seistan Basin of southwestern Afghanistan and Eastern Iran. *Anthropological Paper of the American Museum of Natural History*, Vol. XLVIII, New York, Part I., pp. 1-129.
- Ferioli E. Fiandra E. and Tusa S. (1979); Stamp seals and the functional analysis of their sealings at Shahr-I Sokhta II-III, in: J. E. Van Lohuizen-de Leeuw (ed.), *South Asian Archaeology 1975*, Brillm Leiden.
- Fischer K. (1983); Field surveys in afgan Sistan 1964-1974, in: M. Tosi (ed.), *Prehistoric Sistan I*, IsMEO, Rome, pp. 3-4.

- Frank-Vogt U. (2005); A new perspective of an old site: Reopening excavation at Sohr Damb/Nal, in: C. Jarrige and V. Lefevre (ed.), *South Asian Archaeology 2001*, ERC, pp. 105-116.
- Frank-Vogt U. (2006); Alte Kulturen neu entdeckt. *Antike Welt*, H. 2, pp. 85-93.
- Frouzanfar F. (2010); *Excavations at Shahr-e Sokhta, third preliminary report on the excavations of the graveyard (anthropological studies 1997-2008)*, Iranian Center for Archaeological Research, Cultural Heritage, Handicrafts and Tourism Organization of Sistan and Baluchistan, Zahedan.
- Ganji M.H. (1968); The climate of Iran, in: Fisher, W.B. (ed.), *The land of Iran, The Cambridge history of Iran I*: Cambridge, University Press, p. 212–245.
- Ganji M.H. *Gazetteer of Afghanistan II*, pp. 114-27.
- Gnoli G. (1980); *Zoroaster's Time and Hmeland. A study on the Original of Mazdeism and Related Problems*. IUO, Naples.
- Gullini G. (1964); *Architettura iranica dagli achemenidi ai sasanidi. Il “ Palazzo” di Kuh-e Khwaja (Seistan)*, Torino.
- Hakemi A. (1997); *Shahdad. Archaeological Excavations of a Bronze Age Center in Iran*. Translated and Edited by S.M.S.Sajjadi, IsMEO, Rome.
- Hanifi J. (1973); A Periplus of Magan and Meluhha, *BSOAS* 36.

-
- Jarrige C., Jarrige J.-F., Meadow R. and Quivron G. (1995/6); Mehgarh, field reports 1974-1985, from Neolithic time to the Indus civilization, Department of Culture and Tourism, Government of Sindh, Pakistan.
 - Jarrige J.-F., Didier A. and Quivron G. (2011); Shahr-i Sokhta and the chronology of the Indo-Iranian regions, *Paleorient*, 37/2, pp. 7-34.
 - Jux U., and Kempf K. E., (1983); Regional geology of Afghan Sistan, in: Tosi, M. (ed.), *Prehistoric Sistan 1*, IsMEO, Reports and Memoirs, v. 19, Rome, p. 5–60.
 - Kendrew W.G. (1961); *The climate of the continents*: New York, Oxford University Press, 5th ed., 608 p.
 - Kohl P. (1977); A Note on Chlorite Artifacts from Shahr-i Sokhta, *East and West* vol. 27/1-4, pp. 111-27.
 - Kohl P. (1977); The "World Economy" of West Asia in the Third Millennium B.C., in: M. Taddei, (ed.), *South Asian Archaeology 1977*, Naples, 1979, pp. 55-86.
 - Kohl P. (1978); The Balance of Trade in Southwestern Asia in the Mid-Third Millennium B.C. *Current Anthropology* vol. 19, pp. 463-92.
 - Kohl P. (1986); The Lands of Dilmun. Changing Cultural and Economic Relations during the Third to Early Second Millennia B.C. in: S. H. A. Al Khalifa and M. Rice, (eds.), *Bahrain Through the Ages. The Archaeology*, London, pp. 367-75.
 - Lamberg- Karlovsky C.C. (1971); The Proto-Elamite Settlement at Tepe Yahya, *Iran*, LX. pp. 87-96.
 - Lamberg-Karlovsky C. C, Beale T. W. (1986); Excavations at Tepe Yahya, Iran 1967-1975 : The Early Periods, American School of Prehistoric Research Bulletin 38, Peabody Museum of Archaeology and Ethnology, Harvard University.
 - Lamberg-Karlovsky C. C. and Tosi M. (1973); Shahr-i Sokhta and Tepe Yahya: Tracks on the earliest history of Iranian Plateau, *East and West*, vol. 23/1-2, pp. 21-58.
 - Laneri & Vidale (1998); An anatomy of the truncated-conical bowls of Shahr-i Sokhta, *East and West*, vol. 48, pp. 225-264.
 - Ligabue G. , S. Salvatori, (1988); *Bactria: An Ancient Oasis Civilization from the Sands of Afghanistan*, Venice.
 - Lyonnet B., A. Isakov, (1988); Céramiques de Sarazm (Tadjikistan, URSS) : problèmes d'échanges et de peuplement à la fin du Chalcolithique et au début de l'Age du Bronze, *Paléorient.*, Vol. 14 N°1. pp. 31-47.

- Macchiarelli R., P. Passarelli (1988); Analisi paleodemografica comparative della popolazione di Shahr-i Sokhta (Sistan, Iran, III millennio a. C.), in: *Rivista di Anthropologia*, vol. LXVI, pp. 5-36.
- Majidzadeh Y. (1982); Lapis lazuli and the Great Khorasan Road, *Paléorient*, Vol. 8/1. pp. 59-69.
- Majidzadeh Y. (2003); *Jiroft: The earliest oriental civilization*, Ministry of Culture and Islamic Guidance, Tehran.
- Majidzadeh Y. and Pittman H. (2008); Excavations at Konar Sandal in the region of Jiroft in the Halil Basin: first preliminary report (2002-2008) (with a contribution on glyptic art by Holly Pittman), *Iran*, 46, 69-103.
- Masimov I. S. (1978); *Keramicheskoe proizvodstvo epokhi bronzy v YuzhnomTurkmenistane*, Ashkhabad.
- Masson V. M. and Sarianidi V. I. (1972); *Central Asia before Achaemenid*, Thames and Huddson, London.
- Masson V.M. (1967); ProtogorodskayatsivilizatsiyayugaSredneĀzii, *Sovetskayaarkheologiya*, no. 3.
- Masson V.M. (1968); Urban Revolution in the South Turkmenia, *Antiquity*, no. 167.
- Masson V.M. (1976); Altyn-depe and the Bull Cult, *Antiquity* 50/1.
- Masson V.M. (1977); Altyn-depe v epokhueneolita, *VDI*, , no. 4.
- Masson V.M. (1988); *Altyn-Depe*, The University Museum, University of Pennsylvania, Philadelphia.
- Masson V.M. Altyn Depe, in: *Encyclopedia Iranica*, Online Electronic Version.
- Masson V.M. (1988); *Altyn – Depe*. Translated by Henry N. Michael. The University Museum. University of Pennsylvania. Philadelphia.
- McMahon H. (1906); Recent Survey and Exploration in Seistan, *The Geographical Journal*, Vol. 28, No. 3, pp. 209-228.
- Meder O. (1977); Sistan: l'aspetti geografico, in: Tucci G. (ed.), *La Citta Bruciata dell Deserto Salato*, pp. 41-64, Venice.
- Mehrafarin R. (2005); Archaeological survey and Analysis of Zahak District in Sistan, unpublished doctorate dissertation, University of Tarbiat Modares, Theran.
- Mojtahedzadeh P. (1995); Hirmand and Ha;oun in the hydroplitic landscape of eastern Iran, *Etella't-e Siasi va Eghtesadi*, vol. 10, no. 5-6, pp. 35-55.
- Mousavi Haji R. (2003); *A research on the archaeology of Zarang in Islamic period (archaeological survey of Zahedan-I Kohneh site in eastern part od Sistan)*, Ph.D. dissertation, University of Tarbiat Modaress, Tehran.

- Mousavi M. (1995); Brick monumental of Kuh-i Khwaja and a brief history of research on it, in: *A Collection of Articles of Congress on the History of Architecture and Urbanism in Iran*, Arg-i Bam, Cultural Heritage Organization, Tehran.
- Moussavi Haji and Mehrafarin R. (2008); Systematic archaeological survey of Sistan plain, reports archived in Cultural Heritage, Handicrafts and Tourism Organization of Sistan and Baluchistan, not-published.
- Mugavero L. and Vidale M. (2003); The use of polychrome containers in the Hilmand civilization: a female function? *East and West*, vol. 53, pp. 67-94.
- Noori G. R., Arbabi T. and Noori S. (2008); *Hamoon Wetland, the life of Sistan*, Sepehr Publication Center, Tehran.
- Nyberg S. H. (1938); *Die Religionen des alten Iran*, tr. Hans Heinrich Schaeder, Leipzig.
- Piperno M. (1976); *Grave 77 at Shahr-i Sokhta: Further Evidence of Technological Specialization in the 3rd Millennium BC*, *East and West*, vol. 26, pp. 9-12.
- Piperno M., Salvatori S. (2007); *The Shahr-i Sokhta Graveyard (Sistan, Iran), Excavation Campaigns 1972-1978*, IsIAO, Roma.
- Piperno M., Tosi M. (1975); The graveyard of Shahr-i Sokhta, Iran, *Archaeology*, vol. 28, no. 3, pp. 186-197.
- Piperno, M., Salvatori S. (1983); Recent results and new perspectives from the research at the Graveyard of Shahr-i Sokhta, Sistan, Iran": *Annali dell Istituto Universitario Orientale*, 43, pp. 173-191.
- Potts D. (1981); *The Potter's Marks of Tepe Yahya*, *Plaeorinet*, vol. 7/1, pp. 107-122.
- Potts D. (2001); *Excavations at Tepe Yahya, Iran, 1967-1975: The Third Millennium*, Cambridge, Mass.
- Potts D. (2003); Tepe Yahya, Tell Abraq and the Chronology of the Bampur Sequence, *Iranica Antiqua*, XXXVIII: 1-24.
- Potts D. (2004); Bampur, in: E. Yarshater (ed.), *Encyclopedia Iranica*, Online Electronic Version.
- Pumpelly R. (1908); *Explorations in Turkestan, Expedition of 1904*, Carnegie Institute of Washington. Washington.
- Rajabi M R., Rohani F., Ekhtessassi M. R., Ghazanfarpoor N. (2006); Morphodynamic analysis of wind faces using spatial sand rose model in Zabol and Zahak region, Iran, *Biaban Journal* Vol 11, No 1, pp. 45-51.
- Sajjadi S. M. (with contributions by F. Frouzanfar, R. Shirazi and S. Baghestani) (2003); Excavations at Shahr-i Sokhta, first preliminary report on the excavations of the graveyard 1997-2000, *Iran*, vol. XLI, pp. 21-97.

- Sajjadi S. M. S. & Frouzafar F. (2000); Preliminary Observations on Human Skeletal Remains from Shahr-e Sukhteh, Sistan (Southeast Iran), in: *Caucasus: Essays on the Archaeology of the Neolithic- Bronze Age*, Tbilisi, pp. 62-75.
- Sajjadi S.M.S., M. Casanova, L. Costantini, and K.O. Lorentz, (2006); Sistan and Baluchistan Project: Short Reports on the Tenth Campaign of Excavations at Shahr-i Sokhta, *Iran*, vol. 43, pp. 1-28.
- Sajjadi, S. M. S. (1997); Water resources and ancients site in Sistan, *Journal of Humanities of Sistan and Baluchistanm University*, vol. 3, no. 5, pp. 8-29.
- Sajjadi, S. M. S. (2004); *Archaeological investigations at Shahr-i Sokhta and Dahaneh-ye Qolaman 1997–2004*. ICHHTO, Teheran.
- Sajjadi, S. M. S. and Saber Moghaddam, F. (2004); "Peintures et gravures murales découvertes à Dahan-e Gholâmân, Sistân". *Studia Iranica*, vol. 33/2, pp.
- Sajjadi, S. M. S., Frouzafar, F., Shirazi, R., Zaruri, R. M (2009); *Excavations at Shahr-i Sokhta, second preliminary report on the excavations of the Graveyard (2001–2003)*. Iranian Center for archaeological Research and Cultural Heritage, Handicrafts and Tourism Organization of Sistan and Baluchistan, Zahedan.
- Sajjadi, S. M. S., Frouzafar, F., Shirazi, R., Zaruri, R. M. (2007); *Excavations at Shahr-i Sokhta, first preliminary report on the excavations of the Graveyard (1997–2000)*. Iranian Center for archaeological Research and Cultural Heritage, Handicrafts and Tourism Organization of Sistan and Baluchistan: Zahedan.
- Salvatori S. And M. Vidale, (1997); *Shahr-i Sokhta 1975-1978: Central Quarters Excavations: Preliminary Report*, IsIAO, Roma.
- Salvatori S., Tosi M. (2005); Shahr-i Sokhta revised sequence", in: C. Jarrige and V. Lefèvre, eds., *South Asian Archaeology 2001*, pp. 281–292.

- Shirazi R. (2007); Figurines anthropomorphes de Shahr-i Sokhta, Séistan, sud-est de l'Iran, approche typologique, *Paléorient*, vol. 32, pp. 97-112.
- Shirazi R. (2008); *Etudes typologiques et comparatives des représentations humaines en terre crue, en terre cuite et en pierre de l'Asie centrale et de l'Iran oriental du Chalcolithique à l'âge du Bronze (4000-1800 av. J.-C.)*. Thèse de doctorat d'archéologie, Université Paris 1, Panthéon-Sorbonne, unpublished.
- Shirazi Z. (2012); *Dynamique de la végétation de l'Iran oriental en interactions avec les sociétés humaines à l'âge du Bronze: approche anthracologique*, Thèse de Doctorat d'archéologie et environnement, Université Paris 1, Panthéon-Sorbonne.
- Smith E.C.B. (1876); The Perso – Afgan Mission, 1871-1872, Eastern Persia. *An Account of the Journeys of the Persian Boundary Commission 1870-72*. London.
- Stein A. M. (1928); *Innermost Asia: Detailed report of explorations in Central Asia, Kan-su and Eastern Iran*, 5 vols. Clarendon Press. Reprint: New Delhi. Cosmo Publications. 1981.
- Stein A. M. (1937); Sir Aurel Stein, Archaeological Reconnaissances in North-Western India and South-Eastern Iran, London.
- Tate, G. P. (1910/12); Seistan, A memoir on the topography, ruins, and people, 4 volumes, Calcutta.
- Tosi M. (1968); Excavations at Shahr-i Sokhta, a Chalcolithic Settlement in the Iranian Sistan, Preliminary Report on the First Campaign, *East and West*, vol. 18, pp. 9-66.
- Tosi M. (1969); Excavations at Shahr-i Sokhta. Preliminary Report on the Second Campaign, September-December 1968, *East and West*, vol. 19/3-4, pp. 283-386.
- Tosi M. (1974); The Problem of Turquoise in Proto-historic Trade on the Iranian Plateau, *MDIIPU*, vol.2, pp. 147-162.
- Tosi M. (1983); *Prehistoric Sistan, I*. IsMEO, Roma.
- Tosi M., Piperno M. (1973); Lithic Technology Behind the Ancient Lapis Lazuli Trade, *Expedition*, vol. 16/1, pp. 15-23 Weippert D., Wittekindt H. and Wolfart, R.,
- Tucci G. (ed.) (1970); *Zur geologischen Entwicklung von Zentral-und Sudafghanistan*. Kabul, Beihefte zum Geologischen Jahrbuch, heft 92.
- Tucci G. (ed.) (1977); *La Citta Bruciatta del Deserto Salato*, Venezia.
- Vavilov N.I. (1949/50); *The origin, variation, immunity and breeding of cultivated plants*, Waltham, Mass., USA.
- Vidale and Tosi (1996); The development of wheel throwing at Shahr-i Sokhta, Low and fast revolution toward statehood, *East and West*, vol. 46, pp. 251-269.
- Watt G. (1889-92); *A Dictionary of the Economic Products of India*. voll. I-IV. Periodical Expert, Delhi.

- Whitney J. (2006); *Geology, Water, and Wind in the Lower Helmand Basin, Southern Afghanistan*, Prepared under the auspices of the U.S. Agency for International Development, U.S. Geological Survey, Virginia.
- Woolley L. (1934); *The Royal Cemetery. Ur Excavations*, vol. II, Philadelphia.
- Woolley L. (1955); *Ur excavations IV, the early periods*, London.
- Yate Y. C.E. (1900); *Khurasan and Sistan*. Edinburgh/London, 1900.
- Zeven A.C. and Zhukovsky P.M. (1975); *Dictionary of cultivated plants and their centers of discovery*. Centre for Agricultural Publishing and Documentation. Wageningen.
- Zohary D. Hopf M. (2000); *Domestication of Plants in Old World*. Oxford University Press. Oxford.

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Chapter 9 : Signature on behalf of the state party

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Mr. Hosein Sarhadi dadian

Mr. Alireza Khosravi

Mr. Ghafour Barahubi

Mr. Majid Davoodi

Traslators:

Dr. Abdollah Sarani

Dr. Ali Rabiei

Mr. Kambiz Mansour Ghanaie

Mr. Kambiz Takapoo manesh

With the assistance of:

Photographers:

Mr. Babak Sedighi

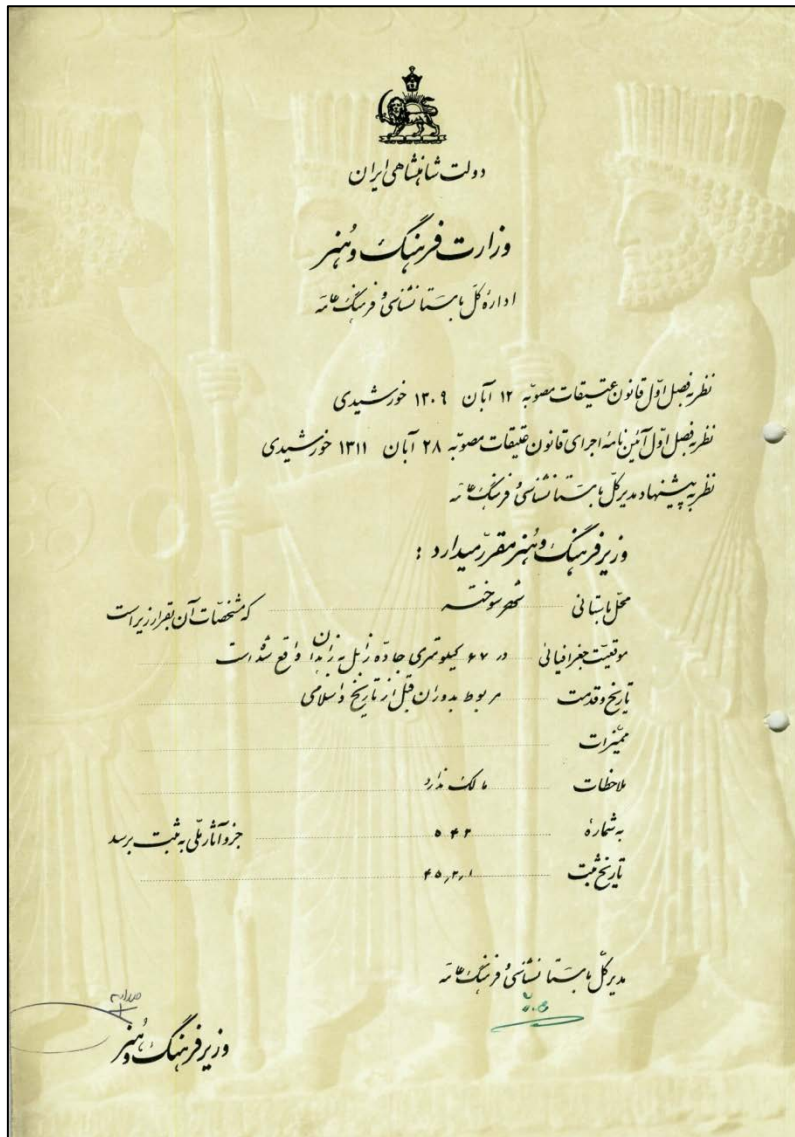
Special thanks:


Dr. Ruhollah Shirazi

Dr. Seyyed Mansour Seyyed Sajjadi

Appendix I: National registration documents of nominated Shahr-i Sokhta

Province	City	Property name	National Registration number
Sistan-o Bluchestan	Zabol	Shahr-i Sokhta	542




 شماره ثبت . . ۵۴۲

وزارت فرهنگ و تفریح

اداره کل حفاظت آثار باستانی و بناهای تاریخی ایران
پیشنهاد ثبت آثار باستانی

پیشنهاد کننده	_____
طی نامه شماره	_____
نام اثر باستانی	شهر سوخته
موقعیت جغرافیائی	سیستان - زابل
وضع فعلی	شهر
قدمت	ما قبل تاریخ - اسلامی
تاریخ بررسی و کشف	زمستان ۱۳۴۴
نام بانی و سازنده اثر	_____
وضع مالکیت	مالک ندارد
ملاحظات	_____

اداره کل باستانشناسی و فرهنگ عامه

	شهر سوخت	بنای تاریخی
	۵۴۲	اثر باستانی
		شماره ثبت تاریخی
		شماره شناسنامه
	۵۴۲	شماره دفتر
	شهر سوخت	نام بن
		کیفیت ساختمان
	طول و عرض شهر مذکور در حدود ۵ کیلومتر است	اندازه و ابعاد آن
	مربوط به دوران قبل از تاریخ و اسلامی	قدمت
	زمن سال ۱۳۴۴	تاریخ بررسی و کشف
	اقوام قبل از تاریخ و دوره اسلامی	اسبابی و سازنده بنا
	مالک ندارد	وضع مالکیت
	در ۵ کیلومتری جاده نابل - زابل از بخش شیب فاصله ۵ کیلومتری است	موقعیت جغرافیائی
	تاریخ ثبت ۴۵۲	ملاحظات :

Istituto Italiano di Cultura

Il Direttore



مؤسسه فرهنگی ایتالیا

رئیس

شماره ۱۰۰/۷۰۰
۱۳۶۳

آقای رضا زابلی خوشبخت مسئول حفظ میراث فرهنگی
اداره کل ارشاد اسلامی - زابل

بدینوسیله می‌خواهم از پذیرایی گرمی که در مدت اقامت در زابل از سوم تا ششم آبانماه جاری مبذول داشتید و از اینکه فرصت مختمی برای بازدید از تمام اماکن عمده باستانی آن منطقه با راهنمایی پرازش خودنو باستانشناسان ایتالیایی برایم فراهم ساختید صمیمانه تشکر نمایم.

به اعتقاد ما این جریان پایان تحقیقات گذشته باستانشناسان ایتالیایی در سیستان و آغاز یک همکاری علمی تازه و پرمیاب میان ایتالیا و ایران بود و با این قصد کماکان خود را با تمام آنچه در قدرتمان است متعهد می‌شماریم تا ثمرات پرباری برای علم و برای آینده فرهنگی و اقتصادی استان شما از این همکاری عاید گردد.

از فرصت استفاده کرده با خوشوقتی تمام یک جلد از کتاب "قنات کاریز" نوشته سید منصور سید سجادی، شاکرد پرفسور توزی را که دو سال قبل از طرف بخش باستانشناسی این انجمن فرهنگی بطبع رسید و به امید آنکه خدمت مفیدی به کشور شما باشد برایتان می‌فرستم.

تشکرات صمیمانه و درود گرم و آرزوهای مرا برای کامیابی مستمر در انجام خدمات فرهنگی خود بپذیرید.

رئیس انجمن فرهنگی ایتالیا
و وابسته فرهنگی سفارت ایتالیا در تهران
پرفسور جان کلودیو مانیارلا

Maniariella



ISTITUTO ITALIANO
PER IL
MEDIO ED ESTREMO ORIENTE
GRUPPO DI RICERCHE PREISTORICHE
PER IL SISTAN ED IL BELUCISTAN

00185 ROMA
VIA MERULANA, 245 (Folozzo Brancocci)
TELEF. 732741-2-3

Research group on prehistoric Sistan and Baluchistan

Prot. n.

جناب آقای رضا مروجی
مدیر کل اداره کل ارشاد اسلامی رستان سیستان و بلوچستان

باسلام . عالم انظار آنکه در آشنائی با شما یک خوشبختی بزرگی برای من بود و ما هم
بگویم که کار کردن با اداره شما بسیار راحت و خوب بود. زحمات شما و همکاران
مخصوصاً آقای زابلی برای من فراوانی زحمتی است. آقای زابلی دو در خدمت کرد
است یکی در مورد تشکیل نمایشگاه مگس و دیگری در مورد تهیه راهنما و اندر بارستان
که در مورد با سفارت صحبت کردم و امیدوارم در بهای خوب ستاد نامه «فرهنگی»
فرستاده شود برای کار ما بکنیم. در این مورد در آینده نزدیک ارتباطی سفارت به شما اطلاع
خواهم داد که چاره تدابیر بکنیم.

با تشکر
سارین سیمو توری

م. م. م.
ارادتمندانه
۱۶/۱۱

وزیر دفتر اداره کل ارشاد اسلامی
سیستان و بلوچستان
شماره ۱۶/۸۶۷۷
تاریخ ۱۶/۸/۶۲

Appendix II: Burial Ceremony



Grave no: 2505

Provenance: Shahr-i Sokhta
Period:
Excavator no: HYE



Grave no: 5011

Provenance: Shahr-i Sokhta
Period: I
Excavator no: HYD



Grave no: 5109

Provenance: Shahr-i Sokhta
Period: II
Excavator no: HYM



Grave no: 5803

Provenance: Shahr-i Sokhta
Period: -
Excavator no: MDX



Grave no: 7909

Provenance: Shahr-i Sokhta
Period: IV
Excavator no: NAM



Grave no: 8507

Provenance: Shahr-i Sokhta
Period: III
Excavator no: NFB



Grave no: 8504

Provenance: Shahr-i Sokhta
Period: II
Excavator no: NFB



Grave no: 8502

Provenance: Shahr-i Sokhta
Period: III
Excavator no: NFB



Grave no: 8323

Provenance: Shahr-i Sokhta
Period: I
Excavator no: MJO



Grave no: 1403

Provenance: Shahr-i Sokhta
Period: III
Excavator no: IUG



Grave no: 1512/1,1512/2

Provenance: Shahr-i Sokhta
Period: II
Excavator no: IUL



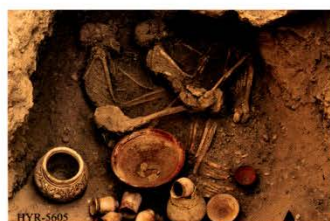
Grave no: 2706

Provenance: Shahr-i Sokhta
Period: I
Excavator no: HTR



Grave no: 3108

Provenance: Shahr-i Sokhta
Period: II
Excavator no: IUM



Grave no: 5605

Provenance: Shahr-i Sokhta
Period: II
Excavator no: HYR



Grave no: 5711

Provenance: Shahr-i Sokhta
Period: ?
Excavator no: NAR



Grave no: 5720

Provenance: Shahr-i Sokhta
Period: -
Excavator no: NAR



Grave no: 6704

Provenance: Shahr-i Sokhta
Period: I
Excavator no: MJN



Grave no: 6905

Provenance: Shahr-i Sokhta
Period: III
Excavator no: NFR



Grave no: 7916

Provenance: Shahr-i Sokhta
Period: I
Excavator no: NFC



Grave no: 7920

Provenance: Shahr-i Sokhta
Period: II
Excavator no: NFC



Grave no: 8116

Provenance: Shahr-i Sokhta
Period: III
Excavator no: NHF



Grave no: 8121

Provenance: Shahr-i Sokhta
Period: -
Excavator no: NFH



Grave no: 8525

Provenance: Shahr-i Sokhta
Period: II
Excavator no: NFB



Grave no: 4300

Provenance: Shahr-i Sokhta
Excavator no: HYI



Grave no: 1503

Provenance: Shahr-i Sokhta
Excavator no: IUL



Grave no: 1517

Provenance: Shahr-i Sokhta
Excavator no: IUL



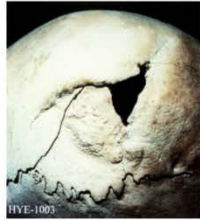
Grave no: 1714

Provenance: Shahr-i Sokhta
Excavator no: IUA



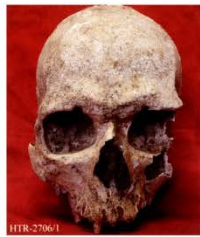
Grave no: 2300

Provenance: Shahr-i Sokhta
Excavator no: IBP



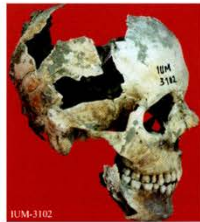
Grave no: 1003

Provenance: Shahr-i Sokhta
Excavator no: HYE



Grave no: 2706/1

Provenance: Shahr-i Sokhta
Excavator no: HTR



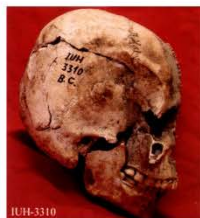
Grave no: 3102

Provenance: Shahr-i Sokhta
Excavator no: IUM



Grave no: 3208

Provenance: Shahr-i Sokhta
Excavator no: IUR



Grave no: 3310

Provenance: Shahr-i Sokhta
Excavator no: IUH



Grave no: 7814

Provenance: Shahr-i Sokhta
Excavator no: NAW



Grave no: 7816

Provenance: Shahr-i Sokhta
Excavator no: NAW



Grave no: 2905

Provenance: Shahr-i Sokhta
Excavator no: HYJ



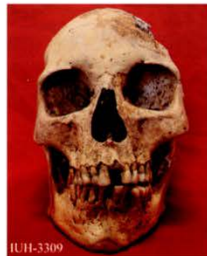
Grave no: 6705

Provenance: Shahr-i Sokhta
Excavator no: MJN



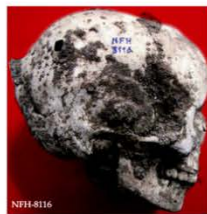
Grave no: 1705

Provenance: Shahr-i Sokhta
Excavator no: IUA



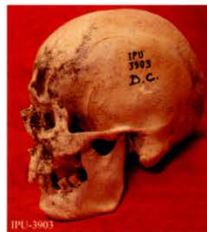
Grave no: 3309

Provenance: Shahr-i Sokhta
Excavator no: IUH



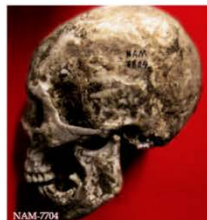
Grave no: 8116

Provenance: Shahr-i Sokhta
Excavator no: NFH



Grave no: 3903

Provenance: Shahr-i Sokhta
Excavator no: IUP



Grave no: 7704

Provenance: Shahr-i Sokhta
Excavator no: NAM



Grave no: 7707

Provenance: Shahr-i Sokhta
Excavator no: NAM



Grave no: 1605

Provenance: Shahr-i Sokhta
Period: II
Excavator no: IUK



Grave no: 5005

Provenance: Shahr-i Sokhta
Period: III
Excavator no: MYD



Grave no: 6606

Provenance: Shahr-i Sokhta
Period: II
Excavator no: IRU



Grave no: 6603

Provenance: Shahr-i Sokhta
Period: III
Excavator no: IRU



Grave no: 5714

Provenance: Shahr-i Sokhta
Period: I
Excavator no: NAR



Grave no: 7817

Provenance: Shahr-i Sokhta
Period: I
Excavator no: NAW



Grave no: 7920

Provenance: Shahr-i Sokhta
Period: III
Excavator no: NFC



Grave no: 8001

Provenance: Shahr-i Sokhta
Period: IV
Excavator no: HHE



Grave no: 8118

Provenance: Shahr-i Sokhta
Period: III
Excavator no: NFH



Grave no: 8519

Provenance: Shahr-i Sokhta
Period: III
Excavator no: NFB



Grave no: 8600

Provenance: Shahr-i Sokhta
Period: III
Excavator no: MJT



Grave no: 8320

Provenance: Shahr-i Sokhta
Period: II
Excavator no: MJO



Grave no: 1607

Provenance: Shahr-i Sokhta
Period: II
Excavator no: IUK



Grave no: 2710

Provenance: Shahr-i Sokhta
Period: IV
Excavator no: HTR



Grave no: 2903

Provenance: Shahr-i Sokhta
Period: II
Excavator no: HYJ



Grave no: 3400

Provenance: Shahr-i Sokhta
Period: II
Excavator no: IPV



Grave no: 5113

Provenance: Shahr-i Sokhta
Period: -
Excavator no: HYM



Grave no: 7816

Provenance: Shahr-i Sokhta
Period: II
Excavator no: NAM



Grave no: 7919

Provenance: Shahr-i Sokhta
Period: III
Excavator no: NFC



Grave no: 8307

Provenance: Shahr-i Sokhta
Period: IV
Excavator no: MJO



Grave no: 7934

Provenance: Shahr-i Sokhta
Period: II
Excavator no: NFC



Grave no: 1404

Provenance: Shahr-i Sokhta
Period: IV
Excavator no: IUG



Grave no: 1400

Provenance: Shahr-i Sokhta
Period: II
Excavator no: IUG



Grave no: 5408

Provenance: Shahr-i Sokhta
Period: III
Excavator no: HTT



Grave no: 5717

Provenance: Shahr-i Sokhta
Period: II
Excavator no: NAR



Grave no: 6804

Provenance: Shahr-i Sokhta
Period: II
Excavator no: NGL



Grave no: 7702

Provenance: Shahr-i Sokhta
Period: -
Excavator no: NAM



Grave no: 8301

Provenance: Shahr-i Sokhta
Period: II
Excavator no: MJO



Grave no: 2607

Provenance: Shahr-i Sokhta
Period: II
Excavator no: HYN



Grave no: 5207

Provenance: Shahr-i Sokhta
Period: III
Excavator no: IPP

Appendix III: Identification of museum objects

Attachment Forms are the kind of forms used for identifying, classifying and conserving museum objects of Shahr-i Sokhta. Here, a few samples of two kinds of forms about classification of objects have been presented in Farsi language. They include a general as well as a specialized ID of cultural and historical objects held in Shahr-i Sokhta.

In general forms, outward characteristics and specifications of each item are recorded including its name, holding place, substance, age, rate of damage, Archaeological datas and its picture. If required, extra explanations will also be added in the form by an expert.

Completion of the forms not only results in the recording and identifying of objects but also helps relevant experts in their restoration and conservation activities.

Finally, some of photos showing objects both before and after restoration are added to these forms.


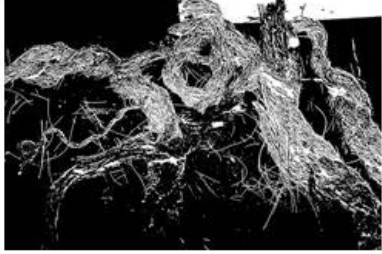
گروه باستان شناسی شهر سوخته

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی
طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

طراحی و تنظیم: هاله هلالی شناسنامه داده های باستان شناسی

فرم شماره: 1

تاریخ تنظیم: 87/10/7

فصل:	<input checked="" type="radio"/> قدمت: هزاره سوم	<input type="checkbox"/> نامشخص <input type="checkbox"/> متعلق:	
سال: 1384	<input checked="" type="radio"/> چگونگی دستیابی: کاوش علمی	شماره:	
1- داده های باستان شناسی:	<input checked="" type="radio"/> نوع مالکیت: قطعی	توضیحات:	
شماره ردیف: 0060	<input checked="" type="radio"/> مالکیت: گروه باستان شناسی شهر سوخته		
کارگاه: 1	<input checked="" type="radio"/> محل نگهداری فعلی: پلگاه، مینان شناسی شهر سوخته		
تراشه: OYL	<input type="checkbox"/> موزه زلفدان <input type="checkbox"/> موزه زابل		
لوکوس: B2	<input type="checkbox"/> سلامت شهر سوخته <input type="checkbox"/> سایر:	شماره تصویر: 0060-2	
فضا: 2	<input checked="" type="radio"/> نوع یافته:		
اناق:	<input type="checkbox"/> پارچه <input type="checkbox"/> لباس <input type="checkbox"/> کفن		
برش: 2	<input type="checkbox"/> نخ <input type="checkbox"/> ریبوش زیر قشر <input type="checkbox"/> زیر لختاز <input type="checkbox"/> رو لختاز		
عمق:	<input type="checkbox"/> طناب <input checked="" type="checkbox"/> حصیر <input type="checkbox"/> سب <input type="checkbox"/> تور ماهگیری <input type="checkbox"/> ابراف خام		
شماره کاتالوگ: 2000			
شماره حفار:			
شماره آزمایشگاه:			
ردیف سابق:			

طرح (IA): 0060-4

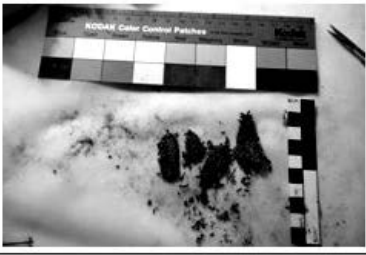
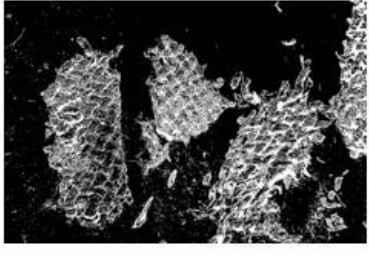
گروه باستان شناسی شهر سوخته

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی
طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

طراحی و تنظیم: هاله هلالی شناسنامه داده های باستان شناسی

فرم شماره: 1

تاریخ تنظیم: 87/10/10


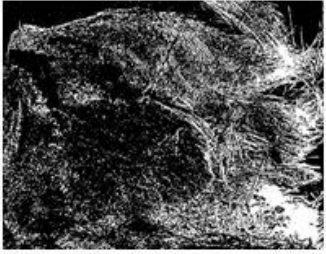
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سال: 1379	<input checked="" type="radio"/> چگونگی دستیابی: کاوش علمی	شماره:	
1- داده های باستان شناسی:	<input checked="" type="radio"/> نوع مالکیت: قطعی	توضیحات:	
شماره ردیف: 0200	<input checked="" type="radio"/> مالکیت: گروه باستان شناسی شهر سوخته		
کارگاه: 1	<input checked="" type="radio"/> محل نگهداری فعلی: پلگاه، مینان شناسی شهر سوخته		
تراشه:	<input type="checkbox"/> موزه زلفدان <input type="checkbox"/> موزه زابل		
لوکوس: 7	<input type="checkbox"/> سلامت شهر سوخته <input type="checkbox"/> سایر:	شماره تصویر: 0200-1	
فضا: 6	<input checked="" type="radio"/> نوع یافته:		
اناق:	<input type="checkbox"/> پارچه <input checked="" type="checkbox"/> لباس <input type="checkbox"/> کفن		
برش: 6	<input type="checkbox"/> نخ <input type="checkbox"/> ریبوش زیر قشر <input type="checkbox"/> زیر لختاز <input type="checkbox"/> رو لختاز		
عمق:	<input type="checkbox"/> طناب <input type="checkbox"/> حصیر <input type="checkbox"/> سب <input type="checkbox"/> تور ماهگیری <input type="checkbox"/> ابراف خام		
شماره کاتالوگ: 189			
شماره حفار:			
شماره آزمایشگاه: 183			
ردیف سابق: 27			

طرح (IA): 0200-4

گروه باستان شناسی شهر سوخته فرم شماره: 1

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی
 طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

طراحی و تنظیم: هاله هلالی شناستامه دلاهِ های باستان شناسی
 تاریخ تنظیم: 87/10/13 تاریخ تنظیم: 87/10/13


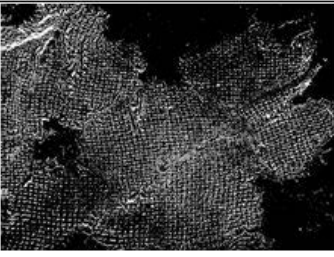
فصل:	<input checked="" type="radio"/> قدمت : هزاره سوم	
سال: 1379	<input checked="" type="radio"/> چگونگی دستیابی:	سفر:
1- داده های باستان شناسی:	کاوش علمی	
شماره رزف: 0252	<input checked="" type="radio"/> نوع مالکیت:	توضیحات:
کارگاه: 1	قطعی	
درانسه:	<input checked="" type="radio"/> مالکیت:	
لوگوس:	گروه باستان شناسی شهر سوخته	
فضا: 7	<input checked="" type="radio"/> محل نگهداری فعلی:	
اتاق:	پلگاه بستان شناسی شهر سوخته	
برش: 6	موزه زلفهان <input type="checkbox"/> موزه زلف <input type="checkbox"/>	شماره تصویر: 0252
لبه:	سایت شهر سوخته <input type="checkbox"/> سایر:	
عمق:	<input checked="" type="radio"/> نوع یافته:	
شماره کاتالوک: م. 197	پارچه <input checked="" type="checkbox"/> لباس <input type="checkbox"/> کفن <input type="checkbox"/>	
قیبر:	تخ <input type="checkbox"/> زربوش زهر قنبر <input type="checkbox"/>	
شماره حفار:	زهر انداز <input type="checkbox"/> رو انداز <input type="checkbox"/>	
شماره آزمایشگاه: 240	مذاب <input type="checkbox"/> حصیر <input type="checkbox"/> سبد <input type="checkbox"/>	
رزفیف سابق: 208	تور مفلکبری <input type="checkbox"/> ارباب دام <input checked="" type="checkbox"/>	

طرح (IA): 0252-1

گروه باستان شناسی شهر سوخته فرم شماره: 1

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی
 طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

طراحی و تنظیم: هاله هلالی شناستامه داده های باستان شناسی
 تاریخ تنظیم: 87/10/10 تاریخ تنظیم: 87/10/10

فصل:	<input checked="" type="radio"/> قدمت : هزاره سوم	
سال: 1999	<input checked="" type="radio"/> چگونگی دستیابی:	سفر:
1- داده های باستان شناسی:	کاوش علمی	
شماره رزف: 0211	<input checked="" type="radio"/> نوع مالکیت:	توضیحات:
کارگاه:	قطعی	
درانسه:	<input checked="" type="radio"/> مالکیت:	
لوگوس:	گروه باستان شناسی شهر سوخته	
فضا:	<input checked="" type="radio"/> محل نگهداری فعلی:	
اتاق:	پلگاه بستان شناسی شهر سوخته	
برش:	موزه زلفهان <input type="checkbox"/> موزه زلف <input type="checkbox"/>	شماره تصویر: 0211-2
لبه:	سایت شهر سوخته <input type="checkbox"/> سایر:	
عمق:	<input checked="" type="radio"/> نوع یافته:	
شماره کاتالوک:	پارچه <input checked="" type="checkbox"/> لباس <input type="checkbox"/> کفن <input type="checkbox"/>	
قیبر:	تخ <input type="checkbox"/> زربوش زهر قنبر <input type="checkbox"/>	
شماره حفار:	زهر انداز <input type="checkbox"/> رو انداز <input type="checkbox"/>	
شماره آزمایشگاه: 124	مذاب <input type="checkbox"/> حصیر <input type="checkbox"/> سبد <input type="checkbox"/>	
رزفیف سابق: 271	تور مفلکبری <input type="checkbox"/> ارباب دام <input type="checkbox"/>	

طرح (IA): 0211-4


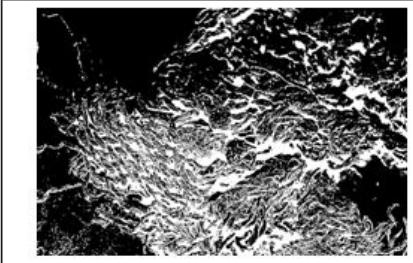
گروه باستان شناسی شهر سوخته

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی
طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

طراحی و تنظیم: هاله هلالی شناسنامه داده های باستان شناسی

فرم شماره: 1

تاریخ تنظیم: 87/10/11

فصل:	<input checked="" type="checkbox"/> قدمت: هزاره سوم	<input type="checkbox"/> مو	<input type="checkbox"/> نامشخص	<input type="checkbox"/> معلق	
سال: 1379	<input checked="" type="checkbox"/> چگونگی دستیابی:	سایر:			
1- داده های باستان شناسی:	کاوش علمی				
شماره ردیف: 0221	<input checked="" type="checkbox"/> نوع مالکیت:	توضیحات:			
کارگاه: 1	قطعی				
تراشه:	<input checked="" type="checkbox"/> مالکیت:				
لوکوس:	گروه باستان شناسی شهر سوخته				
فضا: 8	<input checked="" type="checkbox"/> محل نگهداری فعلی:				
اناق:	پلگاه باستان شناسی شهر سوخته				
پرش: 4	<input type="checkbox"/> موزه زلفان <input type="checkbox"/> موزه زلف				
لبه:	سایت شهر سوخته <input type="checkbox"/> سایر:				
عمق:	<input checked="" type="checkbox"/> نوع یافته:				
شماره کاتالوک: م. 171	<input checked="" type="checkbox"/> پارچه <input type="checkbox"/> لباس <input type="checkbox"/> کفن				
قبر:	<input type="checkbox"/> نخ <input type="checkbox"/> رویوش زیر قبر				
شماره حفر:	<input type="checkbox"/> زیر انداز <input type="checkbox"/> رو انداز				
شماره آزمایشگاه: 194	<input type="checkbox"/> ظاب <input type="checkbox"/> حصیر <input type="checkbox"/> سد				
ردیف سابق: 96	<input type="checkbox"/> تور ماهگیری <input type="checkbox"/> ایفاد خام				

شماره تصویر: 0221

طرح (IA): 0221-1

گروه باستان شناسی شهر سوخته

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی
طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

طراحی و تنظیم: هاله هلالی شناسنامه داده های باستان شناسی

فرم شماره: 1

تاریخ تنظیم: 87/10/11




فصل:	<input checked="" type="checkbox"/> قدمت: هزاره سوم	<input type="checkbox"/> مو	<input type="checkbox"/> نامشخص	<input type="checkbox"/> معلق	
سال: 1379	<input checked="" type="checkbox"/> چگونگی دستیابی:	سایر:			
1- داده های باستان شناسی:	کاوش علمی				
شماره ردیف: 0223	<input checked="" type="checkbox"/> نوع مالکیت:	توضیحات:			
کارگاه:	قطعی				
تراشه:	<input checked="" type="checkbox"/> مالکیت:				
لوکوس:	گروه باستان شناسی شهر سوخته				
فضا: B14	<input checked="" type="checkbox"/> محل نگهداری فعلی:				
اناق:	پلگاه باستان شناسی شهر سوخته				
پرش: 5	<input type="checkbox"/> موزه زلفان <input type="checkbox"/> موزه زلف				
لبه:	سایت شهر سوخته <input type="checkbox"/> سایر:				
عمق:	<input checked="" type="checkbox"/> نوع یافته:				
شماره کاتالوک: م. 150	<input checked="" type="checkbox"/> پارچه <input type="checkbox"/> لباس <input type="checkbox"/> کفن				
قبر:	<input type="checkbox"/> نخ <input type="checkbox"/> رویوش زیر قبر				
شماره حفر:	<input type="checkbox"/> زیر انداز <input type="checkbox"/> رو انداز				
شماره آزمایشگاه: 198	<input type="checkbox"/> ظاب <input type="checkbox"/> حصیر <input type="checkbox"/> سد				
ردیف سابق: 95	<input type="checkbox"/> تور ماهگیری <input type="checkbox"/> ایفاد خام				

شماره تصویر: 0223

طرح (IA): 0223-1

گروه باستان شناسی شهر سوخته

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی

طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

فرم شماره: 1

طراحی و تنظیم: هاله هلالی

شناسنامه داده های باستان شناسی

تاریخ تنظیم: 87/10/7




فصل:	<input checked="" type="radio"/> قدمت : هزاره سوم	
سال: 1384	<input checked="" type="radio"/> چگونگی دستیابی :	
1- داده های باستان شناسی :	کاوش علمی	
شماره ردیف: 0057	<input checked="" type="radio"/> نوع مالکیت :	
کارگاه: 1	قطعی	توضیحات:
ترانسه: OYL	<input checked="" type="radio"/> مالکیت:	
لوکوس:	گروه باستان شناسی شهر سوخته	
فضا: C1	<input checked="" type="radio"/> محل نگهداری فعلی:	
اتاق:	پلگاه باستان شناسی شهر سوخته	
پزش:	موزه زاهدان <input type="checkbox"/> موزه زابل <input type="checkbox"/>	
لبه: 1	سلبت شهر سوخته <input type="checkbox"/> سایر: <input type="checkbox"/>	
عمق: cm140	<input checked="" type="radio"/> نوع یافته:	
شماره کاتالوگ: 1956	پارچه <input checked="" type="checkbox"/> لباس <input type="checkbox"/> کفن <input type="checkbox"/>	
قبر:	بخ <input type="checkbox"/> زینوش زهر قهر <input type="checkbox"/>	
شماره حفار:	زهر انصار <input type="checkbox"/> زو انصار <input type="checkbox"/>	
شماره آزمایشگاه:	طناب <input type="checkbox"/> حصیر <input type="checkbox"/> سب <input type="checkbox"/>	
ردیف سابق:	تور ماهگیری <input type="checkbox"/> ارباب خام <input type="checkbox"/>	

شماره تصویر: 0057

طرح (IA): 0057-1

گروه باستان شناسی شهر سوخته

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی

طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

فرم شماره: 1

طراحی و تنظیم: هاله هلالی

شناسنامه داده های باستان شناسی

تاریخ تنظیم: 87/10/7




فصل:	<input checked="" type="radio"/> قدمت : هزاره سوم	
سال: 1999	<input checked="" type="radio"/> چگونگی دستیابی :	
1- داده های باستان شناسی :	کاوش علمی	
شماره ردیف: 0048	<input checked="" type="radio"/> نوع مالکیت :	
کارگاه:	قطعی	توضیحات:
ترانسه:	<input checked="" type="radio"/> مالکیت:	
لوکوس:	گروه باستان شناسی شهر سوخته	
فضا:	<input checked="" type="radio"/> محل نگهداری فعلی:	
اتاق:	پلگاه باستان شناسی شهر سوخته	
پزش:	موزه زاهدان <input type="checkbox"/> موزه زابل <input type="checkbox"/>	
لبه:	سلبت شهر سوخته <input type="checkbox"/> سایر: <input type="checkbox"/>	
عمق:	<input checked="" type="radio"/> نوع یافته:	
شماره کاتالوگ:	پارچه <input checked="" type="checkbox"/> لباس <input type="checkbox"/> کفن <input type="checkbox"/>	
قبر:	بخ <input type="checkbox"/> زینوش زهر قهر <input type="checkbox"/>	
شماره حفار:	زهر انصار <input type="checkbox"/> زو انصار <input type="checkbox"/>	
شماره آزمایشگاه:	طناب <input type="checkbox"/> حصیر <input type="checkbox"/> سب <input type="checkbox"/>	
ردیف سابق: 203	تور ماهگیری <input type="checkbox"/> ارباب خام <input type="checkbox"/>	

شماره تصویر: 0048

طرح (IA): 0048-1

گروه باستان شناسی شهر سوخته

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی



طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و متسوجات شهر سوخته

طراحی و تنظیم: هاله هلالی

شناسنامه داده های باستان شناسی

تاریخ تنظیم: 87/10/5

فرم شماره: 1

	<input type="checkbox"/> مو	<input type="checkbox"/> نامنص	<input type="checkbox"/> معلق	<input checked="" type="radio"/> خدمت	هزاره سوم	فصل:
					<input checked="" type="radio"/> چگونگی دستیابی:	سال:
					کاوش علمی	1- داده های باستان شناسی:
					نوع مالکیت:	شماره ردیف: 0005
توضیحات: T 78				قطعی	کارگاه:	ترانسه:
				<input checked="" type="radio"/> مالکیت:	لوکوس:	فضا:
				گروه باستان شناسی شهر سوخته	تاق:	برش:
				<input checked="" type="radio"/> محل نگهداری فعلی:	لبه:	عمق:
				پلنگه باستان شناسی شهر سوخته	شماره کاتالوک:	قبر:
				<input type="checkbox"/> موزه راهبان	شماره هزار:	شماره آزمونگاه:
				<input type="checkbox"/> موزه زابل	ردیف سابق: 253	
				<input type="checkbox"/> سلامت شهر سوخته		
				<input type="checkbox"/> سایر		
				<input checked="" type="radio"/> نوع بافته:		
				<input type="checkbox"/> پانجه		
				<input type="checkbox"/> نس		
				<input checked="" type="checkbox"/> کفن		
				<input type="checkbox"/> نخ		
				<input type="checkbox"/> زبوش نهر نهر		
				<input type="checkbox"/> نهر انبار		
				<input type="checkbox"/> رو انبار		
				<input type="checkbox"/> طناب		
				<input type="checkbox"/> حصیر		
				<input type="checkbox"/> سبد		
				<input type="checkbox"/> نور ماهگیری		
				<input type="checkbox"/> ایف خام		

شماره تصویر: 0005

طرح (IA): 0005.1

گروه باستان شناسی شهر سوخته

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی


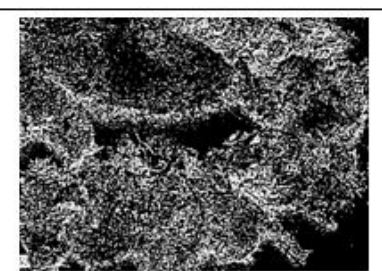
طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و متسوجات شهر سوخته

طراحی و تنظیم: هاله هلالی

شناسنامه داده های باستان شناسی

تاریخ تنظیم: 87/10/7

فرم شماره: 1

	<input type="checkbox"/> مو	<input type="checkbox"/> نامنص	<input type="checkbox"/> معلق	<input checked="" type="radio"/> خدمت	هزاره سوم	فصل:
					<input checked="" type="radio"/> چگونگی دستیابی:	سال: 1377
					کاوش علمی	1- داده های باستان شناسی:
					نوع مالکیت:	شماره ردیف: 0040
توضیحات: TULG.1509 ANL.NO.268 فصل 1509				قطعی	کارگاه:	ترانسه:
				<input checked="" type="radio"/> مالکیت:	لوکوس:	فضا:
				گروه باستان شناسی شهر سوخته	تاق:	برش:
				<input checked="" type="radio"/> محل نگهداری فعلی:	لبه:	عمق:
				پلنگه باستان شناسی شهر سوخته	شماره کاتالوک:	قبر:
				<input type="checkbox"/> موزه راهبان	شماره هزار:	شماره آزمونگاه:
				<input type="checkbox"/> موزه زابل	ردیف سابق: 225	
				<input type="checkbox"/> سلامت شهر سوخته		
				<input type="checkbox"/> سایر		
				<input checked="" type="radio"/> نوع بافته:		
				<input type="checkbox"/> پانجه		
				<input type="checkbox"/> نس		
				<input checked="" type="checkbox"/> کفن		
				<input type="checkbox"/> نخ		
				<input type="checkbox"/> زبوش نهر نهر		
				<input type="checkbox"/> نهر انبار		
				<input type="checkbox"/> رو انبار		
				<input type="checkbox"/> طناب		
				<input type="checkbox"/> حصیر		
				<input type="checkbox"/> سبد		
				<input type="checkbox"/> نور ماهگیری		
				<input type="checkbox"/> ایف خام		

شماره تصویر: 0040

طرح (IA): 0040.1

گروه باستان شناسی شهر سوخته


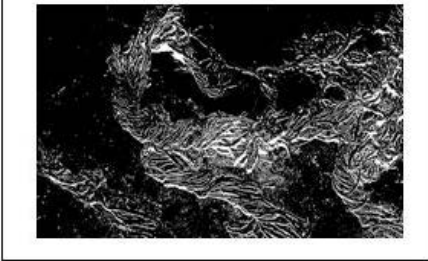
سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی
طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

طراحی و تنظیم: هاله هلالی

شناسنامه داده های باستان شناسی

فرم شماره: I

تاریخ تنظیم: 87/10/9

فصل:	<input checked="" type="radio"/> قدمت: هزاره سوم	<input type="checkbox"/> ماسک <input type="checkbox"/> نامشخص <input type="checkbox"/> مطالعاتی
سال: 1379	<input checked="" type="radio"/> چگونگی دستیابی: کاوش علمی	شماره: 0145
1- داده های باستان شناسی:	نوع مالکیت: <input checked="" type="radio"/> قطعی	توضیحات:
شماره رزف: 0145	مالکیت: <input checked="" type="radio"/> مالکیت:	
کارگاه: 1	گروه باستان شناسی شهر سوخته	
ترانسه:	محل نگهداری فعلی: <input checked="" type="radio"/> پارچه باستان شناسی شهر سوخته	
لوکوس:	پارچه باستان شناسی شهر سوخته	
فضا: 29	موزه زلفخان <input type="checkbox"/> موزه زلف <input type="checkbox"/>	
اتاق:	سایت شهر سوخته <input type="checkbox"/> سایر: <input type="checkbox"/>	
بازش: 7	نوع یافته: <input checked="" type="radio"/> پارچه	
انچه:	پارچه <input type="checkbox"/> لباس <input type="checkbox"/> کفن <input type="checkbox"/>	
عمق:	بج <input type="checkbox"/> ریوش زیر قبر <input type="checkbox"/>	
شماره کاتالوک: 407	زیر انداز <input type="checkbox"/> رو انداز <input type="checkbox"/>	
فهر:	طاب <input checked="" type="checkbox"/> حصیر <input type="checkbox"/> سب <input type="checkbox"/>	
شماره حفار:	نور ماسکری <input type="checkbox"/> ایدام خام <input type="checkbox"/>	
شماره آزمایشگاه:		
رزف سابق: 199		

شماره تصویر: 0145-1

طرح (IA): 0145-3

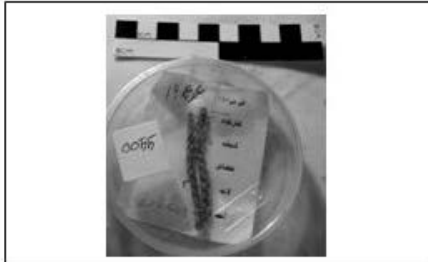

گروه باستان شناسی شهر سوخته

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی
طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

طراحی و تنظیم: هاله هلالی

فرم شماره: I

تاریخ تنظیم: 87/10/7

فصل:	<input checked="" type="radio"/> قدمت: هزاره سوم	<input type="checkbox"/> ماسک <input type="checkbox"/> نامشخص <input type="checkbox"/> مطالعاتی
سال: 1384	<input checked="" type="radio"/> چگونگی دستیابی: کاوش علمی	شماره: 0056
1- داده های باستان شناسی:	نوع مالکیت: <input checked="" type="radio"/> قطعی	توضیحات:
شماره رزف: 0056	مالکیت: <input checked="" type="radio"/> مالکیت:	
کارگاه: 1	گروه باستان شناسی شهر سوخته	
ترانسه: OYL	محل نگهداری فعلی: <input checked="" type="radio"/> پارچه باستان شناسی شهر سوخته	
لوکوس:	پارچه باستان شناسی شهر سوخته	
فضا: E1	موزه زلفخان <input type="checkbox"/> موزه زلف <input type="checkbox"/>	
اتاق:	سایت شهر سوخته <input type="checkbox"/> سایر: <input type="checkbox"/>	
بازش: 2	نوع یافته: <input checked="" type="radio"/> پارچه	
انچه:	پارچه <input type="checkbox"/> لباس <input type="checkbox"/> کفن <input type="checkbox"/>	
عمق:	بج <input type="checkbox"/> ریوش زیر قبر <input type="checkbox"/>	
شماره کاتالوک: 1946	زیر انداز <input type="checkbox"/> رو انداز <input type="checkbox"/>	
فهر:	طاب <input checked="" type="checkbox"/> حصیر <input type="checkbox"/> سب <input type="checkbox"/>	
شماره حفار:	نور ماسکری <input type="checkbox"/> ایدام خام <input type="checkbox"/>	
شماره آزمایشگاه:		
رزف سابق:		


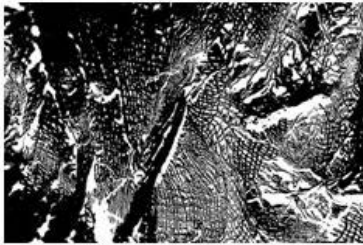
شماره تصویر: 0056

طرح (IA): 0056-1

گروه باستان شناسی شهر سوخته

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی
 طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

طراحی و تنظیم: هاله هلالی شناسنامه داده های باستان شناسی تاریخ تنظیم: 87/10/8

فصل:	<input checked="" type="radio"/> قدمت: هزاره سوم
سال: 1384	<input checked="" type="radio"/> چگونگی دستیابی:
1- داده های باستان شناسی:	کاوش علمی
شماره ردیف: 0089	<input checked="" type="radio"/> نوع مالکیت:
کارگاه: 1	قطعی
ترانسه: OYL	<input checked="" type="radio"/> مالکیت:
لوگوس:	گروه باستان شناسی شهر سوخته
فضا: AS	<input checked="" type="radio"/> محل نگهداری فعلی:
اتاق:	بهنگاه باستان شناسی شهر سوخته
بیرش:	<input type="checkbox"/> موزه زلفان <input type="checkbox"/> موزه زلف
لیه: 8	سخت شهر سوخته <input type="checkbox"/> لهر:
عمق:	<input checked="" type="radio"/> نوع یافته:
شماره کاتالوگ:	<input checked="" type="checkbox"/> پارچه <input type="checkbox"/> لباس <input type="checkbox"/> کفن
قبر:	<input type="checkbox"/> نخ <input type="checkbox"/> ریبوش زهر قبر
شماره حفار:	زهر قنار <input type="checkbox"/> رو قنار
شماره آزمایشگاه:	طناب <input type="checkbox"/> حصیر <input type="checkbox"/> سب
ردیف سابق:	توز ملهگیری <input type="checkbox"/> ارباب دام

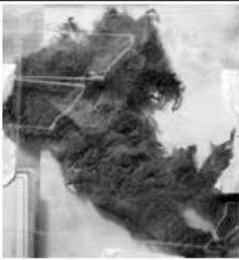
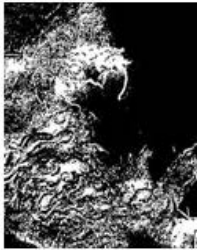
شماره تصویر: 0089-5

طرح (A): 0089-15

گروه باستان شناسی شهر سوخته

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی
 طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

طراحی و تنظیم: هاله هلالی شناسنامه داده های باستان شناسی تاریخ تنظیم: 87/10/7

فصل:	<input checked="" type="radio"/> قدمت: هزاره سوم
سال: 1379	<input checked="" type="radio"/> چگونگی دستیابی:
1- داده های باستان شناسی:	کاوش علمی
شماره ردیف: 0033	<input checked="" type="radio"/> نوع مالکیت:
کارگاه: 1	قطعی
ترانسه:	<input checked="" type="radio"/> مالکیت:
لوگوس:	گروه باستان شناسی شهر سوخته
فضا: 32	<input checked="" type="radio"/> محل نگهداری فعلی:
اتاق: 1	بهنگاه باستان شناسی شهر سوخته
بیرش:	<input type="checkbox"/> موزه زلفان <input type="checkbox"/> موزه زلف
لیه:	سخت شهر سوخته <input type="checkbox"/> لهر:
عمق:	<input checked="" type="radio"/> نوع یافته:
شماره کاتالوگ: 123	<input checked="" type="checkbox"/> پارچه <input type="checkbox"/> لباس <input type="checkbox"/> کفن
قبر:	<input type="checkbox"/> نخ <input type="checkbox"/> ریبوش زهر قبر
شماره حفار:	زهر قنار <input type="checkbox"/> رو قنار
شماره آزمایشگاه: 21	طناب <input type="checkbox"/> حصیر <input type="checkbox"/> سب
ردیف سابق: 283	توز ملهگیری <input type="checkbox"/> ارباب دام

شماره تصویر: 0033

طرح (A): 0033-1

گروه باستان شناسی شهر سوخته

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی


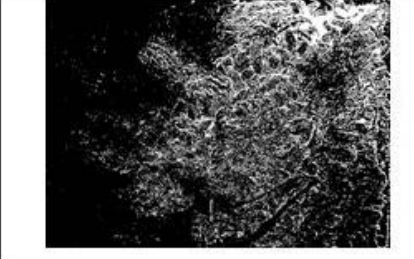
طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

فرم شماره: 1

طراحی و تنظیم: هاله هلالی

شناختنامه داده های باستان شناسی

تاریخ تنظیم: 87/10/11

فصل:	<input checked="" type="radio"/> قدمت: هزاره سوم	<input type="checkbox"/> مو <input type="checkbox"/> نامشخص <input type="checkbox"/> مطاعنی	
سال: 1379	<input checked="" type="radio"/> چگونگی دستیابی:	شماره:	
1- داده های باستان شناسی:	کاوش علمی		
شماره ردیف: 0226	<input checked="" type="radio"/> نوع مالکیت:		
کارگاه: 1	قطعی	توضیحات:	
تراشه:	<input checked="" type="radio"/> مالکیت:		
لوکوس:	گروه باستان شناسی شهر سوخته		
فضا: 8	<input checked="" type="radio"/> محل نگهداری قطعی:		
اتاق:	پلنگه باستان شناسی شهر سوخته		
برش: 3	موزه زلفان <input type="checkbox"/> موزه زابل <input type="checkbox"/>	شماره تصویر: 0226	
لبه:	سایت شهر سوخته <input type="checkbox"/> سایر: <input type="checkbox"/>		
عمق:	<input checked="" type="radio"/> نوع یافته:		
شماره کاتالوگ: 30م	پارچه <input checked="" type="checkbox"/> لباس <input checked="" type="checkbox"/> کفن <input type="checkbox"/>		
قبر:	بج <input type="checkbox"/> رهبوش زیر قبر <input type="checkbox"/>		
شماره حفار:	زیر انداز <input type="checkbox"/> رو انداز <input type="checkbox"/>		
شماره آزمایشگاه: 213	ظباب <input type="checkbox"/> حصیر <input type="checkbox"/> سب <input type="checkbox"/>		
ردیف سابق: 98	تور مفلکبری <input type="checkbox"/> ارباب خام <input type="checkbox"/>		

طرح (IA): 0226-1

گروه باستان شناسی شهر سوخته

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی

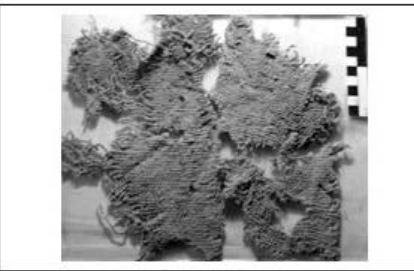
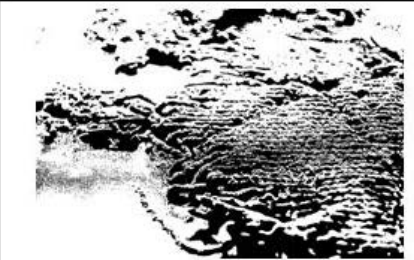
طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

فرم شماره: 1

طراحی و تنظیم: هاله هلالی

شناختنامه داده های باستان شناسی

تاریخ تنظیم: 87/10/5

فصل:	<input checked="" type="radio"/> قدمت: هزاره سوم	<input type="checkbox"/> مو <input type="checkbox"/> نامشخص <input type="checkbox"/> مطاعنی	
سال: 1379	<input checked="" type="radio"/> چگونگی دستیابی:	شماره:	
1- داده های باستان شناسی:	کاوش علمی		
شماره ردیف: 0007	<input checked="" type="radio"/> نوع مالکیت:		
کارگاه: 1	قطعی	توضیحات:	
تراشه:	<input checked="" type="radio"/> مالکیت:	T 75	
لوکوس:	گروه باستان شناسی شهر سوخته		
فضا: 25	<input checked="" type="radio"/> محل نگهداری قطعی:		
اتاق:	پلنگه باستان شناسی شهر سوخته		
برش: 4	موزه زلفان <input type="checkbox"/> موزه زابل <input type="checkbox"/>	شماره تصویر: 0007	
لبه:	سایت شهر سوخته <input type="checkbox"/> سایر: <input type="checkbox"/>		
عمق:	<input checked="" type="radio"/> نوع یافته:		
شماره کاتالوگ: 292 م	پارچه <input type="checkbox"/> لباس <input checked="" type="checkbox"/> کفن <input type="checkbox"/>		
قبر:	بج <input type="checkbox"/> رهبوش زیر قبر <input type="checkbox"/>		
شماره حفار:	زیر انداز <input type="checkbox"/> رو انداز <input type="checkbox"/>		
شماره آزمایشگاه: 245	ظباب <input type="checkbox"/> حصیر <input type="checkbox"/> سب <input type="checkbox"/>		
ردیف سابق: 257	تور مفلکبری <input type="checkbox"/> ارباب خام <input type="checkbox"/>		

طرح (IA): 0007-1

گروه باستان شناسی شهر سوخته

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی

طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

فرم شماره: 1

طراحی و تنظیم: هاله هلالی

شناسنامه داده های باستان شناسی

تاریخ تنظیم: 87/10/10




فصل:	<input checked="" type="radio"/> قدمت: هزاره سوم	
سال: 1384	<input checked="" type="radio"/> چگونگی دستیابی:	سایر:
1- داده های باستان شناسی:	کاوش علمی	
شماره ردیف: 0219	<input checked="" type="radio"/> نوع مالکیت:	توضیحات:
کارگاه: 1	قطعی	
ترانسه: OYL	<input checked="" type="radio"/> مالکیت:	
لوکوس:	گروه باستان شناسی شهر سوخته	
فضا:	<input checked="" type="radio"/> محل نگهداری فعلی:	
اتاق:	پایگاه باستان شناسی شهر سوخته	
برش: 1	<input type="checkbox"/> موزه زاهدان <input type="checkbox"/> موزه زابل	
لایه: 2	سایت شهر سوخته <input type="checkbox"/> سایر:	
عمق:	<input checked="" type="radio"/> نوع یافته:	
شماره کاتالوک:	پارچه <input checked="" type="checkbox"/> لباس <input type="checkbox"/> کفن <input type="checkbox"/>	
قبر:	نج <input type="checkbox"/> ریبوش زیر قبر <input type="checkbox"/>	
شماره حفار:	زیر انداز <input type="checkbox"/> رو انداز <input type="checkbox"/>	
شماره آزمایشگاه:	طناب <input type="checkbox"/> حصیر <input type="checkbox"/> سبد <input type="checkbox"/>	
ردیف سابق:	تور ماهیگیری <input type="checkbox"/> ایلاف خام <input type="checkbox"/>	

شماره تصویر: 0219

طرح (IA): 0219-1

گروه باستان شناسی شهر سوخته

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی



طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

فرم شماره: 1

طراحی و تنظیم: هاله هلالی

شناسنامه داده های باستان شناسی

تاریخ تنظیم: 87/10/8

فصل:	<input checked="" type="radio"/> قدمت: هزاره سوم	
سال: 1379	<input checked="" type="radio"/> چگونگی دستیابی:	سایر:
1- داده های باستان شناسی:	کاوش علمی	
شماره ردیف: 0080	<input checked="" type="radio"/> نوع مالکیت:	توضیحات:
کارگاه: 1	قطعی	
ترانسه: ANL.NO.157	<input checked="" type="radio"/> مالکیت:	
لوکوس:	گروه باستان شناسی شهر سوخته	
فضا: 29	<input checked="" type="radio"/> محل نگهداری فعلی:	
اتاق:	پایگاه باستان شناسی شهر سوخته	
برش: 1	<input type="checkbox"/> موزه زاهدان <input type="checkbox"/> موزه زابل	
لایه:	سایت شهر سوخته <input type="checkbox"/> سایر:	
عمق:	<input checked="" type="radio"/> نوع یافته:	
شماره کاتالوک: 231	پارچه <input type="checkbox"/> لباس <input type="checkbox"/> کفن <input type="checkbox"/>	
قبر:	نج <input type="checkbox"/> ریبوش زیر قبر <input type="checkbox"/>	
شماره حفار:	زیر انداز <input type="checkbox"/> رو انداز <input type="checkbox"/>	
شماره آزمایشگاه:	طناب <input checked="" type="checkbox"/> حصیر <input type="checkbox"/> سبد <input type="checkbox"/>	
ردیف سابق: 354	تور ماهیگیری <input type="checkbox"/> ایلاف خام <input type="checkbox"/>	

شماره تصویر: 0080-1

طرح (IA): 0080-8

گروه باستان شناسی شهر سوخته

سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی

طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

طراحی و تنظیم: هاله هلالی

شناسنامه داده های باستان شناسی

فرم شماره: 1

تاریخ تنظیم: 87/10/13



فصل:	<input checked="" type="checkbox"/> قدمت: هزاره سوم	
سال: 1379	<input checked="" type="checkbox"/> چگونگی دستیابی:	
1- داده های باستان شناسی:	کاوش علمی:	
شماره ردیف: 0250	<input checked="" type="checkbox"/> نوع مالکیت:	
کارگاه: 1	قطعی	توضیحات:
ترانسه:	<input checked="" type="checkbox"/> مالکیت:	
لوگوس:	گروه باستان شناسی شهر سوخته	
فضا: 7	<input checked="" type="checkbox"/> محل نگهداری قطعی:	
اتاق:	پلکانه باستان شناسی شهر سوخته	
برش: 6	موزه زاهدان <input type="checkbox"/> موزه زابل <input type="checkbox"/>	
لبه:	سایت شهر سوخته <input type="checkbox"/> سایر: <input type="checkbox"/>	
عمق:	<input checked="" type="checkbox"/> نوع یافته:	
شماره کاتالوگ: 197	پارچه <input checked="" type="checkbox"/> نس <input checked="" type="checkbox"/> کتان <input type="checkbox"/>	
قبر:	نخ <input checked="" type="checkbox"/> ریپوش زیر قبر <input type="checkbox"/>	
شماره حفر:	زیر انداز <input type="checkbox"/> رو انداز <input type="checkbox"/>	
شماره آزمایشگاه: 239	قناب <input type="checkbox"/> حصیر <input type="checkbox"/> سبد <input type="checkbox"/>	
ردیف سابق: 205	تور فلجگری <input type="checkbox"/> آداب خام <input type="checkbox"/>	

شماره تصویر: 0250



طرح (IA): 0250-1

گروه باستان شناسی شهر سوخته


سرپرست گروه باستان شناسی: دکتر سید منصور سید سجادی

طرح ساماندهی، حفاظت، مرمت و راهکار حفاظتی پارچه ها و منسوجات شهر سوخته

طراحی و تنظیم: هاله هلالی

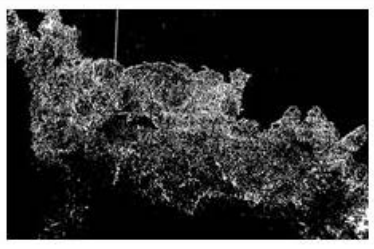
فرم شماره: 1

تاریخ تنظیم: 87/10/13





فصل:	<input checked="" type="checkbox"/> قدمت: هزاره سوم	
سال: 1380	<input checked="" type="checkbox"/> چگونگی دستیابی:	
1- داده های باستان شناسی:	کاوش علمی:	
شماره ردیف: 0238	<input checked="" type="checkbox"/> نوع مالکیت:	
کارگاه:	قطعی	توضیحات:
ترانسه:	<input checked="" type="checkbox"/> مالکیت:	
لوگوس:	گروه باستان شناسی شهر سوخته	
فضا: 74	<input checked="" type="checkbox"/> محل نگهداری قطعی:	
اتاق:	پلکانه باستان شناسی شهر سوخته	
برش: 2	موزه زاهدان <input type="checkbox"/> موزه زابل <input type="checkbox"/>	
لبه:	سایت شهر سوخته <input type="checkbox"/> سایر: <input type="checkbox"/>	
عمق:	<input checked="" type="checkbox"/> نوع یافته:	
شماره کاتالوگ: 798	پارچه <input checked="" type="checkbox"/> نس <input checked="" type="checkbox"/> کتان <input type="checkbox"/>	
قبر:	نخ <input type="checkbox"/> ریپوش زیر قبر <input type="checkbox"/>	
شماره حفر:	زیر انداز <input type="checkbox"/> رو انداز <input type="checkbox"/>	
شماره آزمایشگاه: 80	قناب <input type="checkbox"/> حصیر <input type="checkbox"/> سبد <input type="checkbox"/>	
ردیف سابق: 240	تور فلجگری <input type="checkbox"/> آداب خام <input type="checkbox"/>	

شماره تصویر: 0238



طرح (IA): 0238-1

شناسنامه آسیب شناسی

88/48		مشخصات اثر کد: نام: جنس: <input type="checkbox"/> گل خام <input type="checkbox"/> گل پخته																
وضعیت آسیب شناسی: انواع آسیب:		شکل: رنگ: چگونگی دستیابی:																
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td><input type="checkbox"/> سالم</td> <td><input type="checkbox"/> شکسته</td> <td><input type="checkbox"/> رسوب گرفته</td> <td><input type="checkbox"/> چرک</td> </tr> <tr> <td><input type="checkbox"/> ترک</td> <td><input type="checkbox"/> زبر ترک</td> <td><input type="checkbox"/> شوره زنی</td> <td><input type="checkbox"/> مرمت غلط</td> </tr> <tr> <td><input type="checkbox"/> کمبود</td> <td><input type="checkbox"/> پریدگی</td> <td><input type="checkbox"/> نهان شگفتگی</td> <td><input type="checkbox"/> زایش لایه</td> </tr> <tr> <td><input type="checkbox"/> خراش</td> <td><input type="checkbox"/> ساییدگی</td> <td><input type="checkbox"/> تخلیف ساختار</td> <td><input type="checkbox"/> زایش نقش</td> </tr> </table>		<input type="checkbox"/> سالم	<input type="checkbox"/> شکسته	<input type="checkbox"/> رسوب گرفته	<input type="checkbox"/> چرک	<input type="checkbox"/> ترک	<input type="checkbox"/> زبر ترک	<input type="checkbox"/> شوره زنی	<input type="checkbox"/> مرمت غلط	<input type="checkbox"/> کمبود	<input type="checkbox"/> پریدگی	<input type="checkbox"/> نهان شگفتگی	<input type="checkbox"/> زایش لایه	<input type="checkbox"/> خراش	<input type="checkbox"/> ساییدگی	<input type="checkbox"/> تخلیف ساختار	<input type="checkbox"/> زایش نقش	تاریخ کشف: محل کشف: نام و شماره تراشه: نام حفار: عمق حفاری: دوره تاریخی: لایه حفاری:
<input type="checkbox"/> سالم	<input type="checkbox"/> شکسته	<input type="checkbox"/> رسوب گرفته	<input type="checkbox"/> چرک															
<input type="checkbox"/> ترک	<input type="checkbox"/> زبر ترک	<input type="checkbox"/> شوره زنی	<input type="checkbox"/> مرمت غلط															
<input type="checkbox"/> کمبود	<input type="checkbox"/> پریدگی	<input type="checkbox"/> نهان شگفتگی	<input type="checkbox"/> زایش لایه															
<input type="checkbox"/> خراش	<input type="checkbox"/> ساییدگی	<input type="checkbox"/> تخلیف ساختار	<input type="checkbox"/> زایش نقش															
عامل آسیب رسان:		روند تخریب:																
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td><input type="checkbox"/> فیزیکی</td> <td><input type="checkbox"/> شیمیایی</td> <td><input type="checkbox"/> بیولوژیک</td> </tr> <tr> <td><input type="checkbox"/> انسانی</td> <td><input type="checkbox"/> داخلی</td> <td><input type="checkbox"/> دیگر</td> </tr> </table>		<input type="checkbox"/> فیزیکی	<input type="checkbox"/> شیمیایی	<input type="checkbox"/> بیولوژیک	<input type="checkbox"/> انسانی	<input type="checkbox"/> داخلی	<input type="checkbox"/> دیگر	توضیحات:										
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<input type="checkbox"/> انسانی	<input type="checkbox"/> داخلی	<input type="checkbox"/> دیگر																
		تصویر قبل از مرمت:																
		تصویر بعد از مرمت:																

شناسنامه فیزی

88/48		فن شناسی: روش ساخت: پورهساز کاربرد: میزان پخت: کامل نوع بر کنده: مانه بادی میزان سختی و استحکام: متوسط رنگ بدنه: نقره‌ای نوع لعاب: ندارد رنگ لعاب: ندارد تزئینات: دارد محل تزئینات: ظروف ظرف زمان تزئین: بعد از پخت نوع نقوش: هیپاتی - هندسی رنگ نقوش: قهوه ای توضیحات:																				
وضعیت مرمتی: اقدامات انجام شده:		آزمایشهای انجام شده:																				
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td><input type="checkbox"/> استحکام بخشی</td> <td><input type="checkbox"/> ساماندهی وضعیت نگهداری</td> </tr> <tr> <td><input type="checkbox"/> وصلی</td> <td><input type="checkbox"/> مستند نگاری</td> </tr> <tr> <td><input type="checkbox"/> بازسازی</td> <td><input type="checkbox"/> نمونه برداری</td> </tr> <tr> <td><input type="checkbox"/> تثبیت</td> <td><input type="checkbox"/> پاکسازی</td> </tr> <tr> <td><input type="checkbox"/> موزون سازی</td> <td><input type="checkbox"/> نمک زدایی</td> </tr> </table>		<input type="checkbox"/> استحکام بخشی	<input type="checkbox"/> ساماندهی وضعیت نگهداری	<input type="checkbox"/> وصلی	<input type="checkbox"/> مستند نگاری	<input type="checkbox"/> بازسازی	<input type="checkbox"/> نمونه برداری	<input type="checkbox"/> تثبیت	<input type="checkbox"/> پاکسازی	<input type="checkbox"/> موزون سازی	<input type="checkbox"/> نمک زدایی	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td><input type="checkbox"/> اسپکت تست</td> <td><input type="checkbox"/> آسپت تست</td> </tr> <tr> <td><input type="checkbox"/> بررسی میکروسکوپی</td> <td><input type="checkbox"/> شش تر</td> </tr> <tr> <td><input type="checkbox"/> پتروگرافی</td> <td><input type="checkbox"/> XRD</td> </tr> <tr> <td><input type="checkbox"/> AAS</td> <td><input type="checkbox"/> XRF</td> </tr> <tr> <td><input type="checkbox"/> SEM</td> <td></td> </tr> </table>	<input type="checkbox"/> اسپکت تست	<input type="checkbox"/> آسپت تست	<input type="checkbox"/> بررسی میکروسکوپی	<input type="checkbox"/> شش تر	<input type="checkbox"/> پتروگرافی	<input type="checkbox"/> XRD	<input type="checkbox"/> AAS	<input type="checkbox"/> XRF	<input type="checkbox"/> SEM	
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<input type="checkbox"/> AAS	<input type="checkbox"/> XRF																					
<input type="checkbox"/> SEM																						
توضیحات:		مرمت گر: رضا کیخواه آریا																				

شناسنامه آسیب شناسی

88/64		مشخصات اثر کد: نام: جنس: <input type="checkbox"/> گل خام <input type="checkbox"/> گل پخته																
وضعیت آسیب شناسی: انواع آسیب:		شکل: رنگ: چگونگی دستیابی:																
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td><input type="checkbox"/> سالم</td> <td><input type="checkbox"/> شکسته</td> <td><input type="checkbox"/> رسوب گرفته</td> <td><input type="checkbox"/> چرک</td> </tr> <tr> <td><input type="checkbox"/> ترک</td> <td><input type="checkbox"/> زبر ترک</td> <td><input type="checkbox"/> شوره زنی</td> <td><input type="checkbox"/> مرمت غلط</td> </tr> <tr> <td><input type="checkbox"/> کمبود</td> <td><input type="checkbox"/> پریدگی</td> <td><input type="checkbox"/> نهان شگفتگی</td> <td><input type="checkbox"/> زایش لایه</td> </tr> <tr> <td><input type="checkbox"/> خراش</td> <td><input type="checkbox"/> ساییدگی</td> <td><input type="checkbox"/> تخلیف ساختار</td> <td><input type="checkbox"/> زایش نقش</td> </tr> </table>		<input type="checkbox"/> سالم	<input type="checkbox"/> شکسته	<input type="checkbox"/> رسوب گرفته	<input type="checkbox"/> چرک	<input type="checkbox"/> ترک	<input type="checkbox"/> زبر ترک	<input type="checkbox"/> شوره زنی	<input type="checkbox"/> مرمت غلط	<input type="checkbox"/> کمبود	<input type="checkbox"/> پریدگی	<input type="checkbox"/> نهان شگفتگی	<input type="checkbox"/> زایش لایه	<input type="checkbox"/> خراش	<input type="checkbox"/> ساییدگی	<input type="checkbox"/> تخلیف ساختار	<input type="checkbox"/> زایش نقش	تاریخ کشف: محل کشف: نام و شماره تراشه: نام حفار: عمق حفاری: دوره تاریخی: لایه حفاری:
<input type="checkbox"/> سالم	<input type="checkbox"/> شکسته	<input type="checkbox"/> رسوب گرفته	<input type="checkbox"/> چرک															
<input type="checkbox"/> ترک	<input type="checkbox"/> زبر ترک	<input type="checkbox"/> شوره زنی	<input type="checkbox"/> مرمت غلط															
<input type="checkbox"/> کمبود	<input type="checkbox"/> پریدگی	<input type="checkbox"/> نهان شگفتگی	<input type="checkbox"/> زایش لایه															
<input type="checkbox"/> خراش	<input type="checkbox"/> ساییدگی	<input type="checkbox"/> تخلیف ساختار	<input type="checkbox"/> زایش نقش															
عامل آسیب رسان:		روند تخریب:																
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td><input type="checkbox"/> فیزیکی</td> <td><input type="checkbox"/> شیمیایی</td> <td><input type="checkbox"/> بیولوژیک</td> </tr> <tr> <td><input type="checkbox"/> انسانی</td> <td><input type="checkbox"/> داخلی</td> <td><input type="checkbox"/> دیگر</td> </tr> </table>		<input type="checkbox"/> فیزیکی	<input type="checkbox"/> شیمیایی	<input type="checkbox"/> بیولوژیک	<input type="checkbox"/> انسانی	<input type="checkbox"/> داخلی	<input type="checkbox"/> دیگر	توضیحات:										
<input type="checkbox"/> فیزیکی	<input type="checkbox"/> شیمیایی	<input type="checkbox"/> بیولوژیک																
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		تصویر قبل از مرمت:																
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شناسنامه فیزی

88/64		فن شناسی: روش ساخت: پورهساز کاربرد: میزان پخت: کامل نوع بر کنده: مانه بادی میزان سختی و استحکام: متوسط رنگ بدنه: نقره‌ای نوع لعاب: ندارد رنگ لعاب: ندارد تزئینات: دارد محل تزئینات: ظروف ظرف زمان تزئین: بعد از پخت نوع نقوش: هندسی رنگ نقوش: قهوه ای و سیاه توضیحات:																				
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<input type="checkbox"/> SEM																						
توضیحات:		مرمت گر: رضا کیخواه آریا																				

شناسنامه فنی		شناسنامه آسیب شناسی	
<p>88/80</p> <p>وضعیت مرمتی: اقدامات انجام شده:</p> <p>ساماندهی وضعیت نگهداری <input checked="" type="checkbox"/> مستند نگاری <input type="checkbox"/> نمونه برداری <input type="checkbox"/> پاکسازی <input type="checkbox"/> نمک زدایی</p> <p>استحکام بخشی <input type="checkbox"/> وهالی <input type="checkbox"/> بازسازی <input type="checkbox"/> تثبیت <input type="checkbox"/> موزون سازی</p> <p>توضیحات:</p> <p>آزمایشهای انجام شده: <input type="checkbox"/> اسپکت نند <input type="checkbox"/> شیمی تر <input type="checkbox"/> XRD <input type="checkbox"/> XRF</p> <p>بررسی میکروسکوپی <input type="checkbox"/> پتروگرافی <input type="checkbox"/> AAS <input type="checkbox"/> SEM</p> <p>مرمت گر: رضا کیخواجه آریا</p>	<p>فن شناسی: روش ساخت: تنده کاری</p> <p>کاربرد:</p> <p>میزان پخت: ندارد</p> <p>جنس: استخوان</p> <p>میزان سختی و استحکام: متوسط</p> <p>نوع لعاب: ندارد</p> <p>رنگ لعاب: ندارد</p> <p>تزیینات: ندارد</p> <p>محل تزیینات: ندارد</p> <p>زمان تزئین: ندارد</p> <p>نوع نقوش: هندسی</p> <p>رنگ نقوش: ندارد</p> <p>توضیحات:</p>	<p>88/81</p> <p>وضعیت آسیب شناسی: انواع آسیب:</p> <p>سالم <input type="checkbox"/> شکسته <input checked="" type="checkbox"/> رسوب گرفته <input checked="" type="checkbox"/> چسبی <input type="checkbox"/> ترک <input type="checkbox"/> زبر ترک <input type="checkbox"/> خوردگی <input checked="" type="checkbox"/> مرمت غلط <input type="checkbox"/> کمبود <input type="checkbox"/> پریدگی <input type="checkbox"/> تپان شکستگی <input type="checkbox"/> زبریش لعاب <input type="checkbox"/> خراش <input type="checkbox"/> ساییدگی <input type="checkbox"/> خمیف ساختار <input type="checkbox"/> زبریش نفش <input type="checkbox"/></p> <p>عامل آسیب رسان: فیزیکی <input type="checkbox"/> شیمیایی <input checked="" type="checkbox"/> بیولوژیک <input type="checkbox"/> انسانی <input type="checkbox"/> ناخظی <input type="checkbox"/> دیگر <input type="checkbox"/></p> <p>روند تخریب: فعال <input type="checkbox"/> غیر فعال <input type="checkbox"/> تثبیت شده <input checked="" type="checkbox"/></p> <p>توضیحات:</p>	<p>مشخصات اثر: کد: نام: جنس: سفوق شکل: رنگ: چگونگی دستیابی: تاریخ کشف: محل کشف: نام و شماره تراشه: نام حفار: عمق حفاری: دوره تاریخی: لایه حفاری:</p> <p>تصویر قبل از مرمت:</p> <p>تصویر بعد از مرمت:</p>

شناسنامه فنی		شناسنامه آسیب شناسی	
<p>88/81</p> <p>وضعیت مرمتی: اقدامات انجام شده:</p> <p>ساماندهی وضعیت نگهداری <input checked="" type="checkbox"/> مستند نگاری <input type="checkbox"/> نمونه برداری <input type="checkbox"/> پاکسازی <input type="checkbox"/> نمک زدایی</p> <p>استحکام بخشی <input type="checkbox"/> وهالی <input type="checkbox"/> بازسازی <input type="checkbox"/> تثبیت <input type="checkbox"/> موزون سازی</p> <p>توضیحات:</p> <p>آزمایشهای انجام شده: <input type="checkbox"/> اسپکت نند <input checked="" type="checkbox"/> شیمی تر <input type="checkbox"/> XRD <input type="checkbox"/> XRF</p> <p>بررسی میکروسکوپی <input type="checkbox"/> پتروگرافی <input type="checkbox"/> AAS <input type="checkbox"/> SEM</p> <p>مرمت گر: راشد راهداری</p>	<p>فن شناسی: کاربرد:</p> <p>میزان پخت: ندارد</p> <p>جنس: سفوق</p> <p>میزان سختی و استحکام: کم</p> <p>نوع لعاب: ندارد</p> <p>رنگ لعاب: ندارد</p> <p>تزیینات: ندارد</p> <p>محل تزیینات: ندارد</p> <p>زمان تزئین: ندارد</p> <p>نوع نقوش: ندارد</p> <p>رنگ نقوش: ندارد</p> <p>توضیحات:</p>	<p>88/80</p> <p>وضعیت آسیب شناسی: انواع آسیب:</p> <p>سالم <input checked="" type="checkbox"/> شکسته <input type="checkbox"/> رسوب گرفته <input type="checkbox"/> چسبی <input type="checkbox"/> ترک <input type="checkbox"/> زبر ترک <input type="checkbox"/> خوردگی <input type="checkbox"/> مرمت غلط <input type="checkbox"/> کمبود <input type="checkbox"/> پریدگی <input type="checkbox"/> تپان شکستگی <input type="checkbox"/> زبریش لعاب <input type="checkbox"/> خراش <input type="checkbox"/> ساییدگی <input type="checkbox"/> خمیف ساختار <input type="checkbox"/> زبریش نفش <input type="checkbox"/></p> <p>عامل آسیب رسان: فیزیکی <input type="checkbox"/> شیمیایی <input checked="" type="checkbox"/> بیولوژیک <input type="checkbox"/> انسانی <input type="checkbox"/> ناخظی <input type="checkbox"/> دیگر <input type="checkbox"/></p> <p>روند تخریب: فعال <input type="checkbox"/> غیر فعال <input checked="" type="checkbox"/> تثبیت شده <input type="checkbox"/></p> <p>توضیحات:</p>	<p>مشخصات اثر: کد: نام: جنس: استخوان شکل: رنگ: چگونگی دستیابی: تاریخ کشف: محل کشف: نام و شماره تراشه: نام حفار: عمق حفاری: دوره تاریخی: لایه حفاری:</p> <p>تصویر قبل از مرمت:</p> <p>تصویر بعد از مرمت:</p>

شناسنامه آسیب شناسی		شناسنامه فنی	
<p>88/87</p> <p>وضعیت آسیب شناسی:</p> <p>انواع آسیب:</p> <p>سالم <input type="checkbox"/> شکسته <input type="checkbox"/> رسوب گرفته <input type="checkbox"/> چرتی <input type="checkbox"/></p> <p>ترک <input type="checkbox"/> زبر ترک <input type="checkbox"/> شوره زنی <input type="checkbox"/> مرمت غلط <input type="checkbox"/></p> <p>کمبود <input type="checkbox"/> پریدگی <input type="checkbox"/> نهان شکستگی <input type="checkbox"/> زبرش لایب <input type="checkbox"/></p> <p>خرش <input type="checkbox"/> ساییدگی <input type="checkbox"/> تمهید ساختار <input type="checkbox"/> زبرش نقش <input type="checkbox"/></p> <p>عامل آسیب رسان:</p> <p>فیزیکی <input type="checkbox"/> شیمیایی <input type="checkbox"/> بیولوژیک <input type="checkbox"/></p> <p>انسانی <input type="checkbox"/> ناخوشی <input type="checkbox"/> دیگر <input type="checkbox"/></p> <p>روند تخریب:</p> <p>فصل <input type="checkbox"/> غیر فصل <input type="checkbox"/> تثبیت شده <input type="checkbox"/></p> <p>توضیحات:</p>	<p>مشخصات اثر</p> <p>کد:</p> <p>نام:</p> <p>جنس: چوب</p> <p>شکل:</p> <p>رنگ:</p> <p>چگونگی دستیابی:</p> <p>تاریخ کشف:</p> <p>محل کشف:</p> <p>نام و شماره ترانسه:</p> <p>نام حفار:</p> <p>صق حفاری:</p> <p>دوره تاریخی:</p> <p>لایه حفاری:</p>	<p>88/82</p> <p>وضعیت مرمتی:</p> <p>اقدامات انجام شده:</p> <p>ساماندهی وضعیت نگهداری <input type="checkbox"/> استحکام بخشی <input type="checkbox"/></p> <p>مستند نگاری <input type="checkbox"/> وصلی <input type="checkbox"/></p> <p>نمونه برداری <input type="checkbox"/> بازسازی <input type="checkbox"/></p> <p>پاکسازی <input type="checkbox"/> تثبیت <input type="checkbox"/></p> <p>نمک زدایی <input type="checkbox"/> موزون سازی <input type="checkbox"/></p> <p>توضیحات:</p> <p>آزمایشهای انجام شده:</p> <p>اسپات تست <input type="checkbox"/> بررسی میکروسکوپی <input type="checkbox"/></p> <p>شیمی تر <input type="checkbox"/> پتروگرافی <input type="checkbox"/></p> <p>XRD <input type="checkbox"/> AAS <input type="checkbox"/></p> <p>XRF <input type="checkbox"/> SEM <input type="checkbox"/></p> <p>مرمت گر: راشد راهداری</p>	<p>فن شناسی:</p> <p>روش ساخت: دست مولا</p> <p>کاربرد:</p> <p>میزان پخت: ندارد</p> <p>نوع بر کنده: ماله های</p> <p>میزان سختی و استحکام: مناسب</p> <p>رنگ پنده: تیره</p> <p>نوع لعاب: ندارد</p> <p>رنگ لعاب: ندارد</p> <p>تزئینات: ندارد</p> <p>محل تزئینات: ندارد</p> <p>زمان تزئین: ندارد</p> <p>نوع نقوش: ندارد</p> <p>رنگ نقوش: ندارد</p> <p>توضیحات:</p>
<p>تصویر قبل از مرمت:</p> 		<p>تصویر بعد از مرمت:</p> 	

شناسنامه آسیب شناسی		شناسنامه فنی	
<p>88/82</p> <p>وضعیت آسیب شناسی:</p> <p>انواع آسیب:</p> <p>سالم <input type="checkbox"/> شکسته <input type="checkbox"/> رسوب گرفته <input type="checkbox"/> چرتی <input type="checkbox"/></p> <p>ترک <input type="checkbox"/> زبر ترک <input type="checkbox"/> شوره زنی <input type="checkbox"/> مرمت غلط <input type="checkbox"/></p> <p>کمبود <input type="checkbox"/> پریدگی <input type="checkbox"/> نهان شکستگی <input type="checkbox"/> زبرش لایب <input type="checkbox"/></p> <p>خرش <input type="checkbox"/> ساییدگی <input type="checkbox"/> تمهید ساختار <input type="checkbox"/> زبرش نقش <input type="checkbox"/></p> <p>عامل آسیب رسان:</p> <p>فیزیکی <input type="checkbox"/> شیمیایی <input type="checkbox"/> بیولوژیک <input type="checkbox"/></p> <p>انسانی <input type="checkbox"/> ناخوشی <input type="checkbox"/> دیگر <input type="checkbox"/></p> <p>روند تخریب:</p> <p>فصل <input type="checkbox"/> غیر فصل <input type="checkbox"/> تثبیت شده <input type="checkbox"/></p> <p>توضیحات:</p>	<p>مشخصات اثر</p> <p>کد:</p> <p>نام:</p> <p>جنس: گل خام <input type="checkbox"/> گل پخته <input type="checkbox"/></p> <p>شکل:</p> <p>رنگ:</p> <p>چگونگی دستیابی:</p> <p>تاریخ کشف:</p> <p>محل کشف:</p> <p>نام و شماره ترانسه:</p> <p>نام حفار:</p> <p>صق حفاری:</p> <p>دوره تاریخی:</p> <p>لایه حفاری:</p>	<p>88/87</p> <p>وضعیت مرمتی:</p> <p>اقدامات انجام شده:</p> <p>ساماندهی وضعیت نگهداری <input type="checkbox"/> استحکام بخشی <input type="checkbox"/></p> <p>مستند نگاری <input type="checkbox"/> وصلی <input type="checkbox"/></p> <p>نمونه برداری <input type="checkbox"/> بازسازی <input type="checkbox"/></p> <p>پاکسازی <input type="checkbox"/> تثبیت <input type="checkbox"/></p> <p>نمک زدایی <input type="checkbox"/> موزون سازی <input type="checkbox"/></p> <p>توضیحات:</p> <p>آزمایشهای انجام شده:</p> <p>اسپات تست <input type="checkbox"/> بررسی میکروسکوپی <input type="checkbox"/></p> <p>شیمی تر <input type="checkbox"/> پتروگرافی <input type="checkbox"/></p> <p>XRD <input type="checkbox"/> AAS <input type="checkbox"/></p> <p>XRF <input type="checkbox"/> SEM <input type="checkbox"/></p> <p>مرمت گر: راشد راهداری</p>	<p>فن شناسی:</p> <p>روش ساخت: گنده کاری</p> <p>کاربرد:</p> <p>میزان پخت: ندارد</p> <p>نوع بر کنده: ندارد</p> <p>میزان سختی و استحکام: کم</p> <p>نوع لعاب: ندارد</p> <p>رنگ لعاب: ندارد</p> <p>تزئینات: ندارد</p> <p>محل تزئینات: ندارد</p> <p>زمان تزئین: ندارد</p> <p>نوع نقوش: ندارد</p> <p>رنگ نقوش: ندارد</p> <p>توضیحات:</p>
<p>تصویر قبل از مرمت:</p> 		<p>تصویر بعد از مرمت:</p> 	

شناسنامه آسیب شناسی	
<p>مشخصات اثر</p> <p>کد: 88/1</p> <p>نام: وضعیت آسیب شناسی:</p> <p>نوع آسیب:</p> <p>جنس: <input type="checkbox"/> گل خام <input type="checkbox"/> گل پخته</p> <p>شکل: <input type="checkbox"/> سالم <input type="checkbox"/> شکسته <input type="checkbox"/> رسوب گرفته <input type="checkbox"/> چرکی</p> <p>رنگ: <input type="checkbox"/> ترک <input type="checkbox"/> زبر ترک <input type="checkbox"/> شور زنی <input type="checkbox"/> مرمت غلط <input type="checkbox"/> تمپه <input type="checkbox"/> بودگی <input type="checkbox"/> تپان شکستگی <input type="checkbox"/> زبرش لعاب <input type="checkbox"/> حراش <input type="checkbox"/> ساییدگی <input type="checkbox"/> تلمیف ساختار <input type="checkbox"/> زبرش لعاب</p> <p>چگونگی دستیابی:</p> <p>تاریخ کشف:</p> <p>محل کشف:</p> <p>نام و شماره تراشه:</p> <p>نام حفار:</p> <p>صق حفاری:</p> <p>دوره تاریخی:</p> <p>لایه حفاری:</p>	<p>عامل آسیب رسان:</p> <p>فیزیکی <input type="checkbox"/> شیمیایی <input type="checkbox"/> بیولوژیک <input type="checkbox"/></p> <p>انسانی <input type="checkbox"/> داخلی <input type="checkbox"/> بیگن <input type="checkbox"/></p> <p>روند تخریب:</p> <p>مفصلر <input type="checkbox"/> ثابت شده <input type="checkbox"/></p>
	تصویر قبل از مرمت:
	تصویر بعد از مرمت:

شناسنامه فنی	
<p>فن شناسی:</p> <p>روش ساخت: پوفساز</p> <p>کاربرد:</p> <p>میزان پخت: کامل</p> <p>نوع برکننده: مانه پانی</p> <p>میزان سختی و استحکام: متناسب</p> <p>رنگ بدنه: فلکستری</p> <p>نوع لعاب: ندارد</p> <p>رنگ لعاب: ندارد</p> <p>تزئینات: ندارد</p> <p>محل تزئینات: داخل و لبه بیرونی</p> <p>زمان تزئین: قبل از پخت</p> <p>نوع نقوش: هندسی</p> <p>رنگ نقوش: سبزه</p> <p>توضیحات:</p>	<p>وضعیت مرمتی:</p> <p>اقدامات انجام شده:</p> <p>ساماندهی وضعیت نگهداری <input type="checkbox"/> استحکام بخشی <input type="checkbox"/></p> <p>مستند نگاری <input type="checkbox"/> وصلی <input type="checkbox"/></p> <p>نمونه برداری <input type="checkbox"/> بازسازی <input type="checkbox"/></p> <p>پاکسازی <input type="checkbox"/> تثبیت <input type="checkbox"/></p> <p>نمک زدایی <input type="checkbox"/> موزون سازی <input type="checkbox"/></p> <p>توضیحات:</p> <p>آزمایشهای انجام شده:</p> <p>اسپات تست <input type="checkbox"/> بررسی میکرو <input type="checkbox"/> شیمی تر <input type="checkbox"/></p> <p>پتروگرافی <input type="checkbox"/> AAS <input type="checkbox"/> SEM <input type="checkbox"/></p> <p>XRD <input type="checkbox"/> XRF <input type="checkbox"/></p> <p>مرمتگر: رائد راهداری</p>

شناسنامه آسیب شناسی	
<p>مشخصات اثر</p> <p>کد: 88/2</p> <p>نام: وضعیت آسیب شناسی:</p> <p>نوع آسیب:</p> <p>جنس: <input type="checkbox"/> گل خام <input type="checkbox"/> گل پخته</p> <p>شکل: <input type="checkbox"/> سالم <input type="checkbox"/> شکسته <input type="checkbox"/> رسوب گرفته <input type="checkbox"/> چرکی</p> <p>رنگ: <input type="checkbox"/> ترک <input type="checkbox"/> زبر ترک <input type="checkbox"/> شور زنی <input type="checkbox"/> مرمت غلط <input type="checkbox"/> تمپه <input type="checkbox"/> بودگی <input type="checkbox"/> تپان شکستگی <input type="checkbox"/> زبرش لعاب <input type="checkbox"/> حراش <input type="checkbox"/> ساییدگی <input type="checkbox"/> تلمیف ساختار <input type="checkbox"/> زبرش لعاب</p> <p>چگونگی دستیابی:</p> <p>تاریخ کشف:</p> <p>محل کشف:</p> <p>نام و شماره تراشه:</p> <p>نام حفار:</p> <p>صق حفاری:</p> <p>دوره تاریخی:</p> <p>لایه حفاری:</p>	<p>عامل آسیب رسان:</p> <p>فیزیکی <input type="checkbox"/> شیمیایی <input type="checkbox"/> بیولوژیک <input type="checkbox"/></p> <p>انسانی <input type="checkbox"/> داخلی <input type="checkbox"/> بیگن <input type="checkbox"/></p> <p>روند تخریب:</p> <p>فصل <input type="checkbox"/> غیر فصل <input type="checkbox"/> تثبیت شده <input type="checkbox"/></p>
	تصویر قبل از مرمت:
	تصویر بعد از مرمت:

شناسنامه فنی	
<p>فن شناسی:</p> <p>روش ساخت: پوفساز</p> <p>کاربرد:</p> <p>میزان پخت: کامل</p> <p>نوع برکننده: مانه پانی</p> <p>میزان سختی و استحکام: متناسب</p> <p>رنگ بدنه: فلکستری</p> <p>نوع لعاب: ندارد</p> <p>رنگ لعاب: ندارد</p> <p>تزئینات: ندارد</p> <p>محل تزئینات: داخل و لبه بیرونی</p> <p>زمان تزئین: قبل از پخت</p> <p>نوع نقوش: هندسی</p> <p>رنگ نقوش: سبزه</p> <p>توضیحات:</p>	<p>وضعیت مرمتی:</p> <p>اقدامات انجام شده:</p> <p>ساماندهی وضعیت نگهداری <input type="checkbox"/> استحکام بخشی <input type="checkbox"/></p> <p>مستند نگاری <input type="checkbox"/> وصلی <input type="checkbox"/></p> <p>نمونه برداری <input type="checkbox"/> بازسازی <input type="checkbox"/></p> <p>پاکسازی <input type="checkbox"/> تثبیت <input type="checkbox"/></p> <p>نمک زدایی <input type="checkbox"/> موزون سازی <input type="checkbox"/></p> <p>توضیحات:</p> <p>آزمایشهای انجام شده:</p> <p>اسپات تست <input type="checkbox"/> بررسی میکروسکوپی <input type="checkbox"/> شیمی تر <input type="checkbox"/></p> <p>پتروگرافی <input type="checkbox"/> AAS <input type="checkbox"/> SEM <input type="checkbox"/></p> <p>XRD <input type="checkbox"/> XRF <input type="checkbox"/></p> <p>مرمتگر: رائد راهداری</p>



Object: Spouted ware patcher

Material: Earthenware
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 8519/7



Object: Spouted grey ware patcher

Material: Earthenware
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 2908/1



Object: Painted patcher

Material: Earthenware
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 4410/10



Object: Painted buff ware pear shaped beaker

Material: Earthenware
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 2510/a/23



Object: Painted buff ware pot

Material: Earthenware
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 4303/2



Object: Painted buff ware round jar

Material: Earthenware
Location: Shahr-i Sokhta Museum
Date: -
Excavator no: 7816/2



Object: Painted buff ware round jar

Material: Earthenware
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 1416/6



Object: Painted grey ware round jar

Material: Earthenware
Location: Shahr-i Sokhta Museum:
Date: -
Excavator no: 3203/2



Object: Pottery vessel

Material: Earthenware
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 1400/3



Object: Pottery vessel

Material: Earthenware
Location: Shahr-i Sokhta Museum
Date: -
Excavator no: 1400/48



Object: Painted buff ware bowl

Material: Earthenware
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 3404/1



Object: Painted buff ware pear shaped beaker

Material: Earthenware
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: D/3050/10



Object: painted buff ware round jar

Material: Earthenware
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no:



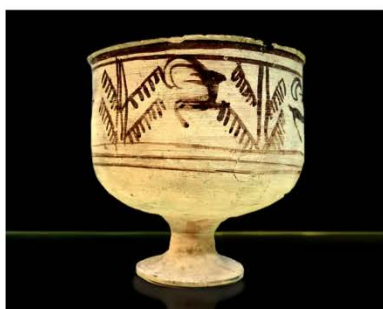
Object: Small Simple jar

Material: Earthenware
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 44



Object: Buff ware patcher

Material: Earthenware
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: D/3352/13



Object: Painted buff ware legged bowl

Material: Earthenware
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 731/42



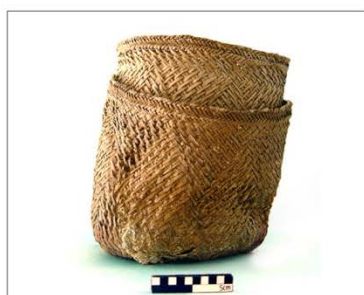
Object: Painted buff ware bowl

Material: Earthenware
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 3110/6



Object: Buff ware pitcher

Material: Earthenware
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 4309/1



Object: Basket

Material: Mat
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 1404



Object:

Material: Cloth
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 3502



Object: Basket

Material: Mat
Location: Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 4700/6



Object: Cloth

Material:Organic fibers
Location:Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 4501/2



Object: Cloth

Material:Organic fibers
Location:Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no:3201/12



Object: Cloth

Material:Organic fibers
Location:Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no:3208/9



Object: Cloth

Material:Organic fibers
Location:Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no:2224/6



Object: Bead

Material:Lapis lazuli
Location:Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no:731/9



Object: Bead

Material:Brown agate
Location:Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 2607



Object: Bead

Material:Lapis lazuli
Location:Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 3208



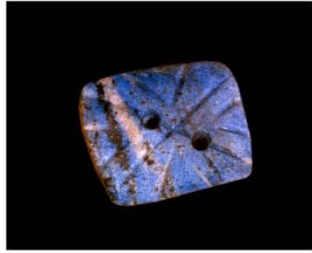
Object: Bead

Material:
Location:Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no:3901/2



Object: Bead

Material:
Location:Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no:4210/7



Object: Bead

Material:Lapis lazuli
Location:Shahr-i Sokhta Museum
Date: -
Excavator no:1542/6



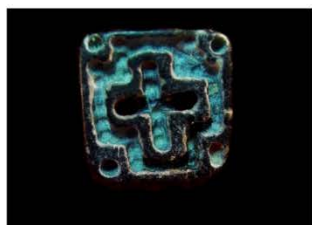
Object: Bead

Material: Soapstone
Location:Shahr-i Sokhta Museum
Date:
Excavator no:2654/8



Object: Bead

Material:Turquoise
Location:Shahr-i Sokhta Museum
Date: -
Excavator no:4125/16



Object: Bead

Material:Turquoise
Location:Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 3205/14



Object: Animal Figure

Material:Clay
Location:Shahr-i Sokhta Museum
Trenches location: Eastern Residential



Object: Animal Figure

Material:Clay
Location:Shahr-i Sokhta Museum
Trenches location: Eastern Residential



Object: Animal Figure

Material:Clay
Location:Shahr-i Sokhta Museum
Trenches location: Eastern Residential



Object: Animal Figure

Material:Clay
Location:Shahr-i Sokhta Museum
Trenches location: Eastern Residential



Object: Animal Figure

Material: Stone

Location: Shahr-i Sokhta Museum

Trenches location: Eastern Residential



Object: Animal Figure

Material: Clay

Location: Shahr-i Sokhta Museum

Trenches location: Monumental Area



Object: Human Figure

Material: Clay

Location: Shahr-i Sokhta Museum

Trenches location: Eastern residential



Object: Human Figure

Material: Clay

Location: Shahr-i Sokhta Museum

Trenches location: Eastern Residential



Object: Stone phiale

Material:Alabaster
Location:Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no:3208/5



Object: Stone goblet

Material:Alabaster
Location:Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no:1716/7



Object: Stone phiale

Material:Alabaster
Location:Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no: 1716/6



Object:Stone goblet

Material:Alabaster
Location:Shahr-i Sokhta Museum
Date: Three millennium B.C
Excavator no:2513/5



Object: Blade

Material:Flint
Location:Shahr-i Sokhta Museum
Date: -
Excavator no:1072



Object: Necklace

Material:Turquoise,Agate,Silica
Location:Shahr-i Sokhta Museum
Date: -
Excavator no:1513



Object:Necklace

Material:Agate,
Location:Shahr-i Sokhta Museum
Date:
Excavator no:200/1



Object: Necklace

Material:Turquoise,Silica
Location:Shahr-i Sokhta Museum
Date: -
Excavator no:3503/12



Object: Necklace

Material:Agate
Location:Shahr-i Sokhta Museum
Date: -
Excavator no:3502/11

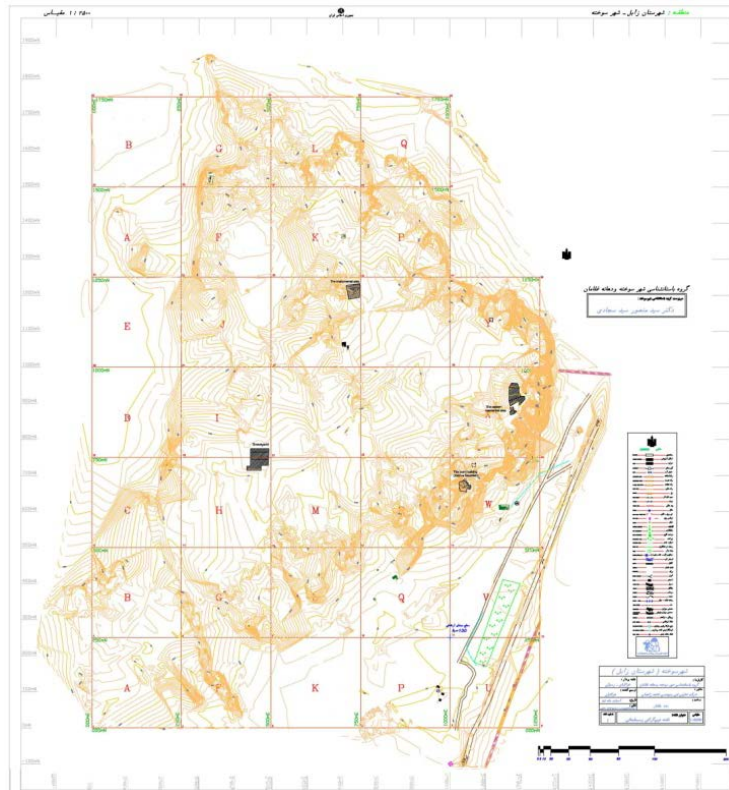


Object: Bracelets

Material:Turquoise,Silica
Location:Shahr-i Sokhta Museum
Date: -
Excavator no: 1515

Appendix IV: Geophysics report in Shahr-i Sokhta**Report on Geophysics Scan by Magnetometer Method in Shahr-e Sokhta of Sistan;
June - July 2012**

Archaeo-geophysical scan in Shahr-i Sokhta site was performed using the method of magnetometers. Three magnetometer instruments are available for magnetometric collections: proton, floss gate and cesium -rubidium vapor tools among which the last one is the most sensitive. Therefore, the magnetometers scan in this area was done using the cesium-rubidium vapor gradiometer instrument which measures the intensity of the magnetic current continuously at 20 cm intervals over a total course of 50 meters. The process is repeated once in every meter to the end of the square. Should a magnetic object be placed under the surface, based on the intensity difference of the magnetic current of the earth at various spots, below surface anomaly is revealed on the magnetic map. Presence of any geophysical pollution (metal or magnetic) causes interference and disturbance on the magnetic map. The method also has its limitations; the biggest one is its inefficiency in urban environments particularly at places near power lines, underground water and gas tubes, busy roads, iron poles and fences; also metal pollution on the ground and highly uneven topography of the earth render it useless.



Map 1. Topographical map of Shahr-i Sokhta
(Source: archives of Base of SIS)

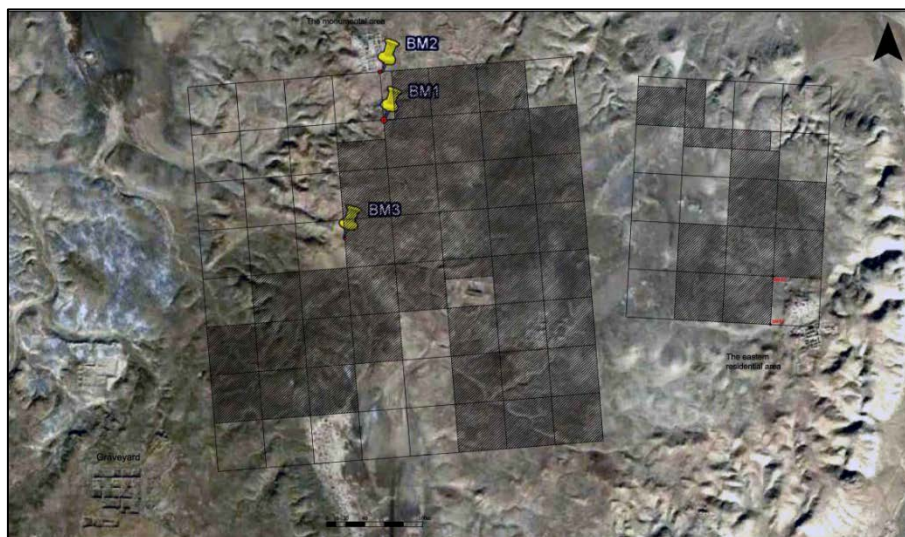
Regions under study for archaeo-geophysical scan of Shahr-i Sokhta

Archaeo-geophysical scan of Shahr-i Sokhta was done in two parts of the city; firstly to the west and north of the eastern residential zone as far as south of the northern residential zone measuring about three hectares and secondly in the south and south west of the monumental building to the west of the eastern residential zone as well as the entire central residential zone to the north of the cemetery measuring more than ten hectares. In the first part located west and north of the eastern residential zone, the site topography was rugged and after passing over low hills at the northern part of the eastern residential zone, the northern residential zone came to rest on top of hills. In the western part, the hills gradually lose height ending in a low land which is flooded during rainfall. Here the terrain is quite flat without any elevations. In the eastern part of the northern residential zone, deep fissures caused by water erosion resulted in the halting of the operation. Also metal bars on the visit path in the southern part led to scan disruption. In the second part namely the south and southwest of the monumental building, the site topography was uneven. In some parts deep fissures caused by water erosion prevented the continuation of activities.

Furthermore, metal sign boards introducing the properties, the dirt road and excavation trenches created problems for further scanning.



Map 2. Aerial photo of the region under scan in Shahr-i Sokhta and the location of selected bench marks for gridding
(Source: Google earth, 2012)



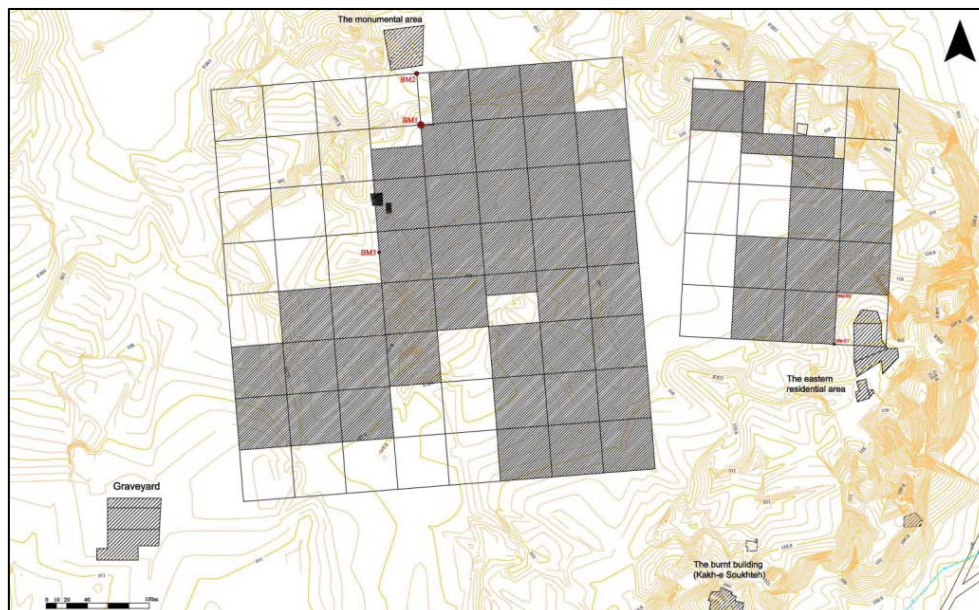
Map 3. Location of the area in which magnetometer scan was conducted
(Basic aerial photo from Google earth, 2012)

Gridding of the site for magnetometric scan

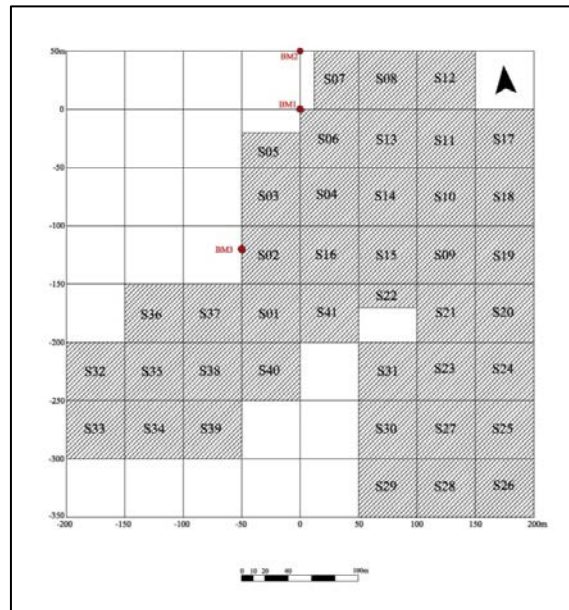
Gridding of the eastern part was done using decameter and geodesy prism. Two main points were considered for gridding (Map 4) with the following coordinates: bench mark number one (BM-E1) with a longitude of 61 degrees, 20 minutes and 0.3 seconds and a latitude of 30 degrees, 35 minutes and 49 seconds and bench mark number two (BM-E2) with a longitude of 61 degrees, 20 minutes and 0.4 seconds and a latitude of 30 degrees, 35 minutes and 50.6 seconds.

Gridding was considered with squares measuring 50 by 50 meters but based on regional requirements and topography, the size of squares for scanning was changed. Gridding of the second part south of the monumental building was done by a total station treambell camera. For this, three local bench marks were considered (Map 5) because international bench marks of the region and/or bench marks existing at the site were not found. Bench mark number 1 (BM1) south of the monumental building was specified with the following geographical coordinates: a longitude of 61 degrees, 19 minutes and 45.3 seconds and a latitude of 30 degrees, 35 minutes and 56 seconds and coordinates of (0, 0).

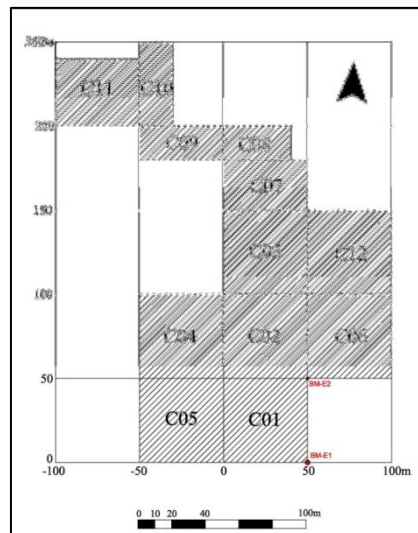
Bench mark number 2 (BM2) was specified with a longitude of 61 degrees, 19 minutes and 45.2 seconds and a latitude of 30 degrees, 35 minutes and 57.6 seconds and coordinates of (0, 50). Finally bench mark number 3 (BM3) was specified with a longitude of 61 degrees, 19 minutes and 43.7 seconds and a latitude of 30 degrees, 35 minutes and 52 seconds and coordinates of (-49/259,-120/316). All gridding squares were delineated by red-colored 40-cm wooden nails at the site.



Map 4. Gridding of areas under magnetometers scans in Shahr-i Sokhta
(Source: archives of Base of SIS)



Map 5. Gridding of the western part of the region under magnetometers scan in Shahr-i Sokhta



Map 6. Gridding of the eastern part of the region under magnetometers scan in Shahr-i Sokhta

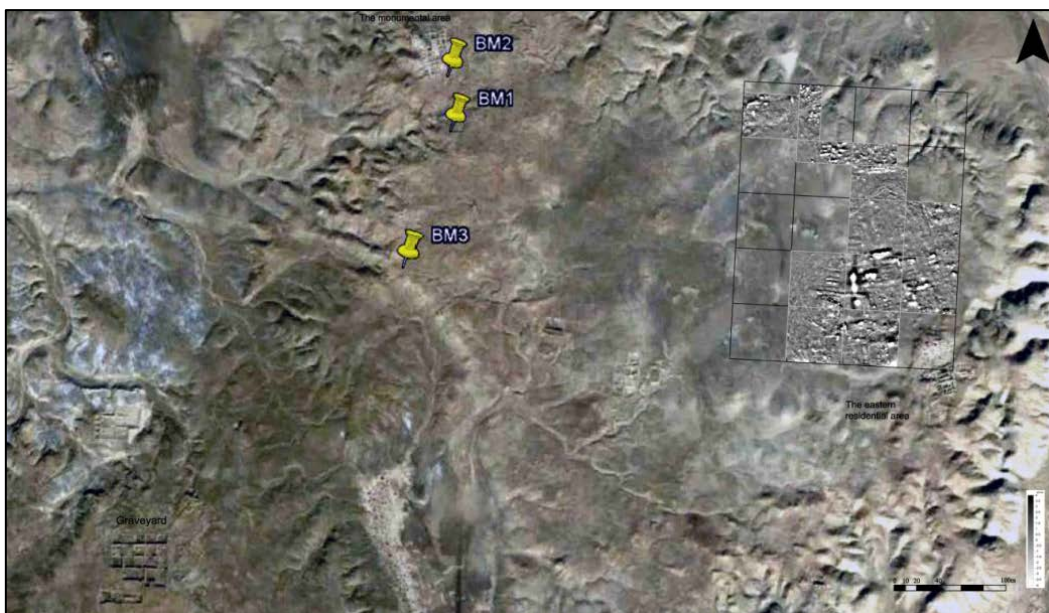
Magnetometers scan in west and north of the eastern residential zone

Magnetometers scan in this area was started west of the eastern residential zone and was continued to the north of the area; then it was extended to the south of the northern residential zone and later to its west. Within the area, anomaly of several structures under the ground was specified. The largest structure became evident north of the eastern residential zone (on eastern part of the magnetic map, square C06).

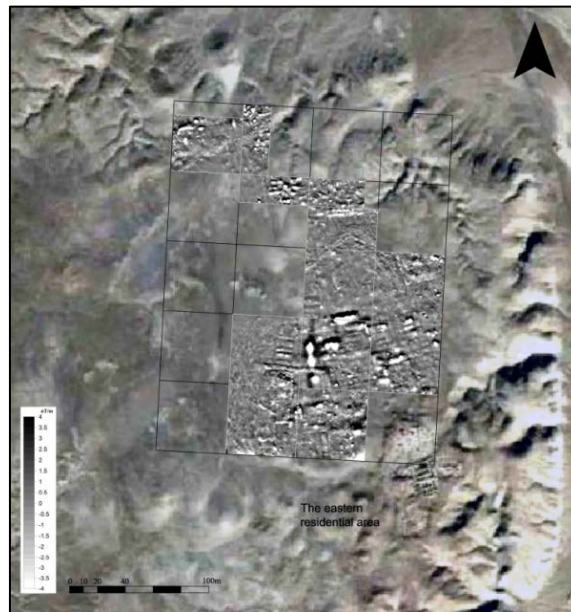
The plan revealed on the magnetic map is a rectangular-shaped structure with an approximate length and width of 40 and 30 meters respectively. During magnetometric scans, because magnetic anomalies have halos, the size of walls cannot be exactly specified. Spatial division has been properly done on the magnetic map. Within the structure specified on the magnetic map, approximate plans of eleven rooms can be distinguished.

Of course based on the type of materials used in the construction of Shahr-i Sokhta buildings which is mostly mud bricks as well as considering the depth of mud bricks position, the ups and downs of anomalies are different but as for the regularity of these anomalies, it can be assumed that they are related to architectural structures existing under the surface. These structures are probably connected to eastern residential buildings or are their northern continuation. Anomalies 1, 2 and 3 are very strong bipolar ones (Map 10) which show a furnace or stove beneath the surface of this part. As for the presence of pieces of slag (though not much in number and amount) on the ground, it can be said that these very strong anomalies pertain to a ceramic cooking or a metal smelting furnace. But because we are in a residential zone, they can also belong to a stove containing ashes. Also in the western part of the eastern residential zone, regular structures have appeared on the magnetic map (Map 10). But no definite regular plan can be discerned in this part. Only regular anomalies with right angles are evident at some parts.

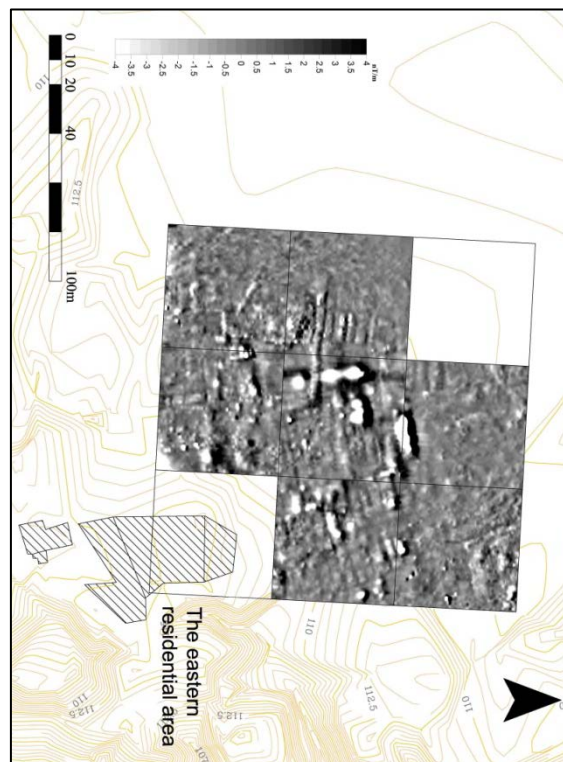
Certainly, there are also structures here that regarding underground magnetic materials have low or high anomalies. But on the magnetic map, only the anomaly of walls is observable. West of this part, because the hills have lost their height, we approach a low and flat area without any elevations so no specific anomaly is seen on the magnetic map.



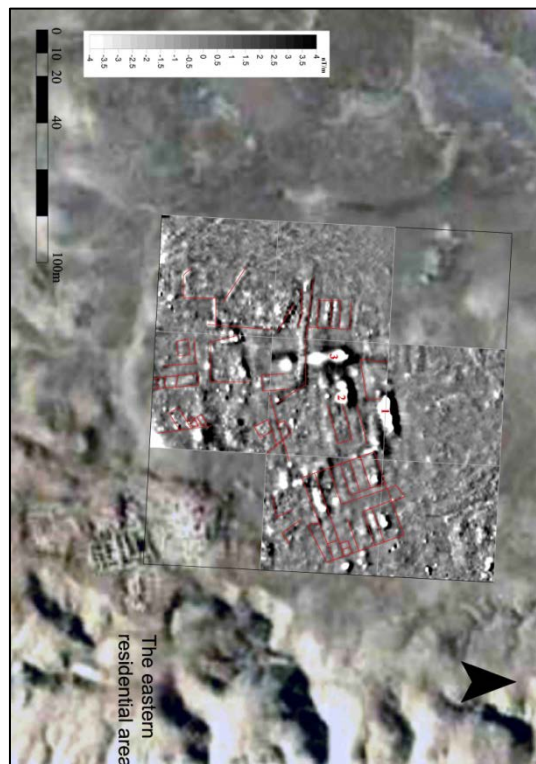
Map 7. Magnetic map of the eastern part and its location within the area under scan in Shahr-i Sokhta (Basic aerial photo from Google earth, 2012)



Map 8. Magnetic map of the eastern part in northern and western area of the Eastern Residential Zone (Basic aerial photo from Google earth, 2012)



Map 9. Magnetic map of northern and western areas of the eastern residential zone of Shahr-i Sokhta (Basic topographical map from the archives of Base of SIS)



Map 10. Magnetic map and outlines of structures revealed on it in northern and western areas of the eastern residential zone of Shahr-i Sokhta (Basic aerial photo from Google earth, 2012)



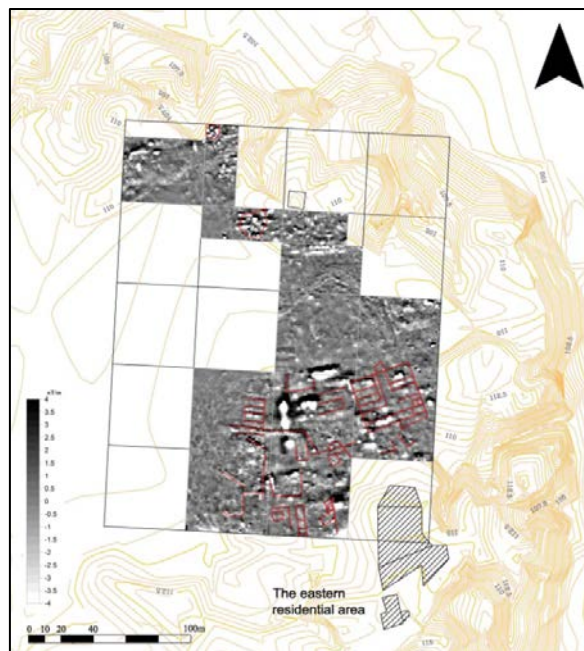
Photo 1. Topography of the western and northern areas of the Eastern Residential Zone for magnetometric scan



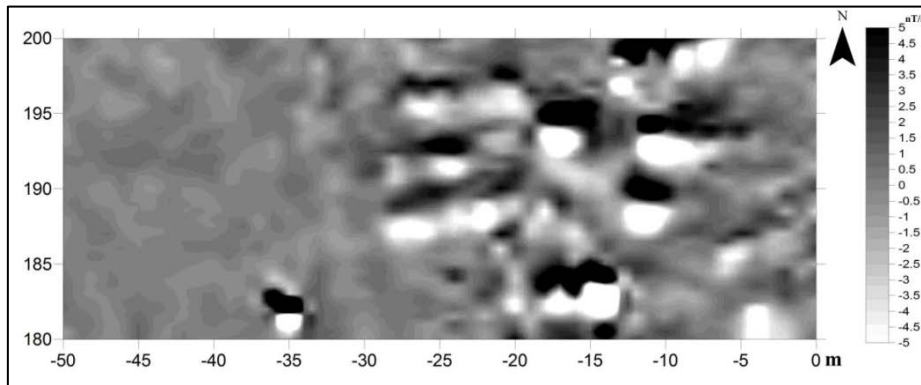
Photo 2. Method of magnetometric scan north of the Eastern Residential Zone

Magnetometric scan in Southern part of the Northern Residential Zone

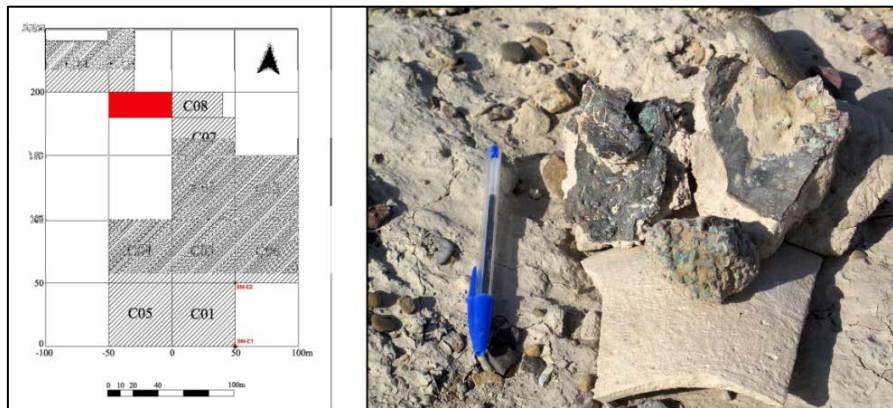
The area is situated in the southern part of the northern residential zone. On magnetic map existence of regular bipolar anomalies is very significant and interesting (Map12). It is a bipolar anomaly around which several other bipolar anomalies spin. Because at this point on the ground metal melting pots were seen it is possible that the anomaly pertains to a metal smelting furnace (Map 13).



Map 11. Magnetic map of the eastern part of the area under scan in Shahr-i Sokhta (Basic topographical map from the archives of the Base of SIS)



Map 12. Magnetic map of the south western part of the Northern Residential Zone



Map 13. Metal melting pots west and Southwest of the Northern Residential Zone (Left); location of the scanned square in the eastern part (Right)



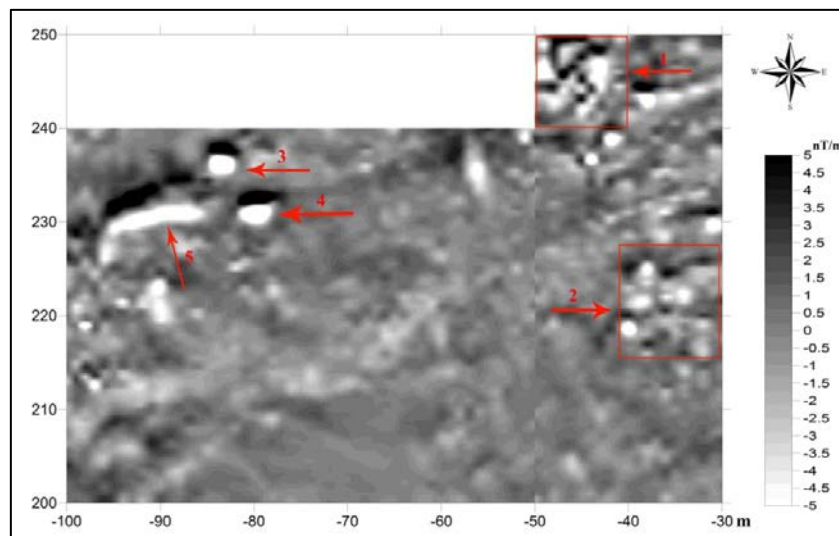
Photo 3. Topography of east of the Northern Residential Zone



Photo 4. Magnetometric scan South of the Northern Residential Zone

Magnetometric scan in western part of the northern residential zone

The area is located in western part of the northern residential zone. Concerning its topography, a large pit is seen here which makes impossible the linking of the scan to the residential zone. Above the ground, not only a large number of ceramics but also bronze pieces and bits of metal smelting pots are seen which is quite significant. Anomalies 1 and 2 on the magnetic map show regular structures in the area. Anomalies seen as white stains indicate a potential empty space beneath the surface. Bipolar anomalies 3, 4 and 5 are possibly due to the presence of a strong magnetic object such as a metal object under the surface.



Map 14. Magnetic map of the western part of the Northern Residential Zone

Magnetometric scan in central part of Shahr-i Sokhta

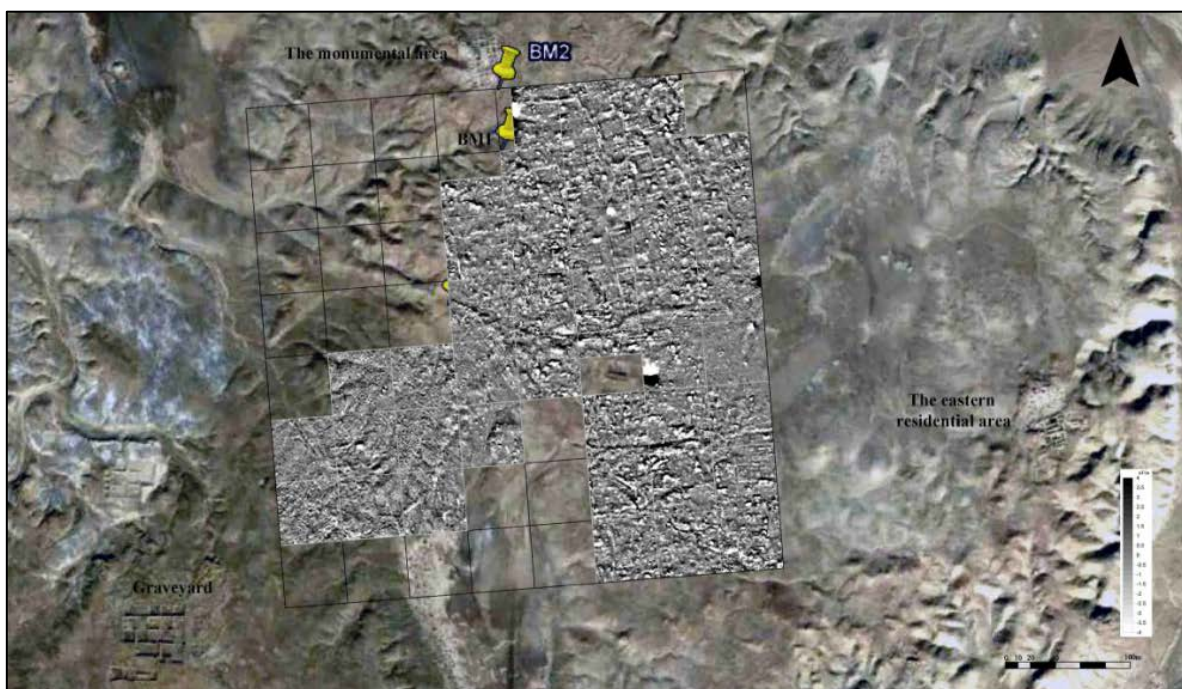
Magnetometric scan was conducted in central part of Shahr-i Sokhta in an area measuring more than ten hectares located amidst the monumental building, the northern residential building, west of the eastern residential building and north of the cemetery. This is a part of Shahr-i Sokhta where low mounds stand each probably representing a single building or a complex of interconnected ones. At most places of this part, a huge amount of ceramics and occasionally pieces of broken seals and scars of intense burning is observed above the ground. In the center of the part under magnetometer scan, stand workshops excavating the central residential building. Moreover, a few scattered excavation trenches exist in this part. Signposts introducing buildings at various places caused disruption in magnetic scan and led to disturbance on the magnetic map.

During the scan all metal chains and bars which had been placed for delineating the tourist path were removed from spots interfering with our scan. Also surface burning scars on some parts caused very strong anomaly on the magnetic map. The western part of the monumental building has elevations where due to its extreme unevenness practically no magnetometric scan was feasible. Actually this problem also existed in the eastern part of the monumental building. We used two local bench marks (BM1 and BM2) for gridding in this part which is seen on the map. In order to use these bench marks in the future too, bench marks 1, 2 and 3 were secured on the ground with a mixture of sand and cement.

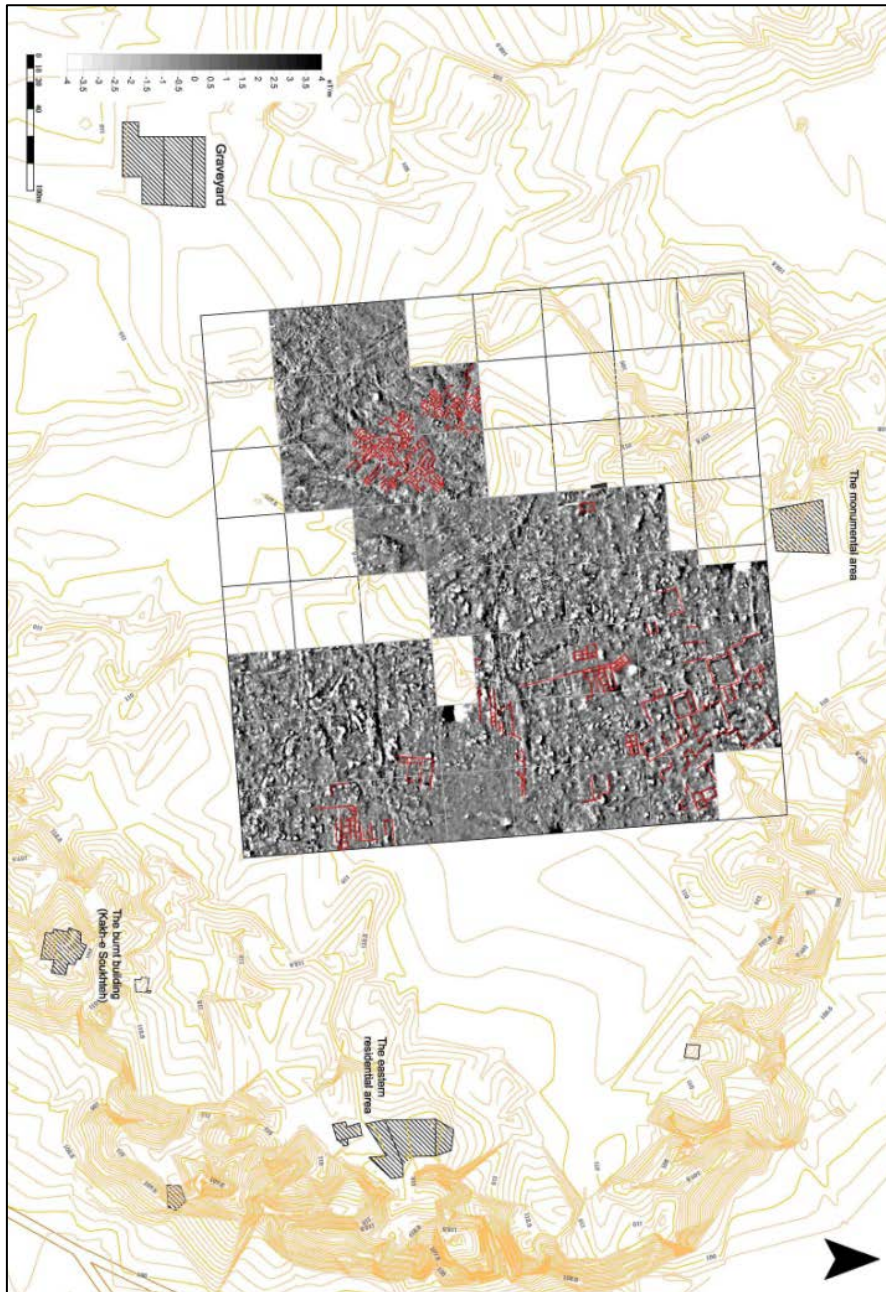
Magnetometric study in southern and southwestern parts of the monumental building

Following scans in southern and southwestern parts of the monumental building, a complex of several buildings appeared on the map here in the direction of the eastern residential zone as far as the central residential zone (Map 17). As a matter of fact, numerous architectural spaces exist here. This building complex is probably the continuation of monumental buildings or maybe it is an independent and separate building complex. These architectural spaces have various sizes. Depending on their plan size, some of them which have been defined on the magnetic map are very large. As for the size of the monumental building which measures about 30 by 40 meters, the extent of some distinguishable architectural spaces measuring approximately 22 by 17 or 16 by 15 meters can be considered quite large (Map 18). Of course it should be pointed out that these large architectural spaces must have been divided into small spaces which are hard to recognize on the magnetic map. Moreover, architectural spaces with smaller sizes are also distinguishable on the magnetic map. Distribution of architectural spaces in this part is very high showing a huge building complex which has utmost importance. The building complex has a length of more than 200 meters and a width of 150 meters and because of its extent is exceptional in Shahr-i Sokhta.

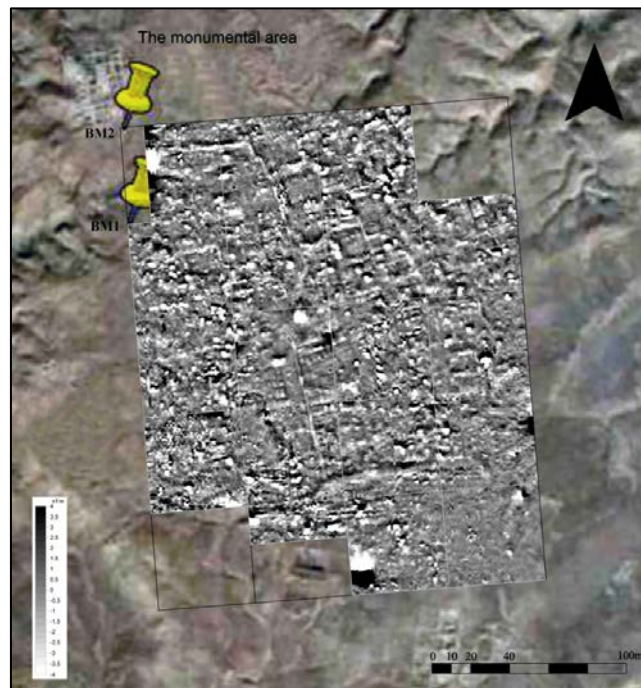
Based on previous excavations conducted by an Italian expedition as well as an Iranian team headed by Dr. Sajjadi in the central part and the discovery of the central residential zone, probably the building complex can link together the central residential zone, the monumental building in north west, the northern residential zone in the northeast and the eastern residential zone west of this part. Here, no wall scar is seen on the surface but the ground is covered with ceramic pieces. In some places, traces of burning are observed on the surface which is quite evident on magnetic maps.



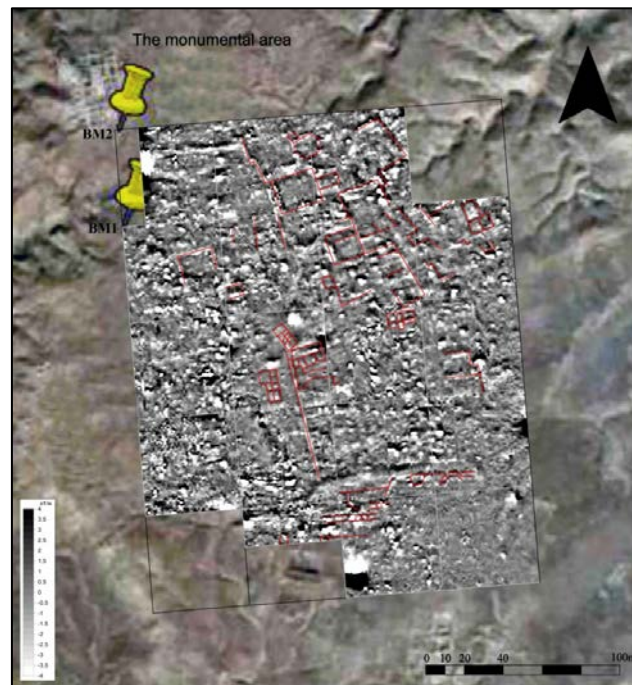
**Map 15. Magnetic map of the western part of the area under scan in Shahr-i Sokhta
(Basic aerial photo from Google earth, 2012)**



Map 16. Magnetic map and outlines of structures west of the scanned area in south and southwest of the monumental building of Shahr-i Sokhta (Masic topographical map from the archives of Base of SIS)



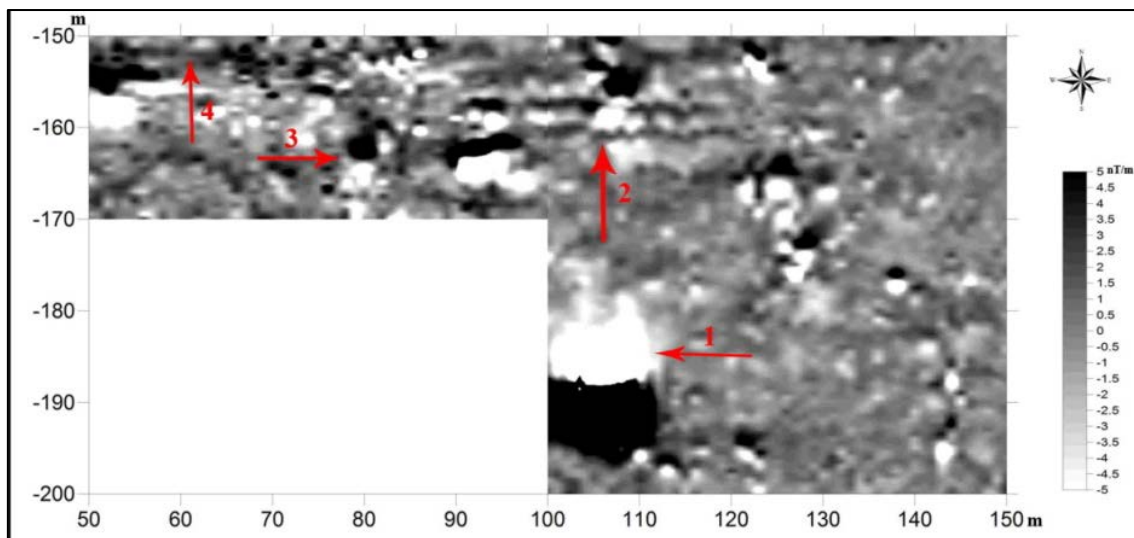
Map 17. Magnetic map of the southwestern part of the monumental building of Shahr-i Sokhta (Basic aerial photo from Google earth, 2012)



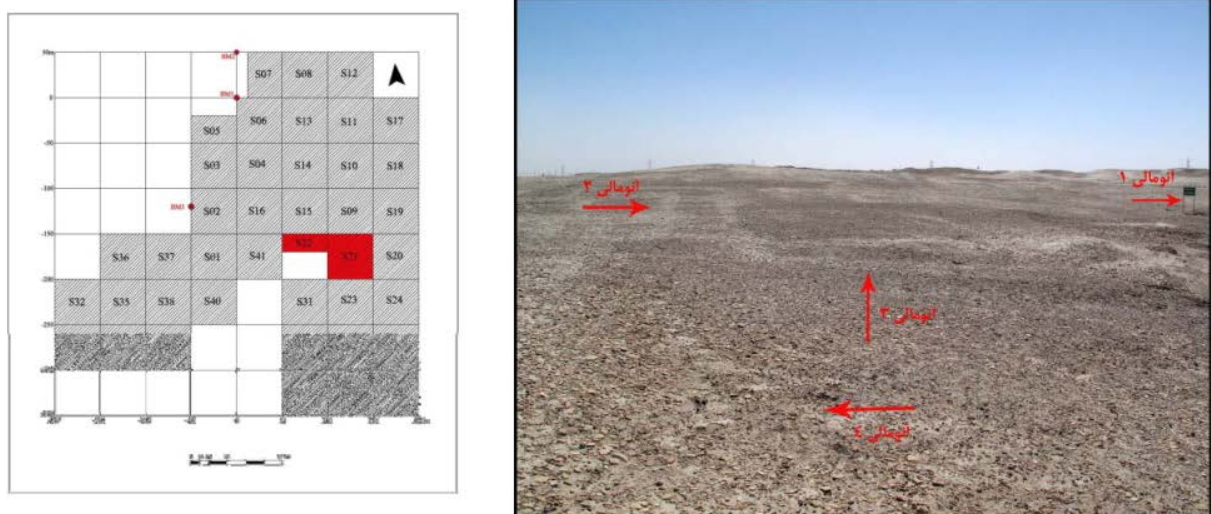
Map 18. Magnetic map and outlines of structures revealed on it in the southwestern part of the monumental building of Shahr-i Sokhta (Basic aerial photo from Google earth, 2012)

Magnetometric scans on squares S21 and S22

These squares are located north of the central residential building which has been excavated previously. Anomaly number 1 is caused by a metal signboard introducing the central residential building but because it was secured in the ground using steel and cement, its dislocation was not feasible. Due to its large amount of metal, the signboard has caused extreme geophysical pollution. Anomaly number 2 is caused by an underground structure with its wall scars seen above the ground. Anomaly number 3 is caused by a below the surface wall with its wall scars seen above the ground. Anomaly number 4 is a mound covered with ceramic pieces.



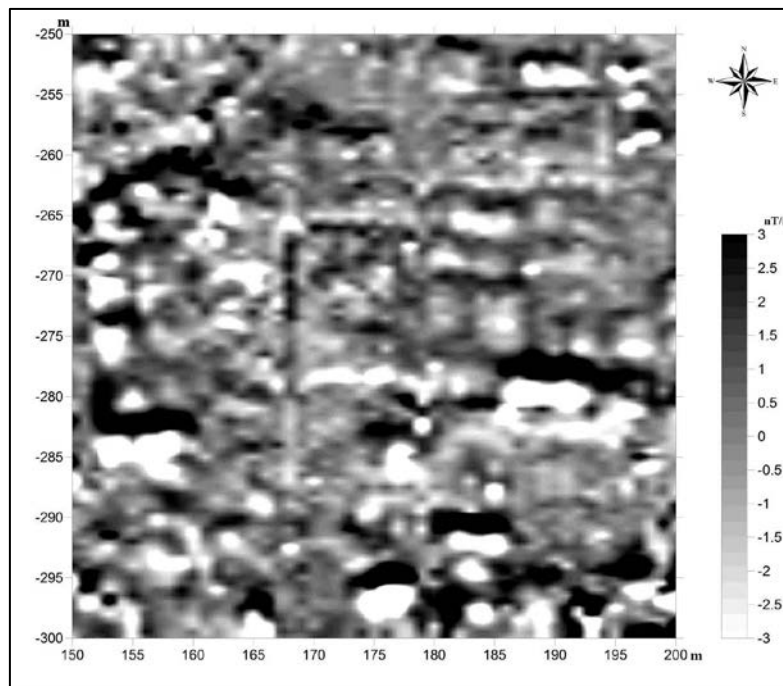
Map 19. Magnetic map of scan in squares S21 and S22



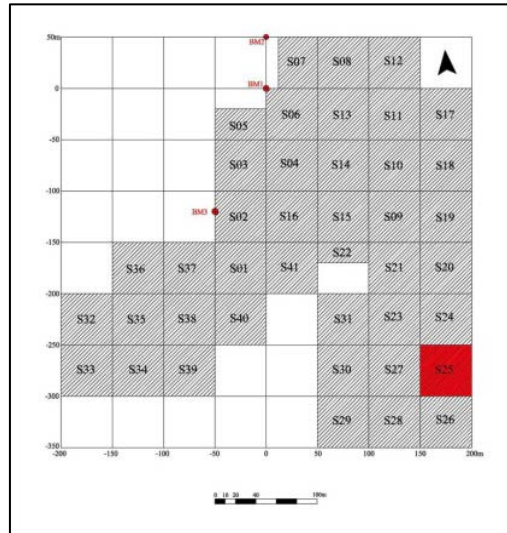
Map 20. Location of anomalies shown on the magnetic map (Right); location of squares scanned in gridding (Left)

Magnetometric scan on square S25

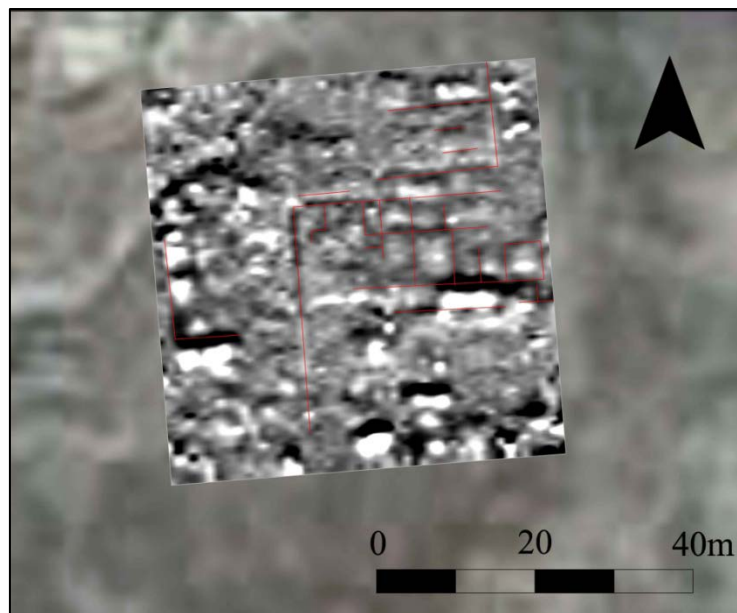
The square is located south east of the region under study. To its west and northwest, the central residential zone exists. The surface of the square is smooth and flat. Also no trace of wall scars is seen on the ground. Based on the structural magnetic map in the square, it was found out that it has an approximate length of 40 meters and a width of 30 meters. Its western wall with a length of about 30 meters is clearly visible. In the northern part of the structure, three distinct rooms are seen. Moreover, in its southern part three square-shaped spaces are seen of which the middle square is divided into three other rectangular spaces. Very strong anomalies in south of the square are caused by abundant ceramic pieces on the ground as well as ash and hematite present in its soil. Extremely strong anomaly of the western part is due to a water-eroded fissure as well as the great amount of ceramics here. Regarding the size of interior rooms which are 5 by 6, 3 by 4 meters or smaller, it can be said that the structure was used as a residential building and considering its proximity to the central residential zone, perhaps there was a connection between the structure and the central residential zone.



Map 21. Magnetic map of S25



Map 22. Location of S25 in gridding of the western part of the area under magnetometric scan in Shahr-i Sokhta



Map 23. Magnetic map of S25 and outlines of the building revealed on it in Shahr-i Sokhta (Basic aerial photo from Google earth, 2012)



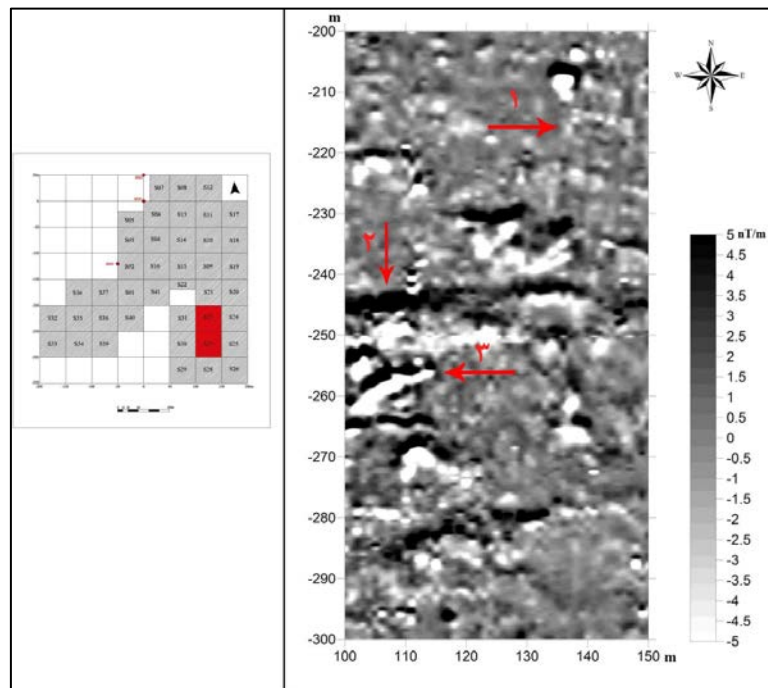
Photo 5. North-west view of S25



Photo 6. South-east view of S25

Magnetometric scan on squares S23 and S27

The eastern part of the S23 is located over the excavated building of the central residential building with its walls eroding heavily due to lack of conservation after excavation. In the southwest of S23 and northwest of S27 (Map 24), the burned soil which is quite soft and uncompressed contains charcoal and probably hematite (Photo 7). This has caused severe anomaly on the magnetic map. Anomaly number 1 on the magnetic map is due to the anomaly of walls of the central residential building but anomaly number 2 is the result of a mound covered with ceramic pieces and soft, incompact burnt soil containing charcoal. Additionally, anomaly number 3 is caused by the soft burnt soil containing much charcoal.



Map 24. The magnetic map of s23 and s27 (Right), location of squares on the gridding (Left)



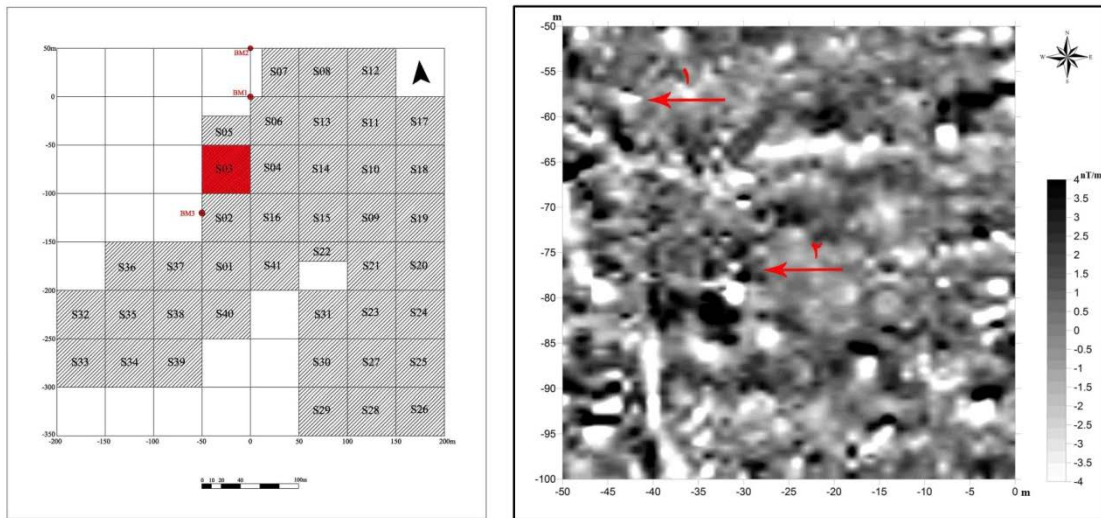
Photo 7. Burnt soil containing ashes and hematite in southern part of S23 and in northern part of S27, view from east



Photo 8. A mound covered with ceramic pieces in southern part of S23, view from east

Magnetometric scan on square S3

In this square, trenches of two excavated buildings are seen with its anomalies also specified on the magnetic map. Anomalies 1 and 2 on the map are due to the walls of the excavated building.



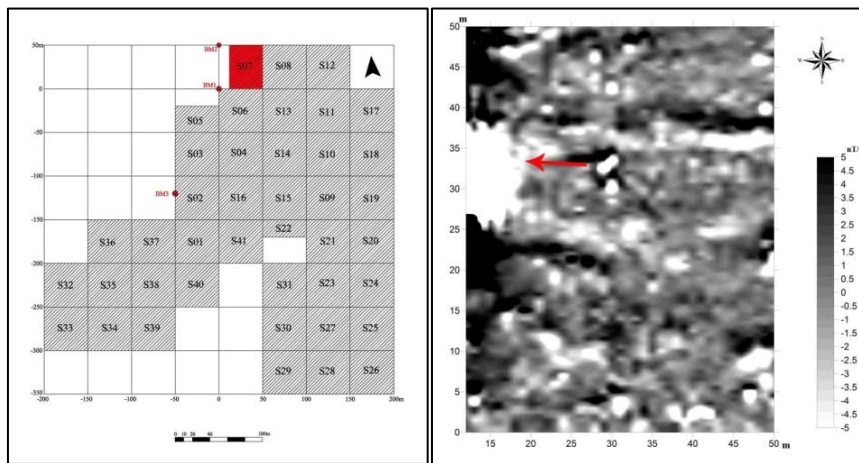
Map 25. The magnetic map of S3 (Right), location of the square on the gridding (Left)



Photo 9. The excavated structure in S3, view from north

Magnetometric scan on square S7

S7 is located to the south of the monumental building. Presence of the signboard of the monumental building as well as inability to dislocate it not only has led to the loss of the first few lines for magnetometric scan but also has resulted in a severe noise in the western part of the map following the collection and analysis of data. The noise was caused by negative effects of iron existing in the signboard.



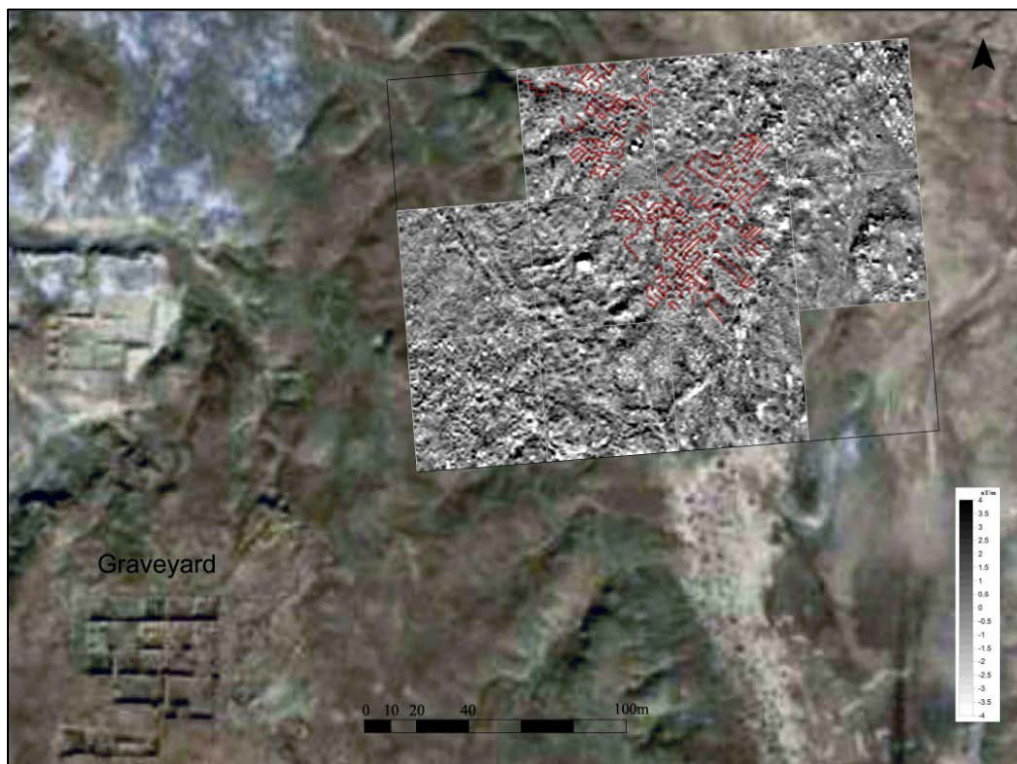
Map 26. The magnetic map of S7 (Right), location of the square on the gridding (Left)



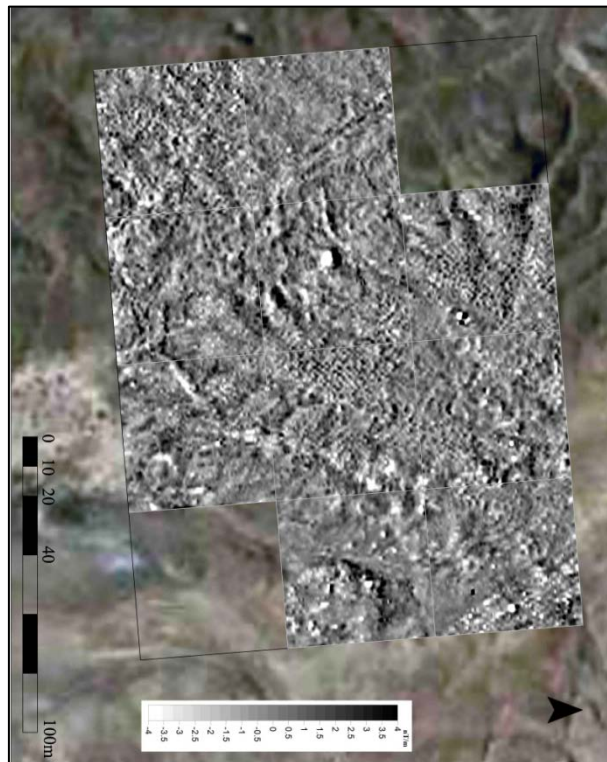
Photo 10. Location of S7 and positions of the signboard and bench mark number 1 south of the monumental building of Shahr-i Sokhta

Scanning the potential site of the cemetery

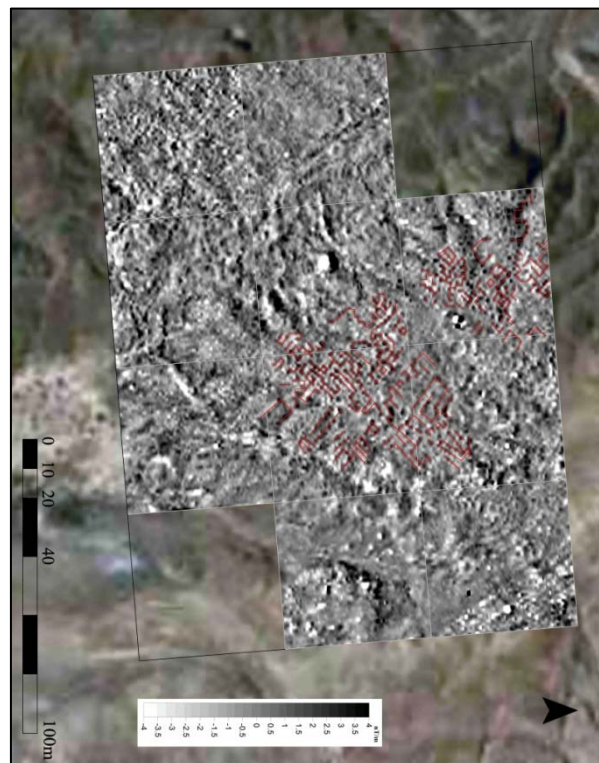
This part of the region under study is on southwestern part of the map. The ground distance of the southernmost square from the excavated cemetery is about 60 meters. In the first chapter, three 50 by 50 meters squares of this part were scanned and after making certain the existence of anomaly in this part, about two hectares of the part was magnetically scanned and formerly scanned squares were re-scanned for good measure. On the magnetic map several potential graves with a series of highly regular structures are seen which shows that probably the graves had special significance. In some parts the scar of graves are seen on the surface. Anomalies of potential graves appear as black dots on the magnetic map. The highly regular structure seen on the map attests that if this part is the continuation of the cemetery of Shahr-i Sokhta, it contains very important graves but for good measure, pilot soundings must be done.



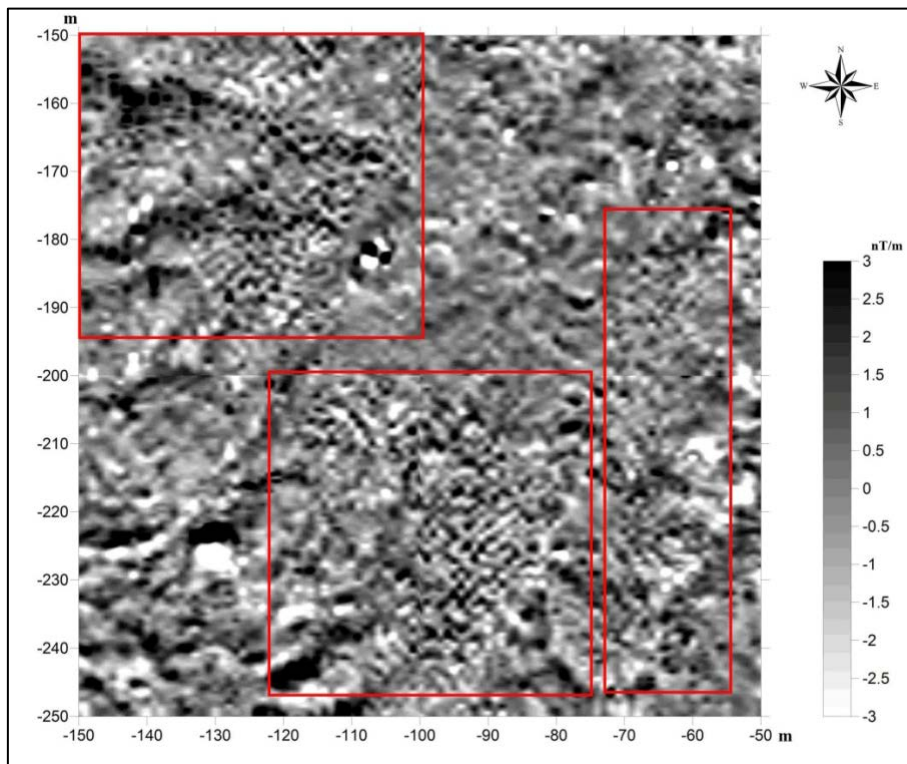
Map 27. Magnetic map of possible location of the northern cemetery and its position relative to the cemetery (Basic aerial photo from Google earth, 2012)



**Map 28. Magnetic map of the possible location of the northern cemetery
(Basic aerial photo from Google earth, 2012)**



**Map 29. Magnetic map of the possible location of the northern cemetery and the outlines of structures revealed on it
(Basic aerial photo from Google earth, 2012)**



Map 30. Magnetic map of part of the possible location of the northern cemetery showing orderly structures and anomalies of potential graves as black spots on the picture



Photo 11. Part of the potential area of the northern cemetery under magnetometric scan



Photo 12. Part of the central area of Shahr-i Sokhta under magnetometric scan



Photo 13. Method of magnetometric scan in the potential northern cemetery of Shahr-i Sokhta



Photo 14. Method of magnetometric scan in the central part of Shahr-i Sokhta



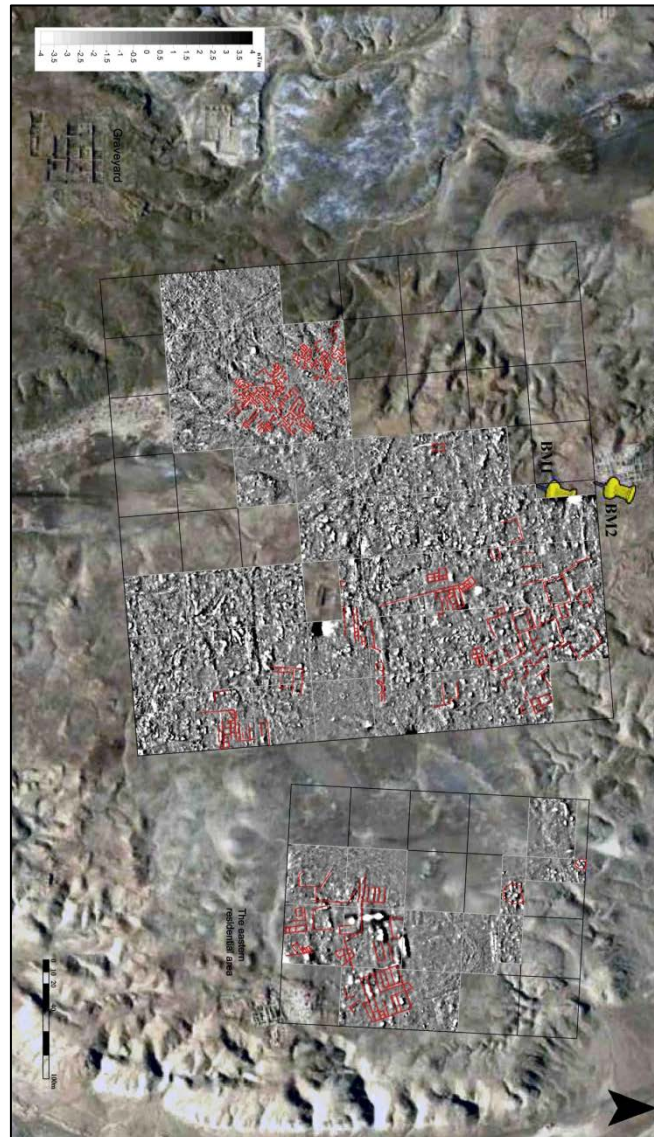
Photo 15. Method of magnetometric scan south west of the monumental building of Shahr-i Sokhta

Future outlook

Results obtained from magnetometric scan in the central part of Shahr-i Sokhta prove that more usage can be made of the magnetometric method at the ancient site. Considering the approximately 151 hectares extent of Shahr-i Sokhta, gathering information from the entire area by excavation requires a lot of time. But using magnetometric scan at the site can help finding the location of potential architectural structures buried in Shahr-i Sokhta at the soonest time possible which greatly helps archaeologists in planning for preservation and conservation of the site. Based on results obtained, continued magnetometric scans in the southern part of the scanned grid as well as west of burnt palace can have significant results. The magnetic map should be completed in the central part and scan in parts of the industrial area without geophysical limitations can contribute to further identification of this major site of Bronze Age by archaeologists. Additionally, such a scan can be used for identifying properties buried in nearby hills of Shahr-i Sokhta.



Map 31. General magnetic map of the magnetometric scan performed in Shahr-i Sokhta in 2012
(Basic topographical map from the archives of Base of SIS)



Map 32. General magnetic map and outlines of structures manifested on it from the magnetometric scan performed in Shahr-i Sokhta in 2012 (basic aerial photo from Google earth, 2012)

Appendix V: Slides of Shahr-i Sokhta



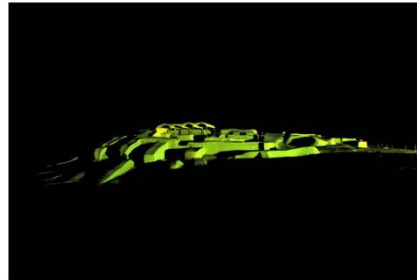
Kakh-i Sokhta (1)



Kakh-i Sokhta (2)



Kakh-i Sokhta (3)



Kakh-i Sokhta (4)



Kakh-i Sokhta (5)



Kakh-i Sokhta (6)



Graveyard (1)



Graveyard (2)



Graveyard (3)



Eastern Residential (1)



Eastern Residential (2)



Eastern Residential (3)



Eastern Residential (4)



Eastern Residential (5)



Monumental (1)



Monumental (2)



Monumental (3)



Monumental (4)



Monumental (5)



Pottery (1)



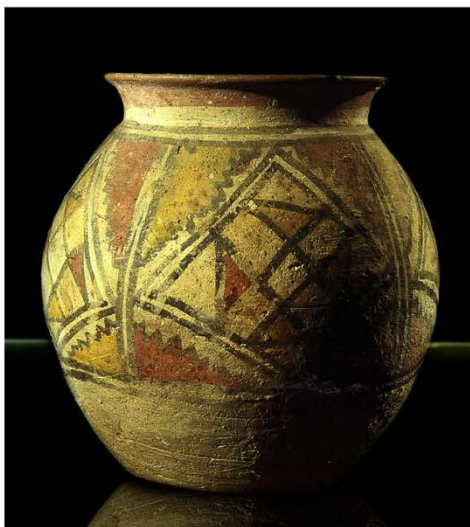
Pottery (2)



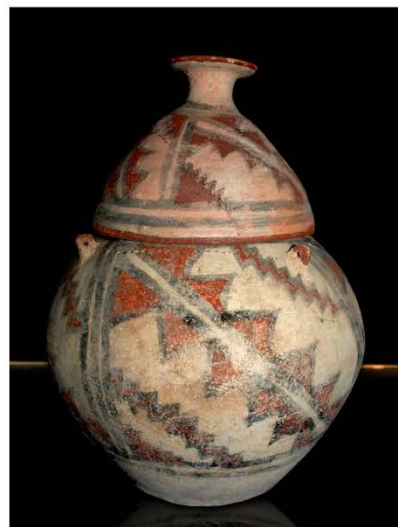
Pottery (3)



Pottery (4)



Pottery (5)



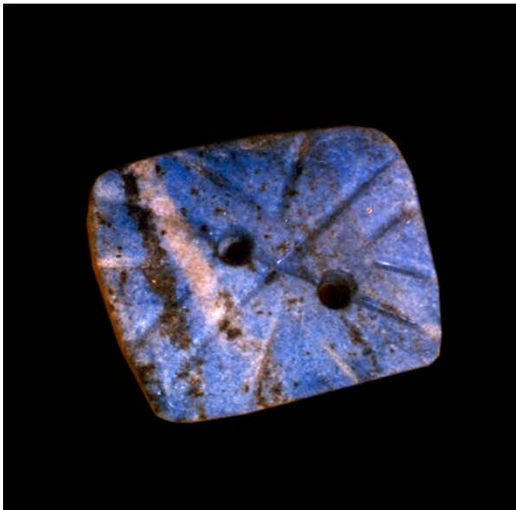
Pottery (6)



Seal (1)



Seal (2)



Seal (3)



Seal (4)



Jewellery (3)



Jewellery (4)



Figures (1)



Figures (2)



Figures (3)



Figures (4)



Stone Tools



Stone Vessel



Textile



Mat Weaving

ICOMOS

INTERNATIONAL COUNCIL ON MONUMENTS AND SITES
CONSEIL INTERNATIONAL DES MONUMENTS ET DES SITES
CONSEJO INTERNACIONAL DE MONUMENTOS Y SITIOS
МЕЖДУНАРОДНЫЙ СОВЕТ ПО ВОПРОСАМ ПАМЯТНИКОВ И ДОСТОПРИМЕЧАТЕЛЬНЫХ МЕСТ

H. E. Mr Mohammad Réza Majidi
Ambassador, Permanent Delegate
Permanent Delegation of the Islamic
Republic of Iran to UNESCO
Maison de l'UNESCO
1, rue Miollis
75732 PARIS Cedex 15

Our Ref. GB/MA 1456

Paris, 25 September 2013

World Heritage List 2014 Sharhr-I Sokhta (Iran)

Dear Sir,

ICOMOS is currently assessing the nomination of Sharhr-I Sokhta as a World Heritage site and we thank you for your cooperation with the organization of the technical evaluation mission.

We would like to ask for clarifications with regard to a number of aspects relevant to the nomination.

Therefore we would be pleased if the State Party could consider the following points and kindly provide additional information:

1. Could the State Party provide plans and details of the Craftsmen Quarters shown on Map 2-16, p.47 of the nomination dossier, together with evidence of pottery production, kilns etc.?
2. Could the State Party provide a more detailed overview map showing the nominated property and buffer zone boundaries in relation to the locations mentioned on pp. 8-9 of the Executive Summary (police station, Houzdar district, Moch castle, asbad, Qale Rostam Village), and also labelling the lakes and rivers?

ICOMOS has no obligation to contact States Parties during the evaluation process. However, with a view to being as transparent as possible, ICOMOS has agreed to approach States Parties in specific cases. This does not prejudice the ICOMOS recommendation on the nomination and should be considered as preliminary information. It also does not prejudice the World Heritage Committee's decision.

We would be grateful if you could provide ICOMOS and the World Heritage Centre with the above information by **28 October 2013**.

We thank you in advance for your kind cooperation.

Yours faithfully



Regina Durighello
Director
World Heritage Unit

Copy to Dr Mohammad Hassan Talebian
Mr Masoud Alavian Sadr, ICHHTO
UNESCO World Heritage Centre



Islamic Republic of Iran
Iranian Cultural Heritage, Handicrafts & Tourism
Organization-ICHHTO
Deputy of Conservation, Revitalization and Inscription

Cultural Heritage, Handicrafts &
Tourism Organization, Azadi av.
Tehran, Iran,
P.O. BOX: 13445-719
Tel. # +98-21 66035290
Fax # +98-21 66035295

Reference: 882/50/3133
Date: 21 October 2013

In the name of God

Ms. Regina Durighello
Director
World Heritage Unit
ICOMOS

***Subject: Evaluation of the nomination of "Shahr-i Sokhta"
(Islamic Republic of Iran) for inscription on the World Heritage List***

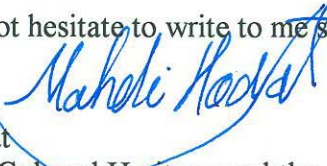
Dear Ms. Durighello,

Thank you very much for your letter of GB/MA 1456 dated 25 September 2013 concerning additional information with regards to the nomination dossier of the **Shahr-i Sokhta** proposed to be enlisted in the World Heritage sites. Please attached find a detailed report concerning the enquiries made. However I would like to briefly react on the questions also here as the followings:

- 1- As for the first question please note that, although the industrial Zone of Shahr-i Sokhta covers an area of about 6 ha but just a small part of it has been excavated. In the autumn of 1972, the excavations, conducted by M. Tosi, has revealed a center for the intensive working of lapis lazuli and, to a lesser extent, of cornelian and turquoise that the report of these excavations have been attached. For more information please kindly find the details in the attached report and pdf. formats of the excavation reports.
- 2- In response to the second enquiry, please kindly refer to the annexed detailed report; the location of the properties which have mentioned and also the buffer zone boundaries have been clarified in an attached map.

Finally, let me thank you once again for your accomplishments in the field of cultural heritage.

Please do not hesitate to write to me should further information be needed.

Sincerely,

Mahdi Hojat
Deputy for Cultural Heritage and the secretary for the Iran's World Heritage
Iranian Cultural Heritage Handicrafts and Tourism Organization

CC:

- His Excellency Dr. Mohammad Reza Majidi, Permanent Delegate of the Islamic Republic of Iran to UNESCO, Paris, France
- Ms. Tarja Virtanen, Director, UNESCO Tehran Cluster Office, Tehran, Iran
- Dr. Mohammad Reza Saeidabadi, Head of the Iranian National Commission of UNESCO, Tehran.
- Mr. Masoud Jalalian, Head of the Department of International Affairs, Iranian Cultural Heritage, Handicrafts, and Tourism Organization, Tehran, Iran
- Mr. Farhad Nazari, Director General, Inscription of Cultural, Natural, and Historical Heritage on Inventories, Iranian Cultural Heritage, Handicrafts, and Tourism Organization, Tehran, Iran.
- Dr. Mohammad Hassan Talebian, Head of Department for Preparation of World Heritage Nomination Dossiers, Tehran.

Islamic Republic of Iran
Iranian Cultural Heritage, Handicrafts and Tourism Organization
ICHHTO

*Evaluation of the nomination of the “Shahr-i Sokhta”
(Islamic Republic of Iran) for inscription on the World Heritage List*



UNESCO
World Heritage Convention
Tehran 2013

In the name of God

Evaluation of the nomination of the “*Shahr-i Sokhta*”

(Islamic Republic of Iran) for inscription on the World Heritage List

1- About the details of the Industrial Zone of Shahr-i Sokhta (Craftsmen Quarters) shown on map 2-16 p.47 of the nomination dossier and evidences of pottery production:

The industrial Zone of Shahr-i Sokhta is located in northwestern corner of the site, in the square EWK, just beside the western depressions. It covers an area of about 6 ha that just a small part of it has been excavated. In the autumn of 1972, the excavations, conducted by M. Tosi, has revealed a center for the intensive working of lapis lazuli and, to a lesser extent, of cornelian and turquoise.

Several rooms have been found during the excavation of this area. The excavation of the rooms and the flotation of all the earth fill in the excavated rooms allowed the recovery of a huge quantity of lapis lazuli waste and of a certain number of finished beads as well as beads broken during the various working phases, in close association with a good number of microlithic implements hitherto unreported among the material found on the surface or coming from excavations previously carried out in various zones of Shahr-i Sokhta ([Piperno and Tosi 1973](#)).

About 200 microliths were found here as well as more than 2 kilograms of lapis lazuli wasters from various stages of working process, ranging from rough blocks to finished beads and pendants. Microscopic analysis of all the implements associated with the lapis lazuli wasters has revealed not only traces of wear in the tips of the elongated borers due to their rotation but also numerous patches of lapis lazuli powder adhering to the small retouch scars. In one case, microscopic traces of cornelian were found on the tip of a borer fragment ([Biscione et al. 1974](#)).

So far 69 implements (about 35%) out of the more than 200 recovered have been found to bear traces of lapis lazuli. This is a fairly significant proportion if it is borne in mind that

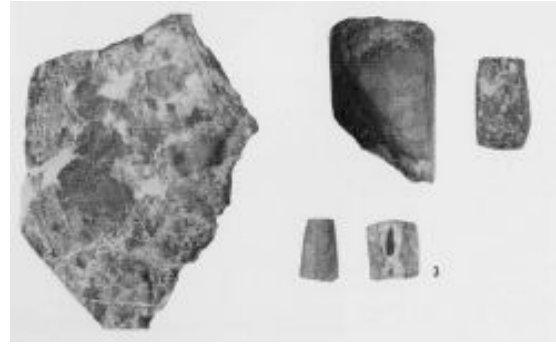
during flotation a large number of the implements may have had the small traces of powder adhering to their surfaces washed away by the water.

According to archaeological investigation in the Industrial Zone, following constants have been found: on several elongated borers the lapis lazuli powder regularly covers the distal extremity and is often present over the whole length of the working part of the implement; on short shoulder borers the powder is concentrated mainly on both the side notches; in other cases it is found on the two faces of the implement on a level with the notches themselves and the small borers. Less frequently it is found on the borer tip itself. The impression given is that these implements were not intended to be used for drilling but were more probably related to a preceding phase of the manufacturing.

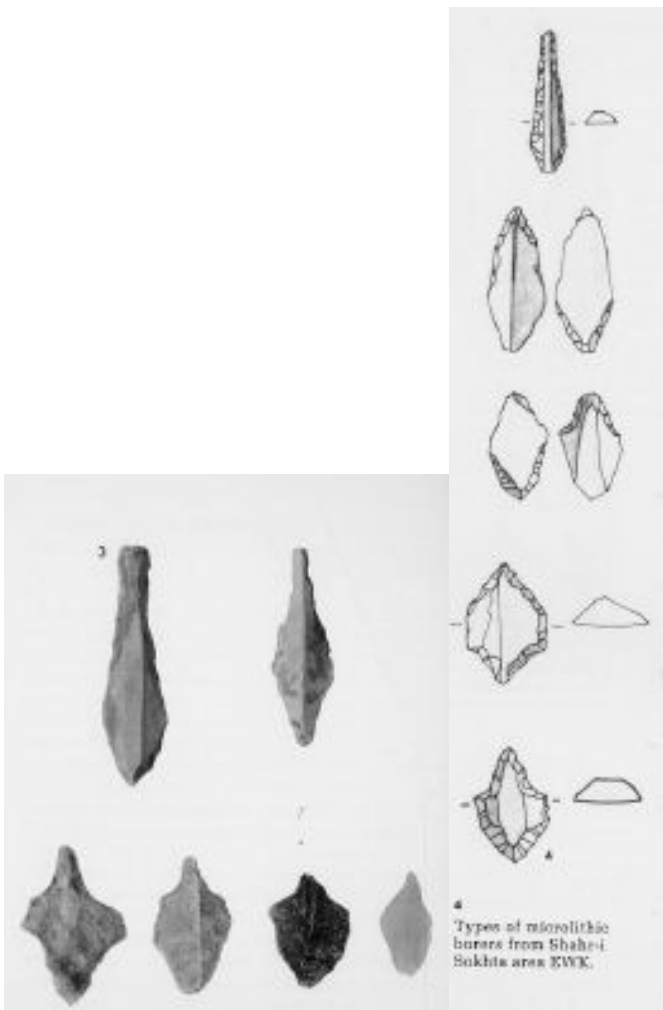
The technique used in working the lapis lazuli is much elaborated. In order to extract the purest cores of lapis lazuli from the calcite block enclosing it a groove not more than 1 mm deep was made with triangular or trapezoidal flint microblades. The incision lies often just between the lapis core and the cortex of the block. Its purpose was to weaken the block and to allow the desired piece to be removed by means of a direct or an angular blow which separated the two parts almost straight. The surface of the block was polished before the incision was made and sharply contrasts on the unfinished wasters with the rough fracture plane. Once freed from the impurities the smaller block thus obtained could be shaped as a bead by means of successive grooving, blowing and polishing. The last and most delicate phase for the production of beads was drilling and required the use of tiny borers as some of the holes are no more than a millimeter in diameter.

The same association between lapis lazuli and the microlithic industry has been found in a number of tombs, e.g. G. 12 which probably represents the tomb or the offering of a stone-cutter ([Biscione et al. 1974](#)).

All the images without reference ([after Piperno and Tosi 1973](#))



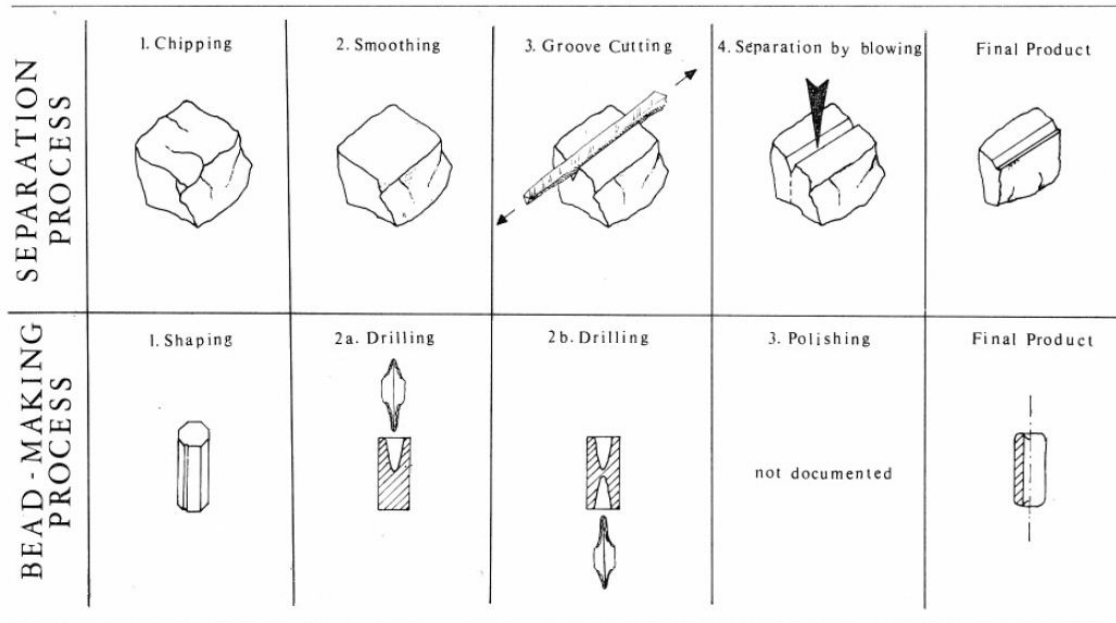
General view of excavation in the Industrial Zone Lapis lazuli core with beads in various phases of production



Stone implements used for manufacturing of lapis lazuli beads

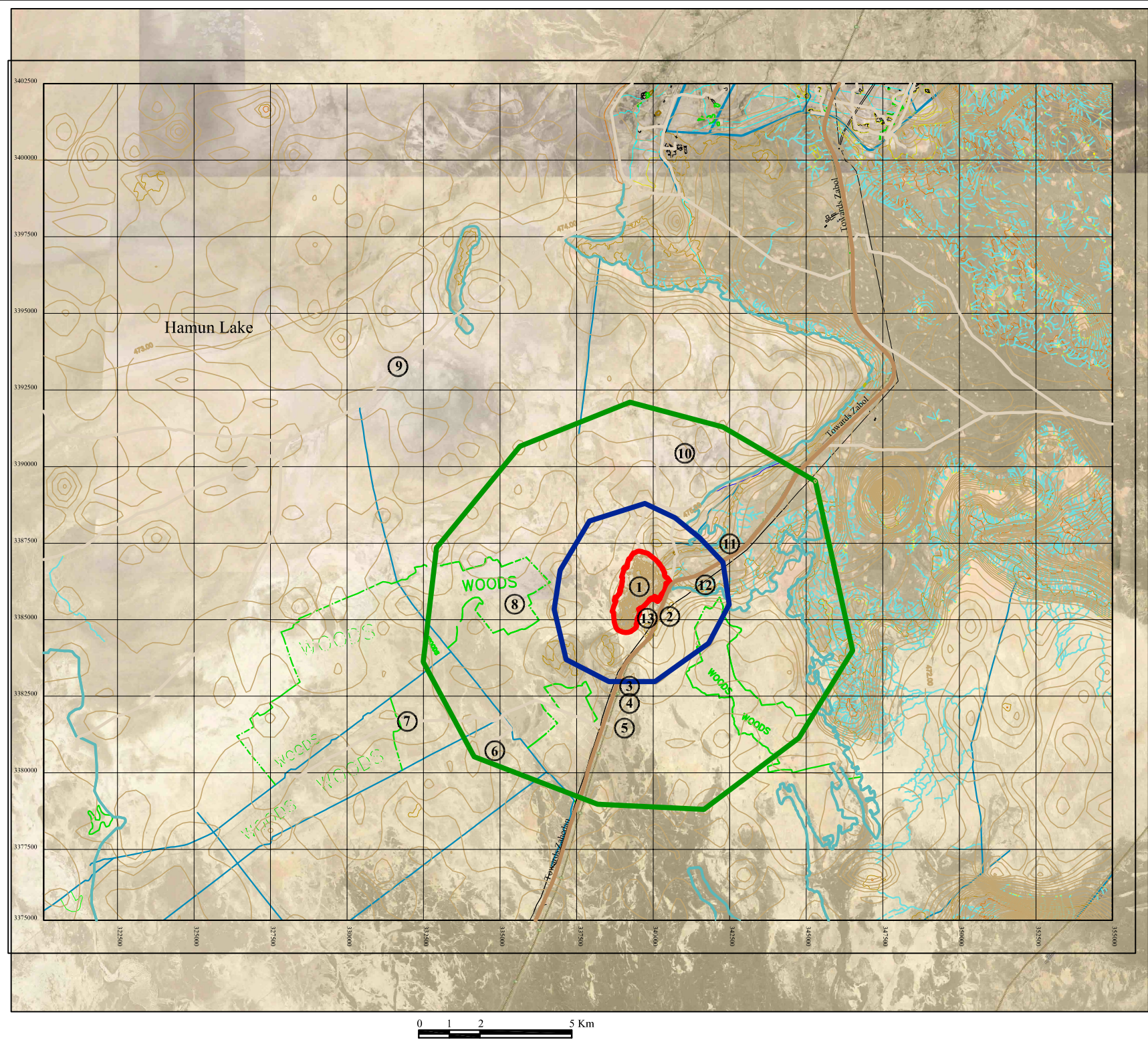


Perforation of a bead by means of a borer



Different phases showing the manufacturing process of lapis lazuli beads at Shahr-i Sokhta based on the data obtained from the Industrial Zone excavations (after Tosi 1974)

- 2- **About the more detailed overview map showing the nominated property and buffer zone boundaries in relation to the locations mentioned on pp.8-9 of the Executive Summary, please find the details in an attached map.**



1-Archaeological Site of Shahr-i Sokhta



2-Research Base



9-Hamoun Lake



9-Hamoun Lake



7-Qal'a-e Rostam (castle)



6-Machi castle



6-windmills (Asbad)

Iranian Cultural Heritage, Handicrafts & Tourism Organization (ICHHTO)

Shahr-i Sokhta

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Landscape zone

LOCATION

Legend

1	Archaeological Site of Shahr-i Sokhta
2	Research Base
3	Police Station
4	Research Missions & Students Dorm
5	Brick Kilns
6	Hauzdar basin, Machi castle and windmills (Asbad)
7	Qal'a-e Rostam (castle)
8	Brick Kilns
9	Hamoun Lake
10	Village of Qal'a-e Rostam
11	Road toward Village of Qal'a-e Rostam
12	Water Pumping Station
13	Emergency & Fire Station

Geographical Coordinates of the Nearest Second

Point	N	E
M	61° 22' 30"	30° 30' 39"

Geographical Coordinates of the Landscape

LEGEND

Landscape Zone	
Buffer Zone	
Core Zone	

NO: I	Date: 2012
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Base Maps

Reference: Cultural Heritage Base of Shahr-i Sokhta

File name: Shahr-i Sokhta / Base / www.Shahr-i-sokhta.ir

R. BISCIONE, G. M. BULGARELLI, L. COSTANTINI, M. PIPERNO, M. TOSI

ARCHAEOLOGICAL DISCOVERIES AND METHODOLOGICAL
PROBLEMS IN THE EXCAVATIONS OF SHAHR-I SOKHTA,
SISTAN

Plates 12-40

INTRODUCTION

The excavation work at Shahr-i Sokhta in Iranian Sistan was begun by the Archaeological Mission in Iran of the Istituto Italiano per il Medio ed Estremo Oriente (IsMEO) in 1967 and has continued uninterruptedly ever since.

The purpose of the research was, and still is, to explore the most important prehistoric settlement in the region and to establish its exact position in the historical and cultural context of Indo-Iran. Very quickly, however, the importance of the finds, their excellent state of preservation and, last but not least, the economic effort made by IsMEO, have led to the research being extended so that it now takes in the entire question of human adaptation to a semi-arid territory by means of extremely complex socio-economic structures. The full-scale participation of the natural sciences in a project of this type has been of decisive importance and has not failed to influence the very methodology of the archaeological research.

The various communications presented are not intended to provide an exhaustive treatment of the various programmes being carried out but rather dwell on those that have shed the most light on the prospects and limitations of the various sectors of applied research. Because of the collective and interdependent nature of the present research work we have decided to present it in a single corpus which would thus be more complete in itself and synthetic. The short opening presentation provides the essential data concerning the site, its territory and on the methodological details of the study programme. This will be followed by an examination of: the problems of a cultural sequence which is valid in urban type settlements; the necropolis of the town; lithic technology as applied to the processing of semi-precious stones.

SEGMENTATION PROCESSES IN SISTAN POPULATION

Shahr-i Sokhta is situated at about 30° latitude N, in a territory having an arid continental climate which could easily be reduced to a desert were it not for the Hil-

mand and other, minor rivers whose land-locked deltas flow into a basin with a surface area of about 16,000 km² where they form a series of unstable swampy lakes (map). Along the arms of the delta, on the banks of the swamps and in the surrounding steppe, the prevailing environmental conditions are suitable for differentiated forms of economic exploitation capable of stimulating the division of labour and the interchange of products—two indispensable elements of which the proto-urban social aggregations of the ancient Near East were composed. A number of specialised activities, which have been confirmed by palaeontological and palaeobotanical research work, are still carried on in Sistan.

THE DELTA AREA WITH STRETCHES OF LAND IRRIGATED BY NATURAL RIVER BEDS AND BY NATURAL CANALS

This territory, which today corresponds to the northern half of Sistan was, in the third millennium B.C. situated at the extremity of a fossil delta, the Rud-i Biyaban, where all prehistoric sites appear located (fig. 1).

Following a hydrogeological mechanism which, although complex, is a fairly common one in land-locked basins situated in arid zones, the Hilmand is subject to frequent changes of direction, especially in its lower reaches.¹ During the third millennium B.C. Shahr-i Sokhta was thus situated on the northern edge of the delta while, today, it lies a good 20 km S.E. of the southernmost of the irrigated arms. The drying up of this portion of the basin has been largely responsible for the excellent state of preservation of Shahr-i Sokhta and the finds made there.

The size of the irrigation area could have been all of 50,000 ha; all the prehistoric sites dating back to periods II-IV of the Shahr-i Sokhta sequence (2900-1900 B.C.) have been located in it. It is reasonable to assume that almost the entire rural population, the decision-making centres and the capital of the region were concentrated here. The degree of demographic and economic concentration must have been high, as the population was distributed throughout the large urban agglomeration and in the villages scattered over its territory, while medium-size settlements were completely absent.²

¹ TATE G. P., *Seistan. A Memoir on the History, Topography, Ruins and People of the Country*, Part 1, Calcutta, 1910. ANNANDALE, N. Report on the Aquatic Fauna of Sistan. Geographical Introduction, *Records of the Indian Museum*, XVIII, Part 1, 1919-1921, pp. 1-16. JUX U., KEMPF E. K., Regional Geology of Sistan, forthcoming in TOSI M. (ed.), *Prehistoric Sistan I, IsMEO Rep. Mem.*, 1974. RAIKES R. L., Environmental Studies at Shahr-i Sokhta, *ibidem*.

² TOSI M., The Early Urban Evolution and Settlement Pattern, Paper read at the Seminar *Models for Archaeology, Sheffield, 13th-17th December, 1971*.

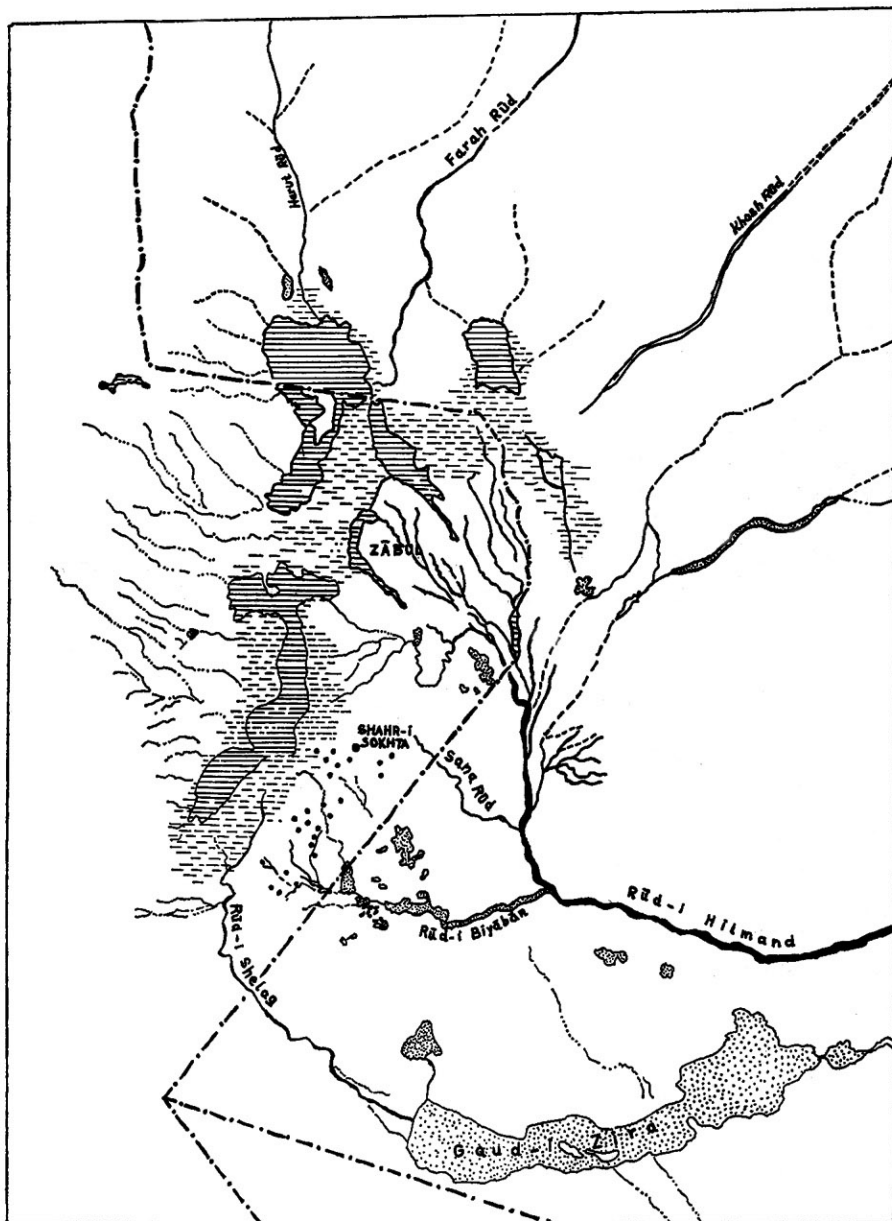


Fig. 1. Sites of the Hilmand civilization in southern Sistan. The major cluster is within the terminal branches of the Rud-i Biyaban deltaic fan.

Among the plants cultivated in this area are barley, wheat, cucurbits, grapes, dates and, perhaps, sorghum. Various kinds of tree species must have grown on the edges of fields and canals and in orchards. The wooden objects found reveal that poplar, ash, elm were in common use while tamarisk and scrap wood were used for firewood.

The town was strategically situated between the south-east edge of the terminal lake and the northernmost branch of the Rud-i Biyaban, perhaps the one which lasted longest before the final layout.

THE PREDESERTIC STEPPE

The pre-desertic steppe surrounds the irrigated area on all sides and even extends into the interior in places. Then, as also today, this territory must have only allowed of sporadic, temporary settlements in the places where the underground water came to the surface. The intensive production of sheep and goats was definitely carried out there as the bones of these animals account for nearly 60% of the total of those found in the Shahr-i Sokhta excavations. There were doubtless very close economic and kinship relations between shepherds and farmers in the delta. This interchange usually reaches its height during the harvest months, when a part of the shepherds is absorbed by seasonal work, or a little later when the fields are manured after the reaping.

It seems that 59-60% of the individuals in a flock were sheep and the remainder goats. The osteological examination reveals that the breed composition was fairly homogeneous.³

In addition to the products deriving from their specific activity, the inhabitants of the stretches of steppe could also rely on secondary activities such as hunting gazelles, as is attested by osteological evidence—something which would have been very hard for the inhabitants of towns and villages to do. At Shahr-i Sokhta, the gazelle (*Gazella subgutturosa*) accounts for barely 1% of goats and sheep, a protein supply situation which is typical of the later stages of the process of urbanisation.⁴ Besides the gazelle also bird species, such as *Perdix perdix* sp, which always are abundant, were hunted on the steppe. A secondary activity, which was nevertheless of some importance during the winter months, was gathering firewood. The latter consisted of spontaneous trees having no food value (tamarisk) as was revealed by examination of charcoal fragments found at Shahr-i Sokhta. Rather more uncertain is the relationship, if any, between the population of the settlement and the gathering of certain plants

³ Data in the course of processing kindly supplied by Dr Bruno Compagnoni, Rome.

⁴ HIGHAM, C. F. W., Towards an Economic Prehistory of Europe, *Current Anthropology*, X, 1969, pp. 139-150.

which are semi-spontaneous in arid environments, particularly *Chenopodiaceae* and *Polygonaceae*. These could be used for food, forage or medicinal purposes, and their presence at Shahr-i Sokhta is amply attested by microfunds. Their abundance makes it seem likely that they were cultivated or grew wild on the edges of stagnant pools or in periodically abandoned fields in the same area of the delta.

It is also likely that the shepherds acted as conveyors of goods in trading at regional level. This may well have been the case for flint and calcite coming from the mountainous west and south boundaries of the Sistan basin or from the Kuh-i Deshu on the middle course of the Hilmand.

These compound forms of working activity in the context of a society of specialist workers certainly allowed a wider margin of production surpluses to be obtained which could then be converted into new goods and services, as well as a certain degree of economic security. These were vital elements under the conditions of perennial instability which characterized pre-industrial states.

THE PERIPHERAL STRIP OF THE TERMINAL LAKES

More than by anything else, the Sistan countryside is characterised by the swamps of the Hamun-i Hilmand, the Hamun-i Parian and the Hamun-i Saberi. Wind erosion of the surface and the flow of water ensure that the degree of salinity is kept low in spite of powerful solar action. Even today beef production, the harvesting of native plants and the hunting of numerous bird species are carried on extensively on their shores.

The oxen belong to a small-bodied, local species, which is very resistant to drought and fatigue. Although having more constant morphological features, similar animals were also found at Shahr-i Sokhta where they account for more than 30% of all the animals found.⁴ For Bronze Age populations this animal was important not only as a source of food; this is attested by the very large number (about 5000) of unbaked clay and terracotta figurines found during the excavations (pl. 12). In the coroplastic collection, bovines account for about 80% of the figurines, followed by wild boars and by a small number of specimens of wild carnivores. The wild boar probably inhabited both the predesertic steppe and the swamp region but there are so far no specimens of it in the large osteological collection. On the other hand, there seems to be a complete absence in the coroplasty of goat and sheep figures which were nevertheless the main source of meat.

By comparison with modern times, it appears likely that the cattle-herders lived around the lakeside in rush houses built up against the animal sheds and that they com-

municated with dry land by means of rush boats (tutan). Up to 400 inhabitants live in such villages today (pl. 13).

The picking and processing of swamp plants (*Scirpus littoralis* and *Phragmites communis*) must have been no less important than it is today. This is amply attested by the finding of baskets and matting which could be made also by those members of the community who were less suited to heavy manual labour. The *Scirpus* baskets vary in size but the type of weave is uniformly coiled on round center (fig. 2). The matting was used not only for house furnishing, as is proved by the impressions left on floors and benches, but also for roofs made of alternate layers of matting and clay.

The hunting of the abundant native and migratory fauna was another major activity and, in our opinion, the products were used not only to satisfy the food demands of the local population. European travellers of last century have attested to the presence throughout the region of enormous numbers of large aquatic birds which today are found only in a few lake areas. More than 20 different species have been found among the osteological specimens collected at Shahr-i Sokhta,⁵ among which there are numerous coots (*Fulica atra*) and other aquatic birds such as the crane (*Megalornis grus*), the goose (*Anser anser*), the swan (*Cignus olor*), the duck (*Nyroca nyroca*) and the white-tailed eagle (*Halyaetus albicilla*). There were also species which could be tamed and used for hawking, such as the kite (*Milvus migrans*), or for fishing, such as the cormorant (*Phalacrocorax carbo*) and the pelican (*Pelecanus anacrotales*).

The thousands of flint and jasper arrow-heads found at Shahr-i Sokhta, as well as on the surface in the delta villages, are striking evidence of the hunting activities of the prehistoric populations. All the arrow-heads are of the foliaceous type and together, they account for about 50% of the lithic industry found.⁶

The function of birds in the ancient Hilmand civilisation was certainly not limited to hunting. Even without mentioning their possible use in hawking and fishing, as, for instance, kites and pelicans, there is no doubt that many specimens were kept for long periods in the settlements in order to begin the process of taming the more suitable species. This is proved by the thousands of egg-shell fragments found by flotation of the waste or road-filling deposits at Shahr-i Sokhta. The huge number of eggs suggested by these fragments cannot be explained in any other way.

⁵ Data in the course of processing kindly supplied by Mr Piero Cassoli, Istituto Italiano di Paleontologia Umana, Rome.

⁶ Data in the course of processing kindly supplied by Dr Grazia M. Bulgarelli, Rome and by Dr J. Lesage, Toulouse.

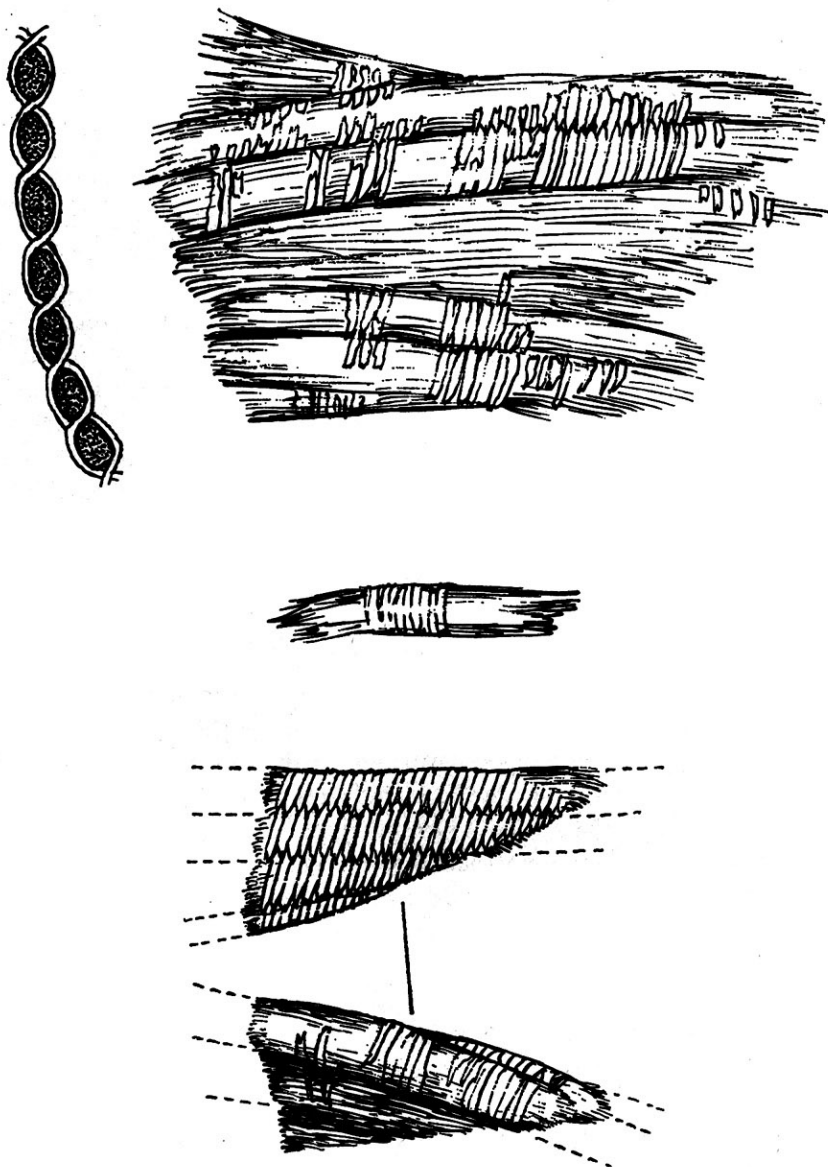


Fig. 2. Shahr-i Sokhta. Room ccx IIIa: Period II. Fragments of round *Scirpus* baskets.

RIVER STRETCHES UPSTREAM FROM THE CANALS

Here another, perhaps fulltime, activity was carried on with a high degree of technical expertise—fishing. The high food value and low cost of production makes fish the protein food par excellence of the poorer classes of an urban population. Flotation has allowed evidence to be gathered revealing that the consumption of fish at Shahr-i Sokhta during the third millenium B.C. was very high. Almost all the bones found belong to fish of the *Schizothoracinae* family, which live in mountain environments and are still to be found today in the delta where they are caught in autumn and sold in the market-place of Zabol.⁷ There might have been two main fishing techniques: one with small bronze anchors for hooking the fish where the schools congregated (dams, narrows, river bends); another with finely-woven fibre (wool?) nets with a square mesh (4 cm on the average) made with a reef knot (pl. 14).

THE TOWN

During Period II (stratigraphic phases 5-7), Shahr-i Sokhta extended over an area of more than 80 ha, whereas the earliest settlement, characterized by south Turkmenian type pottery (stratigraphic phases 9-10) probably had a surface area of about 20 ha. A good part of the population probably had nothing to do with activities connected with the production of food and raw materials and devoted their whole time to a number of trades; they were cutters of semi-precious stones, masons, smiths, weavers, potters and dyers.

The completely urban nature of Shahr-i Sokhta is revealed by the way the services are concentrated as well as by the obvious division of labour. The aerial photographs show how the surface of the settlement is clearly divided into three main zones (pl. 15a and 15b).

1. A densely built zone where the houses are grouped into irregularly-shaped insulae separated from one another by winding streets having an average width of 2.50 m. This zone extends over an area of about 50 ha along the eastern edge of the Plio-Pleistocene terrace. This zone could roughly be defined as the lower town and in it the stratigraphic sequence seems to be complete—from the earliest strata characterized by south Turkmenian pottery to the periods of the frequentation and abandonment of the Burnt Building (stratigraphic phases 0-1).

2. A rectangular zone presumably enclosed by a mud-brick town wall. It takes up the whole of the north-west corner of the site and extends over an area of about 25 ha.

⁷ ANNANDALE, N., The Aquatic Fauna of Seistan. A Summary, *Records of the Indian Museum*, XVIII, 1919-1921, Part 5, pp. 235-253.

Excavation work has revealed a sequence which is limited to the periods of expansion of the town (stratigraphic phases 4-7). Some of the more important finds (a female bronze figurine and a lapis lazuli workshop in the EWK zone) were made inside this hypothetical town wall area. Unless more extensive trial excavations are carried out it will be difficult to ascertain whether or not it was an isolated fortified citadel with respect to the lower town.

3. The necropolis has a surface area of at least 35 ha, and is situated in the south-west portion of the plain. It lies at an average height of 4 m below the level of the inhabited area. The lack of buildings has reduced the archaeological deposit to a minimum. The graves are dug in the Plio-Pleistocene clay and concentrated in areas lying close together. Of interest is the sharp separation between the town of the living and the necropolis, a phenomenon which was rather rare in the proto-urban agglomerations of the third millennium B.C.

Three depressions spread over a number of central portions of the built-up area at the same time, separating it from the necropolis. They extend over a total area of 8 ha, and could easily be collecting basins for run-off water. The existence of a composite pipe made of cylindrical ceramic elements apparently connecting one of these depressions to the lower town would seem to confirm this hypothesis.

The typical dwellings so far established for Periods II—III (stratigraphic phases 4-7) in the lower town have an average area of 120 m² each and are divided into 6-8 rooms (pl. 16). Their plan is more or less rectangular although somewhat irregular. Only one room in each house is given over to cooking food for which an ellipsoidal oven is used, although about half the rooms have a square-bench hearth in the centre. One or two outer stairs link the street to the terrace of the building. Functional structures—mill bases, benches, niches, etc.—help to make the residential unit as a whole more comfortable. All the constructions are built of regular mud-bricks (40x20x10 cm) and the plaster-work and floors are made of the same material. Only an insignificant amount of straw has been added to the clay. The roofs were flat and the roofing material consisted of poplar trunks laid parallel and often covered with matting (fig. 3).

These dwellings were probably single-family units in which several generations lived together. The percentage space used for storing food and other goods was very small—perhaps less than 10%. This points to the existence of a centralized system of distribution and stockpiling of food surpluses; such a hypothesis would be indirectly confirmed by the establishment of the existence of the supposed citadel. For the moment, the only storehouses found in the lower town consist of rooms of about 2-3 m²

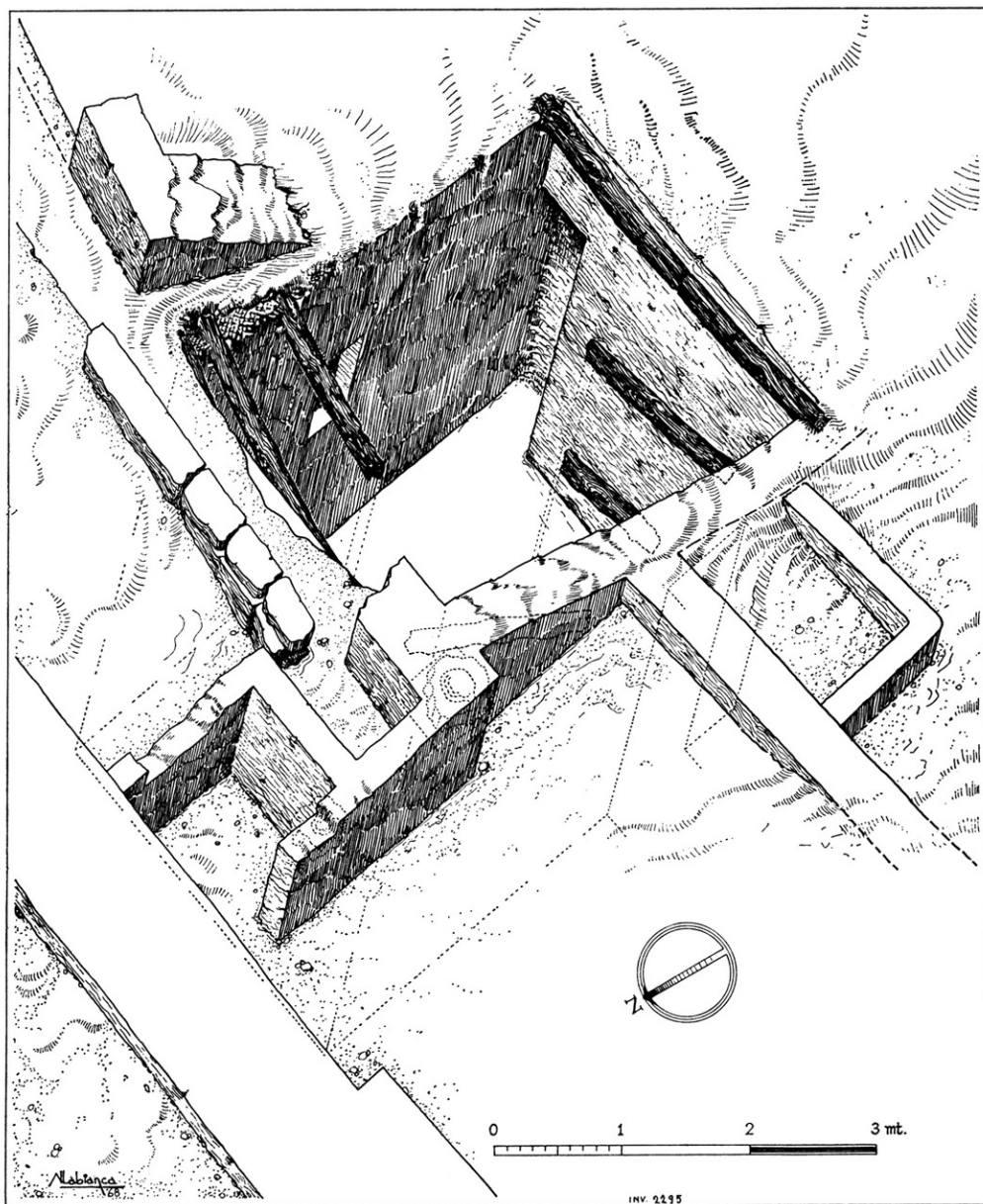


Fig. 3. Shahr-i Sokhta. Period II. Isometrical view of room LXIX, detailing location of roof beams.

situated on the outer perimeter (XLVII), under a staircase (CCXIIIa) and in an out-of-the-way corner of the house (XXXIX) (pl. 17).⁸

Every urban agglomeration must solve a number of specific problems on which the very life of its inhabitants depends—water and food supplies, disposal of liquid and solid refuse, burial of the dead, forms of religious worship—and at Shahr-i Sokhta all these services were removed from the family level and concentrated at urban or district level.

As a direct consequence of the topographical level, artisanal specialisation leads to the concentration of specialists in certain sections of the territory or urban texture. This is a need which corresponds to functional and economic requirements. Some activities are even decentralised with respect to the urban agglomeration according to the source of raw materials supply and the degree of environmental pollution they produce.

In prehistoric Sistan pottery production was, for a certain period of time, concentrated in a section to the north of the town, between the "citadel" and the lower town, or in villages strategically located near the delta watercourses. At Tepe Rud-i Biyaban 2, for instance, which is situated 29 km to the south of Shahr-i Sokhta, no less than 50 kilns were in operation during Period III (stratigraphic phase 4). The factory probably supplied villages in the area lying along the Abdali branch of the prehistoric delta within a 15 km radius. The kilns are of the downdraught type which are capable of producing a uniform temperature of 1000-1100°C.

Specialisation, technology and careful division of labour during the production cycle were certainly stimulated by a growing demand for higher quality goods and services throughout the third millennium B.C. The result was good quality products which, as time went by, tended to become more standardised and functional. Pottery is the first product to undergo this typological evolution which leads to the gradual abandonment of the Period I painted decoration and the introduction of the fast wheel on which, by Period IV, the whole ceramic production is shaped. The wasters at Tepe Rud-i Biyaban 2 are evidence of an intermediate phase in which pottery is shaped on the wheel only to a minor extent, while painted decoration is reduced to a dozen or so stereotyped and highly cursivized motifs.

The working of local stones (calcite) or imported ones (chlorite, lapis lazuli, turquoise and cornelian) was also centralised at various levels. The imported stones are found almost exclusively at Shahr-i Sokhta and are practically absent in the villages where, however, calcite is plentiful (Tepe Qalat'-i Gird is the only settlement on the

⁸ TOSI, M., Excavations at Shahr-i Sokhta, Preliminary Report on the Second Campaign, September-December, 1968, *EW*, XIX, 1969, pp. 283-386.

surface of which lapis lazuli fragments have been found). Tepe Graziani, a village with an area of about 2 ha, 5 km to the east of Shahr-i Sokhta, has provided us with a huge number of unfinished cylindrical calcite beads as well as fragments of statue work. Also the micro-implements used for semi-precious stone working appears to have been concentrated in areas included in the urban texture.

There is every indication that trading in semi-precious stones was controlled entirely within the town itself and that only a small proportion of the finished product was assigned to the domestic market.

THE PERIPHERAL DESERT DEPRESSIONS

Large sections of the Sistan basin are today little more than desert plains and it is likely that several of them already were in these conditions as early as 5000 years ago. Along the southern border flows the Rud-i Shelagh which conveys the overflow from the Hamun-i Hilmand into the Gaud-i Zirrah. It is dry for long periods at a time and its banks are not suitable for permanent settlement. The same is true for the Gaud-i Zirrah depression whose only economic utility was probably represented by its extensive salt deposits. Not even the Dasht-i Zirrah plain—a kind of diaphragm between the Hilmand and the Gaud-i Zirrah depression—lent itself to human settlement as it was impossible to irrigate its dry surface because it lay too high above the level of the water flow. The course of the Rud-i Biyaban was, however, connected with the Gardan Reg depression, which is now completely filled with sand dunes running NW-SW. This basin lies between the southernmost branch of the sub-fossil delta and the final section of the Shelagh. According to G. H. Dales the third millennium settlements here were sparse but always possible.⁹ When there was no sand it was doubtless a suitable land for intensive grazing as it would have had a good plant covering associated with halophytic species. The presence of plains covered completely with copper scraps and casting cut-offs associated with pottery from Shahr-i Sokhta III-IV (stratigraphic periods 1-4) suggests a concentration of metal-workers in an open-air zone near the well-known copper deposit of Kuh-i Malik Siah.

The Hilmand Civilisation in southern Sistan thus shows a complete picture of adaptation to the environment by the socio-economic structures, which pursued an optimization of the resources available in the territory by means of extensive and detailed division of labour. This complex social structure developed over a period of about 1000 years (2900-1900 B.C.), reaching its maximum expansion during the phase of long-

⁹ DALES, G. F., Prehistoric Research in Southern Afghan Seistan, *Afghanistan*, XXIV, 1972, pp. 14-40.

distance trading in semi-precious stones. However, exploitation of natural resources and the long-distance trading are probably two phenomena which exist in their own right as the agricultural settlements of Sistan also extend into Periods III and IV when lapis lazuli virtually disappears from the Shahr-i Sokhta finds.

THEORETICAL BACKGROUND

The study of a proto-urban society like the one which flourished in south Sistan during the third millenium B.C. entails a detailed investigation of the method of adaptation to the natural environment and the development of the technical means required. The contribution made by the natural sciences has thus been organised as in the scheme which follows (see tabel on next page).

The contributions made by the Natural Sciences are thus ideally arranged according to an order of constant complexity from the general (territory) to the particular (human artefacts). Proceeding from left to right the scientific fact tends gradually to become rarefied until we reach the province of the social sciences where it becomes the object of considerations of a speculative nature. However, the direct contributions made by natural sciences and archaeology take methodological priority over the combined contributions of an interdisciplinary nature.

The scheme was drawn up for Sistan where the conditions prevailing in the state of preservation of the finds are such that studies can be carried out on materials which, elsewhere, are documented only to a small extent, or not at all, such as cloths, wood, insects, dung, eggs and other categories of finds that have so far occupied very little place in archaeological collections.

In this case geomorphological and hydrological data are of primary importance. Tiny holocenic mutations in the natural environment have a great effect in a land-locked, semi-arid delta exposed to peripheral tectonic corrugations such as the Hilmand delta. The geology of the region is so complex that the archaeological evidence is of great interest also to the geomorphologist. On the other hand, the diagram could easily be read from right to left in such a way as to show the amount of specialised information provided by archaeology to each branch of the natural sciences involved in the research.

It is not our intention here to put forward our idealized hypothesis for interdisciplinary research but rather a working plan which gives archaeology a definite place in the scientific field both as a method of finding and analysing dates and as an objective made up of projects of great political and financial importance.

EXCLUSIVE CONTRIBUTIONS OF THE NATURAL SCIENCES			COMBINED CONTRIBUTIONS OF THE NATURAL SCIENCES AND ARCHAEOLOGY	EXCLUSIVE CONTRIBUTIONS OF ARCHAEOLOGY	COMBINED CONTRIBUTIONS OF ARCHAEOLOGY AND SOCIAL SCIENCES
Geology and Geophysics	Geomorphology		Settlement patterns	Cultural sequences, typology and chronology	Fragmentation of population according to optimal exploitation models
	Climate	Hydrology		Urban and architectural structures	
	Botany	Vegetation		Techniques of irrigation and landscape adaptations	
Zoology	Fauna	Agriculture and harvesting of spontaneous plants		Techniques of processing wood, fibre, bone and of implement typology	Food
		Hunting and grazing			
		Parasites			
Physical Anthropology	Anthropometric features		Chronological and spatial distribution	Clothing	Social differentiation
	Population pathology				
Mineralogy and Goods Technology	Local resources and their exploitation		Technology	Typological classification and functional analysis	Organisation of work
					Forms of worship and ideology

EVIDENCE OF SPIRAL STRATIGRAPHY IN THE SHAHR-I SOKHTA SEQUENCE

The researches carried out in recent years in urban centres of the Near and Middle East have shown that it is necessary to revise the traditional idea of urban stratigraphy, transforming it from an essentially static conception into a more dynamic and elastic one. The obvious remark that in different areas of an urban centre stratigraphy takes on a different appearance, with the presence or absence of various phases, with different types of stratifications and fillings, with variations in percentage of presence of various classes of finds, has laid the basis for a set of deductions on changes in the socio-economical structure of the city itself.

The presence of gaps in the sequence of an urban area often implies a complex series of concomitant social, economic and political facts that have led to the elaboration of a new, spiral model of the development of a city. These reasons are even more important for the concentration of a determined socio-economical activity (or group of activities) in a well-identified area of the city and for its possible shifting to another area.

The alternation of various strata with different distinctive features immediately gives us data on the use of a certain area. At Shahr-i Sokhta the main types of deposit are three: 1) fillings of rooms, which formed the base for the raising of structures; 2) street deposits; 3) garbage dumps.

Fillings of rooms were formed by heaps of potsherds or whole pots (pl. 18), that could have been used also as a draining device and kept away small rodents, or by loose earth dumps, rich in wastes of every type and origin, or by a mixture of the two types of fillings. In one case a filling has been found formed by clay with only a small amount of finds.

The two other types of deposits, the one of streets and the other of garbage dumps, are similar (pl. 19, pls. 21-22). In both cases the deposits are incoherent, characterized by brown lenses and thin strata, very rich in organic and waste material with a horizontal trend in streets alternating with ashes and charcoal lenses. Garbage dumps are obviously the richest deposits in organic material. The one in the upper part of sector XEU has been studied by means of extensive flotation, and it has given us a remarkable set of data of the greatest importance for the study of economy and alimentation at Shahr-i Sokhta. In fact, due to the exceptional preservation, not only seeds, but even insects, pests and parasites have been recovered (pl. 22).

The three types of deposit are often found alternating in the same area, so that in the 1972 excavation we saw the case of a street that was later covered by buildings. Very close by abandoned houses had been covered by a garbage dump.

At Shahr-i Sokhta, as in other urban sites, the stratigraphy is never fully represented in a single excavation, and it must be reconstructed from the data of trenches in various parts of the city, often far apart. Shahr-i Sokhta has clearly shown the evidence of abandonments and shiftings in different areas of the inhabited part of the city, with later reoccupations of former areas. This is shown clearly by the stratigraphy of the area of the Burnt Building. Six out of eleven phases for the Shahr-i Sokhta sequence are represented there. The most ancient phases and four intermediate ones are lacking, but the last two phases, which have not been found in any other excavations, are represented. It seems that the city had its beginnings in the south-east area, in excavation X; probably a first expansion led to the occupation of the area of the Burnt Building; with a further expansion the city covered its maximum surface, as we see from excavation E in the north-west corner located about a mile to the west. Later on, the area of the Burnt Building was abandoned, while excavations X and E were still occupied; then these two areas were also abandoned (and in excavation X has been made the above-mentioned garbage dump), and then the area of the Burnt Building was inhabited again, without any trace of occupation in other excavations. To obtain these data we had to take into account the evidence from four excavations scattered all over the surface of the tepe, as nowhere did we find more than six phases, either in succession or with gaps.

The presence of this type of evidence has led a group of American archaeologists, among whom we must mention R. McC. Adams and C.T. Young Jr., to propose a new model of urban expansion which is no longer a disordered or regular one, but has a spiral-shaped expansion, with a continuous shift of the inhabited portion of the city, as regards both residential and industrial areas. Sometimes even the centre of power, whether palace or temple, was moved.

As we have already said the evidence gathered at Shahr-i Sokhta by means of excavations, surface collections, study of aerial photographs, seems to fit this model. In Period I (now phases 10-8 of the new sequence) (pl. 20) the city was located in the south-western part of the tepe; its maximum expansion is in Periods II-III of the old sequence, now phases 7-4, towards the north-western part of the tepe, where a testing trench has shown the absence of Period I. In Period IV, now phases 1-0, the city is again in the south-western part of the mound. During the phases of abandonment the uninhabited areas were used for waste disposal, something that has always been a big problem for all the cities.

This type of shifting still survives among the Arabs of the marshes in southern Mesopotamia. They have a system of binary settlements, with a winter village and a

summer one, not far from each other. The moves were justified by considerations of climate and hygiene, and by the nuisance caused by insects and pests.¹⁰

We have made some remarks on the new sequence of Shahr-i Sokhta. On the basis of the data collected in the 1972 campaign it has been possible to elaborate a new sequence based on the building phases, more articulated and precise than the sequence previously in use, which was based on the coefficient of variation of pottery types. In fact the artificial fillings have often been made with materials already used for previous fillings, and all this has sometimes led to artificial association among artifacts used in different phases of the life of the city. The use of the new sequence, which is more objective and less prone to the possibility of chance associations, will give us the possibility of following exactly and precisely the changes in the material culture of Shahr-i Sokhta, and of relating them back to the succession of building phases. We are now faced with the problem of elaborating a precise stratigraphy of the city. This can be done in a way that might seem heretical. The exact stratigraphy of Shahr-i Sokhta can be determined on the basis of data given by small villages surrounding the city, as they do not show the sequence of fillings and re-utilisations, but rather the abandonments and shiftings to nearby areas. This can be seen at Tepe Rud-i Biyaban, the pottery-kiln site showing only phase 4 of Shahr-i Sokhta sequence, and at the villages of Tepe Graziani and Tepe Rubah-i Kuchik, which are not far from each other. The settlement of Tepe Rubah-i Kuchik begins as soon as Tepe Graziani is abandoned. Other elements are given by the necropolis of Shahr-i Sokhta, with its safe associations. It therefore became evident that integrated research must be carried out between city, villages and necropolis.

The model of spiral expansion finds further proof in other cities. At Altyndepe, in southern Turkmenia, occupation, abandonment and re-utilization of an urban area happen in the same period, Namazga V. Between 2200 and 1800 B.C. the western part of the city was inhabited, abandoned and eventually used as a burial ground. It is not exactly the same re-utilization as Shahr-i Sokhta, but in both cases the purpose of keeping away decomposing organic matter is very clear.¹¹

The excavations of Kish, in the twenties and early thirties, with the data gathered in recent years by means of a systematic and effective collection of surface materials, have allowed the complex sequence of occupations, abandonments and re-occupations

¹⁰ ADAMS, R. MCC., NISSEN, H. J., *The Uruk Countryside, The Natural Setting of Urban Societies*, Chicago and London, 1972, pp. 22-23.

¹¹ ŠČETENKO, A. JA., *Raskopki na Altyndepe v Južnoj Turkmenii, Kratkie soobščeniya Instituta Arheologii*, 1968, pp. 39-42, fig. 13.

EXCAVATIONS OF SHAHR-I SOKHTA
THE GENERAL STRUCTURAL AND CULTURAL SEQUENCE AS EVIDENCED BY THE RESULTS OF THE FIFTH CAMPAIGN (Sept.-Dec. 1972)

PHASES	RYL	House of Stairs	House of Plc	House of Buttresses	House in XHD/XHE	EW	Burnt Building	GRAVEYARD			BV	Correspondencies with the first chronological scheme		
								LS	IR	IP				
0-Squatter settlements							X					IV		
1-Phase of Burnt Building							X					UNRECORDED		
2-Phase of Brick Platforms				Abandonment							X	UNRECORDED		
3-Phase of Garbage Dump				X	X		GAP					III		
4-Phase TRB 2		Erosion?		X	~	X					GAP	III		
5-Phase of CCLIV/CCLVII	X	X	X	X	~	X	X			X	X	III		
6-Phase of House of Buttresses	X	X	X	X	~	X	X			X	X	Natural soil	II	LATE EARLY
7-Phase of Burnt Plasters	X	X	~	X	~	X	X			X			UNRECORDED	
8-Phase 2 in room XX	GAP	X	~	~	~	Natural soil	X	X					UNRECORDED	
9-Phase 3 in room XX	GAP?	X	~	~	~	Natural soil	X						I	
10-Phase 4 in room XX	X	X	~	~	~	Natural soil	X						I	
	Natural soil		~	~	~								I	

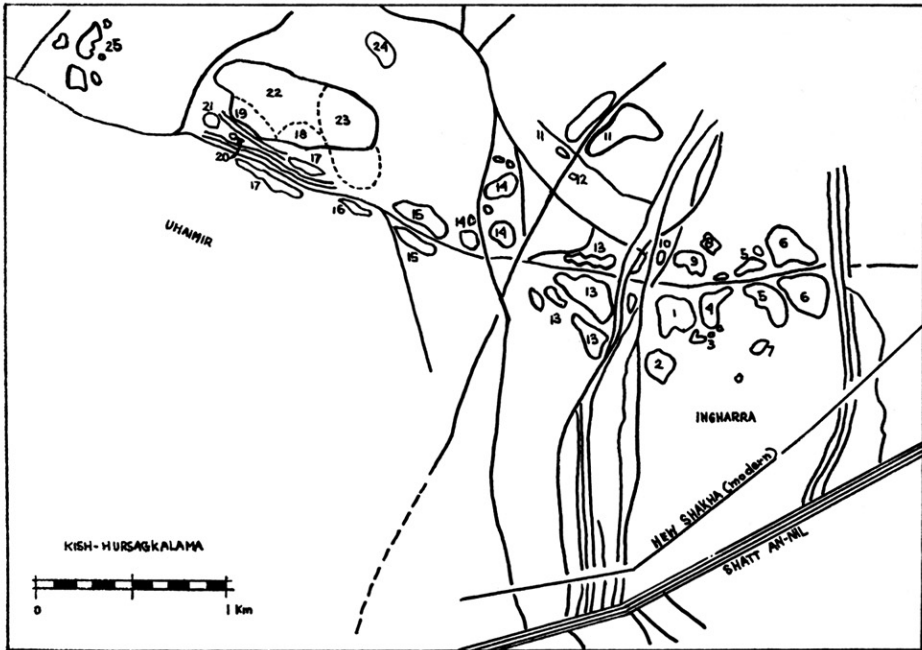


Fig. 4. Kish. The mounds forming the archaeological complex of Kish- Hursag-kalama (from McG. Gibson, "The Archaeological Uses of Cuneiform Documents: Patterns of Occupation at the City of Kish").

between the end of the fourth millenium and the middle of the first millenium B.C. to be studied.

According to a reconstruction by McGuire Gibson in the Proto-literate period the city has its beginning in mounds 1 and 24 (fig. 4). In Early Dynastic I there is an expansion around mound 1 and a new settlement, mounds 19, 22, 23. In Early Dynastic III mound 11 is inhabited. Then there is a shrinking in the area of mound 1, until a further expansion in the Old Babylonian period leads to its re-occupation. In the Achaemenid period the surface of settlements around mound 22 shrinks considerably, only to be re-occupied in Parthian period, and so on.¹²

Let us now approach the problem of the horizontal distribution of the artefacts, from both the chronological and functional points of view. The systematic collection

¹² GIBSON, MCG., *The City and Area of Kish*, Miami, 1972.

of surface material gives us the first data on the period of occupation of an urban area and on the main type of activity concentrated there. Restudying the location of finds from excavation, it has been possible to correct wrong interpretations and to reconstruct shiftings of administrative centres and industrial areas, never identified before. A clear example has been given us by the re-examination of Kish described previously. On the basis of excavation data and by carefully studying the materials of surface survey, Dr. Gibson, as we mentioned earlier, was able to reconstruct the shiftings, abandonments and re-occupations; with the help of the location of clay tablets he was able to correct the excavation data, showing the existence of a previously unidentified school for scribes in the Old Babylonian period, at the same time revealing that, in Achaemenid period Kish was far more important than had previously been thought.¹³

Especially when surface finds are concerned, deductions based on the horizontal distribution of finds imply a series of systematic and highly sophisticated researches. When pottery is the main object, the research of the most significant types for every period gives, because of its very aim, data biased by its basic assumption. It has been shown that data are more reliable if this type of research is integrated by *total* gathering of every potsherd on areas scattered all over the surface of the mound, chosen both because of their morphology and at random. In this way the data given by the mere gathering of diagnostic sherds are corrected and integrated in the general context.¹⁴

This type of research has proved itself exceedingly effective and useful for the identification of concentration of functional areas, as we have seen for lapis lazuli working centres at Shahr-i Sokhta and at Tepe Hissar, for bronze and pottery working centres at Altyn-depe¹⁵ and for a directional centre at Kish.

As we have seen, the study of the horizontal distribution of finds implies a large basic work, with refined chronologies and stratigraphies, the use of highly sophisticated recording techniques and the use, in the final stage of research, of computers and data banks; nevertheless this type of study, in the field of urban archaeology, is of the utmost importance.

¹³ GIBSON, MCG., *The Archaeological Uses of Cuneiform Documents: Patterns of Occupation at the City of Kish, Iraq*, XXIV, I, 1972, pp. 119, 121.

¹⁴ GIBSON, MCG., *op. cit.*; see also ADAMS, R. MCC., *Land Behind Baghdad*, Chicago, 1965, pp. 119-125.

¹⁵ MASSON, V. M., *Protogorodskaja Civilizacija Juga Srednej Azii, Sovetskaja Arheologija*, 1967, 3, pp. 166-167; MASIMOV, I. S., *Raskopki Remeslennogo Kvartala Epohi Bronzy Poselenii Altyn-depe, Karakumskie Drevnosti*, 1970, III, pp. 51-63.

THE GRAVEYARD

The Shahr-i Sokhta necropolis was located by the Italian Archaeological Mission in Iran during the campaign of September-December 1972. The discovery was due partly to chance, partly to the participation of our palaeobotanist in the last year's campaign. It was the opening of a testing pit (3 x3 m) to obtain fluvial clay samples in the IW sector, the area in which the extensive excavation was later carried out, which revealed the presence of tombs (pl. 23).

The trial trenches later dug in various points (BQV; IPV-IUB; LNX—LSD—LSI) and an examination of aerial photographs of the zone revealed that the necropolis covers an area of about 35 ha, i.e. it occupies the whole area sw of the plain which, because of the absence of obvious traces of occupation, was previously thought to consist exclusively of natural sediments (fig. 5).

The ratio between surface area and tomb density as found so far, as well as the calculation of the relative density of occupation of the city in the various periods, seem to indicate that the necropolis must have contained not less than 20,000 tombs. Thus, at the present state of our knowledge, it was one of the largest necropolises in south-western Asia during the third millennium B.C. It is a truly grandiose example of correct planning of the graves with respect to the built-up area for an urban site in this period.

In the total area of 1, 150 m² so far cleared, 60 tombs have been found, of which only 54 have been completely excavated. Although the latter represent little more than 0.25% of the estimated total number of tombs and of the area occupied by the necropolis, they already offer a fairly well-articulated picture of the various problems.

The plane of the necropolis can easily be seen in IW-IR, where the graves were dug in the clay, while in IPV-IVB, LN-LS, the composition of the soil (gravel mixed with sand or small lumps of clay) makes its identification impossible. The plane is about 60-80 cm below present ground level and is given from the surface of layer 4 according to the following stratigraphic scheme:

<i>Strata</i>	<i>IR-IW</i>	<i>IPV-IUB & LN-LS</i>
1	sand and clay of variable consistency	loose sand and gravel
2	salt formation	salt formation
3	clay in small scales	gravel mixed with sand
4	compact Plio-Pleistocene clay.	gravel mixed with lumps of clay.

One formal characteristic of the Shahr-i Sokhta necropolis seems to be its non-homogeneity, as shown by the following factors:

1) *Position and orientation of the skeletons:*

The skeletons lie in crouched position on the left or right side, with considerable bending of the legs, which occasionally appears almost forced, and the arms folded towards the face. Occasionally, skeletons are found lying completely stretched out on their backs with only slight bending of the legs.

These different positions and orientations seem to have no connection with the chronology, nor with the type of tomb, age, or social status occupied by the individual in the community.

2) *Shapes and orientation of the graves.*

3) *Variety of tomb forms:*

So far five tomb types have been identified.

a) *simple grave*, rectangular, oval, cordiform, subcircular;

b) *wide grave* divided into two by a brick wall; one half is used for the burial, the other is either left empty or contains offerings.

c) *catacomb*, certainly the most sophisticated type, consisting of a rectangular grave and a small, hemispherical cave, later bricked up, dug out of the Plio-Pleistocene clay on one of the longer sides of the grave (fig. 6).

Tombs of this type together with simple graves and tombs having a stone chamber have been found in the necropolis of Zamanbaba (Zeravšan), which dates back to the end of the third millennium and the beginning of the second millennium B.C. Of the objects used for furnishing, the bronze wands allow a precise comparison to be made with similar material found at Shahr-i Sokhta.¹⁶ On the other hand, only a perfect formal identity is found with the catacomb tombs found in southern Russia in the Black Sea area (e.g. Troickoj, Malaja Kamyševaha.¹⁷) The furnishings of the latter are more recent (2000—1800/1750 B.C.) than those so far found at Shahr-i Sokhta and show no resemblance to the material coming from our necropolis or the town itself.

d) *cist grave* (G. 12), consisting of a rectangular structure of horizontally laid mud-bricks;

e) *small chamber grave*, (G. 106) built entirely of untidily laid, sloping bricks (pl. 24).

¹⁶ MASSON, V. M., SARIANIDI, V. M., *Central Asia. Turkmenia before the Achaemenids*, London, 1972, pp. 125-128, 150.

¹⁷ GIMBUTAS, M., *The Prehistory of Eastern Europe. Mesolithic, Neolithic, Chalcolithic and Copper Age Cultures in Russia and the Baltic Area*, *Bulletin American School of Prehistoric Research*, 20, Peabody Museum, Harvard University, Cambridge, 1956, pp. 80-83; *ID.*, *Bronze Age Cultures in Central and Eastern Europe*, Paris, The Hague, London, 1965, pp. 479-497.

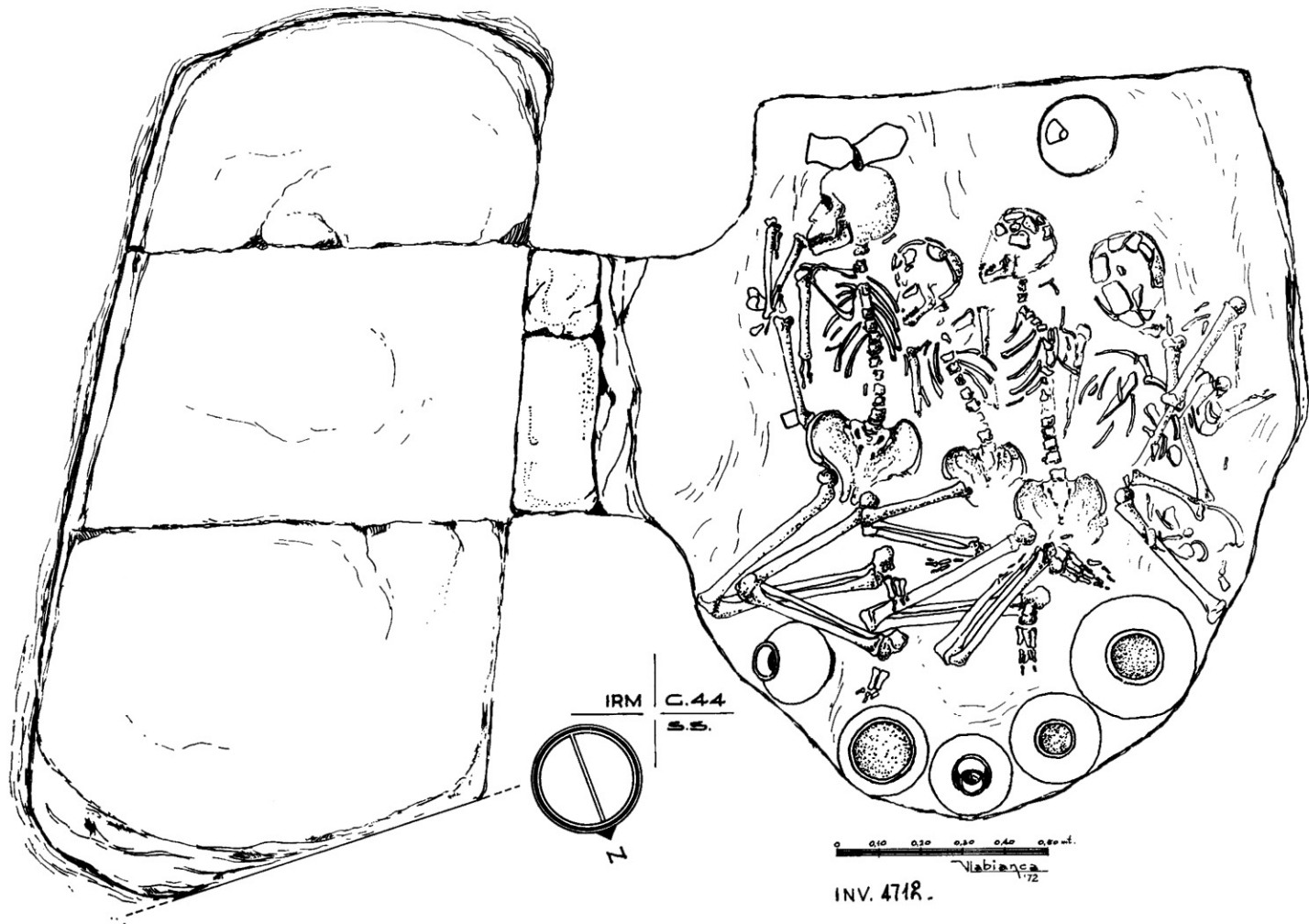


Fig. 6. Shahr-i Sokhta. G. 44: the largest catacomb grave found during the campaign 1972, where have been found the skeletons of four individuals, probably buried at different moments.

As regards the orientation, it should be noted that whereas it varies considerably in tombs of types a) and b), in the catacomb types the small cave was always dug along the north side of the grave.

The necropolis, where burial is the only documented ritual, as is moreover the case throughout south-western Asia during the third millennium B.C., has not provided us with objects of comparable quality to those often found in the necropolises in other sites in protohistoric Iran, especially at Tepe Hissar.¹⁸ All the tombs, even the more sophisticated ones, are rather poor by comparison. The furnishings consist mainly of jars, beakers, ceramic bowls, an occasional calcite bowl, turquoise, lapis lazuli and alabaster beads. Bronze objects (tools, spear-heads, recipients, pins, seals and figurines) are relatively rare (G. 3, G. 12, G. 14, G. 16, G. 205).

Chronologically speaking, the tombs belong to Period II of the old chronological scale. Only G. 201 and 202 belong to the early Period II and the most recent, G. 12, to the beginning of Period III. According to the new phase subdivision, the tombs range from phase 8 (G. 201, 202) to phase 5 (G. 12).

Assignment to the various phases was made according to the ceramic association survey carried out by R. Biscione and M. Tosi.

G. 201—beginning of Period II—phase 8

The furnishings consist of an alabaster bowl and a small jar placed near the feet of the young women and a jar, a small jar and a small spouted jar placed on a level with the highly bent legs. Of significance as regards chronological assignment is the spouted jar, in grit-pasted pottery, light buff in colour, decorated with a wide vertical red band. (pl. 25)

G. 8—Period II—phase 7/6

The furnishings consist of 8 beads (4 turquoise and 4 lapis lazuli) arranged round the neck, an alabaster bead near the left wrist and 7 vases placed between the dividing wall of the grave and the child's skeleton. In addition to these ornaments and to the more common shapes, such as pear-shaped beakers, a small jar and a bowl, there is a small flat biconical jar with brick-red coloured slip glazing, made of highly refined buff paste, decorated with a series of vertical lines alternating with fringed sigmas.

¹⁸ SCHMIDT, E. F., *Excavations at Tepe Hissar, Damghan*, Philadelphia, 1937.

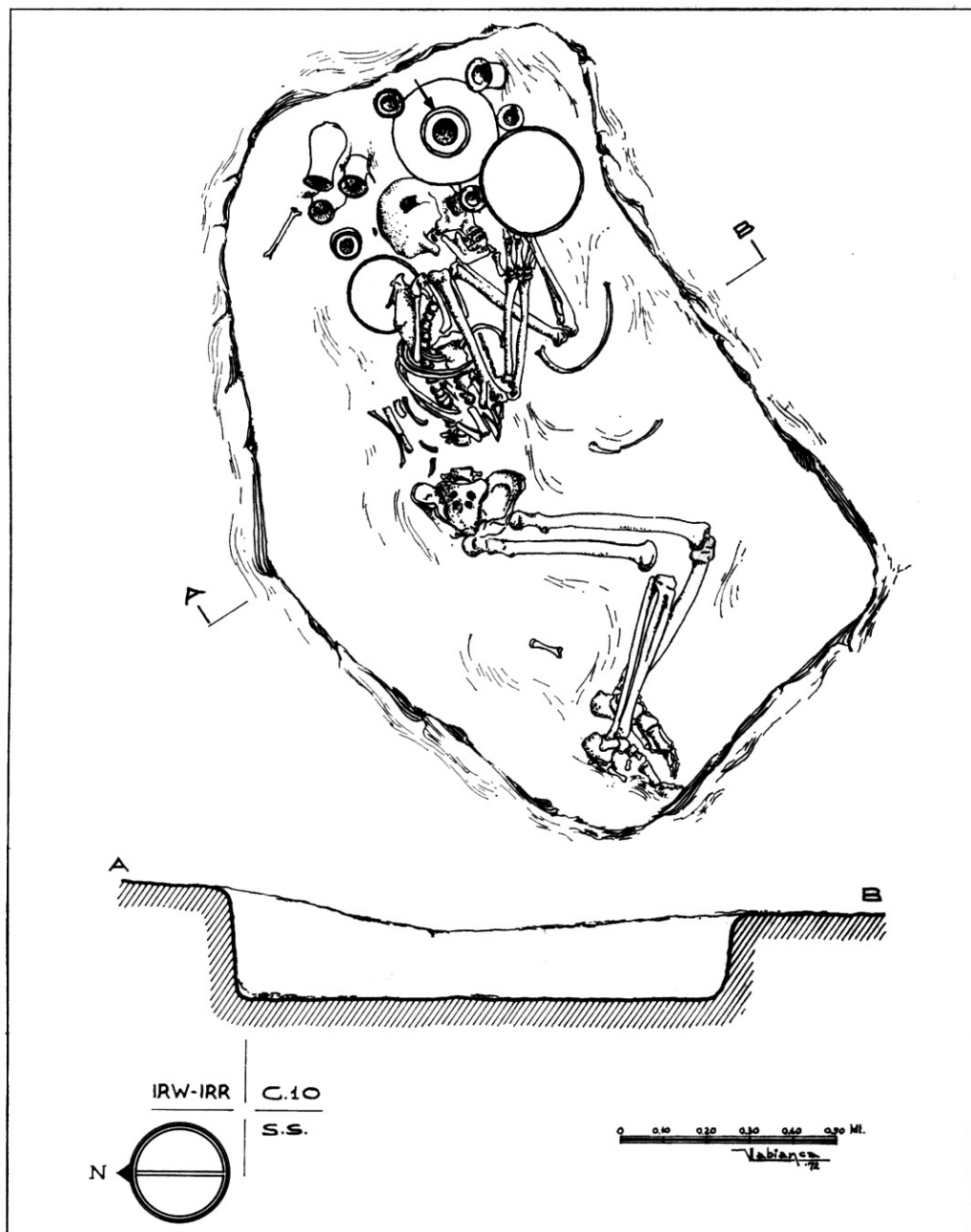


Fig. 7. Shahr-i Sokhta. Plan and section of grave no. 10. The arrow points at the Nal type canister jar closing the globular jar.

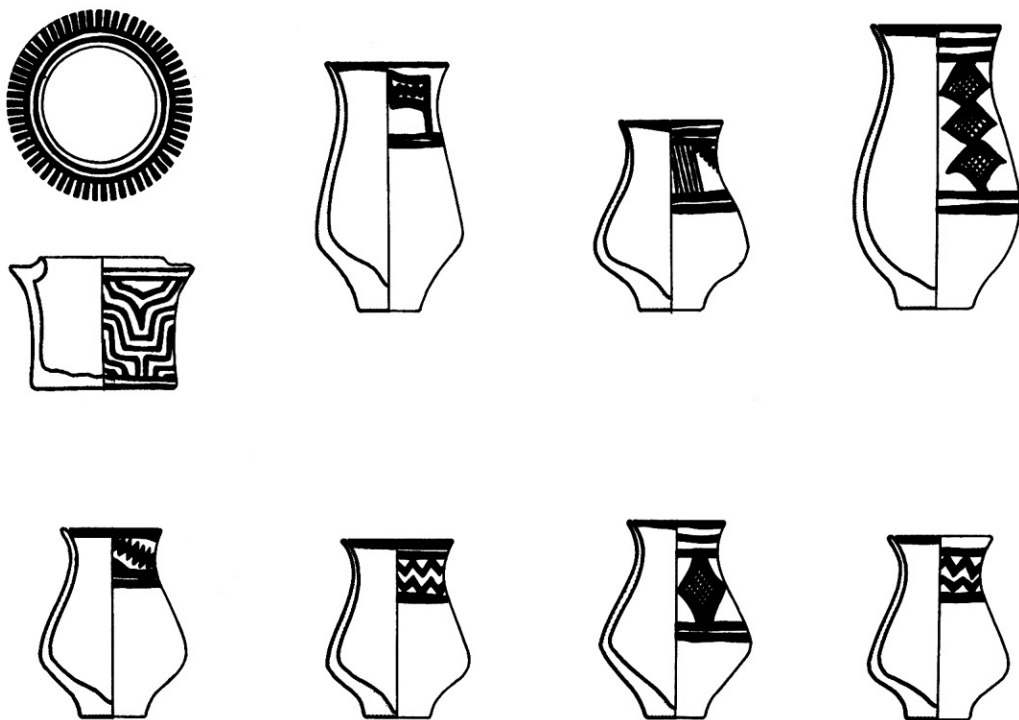


Fig. 8. Shahr-i Sokhta. G. 10: the Nal type canister jar together with pear-shaped beakers.

G. 10—Period II—phase 6 (fig. 7)

In addition to a bracelet composed of 48 beads (45 turquoise, 3 lapis lazuli) near the right hand, also 3 beads (2 turquoise and 1 alabaster), probably belonging to a necklace, were found near the head, around which 11 vases had been arranged. Among the latter (8 pear-shaped beakers, a large bowl and a globular jar), of particular interest is a Nal type canister jar which had been laid on the globular jar to close it (fig. 8). However, although having typical Nal culture decoration, it differs from canister jars typical of this culture in two technical features: a) the shape with concave rims; b) the greater wall thickness. These technical differences seem to indicate that the Shahr-i-Sokhta specimen was manufactured outside the Nal culture area.

The only pot not included in this group, a bowl placed under the right shoulder

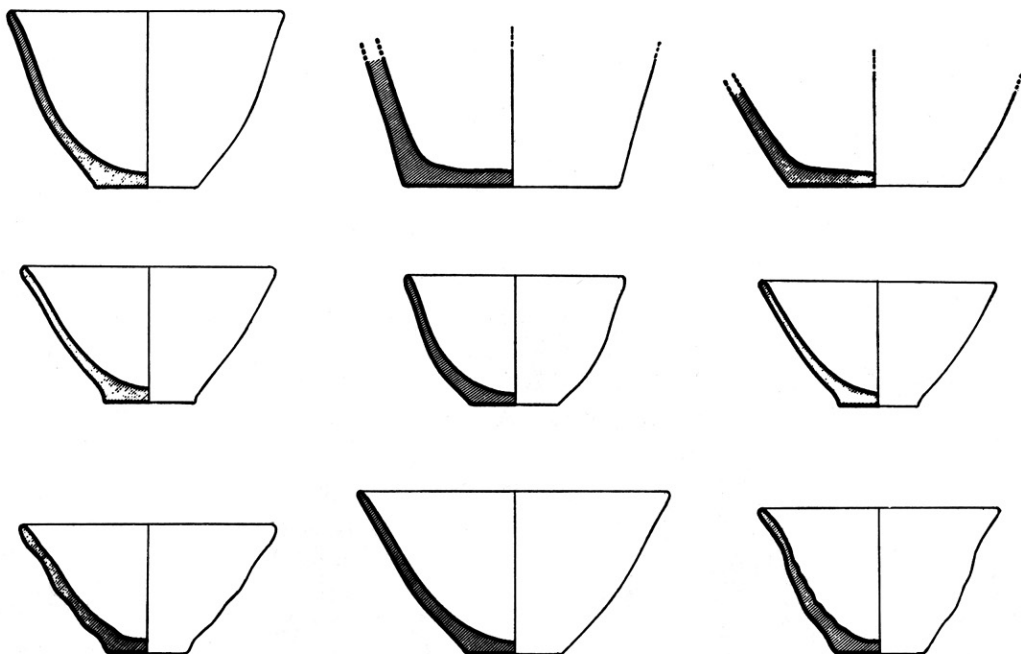


Fig. 9. Shahr-i Sokhta. G. 12: some undecorated small truncated-cone shaped bowls.

blade, contained the remains of a canister, a small crescent-shaped comb and 28 flint microblades.

G. 12—early Period III—phase 5 (fig. 9)

The furnishings of this tomb, which lies at a slightly higher level than the other found in IR—IW (G. I-44), were found to be particularly interesting. In addition to a number of variously shaped beads (201 turquoise, 26 lapis lazuli and 5 alabaster) belonging to several bracelets and necklaces, 59 flint microblades were found in an alabaster bowl associated with small blocks of semi-finished lapis lazuli, which enabled several phases of the process of lapis lazuli working to be clarified and documented. Also noteworthy are a few bronze objects: a large pin, a square chisel with a pyramidal cutting edge, the tang and upper portion of a knife blade.

The abundant pottery (24 vessels: jars, pear-shaped beakers, bowls), most of which has been badly damaged by erosion, points to the beginning of Period III for the assignment of G.12 because of:

- 1) the decorative motifs on two small globular jars consisting of sigmas and sigmas superimposed over sheaves of 4 zig-zag lines;
- 2) the particularly elongated shape of 3 pear-shaped beakers decorated simply with a double horizontal line at the height of the neck;
- 3) the abundance of undecorated vases (jars and bowls); the small truncated-cone shaped bowls, with their standardized shape and size, suggest a similar function to that of the bevelled-rim bowls of Mesopotamia.

The necropolis seems to have developed horizontally, as the tombs appear never to have been cut or disturbed by later graves. However, both catacomb and simple grave type tombs were quite frequently used for later burials, but without the original structure being destroyed or altered. This re-utilization was carried out either by removing the bricks enclosing the caves (G. 44,) or by redigging the graves of the type a) tombs to a level just above that of the previous burial (G. 32, G. 38).

The finding of an intact necropolis undisturbed by later settlements or clandestine excavations is of great importance today as it enables anthropological, palaeopathological and demographic research work to be carried out. Even though it can only be statistical and not dynamic, the last of these three, especially if it is possible to compare data from different periods, will provide us with information to clarify the composition and structure of the Shahr-i Sokhta population and to establish the endemic death rate with special reference to the low children's expectancy (30%) which is comparable with the values found by E. Schmidt in the demographic survey he carried out on Tepe Hissar.

The overall death-rate graph for Hissar I, II and III shows a very high percentage for the younger children (infants I = 19.5%) which drops to 9% in the juvenile group (up to 21 years). No more than 12.5% of the population reaches middle (40—50 years) and old age. The results are all the more astonishing if compared with death-rate data for a present-day population (e.g. U.S.A. in 1930) where more than 80% of the individuals live beyond 40 years of age and more than 60% reach old age.

It would also be very important to make a pathological survey of the skeletons which, in addition to traumas, would also reveal traces of blood and tubercular diseases as well as those due to diet deficiencies.

It would thus be possible to open a field of research which, while requiring the

endeavour of a certain number of specialists, continuity of effort and a considerable amount of time to gather, select and elaborate the data, would nevertheless constitute one of the most important and worth-while ways at the archaeologist's disposal of making a necropolis something more than a precious mine of information about ceramic associations or a safe way of checking relative chronologies.

LITHIC TECHNOLOGY AND LAPIS LAZULI PRODUCTION

The functional analysis of lithic industries is now one of the basic constituents of prehistoric research. This type of research as well as the typological arrangement of a lithic complex were long neglected in the reconstruction of the urban societies of the third millennium in the Indo-Iran Borderlands because of the lack of interest shown in problems relating to lithic technology by the majority of workers who have been mainly interested in clarifying the chronological and cultural relations between the various sites in this region during the fourth and third millennia B.C.

The work done by the Italian Archaeological Mission at Shahr-i Sokhta, C. C. Lamberg Karlovsky's excavations at Yahya¹⁹ and a recent surface survey carried out by us at Tepe Hissar,²⁰ have all provided ample evidence, in spite of the different opinion expressed by a few distinguished scholars such as Jean Perrot, of the fundamental rôle played by lithic industry in the technology of third millennium cultures in Iran, in the Indus valley and in southern Turkmenia. The hundreds of thousands of implements found in these three localities were technological premise for the economic development of entire cultures and the interpretation of this material is no longer simply a typological exercise but makes a contribution of comparable importance to that of pottery finds to the clarification of a number of aspects of Near Eastern proto-history.

One of the most stimulating results of the 1972 campaign at Shahr-i Sokhta was the definition of the technique of working semi-precious stones like cornelian, turquoise, chrysoprase and lapis lazuli, and of problems relating to the lapis lazuli trade during the third millennium.

It is common knowledge that the only lapis lazuli mines known in ancient times were those located in north-eastern Afghanistan, the Sar-i Sang of Badakshan.²¹ Lapis lazuli

¹⁹ LAMBERG KARLOVSKY, C. C., *The Proto-Elamite Settlement at Tepe Yahya, Iran*, IX, 1971, pp. 87-97.

²⁰ BULGARELLI, G. M., *Tepe Hissar. Preliminary Report on a surface survey, August 1972*, *EW*, 1974, forthcoming.

²¹ HERRMANN, G., *Lapis Lazuli: The Early Phases of its Trade, Iraq*, XXX, 1968, pp. 21-62.

mining was carried out by heating-and-cooling of the limestone rock containing the lenses so that through the cracks, they could more easily extracted the blue masses from the matrix surrounding it.²²

Of the two routes from Badakshan to the most important markets, i.e. Mesopotamia, one passes north of the Iranian plateau along the Oxus river and the Elburz range, the second across Afghanistan through the Anjuman pass. It is on these two routes that the two towns most documented in lapis lazuli trading and processing are to be found: Hissar near Damghan and Shahr-i Sokhta in Sistan.

The advantage of controlling lapis lazuli trade in a region lying midway between the mining area and the western markets of Mesopotamia depends on the possibility of being able to carry out an initial trimming and selection of the material extracted so that transport costs are halved and the large centres are sent only flawless material which was thereby much more valuable than freshly-mined material, where intrusions often exceed in weight the lazurite concentrations.

The surface survey carried out at Hissar in August 1972 led to the collection of more than 10,000 stone implements and numerous lapis lazuli fragments (pl. 26), which had been abandoned during the various working phases in Schmidt's old excavations of 1931-32.²³

More than 50% of these implements appear to be directly related to the working of the lapis lazuli. By restoring Schmidt's grid, numerous areas were found to have heavy concentrations of tools and lapis lazuli waste in places corresponding to lapis lazuli workshops.

At Shahr-i Sokhta the excavation of a building in zone EWK, revealed a lapis lazuli working area. In single rooms over 200 microliths were found (pl. 27) as well as more than 2 kilograms of lapis lazuli wasters from various stages of the working process, ranging from rough blocks to finished beads and pendants (pl. 28).

The same association between lapis lazuli and the microlithic industry has been found in a number of tombs, e.g. G. 12 which probably represents the tomb or the offering of a stone-cutter.

The technique used in working the lapis lazuli appears to be exactly the same at Shahr-i Sokhta and at Tepe Hissar (fig. 10). In order to extract the purest cores of lapis lazuli from the calcite block enclosing it a groove not more than 1 mm deep was made with triangular or trapezoidal flint microblades. The incision lies often just between

²² WYART, J., BARIAND, P., FILIPPI, J., *Le lapis-lazuli de Sar-e Sang (Badakshan)*, *Revue de Géographie Physique et de Géologie Dynamique*, XIV, 4, 1972, pp. 443-447.

²³ SCHMIDT, E. F., *op. cit.*, 1937.

SEPARATION PROCESS

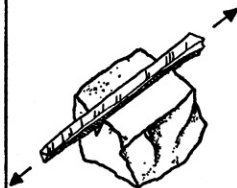
1. Chipping



2. Smoothing



3. Groove Cutting



4. Separation by blowing



Final Product



BEAD-MAKING PROCESS

1. Shaping



2a. Drilling



2b. Drilling



3. Polishing

not documented

Final Product



Fig. 10. Schematic representation of working-stages in lapis lazuli manufacture. *Upper row*: determined stages from raw fragment to clean block. The black wedge marks direction of splitting blow, possibly produced with a metal chisel. The stages are concatenated. *Lower row*: determined stages from shaped to finished bead. The drill head was hafted, possibly in a wooden handle. These stages are not concatenated and one can anticipate the other. (Drawing by I. Reindell)

the lapis core and the cortex of the block. Its purpose was to weaken the block and to allow the desired piece to be removed by means of a direct or an angular blow which separated the two parts almost straight.

The surface of the block was polished before the incision was made and sharply contrasts on the unfinished wasters with the rough fracture plane.

Once freed from the impurities the smaller block thus obtained could be shaped as a bead by means of successive grooving, blowing, and polishing (pl. 29).

The last and most delicate phase for the production of beads was drilling and required the use of tiny borers as some of the holes are no more than a millimeter in diameter (pl. 30).

The lapis lazuli of both Hissar and Shahr-i Sokhta exhibits the same scars corresponding to identical working phases, and confirms that the same relatively specialized technological level existed in both sites.

The discoveries at Tepe Hissar and Shahr-i Sokhta have made it necessary to re-examine the lapis lazuli objects coming from towns in proto-dynastic Mesopotamia. We are indebted to Dr. R. Barnett of the British Museum and Dr. R. H. Dyson of the University Museum, Philadelphia, for their kind permission to examine a good deal of the material from the Royal Cemetery of Ur which often exhibits the same working scars found on the lapis lazuli of Hissar and Shahr-i Sokhta.

Microscopic analysis of all the implements associated with the lapis lazuli wasters has revealed not only traces of wear on the tips of the elongated borers due to their rotation but also numerous patches of lapis lazuli powder adhering to the small retouch scars. In one case, microscopic traces of cornelian were found on the tip of a borer fragment.

So far 69 implements out of the more than 200 recovered have been found to bear traces of lapis lazuli, about 35%. This is a fairly significant proportion if it is borne in mind that during flotation a large number of the implements may have had the small traces of powder adhering to their surfaces washed away by the water.

Analysis of lapis lazuli distribution on the borers is still being carried out and should lead to the identification of the various uses to which these implements were put.

So far the following constants have been found: on several elongated borers the lapis lazuli powder regularly covers the distal extremity and is often present over the whole length of the working part of the implement; on short shoulder borers the powder is concentrated mainly on both the side notches; in other cases it is found on the two faces of the implement on a level with the notches themselves and the small borers; less frequently it is found on the borer tip itself. The impression given is that

these implements were not intended to be used simply for drilling but were more probably related to a preceding phase of the manufacture.

After the discovery of the lapis lazuli processing workshop at Shahr-i Sokhta and the identification of the function of the large number of borers found in it, we decided to subject to stereomicroscopic analysis the thousands of borers found at Tepe Hissar.

The industry presently being studied by G. M. Bulgarelli is very abundant, and its collection, which was carried out co-ordinating the artifacts using E. Schmidt's old grid, will enable a probable dating to be given for the pieces. After 40 years' exposure on the surface and in spite of careful washing carried out by us, numerous implements (borers and blades) from Hissar still show traces of lapis lazuli powder and, in some cases, of tar.

The technique used for the preparation of these implements is different to the flaking technique used at Shahr-i Sokhta. G. M. Bulgarelli claims that they were mainly obtained by burin blows, and has reconstructed the various working phases from the burin down to the finished borer. This hypothesis is sufficiently borne out by the material evidence collected, and is the only one which would explain the presence of hundreds of burins in the Tepe Hissar industry which is in complete contrast with the rareness of this type of implement in the other known third millennium assemblages in western Iran.

Considering both Shahr-i Sokhta and Tepe Hissar we are thus dealing with a rather interesting phenomenon of functional convergence and typological divergence, the explanation of which would seem to be bound up with the interpretation of the production of lapis lazuli objects in the two sites. The horizontal distribution of the implements and other evidence seems to point to the existence of several workshops at Hissar at the small artisanal level and a single large production centre at Shahr-i Sokhta at the level of specialised artisans depending on a centralized authority controlling the internal demand and exportation.

The search for terms of comparison with the Shahr-i Sokhta industry recently led us quite some distance north from eastern Iran to Kyzyl Kum in Tamdytau and Bukantau areas where identical implements with exactly the same association (pls. 31a and 31b), mainly turquoise wasters, have been reported by A. V. Vinogradov.²⁴

The importance of these similarities goes beyond the simple typological aspect and, with unassailable evidence, raises again the problem of the central Asiatic tendencies of the Hilmand civilization.

²⁴ VINOGRADOV, A. V., Kyzylkumskie juveliry, *Uspehi Srednazjatskoj Arheologii*, 2, 1972, pp. 43-45.

MICROSCOPIC REMAINS IN XEU GARBAGE DUMP

During the 1972 campaign numerous soil samples were taken in the XEU sector. A previous cursory examination had already revealed that they were full of small finds of archaeological and palaeontological interest.

The XEU sector formed a small mound in the north-east zone of the excavation site (fig. 11). It was almost completely covered by a salt crust (mostly calcium carbonate) which had allowed the more than four thousand year old deposit to be preserved as though it were no more than five years old. This exceptional state of preservation is due to the combined action of numerous factors. In addition to that of the salt crust, an important influence was also the particularly dry climate of the region and the absence of disturbing action by external agents. These ideal conditions have ensured the perfect preservation of all the organic remains of both animals and plants and the cultural material which otherwise would have been destroyed.

COLLECTION AND SEPARATION TECHNIQUES

The soil in the XEU sector was sampled by using plastic containers (polytene bags) in a fixed ratio to the surface area excavated: for every unit of excavated surface area, i.e. about 9 m² down to a depth of about 10 cm, an approximately 5000 cc sample was taken according to a clockwise rotational scheme starting from the centre and working outwards to the four corners (fig. 12).

The samples were subjected to water separation using sieves of known mesh-size. The various sifting phases can be summarized as follows:

a) *Elimination of both archaeological and non-archaeological macrofinds present in the soil.*

Before being sifted the soil was freed from all those remains (potsherds, lumps of clay, bones, etc.) which because of their size and weight might have damaged the more delicate finds during the later phases (pl. 32).

b) *First sifting.*

The soil to be sifted was placed in a sieve having a 2 mm square mesh. The sieve was placed at the bottom of a tank filled with water whose level was kept at about half way between the mesh and the upper edge of the sieve. By shaking moderately in a rotatory fashion (giving the sieve a half turn first in one direction and then in the other) the larger finds were separated out.

By using a small sieve provided with a short handle and a 0.5 mm square mesh, also the floating remains were collected during this phase.

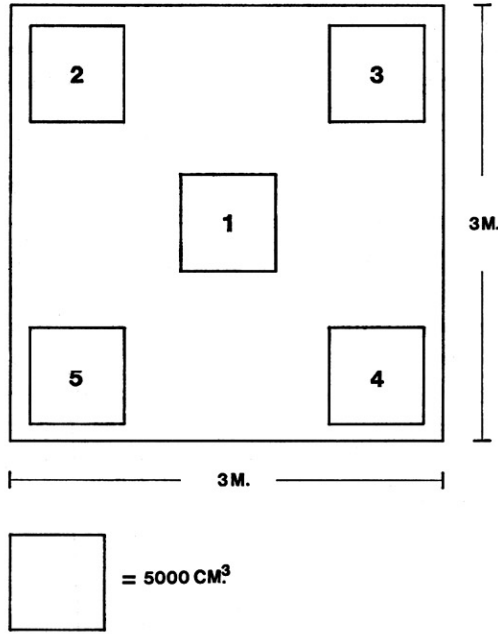


Fig. 12. Schematic representation of soil sampling in room deposits applied at Shahr-i Sokhta.

c) *Second sifting.*

The water containing the material which had passed through the mesh of the first sieve was then filtered through a second sieve having a 1 mm square mesh. The washing technique used was the same: a slow and moderate rotational movement.

The material passing through the second sieve was recovered by filtering the water collected in the tank through a small 0.5 mm mesh.

The total material recovered from the three sieves was dried slowly and gradually in a sheltered place to avoid deformation caused by a too rapid loss of moisture, particularly in the case of seeds and other plant material. It was thus decided to place the material on sheets of newspaper which were folded up into a kind of cushion-shaped packet. This method ensured perfect drying and also allowed the dry material to be recovered easily.

MATERIAL RECOVERED

Stereomicroscopic examination of the dry material led to the identification of numerous finds which have been divided into groups as follows: seeds, animal remains and cultural remains

(1) SEEDS

Vitaceae

Vitis sp.; numerous whole seeds and fragments, most of which are scorched (pl. 33). The seeds are pear-shaped, rounded-triangular, and plano-convex, with the rounded face cut by a central oval or round area connected by a furrow to the terminal part which is deeply cut and divided into two lobes. The flat face is divided into two lobes by a median incisure which is the continuation of the furrow on the convex face; on it there are two deep furrows, one on each lobe, which start just below the point where the seed broadens and stop about 3/4 of the way along the length of the seed.

The large number of seeds found in such a small mound as the XEU sector would indicate that the grapevine was extensively exploited as a fruit plant. It is not possible to ascertain, however, whether the fruit was only eaten fresh or also used to make beverages.

Polygonaceae

Of this family only a few whole and fragmentary seeds have been found, mostly scorched and belonging to two different genera.

Polygonum sp. (or spp.); seeds mostly triangular in shape, although occasionally with oval, flat or lenticular edges with one end rounded and the other flattened. Surface rough and opaque.

Rumex sp.; seeds have an elongated, triangular shape and are plano-convex with rounded edges and pointed extremities. A ridge on the convex face divides the seed into two. The surface is rough and opaque.

Also today the seeds of these two plants are ground into flour and eaten in the form of cakes; the tender green shoots and roots of *Rumex* sp. can be cooked and eaten.

The roots of several species of *Rumex* are widely used as a dyeing mordant.

Chenopodiaceae

Chenopodium sp. (or spp.); numerous seeds, many of which are fragmentary and often scorched (pl. 34). Semicircular-lenticular or globular in shape, with a rounded edge,

characterized by the presence of a hollow giving rise to the formation of a small protruding or adherent tooth. Rough, somewhat shiny surface.

The seeds of these plants are ground into flour which is then made into bread or flat cakes. The presence of numerous whole seeds and fragments indicates that these plants were extensively used for food purposes. Even today in India, in the hot and temperate Himalayan region and in south America, these plants are used as satisfactory substitutes for bread cereals.

The tender green parts could be cooked and eaten, as is still done by many peoples even today.

Cucurbitaceae

Cucumis sp.; numerous, fairly well preserved seeds, never scorched (pl. 35). The seeds are flat, oval, with one extremity rounded and the other flat or, in any case, not round.

The large quantity of *Cucumis* sp. seeds found, second only to that of *Vitis* sp., is doubtless due to the extensive consumption of the fresh fruit. It is quite possible that this plant was even cultivated, although it may well have been native to the flora surrounding the Shahr-i Sokhta settlement. Even today the fruit of the *Cucurbitaceae* are very precious for all the populations living in predesert areas who continuously have to face the problem of heat and water. The refreshing fruit of this genus is often a precious reserve of water and sugar.

Graminaceae

Only a small number of very fragmentary seeds belonging to this family have been found. However, it was possible to identify a seed and a few fragments of rachides belonging to *Triticum compactum* Host., even though it was badly deformed by the visible traces left by preying insects (pl. 36).

General conclusions

The differences in the quantities of seeds found must not lead us into error; it is necessary to bear in mind the varying degrees of importance these seeds had as food. While the seeds of *Vitis* sp. had no food value and were thus normally thrown into the rubbish heap, those of *Cucumis* sp. did have some food value when heat dried, something which is still done today.

The varying quantities of *Polygonaceae*, *Chenopodiaceae* and *Graminaceae* seeds found is explained by the different quantities produced by the individual plants, which were greater in the case of the *Polygonaceae* and *Chenopodiaceae* than in the *Graminaceae*. Further-

more, any survey of the statistical percentages of seeds found must be carried out taking into account the different rôles attributed by the population to the various species in their diet and in the economy in general. This consideration must be added to the commonly known data on the degree of preservability of each type of seed in an archaeological deposit. The accumulation or absence of a given type of seed may have been due to peculiar conditions, as is the case for the seeds of *Chenopodium* sp. found in large quantities in the storeroom of room XXXIX where they had been artificially concentrated.

The complexities involved in feeding a population with an urban economy are further revealed by the large number of different kinds of seeds used for flour-making.

Up to the present we had considered the proto-urban civilisation of the Near and Middle East as being based exclusively on a cereal diet of wheat and barley, without any particular distinction of a social nature being made. The opinion is held by some that the main social distinctions as regards food consisted in the quantities of high-grade proteins and vitamins absorbed.

Although the present results are only preliminary they seem to indicate that such distinctions could be made also upstream from the staple foodstuffs such as bread flours. After all the example of medieval China with its population divided up into "rice eaters" and "millet eaters" is perhaps a better one also for the proto-urban societies of the Near East. Over short periods of time the use of a "humble dish" such as that obtained using flours made from *Chenopodium*, *Polygonum* and *Rumex* may have been increased by the variability of the crop yield in soils which were always subject to periodic droughts and a constant increase in salinity.

(2) ANIMAL REMAINS

INSECTS ²⁵

Coleoptera Adepbaga

Carabidae,

Sub-family *Scaritinae*, *Disticus planus* Bon.

Certain identification of a small number of remains of a specimen of this species of predatory beetle with fossorial forelegs, typical of brackish, muddy environments along the seashore and particularly in coastal lagoons and brackish inland basins. Found throughout the Mediterranean area and in western Asia.

²⁵ The analysis of entomological remains has been carried out at the Institute of Zoology of Rome University in collaboration with Dr A. Vigna Taglianti.

Sub-family *Siagoninae*, *Siagona* sp.

Identification certain at genus level, uncertain at species level; probably *Siagona europaea* Dej., a very common species throughout the Mediterranean basin and in western Asia as far as northern India. It is a predatory species typical of plainlands and is particularly common in muddy and even brackish soils.

Coleoptera Polyphaga

In addition to many unidentifiable remains, probably including also those of *Tenebrionidae* and *Dermestidae*, the following forms have been identified:

Histeridae

Saprinus sp. Remains of a specimen belonging to this large genus represented by numerous species preying on *Diptera* (fly) larvae and thus commonly found in heaps of rotting organic matter. The presence of this genus may perhaps be associated with the presence of numerous larvae of flies in the same sector.

Dermestidae

Well-preserved larval exuviae of at least three species of beetles belonging to this family, one of which probably belonging to the genus *Attagenus*; typical, widely found insects, which commonly prey on foodstuffs, especially the dry commodity, and attack a wide range of organic plant (seeds, flour, etc.) and animal (leather, skins, dried meat, etc.) matter (pl. 37).

Ptinidae

Gibbium psylloides Cz. Numerous remains of wing covers and even well-preserved complete specimens of this typical member of the *Ptinidae*, commonly found in dried foodstuffs (pl. 38). Found throughout the Palaearctic Region; typical of storehouse environments, always associated with human activities.

Diptera Brachycera

Fam., gen. sp.

Many remains of puparia of *Diptera brachycera* (pl. 39), *Muscidae* or *Calliphoridae*, commonly found in all rotting matter.

GASTEROPODS

Numerous gasteropod opercula were found in the soil in sector XEU. Also found were a few small shells on which, however, it has so far not been possible to put forward any hypothesis.

FISHES

Fish remains consisting mainly of vertebrae represent a very significant feature as far as the food resources of Shahr-i Sokhta are concerned. A large number of fish vertebrae have been found in the soil of sector XEU together with fragments of teeth and other bony parts (pl. 40).

BIRDS

No bird remains have been found in the soil treated by water separation, but an extremely large number of egg-shell fragments reveal another important component of the diet of the inhabitants of the site.

GENERAL CONCLUSIONS

This unexpected abundance of egg-shell fragments has shown up the possibility that a few bird species may have been domesticated as early as the third millennium B.C.. The rôle of eggs, birds and fish in the food supplies of a city where hunting is still vitally important and the cost of goat and sheep meat usually tends to rise, is considerable, especially for the poorer, dependent classes. The abundance of egg-shells and bird and fish bones in the Shahr-i Sokhta deposit seems to indicate that this model had already been adopted in the first urban centres. It is thus logical to assume that social complexity was accompanied by varied food supply sources.

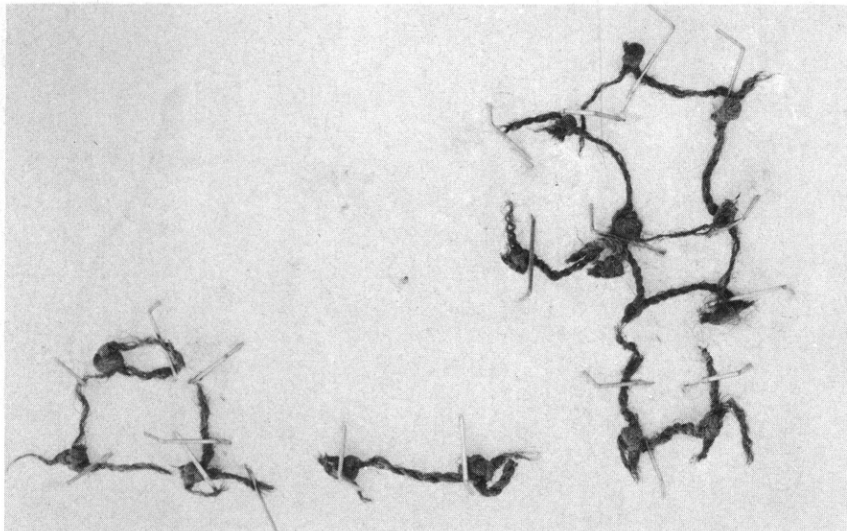
The presence of insects of the species mentioned above brings up a point of fundamental importance in the microclimatic reconstruction of human settlements—what we shall call the extraeconomic function of the diet.

The food cycle produces a gradually increasing quantity of kitchen refuse and organic waste. In a restricted area, this leads to a numerical increase in certain animal populations and the introduction of others which would otherwise remain isolated in their natural niches.

By means of his domestic and physiological waste, man creates slight alterations in the environment which are insignificant and short-lived in the case of individuals with no fixed abode. In urban settlements, on the other hand, the waste produced by man is concentrated and accumulated, and thus tends to create a new environment. Here numerous insect species find their ecological niche with all possible degrees of competitiveness. Again, because of the concentration, large-scale relationships of predation are set up; *Saprinus* sp., which preys on *Diptera* larvae, is a typical example of this in sector XEU.



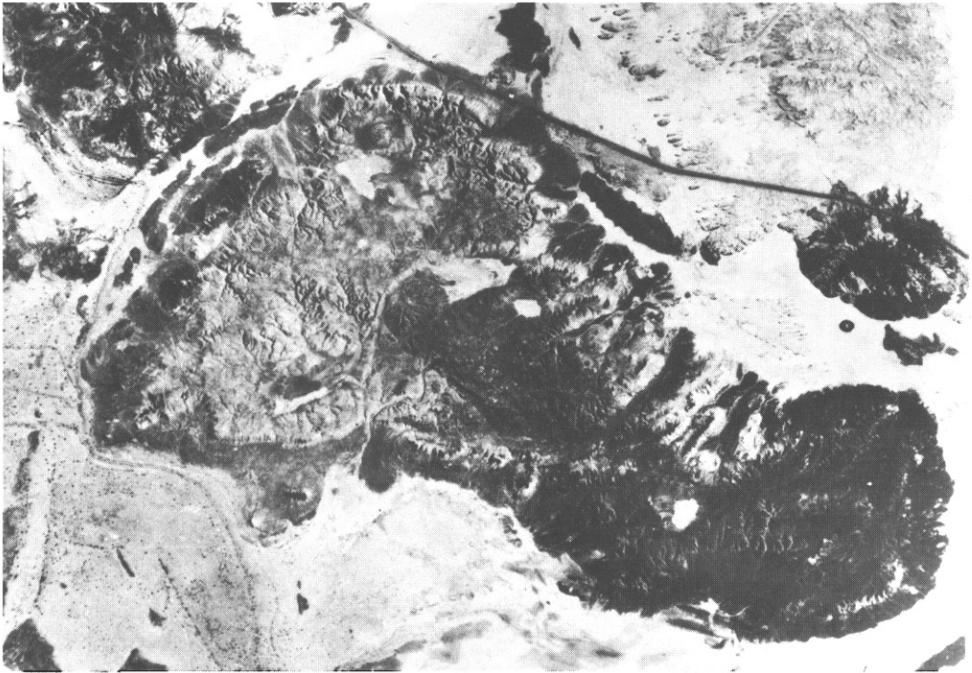
12. Shahr-i Sokhta: Period II. Clay figurine of an humped bull.



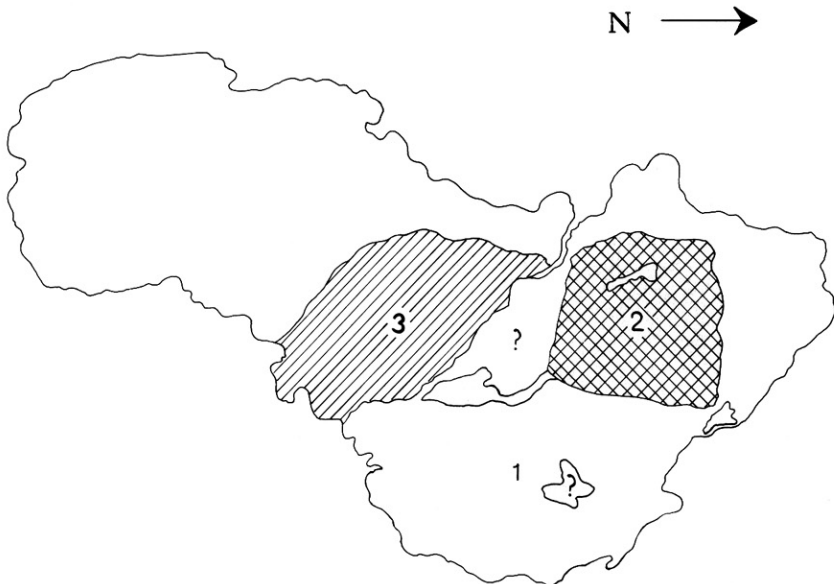
13. Shahr-i Sokhta. Garbage dump of XEU sector: Period II late. Fragments of nest, possibly used for fishing or fowling.



14. Aerial view (1962) of a cattle-keepers village beside Kuh-i Kwaja on eastern shore of Hamun-i Hilmand. Note the extensive use of reeds for the construction of dwellings, staples and fences. To the right small boats (tutān) are visible floating on water. The picture documents the high degree of adaptation reached by this segment of Sistan population. (Courtesy of Dr N. CORTI).



15a. Aerial view of Shahr-i Sokhta.



15b. The schematic interpretation marks the location of the three major parts of the town: the so-called "Lower City" (1), the "Walled Citadel" (2) and the graveyard (3). The white irregular stains in the city area are depression filled with clay.



16. Shahr-i Sokhta: Period II. House of Pit in the Eastern Residential Area of the "Lower City".



17. Shahr-i Sokhta: Period II. Storeroom XXXIX in Eastern Residential Area. Flotations of the earth deposits on floor and inside broken jars have allowed recovering of supposed *Chenopodium* seeds.



18. Shahr-i Sokhta. Pottery filling of Room CCLXXXI, cut 4, belonging to phase 5.



19. Shahr-i Sokhta. Horizontal stratification of an ancient phase of lane 1. The walls of a room of phase 6 can be seen overlying the old lane.



20. Shahr-i Sokhta. Room XX, House of the Stairs. On the background the walls and a door of phase 7. Under it a wall of phase 8, and a wall of phase 9 in the left side of the photo.



21. Shahr-i Sokhta. Garbage dumps in sector XEU. The upper one, extensively studied by means of flotation, determines phase 3.



22. Shahr-i Sokhta. The upper garbage dump, phase 3, of XEU sector. Bowls of Tepe Rud-i Biyaban type, found only in phase 4, can be seen in the foreground.



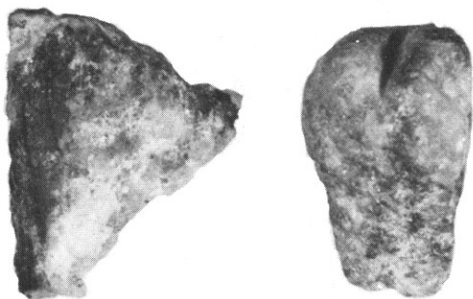
23. Shahr-i Sokhta. View of extensive excavation carried out in the IR-IW sectors.



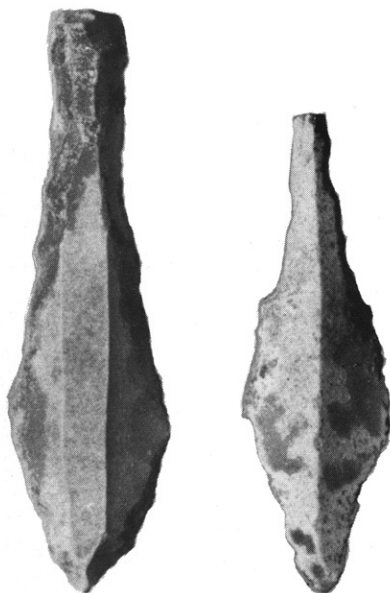
24. Shahr-i Sokhta, G. 106: the small chamber grave is built entirely of bricks.



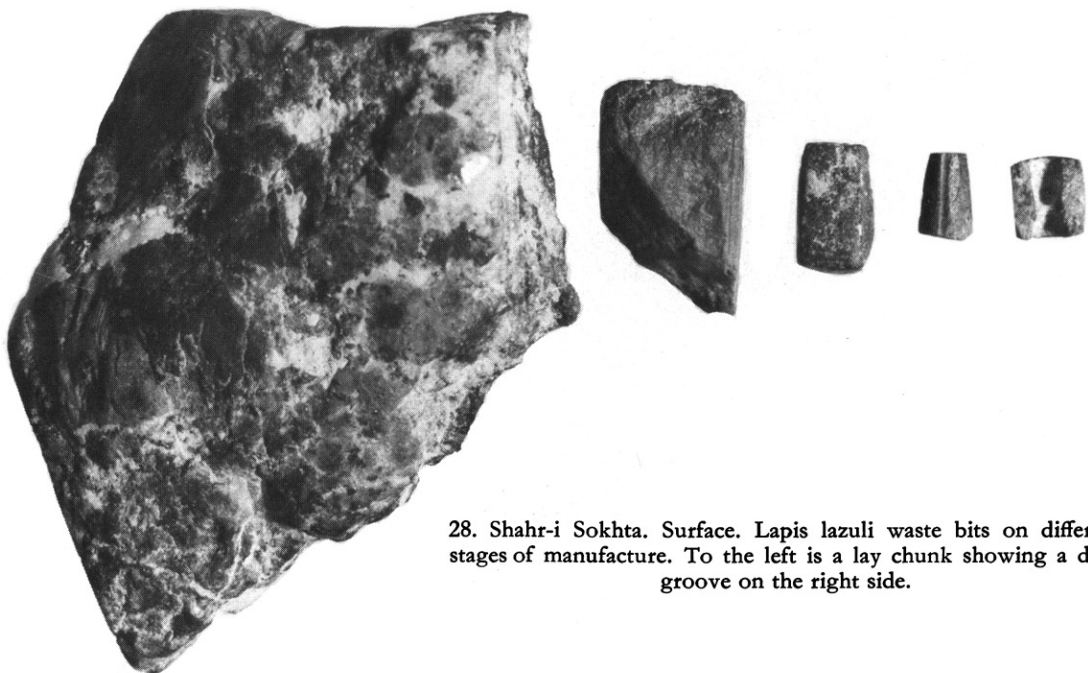
25. Shahr-i Sokhta. G. 201: dug in loose and gravel soil, with a brick wall along one of the longer sides. It contains the skeletons of a young individual and a child. Between the pottery is the spouted-jar decorated with a wide vertical red band very interesting.



26. Tepe Hissar. Surface. Lapis lazuli waste bits showing grooving produced by means of a flint bladlet. The fragment to the right shows an unsplit groove (cfr. fig. 28).



27. Shahr-i Sokhta. Area EWK. Micro-lithic drills recovered in floated soil.



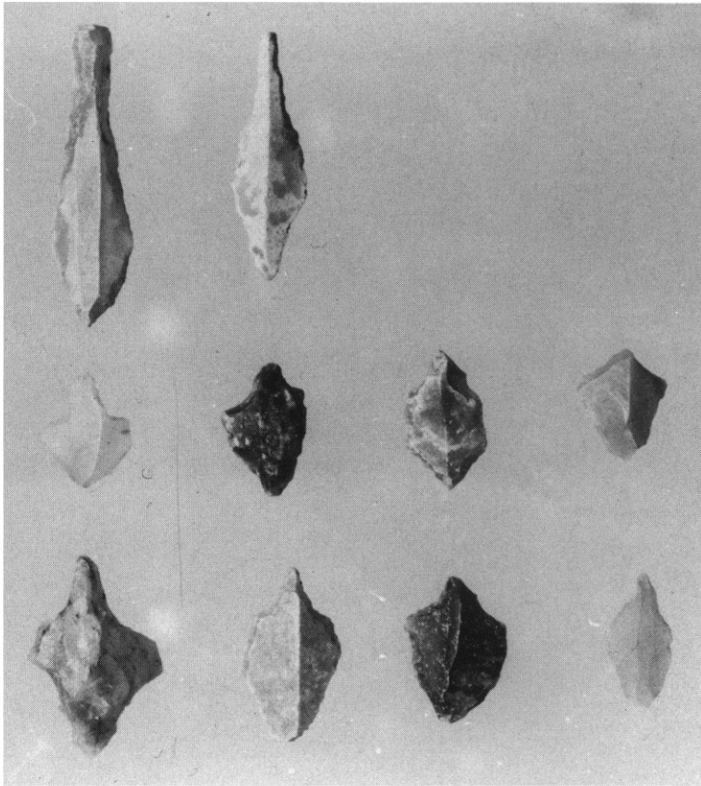
28. Shahr-i Sokhta. Surface. Lapis lazuli waste bits on different stages of manufacture. To the left is a lay chunk showing a deep groove on the right side.



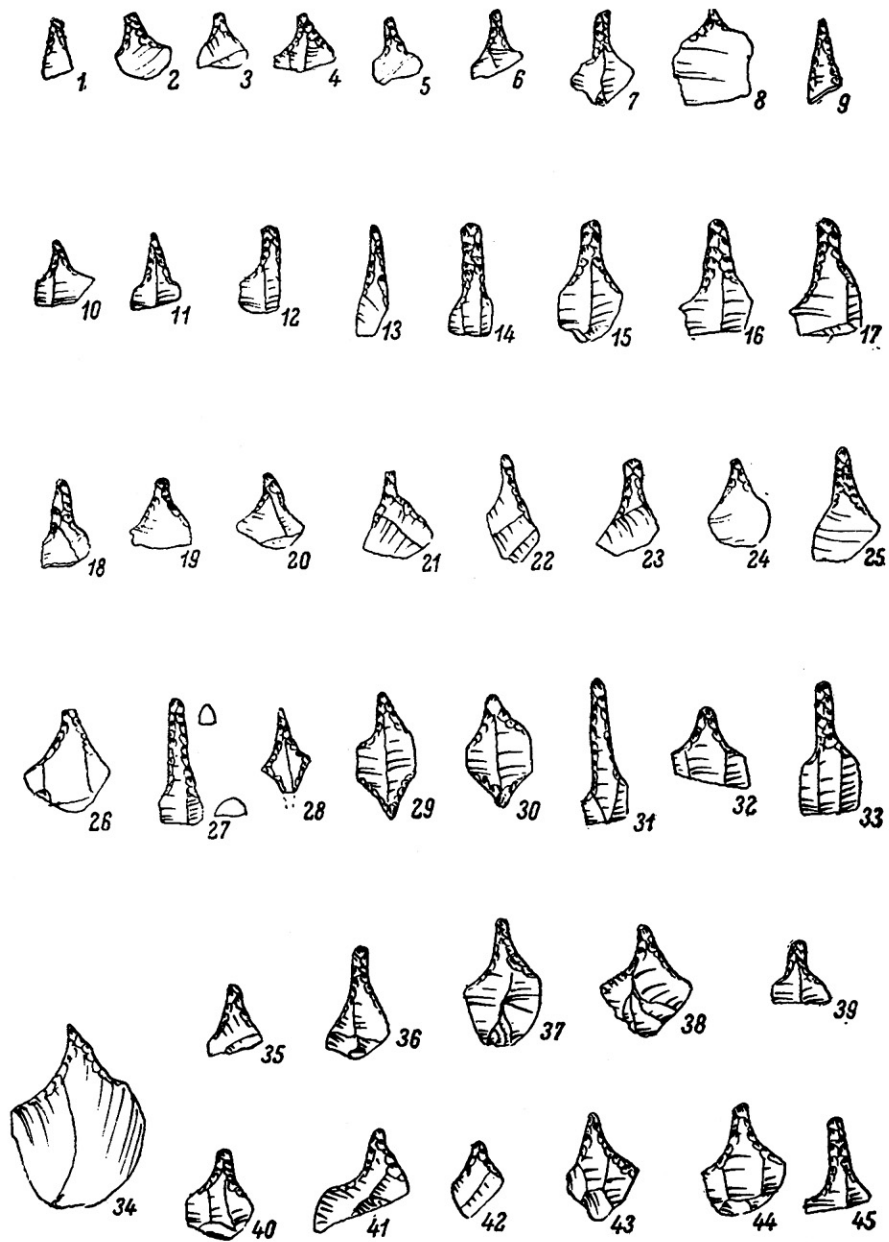
29. Shahr-i Sokhta. Area EWK. Small lapis lazuli block prepared for a bead by means of two splitting blows on both sides.



30. Shahr-i Sokhta. Area EWK. Small lapis lazuli bead split by erroneous drilling. Note the conical section of drilled hole.



31a. Shahr-i Sokhta. Area EWK. Types of flint drill heads.

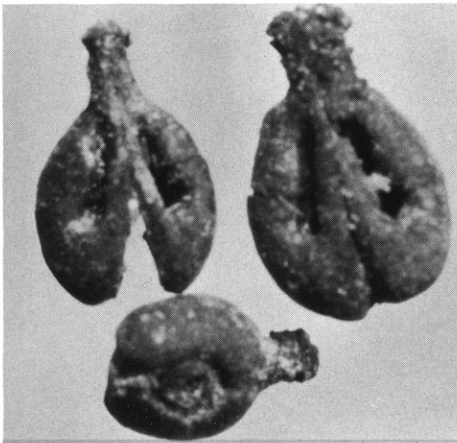


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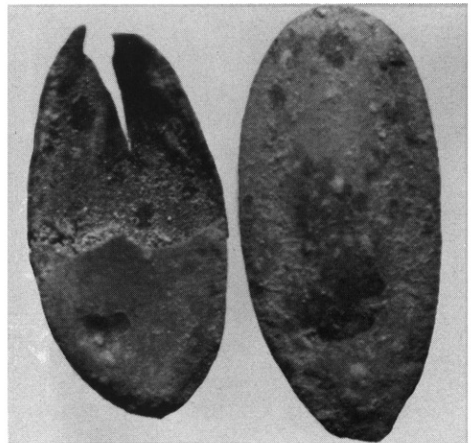
31b.



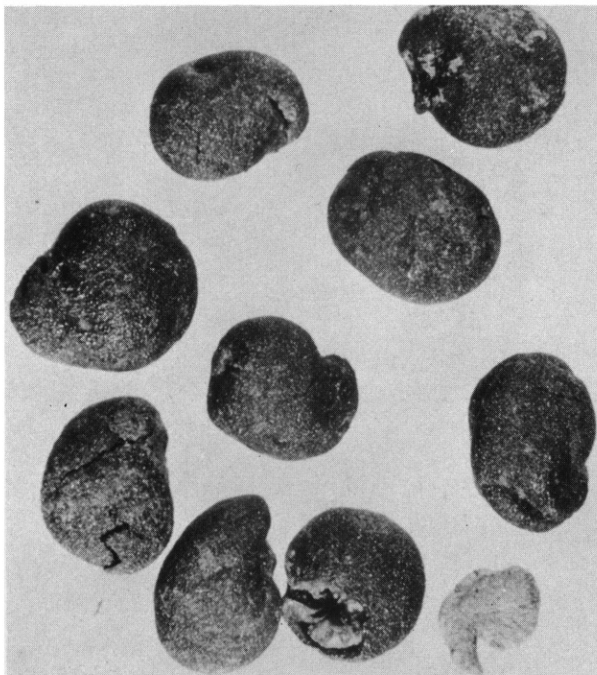
32. Sewers adopted in soil water-separation at Shahr-i Sokhta. The right sample is the result of sewage through a 2×2 mm mesh (large); the left one through a $0,5 \times 0,5$ mm mesh (small).



33. Shahr-i Sokhta. Garbage dump in XEU sector. *Vitis* sp.



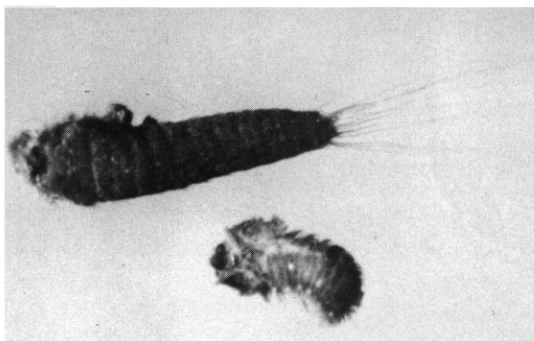
35. Shahr-i Sokhta. Garbage dump in XEU sector. *Cucumis* sp.



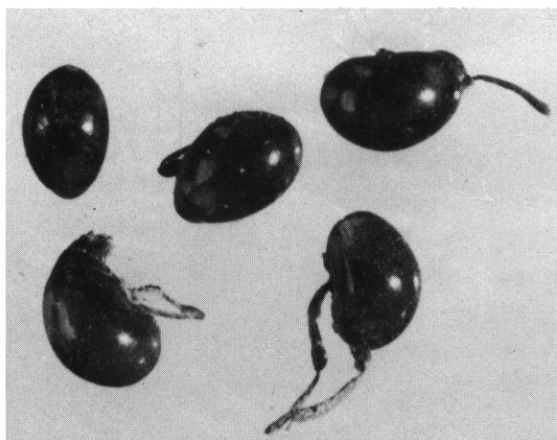
34. Shahr-i Sokhta. Garbage dump in XEU sector.
Chenopodium sp.



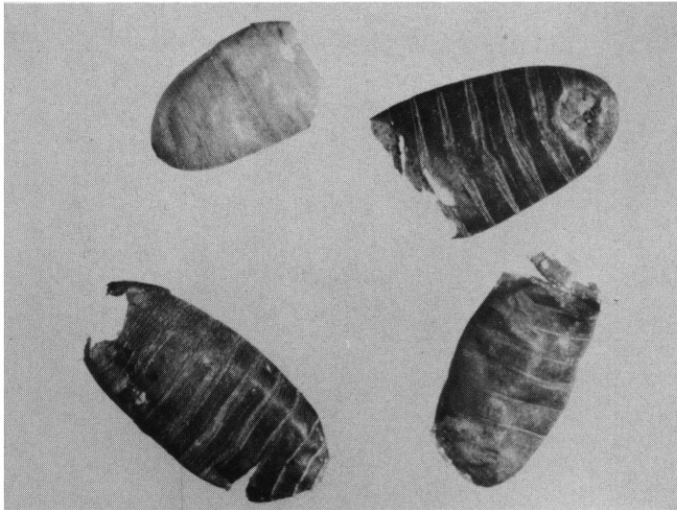
36. Shahr-i Sokhta. Garbage dump in XEU sector. *Triticum compactum*, showing traces of action from prey's insects.



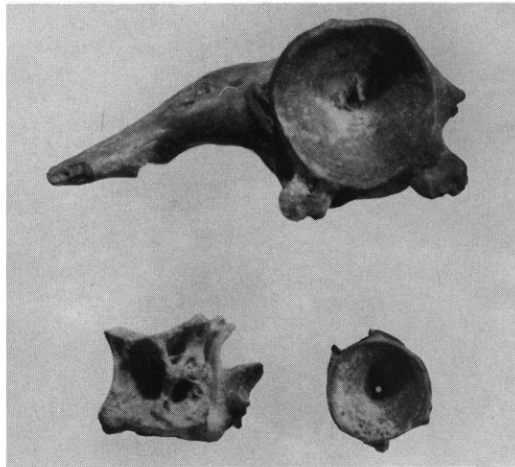
37. Shahr-i Sokhta. Garbage dump in XEU sector.
Larval exuviae of *Coleoptera Polyphaga Dermestidae*.



38. Shahr-i Sokhta. Garbage dump in XEU sector.
Remains of *Coleoptera Polyphaga Ptinidae Gibbium psylloides*.



39. Shahr-i Sokhta. Garbage dump in XEU sector.
Remains of puparia of *Diptera Brachycera*.



40. Shahr-i Sokhta. Garbage dump in XEU sector.
Fish bones.

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AND

J. M. M. UBAGHS



LEIDEN
E. J. BRILL
1974

In his concise essay on the *Urban Revolution*, V. Gordon Childe listed the ten basic attributes of any complex, quantitatively and qualitatively, urban society. None of the ten attributes necessarily prevails over or is prior to any other as, according to Childe, the urban revolution is the end-product of a slow accumulation of expanding food surpluses and increasingly specialized technical know-how.

Almost a quarter of a century later the critics of Childe are now analyzing the complex system of cause and effect in which the various component elements of urban communities have been combined. Under the growing stimulus coming from anthropological categories the modern worker investigating the formative process of ancient Near Eastern civilizations is concerned with determining how demographic factors influenced economic factors, and how social phenomena were evoked by man's gradual control over the productive potential of his environment.

Let us consider two of the points in Childe's system. In his Point 2 he states that all cities included classes of persons who did not produce their own food—craftsmen, transportation workers, merchants—but were supported by the surplus produced by the peasants. In his Point 9 he says that another portion of the pooled surplus was used to pay for the importation of raw materials; he further states that regular foreign trade over quite long distances was a feature of all early civilizations.

Social differentiation stimulates the monumentality of religious worship, class specialization and the demand for highly-prized raw materials. Technological development favors an increase in work productivity and a corresponding increase in the demand for imported goods. This economic axiom is perfectly exemplified in the tremendous growth of Greater Mesopotamia between the end of the 4th and the mid-3rd millennium B.C.

The rapid socio-economic growth of Mesopotamia was a decided stimulus to trade with regions producing hardwoods, metals and semi-precious stones, the materials most in demand for the monumental temples of the Jemdet Nasr period and the lay courts of the Proto-dynastic period which followed.

Lapis lazuli was one of the commodities in greatest demand for the decoration of temples and for personal adornment. In the Old World it is found in abundance on the southern shores of Lake Baikal and in the Kerano-Munjan district of Afghanistan. The metamorphic structure of the lapis lazuli

found in Sumerian sites in Mesopotamia seems to indicate that it came from Afghanistan, over more than 1200 miles of rugged mountains and extensive desert areas.

As the Sumerians had no political control over either the production centers or the intermediate Iranian plateau, for a good half of the 3rd millennium B.C. these more or less constant supplies were guaranteed by independent centers situated on the plateau, which acted as middlemen in the trade. In any case, all commercial transactions are characterized by one or more intermediaries. The exchange value of the commodities is proof that they were no longer exchanged on the basis of a direct and strictly temporary evaluation but as a function of the usefulness of the exchange in itself. The merchant thus became a full-time worker who in turn might stimulate new productive and manufacturing activities in his community as a function of the exchange of goods, most of which may have been in transit.

Scholars realized the importance of these mediating centers as research work progressed in eastern Iran—this large, semi-arid region which, however, was not lacking in favorable environmental conditions and large concentrations of population. Erich Schmidt's excavations at Tepe Hissar (1931-32) for the University Museum as well as those of the Soviet Academy of Sciences in southern Turkmenia and of the Istituto Italiano per il Medio ed Estremo Oriente at Shahr-i Sokhta have revealed the existence of technologically advanced towns and villages on the western slopes of the Afghanistan plateau.

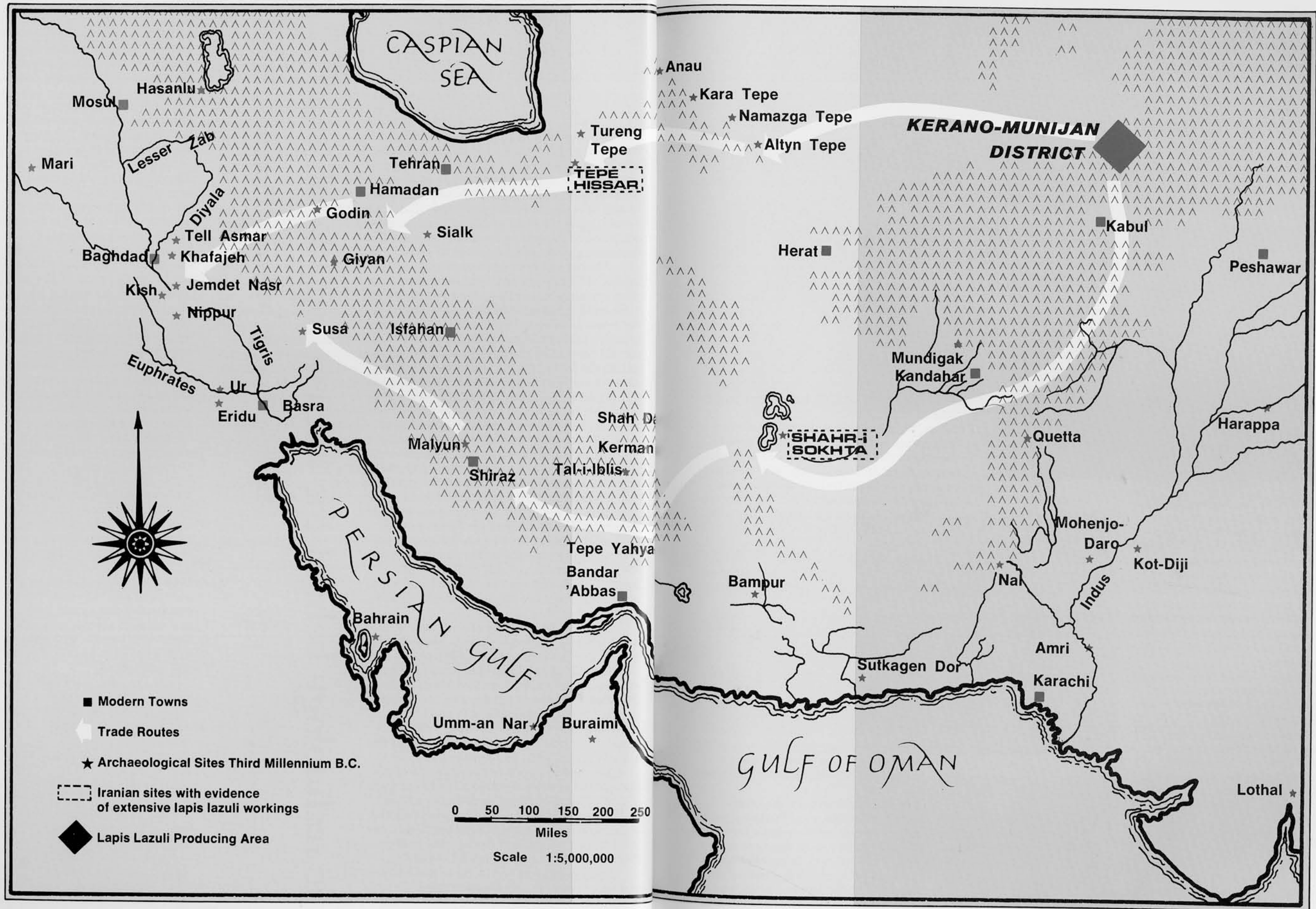
In the strata corresponding to the period 3000-2000 B.C. in the larger settlements, in particular at Shahr-i Sokhta and Tepe Hissar, remarkably large quantities of chips, rejects and finished objects of lapis lazuli have been found side by side with equally large numbers of stone implements made of flint, jasper and touchstone.

In the past, workers engaged in studying ancient urban civilizations paid relatively little attention to the lithic industry, absorbed as they were in the study of artistic and monumental products. And yet, according to the evidence at hand, it seems likely that, during the whole of the 3rd millennium, technology and economic production were still closely linked to stone implements. Whereas in Mesopotamia it may be claimed that these implements were rapidly replaced by metal ones, in Iran, Turkmenia and the Indus Valley many classes of implements were only slightly affected by the advent of metallurgy.

However, the evidence provided by the latest research seems to indicate that these classes were affected, as regards quantity and typology of the implements, by the gradual increase in trading. In the trading regions between the mining centers in Afghanistan and

Lithic technology behind the ancient lapis lazuli trade

Maurizio Tosi & Marcello Piperno

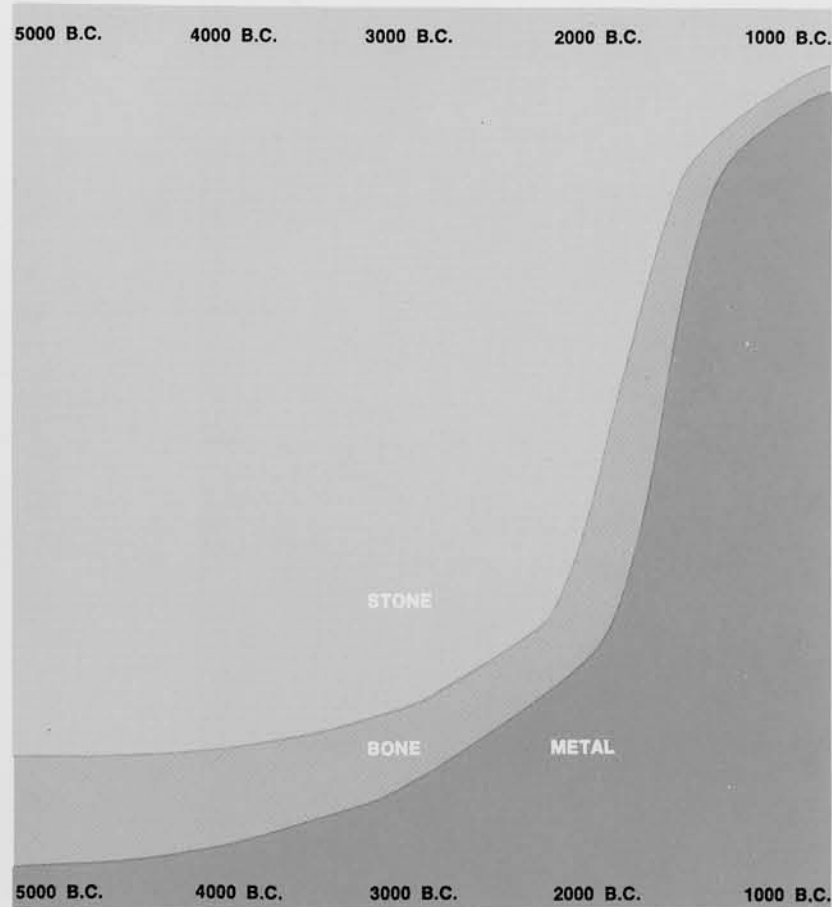


Market Area

Intermediary Area

Producing Area

Iran and Mesopotamia during the third millennium B.C. The distribution of the sites shows the comparative position of lapis lazuli producing, trading and marketing centers.



the Mesopotamian markets, the relationship between technology and trade is reversed with respect to Mesopotamia. Rather than technology stimulating trade, the latter affects the specialization of men and implements in the regions the product passes through.

This recent chapter in archaeological research in Iran has been documented not by sensational discoveries but by the application of two now long-standing methods: flotation of the excavated soil and functional analysis of the stone implements.

Functional analysis of the lithic industry has become one of the essential aspects of prehistoric research. Following on from the studies carried out by F. Bordes and S. A. Semenov, numerous scholars are now analyzing single classes of implements from this standpoint with a view to learning how individual artifacts were used by observing the microscopic traces left by their utilization.

However, little has so far been accomplished on material from protohistoric urban settlements in the Near and Middle East, although these sites are well suited to this kind of research.

In the first place, the state of preservation of the majority of finds from sites such as Shahr-i Sokhta often provides an immediate confirmation of the working hypotheses and often allows whole implements to be found and not just single components consisting of the lithic artifact.

1
A hypothetical model of quantitative relation of stone, bone and metal tools in settlements of Southwestern Asia between 5000 and 1000 B.C.

Secondly, the possibility of directly relating the single classes of implements to the rest of the archaeological evidence found in the same room of a building or in restricted areas of the excavation site allows the immediate association of the implement to the object for which it was used, thus eliminating a source of uncertainty which is always present when the finds are palaeolithic or come from cave levels characterized by the superimposition of various activities in a relatively restricted area.

Thirdly, the chalcolithic industry of Shahr-i Sokhta appears to be characterized by a production background which is common to the whole population and is composed of such simple implements as blades, sickle blades, end-scrapers, and so forth, which were used in numerous different ways according to the daily activities. Grafted on to this is the highly specialized production, restricted to single groups of artisans, of extremely standardized implements used exclusively for working particular classes of objects such as stone seals and alabaster beads, or for the manufacture of certain highly prized materials such as lapis lazuli, turquoise and carnelian. This specialization, which also attests the presence of full-time artisans, results in the production of a large number of implements which are morphologically identical because, due to the technical skill of the artisan who makes and uses them, they are practically free from variations. These implements are usually concentrated in well-defined areas.

One of these areas, discovered during the 1972 excavation campaign in the northwest zone of Shahr-i Sokhta, consists of a center for the intensive working of lapis lazuli and, to a lesser extent, of carnelian and turquoise.

In the autumn of 1972, the excavation of the center and the flotation of all the earth fill in the excavated rooms allowed the recovery of a huge quantity of lapis lazuli waste and of a certain number of finished beads as well as beads broken during the various working phases, in close association with a good number of microlithic implements hitherto unreported among the material found on the surface or coming from excavations previously carried out in various zones of Shahr-i Sokhta.

Also, during the excavation of the necropolis, we had the good fortune again to find this association between lapis lazuli and stone implements in one of the most recent tombs discovered (G. 12). In another tomb (G. 10), a set of 28 microblades and a flint borer had been placed inside a bowl, and a similar offering of 99 microblades was contained in a pear-shaped beaker found in G. 2. All these tombs date to between 2600 and 2400 B.C. This group of finds allows the whole process of lapis lazuli working to be recon-



2



3
Types of microscopic flint borers from Shahr-i Sokhta area EWK.

2

House of the Pit at Shahr-i Sokhta, seen from the east. It covered an area of 108 square meters. The main entrance was to the right, at the bottom of an outer staircase. This house dates from the period of most intense lapis lazuli manufacture, 2700-2400 B.C.



4

4
Shahr-i Sokhta (Seistan): Excavations in area EWK on the western edge of the mound. The worker in the foreground is standing on the occupational layers of a lapis lazuli manufacturing house. The basket carrier to the right heads towards the flotation unit.

5



5
Shahr-i Sokhta from the northeast.

structed and certain classes of stone implements to be assigned to the individual phases of the process.

When examined under the microscope, a large number of lapis lazuli rejects revealed the presence of incisions, polished surfaces and chipping which are the tiny scars left by the artisan during the initial working phases of the raw material.

The lapis lazuli from Badakshan is found in large, rounded masses composed of a limestone cortex enclosing one or more zones of purer lazurite. It thus required an initial cleaning operation to separate the valuable material from the impurities accompanying it. For this purpose, a small portion of the surface of the mass was polished and an incision having an average depth of 1 mm. was made at the dividing line between the limestone and the lazurite, using a flint microblade with a trapezoidal or triangular section. Tests carried out on lapis lazuli waste using similar blades have shown that this was a fairly simple operation, the blade easy to use by hand and the incision made rather quickly. At the end of the operation faint traces of utilization are visible on the edges of the blade.

The separation of the purer material from the cortex was carried out by striking the block at the point of incision at a certain angle, probably using the indirect striker method which is well-known in stone-working.

The whole process may have been made easier by heating the blocks to soften the raw material. Evidence for this surmise is found in the signs of cracking and in the darker color of the surface of several small blocks of lapis lazuli.

By repeating these three operations of smoothing, incising and chipping on the lapis lazuli block, the rough shape of the desired bead was finally obtained. It was then finished by polishing the whole surface.

The results of these operations can be seen at Shahr-i Sokhta in the classification of the lapis lazuli wasters. The majority are flakes or blocks, followed by fragments with polished surfaces, others with the furrow left by the incision or with several furrows intersecting at the corners of the blocks, and others again with a more regular shape, almost completely polished and ready for drilling but still showing faint traces of the furrow.

The next working phase, drilling, must have been the most delicate of the whole process and the one in which the probability of wasting pure and extensively processed material was greatest. These losses are attested by the numerous partially perforated beads broken during drilling found among the lapis lazuli wasters. Indeed, in comparison with the number of wasters, very few finished

beads were found in the excavation of this production center. Erroneous drilling angles and flaws in the crystalline structure were the main causes of failure.

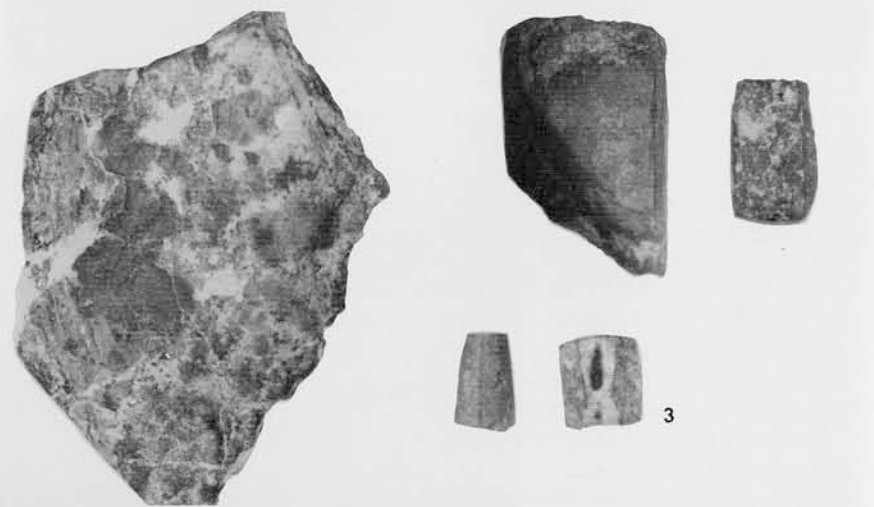
The last phase was the polishing of the still rough surfaces of the fragment. In more recent times, this was carried out by putting a large number of already drilled beads in a damp leather bag which a laborer then kept rotating. The constant friction on all sides ensured the definitive smoothing and polishing of the beads. There is no direct evidence that this was the system in use but the lack of any implement suitable for polishing makes us at least suppose the existence of a similar process.

It must be remarked that this system of interlocking phases was not so rigid in the workshop excavated at Shahr-i Sokhta. In some cases, it appears that polishing preceded drilling, and that drilling could occur before smoothing. Besides, the presence of a large number of pyramid-shaped flakes seems to point to the existence of an alternative process to the one of cutting and hammering to separate the blocks.

The system of working lapis lazuli thus seems to consist of two important, quite distinct phases: a) the separation of the lapis lazuli from the mass of calcites and barylites which were technologically and economically worthless (*basic working process*); b) the production of objects from the purified lapis lazuli (*specific production processes*).

For technical reasons and perhaps also because of the existing system of division of labor, the basic process seems to have consisted of a rigidly fixed series of phases, while a certain amount of flexibility according to the day to day requirements of the workshop was allowed in the specific processes. We shall see later on the importance of this distinction in the system of trading between Mesopotamia and Badakshan.

In a report preceding the 1972 excavations on the microdrilling techniques connected with the production of stone seals and



1 Shahr-i Sokhta: The cut of a groove with a microblade is the most characteristic step in working lapis lazuli in the centers of eastern Iran. The block above is refuse from which was separated a purer fraction, possibly similar to the one below, already on its way to being smoothed in the shape of a cylindrical bead.

2 Shahr-i Sokhta: Cylindrical beads split at different stages of the perforation process.

3 Phases of manufacture of a lapis lazuli bead from a large chunk of stone as reconstructed from wasters found in area EWK of Shahr-i Sokhta.



alabaster beads it was stated that the drill-heads used for these classes of objects could not have been the same as those used for drilling lapis lazuli and turquoise beads, mainly because the diameter of the holes visible in the latter (no greater than a millimeter and a half) was much smaller than that of the drill-heads (about 2-3 mm.).

Only by virtue of flotation was it in fact possible to find hundreds of tiny microlithic borers which, as we shall see later, were closely related to the production of lapis lazuli beads.

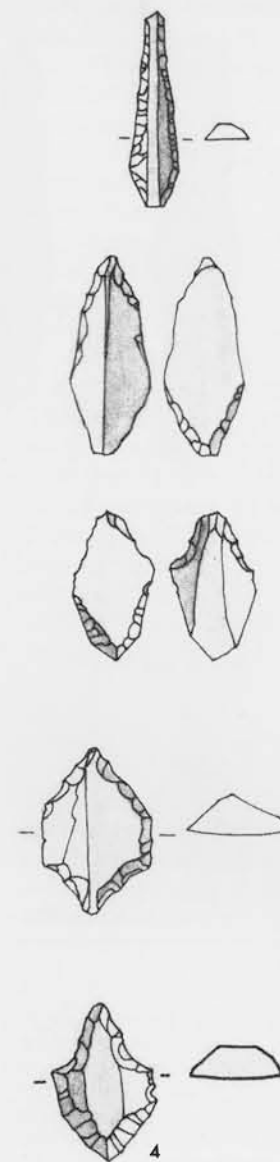
Typologically speaking, three main types can be observed, each of which shows slight variations due mainly to the position of the retouching.

The type most obviously used for drilling operations is a classical borer obtained from a flint microblade with double side-backed retouching on the working edge and proximal inverse retouching which produces the convergence of the edges towards the bulb. The latter is often removed so that the borer can be more easily fitted into a handle. The whole instrument is about 2 cm. long, of which about 1 cm. is accounted for by the borer itself.

The second type, which varies in size from 5-6 mm. to 1cm., is generally triangular in shape with a barely outlined distal borer between two retouched notches. As a rule, in this type also, the proximal part has inverse retouching on the two edges.

The third type, similar in shape and size to the second, differs from it by the presence of a rather steep, direct retouching along the two edges and the absence of proximal inverse retouching. The relatively high frequency of these features in a large number of implements indicates that it is not simply a variant of Type 2 but a deliberately produced shape which probably has slightly different functions.

Microscopic analysis of all these implements has revealed not only traces of wear on the points of the elongated Type 1 borers due to their rotation but also numerous patches of



4 Types of microlithic borers from Shahr-i Sokhta area EWK.

lapis lazuli powder adhering to the small retouch scars. In one case, microscopic traces of carnelian were found on the extremity of a Type 1 borer fragment.

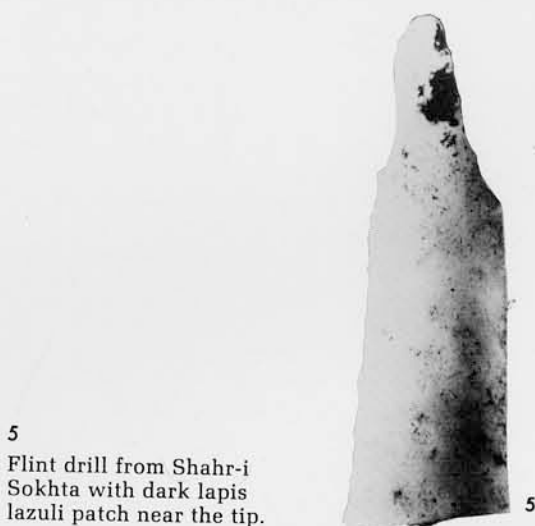
So far, 69 implements of the more than 200 recovered have been found to bear traces of lapis lazuli. This proportion is rather significant if it is borne in mind that during flotation a large number of implements may have had the small traces of power adhering to their surfaces washed away by the water.

Analysis of the distribution of the lapis lazuli patches over the borers is still being carried out, and should enable us to identify the various uses to which these implements were put.

To date, the following constants have been found: on the Type 1 borers the lapis lazuli powder regularly covers the distal extremity and is often present over the whole length of the working part of the implement; on Types 2 and 3 the powder is concentrated mainly on both the side notches; in other cases, it is found on the two faces of the implement on a level with the notches themselves and the small borer; less frequently it is found on the borer point itself. The impression one has is that these implements were not intended to be used simply for drilling but were related to some of the preceding phases.

After the discovery of the lapis lazuli processing workshop at Shahr-i Sokhta and the identification of the function of the large number of borers found in it, we decided to subject to microscopic analysis the thousands of borers found during a survey carried out on the surface at Tepe Hissar by G. M. Bulgarelli, R. Biscione and M. Piperno in August 1972.

This material was coordinated with Erich Schmidt's old grid which should make dating possible. Many of the implements, even after forty years' exposure on the surface and in spite of our careful washing, still show traces



5 Flint drill from Shahr-i Sokhta with dark lapis lazuli patch near the tip.

of lapis lazuli powder and, in some case, of bitumen.

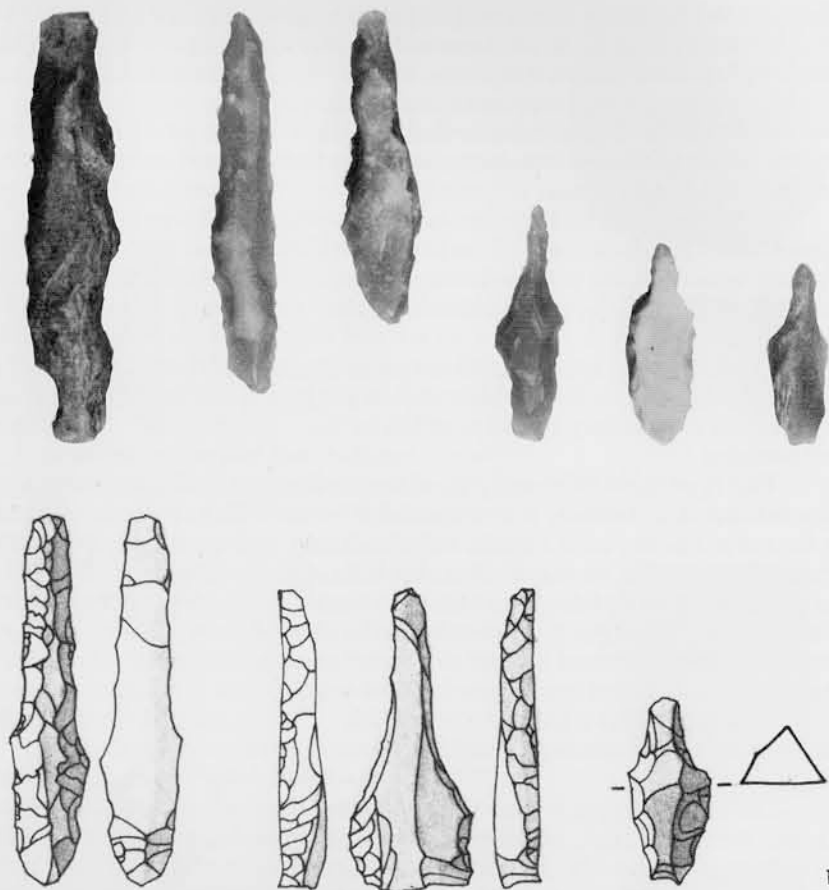
Study by Mr. Bulgarelli has shown that these implements were not made by the flaking technique used at Shahr-i Sokhta but mainly by burin blows. This would account for the presence of hundreds of burins at Tepe Hissar whereas they are extremely rare in the other 3rd millennium assemblages in eastern Iran. As part of his study, Mr. Bulgarelli has reconstructed the various working phases from burin to finished borer.

In considering Shahr-i Sokhta and Tepe Hissar we are thus dealing with a rather interesting phenomenon of functional convergence and technological divergence, whose explanation may be deduced from the exact locations where the material was found. At Hissar it was scattered all over the site, pointing to the existence of several small workshops, each of a few artisans. At Shahr-i Sokhta there was a single large production center, which seems to imply the presence of specialized artisans depending on a centralized authority controlling the internal demand and exportation.

The discoveries made at Tepe Hissar and Shahr-i Sokhta have made it necessary to reassess the lapis lazuli objects found at the excavated cities of protodynastic Mesopotamia. By courtesy of Dr. R. Barnett of the British Museum and Dr. R. H. Dyson, Jr., of the University Museum a thorough examination has been made of a good deal of the available material from the Royal Cemetery of Ur, which seems to correspond chronologically to Shahr-i Sokhta period II, where much of the lapis lazuli found is concentrated. The aim of the survey was two-fold:

- a) to verify the presence of the same traces of working as those found on the lapis lazuli wasters in the Iranian centers;
- b) to establish how the material was shipped from Badakshan to Mesopotamia, whether in the form of raw material, semi-finished or the finished product.

The incised and carved objects are culturally typical of the Sumerian tradition and have sufficient points in common with objects of other raw materials. Because of their geometrical simplicity, beads seemed the most suitable for typological analysis without the



1
Microlithic flint borers from Tepe Hissar, corresponding typologically with those from Shahr-i Sokhta.

2
Flint drill from Shahr-i Sokhta (left) and one from Tepe Hissar. Note the close functional similarity in rather different tool-making traditions.



3
Lapis lazuli cylinder seal of the third millennium B. C., one of the few complete lapis lazuli objects other than beads found at Shahr-i Sokhta.

necessity of considering factors of an aesthetic or social nature.

Of the 45 types from the Royal Cemetery of Ur so far identified only three are repeated at Shahr-i Sokhta and Tepe Hissar: the plain surface cylindrical, spherical and discoidal types, the simplest and least typical types of the Royal Cemetery which abounds in biconical, barrel and axe shapes. There seem to be good grounds for concluding that most of the Ur beads were not made in eastern Iran.

What, then, is the explanation for the large quantity of lapis lazuli waste found at Hissar and Shahr-i Sokhta? The probable explanation is one of an exquisitely economic nature: the technology and production of rejects increased as a function of an increase in costs and speed of transport which gave rise to the necessity of freeing the lapis lazuli from all its impurities (more than 60% of the original mass). The elimination of worthless material reduced deadweight and allowed the semi-finished product to be sold at a higher price. It is possible to reconstruct an equation as follows:

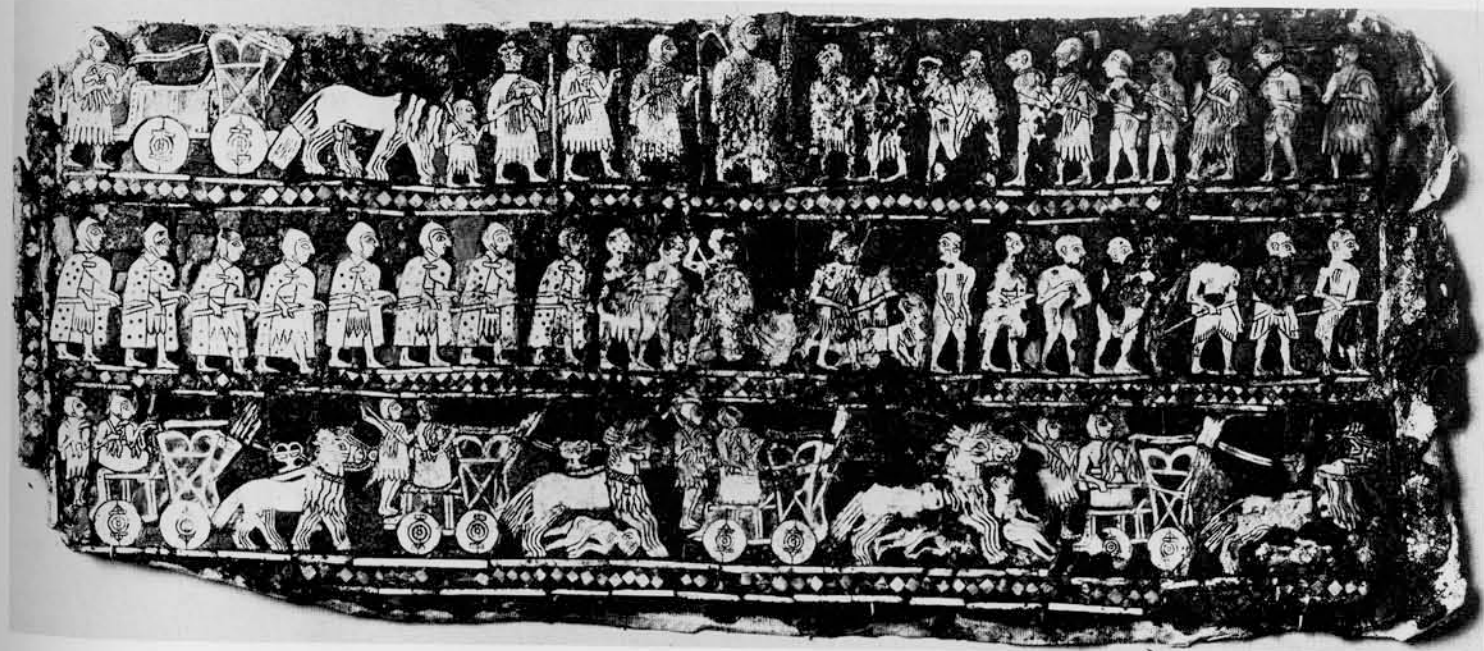
Total Price = cost of extraction + middlemen's operations and profits + trans-



4, 5

War scene from the mosaic standard of Ur, excavated by the Joint Expedition of the British Museum and the University Museum. About 2500 B.C. . . . Two lapis lazuli tesseræ from the end of the standard, showing

the groove cut on the polished face of the block and the underlying rough face resulting from the splitting blow. . . . Photos courtesy of the British Museum Western Asiatic Department.



port costs + processing costs + cost of commissions and taxes.

Thus the development at Tepe Hissar and Shahr-i Sokhta of workshops for semi-processing the raw material must imply that the saving in transportation costs to the final destination was measurably greater than the workshop costs.

An indirect confirmation of the fact that lapis lazuli was shipped from Iran to Mesopotamia in the form of small blocks or semi-processed masses comes from the finding of typical flaking furrows on necklace beads and bracelet elements and on mosaic tesserae. The latter are of particular interest as they were less carefully smoothed and polished than decorative objects.

By courtesy of Mr. F. Dungey, Chief Restorer at the Department of Western Asiatic Antiquities of the British Museum, we were able to examine a few tesserae of the central register of the war scene in the so-called "Standard of Ur" which was restored in March-April 1973. Four of the fifteen tesserae examined showed the typical furrows produced by flint blades.

Although only a beginning, this is a definite indication that the study of the relationship of mutual stimulation between two of Childe's categories—technology and trade—is a valid approach for future research and anthropological analysis. ●

Suggested Reading

Herrmann, G.

1968

"Lapis Lazuli: the Early Phases of its Trade," *Iraq*, 30, 21-67.

Piperno, Marcello

1973

"Micro-drilling at Shahr-i Sokhta: the making and use of the lithic drill-heads," in *South Asian Archaeology*, ed. Norman Hammond, Park Ridge, N. J. Noyes Press, 1973, 119-129.

Tosi, M.

1969

"Excavations at Shahr-i Sokhta. Preliminary report on the second campaign," *East and West*, N. S. 19, 283-386.

Maurizio Tosi is Director of the excavations at Shahr-i Sokhta conducted on behalf of ISMEO. Marcello Piperno is on the staff of that expedition.

L'industria litica e la lavorazione degli elementi di collana a Shahr-i-Sokhta (Iran)*

di Maurizio Tosi

Le prime città del mondo, preparate da un lento continuo sviluppo delle conoscenze tecniche e dal costante incremento demografico e produttivo delle popolazioni agricole, sorsero nel vicino Oriente, tra la Mesopotamia e l'altopiano iranico, nella seconda metà del IV millennio a. C. La concentrazione di uomini e mezzi di produzione in singoli agglomerati accrebbe rapidamente il valore dell'interscambio economico e favorì la formazione di classi intermedie, artigianali e non direttamente produttrici dei mezzi di sostentamento. Le città divennero, quindi, mercati d'acquisto delle materie prime provenienti dalle più varie zone di produzione e centri di lavorazione delle stesse (Fig. 1).

Le grandi vallate alluvionali, quali la Mesopotamia, l'Indo e l'Egitto, dove si realizzò la *Rivoluzione Urbana*, sono peraltro sprovviste di alcune materie prime fondamentali, quali metalli, legno e pietre: di qui, l'esigenza sempre crescente di procurarsele attraverso il commercio o la guerra.

* Mentre erano in corso di stampa le bozze di questo periodico, abbiamo appreso che la spedizione archeologica, guidata dal nostro socio, Prof. Maurizio Tosi, durante la campagna di scavi condotta nello scorso anno, per conto dell'ISMEO (Istituto per il Medio ed Estremo Oriente), a Shahr-i-Sokhta, ha scoperto un importante centro abitato di 5.000 anni fa, sepolto sotto uno spesso strato di sabbia.

Il Prof. Tosi avanza l'ipotesi che si tratti della capitale del leggendario regno di Arappa, famosa per il commercio e l'industria del lapislazzulo.

Ci rallegriamo con il Prof. Tosi per la brillante scoperta che ha suscitato vivo interesse nell'ambiente internazionale degli archeologi e che è stata riportata dalla stampa di tutto il mondo dal « The Times » al « Corriere della Sera ».

Alla fine del IV millennio, quando il metallo era ancora troppo costoso per essere diffuso su larga scala, la pietra manteneva inalterata la sua importanza nella vita economica delle comunità. Se ne faceva larghissimo uso ed il livello di specializzazione e perfezionamento della lavorazione aveva raggiunto gradi veramente elevati. Tre erano, comunque, a grandi linee, le classi di oggetti che si ricavano dalla pietra: recipienti, grani e pendenti di collana, strumenti di offesa e di lavoro. Questi ultimi, in parte

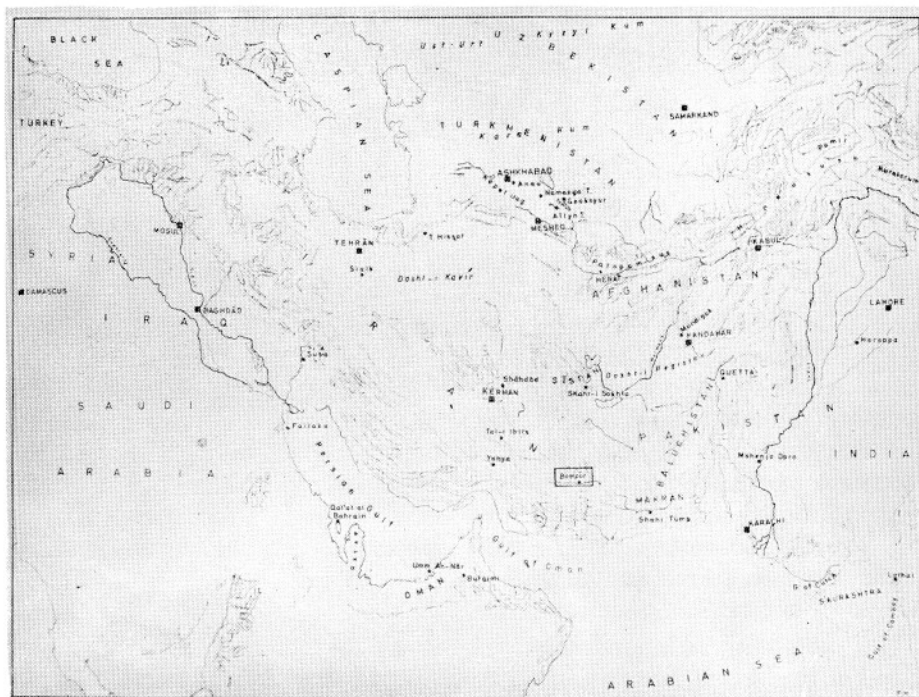


Fig. 1 - Le principali località archeologiche dell'Asia sud-occidentale, nel IV millennio a.C. (Disegno di M. Fiorentini)

erano prodotti con metodi e tipi di tradizione paleolitica, in parte rappresentavano delle innovazioni perché realizzati in funzione di esigenze connesse a problemi tecnici, nati dalle necessità di lavorazione dei nuovi oggetti di consumo. È il caso, ad esempio, delle teste di trapano, recentemente scoperte dalla Missione Archeologica Italiana in Iran a Shahr-i-Sokhta.

un insediamento protostorico del Sistan iraniano (figg. 2,5) e datate alla prima metà del III millennio a. C.

Un fiorente commercio incrementava l'interscambio e la produzione di oggetti di pietra in tutta l'Asia sud-occidentale. L'alabastro per i recipienti proveniva dall'Egitto e dall'Iran orientale, i poli estremi — occidentale ed orientale — della civiltà urbana, agli inizi del III millennio; la

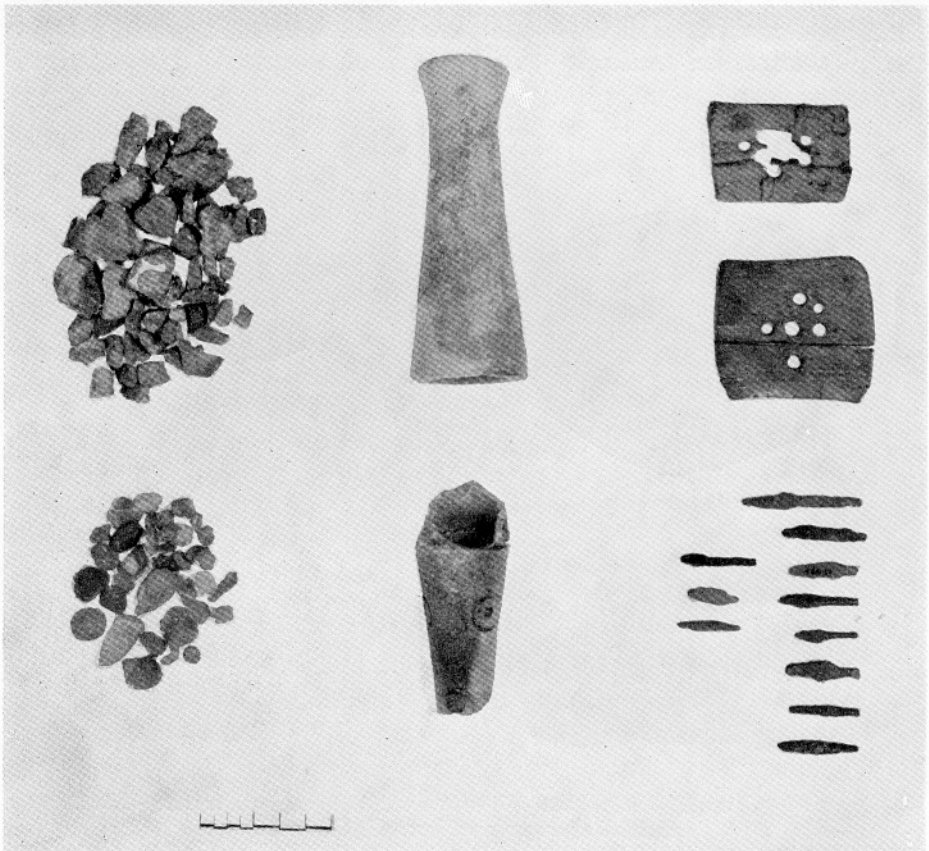


Fig. 2 - *Shahr-i-Sokhta*. Materiale litico di scarto e strumenti di lavorazione della pietra. In alto: scaglie di lapislazzulo, manico reggiata per trapano ad arco, tavolette di legno con fori di fissaggio.

In basso: scaglie e ciottoli di cornalina, manico reggiata con anima di metallo, punte di trapano di diaspro (Foto: G. Silvestrini).

steatite, dall' Iran sud-orientale; la diorite, dal Belucistan; mentre dall'Afghanistan, dove ancor oggi, come allora, si realizza una vastissima produzione di pietre semipreziose, provenivano il lapislazzulo, la cornalina ed il crisopazio, tra i prodotti più richiesti e lavorati nella Mesopotamia protourbana; il turchese, infine, aveva probabilmente il suo centro di estrazione nel Khorassan, dove tuttora se ne ricavano notevoli quantitativi.

Strumenti di lavoro e recipienti meno importanti erano fabbricati facendo uso ovviamente di pietre locali. In Mesopotamia, dove difetta qualsiasi tipo di pietra — a parte il calcare gessoso dei terrazzi dell'Era Terziaria — si preferì, fin dall'inizio, incrementare l'uso del metallo. Infatti, posti nella condizione di importare l'una o l'altra materia prima, è logico che gli abitanti del territorio « tra i due fiumi » finissero col preferire il

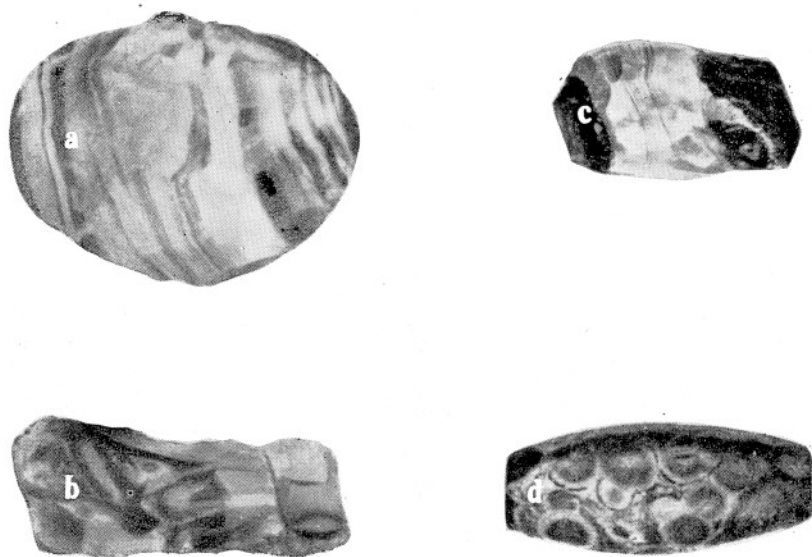


Fig. 3 - *Tepe Graziani* (Sistan). Fasi di lavorazione dei grani di collana, illustrate con materiali di superficie (Foto: G. Silvestrini).

metallo, sia perché esso consentiva una durata degli strumenti circa 100 volte maggiore, sia perché offriva la possibilità della rifusione. In altre regioni, quali la valle dell'Hilmand in Iran e la valle dell'Indo in Pakistan, l'uso degli strumenti di pietra persistette durante tutto il III millennio.

La città di Shahr-i-Sokhta, nel Sistan iraniano, fiorì tra la fine del IV e la fine del III millennio, grazie alla sua posizione strategica che le permetteva di controllare le vie di transito delle pietre semipreziose afgane verso la Mesopotamia. La lavorazione, anche soltanto preliminare, di lapislazzulo, cornalina, turchese e crisopazio assorbiva probabilmente una parte considerevole della popolazione attiva. Gli scavi, infatti, hanno permesso di ricostruire, con buona approssimazione, lo strumentario e le varie fasi di lavorazione degli elementi di collana.

In questo ciclo di lavorazione si distinguono sostanzialmente tre fasi principali: scheggiatura, lisciatura e perforazione. Il blocchetto di pietra — a volte un semplice ciottolo — veniva tagliato o scheggiato finché non assumeva la forma approssimativa del grano di collana (figg. 3, a-b, 4); quindi, con sabbia e mola di pietra vulcanica, si provvedeva a lisciare il grano fintantoché non raggiungeva una superficie regolare, talvolta anche con piacevoli effetti cromatici per le venature della pietra (figg. 3, c-d).

La perforazione costituiva certamente la fase più delicata, perché spesso comprometteva l'integrità dell'elemento di collana. Il trapano

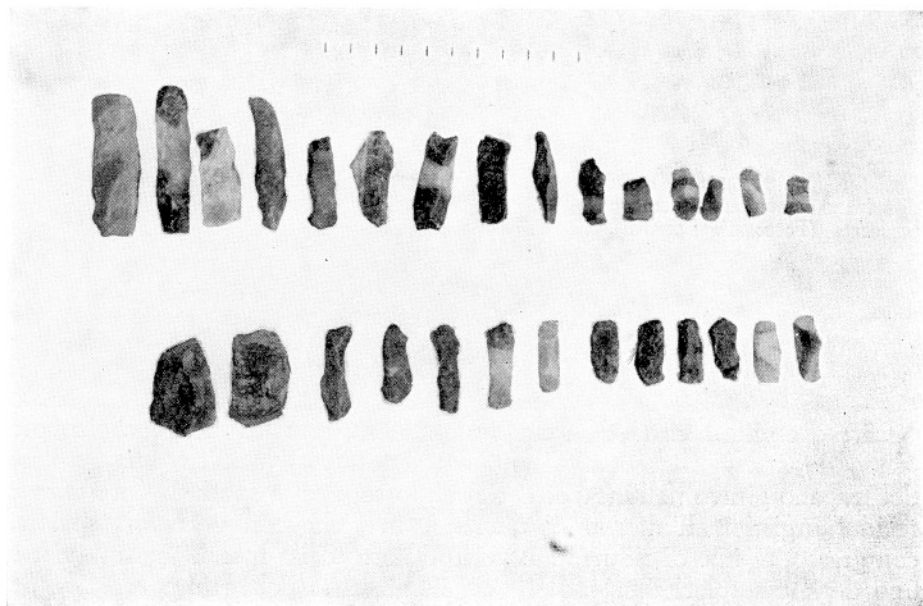


Fig. 4 - *Tepe Graziani* (Sistan). Elementi di collana sbazzati (Foto: F. Bonardi).

usato consisteva in un'asta ed in un archetto che imprimeva a quella un movimento rotatorio a fasi alterne. La punta del trapano, per fori di diametro superiore ad un millimetro, consisteva in un cilindro di diaspro, il cui effetto erosivo era accresciuto da sabbia o polvere di quarzo. La maggior difficoltà consisteva nel mantenere l'asta rotante, in posizione eretta senza, peraltro, compromettere la regolarità del movimento. A nostro avviso, gli artigiani di Shahr-i-Sokhta si servivano di manici di pietra,

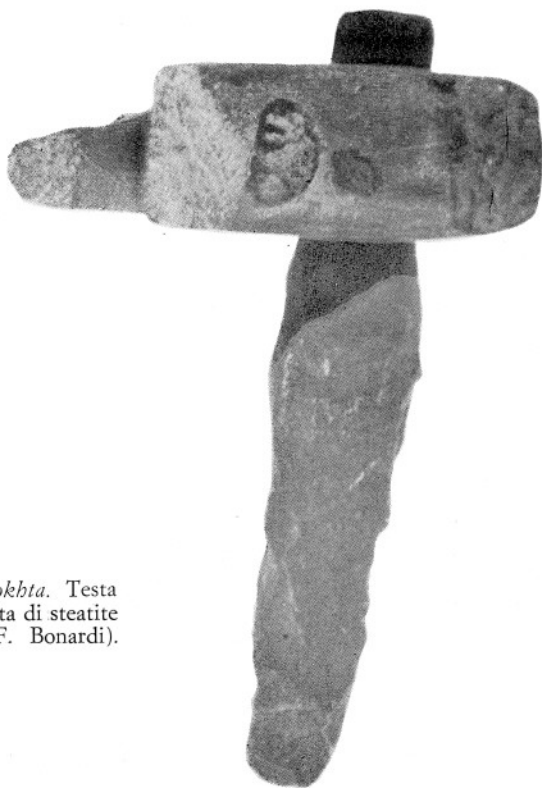


Fig. 5 - *Shahr-i-Sokhta*. Testa di trapano e tavoletta di steatite perforata (Foto: F. Bonardi).

calcare o argilla seccata, alla cui base era praticato un incavo conico profondo da 2 a 4 mm: una mano teneva, quindi, il manico, mentre l'asta del trapano girava nell'incavo. È da supporre, per la sporadica presenza di residui organici all'interno di questi incavi, che essi venissero spalmati con grasso, al fine di ridurre l'attrito prodotto dalla rotazione; tuttavia, in uno degli esemplari illustrati alla fig 2, l'interno del manico era rivestito di rame. Le mani dell'artigiano erano pertanto tenute occupate dal manico reggiasta e dall'archetto rotatorio.

Per fissare il grano di collana si usavano probabilmente tavolette di legno perforate, in cui veniva infilato l'elemento da lavorare. Mantenere ferma la tavoletta, magari con un piede, non doveva rappresentare un problema di difficile soluzione, tenuto conto che gli orientali adoperano gli arti inferiori per usi che vanno al di là della semplice funzione motoria.

La ricostruzione del processo di lavorazione dei grani di collana, testé descritta, come tutte le ipotesi più o meno attendibili, non ha valore definitivo. Gli studi attualmente in corso permetteranno, forse, di chiarire le tecniche e le implicazioni socio-culturali di un'attività che deve essere ritenuta di fondamentale importanza per le primissime comunità urbane della storia dell'umanità.

THE PROBLEM OF TURQUOISE IN PROTOHISTORIC TRADE ON THE IRANIAN PLATEAU

di MAURIZIO TOSI *

INTRODUCTION

The studies carried out in recent times (Herrman, 1967; Tosi, 1974) on the lapis-lazuli trade in the Near East during the 3rd millennium B.C. have revealed just how important was the rôle of intermediary played by the Iranian plateau in a complex system of exchange between Mesopotamia and North-east Afghanistan.

Indeed, Iran produced only a few of the raw materials required by the Mesopotamian cities in which the limitations of an agriculture-biased economic system could be overcome, thereby favouring the development of specialised manufactured products capable of adding plus-value to the cost of the goods imported at a steady rate and at low prices. Because of the economic complementarity of the area, the Iranian plateau may be said to make a direct contribution to the social development of Mesopotamia. This it did by supplying the latter, from the mid-fourth millennium B.C. on, with a continuous export flow of those mineral products (copper, chlorite, calcite, lead, tar, etc.) which are so abundant in Iran (Beale, 1973). However, this flow of exports was not enough to satisfy the growing demand for goods by the Sumerian world whose requirements became greater and greater as political power gradually became laicized (Tjumenev, 1956). Furthermore, the socio-economic development of a number of regions on the plateau itself opened up new markets of considerable importance which were characterised by a high degree of technical specialisation well adapted to various environmental conditions (Lamberg Karlovsky, Tosi, 1973). The regions to the East and North of Iran are, in many respects, the natural continuation of the plateau and communications are often facilitated by perennial water-courses such as the Hilmand and the Harirūd/

Tedžen. These territories surrounding the plateau were capable of producing the very raw materials on which the demand of the urban markets came to be based during the Protodynastic period: lapis-lazuli, carnelian, copper, tin, gold, silver, turquoise. In this way, for the Sumerians, the cities in the interior of the plateau became the main partners in a relationship based on the supply of a very wide range of raw materials and semi-finished products.

During the first half of the 3rd millennium B.C. when the volume of sea trade in the Persian Gulf must have been very limited and before the conquests of Sargon opened up the trade routes to the Eastern Mediterranean and Anatolia, the existing relations with the Iranian plateau had an effect on the economic development of Mesopotamia. This can easily be inferred from a reading of the transparent myth of *Enmerkar and the Lord of Aratta*, which is a constant reference point in all analyses of this type. A recent study by Giovanni Pettinato allows us to draw up a list of the raw materials obtained by the mythical Aratta, the quantities of which make quite clear the go-between and monopolist functions of the above Iranian city (Pettinato, 1973: 162-3):

— Carnelian	na ⁴ Gug
— Lapis-lazuli	na ⁴ Za-Gín
— « Mountain stone »	na ⁴ Ĥur-Sag-Gá
— Silver	Kú-Babbar
— Electrum	Sù-Du-Ág
— Gold	Guškin
— Copper	Urudu
— Tin	Nanga (An.na).

Clearly, no 3rd millennium political structure could have been so extensive as to control directly such a vast territory to contain all the production centres of the above raw materials. Besides, the fact that Aratta is said to have acted as a go-between is apparently confirmed by the presence, *in loco*, of tools and craftsmen specialised in work-

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ing these very raw materials (Pettinato, 1973: 163, 166):

— Casting mould	Agá-Rin
— Beaten metal	Kù-Dím-Ma
— Purified metal (silver?)	Kú-Me (- a)
— Jeweller	Za-Dím
— Goldsmith	Ku-Dím

The finds made at Tepe Hissār III B and at Shahr-i Sokhta reveal the importance of the part played by a number of cities on the plateau. Not only are there rich furnishings of precious stones and metals, i.e. materials at least partly imported from other regions further east located, but there is also a large amount of working wasters and stone tools connected with the complex processes of semi-finishing and manufacturing of the stones (Piperno, Tosi, 1973; Bulgarelli, 1974).

The thin section analyses and sulphur isotope determinations have allowed to assume the origin of the finished products and wasters of lapis-lazuli collected at Ur, Hissār and Shahr-i Sokhta and examined so far to be attributed to Badakshān. It was found to be a more difficult task to establish the area of origin of the carnelian, a reddish-coloured variety of chalcedony, widely found over a mountainous area extending from Yemen to the Himalayas (Quiring, 1948: 21, f. 14).

The third stone, referred to in the list under the generic name of ^{na4}Hur-Sag-Gá, is always combined in the texts with the first two in the expression ^{na4}Gug ^{na4}Hur-Sag-Gá ^{na4}Za-Gín, probably taking on the meaning of all the precious stones (Pettinato, 1973: 75). Considering the archaeological contexts in which these stones are customarily found (grave goods and urban centres where stone-working activities were possibly concentrated) it would have appeared reasonable to assume that this generic « precious stone of the mountain » corresponds to turquoise in one of its chromatic varieties.

In the following pages we set out those elements which, we believe, might be of use in making a correct approach to the problem of this identification, unreliable in our opinion, and, in general, that of the part played by turquoise in protohistoric trade on the Iranian plateau.

PRODUCTION AREAS IN THE NEAR AND MIDDLE EAST

Turquoise is a hydrous aluminium phosphate produced by surface reaction in the presence of copper salts which give it its typical varying shades of blue. The chemical composition seems to be described by the following formula:



It is commonly found in small, compact, opaque lumps or as a filling in the cracks of altered rocks. It is basically a surface mineral which is found in the points of emergence of copper-bearing veins, like the azurites and malachite. To a lesser extent it is found in the outcrops of lead veins (De Launay, 1913: 715).

Leaving aside the percentage of intrusions and the irregular arrangement of the lumps, turquoise is always present with a very wide range of colours even over relatively small surfaces. The blue varieties are the most precious because of their brightness, hardness and wear-resistance, and range from deep to light blue in colour. The green varieties have a large range of hues going from dark green to yellow. Of much less value are the white varieties, whether of the sky blue or green hues, as they are too soft and crumbly to be worked in any appreciable quantity.

It is usually obtained by open-cut mining and the techniques involved in its extraction present no particular difficulty, although medieval mines at Ghar-i Zak, near Nishapur, Iran, exhibit vertical shaft cut in to iron-ore rich rocks, over 40 mts deep. The ancient mines always appear as a group of small pits in line with outcropping seams (Vinogradov et alii, 1965: 120-1).

The main deposits available to the protourban civilisations of the Near East were four in number: the Sinai peninsula; the eastern Elburz mountains, the mountainous territory of the inner Kyzyl Kum, and the mountains of Ilak (Karamazar) in ancient Khodjent (Leninabad) along the upper reaches of the Syr Dar'ja (f. 1). Minor deposits with evidence of earlier quarrying are also reported from the Damghan, Rafsanjan (Sar-i Cheshme) and Shiraz areas (Communication by the Geological Service of Iran).

At the present state of archaeological research, only the mines of the Sinai and the Kyzyl Kum appear to have been exploited during the 3rd millennium B.C. However, any final answer can only come after careful archaeological exploration of the Nishapur area and after extensive neutron activation determinations of typical trace elements on the finds of the main sites.

However, the very position of Nishapur, located as it is between two of the most important centres of urban development in protohistoric Iran — Gorgan to the west and southern Turkmenia to the north-east — makes it highly likely that the extensive finds of green turquoise made in Hissār and Altyn depe come from these deposits.

The Sinai deposits were situated in the sites of Wadi Magharah and Serabit el-Khadim in the south-western part of the peninsula and lay 12 km apart (Petrie, 1906: 46-53; 154-162; Barron, 1938: 40-45, 166-169, 206-212; Lucas, 1964: 231-235).

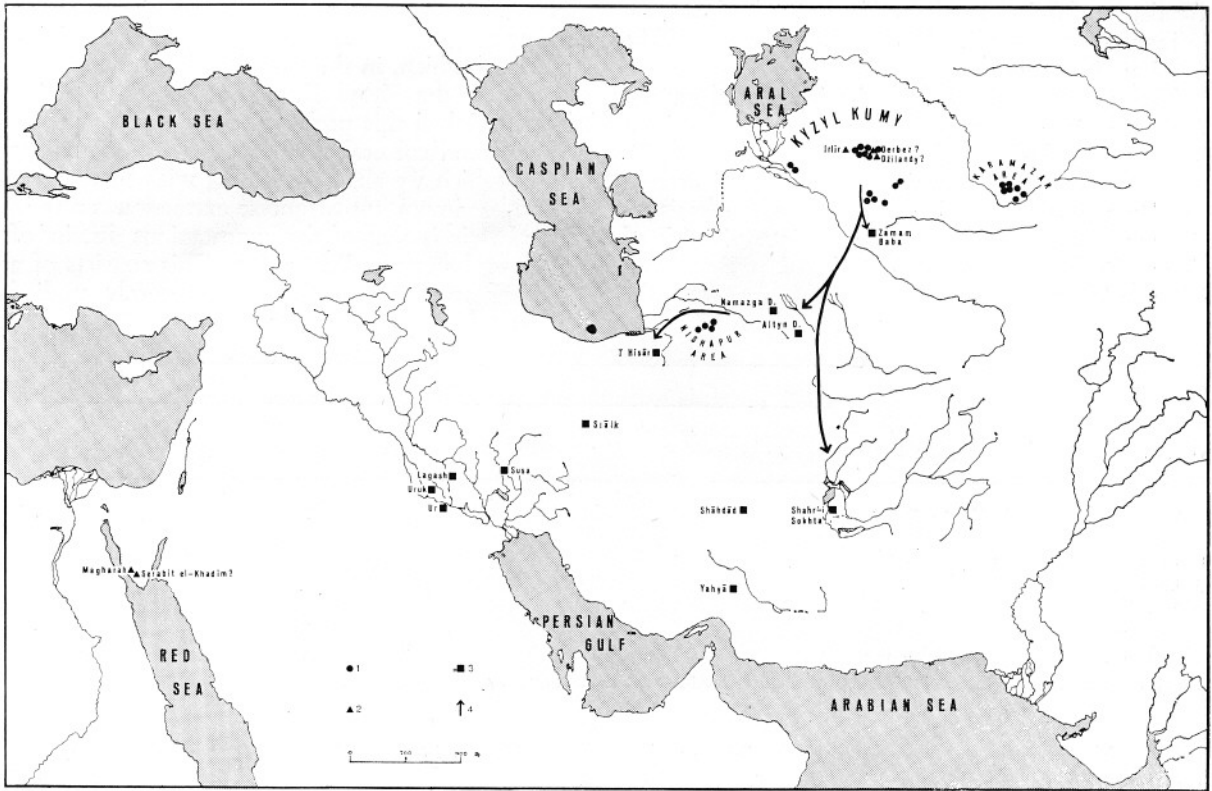


Fig. 1 - Main turquoise deposits in the Near East and Central Asia. 1, turquoise mines taken from historical sources; 2, mines active during the 3rd millennium B.C.; 3, main settlements of the 3rd millennium B.C. involved in trade of the stones; 4, assumed directions of turquoise transport routes during the 3rd millennium B.C. (drawing by I. Reindell).

In both sites, the combined extraction of copper and turquoise was carried out, as well as the copper carbonates, malachite and azurite, which were used as cosmetics. The presence of foundry waste and fragments of moulds is particularly apparent at Wadi Magharah. The Egyptian inscriptions found here date back to between the 1st and the 19th dynasty and are always related to names and titles of the Pharaohs and of the officers commanding expeditions. Those dating back to the 3rd millennium total 17 and are related to the period of time between the 1st and the 6th dynasty. At Serabit el-Khadim, on the other hand, the earliest inscriptions date back to the 12th dynasty (1991-1786 B.C.), i.e. to a period in which Egypt was most actively engaged in importing and working semi-precious stones.

The oldest finds of turquoise made in Egypt nevertheless date back to the late Neolithic, at the height of the Badarian, and logically precede the introduction of lapis-lazuli which takes place during the Gerzean and accompanies the more direct evidence of contacts with the Mesopotamian environment (Payne, 1968: 58). It is very likely that turquoise was the first product imported

for the purposes of embellishment and decoration and was purchased by the agricultural communities of Egypt as soon as they had sufficient food surpluses and capital goods at their disposal. The distances were not too great to prevent the arrival of constant supplies free of control by intermediate populations as a result of the inhospitality of the zones of production and transit.

There does not seem to have been any semi-processing of the products mined at Wadi Magharah. In all likelihood, the material was transported directly into the Nile valley. In actual fact, at least in historical times, it was not a true commerce based on an exchange system but rather on military expeditions organised by the central authorities.

The rediscovery of the turquoise mines of the interior Kyzyl Kum by S. V. Lopotin (Vinogradov, 1972: 121) has opened up new vistas as regards the Middle Eastern sources of supplies of this product. The interest aroused by the discovery is mainly connected to the studies of A. V. Vinogradov who succeeded in relating it to the enormous amount of data available on the Neolithic in Central Asia thanks to the work of the expedition carried out under the auspices of the

Academy of Sciences of the USSR in the Khorezm (Vinogradov et alii, 1965; Vinogradov, 1970; 1972 a; 1972 b; 1973).

The mines are located in the isolated mountain groups lying scattered to the north of Zerašvan between the Amu Dar'ja and the Syr Dar'ja (f. 2). Out of a total of 18 main mines situated here it has been possible to date only 7 on the basis of the materials found in the immediate vicinity of them. Here is a summarising table drawn up after Vinogradov et alii:

Mountain area	Locality	Periods						
		Late Neolithic (3800-2200)	Bronze 700 B.C. - 700 A.D.	VIII-IX	X-XI	XII-XIV	XV-XVI	XVII-XVIII
Sultanuizdag	Tebin Bulak				X	X		
Bukantau	Ajakaši					X		
Bukantau	Džaman Kaskyr				X	X	?	?
Bukantau	Derbez	?						
Bukantau	Džilandy	?				X		
Bukantau	Irlir	X				?		
Kul'džuktau	Taskazgan			?	X	X		X

From these on-the-spot observations, Vinogradov and coworkers established the following points:

— the Kyzyl Kum turquoise began to be used during the 3rd millennium B.C., about the time of the mature phase of the Kel'teminar culture (Vinogradov, 1970: 151);

— there was a long interruption beginning from the early centuries of the 2nd millennium B.C., which coincided with the spread of the Tadžsken culture;

— mining activity reached its height between the 12th and the 14th centuries a. D., i.e. the period of greatest expansion of the Central Asian empires.

Of direct interest to us, of course, are only the mines dating back to the Kel'teminar culture, especially that of Irlir, which lies about one kilometer east of the spring bearing the same name on the western slopes of the Bukantau range. All that remains of the mine nowadays are five small, rather eroded holes, each with an average depth of one metre. The extraction process was linked to copper mining and working. The mining method and this association with copper extraction processes are very reminiscent of the methods used at Wadi Magharah during the protodynastic period. A short distance away is a small late-Kel'teminar site.

The possible association of Derbez and Džilandy with the late Kel'teminar is bound up exclusively with the flint artifacts and with the evidence that they were worked *in situ*.

To Vinogradov goes the credit not only of documenting the great extension of the mining operations which, in the past, had been carried out throughout the Kyzyl Kum, but also for having correctly linked this problem to the complex chronological and cultural situation of the Kel'teminar culture which we shall be dealing with further on.

Another important turquoise extraction centre in Central Asia is that of the mountainous district of Ilak, now known as Karamazar. This consists of a group of seven mines that were recently studied

by E. V. Pruger (Pruger, 1970). Various minerals were extracted from them, including copper and malachite. According to the Soviet worker, the mines were active between the 9th and 11th centuries A.D. It is unlikely that the Ilak mines were used earlier especially considering that all the turquoise found in Afrasiab (Samarkand) and Starij Merv, the largest settlements of this period to be excavated so far in this part of Central Asia, still came from the interior Kyzyl Kum, particularly from Bukantau and Sultanuizdag, respectively (Pruger, in Vinogradov, 1972).

It is a seemingly more difficult task to deal with the other potential mining areas on the Iranian plateau, such as Kūh-i Dashak south of Herat, the site of the only known turquoise mines in Afghan territory which were exploited in an as yet undefined past (H. Mohr, personal communication), or those situated on the Kermān mountains south of Yazd (A. Williamson, personal communication; but stated as major mines in Beale, 1973, f. 1).

TURQUOISE WORKING IN THE KEL'TEMINAR CULTURE

The Central Asian Neolithic between the Ust Urt lowlands and the west bank of the Syr Dar'ja can be identified with the Kel'teminar culture. The latter was characterised by coarse-pasted pottery with incised or impressed decoration, by a stone

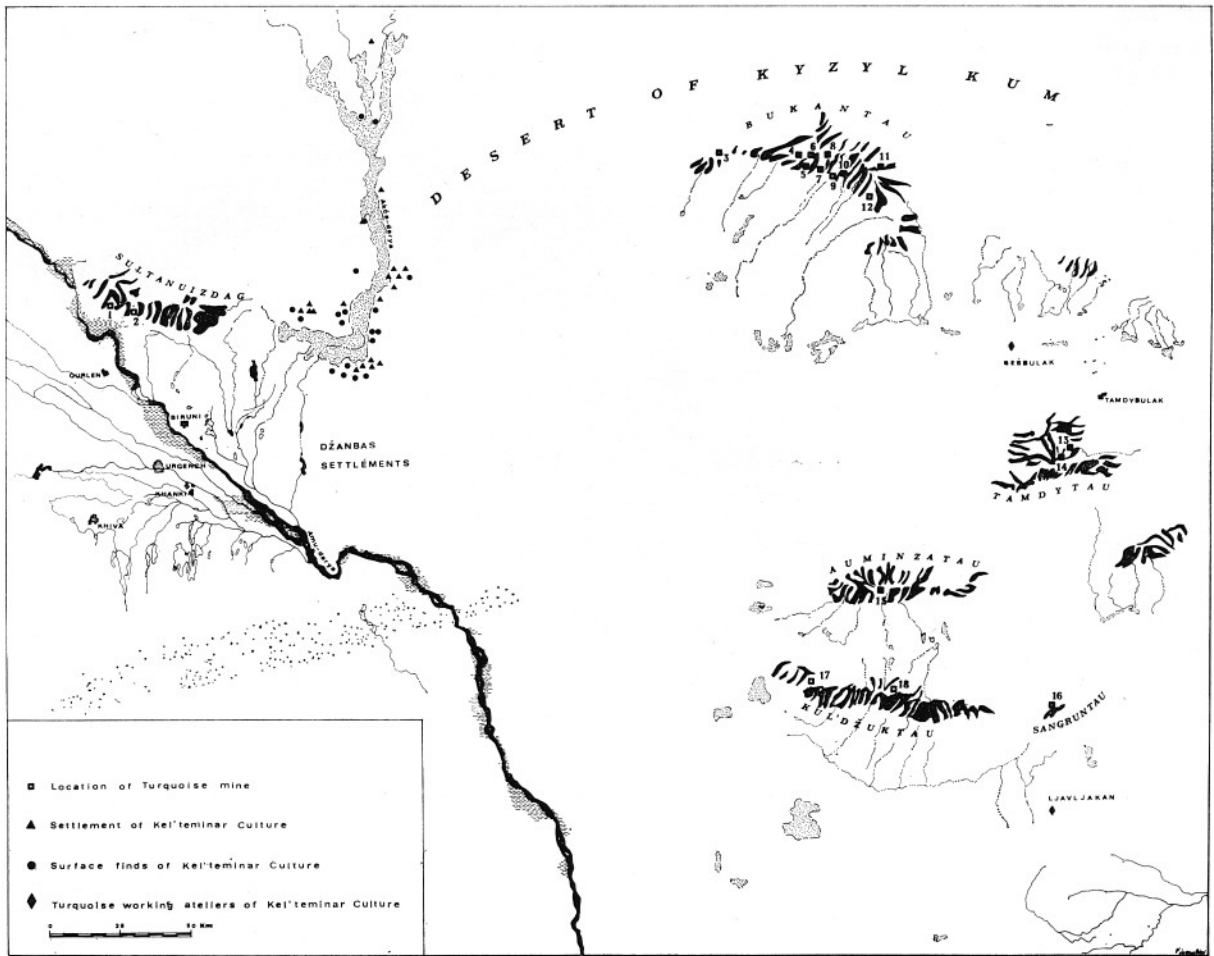


Fig. 2 - Turquoise mines and Kel'teminar settlements in Kyzyl Kum. Denomination of the mines; 1, Tebinbulak; 2, Sultanuizdag; 3, Irlir; 4, Ajakaši 1; 5, Ajakaši 2; 6, Turbaj 1; 7, Turbaj 2; 8, Džaman Kaskyr; 9, Karatau; 10, Derbez; 11, Kunija; 12, Džilandy; 13, šatymtau; 14, Taskažgan; 15, Ujrektytau; 16, Ajax-Kuduk; 17, Taškazgan; 18, Taušan (drawing by M. Fiorentini).

industry with microlithic tendencies using points on blades and by a mixed economy divided between hunting and farming (Tolstov, 1948: 68-69).

In spite of numerous attempts, also of an analytical nature (Vinogradov, 1957), it was found to be practically impossible to relate this culture to that of southern Turkmenia, let alone to the cities of the Iranian plateau.

What is certain is that Kel'teminar documents a horizon of considerable cultural complexity spread over alluvial plains which were extremely unstable from the hydrological stand-point where the population settling there succeeded in adapting to the conditions, distributing themselves in small river levees and always maintaining a high coefficient of food production by means of food gathering; this is a model of settlement and of socio-economic structures which is apparently alternative to the

process of concentration and urbanisation typical of other alluvial plains of the Near East.

A careful palaeogeographical survey carried out on a fossil branch of the Amu Dar'ja known as Akča Dar'ja has in fact shown up the overmobility of these small settlements which were always situated on the shifting banks of small canals and natural basins (Kes', Itina, Vinogradov, 1970). This mobility, which in any case is common in communities where aggregation is incomplete and which are situated in semi-arid territories, is revealed by the very large number of Neolithic settlements, more than 500 discovered between the Akča Dar'ja and the Zeravšan (f. 2).

Over such a vast territory and over a time span of about 2000 years, the concept of the cultural unity of Central Asia during the Neolithic, which has been identified with the Kel'teminar, does

not stand up to a more thorough analysis of the finds (Vinogradov, 1970: 31).

Today Vinogradov speaks of three geographical areas which he considers as being chronologically divisible into three main phases on the almost exclusive basis of the stone industry as analysed in a series of index sites. Unaided by both Radio-carbon data and imports from the southern areas, the procedure adopted by the Soviet worker necessarily took on an internal character.

The three geographical areas are: *a*) the lower valley of the Amu Dar'ja with the Akča Dar'ja, later known as Khorezm, to which alone the term *Kel'teminar* is to be applied; *b*) the inner Kyzyl Kum, particularly around the ancient lake beds of Bešbulak and Ljavljakan; *c*) the lower valley of the Zeravšan in the vicinity of the Mahan Dar'ja.

These subdivisions are heavily underlined in the later «Neolithic» phase in Central Asia which occurred during the 3rd millennium B.C. and is

characterised by the appearance of stone tools produced using the bifacial technique. The local variants of each area can be identified through a number of elements; among these, Vinogradov stressed in particular the choice of different materials for personal decoration — shells of the genera *Clamys* and *Dentalium* in the Khorezm, flat river pebbles in lower Zeravšan, turquoise in the inner Kyzyl Kum (Vinogradov, 1970; 1973).

Although these conclusions are not final, if only because of the relatively small number of tombs excavated so far in the region, it is interesting to note that all three of the above zones possessed the materials used by each one of them. At Ljavljakan, situated in a region of dry lakes where E. D. Mamedov had discovered some forty small late-Kelteminarian sites, and actual turquoise-working area was brought to light with numerous unfinished fragments and a flint stone industry. Out of 600 implements found, 55 (i.e. about 9%)

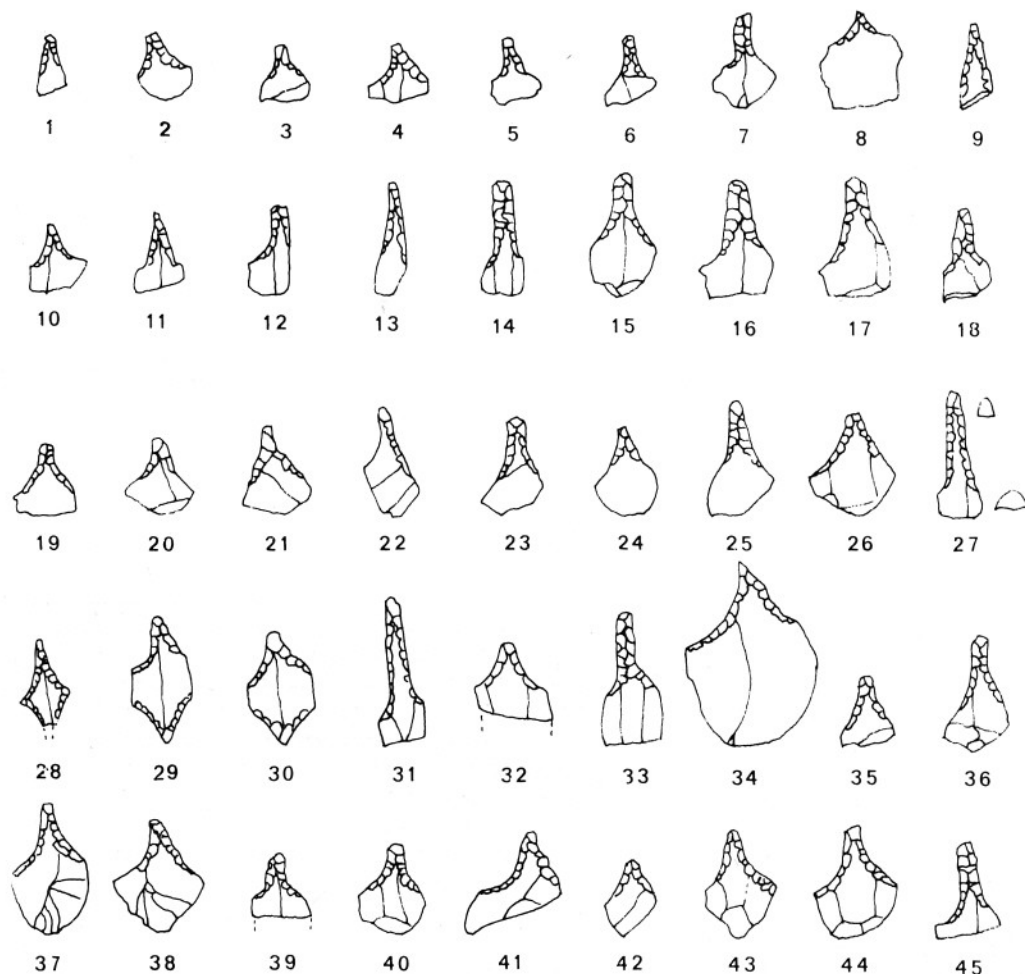


Fig. 3 - Types of microlithic drills from Bešbulak 1 (from Vinogradov, 1972).

consisted of microlithic drills on flakes or micro-blades and characterised by steep retouching (Vinogradov et alii: 1965, 126-127). The total length of the implements varies from 0.8 cm to 1.6 cm; the points have an average length of 0.5 cm. They are, without doubt, drills which had bone or wooden handles in view of their small size. Similar tools were occasionally found in other sites in the area, in smaller quantities but always associated with turquoise wasters.

A similar industry was later found at Bešbulak 1 near Džmankum, practically on the north-east edge of the Kyzyl Kum (Vinogradov, 1972). Here the association with turquoise and calcite wasters is quite apparent and the materials are concentrated in well defined zones over a relatively small area. The typology of these microliths is surprisingly constant (f. 3), and is doubtless evidence of a considerable specialisation at local level which heightens and justifies the cultural differentiation of the inner Kyzyl Kum in comparison with the other regional variants of the Kel'teminar culture.

The problem thus consists in determining whether turquoise production was geared to a relatively restricted local consumption or whether it was also used in interregional trade. It was only at the end of the 3rd millennium B.C. with the culture of the Zaman Baba graveyard that socially aggregated communities formed in inner Central Asia which were capable of creating a demand large enough to stimulate a regional market (Kuzmina, 1965). It is even quite conceivable that part of the Kyzyl Kum turquoise was shipped further south than Zeravšan where the demand for the product was greatest. A certain amount of trading was already taking place, judging by the obvious correlations between the sites of Ljavljakan and Zaman Baba (A. Askarov in Vinogradov, 1970: 36).

TYOLOGICO-FUNCTIONAL CONVERGENCE

One element of direct convergence between the inner Kyzyl Kum and the Iranian plateau comes, however, from the shouldered microlithic drill-heads which are closely associated with the production of turquoise and calcite beads at Bešbulak 1 and Ljavljakan 34. Similar implements have also been found at Shahr-i Sokhta in Iranian Sistan which were related to the working of lapis-lazuli (Piperno, Tosi, 1973). With respect to the typological classification, worked out by M. Piperno for the Shahr-i Sokhta drills (f. 4), the Kyzyl Kum finds correlate with the type with a longer proximal part (a, b) which we believe were used for the actual drilling. The specimens from Bešbulak and

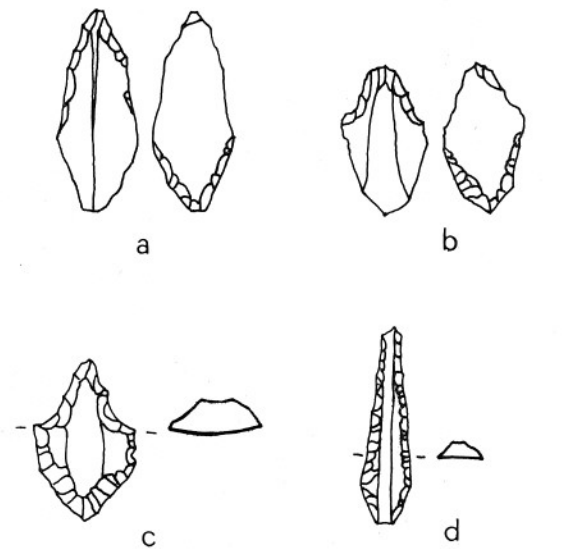


Fig. 4 - Shapes of microlithic drills from Shahr-i Sokhta, preliminarily determined by M. Piperno (drawing by C. Placidi).

Ljavljakan can be distinguished only by their smaller degree of typological homogeneity and by the irregularity of the distal part (f. 5). On the other hand, the type C of Shahr-i Sokhta, which is much heavier, almost prismatic, in the distal part, is completely absent.

At Shahr-i Sokhta about 200 shouldered drill-heads were found in the 100 m² covered by the group of Period II rooms in EWK. Also from this zone came several thousand rejects and unfinished beads of lapis-lazuli and carnelian, as well as 71 turquoise fragments (about 2% of the total). The direct correlation between the microlithic drill-heads and the processing of semi-precious stones is confirmed at Shahr-i Sokhta by the presence of stains and tiny deposits of lapis-lazuli (60 cases) and carnelian (1 case) on the proximal parts of the tools.

At Tepe Hissār, another very important site as regards the lapis-lazuli trade, the same kind of traces of this mineral have been found on tools which are functionally similar to, although typo-

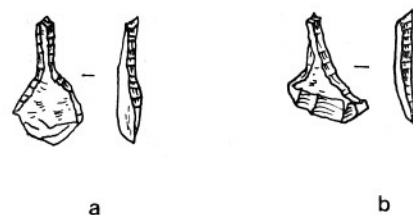


Fig. 5 - Types of microlithic drills from Ljavljakan 34 (from Vinogradov, 1973).

logically different from, those of Shahr-i Sokhta and Kyzyl Kum. These consist of drills on flakes and burin blows produced using a technique which has been reconstructed by Bulgarelli (Bulgarelli, 1974). This technique is probably connected with a different stone-working tradition.

This kind of typological and functional convergence between sites all of which date back to about the middle of the 3rd millennium B.C. cannot simply be due to chance. The strategic position of these settlements within the area of trading in semi-precious stones during the protodynastic period makes any explanation based on pure chance highly implausible.

Once the technico-functional convergences are acknowledged there is no need to seek any justifications of a cultural nature. Let us instead try to ascertain just how turquoise was distributed among the settlements of the Iranian plateau during the 3rd millennium B.C.

DISTRIBUTION OF TURQUOISE IN THE MAIN STONE TRADING CENTRES

At the present state of our knowledge it can be said that only two turquoise mining centres were definitely known to be active at the middle of the 3rd millennium B.C. — the Sinai to the West and Bukantau in Kyzyl Kum to the East — both of which lay on the extreme outskirts of the ancient Near East. The socio-economic dynamics of the turquoise trade were certainly complex. There was a constant demand for the Sinai product on the Egyptian market which certainly governed the sending of expeditions to Wadi Margharah by the Pharaohs. In this way, turquoise trading transactions took place here without the assistance of intermediaries, directly at the place of manufacture and purchase. Between Bukantau and the Near East and Iranian markets, on the other hand, there was an undisputed chain of intermediaries of the kind which were seen to be active in the commerce of Afghan lapis-lazuli (Tosi, 1974), even though, in this case, the stimulus of a high demand was probably lacking. In fact, as we shall see, turquoise is absent in the Royal Cemetery of Ur and in other Mesopotamian cities whereas lapis-lazuli reached there from equally far-off regions in such large quantities that, between 2600 and 2400 B.C., it was considered the most widely used material for the production of Mesopotamian jewellery (Woolley, 1934: 269-270).

Our task is to verify, for the moment on the sole basis of the archaeological data in our possession, whether the absence of turquoise in the

decorative products of protodynastic Mesopotamia was due to one or more of the following factors:

- 1) Shortage of raw material.
- 2) Absence of specific demand.
- 3) Inefficiency of trade-and-transport system on the Iranian plateau.

Thus the problem is basically reduced to the relations existing between the production centres, the intermediaries, whose job it was to prepare the raw material and produce semi-finished goods, and the large markets of production, consumption and redistribution (Tosi, 1974).

During the 3rd millennium B.C. the two main intermediate centres in the lapis-lazuli trade were Shahr-i Sokhta in Iranian Sistan on the far reaches of the Hilmand, and Tepe Hissār on the southern slopes of the Elburz mountains on what seems to have been once the main overland route of south-western Asia (Mallowan, 1965: 117-123).

Our information on both these towns comes from excavation of the inhabited areas, tombs, stone-working zones and garbage dumps (Schmidt, 1937; Tosi, 1969; Piperno, Tosi, 1973; Bulgarelli, 1974; Biscione et alii, 1975).

In the stratigraphic sequence of Shahr-i Sokhta, turquoise and lapis-lazuli are always found in chronological association. Both appear to be widespread during Period II, or more precisely in phase 5-7, about the mid-third millennium B.C. (East and West, 21, 1971, 423). In the area which was most densely populated during this period, the *Eastern Residential Area*, finished beads and wasters are rare. The deposit of the dwellings consists of superimposed layers of artificial fillings probably removed from a previous deposit and containing a large amount of potsherds and other finds of little economic value. Of course, there are very few metals or semi-precious stone, which were valuable materials and could almost always be returned to the production cycle (Tosi, s.d.). One exception, however, is the garbage dump XEU dating back to a more recent period of the city's history: Period III, structural phase 3. Here an odd semi-precious stone processing reject can occasionally be found (L. Costantini, personal communication).

In the zone EWK, on the western side of the settlement, inside what the aerial photograph seems to show as a boundary wall of a quadrangular citadel with an area of about 20 ha., a production centre of necklace beads dating back to Period II, structural phase 6 was found.

Painstaking procedures of washing and sifting the earth removed allowed stone tools and semi-finished material to be recovered at all stages of the manufacturing process (Piperno, Tosi, 1973).

It was found that turquoise is present in very low percentages, about 2%, as compared with

90% for lapis-lazuli and 8% for carnelian, calcite and other lesser materials.

The working zone so far excavated consists of a series of four rooms grouped round a quadrangular central part and having an overall area of about 80 m². The working rejects are concentrated in the twenty centimetres of thickness above the floor levels, especially in rooms DXII and DV. A total of about 3200 waste fragments have been

this period seems to be all the more significant. The graveyard covers an area of about 40 ha and takes up the entire south-western part of the settlement. In the area excavated up to date (approx. one hectare), the average grave density is one every 10 m². On the whole, the graveyard appears to be more or less intact except for superimposed burials and floods, most of which occurred after the city was abandoned. Of the 102 graves so far

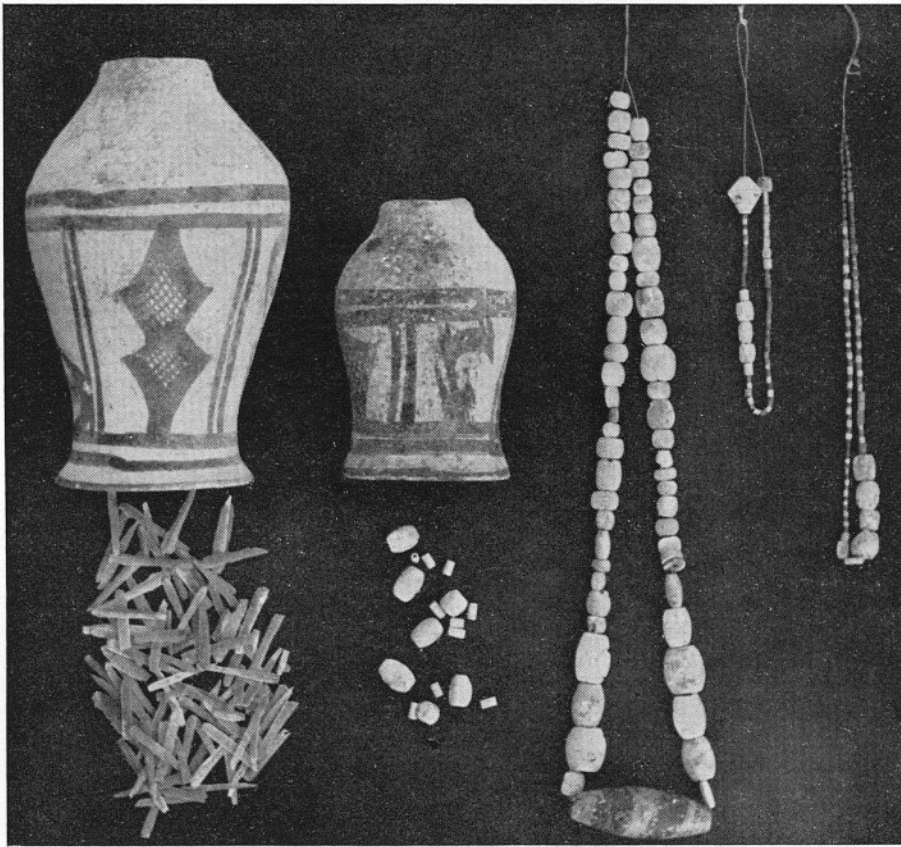


Fig. 6 - Shahr-i Sokhta. Deposit of flint microblades associated with turquoise necklaces and lapis-lazuli among the grave goods of G. 2 (Photo IsMEO Dep. CS Neg. LA. 10.304/1).

found. On the ground surface, turquoise reaches values of perhaps 5-6% and we think that intermediate values ought to be assumed for the entire EWK area. However, the percentage of the total accounted for by this product remains practically negligible. It must be borne in mind that the turquoise found has an unaltered surface and it could not have been completely pulverised in a deposit in which vegetable fibres, human hair, birds' feathers, egg-shells and other, much more perishable, material has been preserved.

For these reasons the analysis made of the necklace beads found among the grave goods of

excavated more than three quarters (79) are to be attributed to structural phases 5-7 of Period II.

We shall stick to this period so as to have a correct term of comparison with the working zone in EWK. It must also be stressed that aside from 4 lapis-lazuli beads (1.69%) found in two tombs probably dating back to phase 8 of Period I (G. 114 and G. 204) the only materials used in previous and later periods were found to be of local origin (fayence, rock crystal, calcite).

The beads probably had a precise function in the funeral rites of the ancient Iranian city. The table below shows how only in the Period II graves

the percentage of grave goods containing beads was 51.89%. The remaining 48.11% consisted mainly of childrens' graves or altered or eroded graves.

bronze objects, which were usually very rare, by pots and other objects of everyday use.

A total of 557 turquoise beads has been found, or 37.55% of the total. In absolute, they are the

Approx. absolute chronology B. C.		2900-2600		2600-2400		
Period Structural Phase	No.	%	I 10-9-8		II 7-6-5	
			No.	%	No.	%
Total Excavated Graves	102	—	—	—	79	—
Graves with beads	48	47.75	—	—	41	51.89
Graves with 1-2 beads	23	47.91	—	—	21	26.58
Graves with 3-25 beads	14	29.16	—	—	11	13.92
Graves with 26-100 beads	7	14.58	—	—	6	7.59
Graves with 101-200 beads	1	2.10	1	—	—	—
Graves with over 200 beads	3	6.25	—	—	3	3.79

Two beads were always placed near the head or the knees of the deceased or both parts of the body — an arrangement which must have had a precise ideological significance. The number of beads varying from 10 to 25 usually corresponds to a small child's necklace or a bracelet; multiples of this number denote a proportionate number of necklaces (or bracelets) with a probable corresponding difference in social rank. In the three graves richest in beads - G. 2 (f. 6), G. 12 (ff. 7, 8) and G. 38, the abundance of beads is accompanied by

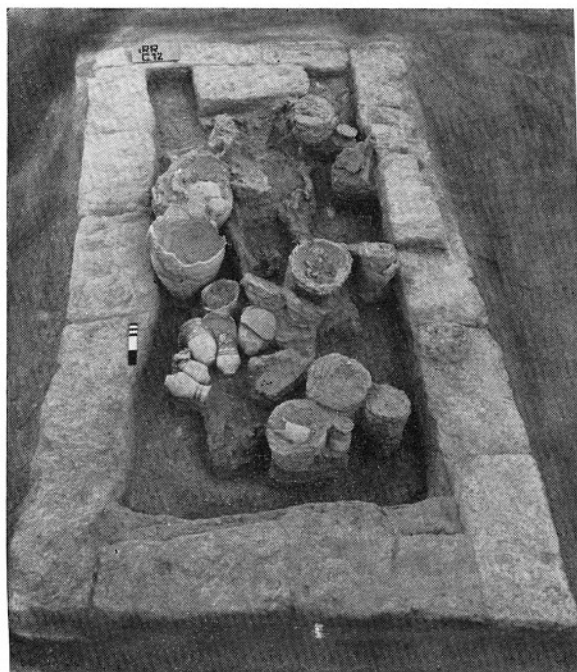


Fig. 7 - Shahr-i Sokhta. Grave G. 12 viewed from West (Photo ISMEO Dep. CS Neg. 10.324/4).

most frequent, followed by calcite beads (a total of 432, but 307 if only Period II is considered). Lapis-lazuli only comes third, with 236 beads or 15.80% of the total. If we take only lapis-lazuli and turquoise into consideration, the latter accounts for 70.23% as compared with the 29.37% of the former. The ratio is thus almost exactly the inverse of what it was in the contemporary processing centre. Out of a total sample of more than one hundred graves, this proportion cannot be due to chance if it is borne in mind that over the approximately 75 ha area of the inhabited zone lapis-lazuli has always been found in relatively large quantities whereas turquoise is almost nonexistent. It appears reasonable to conclude that turquoise was highly appreciated at Shahr-i Sokhta but much smaller quantities of it were processed there with respect to lapis-lazuli. The consumption of turquoise at Shahr-i Sokhta would thus exceed the quantities processed by a city's manufacturing complex. However, it must not be thought that this deficit in turquoise working was due to problems of a technical nature; the jewellers of Shahr-i Sokhta were able to produce necklace beads using an extremely complex and typological diversified set of stone tools. As flint tools had a hardness number of 7, it was not difficult to drill lapis-lazuli (hardness 5.5) with this, as well as turquoise whose pure blue and green varieties have a hardness of up to 6 which drops to 4.5 in the case of the pastier white varieties. Furthermore, the intrusions in the turquoise are very soft (graphite, iron oxides, malachite), unlike those of lapis-lazuli which consist of siliceous compounds with a compact crystalline structure (6-6.5) or pyrites nuclei.

The following table presents the data gathered on the materials used for making necklace beads at



Fig. 8 - Shahr-i Sokhta. Ceramic grave goods from tomb 12. Typological comparison confirms dating of 2400-2300 B.C. (Photo IsMEO Dep. CS Neg. LA 10.311/6).

Shahr-i Sokhta together with their probable zone of origin.

Type of stone	Total of beads	%	Provenience	Notes
Turquoise	557	37.55	Bukantau?	Inclusive of Periods I and III
Calcite	432	28.91	Local	
Lapis-lazuli	236	15.80	Badakshan	Restricted to Period I
Chlorite	131	8.78	Zahedan?	
Chrysoprase	24	1.61	Gujarat???	
Gold	6	0.40	?	
Carnelian	6	0.40	Afghanistan	
Porphyrite	2	0.13	Local	
Conglomerate	2	0.13	Local	
Bronze	1	0.06	Local	
?	1	0.06	—	
Fayence	83	5.50	Local	
Rock crystal	13	0.87	Local	
Totals	1494	100.00		

The sole utilisation of turquoise at Shahr-i Sokhta appears to be for necklace beads which are found in the following basic shapes (f. 9):

- 1) Cylindrical.
- 2) Truncated convex biconical.
- 3) Bi-convex.
- 4) Elliptical.

All the types were made using the bilateral drilling technique. It is noteworthy that the simplest and most common types (cylindrical, truncated convex biconical) account for almost the entire Kyzyl Kum production at Beşbulak 1 towards the middle of the 3rd millennium (Vinogradov, 1973: f. 11).

The manufacturing technique adopted is generally simpler than that used for the production of identical lapis-lazuli beads (f. 10). The bead was roughshaped by means of a close series of cuts with overlapping edges which are almost always visible in the more complex rhomboidal beads. After drilling, which was always a risky operation, the bead was smoothed by abrasion along planes which were often oblique with respect to the longitudinal axis. Polishing seems to have been carried

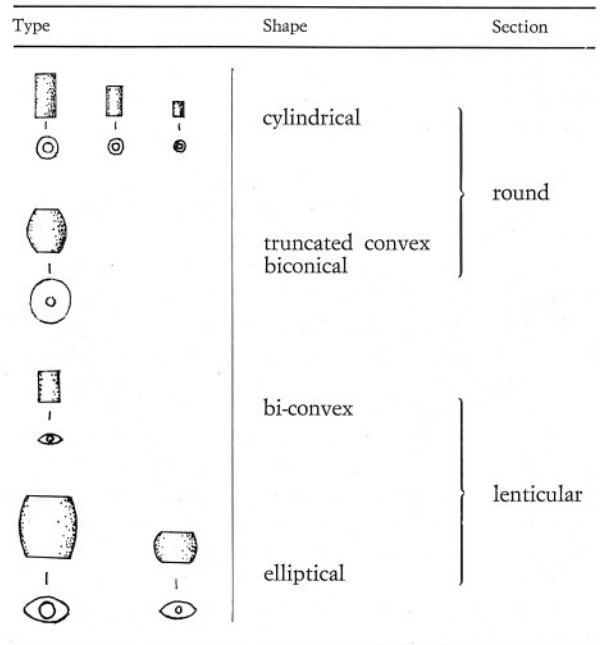


Fig. 9 - Types of turquoise necklace beads from Shahr-i Sokhta (drawing by I. Reindell).

out only in the case of the varieties with the most intense colours and with a high siliceous content. In the case of unpolished cylindrical beads it is a common occurrence, on examination under the microscope, to find that the shorter beads were obtained by cutting up longer pieces.

The situation at Tepe Hissār seems to be quite different. It must first of all be said that the stratigraphic sequence of this important settlement is at present undergoing complete revision (Bulgarelli, 1973; 1974). For obvious reference purposes,

at Hissār: a stepped rectangle with a lenticular section (H. 2388) of the green variety of the dimensions of 2.7 × 2.2 cm.

The discovery of more than 10,000 stone tools on the surface of the Main Mound makes it very likely that also Hissār was a very active processing centre (Bulgarelli, 1973; Biscione et alii, 1975).

Turquoise was introduced there at the same time as lapis-lazuli, but has been found to be much rarer in the area of the graveyard itself. The following is a summarising table drawn up on the

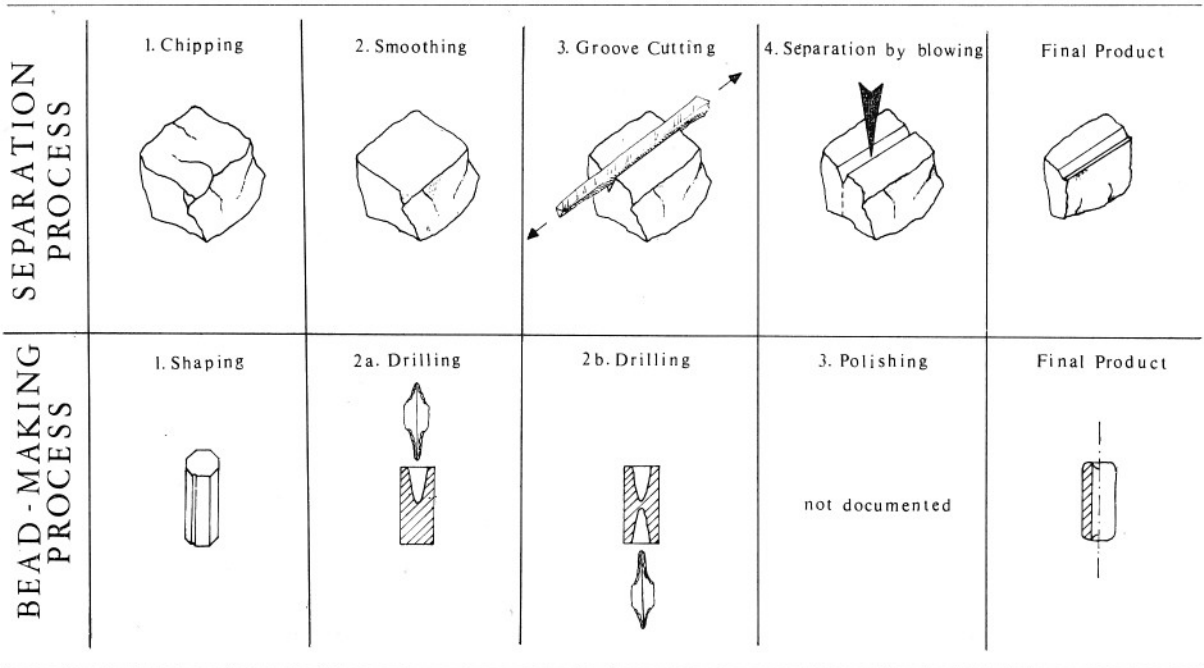


Fig. 10 - Working phase for the manufacture of lapis-lazuli beads. The process is divided into a generic cleaning operation carried out through separation of the lazurite concentrations from the matrix and a specialized one for the more proper bead-making (drawing by I. Reindell).

however, we shall here use the old scheme of succession unchanged.

Lapis-lazuli was certainly introduced earlier at Hissār than at Shahr-i Sokhta. Although in small quantities, it can be found in the more archaic layers of Period II (2900-2700 B.C.) and begins to spread in Period II B (2700-2500 B.C.). In Period III A-B, which Dyson dates as the second half of the 3rd millennium (Dyson, 1965: f. 1), this material was always used for making necklace beads and small zoomorphic figurines. The most significant lapis-lazuli object were found mainly in the woman's grave C.F. 55 ×-1 dating back to Period III B. They consist of necklaces, tortoise-shell figurines and stylized rams' heads (Schmidt, 1937: 229; f. 134).

This grave seems to denote a high social position; from it come also the largest turquoise find made

basis of data taken from Schmidt's work (Schmidt, 1933, 1937) and from personal observations made at the University Museum of Philadelphia by courtesy of Prof. R. H. Dyson jr.

Inv. No.	Provenience	Period	Approximate quantities recorded
H. 1716	DG 60	II	various
H. 4542	DM 34, grave ×-13	II A	1
H. 4543	DM 34, grave ×-13	II A	1
H. 384	DF 18, grave ×-1	III	1
H. 2099	DG 60, grave ×-1	III A	various
H. 2388	CF 55, grave ×-1	III B	1
H. 2422	CF 57, grave ×-1	III B	various
H. 2474	CF 57, grave ×-28	III B	various
H. 2809	CF 48, grave ×-1	III B	various
H. 2786	CF 47, grave ×-1	III C	various
H. 2796	CF 47, grave ×-2	III C	various
H. 33-22-724	CF 47, grave ×-2	III (?)	various

The inaccuracy of the recorded data prevents us from being able to make even a minimum statistical analysis of the finds. The characteristic shapes of the beads are the cylindrical, annular and discoidal ones found in the Kyzyl Kum and at Shahr-i Sokhta. One exception is the large stepped rectangular from grave CF 55, X-1 attributed to Period III B (Schmidt, 1937; f. 135).

However, turquoise does not ever seem to account for more than 5-6% compared with lapis-lazuli throughout the entire Period III complex. Although only approximate and relatively undocumented, this ratio shows up the profound differences existing in the contemporary grave goods of Shahr-i Sokhta and Tepe Hissār. This consideration becomes all the more significant if one takes into account the greater area and the longer number of Period III graves (429) excavated at Hissār covering a period of time ranging from 2600 to 1800 B.C. For a number of graves corresponding to one quarter of those of Tepe Hissār and over a much shorter time-span (400 years), Shahr-i Sokhta has yielded us a much larger percentage quantity of turquoise. At Tepe Hissār, out of a total number of 658 excavated graves (Periods I-III), only 10 contained turquoise, i.e. about 1.5%.

When the finds made on the surface and in the urban excavations are examined, turquoise is found to be actually non-existent. Schmidt mentions a few beads found in the DG 60 area and dating back to Period II, while the thorough surface reconnaissance carried out by G. M. Bulgarelli in 1972 led to not one find being made. On the other hand, lapis-lazuli continues to be present in relatively large quantities and shows clear signs of having been processed *in loco* in a way quite similar to that of Shahr-i Sokhta in EWK (Biscione et alii, 1975).

There thus seems to be considerable evidence to the effect that both the demand for and the processing of turquoise at Tepe Hissār were not very extensive. It is consequently rather hard to imagine that the nearby mines of Nishapur were active at the time. The existence of a consumer market with a large demand for the product such as Shahr-i Sokhta, situated 800 km to the south, would have made productive the extraction of a mineral which even at the time was easily to locate in the outcrops between Abdūr Rezaġi and Der-i Kūh.

On the other hand, it is also quite conceivable that even the Hissār turquoise was of Central Asian origin and was imported through the neighbouring towns in Southern Turkmenia which were in constant communication with the Khorezm and the lower reaches of the Zeravšan (Masson, Sarianidi, 1972: 125-128). The communications between the two sides of the Kopet Dagh were

constant. Indeed, according to V. I. Sarianidi, Hissār occupies a vertex of an ideal triangular area of interaction taking in the whole of north-east Iran, and the river basins of the Gorgan and Atrek together with the fertile plains of Sumbar, Misrian and Kyzyl Arvat (Sarianidi, 1971: 295). In southern Turkmenia the greater duration of the sequence provides evidence that turquoise was found there starting from the second half of the 4th millennium B.C. After chalk, which was abundant also at Hissār I and II A, the material most commonly used at Geoksjur I, during the Period Namazga III, was turquoise (Sarianidi, 1965: 39). The drilling technique is the same all over and the failure to find shouldered microdrills on the southern Turkmenian sites is perhaps due only to chance.

During the long periods of Namazga IV (2700-2200 B.C.) beads having the shape of a stepped rectangle first appear and continue into the following period of Namazga V. Two of them came from grave 60 at Altyn depe where a woman was buried and which contains a rich array of grave goods made of agate, silver and gold revealing the existence of an ordered social hierarchy (Masson, 1967: f. 15).

The stepped triangle motif or « square-bodied cross » derives from the geometric decoration painted on 4th millennium southern Turkmenian pottery (Hlopin, 1962). This square-bodied cross was later frequently reproduced on the bronze seals of the periods of Namazga IV-V (Masson, 1967: f. 13, 1-2) and in necklace beads of frit ware.

It is thus quite conceivable that the large necklace bead H. 2388 from Hissār III B is connected with Namazga IV production and can thus be dated as between 2500 and 2300 B.C., i.e. Period III B.

Even at the end of the 3rd millennium, turquoise continues to be a widely used product in Southern Turkmenia, while it appears not to have reached Sistan any longer.

At Altyn depe, many graves of the period Namazga V contain grave goods including turquoise necklaces or zoomorphic sculptures on sheet gold studded with turquoise to represent the eyes and other markings (Masson, 1973).

In spite of the wide spread of turquoise in eastern Iran, this stone did not reach Mesopotamia after the end of the 4th millennium in spite of the existence of distribution and trade mechanisms which allowed lapis-lazuli to be transported over distances of up to about 2500 km. In the whole of the Royal Cemetery of Ur which, according to the chronology given by H. J. Nissen, can be dated as 2500-2000 B.C. (Nissen, 1966), turquoise is completely absent. In the Protodynastic period the list of the materials used for making beads is headed by lapis-lazuli, gold and carnelian (Wool-

ley, 1934: 369-70). In the following Akkadian and Neo-Sumerian periods, the range of raw materials is extended to include agate, sardonyx, hematite, steatite, pebbles, frit and, in two cases only, chrysoprase, which we have seen to be contemporary with turquoise and associated with the latter in the grave goods at Shahr-i Sokhta (U. 11531 from *Protodynastic* PG. 1070 and U. 9704 from *Sargonic* PG 704). It is still not known where the green chalcedony or chrysoprase of the 3rd millennium B.C. came from. The most likely origin is Gujarat, a zone rich in large quartz-bearing formations, but it could also have been of Afghan origin on the strength of the relative abundance of this mineral at Shahr-i Sokhta. Here chrysoprase has been found also among the working wasters in quantities definitely much greater than those of turquoise.

Thus, unlike lapis-lazuli, turquoise does not seem to have been a product in demand on the markets of the ancient Near East in spite of the fact that it presented the same problems of extraction, sale, transport and processing.

Thus, economic factors alone cannot explain its restricted utilisation; the small demand for it may well have been round up with ideological factors as yet unknown to us.

We still know too little about the trade mechanisms of the pre-capitalistic societies and their exchange values where prices and money values still fluctuate and are still highly influenced by ideological considerations so that they do not lend themselves to present methods of economic analysis (Godelier, 1970: 55-64). What is certain, however, is that throughout the 3rd millennium B.C. trade of semi-precious stones in general, and of lapis-lazuli in particular, were not simply aspects of sporadic and furtive exchanges. Supply and demand were so evenly balanced as to ensure continuous production and a capillary diffusion throughout the Near East which, in Iran, as in Mesopotamia, was accompanied by a highly specialised technology on stone industry. Such was the integration that, about 2300 B.C., a gem-cutter from Ur (PG. 958) and one from Shahr-i Sokhta (G. 12) were buried with an identical set of stone tools and a handful of semi-finished stones (Woolley, 1934: 206-207; Biscione et alii, 1975).

The absence of turquoise cannot therefore be explained by an inadequate production or defects in the trade mechanisms but must be considered in terms of a weak demand on the main consumer markets. Were it not for the Shahr-i Sokhta finds, turquoise would still be a material practically restricted to Central Asia and the object of sporadic trading between the proto-urban communities of southern Turkmenia, and the semi-nomadic inhabitants of the Kel'teminar villages. Shahr-i Sokhta has thus become an exception to the rule and, as

such, obliges us to reassess the problem; unless, of course, one postulates the existence of another Iranian or Afghan source of turquoise of which only vague information is at hand and which is completely ignored by specialised texts.

For the moment, many of the factors discussed seem to point to Bukantau as the main turquoise production centre for this period, around which gravitate the small manufacturing centres such as Bešbulak 1 and Ljavljakan 34 in the immediate vicinity. Trace element analysis by means of neutron activation will perhaps allow us in the near future to confirm the validity of the hypothesis advanced in this paper.

The presence of turquoise at Shahr-i Sokhta may perhaps receive a logical explanation when the problem is examined in the general cultural context of the ancient Iranian city.

The original city (Period I- structural phase 8-10) is here characterised by Central Asian elements of southern Turkmenian derivation. Pointed pottery with chequered geometric patterns and anthropomorphic figurines with a foot-shaped profile are frequent elements which find their direct prototypes in the oasis of Geoksjur (period of Namazga III). So that it is possible, on several occasions, to speak of a direct contribution by south-eastern Turkmenia to the formation dynamics of the Hilmand Civilisation (Biscione, 1973; Tosi, 1973; Sarianidi, s.d.). Although this convergence gradually declined during the 3rd millennium B.C., pottery production in Sistan presents sporadic southern Turkmenian materials of period Namazga IV.

Furthermore, identity of function and tradition link the stone tools of Bešbulak and Ljavljakan with those of Shahr-i Sokhta II.

It seems quite clear that Shahr-i Sokhta, and with it the entire Hilmand Civilisation, kept up special contacts with Central Asia, remaining a basically isolated phenomenon in the complex cultural geography of the Iranian plateau (Lamberg Karlovsky, Tosi, 1973: 34-44). It is not unlikely that this « Central Asian attitude » of the Hilmand Civilisation is based on converging ideological factors deriving from a common tradition. To our way of thinking, one element of proof that this is so seems to be the burial traditions in the two regions. Typical of Shahr-i Sokhta are the catacomb graves with their narrow entrance shafts and inhumation in graves divided into two sections by a brick wall in which the tomb proper occupies only one of the two spaces so created. Both types reflect the desire to keep the tomb « open », even if only symbolically. This is proved by the numerous offerings of sheep or goats, or of vessels, in the empty sectors adjacent to the tomb itself. The corpse is laid crouched on the side and its orientation varies (Biscione et alii, 1975).



Fig. 11 - Distribution of tombs with the graves divided by a wall of probable southern Turkmenian tradition on the Iranian plateau (drawing by I. Reindell).

This type of grave is found in all the structural phases (3-8) met with so far in the graveyard and which date back to 2700-2100 B.C. Certainly contemporary with the later phases are the analogous graves excavated by A. Hakemi at Shāhdād which contain grave goods of truly incredible richness (Hakemi, 1970). Probably also the hypogea of Ghubayrā can be considered as burial structures of the same type which were utilised again during the Islamic period (f. 11). Very appropriately, the excavators have stressed the possible archaism of the structures which, in their opinion, date back to the pre-Parthian period (Bivar, Fehérvári, 1973).

The catacomb graves, or rather, the eschatological conception reflected in them, perhaps spread over most of eastern Iran during the last few centuries of the 3rd millennium B.C. Furthermore, a precise confirmation comes from a region 1200 km further north. In the lower valley of the Zeravšan, which is in direct contact with the turquoise mine and with the late-Kel'teminar settlements of the Kyzyl Kum, we find the same burial construction in the graveyard of Zaman Baba (Kuzmina, 1965). Also the type of inhumation, the presence of yellow and red ochre in the form of small masses, and of necklace beads placed near the head of the deceased add up to a substantial ideological convergence between the two cultures.

Recent discoveries indicate that the graveyard of Zaman Baba is not an isolated phenomenon in Central Asia (Vinogradov, personal communication).

We are thus dealing with a complex phenomenology which might well have originated one thousand years earlier in the *tholoi* and in the rectangular collective tombs of southern Turkmenia. As is known, this region saw the development of many of the premisses forming the basis of the late-Iranian civilisations which made a clean break with the converging Mesopotamian tradition and that of western Iran (Tosi, 1974 b). The *tholoi* are characteristic of the period of Namazga III and, in particular, of the oasis of Geoksjur (Sarianidi, 1959; 1965: 14-19; f. 10). It is even conceivable that, together with the Geoksjurian pottery types, a burial tradition with its own peculiar characteristics spread throughout east Iran and was later adopted in other regions.

CONCLUSIONS

The absence of turquoise on the western markets and its abundance in protohistoric Sistan can both be explained, in our opinion, by specific ideological factors, perhaps the only ones capable of boosting or restricting a trade system in the protohistoric period when capitalism and investment policy in the more highly developed areas were still concentrated in the hands of a centralised state economy (Tjumenev, 1956).

During the 3rd millennium, turquoise was thus a product for which there was little demand and whose area of consumption moved along a north-south axis from Kyzyl Kum to Sistan (f. 1) crossing, but never joining, the great lapis-lazuli route.

RIASSUNTO

Il problema del turchese nel commercio protostorico sull'Altopiano Iranico

L'evidenza archeologica ed i principali testi letterari documentano l'esistenza, per la Mesopotamia del III millennio a. C., di un fiorente mercato per pietre e metalli di provenienza iraniana. Partendo così da uno studio a carattere prevalentemente filologico di G. Pettinato, l'Autore prende in esame la possibilità di identificare nel turchese uno dei prodotti elencati nel testo *Enmerkar ed il Signore di Aratta* come proveniente dalla città iranica di Aratta. In realtà l'assenza di tale prodotto in tutto l'Iraq per il III ed il II millennio a. C., rende poco plausibile una tale identificazione, quando si confronta invece con l'abbondanza di lapis-lazuli e corniola, sempre citati nei medesimi testi. Ci si domanda poi il motivo dell'assenza del turchese in Mesopotamia. Vengono elencate le fonti del turchese nel Vicino Oriente e nell'Asia Centrale: Sinai, Monti Kerman, Nishapur, Kyzyl Kum, Ilak. Particolare interesse meritano naturalmente tra questi i centri del Sinai (Wadi Magharah) e del Kyzyl Kum (Ilan ed altri) dove abbondante materiale archeologico ci ha permesso di datarne un periodo di estrazione al III millennio a. C. Entrambi i centri si trovavano in zone desertiche, ma rifornivano due grandi mercati: l'Egitto per il Sinai ed i nuclei protourbani dell'Iran

Oriente e della Turkmenia meridionale per il Kyzyl Kum. Il turchese è risultato particolarmente abbondante a Shahr-i Sokhta, nel Sistan iraniano, dove scavi sistematici della Missione Archeologica Italiana hanno rilevato una intensa attività di importazione e manifattura di pietre semipreziose, fra cui anche il lapislazzuli e la corniola per il periodo 2700-2400 a. C. In questo arco di tempo il turchese risulta la pietra più frequente nei corredi funerari, sebbene non vi sia evidenza di una intensa lavorazione locale come nel caso del lapislazzuli, certamente importato dal Badkshan afghano.

È quindi evidente che l'assenza del prodotto in Mesopotamia non può essere giustificato come conseguenza di una scarsità mineraria della materia prima o di un inefficiente sistema d'interscambio laddove gli stessi intermediari del lapislazzuli ne richiedevano per il loro consumo, provocando l'incontro delle due materie prime sui loro mercati. Possiamo pertanto supporre soltanto una assenza di domanda per il turchese nella Mesopotamia del III millennio a. C. in conseguenza di fatti ideologici non determinati.

SUMMARY

The absence of turquoise in sites of Mesopotamia during the 3rd millennium is taken by the author as evidence of selective articulation of the sumerian demand for foreign goods, possibly based on ideological grounds. A complete analysis of the turquoise ores in the Near East and Central Asia is carried out in relation to the distribution of wasters and finished products on protohistorical sites of eastern Iran.

References

- Barron T. (1938), *The Topography and Geology of the Peninsula of Sinai (Western Portion)*.
- Beale T. W. (1973), *Early Trade in Highland Iran: a View from a Source Area*. World Archaeology, 5, 133-148.
- Biscione R. (1973), *Dynamics of an Early South Asian Urbanization: the First Period of Shahr-i Sokhta and its Connection with Southern Turkmenia*. In: N. Hammond (ed.), *South Asian Archaeology*, 1, 105-118, London.
- Biscione R., Bulgarelli G. M., Costantini L., Piperno M., Tosi M. (1975), *Archaeological Discoveries and Methodological Problems in the Excavations of Shahr-i Sokhta, Sistan*. *South Asian Archaeology*, 2, 12-52, Leiden.
- Bivar A. D. H., Fehérvári G. (1973), *Underground Chambers and an Octagonal Shrine Excavations at Ghubayrā in Kirmān Province in 1971 and 1972*. Proceedings of the 1st Annual Symposium of Archaeological Researches in Iran, Teheran.
- Bulgarelli G. M. (1973), *Tepe Hissār*. Iran, 11, 206.
- Bulgarelli G. M. (1974), *Tepe Hissār. Preliminary Report on a Surface Survey. August 1972*. East and West, 15-27, Roma.
- De Launay L. (1913), *Traité de Métallogénie. Gîtes minéraux et métallifères*. Paris et Liège, 1, 715-718.
- Godelier M. (1970), *La moneta di sale*. 55-64, Milano.
- Hakemi A. (1960), *Études archéologiques de la bisière du desert de Lout*. Bastan Chenassi va Honar-i Iran, 2, 36-51 (in persian with french summary, 24-25).
- Herrmann G. (1968), *Lapis Lazuli: the Early Phases of its Trade*. Iraq, 30, 21-57.
- Hlopin I. N. (1962), *Izobrazenie kresta v drevnezemel'českib kulturab južnoj Turkmenii*. KSIA, 91, 14-21.
- Kes' A. S., Itina M. A., Vinogradov A. V. (1970), *K Paleogeografii Akča-Dar'i*. KSIA, 122, 110-113.
- Kuzmina E. E. (1958), *Mogil'nik Zaman-Baba*. Sovetskaja Etnografija, 2, 24-33.
- Lamberg Karlovsky C. C., Tosi M. (1973), *Shahr-i Sokhta and Tepe Yabya: Tracks on the Earliest History of the Iranian Plateau*. East and West, 23, 21-57, Roma.
- Lucas A. (1964), *Ancient Egyptian Materials and Industries*. 4th edition, 231-235, London.
- Masson V. M. (1967), *Protogorodskaja Čivilizacija juga srednej Azii*. Sovetskaja Arheologija, 3, 165-89, Moskva.
- Masson V. M. (1973), *Raskopki žrečeskoj grobnicy v Turkmenii*. Priroda, 3, 114, Moskva.
- Masson V. M., Sarianidi, V. I. (1972), *Central Asia, Turkmenia before the Achaemenids*. London.
- Nissen H. J. (1966), *Zur Datierung des Königlichfriedhof von Ur*. Bonn.
- Payne J. C. (1968), *Lapis Lazuli in Early Egypt*. Iraq, 30, 58-61.
- Petrie W. M. F. (1906), *Researches in Sinai*. London.
- Pettinato G. (1972), *Il commercio con l'estero della Mesopotamia meridionale nel III millennio a. C. alla luce delle fonti letterarie e lessicali sumeriche*. Mesopotamia, 7, 43-166, Torino.
- Piperno M., Tosi M. (1973), *Lithic Technology behind the Ancient Lapis lazuli Trade*. Expedition, 15, 15-23.
- Pruger E. B. (1970), *Birjuza Ilaka i « ilanskij rudnik » birjuzy*. Sovetskaja Arheologija, 2, 118-126.
- Quiring H. (1948), *Geschichte des Goldes*. Stuttgart.
- Sarianidi V. I. (1959), *Novyj tip drevnih pogrebal'nyh sooruzenij južnoj Turkmenii*. Sovetskaja Arheologija, 2, 235-238.
- Sarianidi V. I. (1965), *Pamiatniki pozdenego eneolita jugovostočnoj Turkmenii*. SAI, B 3-8, 4, Moskva-Leningrad.
- Sarianidi V. I. (1965), *Southern Turkmenia and Northern Iran. Ties and Differences in very Ancient Times*. East and West, 21, 291-310, Roma.
- Sarianidi V. I. (s.d.), *The Pottery of Shahr-i Sokhta I and its Turkmenistan Affinities*. In: Tosi, M. (ed.), *Prehistoric Sistan I*. IsMEO Rep. Mem., Rome, Forthcoming.
- Schmidt E. F. (1933), *Tepe Hissar Excavations 1931*. The Museum Journal, 23, 4, 323-483, Philadelphia.
- Schmidt E. F. (1937), *Excavations at Tepe Hissār, Damghan*. Philadelphia.
- Tjumenev A. I. (1956), *Gosudarstvennoje hozjajstvo drevnego Šumera*. Moskva-Leningrad.
- Tolstov S. P. (1948), *Po sledam drevnehozjajstvoj Civi-lizacii*. Moskva.
- Tosi M. (1973), *The Early Urban development and Settlement Pattern in the Indo-Iranian Border*. In: Renfrew C. (ed.), *The Explanation of Cultural Change*, 429-446, London.
- Tosi M. (1974 a), *The Lapislazuli Trade across the Iranian Plateau in the 3rd Millennium B.C. Gururajamañjarikā: Miscellanea in onore di Giuseppe Tucci*, Napoli.
- Tosi M. (1974 b), *The North-Eastern Frontier of the Ancient Near East*, Forthcoming in Mesopotamia, Torino.
- Tosi M. (s.d.), *Development, Continuity and Change in the Stratigraphical Sequence of Shahr-i Sokhta*. Forthcoming In: Tosi M. (ed.), *Prehistoric Sistan, I*, IsMEO Rep. Mem., Rome.
- Vinogradov A. V. (1957), *K voprosy o južnyh svjazjah Kel'teminarskoj kul'tury*. Sovetskaja Etnografija, 1, Moskva.
- Vinogradov A. V. (1970), *O lokal'nyh variantab neolitičeskoj kul'tury Kyzylkumov*. KSIA, 122, 31-36, Moskva.
- Vinogradov A. V. (1972 a), *Birjuza, pervobytnaja moda, etnogenez...* Sovetskaja Etnografija, 5, 120-130, Moskva.
- Vinogradov A. V. (1972 b), *Kyzylkumskoie juveliry. Uspehi Srednaziatskoj Arheologii*, 2, 43-45, Ašhabad.
- Vinogradov A. V. (1973), *Pervobytnye juveliry*. Nauka i Žizn' 3, 132-134, Moskva.
- Vinogradov A. V., Lopatin S. V., Mamedov E. D. (1965), *Kyzylkumskaia Birjuka*. Sovetskaja Etnografija, 2, 114-134, Moskva.