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A Landscape Archaeology in Shahdad Plain (Dasht-e Lut) from the 5th to the 2nd Millennium BC

Nasir Eskandaridamne

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A Landscape Archaeology in Shahdad Plain (Dasht-e Lut) from the 5th to the 2nd Millennium BC.

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**A Landscape Archaeology in Shahdad Plain (Dasht-e Lut)
from the 5th to the 2nd Millennium BC**

By

Nasir ESKANDARIDAMNE

A thesis submitted in partial fulfillment of the requirements

for the degree of Doctoral in Archaeology

University of Lyon 2, France

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Abstract

This thesis examines the cultural developments of Dasht-e Lut (western edge of the Lut Desert, South-East Iran) from early fifth to early second millennia BC. Archaeologically, Dasht-e Lut is well-known thanks to the existence of the Bronze Age urban center of Shahdad where it is considered to be a meeting point in the Bronze Age networks of Southwest Asia.

This study will develop a landscape approach to the studies of the human-environment interactions, settlement patterns and population changes on the west of Lut desert during Chalcolithic era and the Bronze Age. In this regard, a three season archaeological project (in 2012, 2013 and 2016) were carried out by the author in this area. The first season was an extensive archaeological survey on the Dasht-e Lut to identify the settlement patterns of the region through the ancient times. The second season of the project considered in stratigraphic excavations at two prehistoric sites in Shahdad area dating to 5th, 4th and 3rd millennium BC. And, the last fieldwork included surface survey and small-scale excavations at the early urban site of Shahdad.

This archaeological research project brought to light new data for studying the Chalcolithic and the Bronze Age cultures of Dasht-e Lut which form the focus of this research. The proximity of Dasht-e Lut and Desert of Lut has led to the formation of a particular ancient desert landscape in the Near East.

Drawing on the current work on the western edge of Lut Desert, the present research introduces a phenomenal geological feature in ancient Near East named Kalut (natural hill in the desert landscapes) and discusses its relation with the prehistoric occupations in the study area. Also, studying the urban lay-out of Shahdad site and its formation processes is another subject matter of this thesis. Furthermore, the Bronze Age regional patterns of urbanization in the South East of Iran will be studied based on new data from Dasht-e Lut. This thesis provides a unique opportunity for studying the impact of desert environmental variables on the prehistoric and protohistoric settlement patterns.

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TABLE OF CONTENTS

Abstract	ii
Acknowledgments	iii
List of Figures	vii
List of Tables	xii
Résumé en français	1
Introduction: The General Scope of the research	20

Part I: The Context of the Study

Chapter I: The Environment Context

1.1.1. Physical Geography	23
1.1.2. Lut Desert: Geology and Geomorphology	25
1.1.3. Alluvial fan of Shahdad	26
1.1.4. Environmental Geography	28
1.1.5. Kalut	32

Chapter II: Problematic and Methodology

1.2.1. Methodology, Problematic and Approaches	35
1.2.2. Kalut landscape as an adaptive strategy in Dasht-e Lut	40

Part II: Archaeological Fieldwork Investigations in

Dasht-e Lut

Chapter I: A Reappraisal of the Bronze Age Urban Center of Shahdad

2.1.1. Introduction	44
2.1.2. The Graves of the Site of Shahdad	48
2.1.3. Pottery of Shahdad	52

2.1.4. Stone objects	59
2.1.5. Metal Objects	62
2.1.6. Clay Objects	67
2.1.7. Seals	68
2.1.8. Architectural remains of the residential quartier	72
2.1.9. The Chronology of the site of Shahdad	74
2.1.10. Summary	79

Chapter II: Recent Excavations and Surface Survey at the Urban Center of Shahdad

2.2.1. Introduction	82
2.2.2. Current picture of the Shahdad City	84
2.2.3. Surveys and Soundings for determining the extent of the site	85

Chapter III: Archaeological Survey on Dasht-e Lut

2.3.1. Introduction	90
2.3.2. Survey Area	91
2.3.3. Theoretical Framework	93
2.3.4. Survey Methodology	93
2.3.5. Chronology and Periodization	96
2.3.6. The Prehistoric and Protohistoric Sites	98
2.2.7. Summary	119

Chapter IV: Excavations at the Prehistoric Sites of Dehno and East Dehno

2.4.1. Introduction	121
2.4.2. Methodology	123
2.4.3. Excavations at Tepe Dehno	124

2.4.4. Excavations at Tepe East Dehno	135
2.4.5. Summary	139
Chapter V: A chronological reconsideration to the prehistory of SE Iran based on new data	
2.5.1. Introduction	141
2.5.2. New Absolute Dates form SE Iran	142
2.5.3. New look at the chronology and the cultural developments of SE Iran	151
2.5.4. Concluding Remarks	167

Part III: Settlement, Population and the Landscape

Chapter I: Prehistoric and Protohistoric Settlement and Population Trends on the west of the Lut Desert

3.1. Patterns of Settlement	170
3.1.1. Introduction	170
3.1.2. Fifth Millennium BC	172
3.1.3. Fourth Millennium BC	173
3.1.4. Third Millennium BC	173
3.1.5. Second Millennium BC	175
3.1.6. Human-environment Interactions in Dasht-e Lut	176
3.1.7. Economic Landscapes of Dasht-e Lut	178
3.2. Population Trends	183
3.2.1. Introduction	180
3.2.2. Prehistoric and protohistoric population trends in Dasht-e Lut	181

3.3. Concluding Remarks	184
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Chapter II: The Bronze Age Center of Shahdad: "hollow" early urban model

3.2.1. Early Bronze Age Urban Landscape of Dasht-e Lut	185
3.2.1.1. Introduction	185
3.2.1.2. An overview of the known Urban Centers of SE Iran	186
3.2.1.3. Recent Dasht-e Lut Project: Two new-found large urban centers	189
3.2.1.4. Spatial perspectives on Urban Landscape of Dasht-e Lut	191
3.2.1.5. Southeastern Iran Urbanization: New views from Dasht-e Lut	193
3.2.2. The Bronze Age Center of Shahdad: "hollow" vs. nucleated early urban models in the light of site formation processes	196
3.2.2.1. Introduction	196
3.2.2.2. Determining the extent of the settlement and its lay-out	199
3.2.2.3. Implications of the site's formation processes	203
3.2.2.2. Concluding Remarks	206
Conclusions	208
Bibliography	214

VOLUME TWO

Appendix	230
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List of Figures

Fig 1: Location of Lut Desert in the Iranian Plateau	237
Fig 2: Map showing the study area to the west of Lut Desert	237
Fig 3: Location of the alluvial fan of Shahdad	238
Fig 4: Location of the alluvial fan of Shahdad and its adjacent faults	238
Fig 5: Location of the central part of Dasht-e Lut in the west of the Lut Desert where most of the studied sites are distributed.	239
Fig 6: Current bed of the Shahdad River running eastward situated 6km north of the Bronze Age city of Shahdad	240
Fig 7: A gully passing directly through the Bronze Age city Shahdad	240
Fig 8: Satellite imagery showing the Qanat chains at the base of alluvial fan of Shahdad transferring water from west to east of the plain	241
Fig 9: Nebka tree of the Lut area and the vase-shaped sand dune formed around vegetation	241
Fig 10: The graves on the surface of Mokhtarabad attesting the extreme wind erosion in the Lut area	242
Figs 11, 12: Kaluts (sand dunes) the typical feature of Lut Desert	243
Fig 13: A small Kalut at the base of the alluvial fan of Shahdad	244
Fig 14: A comparison of the Kaluts of the Lut Desert (left) and Smaller Kaluts (right) of Shahdad plain	244
Fig 15: The Location of Urban Center of Shahdad to the east of the modern city	245
Fig 16: Image showing the site of Shahdad and its excavated areas	245
Fig 17: Excavated Areas of Cemetery A of Shahdad (After Hakemi 1997: 45, modified by author)	246

Fig 18: some of the potteries recovered from Cemetery A of Shahdad (Kept in the storeroom of Shahdad city)	248
Fig 19: some of the chlorite containers recovered from Cemetery A of Shahdad (Kerman Museum)	253
Fig 20: Stone miniature columns from Cemetery A of Shahdad (Shahdad storeroom)	253
Fig 21: A decorated Bronze dish from Shahdad (After; Hakemi 1997)	254
Fig 22: Drawing of the sense of the Standard of Shahdad (After; Hakemi 1997:649)	255
Fig 23: Standard of Shahdad (National Museum of Tehran)	257
Fig 24, 25: Two Clay Statues from Cemetery A of Shahdad (Courtesy of the National Museum of Iran)	258
Fig 26: A Cylindrical Seal recovered from grave 163 of Cemetery A of Shahdad (Courtesy of the National Museum of Iran)	259
Figs 27 & 28: Two unpublished seals recovered from area D of Shahdad, found by Hakemi (Courtesy of National Museum of Iran)	261
Fig 29: Seal impression of a clay stamp seal from architectural complex excavated by M. Kaboli (After Kaboli 1997)	262
Fig 30: Plan of the Architectural complex A of <i>farmers's area</i>	263
Figs 31, 32: Architectural complex A of <i>farmers's area</i> excavated by M. Kaboli (After Kaboli 1997)	264
Fig 33: Architectural complex B of <i>farmers's area</i> excavated by M. Kaboli (After Kaboli 2002)	265
Fig 34: Architectural complex of <i>Jewelry's area</i> excavated by M. Kaboli (After Kaboli 2001)	266
Fig 35: Exposure of graves on surface and erosion of burial goods at Shahdad	267
Fig 36: Aerial photograph showing the location of the trenches excavated in 2016 for delimiting the site	268
Fig 37: Topographic map of Shahdad showing the site's extension. "Jewelry" and "Farmers" Areas are the English translation of labels originally used by M. A. Kaboli in	

his field reports. T1 to T30 are the small test trenches dug for delimiting the 3rd millennium site. Block letters A-D locate old excavation areas discussed in the text.	
Contour lines: 1 m.	269
Fig 38: The survey area in red color on the west of Lut Desert	270
Fig 39: Distribution pattern of all the studied sites (5 th -2 nd Millennium BC) on the western edge of Lut Desert.	271
Fig 40: General view of the surface of Mokhtarabad site	272
Fig 41: Density of cultural materials on the surface of the Mokhtarabad	272
Fig 42: The graves on the surface of Mokhtarabad attesting the extreme wind erosion in the Lut area	273
Fig 43: The plain red ware of Shahdad recovered from the surface of the site	273
Fig 44, 45: The plain red ware of Shahdad recovered from the surface of the site	273
Fig 46: General view of the hill-top site of Shd 59	275
Fig 47: General view of the hill-top site of Shd 61	275
Fig 48: General view of the surface of the large site of Keshit	276
Fig 49: Density of cultural materials on the surface of Keshit site	276
Fig 50: Some of the industrial kilns on the surface of the Keshit	277
Fig 51: Some drawings of the surface collected ceramics of Keshit	278
Fig 52: The location of two excavated sites to the east of urban center of Shahdad	281
Fig 53: Tepe Dehno and the Landscape around at the site	281
Fig 54: Tepe Dehno is founded on the top of a Kalut	282
Fig 55: Topographic map of Tepe Dehno showing the place of the Trenches	282
Fig 56: The Stratigraphy of Trench I, Northern Section	283
Fig 57: A selection of the recovered ceramics from Trench I, Tepe Dehno	286
Fig 58: Tepe Dehno, Characteristic of the recovered ceramics from Trench II (Loc. 2001 (1-4), Loc. 2002 (5-10), Loc. 2003 (11-13), Loc. 2004 (14-16), Loc. 2005 (17-20)	288
Fig 59: Deflation of Cultural deposits at Trench II, Tepe Dehno	289

Fig 60: A selection of the recovered ceramics from Trench III, Tepe Dehno	289
Fig 61: Stratigraphy of cultural layers at Trench III, Tepe Dehno	291
Fig 62: Deflation of cultural layers at Trench III, Tepe Dehno	291
Fig 63: A selection of the recovered ceramics from Trench IV, Tepe Dehno	293
Fig 64: Stratigraphy and the deflation of cultural deposits at Trench IV, Tepe Dehno	294
Fig 65: General view of Tepe East Dehno	294
Fig 66: Deflation of cultural deposits at Trench I, Tepe East Dehno	295
Fig 67: Stratigraphy of cultural layers at Trench I, Tepe East Dehno	295
Fig 68: A selection of the recovered ceramics from Trench I, Tepe East Dehno	297
Fig 69: Map showing the major excavated sites of Southeastern Iran	298
Figs 70, 71: The result of 14C dating analysis from East Dehno showing the second quarter of 5 th Millennium BC	299
Figs 72, 73: The result of 14C dates from Trench IV, Tepe Dehno, Locus 4002 (left) and Locus 4004 (right)	300
Figs 74, 75: The result of 14C dates from Trench I, Tepe Dehno, Locus 1006 (left) and Locus 1007 (right)	301
Figs 76, 77: The result of 14C dates from Trench II, Tepe Dehno, Locus 2002 (left) and Locus 2003 (right)	302
Figs 78, 79: The result of 14C dates from Trench III, Tepe Dehno, Locus 3002	303
Fig 80: Radiocarbon dates from Tr. I, Site of Varamin-e Jiroft	304
Fig 81: Radiocarbon dates from Tepe Gav Koshi (after Soleimani and Fazeli 2018)	306
Fig 82: Radiocarbon dates for Konar Sandal South	307
Fig 83: GIS map showing the distribution pattern of 5 th millennium settlements on the Lut area	309

Fig 84: GIS map showing the distribution pattern of 4th millennium settlements on the Lut area	310
Fig 85: GIS map showing the distribution pattern of 3rd millennium settlements on the Lut area	310
Fig 86: Exposure of graves on surface and erosion of burial goods at the 3 rd millennium Site of Mokhtarabad on the west of Lut desert	312
Fig 87: Urban center of Shahdad and its contemporaneous small satellite occupations (CORONA Image)	314
Fig 88: Aerial photograph showing the location of the trenches excavated in 2016 for delimiting the site (photos from National Cartographic Centre, Iran, taken in 1993)	315
Fig 89: The new topographic map of Shahdad showing in orange the settlement cores or inhabited areas of the site. Contour lines: 1 m.	317
Fig 90: Shahdad. Map of Site D, excavated by A. Hakemi and E. Bayani in 1979. The stars mark the two rooms where hoards with unfinished beads in chalcedony and carnelian were found, below the level of the copper ores processing craft spaces. The arrows point to the entrances of five different dwellings.	318

List of Tables

Table 1: Speed and Direction of the Winds in Dasht-e Lut	242
Table 2: Placement of the uncovered graves from Shahdad	247
Table 3: Comparison of the Shahdad ceramics with the contemporaneous sites of the other regions	248
Table 4: Comparison of the Metal Objects of Shahdad with the Contemporaneous Sites of the Other Regions	254
Table 5: Comparison of the Seals of Shahdad with the Contemporaneous Sites of the Other Regions	260
Table 6: The Revised Chronology of Shahdad	266
Table 7: The identified prehistoric and protohistoric sites of Dasht-e Lut	279
Table 8: Characteristics of the recovered ceramics from Trench I, Tepe Dehno	284
Table 9: Characteristics of the recovered ceramics from Trench II, Tepe Dehno	287
Table 10: Characteristics of the recovered ceramics from Trench III, Tepe Dehno	290
Table 11: Characteristics of the recovered ceramics from Trench IV, Tepe Dehno	292
Table 12: Characteristics of the recovered ceramics from Trench I, East Dehno	296
Table 13: Results of the Radiocarbon dates from Tr. I, Site of Varamin-e Jiroft	305
Table 14: Proposed chronological table for the South-East Iran	308
Table 15: Settled Areas of Lut in different periods derived from survey data	313
Table 16: Long-term population trend from Lut area	313
Table 17: Location and size of 18 individual settlement cores surveyed within the limits of the Shahdad site complex.	316

Résumé en français

Une archéologie du paysage dans la plaine de Shahdad (Dasht-e Lut) du 5^e au 2^e millénaires av. J.-C.

Cette thèse examine les développements culturels du Dasht-e Lut (bordure ouest du désert de Lut, sud-est de l'Iran) du début du cinquième au début du deuxième millénaire avant J.C. Archéologiquement, Dasht-e Lut est bien connu grâce à l'existence du centre urbain de l'âge du Bronze de Shahdad considéré comme un point de rencontre dans les réseaux de l'âge du Bronze en Asie du Sud-Ouest.

Cette étude développera une approche du paysage pour étudier les interactions homme-environnement, les modèles de peuplement et les changements de population à l'ouest du désert de Lut pendant la période chalcolithique et l'âge du Bronze. Pour répondre à cette question, un projet archéologique de trois campagnes de terrain (en 2012, 2013 et 2016) a été réalisé par l'auteur dans cette région:

- 1- une prospection extensive dans la région du Dasht-e Lut pour comprendre dans la diachronie le paysage culturel.
- 2- un ré-examen du site urbain de Shahdad où nous avons procédé à une prospection intensive et à des sondages stratigraphiques pour évaluer son extension.
- 3- Des fouilles ciblées sur les sites de Dehno et East Dehno.

Ces études, menées à différentes échelles, nous ont permis de comprendre Shahdad dans son contexte régional.

Résumé en français

La première campagne a consisté à une vaste prospection archéologique sur le Dasht-e Lut pour identifier les modèles de peuplement de la région à travers la préhistoire. Pendant la deuxième saison du projet, nous avons conduit des fouilles stratigraphiques de deux sites préhistoriques dans la région de Shahdad datant des 5ème, 4ème et 3ème millénaires avant J.-C. Pendant la deuxième campagne de terrain, nous avons mené une prospection de surface et des fouilles à petite échelle sur un site lié à l'âge du Bronze ancien.

Ce projet de recherche archéologique a mis en lumière de nouvelles données pour étudier les cultures chalcolithiques et de l'âge du Bronze ancien et moyen du Dasht-e Lut qui est le sujet principal de cette recherche. La proximité du Dasht-e Lut et du désert de Lut a conduit à la formation d'un ancien paysage désertique particulier au Proche-Orient.

L'objectif de cette thèse portait sur les systèmes de peuplement désertique, les adaptations humaines aux environnements désertiques et les tendances à long terme des établissements.

La présente recherche introduit une caractéristique géologique remarquable au Proche-Orient appelée Kalut: Les crêtes rocheuses atypiques, hautes de plusieurs dizaines de mètres, formées par l'érosion éolienne.

Nous discutons ici de sa relation avec les occupations préhistoriques dans la zone d'étude.

L'étude de l'organisation urbaine du site de Shahdad et de ses processus de formation sont également abordés dans cette thèse. En outre, les modèles régionaux d'urbanisation de l'âge du bronze dans le sud-est de l'Iran sont étudiés sur la base des nouvelles données au Dasht-e Lut. Cette thèse offre une occasion unique d'étudier l'impact des variables environnementales du désert sur les modèles de peuplement préhistoriques et protohistoriques.

Shahdad est un grand site de l'âge du Bronze situé à l'est de la ville moderne de Shahdad, à l'ouest du désert de Lut. D'après les fouilles et les prospections archéologiques, l'extension du site est de plus de 170 hectares. Le site urbain de l'âge du Bronze est situé à la base d'un cône alluvial où il était dans le passé entouré par la rivière Shahdad et un

certain nombre de ruisseaux coulant à l'est des montagnes occidentales vers l'est. Ce site est connu comme un centre urbain du troisième millénaire avant J.-C. dans l'archéologie du Proche-Orient¹.

L'histoire des activités archéologiques sur le site de Shahdad, à l'ouest du désert de Lut, remonte à un demi-siècle. En 1968, lors d'une reconnaissance géographique générale de la dépression de Lut, le site de l'âge du bronze ancien de Shahdad a été identifié. Les fouilles menées par Ali Hakemi du Service archéologique d'Iran ont commencé l'année suivante et se sont poursuivies jusqu'en 1978².

La fouille s'est concentrée sur une nécropole dans laquelle 383 tombes ont été fouillées. Beaucoup ont livré avec des objets funéraires spectaculaires, y compris des statuettes humaines impressionnantes, des objets métalliques élaborés tels qu'un étendard en bronze, de nombreux récipients en pierre et en céramique et des découvertes ornementales. Hakemi a également conduit des fouilles à l'est du site, dans l'opération D, qu'il a identifiée comme "une zone industrielle" du centre urbain de Shahdad. Dans l'ensemble, les fouilles dans la nécropole et "la zone industrielle" ont fourni des preuves d'activités artisanales locales et de contacts interrégionaux.

En 1977, une prospection de cinq jours sur le site de Shahdad et ses environs a été conduite avec la collaboration d'une équipe italienne qui a identifié 37 points d'échantillonnage à l'aide de photographies aériennes³. En 1978, le programme de recherche archéologique de Shahdad a été suspendu pendant une décennie. Les fouilles sur le site de Shahdad ont repris sous la direction de M. Kaboli pendant quatre campagnes de terrain dans les années 1990. Le travail de Kaboli s'est concentré dans les quartiers résidentiels du site.

Son travail, dans la partie nord du site, a permis de découvrir deux complexes architecturaux. L'un d'eux situé à 800 m au nord du cimetière A, a été nommé "zone des

¹ Hakemi (1997).

² Hakemi (1997).

³ Salvatori & Vidale (1982); Hakemi (1997), Chart.5.

fermiers " et à 300 m à l'est, le deuxième complexe, appelé "zone de bijoux", a été identifié. Ces deux complexes de zones résidentielles augmentent considérablement notre compréhension de la configuration du centre urbain de l'âge du Bronze de Shahdad qui n'était auparavant connu que par sa nécropole. Cependant, nous savons encore peu de choses sur l'aménagement physique de la ville. Ce manque d'information concernant l'urbanisme gênait notre compréhension du modèle de développement urbain et du modèle de croissance du site.

En avril et mai 2016, le complexe de sites de Shahdad a été systématiquement exploré et délimité. Alors qu'en vérifiant l'extension réelle de Shahdad, nous voulions éviter d'éventuels dommages au site, l'étude de surface a révélé un type d'organisation de la ville de l'âge du Bronze très différent de celui généralement imaginé.

Les résultats préliminaires de cette campagne de sondages indiquent que les ruines de Shahdad s'étendent sur une longueur maximale de 2100 mètres du nord au sud, environ 1600 m d'est en ouest à son point le plus large, et environ 800 mètres, où l'extension est la plus réduite, la partie nord du complexe du site étant plus large que celle du sud. Ces chiffres montrent que Shahdad s'étend donc sur environ 170 ha de surface. Il s'agit donc de l'un des plus grands centres urbains de l'âge du Bronze en Asie du Sud-Ouest mais les prospections de surface et les fouilles récentes de l'auteur ont révélé que l'étendue occupée de ce site n'est que 90 hectares que représentent un modèle urbain différent qui est appelé comme "*Hollow model*". L'étude de surface du site a produit également des informations précieuses pour le modèle urbain du site qui sont discutées dans la partie III, chapitre II.

Le désert de Lut occidental offre une occasion unique d'étudier l'impact des variables environnementales du désert sur les modèles de peuplement préhistoriques, ainsi que sur la formation, la croissance et la nature des établissements qu'on y a découvert.

Cette thèse examine en effet les interactions homme-environnement dans le désert de Lut occidental de la période chalcolithique à l'âge du Bronze et vise à comprendre comment l'environnement physique a contribué au modèle de peuplement unique qui caractérise ces paysages.

Résumé en français

Les paysages culturels y sont le résultat de millénaires d'efforts humains et illustre l'écologie humaine dans un environnement extrême. L'étude de l'exploitation humaine d'un environnement désertique permet non seulement de reconstruire les comportements humains du passé, mais peut également être un atout pour la planification future.

Cette thèse présente une étude de cas en Iran et l'utilise pour examiner certaines des questions relatives à l'étude archéologique des paysages désertiques. L'accent est mis sur les systèmes de peuplement envisagés dans la diachronie, les adaptations humaines aux contraintes environnementales et les tendances à long terme des établissements.

Non seulement cette recherche nous a permis de documenter le paysage urbain du 3ème millénaire avant J.-C. de la région du Dasht-e Lut, mais elle a fourni également des indices de la façon dont les premières sociétés complexes se sont développées dans un paysage désertique complètement différent d'autres paysages urbains contemporains du sud-est de l'Iran⁴, à savoir le Halilrud et les Bassins du Sistan. Ces développements sont également considérés dans le contexte de l'urbanisation dans le Proche-Orient ancien (voir partie trois).

J'ai tenté de mettre en évidence le paysage culturel désertique local de la région du Lut en appuyant sur les approches actuelles de l'archéologie du paysage. Ainsi, l'enquête régionale a pu produire des données sur les activités humaines dispersées dans le paysage plutôt que de se concentrer uniquement sur les «sites».⁵ Par ailleurs, la prospection dans la région du Lut a été conçue pour explorer les modèles de peuplement régional à long terme⁶, leur évolution au fil du temps et leur relation avec les conditions environnementales uniques de la région du Lut.

Le projet Dasht-e-Lut a utilisé des méthodes d'enquête à la fois extensives et intensives. La première consistait en une vaste enquête conventionnelle au cours de laquelle nous avons visité tous les endroits possibles où des sites pouvaient être trouvés.

⁴ cf. Wilkinson (2003a), David and Thomas (2008).

⁵ Banning (2002), p 1.

⁶ cf. Kowalewski (2008).

Résumé en français

Cela a été guidé par une analyse des cartes, des images satellites modernes à haute résolution disponibles sur Google Earth, des informations fournies par des informateurs locaux et l'emplacement des villages modernes. La deuxième méthode consistait à marcher sur les champs dans les zones où ils se prêtaient à l'enquête piétonne, par exemple le long des rivières et des ruisseaux dans la direction est-ouest, et dans la partie centrale de la région du Lut, où se trouve le centre urbain de Shahdad, à l'âge du Bronze.

A cause de la diversité des paysages dans la zone d'étude, la stratégie et la méthodologie de la prospection différaient d'un endroit à l'autre. En fait, pour atteindre l'objectif principal de la documentation des modèles d'établissement, une méthodologie de prospection en quatre phases a été adoptée, liée à la diversité des paysages dans la zone d'étude ainsi que du potentiel des sites archéologiques.

La première phase comprenait une reconnaissance générale de la marge ouest du Lut, du village le plus au nord de la plaine (Dehseyf) au village de Keshit (le plus au sud) au sud-ouest de Lut. La deuxième phase concernait les montagnes occidentales de l'ouest du désert du Lut. La deuxième phase a couvert les montagnes occidentales de l'ouest du désert de Lut. Dans cette phase, l'objectif principal était de rechercher des sites pastoraux ainsi que des établissements du paléolithique.

Dans la troisième phase, une prospection pedestre intensive a été menée le long des rives des cours d'eau principaux qui proviennent de la région montagneuse et se dirigent vers l'est et le désert de Lut.

La dernière phase s'est concentrée dans les zones autour du centre urbain fouillé de Shahdad. Cette zone nous a offert une occasion unique d'étudier l'impact des caractéristiques environnementales d'un désert sur l'emplacement des établissements préhistoriques. Il s'agit de la zone directement à l'est de la ville moderne de Shahdad avec une étendue d'environ 10 km sur 10 km où les Kaluts sont répartis.

Pour comprendre le cadre chronologique sous-tendant les modèles de peuplement de la région de Lut, la principale composante analytique de cette étude s'est fondée sur l'analyse des céramiques de surface de chaque site. Les dates proposées pour les sites de Lut reposent largement sur des comparaisons avec les données publiées sur la céramique

provenant des fouilles de Shahdad⁷ et d'autres régions du sud-est de l'Iran, en particulier la plaine de Bardsir⁸ et la vallée de Soghun⁹.

Les fouilles sur le site de Shahdad, ainsi que les nouvelles fouilles à Tepe Dehno et Tepe East Dehno dans la région de Shahdad¹⁰, ont permis l'identification de la majorité des tessons de surface. La récente prospection dans la région de Lut a conduit à l'identification de quatre-vingt-sept sites antiques, allant du début du cinquième millénaire avant J.-C. à la fin de la période islamique. Parmi les sites documentés, vingt-trois sont liés aux périodes du Chalcolithique et de l'âge du Bronze ancien.

En ce qui concerne le nombre de sites, il faut mentionner que chacun des trois grands sites de la zone de Lut (Shd 46, Shd 22 et Gbf 04) est composé de nombreux monticules qui sont collectivement considérés comme un seul grand site.

Les sites mesurent entre 0,2 ha et environ 200 ha. À l'exception des trois grands sites susmentionnés, les autres établissements ont été localisés sur des collines naturelles où il n'était pas difficile de déterminer leur étendue. Sur le plan fonctionnel, les sites sont généralement de deux types: Les établissements résidentiels (21 sites) et les ateliers (2 sites). Chronologiquement, 13 sites appartiennent au cinquième millénaire avant J.-C. et 15 sites remontent au quatrième millénaire avant J.-C. De plus, 12 sites sont datés du troisième millénaire avant JC et seulement 2 sites datent du deuxième millénaire avant J.-C. La plupart des sites semblent être des établissements à plusieurs composants. En terme de distribution spatiale, vingt et un sites ont été localisés à la base du cône alluvial de Shahdad dans la partie centrale du Dasht-e Lut.

La deuxième campagne de terrain du projet récent dans le Dasht-e Lut comprenait des fouilles stratigraphiques des deux sites préhistoriques de Tepe Dehno (Shd 051) et Tepe East Dehno (Shd 032). Malgré le fait que douze campagnes de terrain ont déjà été conduites

⁷ Hakemi (1997), Eskandari (2017).

⁸ Caldwell (1967).

⁹ Lamberg-Karlovsky and Beale (1986), Lamberg-Karlovsky and Potts (2001).

¹⁰ Eskandari (2017).

Résumé en français

dans la plaine de Shahdad, les périodes précédant l'âge du Bronze n'avaient pas encore été étudiées.

Bien qu'une occupation du 5^e ou 4^e au début au milieu du 2^e millénaire avant J.-C. ait été proposée pour la plaine de Shahdad, ils n'y avaient pas de séquence stratifiée ou de chronologie absolue pour ces périodes préhistoriques avant nos travaux.

Le but de mes travaux récents dans le Dasht-e Lut était donc de compenser le manque d'Indices archéologiques pour les périodes anciennes. Les principaux objectifs des fouilles étaient :

- de déterminer la séquence culturelle de la plaine de Shahdad, en particulier pour les périodes antérieures à l'âge du Bronze;
- d'évaluer la fiabilité des échantillons de l'enquête et de fournir une séquence chronologique contrôlée dans laquelle des céramiques précédemment non identifiées pourraient être datées.
- de fournir des dates absolues pour mieux situer chronologiquement le matériel grâce à un programme complet d'analyses au radiocarbone d'échantillons recueillis en stratigraphie ;
- d'explorer la transition du Chalcolithique récent au début de l'âge du Bronze ;
- d'explorer les racines de l'urbanisme de l'âge du Bronze dans la région de Lut en fouillant Tepe Dehno, grand centre régional qui a été occupé de la fin du cinquième au troisième millénaire avant J.-C.

La campagne de fouilles à Tépé Dehno ainsi que les travaux à Tépé East Dehno ont commencé en janvier et se sont poursuivis jusqu'au mois de mars en 2013. Les fouilles à Tépé Dehno ont été menées dans quatre tranchées stratigraphiques (environ 3 × 3 m). La tranchée I a été ouverte sur la partie est du site, en haut de la plus haute terrasse. La tranchée II était située au centre du site. La partie ouest du site où dominaient les tessons de céramique rouge de l'âge du Bronze ancien a été choisie pour l'emplacement de la tranchée III.

Résumé en français

Avant de commencer les fouilles, nous avons émis l'hypothèse que le site de Dehno conservait au moins sept mètres de stratigraphie archéologique. Lorsque nous avons fouillé les tranchées I, II, III, nous avons découvert que le site était un établissement au sommet d'une colline contenant moins d'un mètre d'épaisseur de couche culturelle. C'est pourquoi nous avons ouvert la tranchée IV sur la partie est du site, dans une dépression qui était entourée par des pieux. En effet, nous avons cru que cette partie du site avait probablement conservé des dépôts archéologiques plus profonds car les monticules environnants l'avaient protégée contre l'érosion éolienne extrême qui a été la principale cause d'une telle déflation.

Les fouilles à Tepe Dehno ont fourni une séquence d'occupations de la fin du cinquième au début du troisième millénaire avant J.-C., mais les périodes les plus anciennes (début-milieu du 5^e millénaire avant J.-C) attestée dans la région ne sont pas représentées sur le site. Par conséquent, gardant en tête l'objectif principal de nos fouilles, qui visent à déterminer la séquence culturelle complète de la période préhistorique de la région, un site identifié comme East Tépé Dehno (situé à 700 m à l'est de Tepe Dehno) a également été fouillé.

Bien que East Tepe Dehno soit un site à périodes multiples qui a été occupé dès le 5^e millénaire jusqu'au 3^e millénaire avant J.-C. Une seule tranchée stratigraphique de 3 × 3 m a été ouverte, sur le versant ouest du site. Nous avons ouvert la tranchée à cette emplacement parce que des découvertes de surface ont permis de penser qu'une occupation du cinquième millénaire avant J.-C y était préservée. Au total, ce programme de travail sur le terrain a mis en lumière des informations précieuses pour établir un cadre chronologique pour la région de Shahdad commençant dès le début du cinquième et s'étendant jusqu'au début du troisième millénaire avant J.-C.

Les fouilles dans les tranchées I et II ont mis en lumière des informations précieuses sur la culture d'Aliabad qui, d'après quatre dates radiocarbone, remontaient au milieu et à la fin du quatrième millénaire avant JC. C'est l'époque où le site de Dehno a été atteint sa plus grande étendue soit 15 hectares. En fait, le site de Tepe Dehno a fourni une occasion

presque unique d'enquêter sur la période IV du site d'Iblis. Cela peut nous informer sur la culture plus large d'Aliabad.

La tranchée III a été creusée dans la partie ouest de Tepe Dehno, où un petit établissement (environ 3 ha) lié à l'âge du Bronze ancien I a été installé. Les fouilles de cette tranchée ont révélé une phase importante, énigmatique et jusqu'ici inconnue dans la plaine de Shahdad qui, sur la base de deux dates radiocarbone, tombent à la fin du quatrième et au début du troisième millénaire avant J.-C. La culture Aliabad (Iblis IV) à Tépé Dehno a été remplacée par cette phase jusqu'alors méconnue à la fin du quatrième millénaire avant J.-C, illustrée par un assemblage céramique complètement différent.

Les fouilles de la tranchée IV ont révélé que la première occupation de Tepe Dehno était liée à la fin du cinquième millénaire avant J.-C. Les fouilles dans toutes les opérations qui y ont été menées ont montré que cet établissement au sommet d'une colline préservait rarement plus d'un demi-mètre de stratigraphie. De plus, elles ont mis en évidence le fait que les vestiges architecturaux n'étaient probablement pas préservés en raison de processus taphonomiques. Cependant, plus de fouilles est nécessaire pour confirmer cette hypothèse.

En termes de séquence chronologique, la première campagne de fouille à Tépé Dehno a révélé jusqu'à présent trois périodes d'occupation principales qui sont numérotées de la plus ancienne à la plus récente Dehno I-III. Ces périodes ont été distinguées sur la base d'assemblages céramique et de dates absolues. La période Dehno I en tant que première occupation correspond à la fin du cinquième millénaire avant J.-C (4250-4000 B.C) et a été identifiée dans la tranchée IV. La deuxième période a été documentée par des fouilles des tranchées I et II. La période Dehno II est liée au milieu et à la fin du quatrième millénaire avant J.-C (3700-3300 avant J.-C). Elle est connue sous le nom de culture Aliabad (Iblis IV). La période Dehno III (3200-2900 / 2800 av. J.-C.) est une période jusqu'alors inconnue. La découverte la plus intéressante est que cette période est directement précédée par la culture Aliabad. Ainsi les fouilles à Tépé Dehno ont déterminé une séquence d'occupation de la fin du cinquième au début du troisième millénaire avant J.-C, mais la période la plus ancienne connue dans la région (début-milieu du 5ième

millénaire avant J.-C) n'a pas été découverte. Par conséquent, Tépé East Dehno a été fouillé afin de découvrir ces premières périodes attestées dans la région. Les fouilles limitées sur ce site ont identifié les premières périodes de la plaine de Shahdad, connues sous le nom de cultures Iblis I-II qui, d'après deux dates au radiocarbone, tombent dans la première moitié du cinquième millénaire avant J.-C.

Les fouilles à Tépé East Dehno ont également confirmé le fait que les sites de la région sont généralement des établissements au sommet d'une colline qui possèdent des dépôts archéologiques de moins d'un demi-mètre d'épaisseur. Les fouilles à Tépé Dehno et à Tépé East Dehno ont révélé que les établissements préhistoriques de la plaine de Shahdad, tous fondés sur un cône alluvial, ont été fortement affectés par leur environnement. En effet, le paysage naturel a provoqué la formation de peuplements au sommet d'une colline plutôt que sur les Tépé sites dans cette partie du plateau iranien. En outre, il a montré que les établissements préhistoriques ont un modèle de croissance horizontale plutôt que verticale. Il ne fait aucun doute que les caractéristiques environnementales ont poussé les anciens habitants à déménager, plutôt qu'à construire sur une occupation plus ancienne.

En termes d'état du paysage culturel, les sites préhistoriques de la plaine de Shahdad sont en danger en raison de l'érosion éolienne extrême. Dans ce cas, les fouilles des années 1970 et 1990 sur le site de Shahdad et mes fouilles récentes ont montré que les dépôts culturels préhistoriques ont une épaisseur inférieure à 1 m. Je suppose que la déflation éolienne explique cette faible puissance des dépôts archéologiques.

Cette étude a cherché à étudier les établissements du Dasht-e Lut, dans le sud-est de l'Iran de la période Chalcolithique et de l'âge du Bronze, afin de développer une perspective théorique appropriée concernant les données spatiales archéologiques. En effet, cette thèse a examiné les interactions homme-environnement dans l'ouest du désert de Lut et visait à comprendre comment l'environnement physique a contribué au modèle de peuplement unique qui caractérise ces paysages pendant ces périodes.

En raison de la diversité environnementale en Asie du Sud-Ouest, il existe des paysages diversifiés et fragmentés dans la région. Les contextes environnementaux physiques sont très importants dans la formation du comportement humain. Parmi eux, les

paysages désertiques représentent un cas très particulier dans un environnement extrême. L'emplacement du Dasht-e Lut sur la frange ouest du désert hyper aride de Lut, a provoqué la formation d'un certain paysage historique dans l'archéologie de l'Asie du Sud-Ouest.

La structure particulière du paysage de Kalut du Dasht-e Lut a constitué un privilège pour la région pendant les périodes préhistoriques et protohistoriques, ce qui a fait que la région est devenue un paysage ancien unique dans l'archéologie du Proche-Orient. Comme cela a été démontré, il y a eu une relation étroite entre les Kalut et les anciens sites du Dasht-e Lut.

Les principaux impacts de l'environnement désertique sur les paysages culturels de la région de Lut sont observés à travers l'emplacement, le type et la morphologie des établissements. Les sites préhistoriques de la région se sont formés au bord du cône alluvial de Shahdad, dans la partie centrale de la région de Lut. Ce schéma d'implantation est très différent des autres paysages du plateau iranien. En effet, le schéma semble avoir été celui de communautés agrégées, concentrées dans des parties spécifiques de la région, plutôt que dispersées dans le paysage. Les oasis sont en effet, les seuls endroits du désert propices regroupement des communautés humaines en raison des sources d'eau limitées.

Wilkinson¹¹ a suggéré que l'oasis est l'endroit d'établissement par excellence du désert. Les oasis ont été définies par Paolo Costa (1983) comme « le lieu où l'eau et les terres cultivables se rencontrent » dans le désert ou selon Mainguet comme « une enclave agricole dans ou au bord d'un désert »¹². La question est de savoir comment l'environnement désertique a affecté les types d'établissements qui se sont développées dans la région du Lut.

Les conditions hydrologiques y ont eu deux impacts principaux sur le paysage culturel de Lut. Premièrement, elles ont affecté les schémas de distribution des établissements ; les vingt et un établissements préhistoriques (sauf 022 et 004) sont dispersés dans un rayon

¹¹ Wilkinson (2003a), p. 155.

¹² Mainguet (1999), p. 209.

de 4 km à l'extrémité du cône alluvial de Shahdad, dans la partie centrale de la région de Lut.

Deuxièmement, elles ont suscité la formation de sites au sommet des collines (hill-top settlement) plutôt que de la constitution de tells archéologiques. En effet, bien que les oasis attirent les communautés humaines, elles sont également exposées à des crues soudaines. Par conséquent, on peut les qualifier des zones à haut risque. En fait, pour éviter le risque d'inondations soudaines, les habitants préhistoriques de Lut ont fondé leurs établissements sur le sommet de collines naturelles ou Kaluts qui sont normalement plusieurs mètres au-dessus de la surface des terres environnantes. Pour illustrer un exemple de ce risque, nous pouvons citer la destruction de la ville islamique de Shahdad par une inondation massive au milieu de l'époque islamique. Par conséquent, l'environnement physique peut fortement influencer l'emplacement des établissements.

Un autre impact du paysage désertique du Lut sur le paysage culturel se reflète dans le type et la morphologie des sites. Fait intéressant, les prospections ont montré que les sites préhistoriques avaient tendance à s'étendre horizontalement au fil du temps dans la région de Lut. Les Tells ou Tépé, caractéristiques des plaines d'Asie du Sud-Ouest, ne se trouvent pas dans la région de Lut. Les facteurs environnementaux ont clairement joué un grand rôle dans l'absence de formation de tells et de tépés.

Des fouilles anciennes et récentes sur le site de Shahdad ainsi que les fouilles récentes sur les sites de Tépé Dehno et East Dehno ont montré que les couches préhistoriques ont moins d'un demi-mètre d'épaisseur. Bien que les sites montrent une tendance à la croissance horizontale au fil du temps, il semble peu probable qu'il n'y ait pas eu d'accumulation de dépôts du tout au fil du temps. L'exposition de tombes à la surface et l'érosion des vestiges funéraires sur les sites préhistoriques de la région, qui devaient se trouver à l'origine au moins un ou deux mètres sous le niveau du sol, indiquent qu'il y a eu une importante déflation des dépôts archéologiques en raison d'une érosion éolienne constante. Cela doit être l'une des principales raisons pour lesquelles il y a une telle déflation de la stratigraphie des sites.

Résumé en français

D'une manière générale, les paysages culturels locaux de la région de Lut à l'époque préhistorique sont marqués par trois tendances:

- 1) Les établissements sont peu nombreux et ont tendance à être concentrés plutôt qu'à s'étendre sur de vastes zones.

- 2) Le modèle de type de site et de distribution des établissements est adapté aux conditions locales unique et reflète la continuité d'occupation sur le long terme.

- 3) La formation d'un type de peuplement spécifique (hill-top settlements and Kalut settlement) semble avoir été une stratégie adaptative répondant au paysage naturel de la région de Lut.

Le schéma d'implantation est, dans l'ensemble, le reflet des adaptations sociales, culturelles et économiques à un environnement aride dans lequel les ressources en eau sont limitées à des zones spécifiques, mais dans lequel d'autres ressources naturelles précieuses peuvent être exploitées (par exemple les ressources minérales).

Les changements de l'organisation spatiale de Dasht-e Lut au cours du 5ème-2ème millénaire avant J.-C révèlent par une croissance démographique rapide et une centralisation croissante de l'économie politique. La formation d'un système centralisé dans la région de Lut est déduite de l'émergence du grand centre de Tépé Dehno au 4e millénaire et de Shahdad au 3ème millénaire avant J.-C. La croissance démographique dans les agglomérations urbaines n'est pas possible sans une agriculture productive, un excédent, une spécialisation artisanale, un système de relations sociales avec l'émergence de membres de statut supérieur dans la société. Dans le Dasht-e Lut, un changement de structure profond et progressif est évident du 5ème au 3ème millénaire avant JC. En particulier, au début de l'âge du Bronze, le Dasht-e Lut accueille des sociétés politiquement centralisées qui se formèrent le long du couloir commercial naturel du désert de Lut.

L'économie des communautés de la périphérie ouest de Lut au troisième millénaire avant J.-C reflète clairement l'importance du commerce. Hiebert et Lamberg-Karlovsky¹³ considéraient que Shahdad contrôlait pleinement un territoire important et un réseau commercial à longue distance avec les régions environnantes. L'emplacement de la région de Lut au milieu d'un réseau commercial, la richesse des sources minérales¹⁴ locales et la juxtaposition de cette zone avec le désert de Lut étaient un avantage, et pour ces raisons peuvent avoir conduit les Shahdadiens à développer une économie mixte consistant en l'agriculture et la production artisanale.

En outre, notre programme de recherche du Lut a abouti à de nouvelles informations sur la chronologie de la préhistoire du sud-est de l'Iran. La revue critique de la séquence de la région a été réalisée sur la base de la datation radiocarbone de 10 échantillons découverts dans les fouilles de Tepe Dehno et East Dehno et la chronologie comparative des régions adjacentes. À la suite de cette étude, la plupart des points de vue liés à la chronologie de la région nécessitent une révision (tableau 14). En outre, la mise en contexte des cultures Dasht-e Lut dans un contexte plus large a abouti à une image non uniforme de la préhistoire du plateau iranien. Des études sur les cultures préhistoriques de la région ont révélé un processus et une voie d'évolution indigènes qui a prospéré le plus au cours du 3ème millénaire avant J.-C. En fait, le sud-est de l'Iran, malgré toutes les interactions culturelles avec les régions adjacentes, a suivi sa propre trajectoire de développement avec ses caractéristiques locales et régionales.

Outre les tendances de peuplement à Dasht-e Lut, cette recherche s'est concentrée sur l'âge du Bronze de Shahdad. Des fouilles archéologiques et des études de surface, ainsi qu'une réévaluation des fouilles précédentes des années 1970 et 1990 sur le site lui-même ont fourni des informations intéressantes sur la configuration urbaine et les processus de formation du site.

¹³ Hiebert and Lamberg-Karlovsky (1992).

¹⁴ See Vatandoust (1977), Salvatori and Vidale (1982), Meier (2015).

Résumé en français

La révision des données de Shahdad a fourni de nouvelles informations, notamment sur les tombes, les poteries, les objets en pierre, les sceaux, les vestiges architecturaux et les objets en métal et en argile, ce qui a conduit à présenter une chronologie révisée pour le site urbain de Shahdad et les analyses de intra-site et régionale.

Il a été démontré que Shahdad a été habité pendant une longue période du milieu du troisième millénaire avant J.-C au début du deuxième millénaire avant J.-C et qu'il a prospéré pendant la seconde moitié du troisième millénaire avant J.-C. Selon une étude des données obtenues à partir des fouilles de Shahdad, la ville pendant la seconde moitié du troisième millénaire avant J.-C et surtout à la fin de ce millénaire avait une similitude culturelle avec d'autres zones urbanisées du sud-est de l'Iran, y compris la région du Sistan, le bassin du Halilrud et le Balouchistan (Fig 1). Cette similitude culturelle résulte de l'établissement d'un réseau de communications commerciales le long de la région urbaine du sud-est de l'Iran. Malgré toutes les interactions culturelles avec toutes ces régions, les traditions culturelles locales et régionales ont dominé à Shahdad. Le site a toutes les caractéristiques d'une ville qui a développé des faciès culturels locaux au début et au milieu de l'âge du Bronze à l'ouest du désert de Lut.

Résumé en français



Fig 1: Carte montrant l'emplacement des principaux sites de l'âge du bronze ancien dans le sud-est de l'Iran

Ces faciès culturels locaux s'illustrent dans les types d'inhumations, les objets funéraires tels que les sculptures en argile humaine et le modèle de maison, la couverture du corps avec des nattes et la présence de plates-formes dans les tombes. On peut affirmer que Shahdad est un bon exemple du rôle du sud-est de l'Iran comme médiocre dans les réseaux d'interaction de l'Asie du Sud-Ouest au cours de la seconde moitié du 3^e millénaire avant J.-C.

Les travaux actuels ont été l'occasion de faire un pas en avant et de mieux comprendre l'urbanisation ancienne de la région de Lut et dans l'ensemble du sud-est de l'Iran. Tout d'abord, il a été prouvé que le Dasht-e Lut présentait un modèle urbain spatial très intéressant et inattendu au début de l'âge du Bronze et qu'aucun des centres urbains ne semble avoir eu de sites satellites - une telle distribution de sites est étrange, selon les normes du Proche-Orient. Il suggère que les facteurs écologiques et le paysage désertique

naturel ont eu une influence majeure sur la création de ce modèle spatial distinctif à l'ouest du Dasht-e Lut.

Deuxièmement, en faisant une étude de surface et des tranchées-tests, j'ai essayé de comprendre le modèle urbain du site du 3e millénaire avant JC de Shahdad. Nous avons tenté de répondre à la question suivante : la ville importante de Shahdad de l'âge du Bronze était-elle une sorte de "ville creuse" - "une succession de quartiers denses et fonctionnellement mixtes, une sorte de centre-ville linéaire délocalisé" - plutôt qu'une ville ancienne nucléée dense?

En d'autres termes, le modèle Hollow fait référence à une ville qui est physiquement composée d'un ensemble de groupes interconnectés mais séparés qui se réunissaient pour former un centre urbain au lieu de présenter un modèle d'établissement dispersé et non nucléé (pour une discussion détaillée, voir la partie III , Chapitre 2). Donc cette thèse suggère que Shahdad présente un modèle Hollow car cette ville se compose d'un ensemble de clusters de maisons interconnectés mais séparés, si en fait, ces noyaux se sont réunis pour former un complexe urbain lâche rappelant au moins certains aspects du modèle d'urbanisation de la «ville vide» de Stransky et Maupu.¹⁵

Enfin, dans cette thèse, au moyen d'une recherche régionale, consistant en un programme combiné de prospections et de fouille, j'ai tenté de donner un aperçu des systèmes de peuplement et de l'interaction des sociétés préhistoriques avec leur environnement naturel en particulier sur la bordure occidentale de la Lut Désert. En conséquence, les interactions des paysages physiques et culturels du désert dans la région de Lut se reflètent dans les modèles de distribution des sites, le type de peuplement et la stabilité à long terme des systèmes de peuplement.

¹⁵ Stransky and Maupu (2014).

Résumé en français

En outre, ce travail a introduit une caractéristique archéologique remarquable de l'ancien Proche-Orient appelée Kalut (dune de sable) qui était une partie fondamentale de la signature du paysage du Dasht-e Lut, et qui a considérablement affecté le système de peuplement de la région.

The General Scope of the Research

Not only is the desert the quintessential Near Eastern landscape, it is also a "landscape of survival" and is therefore capable of providing some of the best-preserved landscapes.

Tony Wilkinson (2003a:151)

Archaeologically, South East of Iran is one of the most important regions of the Near East in the Chalcolithic era and the Bronze Age. This region due to existence of some glorified Bronze Age urban centers such as Shahr-i Sokhta, Jiroft and Shahdad, has played an important role in the ancient Near East. Dasht-e Lut is one of the key regions of the Iranian plateau for studying the pathways and trajectories of the early urbanization.

This research will study the human-environment interactions, settlement patterns and population changes in the Dasht-e Lut during 5th to 3rd Millennium BC. By means of a regional research, consisting of a combined program of survey and excavation, I attempted to bright to light an insight into the social structure, intra- and intersite relations among the settlement, and the interaction of prehistoric and protohistoric societies with their natural environment.

In this research, GIS applications are used to integrate the spatial data obtained and to improve our understanding of local environment, choices of site location and subsistence economy.

In a wider perspective, attention is drawn to the variability in the prehistoric landscapes in South East of Iran. In other words, it shows that in a different natural setting of a marginal desert landscape there were solutions or strategies available to communicate in order to cope with external restraints and cultural notions for organizing social life.

The General Scope of the research

This thesis is formulated in three parts. Part I deals with the physical landscape, problematic and the theoretical approaches of the research.

Part II is focused on the results of the fieldwork of the study area. It contains five chapters presenting different studies as following: The first chapter is an assessment of the twelve season of excavations at the Bronze Age urban center of Shahdad that was explored by Ali Hakemi and Mir-Abedin Kaboli respectively in 1970s and 1990s. Here, I reevaluated all the material culture recovered from the site of Shahdad.

In the second chapter, the results of a fieldwork at the urban center of Shahdad is presented which includes a surface survey and digging test trenches for determining the extent of the city.

Next chapter presents the extensive survey of the Dasht-e Lut and the identified sites assigned to Chalcolithic and Bronze Ages which are relevant to this study. The fourth chapter deals with the excavations at two prehistoric sites of Tepe Dehno and Tepe East Dehno of Shahdad.

The last chapter of this part is consisting of a debate on the old chronology of prehistory of south-east Iran based on new absolute dates from excavations at Tepe Dehno and Tepe East Dehno. Also, here I presented an updated chronological table for the southeastern Iran based on the new analyses from several recent excavations in south-east Iran.

Part III of this thesis contains two chapters, first chapter deals with the settlement and population trends in Dasht-e Lut. Here, I studied the human-environment interactions of the study area during the Chalcolithic period and the Bronze Age. The latter discusses the regional patterns of the early urbanization of SE Iran and also introduces a new “early urban model” in light of site formation processes of the third millennium BC center of Shahdad.

Part I:

The Context of the Study

Le contexte de l'étude

Chapter I: The Environment Context

1.1.6. Physical Geography

Physical environmental contexts are very important in forming human behavior, among them, desert landscapes represent human exploitation in an extreme environment. To achieve a better understanding of the prehistoric and protohistoric societies in our study area, we should have a detailed look at the environment of Lut area.

Kavir and Lut Deserts in north and south of Iranian plateau surround two large continuous arid desert areas (Fig 1). In addition to these areas, Iran plateau contains different environments like dry steppe, salt marsh, mountain forests with narrow foothill regions and alluvial plains together and a series of mountain ranges¹⁶. One of these mountains is Kerman Mountain that has divided the Iranian plateau into two parts from near of Qom in the central Iran to Bampur in the Southeast.

Dasht-e Lut or western fringe of the Lut desert is located on the eastern area of this mountain and between Kerman Mountain and the Lut desert (Fig 2). The existence of these mountains in the Iranian plateau made the population movement difficult in the upper heights but it caused to create alluvial plains and mountain base areas where natural corridors emerged and it makes the movement of axes easier¹⁷. It seems that Dasht-e Lut that is located between the Lut Desert and Kerman Mountain was one of the main connecting roads in the past. The existence of tens of Caravansaries belonging to Late Antiquity and Islamic era along by the Lut Desert is the proving evidence for this hypothesis.

¹⁶ Miller (2003), p. 10; Fisher (1968), p. 90.

¹⁷ Caldwell (1967), p. 27.



Fig 1: Location of the Lut Desert in the Iranian Plateau (Courtesy of M. Rokni)

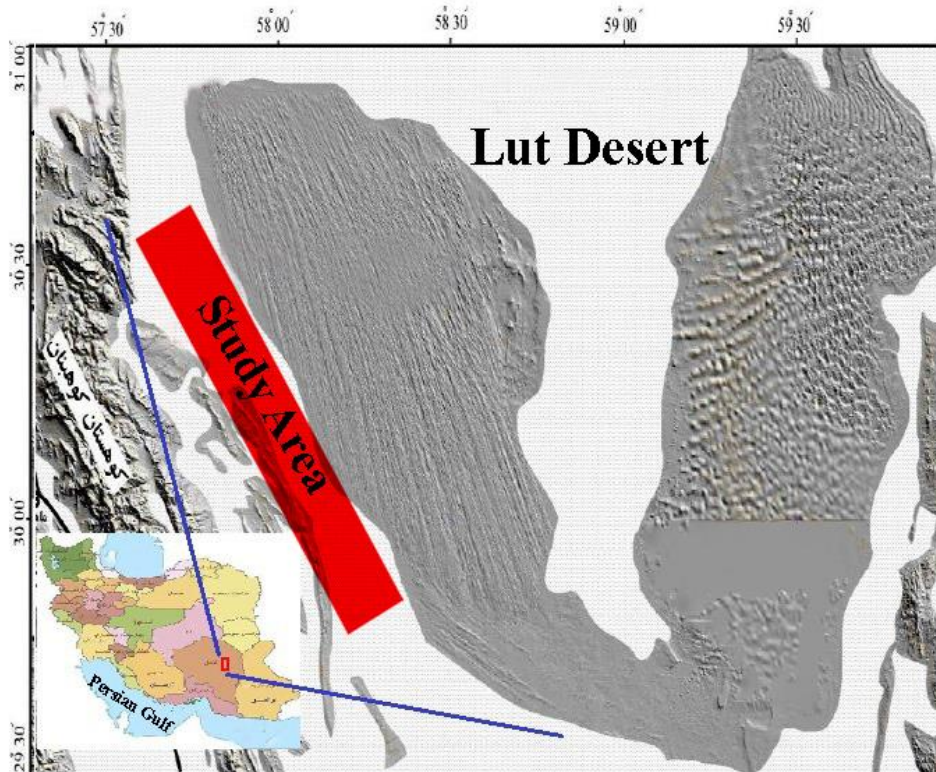


Fig 2: Map showing the study area to the west of the Lut Desert (Base map After Maghsoudi et al. 2012, modified by author)

1.1.2. Lut Desert: Geology and Geomorphology

Considering the Dasht-e Lut's structural location, it is surrounded from the east by the Nehbandan fault and the Flyscharea in the east of Iran, from the west by Nayband Fault and the block of Tabas, from the north by the Graben in the south of Kashmar, and from the south by Jazmoryan's pit in the west of Baluchistan¹⁸. The Dasht-e Lut is a low-lying and aseismic desert depression, and little is known of its bedrock composition and structure¹⁹.

Dasht-e-Lut includes volcanic rocks of Tertiary system with approximately 2000 m thickness. The volcanic rocks cover more than half of the Lut block. Lake deposits in the area called Lut formation represent folding of the block²⁰.

The Lut Desert protects a globally recognized iconic hot desert landscape, one of the hottest places on the earth. It is renowned for its spectacular series of landforms namely the yardangs (massive corrugated ridges) in the west of the property and the sand sea in the east. The yardangs are so large and impressive that they can be seen easily from space. Lut is particularly significant for the great variety of desert landform types found in a relatively small area. Key attributes of the aesthetic values of the unspoilt property relate to the diversity and sheer scale of its landforms; a visually stunning mosaic of desert colors; and uninterrupted vistas across huge and varied dune system that transition into large flat desert pavement areas.

The yardang/kalut landforms are widely considered the best-expressed in the world in terms of extent, unbroken continuity and height. The Lut sand-seas are amongst the best developed active dune fields in the world, displaying a wide variety of dune types (crescentic ridges, star dunes, complex linear dunes, funnel-shaped dunes) with dunes amongst the highest observed anywhere on our planet. Nebkha dune fields (dunes formed around plants) are widespread with those at Lut as high as any measured elsewhere.

¹⁸ Stocklin *et al.* (1973).

¹⁹ Walker *et al.* (2009).

²⁰ Aghanabati (2004).

Between June and October, this arid subtropical area is swept by strong winds, which transport sediment and cause aeolian erosion on a colossal scale. Consequently, the area presents some of the most spectacular examples of aeolian yardang landforms (massive corrugated ridges). It also contains extensive stony deserts and dune fields. The property represents an exceptional example of ongoing geological processes.

1.1.3. Alluvial fan of Shahdad

Alluvial fans are fan-shaped deposits of water-transported material (alluvium). They are typically formed at the base of topographic features where there is a marked break in slope. Consequently, alluvial fans tend to be coarse-grained, especially at their mouths. At their edges, however, they can be relatively fine-grained. Alluvial fans are usually created as flowing water interacts with mountains, hills, or the steep walls of canyons. Streams carrying alluvium can be trickles of rainwater, a fast-moving creek, a powerful river, or even runoff from agriculture or industry. As a stream flows down a hill, it picks up sand and other particles alluvium. The rushing water carries alluvium to a flat plain, where the stream leaves its channel to spread out. Alluvium is deposited as the stream fans out, creating the familiar triangle-shaped feature.

Creating a settlement on an alluvial fan can be i. Alluvial fans are prone to flooding. Rushing water, mud, and debris can threaten communities many kilometers away from the apex of the alluvial fan. In Dasht-e Lut, this feature has impacted on the patterns of ancient human behaviors.

The alluvial fan of the Shahdad in Derakhtangan River is one of the biggest alleviation in total dry area in the north eastern Kerman. This alluvial fan is formed effected by different materials erosion in drainage basin of Derakhtangan River and laying these materials in the final part of this drainage basin called Lut (Fig 3). Tectonics activate with efficacy in the place of the settlement of the alluvial fan.

One of the most important evidence in the region is the various faults in the area and implies to fan alluvium. The most important fault of the region is the great fault of Nay band the southern fault of Shahdad and the series of faults having the direction of north-western to south-eastern and northern and southern (Fig 4). The drainage basin of alluvial

fan of the Derakhtangan River leads from east to the Desert of Lut, from west to the Baghe-Bala Mountains²¹. Water as divergent flows stream on the surface of the fan in multiple branches and often due to exploration action create specific substrates for themselves, in fact, that floods often on the alluvial surface create almost deep and abundant gullies. A number of these gullies pass right through the Bronze Age city of Shahdad. When the original stones of plains like Lut desert are gypsum or salt, only formation and development of alluvial fans provide the possibility of human life in that area. Most of the prehistoric and protohistoric settlements of the Dasht-e Lut are formed at the base of the alluvial fan of Shahdad (Fig 5). In the next chapters, their relations will be discussed in detail.



Fig 5: Location of the central part of Dasht-e Lut in the west of the Lut Desert where most of the studied sites are distributed (Courtesy of M. Vidale).

²¹ Shaahzeidi and Entezari 2014

1.1.4. Environmental Geography

1.1.4.1. Water

The successful management of water is crucial in the desert landscapes. In Landscape archaeology, it is pivotal to explore the archaeological remains related to water use, especially in the desert landscapes where the possibilities and the limitations of water have obviously affected the cultural landscapes.

Dasht-e Lut or the western fringe of the Lut Desert due to its proximity to the most arid desert region of Iran and its latitude has hot and dry climate. Actually, it presents an arid environment through ancient times.

In terms of water resources, the central part of western edge of the Lut desert, where the modern city of Shahdad is situated, is the most favorable for the human settlement thanks to the alluvial fan of Shaded and its streams.

Shahdad constant water comes from the Derakhtangan River. This river is situated on the alluvial fan of Shahdad. It seems that the flow of water has provided required water for prehistoric settlements at the end of the alluvial fan of Shahdad. Here the branches of the Derakhtangan River that passes directly through the Shahdad city is known as the Shahdad River (Figs 6, 7). So it is different from Derakhtangan River that flows 6 km north of Shahdad. Another watercourse that its name is Konaran flows at the south of the city of Shahdad in the west-east direction.

In Dasht-e Lut, there are many aqueducts on the plains from western mountains to the eastern plains, some of them are still full of water. It is unclear to know the chronology of the construction of the aqueducts. Al-Maqaddasi, the medieval Arab geographer, has referred to the aqueducts in the Shahdad (ancient Khabis) region in his book "Ahsan Altaghasim fi Marefate Alaqalim".

In addition, there are many qanats in Dasht-e Lut which are transferring water from western part of the plain to the eastern side near the Desert. The existing qanats passing through the prehistoric sites at the base of the alluvial fan of Shahdad which belong to later periods and do not coincide with these settlements have had no role in the prehistoric landscape of the Lut desert.

Interestingly, after the creation of qanat system in the region _from first millennium BC onwards_ a dramatic shift is evident in the patterns of site distributions. In other words, in historical and Islamic periods the eastern parts of the Dasht-e Lut were populated thanks to this water management system (Fig 8).

Floods on the alluvial fans, although characterized by relatively shallow depths, strike with little if any warning, can travel at extremely high velocities, and can carry a tremendous amount of sediment and debris. Such flooding presents unique problems to the settlements usually formed at the base of the fans, in terms of quantifying flood hazards. Due to the duality of the surface water and possibility of flash floods on the alluvial fans, one can call the fans “destructive attraction” in term of the site formation placement.

1.1.4.2. Fauna and Flora

In Persian language “Lut” refers to bare land without water and devoid of vegetation. The Lut Desert is situated in an interior basin surrounded by mountains, so it is in a rain shadow and, coupled with high temperatures, the climate is hyper-arid.

Vegetation within the property is very limited, both in terms of abundance and diversity. A total of 58 plant species have been recorded, spanning 32 families. There is anecdotal evidence that plant species are more abundant in the west of the region, where there is more water available. The plant species found within the region are all xerophytic. This region is situated in the Bubo-Sindian phytogeographic region of Iran. Overall, Iran is thought to have in the region of 10,000 species of plant, of which 20% are thought to be endemic²². One of the unique vegetation characteristics of the Lut area is Nebka. Nebka trees are vase-shaped sand dunes formed around vegetation (Fig 9).

The study area or Dasht-e Lut presents same vegetation condition as the Lut itself except the central parts where the streams of the alluvial fans have provided fertile sediments in west-east directions. Most suitable area for agriculture is the base of alluvial fan of Shahdad. Still today, palm and citrus gardens of Shahdad region are generally well-

²² Zehzad et al. 2002

known. Also, medieval geographers have referred to favorable vegetation condition of Shahdad/ancient Khabis. One of the first description of Khabis is by the tenth Century scholar Estakhri, who in his book 'Masalek ol Mamalek' describes Khabis as a small city with water, plenty of trees and fine dates²³.

This region also presents a poor fauna variety. The challenging abiotic conditions of the region, in conjunction with a dispersed and limited abundance of vegetation, has resulted in the property's fauna adapting their behavioural, physiological and/or morphological characteristics. For example, species will look for food at night or dig tunnels so as to escape the heat of the day. The sand fox (*Vulpes rueppelli*) is the largest known animal to reside within the region. The sand fox is nocturnal and resides in the holes of the yardangs. Several bird species are also present within the area.

1.1.4.3. Fringe of the Lut as the Communication Corridor

Geographers of the early Islamic period have described several famous ways around the Lut which were not created in the Islamic era and it is obvious that these ways could be in use before Islam.

Southern fringe of the Lut is connecting Kerman to Sistan as it has been mentioned in the book of Ibn-Khordadbeh the Persian geographer of ninth century. Communication ways of Dasht-e Lut are the same old caravan roads which pass through the plain and western edge of the Lut. In Mid-Islamic period, Shahdad was connected to the most important centers of Kerman, Sistan, Baluchestan and Khorasan by three main ways to the south, west and north²⁴. The southern way was connecting Shahdad to southern side of Lut (Bam area) then to Sistan and Afghanistan. The northern way along the west of the Lut Desert was connecting to the Great Khorasan and ends to the Central Asia. To the west, Shahdad is reaching Kerman area and the central Iran.

²³ Estakhri (1990).

²⁴ Hakemi (2006), p. 63-64.

In general, the specific situation of communication on the west of the Lut Desert has brought a privilege for the area during different periods. The most important communication way of the Lut Desert, is north-south road along the west side of the Desert that has been a natural corridor performed an important role in linking through the times. There are a great number of Islamic period caravanserais in this way that show the importance of communication role of this area.

1.1.4.4. Wind

Based on climatic zoning map, the western fringe of the Lut plain climate is extreme continental climate that is very dry and hot. One of the continental features of the study area, is wind with high speed. Because of the proximity to the Lut desert, winds accompanied with sand. According to the recorded data, the most frequency of winds are northern and northwestern winds and the fastest winds blow in April to September months (Table 1). Based on the results of the study of M. Maghsoodi and his colleagues on the effect of the risks of sand wind on the modern villages in Shahdad plain, sandy wind is the main reason for the population decline and displacement of the villages²⁵.

Hence, one can say that the winds in the desert area of study were the effective reasons of demographics changes and relocation of villages in the Lut plain. Wind is one of the main features of the natural landscape of the Lut that has affected on the region's cultural landscape. In addition, wind erosion is the main cause of destruction of archaeological sites of the region (Fig 10).

²⁵ Maghsudi *et al.* (2012).



Fig 10: The graves on the surface of the Bronze Age site of Mokhtarabad attesting the extreme wind erosion in the Lut area. The arrows show the magnified objects (Photo by author)

1.1.4.5. Kalut

The Kaluts (local name) or Yardangs (scientific name) are known as an unbeatable natural phenomenon of the Lut Desert. In fact, the Shahdad region, where holds the stunning and beautiful Kaluts, is the only Iranian UNESCO natural world heritage site (Figs 11-13). Kaluts are bedrock features carved and stream-lined by the dual action of wind abrasion of dust and sand, and the deflation which is the removal of loose material by wind turbulence.

Yardangs are formed by wind erosion, typically of an originally flat surface formed from areas of harder and softer material. The soft material is eroded and removed by the wind, and the harder material remains. The resulting pattern of yardangs is therefore a combination of the original rock distribution, and the fluid mechanics of the air flow and

resulting pattern of erosion. Kaluts are formed in environments where water is scarce and the prevailing winds are strong, uni-directional, and carry an abrasive sediment load. The wind cuts down low-lying areas into parallel ridges which gradually erode into separate hills that take on the unique shape of a Kalut. This process yields a field of yardangs of roughly the same size, commonly referred to as a fleet due to their resemblance to the bottoms of ships.

Yardangs come in a large range of sizes, and are divided into three different categories: mega-yardangs, meso-yardangs, and micro-yardangs. Mega-yardangs can be several kilometers long and hundreds of meters high and are found in arid regions with strong winds; meso-yardangs are generally a few meters high and 10 to 15 meters long and are commonly found carved in semi-consolidated playa sediments and other soft granular materials; and micro-yardangs are only a few centimeters high.

Kaluts of Lut Desert, mostly in the west edge of the desert, are shaped in the grounds with finer structure and wind and water erosion. Kaluts of Lut Desert have given to it a privilege of being a unique physical landscape.

A micro-morphological study by university of Tehran on the Lut Kalut yielded the following results²⁶:

Iran Kaluts are unique example of the magnitude and extent of desert areas. Although these Kaluts are affected by wind erosion, but water and wind erosion processes are involved in their formation simultaneously. In this study, after sampling from a Kalut with 33 meters high and 15 layers, these sediment samples were transferred to the laboratory and examined by granulometry tests. The results of this study revealed that the Kalut sedimentary samples in the rate of silt and clay have horizontal and lamination classification. This refers to this fact that the tiny sediments hanging in the water were deposited in a calm environment. Furthermore, on the muddy silts some chaps were observed. The silts were produced when the lakes were dried and the water was vaporized severely and then the sediments could be observed in the form of salty and chalky layers of Kaluts along with silt and clay particles carried by the wind. This fact can be certified with respect to this fact that in the past the shallow lake was severely vaporized and dried in the low energy environment. As a result of this, the chalky and salty layers were made. Based on the experiments,

²⁶ Maghsoudi et al. (2012)

most of the related layers have the muddy context with very bad sorting and fine skewness. This reveals that the following activities in the district were low and the environment was low energy during sedimentation of the Kaluts.

In Dasht-e Lut, Kaluts have played an important role in the cultural landscape of the prehistoric societies. In particular, the medium-size Kaluts which are distributed across the base of the alluvial fan of Shahdad have provided a very unique case for the study of human-environment interactions in the desert landscape of Lut region. In the next part, the relation of Kaluts and the settlements will be discussed.

Chapter II: Problematic and Methodology

1.2.1. Methodology, Problematic and Approaches

Landscape term is extension of the word "Land" and suffix "scape" that means scene. This term is derived from the Dutch word Landskap. On arrival in English, it was used as "perspective of painting art" and "how to look at the environment". Although the term is still used in its original meaning, in archaeology it is defined as geographical context of the human life. This context is formed by the interaction of human with the environment²⁷.

An initial and implicit classification in archaeological landscape studies shows that the distinction between cultural landscape and natural landscape is normal. But the analysis of complex interactive relations of these landscapes is the main topic of landscape archeology. With such a focus on the relationship between people and their physical environments came ongoing calls to more accurately and systematically characterize the way people occupied and used places in the past²⁸.

Landscape archaeology is a processing, conceptual, interactive and interdisciplinary approach that creates a framework for determining settlement patterns and the interpretation of behavior. This approach also help to understand the relationship between different elements of local, temporal, ecological, and cognitive, which create different substrates to make interaction relationship between human and environment. While the landscape is a natural phenomenon, it is also a cultural setting.

Landscape is related to values and types understanding of intuition, experiences, objects, history, nature, fantasy, realities, legends and memories that are created in the field of cultural ecosystem. Landscape is a multi-dimensional subject belonging to several times. Landscape exhibits culture, from the perspective of geography²⁹.

²⁷ Evans and Dally (2006), p. 132.

²⁸ David and Thomas (2008), p. 28.

²⁹ Shanks (2001), p. 293.

Landscape archaeology deals with examining the cultural landscape over time. This involves record and dating of the cultural factors that remained with their interpretation in terms of sociological, economic and environmental factors³⁰. Tony Wilkinson states the importance and necessity of landscape archaeology studies as following³¹:

- The Landscape provides economic infrastructures and support for settlements and society.
- It provides a receptacle for records environmental change and contributes to fundamental data concerning transformations of earth's land surface.
- Landscape provides evidence for long-term changes in settlement, economic patterning and features that relate to social and religious changes. In addition, the landscape provides a fundamental context for features such as religious monuments.
- It also provided the context for people's lives throughout history and therefore shapes their perceptions and way of life.
- Overall, the landscape archaeology provides evidence for the long-term human beyond actual living areas themselves.

In fact, landscape archaeology is a bridge between positivist archaeologists and approaches of theories of social sciences or humanities³²; this means that it fills the gap between methodology of archaeology in science and the humanities. Other approaches such as spatial archeology, environmental archeology, contextual archaeology and cultural ecology are trying to study human interaction behavior with the environment and we can say that landscape archaeology partly overlaps with each of these trends. It has advantage of a more comprehensive look and can analyze the human relationships with the environment by these approaches.

In this regard, archaeologists in addition to archaeological excavations, have been able to take advantage of the knowledge and use of methods and tools such as; aerial

³⁰ Wilkinson (2003a), p. 3.

³¹ Wilkinson (2003a), p. 4.

³² Thomas (1996), p. 20.

photos, satellite imagery, geophysical studies, studies of the geomorphology, paleontology, paleo-climatology, archaeobotany, archaeozoology and historical texts. They analyze the relationships between human societies and the environment as a context of shaping human societies.

Human contexts in different societies were contributed in accordance with their environment. This means that in different environments and different contexts, human behaviors are different according to the situation³³. So the behavioral diversity in different environments and natural landscapes, caused to create the different cultural landscapes. Whereas different environments make different human behavior, in reconstruction and study of ancient societies of any region, the methods, manners and approaches should be used according to the environment.

In this thesis, I tried to study the prehistoric cultural developments of the Lut area by focusing on the physical landscape. Indeed, I attempted to study demographic changes and settlement patterns of the prehistoric and protohistoric societies (fifth millennium to the third millennium BC) on the desert landscape of western fringe of the Lut Desert. For this purpose and an integrated and holistic study, the approach of archaeological landscape is used.

On one hand _ in terms of archaeology _doing the archaeological survey across the western fringe of the Lut Desert and selective exploration in three prehistoric and protohistoric sites and on the other hand, taking advantage of information of other sciences such as geology and geography helped us to study the interactive relationship between prehistoric communities of western fringe of the Lut Desert with environment of the area.

In other words, we tried to analyze the relationship of prehistoric societies of Dasht-e Lut with all the elements of the natural landscape which have been formed.

³³ Hodder (1992), p. 23.

The software of geographic information system (GIS) has also been used. GIS has the capability to analyze the sites in their natural environment and give power to archaeologists for finding the relationships between sites and the environment.

Methodologically, in this research, we were intended to discover the relation of settlement pattern and the environment of the region, the relationship between the human behavior, architecture and the physical landscape of the Lut area³⁴.

In terms of physical setting, the study area of this thesis presents a very specific landscape. Since Dasht-e Lut is located on the edge of (Paleo-Lake) Lut Desert and due to its proximity to the desert, it has been able to introduce a unique desert cultural landscape in the Iranian plateau.

In this thesis, I aimed to know how physical circumstances affect settlement landscapes and reveal the way in which the configuration of the land affects settlements. In fact, I will examine the human-environment interactions on the Dasht-e Lut in Chalcolithic period and Bronze Age.

Data of this study is based on the results of a three-year field project conducted by the author in 2012, 2013 and 2016. The project was structured around three main research agendas: an extensive archaeological survey along the western edge of Lut desert, stratigraphic excavations of two prehistoric multi-period sites, and the test excavations and surface survey at 3rd millennium BC urban center of Shahdad.

Despite several seasons of excavations at the site of Shahdad, no comprehensive survey has been undertaken on the western edge of the Lut. This lack of information concerning the catchment of the urban center of Shahdad along with the lack of stratified occupational sequence or secure chronology for the periods before the Bronze Age in this region has frustrated our understanding of the developmental origins of the urbanization of the Lut area. In addition, human-environment interactions were ignored

³⁴ i.e, McFadyen (2008), Thomas (2008).

in the past studies. It was to address this lacunae that we undertook the current research project.

Methodologically, archaeological surveys can vary from general reconnaissance along the modern routes by car to very detailed extensive fieldwalking operations. I am not claiming that the latter approach was exactly applied in recent Dasht- Lut Project but the surveyors were intended to come closer to it.

The survey methods consisted of both extensive and intensive methods. The former comprises a conventional method of visiting every possible place sites expected to be with help of maps, Google Earth satellite imageries, local informants, and the location of modern villages. The latter method consists of walking over fields. The intensive method was undertaken at the areas where were eligible to be surveyed by such methods which includes alongside the rivers and streams which all cross the width of the plain eastward as well as the central part of the Lut area where the early Bronze Age urban center of Shahdad has located in.

To reach the chronological framework underpinning Lut area settlement patterns, the major analytical component of this study was based on surface materials from each site. The proposed dates of Lut sites rely significantly on comparisons with published ceramic data from excavations from Shahdad area³⁵ and other areas of South-East Iran, particularly Bardsir Plain³⁶ and Soghun valley³⁷. The excavations at site of Shahdad together with new excavations by author at Tepe Dehno and Tepe East Dehno within the Shahdad area have enabled secure identification of a majority of surface ceramics.

In addition, I made attempts to estimate population numbers from Dasht-e Lut's survey data because the population dynamics are important indicators in the long-term settlement trends in regional studies.

³⁵ Hakemi (1997), Eskandari (2017).

³⁶ Caldwell (1967).

³⁷ Lamberg-Karlovsky (1970), Beale and Lamberg-Karlovsky (1986), Shafie *et al.* (2019).

In order to arrive a total population estimate for the entire region of western fringe of the Lut Desert, the total for all known sites were added together. The method of calculating individual settlement populations and adding all of those together to derive a population estimate for the entire region is much more accurate than attempting a regional estimate based on techniques such as carrying capacity, counting of sites, or demographic comparisons³⁸.

To sum up, in this thesis I attempted to highlight the indigenous desert cultural landscape of Dasht-e Lut based on landscape archaeology approaches³⁹.

1.2.2. Kalut landscape as an adaptive strategy in Dasht-e Lut

Location of Shahdad area on the western fringe of Hyper-arid Lut, caused the formation of a certain historical desert landscape in archeology of Southwestern Asia. There are many desert landscapes in the world but they cannot be placed in one general category. Physical features of desert are very effective on realization of long-term pattern of human settlement and settlement systems.

Although the main feature in definition of desert is dryness, their classification is based on several factors, usually originating from physical geography and climatology. In the difference of desert landscapes can be cited, for example, the hyper arid, arid and semi-arid desert landscapes.

Dasht-Lut or Shahdad archaeological landscape is unique, not because of its desert or hyper-arid climate. In fact, Kalut landscape structure of prehistoric Shahdad plain caused the area becomes a unique ancient landscape in the archeology of Near East. This thesis will introduce the Kalut Landscape and its effect on the prehistoric settlements of Dasht-e Lut.

³⁸ Renfrew and Bahn (2004), p. 463.

³⁹ *cf.* Wilkinson (2003a), David and Thomas (2008).

From a geomorphological point of view, most of the prehistoric sites of Dasht-e Lut were founded on the base of the alluvial fan of Shahdad where thick alluvial layers are cut by wind and water erosions into Kaluts. These unique phenomenal features of the Lut Desert are also scattered at the base of fan but in smaller size compared to those are present in the Desert (Fig 14). Here, the Kaluts are in different sizes and densities. they measure from 0.1 ha up to several hundred meters and in term of height, Kaluts are between 1 to 8 meters. In the eastern part of the fan the Kaluts are larger and low dense and in the western part where the third millennium BC city of Shahdad is formed they are denser and smaller.



Fig 14: A comparison of the Kaluts of the Lut Desert (left) and the Smaller Kaluts (right) of Shahdad plain (Photo by author)

The question is what was the relationship between Kaluts and prehistoric settlements in Dasht-e Lut? And what was the impact of the Kalut landscape on the cultural landscape of the Lut area?

As Tony Wilkinson⁴⁰ said the formation location of the desert are oases. These locations are mentioned briefly by Paolo Costa as "a place in the desert where water and lands with agricultural potential meet" and also mentioned as agricultural land by a desert. Oases perform a major role in the landscape of desert and social systems. They not only have the provider role for inhabitants but also provide trade centers for desert communities⁴¹. As mentioned, alluvial fans or oases are the only place for the formation of a settlement in desert areas. But there is a natural hazard in these areas and that is widespread flash floods. In Dasht-e Lut the local people required an innovation to settle across the fans where the water was available while they were in danger of this natural disaster. In Chalcolithic and Bronze Age, people did use the Kaluts as the adaptation.

The destruction of the medieval city of Shahdad by floods has shown that settlements built on the alluvial fan of Shahdad always faced with the risk of flooding. Prehistoric inhabitants of Dasht-e Lut used Kaluts to conform to the environment against the threat of the natural environment. Thus, to avoid the risk of natural flood that is feature of alluvial fans, prehistoric people in the Lut made their settlements on the Kaluts of the Lut desert. Thus, in this desert area instead of the formation of *Tell* sites we face with the existence of settlements formed on the natural hills that they can be called *Hill-top* Settlements.

Dasht-e Lut specific natural landscape, especially the landscape of Kalut, had special impact on the cultural landscape of prehistoric Lut. This impact is reflected in the following cases: Habitats locating and dispersion of prehistoric settlements, form of establishment, development of settlements, type of them, displacement, long-term continuation of the settlement pattern, and long-term continuation of the settlement system. In the third part of this thesis, human-environment interactions in Dasht-e Lut and the Kalut landscape formations and their Impact on the Settlements will be discussed.

⁴⁰ Wilkinson (2003a), p. 155.

⁴¹ Wilkinson (2003a), p. 155.

Part II:

Archaeological Fieldwork

Investigations

**(Les recherches
archéologiques de terrain)**

Chapter I: A reappraisal of the Bronze Age Urban Center of Shahdad

2.1.1. Introduction

Shahdad is a large Bronze Age site which is situated in the east of the modern city of Shahdad on the western edge of Lut desert (Fig 15). According to the delimitation excavation and surface survey, the extension of the site is over 170 hectares. The Bronze Age urban site of Shahdad is located at the base of an alluvial fan where it was in antiquity surrounded by the Shahdad River and a number of streams flowing east from their origin in the western mountains. This site is known as a third millennium BC urban center in Near Eastern archaeology⁴².

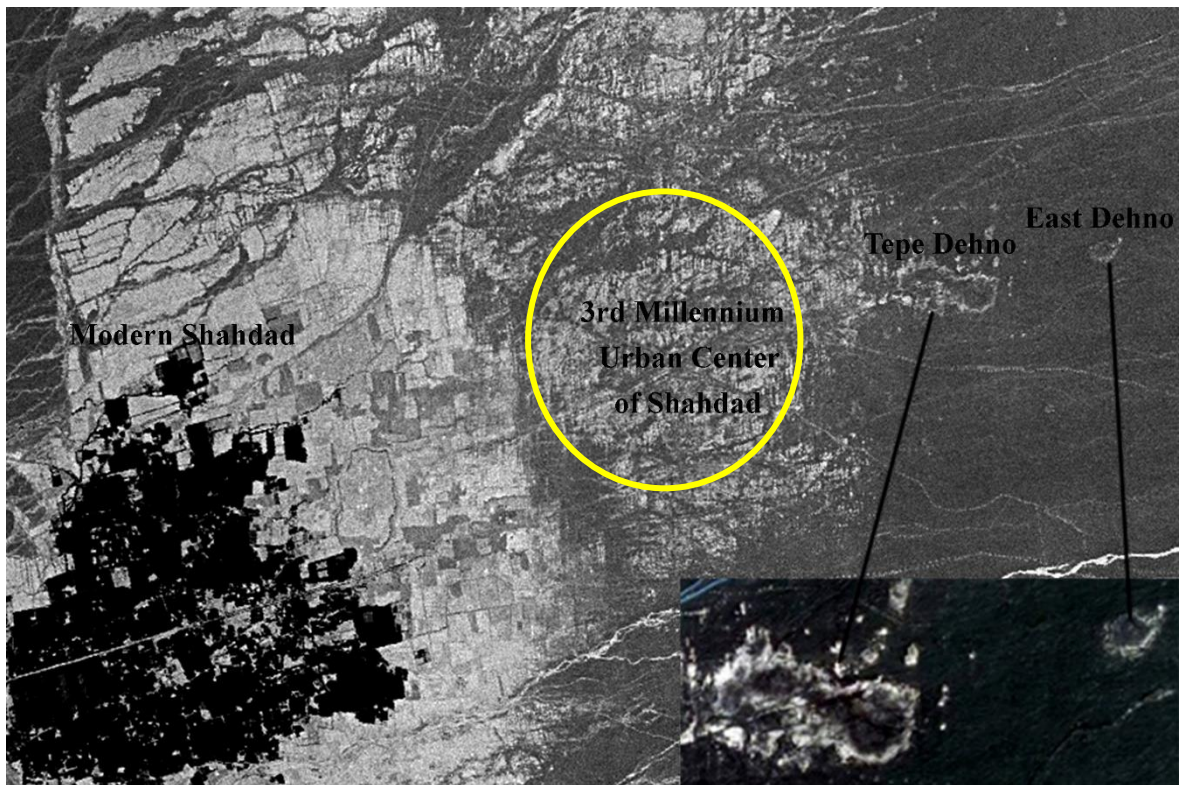


Fig 15: The Location of 3rd Mil. Urban Center of Shahdad to the east of the modern city

⁴² Hakemi (1997)

The history of archaeological activities at the site of Shahdad on the west of Lut desert dates back to half a century ago. In 1968, during a general geographical reconnaissance of the Lut depression, the Early Bronze Age site of Shahdad was identified. Excavations lead by Ali Hakemi of the Archaeological Service of Iran began in the following year and continued until 1978⁴³. The work concentrated on a necropolis in which 383 graves were cleared including many with spectacular grave goods, including impressive human statuettes, elaborate metal objects such as a bronze standard, numerous stone and ceramic containers and ornamental finds. Hakemi also did some excavations in the east of the site, Operation D, which he identified as an industrial area of the urban center of Shahdad. Overall, excavations in necropolis and industrial area provided evidence for local craft activities and cross-regional contact.

In 1977, a five-day survey across the site of Shahdad and its surroundings was undertaken with the collaboration of an Italian team which identified 37 points for sampling using aerial photographs⁴⁴. In 1978, archaeological research program of Shahdad was suspended for a decade and a half. Excavations at Shahdad site resumed under direction of M. Kaboli for four seasons in 1990s. The work of Kaboli was concentrated in the residential areas of the site. His work in the northern part of the site uncovered two architectural complexes. One of them located 800 m north of the cemetery A has been named the farmers's area and 300 m to the east, a second complex named Jewelry's area was identified. These two complexes of residential area greatly increased our understanding of the layout of the Bronze Age urban center of Shahdad that was previously only known through its necropolis. However, we still know a little about the physical layout of the city (Fig 16). This lack of information concerning the urban planning has frustrated our understanding of the developmental urban model and growth pattern of the site. It was to address this lacunae that we carried out a surface survey and excavation project (see, next chapter).

⁴³ Hakemi (1997).

⁴⁴ Salvatori & Vidale (1982), Hakemi (1997), Chart.5.



Fig 16: Image showing the site of Shahdad and its excavated areas (A-D localities were excavated by Hakemi and Kabobi's operations are shown as black squares)

Following the 12 seasons of archaeological excavations at Shahdad, the site was identified as a very important urban center during the Bronze Age in the Iranian plateau. Hiebert and Lamberg-Karlovsky have also mentioned it as an important city which had all the economic and political processes of the neighboring regions in control⁴⁵. Shahdad also was main candidate for being the location of the Sumerian toponym of *Aratta* before the Jiroft civilization appeared to be the known⁴⁶.

Excavations at site of Shahdad led to discovering more than four thousands various funerary goods⁴⁷. After half a century of Shahdad excavations, it is time to have a new look at

⁴⁵ Hiebert and Lamberg-Karlovsky (1992).

⁴⁶ Madjidzadeh (1976), Steinkeller (1982).

⁴⁷ They are mostly kept at the national museum of Iran. There are also some of them in the storerooms of Kerman museum and Shahdad ICHTO.

Shahdad and its objects in light of our present knowledge from the archeology of southeastern Iran. Here is an assessment of the results of Shahdad, especially graves, pottery, stone objects, seals, architectural remains, metal and clay objects. In this chapter, I tried to present a revised chronology for Shahdad. This research also provides information on the status of the regional and trans-regional cultural interactions of Shahdad.

According to the studies done on the data yielded from Shahdad excavations, the city of Shahdad in the second half of the third millennium BC and especially in the late of this millennium had a cultural similarity to other civilized areas of South-East of Iran including Sistan area, Halilrud Basin and Baluchistan. This cultural similarity arises through the establishment of a commercial-communications network along the urban period of Southeastern Iran. The research also showed that Shahdad was linked with the various regions of Near East like Mesopotamia and Southwestern Iran, Central Asia, Indus Valley and Persian Gulf areas. Shahdad is a very good example of the role of the South-East of Iran as the Heartland in Southwest Asia during the second half of the 3rd millennium BC.

One of the main objectives of this study was to determine the exact position of all graves, their chronology and the relation between the graves of different parts of the cemetery. Also, the internal chronology of Shahdad should be specified in order to chronologically determine the syntax of the various parts of the excavated areas. In addition, regional and cross-regional interactions of Shahdad in the context of the Bronze Age archaeology of Southwest Asia is another object of this study. Generally speaking, this chapter deals with an assessment of Shahdad data obtained from twelve seasons of excavations of Ali Hakemi⁴⁸ and Mirabedin Kaboli⁴⁹.

We confronted several restrictions in our studies. First of all, the common approaches of Shahdad excavations and interpretations were historical-cultural based under the influence of the archaeology of the decades 60s and 70s. Second of all, the lack of interdisciplinary studies on cultural materials of Shahdad didn't let us to have detailed information on production processes, subsistence, cultural complexities and environmental conditions. On

⁴⁸ Hakemi (1997), Hakemi (2006).

⁴⁹ Kaboli (1997), (2001), (2002).

the other hand, due to the glorious finds of the cemetery, most of the excavations were conducted in this area and the other parts of the city were neglected.

2.1.2. The Graves of the Site of Shahdad

The main trench of Shahdad, trench A, with a dimension of 100×50 meters, had been excavated during all the seasons. Five smaller trenches, situated to the east and north of trench A, were also excavated. The trench which was situated 50 meters to the east of trench A, was called the eastern cemetery and the trench located at the north of the main trench was called the northern trench. The other 3 trenches were numbered from I to III by Hakemi. In this research, the northern trench is introduced as trench IV. The trench A with all the 5 surrounding excavated areas is called as the cemetery A (Fig 17). In addition to this area, 2 other small cemeteries are situated to the north (trench B) and to the northwest of the cemetery A (trench C).

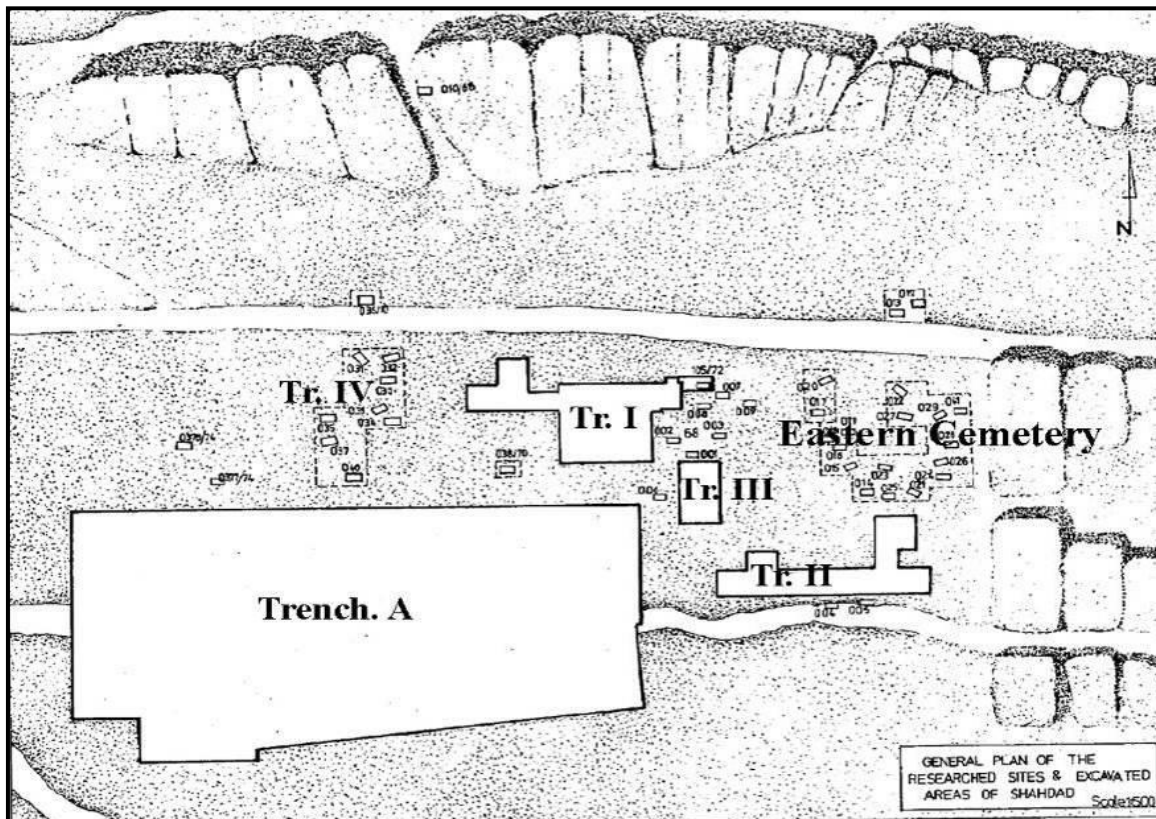


Fig 17: Excavated Areas of Cemetery A of Shahdad (After Hakemi 1997: 45, modified by author)

As a result of the excavations, a total of 383 graves were uncovered which were labeled from 1 to 383. In the excavation reports of Shahdad, the distribution of graves are not clear enough especially the graves which situated outside of the main trench are not fully documented. We tried to relocate the graves based on the given information in the catalogues to bring to the light the distribution pattern of burials (Table 2).

Two of the burials (39 and 104) were described in the catalogues but they don't exist on the map of the burial pattern. Two kilns were also labeled as graves 173 and 383 by mistake. Burials 187 and 188, represent 2 graves each on the map. Except the 16 graves which were found from trench B and C, the others are from the cemetery A. In other words, 367 graves were uncovered from the cemetery A. This cemetery also includes several trenches and a number of graves outside the trenches. Trench A, which is known as the main trench of the cemetery A, includes 289 graves. Five small trenches in the north and the east of the trench A cover 62 graves.

The distribution of graves in these trenches is mentioned above: 19 in the eastern cemetery, 25 in trench I, 11 in trench II, 4 in trench III, 3 in northern trench or trench IV and finally 16 from the outside of trenches.

According to Shahdad excavator, all the burials do not belong to the same period and he believed in a horizontal chronology for trench A graves while he applied a vertical chronology for the trench A burials. He considers the graves of the east of the cemetery A as the oldest ones, which have simple or incised buff wares. He also divided the burials with red wares (the graves of trench A of Cemetery A) into two different periods. These graves are found in two levels. Upper-level graves were found at depth of 10 to 60 cm, and low-level had reached at the depth of 60 cm downward (some graves were also up to 240 cm deep).

The author disagrees with the horizontal chronology of cemetery A and also the chronology given based on the depth of the graves which will be discussed later. In the burials containing red wares, there also existed painted buff wares, green and grey potteries. In addition to the graves of cemetery A, eight graves were discovered from area B (10 x 10 m) and eight graves from area C. It should be noted that grave number 55 was found at trench C,

but in terms of chronology is not simultaneous with the other seven graves of the trench and its burial goods reveal a great similarity with the burials of trench A.

The burials are mostly deteriorated by the environmental factors. The only intact skeleton was from area C. Hakemi proposed three dating for each cemetery; cemetery A from 2750 to 1900 BC, 1900-1700 BC for cemetery B and 1700-1500 BC for cemetery C (Hakemi 1997: 47). The tomb structure is divided into 2 groups; simple pits (which covers almost 80 percent of the graves) and the second group which has clay structures such as walls or platforms inside. Except for 3 graves of cemetery C, most of the second type burials were found from the graves with red wares of the cemetery A.

According to graves structures, Ali Hakemi classified them into 7 groups⁵⁰. The clay bricks used in some of these burials have dimensions of 21×10 ×10 cm. All graves are solitary except the grave 187 which can be identified as a family grave. This grave consisted of two burials from which, one female and one male clay sculpture were yielded. The existence of burial rituals is proved in Shahdad. Some traces of tissues reveal that people were buried with their clothes on. Bodies were sometimes covered by reed matting. In some cases, the body is placed on a platform with all funerary goods around it. The burial orientation of almost all graves is east-west with the head to the east with the exception of a few north-south burials. In some burials, remains of baskets were also found which reveals the tradition of putting food in graves which is also found in Shahr-i-Sokhta II-IV.

Each grave contained approximately from 1 to 29 funerary goods. Graves differ in terms of size, number of burial goods and their materials from each other which reveal the social position of each person. The number of graves compared to the size and population of the Bronze Age city of Shahdad is insignificant. In this regard, it should be accepted that Shahdad cemetery, has a far greater extent than what is known so far or given that deceased in this cemetery, according to burial objects, are all from a high social class, it can be argued that this cemetery only belonged to the privileged class of the society.

⁵⁰ Hakemi (1997), p. 47.

Table 2: Placement of the uncovered graves from Shahdad (provided by author)

Excavated Area	Graves	Grave Number
Trench B	7+1 ⁵¹	10, 11, 42 – 47
Trench C	8	48 – 55
Eastern Cemetery of the Cemetery A	19	12, 28, 37, 41
Trench A of the Cemetery A	289	29, 33, 38 – 40, 92 – 105, 110 - 375 ⁵²
Trench I of the Cemetery A	25	56-80
Trench II of the Cemetery A	11	81-91
Trench III of the Cemetery A	4	106-109
Trench IV of the Cemetery A	3	34-36
Cemetery A, the graves outside of the trenches	16	1-9, 376-382

⁵¹ the grave number 10 is an individual grave in the south of the trench B where it is situated between two streams and its burial goods are comparable to those of trench B. Excavator of Shahdad has mentioned that he discovered another grave below this grave at the depth of 60 cm. Its goods are similar to the red ceramics of cemetery A. Unfortunately, the mentioned grave has not been documented.

⁵² Each of Graves 187 and 188 includes two graves that were distinguished by letters a & b by its excavator.

2.1.3. Pottery of Shahdad

Most of Shahdad potteries are the funerary containers (Fig 18). They are mostly wheel-made and simple. The ceramic assemblage of the site could be classified into three general groups: red, buff and grey wares. Red wares are the most frequent finds of Shahdad (90 percent) and grey wares are the least frequent ones (less than 0.50 percent). Potteries of Shahdad are not described and presented according to a standard classification. Hakemi divided the pottery of the cemetery A into three categories based on the areas they were found; buff wares discovered from the east of trench A named the eastern cemetery.

The excavator considers the buff wares of the eastern cemetery older than the red wares of the main trench (trench A) of the cemetery A. The red wares were found from both levels of the graves of the cemetery A. The third type is painted ware which is found from all the cemeteries. A very small number of this type of pottery was found in the eastern part of the cemetery. Although they are smaller in the number than red wares but in terms of forms and decorations, they are more diverse. Most of their decorations are geometric shapes, curved lines, zigzag or plants. These potteries were discovered from one grave with red wares so they are simultaneous⁵³.

A few potteries are also found from the graves of areas B and C, which are different from the cemetery A. The area B potteries are all plain except for some jars which are carved with parallel or wavy lines⁵⁴. The buff wares of area C are similar to area B potteries⁵⁵. The area D potteries are also comparable with the cemetery A ceramics based on their form and decoration. According to potteries, we state that Shahdad dates back from the mid third millennium BC to the early second millennium BC, but this dating does not correspond to all parts of the site.

Based on the comparative chronology, two periods are proposed for the Shahdad graves. The first one relates to the graves of cemetery A dating back to 2500-2000 BC and the

⁵³ Hakemi (2006), p. 118.

⁵⁴ Hakemi (2006), p. 85.

⁵⁵ Hakemi (2006), p. 90.

second period dates back to 2000 to 1800/1700 BC covering a few graves of areas B and C. The potteries found from the excavations of different areas of Shahdad have comparable examples with the early and middle Bronze Age sites of the southeast of Iran and neighboring areas (Table 3). In the following table, the word No. corresponds to the number of each pottery given by Hakemi and the letter g relates to the word "grave".

Comparative analysis on the potteries of Shahdad reveals similarities with other southeastern Iran Bronze Age sites and neighboring areas such as Pakistan, Afghanistan and Central Asia. The study of Shahdad potteries is important for two reasons; the intra-site and inter-site analyses. The intra-site studies help us to identify the connections between the excavated areas in the site of Shahdad and also the chronology of different excavated parts of this site. Inter-site studies will reveal the connection and the regional and interregional interactions of this urban center over time.



Fig 18: Some of the potteries recovered from the Cemetery A of Shahdad (storeroom of Shahdad Base, Photo by author)

Table 3: Comparison of the Shahdad ceramics with the contemporaneous sites of the other regions (provided by author)

Shahdad Pottery	Form/Decoration	Similar Parallel
No.0118. g 018 (Easter Cemetery) No.0094. g 013 (Easter Cemetery) No.0173. g 027 (Easter Cemetery) No.0112. g 017 (Easter Cemetery) No.0182. g 028 (Easter Cemetery)	Palm with 1-3 branches between single or double bands on wide-mouthed globular pots, and globular jars with high collar and flaring rim	Bampur I-III (de Cardi 1970: Fig.17.12-22.126); IV (Fig.23.185 & 187; 25.239 & 258); V (Fig.34.326; 36.98; 37.108; 38.375); VI (Fig. 43.483) Miri Qalat III (Besenval 1994: Fig.6.3) Khurab (Stein 1937: Pl.XIII.Kh.B.ii.199) Konar Sandal South (Madjidzadeh 2008:Fig. 24)
No.3505. g 291 (Tr. A) No.2996. g 241 (Tr. A)	Truncated Conical Bowls	Yahya IVB4-1 (Potts 2001: Fig.5.3) Khurab (Stein 1937: Pl.VI.Khur.L.i.276) Mehrgarh VIII (Jarrige <i>et al.</i> 1995: Fig. 5.19.b; 7.25.d-e), Nausharo IV and Dauda Damb (Jarrige 1994: 297) Togolok 1 and 21 (Sarianidi 1986: Fig.12.6; Hiebert 1994a: Fig.4.10)
No.0854. g 091 (Tr. II) No.0999. g 109 (Tr. III)	hatched "M"	Bampur I-IV (de Cardi 1970: Fig.20.81-83, Fig.34.326; V (de Cardi 1970: Fig. 34.326; 36.100; VI (de Cardi 1970: 302) Konar Sandal South (Madjidzadeh and Pittman 2008:Fig. 24) Mundigak III.6 (Casal 1961: Fig.61.141)
No.0218. g 032 (Tr. IV) No.3972. g 327 (Tr. A) No.4395. g 375 (Tr. A)	Hatched Wavy Bands	Yahya IVB (Potts 2001: 8, Fig.1.17) Tell Abraq (Potts 2001: 8, 114, with refs)
No.3082. g 254 (Tr. A) No.4218. g 354 (Tr. A) No.0219. g 032 (Tr. IV) No.0187. g 029 (Tr. A)	Hatched semicircles	Shahr-i Sokhta III (Lamberg-Karlovsky & Tosi 1973: Fig.56) Mundigak III, IV (Casal 1961: Fig.57.104; Fig.87.359; 97.464.a) Konar Sandal South (Madjidzadeh and Pittman 2008:Fig. 24)

Chap.1: A reappraisal of the Bronze Age Urban Center of Shahdad

No.0109. g 016 (Tr. E.A) No.0175. g 027 (Eastern Cemetery) No.1164. g 120 (Tr. A)	Hatched Chain Design	Bampur V (de Cardi 1970: Fig.38.377) Amri IIIC (Casal 1964: Fig.82.373; 86.411)
No.0172. g 027 (Eastern Cemetery)	hatched hourglass	Bampur II-IV (de Cardi 1970: Fig.21.113; 22.160; 25.233)
No.0182. g 028 (Eastern Cemetery) No.0110. g 016 (Eastern Cemetery) No.0999. g 109 (Tr. III)	High-collared globular jars with flaring rim	Bampur I-IV (de Cardi 1970: Fig.18.28 & 29; 22.129; 23.180; 31.50)
No.0888. g 096 (Tr. A) No.4466. Room10 (D) No.0247. g 034 (Tr. IV) No.1383. g 134 (Tr. A)	Painted Spouted Vessels	Yahya IVA (Lamberg-Karlovsky 1970: Fig.16.p) Shahr-i Sokhta II (Lamberg-Karlovsky & Tosi 1973: Fig.24) Jiroft (Majidzadeh 2003: 159)
No.1056. g 115 (Tr. A) No.0982. g 107 (Tr. III) No.0832. g 088 (Tr. II)	Trough-spouted Vessels	Hissar IIIC (Schmidt 1937: Pl.XLI. H3315); Togolok 21 (Sarianidi 1986: fig.47) Yahya IVC2-IVB5 (Potts 2001: Fig.1.10) Altyn " Burial 281" (Masson 1988: Pl.XL.7) Konar Sandal North (Madjidzadeh 2008:Fig. 27)
No.3104. g 275 (Tr. A) No.3454. g 288 (Tr. A) No.0508. g 058 (Tr. I) No.0117. g 018 (Eastern Cemetery) No.4489. Room 18 (D)	Tubular-spouted Vessels	Yahya IVC2-IVB5 (Potts 2001: Fig.1.10; 4.16.c) Konar Sandal North (Madjidzadeh 2008:Fig. 27) Togolok 21 (Sarianidi 1986: fig.47)
No.1721. g 159 (Tr. A)	Appliqué Decoration	Bampur II-VI (de Cardi 1970: Fig.19.60; 20.67; 22.172; 24.224 ;39.389) Konar Sandal South (Madjidzadeh and Pittman 2008:Fig. 23)

		<p>Khurab burials (Stein 1937: Pl.XIII. Khur. B.ii.198 & 199)</p> <p>Miri Qalat (Besenval 1997: Fig.21)</p> <p>Umm an-Nar (Frifelt 1991: Fig.82).</p>
No.0172. g 027 (Eastern Cemetery)	Globular jars decorated with one or more rows of crosshatched triangles	<p>Yahya IVC1 (Potts 2001: Fig.2.12.a; 2.23.c)</p> <p>Mundigak IV (Casal 1961: Fig. 74.243)</p>
No.4442. Room 2 (D)	Relief snake-cordons	<p>Konar Sandal South (Madjidzadeh and Pittman 2008: Fig. 23)</p> <p>Yahya IVC1-IVB4-2 (Potts 2001: Fig. 2.18); Damin (Tosi 1974: Fig.35)</p> <p>Kulli (Possehl 1986: Fig.XV.Kulli.I.viii.8)</p> <p>Mundigak IV.1-2 (Casal 1961: Fig.79)</p> <p>Umm an-Nar (Potts 2001: 59, with refs)</p>
No.0101. g 014 (Eastern Cemetery) No.0366. g 041 (Eastern Cemetery) No.0683. g 074 (Tr. I) No.4482. Room 13 (D) No.4191. g 351 (Tr. A)	Coarse buff/red-ware jars with incised decoration	<p>Yahya IVB (Potts 2001: Fig.7.9.a); Shahr-i Sokhta II-III (Lamberg-Karlovsky & Tosi 1973: Fig.48)</p> <p>Takhirbai 3 (Gotzelt 1996, no.872)</p> <p>Mundigak IV (Casal 1961: Fig.87.365)</p> <p>Gonur North (Sarianidi 1998: Fig. 11.9.b & 15.1); Konar Sandal North (Madjidzadeh and Pittman 2008:Fig. 27)</p>
No.0510. g 058 (Tr. I)	Incised Grey Ware F	<p>IVB5 (Lamberg-Karlovsky and Tosi 1973: 44; Bampur IV-VI (During-Caspers 1970: 320, Fig.45); Damin (Tosi 1974: Fig.37); Shahr-i Sokhta IV (Lamberg-Karlovsky & Tosi 1973: Fig.147-50); Persian Gulf Sites including Umm an-Nar, Hili and Tarut (Mery 2000: 204-217, with refs)</p>
No.0067. g 010 (B) No.0399. g 047 (B) No.0386. g 045 (B)		<p>Gonur 1 graveyard (Salvatori 1995: G432/2, G.C.7/5)</p>

No.0443. g 052 (C)	Incised/undecorated Narrow-Necked Globular Bottles	Mehrgarh VIII (Jarrige et al. 1995: Fig.6.22)
No.0068. g 010 (B) No.0066. g 010 (B) No.0375. g 043 (B)	Buff-Ware Globular-Oval Flasks	Gonur South (Sarianidi 1993: Fig.5) Mehrgarh VIII (Santoni 1988: Fig.1)
No.0405. g 048 (C) No.0440. g 052 (C) No.0413. g 049 (C)	Narrow-necked Bottle	Chanhu-Daro (Mackay 1943: Pl.XLI.46-47); Anau (Khlopin 1981: Fig.5.X) Mundigak IV.3 (Casal 1961: Fig.96.456)
No.4438, Room3 (D) No.4456, Room29 (D) No.4465, Room10 (D) No.4497, Room27 (D) No.4500, Room28 (D)	Intersecting or nested zig- zags, chevrons or triangles between 1-3 horizontal bands	Bampur II-IV (De Cardi 1970: Fig.18.25 & 42; 24.203; 29.308) Yahya IVB (Potts 2001: 7, Fig.1.6.j) Konar Sandal South (Madjidzadeh and Pittman 2008:Fig. 23)
No.4482. Room 13 (D)	Wavy comb-incised decoration	Yahya IVB5 (Potts 2001: 4.29.g); Bampur I-IV (de Cardi 1970: Fig.17.8; 18.30-34; 22.133; 30.33 & 49); Amri IIIA (Casal 1964: Fig.78.344); Damin (Tosi 1974: Fig.36)

The comparative studies on the potteries of the cemetery and the residential area of Shahdad with the other regions⁵⁶ suggest the dating of mid-third millennium BC to the early second millennium BC. The earliest date that could be suggested for Shahdad is Mid-3rd Millennium BC based on pottery similarities with Konar Sandal South, Shahr-i Sokhta II & III, Yahya IVB and Umm an-Nar.

There is no evidence to prove the dating suggested by Hakemi. He believed that the cemetery A dates back to the first half of the third millennium BC. One of the reasons of this suggestion is the discovery of one single pottery with writings (from the grave 030) which was

⁵⁶ To compare the ceramics of Shahdad with Central Asia, Paklayan's BA dissertation (2004) was helpful for me.

taken by mistake as Proto-Elamite script while it belongs to linear Elamite writing system which is a few centuries later than Proto-Elamite writing. Potteries of area D and most of the potteries of trench A are similar and suggest the same dating for the area D that is known as industrial area.

The graves of areas B and C contained the most recent finds of Shahdad, dating back to the early second millennium BC. Hakemi divided the graves of trench A into 2 groups based on their depth although there is no difference between their potteries and cannot be related to two different periods. Since there is no topographic map of the cemetery before the excavations, it is not easy to discuss the two level cemetery. This depth difference might be due to the natural topographical condition of the terrain. As it was mentioned before, Shahdad is formed among Kaluts, on the other hand Hakemi had mentioned before that some parts of cemetery were bulldozed for agricultural purposes. There exists also wind erosions which may differ from one part to another parts of the area. It is clear that the graves might differ in depths but not in their cultural materials.

Painted potteries of trench A and area D show strong similarities with the sites situated in southeastern Iran and neighboring regions such as Central Asia, Pakistan, Afghanistan and the Persian Gulf belonging to the second half of the third millennium BC. Suggesting a precise dating for these pottery similarities is difficult because of two reasons; first of all, most of the decorations and forms lasted for a very long time, from the mid-third millennium to the early second millennium BC. The second reason is the problem with the chronology of southeastern Iran and neighboring regions which is not exact and trusted and there are some disagreement on the chronology of the different periods of the Bronze Age.

In general, not only Shahdad's potteries described the situation inside Shahdad area, but also revealed the status of the regional and trans-regional interactions of the site. As a result of this study, we argue that this site had been inhabited for a long time from the mid-third millennium BC to the early second millennium BC. Although potteries indicate Shahdad appear to continue in 2nd millennium BC but this period can be regarded as the time after the collapse of the urbanization of southeastern Iran and the city of Shahdad. Collapse of the Early Bronze Age urban centers of southeastern Iran is discussed in part III of this thesis. The pottery related

to the first quarter of the second millennium of the city of Shahdad, uncovered from the areas B and especially C, shows a shift in the pottery tradition patterns of Shahdad.

It seems that after the decline of urbanization of southeast Iran and the collapse of the urban centers of this region, there has been a fundamental shift in the pottery pattern of the early second millennium BC settlements on the western margin of the Lut plain; in a way there was a decline of the interactions with southern cultures (Halilrud basin and the Persian Gulf) and east (Sistan and Baluchistan). Instead, cultural integration with the north (Central Asia) had increased.

2.1.4. Stone objects

2.1.4.1. Chlorite Vessel

About two hundred chlorite objects have so far yielded from Shahdad excavations while only less than half of them have been published and introduced (Fig 19). Chlorite vessels have been found in a wide geographical range from Mesopotamia to the central Asia and Pakistan. Most scholars consider the southeastern Iran as one of the main chlorite production centers during the Bronze Age.

A chlorite workshop was found from Yahya IVB⁵⁷. Interdisciplinary studies revealed that chlorite resources existed in the East of Iran in the areas such as Soghun valley, Khorasan, Sistan⁵⁸ and Jiroft⁵⁹. Surveys and studies have not yet revealed any traces of chlorite productions in Shahdad area. There are also no chlorite sources around Shahdad⁶⁰.

⁵⁷ Lamberg-Karlovsky (1970), p. 39, Potts (2001).

⁵⁸ Kohl *et al.* (1980).

⁵⁹ Emami *et al.* (2017).

⁶⁰ Hakemi (1997), p. 57.

Most Shahdad chlorite vessels belong to the *Série Ancienne*⁶¹ or the *intercultural style*⁶². *Série ancienne* vessels were primarily found during the Early Dynastic II, III in Mesopotamia⁶³. Some of the known motifs of *Série ancienne* chlorite vessels exist in Shahdad⁶⁴ such as mat-weave (No.0345, g 039, A), imbricate (No.0403, g 047, C) hut-pot (No.4449, Room 7, D) zig-zags (No.0161, g 025, Tr. IV), rope (No.0178, g 027, Tr. V). Some similarities in the forms with *Série ancienne chlorite vessels* can be seen in Shahdad chlorite wares e.g. squat goblets (No.1269, g 125, A), compartmented boxes (No.1103, g 116, A) house-model (No.4077, g 338, A), square-based, round-necked vials (No.3579, g 296, A), Bell-shaped bowls (No.1211, g 122, A).

Chlorite vessels similar to the ones found from Shahdad, were abundantly yielded from Jiroft, Tepe Yahya, Shahr-i Sokhta and Bampur. Kohl believes some of Shahdad vessels had been brought from Tepe Yahya however there were some samples which were not found from Yahya⁶⁵.

Based on the variability in the quality and color of Shahdad chlorite vessels, it can be said that various chlorite mines were used during the Bronze Age in southeastern Iran. Although there has not yet found any chlorite production workshop in Shahdad, but due to the discovery of these vessels in a very large number in Shahdad, as well as their variety in colors and quality, and also the presence of some forms such as compartmented boxes and house models in abundance unlike the other areas, it can be said that at least some of these vessels had been produced in Shahdad. On the other hand, we know that working with chlorite, which is a soft rock, should not have been difficult for Shahdad artists, so it is reasonable to assume that raw materials were imported to Shahdad, where the vessels were produced.

⁶¹ De Miroschedji (1973).

⁶² Kohl (1974).

⁶³ Lamberg-Karlovsky (2001), p. 277.

⁶⁴ Here, the word No. corresponds to the number of object given by Hakemi (1997) and the letter g relates to the word "grave"

⁶⁵ Kohl (2001), p. 212.

Given the little similarity in the form and iconography of the Shahdad vessels with those of *Série ancienne* of the Southeast of Iran, in particular Halilrud basin, it can be claimed that they all date back to the same period: the second half of the third millennium BC. Some types of *Série ancienne* vessels such as hand bags do not exist in Shahdad, which can be interpreted as a cultural difference not a chronological one⁶⁶.

2.1.4.2. Calcite vessels

Overall 112 calcite objects have been found in Shahdad including bowls, goblets, pins, canes and miniature columns (Fig 20) which are not fully and thoroughly described and published. These calcite objects have only uncovered from areas A and B. Most of them are found from area A graves along with red wares.

Although calcite mines exist in the west of Shahdad in the mountains of Kerman⁶⁷ there is no evidence of calcite productions in Shahdad. Shahdad calcite vessels resembles to those of Shahr-i Sokhta and Mundigak⁶⁸.

Shahr-i Sokhta as the only known calcite production center of southeastern Iran, is the most probable origin of Shahdad objects⁶⁹. But the fact that there is variety in colors and forms of Shahdad calcite vessels which doesn't exist in Sistan, suggests the existence of other production origins which can be Afghanistan or other areas in Southeastern Iran⁷⁰.

Shahdad calcite vessels are comparable to those of Central Asia, Northeastern Iran and Indo-Iranian borders. Despite the studies, it is not possible to state with certainty their chronology, origin and the trade roads. For example the miniature columns of Shahdad had lasted for a long time, one similar item was found from Kara Depe in the east of Kopet

⁶⁶ Kohl (2001), p. 212.

⁶⁷ Hakemi (1997), p. 19.

⁶⁸ Casanova (1991), p. 49, Tableau.10.

⁶⁹ Piperno and Tosi (1975), p. 194, Ciarla (1981), p. 46-7, 58, n4.

⁷⁰ Ciarla (1981), Casanova (1991), T. F Potts (1994), Moorey (1994).

Dagh⁷¹ which dates back to the early third millennium BC and the other from Togolok 21 dating back to the early second millennium BC⁷². In general, we can say that the calcite objects of Shahdad are comparable to those of Shahr-i Sokhta II & III dating back to the mid to late third millennium BC.

2.1.5. Metal Objects

The origins of arsenical copper smelting in the Iranian plateau often argued to date to the fifth millennium BC⁷³. Analysis of the data of Tal-i Iblis confirm the presence of smelting at Tal-i Iblis at least in the early fifth millennium BC if not earlier⁷⁴.

Excavations in workshop D or artisan's area of Shahdad led to the discovery of a great complex of the Bronze Age copper smelting processes. Most of Shahdad metal artifacts are made of arsenical copper and only a few of them have tin in their composition⁷⁵. Furnaces, crucibles, moulds and metal objects were found in situ in workshop D which prove the early and secondary metal production in Shahdad.

A metallurgy area, with an extent of 0.5 hectare, was found near the workshop D (800 meters to east). Its surface is covered with metal furnaces and metal slags. It may be in use by inhabitants of Shahdad in 3rd millennium BC.

More than 700 metal objects have yielded from Shahdad excavations which are made of bronze, lead, silver and gold. 670 of them are bronze objects, including 350 vessels (Fig 21), 239 pins and 81 other objects, such as axes, stamp seals, rings, bracelets, instruments, plates, flags and weapons. Most of the metal objects are not yet published.

Overall, the Shahdad collection provides interesting information about the origins and methods of the metallurgy of the southwestern Asia. More than 80 percent of Shahdad graves contained bronze artifacts. Shahdad metal objects with their comparable parallels

⁷¹ Hiebert (1994), p. 381.

⁷² Sarianidi (1998), p. 52, Fig. 20.

⁷³ Thornton *et al.* (2002).

⁷⁴ Caldwell (1967), Frame (2004).

⁷⁵ Hakemi (1997), p. 59, 110-114, Meier (2011).

of other regions can be seen in the below table (Table 4) in order to understand the chronology, the regional and intra-regional interactions of the site during the Bronze Age.

Table 4: Comparison of the metal objects of Shahdad with the contemporaneous sites of the other regions (provided by author)

Object Number	Object	Similar Parallel
No.3555, g294 (Tr. A) No.0816, g084 (Tr. II)	Spouted Vessels	Not found elsewhere
No.0071, g010 (B) No.0312, g037 (Tr. IV)	Hemispherical Bowls with trough spout	Hissar IIIC (Schmidt 1937: Pl.LVII.H4883 & 3270) Khinaman (Curtis 1988: Fig.19-20)
No.1011, g111 (Tr. A) No.3934, g325 (Tr. A) No.2576, g212 (Tr. A)	Carinated bowls	Bani Surmah (Bellelli 2002: Tav.16.67); Bani Surmah and D'um Avize (Schmidt et al. 1989: Pl.119.r; Bellelli 2002: Tav.20.113)
No.1044, g114 (Tr. A) No.1759, g161 (Tr. A)	Round-bottomed carinated jars with a raised centre seam	Harappa (Vats 1940: Pl. CXXI.277) Mohenjodaro (Mackay 1938: Pl.CXVI.5 & 7)
No.2890, g232 (Tr. A) No.1070, g115 (Tr. A) No.1219, g122 (Tr. A)	Dishes with relief zoomorphic decoration	Hissar III (Schmidt 1937: Fig.112) (Majidzadeh 2003: 156)
No.2420, g203 (Tr. A) No.1701, g158 (Tr. A)	Undecorated dishes with wide lip	Khurab (Stein 1937: Pl.XVIII.Khur.B.i.130, B.i.298) Hissar and Kamtarlan II (Bellelli 2002: Tav.4.7 & 4.8, with refs)
No.0898, g096 (Tr. A) No.0084, g011 (B) No.1441, g139 (Tr. A)	Goblets	Khurab (Stein 1937: Pl.XVIII.Khur.E.i.251). Mohenjodaro (Marshall 1931: Pl.CXL.8)

		Ur (Muller-Karpe 1993: no.1131-1133)
No.1168, g120 (Tr. A) No.1068, g115 (Tr. A)	Pear-shaped vessels with hanging cords	Not found elsewhere
No.0402, g047 (B) No.0393, g045 (B) No.0302, g036 (Tr. IV) No.4302, g363 (Tr. A)	Ornamental axe-heads	Khinaman (Curtis 1988: Fig.1 & 2) Khurab (Stein 1937: Pl. XVIII.Khur.E.i.258)
No.2259, g193 (Tr. A) No.2421, g203 (Tr. A) No.2444, g204 (Tr. A)	Undecorated shaft-hole axes	Yahya IVB5 (Potts 2001: Fig.4.44, p115) Damin (Tosi 1970: Fig.17a & 54) Susa (Collon1987: vol. I, 96, no.73).
No.1117, g117 (Tr. A) No.0573, g063 (Tr. I)	Pins	Jiroft (Majidzadeh 2003: p155)
No.1049, g114 (Tr. A)	The Shahdad`s Standard	No found somewhere else

The comparative study of the metal artifacts of Shahdad with those of the sites of Southwestern Asia revealed some results. First, the interactions of Shahdad with long-distance areas such as Indus valley, Central Asia, East, West and southwest of Iran were identified, then the evidence of the existence of a very homogenous style in metal objects in a wide geographical area was revealed and third, Shahdad was a metal production center with its own characteristics. Due to the comparative chronology, Shahdad metal artifacts date back from the mid-third millennium BC to the early second millennium BC.

There are some metal objects such as tubular containers and standard Shahdad which do not have any similar parallels in other areas which not only show the art and specialty of the metalworkers of Shahdad, but also reveal the unique characteristics of Shahdad metallurgy.

The Shahdad standard was found from the grave 114 of area A. It is consisted of a squared metal piece, mounted on a 128-centimeter metal axle which the flag can turn over it. An eagle with opened wings which is in a landing position can be seen on top of the axle. The flag is engraved with some designs (Fig 22, 23).

The scene depicted on the plaque presents a picture of a person in power receiving gifts. Ali Hakemi has described the scene very well-detailed⁷⁶. Hakemi introduced the gift recipient in this scene as a goddess and believed that all gift holders are females and it corresponds to a ritual scene while these people do not have any feminine characteristics such as breasts which is not usual because on the seals of Shahdad, women can be spotted with big breasts that distinguished them from men. Pierre Amiet also consider the recipient as a man⁷⁷. But the more important question is whether this scene is a ritual one or not. Despite the fact that Hakemi believes it belongs to a ritual ceremony, there is no evidence to prove it. None of the depicted people in this scene have god's signs present on Shahdad seals such as crowns or horns. It can be related to a local governor accepting gifts and taxes.

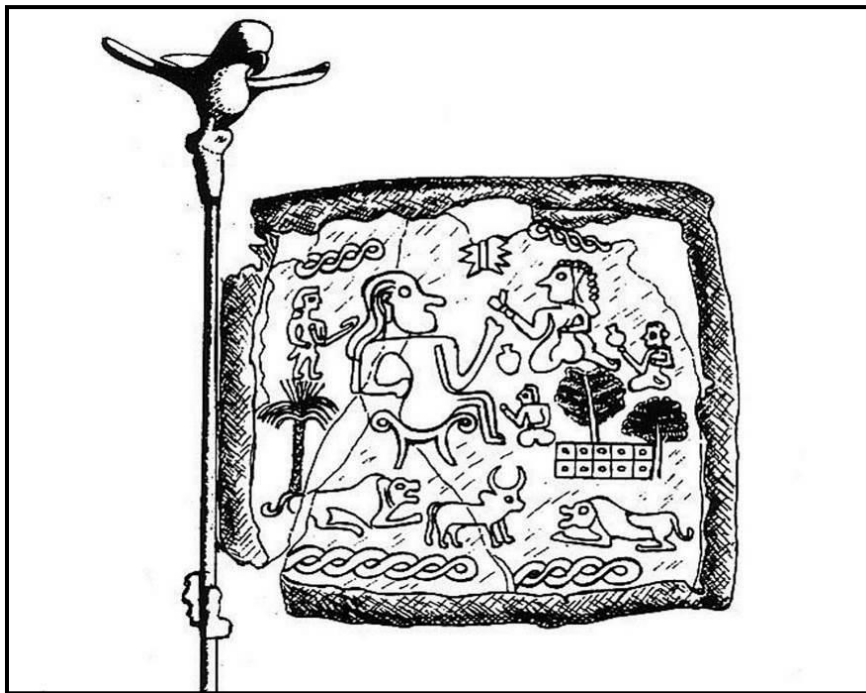


Fig 22: Drawing of the Standard of Shahdad (Hakemi 1997: 649)

⁷⁶ Hakemi (1997), p. 649.

⁷⁷ Amiet (1986), p. 165.

To sum up, the bronze objects of Shahdad were produced in Shahdad, and the presence of the workshop D in the east of the site of Shahdad, along with a large metallurgical site at 800 meters east of it, indicates a large metallurgical area in the eastern part of the city of Shahdad in the third millennium BC. Most scholars state that Anarak (700 km to the northwest of Shahdad) supplied the arsenical copper of the prehistory societies of eastern Iran⁷⁸ and the Indus valley⁷⁹. Meanwhile, there are copper-rich mines around the Lut plain in which there are signs of being exploited during the ancient times.

It seems more reasonable to assume that Shahdad inhabitants used these mines rather than those in Anarak which were too far. More interdisciplinary studies are needed to prove or reject this hypothesis.

2.1.6. Clay Objects

Two unique types of artifacts were found from the site of Shahdad; one human statues (Figs 24 & 25) and one house models. In total, 24 human clay statues were discovered from Shahdad cemetery⁸⁰ which had ritual functions.

Because of the destruction of bodies and burials, the relations between the statues and the body cannot be seen. It can be argued that these statues were buried as their dead companion, or that the body of the deceased was destroyed during certain ritual ceremonies and instead their statue was placed in grave.

Although the clay statues compared with the ones of Mesopotamia and the Indus Valley, the similarities between them were superficial, and the differences in the size, style, materials and the context in which they were found, reveal the unique tradition of Shahdad.

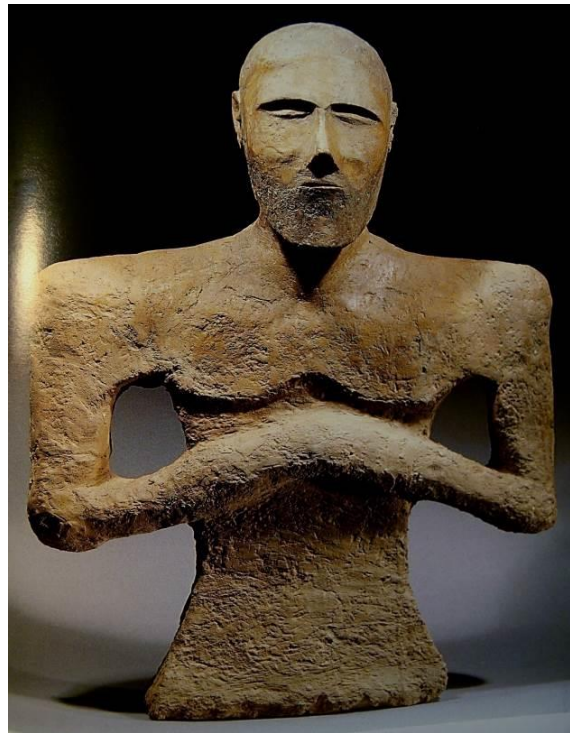
⁷⁸ Heskell & Lamberg-Karlovsky (1980) p. 258-9, Pigott (1999).

⁷⁹ Kenoyer & Miller (1999), p. 116-17.

⁸⁰ Hakemi (1994), (1997).

The other special finds of Shahdad are the house models. The clay house models were uncovered from 33 graves of the cemetery of Shahdad. They are cubical and 20-30 centimeters long. Some researchers take them as a 3D example of house motifs on chlorite vessels⁸¹. Hakemi called them shrines⁸².

The house models and human statues were uncovered from the cemetery A. So they date back to the second half of the third millennium BC. House models and human statues have not yet been found in any other cemetery than Shahdad, so we can identify them as a unique tradition of Shahdad.



⁸¹ Lamberg-Karlovsky (1988), p. 53.

⁸² Hakemi (1997), p. 62.

Figs 24, 25: Two Clay Statues from Cemetery A of Shahdad discovered by A. Hakemi (Courtesy of the National Museum of Iran)

2.1.7. Seals

Despite the discovery of cylindrical seals, the only evidence of the use of stamp seals can be seen on red wares of the cemetery A. No seal impressions have so far been found. The function of the cylindrical seals of Shahdad has not yet documented. 32 seals were uncovered during the Hakemi's excavations (Fig 26). Except for 2 seals found from the workshop D⁸³, the rest of them, all, have been found from the cemetery A.

Six seals come from the cemetery of Shahdad which are not yet published including two stone seals (no. 0766, grave 079 and no. 2572, grave 212) and four bronze seals (no. 3109, grave 257, no. 4175, grave 349, no. 4185, grave 350 and no. 4289, grave 362).

Two other seals of the cemetery do not have proper and clear drawings including a stone cylinder seal, no. 2263, grave 193; a bronze compartmented seal, no. 2489, grave 207. The seals of Shahdad are made of metal, stone and clay. Eleven other seals were also collected during the surface surveys. Shahdad stamp seals with their comparable examples of other regions can be seen in the below table (Table 5).

⁸³ Hakemi (1997), p. 72, 97.



Fig 26: A Cylindrical Seal recovered from grave 163 of Cemetery A of Shahdad (Courtesy of the National Museum of Iran)

Table 5: Comparison of the seals of Shahdad with the contemporaneous sites of the other regions (provided by author)

Shahdad Seal	Description	Similar Parallel
Bronze stamp seal: no. 0315, g037 (Tr. IV)	The duck-like bird	
Bronze stamp seal: no. 4404, g377 (Tr.A)	A double-headed bird	

Bronze stamp seal: no. 0362, g040 (Tr. A)	The eagle with spread wings	Comparable with Chlorite Objects from Yahya and Jiroft
Bronze stamp seal: no. 0236, g033 (Tr. A)	The bearded human figure	
Bronze stamp seal: no. 0222, g032 (Tr. A)	The trefoil design	
Bronze stamp seal: no. 1217, g122 (Tr.A)	An insect	
Stone stamp seal: no. 0751, g078 (Tr.I)	The opposed feet	Yahya IVB2 (Pittman 2001: Fig.10.56) Shahr-e Sokhta II-III (Lamberg-Karlovsky & Tosi 1973: Fig.49) Mundigak IV.3 (Casal 1961: Pl.XLV.4)
Stone stamp seal: no. 2858, g230 (Tr.A)	Eight-lobed rosette	Dashly 1, Murghab Delta and North Afghanistan (Baghestani 1997: no. 114, 115, 111, 171)
Stone stamp seal: no. 1933, g170 (Tr.A)	Eight-point star	Togolok (Hiebert 1994: 60, Fig.4.32.2)
Bronze stamp seal: no. 1830, g166 (Tr.A)	A cross inside a circular collar	Many sites in Bactria and Margiana (Baghestani 1997: no.330-345)

According to the comparative studies, Shahdad seals share some similarities and characteristic with those of Early Bronze Age sites such as Shahr-e Sokhta, Jiroft, Tepe Yahya and the remote areas such as Central Asia and the Indo-Iranian borderlands.

It was also revealed that most of Shahdad seals are not comparable with those found from other regions and they had their own local characteristics. One cylinder seal was also uncovered from workshop D that is not yet published. Due to erosion, its motif is not very clear. It seems to represent a winged goddess (Fig 27).

Another unpublished seal from Area D is a stamp seal made of clay bearing a geometric impression (Fig 28). M. Kaboli found a clay stamp seal (6.5×5.3 cm) in the residential area in the northern part of the site which representing animal motif⁸⁴ (Fig 29).

The cylinder seals of Shahdad are made of silver and stone with human, vegetal and animal motifs. Pittman groups them with the seals of Yahya IVB5-IVA⁸⁵ and called them "Southeastern Style" or the central southern of the Iranian plateau. Based on the context in which these seals were discovered, they date back to the second half of the third millennium BC.

2.1.8. Architectural Remains of the Residential Quartier

In 1978, archaeological research program of Shahdad was suspended for a decade and a half. Excavations at Shahdad site resumed under direction of Mr. Kaboli for four seasons in 1990s. The work of Kaboli was concentrated in the residential areas of the site. His work in the northern part of the site uncovered three architectural complexes⁸⁶. Two

⁸⁴ Kaboli (1997).

⁸⁵ Pittman (2001), p. 46-10.51, Fig.10.

⁸⁶ Kaboli (1997), (2001), (2002).

of them located 800 m north of the cemetery A has been named the *farmers's area* and 300 m to the east, a third complex named *Jewelry's area* was identified.

The complex of *farmers's area* is consist of two adjacent complexes named A (Figs 30-32) and B (Fig 33). All architectures from Shahdad are made from mudbrick. The size of the mudbricks of complex A is 39 x 22 x 8.5 centimeters. 22 ceramic sherds and one clay seal were found from this complex. The pottery obtained from this architectural complex is similar to those from the cemetery A of Shahdad, and therefore we can assign it to the second half of the third millennium BC.

Complex B of *farmers's area* is located to the southeast of the first complex. This architectural complex is made of mudbrick with the dimensions of 38 x 25 x 8.5 cm. The thickness of walls is 25 cm. This complex consists of 6 rooms and storerooms and has two entrances in the south. Due to the discovery of ploughed lands that were covered by sands next to these two architectural complexes, the excavator named this area as *farmers's area*.

Another architectural remains were unearthed by Kaboli is located 300 m to the east of *farmers's area* (Fig 34). A 10 by 10 m trench was opened where many semi-precious stones like agate and lapis lazuli⁸⁷, unfinished and broken beads as well as working tools like blades, drills were scattered on the surface⁸⁸. The excavations at this place resulted in uncovering a mudbrick architectural complex that was named *Jewelry's area* by its excavator. In the northwest of the complex, more than 200 pieces of agates, mostly raw, as well some unfinished beads were discovered. This evidence made the excavator to refer to this complex as a workshop for producing semi-precious stones.

Importantly, these architectural complexes of residential area excavated by Kaboli greatly increase our understanding of the layout of the Bronze Age urban center of Shahdad that was previously only known through its necropolis.

⁸⁷ See Casanova (1992).

⁸⁸ Kaboli (2002).

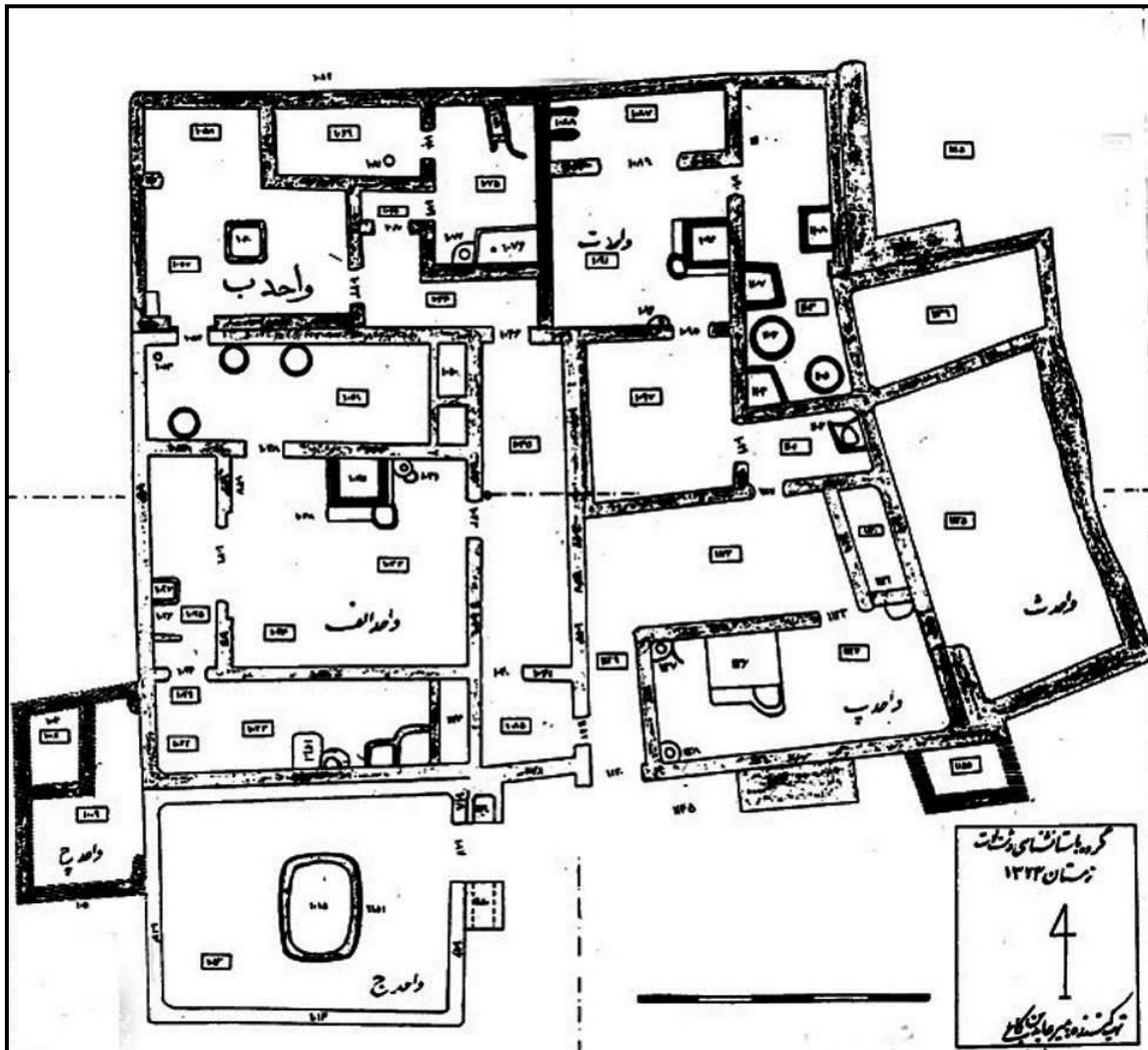


Fig 30: Plan of the Architectural complex A of *farmers's area* (After Kaboli 1997)

2.1.9. The Chronology of the site of Shahdad

It is hard to present an absolute chronology of Shahdad due to the lack of an organized settlement sequence in order to compare the funerary goods with and also the lack of absolute C14 dating results. All we have relate to the one and only C14 dating result which is not sufficient. The other problem is that all the cultural materials are uncovered

from the burials and not from the settlement layers and the fact that the cemetery is dated both vertically and horizontally poses another problem.

There is no excavated site in Shahdad area or sites in Northern Kerman to compare the data of Shahdad with and in case there are some comparable sites in Southeastern Iran such as Shahr-i Sokhta, Bampur and Tepe Yahya or in neighboring areas (Mundigak, Turang Tepe and all sites of the central Asia), their chronology is so complicated and challenging they can't be trusted.

Hakemi suggested the dating of 3100 to 1500 BC for Shahdad⁸⁹. He used the expression of Takab (local name for the central part of Dasht-e Lut) for the sequence of Shahdad so that Takab IV₂ (identified from surface survey of Shahdad) dates back to 3100-2750 BC. Takab IV₁ (2750-2400 BC) is related to the Eastern cemetery A (19 graves containing buff wares in the east of the trench A). Takab III is divided into two subgroups: III₂ (2400-2200 BC) and III₁ (2200-1900). Takab III relates to the cemetery A, for the graves with the depth of 60 to 240 cm the period III₂ is suggested and for the rest the period III₁. Hakemi suggested the period Takab II₂ (1900-1700BC) for the graves discovered from the cemetery B and Takab II₁ (1700-1500 BC) for the cemetery C of the site of Shahdad. He also suggested the dating of 2200-2000 BC for the area D. The only absolute dating we have got from Shahdad relates to this area which reveals the date of 2050 BC (Hakemi 1997: 112). It seems that the proposed chronology needs to be revised (Table 6).

As mentioned before, Hakemi applied both horizontal and vertical chronology for Shahdad. I assume that none of them can be correct based on the evidence and documents. First, I discuss the horizontal chronology. Hakemi presents a horizontal chronology from east to west from the oldest to the latest period so that the eastern cemetery with buff wares is considered as the oldest part (2750-2450 BC). Then there is the cemetery A with red ware in its west (2450-1900 BC).

The author believes that the graves of both areas are simultaneous and date back to the second half of the third millennium BC. The suggested dating is based on the pottery

⁸⁹ Hakemi (1997), p. 75.

similarities between the burial goods of Eastern cemetery and those of cemetery A, Bampur, Yahya and Konar Sandal. The painted potteries found from the eastern cemetery's graves, show a very close resemblance to the cemetery A and the mentioned-above third millennium BC sites. They mostly share same motifs such as palm trees between two lines, hatched chains, hatched sandglasses, hatched semicircles, hatched wavy lines, engraved motifs and applique decoration. There are also some analogies in their forms such as spouted vessels. There are also potter's marks on the potteries discovered from the graves of both areas.

Hakemi admitted the very close resemblances of painted potteries of the cemetery A and the eastern cemetery. In fact the reason why Hakemi presented two different chronologies for these 2 areas was the lack of red wares in the eastern cemetery. However, unlike the cemetery A, the buff wares were used instead of the red wares along with the burial goods in the eastern cemetery. The author considers the graves of both areas contemporaneous and this difference (in using the red and buff wares and the amount of chlorite vessels) arises from the social or ethnic hierarchy rather than the chronological diversity.

The reason why we believe all graves belong to the same time, is the existence of both red wares and buff wares in the graves 85 and 87 of the cemetery A⁹⁰. So, as a result of the simultaneity of the eastern part and the cemetery A, the hypothesis of Shahdad west-east ward horizontal growth is questioned. Hakemi had also proposed a vertical sequence for the main trench of the cemetery A. According to him, the graves with the depth of 15-60 cm date back to 2200-1900 BC while the rest (60-240 cm) go back to 2450 to 2200 BC. Hakemi divided the graves of area A into 2 groups based on their depth although there is no difference between their potteries and cannot be related to two different periods. Since there is no topographic map of the cemetery before the excavations, it is not easy to discuss two levels of the cemetery. This depth difference might be due to the natural topographical condition of the terrain. On the other hand Hakemi had mentioned that some parts of cemetery were bulldozed for agricultural purposes.

⁹⁰ Hakemi (2006), p. 372, 373.

There exists also wind erosions which may differ from one part to another parts of the area. It is clear that the graves might differ in depths but not in their cultural material.

Although Hakemi stated the depths of the graves between 15 and 240 centimeters, only 6 graves (incl. 294, 203, 189, 188a, 188b and 132) of the 289 graves of the trench A have a depth of more than one and a half meters, and all other graves have a lesser depth. The interesting point is that each of the six graves that are deeper than the others, are located in the southern side of the trench A near the southern wall of the trench.

According to the north-south slope of the Shahdad Cemetery A, it is natural that the graves of the southern part of the main trench have a greater depth, based on a fixed benchmark (probability in the northwest corner of the trench). It seems that if the trench A had been excavated several meters further to the south, the depth of the graves would have reached up to three meters with this method, which reveals the topographic condition of the cemetery. The error in the data registration had a direct impact on the depth measurement of some burials in the southern corner of the trench.

The comparative analysis of the funerary goods reveals that the cemetery A of Shahdad dates to the mid-third millennium BC and lasts until the late third millennium BC (2500-2000). This dating is based on the comparative studies on pottery, chlorite and marble vessels, bronze objects and seals of Shahdad with the contemporaneous areas of southeastern Iran and neighboring regions such as Shahr-i Sokhta, Jiroft, Bampur, Tepe Yahya, Mundigak, Umm-al Nar, Susa and the sites of the central Asia.

There is no evidence to prove the dating suggested by Hakemi. He believed that the cemetery A dates back to the first half of the third millennium BC. One of the reasons of this suggestion is the discovery of one single pottery with writings (from the grave 030)⁹¹ which was taken by mistake as Proto-Elamite script⁹² and he compared it with the late fourth millennium BC and the early third millennium BC examples of Tepe Yahya, Shahr-i

⁹¹ Hakemi (1997), p. 183, no.0193, Db.5.

⁹² Hakemi (1997), p. 576.

Sokhta, Malyan and Sialk while it relates to linear Elamite which is several centuries later than proto Elamite writing.

Linear Elamite is a writing system used during the reign of Puzur-Inshushinak⁹³. The existence of a linear Elamite script in the Shahdad Cemetery does not necessarily relate the graveyard to the time of Puzur-Inshushinak. The latest archaeological discoveries in Konar Sandal of Jiroft, yielded new information about the linear Elamite writing system. The discovery of linear Elamite tablets in Konar Sandal, which date back to the mid to the late third millennium BC⁹⁴, suggests Jiroft as the origin of this writing system because it was invented and used in Jiroft before the reign of Puzur-Inshushinak. It also reveals that the existence of the linear Elamite scripts in Shahdad should not be linked to the time of Puzur-Inshushinak, the king of Awan.

Table 6: The revised chronology of Shahdad (provided by author)

Excavated Area	Hakemi's proposed Chronology and Periodization	Proposed Chronology of Author
Surface Data	Takab IV ₂ (3100-2750 BC)	Aliabad Culture (3800-3300 BC)

⁹³ Andre & Salvini (1989), p. 58, Potts (1999), p. 79.

⁹⁴ Madjidzadeh (2012).

Eastern Cemetery	Takab IV ₁ (2750-2450 BC)	2300-2000 BC
Cemetery A	Takab III ₂ (2450-2200 BC) Graves with the depth of 60-240 cm	2500-2000 BC
	Takab III ₁ (2200-1900 BC) Graves with the depth of 15-60 cm	
Cemetery B	Takab II ₂ (1900-1700 BC)	2000-1800 BC
Cemetery C	Takab II ₁ (1700-1500 BC)	1800-1600? BC
Area D	2200-2000 BC	2 nd half of 3 rd millennium BC

2.1.10. Summary

In this chapter, I tried to evaluate the results of twelve seasons of Shahdad excavations. We confronted several constrains in our studies. First of all; the common approaches of Shahdad excavations and interpretations were historical-cultural under the

influence of the archaeology of decades 60s and 70s. Instance; there is no information from animal and botanical exploitations and human remains were not collected. Second, the lack of interdisciplinary studies on cultural materials of Shahdad didn't let us to have detailed information on production processes, the livelihood of population, cultural complexities and environmental factors. On the other hand, due to the glorious finds of the cemetery, most of the excavations were conducted in this area and the other parts of the city were neglected. The revision of Shahdad data yielded some new information. Shahdad had been inhabited for a long period from the middle third millennium BC to the early second millennium BC.

Potteries reveal the cultural similarity to other civilized areas of South-East of Iran including Sistan area, Halil Rud Basin and Baluchistan. Although potteries indicate the settlement continuity in Shahdad after the third millennium BC, this period can be regarded as the time after the collapse of the urbanization of southeastern Iran and the city of Shahdad. The pottery related to the first quarter of the second millennium BC of the city of Shahdad, uncovered from the areas B and especially C, shows a shift in the pottery tradition patterns of Shahdad. It seems that after the decline of urbanization of southeast Iran and the vanish of the city centers of this region, there has been a fundamental shift in the pottery pattern of the early second millennium BC settlements in the western margin of the Lut plain. In a way there was a decline in interaction with southern cultures (Halilrud basin and the Persian Gulf) and east (Sistan and Baluchistan). Instead, cultural integration with the north (Central Asia) had increased.

By studying other cultural material found from Shahdad area, one can find cultural interactions of Shahdad with other regions. For example, the presence of marble miniature pillars that existed in Central Asia before Shahdad, reveals how Shahdad was influenced by other regions and vice versa, because there were certainly mutual relations between these regions.

The other conclusion of this study was the fact that the graves of the eastern cemetery were not the oldest ones and both sequences west-east sequence and the one based on the depth of the graves were rejected. Also, the dating of the second half of the

third millennium BC was proposed for the cemetery A, the artisans 'area (area D) and the residential areas excavated by Mirabedin Kaboli.

The evidence from the production of objects made of semi-precious stones such as agate, lapis lazuli and marble discovered from surface survey⁹⁵ and Shahdad excavations⁹⁶ introduce Shahdad as a main production center in 3rd millennium BC. Considering the discovery of the abundant evidence of the production of objects made of semi-precious stones in Shahdad area and their low presence in the Shahdad cemetery, it can be concluded that these small items were probably products for export. Not only Shahdad is a production center of small objects of semi-precious stones, but also it is known as a very important metal production center during the early and middle Bronze Age.

The impact of Shahdad on Central Asia through the Bronze and chlorite materials can be easily observed. Despite all the cultural interactions with all these regions, the local and regional cultural traditions dominated in Shahdad and it has all the characteristics of a city with a local cultural character in 3rd millennium BC.

In general, the similarity and the cultural links between the cultural materials of Shahdad and different parts of the South-West Asia, from Mesopotamia and Southwest Iran to Central Asia, the Indus valley and the south of the Persian Gulf indicate the existence of a cultural interaction sphere in the west of Asia during the early and middle Bronze Age. The presence of some iconographic similarities in seals and the presence of chlorite objects in southeastern Iran with other regions proves this claim. The evidence from the production of objects made of semi-precious stones discovered from surface survey⁹⁷ and Shahdad excavations⁹⁸ make this hypothesis stronger.

According to a study of data obtained from Shahdad excavations, the city of Shahdad in the second half of the third millennium BC and especially the late of this millennium had

⁹⁵ Salvatori and Vidale (1982).

⁹⁶ Kaboli (2002).

⁹⁷ Salvatori and Vidale (1982).

⁹⁸ Kaboli (2002).

a cultural similarity to other civilized areas of South-East of Iran including Sistan area, Halilrud Basin and Baluchistan. This cultural similarity arises through the establishment of a commercial-communications network along the urban period of Southeastern Iran.

Despite all the cultural interactions with all these regions, the local and regional cultural traditions dominated in Shahdad and it has all the characteristics of a city with local cultural factors during the early and middle Bronze Age on the west of Lut desert. These cultural local factors include the burial patterns, grave goods such as human clay sculptures and house model, the body coverage with mats and the presence of platforms in graves.

Chapter II: Recent Excavations and Surface Survey at the Urban Center of Shahdad

2.2.1. Introduction

In the previous chapter, the Bronze Age urban center of Shahdad was introduced in detail. Also, a reassessment of the twelve seasons of excavations at the site was presented. While the excavations of its eroded burial grounds have provided valuable information on the site's material culture and its links with the contemporary cultures or civilizations, the extent and layout of the settlement areas were still poorly known.

In this regard, in 2016 a fieldwork project⁹⁹ under supervision of the author was conducted to achieve the extent and the layout of the site. It includes surface survey and sounding for the delimitation/ determining the extent of the site. Indeed, this chapter presents the results of this project, which is the fifteenth season of the archaeological researches of Dasht-e Lut. The present research shed new light on the physical model of the urban center of Shahdad.

Previous research on the large early Bronze Age site of Shahdad, with its sophisticated artifacts in rich burials¹⁰⁰, fully justified its definition as an advanced early urban center¹⁰¹. The site developed near the endoreic fan of the Derakhtangan river moving from the edge of the Lut in late Chalcolithic times westwards, to a much more substantial late 4th millennium BC settlement distinguished by the general use of polychrome Aliabad ware¹⁰².

⁹⁹ This project was supported by Iranian Cultural Heritage, Handicraft and Tourism Organization

¹⁰⁰ Hakemi (1997).

¹⁰¹ Vidale (2006-2008).

¹⁰² Eskandari (2017).

Further west, a large area of the site is studded with pottery generically dated to the second half of the 3rd millennium BC. It is estimated that the ancient city, in its prospering time between 2500 and ca. 1900 BC, extended between 150 to 200 ha¹⁰³, and consequently had hosted a substantial, permanent urban population. The site seems to have been abandoned in the second quarter of 2nd millennium BC (in early 2nd millennium, Shahdad appeared to be limited to a small settlement), possibly in correspondence of important climatic changes like the so-called and much discussed mega-drought that variously impacted southern Eurasia 4.2 kya. Excavations at Konar Sandal-e Jiroft¹⁰⁴ showed that the city was collapsed at the end of 3rd millennium BC. Importantly, my recent (2021) excavations at Konar Sandal showed that it appeared to be a city (ca. 100 ha) in early-mid second millennium BC once again.

The westward shift of the Shahdad communities towards the piedmont, perhaps for a more favorable access to reliable underground water, continued in a settlement and a large mud brick fortress of the early historic period, to end in the presently inhabited village.

Although the few dwelling areas so far excavated at Shahdad are densely packed, was Bronze Age Shahdad such a large urban core, and a powerful city-state?

For example, this is suggested by Hiebert and Lamberg-Karlovsky¹⁰⁵ who considered Shahdad in full control of an important territory, and of a long-distance trade network with the surrounding areas.

While historical interpretations and questions of this kind may proliferate, the rise of Shahdad, the form of its urban lay-out and the reasons of its abandonment remain major enigmas.

In April and May 2016, the site complex of Shahdad was systematically surveyed and delimited by the means of limited test trenches. While by ascertaining the real extension of Shahdad we meant to prevent possible damages to the site, the surface survey produced

¹⁰³ Salvatori and Tosi (1997).

¹⁰⁴ Madjidzadeh and Pittman (2008).

¹⁰⁵ Hiebert and Lamberg-Karlovsky (1992).

a record of the habitational pattern of the Bronze Age city quite different from that commonly imagined (see; part III, chapter 2).

2.2.2. Current picture of the Shahdad City

Previous archaeological activities at site of Shahdad by two Iranian archaeologists A. Hakemi and M. Kaboli (see, previous chapter) provided evidence for important, presumably local craft traditions and cross-regional contact. These works were focused on the excavations, especially in cemetery, and little attention was paid to the settlement system of the city.

In January 1977, a short survey across the site of Shahdad and its surroundings was undertaken with the collaboration of an Italian team. This survey identified 37 points on the basis of aerial photographs and walking survey, mainly guided by the directions provided by the local Qanats¹⁰⁶. In the open, widely dissected landscape of the site, locating sites and areas, in absence of the advanced technologies nowadays available was difficult. Actually, some of the locations pinpointed in the map of Salvatori and Vidale 1982 were misplaced.

During this survey, however, north-east of the cemeteries was identified site D, a dense cluster of mudbrick houses filled with sand and gravel and largely exposed by wind deflation. Valuable artifacts like a figured cylinder seal, and unfinished chlorite beads were visible on surface, while some rooms contained groups of very fragile unbaked clay beads. Site D was excavated in the same year by A. Hakemi¹⁰⁷ and M.E. Bayani¹⁰⁸, and because of the finds was interpreted as a "Metallurgical workshop"¹⁰⁹.

¹⁰⁶ Salvatori and Vidale (1982), Hakemi (1997).

¹⁰⁷ Hakemi (1992).

¹⁰⁸ Bayani (1979).

¹⁰⁹ Extensively reviewed in Meier (2015), p. 102-143.

In 1978, the archaeological activities at Shahdad were suspended, and stopped for a decade and a half. Excavations at Shahdad were resumed under direction of M. A. Kaboli for four seasons in the 90s¹¹⁰. Kaboli concentrated the digs in well preserved residential areas of the site. His important work in the northern extension uncovered two architectural complexes (see, previous chapter). These two residential compounds, added to the "Metallurgical workshop", noticeably increased our understanding of the urban center of Shahdad, previously only known through its graves, and stressing the involvement of Shahdad in the processing of valuable raw materials.

However, the historical role of this important center in the complex picture of the Iranian plateau in the late 3rd millennium BC remains to a great extent obscure. The recent surface survey and site delimitation project of Shahdad were meant as first step to address and solve a long series of lacunae. First of all, how large was Shahdad?

2.2.3. Surveys and soundings for determining the extent of the site

To delimitate the site of Shahdad by the means of lines of test trenches turned out difficult, due to the complexity of the site. Firstly, Shahdad is a very large site. The dispersal of sherds and objects on the surface had been correctly estimated to ca. 200 ha. Therefore, to follow the edge of the deposits visible on surface and to choose the location of trenches, and to connect them to each other, was sometimes problematic.

Secondly, natural agents (wind and water) had variously scattered cultural materials beyond the elevated topographic features of the site, so that the relationship between surface and sub-surface deposits was far from univocal. The search for the site's limit thus required test excavations both on and beyond the scatters visible on surface. Thirdly, due to the combined effects of horizontal settlement shift, rather than vertical growth, of powerful wind deflation, fluvial flooding and erosion, the thickness of archaeological deposits was often quite limited. In general, extreme wind erosion is the main reason of such deflation of the archaeological deposits.

¹¹⁰ Kaboli (1997), (2001), (2002).

Although processes of horizontal growth were certainly a factor in play, depositional build-up over time should not be under-estimated. In fact, the site of Shahdad is a landscape studded with large parallel yardangs running in a south-west/north-east direction. They are made of residual massive low-energy sediments deposited in historical and late-historical periods. The ruins of the 3rd millennium settlements are often dissected by wind erosion down to a depth of two-to-four m below the top of these recent yardangs. In this extensive erosive process, the early Bronze age deposits were substantially lowered, as demonstrated by the exposure of graves' furnishings on surface (Fig 35), whose shafts should have originally been at least one or two m below the original trampling surface of the settlement. Another expectation is that the pottery clustered on surface of these deeply dissected patches of surfaces potentially reflected more than one occupation phase.

In such highly dynamic and largely destructive geomorphological context, the delimitation of the settlement areas started from the fieldwork by A. Hakemi and M.-A. Kaboli at Shahdad. Their views on the extent and delimitation of the site were carefully considered. As a next step, the aerial photos of the site taken in 1993 were used to explore the site. Also, 1970 satellite Corona images were used and compared to new Google Earth images to observe any possible change over the past four decades.

Then, by the means of a two-week extensive walking surface survey was conducted by a team of archaeologists and a topographer in straight lines. The dispersal of the surface materials was recorded on a new, high resolution topographic map of Shahdad (20 cm contour lines) made with a total station.

In this way we isolated a series of discrete areas that bore heavy concentrations of archaeological finds. Finally, 30 test trenches were opened all around the outer periphery of these archaeological features (Fig 36).

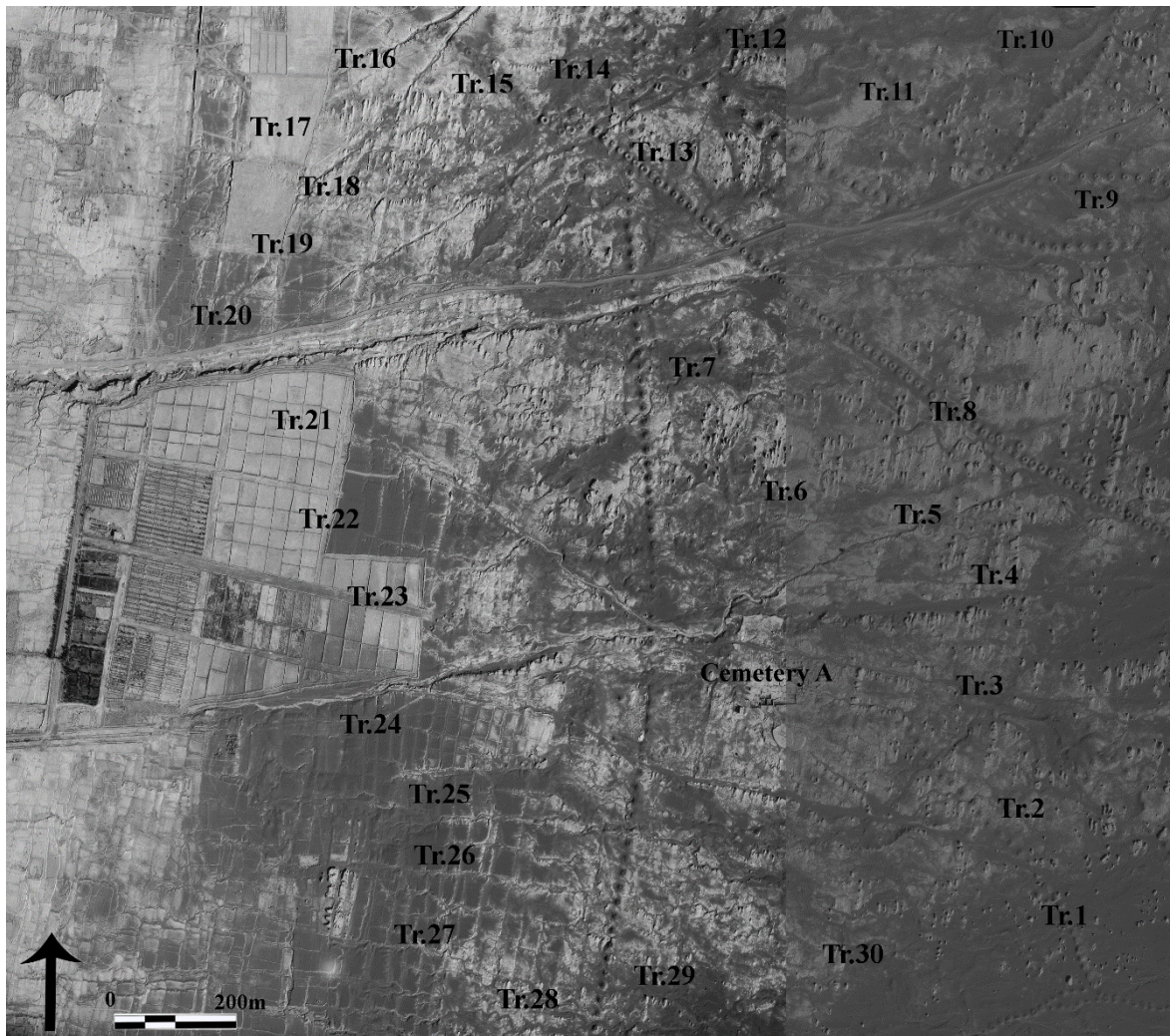


Fig. 36: Aerial photograph showing the location of the trenches excavated in 2016 for delimiting the site (photos from National Cartographic Centre, Iran, taken in 1993, modified by author).

The trenches were 1.5 by 1.5 m in size and went down, at variable depths, to the virgin soil. The work began at the southeastern part of the site (about 500 m south-east of cemetery A) and continued around its periphery counterclockwise.

Among the excavated trenches, trenches 1 to 9 were opened on the eastern front, 10 to 17 along the northern limit, 18-26 on the western side and 27 to 30 to the south. Nine of these 30 excavated trenches (3, 9, 11, 18, 23, 24, 25, 26, and 27) reached cultural deposits, showing that the site extended further than the supposed limits in these areas, while 21 had no cultural layers.

The preliminary results of this sounding campaign indicate that the ruins of Shahdad stretch for a maximum length of 2100 meters north-south, about 1600 m east-west at its widest point, and about 800 meters at the narrowest extension, the northern part of the site complex being wider than the southern one. These figures, thus taken at face value, would make Shahdad, with ca. 170 ha of maximum surface occupation, one of the largest Bronze Age urban centers in South-West Asia (Fig 37).

But the story might have been quite different. Surface survey of the site produced valuable information for the physical urban model of the site which will be discussed in next part.

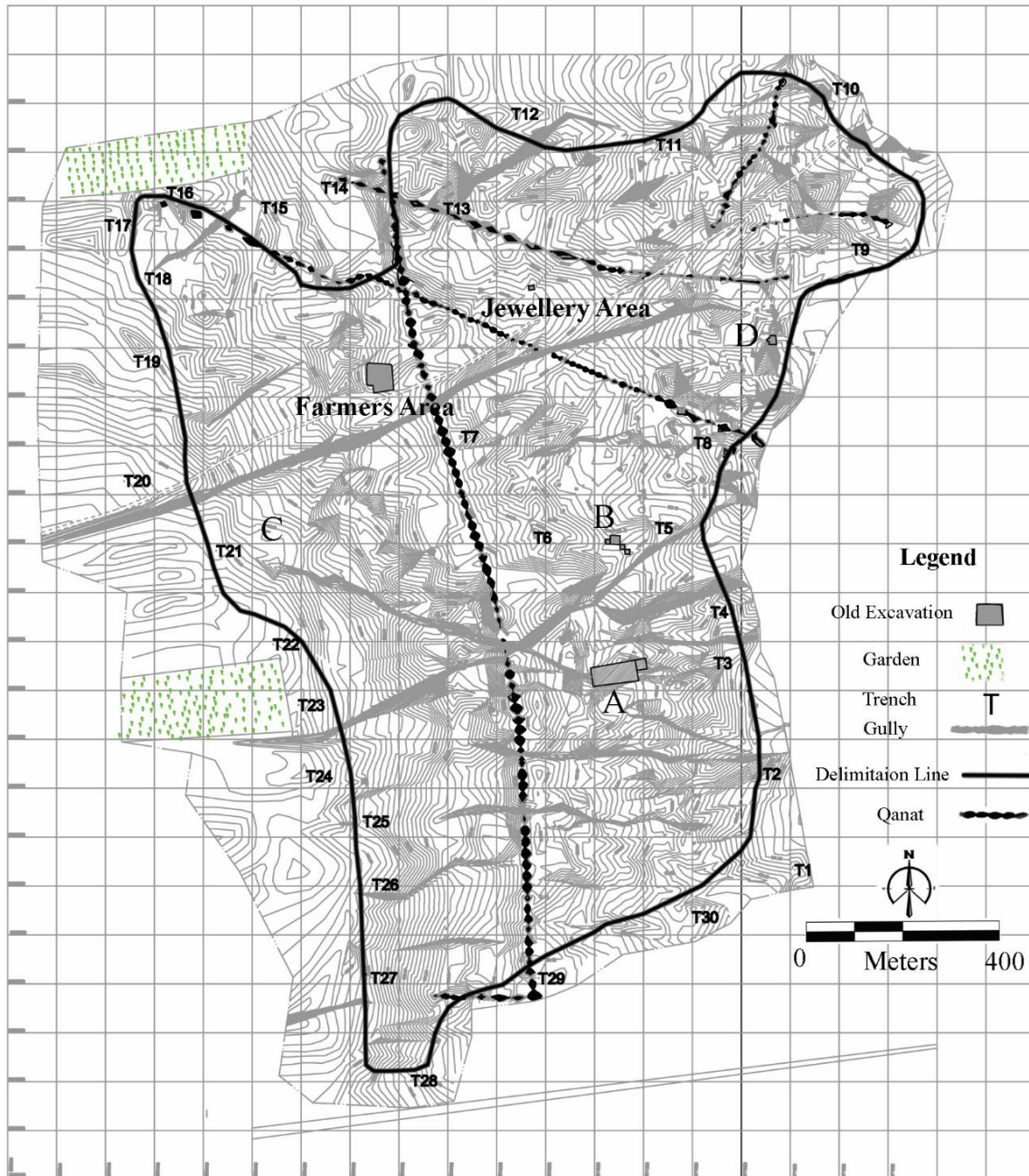


Fig 37. Topographic map of Shahdad showing the site's extension. "Jewellery" and "Farmers" Areas are the English translation of labels originally used by M. A. Kaboli in his field reports. T1 to T30 are the small test trenches dug for delimiting the 3rd millennium site. Block letters A-D locate old excavation areas discussed in the text. Contour lines: 1 m. (Map by author).

Chapter III: Archaeological Survey on Dasht-e Lut

2.3.1. Introduction

The Lut Archaeological Project was devised to investigate the prehistoric settlement development on the west of Lut Desert in the South-East Iran. The project was structured around three main research agendas. This chapter presents the results of the first season of the project, a two month archaeological survey conducted in Dasht-e Lut which has been undertaken in early 2012¹¹¹. The survey area lies immediately at the eastern foot of the *Kerman Range Mountains* which runs roughly north-west to south-east along western edge of Lut desert.

The survey was planned in the hope of providing answers to, or at least evidence pertaining to, some regional questions. The survey aims have been devised to address clear gaps in the archaeology of Shahdad area. Our main objectives were to identify the settlement patterns of the region through the ancient times, investigate the human-environment interactions and settlement development during prehistoric times in a region where previous excavations had documented the existence of a significant Early Bronze Age urban center.

Some considerations led to the choice of this area in the SE Iran. The first one was the fact that the already documented EBA urban center of Shahdad was evidence of the significant archaeological potential of this region. Furthermore, the lack of information concerning the catchment of this urban center, because no overwhelm survey has been undertaken in the Shahdad plain before. The next factor is geographical. In this case, two considerations were raised up, first, the proximity of Shahdad area with the Lut Desert which is able to introduce a unique cultural landscape in the Iranian plateau. Second, the strategic position of Dasht-e Lut which renders a natural transportation and communications corridor connecting Kerman area to Khorasan to the North. The latter agent persuaded us to seek this hypothesis that this natural corridor has been played the main role in linking the prehistoric Southeastern Iran cultures to the Great Khorasan.

¹¹¹ Eskandari *et al.* (2016).

During the Lut survey project eighty-seven ancient sites were identified, the earliest dates to the fifth millennium BC the latest to the late Islamic era. The identified sites are scattered in different environmental zones across the survey area, from desert district to alluvial plain, piedmont and mountainous zones, but the majority of settlements were identified within the alluvial central Shahdad plain where the distance between *Kerman Range Mountains* and Lut desert is in its largest width. Overall, the western edge of Lut desert demonstrated that the area is one of the considerable interest, particularly in the prehistoric periods.

2.3.2. Survey Area

A detailed discussion of the natural landscape of Dasht-e Lut was outlined in the previous part, chapter I. Here I particularize the physical characteristics of Lut survey area which are of relevance for better understanding the location of identified sites. Geographically, the survey area is located in the north-east of Kerman province, which covers two districts, Shahdad and Golbaf, of Kerman city. Shahdad and Golbaf respectively lie in East and south-east of modern Kerman city both along western edge of Lut desert (Fig 38). Shahdad district includes the northern portion of the survey area and the southern portion contains Golbaf district. Over 50 years ago, together, these two mentioned districts formed the administrative district of Shahdad (Khabis) with headquarters centered at Shahdad. It must be mentioned that in the current research the term *Shahdad/Shahdad Area* is referring to the both modern districts.

The survey area covers an area between the eastern side of the heavily folded Kerman Range Mountains to the west and the Lut Desert to the east. Due to that, the study area comprised two different landscape, on one hand the valleys across the western mountains and on the other hand the eastern long narrow alluvial plain along the Lut.

The survey area, at its extremities, encompassed an approximate area of 100 km north-south and 40 km west-east. The height of mountainous part is over 2500 m above sea level while less than the 20 km eastward in which the Shahdad plain is located the height from sea level is about 400 m. The distance between the Kerman Mountains and Lut

desert varies as subsequent the width of the Shahdad plain alters in its different parts. In the southern portion of the survey area it appears in its least width, less than 10 km. In northern portion, where the modern Shahdad city as well as the EBA urban center are situated, the distance between the mountains and Parallel Kaluts of Lut is in the most width approximately 40 km.

Geomorphological observations showing there are some permanent and seasonal rivers and smaller streams in the study area which all originated from the western mountains and run eastward and after passing the not long width of the plain ended in the Lut. Hence, the Shahdad area is always under flooding due to the nature of landscape.

The well-watered zone of the Shahdad area is where the alluvial fan of Shahdad has located in. Over the Shahdad fan the water sources originate from the Chahrfarsagh at the apex of the fan and flow eastward and occupy many positions on the base of the fan.

Geologically, at the base of alluvial fan of Shahdad, east of modern Shahdad, there is a geological platform that seems to be a geological part of the Lut that has been separated from it by tectonic activities in the past. On the eastern part of this platform, where most of prehistoric sites have been formed, many Kaluts distributed vary in size and intensity ranging from 0.1 to 20 hectares. Now, by visualizing a general picture of environmental features of the survey area we are able to contextualize the survey data for a better interpretation of settlement developments.

2.3.3. Theoretical Framework

An archaeological survey is an overview, a superficial examination of some segment of the earth's surface for evidence of human use and habitation¹¹². Survey is uniquely able to address some research questions that excavation alone will never answer. Only regional survey is capable of producing the data we need to investigate prehistoric use of landscapes, settlement hierarchies, and human behaviors that were dispersed in space instead of concentrated within the more obvious kinds of "sites"¹¹³. In fact, a shift from "sites" to regions as the investigatory universe appropriate to most archaeological problems is one of the characteristics of the new archaeology¹¹⁴.

In this research, regional survey in regard to achieving its main aims is designed to explore the following issues in the whole area of western edge of Lut: long term regional settlement patterns¹¹⁵ and change over time, population dynamics as an important indicator of long-term settlement trends, and the spatial distribution of prehistoric sites with regard to other settlements and environmental zones to be contextualized within environmental parameters.

2.3.4. Survey Methodology

Archaeological survey is often the first stage of a long-term archaeological research project. In terms of intensity, archaeological surveys can vary from general reconnaissance along the modern routes by car to very detailed extensive fieldwalking operations. I am not claiming that the latter approach was exactly applied in recent Dasht- Lut Project but the surveyors were intended to come closer to it.

¹¹² Hole (1980).

¹¹³ Banning (2002), p. 1.

¹¹⁴ e.g., Binford (1964).

¹¹⁵ *cf.* Kowalewski (2008).

The survey methods consisted of both extensive and intensive methods. The former comprises a conventional method of visiting every possible place sites expected to be with help of maps, Google Earth satellite imageries, local informants, and the location of modern villages. The latter method consists of walking over fields. The intensive method was undertaken at the areas where were eligible to be surveyed by such methods which includes alongside the rivers and streams which all cross the width of the plain eastward as well as the central part of Shahdad plain where the EBA urban center of Shahdad has located in.

Thanks to diverse landscape of the survey area, the strategy and the methodology of the survey differed from place to place. In fact, to achieve the main aim of documenting settlement patterns, a four-phase survey methodology was adopted. It was because of diversity of landscapes in the survey area as well as the potential of archaeological site places.

The first phase included a general reconnaissance of the western margin of Lut from the northernmost village of plain (Dehseyf) to the Keshit village (the southernmost) on the southwest of Lut. The first phase area consists of a long and narrow flat plain.

The second phase involved the western mountains of WLD. In this phase the main goal of the surveyors were looking for pastoral campsites as well as Stone Age occupations.

In the third phase, an intensive walking survey carried out along the banks of mainstreams which originate from the mountainous part and run to the east toward the Lut Desert.

The last phase of the survey methodology, in fact most intensive, was concentrated to surrounded areas of the excavated urban center of Shahdad. This phase area provide a unique opportunity for studying the impact of a desert environmental features on the location of prehistoric settlements. It is the area directly east of modern Shahdad city with a size around 10 by 10 km where the *Kaluts* are distributed in.

In Dasht-e Lut survey, field collection and recording methodology was as following: When a site was identified, the location was recorded using GPS and we made a sketch plan of the site, described the morphology of site and its surrounding environment, and

collected diagnostic ceramic samples. Each site was labeled with consecutive site numbers prefixed by Shd (abbreviation for Shahdad) in the modern administrative district of Shahdad and Gbf (abbreviation for Golbaf) within the Golbaf district. The dimensions of each site was calculated using GPS to measure their main axes by recording maximum length and width of sites.

In this survey, the identified sites include diverse types from mounds, architectures, graveyards, industrial workshops to rock art, while the focus of the current study is prehistoric and protohistoric¹¹⁶ sites which comprise mounds and industrial workshops. All prehistoric sites contained surface artefacts, the most frequent of which were pottery, with occasional lithic or other miscellaneous finds. Most of prehistoric sites provide evidence for multiple periods of occupation, but single phase occupation mounds are also present. In this survey, we attempted to measure the approximate size of each site based on surface ceramics. Apart from taphonomic problems (i.e. erosion and sedimentation) for all sites, the difficult problem arises when attempting to apportion areas to different occupations periods at multi-period sites¹¹⁷. In addition, the surveyors made attempts to estimate population numbers from the survey data because the population dynamics are important indicators in the long-term settlement trends in regional studies¹¹⁸ (See part III, chapter I).

In terms of survey restrictions, we had a dangerous limitation in some parts of the survey area. The western margins of Lut has been used for smuggling opium that illegally was transferred from Afghanistan and Pakistan boundaries to Khorasan region in the past. Hence, the police was authorized for laying landmines in some western margins of Lut. Indeed, the landmines endangered the survey team and created some limitations for covering the survey area. With the help of police and local guides we could cover the all-

¹¹⁶ In the Shahdad area, it refers to 5th to 2nd Millennium B.C because no occupation earlier than 5th mil BC was found in this area so far. In addition, no settlements from mid-second millennium onward have not been identified yet.

¹¹⁷ In Dasht-e Lut, the large prehistoric sites appear with horizontal growth, as subsequence it is easier to measure the site phases at multi-period sites, but this problem remains for small sites.

¹¹⁸ Wilkinson (2003b).

western margins of Lut except two areas where mines have been used extensively which are located approximately 30 and 56 km south of the modern Shahdad. These unsurveyed areas locate in the survey first phase's zone. It includes a narrow proximate area along the Lut where the distance between the mountains and Lut Desert is less than six kilometers.

2.3.5. Chronology and Periodization

To reach the chronological framework underpinning WLD settlement patterns, the major analytical component of this study was based on surface materials from each site. As with any comparative study the use of ceramics as chronological markers can be problematic, particularly where the ceramic sequences are punctuated by large gaps, or when they span very long 'ceramic' periods¹¹⁹. The proposed dates of WLD sites rely significantly on comparisons with published ceramic data from excavations from Shahdad area and other areas of Kerman (particularly the Bardsir Plain)¹²⁰.

The cultural periodization and terminology developed for the early periods of Bardsir valley is used to describe the material from Shahdad. Although it is apparent that there is a long-term resemblance between the archaeological assemblages of Shahdad and the Bardsir valley, there are also differences and these are more evident in some periods than in others. In this regard, occupation phases are characterized primarily by material correlations to the regional ceramic sequence from stratified deposits at Tal-i Iblis for 5th and 4th millennia B.C and largely excavated site of Shahdad for 3rd millennium B.C. Southern Kerman cultures for these periods which are known from Lamberg-Karlovsky excavations at Tepe Yahya display different cultures¹²¹ while cultures of northern Kerman show same and integrated cultures from east of Fars Province to Lut Desert.

¹¹⁹ Wilkinson (2003a), p. 223.

¹²⁰ Ceramics from Tepe Yahya, south of Kerman province, display limited evidence of stylistic links with prehistoric wares of Shahdad area.

¹²¹ See Lamberg-Karlovsky (1970), Lamberg-Karlovsky and Beale (1986).

The excavations at site of Shahdad together with new excavations by author at two multi-period sites of Tepe Dehno and Tepe East Dehno within the Shahdad area have enabled secure identification of a majority of surface ceramics. However, owing to the scanty of excavations that have been carried out in the area of South East Iran over the last 45 years, there remains substantial dubiousness about the chronological subdivisions of the various cultural prehistoric periods.

In the current research, I present an updated chronology for the Chalcolithic period and Bronze Age of Kerman area based on the absolute C14 radiocarbon dates which come from new excavations at Tepe Dehno and Tepe East Dehno. Furthermore, a regional-based new periodization for the prehistory of Kerman area is proposed that is able to contain all other periodizations. I have used both the local terminology and the common technology-based terminology of Neolithic, Chalcolithic and Bronze Age (see, chapter 5).

2.3.6. The Prehistoric and Protohistoric Sites

Recent reconnaissance survey along the west of the Lut led to identifying eighty-seven ancient sites the earliest dates to the fifth millennium BC the latest to the late Islamic period. Of the recorded sites, twenty-three are assigned to prehistoric times (Fig 39). In regard to the number of the prehistoric sites, it must be mentioned that there are three large sites (Shahdad, Keshit, and Mokhtarabad) that each of those include many mounds which are collectively considered as one large site.

In attempting to move toward a definition, in this study, the term "Site" does not refer only to the habitation sites. It could also contain the workshops and the other indications of past human activities. The term "Hill-Top Settlement" was applied to those sites that have been founded on the top of *Kaluts*/ natural hills. We also applied the term "Urban Center" to those 3rd millennium B.C. large and densely populated sites that are over 50 hectares. In the following, I will present a detailed description of all twenty-three identified prehistoric sites and their modern environmental context that they are formed in. In addition, the surface ceramic assemblage of each site will be presented. Finally, their relative chronology is presented based on the collected ceramics.

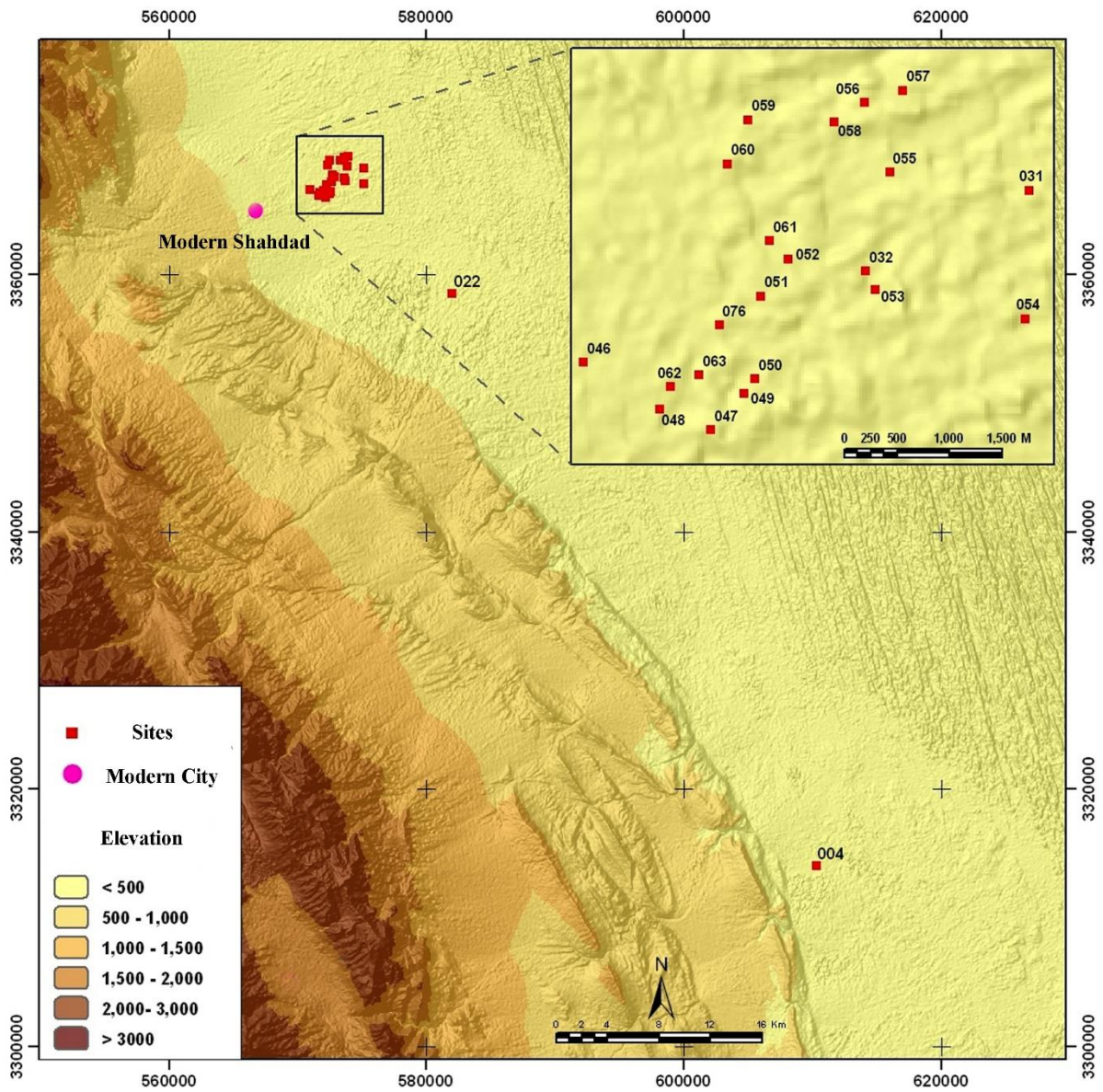


Fig 39: Distribution pattern of all the studied sites (5th-2nd Millennium BC) on the western edge of the Lut Desert.

Site Name: Shd 022 (Mokhtarabad)	Dimensions
Geographical Coordinates: 40R0574932-3367820	Length: 1000 m
Periods: 4 th & 3rd Millennium B.C	Width: 700 m
Subsequent Occupation: No	Area: ca. 70 ha

Modern Environmental Context: The site of Mokhtarabad is situated 15 km to the south of modern Shahdad roughly near the center of the western edge of Dasht-e Lut. The site was formed on the northern bank of a river that originated from western mountains, Andohjerd area. The current bed of the river is directly adjacent to the southern part of the site. Morphologically, it seems that the site is like the site of Shahdad. Both of them were founded on the geological platforms of Lut which were raised by tectonic activities. The difference is there is no *Kalut*/natural hill on which Mokhtarabad has been formed.

General Description and Remarks: It located 1 km to the west of modern village of Mokhtarabad and also covered extensively with sand. Dispersal of surface materials suggests that the site was approximately 70 ha (Fig 40). Scattered ceramics were found across the surface of the site, and are particularly dense in the western part of the site. The dense and contiguous scatter of surface materials shows that mostly probably the site was occupied across the full extent of the scatter (Fig 41). Except less than 3 ha in eastern part, the site has been occupied in 3rd millennium B.C. There are several mounds across the site, especially in western part, which stand several meters higher than their surroundings suggesting the presence of architectural remains. By doing an intensive surface walking survey, we could identify a cemetery in the southeastern part of the site. In fact, because of the wind erosion some of burials are visible on the surface. The exposure of the graves on the surface, which would have originally been at least one or two meters below the level of the site, indicate that there has been extensive deflation of cultural deposits due to extreme wind erosion (Fig 42). Generally, we can say this urban center is a smaller version of two other large EBA sites of Shahdad and Keshit that is placed between them.

Chronology: The collected ceramics indicate that the site can be assigned to the fourth (Aliabad Culture) and third millennia BC; there is no evidence for subsequent occupation.

Site: Shd 031

Dimensions:

Geographical Coordinates: 40R0568208-3376910

Periods: 4th and 3rd Millennium B.C **Area:** less than 3 ha in prehistoric times

Subsequent Occupation: Islamic Period

Modern Environmental Context: From a geomorphological point of view, this site is located at the base of Shahdad alluvial fan. The same condition can be observed in the other Shahdad prehistoric sites but there is a difference in its formation. The other sites were founded on *Kaluts*/natural hills while the mentioned site was not founded on a high natural hill. It can be the reason why it is buried under sand. Derakhtangan River is situated at a distance of 5 km to the north of the site and Konaran stream at a distance of 4 km to the south. It seems that it was probably a long distance to access water for the inhabitants of the settlement. Some distributaries of Shahdad River also reached Shahdad plain and flew near this site through the streams passing to the east. The existing Qanats passing through the site belong to later periods and do not coincide with this settlement.

General Description and Remarks: The settlement is located at 6.5 km east of the modern Shahdad and 5.5 km from Cemetery A of Shahdad site. The site has no height and it is covered by sand which makes it impossible to estimate its real dimension. In addition, it was also inhabited during Islamic period which makes it hard to determine its real extent during the prehistoric periods. Islamic pottery distribution can be observed in an area of 400 by 400 meters. There are only small amounts of prehistoric sherds on the surface around Qanats which prove they were uncovered during digging wells. Prehistoric potteries are scattered in an area of less than 3 hectares. The fact that this site was covered by the sand shows that there is a possible chance of existence of other prehistoric settlements in Shahdad plain buried by sand which cannot be observed by surface survey.

Chronology:

Based on the surface ceramics, the site can be related to the fourth and third millennium BC.

Site: Shd 032 (Tepe East Dehno)

Dimensions:

Geographical Coordinates: 40R0567540-3376910

Length: 250 m

Periods: 5th, 4th & 3rd millennium B.C

Width: 180 m

Subsequent Occupation: No

Area: ca. 4.5 ha

Modern Environmental Context: The site was formed on top of a *Kalut*/natural hill at the base of the alluvial fan of Shahdad. It is where all the prehistoric sites of Shahdad plain have been founded on a geological platform that seems to be geologically part of the Lut. Derakhtangan River is situated at a distance of 5 km to the north of the site and Konaran stream is located 3 km to the south. The natural canals branching of Shahdad River flow from both northern and southern side of the site with east-west direction. There is a strong probability that in the past these canals provided water to this site's inhabitants.

General Description and Remarks: The settlement lies 5 km east of the modern Shahdad and 3 km from Cemetery A of Shahdad site. Tepe East Dehno is a multi-period site rising eight meters above the level of surrounding land.

The site was already recorded as unit 02 in the 1977 short survey of Italian mission. Some limited excavation was carried out by the author at the site in 2013 (see next chapter). Excavations at Tepe East Dehno proved that the site is a hill-top settlement and contains less than half a meter accumulation of cultural deposit¹²². Excavations at this site led to uncovering Iblis I period occupation.

Chronology:

This site presents occupations from early 5th to 3rd millennium BC.

¹²² Eskandari (2017).

Site: Shd 046 (Site of Shahdad)

Dimensions:

Geographical Coordinates: 40R0565045-3378059

Length: 1900 m

Periods: 3rd & 2nd Millennium B.C

Width: 1600 m Max, 800 Min.

Subsequent Occupation: No

Area: ca. 170 ha

Modern Environmental Context: In term of natural landscape, site of Shahdad is unique not only in Southeastern Iran archaeology but also in the Iranian Plateau because of its proximity to Lut Desert. The site of Shahdad is located at the base of alluvial fan of Shahdad where it was in antiquity surrounded by the Shahdad River and a number of streams flowing east from their origin in the western mountains. This site like other prehistoric sites of the plain was founded on a geological platform of Lut. This platform seems to be a part of Lut Desert which is different from the other lands of the Shahdad plain. The soil of this area is silt and it is suitable for agriculture.

In terms of irrigational system, it seems that the site of Shahdad was irrigated by the surface water of Shahdad River streams. As the characteristic of alluvial fans, the water spreads on the surface by reaching the base of fan. Thus, it is easier to control the surface water. Therefore, it seems that the Shahdad River flowing east from its origin in the apex of the fan and before the site of Shahdad spread into several streams. These watercourses passed directly through Shahdad site eastward.

General Description and Remarks: The site of Shahdad is over 170 hectares (see part II, chapter II). Its length with north-south orientation is about 1900 m and its east-west width in the northern part is 1600 m and in the southern part is 800 m. The main ceramic of the site contain the plain red potteries (Figs 43-45) which are different from those recovered from other main EBA sites of SE Iran.

Chronology:

The site mainly belongs to mid to the end of third millennium BC (for chronology of the site see part II, chapter II). Also small part of site was related to the first half of the second millennium BC.

Site: Shd 047

Dimensions:

Geographical Coordinates: 40R0563999-3370597

Length: 200 m

Periods: 3rd millennium B.C

Width: 150 m

Subsequent Occupation: No

Area: ca. 3 ha

Modern Environmental Context: This site is located at the base of alluvial fan of Shahdad. It is located on a *Kalut*/natural hill rising 3 meters above the level of the surrounding land. The natural hill where the settlement has been founded is surrounded by several small isolated Kaluts. Two Qanats exist in both side of the site in east-west direction. However, they belong to later periods and do not coincide with the settlement. Konaran stream is situated 3 km to the south of the site. A stream of Shahdad River passes directly from southern side of the site with east-west direction. It seems that in the past these streams of Shahdad River highly probable provided water to the inhabitants of this site.

General Description and Remarks: Site Shd 047 lies a kilometer to the east of the cemetery A of Shahdad site. This single period site is a hill-top settlement and the thickness of its cultural deposit seems to be less than a meter like other prehistoric sites of the plain. It is covered by sand and affected by extreme wind erosion.

Chronology:

According to the collected surface ceramics, this site belongs to 3rd millennium BC.

Site: Shd 048

Dimensions:

Geographical Coordinates: 40R0566653-3374896

Length: 130 m

Periods: 4th & 3rd Millennium B.C

Width: 80 m

Subsequent Occupation: No

Area: ca. 1 ha

Modern Environmental Context: Morphologically, this settlement like the other prehistoric sites of Shahdad plain is located at the base of alluvial fan of Shahdad. It is located on top of a *Kalut*/ natural hill with an altitude of 5 meters above the level of the

surrounding land. This natural hill on which the settlement has formed stretches from north to south and is surrounded by small isolated Kaluts.

In term of irrigational system, the canals branching of Shahdad River flow from both northern and southern sides of the site with east-west direction. There is a strong probability that in the past these canals provided water to this settlement's inhabitants. The existing Qanats near the site belong to later periods and do not coincide with the settlement.

General Description and Remarks: This small site with size of around a hectare is a hill-top settlement. It was founded on the top of *Kalut* and is covered by sand. It seems that the site is affected by the wind erosion caused to leaving less than a meter thick of cultural deposit. Although the site contains two different periods, it seems that the main occupation belongs to 3rd millennium BC.

Chronology:

This small site can be assigned to 4th and 3rd millennium BC.

Site: Shd 049

Dimensions:

Geographical Coordinates: 40R0566384-3374273

Length: 60 m

Periods: 5th Millennium B.C

Width: 50 m

Subsequent Occupation: No

Area: ca. 0.3 ha

Modern Environmental Context: This site is located at the base of alluvial fan of Shahdad. Like the other prehistoric sites of Shahdad plain, this settlement was founded on top of a *Kalut*/natural hill, rising 4 meters above the ground level. Konaran stream is situated 2.5 km to the south of the site.

In terms of irrigational system, a stream of Shahdad River passes near the site with east-west direction. There is a strong probability that in the past these canals provided water to this settlement's inhabitants.

General Description and Remarks: This site is located to the east of the site of the Shahdad at a distance of a kilometer and half to the east of the cemetery A of Shahdad site. This single period site is a hill-top settlement and very small in size. It is affected by extreme wind erosion and like the other prehistoric hill-top settlements of the region contains a minimal thick of cultural deposit.

Chronology:

This very small site presents an occupation from 5th millennium BC.

Site: Shd 050

Dimensions:

Geographical Coordinates: 40R0564160-3373399

Length: 50 m

Periods: 5th & 4th Millennium B.C

Width: 50 m

Subsequent Occupation: No

Area: ca. 0.2.5 ha

Modern Environmental Context: This site was founded on the base of alluvial fan of Shahdad. It is placed on top of a *Kalut*/natural hill which stands around 2.5 meters above the level of the surrounding land. In terms of irrigational system, a stream of Shahdad River flows from directly near of the site with east-west direction. It seems that in the past these streams of Shahdad River probably provided water to the inhabitants of the site.

General Description and Remarks: The settlement lies to the east of the site of Shahdad at a distance of 1600 m to the east of the cemetery A of Shahdad site. This site is a hill-top settlement. It seems that the site like the other prehistoric sites of the plain is affected by extreme wind erosion and contains a minimal thick of cultural deposit. The lithic appeared to be scattered on the surface of the site in high density.

Chronology:

Based on the collected ceramics, the site belongs to 5th and 4th millennium BC.

Site: Shd 051 (Tepe Dehno)

Dimensions:

Geographical Coordinates: 40R0565095-3374726

Length: 700 m

Periods: 5th, 4th and early 3rd Millennium B.C

Width: 300 m

Subsequent Occupation: No

Area: ca. 21 ha

Modern Environmental Context: The site of Tepe Dehno stands roughly near the center of Shahdad plain where the distance between *Kerman Mountains* and the Lut desert faces its most width. From a geomorphological point of view, the site was founded on the base of the alluvial fan of Shahdad. Derakhtangan River is situated at a distance of 5 km to the north of the site and Konaran stream is located 3 km to the south.

A stream of Shahdad River flows from both northern and southern side of the site with east-west direction. There is a strong probability that in the past these streams provided water to this site's inhabitants.

General Description and Remarks: Tepe Dehno is a large site at 4 km east from modern city of Shahdad. It is a large mound, surrounded by several small isolated mounds. It was founded on the top of a *Kalut*/natural hill about 21 hectare in extent and rising 8 m above the level of surrounding land¹²³. This site located at a kilometer east of the excavated urban site of Shahdad was already reported by Ali Hakemi and recorded as unit 04 in the 1977 short survey of Italian mission. The site was excavated by author in 2013 (see next chapter). Excavations at Tepe East Dehno showed that the site is a hill-top settlement and contains less than half a meter accumulation of cultural deposit.

Chronology:

Excavations brought to light that the site was occupied from early fifth to early third millennia B.C.

¹²³ Eskandari (2017).

Site: Shd 052

Dimensions:

Geographical Coordinates: 40R0566115-3375048

Length: 110 m

Periods: 5th, 4th and 3rd Millennium B.C

Width: 60 m

Subsequent Occupation: No

Area: ca. 0.6.5 ha

Modern Environmental Context: This site is located at the base of alluvial fan of Shahdad. It was formed on top of a *Kalut*/ natural hill. Konaran watercourse and Derakhtangan River are respectively situated at 3.5 km to the south and 4.5 km to the north of the site. The natural canals branching of Shahdad River flow from both northern and southern side of the site with east-west direction. There is a strong probability that in the past these canals provided water to this site's inhabitants. The existing Qanats near the site belong to later periods and do not coincide with this settlement.

General Description and Remarks: This hill-top settlement lies 4.5 km east of the modern Shahdad and 2.2 km to the northeast of Cemetery A of Shahdad site. It's located approximately 200 meters to the northeast of Tepe Dehno. The Kalut on which the settlement was formed is with an extent of less than a hectare. It is composed of two contiguous mounds, the southern with six m height and the northern mound is rising four m above ground level. The site was already recorded as unit 03 in the 1977 short survey of Italian mission.

Of greater importance is that this hill-top site, despite its small size, was occupied from 5th into 3rd millennia B.C. What we can understand from analysis of Shahdad prehistoric human's behavior patterns in site choosing, is that they chose *Kaluts*/ natural hills for establishment of settlement because of their height. In fact, it was an environmental adaptation in response to flash floods of Shahdad alluvial fan. In addition, the long duration of occupation on top of this small Kalut shows the lack of enough space for establishment of settlements in Shahdad plain.

Chronology:

This small hill hosted occupations from 5th to 3rd millennium BC.

Site: Shd 053

Dimensions:

Geographical Coordinates: 40R0565095-3375048

Length: 100 m

Periods: 5th Millennium B.C

Width: 50 m

Subsequent Occupation: No

Area: ca. 0.5 ha

Modern Environmental Context: From a geomorphological point of view, this site as the other Shahdad prehistoric sites, is located at the base of alluvial fan of Shahdad. It was founded on top of a *Kalut*/ natural hill with an altitude of two meters above ground level. Konaran watercourse is situated at 2.5 km to the south of the site. One of the branches of Shahdad River passes directly adjacent to the site. It seems that in the past these streams of Shahdad River highly probable provided water to the inhabitants of this settlement.

General Description and Remarks: This site is a small hill-top settlement at 4.5 km east of the modern city of Shahdad. The settlement lies the east of the site of Shahdad at a distance of 2.8 km to the east of the cemetery A of Shahdad site. The lithic is appeared to be the only cultural material on the surface of the site. No evidence of pottery or architecture was observed on the surface. One can consider this area as a tool making workshop. Since this workshop and Tepe eastern Dehno site are very close to each other (about 150 meters), we can imagine a connection between them. In addition to the closeness of the sites, the similarity between lithic found from both surface surveys and excavations of Tepe Dehno, emphasis on this connection.

Chronology

This site is probably related to the 5th Millennium BC.

Site: Shd 054

Dimensions:

Geographical Coordinates: 40R0569829-3375857

Length: 240 m

Periods: Early 2nd Millennium B.C

Width: 130 m

Subsequent Occupation: No

Area: ca. 3 ha

Modern Environmental Context: This site is located at the base of Shahdad alluvial fan. This site and site Shd 031 are the easternmost prehistoric sites of central part of Shahdad

plain where the Kaluts are rarely observable. The mentioned sites were not founded on a high natural hill. It can be the reason why they are buried by sand. Konaran stream is situated at a distance of 2.5 km to the south of the site. A stream of Shahdad River flows near the site. The existing Qanats near the site belong to later periods and do not coincide with the settlement.

General Description and Remarks: The settlement is located at 6 km east of the modern Shahdad and 4 km to the east of Cemetery A of Shahdad site. The site has no height and it is covered by sand which makes it impossible to estimate its real dimension. The proposed site estimate is based on visible surface ceramics. One kiln with size of 2 by 1.2 m is also visible on the surface of the site. The existence of the buried sites Shd 031 and Shd 054 at eastern part of central Shahdad plain shows that there is a possible chance of existence of other prehistoric settlements in the east of Shahdad plain buried by sand which cannot be observed by surface survey.

Chronology:

This site presents an occupation relating to the early second millennium BC.

Site: Shd 055

Dimensions:

Geographical Coordinates: 40R0569829-3375857

Length: 105 m

Periods: 4th Millennium B.C

Width: 100 m

Subsequent Occupation: No

Area: ca. 1 ha

Modern Environmental Context: This site was founded on the base of alluvial fan of Shahdad. It was formed on top of a *Kalut*/natural hill which stands around 5 meters above the level of surrounding land. Derakhtangan River is situated at a distance of 4 km north of the site. It seems that in the past streams of Shahdad River highly probable provided water to the inhabitants of this site.

General Description and Remarks: The settlement lies 4.5 km to the east of the modern Shahdad at a distance of 3.6 km from cemetery A of Shahdad site to the east. This site is a

hill-top settlement which is affected by extreme wind erosion. It seems that the site like the other prehistoric sites of the plain preserve a minimal thick of cultural deposit.

Chronology:

The occupation can be assigned to the 4th millennium BC based on the collected materials.

Site: Shd 056

Dimensions:

Geographical Coordinates: 40R0565646-3375623

Periods: 5th & 4th Millennium B.C

Subsequent Occupation: No

Area: ca. 1.2 ha

Modern Environmental Context: This site is located at the base of Shahdad alluvial fan. It was founded on top of the *Kalut* with an altitude of 5 meters above ground level. This hill-top settlement is composed of three mounds on which settlements were formed. Derakhtangan River is situated at a distance of 3.5 km north of the site. One of the branches of Shahdad River flowing from the upper part of modern Shahdad city to the east, passes at a distance of 200 m from this site.

General Description and Remarks: The settlement is located at 5.5 km east of the modern Shahdad and 3.7 km to the northeast of cemetery A of Shahdad site. As it was said before, this site is composed of three hills. The main hill's extent is 100 by 70 m, the smaller hill with an extent of 60 by 45 m is situated at 50 m to the north and the last one with a size of 55 by 40 m is at 70 m to the northeast of the main hill. The space between these mentioned mounds is filled by sand, so it is hard to tell if those areas were inhabited or not. This hill-top settlement is affected by extreme wind erosion. It seems that like other prehistoric sites of the district its cultural deposit does not reach to a meter. The presence of pottery kilns on the surface of the site together with deformed sherds related to the Chalcolithic period, can suggest the function of pottery production for this site.

Chronology: The surface materials suggest that it belongs to 5th and 4th millennium BC.

Site: Shd 057

Dimensions:

Geographical Coordinates: 40R0565224-3376648

Length: 70 m

Periods: 5th & 4th Millennium B.C

Width: 45 m

Subsequent Occupation: No

Area: ca. 0.3 ha

Modern Environmental Context: This site like the other prehistoric sites of Shahdad plain was founded on the base of alluvial fan of Shahdad. It was formed on top of a *Kalut*/natural hill which is rising around 2.5 meters above the ground level. Derakhtangan River is situated at a distance of 3.5 km north of the site. A stream of Shahdad River flows directly from near of the site with east-west direction. It seems that in the past these streams highly probable provided water to the inhabitants of the site.

General Description and Remarks: The settlement lies 6 km to the east of the modern Shahdad at a distance of 4.2 km from cemetery A of Shahdad site to the northeast. This site is a very small hill-top settlement. A pottery kiln with size of 2 by 1.3 m is visible on the surface of the site testifying the pottery production in this site. Lithic is scattered on the surface in considerable quantity. It seems that the site is affected by extreme wind erosion. It also recognizable that this hill-top settlement preserves a minimal thick of cultural deposit.

Chronology:

Based on the collected ceramics, this small site presents occupations related to 5th and 4th millennium BC.

Site: Shd 058

Dimensions:

Geographical Coordinates: 40R0566408-3376036

Length: 120 m

Periods: 5th Millennium B.C

Width: 100 m

Subsequent Occupation: No

Area: ca. 1.2 ha

Modern Environmental Context: This site is located at the base of alluvial fan of Shahdad. It was formed on top of a *Kalut*/ natural hill rising 5 meters above the level of

surrounding land. Current Derakhtangan River is situated at 3.5 km to the north of the site. There is a strong probability that in the past the streams of Shahdad river provided water to this site's inhabitants. The existing Qanats near the site belong to later periods and do not coincide with this settlement.

General Description and Remarks: This hill-top settlement lies 5.2 km east of the modern Shahdad and 3.5 m to the northeast of Cemetery A of Shahdad site. The surrounding lands around the *Kalut* on which the settlement was formed are covered by sand. Hence, it is difficult to recognize that this settlement has been extended to nearby or not. Besides pottery, the lithic is appeared to be scattered on the surface in considerable quantity. The existence of industrial production evidence on surface such as pottery kiln, slags, over fired ceramics together with deformed ceramics testify the production of pottery in this site. This site also is affected by extreme wind erosion. It seems that the cultural deposit does not reach a meter in this hill-top settlement.

Chronology:

Based on the surface materials, the site can be assigned to the 5th millennium BC.

Site: Shd 059

Dimensions:

Geographical Coordinates: 40R0565743-3376857

Length: 90 m

Periods: 5th Millennium B.C

Width: 55 m

Subsequent Occupation: No

Area: ca. 0.5 ha

Modern Environmental Context: This site is located at the base of Shahdad alluvial fan like the other prehistoric sites of Shahdad plain. It was founded on top of a *Kalut* with an altitude of 7 meters above the ground level (Fig 46). Current bed of Derakhtangan River is situated at a distance of 3.5 km north of the site. The branches of Shahdad River flowing from the upper part of modern Shahdad city to the east, pass near this site.

General Description and Remarks: The settlement is located at 4.5 km east of the modern Shahdad and 3.1 km to the northeast of cemetery A of Shahdad site. This hill-top settlement is affected by extreme wind erosion. It is recognizable through the

eroded surface potsherds. It seems that like other prehistoric sites of the district it preserves a minimal thick of cultural deposit. Apart from pottery, lithic and fragments of marble vessels are observable on the surface of the site.

Chronology:

This small mound is a single period site relating to the fifth millennium BC.

Site: Shd 060

Dimensions:

Geographical Coordinates: 40R0567062-3376132

Length: 110 m

Periods: 5th & 4th Millennium B.C

Width: 90 m

Subsequent Occupation: No

Area: ca. 1 ha

Modern Environmental Context: This site like the other prehistoric sites of Shahdad plain was founded on the base of alluvial fan of Shahdad. It was formed on top of a *Kalut/* natural hill rising around 4 meters above the ground level. Derakhtangan River is situated at a distance of 3.5 km north of the site. In terms of irrigational system, a stream of Shahdad River flows from near of the site with east-west direction. It seems that in the past these streams of Shahdad River highly probable provided water to the inhabitants of the site.

General Description and Remarks: The settlement lies 4.2 km to the east of the modern Shahdad at a distance of 2.7 km from cemetery A of Shahdad site to the northeast. This site is a hill-top settlement. It seems that it is affected by extreme wind erosion. It is also recognizable that it preserves a minimal thick of cultural deposit.

Chronology:

This site can be related to the 5th and 4th millennium BC based on the surface ceramics.

Site: Shd 061

Dimensions:

Geographical Coordinates: 40R0566837-3375375

Length: 70 m

Periods: 5th, 4th & 3rd Millennium B.C

Width: 45 m

Subsequent Occupation: No

Area: ca. 0.3 ha

Modern Environmental Context: Shd 061 is located at the base of alluvial fan of Shahdad. It was founded on top of a very small Kalut. Derakhtangan River is situated at 6.4 km north of the site. A water stream flowing from upper side of Shd 56-60 sites, also passes at a distance of 1.3 km to the settlement.

General Description and Remarks: The settlement is located 4/3 km to the east of the modern Shahdad at a distance of 2.3 km from cemetery A of Shahdad site to the northeast. The Kalut on which the settlement was formed is composed of two contiguous mounds with an altitude of 4/6 meters above the ground level (Fig 47). It is very small and is situated close to Tepe Dehno and eastern Dehno. Shd 061 has the same periods as these two mentioned sites. This site, despite its small size (about 0.3 ha), was occupied from fifth to third millennium BC. The fact that such small mounds were being used for three millennia show the importance of living on top of the hills. Despite the three occupational sequence on top of this small hill it seems that it preserves a minimal thick of cultural deposit. This deflation shows that the prehistoric sites of the region are affected by extreme wind erosion.

Chronology: This small site was occupied from 5th to 3rd millennium BC.

Site: Shd 062

Dimensions:

Geographical Coordinates: 40R0563710-3373544

Periods: 5th & 4th Millennium B.C

Subsequent Occupation: No

Area: ca. 1.5 ha

Modern Environmental Context: This site is located at the base of Shahdad alluvial fan. It was founded on top of the Kaluts with an altitude of 5 meters above ground level. This hill-top settlement is composed of four adjacent mounds on which settlements were formed. Konaran stream is situated at a distance of 2.5 km south

of the site. The branches of Shahdad River flowing through Shahdad site to the east, pass near this site.

General Description and Remarks: The settlement is located at 2.6 km east of the modern Shahdad. It is situated east of the southern part of Shahdad site (Shd 046) at a distance of 670 m from cemetery A to the east. This settlement is the westernmost Chalcolithic site in Shahdad plain. This hill-top settlement is composed of four mounds which they all together present a size around 1.5 hectare. Each of these four mounds stands around three and four meters above ground level with a size less than half a hectare. The spaces between these mentioned hills are filled by sand, so it is hard to tell if those areas were inhabited or not. This hill-top settlement is affected by extreme wind erosion. It seems that like other prehistoric sites of the district its cultural deposit does not reach a meter. A chain of Qanat is exactly passing through the site. It belongs to later periods and does not coincide with the settlement.

Chronology:

Based on the collected ceramics, the site presents occupations from 5th and 4th millennium BC.

Site: Shd 063

Geographical Coordinates: 40R0566616-3373321

Periods: 3rd millennium B.C

Subsequent Occupation: No

Dimensions:

Length: 160 m

Width: 120 m

Area: ca. 2 ha

Modern Environmental Context: This site is located at the base of alluvial fan of Shahdad. It was founded on top of a *Kalut/* natural hill. The kalut on which the site was formed is with a size of 2 hectares rising 3 m above the ground level. Konaran stream is situated 2.5 km to the south of the site. A stream of Shahdad River flows near the site with east-west direction. It seems that in the past these streams of Shahdad River highly probable provided water to the inhabitants of this site.

General Description and Remarks: Site Shd 063 lies 3 km to the east of the modern Shahdad and at a distance of a kilometer from cemetery A of Shahdad site to the east. This single period site is a hill-top settlement. It is affected by extreme wind erosion. Its cultural deposit seems to be less than a meter like other prehistoric sites of the district. A stone architectural complex is visible on the surface of the site.

Chronology:

This site can be dated to the third millennium BC based on the surface materials.

Site: Shd 075

Dimensions:

Geographical Coordinates: 40R0566616-3373321

Length: 85 m

Periods: 4th 3rd Millennium B.C

Width: 60 m

Subsequent Occupation: No

Area: ca. 0.5 ha

Modern Environmental Context: From a geomorphological point of view, this site as the other Shahdad prehistoric sites, is located at the base of alluvial fan of Shahdad. It was founded on top of a *Kalut*/ natural hill. The natural hill on which the settlement was formed, is with a size of 0.5 hectare rising 4 m above the level of surrounding land. Konaran watercourse is situated at 2.5 km to the south of the site. The branches of Shahdad River pass near the site. It seems that in the past these streams of Shahdad River highly probable provided water to this settlement. The existing Qanats near the site belong to later periods and do not coincide with this settlement.

General Description and Remarks: This site is not a habitation settlement. It is considered as an industrial workshop. The site surface is covered by copper slags. There are also some kilns on the surface of the site. This industrial workshop is situated at 200 m to the southwest of Tepe Dehno (Shd 051) and at 400 m to the east of Shahdad site (Shd 046). The industrial area of Shahdad site known as Operation D¹²⁴, which is previously excavated by Hakemi, is situated at 800 m to the west of this site.

¹²⁴ Hakemi (1997).

Chronology:

It is difficult to determine the exact date of this industrial workshop; it could relate to the 4th millennium BC or to the 3rd millennium BC or even to both periods. Considering the short distance between Dehno (which was a huge 4th millennium settlement site) and this workshop, there is a possibility of using this area as a workshop of Dehno in the 4th millennium B.C.

The presence of Shahdad site at 400 m to the west of this site and also the existence of early 3rd millennium occupation at Tepe Dehno, could also suggest the use of this industrial area during the 3rd millennium BC.

Site: Gbf 004 (Keshit)

Dimensions:

Geographical Coordinates: 40R0615773-3309630

Length: 1600 m (N-S)

Periods: 4th & 3rd Millennium B.C

Width: 1300 m (W-E)

Subsequent Occupation: No

Area: ca. 200 ha

Modern Environmental Context: The site of Keshit is located 65 km to the south of modern city of Shahdad. It is situated on southwest of the Dasht-e Lut where the distance between the western mountains and Lut is in its minimal width. It is located at a distance of 4 km to Lut Desert to the east and 2.5 km to mountains to the west.

From a morphological point of view, it seems that this site is comparable to the Shahdad and Mokhtarabad sites. All of these mentioned large sites were founded on the geological platforms of Dasht-e Lut which were raised by tectonic activities. These platforms on which the site are formed are higher than the surrounding lands on the west of Lut Desert. Unlike the Shahdad site, there is no *Kalut* on which Keshit was formed.

In terms of irrigational system, today there are two mainstreams to north and south of the site, respectively, 2.5 and 4.5 km which originated in the western mountains and after passing the narrow width of the plain ended in the Lut desert. Moreover, there are some smaller sources that originated in the western mountains and exactly pass through the site.

General Description and Remarks: The site named after the village of Keshit (the nearest one) which lies about 10 km to the south of site. Due to the proximity of Keshit to the desert of Lut, it is covered with sand. Preliminary surface survey shows that it was a large site of around c. 200ha¹²⁵. Archaeological materials, predominantly pottery sherds are scattered across the surface of the site at high densities (Fig 48, 49). Based on the ceramic typologies, the site can be attributed to the fourth and third millennia BC. There is no evidence for subsequent occupation.

Based on surface materials, the main occupation of the site belong to 3rd millennium BC, only less than 5 ha seems to be attributed to 4th millennium BC. Based on the dense and contiguous scatter of surface materials it seems that the site was occupied during the Early Bronze Age.

Pottery is the most abundant find, but other surface materials at the site include fragments of marble vessels, bronze objects, lithic tools and semi-precious stones such as agate. In the north-western part of the site, slags and, kilns pottery wasters collected from the surface may indicate the location of the industrial quarter of the site (Fig 50). More generally, there are many mounds across the site standing several meters higher than their surroundings that probably preserve architectural remains.

Keshit appears to be similar to Shahdad, the other Early Bronze Age site on the western fringes of the Lut Desert. Further fieldwork programs will investigate the overall city layout. Overall, it seems that the site of Keshit was a large 3rd millennium BC center in southwestern part of Lut Desert¹²⁶.

Chronology:

The collected potteries are comparable to that from Shahdad and Tal-i Iblis (Fig 51). The collected ceramics indicate that the site can be assigned to the fourth and third millennia BC. There is no evidence for subsequent occupation.

¹²⁵ Eskandari (2019).

¹²⁶ Eskandari *et al.* (2014).

2.2.7. Summary

Extensive archaeological surveys on the west edge of the Lut Desert led to identifying 87 ancient sites. Of the recorded sites, twenty-three belong to the prehistoric and protohistoric times (Chalcolithic era and Bronze Age) (Table 7). In regard to the number of the sites, It must be mentioned that each of the three large sites of the Lut area (Shd 46, Shd 22 and Gbf 04) are composed of many mounds which are collectively considered as one large site.

The sites measure from between 0.2 ha up to around 200 ha. Except the above-mentioned three large sites, other occupations appear to have been located on natural hills where it wasn't difficult to determine their extent. Functionally, sites tend to fall within two types: habitation settlements (21 sites) or workshops (2 sites).

Chronologically, 13 sites belong to fifth millennium BC and 15 sites can be assigned to the fourth millennium BC. Also, 12 sites are dated to the third millennium BC and only 2 sites are from second millennium BC. Most of the sites appear to be multi-component settlements. In term of spatial distribution, twenty-one sites have been located at the base of the alluvial fan of Shahdad in the central part of Dasht-e Lut.

Table 7: The identified prehistoric and protohistoric sites of Dasht-e Lut (provided by author)

No.	Site	Size (ha)	Period (BC)			
			5 th Mil.	4 th Mil.	3 rd Mil.	2 nd Mil.
1	Shd 022	70		*	*	
2	Shd 031	3		*	*	
3	Shd 032	4.5	*	*	*	
4	Shd 046 Shahdad	170		*	*	

Chap.3: Archaeological Survey on Dasht-e Lut

5	Shd 047	3			*	
6	Shd 048	1		*	*	
7	Shd 049	0.3	*			
8	Shd 050	0.2,5	*	*		
9	Shd 051 Tepe Dehno	21	*	*	*	
10	Shd 052	0.6,5	*	*	*	
11	Shd 053	0.5	*			
12	Shd 054	3				*
13	Shd 055	1		*		
14	Shd 056	1.2	*	*		
15	Shd 057	0.3	*	*		
16	Shd 058	1.2	*			
17	Shd 059	0.5	*			
18	Shd 060	1	*	*		
19	Shd 061	0.3	*	*	*	
20	Shd 062	1.5	*	*		
21	Shd 063	2			*	
22	Shd 076	0.5		*	*	
23	Gbf 004	200		*	*	

Chapter IV: Excavations at the Prehistoric Sites of Dehno and East Dehno, Shahdad Plain

2.4.1. Introduction

The second season of recent project in the Dasht-e Lut included stratigraphic excavations of the prehistoric multi-period sites of Tepe Dehno (Shd 051) and Tepe East Dehno (Shd 032). Both of these sites are located to the east of the excavated urban center of Shahdad in Shahdad plain (Fig 52). In spite of the fact that twelve seasons of fieldwork have already been carried out in Shahdad plain, the periods preceding Bronze Age have not yet been investigated. However, although a chronological range spanning the 5th or 4th to the early to mid-2nd millennia B.C was proposed¹²⁷ for Shahdad plain, there is no stratified occupational sequence or absolute chronology for these prehistoric periods.

The goal of the current work in Dasht-e Lut was to address this lack of evidence for the early periods. The main aims for the excavations were:

- to determine the cultural sequence of the Shahdad plain, in particular the periods before the Bronze Age,
- to evaluate the reliability of the survey samples and to provide a controlled chronological sequence into which previously unidentified pottery could be dated,
- to provide concrete absolute dates for the material through a comprehensive program of radiocarbon analyses of well stratified samples,
- to explore the transition from Late Chalcolithic to Early Bronze Age
- to explore the roots of Early Bronze Age urbanism of Lut area by excavating Tepe Dehno as a large regional center that was occupied from the late fifth into the third millennia B.C.

¹²⁷ Salvatori & Vidale (1982), p. 7, Hakemi (1977).

The excavation campaign at Tepe Dehno together with work at Tepe East Dehno began in January and continued until the middle of March 2013. Excavations at Tepe Dehno were conducted in four stratigraphic (c. 3×3 m) trenches across the site: Trench I was opened on the eastern part of the site on the top of the highest terrace. Trench II was located on the center of the site. The western part of the site where the Early Bronze Age red wares dominated was selected for the place of Trench III.

Before beginning the excavation, we hypothesized that the site of Dehno preserved at least seven meters of cultural deposits. When we excavated Trenches I-III we found out that the site was a hill-top settlement that contains less than one meter thickness of cultural deposit. In light of this fact, we opened Trench IV on the eastern part of the site on a depression that was surrounded by piles. Indeed, we thought this part of the site had probably preserved deeper cultural deposits because the surrounding mounds had protected it against the extreme wind erosion that has been the main reason of such deflation.

Although excavations at Tepe Dehno provided a sequence of occupations from late fifth to early third millennia BC, the earliest periods (early-mid 5th millennium B.C) of the district is not represented at the site. Hence, in addressing the main aim of our excavations, to determine the complete cultural sequence of the prehistoric period of the region, a site identified as East Tepe Dehno (located 700 m east of Tepe Dehno) was also excavated.

Although East Tepe Dehno is a multiple period site that was occupied as early as 5th millennium into 3rd millennium B.C. only one stratigraphic 3×3 m trench was opened, on the west slope part of the site. We placed the trench here because it appeared from surface finds to preserve in situ the fifth millennium B.C occupation. In total, this fieldwork agenda brought to light valuable information to establish a chronological framework for the Shahdad region beginning as early as early fifth and extending down into the early third millennium B.C.

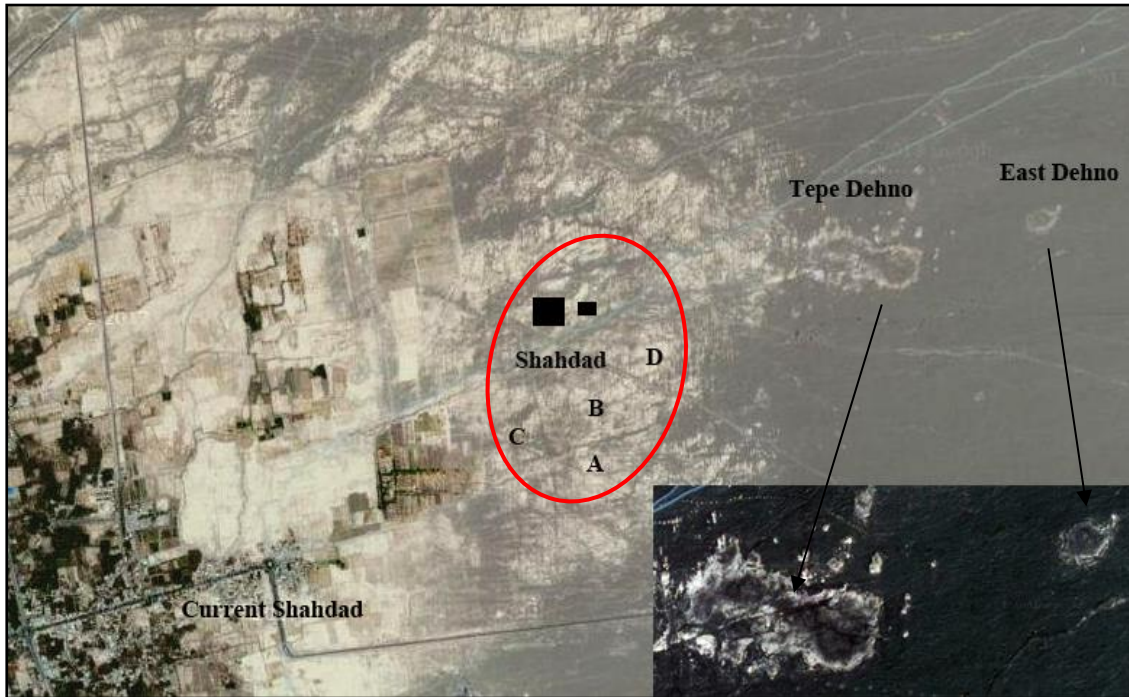


Fig 52: The location of two excavated sites to the east of urban center of Shahdad

2.4.2. Methodology

As the first step in our fieldwork, we conducted an intensive surface survey and collected the diagnostic ceramics found on the mound of Tepe Dehno. The distribution of pottery sherds in different parts of the site guided us in selecting the best places for soundings. Through the surface survey, we recognized that the site covers a very large area, ca 20 ha, and that some parts of the site were occupied during different periods that could influence our strategy.

Placement of the trenches were determined by a desire to excavate the complete range of occupation and to correlate the stratigraphic sequence in recording the trenches. Finally, we excavated four trenches across the site of Dehno, Trench I and II on the fourth millennium B.C occupation, Trench III was opened on the third millennium B.C occupation and last trench IV on the earliest occupation of the site in the late fifth millennium B.C.

As part of the survey, we made a detailed topographic map of the Tepe Dehno and its surrounding isolated small hill-top settlements to show the location of excavations (fig 1). After finishing excavations at Tepe Dehno, we continued our work at Tepe East Dehno by excavating one 3 by 3 trench to complete the sequence of Shahdad district.

The system employed to record the excavated deposits was a Locus system. Each locus can be any type of accumulation, such as pit fill, a wall, collapse, floor surface, hearth, deposit, natural sediments etc. All of the recognized loci of each trench were numbered from the top down. Each locus was recorded on a separate double-sided data sheet, where the nature of deposit was characterized through a written description. All samples of each locus were collected and retained; these included radiocarbon samples, sediment for flotation, micro-morphology, special finds, pottery, bone, small finds, lithic, etc. Analysis of the pottery is perhaps the single most important aspect of find analysis, because it provides the chronological framework for further serious interpretations. All of pottery from each locus was registered so that a quantitative categorization of pottery could be developed; diagnostic sherds were selected for drawing. In all five excavated trenches at Tepe Dehno and East Dehno, we reached virgin soil. It is worth mentioning that since both sites were hill-top settlements the virgin soil was the *Kaluts/yardangs*.

2.4.3. Excavations at Tepe Dehno

2.4.3.1 The Site and its environs

Tepe Dehno (Shd 051) is a large site at 4 km east from modern city of Shahdad. It is a shallow large mound, surrounded by several small isolated mounds (Fig 53). It is founded on the top of a *Kalut*/natural hill (Fig 54). The site is approximately 20 hectare in extent and rises 8 m above the level of the surrounding land. Tepe Dehno is located at a kilometer east of the excavated urban site of Shahdad. It was recorded as unit 04 in the 1977 short survey of the Italian mission¹²⁸. The site of Tepe Dehno stands roughly near the center of Shahdad plain at the widest point in the plain flanked on the west by the *Kerman Mountains* and by

¹²⁸ Hekemi (1997), Salvatori and Tosi (1997).

the Lut desert on the east. From a geomorphological point of view, the site was founded on the base of the alluvial fan of Shahdad where thick alluvial layers are cut by wind and water erosions into *Kaluts* which were surrounded by the Shahdad River in antiquity as well as by a number of streams flowing east from their headwaters in the western mountains.

Tepe Dehno was selected for excavations for several reasons (Fig 55). First of all, based on the surface materials it was evident that Tepe Dehno was permanently settled for more than three millennia from 5th through the 3rd millennium BC and thus would preserve material culture from that long period. Secondly, on the basis of the survey evidence and theoretical considerations, we thought that Tepe Dehno was the largest fourth millennium B.C center and therefore might have served as a central place. The large site is surrounded by smaller satellite sites which perhaps fulfilled a kind of local service function. Finally, Dehno allows for the exploration of the process of transition from Late Chalcolithic to Early Bronze Age because the site contains both fourth and third millennia BC occupations based on absolute dates.

On the basis of the stratified remains exposed in the four soundings, it appears that Tepe Dehno was occupied from late fifth to early third millennia B.C. In addition, the excavations brought to light at least two new significant results: first, the impact of the desert landscape of Dasht-e Lut on the sites on the Shahdad plain which lead to the preference for hill-top settlement rather than *Tell site* in this part of Iranian plateau. Second, the severe deflation of cultural deposits at prehistoric sites of the Shahdad district was caused by extreme wind erosion.

2.4.3.2 Trench I and its Stratigraphy

Trench I was a 3 × 3 meter operation at the eastern part of the site on the highest terrace which we thought would provide the deepest depositional sequence of the site. In addition, since the pre-excavation surface survey showed a pattern of westward horizontal growth for the site, the east of the site was chosen for opening this trench in order to reach

the earliest occupations of the Tepe Dehno. This trench was excavated to a depth of approximately a meter and half. Through this excavation, eight loci were exposed that are numbered locus 1001 for the uppermost to locus 1008 for the lowest (Fig 56). In this trench no architectural remains were discovered. The main factors which allowed us to distinguish the loci were changes in the color and texture of the deposits. A total of 761 potsherds were recovered from the exposed loci of this trench (Fig 57, Table 8). The common pottery came from this trench is known as painted fine buff ware of Iblis IV, Aliabad culture.

Relative chronology, based on ceramic evidence, combined with two C14 absolute dates establish a span of mid to late fourth millennium B.C for this trench. Although some Lalehzar wares (Iblis 0) were scattered on the surface near the trench, no occupation earlier than Iblis IV was identified through excavation. Six special finds were found which included a copper awl, a fragment of copper, a miniature pottery vessel, a snail shell, a stone pounder and a door pivot stone (this discovery reveals that there was a building near the trench). Excavation of this trench revealed much about the nature of prehistoric occupations in the Lut area. Before excavation, we expected to document at least seven meters of accumulated cultural deposit at the Tepe Dehno. Our stratigraphic excavations showed that the site is a hill-top settlement that was founded on top of a Kalut and contains less than a meter deposit. The excavated deposits are described below and their stratigraphic relations are illustrated in following pages.

Locus 1001: this locus is composed of silt clay with an average thickness of 4 cm. It is the surface layer and covers the full extent of the trench. A total of 46 potsherds were brought to light from this locus. The pottery assemblage of the locus consists of the painted buff ware of Aliabad culture.

Locus 1002: this locus with an extent of 90 × 100 cm was located on the northeastern corner of the trench. It was located under the surface layer adjacent to the locus 1004 and continued to the depth of 35 cm. In fact, this locus consists of the fill of a pit which had cut into locus 1004; it consists of slit clay and small pebbles with the color of 5Y 5/1 Gray¹²⁹. A total of 59 potsherds were recovered from this locus which include the painted buff ware

¹²⁹ In this excavation, we used the Mansell Book of Soil Color Charts 2009 Rev.

of Aliabad culture. Besides pottery, some fragments of copper were retrieved from this locus.

Locus 1003: this locus is the cut (line) of a pit (locus 1002). This cut was visible in the northern and eastern sections at the northeastern corner of the trench. This locus has cut the locus 1004 and is surrounded locus 1002.

Locus 1004: this non-structural locus extended across the full extent of the trench, except in the northeastern corner of the trench which had been cut by a pit. It is composed of slit clay with a maximum thickness of 26 cm with the color of 7.5 YR 7/4 Pink. It has a thickness of 8 cm under the locus 1001 and continued to the depth of 35 cm. A total of 56 potsherds were recovered from this locus, which like the other assemblages from other loci belong to Aliabad culture.

Locus 1005: this locus is composed of an intense compact sediment with the color of YR 7/1 Light Gray with a maximum thickness of 7 cm. Although a total of 68 potsherds were retrieved from this locus, it seems to be a natural layer. This natural sediment was identified in the three other trenches of Tepe Dehno. It is probably because of a flood.

Locus 1006: this locus extended across the entire surface of the trench. It was located under the locus 1005 and composed of a compact slit clay with a high density of pebbles. It was started at the depth of 42 cm with a thickness of 43 cm. A total of 413 potsherds were found in this locus belonging to Aliabad culture. The other finds include lithic, a copper/bronze awl, a fragment of copper, a miniature pottery vessel, a snail shell, a stone pounder as well as many bones which are mostly burnt. The evidence shows that this locus could be a dump pit. One C14 absolute date shows a range of mid to late fourth millennium B.C for this locus.

Locus 1007: this is located under the locus 1006 and covers the full extent of the trench, having a thickness of 14 cm. It was situated directly on virgin soil at the depth of 99 cm. Like the loci above, it is composed of a compact slit clay with a high density of pebbles. Indeed, despite close similarities, these two loci are distinguished by two features: first, the less density of pebbles in the locus 1007 and second, there was a lens of a thin silt soil between them. A total of 119 potsherds were found from this locus which mostly of them belong to Aliabad culture. It is worth mentioning that one new type of ware- painted red

ware was found from this locus that is different from the Iblis IV ceramics (See appendix 2, fig 1). Apart from pottery, lithic and a door pivot stone were recovered from this locus. The evidence shows that this locus could be a dump pit. One C14 charcoal sample from this locus was analyzed showing a range of mid to late fourth millennium B.C date for it.

Locus 1008: this locus is the virgin soil at the Tepe Dehno. It consists of sterile very compact silt clay. In fact, it was the top of the Kalut where the site was founded. We reached the virgin soil at the depth of 99 cm and continued the excavation of the Kalut for half a meter to be sure that it was the virgin soil. We stopped excavating of this trench at the depth of a meter and half.

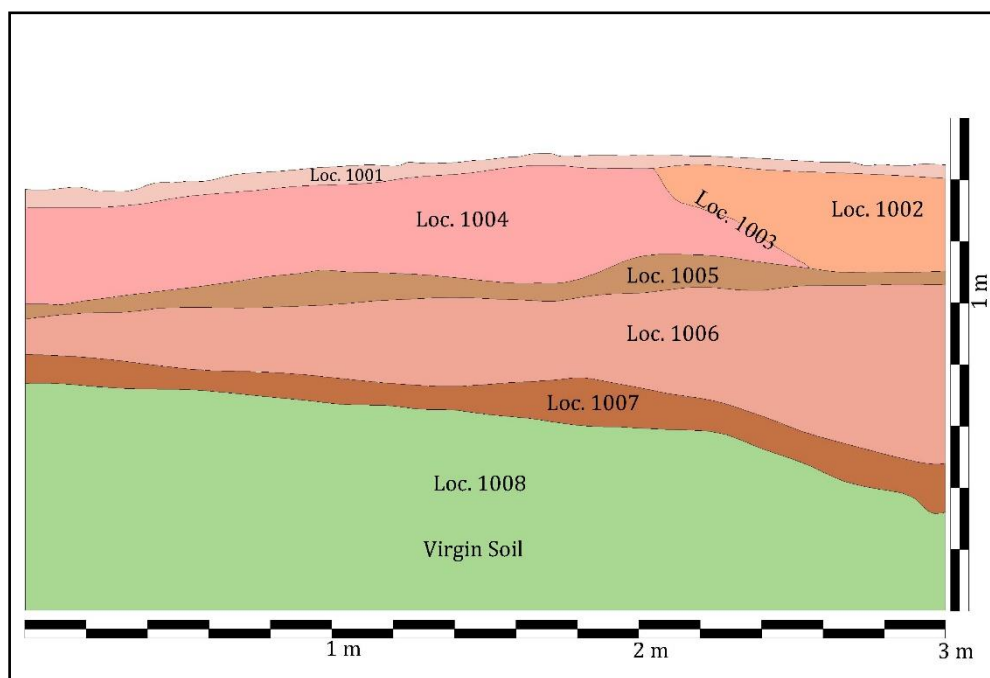


Fig 56: The Stratigraphy of Trench I, Northern Section

2.4.3.3 Trench II and its Stratigraphy

This 3 × 3 trench was located near the central part of the site. It appeared from the surface ceramics to be related to Aliabad culture (Iblis IV) occupation. Trench II was excavated to a depth of approximately 60 centimeters. The excavation showed that this part of the hill-top settlement consists of approximately half a meter of cultural deposit. In this trench, seven loci were exposed within the sounding numbered locus 2001 (surface) to locus 2007 (virgin soil). None of the exposed deposits contained any associated

structural features. The main factors that allow us to distinguish the loci are changing colors and textures of the deposits.

A total of 724 potsherds were recovered from these loci that indicate one period belonging to Aliabad culture (Fig 58, Table 9). The common pottery of this trench is the fine painted buff ware which is already well known from Aliabad site in Bardsir plain. Other finds include seven fragments of copper/bronze, a stone animal figurine, a piece of marble vessel, a snail shell, a bronze seal, a bronze pinhead and a copper/bronze awl. The excavated deposits are described below and their stratigraphic relations are illustrated as well.

Locus 2001: this locus is the surface soil and covers the full extent of the trench with an average thickness of 3 cm. A total of 150 potsherds were collected from this surface layer. Three special finds including a bronze seal with geometric design, a bronze pin head and a stone animal figurine. These finds are closely paralleled among the third millennium B.C finds from the site of Shahdad.

Locus 2002: the second locus is beneath locus 2001 and extended across the entire operation with a maximum thickness of 17 cm. This non-structural locus is composed of a silt clay with the color of 10YR 8/4 very pale brown. A total of 150 potsherds were recovered from the locus, all related to Iblis IV assemblage. Alongside pottery, a small piece of copper/bronze object and a snail shell were also identified through our excavation.

Locus 2003: this locus is under the locus 2002 and also covers the full extent of the trench with a thickness of 10 cm. It is composed of silt clay and its color is 10YR 7/2 light gray. In total, 70 potsherds were brought to light from this trench, which belong to the Aliabad culture. Another important find is a metal awl which probably is made of copper/bronze.

Locus 2004: this non-structural locus with an extent of 130 × 260 cm was located on the eastern part of the trench. It is composed of silt clay and has a maximum thickness of 9 cm with the color of 5Y 7/4 pale yellow. A total of 59 potsherds were recovered from this locus belonging to Aliabad culture.

Locus 2005: this locus is the lowest cultural layer of this trench. It was extended 3 by 3 m with a maximum thickness of 15 cm under the locus 2003 at the western part and locus

2004 at the eastern part of its extent. In fact, it surrounds locus 2004. It is composed of silt clay with the color of 10YR 8/2 very pale brown. Some pebbles were scattered at the southern part of the locus. A total of 119 potsherds were brought to light from this layer which like the other loci of this trench are belonging to Aliabad culture.

Locus 2006: this locus is composed of an intense compact sediment with the color of YR 7/1 Light Gray with an average thickness of 5 cm. This natural layer covers the full extent of the trench and is just above the virgin soil. This natural sediment was identified in the three other trenches of Dehno and has been interpreted as residue from a flash flood.

Locus 2007: this locus is the virgin soil at the Tepe Dehno. It is composed of a sterile very compact silt clay. In fact, similar to what was exposed in Trench I, this is the top of the Kalut on which the site has been founded (Fig 59). We reached the virgin soil at the depth of 50 cm and since this layer was already known to us through excavation at trenches I & III, we stopped excavating of this trench after digging 10 cm of the Kalut at the depth of 60 cm.

2.3.3.4 Trench III and its Stratigraphy

Trench III was opened with size of 3 × 3 m at the most western part of Tepe Dehno. The ceramic evidence on the surface is of Early Bronze Age date indicating that the western part of the site was settled later than the east. In fact, in addressing the main aim of our excavation to define the chronological sequence of the plain, this place was intentionally chosen for the third operation because of its late date. The trench was excavated to a depth of approximately 55 centimeters and six loci were exposed. The loci are numbered locus 3001 for the uppermost to locus 3006 for the lowest. In this trench, as in those discussed above, no architectural remains were discovered. The main factors which allow to distinguish the loci were changes in the color and texture of the deposits. The excavations at the west of the site showed the extreme deflation of cultural deposits of later occupations too.

Excavations at this trench revealed an important, enigmatic and hitherto unknown phase of Shahdad plain. Absolute dates from this trench showed a late fourth and early

third millennia B.C range for this phase. The common pottery of this trench is a coarse red ware. A total of 380 potsherds were recovered from the exposed loci of this trench (Fig 60, Table 10). Through excavating this trench, we knew although this phase is in the following of Aliabad culture (Iblis IV), the ceramic tradition is completely different and is much closer to the ceramic pattern of the later urban phase of Shahdad. Apart from ceramic, various other finds were found from this locus, mostly from surface layer. They include stone beads, potsherd with potter`s mark, stone pendant, bronze fragments, shell, pieces of stone vessels, bronze objects, and textile. The excavated deposits are described below and their stratigraphic relations are illustrated in following (Fig 61).

Locus 3001: This locus is composed of silt clay with a thickness of 4 cm. In fact, it is the surface soil that covers the full extent of the trench. Due to extreme wind erosion in Shahdad area, a high density of cultural material is preserved on the surface of the site. A total of 154 potsherds were recovered from this locus. Apart from pottery that is most abundant find of this thin surface layer, some other finds were brought to light including lithic, bronze slats, a potsherd with potter`s mark, a piece of a marble vessel, a stone pendant carrying seven spots that shows it probably was inlaid with semi-precious stones, eleven stone beads among which eight of them are agate. Among them there is an unfinished agate bead that shows the production of agate ornamental objects in Shahdad plain.

Locus 3002: The next locus, with a maximum thickness of 18 cm is located under the surface layer. Its extent is 3 by 3 m covering the full extent of the trench. This locus is composed of a silt clay with the color of 2YR 7/4 Pale Yellow. A total of 150 potsherds were recovered from the locus; they are mainly the coarse simple red ware. Other finds include lithic, some fragments of bronze, a snail shell, two small green stone objects that are like drills. The most important find is a piece of textile. It is worth mentioning that the two absolute C14 dates of this trench come from this locus.

Locus 3003: This non-structural locus with an extent of 3 × 3 m was located under the locus 2002. It is composed of slit clay and appeared with a maximum thickness of 13 cm with the color of HUE 5Y 7/4 Pale Yellow. It was continued to the depth of 35 cm. Only four

potsherds were recovered from this locus which are similar to the sherds found in the other loci of the trench.

Locus 3004: this locus with an extent of 90 × 30 cm was located on the eastern part of the trench. It was surrounded by locus 3003 at the east of the trench with the color of HUE 5Y 3/1 Very Dark Gray. This deposit is composed of slit clay and was distinguished from adjacent locus due to its black color with charcoal inclusions. A total of 22 potsherds were recovered from this locus which are mainly the coarse simple red ware.

Locus 3005: this locus of 10 cm thickness, is made of an intense compact sediment with the color of 7.5 YR 7/1 Light Gray. This natural layer located under the locus 3003, covered the full extent of the trench and has been founded on the virgin soil.

Locus 3006: this locus is the virgin soil at the Tepe Dehno and is composed of a sterile very compact silt clay. As before, it was the top of the Kalut on which the site was founded. We reached the virgin soil at the depth of 45 cm and after digging 10 cm of the Kalut we stopped excavating of this trench at the depth of 55 cm (Fig 62).

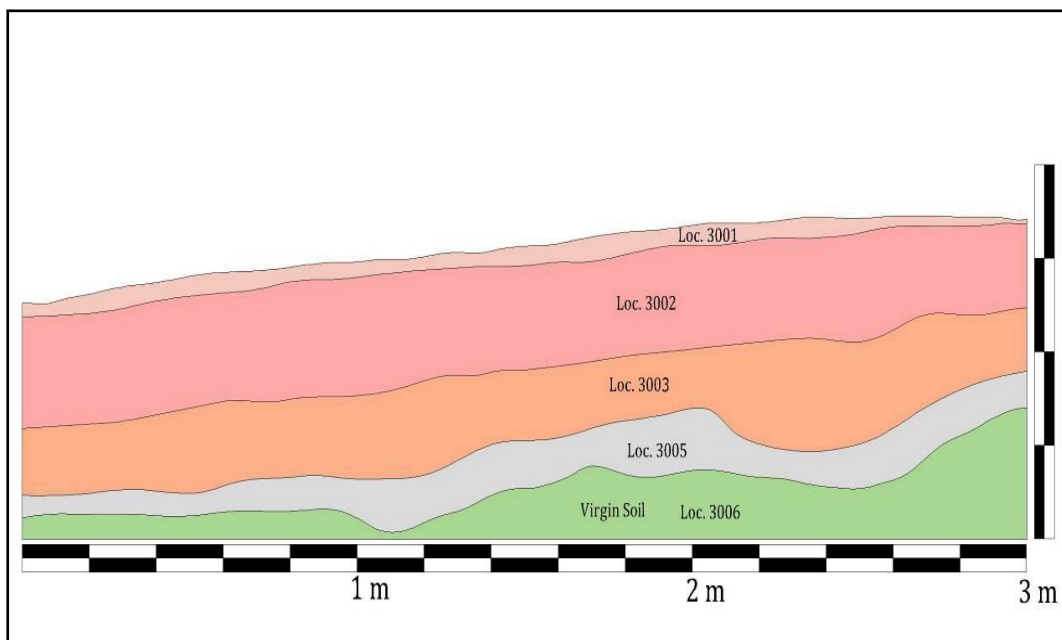


Fig 61: Stratigraphy of cultural layers at Trench III, Tepe Dehno

2.4.3.5 Trench IV and its Stratigraphy

Trench IV with size of 3 × 3 was opened on the eastern part of the site. From the surface ceramic evidence, this operation seemed to belong to the preceding Iblis IV (fourth millennium B.C) occupation. Two main aims determined the choice of the location: firstly, we were looking to reveal the earliest occupations of the site, earlier than Aliabad culture, which had not been reached in the other excavated trenches I-III. Secondly, we were hoping to expose a deeper accumulation of cultural deposits. Since this place was a depression surrounded by mounds, we thought this part of the site might have been protected from the extreme wind erosion. However, despite the fact that the cultural deposit was deeper than in other trenches, the depth of deposit was also less than one meter thick.

In this trench, seven loci were exposed within the sounding which are numbered locus 4001 (surface) to locus 4007 (virgin soil). None of the exposed deposits have any associated structural features and the main factors for distinguishing the loci was, as in the other cases, changes in the color and texture of the deposits. A total of 139 potsherds were recovered from the exposed loci that belong to an enigmatic period that can be placed during the last two centuries of the fifth millennium B.C (Fig 63, Table 11). This date came from two C14 dating samples from Loci 4002 and 4004. Besides ceramic, the other finds include lithic, small pottery wheel-like objects, worked potsherd, pieces of marble vessels, stone and metal beads and metal pin. The excavated deposits are described below and their stratigraphic relations are illustrated as well (Fig 64).

Locus 4001: this locus is composed of silt clay with a thickness of 4 cm is the surface layer and covered the full extent of the trench. A total of 19 potsherds were brought to light from this thin surface layer which was mostly eroded due to wind deflation. Some other finds brought to light such as lithic, two small pottery wheel-like objects, a recycled potsherd, a metal (probably copper) pin, a copper bead and a lapis lazuli pendant.

Locus 4002: the second locus is beneath the surface layer, it has a maximum thickness of 16 cm, and it extended across the entire trench. It is composed of a silt clay with the color of 2.5 Y 8/2 Pale Yellow. Apart from 45 potsherds which are fine buff ware, other finds that were recovered from the locus include lithic, a piece of marble vessel and two worked

potsherds. One absolute C14 dating from this locus shows a date from last two centuries of the fifth millennium B.C.

Locus 4003: this locus has an extent of 92 × 83 cm and is located on the eastern part of the trench. It was surrounded by locus 4004 and has the color of 10Y 4/1 Dark Greenish Gray. This deposit is composed of slit clay with a high density of charcoal and was distinguished from the adjacent locus through its black color and charcoal inclusions. No potsherds were recovered from this locus.

Locus 4004: this non-structural locus was extended across the full extent of the trench, however, in the east of the trench it is surrounded the locus 4003. It is composed of slit clay with a maximum thickness of 10 cm with the color of 5Y 4/2 Olive. It is located under the locus 4002 at the depth of 20 cm and continued to the depth of 30 cm. A total of 50 potsherds were recovered from this locus which mostly include fine buff ware. Lithic, a recycled potsherd and three pieces of marble vessels consist the finds of this trench. Based on a C14 absolute dating, the level dates to the last two centuries of the fifth millennium BC.

Locus 4005: this locus is composed of an intense compact sediment with the color of 7.5 YR 7/1 Light Gray with an average thickness of 5 cm. This natural layer is located under the locus 4004 and covers the full extent of the trench. This layer were recovered from other three trenches. Beneath this flash flood stratum there is in situ cultural deposits that could help us to suggest a relative date for the time of this natural layer.

Locus 4006: this non-structural locus with an extent of 3 × 3 m was located under the locus 4005. It is composed of slit clay mixed with ash. It was located beneath the natural sediment (locus 4005) and has a maximum thickness of 30 cm and continues to a depth of 65 cm. It sloped from west to east; at the western part of the trench its thickness is about 5 cm and at the eastern part is around 30 cm. A total of 25 potsherds were recovered from this locus which include fine buff ware. In addition, a miniature pottery vessel was recovered from this locus.

Locus 4007: this locus is the virgin soil at the Tepe Dehno and like in other trenches is composed of a sterile very compact silt clay with the color of 10YR 8/3 very pale brown. In

fact, it was the top of the Kalut that the site was founded on it. We reached the virgin soil at the depth of 40 cm at the west and 65 cm at the east of the trench. Although this layer was already known to us through excavation at trenches I-III, we continued our excavations to a depth of approximately a meter.

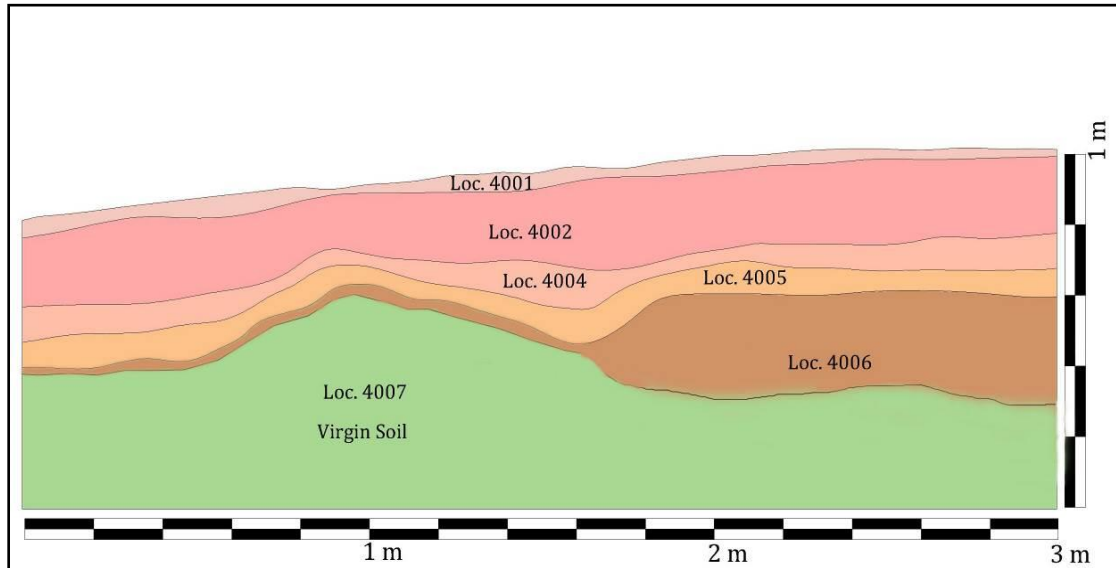


Fig 64: Stratigraphy and the deflation of cultural deposits at Trench IV, Tepe Dehno

2.4.4. Excavations at Tepe East Dehno

2.4.4.1 The Site and its environs

Tepe East Dehno (Shd 032) is a prehistoric site located 700m east of the site of Tepe Dehno. It lies 3 km northeast of cemetery A of the Shahdad site and about 5 km to the east of modern city of Shahdad. It is a multiple period site that was occupied as early as 5th and continued to be occupied into the 3rd millennium B.C. Tepe East Dehno is about 4.5 ha in extent (250 × 180) and it rises 8 m above the level of the surrounding land (Fig 65). The site was already recorded as unit 02 in the 1977 short survey of the Italian mission¹³⁰. From a geomorphological point of view, the site was formed on a *Kalut*/natural hill on the base of the alluvial fan of Shahdad where all the prehistoric sites of Shahdad plain have been

¹³⁰ Salvatori and Vidale (1982).

founded on a geological platform that seems to be a geological part of the Lut that has been separated from it by tectonic activities in the past.

Since we could not reach the earliest periods of Shahdad district through our excavations at Tepe Dehno, we selected the site of East Dehno for small scale excavation in this purpose. In fact, to address the primary goals of the excavation project, only one stratigraphic 3×3 m trench was opened in this small mound that appeared from surface finds to preserve in situ the fifth millennium B.C occupation. The trench was located in the west slope of site and labeled trench I. There is one phase of fifth millennium BC. occupation attested at East Tepe Dehno; the cultural deposit is approximately 40 cm deep and it has no preserved architectural remains. Of course, the excavations gave us precise information about the chronological relationship between the straw-tempered coarse ware (Iblis 0) and fine painted ware (Iblis I and II) that are known from Shahdad.

The material from Shahdad which can be dated to fifth millennium BC includes black on buff, black on red ceramics as well as coarse reddish crude (Lalehzar) wares. The strong stylistic and typological parallels between Iblis I, II material from Shahdad and Bardsir valley suggest that in the 5th millennium B.C. these two regions were closely linked culturally and it is highly probable that the ceramic parallels reflect parallel development within the entire region. Two C14 radiocarbon dates from this trench indicate that the occupation of Tepe Dehno falls into the first half of the fifth millennium.

2.4.4.2 Trench I and its Stratigraphy

The single trench excavated at Tepe East Dehno was a 3 × 3 meter square in the west slope part of site. The main aim in choosing this area was to possibly identify the fifth millennium occupation of the site. Surface ceramic evidence and the high density of lithic (mostly core and blade) suggested that this part of the site preserved the early fifth millennium BC occupation was absent in Tepe Dehno. This trench was excavated to a depth of approximately 45 cm. It included approximately 35 cm depth of cultural deposit (Fig 66). In this trench, five loci were exposed that are numbered locus 1001 for the uppermost to locus 1005 for the lowest (Fig 67). No architectural remains were discovered and as at Tepe

Dehno, the main factors for distinguishing the loci were changes in the color and texture of the deposits. A total of 48 potsherds were recovered from the exposed loci of the trench (Fig 68, Table 12). The pottery of the trench can be classified into three main groups including fine red ware, fine buff ware and straw-tempered coarse ware; the last two groups are already known through excavations at Tal-i Iblis.

Similar to the results from Tepe Dehno, excavations at this trench also proved the extreme deflation of cultural deposits in the Shahdad area. Furthermore, it also confirmed that the prehistoric sites of Shahdad plain were founded on top of Kaluts, in other words in response to environmental impact the sites are hill-top settlements rather than *Tell sites*. The excavated deposits are described below and their stratigraphic relations are illustrated as well.

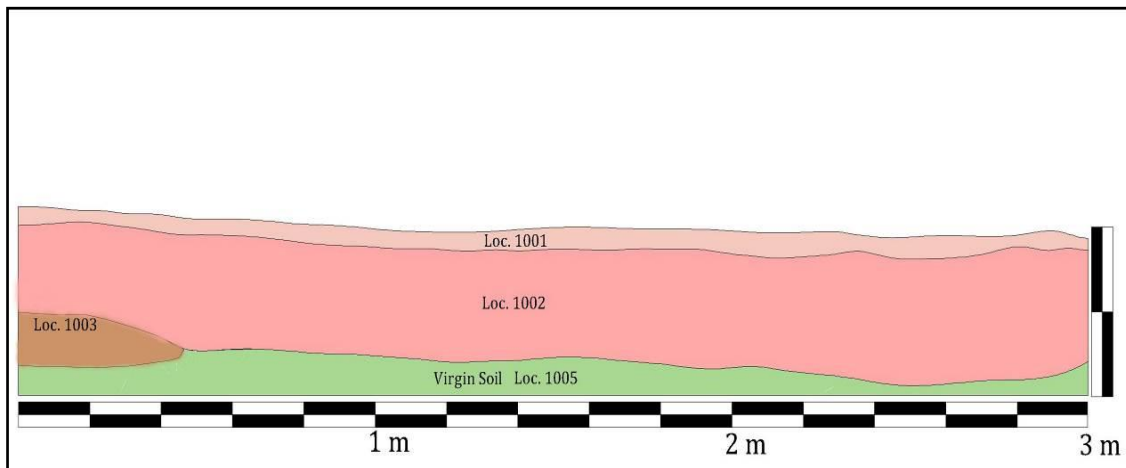


Fig 67: Stratigraphy of cultural layers at Trench I, Tepe East Dehno

Locus 1001: this locus is composed of silt clay with a thickness of 4 cm. In fact, it is the surface soil and covers the full extent of the trench. From this locus only 17 potsherds were recovered while many lithic were brought to light.

Locus 1002: the second locus was located under the surface layer with a maximum thickness of 25 cm. Its extent is 3 by 3 m covering the full extent of the trench. This locus is composed of a silt clay with the color of 2.5YR 7/4 Pale Yellow. A total of 22 potsherds were recovered from the locus. Other finds include lithic as well as an ornamental white stone

pendant (See Appendix 2, fig 1). One C14 radiocarbon date shows the span of second quarter of fifth millennium B.C. for this locus.

Locus 1003: this non-structural locus with an extent of 70 × 60 cm was located under the locus 1002 at the northwestern corner of the trench. It is composed of slit clay and appeared with an average thickness of 6 cm with color of 5Y 3/1 Very Dark Gray. It was founded on the virgin soil at the depth of 35 cm. Nine potsherds were recovered from this locus which are fine black on red; to our knowledge these sherds have no clear parallels from other excavated sites of South-East Iran. One C14 radiocarbon date shows the span of second quarter of fifth millennium B.C. for this locus.

Locus 1004: this locus has an extent of 50 × 30 cm and is located in the south-eastern corner of the trench. It is composed of slit clay with the color of 5Y 3/1 Very Dark Gray. This deposit which was distinguished from adjacent locus due to its black color and charcoal inclusions; it has a thickness of 10 cm and extends to virgin soil.

Locus 1005: this locus as the virgin soil at the Tepe Dehno is composed of a sterile very compact silt clay with the color of 10YR 7/3 Very Pale Brown. In fact, it was the top of the Kalut that the site was founded on it. We reached the virgin soil at the depth of approximately between 30 and 35 cm.

2.4.5. Summary

This chapter presented the results of excavations at two prehistoric sites of Tepe Dehno and East Dehno in Shahdad plain. It may be helpful to sum it up here in order to some prominent points be restated.

This fieldwork agenda, excavations at Tepe Dehno in tandem with East Dehno, provides a stratified occupational ceramic sequence for the prehistory of Shahdad area. On the basis of the stratified remains exposed in the four soundings, it appears that Tepe Dehno was occupied from late fifth to early third millennia BC.

Excavations in trenches I and II brought to light valuable information on Aliabad culture. This cultural horizon is dated based on four C14 absolute dates assigning to mid to late fourth millennium BC. It is the time when Tepe Dehno has been reached to its largest extent over 15 hectares. In fact, the site of Tepe Dehno provided an almost unique opportunity to investigate a large Iblis IV town. It can tell us about the broader Aliabad culture. Trench III was excavated at the western part of Tepe Dehno where a small occupation (*ca.* 3 ha) related to Early Bronze Age I is settled.

Excavations at this trench revealed an important, enigmatic and hitherto unknown phase of Shahdad plain. This horizon is dated through two C14 radiocarbon dates falling in late fourth and early third millennia B.C. The Aliabad (Iblis IV) culture in Tepe Dehno was replaced by this previously unrecognized phase in the end of fourth millennium BC which has presented a completely different ceramic assemblage.

Excavation at trench IV revealed the earliest occupation of Tepe Dehno related to late fifth millennium B.C. Excavations in all operations across Tepe Dehno showed that this hill-top settlement was rarely preserved more than half a meter deep of cultural deposit. Moreover, it brought to light that the architectural features probably were not preserved due to taphonomic processes. However, more exposures are required to confirm this hypothesis.

In terms of occupational sequence, the first season of excavation at Tepe Dehno established three main occupation periods so far which are labeled from the oldest to the

youngest Dehno I-III. These periods were distinguished based on ceramic evidence and absolute dates. Dehno I period as the earliest occupation corresponds to late fifth millennium B.C. (4250-4000 B.C) was identified in trench IV. The second period was documented through excavations at trenches I & II; Dehno II period is related to mid to late fourth millennium B.C (3700-3300 B.C), known as Aliabad (Iblis IV) culture. Dehno III period (3200-2900/2800 B.C) is a hitherto unknown period.

The most interesting discovery was the fact that this period was directly preceded by Aliabad culture. Although excavations at Tepe Dehno determined a sequence of occupation from late fifth to early third millennia BC, it did not produce the earliest period (early-mid 5th millennium B.C) known in the district. Hence, Tepe East Dehno was excavated in order to reveal these earliest periods of the region. The limited excavation at this site identified the earliest periods in Shahdad plain, known as Iblis I-II cultures that are based on two C14 radiocarbon dates falling in the first half of the fifth millennium B.C.

Excavations at Tepe East Dehno also confirmed the fact that the sites in the region are typically hill-top settlements that have cultural deposits that are less than half a meter thick. Excavations at Tepe Dehno and East Dehno brought to light the fact that the prehistoric settlements in Shahdad plain which all are founded on a fan have been highly affected by the Shahdad fan environment. Indeed, the natural landscape caused the formation of hill-top settlement rather than *Tell site* in this part of Iranian plateau. Moreover, it showed that the prehistoric settlements have probably a pattern of horizontal rather than vertical growth. Without doubt environmental features caused the ancient inhabitants to move settlement rather than to build on top of earlier occupation.

In terms of cultural landscape' condition, the prehistoric sites of Shahdad plain are in danger because of the highly extreme wind erosion. In this case, 1970s and 1990s excavations at site of Shahdad and my recent excavations showed that prehistoric cultural deposits are less than 1m thick. I assume that extreme wind erosion must be one of the main reasons why there is such deflation of the cultural deposits. Although here the sites have a horizontal growth, it may not be that there was no depositional build-up over time, but rather that there was constant deflation leaving deposits less than 1 m thick.

Chapter V: A chronological reconsideration to the prehistory of Southeastern Iran based on new data

2.5.1. Introduction

The prehistory of southeastern Iran has not yet been sufficiently studied archaeologically compared to other regions of Iran (Fig 69). The major part of our information on prehistory of this area dates back to 1970s from some dispersed archaeological activities. Due to the exciting discovery of major Bronze Age urban centers in southeastern Iran, such as Shahr e Sokhta, Shahdad and Konar Sandal (Jiroft), most scholarly attention has been given to the 3rd millennium BC. As a result, the cultures preceding and posterior to the Bronze Age have been often neglected.

During the 1970s, five different missions conducted excavations in Soghun valley (Tepe Yahya), Bardsir (Tal-i Iblis), Dasht-e Lut (Shahdad), Baluchestan (Bampur), Sistan (Shahr-e Sokhta) (Lamberg-Karlovsky 1970, Caldwell 1997, Hakemi 1997, Tosi 1969, De Cardi 1970). It should be mentioned the activities of Sir Aurel Stein in 1940s in SE Iran who was a precursor to future studies of western archaeologists as a result of which, consistent archaeological actions were undertaken in 1970s. After this period, researches on the archaeology of SE Iran were almost interrupted except for excavations of Bronze Age sites of Jiroft and also Shahr-e Sokhta; so all we have got so far is limited to old resources and the cultural sequence of the region has not yet been presented thoroughly and correctly.

Our knowledge on the sequence of SE Iran is based on old chronologies and it was really needed to have revised sequence for this area. Beside, studies on cultures of SE Iran are all under the influence of better known prehistoric cultures such as Mesopotamia and SW Iran so the role of local dynamics in analysis of the evolution of human societies has been neglected.

The recent project of the Lut resulted in new information on chronology of prehistory of SE Iran. The critical review of the sequence of the region has been achieved on the base of C14 dating of 10 samples uncovered from Tepe Dehno and the East Dehno excavations. In this chapter I try to present a critical evaluation on previous archaeological researches conducted in this area and also a revised sequence of prehistory of southeastern Iran,

based on new radiocarbon datings and the comparative chronology of adjacent regions. An updated chronological table of the prehistory of SE Iran is also presented (see table 14) and the evolution of human societies with emphasis on local dynamics is studied for the Chalcolithic and Bronze Age periods.

2.5.2. New Absolute Dates from SE Iran: Tepe Dehno, East Dehno, Konar Sandal South, Varamin-e Jiroft, Mahtoutabad, Vakilabad, Tal-e Attashi, Tepe Gavkoshi

2.5.2.1. Tepe Dehno and East Dehno

The excavations of Tepe Dehno and East Dehno revealed a cultural sequence from the beginning of the 5th millennium BC to the 3rd millennium BC (see, previous chapter). The presented dates are based on the results of carbon 14 dating on 10 samples of charcoal found from 5 trenches of Tepe Dehno and East Dehno. There are 2 absolute dating samples from each trench. Except for one dating sample which was examined in university of Belfast in Ireland, all samples were experimented in the University of Lyon I in France.

The excavation of East Dehno led to identifications of Iblis culture (Iblis I, according to Tal-i Iblis sequence) which according to radiocarbon dating of 2 samples, dates back to the 2nd quarter of the 5th millennium. These 2 charcoal samples were examined in 2 different laboratories and they both revealed the same results. One sample was experimented in university of Belfast in Ireland and the other in university of Lyon in France (Fig 70, 71). Three different settlements were identified during excavations in Tepe Dehno that are called Dehno I to III. Dehno I, as the oldest settlement of the area, was identified from trench IV and it dates back to the last quarter of the 5th millennium BC (4250-4000BC) on the base of C14 dating of 2 samples (Fig 72, 73). Dehno II was identified from trenches I, II and it dates back to the mid-4th millennium on the base of 4 radiocarbon samples (Fig 74-77). This period is known as Aliabad culture in Bardsir plain. Dehno III dates back to (3200-2900BC) (Fig 78, 79).

Apart from the new dating from the two above-mentioned sites of Lut area, there are six new excavated sites in Kerman province which present new radiocarbon data for the region. Among them, the four sites of Konar Sandal, Mahtotabad, Gav Koshi and Varamin

are located in Jiroft area and Tal-i Attashi and Tepe Vakilabad are situated respectively in Bam and in Orzouih plain (where Tepe Yahya is located in).

2.5.2.2. Varamin-e Jiroft

The Varamin archaeological site is located 6 km south-west of Konar Sandal South in the Jiroft plain. It is one of the largest prehistoric settlements in the Halil Rud valley. It was excavated by Nasir Eskandari for two seasons in 2017 and 2018¹³¹. A series of 14C dating from different contexts was run at the Klaus-Tschira-Archaeometry-Centre (Mannheim); associated with the University of Tübingen. There were 21 samples altogether, of which seven are from grave 1 and 14 from Area A. Of the samples from grave 1 –four human teeth and three charcoal pieces – five did not provide any collagen, and two others (charcoal pieces) gave unreasonable geological and modern dates. Thus, unfortunately, the radiocarbon dates available for Tomb B1 are unreliable.

Among the 14 samples from the stratigraphic sounding in Area A of the Varamin mound, 12 produced valuable and very interesting results, while two resulted in modern dates. The samples derive from stratigraphic contexts A3, A4, A5, A6, A7 and A8, and thus reflect a wide chronological range, covering nearly the total sequence of the mound (Fig 80, Table 13).

Three samples are connected to the oldest stratigraphic context A8 of the sequence (architectural level V), which is dated through pottery analysis to the Late Aliabad Period, or Late Chalcolithic III (see above). Most important is a seed, which was hand-picked from the area of an oven in Locus 1044. It has a high potential to offer a reliable date, because it represents a short-lived plant (No. 33788). The date for this seed lies between c. 3350 and 3100 calBC (2σ SD), with an equal distribution of probabilities over this long time range. This wide time range is due to the flat calibration curve for the second half of the 4th millennium BC. The two other samples for stratigraphic context A8 are from charcoal pieces. They are considerably older, with a total range between c. 3650 and 3500 calBC (1σ SD). In an attempt to combine these diverse dates, an overall duration of stratigraphic context A8 from around 3650 to 3300 BC needs to be considered. Within this wide time

¹³¹ Eskandari *et al.* (2020), Eskandari *et al.* (2021).

range, the seed could not have been deposited earlier than at around c. 3350 BC in the oven. Conversely, a younger date within the long radiocarbon range of the seed would be highly improbable in view of the two other samples and the general chronological setting of the Late Aliabad Period. In conclusion, a date between 3600 and 3300 BC is proposed for the Late Aliabad Period or Late Chalcolithic III

For stratigraphic contexts A7 to 6, associated with architectural levels III and IV, which are attributed to the Varamin A Period or Early Bronze Age I on the basis of the analysis of the pottery, five ^{14}C samples were analyzed. They are all very consistent and, therefore, indicate a reliable dating for the Varamin A Period. Their single time ranges are c. 3360–3140 calBC (1σ SD), 3480–3200 calBC (1σ SD), 3350–3120 calBC (1σ SD), 3490–3360 calBC (1σ SD) and 3350–3120 calBC (1σ SD). The probabilities are quite regularly distributed over these time ranges. A combined time range for the five samples would cover the period from c. 3350 to 3100 calBC. In view of the aforementioned dates for stratigraphic context A8, the time before c. 3300 should be excluded for stratigraphic contexts A7–6 in order to place this period meaningfully into the sequence. This would be perfectly in line with the highest probabilities of all samples except no. 33784. These arguments lead us to propose a time range of 3300–3100 BC for stratigraphic contexts A7–6, and thus for the Early Bronze Age I.

One sample was measured for stratigraphic context A5, which is a layer of sandy soil and some charcoal remains separating architectural levels II and III. The sample produced a date between c. 2880 and 2640 calBC. This is – in relation to the radiocarbon dates retrieved from the architectural level II (see below) – too young for a layer separating the Early Bronze Age I (architectural level III) from the Early Bronze Age IIA (architectural level II). Therefore, we have to assume that this sample was either not stratified well enough or produced an invalid result due to preservation reasons.

Two samples are available for stratigraphic contexts A4, corresponding to the Early Bronze Age IIA as determined by the analysis of pottery. This phase is labelled Varamin B Period. The dates of the two samples are slightly divergent from each other: MAMS-33781 dates c. 3500–3100 calBC, while MAMS-33768 dates c. 3300–2900 calBC (2σ SD). For the latter sample, probabilities are by far the highest (83%) for the time span of c. 3100–2900

calBC (2σ SD). This would fit very well with the results from the older stratigraphic contexts A6-7, which led us to attribute a time range of 3300–3100 BC for the Early Bronze Age I (see above). Therefore, the Early Bronze Age IIA could be easily placed to 3100–2900 BC, to which the results of the second sample from stratigraphic context A4 (MAMS-33768) would be a perfect match. The first sample from stratigraphic context A4 (MAMS-33781) would still be approximately in line with this chronological assessment, if one takes the lowest possible 2σ SD time range for this sample into consideration, which lies at 3158-3125 calBC (with a 8,0% probability). The proposed dating of the Varamin B Period (Early Bronze Age IIA) to 3100–2900 BC would also give the chronological frame for the date of grave 1 of Varamin.

Finally, from stratigraphic context A3, dated to the Jiroft A period or Early Bronze Age IIB, there is just one sample which produced a reliable result. It offers a time range of 2900-2700 calBC (2σ SD). This is perfectly in line with our general assumptions of placing the Early Bronze Age IIB Jiroft A culture into the first half of the 3rd millennium BC (2900–2500 BC). It shows that the stratigraphic context A3 would date in the earlier part of the Early Bronze Age IIB. It should be added here that the sample from stratigraphic context A3, surprisingly, offers exactly the same date as the mysterious sample MAMS-33782 from architectural context A5. Therefore, it seems that the latter ecofact would belong to the Early Bronze Age IIB, as well. It needs to be assumed that this sample came either accidentally or through an unexplained taphonomic process into the older deposit.

2.5.2.3. Gav Koshi-e Esfandagheh, Jiroft

One of the recent excavated prehistoric sites of SE Iran is the Pottery Neolithic site named Fathabad or Gavkoshi which has been excavated by Nader Alidadi Soleimani from ICHTO of Kerman for three seasons. The site is located c.70 km north-west of Jiroft plain in the mountainous district of Esfandagheh. It is a small Neolithic site less than one hectare which presents two phases of the Pottery Neolithic period. The first or earlier phase dates back to 7100 to 6700 BC based on absolute radiocarbon dates (Fig 81) and the later phase

is assigned to late 7th millennium BC¹³². Based on the available information, Gav Koshi presents the earliest occupation of Southeastern Iran prior to Yahya VII and Gaz Tavila.

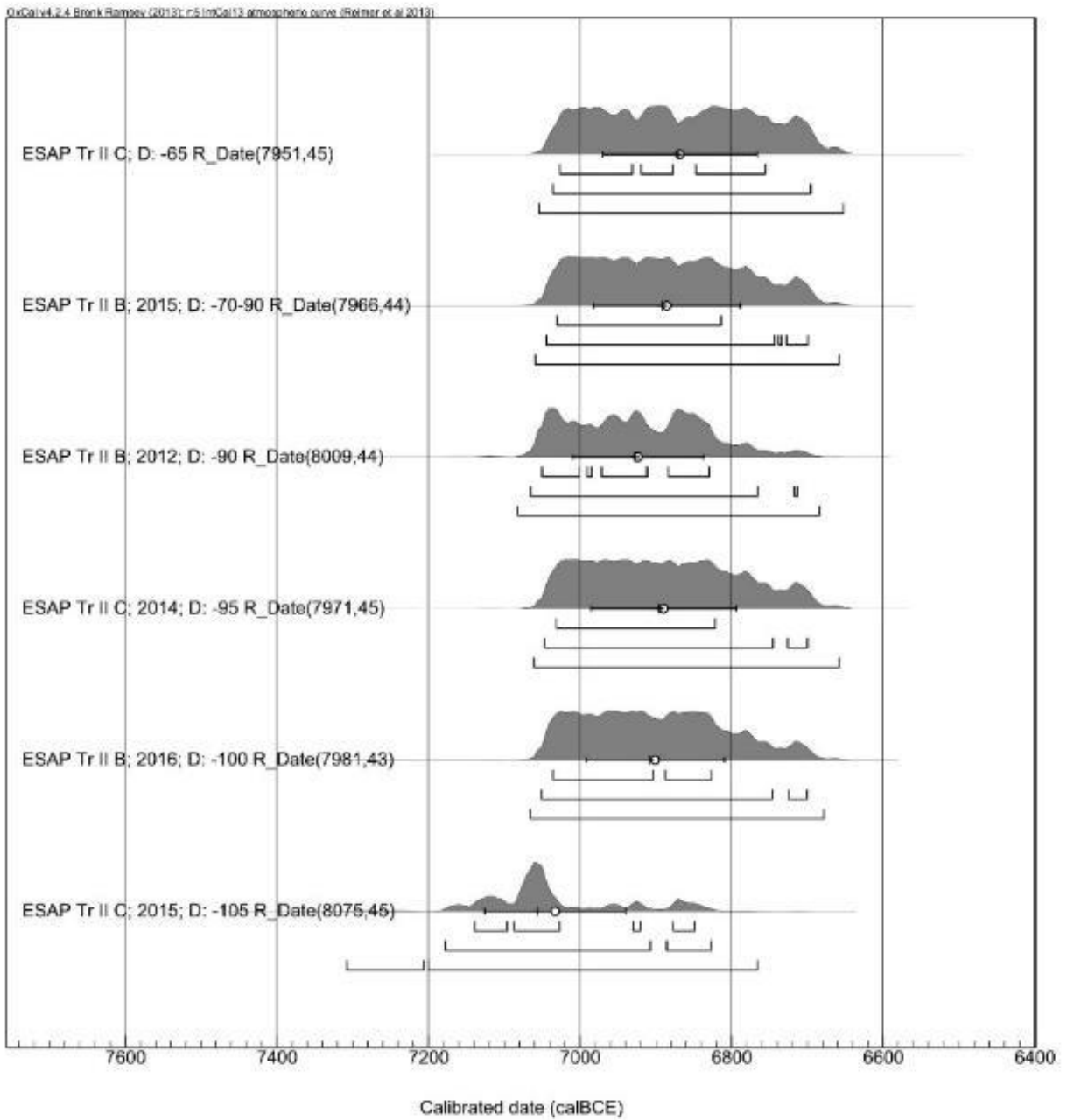


Fig 81: Radiocarbon dates from Tepe Gav Koshi (after Soleimani and Fazeli 2018)

¹³² Soleimani and Fazeli Nashli (2018).

2.5.2.4. Konar Sandal South

Konar Sandal site is an archaeological complex of sites such as Konar Sandal South (KSS), Konar Sandal North (KSN), Qale Kouchak and cemetery of Mahtotabad in the center of the Jiroft plain. Konar Sandal South is a very large urban center from 3rd millennium BC. This site is considered as the possible geographical location of the Sumerian toponym of Marhashi¹³³. The site was excavated headed by Youssef Madjidzadeh ¹³⁴ for six years in 2000s.

Excavations at Konar Sandal South have revealed the character of an Early Bronze Age. A large mud-brick Citadel was surrounded by a massive defensive wall in the center of a large lower town. Although there is still much to learn about this center, the results are clear testimony to the power, wealth and social stratification of this urban center.

According to radiocarbon dates from well-controlled contexts at the site of Konar Sandal South, an absolute range between 2880 and 2140 BCE is proposed for duration of occupation at the site¹³⁵ (Fig 82). The relative dating offered by the glyptic evidence from KSS also confirms these radiocarbon dates¹³⁶.

¹³³ Steinkeller (2014).

¹³⁴ Madjidzadeh and Pittman (2008).

¹³⁵ Madjidzadeh and Pittman (2008), Table 1.

¹³⁶ Madjidzadeh and Pittman (2008), Pittman (2012).

<i>Sample</i>	<i>Operation/Phase</i>	<i>Radiocarbon age</i>	<i>Calibrated age range (1 sigma 68% probability)</i>	<i>Calibrated age range (2 sigma)</i>
Beta 207285 KSS0501 Charred material AMS	KSSStr. 7:301—70–80 from north wall 1.9–2.05m above floor of step trench 7. Possible pit associated with mud brick	3920+/-40 BP	2470–2340 Cal B.C.	2490–2290 Cal B.C.
Beta 207286 KSS0502 Charred material AMS	KSSStr. 8:303—south wall, burned organic with small pebbles 1.20 m depth predates or dates to construction of massif. Under first row of big mud bricks	3880+/-40 BP	2450–2290 Cal B.C.	2470–2210 Cal B.C.
Beta 207287 KSS0503 Charred material AMS	KSSStr. 9:31515 cm north of south wall. 2.5 m depth. Charcoal under vessel A in southeast corner along wall. Room predates the massif	3830+/- BP	2330–2210 Cal B.C.	2450–2140 Cal B.C.
Beta 207292 KSS0508 Charred material AMS	KSSTr. XI:325. depth 0.84 meters. Floor surface. Lowest phase (3)	4130+- BP	2860–2800 Cal B.C. 2760–2600 Cal B.C.	2880–2580 Cal B.C.
Beta 207293 KSS0509 Charred material AMS	KSSTr III: 306 depth .80 meters. On floor surface where seal impressions were found. Citadel earliest phase	3880 +/- BP	2450–2290 Cal B.C.	2470–2210 Cal B.C.
Beta 207294 KSS0510 Charred material AMS	KSSTr III:306 depth .80 meters. On floor surface where seal impressions were found. Citadel earliest phase	3910+/-BP	2470–2330 Cal B.C.	2480–2290 Cal B.C.

Fig 82: Radiocarbon dates for Konar Sandal South (after, Madjidzadeh and Pittman 2008)

2.5.2.5. Mahtotabad

Mahtotabad is one of the sites of Konar Sandal site complex which is located 1.5 km northwest of Konar Sandal South¹³⁷. It includes a very large plundered graveyard and two habitation sites. The graveyard of Mahtotabad was certainly used by the Konar Sandal South urban society, particularly in the second half of the 3rd millennium BC. Mahtotabad was excavated by Madjidzadeh and Vidale in 2000s. The excavations led to identification of four phases of occupation as following¹³⁸: Mahtotabad I (late 5th-early 4th millennium BC), Mahtotabad II or Aliabad culture (Mid-4th millennium BC), Mahtotabad III (an

¹³⁷ Madjidzadeh and Pittman (2008).

¹³⁸ Vidale and Desset (2013).

occupation with Uruk-related materials¹³⁹) and Mahtotabad IV (graveyard from second half of 3rd millennium BC¹⁴⁰).

Absolute dates are provided only from period I. Four datings (calibrated with OxCal 4.1.3) were obtained from charcoal gathered from Mahtoutabad I layers. The samples were processed at the AMS facility of CEDAD, University of Lecce (Italy)¹⁴¹:

LTL 4244A: 5284 ± 45 BP: 4237-3989 BC (95%) / 4228-4043 BC (68%)

LTL 4240A: 5038 ± 40 BP: 3953-3714 BC (95%) / 3941-3779 BC (68%)

LTL 4239A: 4805 ± 45 BP: 3694-3384 BC (95%) / 3657-3527 BC (68%)

LTL 4241A: 4745 ± 45 BP: 3639-3377 BC (95%) / 3634-3385 BC (68%)

Mahtoutabad I datings match well stratigraphy. Apparently, there was a short chronological gap (a local abandonment?) between the green layers of the first floor (LTL 4240A, 3950-3710 BC) and the layers just above (LTL 4239A and LTL 4241A), around 3650-3380 BC.

2.5.2.6. Vakilabad

After half a century, a new excavation project was launched in Orzu'iyeh (Soghun valley), south-eastern Iran where the well-published Tepe Yahya is located. Tepe Yahya was discovered in 1967 by a survey team from Harvard University under the direction of C.C. Lamberg-Karlovsky. It was occupied, with interruptions, from the late Neolithic to the early Sasanian period. Indeed, Tepe Yahya remains the main controlled excavation carried out within south east Iran. After half a century, a new excavation project was carried out in this area headed by Mojgan Shafie and M. Molasalehi. Tepe Vakilabad, as a Chalcolithic key site in the south-eastern Iran was chosen for excavation. This mound is located in the Orzu'iyeh district in the south west of Kerman province. This area is a natural corridor drawn in the east-west direction connecting south of Kerman province to Fars. The eastern part of this

¹³⁹ Desset *et al.* (2013).

¹⁴⁰ Desset *et al.* (2017).

¹⁴¹ Vidale and Desset (2013).

plain includes Soghun Valley (where Tepe Yahya is situated), and the middle and western parts are respectively Dowlatabad and Vakilabad plains.

This mound contains more than 4 meters of cultural layers belonging to the chalcolithic periods which reveal how important this site could be, but unfortunately, it is badly damaged and bulldozed. As the results of excavation at Tepe Vakilabad, a total of 6 radiocarbon charcoal samples were collected from the only trench of this mound and analyzed by the Accelerator Mass Spectrometer (AMS) method in the laboratory of university of Lyon, France¹⁴². According to a comparative analysis based on the ceramics of this excavated settlement site, it could be sign of characters that Vakilabad belongs to Yahya V culture, and based on the absolute dating results, this site dates back to the early fifth millennium BC to the mid-fifth millennium BC¹⁴³.

2.5.2.7. Tal-i Atashi

The site of Tal-i Atashi in Darestan of Bam (east of Kerman province) has been ascribed as a pre-pottery Neolithic site by its excavator. This site was excavated by Garazhian in 2008. Its cultural deposits include 11 architectural levels all belonging to one period¹⁴⁴. Based on relative and absolute dating, the excavator suggested that the site of Tal-i Atashi dates back to the late 6th millennium and the beginning of 5th millennium BC (5200-4600 BC) and considered it as the culture before Iblis 0 culture¹⁴⁵.

In 2017, a new Iranian-French joint project continued the excavations of this site. The latter made it clear that this site is aceramic, a configuration that stands in contrast to the typical sixth and fifth millennia BCE archaeological sites in Iran¹⁴⁶. Absolute dates from the

¹⁴² Shafie *et al.* (2019).

¹⁴³ Shafie *et al.* (2019).

¹⁴⁴ Garazhian (2009).

¹⁴⁵ Garazhian (2016).

¹⁴⁶ Mutin and Garazhian (2020).

recent project also propose the time span between mid-6th to early 5th millennium BC for this site¹⁴⁷.

2.5.3. New look at the chronology and the cultural developments of southeastern Iran

2.5.3.1. Southeast Iran in Neolithic Period (7100-5500):

The Neolithic of SE Iran is barely known. Until the last decade, all our information on this period was limited to Gaz Tavile, lower layer of Iblis (Iblis 0) and lower layers of Tepe Yahya (Yahya VII). The recent excavations of Omran Garazhian (later jointly with Benjamin Mutin) at Tal-i Atashi in Darestan of Bam and Nader Soleimani at Tepe Gavkoshi-e Esfandagheh have yielded new information on this period.

All data on the Neolithic period of SE Iran was obtained just in Kerman province and no evidence of this period was found in Sistan, Baluchistan and Hormozgan. Apart from Tal-i Atashi which is considered as a PPN site, all other mentioned sites are pottery Neolithic (PN). One of the Neolithic settlement sites is Gaz tavile which is situated in Shahmaran-Dowlatabad (West of the Soghun valley). This site was excavated by the excavation team of Tepe Yahya in 1973. Gaz tavile is a PN campsite and it dates back to the early 6th millennium based on radiocarbon dating (Prickett 1986a: 219). Prickett identifies Gaztavile as the early Yahya VII and believes that it is prior to Yahya VII. Period VII, with Chaff-tempered Coarse Ware sherds, is known as the Neolithic period in Tepe Yahya.

Although, Chaff-tempered Coarse Ware potteries remained until Yahya VB in Tepe Yahya but the Neolithic chaff-tempered sherds are different in terms of type and temper from potteries of more recent periods (Lamberg-Karlovsky and Beale, 1986: 39; Dyson, 1965: 217-218). Beale and Lamberg-Karlovsky suggested that period VII of Tepe Yahya dated back to the 5th millennium BC based on uncalibrated dating¹⁴⁸. Prickett suggests the late 6th millennium and the 1st half of 5th millennium BC for period VII of Tepe Yahya based

¹⁴⁷ Mutin and Garazhian (2020).

¹⁴⁸ Lamberg-Karlovsky and Beale (1986), p. 11.

on calibrated dating¹⁴⁹. According to recalibrated absolute dating results of Tepe Yahya excavations and also the new suggested chronology table based on recent excavations, the author believes Yahya VII dates back to the 7th millennium BC. The period VII of Tepe Yahya had a relatively long duration which had probably prolonged from the beginnings of the 7th millennium BC to the early-6th millennium BC.

Marta Prickett has also compared these chaff-tempered coarse wares to Mushki wares¹⁵⁰. The typical chaff-tempered wares introduced by Dyson¹⁵¹ as soft-ware horizon has been found from Neolithic sites of different regions of Fars such as Mamasani, Darab, Fasa, Shiraz, Arsanjan and Qare aqaj¹⁵².

Iblis 0 period with Lalehzar coarse wares has been known as the pottery Neolithic of Tal-i Iblis. This period has been uncovered from the 40 cm of the lower layers of sections A, B of trench A in Tal-i Iblis. The Lalehzar wares were also present in abundance during Iblis I and II with Bardsir and Iblis wares. The fact that only Lalehzar wares were uncovered from lower layer of Tal-i Iblis, made David Chase to introduce the Lalehzar coarse ware horizon and to consider Iblis 0 as a distinct layer¹⁵³.

Some researchers believe that this period does not exist and consider the lack of other wares in lower layer of Tel-Iblis as the fault in sampling and excavation (Voigt and Dyson 1992, 143). Voigt and Dyson mentioned that from an architecture with an extent of 96 m² relating to Iblis I period in Tal-i Iblis, only one Iblis sherd was found accompanied by 275 Lalehzar coarse wares. Despite these arguments, the author, based on the archaeological evidence, believes that this cultural horizon exists. With a trans-regional point of view, we find out that the prelude of chalcolithic cultures (Bakun in Fars and Yahya

¹⁴⁹ Prickett (1986a), p. 217.

¹⁵⁰ Prickett (1986b) p. 762.

¹⁵¹ Dyson (1965).

¹⁵² Sumner (1977), Ikeda (1979), Bernbeck *et al.* (2005), Zeidi *et al.* (2009), Miroschedji (1972), Dittmann (1986).

¹⁵³ Chase *et al.* (1967), p. 149-150.

VI in Kerman) is marked by chaff-tempered wares, so it's actually possible to have one specific period with this kind of sherds in Tal-i Iblis (Iblis 0).

The site of Gav Koshi in Esfandagheh of Jiroft is another PN Sites of southeastern Iran. The ceramic tradition of Gav Koshi is different from those recovered from Yahya VII and Gaz tavile. Gav Koshi presents two different phases of pottery Neolithic period; the earlier phase dates back to 7100 to 6700 BC and the second phase is related to about 6100 BC¹⁵⁴. The ceramics of the earlier phase tend to present a local tradition but those recovered from the later phase are comparable with those discovered at the Neolithic sites of southern Fars such as Qasr Ahmad. Based on the available information, the cultural horizons attested at Gav Koshi are the oldest ones of South-east Iran.

The site of Tal-i Atashi in Darestan of Bam province has also been ascribed as a PPN site of Southeastern Iran. This area was excavated by Garazhian. Its cultural deposit includes 11 architectural levels, all belonging to one period¹⁵⁵. Based on relative and absolute dating, the excavator suggested that the PPN of Tal-Atashi dates back to the late 6th millennium and the beginning of 5th millennium BC (4600-5200 BC) and considered it as the culture before Iblis 0. The author disagrees with this argument and believes that not only this site is not prior to Iblis 0 but also is contemporaneous to Iblis I.

No PPN sites have yet been identified in southeastern Iran, despite the fact that in Tal-i Atashi we have an aceramic culture. It is not the prelude of pottery Neolithic of southeastern Iran and it relates to the time after that. Indeed, it is chronologically contemporaneous with Early Chalcolithic period (mid- 6th to early 5th millennium BC).

These are the questions on the Neolithic period of Southeastern Iran that the answers are not yet clear to us: where is the origin of pottery Neolithic of southeastern Iran? Has the Neolithic culture been adopted from other region or has the Neolithisation actually taken place in this region?

¹⁵⁴ Soleimani and Fazeli Nashli (2018).

¹⁵⁵ Garazhian (2009).

During the archaeological surveys conducted in Southeast Iran, a lot of pottery Neolithic sites were identified in different regions of Kerman province such as Shahmaran-Dowlatabad area, Soghun valley, Darestan of Bam, Bardsir and Esfandagheh plain¹⁵⁶.

According to this vast geographical distribution and the high number of PN sites in the region, the presence of PPN sites seems very probable which have not yet been identified. Due to some pottery similarities between Fars and Southeastern Iran, It is also stated that the Pottery Neolithic of SE Iran is adopted from western areas. Despite the fact that no Epipaleolithic and PPN sites were identified in SE Iran, we cannot disprove the existence of PPN sites in southeastern Iran with certainty. This hypothesis seems more probable when we perceive that researchers consider a local Neolithisation process for Baluchistan of Pakistan (eastern neighbor of SE Iran) based on archaeological evidence and disagree to diffusion theory for this area.

2.5.3.2. Southeastern Iran in the 5th millennium BC: from cultural transformations to regional integration

The 5th millennium BC is known as a significant period in evolution of human societies of Iranian plateau. It was a critical period of socio-economic transformations such as technical innovations and social hierarchy. There are only few information on the 5th millennium of SE Iran, limited to the excavations of Tepe Yahya and Tel-i- Iblis.

Beside, studies on cultures of SE Iran in this period are all under the influence of better known prehistoric cultures such as Mesopotamia (Ubaid) and SW Iran (Bakun) so the role of local dynamics in analysis of the evolution of human societies has been neglected and SE of Iran is considered as a marginal area (Ubaidian Oikoumene) and as a copper supply center for Western part of Iran¹⁵⁷.

¹⁵⁶ Prickett (1986b), Prickett (1986a), Lamberg-Karlovsky and Beale (1986), Garazhian (2009), Sajjadi (1987), Soleimani and Fazeli Nashli (2018).

¹⁵⁷ Caldwell (1968).

In general, the 5th millennium BC is known through the excavations of Tepe Yahya, Tepe Muradabad (Dowlatabad plain), Tal-i Iblis, Tepe Chah Hosseini, Tepe Langar (Mahan), Tal-i Atashi and the newly excavated sites of Tepe Dehno and East Dehno in Lut area¹⁵⁸ as well as Tepe Wakilabad in Orzuiyeh plain. The recent excavations of East Dehno in Shahdad has revealed new information which has made us to question the chronology of the 5th millennium.

Based on our information, there were 3 different cultures in SE Iran during the first half of the 5th millennium: Yahya VC-B (Soghun) which existed in southern Kerman (Soghun valley and Shahmaran and Dowlatabad region), Iblis I (Bardsir) in Northern part of Kerman province (which was extended from Shahdad to Bardsir plain) and the last one, the aceramic culture of Darestan (Bam region) which was simultaneous with the Chalcolithic cultures of the region. In the mid-fifth millennium BC, SE Iran reaches regional integration in a wide geographical extent from north of Kerman province to Baluchestan.

According to the excavator of Tal-i Iblis, the early periods of the site (0, I and II) cover a duration for a half-millennium from the mid to the late 5th millennium BC which shows a gradual process¹⁵⁹. Caldwell believed that Iblis 0 period related to the mid-5th millennium BC (4500BC). During Iblis I period (4400-4200BC), a new type of pottery called Bardsir has been found as well as chaff-tempered Lalehzar wares. Iblis II period (4200-4000) is known by painted red wares called Iblis wares. As a result of the recent excavation of the author at East Dehno in Shahdad, the chronology given of the first periods of Tel-i-Iblis needs revision.

According to radiocarbon dating of 2 samples of the East Dehno, the layers containing Iblis I culture date back to the 2nd quarter of the 5th millennium (4750-4500BC)¹⁶⁰. Based on these new dates for the East Dehno of Shahdad, as a marginal area for this culture (the western edge of Lut desert), it can be inferred this culture in its formation center(s) might have gone back to the first quarter of the 5th millennium BC or

¹⁵⁸ Eskandari (2017).

¹⁵⁹ Caldwell (1967).

¹⁶⁰ Eskandari (2017).

late 6th millennium BC. So, we suggest the late 6th-mid 5th millennium BC for Iblis I period (Bardsir wares). The similarity between Iblis I buff wares with Bakun wares (Fars) confirms this suggested dating¹⁶¹. Now that Iblis I period has been placed in the first half of the fifth millennium BC, the next period (Iblis II) could be put into the second half of the fifth millennium BC.

In Tepe Yahya, early Yahya periods (VII, VI & V) have been attributed to the 5th and 4th millennium BC¹⁶². Although the chronology proposed for early periods of Yahya have been changed several times by its excavators, a precise chronology is still required.

Lamberg-Karlovsky and Beale suggested that period VII of Tepe Yahya took place during the 5th millennium BC for a whole millennium¹⁶³. Based on new data, the idea of considering Yahya VII as the period of the 5th millennium and dating Yahya VI&V to the 4th millennium can't be correct. Prickett suggests the late 6th millennium and the 1st half of 5th millennium BC for period VII of Tepe Yahya based on calibrated dating¹⁶⁴. She has considered a very long period from the late 6th millennium to the mid-fifth millennium for Yahya VII and surprisingly puts Yahya VIB, VIA, VC & VB in a same category existing for a short time during the mid-fifth millennium BC. Based on her suggested chronology, Yahya VA also dates back to the late 5th and early 4th millennium BC. One absolute dating sample of Tepe Moradabad Dowlatabad shows the dating of 4250-3700 BC for Yahya VA. She suggests that Yahya VI& V lasted from 4600 to 3900 BC which is influenced by old suggested dates of Caldwell for Iblis. As mentioned earlier, Caldwell suggested the second half of the 5th millennium BC for Iblis I & II. Iblis I sherds (buff wares) were present in the Yahya B and C. The red painted ware of Iblis II was also the same as the ceramics of Yahya VA period.

The similarity between the architecture and potteries of Iblis I & II and Yahya VC, VB & VA, established a homogeneity in the 5th millennium cultures of these 2 areas of southern and northern Kerman. According to new chronological data including recalibrated dating

¹⁶¹ See Voigt and Dyson (1992), Caldwell (1967), Sarraf (1981).

¹⁶² Lamberg-Karlovsky and Beale (1968).

¹⁶³ Lamberg-Karlovsky and Beale, (1986), p. 11.

¹⁶⁴ Prickett (1986a), p. 217.

of early levels of Iblis and Yahya, absolute dating of Iblis I level in the East Dehno, absolute dating of Mahtotabad¹⁶⁵, radiocarbon results of newly excavated site of Vakilabad, Varamin and Dehno and comparative chronology of adjacent regions especially Fars province (Bakun), the author tries to present a revised chronology for the 5th millennium of SE Iran which will be discussed in the following pages. The cultures of the 5th millennium BC were developed through the predecessor cultures of the region and the evolution of human societies was influenced mostly by the local dynamics. Since Yahya VI potteries (Soghun bichrome and red painted Soghun) have never been found in other regions of Iran, it can be stated that Soghun was a local culture and was inherited from the previous level (Yahya VII). In the northern Kerman, synchronous with Soghun culture, the Bardsir culture was formed within the pottery Neolithic of the region. Despite all the similarities in architecture, these two predominant cultures of SE Iran, have significant differences in mid-6th millennium BC.

By the beginning of 5th millennium BC, entire Kerman region went under the influence of one culture, Yahya VC, B in South and Iblis I in Northern Kerman. It should be mentioned that, during this time another culture existed in the East of Bam (Darestan) which was an aceramic culture. The status of the other regions of South East such as Baluchestan, Hormozgan and Sistan in the early fifth millennium BC is still unknown.

Available evidence suggests that in the early fifth millennium BC, in spite of regional interactions, there had been a cultural diversity in south-East of Iran. Archaeological evidence reveals that the first steps toward the throughout regional integration were initiated in the mid-fifth millennium BC when the Yahya VA/ Iblis II with black on buff pottery dominated. During Yahya VC, Soghun wares gradually disappeared and were replaced by painted-buff wares similar to Bardsir (Iblis I), which were actually not still that common during this period. Petrography test results on buff-painted wares of Yahya VC has revealed that they had been imported but the analysis of this type of pottery in the next level (Yahya VB) suggests local production¹⁶⁶. Cultural integration in this period (Yahya VC,

¹⁶⁵ Vidale and Desset (2013).

¹⁶⁶ Kamilli and Lamberg-Karlovsky (1979), Beale (1968), p. 58.

B and Iblis I), was reflected not only in ceramics but also in the architecture. This period is a prelude to a broader cultural integration in the second half of the fifth millennium BC in the South East of Iran.

In Tal-i Iblis, Iblis II (red painted wares) replaces Bardsir culture and in Tepe Yahya, Yahya VA (red painted wares) supersedes the previous period. This pottery culture is considered as a continuity of buff-painted wares of the previous level¹⁶⁷. The red-painted pottery culture has been also found from Chah Hosseini in Baluchistan in the late fifth millennium BC¹⁶⁸.

This culture extends in a vast geographical zone from North of Kerman to Baluchestan which can be considered as a sign of regional-cultural integration and the formation of an independent regional identity in the late 5th millennium BC in SE Iran. The early stage of this cultural integration in the region goes back to the late 6th millennium BC and it reached to its peak in the middle of the 5th millennium. Most likely the cultural integration has emerged through an exchange system. There are several hypotheses on the pottery similarity in the South Eastern Iran in the second half of the fifth millennium BC, among which I believe the theories of imitation of a style or itinerant potters seem more probable.

The similarity between painted buff wares of SE Iran (Iblis I& Yahya V C,B) and Bakun wares has made most researchers believe that the 5th millennium societies of SE Iran were under the influence of Fars region. The author is against this idea. In addition to this Southwest oriented archaeology, the old chronology of Tal-i Iblis and Tepe Yahya was also the reason of development of this theory. As I mentioned before, Kerman's painted buff wares were dated to the late 5th and even the early 4th millennium BC¹⁶⁹ which is synchronic with the late Bakun and even Lapui. Hence it seems logical to consider Kerman's painted buff ware culture under the impact of Bakun. Now the fact that we know painted buff ware culture of SE Iran dates back to the late 6th to mid-5th millennium BC, proves this theory wrong. The similarity between buff ware decorations of SE Iran with Bakun wares

¹⁶⁷ Beale (1986), p. 67-80.

¹⁶⁸ Stein (1937), pls. XXV, XXIX, XXXIV.

¹⁶⁹ Lamberg-Karlovsky and Beale (1986), P. 11.

of Tol-Gap and Bakun B, proves the simultaneity of painted buff wares of SE Iran with early levels of Bakun culture.

It seems that the pottery similarity of the two regions in the early and mid-fifth millennium BC was caused by the mutual economic-ideological exchanges and should not be considered as one-sided impact, only from West to East. There is also evidence that confirms the impact of the East on the West. The emergence of some motifs such as lizards on Bakun buff wares or Lapui wares, is a sign of cultural penetration of the East to the West in the 5th millennium BC.

In fact, the South Eastern Iran in the fifth millennium BC, despite the cultural interactions with Fars and other regions as well, had passed through its own independent developmental trajectory with its local and regional characteristics.

By the 4200 BC, the Yahya VA or Iblis II culture with black on red wares was replaced by other cultures. In Shahdad, Tepe Dehno I¹⁷⁰ period is the common culture of the Lut area in the last quarter of 5th millennium or in the Halil Valley, Mahtotabad I¹⁷¹ culture was the subsequent culture of Yahya VA.

Finally, the 5th millennium BC is known as a significant period in evolution of human societies of Iranian plateau. It was a critical period of socio-economic transformations such as technical innovations, social hierarchy, significant population growth and regional cultural integration. Agriculture and insignificant role of pastoralism (unlike Fars) used to be the dominant subsistence pattern of SE Iran during the 5th millennium BC. Marta Prickett, based on her studies on Shahmaran-Dowlatabad on agriculture and irrigation systems, brings up the need of water management and human resources and explains the need for task division and the formation of social hierarchies in the fifth millennium BC¹⁷². Little administrative evidence related to the 5th millennium BC of SE Iran has been uncovered so far but it can be the consequence of lack of archaeological excavations.

¹⁷⁰ Eskandari (2017).

¹⁷¹ Vidale and Desset (2013).

¹⁷² Prickett (1986b), p. 772.

2.5.3.3. Southeastern Iran in the 4th millennium BC

The 4th millennium BC of SE Iran is poorly known. Our knowledge on this period is limited to the excavations of Tepe Aliabad (Bardsir)¹⁷³, Mahtotabad¹⁷⁴, Khaje Askar¹⁷⁵ (Bam), Varamin-e Jiroft¹⁷⁶ and Tepe Dehno. Yahya IVC and Shahr-i-Sukhte I provide some information on the late 4th millennium BC (Proto-Elamite culture). The archaeological surveys conducted in Shahmaran-Dowlatabad, Soghun, Bardsir, Bampur, Halilrud and Shahdad reveal some information on the fourth millennium BC settlement patterns of SE Iran¹⁷⁷.

It has been suggested that there is a gap during the fourth millennium BC in Tepe Yahya, hence the plain Soghun and Shahmaran-Dowlatabad region in this period remain unknown to us. On the one hand, the culture of Yahya VA in the mentioned areas had been existed until the end of the 5th millennium, on the other hand the beginning of Yahya IVC (Proto-Elamite) dates back to the late 4th millennium BC¹⁷⁸ which reveals ca. 700 years of cultural gap in Tepe Yahya. The author believes that the interruption between the end of Yahya VA and IVC is simultaneous with Iblis IV in SE Iran.

The surveys conducted in Shahmaran-Dowlatabad and Soghun plain, prove the existence of Aliabad culture in these areas¹⁷⁹. In Tal-i Iblis, period IV or Aliabad culture represents the 4th millennium BC culture. The pottery of Iblis IV comprises Aliabad plain, Aliabad painted, Aliabad bichrome, Aliabad brushed and Aliabad ridged¹⁸⁰. First described at Tal-i Iblis¹⁸¹,

¹⁷³ Caldwell (1967).

¹⁷⁴ Vidale and Desset (2013).

¹⁷⁵ Soleimani *et al.* (2016).

¹⁷⁶ Eskandari *et al.* (2020), Eskandari *et al.* (2021), Eskandari *et al.* (in press).

¹⁷⁷ See Prickett (1986b), Caldwell (1967), Sajjadi (1987), Stein (1937), Madjidzadeh and Pittman (2008), Hakemi (1997), Salvatori and Vidale (1982).

¹⁷⁸ Mutin (2013a), Dahl *et al.* (2012).

¹⁷⁹ Prickett (1986a), p. 217.

¹⁸⁰ Chase *et al.* (1967), p. 79.

¹⁸¹ Caldwell (1967).

the Aliabad pottery is a development of the Mahtoutabad I technological tradition. It is usually sturdy, painted with gross but it presents highly visible three-chromatic patterns (black, light brown and white) forming a limited set of geometric designs. The ring feet of its distinctive tall conical goblets, resistant to destruction, are excellent chronological markers.

Aliabad ceramics are found in a wide geographical range from Kerman province to Pakistan. Aliabad wares appeared by the middle of the 4th millennium BC in eastern Pakistani Baluchistan¹⁸². A series of absolute radiocarbon dates from Tepe Dehno and Varamin falls it in range of second and third quarters of 4th millennium BC¹⁸³.

Khaje Askar cemetery belongs to the Aliabad culture (Iblis IV) and dates back to the 4th millennium BC¹⁸⁴. The fact that Khaje Askar cemetery belongs to the 4th millennium BC is very important because it proves that the use of cemeteries in southeastern Iran goes back to 4th millennium BC. The recent excavations on Tepe Dehno Shahdad has revealed new information on this period.

In Bardsir Valley, Iblis III period (Dashkar culture) is dated to the late 5th millennium BC and the early 4th millennium BC. There are some indications of a transition from Iblis III to Iblis IV which is known as "Early Aliabad" and contained both Dashkar and Aliabad sherds suggesting a true ceramic transition between the two periods¹⁸⁵. Caldwell has suggested the mid to the end of the fourth millennium BC for Iblis IV layers¹⁸⁶. Voigt and Dyson believed on the simultaneity of Aliabad culture and early Banesh (3400-3250) based on the emergence of early Banesh ceramics such as beveled rim bowls¹⁸⁷. Cameron Petrie stated that Ali Abad period coincides with the early and mid Banesh (3250-2950 BC)¹⁸⁸. Iblis IV

¹⁸² Mutin (2013b).

¹⁸³ Eskandari (2017), Eskandari *et al.* (2020).

¹⁸⁴ Soleimani *et al.* (2016).

¹⁸⁵ Caldwell (1967), p. 37.

¹⁸⁶ Caldwell (1967), p. 24.

¹⁸⁷ Voigt and Dyson (1992), p. 146.

¹⁸⁸ Petrie (2012).

cultural materials are found from Mahtoutabad (period II) in Halil Rud valley which date back to the mid-4th millennium BC¹⁸⁹. Dehno II (containing Aliabad cultural materials) was identified from trenches I, II in Dehno and it dates back to 3700-3300BC on the base of four C14 samples. Also, the absolute dates from Varamin confirm this date for Aliabad culture. Hence, the author suggests the two last centuries of 5th millennium to beginning of the 4th millennium BC for the period of "Early Aliabad" or Mahtotabad I culture.

Relating the second half of the 4th millennium BC to Aliabad culture by many scholar was due to the discovery of the Early Banesh/Uruk related cultural material in the layers containing Aliabad materials in Bardsir valley. In my opinion, Iblis IV should be divided into two separated periods based on the presence of Uruk-Banesh cultural material since they have only been found from the second period (3rd quarter of the fourth millennium BC). These Uruk-Banesh cultural materials have also been uncovered from Mahtotabad (Jiroft) and they have been referred to the same period (3rd quarter of the fourth millennium BC) by its excavators¹⁹⁰.

The excavation of Tepe Dehno revealed that a new pottery tradition (simple red wares) replaced Aliabad wares in the last quarter of the fourth millennium BC in the western edge of Lut plain. Since this new cultural layer is placed on Aliabad layers without any interruption and without any trace of Uruk related materials, it seems that the termination of Aliabad pottery tradition was due to internal and local factors. A same scenario can be proposed for the Jiroft plain where Aliabad culture was replaced by a local culture so-called "Varamin"¹⁹¹ in 3300 BC.

There was a fundamental change in settlement patterns of SE Iran during Aliabad period. The studies on the settlement patterns of Jiroft plain and the western edge of Lut during this period reveal the formation of multi-level hierarchy and the emergence of settlements with an extent more than 15 hectares surrounded by smaller areas. Tepe Dehno in Shahdad is one of these central settlements with an extent over 15 hectare during

¹⁸⁹ Vidale and Dessel (2013).

¹⁹⁰ Dessel *et al.* (2013).

¹⁹¹ Eskandari *et al.* (2021), Eskandari *et al.* (2020).

Aliabad period. These type of sites can be considered as precursors to urban centers and cities of the Bronze Age.

During Aliabad period, a cultural homogeneity dominated all over the SE Iran. It can be known as an independent indigenous cultural identity. In addition to the emergence of large centers and settlement hierarchies, other factors such as emergence of the cemeteries, population growth, widespread cultural integration, cross-regional interactions, long distance trades, “industrial” growth and the need of human resource managements made the fundamental socio-economic-political changes more probable.

During the late fourth millennium BC, Uruk-related materials began to spread in SE Iran (Tal-i Iblis, Tepe Langar in Mahan plain, Mahtotabad) which are not at all the reflect of a hegemonic relation of Mesopotamia or SW Iran with Southeastern Iran. The emergence of these materials in SE Iran can be interpreted as a mutual economical-ideological-cultural connection between these two regions.

Right after this period, the continuation of this relationship between the South East and South West of Iran during the Proto-Elamite period is visible. In the early third millennium BC, evidence of this relation can still be observed of which we can refer to the seal impressions belonging to the early dynastic period found from excavations of the South Konar Sandal¹⁹².

2.5.3.4. Southeastern Iran during the third millennium BC: Genesis of urbanization

The third millennium BC was as a critical period of socio-economic transformations in SE Iran. It is well known that this period witnessed the appearance of the earliest urban centers in this region. Some researchers believe that the Mesopotamian names during the third millennium BC (Aratta and Marhashi) could refer to the Southeastern Iran¹⁹³. Due to the exciting discovery of major Bronze Age urban centers in southeastern Iran, such as Shahr-e Sokhta, Shahdad and Konar Sandal (Jiroft), most scholarly attention has been given to the 3rd millennium BC. Therefore we already have a lot of information on this period

¹⁹² Madjidzadeh and Pittman (2008), Pittman (2012).

¹⁹³ See Steinkeller (1982),(2006), Madjidzadeh (1976).

based on the studies conducted on Yahya IVB¹⁹⁴, Shahr-i-Sokhta¹⁹⁵, Bampur¹⁹⁶, Konar Sandal¹⁹⁷, Shahdad¹⁹⁸, Hanzaf¹⁹⁹, Rud-e Biaban, Tepe Sadeq, Tepe Dasht, Tepe Graziani²⁰⁰ in Sistan and some excavated cemeteries such as Khurab, Damin, Bampur 14²⁰¹, Spidej²⁰² and Chegerdak²⁰³ in Baluchistan, Konaru²⁰⁴ in Esfandage, Mahtutabad²⁰⁵, Riganabar, Varamin²⁰⁶ and Rameshk in Halilrud cultural basin and Shahdad in Lut Desert area.

The regional surveys have also led us to know better the settlement patterns of the region during this period²⁰⁷. Our understanding of all periods of the third millennium BC is not equally the same. Cultural materials of the early Bronze Age I & II have been found in a small scale from Shahr-e Sokhta and the South Konar Sandal (period I). Therefore, the time before the so-called Urbanization period (2700-2000BC or Early Bronze Age III & IV) is still unknown.

Although more data is available from second half of the 3rd millennium BC, there are disagreements on the chronology of SE Iran during this period. For instance, Potts suggests the late 3rd millennium BC for Yahya IVB²⁰⁸ while Lamberg-Karlovsky believes this period

¹⁹⁴ Potts (2001).

¹⁹⁵ Tosi (1969), Sajjadi (2006)

¹⁹⁶ De Cardi (1970).

¹⁹⁷ Madjidzadeh and Pittman (2008).

¹⁹⁸ Hakemi (1997).

¹⁹⁹ Eskandari *et al.* (2019a)

²⁰⁰ Kavosh *et al.* (2019).

²⁰¹ Rahbar (2003).

²⁰² Heydari *et al.* (2019).

²⁰³ Heydari *et al.* (2015).

²⁰⁴ Rahbar (2003).

²⁰⁵ Madjidzadeh and Pittman (2008), Desset *et al.* (2017).

²⁰⁶ Eskandari *et al.* (2020).

²⁰⁷ See Eskandari (2019), Pfalzner *et al.* (2019), Mutin *et al.* (2017).

²⁰⁸ Potts (2001).

dates back to the mid until the late third millennium BC²⁰⁹. Chronology of Yahya IVC or Proto-Elamite culture needs a revision. Based on new dating of Varamin Culture from site of Varamin-e Jiroft, I propose that Yahya IVC falls in a range of 3300-3000 BC and not later. It is backed by the Varamin potsherds that were found among the Yahya IVC material assemblage²¹⁰.

Potts and De Cardi suggested the 2nd half of the third millennium BC for the all phases of Bampur (I-VI)²¹¹ while Lamberg-Karlovsky and Tosi²¹² dates Bampur to the first half of the 3rd millennium.

Recent excavations of the author at the site of Varamin-e Jiroft provided new information especially absolute dates for revising the old chronology of Tepe Bampur after more than half a century. Based on the ceramic comparison, there was a close link between Varamin period (3300-2900 BC²¹³) and those recovered from Bampur I-V. An influence of Eastern Civilization (Pakistan) can be recognized in the two last periods of Bampur (V&VI). Thus, one can conclude two different dates can be proposed of the Bampur, the late 4th millennium BC for Bampur I-V and second half of the 3rd millennium BC for the Bampur V & VI.

Shahdad has also received different comments on its chronology. Hakemi believes it dates back to the early third millennium and it lasts until the end of the third millennium BC²¹⁴, Voigt and Dyson consider Shahdad concurrent with Yahya IVB & IVA²¹⁵. The author also presents a new chronology for Shahdad in this thesis (See Part II, chapter II). The chronology of Shahr-e Sokhta had been presented by Italian archaeologists before the Islamic revolution of Iran and it has not changed through all these years of recent

²⁰⁹ Lamberg-Karlovsky (2001).

²¹⁰ The Varamin materials in assemblage of Yahya IVC. See Mutin (2013).

²¹¹ Potts (2003), De Cardi (1970).

²¹² Lamberg-Karlovsky and Tosi (1973).

²¹³ Eskandari *et al.* (2020).

²¹⁴ Hakemi (1997).

²¹⁵ Voigt and Dyson (1992), p. 147.

excavations. Recent radiocarbon dates for the Tepe Graziani provide an early date for period IV of Shahr-e Sokhta. Excavators of Tepe Graziani proposed 2400 BC for the beginning of period IV²¹⁶. This dating made us to have a skeptical look at the chronology of the Shahr-e Sokhta I-III periods.

In general, despite all the excavations conducted on the third millennium sites in Southeastern Iran, the chronology of this era is not fully and precisely known. It must be mentioned that chronology of Bronze Age cultures of SE Iran requires revisions.

2.5.3.5. The Southeast of Iran during the 2nd millennium

We have got very few information on the 2nd millennium BC of SE Iran. We have only identified this period in Halilrud cultural basin and Shahdad and other regions of SE Iran during the 2nd millennium have remained unknown to us.

In Halilrud cultural basin, our knowledge is limited to Yahya IVA (1900-1700 BC) and the lower levels of the Konar Sandal North which both covered the same time horizon (early first millennium BC). We have got no data available for the rest of the 2nd millennium BC. The Konar Sandal North/ Yahya IVA culture differs from the previous period with simple buff wares and sometimes incised potteries²¹⁷ which have not yet been found from any other regions of Iranian plateau.

Most scholars believe that by the collapse of the urbanization of SE Iran at the end of the 3rd millennium BC, this region witnessed a thousand year of cultural gap. It is possible to assume that urbanization of the Southeastern Iran vanished as a result of environmental changes²¹⁸ and the region went through a huge population loss during the second millennium BC the existence of the northern Konar Sandal / Yahya IVA culture during the early 2nd millennium BC proves the continuity of settlements in this region.

²¹⁶ Kavosh *et al.* (2019).

²¹⁷ Lamberg-Karlovsky (1970), p. 39.

²¹⁸ See Hamzeh *et al.* (2016).

I believe the lack of our information on this era is due to our lack of knowledge on cultural materials of this period. The fact that no second millennium cultural materials have uncovered from any prehistoric sites of SE Iran, reveals changes in settlement patterns and even in the lifestyle of inhabitants of the region during this period, which makes it more complicated for us to know them better.

No settlements have been identified so far from SE Iran related to the time period from 1700 to 900 BC. The first settlement known after this period, belongs to the third layer of Tepe Yahya (Yahya III) which dates back to 800-650 BC based on two carbon 14 datings.²¹⁹ In addition to Tepe Yahya, Qale Kouchak in Jiroft²²⁰ and also the huge superimposed mud-brick platforms of the Konar Sandal North²²¹ date back to the first half of the first millennium BC.

2.5.4. Concluding Remarks

This chapter aimed to study and evaluate the chronology and cultural developments of Southeastern Iran from Neolithic to the end of the Iron Age. As a result of this study, most viewpoints related to the prehistoric cultures of the region and its chronology need to be revised. In this research I attempted to present an updated chronological table of the prehistory of Southeast Iran based on new carbon 14 datings (Table 14)

Based on available data, the prehistoric cultures of Southeastern Iran presents a non-uniform picture of the prehistory of the Iranian plateau. Studies on prehistoric cultures of the region revealed an indigenous evolutionary process and pathway which flourished during the 3rd millennium BC. In fact, despite all the cultural interactions with adjacent regions southeast Iran had passed through its own independent developmental trajectory with its local and regional characteristics. To sum up, our understanding of the prehistoric cultures of this very important region is too limited and insufficient and further studies are required.

²¹⁹ Magee (2004), p. 75-6.

²²⁰ Azadi *et al.* (2010).

²²¹ Eskandari (2012).

Table 14: Proposed chronological table for the South-East Iran (provided by author)

Date BC	Period	Kerman Region					Sistan & Baluchistan	
		Shahdad	Bardsir	Soghun	Jiroft	Bam	Sistan	Baluchistan
2000	Middle Bronze Age	Cemetery. B&C		Yahya IV A	KSN			
	Early Bronze Age II-IV	Shahdad City		Yahya IV B	KSS City		S.sokhta IV	Bampur V,VI
3000	Early Bronze Age I	Dehno III	Iblis V ?	Yahya IV C	Varamin period		S.sokhta II&III	Bampur I-IV
3300	Late Chalcolithic	Dehno II	Iblis IV	Hiatus	Matotabad III	Khaje-Askar	?	
					Mahtotabad I&II			
4000		Dehno I	Iblis III		Gaz Saleh?			
4700	Middle Chalcolithic	East Dehno	Iblis II	Yahya V A				Chah-Hussini
	Early Chalcolithic			Iblis I	Yahya V C-B		Aceramic Atashi	
5500		?	Iblis 0	Yahya VI		?		?
6000	Late Pottery Neolithic							
7000	Early Pottery Neolithic		?	Yahya VII				

Part III:

Settlement Patterns, Population and Landscape

**Modes d'occupation des
territoires, Population et Paysage**

Chapter I: Prehistoric Settlement and Population Trends on the west of the Lut Desert

3.1. Patterns of Settlement

3.1.1. Introduction

The western Lut Desert provides a unique opportunity for studying the impact of desert environmental variables on prehistoric settlement patterns, as well as the formation, growth, and type of individual settlements. This research examines human-environment interactions in the western Lut desert from the Chalcolithic period through the Bronze Age and aims to understand how the physical environment contributed to the unique settlement pattern that characterises these landscapes.

Cultural landscapes are the result of millennia of human endeavor. Desert cultural landscapes represent human ecology in an extreme environment. Studying human exploitation of a desert environment not only allows us to reconstruct human behaviors of the past, but can also be an asset for future planning. This thesis introduces a case study from Iran and uses it to examine some of the issues pertaining to the archaeological study of desert landscapes. The focus will be on desert settlement systems, human adaptations to desert environments, and long-term settlement trends. The main feature of the desert landscape of the Lut area is the natural sandy hills (dunes), locally called Kalut, which are shaped by the local environmental characteristics (especially hydrology and windy conditions).

Data collection for this research was gathered during the recent Lut archaeological project. This project was devised to investigate the prehistoric settlement development and human-environment interactions in the Lut area throughout prehistory in a region where previous excavations had documented the existence of a significant Early Bronze Age urban center (Shahdad)²²².

²²² Hakemi (1997).

Not only did this research allow us to document the 3rd millennium BC urban landscape of the Lut Region, but, also provides evidence for how early complex societies developed in a desert landscape completely differently from other contemporaneous urban landscapes of Southeastern Iran, namely the Halilrud and Sistan basins. These developments are also considered in the context of early urbanisation in the greater Near East (see next chapter).

Throughout this work I have attempted to highlight the indigenous desert cultural landscape of the Lut area through current landscape archaeology approaches²²³.

Regional surveys produce data about human activities dispersed throughout the landscape rather than concentrating on “sites” alone²²⁴. The Lut Area survey was designed to explore long-term regional settlement patterns²²⁵, how they changed over time, and how they related to the unique environmental conditions of the Lut Area.

The Dasht-Lut project utilised both extensive and intensive survey methods. The former comprised a conventional extensive survey in which we visited every possible place where sites were expected to be found.

To understand the chronological framework underpinning the Lut area settlement patterns, the major analytical component of this study was based on the collection and analysis of surface materials from each site. The proposed dates of Lut sites rely significantly on comparisons with published ceramic data from excavations of Shahdad²²⁶ and other areas of South-East Iran, particularly the Bardsir Plain²²⁷ and the Soghun valley²²⁸. The excavations at the site of Shahdad together with new excavations at Tepe Dehno and Tepe East Dehno²²⁹ within the Shahdad area have enabled the secure identification of the majority of surface

²²³ *cf.* Wilkinson (2003a), David and Thomas (2008).

²²⁴ Banning (2002), p. 1.

²²⁵ *cf.* Kowalewski (2008).

²²⁶ Hakemi (1997), Eskandari (2017).

²²⁷ Caldwell (1967).

²²⁸ Lamberg-Karlovsky and Beale (1986), Lamberg-Karlovsky and Potts (2001).

²²⁹ Eskandari (2017).

ceramics. The recent reconnaissance survey of the Lut area led to the identification of eighty-seven ancient sites, ranging from the early fifth millennium BC to the late Islamic era. Of the recorded sites, twenty-three are assigned to the Chalcolithic era and Bronze Age. In the following discussion, I will focus on the settlement trends of the prehistoric periods of the Lut area.

3.1.2. Fifth Millennium BC

The 5th millennium BC is significant as the crucible for various aspects of complexity that led to social changes in the 4th millennium BC and finally the emergence of first cities in the early Bronze Age in the area of Southeastern Iran. For instance, evidence for copper working²³⁰ as well as agricultural and irrigation systems²³¹ in the greater region signal the commencement of social hierarchies in the 5th millennium BC.

The Lut survey provided no evidence for occupation earlier than the 5th millennium BC. Thirteen sites were recorded which can be attributed to this period. All were distributed at the base of the alluvial fan of Shahdad within a radius of 2 kilometers (Fig 83).

These sites are small and range in size from 0.25 to 4.5 hectares. Together, the 5th millennium settlements of the Lut area represent 17 hectares of occupation. All of these sites were founded on Kaluts. In other words, all the fifth millennium sites in the Lut area are hill-top settlements. To conclude, the fifth millennium landscape thus appears to be represented by small villages located at the edge of an alluvial fan in the central part of the Lut area.

²³⁰ Caldwell (1967).

²³¹ Prickett (1986a), p. 772.

3.1.3. Fourth Millennium BC

The 4th millennium, including the Aliabad (Iblis IV) period, is represented by 15 sites in the Lut area. Following the 5th millennium, when settlement was entirely limited to hill-top sites on the oasis of Shahdad, several settlements were also established along the edge of Lut Desert As in the previous period. The majority of sites (13) in the Shahdad oasis were found at the end of the Shahdad fan.

However, within this zone, settlements appear to be distributed in a more linear alignment along the naturally more traversable corridor of the western edge of the Lut desert. This can arguably be seen as the development of a particular communication network that fully developed during the 3rd millennium BC.

However, two sites (022, 004) with 4th millennium occupation were also found beyond the edge of the fan within the Lut desert zone (Fig 84). These two sites (without any peripheral occupation) are situated 15 and 65 km, respectively, south of the fan of Shahdad.

Settlements tend to fall within two size ranges. There is one large site (051/Tepe Dehno), which is over 15 hectares, while the other 14 settlements are all less than 4 hectares.

Overall, fourth millennium settlements of the Lut area cover 42 hectares of occupied area. On the basis of the evidence, it seems likely that Tepe Dehno (051) was a large fourth millennium BC center and therefore might have served as a central place. This large site is surrounded by smaller satellite sites which perhaps fulfilled a kind of local service function.

3.1.4. Third Millennium BC

A total of 12 sites were attributed to the 3rd millennium BC (Fig 85). The number of sites occupied at this time represents a reduction from the total number of settlements attributed to the Chalcolithic period. However, in contrast, the total settled area increased dramatically. Among the sites identified, there are three large sites including Shahdad (46) (over 170 ha), Mokhtarabad (22) (over 70), and Keshit (04) (over 150 ha)²³².

²³² Eskandari (2019), Eskandari *et al.* (2014).

The distribution pattern of these sites is nearly the same as in the 4th millennium. There are 9 sites at the end of Shahdad fan on the central part of the Lut area and two large sites - Mokhtarabad and Keshit- located 15 and 65 km south, respectively, from the contemporaneous urban center of Shahdad. It should be mentioned that each of these large sites are composed of many mounds.

In the middle portion of the western edge of the Lut area, all of the 3rd millennium sites including the urban center of Shahdad and its periphery sites were distributed at the base of the alluvial fan of Shahdad. These periphery sites are small and range in size from half a hectare to 3 hectares.

What stands out in term of site distribution is that all of these small sites are concentrated to the east of the urban site of Shahdad at a distance ranging from 300 m to 4 km. It seems possible that these smaller sites were satellite sites for the urban center of Shahdad. Neither of the other two large sites (22 and 04) appear to have satellite sites.

The Lut area has a very interesting and unexpected pattern of site distribution. To judge from these results, the third millennium settlement pattern of the Lut is completely different from two other contemporaneous urban landscapes of South-East Iran, the Halilrud valley²³³ and the Sistan Plain²³⁴.

In the Sistan plain there is only one large urban center _Shahr-i Sokhta_ with numerous smaller satellite sites, and this scenario is the same for Konar Sandal in Jiroft plain (see next chapter)²³⁵.

These results suggest that both ecological factors and the natural landscape had a major influence in generating this distinctive spatial pattern on the west of Lut. Furthermore, there was also a functional basis for the location of 3rd millennium sites. In the west of the Lut area, water sources do not cross the entire length of the plain. Thus, there was no water available to develop agricultural lands along the entire extent of the western edge of Lut desert, but only in specific location (i.e. near the site of Shahdad).

²³³ Madjidzadeh and Pittman (2008).

²³⁴ Tosi (1986), Mehrafarin and Mousavihaji (2006).

²³⁵ See Eskandari (2019).

The lack of small satellite settlements around the other two large Bronze Age urban centres (Mokhtarabad and Keshit) is in part related to the lack of water resources suitable for cultivation and indicates a different economic strategy.

The location of three urban centers along the natural corridor of the western edge of the Lut desert and the distances separating them, allows us to reasonably suggest that their strategic position permitted them to control trade networks. In fact, they likely belong to a chain of caravan trade stations that could have controlled the movements of goods and raw materials in the 3rd millennium BC.

This north-south corridor of the western Lut area, even today, is the main transit route for connecting the South-East of Iran (in particular Kerman and Hormozgan Provinces) to the Great Khorasan road. In addition, this route is known as the opium route along which illegally imported opium is transported from the South-Eastern Iranian borderlands (Pakistan and Afghanistan borders) to the Khorasan area. Hence, it seems that the locations along the transportation route were probably a very strong factor determining the spatial organization of the sites during the Bronze Age in the Lut area.

3.1.5. Second Millennium BC

The collapse of the third millennium settlement pattern was dramatic in the Lut area. Only two sites continue to be occupied into the second millennium (46 (Shahdad), and 54). This represents a reduction from around 350 hectares of total occupied area in 3rd millennium BC to only 5 hectares in the early second millennium.

This is the period in which the urban centers of the Lut area collapsed. Important climatic changes could have contributed to these events. There has been much discussion about the impact of the 4.2 kya event on 3rd millennium BC settlement in southern Eurasia²³⁶.

However, the relevance of this climatic event to our study area is not clear. Local climate proxies would be helpful in ascertaining if there was a link between the dramatic restructuring

²³⁶ See, among others, Weiss *et al.* (1993), Madella and Fuller (2006), Schmidt *et al.* (2011); Lawrence *et al.* (2016).

of the settlement system in the Lut area and period of dryer conditions. Paleo-climatological studies in the Lake Hamoon on the eastern side of Lut Desert showed dramatic fluctuations at the end of third millennium BC which coincide with the collapse of the urban centers of Southeastern Iran²³⁷.

In summary, the Lut area witnessed a dramatic change in its settlement system in the early second millennium. The survey data provides no evidence of occupation from the second quarter of 2nd millennium until the middle of the 1st millennium BC.

3.1.6. Human-environment Interactions in Dasht-e Lut

The main impacts of the desert environment on the cultural landscapes of the Lut area is seen through *settlement location, type and morphology* of the archaeological sites.

As mentioned before, prehistoric sites of the region were formed on the edge of the alluvial fan of Shahdad in the central part of the Lut area. This pattern of settlement distribution is very different from other landscapes of the Iranian plateau.

Indeed, the pattern appears to have been one of aggregated communities concentrated in specific parts of the region rather than scattering across the landscape. Oases are the only places in the desert suitable for the formation of human communities due to limited water sources.

Wilkinson²³⁸ has suggested that the *oasis* is the quintessential settlement of the desert. Oases have been defined by Paolo Costa (1983) as “where water and cultivable land meet” in the desert or as an “agricultural enclave in or on the edge of a desert”²³⁹. The question, is how did the desert environment impact the types of the settlement that developed in the Lut area?

²³⁷ Hamzeh *et al.* (2016).

²³⁸ Wilkinson (2003a), p. 155.

²³⁹ Mainguet (1999), p. 209.

Here, hydrological conditions had two principal impacts on the cultural landscape of Lut. First, it has affected the distribution patterns of settlement; all twenty-one prehistoric settlements (except 022 and 004) are scattered within a radius of 4 km at the end of alluvial fan of Shahdad in the central part of Lut area.

Second, it encouraged the formation of hill-top settlements rather than Tell-sites. Indeed, although oases attract human communities, they are also at increased risk of flash floods. Therefore, one can label them as high risk settlement zones. In fact, to avoid the risk of flash floods, the prehistoric inhabitants of Lut founded their settlements on the top of natural hill/Kaluts that are normally several meters higher than the surrounding land surface. To illustrate an example of this risk, we can look at the destruction of the Islamic city of Shahdad by a massive flood in the middle Islamic era. Hence, the physical environment may heavily influence the location of settlement.

Another impact of the desert landscape of Lut on the cultural landscape is reflected in site type and morphology. Interestingly, investigations have indicated that prehistoric sites tended to expand horizontally through time in the Lut Area. Often, in the greater Near East previous places of settlement became meaningful, and it was advantageous and important for communities to rebuild in exactly the same place through time, not merely nearby. The Tell or Tepe sites, so characteristic of lowland plains across Southwest Asia, are not found in the Lut area. However, environmental factors clearly played a role in the absence of tell formation.

Previous and recent excavations at the site of Shahdad as well as recent excavations at the sites of Tepe Dehno and East Dehno showed that prehistoric cultural deposits are less than half a meter thick.

Although the sites show a trend toward horizontal growth through time (a factor that will be discussed below), it seems unlikely that there was no depositional build-up at all over time. The exposure of graves on the surface and erosion of burial goods at the prehistoric sites of the region, which would have originally been at least one or two meters below the level of the site, indicate that there has been extensive deflation of cultural

deposits due to consistent wind erosion (Fig 86). This must be one of the main reasons why there is such deflation of the cultural deposits.



Fig 85: Exposure of graves on surface and erosion of burial goods at the 3rd millennium Site of Mokhtarabad on the west of the Lut desert (Photo by author)

3.1.6. Economic Landscapes of Dasht-e Lut

In the 1990s excavations at the site of Shahdad in this region, led to the discovery of ploughing furrows in the test trenches²⁴⁰ that provide proxy indicators of ancient cultivation.

However, the arid character of the plain, along with the limited number and direction of the streams running across the plain meant that there was a lack of large cultivable areas.

²⁴⁰ Kaboli (2002).

The economy of the communities of the western edge of Lut in third millennium BC clearly reflects the importance of trade. Hiebert and Lamberg-Karlovsky²⁴¹ considered Shahdad in full control of an important territory, and of a long-distance trade network with the surrounding areas.

On the basis of the style and types of its abundant copper products, Salvatori has even suggested that Shahdad at a given time might have worked as a trade colony, or some kind of *karum*, for one or more Oxus polities²⁴².

Therefore, the Lut area's location in the middle of a trade network, the richness of local mineral sources²⁴³ and the juxtaposition of this area with the Lut desert (placing in a natural communicative corridor) were the advantages, and for these reasons may have led to the Shahdadians to develop a mixed economy consisting of farming and industrial manufacturing. Such economies seem to have favored the formation of large settlements without peripheral communities in the 3rd millennium BC as an adaptive strategy responding to the natural landscape of Lut area (see next chapter).

²⁴¹ Hiebert and Lamberg-Karlovsky (1992).

²⁴² Salvatori (1995).

²⁴³ See Salvatori and Vidale (1982), Meier (2015).

3.2. Population Trends

3.2.1. Introduction

In the late 1960s and 1970s, population was flagged as one of the main indications in cultural change. The seminal works by Binford²⁴⁴ and Flannery²⁴⁵ on the role of population dynamics, and particularly population pressure, in the origins of agriculture in the Southwest Asia were intriguing and novel²⁴⁶.

Although archaeologists use modern data and results of the ethnographic studies in order to assess the possibilities of estimating the size of ancient populations on the basis of the extent of occupation areas, the results could not be accurate. But, the method has some value for documenting the population changes over time in a specific area for a better understanding of the regional settlement trends.

It can be argued that observed variation in the relationship between settlement area and population, along with uncertainties introduced by the assumption that archeological site area is equal to settlement area, makes efforts to estimate population from site area an impossible task. Such an argument leads to the conclusion that only a relative measure is justified, using site area as a proxy for population, rather than an estimator²⁴⁷.

In the following, it will be attempted to estimate the population changes of the Desert landscape's settlements of Dasht-e Lut from 5th to second millennium BC on basis of the settled occupations. In this thesis, I tried to study the population dynamics as an important indicator of long-term settlement trends in Dasht-e Lut

²⁴⁴ Binford (1968).

²⁴⁵ Flannery (1969).

²⁴⁶ Hassan (2007).

²⁴⁷ Sumner (1989).

3.2.2. Prehistoric and Protohistoric population trends in Dasht-e Lut

I made attempts to estimate population numbers from the Lut survey data because population dynamics are important indicators of long-term settlement trends in the regional studies. In order to arrive at a total population estimate for the entire region of the western fringe of the Lut Desert, the total population estimate for all known sites was added together.

The method of calculating the population for individual settlements and then adding those together to arrive at a population estimate for an entire region is much more accurate than attempting a regional estimate based on techniques such as carrying capacity, site numbers, or demographic comparisons²⁴⁸.

Demographic investigation in archaeology should not be viewed merely as a means of generating estimates of demographic variables²⁴⁹. Such estimates provide the data required for formulating and testing hypotheses about the relationship between demography and subsistence, settlement, social organization, and other aspects of cultural systems²⁵⁰.

One way to estimate population is to multiply site area by an assumed population density factor²⁵¹. The density coefficients employed by various population estimates of Chalcolithic period and Bronze Age in Near Eastern archaeology have used a rate of about 200-250 persons per hectare. These densities have been based upon data obtained through observations of population densities in the old quarters of various Middle Eastern cities, towns, and villages in Iraq, Iran, and Syria²⁵².

²⁴⁸ Renfrew and Bahn (2004), p. 463.

²⁴⁹ Hassan (1978).

²⁵⁰ Jochim (1976), Wobst (1975), Keene (1977).

²⁵¹ Adams 1965; Kramer (1980).

²⁵² Hassan (1981), p. 66.

Toward a better understanding of the development and trajectory of societies in the Lut area, we attempted to make basic estimates of population from the archaeological survey data (Table 15).

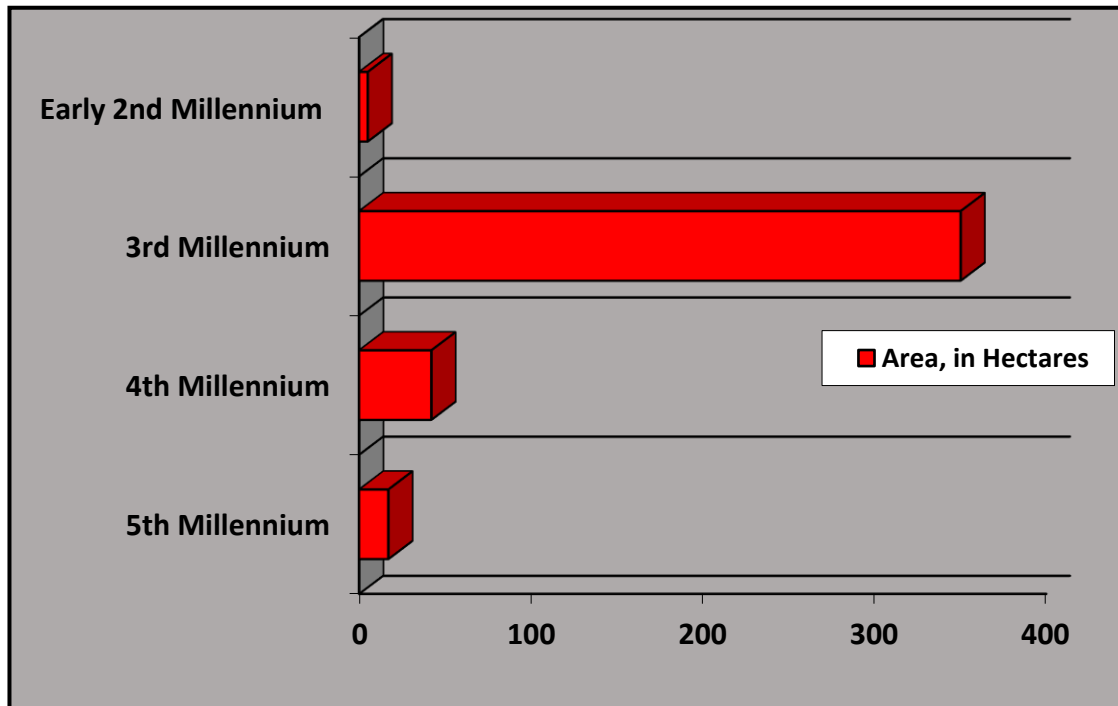


Table 15: Settled Areas of Lut in different periods derived from survey data

Assuming a population density of 200-250 people per hectare and regarding 17 ha of settled area (adding all of the habitation settlements together to derive a population estimate for the entire region) during the 5th millennium we would suggest a population of 3,400-4250 for the region (Table 16).

Using the same density, the 42 ha of occupation (representing 15 communities of different sizes), recorded for the fourth millennium could represent a population of about 8,400-10500 people (Table 16). However, the particular type of settlement that characterizes the 5th and 4th millennium - the hill-top settlement - suggests a dense structure of houses due to limited space on the top of the natural hills.

By the third millennium, following the appearance of large urban centers along the Lut desert, the total settled area dramatically increased to 350 hectares in only 3 aggregated communities.

In order to achieve a more realistic estimate of the limits of the urban center of Shahdad, a systematic surface survey was conducted and the site was delimited by the means of a small number of test trenches in 2016. The surface survey produced a record of the habitational pattern of the Bronze Age city quite different from that of commonly imagined.

The entire area assigned to the site appears not to have been completely occupied representing a spatially discontinuous pattern²⁵³. Hence, a minimum population density of 100-150 people per hectare is estimated for ca. 350 ha occupation of Lut during the 3rd millennium. We therefore suggest that the Lut area could have hosted an approximate population of around 35,000-52,500 persons at this time (Table 16).

One of the most prominent but least understood demographic phenomena in the prehistoric trajectory of the Lut area is the disappearance of the population from the region in the early 2nd millennium BC. This phenomenon seems to have occurred not just in the Lut area, but across Southeastern Iran.

We assume that around the beginning of the second millennium a severe environmental change²⁵⁴ and eventually population migrations caused deurbanization in the area and a gradual decline in population density of the entire region after which the region saw only the smaller remnant groups.

²⁵³ Eskandari *et al.* (in press).

²⁵⁴ See Hamzeh *et al.* (2016).

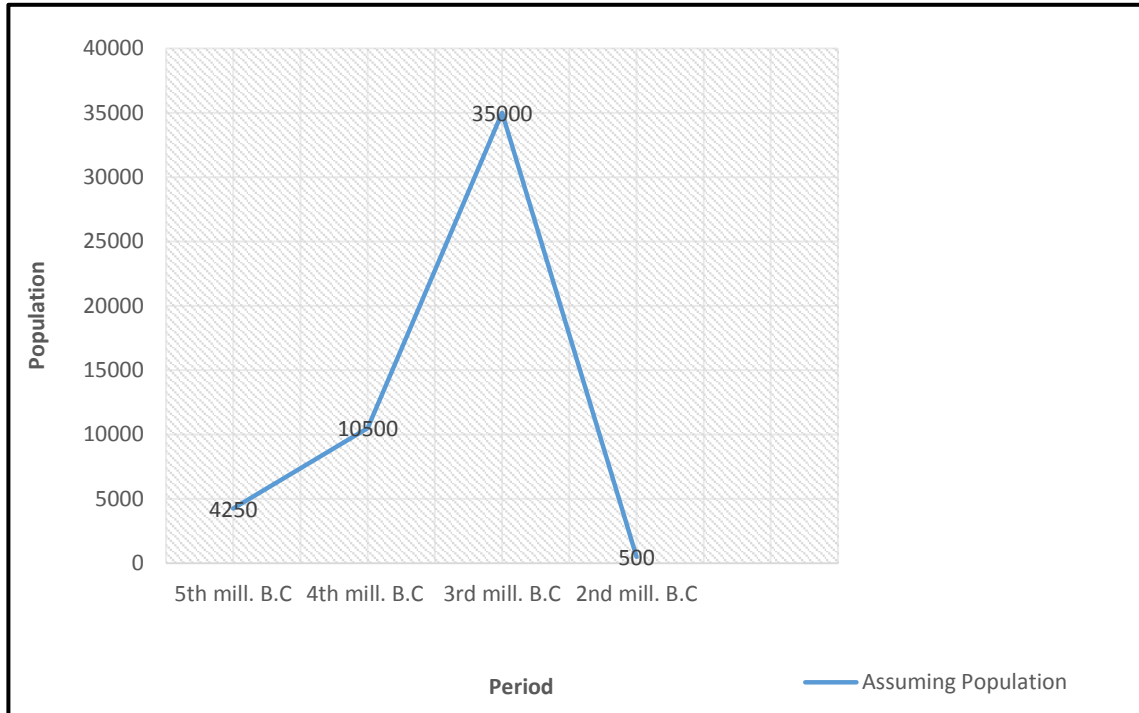


Table 16: Long-term population trend from Lut area

3. 3. Concluding Remarks

The settlement pattern is, overall, a reflection of social, cultural and economic adaptations to an arid environment in which water resources are limited to specific areas, but in which other valuable natural resources can be exploited (e.g. mineral resources).

By means of a regional research, consisting of a combined program of survey and excavation, I attempted to provide insight into the settlement systems and the interaction of prehistoric societies with their natural environment on the west edge of the Lut Desert. Accordingly, the interactions of the desert physical and cultural landscapes on the Lut area are reflected in the patterns of site distributions, settlement type, and the long-term stability of the settlement systems.

Chapter II: 3rd Millennium BC Urban Landscape of Dasht-e Lut: Introducing “Hollow” Early Urban Model of Shahdad

3.2.1. Early Bronze Age Urban Landscape of Dasht-e Lut

3.2.1.1. Introduction

The origins, development and the collapse of early urban societies have long been a favorite subject matter in Near Eastern archaeology. Today, the assumption that the idea of urbanism diffused from southern Mesopotamia is questioned because ample evidence increasingly illustrates that in addition to southern Mesopotamia, many urban centers in northern Mesopotamia, Indus and Southern Iran Valley existed at the same time – Early Bronze Age- which had their own cultural character and their own trajectory of development.

However, there are some debatable considerations on the definition of early cities and urbanization in the mentioned areas. In other words, one can criticize the studies on early urbanization of Near Eastern Archaeology because most of research that has engaged with urbanization in this region has not adequately defined what they mean by “urban” or “city” and as a result a number of ancient sites in this area have been called “cities”.

This lack of definition has given rise to a vague and diverse understanding of urbanization in Near Eastern archaeology. Sometimes the term “city” is used instead of “urbanism”, even though a difference between them, was established long ago by Charles Redman²⁵⁵ who noted that “Urbanism implies the characteristics that distinguish cities from simpler community form; it also refers to the organization of an entire urban society, which includes not only cities, but also towns and villages. A city, on the other hand, is the physical center manifesting many important characteristics of urban condition”.

In attempting to move toward a definition, in light of our present knowledge, it is difficult to characterize in detail the process of Early Bronze Age urbanization in

²⁵⁵ Redman (1978), p. 215.

southeastern Iran because compared to other centers of the Near East, it is still very poorly known.

General speaking, the EBA urbanization of southeastern Iran can be identified at through our increasing knowledge of large and densely populated centers, an increased understanding of the patterns of occupation surrounding these centers, socio-economic stratification, long distance trade, craft specialization and an emergence of administrative agencies.

On the western edge of Lut desert the Early Bronze Age spatial pattern is completely different from Helmand and Halil river Basins. Contrary to the Halil and Helmand areas where urban centers are contributed to grassroots increase of satellite sites, on the western edge of Lut desert large urban centers are characterized with the scanty of surrounding occupations. In the further below, these two different spatial patterns will be discussed.

However, in order for us to have an understanding of the character of SE Iran urbanization, more archaeological and survey investigations are urgently required. We first knew of Southeastern Iran early cities from excavations at Shahr-i Sokhta and Shahdad in 1970s. The third major urban center of SE Iran – Jiroft (Konar Sandal South) - has been identified in last decade. These centers are located, respectively, in Sistan plain, west fringe of Dasht-e Lut and Jiroft plain in Halil River Valley. In this chapter, I will present new information that comes from recent work in the Dasht-e Lut.

3.2.1.2. An overview of the known Urban Centers of SE Iran

3.2.1.2.1. Helmand River Basin: Shahr-i Sokhta

Shahr-i Sokhta “Burnt City” is located in Sistan plain of the southeastern part of Iranian plateau, close to the Afghanistan and Pakistan borders. At its greatest expanse the site was over 150 hectares making it the largest city at the dawn of the urban era in the Helmand Basin. The site was discovered by Stein in the early 1900s. Beginning in 1967, the

site was excavated by an Italian mission under supervision of Maurizio Tosi²⁵⁶ who continued his work until 1978. After a gap, work at the site was resumed in 1977 by an Iranian team under the direction of Mansour Sajjadi²⁵⁷. The excavations have partly revealed the layout and organization of the urban center of Shahr-i Sokhta. Like the Italian mission, the ongoing work of Sajjadi has been concentrated in three main parts of the site: Cemetery in the southwestern part of the site, residential area in the eastern and northeastern parts and craftsmen`s area in the north. The cultural sequence of Shahr-i Sokhta is a continuous development, subdivided in four periods, which begins in the late 4th mil until the abandonment of the city at the beginning of the 2nd millennium BC. Earliest occupation of the site, Period I, is contemporary with the Proto-Elamite culture of the late fourth millennium. In the two following periods_ periods II and III are attributed to early to late 3rd millennium BCE_ when Shahr-i Sokhta was a well-organized large urban center comprised of administrative and public buildings; an artisan`s quarter for various specialized craft activities including copper, lapis lazuli, turquoise, alabaster and flint; residential areas; and a vast graveyard. Period IV, at the very end of the third millennium, Shahr-i Sokhta shrunk to a small village of about ca. 5 ha (probably in response to a drastic climate change²⁵⁸ and shift in the course of the Helmand River) before it be abandoned in the initial of 2nd millennium BC.

3.2.1.2.2. Jiroft

Following massive illegal looting of Bronze Age cemeteries of Halil river valley in 2000, a hitherto unknown archaeological culture came into light in the Near East. As a result of the vast looting at a dozen of cemeteries, thousands of burial goods, in particular distinctively carved chlorite vessels, were plundered²⁵⁹. The main plundering seems to have occurred in a zone between 20 to 50 km south of the modern city of Jiroft. Various burial

²⁵⁶ Tosi (1969), Tosi (1986), Tosi and Piperno (1975), Salvatori and Tosi (2005).

²⁵⁷ Sajjadi 2006, Sajjadi (2003), Sajjadi *et al.* (2008).

²⁵⁸ Hamzeh *et al.* (2016).

²⁵⁹ See Madjidzadeh (2003).

goods such as metal and elaborate semi-precious stone objects are also attested among the looted material indicating the existence during the Early Bronze Age of a sizable craft production in the Halil River Basin. After looting was halted in 2001, archaeological research began led by Youssef Madjidzadeh ²⁶⁰ at Konar Sandal South, Konar Sandal North, Ghalleh Kouchak and the cemetery of Mahtoutabad.

Excavations at Konar Sandal South have revealed the character of an EBA large mud-brick Citadel which was surrounded by a massive defensive wall in the center of a large lower town. Although there is still much to learn about this center, the results are clear testimony to the power, wealth and social stratification of this urban center. According to radiocarbon dates that come from well-controlled contexts at the site of Konar Sandal South, an absolute range between 2880 and 2140 BCE is proposed for the Konar Sandal South²⁶¹. The relative dating offered by the glyptic evidence from KSS also confirms these radiocarbon dates²⁶². Another significant achievement of Jiroft excavations is the appearance of a new writing system²⁶³. We can therefore hope that the eventual decipherment of the writing system of Jiroft will enable us to explore the ethnic and historical character of this urban center of Southeastern Iran²⁶⁴. According to Madjidzadeh, Jiroft was certainly a center of an urban character in the 3rd millennium B.C. of Southeastern Iran that can be compared with previously known sites of the region such as Tepe Yahya, Bampur, Shahdad and Tal-i Iblis²⁶⁵.

²⁶⁰ Madjidzadeh and Pittman (2008).

²⁶¹ Madjidzadeh and Pittman (2008), Table 1.

²⁶² Pittman (2008), Pittman (2012).

²⁶³ Madjidzadeh (2012).

²⁶⁴ A piece of an inscribed brick and three tablets were discovered in Jiroft. Tablets of Jiroft with Linear Elamite inscription are similar to those of Puzur-Inshushinak from Susa. Jiroft writing system is regarded as the origins of Linear Elamite writing system by Madjidzadeh.

²⁶⁵ Madjidzadeh and Pittman (2008).

3.2.1.2.3. Dasht-e Lut: Shahdad

The Third important Early Bronze Age urban center of South-East Iran is the site of Shahdad in the central part of Dasht-e Lut (For a detail description, see part II, chapter I & II). In this chapter, I will present the urban model of the site of Shahdad.

3.2.1.3. Recent Dasht-e Lut Project: Two new-found large urban centers

As mentioned earlier, a dozen seasons of fieldwork have already been carried out in Lut area that brought to light valuable information on a significant early urban center of the Early Bronze Age Near East.

After one decade and half, investigations in Lut area was undertaken to investigate the prehistoric archaeology of the Lut area to sharpen our understanding of archaeological potential of this area. As mentioned in previous part, the reconnaissance survey along the western edge of the Lut Desert led to identifying eighty-seven ancient sites. Among them twelve sites can be attributed to the 3rd millennium BC.

During the survey, two large early Bronze Age sites-Keshit and Mokhtarabad- were identified for the first time. The ceramics collected during the surface survey at the sites of Keshit and Mokhtarabad showed that they can be regarded as 3rd millennium BC urban centers, however, much more fieldwork investigations are required to confirm this claim. In the below, they are introduced as following:

3.2.1.3.1. Keshit

The site of Keshit is located 65 km to the south of modern city of Shahdad. The site named after the village of Keshit (the nearest one) which lies about 10 km to the south of site. Since Keshit is located only 3 km to the west of the desert of Lut, it is covered with sand. Preliminary surface survey shows that it was a large site of around 1600m × 1300m²⁶⁶, or c. 200ha (See part II, chapter III).

²⁶⁶ Eskandari *et al.* (2014).

Archaeological materials, predominantly pottery sherds are scattered across the surface of the site at high densities. Based on the ceramic typologies, the site can be attributed to the fourth and third millennia BC; there is no evidence for subsequent occupation²⁶⁷.

Based on surface materials, the main occupation of the site belong to 3rd millennium BC, only less than 5 ha seems to be attributed to 4th millennium BC. Based on the dense and contiguous scatter of surface materials it seems that the site was occupied during the Early Bronze Age. Pottery is the most abundant find, but other surface materials at the site include fragments of marble vessels, bronze objects, lithic tools and semi-precious stones such as agate. In the north-western part of the site, slag and pottery wasters collected from the surface may indicate the location of the industrial quarter of the site.

More generally, there are many mounds across the site standing several meters higher than their surroundings that probably preserve architectural remains. The collected potteries are comparable to that from Shahdad and Tal-i Iblis. Morphologically, Keshit appears to be similar to Shahdad, the other Early Bronze Age site on the western fringes of the Lut Desert. Further fieldwork programs will investigate the overall city layout. Overall, it seems that the site of Keshit was a large 3rd millennium BC urban center in southwestern part of Lut Desert.

3.2.1.3.2. Mokhtarabad

The site of Mokhtarabad situated between the sites of Shahdad and Keshit on the western fringe of Dasht-e Lut, 15 Km to the south of Shahdad and 50 Km to the north of Keshit. The site is located 1 km to the west of modern village of Mokhtarabad, on the northern bank of a river that originated from western mountains of Andohjerd.

Like the site of Keshit, it is also covered extensively with sand. Surface ceramics indicate that the site was occupied during the 4th and 3rd millennia B.C. Dispersal of surface materials suggests that the site (1000 m north-south and 700 m west-east) was approximately 70 ha. (see part II, chapter III). Ceramics are scattered across the surface of

²⁶⁷ Eskandari *et al.* (2014).

the site, and are particularly dense in the western part of the site. The dense and contiguous scatter of surface materials shows that mostly probably the site was occupied across the full extent of the scatter.

The collected ceramics indicate that the site can be assigned to the fourth and third millennia BC; there is no evidence for subsequent occupation. Except less than 3 ha in eastern part, the site has been occupied in 3rd millennium BC. There are several mounds across the site, especially in western part, which stand several meters higher than their surroundings suggesting the presence of architectural remains.

By doing an intensive surface walking survey, we could identify a cemetery in the southeastern part of the site. In fact, because of the wind erosion some of burials are visible on the surface. The exposure of the graves on the surface, which would have originally been at least one or two meters below the level of the site, indicate that there has been extensive deflation of cultural deposits due to extreme wind erosion. Generally, we can say this urban center is a smaller version of two other large EBA sites of Shahdad and Keshit that is placed between them.

3.2.1.4. Spatial perspectives on Urban Landscape of Dasht-e Lut

Recent reconnaissance survey along the western edge of Dasht-e Lut indicated that in addition to the three above-introduced large urban centers of Shahdad, Keshit and Mokhtarabad, nine other sites can be attributed to Early Bronze Age in this region. It must be mentioned that each of those large sites of Lut area include many mounds which are collectively considered as one large site.

In the middle portion of west edge of the Lut, all of the Bronze Age sites including the urban center of Shahdad (ca. 170 ha) and its periphery sites were distributed at the base of the alluvial fan of Shahdad. These periphery sites are small and range in size from half a hectare to 3 hectares.

What stands out in term of site distribution is that all of these small sites are concentrated to the east of the urban site of Shahdad at a distance ranging from 300 m to 4 km east of the site (Fig 87).

It seems that these were satellite sites for the urban center of Shahdad. Overall, from point of view of spatial pattern, there are 12 Bronze Age site along the Dasht-e Lut including 3 large urban centers which two of them, Mokhtarabad and Keshit that respectively are situated 15 and 65 km south of the site of Shahdad.

Neither of these sites appear to have satellite sites. Dasht-e Lut definitely has a very interesting and unexpected pattern- site distribution is strange, by Near Eastern standards. To judge from these results, the Bronze Age settlement pattern of Dasht-e Lut is completely different from two other contemporaneous urban landscape of South-East Iran.

In the Sistan plain there is only one large urban center _Shahr-i Sokhta_ with numerous smaller satellite sites²⁶⁸, and this scenario is the same for Konar Sandal in Jiroft plain²⁶⁹.

These results suggest that both ecological factors and the natural landscape had a major influence in generating this distinctive spatial pattern on the west of Dasht-e Lut, but the functional basis was also a main factor.

In the west of the Lut, the water sources did not pass the across the entire length of the plain, in fact there are some sources that originated in the western mountains and after passing the narrow width of the plain ended in the oasis that was the Lut desert. Thus there

²⁶⁸ This information comes from the unpublished results of 2006 reconnaissance surveys of Mr. Mousavi Haji and Mr. Mehrafarin in Sistan plain which are prepared in 29 volumes for I.C.A.R and ICHTO.

²⁶⁹ This information comes from a series of ICHTO's reconnaissance surveys in Halil Valley that are remained still unpublished. It is important to note that although several regional surveys have been done in Halil river valley, the area was not fully surveyed. Therefore there is still the possibility of the existence of more large EBA sites in the region.

was not available water to develop agricultural lands along the whole extent of the western edge of Lut desert.

Therefore it is obvious that the ecological factors seem to have played a fundamental role in determining this unusual settlement pattern. Indeed, this spatial pattern_ distribution of the large Bronze Age urban centers without satellite sites_ seems to be an adaptive strategy responding to the natural landscape of Lut area.

By having an overview look at the location of these three urban centers along the natural corridor of western edge of Dasht-e Lut and the distances separating them, it seems reasonable to suggest that their strategic position permitted them to control the trade networks.

In fact, they should belong to the same unbroken chain of caravan trade stations that could control the movements of goods and raw materials in 3rd millennium BC. This north-south western corridor of Dasht-e Lut even today is the main transit route for connecting South-East of Iran (In particular Kerman and Hormozgan Provinces) to Great Khorasan.

In addition, this route is known as opium route along which illegally imported opium is transported from south-Eastern Iran borderlands (Pakistan and Afghanistan borders) to Khorasan area. Hence, it seems that location along a transportation route was probably a very strong factor determining the spatial organization of the sites during the Bronze Age in the Dasht-e Lut.

3.2.1.5. Southeastern Iran Urbanization: New views from Dasht-e Lut

Alongside the previously discovered urban centers of south-eastern Iran, the discovery of two additional large urban centers on the western edge of Lut desert point to the scale and organization of urbanization during the third millennium BC. In fact, new views and information from Dasht-e Lut provide an opportunity to take a step forward toward a better understanding of the early urbanization of this part of the Iranian Plateau.

Broadly, two main factors are likely to be associated with the development of urbanization in this region: first, the role of the natural environment and, specifically, the

fertile alluvial plain and availability of permanent water in the Halil River valley and Helmand Basin; second, the strategic geopolitical location of south-eastern Iran, connecting the west and east of South-West Asia, which allowed for the sites in the region to play a significant role in ancient trade and communication.

Understanding the origins and nature of urbanization in south-eastern Iran is difficult because the character and complexity of the preceding periods have not yet been fully investigated. What we know is during mid to late fourth millennium B.C. there were an integrated culture named Aliabad culture²⁷⁰ which prospered in southeastern Iran extending over a large area from west of Kerman to the most eastern lands of Iran, even Pakistan²⁷¹ to the east.

The excavations at Tepe Dehno as the second part of recent Dasht-e Lut project showed the context of 4th millennium B.C. within the region. The 20 hectare mid-late 4th millennium (Aliabad culture) center of Tepe Dehno demonstrated that the major Dasht-e Lut urban centres grew up in a region where population was already dense.

Although the Aliabad culture is still poorly known, I assume that gradual local dynamic cultural changes began in this period and set the stage for establishment of the first cities in this region in the 3rd millennium BCE. I postulate that the roots of southeastern Iran urbanization must be sought in the Aliabad culture.

Meaningfully, all the EBA urban centers of Kerman including Konar Sandal South (Jiroft), Shahdad, and even the two new found sites of Keshit and Mokhtarabad are located near important Aliabad sites. The work has demonstrated that the urban centers of the Dasht-e Lut are different in term of site formation and settlement patterns from the two other urban landscapes_ Sistan and Jiroft_ of the SE Iran. Hence, the new information from

²⁷⁰ The Aliabad culture which is firstly documented in the excavations of Tal-i Iblis, Iblis IV period, probably started in the first half of the fourth millennium BC and continued to the late of that millennium, and is characterized by fine painted buff ware and metallurgically craft specialization (See Caldwell 1967) as well as the cemeteries which are separated from the occupational settlements (See Soleimani *et al.* 2016).

²⁷¹ Mutin (2013b).

Dasht-e Lut shows the increasingly regional variations within SE Iran on patterns of urbanization and they demonstrate that we must accommodate multiple models for the EBA cities of region.

Recent surveys revealed no pastoral sites from either the Chalcolithic or the Bronze Age in the mountainous part of the Dasht-e Lut area. This allows us to think that that role of the pastoral societies was minimal in the rise and development of southeastern Iran urbanization. However, more fieldwork is needed to confirm this hypothesis.

With the addition of two new 3rd millennium BC large urban centers on the western fringes of Dasht-e Lut, we now know the rich potential of this part of Near East for the study of early urbanization. Broadly, it also demonstrates the potential importance of south-eastern Iran for future studies on urbanization in the South-West Asia. On the basis of the results of my survey to the west of the Lut Desert, I suggest that it is highly probable that further extensive archaeological survey across south-eastern Iran will lead to the discovery of further third millennium BC urban centers²⁷².

²⁷² Eskandari (2019).

3.2.2. The Bronze Age Center of Shahdad: "hollow" vs. nucleated early urban models in the light of site formation processes

3.2.2.1. Introduction

Was the important Bronze Age city of Shahdad, on the western edge of the Dasht-e Lut in Iran, a kind of "hollow city" - "a succession of dense and functionally mixed districts, a sort of de-localised linear city centre"²⁷³ - rather than a dense nucleated early city?

Or was its present surface thus patterned by intensive post-depositional site formation processes?

In 2016, Shahdad was subjected to a systematic pedestrian survey and limited test trenching along its apparent periphery. This revealed that the inhabited area is much smaller than previously expected, and that the early Bronze Age city may have developed as a discontinuous network, not necessarily coeval, of individual household groups.

The chapter presents a new view of this topic that considers the effect of post-depositional processes: namely, the impact on the archaeological record of intensive deflation, and of one or more destructive floods. The latter may have suddenly destroyed, but also locally sealed and protected parts of the settlement of the second half of the 3rd millennium BC.

Previous research on the large early Bronze Age site of Shahdad, with its burials containing rich and sophisticated artifacts²⁷⁴, fully justified its definition as an advanced early urban center²⁷⁵.

In late Chalcolithic times, the site grew beside the endoreic fan of the Derakhtangan river. The settlement gradually shifted from the edge of the Lut Desert westwards, developing in the late 4th millennium BCE into a more substantial, compact settlement in which polychrome Aliabad ware was in common use²⁷⁶.

²⁷³ Stransky and Maupu (2014).

²⁷⁴ Hakemi (1997).

²⁷⁵ Eskandari (2019).

²⁷⁶ Eskandari (2017).

Further west, a much larger area of the site is studded with large amounts of red-colored, unpainted coarse pottery generically dated to the second half of the 3rd millennium BC. Here, large parts of the surface are strewn with manufacturing waste such as copper smelting slag, chert and carnelian bead making refuse²⁷⁷. Due to the absence of updated systematic studies of the morphology of this red-colored ware, its precise chronological range is still unclear. The continuous westwards shift of the settlement followed the Bronze Age in the form of large early historic fortress, then of an important Islamic settlement and, finally, of the present-day village.

So far, interpretations of the site centered on the possible roles of this ancient city in the framework of a globalized exchange economy, in what has been labeled as the "Middle Asian Interaction Sphere" or MAIS²⁷⁸. While the idea of a highly dynamic trade network, intensively active in the 3rd millennium BCE, remains quite credible, unfortunately MAIS is still poorly defined not only in terms of precise chronological scenarios and synchronicity, but also of cultural actors, given the fact that entire regions of the southeastern Iranian Plateau are still completely unexplored. Moreover, recent evidence and studies have re-examined the role of long-distance trade, as in the crucial case of the eastern lapis lazuli routes, now more convincingly described mainly in terms of regional phenomena²⁷⁹.

The ancient city of Shahdad is another case that requires further detailed study, as well as important revisions. In the course of its life span - from the 5th millennium BCE to present - the described westwards shift of Shahdad was probably dictated by the growing need of intercepting better and more accessible sources of underground water - a circumstance noted since the early surveys of the area²⁸⁰.

Eventually, the Bronze age city was abandoned in the early 2nd millennium BC, possibly in correspondence of important climatic changes like the so-called and much

²⁷⁷ Salvatori and Vidale (1982).

²⁷⁸ Possehl (2007).

²⁷⁹ Casanova (1992), Vidale and Lazzari (2017).

²⁸⁰ Salvatori and Vidale (1982).

discussed mega-drought that variously impacted southern Eurasia 4.2 kya and possibly a couple of centuries before²⁸¹.

Scholars proposed that Shahdad, in its peak of urban expansion between c. 2500 and 1900 BC (the coarse red ware period), extended over an area of 150 to 200 ha²⁸², hosting substantial, permanent urban population.

According to the estimates by Chamberlain (2006) on modern non-industrialized settlements (1 individual for 5-10 sqm of roofed surface), in the 3rd millennium BC a continuously built surface of 150-200 ha should have hosted a minimum of 150 000 to 300 000 inhabitants. Although the few dwelling areas so far excavated at Shahdad do look densely packed (see below), are similar estimates realistic?

Was Bronze Age Shahdad such a dense demographic cluster, a large urban core, and - consequently - a powerful city-state? Among others, this was suggested by Hiebert and Lamberg-Karlovsky²⁸³ who considered Shahdad in full control of an important territory, and of a long-distance trade network with the surrounding areas.

On the basis of the style and types of its abundant copper products, witnessed by graves' furnishings, Salvatori added that Shahdad, at a given time, was a trade colony, a kind of *karum*, for one or more Oxus polities²⁸⁴. The impression of strong links with the north gains further support from the close similarity between the elaborated clay ovens found in the houses of Shahdad and the those excavated at Gonur (Margiana) and at Susa (Khuzistan), where a strong Shimaskian influence became evident at the turn of the 3rd millennium BC²⁸⁵.

While historical interpretations and questions of this kind may proliferate, the rise of Shahdad, the form of its urban lay-out and the reasons of its local abandonment (after or during the 4.2 kya climatic event, see above) remain major open questions.

²⁸¹ See among others, Weiss *et al.* (1993), Madella and Fuller (2006), Schmidt *et al.* (2011), Lawrence *et al.* (2016).

²⁸² Salvatori and Tosi (1997).

²⁸³ Hiebert and Lamberg-Karlovsky (1992).

²⁸⁴ Salvatori (1995).

²⁸⁵ Kaniuth (2010), Meier (2019), general discussion in Potts (2008).

In April and May 2016, the site complex of Shahdad was systematically surveyed and delimited by the means of limited test trenches under the supervision of the author. If by ascertaining the real extension of Shahdad we meant to prevent possible future damages to the site, the survey also produced a record of the habitational pattern of the Bronze Age city quite different from that commonly imagined. It is important to stress that the geomorphological context under scrutiny is highly dynamic, and that a proper updated geomorphological survey, after the first seminal observations by O. G. Meder²⁸⁶, published in German, has never been attempted. Of course, the urban formation and change of the Shahdad settlements remains quite a complex issue; new geomorphological studies and more intensive archaeological surveys are certainly needed.

3.2.2.2. Determining the extent of the settlement and its lay-out

The dispersal of cultural materials over the surface of Shahdad has been grossly estimated at c. 200 ha. Given such a large area, choosing the location of soundings based on archaeological scatters visible on the surface was sometimes problematic. Secondly, natural agents (wind, and secondly water) had variously and abundantly scattered cultural materials beyond the elevated topographic features of the site, often piling them in gullies of variable depth, so that the relationship between surface and sub-surface deposits was far from univocal.²⁸⁷

The search for the site's limit thus required test excavations both on and beyond the scatters visible on the surface. Thirdly, due to the combined effects of horizontal settlement shift, rather than vertical growth, and powerful wind deflation and fluvial flooding and erosion, the thickness of archaeological deposits was often locally quite limited. In some places, the early Bronze Age deposits were substantially lowered, as demonstrated by the direct exposure of graves, whose shafts should have originally been at least 1 - 2 m below the original surface of the cemeteries.

²⁸⁶ Meder (1979).

²⁸⁷ One cannot exclude that the pottery clustered on the surface of these deeply dissected patches of surfaces potentially reflects more than one occupation phase.

In such a highly dynamic and largely destructive geomorphological context, the delimitation of the settlement areas was based on the fieldwork by A. Hakemi and M.-A. Kaboli: their views on the extent and delimitation of the site were carefully considered. As a next step, an aerial photograph taken in 1993 was used to investigate the site. Also, Corona satellite images from 1970 were used and compared to new images available on Google Earth to observe any possible change over the past four decades.

The landscapes of the general area seem to have been relatively unchanged, with the exception of new agricultural lots supported by artificial irrigation which seem to have gradually expanded in the last decades. In general, we considered as unoccupied surfaces those formed by alluvial sediments completely free from artifacts of the 3rd millennium BC or earlier periods, and that could be considered natural after subsurface test trenches, or sections locally exposed by wind erosion, to various depths. Field evidence, in fact, confirmed that even where occupational deposits were completely removed down to eroded natural sedimentary substrata (like in the case of the graves), clusters of stones, sherds and artifacts survived in large amounts within erosive gullies and local depressions.

In 2016, a two-week extensive walking surface survey was conducted by a team of archaeologists and a topographer under the direction of the author. We proceeded from S to N in straight parallel lines, c. 50 m distant from one another. The recording strategy was mainly observational: given the peculiar conditions of the site, whose occupied surfaces present a rather uniform, medium density spread of surface materials, these latter were mainly recorded and mapped in terms of meaningful presence vs. absence. In order to avoid excessive disturbance to the site, only limited amounts of highly diagnostic sherds were collected, and are currently under study. The most frequent types - medium to coarse red ware globular restricted pots, and medium-sized globular jars with everted rims, seem to reflect those described at length for the graveyards by A. Hakemi²⁸⁸. Whether pottery reflects a single period occupation (as its apparent uniformity might suggest) or it conceals meaningful chronological variations, as stated above, will be discovered in future. Results were recorded on a new, high resolution topographic map of Shahdad (20 cm contour lines) made with a total station. In this way we isolated a series of discrete areas that bore meaningful concentrations of archaeological finds.

²⁸⁸ Hakemi (1997).

Finally, 30 test trenches were opened all around the outer periphery of these archaeological features (Fig 88). The preliminary results of this sounding campaign indicate that the ruins of Shahdad stretch for a maximum length of 2100 m north-south, about 1600 m east-west at its widest point, and about 800 m at the narrowest extension, the northern part of the site complex being wider than the southern one. These figures, taken at face value, would confirm that Shahdad, with ca. 170 ha of maximum surface occupation, was one of the largest Bronze Age urban centers in South-West Asia. But the story might have been quite different.

While excavating the peripheral sounding Tr., we also paid attention to some wide surfaces that, among the settlement areas delimited by the surface survey, were completely void of Bronze Age artefacts. Two Tr. (6 and 7) were opened within the limits of the settlement, on gaps between Cemetery A, excavated by A. Hakemi and the architectural complex excavated by M. A. Kaboli. Both revealed no archaeological layer, thus making it clear that the settlement delimited by the peripheral soundings included also spaces that had never hosted buildings and dumps. In other words, this suggested that Shahdad was not a single, nucleated urban settlement but might have been a more complex aggregate of clustered households and wide open spaces of unknown nature and function - possibly exploited for ephemeral agricultural lots whose soils were renewed by shifting seasonal floods.

After this evidence, a new phase of surface survey was dedicated to re-trace the limits of the inner populated areas (including their dumping grounds), evaluating their exact size and distances from each other. As the result, were recorded 18 discrete settlement cores, marked in orange on the topographic map of Fig 89. The size of these cores is variable, they range from 0.2 to 22 ha (Table 17).

A meaningful example of the spatial segregation of the inner settlement cores is Area 13 (Fig 89), where old excavations had uncovered an important architectural complex²⁸⁹. Around Area 13 there is no evidence of occupation within a radius of 200 to 500 m. On the whole, there are two large settlement areas of approximately 20 ha each, nine between 4 and 8 ha, and seven minor patches of 2 ha or less. Moreover, the two main cores (Areas

²⁸⁹ Kaboli (1997).

22 at NE, and 7 in the center) are separated by a void of 350-400 m (punctuated by smaller surface spreads of pottery, Areas 9 and 10); all this strongly supports the claim of a dispersed, non-nucleated settlement pattern.

In order to achieve a more realistic estimate of the settled space of Shahdad, we summed up the occupied surfaces of all the 18 the recorded cores. These restricted values amount to a total of c. 93 ha, and - would assess the maximum population of the city, in the late 3rd millennium BCE, between ca. 10000 and 20000 inhabitants - of course, arbitrarily assuming that all the settlement cores were occupied at the same time. Given the fact that households would likely have been surrounded by rubbish disposal areas, which contribute substantially to the final archaeological visibility of the settled cores²⁹⁰, such values should be further lowered. But was this really the case?

²⁹⁰ e.g. Ur *et al.* (2007).

Recorded settlement core	Location	Size (in sqm)	Extent (in ha)
Area 1	SW of the site complex	200 × 200	4
Area 2	SW of the site complex	250 × 200	5
Area 3	S of the site complex	250 × 200	5
Area 4	S of the site complex	400 × 200	8
Area 5	SE of the site complex	55 × 45	0.25
Area 6	SE of the site complex	100 × 100	1
Area 7	Central part	750 × 250	18.8
Area 8	Central part	300 × 200	6
Area 9	Central part	200 × 200	4
Area 10	Central part	200 × 100	2
Area 11	W of the site complex	200 × 200	4
Area 12	N of the site complex	400 × 200	8
Area 13	N of the site complex	100 × 100	1
Area 14	N of the site complex	70 × 50	0.35
Area 15	N of the site complex	250 × 250	6.3
Area 16	N of the site complex	90 × 55	0.5
Area 17	N of the site complex	150 × 100	1.5
Area 18	NE of the site complex	600 × 370	22
Total size of the settlement cores (in ha)			93

Table 17: Location and size of 18 individual settlement cores surveyed within the limits of the Shahdad site complex (see also Fig 88).

3.2.2.3. Implications of the site's formation processes

Answering the above question, once more, is not easy. Without a detailed typo-chronological quantitative assessments of the variability of the Bronze Age red ceramics, and given the only ^{14}C dating available, reported in a preliminary way in Bayani 1979, the end of the metallurgical activities of Site D would fall around 2100-2000 BCE. Such a date would fit well with some of the artefacts found in the same contexts, like sherds of incised

grey ware²⁹¹. But, unfortunately, the information is of little use, because the analytical details of this absolute date were not reported, and the original source or laboratory where the sample was processed could not be retraced. In short (as far as the settled cores are concerned) final evidence of the absolute chronology is missing, and more detailed relative chronologies, at present, cannot be applied. Such poor chronological information, added to anomalous features of Shahdad's urban lay-out, still limit our understanding of the developmental urban model and growth patterns of the Bronze Age center.

In this situation, a careful re-consideration of the archaeological context of Site D (Fig 90) suggested new, useful lines of enquiry.²⁹² Site D is a haphazard cluster of five small and rather poor houses, built in *pisé* and single-line mudbricks, that appears to have been suddenly knocked down by a disastrous flood that sealed the rooms' contents. In fact, maps and excavation records retrieved from Hakemi's and Bayani's reports make clear that in at least six rooms of the cluster entire walls fell down in a block, the rows of bricks remaining in their original setting.

The push across the trench seems to have been from W-SW, i.e. from the main local branches of the Derakhtangan stream. Also, such a sudden destruction accounts for the homogeneous filling of pure fluvial sand and lenses of gravel uncovered within the rooms, for the quite unusual preservation of the clay cylindrical beads there preserved (one of which still accompanied by its lid), and for the rich assemblages of seals, tools, facilities, vessels and raw materials found on the floors of several rooms. Only a turbulent flow of sand and silt might have preserved the collapsing buildings and their fragile content in such a little disturbed, sub-primary context. Another evidence of a sudden, unplanned abandonment is the find in this part of the settlement of several stone door sockets, found still in their position on their thresholds.

If we accept the above-mentioned hypothesis, such a flood might match with the major climatic crisis of the later 3rd millennium BC, considering that in this contingency "...severe

²⁹¹ Bayani (1979), discussion in Salvatori and Tosi (1997).

²⁹² See Meier (2019).

droughts and extreme floods were parts of the climatic variability during abrupt possible climatic event and climatic decline in the semi-arid to sub-humid zones over the world"²⁹³.

Although Hakemi²⁹⁴ insisted on considering the elaborate ovens found in each house as copper-processing furnaces, they are more likely domestic fireplaces. However, reconsidering the distribution of the artefacts found in excavation, and aside from the undeniable presence of crucibles, casting molds, pits lined with copper slag and other less identifiable copper-smelting and/or melting indicators, the most evident activity performed in many rooms at the precise moment of the flood was the breakage and grinding with pestles of large amounts of copper ore on large granite slabs.

The distribution of grinding stones, pestles and partially ground copper ore in the excavated units make clear that when the houses were suddenly hit by the flood, residents, having extracted their heavy duty stone tools from recesses and small storage places, were busy in grinding and purifying loads of atacamite and malachite-bearing rocks from the gangue, in rooms and possibly open spaces of the compound.

As floods along the Lut's edge would mostly take place in April-May, after the melting of the winter snows, Site D may bear witness to the interruption of an ore-preparation step in late spring, in view of a smelting stage conveniently planned for the incoming hot season. Moreover, in two storerooms (23 and 18) of the same house, the excavators found as many hoards of chalcedony and carnelian beads in various stages of processing²⁹⁵. Thus, while the evidence of manufacturing has commonly suggested that Shahdad had "specialized metallurgical workshops" owned by craft families, it seems more likely that the houses of Site D were multi-tasks facilities where coppersmiths and carnelian beadmakers (or coppersmiths and beadmakers) were temporarily hosted, in different months of the year, by costumers-and-traders who took care of the houses, for processing lots of different valuable raw materials.

²⁹³ Huang *et al.* (2011), p. 460.

²⁹⁴ Hakemi (1992), Hakemi (1997).

²⁹⁵ Meier (2019).

In summary, this means that the occupation of the urban space of Shahdad might have been discontinuous in terms of allocations of craft functions (perhaps on a seasonal schedule). Various craft groups might have been hosted at Shahdad in different moments of the year to perform specific stages of different production cycles. The probable destruction by a sudden flood of the tightly packed houses of Site D may help explaining the discontinuous pattern of settlement revealed by the survey: a destructive event in one or more blocks might have required a fast rebuilding of the craft facilities in nearby free spaces. The expedient architecture and flimsy walls of the compound of Site D, whose houses seem to have grown in an unplanned fashion one against the other, might support these interpretations.

3.2.2.2. Concluding Remarks

In terms of physical and organizational models, the current project suggests that Shahdad was a set of interconnected but separate households clusters (probably interspersed with farming lots, based on the discovery of ploughing furrows in the test trench of the "Farmers' area" excavated by M.-A. Kaboli²⁹⁶. If actually coeval, in the course of time these cores came, or were coming together to form a loose urban complex reminiscent of at least some aspects of Stransky and Maupu's²⁹⁷ "hollow city" model of urbanization is rationally²⁹⁸.

On the other hand, the modes of destruction and burial of Site D, whose erections were hit by a sudden flood and filled with sand and silt, leave little doubt that the site was never re-occupied. Local residents and craftsmen, after the flood and the loss of their houses and possessions, probably shifted somewhere else. Thus, we cannot assume that all locations spotted on surface within the 170 ha perimeter were settled exactly at the same time. In

²⁹⁶ Kaboli (2002).

²⁹⁷ Stransky and Maupu (2014).

²⁹⁸ It seems that the "green areas" (and seasonal wadis which intersected them) among the individual settlement cores would be the economical supporting bases of the local communities, rather than free common spaces in the modern understanding.

this light, the number of inhabitants of Bronze Age Shahdad, at present, cannot be confidently established at the above mentioned estimates. Seasonal occupations by shifting craft groups, or even bi-local communities which migrated seasonally from highlands to plains with animals and raw materials might have been in play. Thus, waiting for new exploration and further explanations, the urban organization patterns and craft production schedules of Shahdad still escape the power of definition of our archaeological approaches - but a variant of the "hollow city" model is an interesting alternative to be tested.

Another important site that might show a similar process is Tall-i Malyan (Kur river basin, Fars) in the middle Banesh period, where within the city walls (enclosing ca. 200 ha of total surface), only 45 ha may represent individual settlement cores, possibly separated by cultivated lots and impermanent animal pens. The resident population, in this case, has been evaluated to ca 20000 inhabitants.²⁹⁹

Whatever the case - "hollow city", failed synoecism or shifting inner settlements - at the dawn of the urban era of the Bronze Age the disaggregated urban form of Shahdad, at least as we presently understand it, may represent one or more converging pathways to urbanization different from what commonly described for greater Mesopotamia³⁰⁰, and in the Indus valley; and will require further investigation. It will be important to understand how far this apparent form was due, across the Iranian Plateau, to a specific adaptation to the environmental conditions and to the distribution of the regionally available resources, and/or to the local processes of escalating social stratification.

²⁹⁹ Nicholas (1990), p. 132, Sumner (1988), p. 308, Sumner (2003), p. 112-113.

³⁰⁰ Ur *et al.* (2007), Redman (1978).

Conclusions

Conclusions

This study has sought to consolidate the settlements in Dasht-e Lut, SE Iran from Chalcolithic era and Bronze Age, to develop an appropriate theoretical perspective on archaeological spatial data. Indeed, this thesis examined human-environment interactions in the western Lut Desert and aimed to understand how the physical environment contributed to the unique settlement pattern that characterises these landscapes.

Due to the environmental diversity in Southwestern Asia, there are diverse and fragmented landscapes across the region. Physical environmental contexts are very important in forming human behavior. Among them, desert landscapes represent human exploitation in an extreme environment. Location of Dasht-e Lut on the western fringe of Hyper-arid Lut, caused the formation of a certain historical desert landscape in archeology of Southwestern Asia. The focus of this thesis was on desert settlement systems, human adaptations to desert environments, and long-term settlement trends.

The Kalut landscape structure of Dasht-e Lut has brought a privilege for the area during prehistoric and protohistoric periods which caused the area becomes a unique ancient landscape in the archeology of Near East. As has been demonstrated, there was a close relationship between the Kaluts and the ancient settlements of Dasht-e Lut.

The main impacts of the desert environment on the cultural landscapes of the Lut area is seen through *settlement location, type and morphology* of the archaeological sites.

As mentioned before, prehistoric sites of the region were formed on the edge of the alluvial fan of Shahdad in the central part of the Lut area. This pattern of settlement distribution is very different from other landscapes of the Iranian plateau.

Indeed, the pattern appears to have been one of aggregated communities concentrated in specific parts of the region rather than scattering across the landscape. This settlement pattern is due to the fact that oases are the only places in the desert suitable for the formation of human communities due to limited water sources.

Conclusions

The question is how did the desert environment impact the types of the settlement that developed in the Lut area?

Here, hydrological conditions had two principal impacts on the cultural landscape of Lut. First, it has affected the distribution patterns of settlement; all twenty-one prehistoric settlements (except 022 and 004) are scattered within a radius of 4 km at the end of alluvial fan of Shahdad in the central part of Lut area. Second, it encouraged the formation of hill-top settlements rather than Tell-sites. Indeed, although oases attract human communities, they are also at increased risk of flash floods. Therefore, one can label them as high risk settlement zones. In fact, to avoid the risk of flash floods, the prehistoric inhabitants of Lut founded their settlements on the top of natural hill/Kaluts that are normally several meters higher than the surrounding land surface. To illustrate an example of this risk, we can look at the destruction of the Islamic city of Shahdad by a massive flood in the middle Islamic era. Hence, the physical environment may heavily influence the location of settlement.

Another impact of the desert landscape of Lut on the cultural landscape is reflected in site type and morphology. Often, in the greater Near East previous places of settlement became meaningful, and it was advantageous and important for communities to rebuild in exactly the same place through time, not merely nearby. The Tell or Tepe sites, so characteristic of lowland plains across Southwest Asia, are not found in the Lut area. However, environmental factors clearly played a role in the absence of tell formation.

Although the sites show a trend toward horizontal growth through time, it seems unlikely that there was no depositional build-up at all over time. The exposure of graves on the surface and erosion of burial goods at the prehistoric sites of the region, which would have originally been at least one or two meters below the level of the site, indicate that there has been extensive deflation of cultural deposits due to consistent wind erosion. This must be one of the main reasons why there is such deflation of the cultural deposits.

Conclusions

Generally, local or indigenous cultural landscapes in the Lut area in the prehistoric periods are marked by three trends:

- 1) Settlements are few in number, tending to be concentrated rather than extending over large areas;
- 2) The pattern of site type and distribution is uniquely adapted to the local conditions and reflects continuity over the long term
- 3) The formation of a specific settlement types (the hill-top settlement or Kalut settlement) appears to have been an adaptive strategy responding to the natural landscape of Lut area

The settlement pattern is, overall, a reflection of social, cultural and economic adaptations to an arid environment in which water resources are limited to specific areas, but in which other valuable natural resources can be exploited (e.g. mineral resources).

The changes of the spatial organization of Dasht-e Lut during 5th-2nd millennium BC have been demonstrated through rapid population growth and growing centralization of the political economy. The formation of centralized system in Lut area is inferred from the emergence of the large center of Tepe Dehno in 4th millennium and Shahdad in 3rd millennium BC. The growth of the large concentrations of people in urban settlements isn't possible without a productive agriculture, surplus, "industrial" specialization, a system of social relations with emergence of a higher status members of the society. In Dasht-e Lut, a gradual deep structure change is evident from the 5th to 3rd millennium BC. In particular, in the early Bronze Age, Dasht-e Lut accommodated politically centralized societies which were formed along the natural trade corridor of Lut Desert.

Based on the Resilience Theory, a single cycle covers four behavioural stability domains and the spatio-temporal trajectory of the system develops across them. These domains are: growth/ exploitation (r), conservation (K), release (Ω), and reorganization (α). Each domain exhibits a different value of resilience and is determined by the degree of connectedness and potential³⁰¹. Dasht-e Lut has presented an adaptive system in the later

³⁰¹ Bradtmoller *et al.* (2017), Redman (2005), ca. Redman and Kinzig (2003).

Conclusions

prehistory which, based on the adaptive cycle model, was reorganized in a complex web of interactions between humans and their desert landscape.

The economy of the communities of the western edge of Lut in third millennium BC clearly reflects the importance of trade. Hiebert and Lamberg-Karlovsky³⁰² considered Shahdad in full control of an important territory, and of a long-distance trade network with the surrounding areas. The Lut area's location in the middle of a trade network, the richness of local mineral sources³⁰³ and the juxtaposition of this area with the Lut desert were an advantage, and for these reasons may have led to the Shahdadians to develop a mixed economy consisting of farming and industrial manufacturing. Such economies seem to have favored the formation of large settlements without peripheral communities in the 3rd millennium BC.

In addition, the current project of the Lut resulted in new information on chronology of prehistory of SE Iran (see table 14). The critical review of the sequence of the region has been achieved on the base of C14 dating of 10 samples uncovered from Tepe Dehno and the East Dehno excavations. I did present an evaluation on the previous archaeological researches conducted on this area and also a revised sequence of prehistory of southeastern Iran, based on new radiocarbon datings and the comparative chronology of adjacent regions. As a result of this study, most viewpoints related to the chronology of the region need a revision (Table 14). Also, contextualizing Dasht-e Lut cultures in a broader context resulted in a non-uniform picture of the prehistory of the Iranian plateau. Studies on prehistoric cultures of the region revealed an indigenous evolutionary process and pathway which flourished the most during the 3rd millennium BC. In fact, the South Eastern Iran, despite all the cultural interactions with adjacent regions had passed through its own independent developmental trajectory with its local and regional characteristics.

Apart from settlement trends in Dasht-e Lut, the focus of this research was given to the early Bronze Age center of Shahdad. Archaeological text excavations and surface surveys together with a reevaluation of the previous 1970s and 1990s excavations at the

³⁰² Hiebert and Lamberg-Karlovsky (1992).

³⁰³ See Vatandoust (1977), Salvatori and Vidale (1982), Meier (2015).

Conclusions

urban site of Shahdad provided interesting information about the urban lay-out and formation processes of the site.

The revision of Shahdad data yielded some new information especially about the graves, potteries, stone objects, seals, architectural remains, and metal and clay objects which led to presenting a revised chronology for the urban site of Shahdad and the intra-site and inter-site analyses. It has been demonstrated that Shahdad had been inhabited for a long period from the middle third millennium BC to the early second millennium BC and it was flourished during the second half of the third millennium BC. According to a study of data obtained from Shahdad excavations, the city of Shahdad in the second half of the third millennium BC and especially the late of this millennium had a cultural similarity to other civilized areas of South-East of Iran including Sistan area, Halilrud Basin and Baluchistan. This cultural similarity arises through the establishment of a commercial-communications network along the urban period of Southeastern Iran.

Despite all the cultural interactions with all these regions, the local and regional cultural traditions dominated in Shahdad and it has all the characteristics of a city with local cultural factors during the early and middle Bronze Age on the west of Lut desert. These cultural local factors include the burial patterns, grave goods such as human clay sculptures and house model, the body coverage with mats and the presence of platforms in graves. One can claim that Shahdad is a good example of the role of the South-East of Iran as the intermediary in Southwest Asia interaction networks during the second half of the 3rd millennium BC.

The present work provided an opportunity to take a step forward a better understanding of the early urbanization of Lut area and broadly Southeastern Iran. As a result, firstly, it was proved that Dasht-e Lut presented a very interesting and unexpected spatial urban pattern during the early Bronze Age which neither of the urban centers appear to have satellite sites. Such site distribution is strange by Near Eastern standards. It suggests that both ecological factors and the natural desert landscape had a major influence in generating this distinctive spatial pattern on the west of Dasht-e Lut, but the functional basis was also a main factor.

Conclusions

Secondly, by doing a fieldwork combination of surface survey and test trenches, I tried to shed light into the urban model of the 3rd millennium BC site of Shahdad. We attempted to answer the following question: Was the important Bronze Age city of Shahdad a kind of "hollow city" - "a succession of dense and functionally mixed districts, a sort of de-localized linear city centre" - rather than a dense nucleated early city?

In terms of physical and organizational models, this thesis suggests that Shahdad was a set of interconnected but separate households clusters if actually coeval, in the course of time these cores came, or were coming together to form a loose urban complex reminiscent of at least some aspects of Stransky and Maupu's³⁰⁴ "hollow city" model of urbanization.

Lastly, in this thesis, by means of a regional research, consisting of a combined program of survey and excavation, I attempted to provide insight into the settlement systems and the interaction of prehistoric societies with their natural environment particularly on the west edge of the Lut Desert. Accordingly, the interactions of the desert physical and cultural landscapes on the Lut area are reflected in the patterns of site distributions, settlement type, and the long-term stability of the settlement systems. Also, this work introduced a phenomenal archaeological feature of the ancient Near East called the Kalut (sand dune) which was a fundamental part of the landscape signature of Dasht-e Lut, and one which has impressively affected the settlement system of the region.

³⁰⁴ Stransky and Maupu (2014).

Bibliography

Bibliography

- Adams, R. McC., 1965. *Land Behind Baghdad*, University of Chicago Press, Chicago.
- Aghanabati, A., 2004. *Geology of Iran: Geological Survey of Iran*, Tehran (in Persian).
- Amiet, P., 1986. *L'age des Échanges Inter-Iraniens 3500-1700 avant J. -C.* Paris: Éditions de la Réunion des Musées Nationaux.
- Andre, B., and M. Salvini., 1989. Réflexions sur Puzur-Insusinak. *Iranica Antiqua* XXIV, p. 53-72.
- Azadi, A., E. Ascalone and L. Peyronel., 2010. The First Season (2009) of Archaeological Research by the Iranian-Italian Joint Expedition at Qaleh Kuchek, Halil Valley (Jiroft, Kerman province, SE Iran), *Proceedings of the 7th ICAANE, London*, p. 277-302.
- Baghestani, S., 1997. *Metallene Compartimentsiegel aus Ost-Iran, Zentralasien und Nord-China*. *Archäologie in Iran und Turan* Band 1. Rahden: Verlag Marie Liedorf.
- Banning, E.B., 2002. *Archaeological Survey, Manuals in Archaeological Method, Theory, and Technique*, Kluwer Academic/Plenum Publishers, New York.
- Bayani M. E. (1979), *Primi risultati dello scavo nel quartiere artigiano di Shahdad (Kerman, Iran). Aspetti della produzione metallurgica alla fine del terzo millennio in Iran*. Unpublished M.A. Thesis, Università La Sapienza, Roma.
- Bellelli, G. M., 2002. *Vasi Iranici in Metallo dell'Eta dell Bronzo*. *Prahistorische bronzefunde Abteilung II*, Band 17. Stuttgart: Franz Steiner Verlag.
- Besenval, R., 1994. The 1992-1993 field seasons at Miri Qalat: new contributions to the chronology of Protohistoric settlement in Pakistani Makran. In A. Parpola and P. Koskikallio (eds), *South Asian Archaeology 1993*. Helsinki: Suomalainen Tiedeakatemia, p81-91.
- 1997. The Chronology of Ancient Occupation in Makran: Results of the 1994 Season at Miri Qalat, Pakistan. In R. Allchin and B. Allchin (eds), *South Asian Archaeology 1995*. Enfield N. H.: Science Publishers, p199-216.
- Binford, L., 1964. A Consideration of Archaeological Research Design. *American Antiquity* 29, p. 425-441.

Bibliography

- Bradtmoller, M. Salvatore, J, Grimm, S. 2017. Resilience theory in archaeological practice: An annotated review, *Quaternary International*. p. 1-14.
- Caldwell, R. J, (ed.). 1967. *Investigations at Tal-i-Iblis* (Illinois State Museum Preliminary Reports 9). Springfield: Illinois State Museum Society.
- , 1968. Pottery and Cultural History on the Iranian Plateau, *Journal of Near Eastern Studies*, Vol.27, No. 3, p. 178-183.
- Casal, J. M, 1961. *Fouilles de Mundigak*. Mémoires de la Délégation archéologique française en Afghanistan 17. Paris: C. Klincksieck.
- , 1964. *Fouilles d'Amri*. Publication de la Commission des fouilles archéologique. Fouilles de Pakistan. Paris: C. Klincksieck.
- Casanova, M, 1991. *La vaisselle d'alabâtre de Mésopotamie, d'Iran et d'Asie Centrale aux IIIe et IIe millénaires av. J. -C.* Mémoires de la Mission archéologique française en Asie Centrale 4. Paris: Éditions Recherche sur les Civilisations.
- , 1992. The Sources of the Lapis-lazuli found in Iran. In C. Jarrige (ed.), *South Asian Archaeology 1989. Monographs in World Archaeology* 14. Prehistory Press, Madison, p 49-56.
- Chase D.W., Fehervari G. and Caldwell J.R., 1967. Reconnaissances in the Bard Sir Valley. In J. R. Caldwell (ed.), *Investigations at Tal-i Iblis*. Illinois State Museum Preliminary Reports 9 (Springfield) p. 73-107.
- Ciarla, R, 1981. A Preliminary Analysis of the Manufacture of Alabaster Vessels at Shahr-i Sokhta and Mundigak in the 3rd Millennium BC. in H. Hartel (ed), *South Asian Archaeology 1979*. Berlin: Dietrich Reimer Verlag, p45-63.
- Collon, D., 1987. *First Impressions: Cylinder Seals in the Ancient Near East*. London: British Museum Publications.
- Curtis, J., 1988. A Reconsideration of the Cemetery at Khinaman, South-East Iran. *Iranica Antiqua* XXIII: 97-124.
- Dahl, J.L., C.A. Petrie, and D. T. Potts., 2013. Chronological Parameters of the Earliest Writing System in Iran, In C. Petrie (ed.) *Ancient Iran and Its Neighbours: Local Developments and Long-range Interactions in the 4th Millennium BC*. The British Institute of Persian Studies, Archaeological Monographs Series III, p. 353-378.

Bibliography

- David, B and J, Thomas., (eds.). 2008. *Handbook of Landscape Archaeology*, Walnut Creek: Left Coast Press.
- De Cardi, B. 1970. *Excavations at Bampur: A Third Millennium Settlement in Persian Baluchistan 1966*. New York: Anthropological Papers of the American Museum of Natural History 51(3).
- Desset, F, M. Vidale, N, A. Soleimani., 2013. Mahtoutabad III (Province of Kerman, Iran): An “Uruk-related” Material Assemblage in Eastern Iran, *Iran* 51, p. 17–54.
- Desset F., Vidale M., Alidadi Soleimani N., Battistella E. and Daneshi A. 2017. A Grave of the Halil Rud Valley (Jiroft, Iran, Ca. 2400-2200 BC): Stratigraphy, Taphonomy, Funerary Practice, *Iranica Antiqua* 52, p. 25-60.
- During-Caspers, E. C. L, 1970. “A Note on the Carved Stone Vases and Incised Grayware.” In B. de Cardi, *Excavations at Bampur: A Third Millennium Settlement in Persian Baluchistan 1966*. New York: Anthropological Papers of the American Museum of Natural History 51(3), p319-325.
- Eskandari, N., 2012. A chronological reappraisal of the Konar Sandal North and its superimposed platforms, *Payame Bastanshenas*, p. 69-76 (in Persian).
- , 2017. Excavations at the Prehistoric Sites of Tepe Dehno and Tepe East Dehno, Shahdad, Southeastern Iran, *Iranian Journal of Archaeological Studies* 7, 1-20.
- , 2019. Regional patterns of Early Bronze Age urbanization in the southeastern Iran. New discoveries on the western fringe of Dasht-e Lut. In J.-W. Meyer, E. Vila, M. Mashkour, M. Casanova and R. Vallet (eds.) *The Iranian Plateau during the Bronze Age. Development of Urbanisation, Production and Trade*. Maison de l’Orient et de la Méditerranée, Jean Pouilloux, Lyon, 201-216.
- Eskandari, N., M. Javadi, M. Shafie, A. Abedi, 2014. Keshit: an early Bronze Age urban center on the western edge of the Lut Desert, south-eastern Iran, *Journal of Antiquity*, Vol. 341, Project gallery.
- Eskandari, N., H. Molasalehi, H. Fazeli Nashli., 2016. Prehistoric Settlements of Dasht-e Lut, SE Iran, *Journal of Motaleat-e Bastanshenasi* 8, p.1-15 (in Persian).
- Eskandari N., H. Molasalehi, M. Shafiee, A. Abedi, 2019. Excavations at the Bronze Age Pastoral Site of Hanzaf, S.E. Iran: Strategy of Pastoralism in the Halil Rud Basin based on the

Bibliography

Archaeological and Ethno-Archaeological Evidence. *Mediterranean Archaeology and Archaeometry* 19, 1, 143-156.

- Eskandari N., Pfälzner P and Alidadi Soleinami N.. The formation of the Early Bronze Age Jiroft Culture, Halilrud Basin, SE Iran: Excavations at Varamin Jiroft 2017, *AMIT*. (in press)

- Estakhri, A. 1990. *Masalik wa Mamalik (Al Masalek va Al Mamalek) Anonymous Persian translation from V/VI century A.H Afshar, I.*, Tehran, Iran.

- Evans, T. L. and P. T. Dally, 2006. *Digital Archaeology: Bridging Method and Theory*, London & New York: Taylor and Francis Routledge.

- Frame, Lesley, 2004. Investigations at Tal-I Iblis: Evidence for Copper Smelting during Chalcolithic Period, M.S Dissertation, Massachusetts Institute of Technology, (Unpublished).

- Flannery, K., 1969. Origins and ecological effects of early domestication in Iran and the Near East, in P Ucko and G Dimbleby (eds) *the domestication and exploitation of plants and animals*, Chicago Aldine, p 73-100.

- Frifelt, K. 1991. *The Island of Umm an-Nar, vol.1. The Third Millennium Graves*. Aarhus: Jutland Archaeological Society Publications 26 (1).

- Garazhian, Omran., 2009. Darestan: A Group of Pre-Pottery Neolithic (PPN) Sites in South-Eastern Iran, *Antiquity*, Vol. 83, Issue 319, Project Gallery.

- Garazhian O. (2016) Stratigraphic Excavation at Tall-e Atashi, Dārestān, Bam. Living Floors of a Pre-Pottery Neolithic Site, Southeastern Iran. In K. Roustaei and M. Mashkour (eds.) *The Neolithic of the Iranian Plateau, Recent Research*. Studies in Early Near Eastern Production, Subsistence, and Environment 18, Berlin, exoriente, p.49-64.

- Gotzelt, T., 1996, *Ansichten der Archaologie Sud-Turkmenistans beu der Erforschung der "mittleren Bronzezeit" (Periode Namazga V)*. Archaologie in Eurasien, Bd.2. Espelkamp: M. Leidorf.

- Hakemi, A., 1992. The copper smelting furnaces of the Bronze Age in Shahdad. In Jarrige C. (ed.), *South Asian Archaeology 1989*. Papers from the Tenth International Conference of South Asia Archaeologists in Western Europe, Musée national des Arts asiatiques, Guimet, Paris, France, 3-7 July 1989. Monographs in World Archaeology no.14, Madison, Wisconsin, 119-132.

Bibliography

- Hakemi, A. 1994. Some Statues Discovered in the Excavations at Shahdad. in A. Parpola and P. Koskikallio (eds), *South Asian Archaeology 1993*. Helsinki: Suomalainen Tiedeakatemia, p. 217-224.
- , 1997. *Shahdad: archaeological excavations of a Bronze Age center in Iran*. Rome: ISIAO.
- , 2006. *The Report of eight seasons of excavation and survey at Shahdad (Dasht-e Lut)*, (ed) M. Mousavi, Pazhoheshgah-e Miras Farhangi, Tehran (in Persian).
- Hamzeh, M, M. Gharaie, H. Lahijani and R. Mousavi-Harami. 2016. Paleolimnology of Lake Hamoun (E Iran): Implications for past climate changes and possible impacts on Human Settlements, *PALAIOS*, Vol.31. P1-14.
- Hassan, Fekri A, 1978. Demographic Archaeology, *Advances in Archaeological Method and Theory*, Vol. 1, p. 49-103.
- , 1981. *Demographic Archaeology*. New York: Academic Press.
- , 2007, Review Essay: Demography and Archaeology. Demography in Archaeology by Andrew Chamberlin, *Journal of Anthropological Research*, Vol. 63, No.4, p. 563-567.
- Heskell, D. L., and C. C. Lamberg-Karlovsky, 1980. An Alternative Sequence for the Development of Metallurgy: Tepe Yahya, Iran. In T. A. Wertime and J.D. Muhly (eds), *The Coming of the Age of Iron*. New Haven: Yale University Press, p229-265.
- Heydari M., Desset F. and Vidale M., 2019. A late 4th - early 3rd millennium BC grave at Spidej (Eastern Jazmurian, Iranian Baluchistan), *Iranica Antiqua* 54, p.17-57.
- Heydari M., H. Fazeli Nashli, E. Cortesi and M. Vidale. 2015, A surface collection at Chegerdak, a Bronze Age centre in the Jazmurian basin (South-Eastern Iran), *Paléorient* 41, 2, p133-155.
- Hiebert, F. T, 1994a. *Origins of the Bronze-Age Oasis Civilization in Central Asia*. Cambridge Mass.: Peabody Museum, Harvard University. American School of Prehistoric Research Bulletin 42.
- , 1994b. Production Evidence for the Origins of the Oxus Civilization. *Antiquity* 68, p. 372-387.

Bibliography

- , 1998. *Margiana and Protozoroastrianism*. Athens: Kapon Editions.
- Hiebert, F. T., and C. C. Lamberg-Karlovsky., 1992. Central Asia and the Indo-Iranian Borderlands. *Iran* 30, p. 1-15.
- Hodder, I., 1992. *Theory and Practice in Archaeology*, London/New York: Routledge.
- Hole, F. 1980. Archaeological Survey in Southwest Asia. *Paléorient* 6, p. 21-44.
- Huang C. C., J. Pang, Z. Xiaochun, H. Su. and Y. Jia (2011) Extraordinary floods related to the climatic event at 4200 a BP on the Qishuihe River, middle reaches of the Yellow River. *China Quaternary Science Reviews* 30, 3, 460-468.
- Jarrige, C., 1994. The final phase of the Indus occupation at Nausharo and its connection with the following cultural complex of Mehrgarh VIII." In A. Parpola and P. Koskikallio (eds), *South Asian Archaeology 1993*. Helsinki: Suomalainen Tiedeakatemia, p295-313.
- Jarrige, C., J-F. Jarrige, R.H. Meadow, and G. Quivron (eds.), 1995. *Mehrgarh. Field Reports 1976-85. From Neolithic Times to the Indus Civilization*. Karachi: Department of Archaeology and Museums.
- Jochim, M.A., 1976, Hunter-gather subsistence and settlement: A predictive model. New York: Academic Press.
- Kaboli, M.A. 1997. The Report of the tenth season of excavation at the ancient Shahdad, *Gozaresh-ha-ye Bastan Shenasi*, Tehran: 87–124 (In Persian).
- , 2001. The Report of the twelfth season of excavation at the ancient Shahdad, *Pajoheshnameh*, Tehran: 239–266 (In Persian).
- , 2002. The Report of the eleventh season of excavation at the ancient Shahdad, *Pajoheshnameh*, Tehran: 181–141 (In Persian).
- Kamilli, D., and C.C. Lamberg-Karlovsky, 1979. Petrographic and Electron Microprobe Analysis of Ceramics from Tepe Yahya. Iran, *Archaeometry* 21(1), p. 47-59.
- Kaniuth K. (2010) Long Distance Imports in the Bronze Age of Southern Central Asia: Recent Finds and their Implications for Chronology and Trade. *Archäologische Mitteilungen aus Iran und Turan* 42, 3–22.
- Kavosh H. A., M. Vidale M. and H. Fazeli. 2019. *Tappeh Graziani, Sistan, Iran: stratigraphy, formation processes and chronology of a suburban site of Shahr-i Sokhta*. Prehistoric Sistan 2. Padova and Rome: Antilia.

Bibliography

- Keene, A. S., 1977, Economic optimization models and the study of hunter-gather subsistence settlement systems. Paper presented at the 42nd Annual Meeting of the Society for American archaeology, April 30, 1977, New Orleans.

- Kenoyer, J. M., and H. M. L. Miller, 1999. Metal Technologies of the Indus Valley Tradition in Pakistan and Western India. In V. C. Pigott (ed.), *The Archaeometallurgy of the Asian Old World*. Philadelphia: MASCA, The University Museum, University of Pennsylvania, p. 107-151.

- Khlopin, I. N., 1981. The Early Bronze Age cemetery of Parkhai II: The First Two Seasons of Excavations: 1977-78. In P. L. Kohl (ed), *The Bronze Age Civilization of Central Asia; Recent Soviet Discoveries*. New York: M. E. Sharpe, p. 3-34.

- Kohl, P.C, 1974. *Seeds of Upheaval: The Production of Chlorite at Tepe Yahya and an Analysis of Commodity Production and Trade in Southwest Asia in the Mid-Third Millennium*. Ph.D. Dissertation, Department of Anthropology, Harvard University.

- , 2001. Reflections on the Production of Chlorite at Tepe Yahya: 25 Years Later. In Lamberg-Karlovsky, C.C. and D. T. Potts (eds), *Excavations at Tepe Yahya, Iran, 1967-1975: The Third Millennium*. Cambridge, Mass.: Peabody Museum (American School of Prehistoric Research Bulletin 45), p. 209-230.

- Kohl, P.C, G. Harbottle and E. V Sayre, 1980. Physical and Chemical Analyses of the Soft Stone Vessels from Southwest Asia, *Archaeometry*, 21(2):131-159.

- Kowalewski, S. 2008. "Regional Settlement Pattern Studies." *Journal of Archaeological Research* 16, p. 225-285.

- Kramer, C., 1980. Estimating Prehistoric Populations, an Ethnographic Approach. In *L'archéologie de l'Iraq: perspectives et limites de documents d'interprétation anthropologique de documents*, 315-334. Paris: Colloques internationaux du CNRS 580.

- Lamberg-Karlovsky, C.C., 1970. Excavations at Tepe Yahya, Iran, 1967-1969, American school of Prehistoric Research, Bulletin 27, Peabody museum, Harvard University.

- , 1988. The 'Intercultural Style' Carved Vessels. *Iranica Antiqua* XXIII, p. 45-95.

Bibliography

- , 2001. Afterword." In Lamberg-Karlovsky, C.C and D. T. Potts (eds), *Excavations at Tepe Yahya, Iran, 1967-1975: The Third Millennium*. Cambridge, Mass.: Peabody Museum (American School of Prehistoric Research Bulletin 45), p. 267-280.
- Lamberg-Karlovsky, C. C., and M. Tosi, 1973. Shahr-i Sokhta and Tepe Yahya: Tracks on the Earliest History of the Iranian Plateau. *East and West* 23: 21-53.
- Lamberg-Karlovsky, C.C and T.W Beale, C.C. (eds.) 1986. *Excavations at Tepe Yahya, Iran 1967- 1975. The Early Periods*, American School of Prehistoric Research Bulletin, Vol. 38, Peabody Museum of Archaeology and Ethnology, Cambridge.
- Lamberg-Karlovsky, C.C. and Potts, D.T., 2001. Excavations at Tepe Yahya, Iran, 1967-1975, The Third Millennium, American school of Prehistoric Research, Bulletin 45, Peabody museum of Archaeology and ethnology, Harvard University.
- Lawrence D., G. Philip, H. Hunt, L. Snape-Kennedy, T. J. Wilkinson, 2016. Long Term Population, City Size and Climate Trends in the Fertile Crescent: A First Approximation. *PLoS ONE* 11(3): e0152563. doi:10.1371/journal.pone.0152563
- Mackay, E. J. H, 1938. *Further Excavations at Mohenjo-Daro: being an official account of excavations at Mohenjo-Daro carried out by the Government of India 1927-1931*. Delhi: Manager of Publications.
- Mackay, E. J. H, 1943. *Chanhu-Daro Excavations*. New Haven: American Oriental Society Publications, no. 20.
- Madella M. and D. Fuller, 2006. Palaeoecology and the Harappan Civilisation of South Asia: a reconsideration. *Quaternary Science Reviews* 25 (11–12), 1283–1301.
- Madjidzadeh, Y. 1976. The Land of Aratta, *Journal of Near Eastern Studies*, Vol. 35, No.2 p. 105-113.
- , 2003. *Jiroft: The Earliest Oriental Civilization*. Teheran: Printing and Publishing Organization of the Ministry of Culture and Islamic Guidance.
- , 2012. Jiroft tablets and the origin of the Linear Elamite writing system, in: Osada T. & Witzel M. (eds.), *Cultural relations between the Indus and the Iranian plateau*

Bibliography

during the third millennium BCE ; Indus project, Institute for humanities and nature, June 7-8, 2008, Harvard oriental series, opera minor vol. 7, Department of Sanskrit and Indian studies, Harvard University.

Madjidzadeh, Y and H. Pittman, 2008. Excavations at Konar Sandal in the region of the Jiroft in Halil Basin: First preliminary report (2002-2008), *Iran*, Vol.46, p. 69-103.

- Magee, P., 2004. *Excavations at Tepe Yahya, Iran, 1967-1975: The Iron Age Settlement*, Cambridge: Bulletin of the American School of Prehistoric Research, 46.

- Maghsoudi, M., Negahban and S. Bagheri., 2012, An analysis of the natural disaster of sand dunes on the modern settlements of Dasht-e Lut, *Journal of Geography and Natural Disasters*, Vol. I, p.83-96. (in Persian)

- Maghsoudi, M., Kiabi, B.H. & Madjnoonian, H. (2002). The natural areas and landscape of Iran: an overview. *Zoology in the Middle East* 26(1): 7-10.

- Mainguet, M., 1999. *Aridity, droughts and human development*, Springer, Berlin.

- Marshall, S. J., 1931. *Mohenjo-daro and the Indus Civilization: being an official account of archaeological excavations carried out by the Government of India 1922-1927*. London: Probsthain.

- Masson, V. M, 1988. *Altyn Depe*. (Trans. H. N. Michael). Philadelphia: University of Pennsylvania Press. University Museum Monograph 55.

- McFadyen, L., 2008, Building and Architecture as Landscape Practice, in David, B and J, Thomas., (eds.). *Handbook of Landscape Archaeology*, Walnut Creek: Left Coast Press, p 307-314.

Meder O. G, 1979. Klimaökologie und Siedlungsgeschichte auf dem Hochland von Iran in vor- und frühgeschichtlicher Zeit, *Marburger Geographische Schriften* 80, Marburg, 1979.

- Mehrafarin, R. and R. Mousavi Haji, 2006. Report of archaeological survey on the Sistan plain, Archive of ICHTO, unpublished, (in Persian).

Bibliography

- Meier, D., 2011. Preliminary Archeometallurgical Investigations of Bronze Age Metal Finds from Shahdad and Tepe Yahya, *Iranian Journal of Archaeological Studies* 1:2, p. 25-34.

- , 2015. Kaveh's forefathers. Traces of protohistorical metallurgical activities during the 3rd millennium BCE in East Iran with a special focus on the case of Shahdad in the Dasht-eh Lut (Kerman province), unpublished PhD-thesis, Freie Universität Berlin.

- , 2019. A Pyrotechnological Installation from the “Metallurgical Workshop” at Shahdad and Its Next Geographical and Chronological Comparisons. In J.-W. Meyer, E. Vila, M. Mashkour, M. Casanova, R. Vallet (eds.) *The Iranian Plateau during the Bronze Age. Development of Urbanisation, Production and Trade*. MOM Éditions, Lyon, 217-234.

- Mery, S, 2000. *Les céramiques d’Oman et l’Asie moyenne: Une archéologie des échanges à l’Age du Bronze*. Paris : Éditions Centre National de la Recherche Scientifique.

- Miroschedji, P. de. 1973. Vases et Objets en Stéatite Susiens du Musée du Louvre. *Cahiers de la Délégation Archéologique Française en Iran* 3: 9-80.

- Moorey, P. R. S, 1994. *Ancient Mesopotamian Materials and Industries: The Archaeological Evidence*. Oxford, New York: Clarendon Press.

- Muller-Karpe, M, 1993, *Metallgefäße im Iraq I (Von den Anfängen bis zur Akkad-Zeit)*. Prahistorische bronzefunde Abteilung II, Band 14. Stuttgart: Franz Steiner Verlag.

- Mutin B. 2013a. *The Proto-Elamite settlement and its neighbors ; Tepe Yahya period IVC*, ed. C.C. Lamberg-Karlovsky, American School of Prehistoric Research Monograph series, Oxbow Books.

- , 2013b. Ceramic Traditions and Interactions on the Southeastern Iranian Plateau during the 4th millennium BC, in C. Petrie (ed), *Ancient Iran and Its Neighbors: Local Developments and Long-range Interactions in the 4th Millennium BC*. Oxbow Book, The British Institute of Persian Studies Archaeological Monographs Series III, p. 253-275.

- Mutin B., H. Moradi, H. Sarhaddi-Dadian, H. Fazeli Nashli and M. Soltani (2017) New Discoveries in the Bampur Valley (South-Eastern Iran) and their Implications for the Understanding of Settlement Pattern in the Indo-Iranian Borderlands During the Chalcolithic Period. *Iran* 55, 2, 1-21.

Bibliography

- Mutin B. and O. Garazhian. 2020. Iranian-French Archaeological Mission in Bam, Kerman: Summary of Field-seasons 2016-2017. *Archaeology* 4, Winter, 93-106.
- Nicholas I.M, 1990. *The Proto-Elamite settlement at TUV, Malyan Excavation Report*. University Museum Monograph 69, University of Pennsylvania, Philadelphia.
- Paklayan, S., 2005. An Analysis of the Site of Shahdad (Khabis), Kerman, Iran: Internal Chronology and External Relations during the Third and Early Second Millennia BC, BA Dissertation, University of Sydney.
- Petrie C. A. 2012. The Chalcolithic of south Iran, in Potts, D.T. (ed.), *Oxford Handbook of Iranian Archaeology*, OUP, Oxford, p 120–158.
- Pfälzner P., Soleimani N. A. and Karami M. 2019. SOJAS 2015-2018 : A résumé of four seasons of archaeological survey south of Jiroft, *Archaeology, journal of the Iranian Center for Archaeological Research* 2/2, p. 107-124.
- Pigott, V. C., 1999. The Development of Metal Production on the Iranian Plateau: An Archaeometallurgical Perspective.” In V. C. Pigott (ed), *The Archaeometallurgy of the Asian Old World*. Philadelphia: MASCA, The University Museum, University of Pennsylvania, p. 73-106.
- Pittman, H. 2001. Glyptic Art of Period IV. In Lamberg-Karlovsky C.C. D. T. Potts (eds), *Excavations at Tepe Yahya, Iran, 1967-1975: The Third Millennium*. Cambridge, Mass.: Peabody Museum, Harvard University. American School of Prehistoric Research Bulletin 45, p231-267.
- Possehl, G. L, 1986. *Kulli: An Exploration of Ancient Civilization in Asia*. Durham, N.C.: Carolina Academic Press. Centers of Civilization 1.
- Possehl, G. L. (2007) The Middle Asian Interaction Sphere. Trade and contact in the 3rd millennium BC. *Expedition*, 49, 1, 40-42.
- Potts, D.T., 1999. *The Archaeology of Elam: Formation and Transformation of an Ancient Iranian State*. Cambridge: Cambridge University Press.
- , 2003. Tepe Yahya, Tel Abraç and the Chronology of the Bampur Sequence. *Iranica Antiqua* XXXVIII: p. 1-24.

Bibliography

Potts D. (2008) Puzur-Inshushinak and the Oxus Civilization (BMAC): Reflections on Shimashki and the Geo-Political Landscape of Iran and Central Asia in the Ur III Period. *Zeitschrift für Assyriologie* 98, 165–194.

- Potts, T. F., 1994. *Mesopotamia and the East: An Archaeological and Historical Study of Foreign Relations ca. 3400-2000 BC*. Oxford: Oxford University Committee for Archaeology, Monograph 37.

- Prickett, M.E., 1986a. Settlement during the Early Periods. In: C.C. Lamberg-Karlovsky (ed.)/T.W. Beale, *Excavations at Tepe Yahya, Iran, 1967-1975. The Early Periods*. American School of Prehistoric Research Bulletin 38 (Cambridge), p. 215-246.

-----, 1986b. Man, Land and Ware: Settlement Distribution and the Development of Irrigation Agriculture in the Upper Rud-i Gushk Drainage, Southeastern-Iran. PhD Diss. Harvard University.

- Rahbar M., 2003. Preliminary report of the first season of excavations at site of Bampur 14 (cemetery), Archived at the University of Sistan and Baluchistan, (in Persian).

-----, 1991, Konaro cemetery in relation with the civilizations of southeastern Iran, *Journal of Miras Farhangi* 4, p. 60-75 (in Persian).

- Razani, M. M. Emami. N, Soleimani and Y. Madjidzadeh, 2017. New insights into the characterization and provenance of chlorite objects from the Jiroft civilization in Iran, *Journal of Archaeological Science: Reports*, 16:194-204.

- Redman, C.L. 1978. *The Rise of Civilization: From Early Farmers to Urban Society in the Ancient Near East*, San Francisco: W.H. Freeman.

-----, 2005. Resilience Theory in Archaeology, *AMERICAN ANTHROPOLOGIST*, Vol. 107, Issue 1, p. 70-77.

- Redman, C., Kinzig, A.P., 2003. Resilience of past landscapes: resilience theory, society, and the longue duree. *Conserv. Ecol.* 7.

- Renfrew, Colin and Bahn, Paul. 2004. *Archaeology: Theories, Methods and Practice*.

Fourth Edition. London: Thames and Hudson.

Bibliography

- Sajjadi S.M.S. 1987. Prehistoric Settlements in the Bardsir Plain, South-Eastern Iran, *East and West* 37, p. 11-129.
- 2003, Excavations at Shahr-i Sokhta. First Preliminary Report on the Excavations of the Graveyard 1997-2000. *Iran* 41, p. 21-97.
- , 2006. *Excavations at Shahr-i Sokhta*. Tehran (in Persian, English, French, Italian, German and Russian).
- Sajjadi, S.M.S, M. Casanova, L. Costantini and K.O. Lorentz. 2008, Sistan and Baluchistan Project: Short Reports on the Tenth Campaign of Excavations at Shahr-i Sokhta. *Iran* 46, p. 307-337.
- Salvatori, S., 1995. "Gonur-Depe I (Margiana, Turkmenistan): The Middle Bronze Age Graveyard. Preliminary Report on the 1994 Excavation Campaign". *Rivista di Archeologia* XIX: 5-37.
- Salvatori, S. and Vidale, M. 1982. A Brief Surface Survey of the Proto-Historical Site of Shahdad (Kerman, Iran), *Rivista di Archeologia* 6, p. 5-10.
- Salvatori, S., and M. Tosi., 1997. Postscriptum: Some Reflections on Shahdad and its Place in the Bronze Age of Middle Asia. in A. Hakemi. *Shahdad: Archaeological Investigations of a Bronze Age Center in Iran*. Istituto Italiano per il Medio ed Estremo Oriente, Centro scavi e ricerche archeologiche, Reports and Memoirs 27. Rome: Oxford & IBH, p. 121-138.
- Salvatori, S. and M. Tosi., 2005. Shahr-i Sokhta Revised Sequence. In C. Jarrige, ed., *South Asian Archaeology 2001*. p. 281-292, Paris.
- Santoni, M, 1988. "Aspects matériels des cultures de Sibri et de Mehrgarh VIII (plaine de Kachi, Balûchistân, Pakistan) a la fin du troisième et au début du deuxième millénaires." In *L'Asie centrale et ses rapports avec les civilisations orientales des origines a l'age du Fer*. Actes du Colloque franco-soviétique de Paris 1985. Paris : Diffusion de Boccard, p135-141.
- Sarianidi, V. I, 1986. Le complexe cultuel de Togolok 21 en Margiane. *AA* XLI: 5-21.
- , 1993, Excavations at Southern Gonur. *Iran* 31: 25-37.
- , 1998. *Margiana and Protozoroastrianism*. Athens: Kapon Editions.
- Schmidt, E.F, 1937. *Excavations at Tepe Hissar, Damghan*. Philadelphia: University Museum.

Bibliography

- Schmidt, E. F., M. N. van Loon, and H. H. Curvers, 1989. *The Holmes Expeditions to Luristan*, vol. I-II. Chicago: Oriental Institute Publications 108.

- Schmidt A., M. Quigley, M. Fattahi, G. Azizi, M. Maghsoudi and H. Fazeli, 2011. Holocene settlement shifts and palaeoenvironments on the Central Iranian Plateau: investigating linked systems. *Holocene* 21, 583-595.

- Shaahzeidi, S and M. Entezari. 2014. The effect of active tectonic to morphology of alluvial fan of Shahdad in Kerman- Iran, *Journal of Earth Science and Engineering*, 4, p 141-145.

- Shafie, M., H. M. Salehi, and N. Eskandari. 2019. "Gahnegari nesbi va motlaq Tappeh Vakilabad Ourzouyeh ba estefade az ravesh tarikhgozari radiocarbon ba tif sanji jermi shetabdahande (AMS-14C): arziyabi gahnegari doreye Mes-o sangi Tappeh Yahya Soghan" (The Absolute and Relative chronology of Tepe Vakilabad: A Reappraisal of the chronology of the Chalcolithic Period of Tepe Yahya in SE Iran) *Journal of Research on Archaeometry* 5, 1, p 81-94.

- Shanks, M, 2001. Culture/Archaeology: the dispersion of a discipline and its objects, in I. Hodder (ed.), *Archaeological Theory Today*, Cambridge: Cambridge University Press, p. 284-306.

Soleimani, N. A., Shafiee, M., Eskandari, N., & Salehi, H. M. 2016. Khaje Askar: A 4th millennium BC Cemetery in Bam, Southeastern Iran. *Iranica Antiqua* 51, 57-84.

- Soleimani N. A. and Fazeli-Nashli H. 2018. The reevaluation of Kerman Neolithic chronology based on the excavation of Tepe Gav Koshi, Esfandagheh-Jiroft, *Journal of Research on Archaeometry* 4(2), p. 61-79 (in Persian).

- Stein, Sir Aurel. 1937. *Archaeological Reconnaissances in North-Western India and South Eastern Iran*, London.

- Steinkeller, P., 1982. The Question of Marhashi: A Contribution to the Historical Geography of Iran in the Third Millennium B.C. *Zeitschrift für Assyriologie und Vorderasiatische Archäologie*, 72, II, p. 237-264.

- -----, 2014. Marhashi and Beyond: The Jiroft Civilization in a Historical Perspective, in Lamberg-Karlovsky, C.C, Genito, B and Cerasetti, B (eds)., *My life is like the summer rose, papers in honour of Maurizio Tosi.*, p. 691-707.

Bibliography

- Stocklin, Y. (1973) Basic Geological Study of Central Lut, East of Iran. Report 22-F, Institute of Geology and Mining Publications, Tehran.

- Stransky V. and J. L. Maupu (2014) *The Hollow City: A Ring as an Urban Utopia or as a Model for Sustainable Urbanization?* HAL Id: halshs-01078080, <https://halshs.archives-ouvertes.fr/halshs-01078080>

Sumner W. (1988) Malyan, Tall-e (Anshan). *Reallexikon der Assyriologie und vorderasiatischen Archäologie* 7 (3/4), Berlin, de Gruyter, 306-320.

Sumner W., 1989, Population and Settlement Area: an example from Iran, *American Anthropologist*, Vol 91, p. 631-641.

Sumner W. (2003) *Early Urban Life in the Land of Anshan: Excavations at Tal-e Malyan in the Hughlands of Iran*. University Museum Monograph 117, University of Pennsylvania, Philadelphia.

- Thomas, J, 1996. Time, Culture, and Identity: An Interpretive Archaeology, London: Routledge.

-----, 2008, Archaeology, Landscape and Dwelling, in David, B and J, Thomas., (eds.). *Handbook of Landscape Archaeology*, Walnut Creek: Left Coast Press, p 300-306.

- Thornton, C. P., C. C. Lamberg-Karlovsky, M. Liezers, and M. M. Young. 2002. On Pins and Needles: Tracing the Evolution of Copper-base Alloying at Tepe Yahya, Iran, via ICP-MS Analysis of Commonplace Items. *Journal of Archaeological Science* 29, p. 1451-1460.

- Tosi, M., 1969. Excavations at Shahr-i Sokhta. Preliminary Report on the Second Campaign, *East and West* 19, Rome: IsMEO, p. 109-122.

Tosi, M., 1970. A Tomb from Damin and the Problem of the Bampur Sequence in the Third Millennium BC, *East and West* 20: 9-50.

- Tosi, M., 1974. "Bampur: A Problem of Isolation." *East and West* 24: 29-50.

-----, 1986. The Archaeology of Early States in Middle Asia. *Oriens Antiquus* XXV: 153-187.

Bibliography

- Tosi, M. and M. Piperno., 1975. The Graveyard of Sahr-e Suxteh (A Presentation of the 1972 and 1973 Campaigns). in F. Bagherzadeh, ed., *Proceedings of the 3rd Annual Symposium on Archaeological Research in Iran*. p. 121-140, Tehran.
- Ur J. A., P. Karsgaard and J. Oates (2007) Urban Development in the Ancient Near East. *Science* 317, 1188.
- Vats, M.S, 1940. *Excavations at Harappa: being an account of archaeological excavations at Harappa carried out between the years 1920-21 and 1933-34*. Calcutta: Government of India.
- Vidale M. (2006-2008) Šahdad. *Reallexikon der Assyriologie und Vorderasiatische Archäologie* 11, Berlin, de Gruyter, 535-537.
- Vidale, M and F. Desset, 2013. Mahtoutabad (KSS, Jiroft). Preliminary Evidence of Occupation of a Halil Rud Site in the early 4th Millennium BC, In C. Petrie (ed.) *Ancient Iran and Its Neighbours: Local Developments and Long-range Interactions in the 4th Millennium BC*. The British Institute of Persian Studies, Archaeological Monographs Series III, p. 233-252.
- Vidale, M., and A. Lazzari (eds.), 2017. *Lapis Lazuli Bead Making at Shahr-i Sokhta. Interpreting craft production in a urban community of the 3rd millennium BC.*, *Serie Orientale Roma* N.S. 6. Antilia, Treviso.
- Voigt, M., and R. H. Dyson. 1992. *The Chronology of Iran, ca. 8000-2000 B.C*. In R. W. Ehrich (ed), *Chronologies in Old World Archaeology* (3rd Ed). Chicago: University of Chicago Press, p. 122-178.
- Walker, R. T. P. Gans, M. B. Allen, J. Jackson, M. Khatib5N. Marsh and M. Zarrinkoub, 2009, Late Cenozoic volcanism and rates of active faulting in eastern Iran, *Geophysical Journal International*, 177 (2), p. 783-805.
- Weiss H., M. A. Courty, W. Wetterstrom, F. Guichard, L. Senior, R. Meadow and A. Curnow, 1993. The genesis and collapse of third millennium north Mesopotamian civilization. *Science* 261 (5124), 995-1004.
- Wilkinson, T, J. 2003a, *Archaeological Landscapes of the Near East*, University of Arizona Press, Tucson.

Bibliography

-----, 2003b. Archaeological Survey and Long-Term Population Trends in Upper Mesopotamia and Iran. In Miller, N. F. and Abdi, K. (eds), *Yeki Bud, Yeki Nabud: Essays on the Archaeology of Iran in Honor of William M. Sumner*. p. 39-51. The Cotsen Institute of Archaeology: Los Angeles.

- Wobst, H. M. 1975. The demography of finite populations and the origins of the incest taboo. In *population studies in archaeology and biological anthropology: A symposium*, edited by A.C. Swedlund. Society for American Archaeology, Memoirs 30: 74-81.

- Zehzad, B., Khanbabaei, Z, Mohammadi, A, Mahboobi, S & Baharvand, M. 2016. Environmental Conditions of Iran Pluvial Lakes using Sedimentary Evidence (Case study: Lut Desert Kalut). *Physical Geography Research Quarterly*, Vol. 48, p. 18-19.

Illustrations

VOLUME TWO

Appendix

Illustrations

Illustrations

List of Figures

Fig 1: Location of Lut Desert in the Iranian Plateau	237
Fig 2: Map showing the study area to the west of Lut Desert	237
Fig 3: Location of the alluvial fan of Shahdad	238
Fig 4: Location of the alluvial fan of Shahdad and its adjacent faults	238
Fig 5: Location of the central part of Dasht-e Lut in the west of the Lut Desert where most of the studied sites are distributed.	239
Fig 6: Current bed of the Shahdad River running eastward situated 6km north of the Bronze Age city of Shahdad	240
Fig 7: A gully passing directly through the Bronze Age city Shahdad	240
Fig 8: Satellite imagery showing the Qanat chains at the base of alluvial fan of Shahdad transferring water from west to east of the plain	241
Fig 9: Nebka tree of the Lut area and the vase-shaped sand dune formed around vegetation	241
Fig 10: The graves on the surface of Mokhtarabad attesting the extreme wind erosion in the Lut area	242
Figs 11, 12: Kaluts (sand dunes) the typical feature of Lut Desert	243
Fig 13: A small Kalut at the base of the alluvial fan of Shahdad	244
Fig 14: A comparison of the Kaluts of the Lut Desert (left) and Smaller Kaluts (right) of Shahdad plain	244
Fig 15: The Location of Urban Center of Shahdad to the east of the modern city	245
Fig 16: Image showing the site of Shahdad and its excavated areas (A-D localities were excavated by Hakemi and Kabobi's operations are shown as black squares)	245
Fig 17: Excavated Areas of Cemetery A of Shahdad (After Hakemi 1997: 45, modified by author)	246

Illustrations

- Fig 18:** some of the potteries recovered from Cemetery A of Shahdad (Kept in the storeroom of Shahdad city) 248
- Fig 19:** some of the chlorite containers recovered from Cemetery A of Shahdad (Kerman Museum) 253
- Fig 20:** Stone miniature columns from Cemetery A of Shahdad (Shahdad storeroom) 253
- Fig 21:** A decorated Bronze dish from Shahdad (After; Hakemi 1997) 254
- Fig 22:** Drawing of the sense of the Standard of Shahdad (After; Hakemi 1997:649) 255
- Fig 23:** Standard of Shahdad (National Museum of Tehran) 257
- Fig 24, 25:** Two Clay Statues from Cemetery A of Shahdad (Courtesy of the National Museum of Iran) 258
- Fig 26:** A Cylindrical Seal recovered from grave 163 of Cemetery A of Shahdad (Courtesy of the National Museum of Iran) 259
- Figs 27 & 28:** Two unpublished seals recovered from area D of Shahdad, found by Hakemi (Courtesy of National Museum of Iran) 261
- Fig 29:** Seal impression of a clay stamp seal from architectural complex excavated by M. Kaboli (After Kaboli 1997) 262
- Fig 30:** Plan of the Architectural complex A of *farmers's area* 263
- Figs 31, 32:** Architectural complex A of *farmers's area* excavated by M. Kaboli (After Kaboli 1997) 264
- Fig 33:** Architectural complex B of *farmers's area* excavated by M. Kaboli (After Kaboli 2002) 265
- Fig 34:** Architectural complex of *Jewelry's area* excavated by M. Kaboli (After Kaboli 2001) 266
- Fig 35:** Exposure of graves on surface and erosion of burial goods at Shahdad 267
- Fig 36:** Aerial photograph showing the location of the trenches excavated in 2016 for delimiting the site 268
- Fig 37:** Topographic map of Shahdad showing the site's extension. "Jewelry" and "Farmers" Areas are the English translation of labels originally used by M. A. Kaboli in

Illustrations

his field reports. T1 to T30 are the small test trenches dug for delimiting the 3rd millennium site. Block letters A-D locate old excavation areas discussed in the text.	
Contour lines: 1 m.	269
Fig 38: The survey area in red color on the west of Lut Desert	270
Fig 39: Distribution pattern of all the studied sites (5 th -2 nd Millennium BC) on the western edge of Lut Desert.	271
Fig 40: General view of the surface of Mokhtarabad site	272
Fig 41: Density of cultural materials on the surface of the Mokhtarabad	272
Fig 42: The graves on the surface of Mokhtarabad attesting the extreme wind erosion in the Lut area	273
Fig 43: The plain red ware of Shahdad recovered from the surface of the site	273
Fig 44, 45: The plain red ware of Shahdad recovered from the surface of the site	273
Fig 46: General view of the hill-top site of Shd 59	275
Fig 47: General view of the hill-top site of Shd 61	275
Fig 48: General view of the surface of the large site of Keshit	276
Fig 49: Density of cultural materials on the surface of Keshit site	276
Fig 50: Some of the industrial kilns on the surface of the Keshit	277
Fig 51: Some drawings of the surface collected ceramics of Keshit	278
Fig 52: The location of two excavated sites to the east of urban center of Shahdad	281
Fig 53: Tepe Dehno and the Landscape around at the site	281
Fig 54: Tepe Dehno is founded on the top of a Kalut	282
Fig 55: Topographic map of Tepe Dehno showing the place of the Trenches	282
Fig 56: The Stratigraphy of Trench I, Northern Section	283
Fig 57: A selection of the recovered ceramics from Trench I, Tepe Dehno	286
Fig 58: Tepe Dehno, Characteristic of the recovered ceramics from Trench II (Loc. 2001 (1-4), Loc. 2002 (5-10), Loc. 2003 (11-13), Loc. 2004 (14-16), Loc. 2005 (17-20)	288
Fig 59: Deflation of Cultural deposits at Trench II, Tepe Dehno	289

Illustrations

Fig 60: A selection of the recovered ceramics from Trench III, Tepe Dehno	289
Fig 61: Stratigraphy of cultural layers at Trench III, Tepe Dehno	291
Fig 62: Deflation of cultural layers at Trench III, Tepe Dehno	291
Fig 63: A selection of the recovered ceramics from Trench IV, Tepe Dehno	293
Fig 64: Stratigraphy and the deflation of cultural deposits at Trench IV, Tepe Dehno	294
Fig 65: General view of Tepe East Dehno	294
Fig 66: Deflation of cultural deposits at Trench I, Tepe East Dehno	295
Fig 67: Stratigraphy of cultural layers at Trench I, Tepe East Dehno	295
Fig 68: A selection of the recovered ceramics from Trench I, Tepe East Dehno	297
Fig 69: Map showing the major excavated sites of Southeastern Iran	298
Figs 70, 71: The result of 14C dating analysis from East Dehno showing the second quarter of 5 th Millennium BC	299
Figs 72, 73: The result of 14C dates from Trench IV, Tepe Dehno, Locus 4002 (left) and Locus 4004 (right)	300
Figs 74, 75: The result of 14C dates from Trench I, Tepe Dehno, Locus 1006 (left) and Locus 1007 (right)	301
Figs 76, 77: The result of 14C dates from Trench II, Tepe Dehno, Locus 2002 (left) and Locus 2003 (right)	302
Figs 78, 79: The result of 14C dates from Trench III, Tepe Dehno, Locus 3002	303
Fig 80: Radiocarbon dates from Tr. I, Site of Varamin-e Jiroft	304
Fig 81: Radiocarbon dates from Tepe Gav Koshi (after Soleimani and Fazeli 2018)	306
Fig 82: Radiocarbon dates for Konar Sandal South	307
Fig 83: GIS map showing the distribution pattern of 5 th millennium settlements on the Lut area	309

Illustrations

- Fig 84:** GIS map showing the distribution pattern of 4th millennium settlements on the Lut area 310
- Fig 85:** GIS map showing the distribution pattern of 3rd millennium settlements on the Lut area 310
- Fig 86:** Exposure of graves on surface and erosion of burial goods at the 3rd millennium Site of Mokhtarabad on the west of Lut desert 312
- Fig 87:** Urban center of Shahdad and its contemporaneous small satellite occupations (CORONA Image) 314
- Fig 88:** Aerial photograph showing the location of the trenches excavated in 2016 for delimiting the site (photos from National Cartographic Centre, Iran, taken in 1993) 315
- Fig 89:** The new topographic map of Shahdad showing in orange the settlement cores or inhabited areas of the site. Contour lines: 1 m. 317
- Fig 90:** Shahdad. Map of Site D, excavated by A. Hakemi and E. Bayani in 1979. The stars mark the two rooms where hoards with unfinished beads in chalcedony and carnelian were found, below the level of the copper ores processing craft spaces. The arrows point to the entrances of five different dwellings. 318

Illustrations

List of Tables

Table 1: Speed and Direction of the Winds in Dasht-e Lut	242
Table 2: Placement of the uncovered graves from Shahdad	247
Table 3: Comparison of the Shahdad ceramics with the contemporaneous sites of the other regions	248
Table 4: Comparison of the Metal Objects of Shahdad with the Contemporaneous Sites of the Other Regions	254
Table 5: Comparison of the Seals of Shahdad with the Contemporaneous Sites of the Other Regions	260
Table 6: The Revised Chronology of Shahdad	266
Table 7: The identified prehistoric and protohistoric sites of Dasht-e Lut	279
Table 8: Characteristics of the recovered ceramics from Trench I, Tepe Dehno	284
Table 9: Characteristics of the recovered ceramics from Trench II, Tepe Dehno	287
Table 10: Characteristics of the recovered ceramics from Trench III, Tepe Dehno	290
Table 11: Characteristics of the recovered ceramics from Trench IV, Tepe Dehno	292
Table 12: Characteristics of the recovered ceramics from Trench I, East Dehno	296
Table 13: Results of the Radiocarbon dates from Tr. I, Site of Varamin-e Jiroft	305
Table 14: Proposed chronological table for the South-East Iran	308
Table 15: Settled Areas of Lut in different periods derived from survey data	313
Table 16: Long-term population trend from Lut area	313
Table 17: Location and size of 18 individual settlement cores surveyed within the limits of the Shahdad site complex.	316

Illustrations



Fig 1: Location of Lut Desert in the Iranian Plateau (Courtesy of M. Rokni)

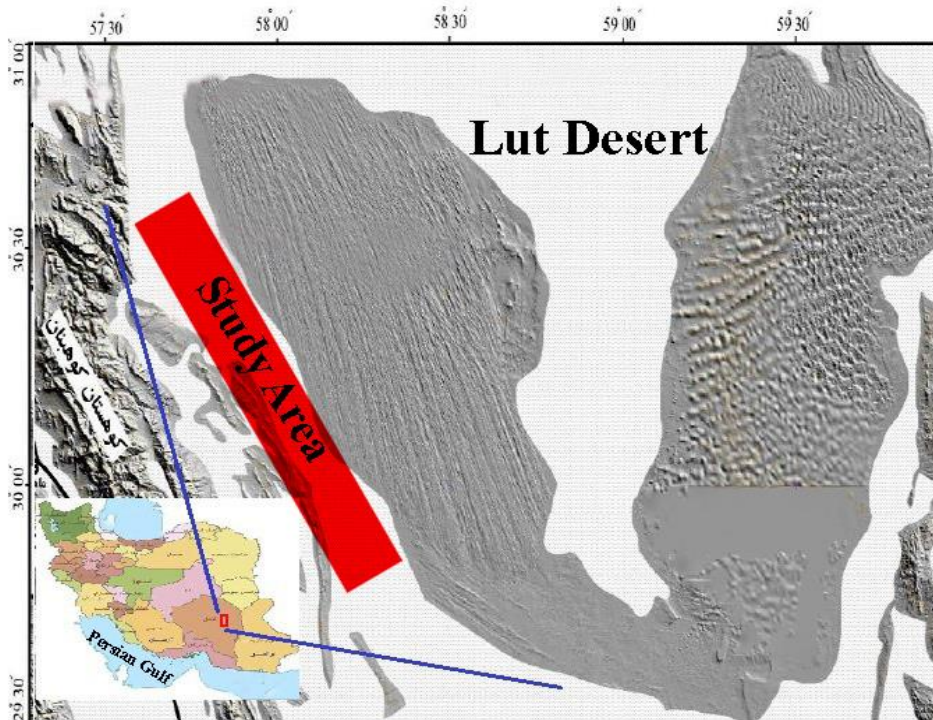


Fig 2: Map showing the study area to the west of Lut Desert (Base map After Maghsoudi *et al.* 2012, modified by author)

Illustrations

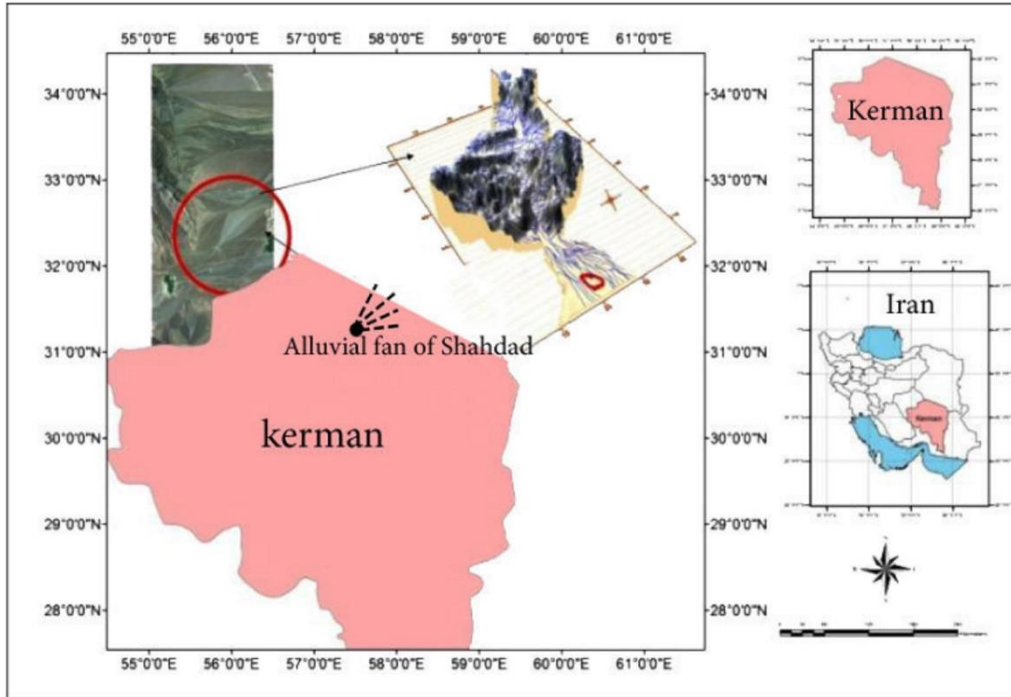
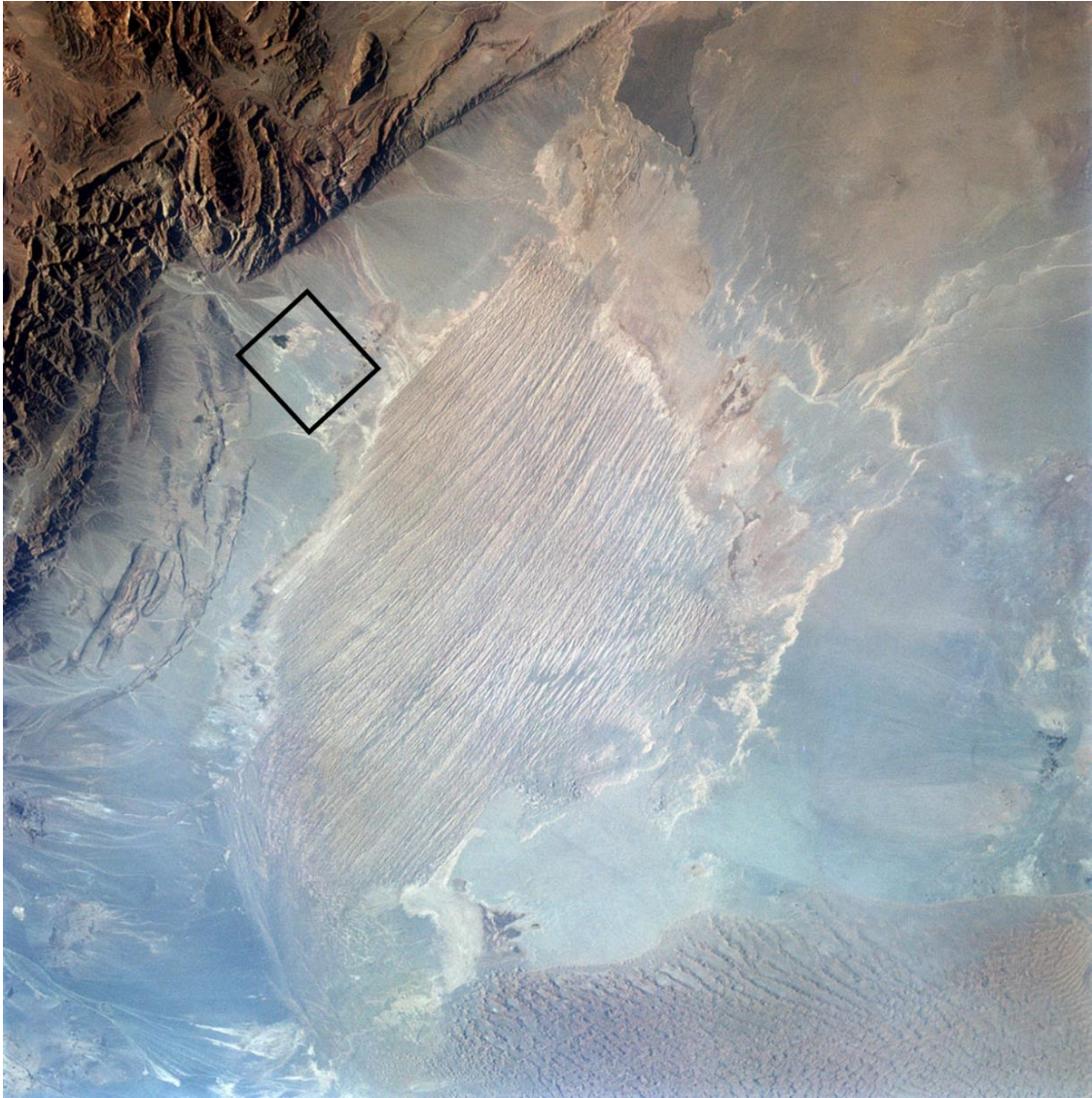


Fig 3: Location of the alluvial fan of Shahdad (After Shahzeidi and Entezari 2014)



Illustrations

Fig 4:



Location of the alluvial fan of Shahdad and its adjacent faults (Google Earth Image)

Illustrations

Fig 5: Location of the central part of Dasht-e Lut in the west of Lut Desert where most of the studied sites are distributed (Courtesy of M. Vidale).



Illustrations

Fig 6: Current bed of the Shahdad River running eastward situated 6km north of the Bronze Age city of Shahdad (Photo by author)



Fig 7: A gully passing directly through the Bronze Age city of Shahdad (Photo by author)



Illustrations

Fig 8: Satellite imagery showing the Qanat chains at the base of alluvial fan of Shahdad transferring water from west to east of the plain (Google Earth Image)



Fig 9: Nebka tree of the Lut area and the vase-shaped sand dune formed around vegetation (Photo by author)

Illustrations

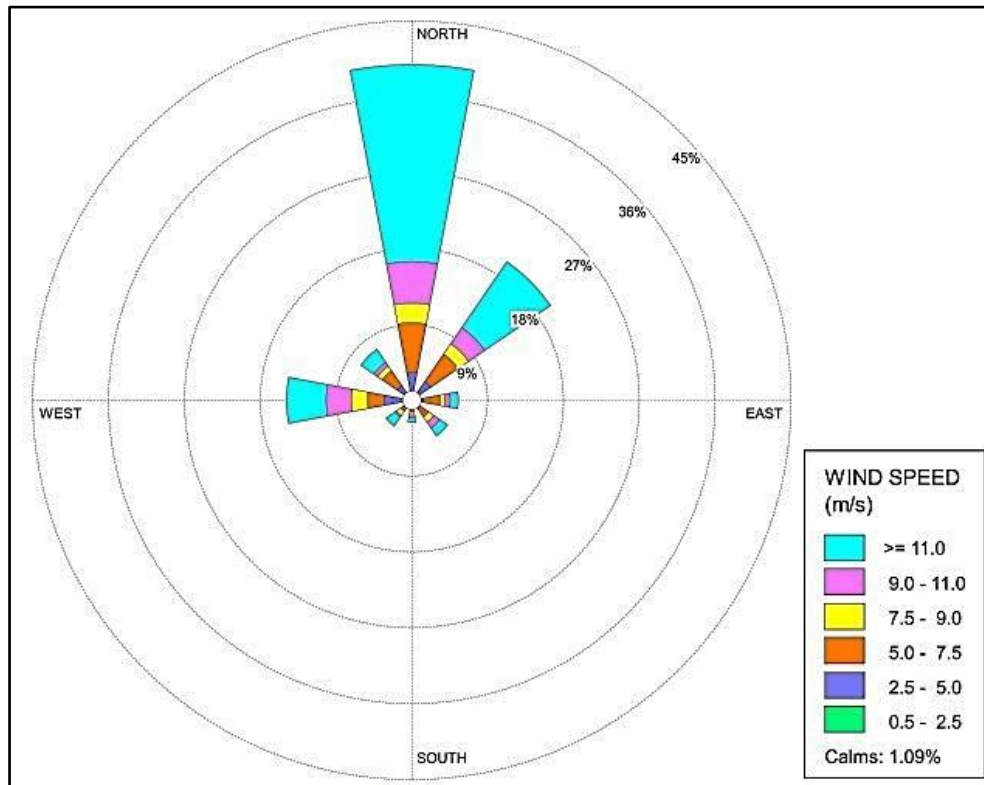


Table 1: Speed and Direction of the Winds in Dasht-e Lut (After Maghsoudi *et al.* 2012)



Illustrations

Fig 10: The graves on the surface of Mokhtarabad attesting the extreme wind erosion in the Lut area
(Photo by author)



Figs 11, 12: Kaluts (sand dunes) the typical feature of Lut Desert (Photo by author)

Illustrations



Fig 13: A small Kalut at the base of the alluvial fan of Shahdad (Photo by author)

Illustrations



Fig 14: A comparison of the Kaluts of the Lut Desert (left) and Smaller Kaluts (right) of Shahdad plain (Photo by author)

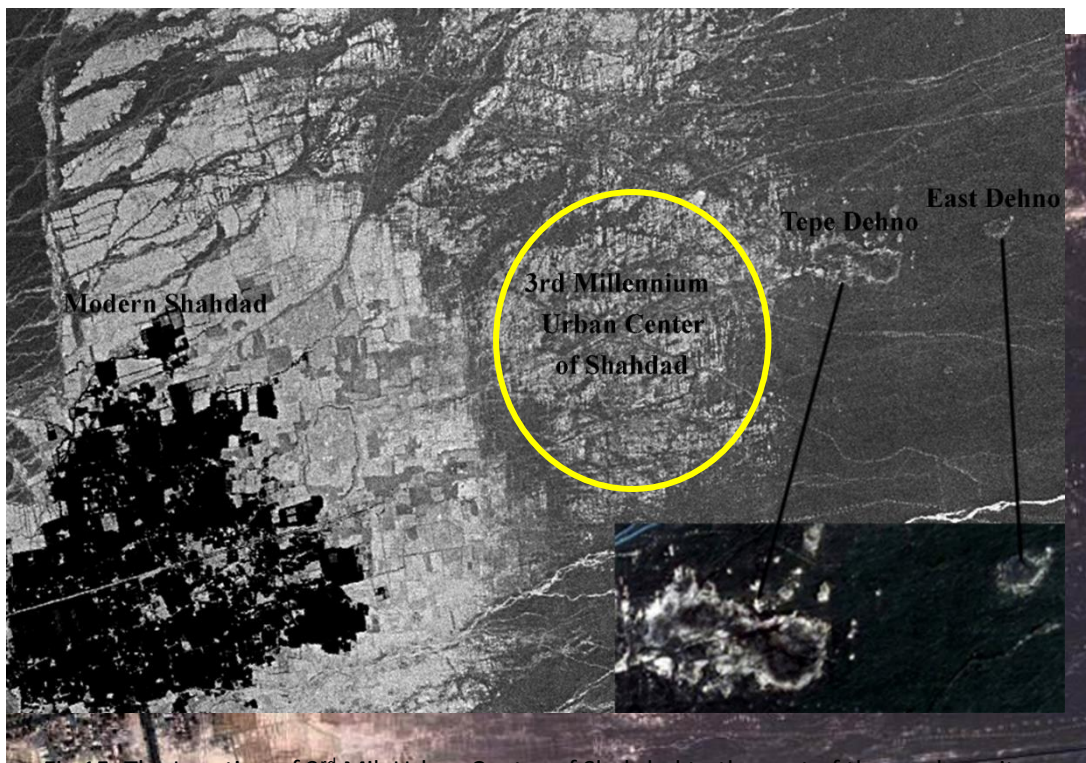


Fig 15: The Location of 3rd Mil. Urban Center of Shahdad to the east of the modern city

Illustrations

Fig 16: Image showing the site of Shahdad and its excavated areas (A-D localities were excavated by Hakemi and Kabobi's operations are shown as black squares)

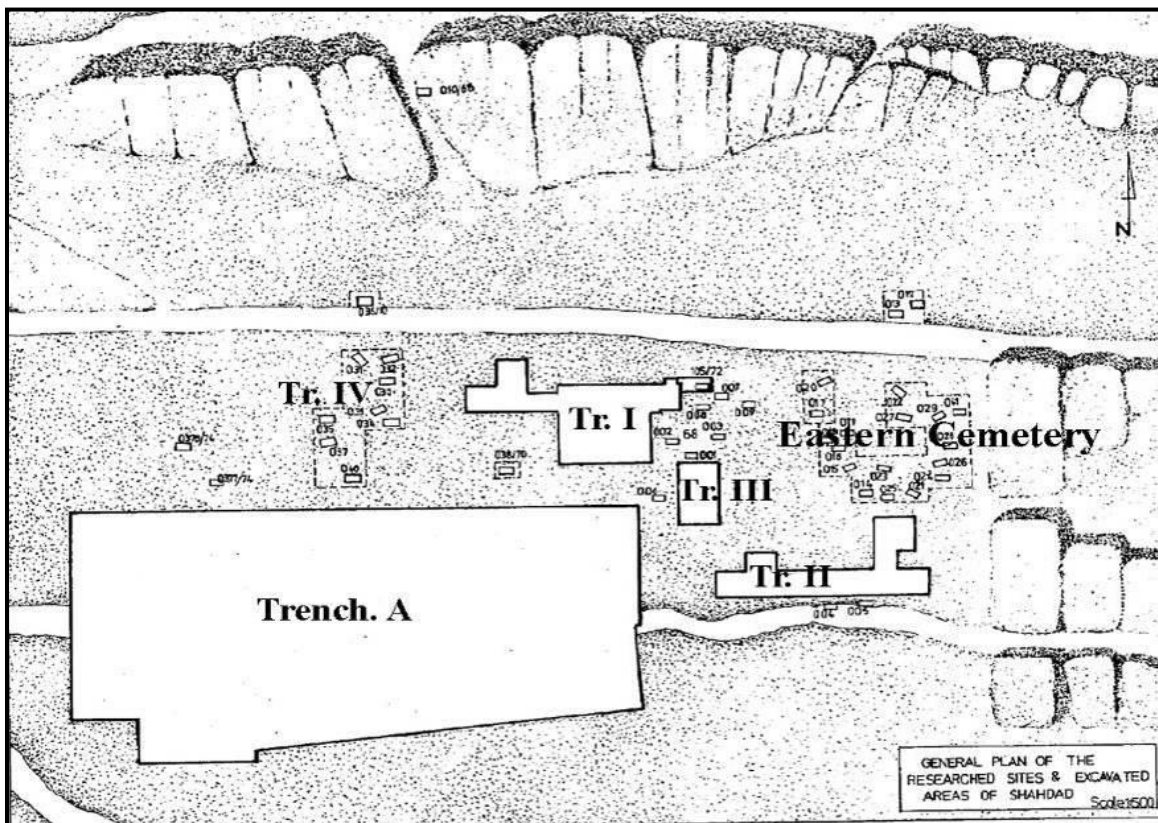


Fig 17: Excavated Areas of Cemetery A of Shahdad (After Hakemi 1997: 45, modified by author)

Illustrations

Table 2: placement of the uncovered graves from Shahdad

Excavated Area	Graves	Grave Number
Trench B	7+1	10, 11, 42 – 47
Trench C	8	48 – 55
Eastern Cemetery of the Cemetery A	19	12, 28, 37, 41
Trench A of the Cemetery A	289	29, 33, 38 – 40, 92 – 105, 110 - 375
Trench I of the Cemetery A	25	56-80
Trench II of the Cemetery A	11	81-91
Trench III of the Cemetery A	4	106-109
Trench IV of the Cemetery A	3	34-36

Illustrations

Cemetery A, the graves outside of the trenches	16	1-9, 376-382
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Fig 18: some of the potteries recovered from Cemetery A of Shahdad (Kept in the storeroom of Shahdad city) (Photo by author)

Table 3: Comparison of the Shahdad ceramics with the contemporaneous sites of the other regions

Illustrations

Shahdad Pottery	Form/Decoration	Similar Parallel
No.0118. g 018 (Eastern Cemetery) No.0094. g 013 (Eastern Cemetery) No.0173. g 027 (Eastern Cemetery) No.0112. g 017 (Eastern Cemetery) No.0182. g 028 (Eastern Cemetery)	Palm with 1-3 branches between single or double bands on wide-mouthed globular pots, and globular jars with high collar and flaring rim	Bampur I-III (de Cardi 1970: Fig.17.12; 22.126); IV (Fig.23.185 & 187; 25.239 & 258); V (Fig.34.326; 36.98; 37.108; 38.375); VI (Fig. 43.483) Miri Qalat III (Besenval 1994: Fig.6.3) Khurab (Stein 1937: Pl.XIII.Kh.B.ii.199) Konar Sandal South (Madjidzadeh 2008:Fig. 24)
No.3505. g 291 (Tr. A) No.2996. g 241 (Tr. A)	Truncated Conical Bowls	Yahya IVB4-1 (Potts 2001: Fig.5.3) Khurab (Stein 1937: Pl.VI.Khur.L.i.276) Mehrgarh VIII (Jarrige et al. 1995: Fig. 5.19.b; 7.25.d-e), Nausharo IV and Dauda Damb (Jarrige 1994: 297) Togolok 1 and 21 (Sarianidi 1986: Fig.12.6; Hiebert 1994a: Fig.4.10)
No.0854. g 091 (Tr. II) No.0999. g 109 (Tr. III)	hatched "M"	Bampur I-IV (de Cardi 1970: Fig.20.81-83, Fig.34.326; V (de Cardi 1970: Fig. 34.326; 36.100; VI (de Cardi 1970: 302) Konar Sandal South (Madjidzadeh 2008:Fig. 24) Mundigak III.6 (Casal 1961: Fig.61.141)
No.0218. g 032 (Tr. IV) No.3972. g 327 (Tr. A) No.4395. g 375 (Tr. A)	Hatched Wavy Bands	Yahya IVB (Potts 2001: 8, Fig.1.17) Tell Abraq (Potts 2001: 8, 114, with refs)
No.3082. g 254 (Tr. A) No.4218. g 354 (Tr. A) No.0219. g 032 (Tr. IV) No.0187. g 029 (Tr. A)	Hatched semicircles	Shahr-i Sokhta III (Lamberg-Karlovsky & Tosi 1973: Fig.56) Mundigak III, IV (Casal 1961: Fig.57.104; Fig.87.359; 97.464.a) Konar Sandal South (Madjidzadeh 2008:Fig. 24)

Illustrations

No.0109. g 016 (Tr. E.A) No.0175. g 027 (Eastern Cemetery) No.1164. g 120 (Tr. A)	Hatched Chain Design	Bampur V (de Cardi 1970: Fig.38.377) Amri IIIC (Casal 1964: Fig.82.373; 86.411)
No.0172. g 027 (Eastern Cemetery)	hatched hourglass	Bampur II-IV (de Cardi 1970: Fig.21.113; 22.160; 25.233)
No.0182. g 028 (Eastern Cemetery) No.0110. g 016 (Eastern Cemetery) No.0999. g 109 (Tr. III)	High-collared globular jars with flaring rim	Bampur I-IV (de Cardi 1970: Fig.18.28 & 29; 22.129; 23.180; 31.50)
No.0888. g 096 (Tr. A) No.4466. Room10 (D) No.0247. g 034 (Tr. IV) No.1383. g 134 (Tr. A)	Painted Spouted Vessels	Yahya IVA (Lamberg-Karlovsky 1970: Fig.16.p) Shahr-i Sokhta II (Lamberg-Karlovsky & Tosi 1973: Fig.24) Jiroft (Majidzadeh 2003: 159)
No.1056. g 115 (Tr. A) No.0982. g 107 (Tr. III) No.0832. g 088 (Tr. II)	Trough-spouted Vessels	Hissar IIIC (Schmidt 1937: Pl.XLI. H3315); Togolok 21 (Sarianidi 1986: fig.47) Yahya IVC2-IVB5 (Potts 2001: Fig.1.10) Altyn " Burial 281" (Masson 1988: Pl.XL.7) Konar Sandal North (Madjidzadeh 2008:Fig. 27)
No.3104. g 275 (Tr. A) No.3454. g 288 (Tr. A) No.0508. g 058 (Tr. I) No.0117. g 018 (Eastern Cemetery) No.4489. Room 18 (D)	Tubular-spouted Vessels	Yahya IVC2-IVB5 (Potts 2001: Fig.1.10; 4.16.c) Konar Sandal North (Madjidzadeh 2008:Fig. 27) Togolok 21 (Sarianidi 1986: fig.47)
No.1721. g 159 (Tr. A)	Appliqué Decoration	Bampur II-VI (de Cardi 1970: Fig.19.60; 20.67; 22.172; 24.224 ;39.389)

Illustrations

		<p>Konar Sandal South (Madjidzadeh 2008:Fig. 23)</p> <p>Khurab burials (Stein 1937: Pl.XIII. Khur. B.ii.198 & 199)</p> <p>Miri Qalat (Besenval 1997: Fig.21)</p> <p>Umm an-Nar (Frifelt 1991: Fig.82).</p>
No.0172. g 027 (Eastern Cemetery)	Globular jars decorated with one or more rows of crosshatched triangles	<p>Yahya IVC1 (Potts 2001: Fig.2.12.a; 2.23.c)</p> <p>Mundigak IV (Casal 1961: Fig. 74.243)</p>
No.4442. Room 2 (D)	Relief snake-cordons	<p>Konar Sandal South (Madjidzadeh 2008: Fig. 23)</p> <p>Yahya IVC1-IVB4-2 (Potts 2001: Fig. 2.18); Damin (Tosi 1974: Fig.35)</p> <p>Kulli (Possehl 1986: Fig.XV.Kulli.I.viii.8)</p> <p>Mundigak IV.1-2 (Casal 1961: Fig.79)</p> <p>Umm an-Nar (Potts 2001: 59, with refs)</p>
<p>No.0101. g 014 (Eastern Cemetery)</p> <p>No.0366. g 041 (Eastern Cemetery)</p> <p>No.0683. g 074 (Tr. I)</p> <p>No.4482. Room 13 (D)</p> <p>No.4191. g 351 (Tr. A)</p>	Coarse buff/red-ware jars with incised decoration	<p>Yahya IVB (Potts 2001: Fig.7.9.a); Shahr-i Sokhta II-III (Lamberg-Karlovsky & Tosi 1973: Fig.48)</p> <p>Takhirbai 3 (Gotzelt 1996, no.872)</p> <p>Mundigak IV (Casal 1961: Fig.87.365)</p> <p>Gonur North (Sarianidi 1998: Fig. & 15.1); Konar Sandal North 11.9.b (Madjidzadeh 2008:Fig. 27)</p>
No.0510. g 058 (Tr. I)	Incised Grey Ware f	<p>IVB5 (Lamberg-Karlovsky and Tosi 1973: 44; Bampur IV-VI (During-Caspers 1970: 320, Fig.45); Damin (Tosi 1974: Fig.37); Shahr-i Sokhta IV (Lamberg-Karlovsky & Tosi 1973: Fig.147-50); Persian Gulf Sites including Umm an-Nar, Hili and Tarut (Mery 2000: 204-217, with refs)</p>

Illustrations

<p>No.0067. g 010 (B) No.0399. g 047 (B) No.0386. g 045 (B) No.0443. g 052 (C)</p>	<p>Incised/undecorated Narrow-Necked Globular Bottles</p>	<p>Gonur 1 graveyard (Salvatori 1995: G432/2, G.C.7/5) Mehrgarh VIII (Jarrige et al. 1995: Fig.6.22)</p>
<p>No.0068. g 010 (B) No.0066. g 010 (B) No.0375. g 043 (B)</p>	<p>Buff-Ware Globular- Oval Flasks</p>	<p>Gonur South (Sarianidi 1993: Fig.5) Mehrgarh VIII (Santoni 1988: Fig.1)</p>
<p>No.0405. g 048 (C) No.0440. g 052 (C) No.0413. g 049 (C)</p>	<p>Narrow-necked Bottle</p>	<p>Chanhu-Daro (Mackay 1943: Pl.XLI.46-47); Anau (Khlopin 1981: Fig.5.X) Mundigak IV.3 (Casal 1961: Fig.96.456)</p>
<p>No.4438, Room3 (D) No.4456, Room29 (D) No.4465, Room10 (D) No.4497, Room27 (D) No.4500, Room28 (D)</p>	<p>Intersecting or nested zig-zags, chevrons or triangles between 1-3 horizontal bands</p>	<p>Bampur II-IV (De Cardi 1970: Fig.18.25 & 42; 24.203; 29.308) Yahya IVB (Potts 2001: 7, Fig.1.6.j) Konar Sandal South (Madjidzadeh 2008:Fig. 23)</p>
<p>No.4482. Room 13 (D)</p>	<p>Wavy comb-incised decoration</p>	<p>Yahya IVB5 (Potts 2001: 4.29.g); Bampur I-IV (de Cardi 1970: Fig.17.8; 18.30-34; 22.133; 30.33 & 49); Amri IIIA (Casal 1964: Fig.78.344); Damin (Tosi 1974: Fig.36)</p>

Illustrations



Fig 19: Some of the chlorite containers recovered from Cemetery A of Shahdad (Kerman Museum)
(Photo by author)



Fig 20: Stone miniature columns from Cemetery A of Shahdad (Shahdad storeroom) (Photo by author)

Illustrations

Table 4: Comparison of the Metal Objects of Shahdad with the Contemporaneous Sites
of the Other Regions

Object Number	Object	Similar Parallel
No.3555, g294 (Tr. A) No.0816, g084 (Tr. II)	Spouted Vessels	No found somewhere else
No.0071, g010 (B) No.0312, g037 (Tr. IV)	Hemispherical Bowls with trough spout	Hissar IIIC (Schmidt 1937: Pl.LVII.H4883 & 3270) Khinaman (Curtis 1988: Fig.19-20)
No.1011, g111 (Tr. A) No.3934, g325 (Tr. A) No.2576, g212 (Tr. A)	Carinated bowls	Bani Surmah (Bellelli 2002: Tav.16.67); Bani Surmah and D'um Avize (Schmidt et al. 1989: Pl.119.r; Bellelli 2002: Tav.20.113)
No.1044, g114 (Tr. A) No.1759, g161 (Tr. A)	Round-bottomed carinated jars with a raised centre seam	Harappa (Vats 1940: Pl. CXXI.277) Mohenjodaro (Mackay 1938: Pl.CXVI.5 & 7)
No.2890, g232 (Tr. A) No.1070, g115 (Tr. A) No.1219, g122 (Tr. A)	Dishes with relief zoomorphic decoration	Hissar III (Schmidt 1937: Fig.112) (Majidzadeh 2003: 156)
No.2420, g203 (Tr. A) No.1701, g158 (Tr. A)	Undecorated dishes with wide lip	Khurab (Stein 1937: Pl.XVIII.Khur.B.i.130, B.i.298) Hissar and Kamtarlan II (Bellelli 2002: Tav.4.7 & 4.8, with refs)
No.0898, g096 (Tr. A) No.0084, g011 (B) No.1441, g139 (Tr. A)	Goblets	Khurab (Stein 1937: Pl.XVIII.Khur.E.i.251). Mohenjodaro (Marshall 1931: Pl.CXL.8) Ur (Muller-Karpe 1993: no.1131-1133)

Illustrations

No.1168, g120 (Tr. A) No.1068, g115 (Tr. A)	Pear-shaped vessels with hanging cords	No found somewhere else
No.0402, g047 (B) No.0393, g045 (B) No.0302, g036 (Tr. IV) No.4302, g363 (Tr. A)	Ornamental axe-heads	Khinaman (Curtis 1988: Fig.1 & 2) Khurab (Stein 1937: Pl. XVIII.Khur.E.i.258)
No.2259, g193 (Tr. A) No.2421, g203 (Tr. A) No.2444, g204 (Tr. A)	Undecorated shaft-hole axes	Yahya IVB5 (Potts 2001: Fig.4.44, p115) Damin (Tosi 1970: Fig.17a & 54) Susa (Collon1987: vol. I, 96, no.73).
No.1117, g117 (Tr. A) No.0573, g063 (Tr. I)	Pins	Jiroft (Majidzadeh 2003: p155)
No.1049, g114 (Tr. A)	The Shahdad`s Standard	No found somewhere else

Illustrations



Fig 21: A decorated Bronze dish from Shahdad (After Hakemi 1997)

Illustrations

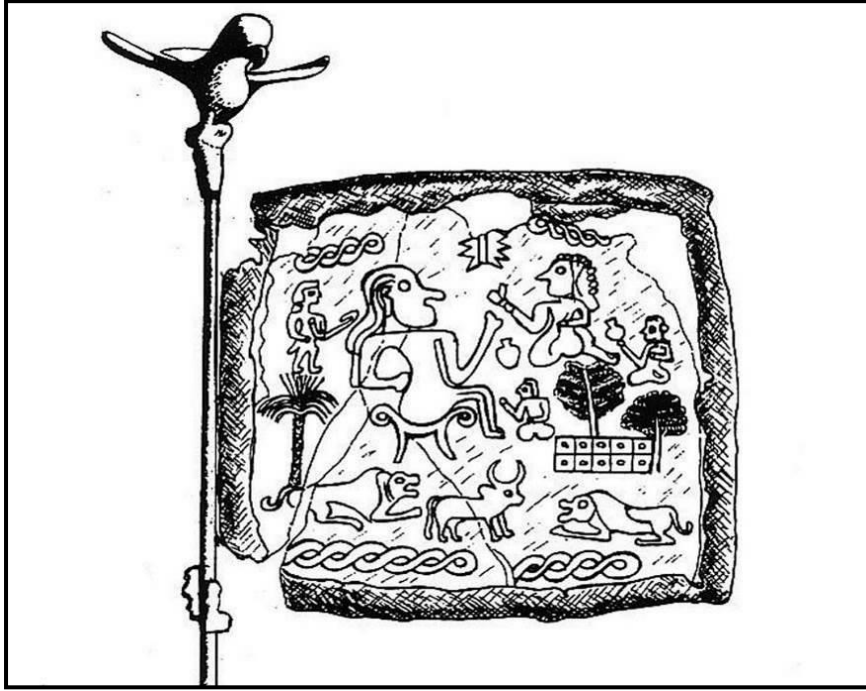


Fig 22: Drawing of the sense of the Standard of Shahdad (After Hakemi 1997:649)

Illustrations



Fig 23: Standard of Shahdad (Courtesy of the National Museum of Iran)

Illustrations

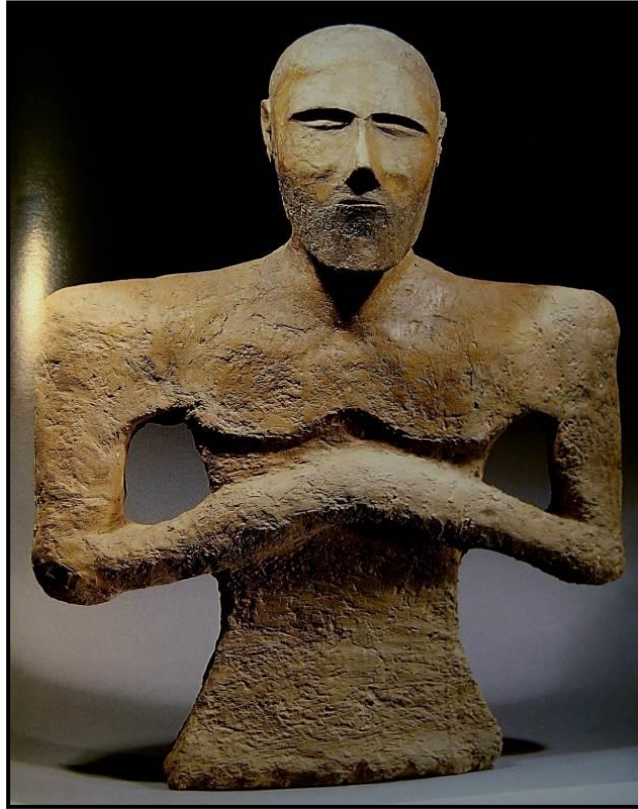


Fig 24, 25: Two Clay Statues from Cemetery A of Shahdad (Courtesy of the National Museum of Iran)

Illustrations



Fig 26: A Cylindrical Seal recovered from grave 163 of Cemetery A of Shahdad (Courtesy of the National Museum of Iran)

Illustrations

Table 5: Comparison of the Seals of Shahdad with the Contemporaneous Sites of the Other Regions

Shahdad Seal	Description	Similar Parallel
Bronze stamp seal: no. 0315, g037 (Tr. IV)	The duck-like bird	
Bronze stamp seal: no. 4404, g377 (Tr.A)	A double-headed bird	
Bronze stamp seal: no. 0362, g040 (Tr. A)	The eagle with spread wings	Comparable with Chlorite Objects from Yahya and Jiroft
Bronze stamp seal: no. 0236, g033 (Tr. A)	The bearded human figure	
Bronze stamp seal: no. 0222, g032 (Tr. A)	The trefoil design	
Bronze stamp seal: no. 1217, g122 (Tr.A)	An insect	
Stone stamp seal: no. 0751, g078 (Tr.I)	The opposed feet	Yahya IVB2 (Pittman 2001: Fig.10.56) Shahr-e Sokhta II-III (Lamberg-Karlovsky & Tosi 1973: Fig.49) Mundigak IV.3 (Casal 1961: Pl.XLV.4)
Stone stamp seal: no. 2858, g230 (Tr.A)	Eight-lobed rosette	Dashly 1, Murghab Delta and North Afghanistan (Baghestani 1997: no. 114, 115, 111, 171)
Stone stamp seal: no. 1933, g170 (Tr.A)	Eight-point star	Togolok (Hiebert 1994: 60, Fig.4.32.2)
Bronze stamp seal: no. 1830, g166 (Tr.A)	A cross inside a circular collar	Many sites in Bactria and Margiana (Baghestani 1997: no.330-345)

Illustrations



Figs 27 & 28: Two unpublished seals recovered from area D of Shahdad, found by Hakemi (Courtesy of National Museum of Iran)

Illustrations

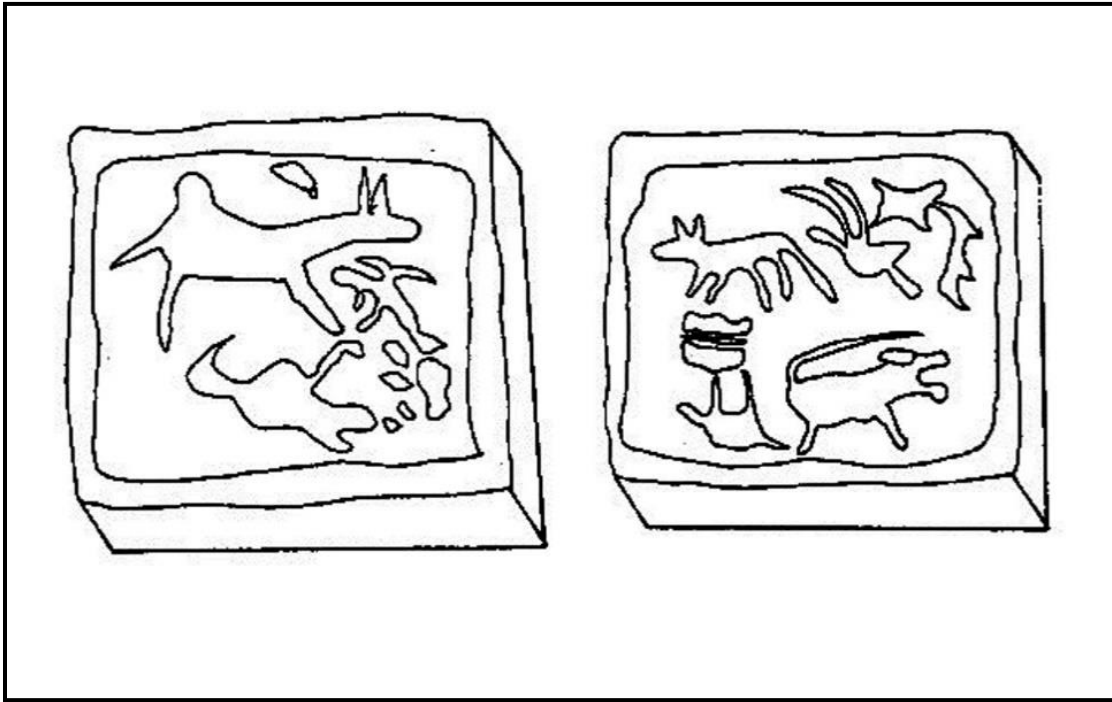


Fig 29: Seal impression of a clay stamp seal from architectural complex excavated by M. Kaboli (After Kaboli 1997)

Illustrations

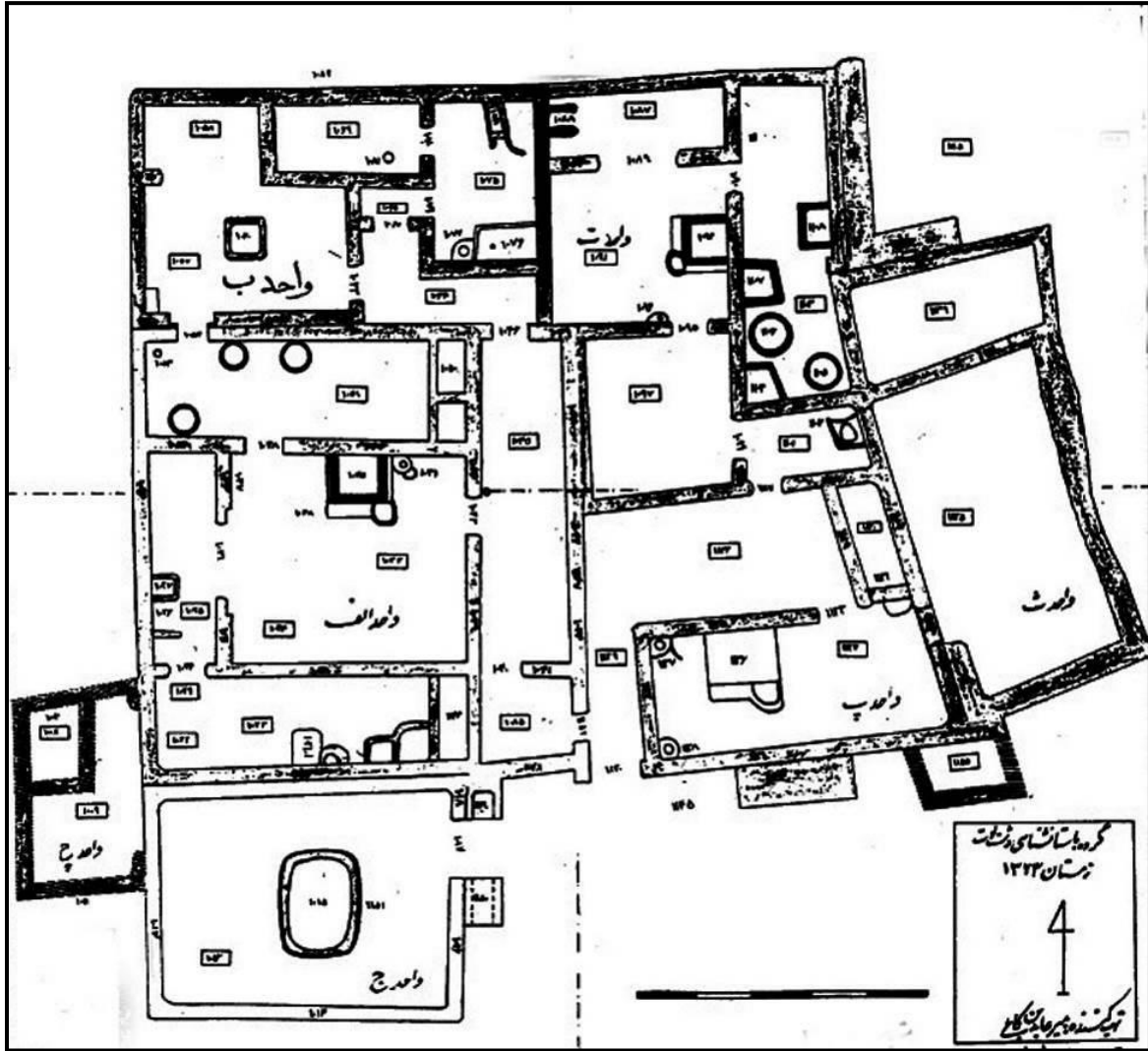


Fig 30: Plan of the Architectural complex A of *farmers's area* (After Kaboli 1997)

Illustrations



Figs 31, 32: Architectural complex A of *farmers's area* excavated by M. Kaboli (Photo by author)

Illustrations

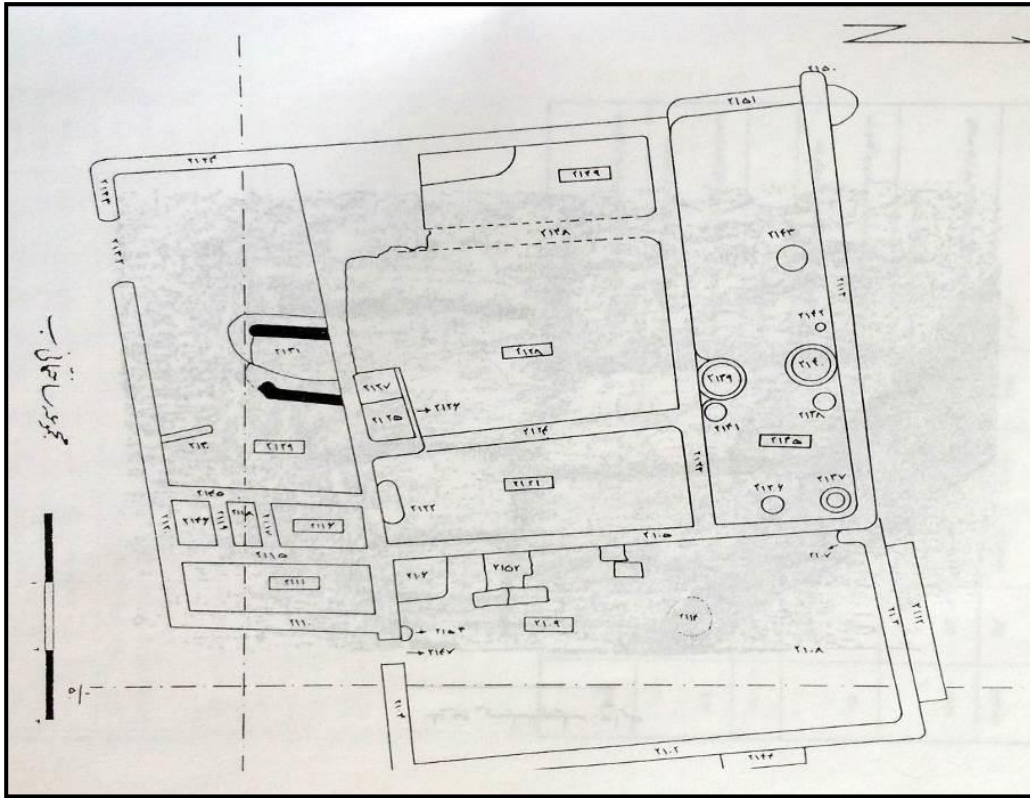
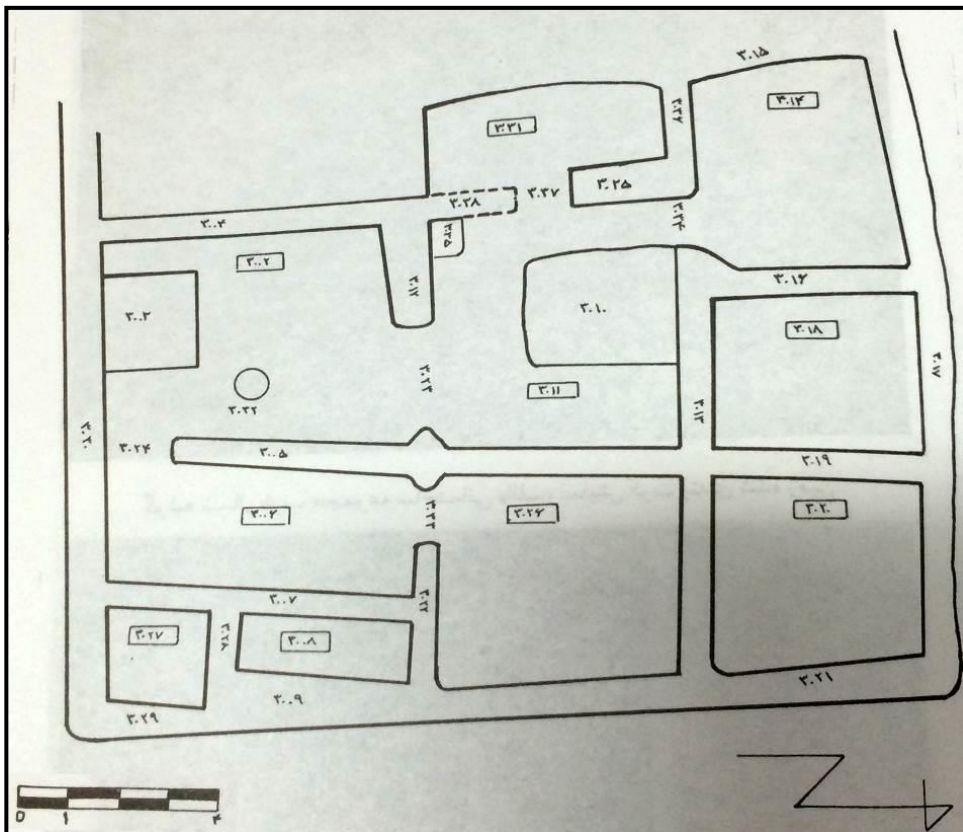


Fig 33: Architectural complex B of *farmers's area* excavated by M. Kaboli (After Kaboli 2002)



Illustrations

Fig 34: Architectural complex of *Jewelry's area* excavated by M. Kaboli (After Kaboli 2001)

Table 6: The Revised Chronology of Shahdad

Excavated Area	Hakemi's proposed Chronology and Periodization	Proposed Chronology of Author
Surface Data	Takab IV ₂ (3100-2750 BC)	Aliabad Culture (3800-3300 BC)
Eastern Cemetery	Takab IV ₁ (2750-2450 BC)	2300-2000 BC
Cemetery A	Takab III ₂ (2450-2200 BC) Graves with the depth of 60-240 cm	2500-2000 BC
	Takab III ₁ (2200-1900 BC) Graves with the depth of 15-60 cm	
Cemetery B	Takab II ₂ (1900-1700 BC)	2000-1800 BC
Cemetery C	Takab II ₁ (1700-1500 BC)	1800-1600? BC
Area D	2200-2000 BC	2 nd half of 3 rd millennium BC

Illustrations

Illustrations



Fig 35: exposure of graves on surface and erosion of burial goods at the Site of Shahdad (Photo by author)

Illustrations

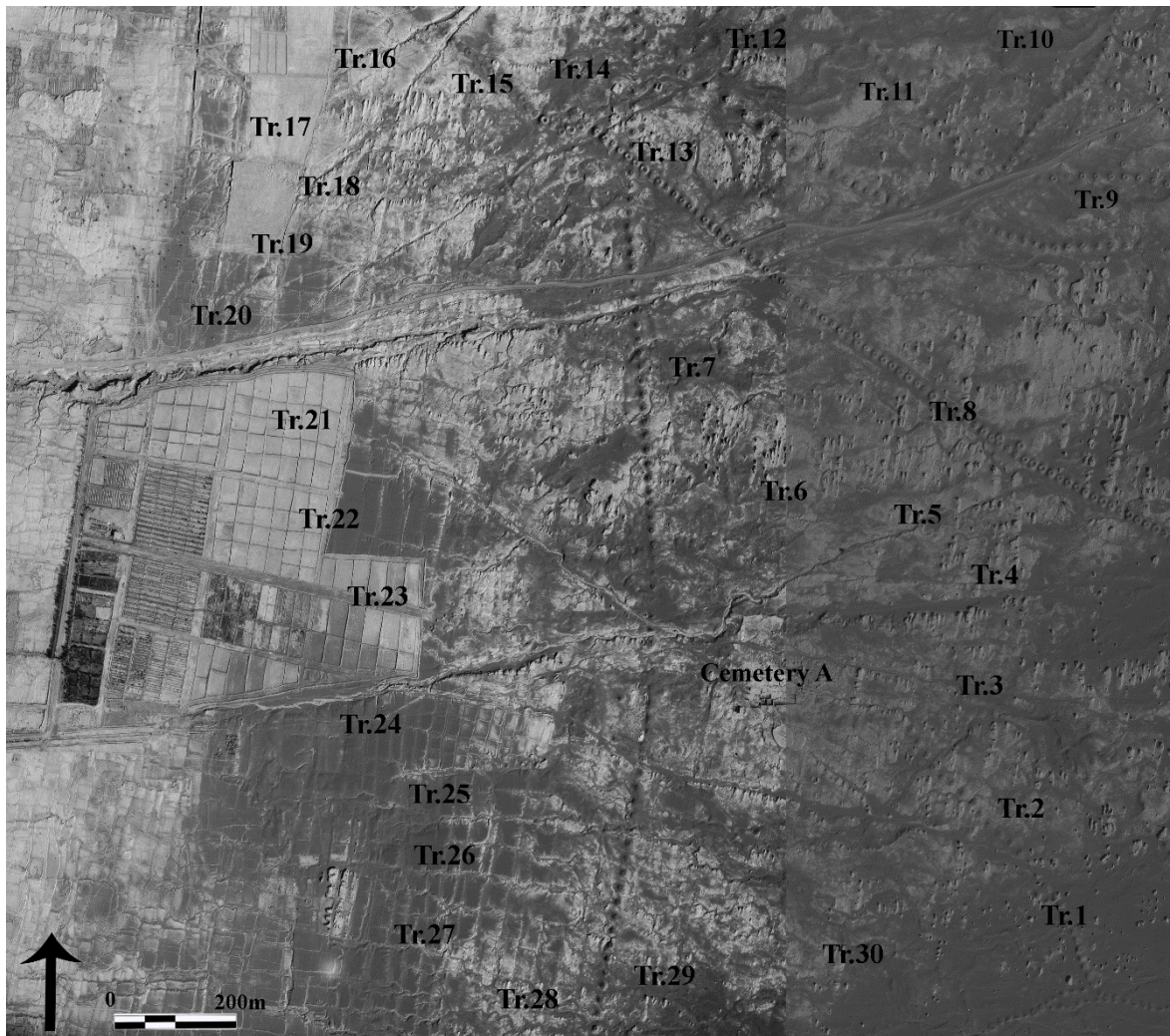


Fig. 36: Aerial photograph showing the location of the trenches excavated in 2016 for delimiting the site (photos from National Cartographic Centre, Iran, taken in 1993, modified by author).

Illustrations

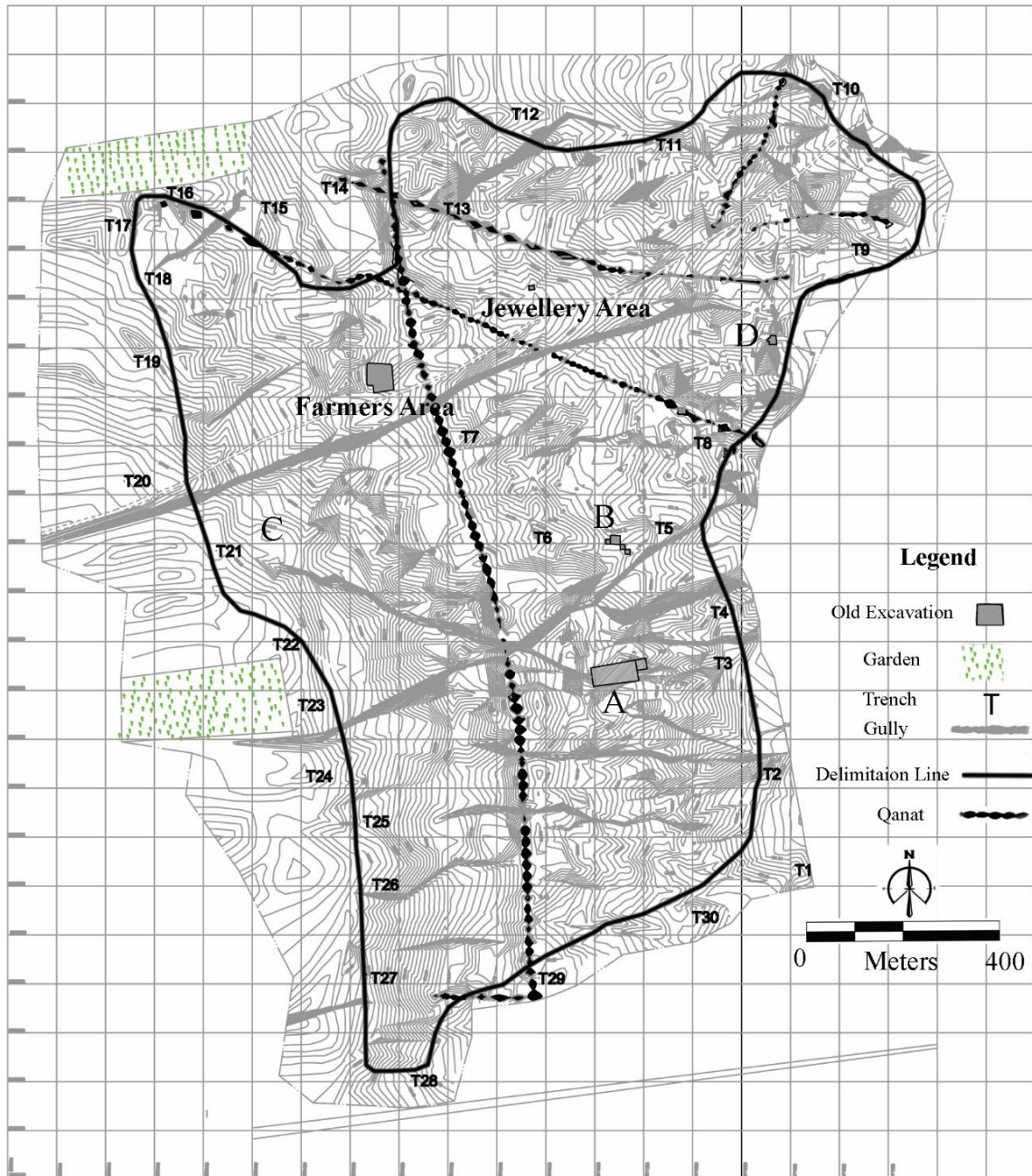


Fig 37. Topographic map of Shahdad showing the site's extension. "Jewellery" and "Farmers" Areas are the English translation of labels originally used by M. A. Kaboli in his field reports. T1 to T30 are the small test trenches dug for delimiting the 3rd millennium site. Block letters A-D locate old excavation areas discussed in the text. Contour lines: 1 m. (Map by author)

Illustrations

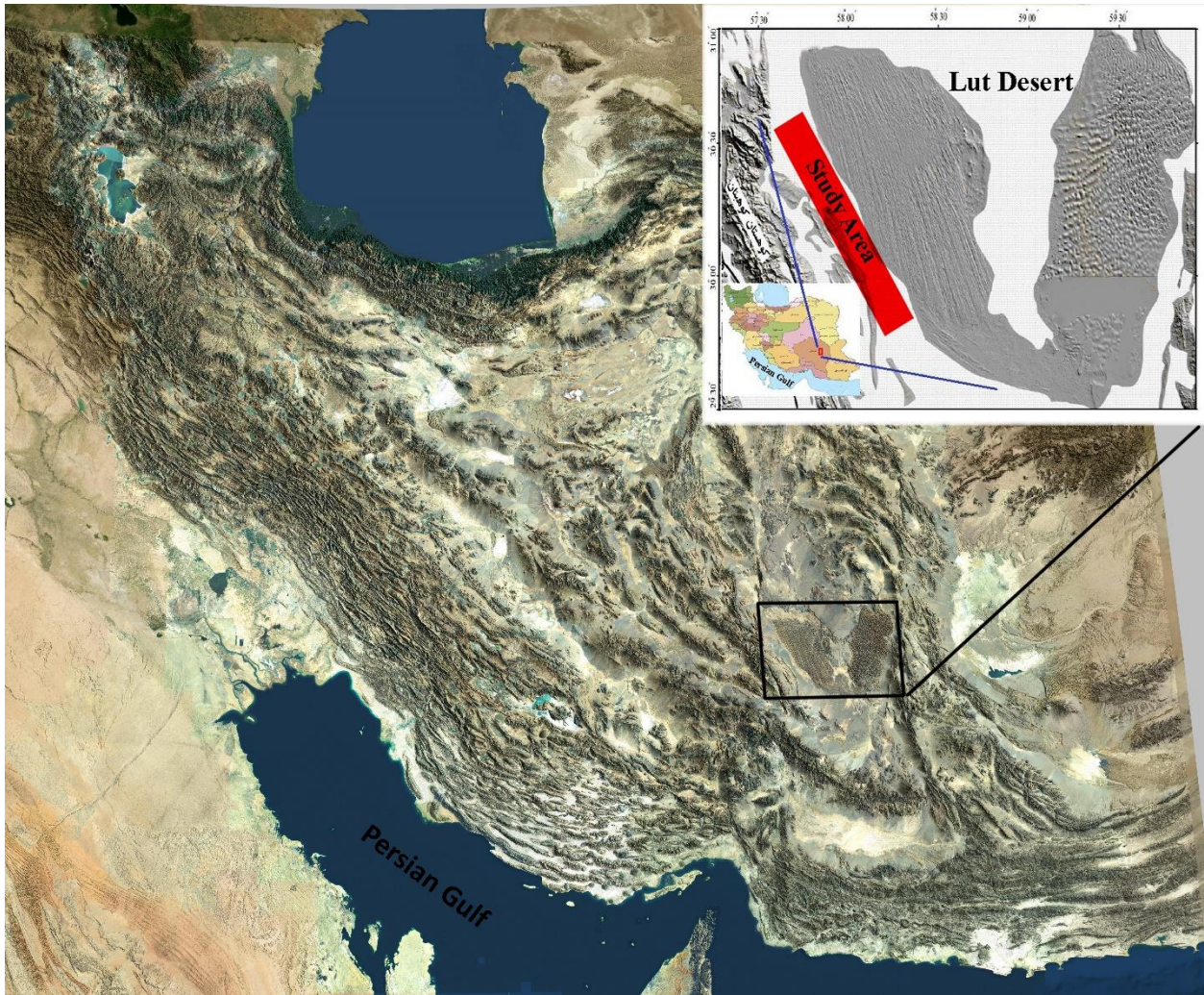


Fig 38: The survey area in red color on the west of Lut Desert (Courtesy of M. Rokni)

Illustrations

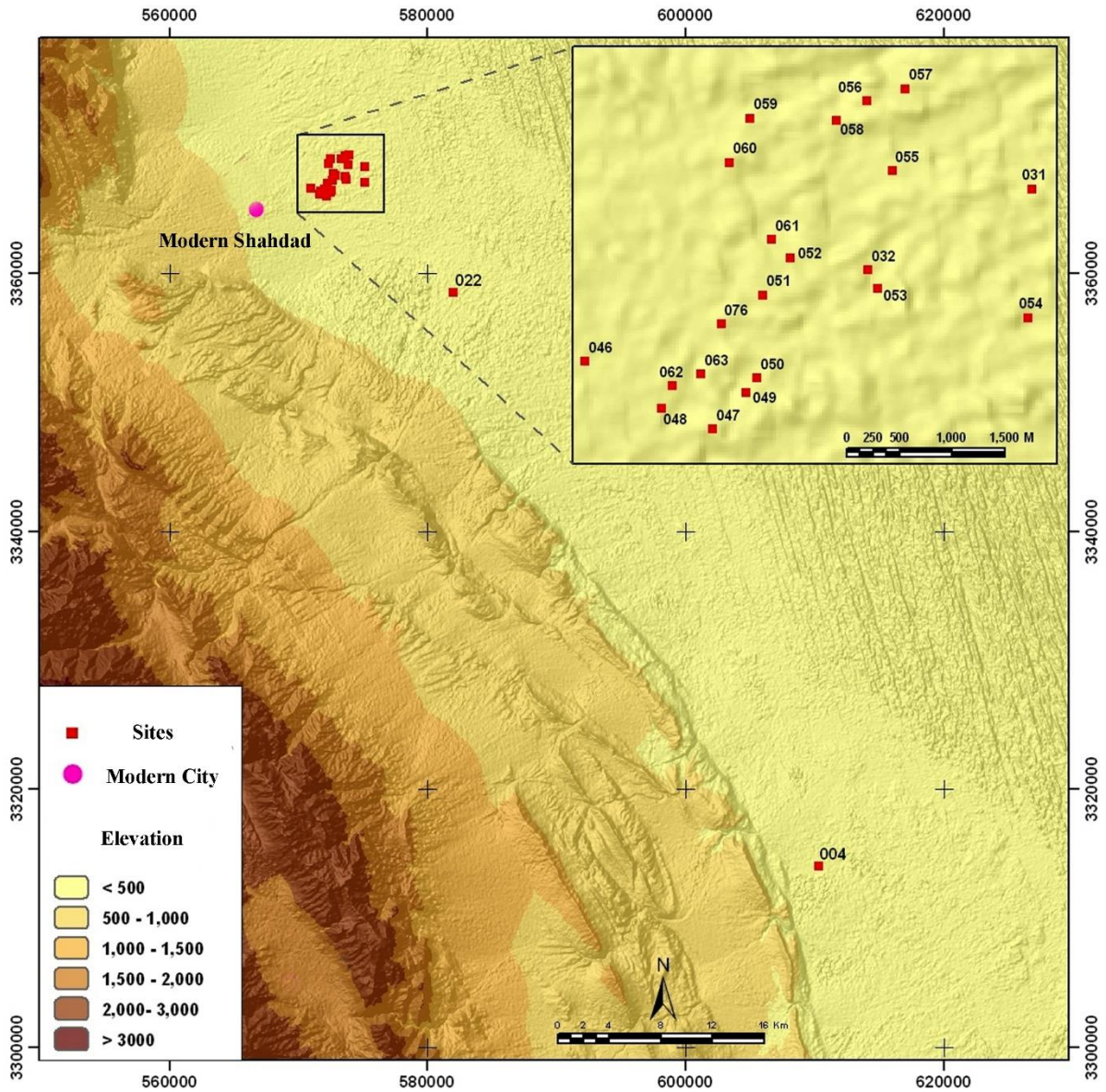


Fig 39: Distribution pattern of all the studied sites (5th-2nd Millennium BC) on the western edge of Lut Desert (GIS map by author)

Illustrations



Fig 40: General view of the surface of Mokhtarabad site (Photo by author)



Fig 41: Density of cultural materials on the surface of the Mokhtarabad (Photo by author)

Illustrations

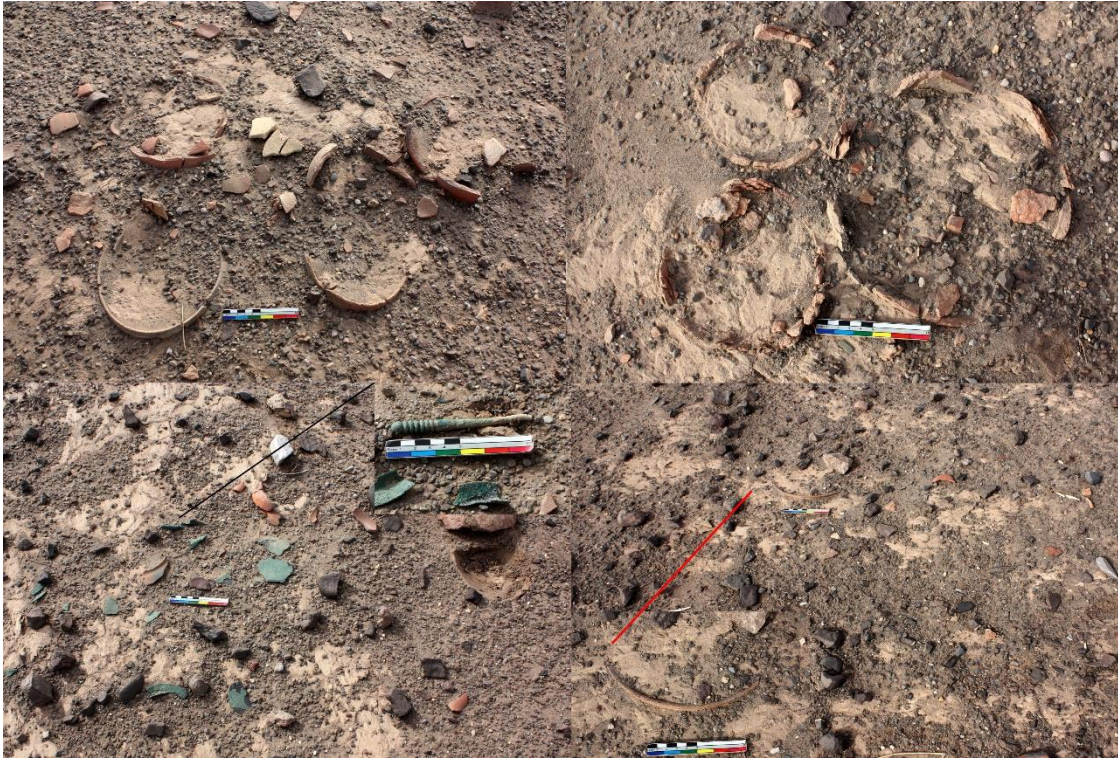


Fig 42: The graves on the surface of Mokhtarabad attesting the extreme wind erosion in the Lut area. The arrows indicate the magnified objects. (Photo by author)



Fig 43: The plain red ware of Shahdad recovered from the surface of the site (Photo by author)

Illustrations



Fig 44, 45: The plain red ware of Shahdad recovered from the surface of the site (Photo by author)

Illustrations



Fig 46: General view of the hill-top site of Shd 59 (Photo by author)



Fig 47: General view of the hill-top site of Shd 61 (Photo by author)

Illustrations



Fig 48: General view of the surface of the large site of Keshit (Photo by author)



Fig 49: Density of cultural materials on the surface of Keshit site (Photo by author)

Illustrations

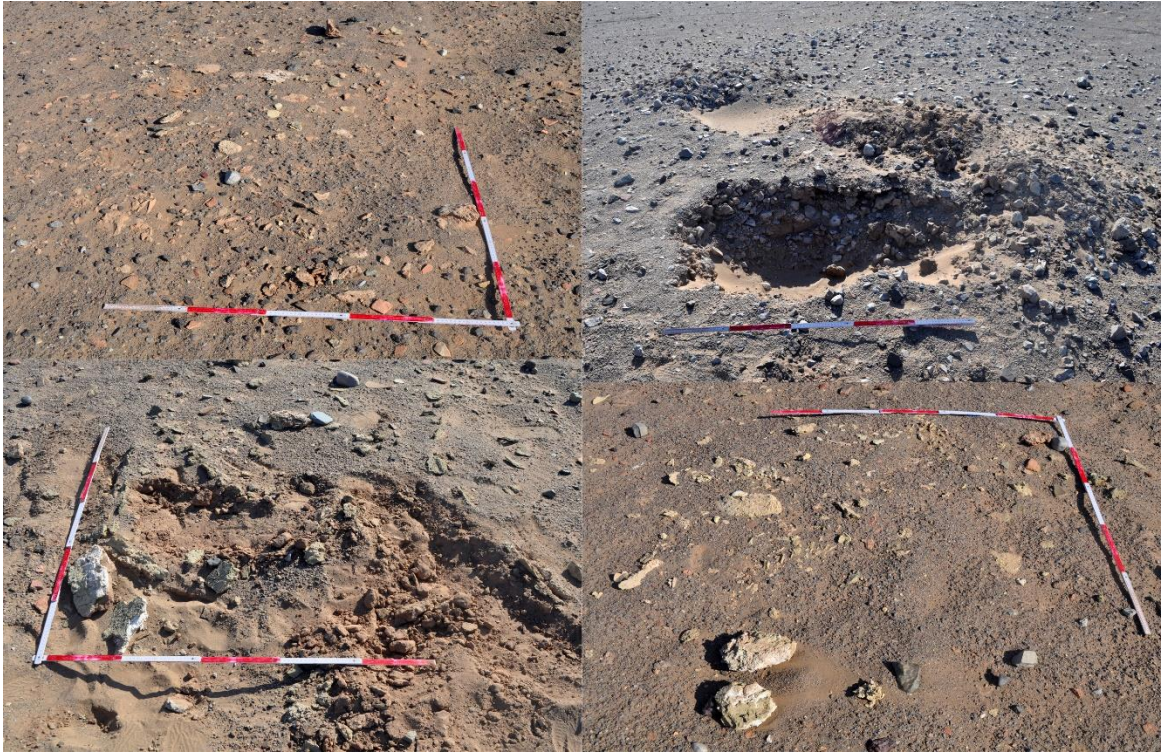


Fig 50: Some of the industrial kilns on the surface of the Keshit (Photo by author)

Illustrations



Fig 51: Some drawings of the surface collected ceramics of Keshit

Illustrations

Table 7: The identified prehistoric and protohistoric sites of Dasht-e Lut

No.	Site	Size (ha)	Period (BC)			
			5 th Mil.	4 th Mil.	3 rd Mil.	2 nd Mil.
1	Shd 022	70		*	*	
2	Shd 031	3		*	*	
3	Shd 032	4.5	*	*	*	
4	Shd 046 Shahdad	170		*	*	
5	Shd 047	3			*	
6	Shd 048	1		*	*	
7	Shd 049	0.3	*			
8	Shd 050	0.2,5	*	*		
9	Shd 051 Tepe Dehno	21	*	*	*	
10	Shd 052	0.6,5	*	*	*	
11	Shd 053	0.5	*			
12	Shd 054	3				*
13	Shd 055	1		*		
14	Shd 056	1.2	*	*		

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15	Shd 057	0.3	*	*		
16	Shd 058	1.2	*			
17	Shd 059	0.5	*			
18	Shd 060	1	*	*		
19	Shd 061	0.3	*	*	*	
20	Shd 062	1.5	*	*		
21	Shd 063	2			*	
22	Shd 076	0.5		*	*	
23	Gbf 004	200		*	*	

Illustrations

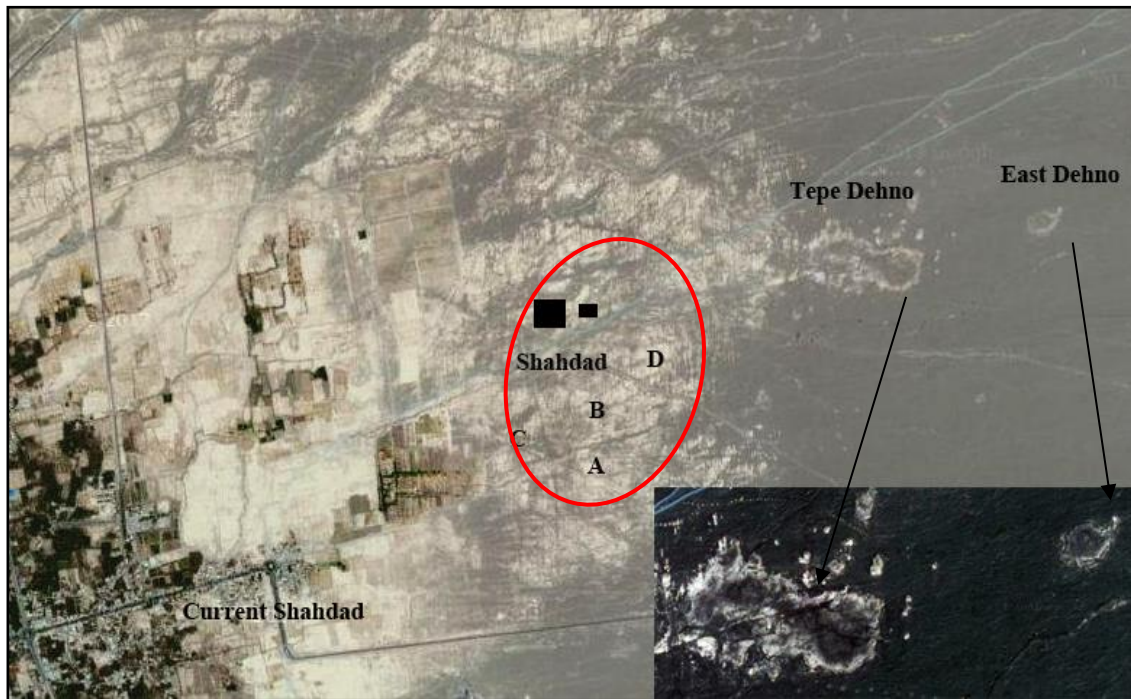


Fig 52: The location of two excavated sites to the east of urban center of Shahdad (Google Earth)

Illustrations



Fig 53: Tepe Dehno and the Landscape around at the site (Photo by author)



Fig 54: Tepe Dehno is founded on the top of a Kalut (Photo by author)

Illustrations

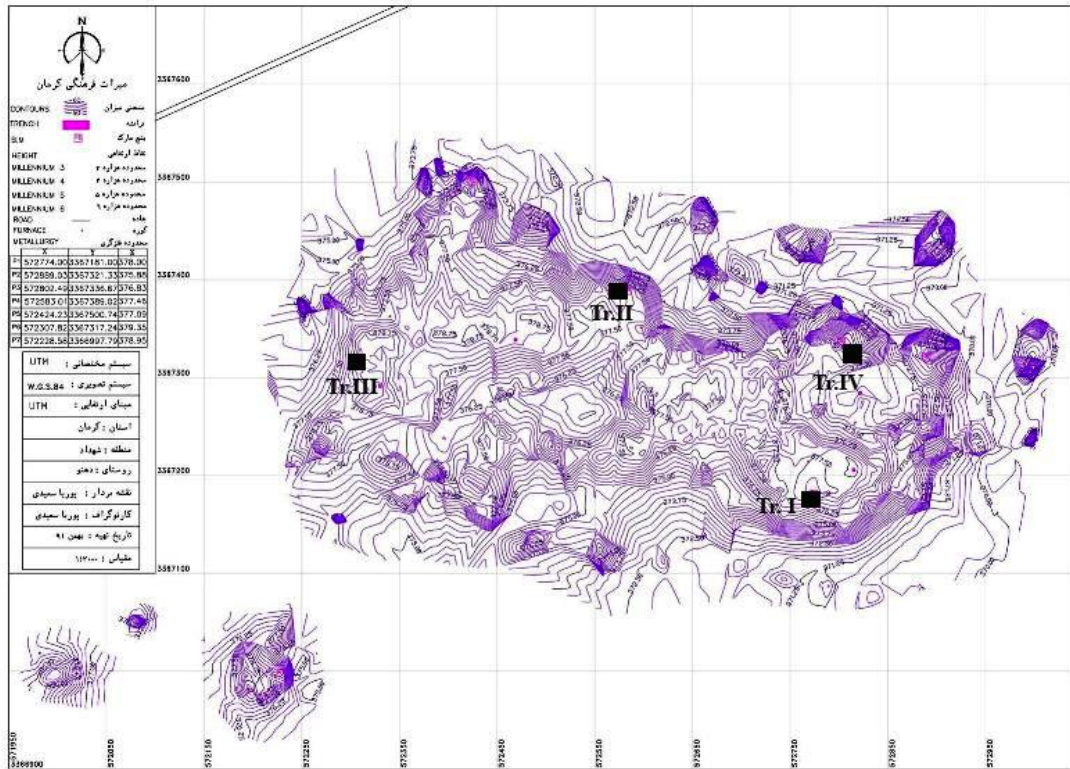


Fig 55: Topographic map of Tepe Dehno showing the place of the Trenches (Topographic map by P. Saedi)

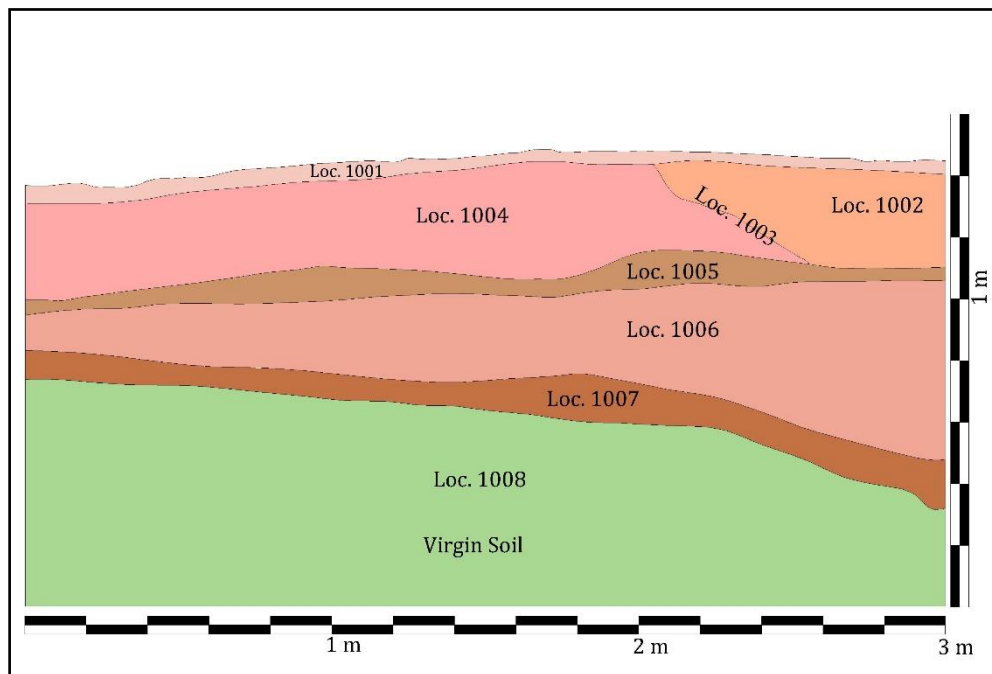


Fig 56: The Stratigraphy of Trench I, Northern Section (Drawing by author)

Illustrations

Pottery No.	Locus	Description 1. Type 2. Fabric Color (ext./int./core.) 3. Inclusions 4. Firing 5. Treatment 6. Decoration 7. Painting Color	Date BC
1	1001	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	
2	1001	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Inside: Black	
3	1001	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Inside: Black	
4	1004	1. Fine Buff Ware 2. Buff. Orange. Orange 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium
5	1004	1. Fine Buff Ware 2. Buff. Buff. Orange 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium
6	1004	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Inside: Black	Mid-4 th Millennium
7	1004	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium
8	1004	1. Fine Buff Ware 2. Buff. Brown. Brown 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Brownish Green	Mid-4 th Millennium
9	1006	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Inside: Black	Mid-4 th Millennium
10	1006	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	Mid-4 th Millennium
11	1006	1. Fine Buff Ware 2. Buff. Buff. Brown 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium
12	1006	1. Fine Buff Ware 2. Buff. Buff. Orange 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium
13	2003	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium
14	1006	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium
15	1006	1. Fine Buff Ware 2. Buff. Buff. Orange 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium
16	1006	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium
17	1006	1. Fine Buff Ware 2. Buff. Buff. Orange 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium
18	1007	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium

Illustrations

19	1007	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium
20	1007	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium
21	1007	1. Fine Red Ware 2. Red. Red. Red 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium
22	1007	1. Fine Buff Ware 2. Buff. Buff. Orange 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium

Table 8: Characteristics of the recovered ceramics from Trench I, Tepe Dehno

Illustrations

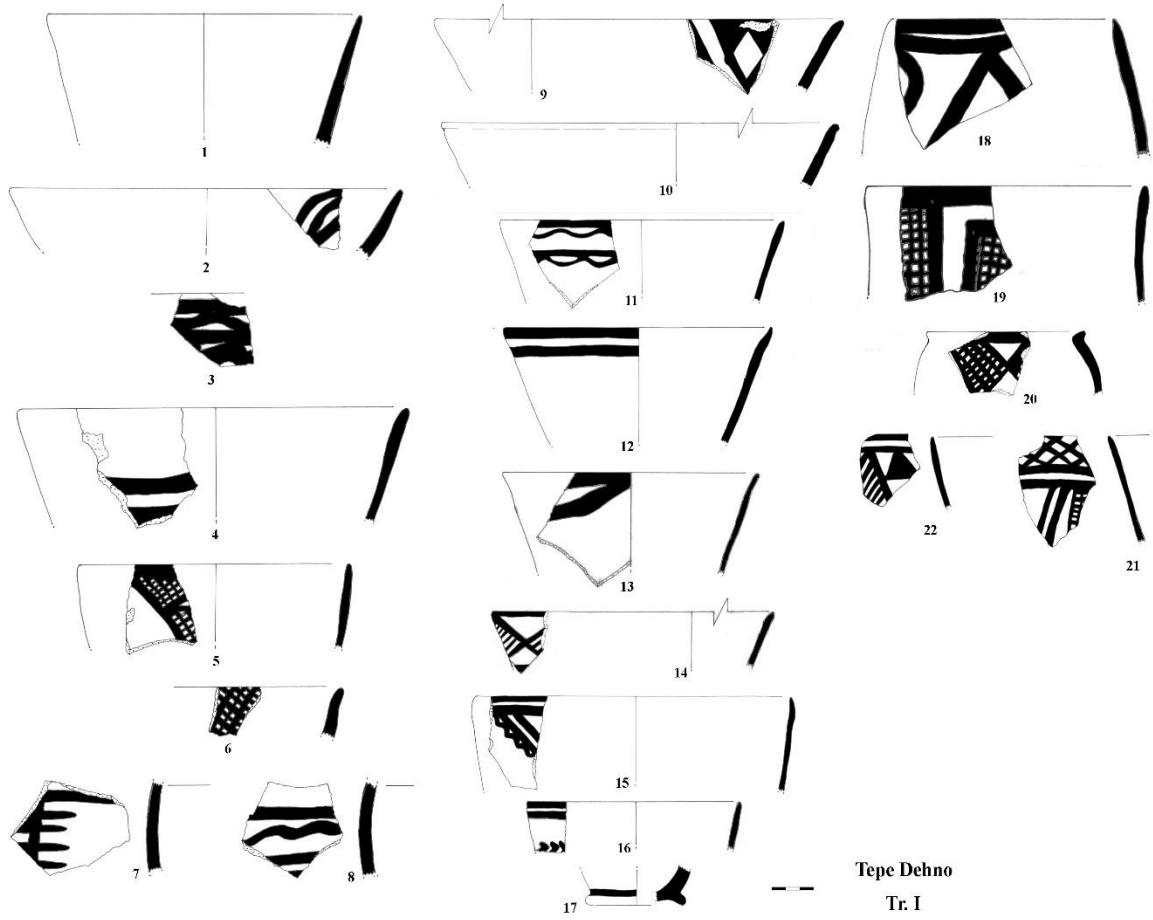


Fig 57: A selection of the recovered ceramics from Trench I, Tepe Dehno

Illustrations

Pottery No.	Locus	Description	
		1. Type 2. Fabric Color (ext./int./core.) 3. Inclusions 4. Firing 5. Treatment 6. Decoration 7. Painting Color	Date BC
1	2001	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Inside: Green	Mid-4 th Millennium
2	2001	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium
3	2001	1. Fine Buff Ware 2. Buff. Buff. Orange 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium
4	2001	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	Mid-4 th Millennium
5	2002	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	Mid-4 th Millennium
6	2002	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Inside: Black	Mid-4 th Millennium
7	2002	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	Mid-4 th Millennium
8	2002	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Inside: Black	Mid-4 th Millennium
9	2002	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Inside: Black	Mid-4 th Millennium
10	2002	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Inside: Black	Mid-4 th Millennium
11	2003	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Inside: Black	Mid-4 th Millennium
12	2003	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Inside: Black	Mid-4 th Millennium
13	2003	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	Mid-4 th Millennium
14	2004	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Inside: Black	Mid-4 th Millennium
15	2004	1. Fine Buff Ware 2. Buff. Buff. Orange 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Inside: Black	Mid-4 th Millennium
16	2004	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	Mid-4 th Millennium
17	2005	1. Fine Brown Ware 2. Brown. Brown. Brown 3. Grit- Medium 4. Well Fired 5. Slip	Mid-4 th Millennium
18	2005	1. Fine buff Ware 2. Buff. Buff. Orange 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Inside: Green	Mid-4 th Millennium

Illustrations

19	2005	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Inside: Black	Mid-4 th Millennium
20	2005	1. Fine Red Ware 2. Red. Red. Red 3. Grit- Medium 4. Well Fired 5. Slip	Mid-4 th Millennium

Table 9: Characteristics of the recovered ceramics from Trench II, Tepe Dehno

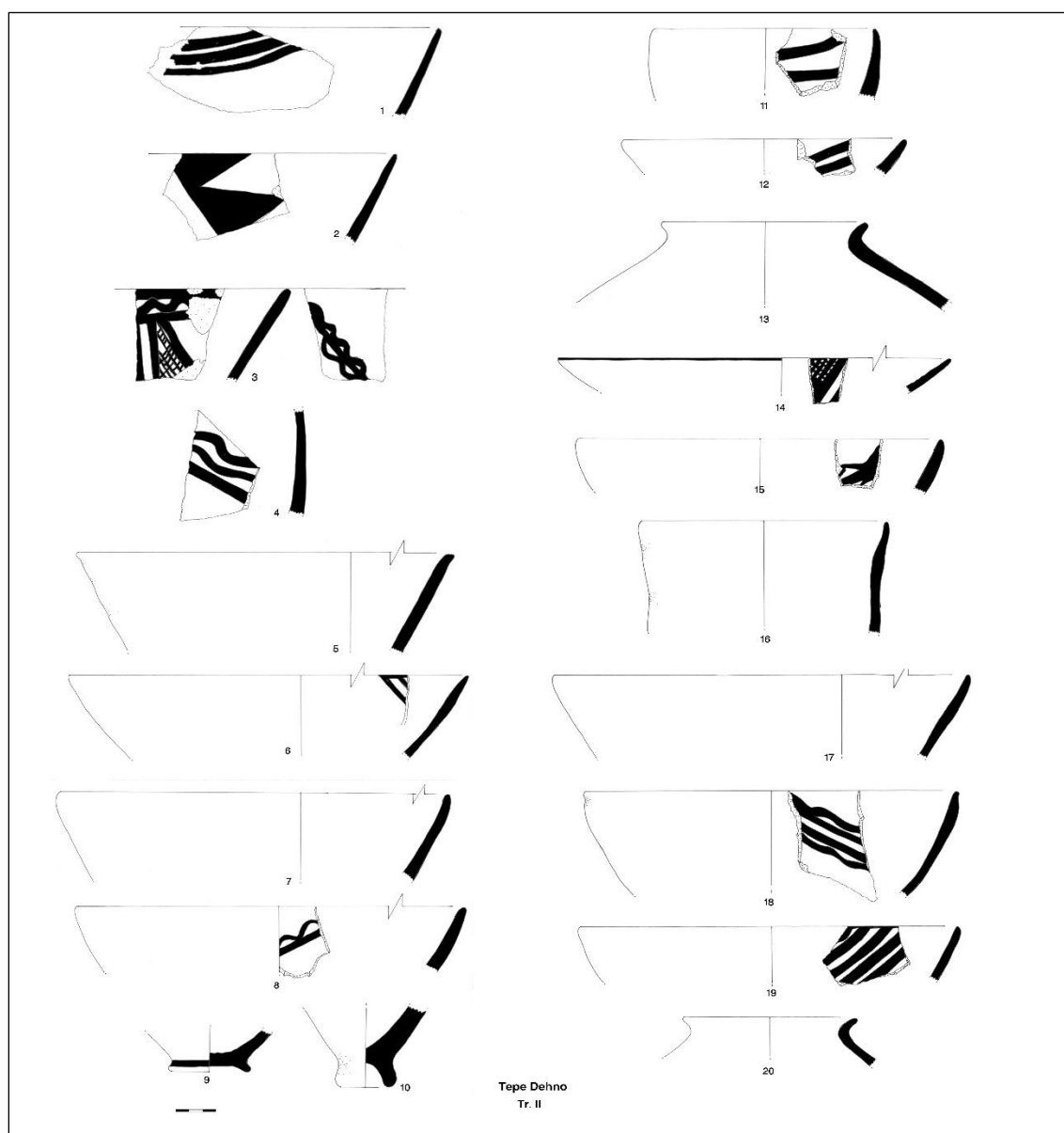


Fig 58: Tepe Dehno, drawings of the recovered ceramics from Trench II (Locus 2001 (1-4), Locus 2002 (5-10), Locus 2003 (11-13), Locus 2004 (14-16), Locus 2005 (17-20))

Illustrations

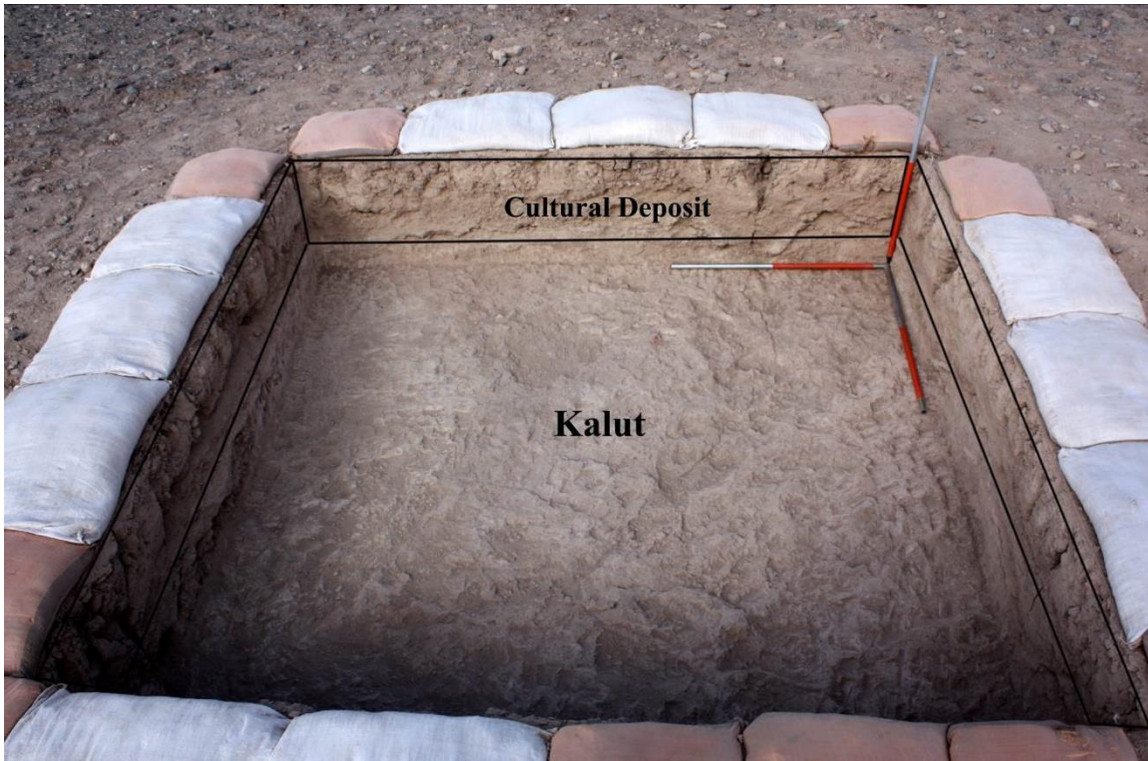


Fig 59: Deflation of Cultural deposits at Trench II, Tepe Dehno (Photo by author)

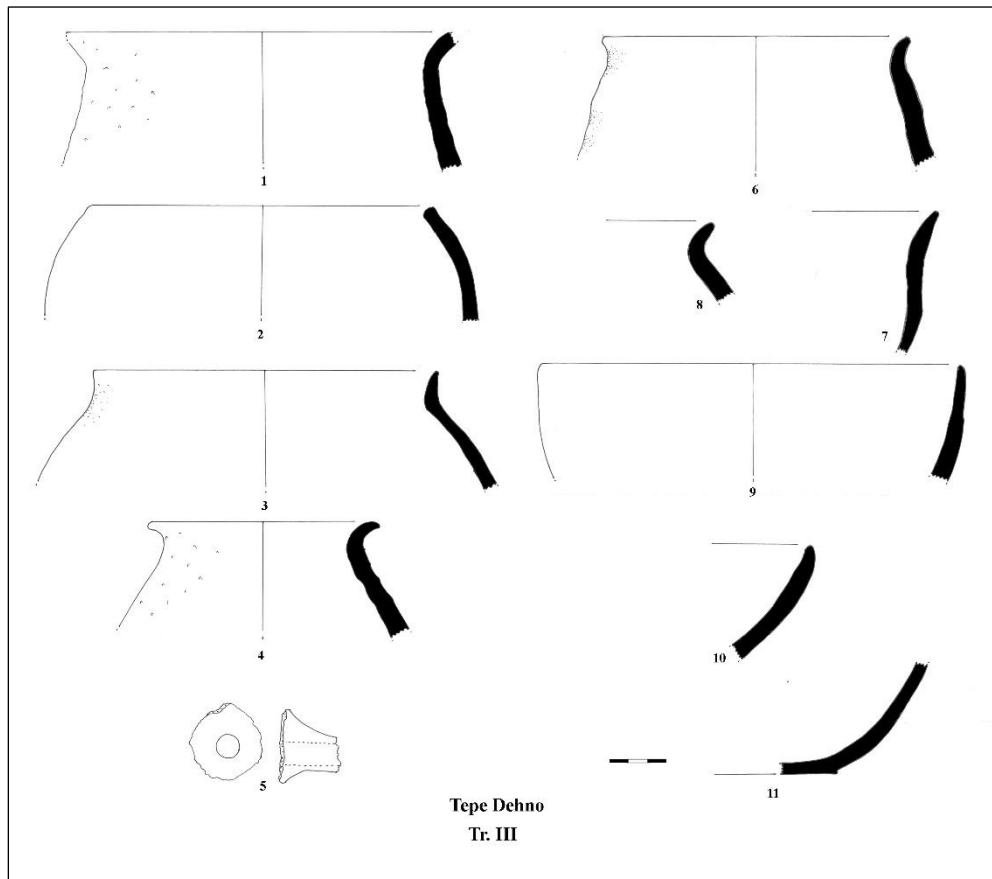


Fig 60: A selection of the recovered ceramics from Trench III, Tepe Dehno

Illustrations

Pottery No.	Locus	Description	
		1. Type 2. Fabric Color (ext./int./core.) 3. Inclusions 4. Firing 5. Treatment 6. Decoration 7. Painting Color	Absolute Date BC
1	3001	1. Medium/Coarse Red Ware 2.Red. Red. Red 3. Grit-Medium/Coarse 4. Well Fired 5. Slip	
2	3001	1. Medium/Coarse Red Ware 2.Red. Red. Red 3. Grit-Medium/Coarse 4. Well Fired 5. Slip	
3	3001	1. Medium/Coarse Red Ware 2.Red. Red. Red 3. Grit-Medium/Coarse 4. Well Fired 5. Slip	
4	3001	1. Medium/Coarse Red Ware 2.Red. Red. Red 3. Grit-Medium/Coarse 4. Well Fired 5. Slip	
5	3001	1. Medium/Coarse Red Ware 2.Red. Red. Red 3. Grit-Medium/Coarse 4. Well Fired 5. Slip	
6	3002	1. Medium/Coarse Red Ware 2.Black. Black. Red 3. Grit-Medium/Coarse 4. Over Fired 5. Slip	3100-2900
7	3002	1. Medium/Coarse Red Ware 2.Red. Red. Red 3. Grit-Medium/Coarse 4. Well Fired 5. Slip	3100-2900
8	3002	1. Medium/Coarse Red Ware 2.Red. Red. Red 3. Grit-Medium/Coarse 4. Well Fired 5. Slip	3100-2900
9	3002	1. Medium/Coarse Red Ware 2.Red. Red. Red 3. Grit-Medium/Coarse 4. Well Fired 5. Slip	3100-2900
10	3002	1. Medium/Coarse Red Ware 2.Red. Red. Red 3. Grit-Medium/Coarse 4. Well Fired 5. Slip	3100-2900
11	3002	1. Medium/Coarse Red Ware 2.Red. Red. Red 3. Grit-Medium/Coarse 4. Well Fired 5. Slip	3100-2900

Table 10: Characteristics of the recovered ceramics from Trench III, Tepe Dehno

Illustrations

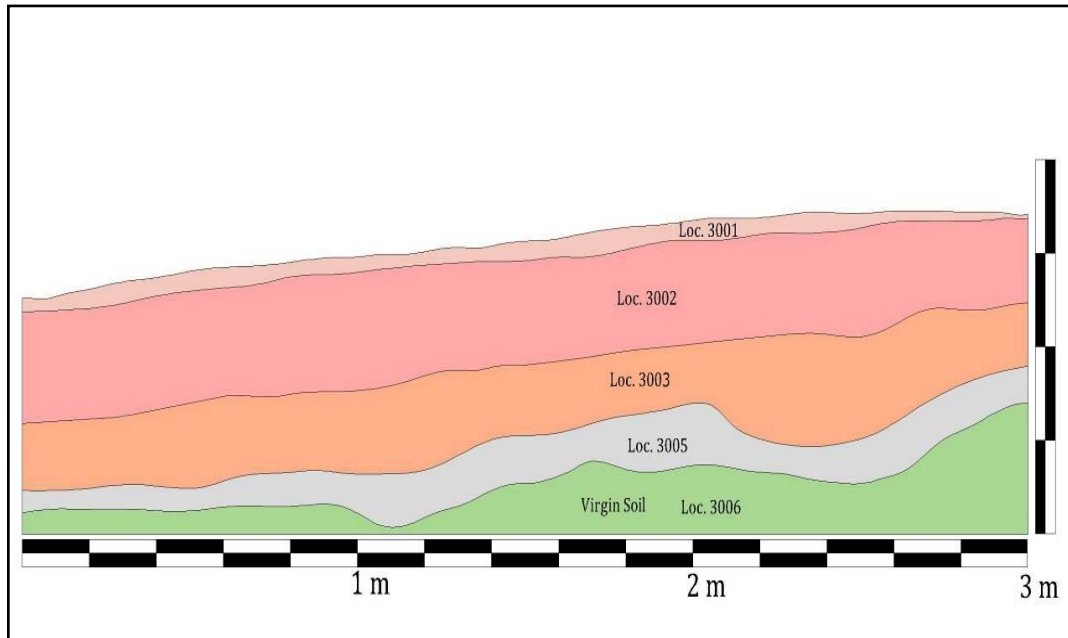


Fig 61: Stratigraphy of cultural layers at Trench III, Tepe Dehno (Drawing by author)

Illustrations

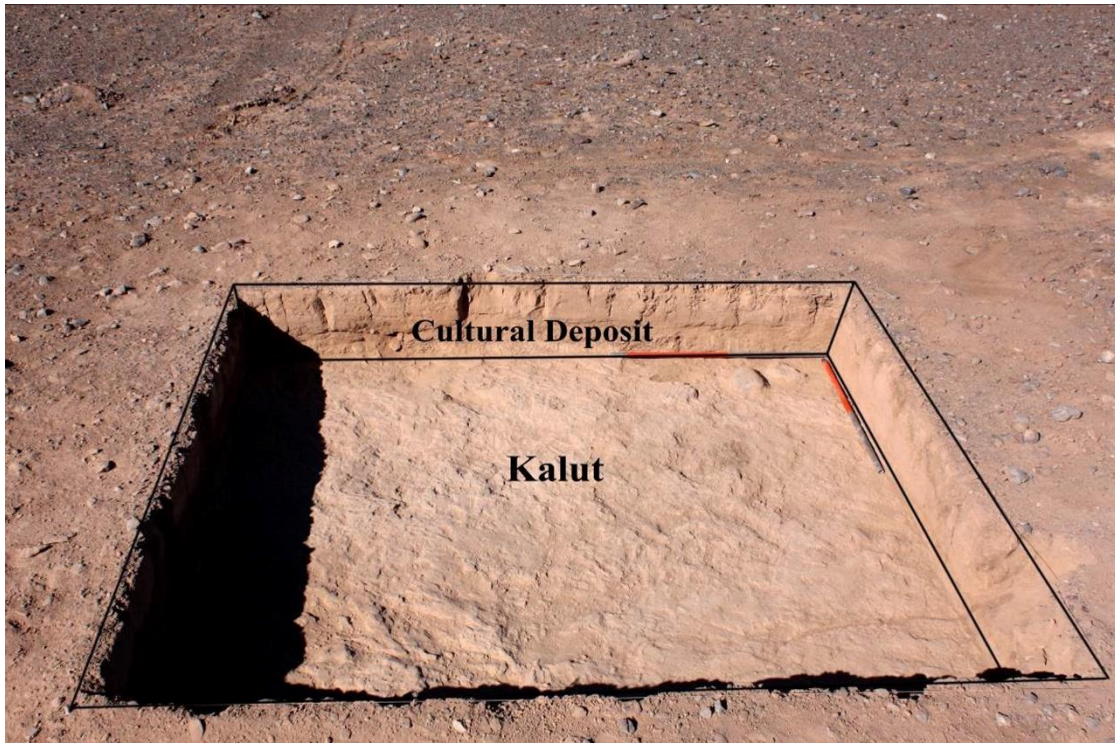


Fig 62: Deflation of cultural layers at Trench III, Tepe Dehno (Photo by author)

Illustrations

Pottery No.	Locus	Description 1. Type 2. Fabric Color (ext./int./core.) 3. Inclusions 4. Firing 5. Treatment 6. Decoration 7. Painting Color	Absolute Date BC
1	4001	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	
2	4001	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	
3	4002	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	
4	4002	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	
5	4002	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	
6	4002	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	
7	4004	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	4250-4000
8	4004	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	4250-4000
9	4004	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	4250-4000
10	4004	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	4250-4000
11	4004	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	4250-4000
12	4006	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Inside: Red	4250-4000
13	4006	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	4250-4000
14	4006	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Brownish Red	4250-4000
15	4006	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Brownish Red	4250-4000
16	4006	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	4250-4000

Table 11: Characteristics of the recovered ceramics from Trench IV, Tepe Dehno

Illustrations

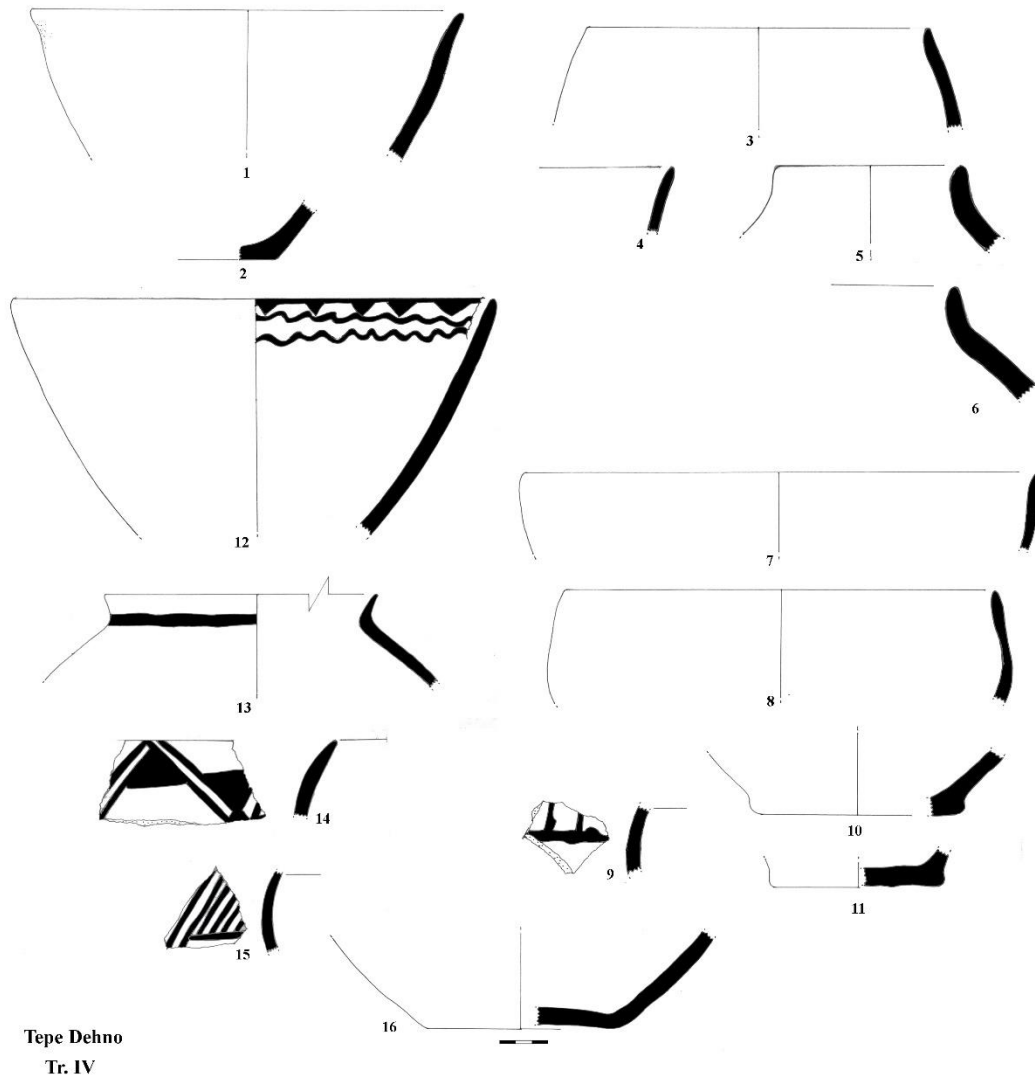


Fig 63: A selection of the recovered ceramics from Trench IV, Tepe Dehno

Illustrations

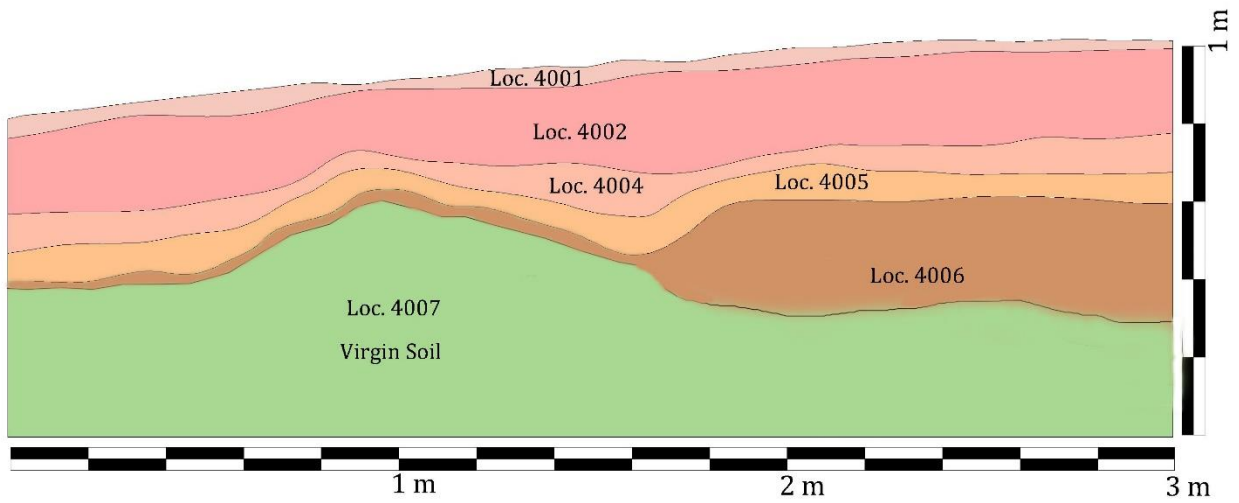


Fig 64: Stratigraphy and the deflation of cultural deposits at Trench IV, Tepe Dehno (Drawing by author)



Fig 65: General view of Tepe East Dehno (Photo by author)

Illustrations

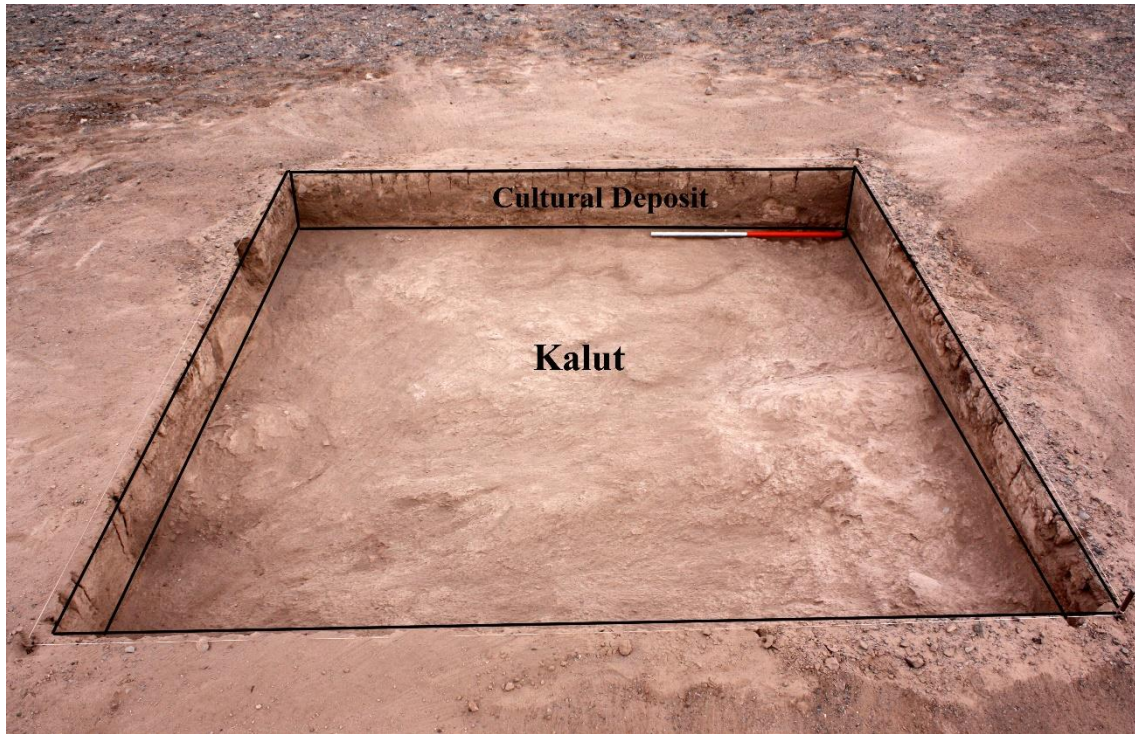


Fig 66: Deflation of cultural deposits at Trench I, Tepe East Dehno (Photo by author)

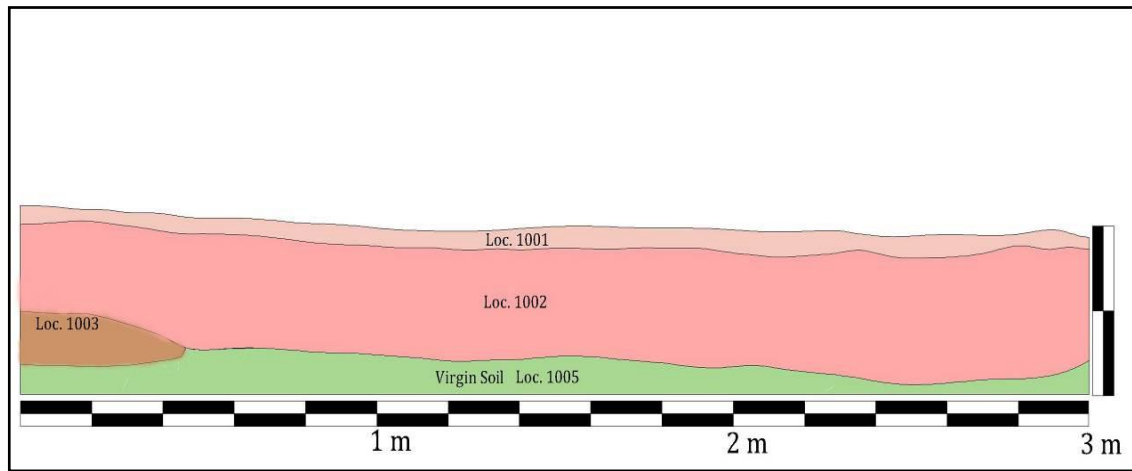


Fig 67: Stratigraphy of cultural layers at Trench I, Tepe East Dehno (Drawing by author)

Illustrations

Pottery No.	Locus	Description 1. Type 2. Fabric Color (ext./int./core.) 3. Inclusions 4. Firing 5. Treatment 6. Decoration 7. Painting Color	Absolute Date B.C
1	1001	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	4700-4500
2	1001	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	4700-4500
3	1001	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	4700-4500
4	1002	1. Fine Buff Ware 2. Buff. Buff. Buff 3. Grit- Medium 4. Well Fired 5. Slip	4700-4500
5	1002	1. Fine Red Ware 2. Red. Red. Red 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	4700-4500
6	1002	1. Coarse Brown Ware 2. Brown. Brown. Brown 3. Grit- Coarse & Chaff 4. Well Fired 5. Slip	4700-4500
7	1003	1. Fine Red Ware 2. Red. Red. Red 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	4700-4500
8	1003	1. Fine Red Ware 2. Red. Red. Red 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	4700-4500
9	1003	1. Fine Red Ware 2. Red. Red. Red 3. Grit- Medium 4. Well Fired 5. Slip 6. Painting 7. Outside: Black	4700-4500
10	1003	1. Coarse Brown Ware 2. Brown. Brown. Brown 3. Grit- Coarse & Chaff 4. Well Fired 5. Slip	4700-4500

Table 12: Characteristics of the recovered ceramics from Trench I, Tepe East Dehno

Illustrations

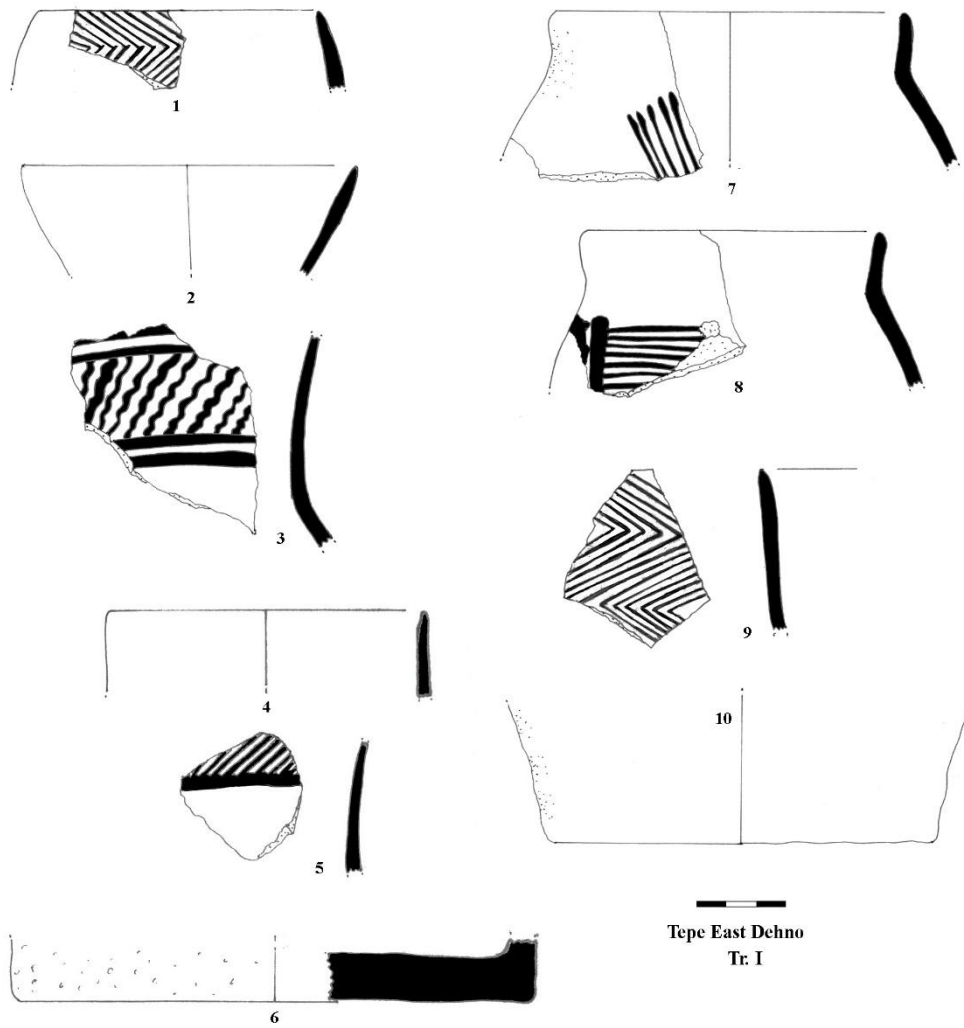


Fig 68: A selection of the recovered ceramics from Trench I, Tepe East Dehno

Illustrations

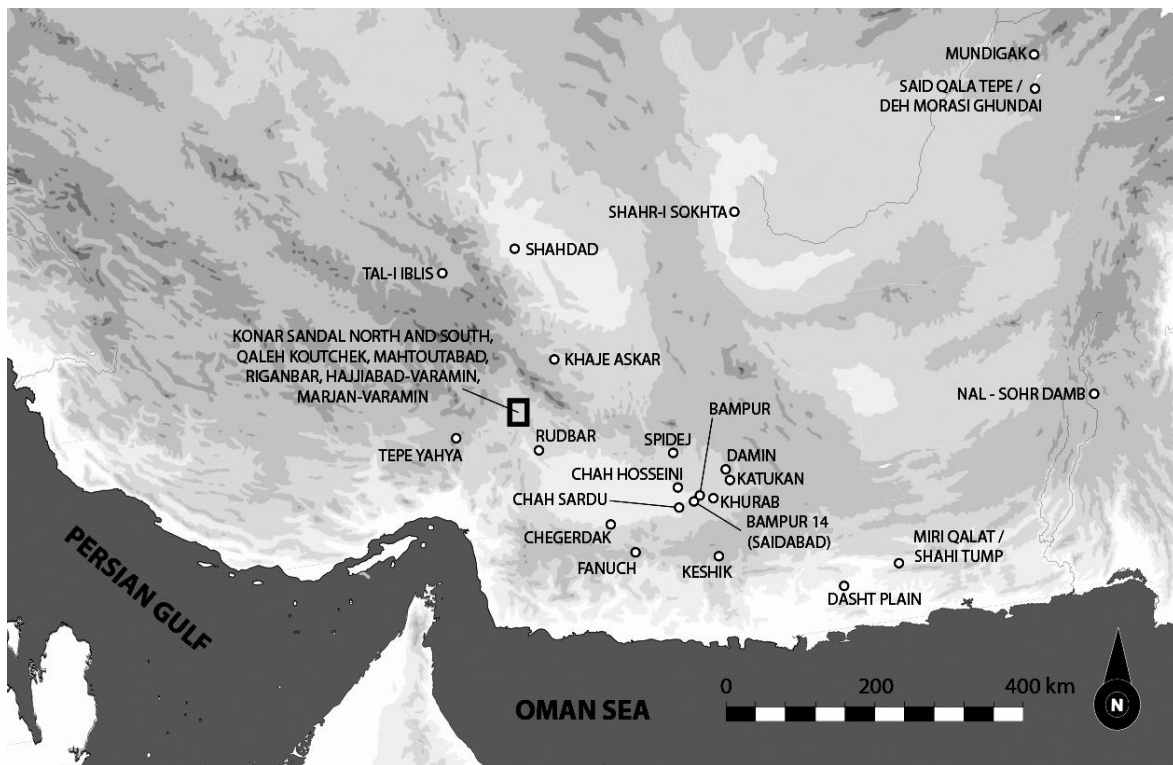
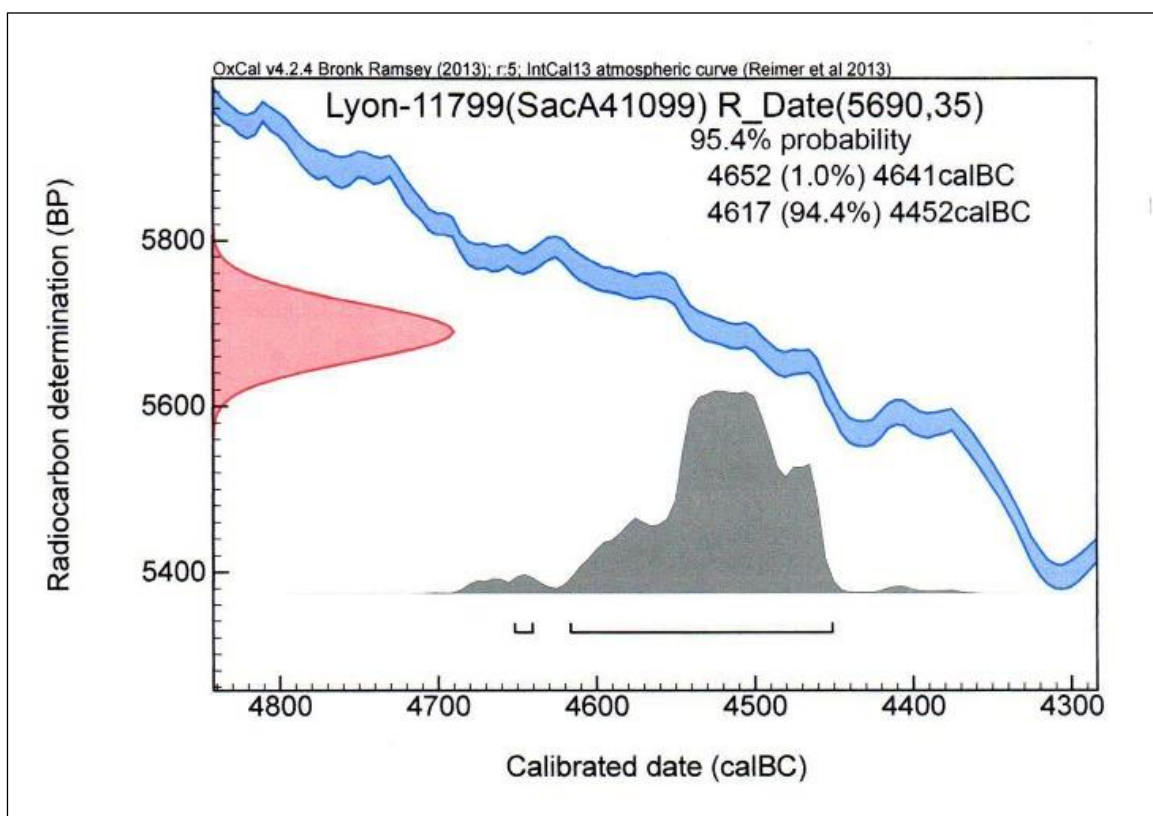


Fig 69: Map showing the major excavated sites of Southeastern Iran (Map by author)

Illustrations



TDN Tr I L

UBA-22828

Radiocarbon Age BP 5753 +/- 34

Calibration data set: intcal09.14c

% area enclosed cal AD age ranges

Reimer et al. 2009

relative area under probability distribution

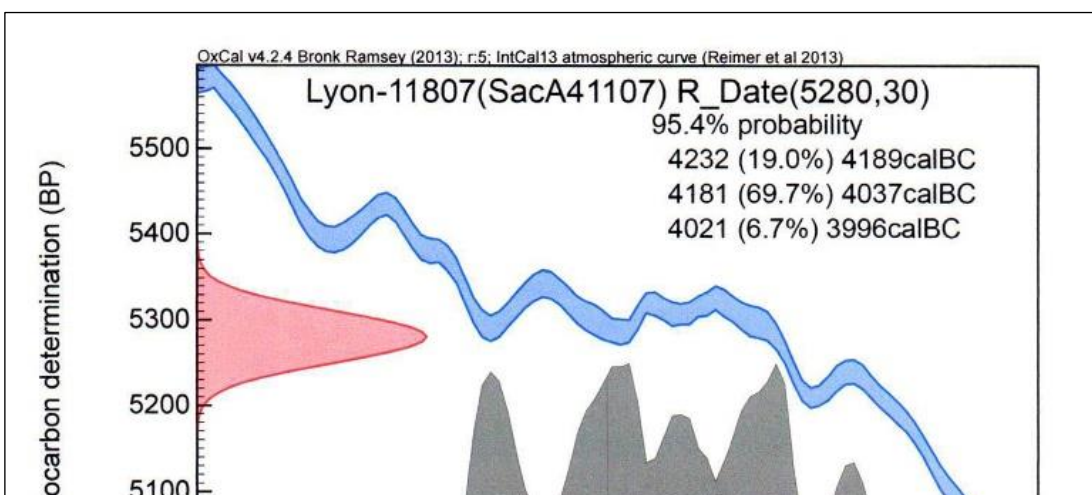
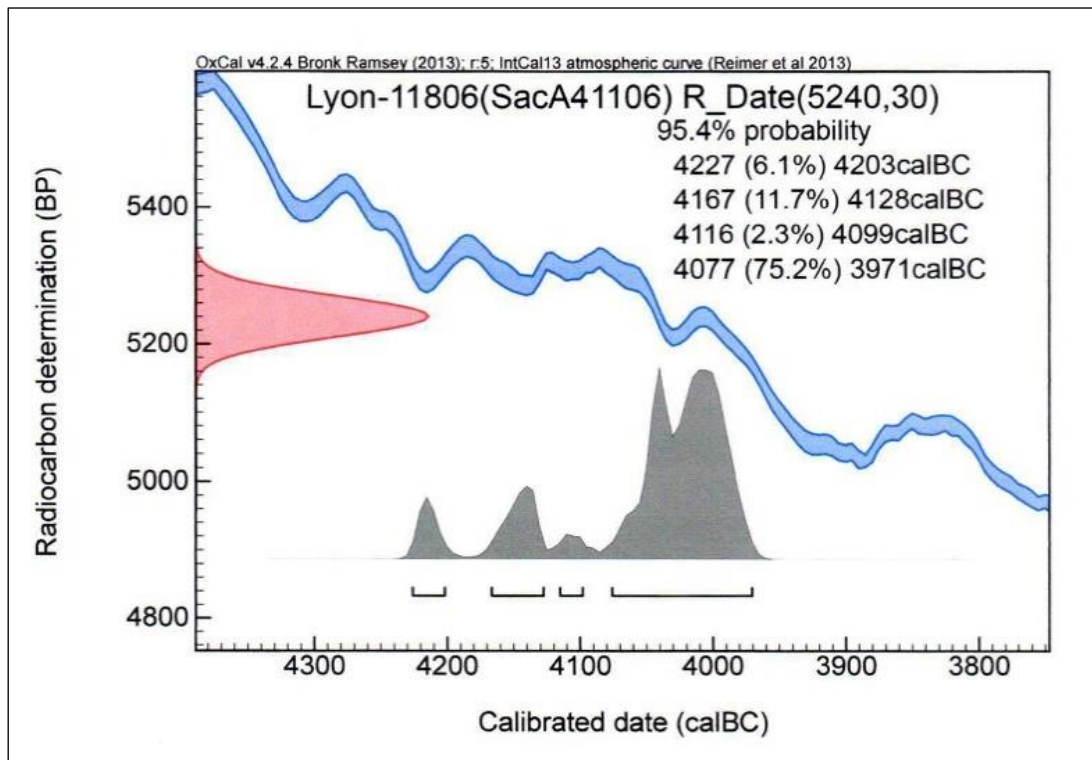
68.3 (1 sigma)	cal BC 4678- 4674	0.032
	4670- 4658	0.091
	4655- 4637	0.152
	4618- 4547	0.724
95.4 (2 sigma)	cal BC 4701- 4700	0.001
	4694- 4515	0.991
	4509- 4504	0.007

References for calibration datasets:

PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, PG Blackwell, C Bronk Ramsey, CE Buck, GS Burr, RL Edwards, M Friedrich, PM Grootes, TP Guilderson, I Hajdas, TJ Heaton, AG Hogg, KA Hughen, KF Kaiser, B Kromer, FG McCormac, SW Manning, RW Reimer, DA Richards, JR Southon, S Talamo, CSM Turney, J van der Plicht, CE Weyhenmeyer (2009) Radiocarbon 51:1111-1150.

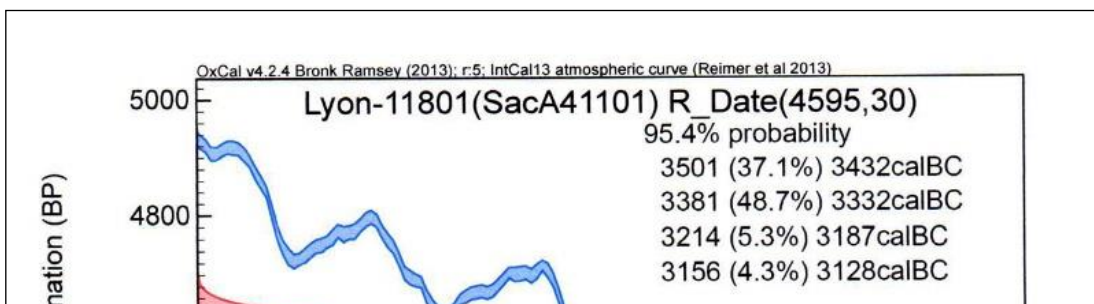
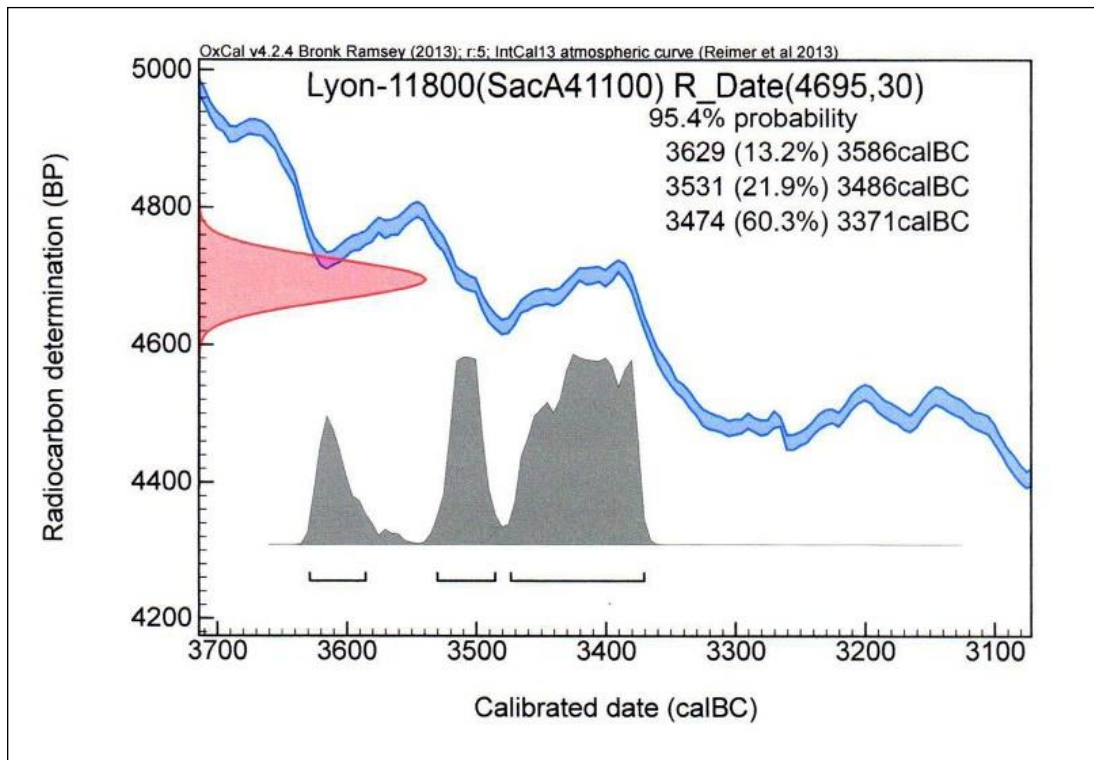
Illustrations

Figs 70, 71: The result of ¹⁴C dating analysis from East Dehno showing the second quarter of 5th Millennium BC



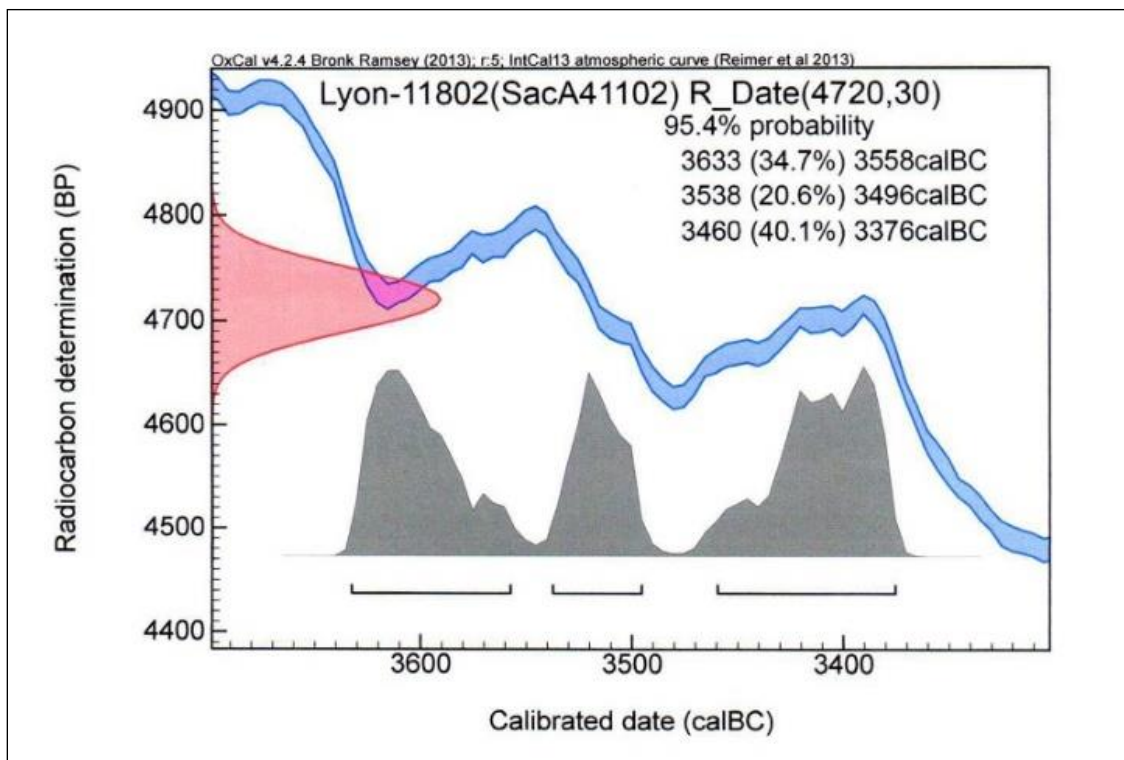
Illustrations

Figs 72, 73: The result of 14C dates from Trench IV, Tepe Dehno, Locus 4002 (left) and Locus 4004 (right)

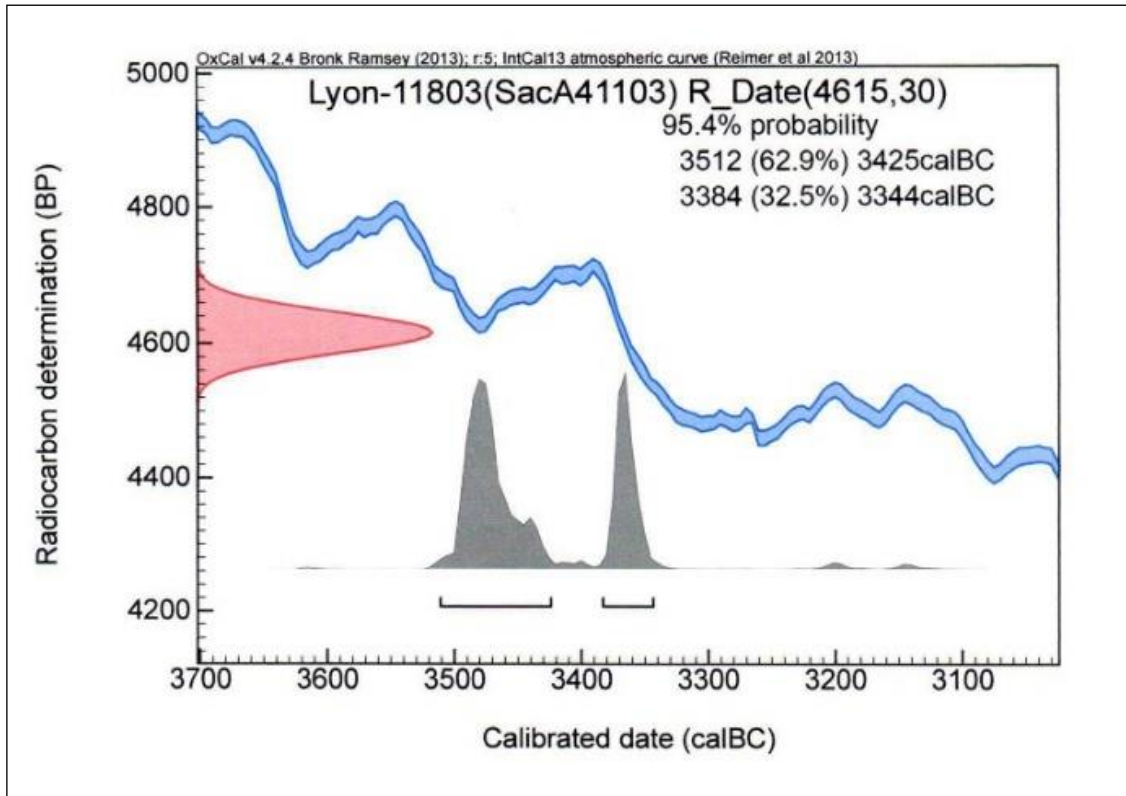


Illustrations

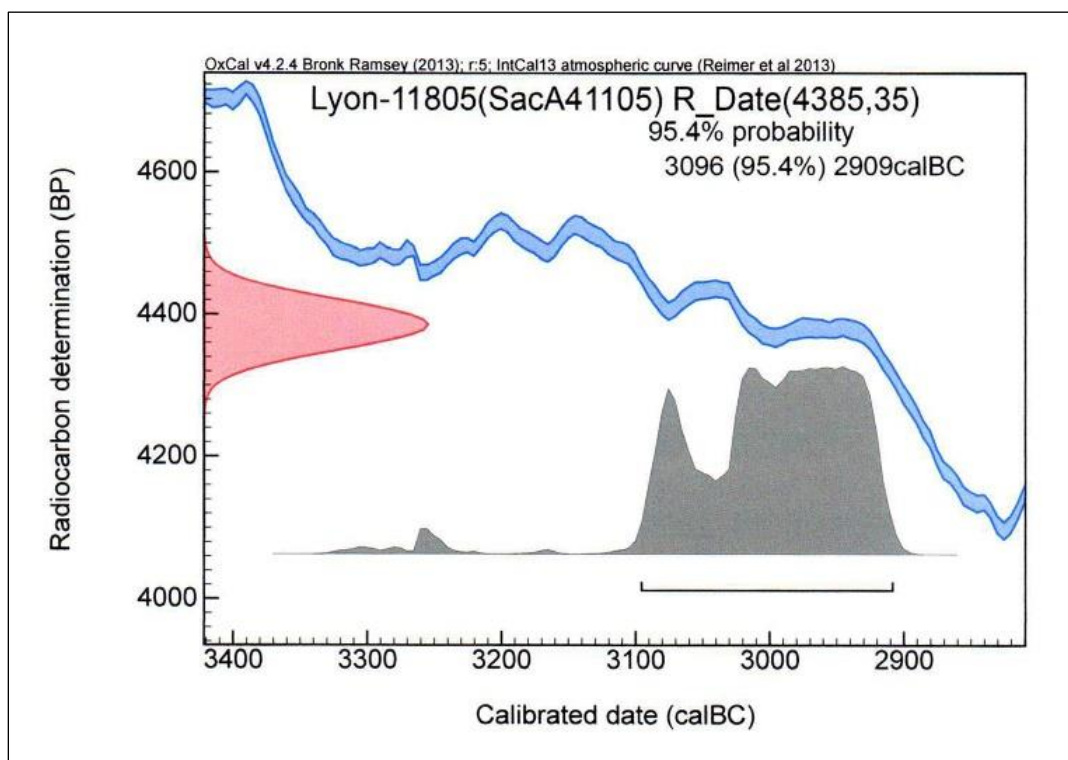
Figs 74, 75: The result of 14C dates from Trench I, Tepe Dehno, Locus 1006 (left) and Locus 1007 (right)



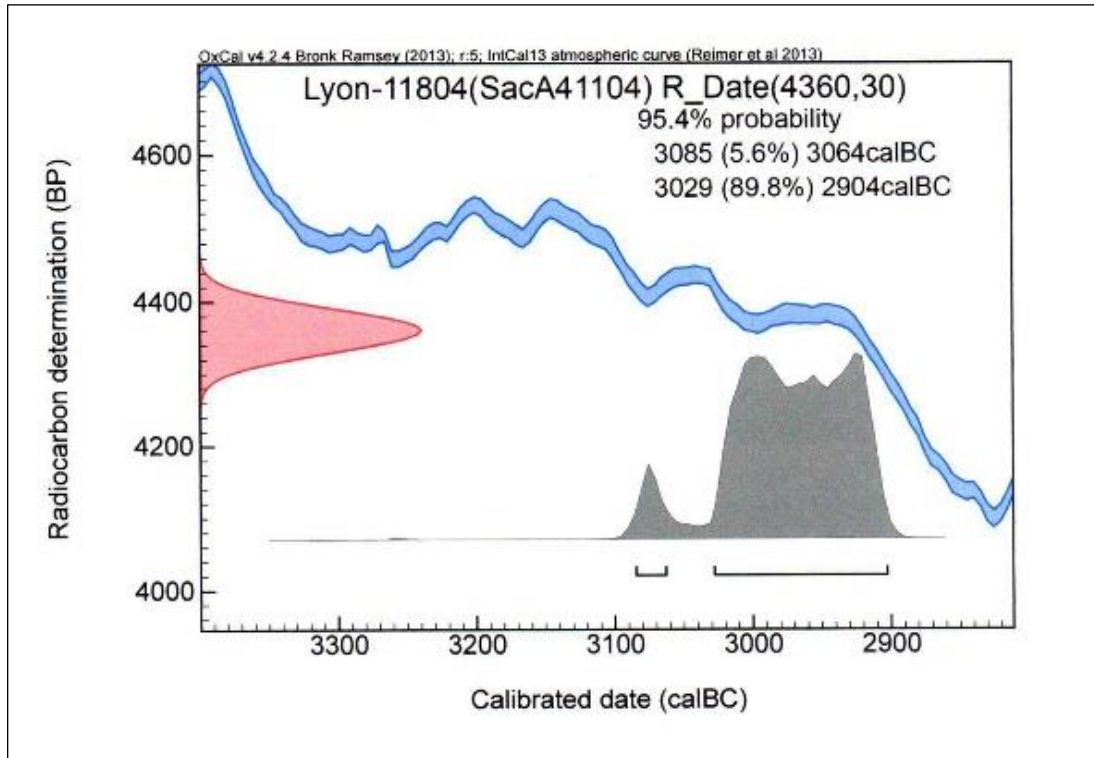
Illustrations



Figs 76, 77: The result of 14C dates from Trench II, Tepe Dehno, Locus 2002 (left) and Locus 2003 (right)



Illustrations



Figs 78, 79: The result of 14C dates from Trench III, Tepe Dehno, Locus 3002

Illustrations

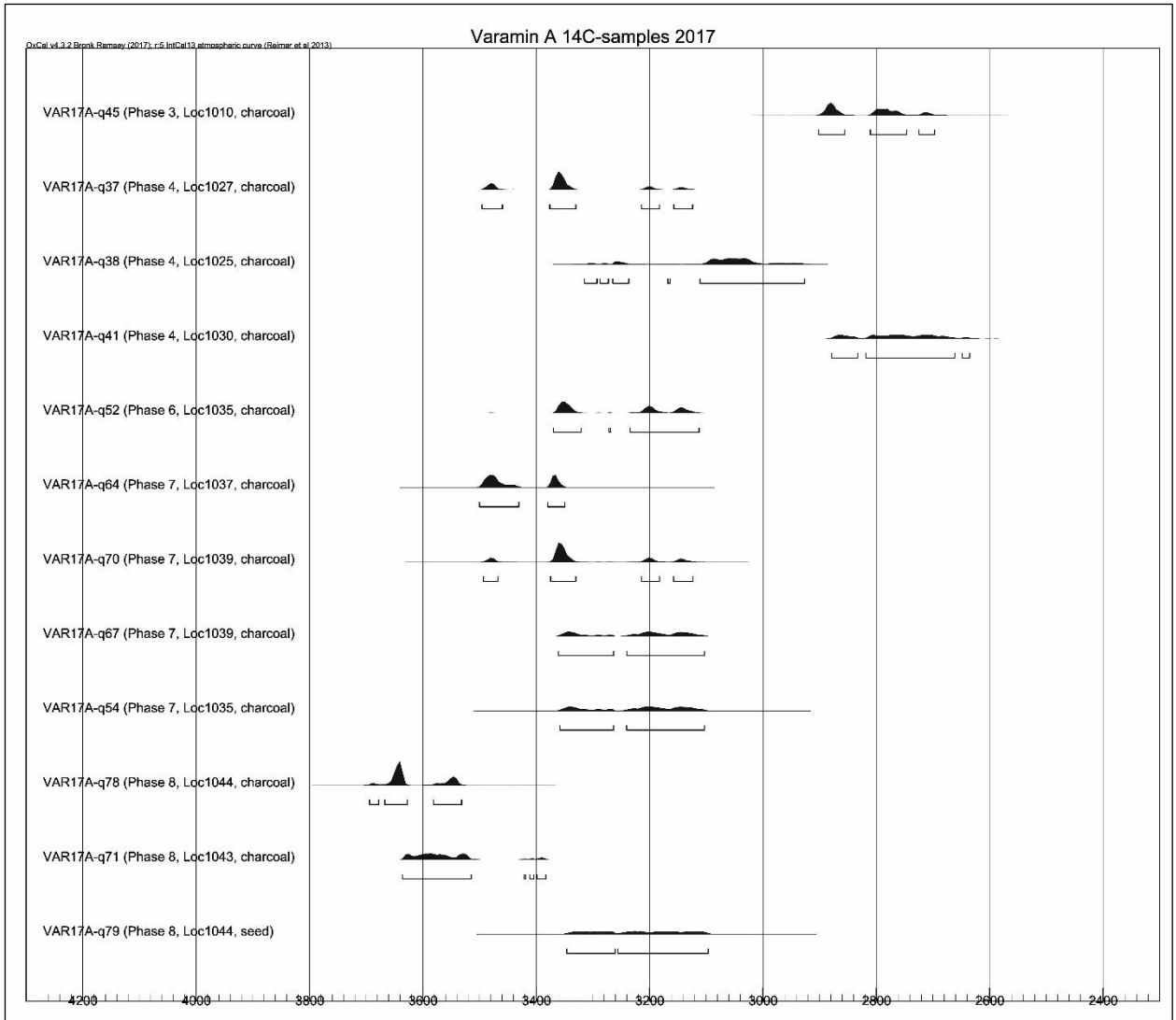


Fig 80: Radiocarbon dates from Tr. I, Site of Varamin-e Jiroft

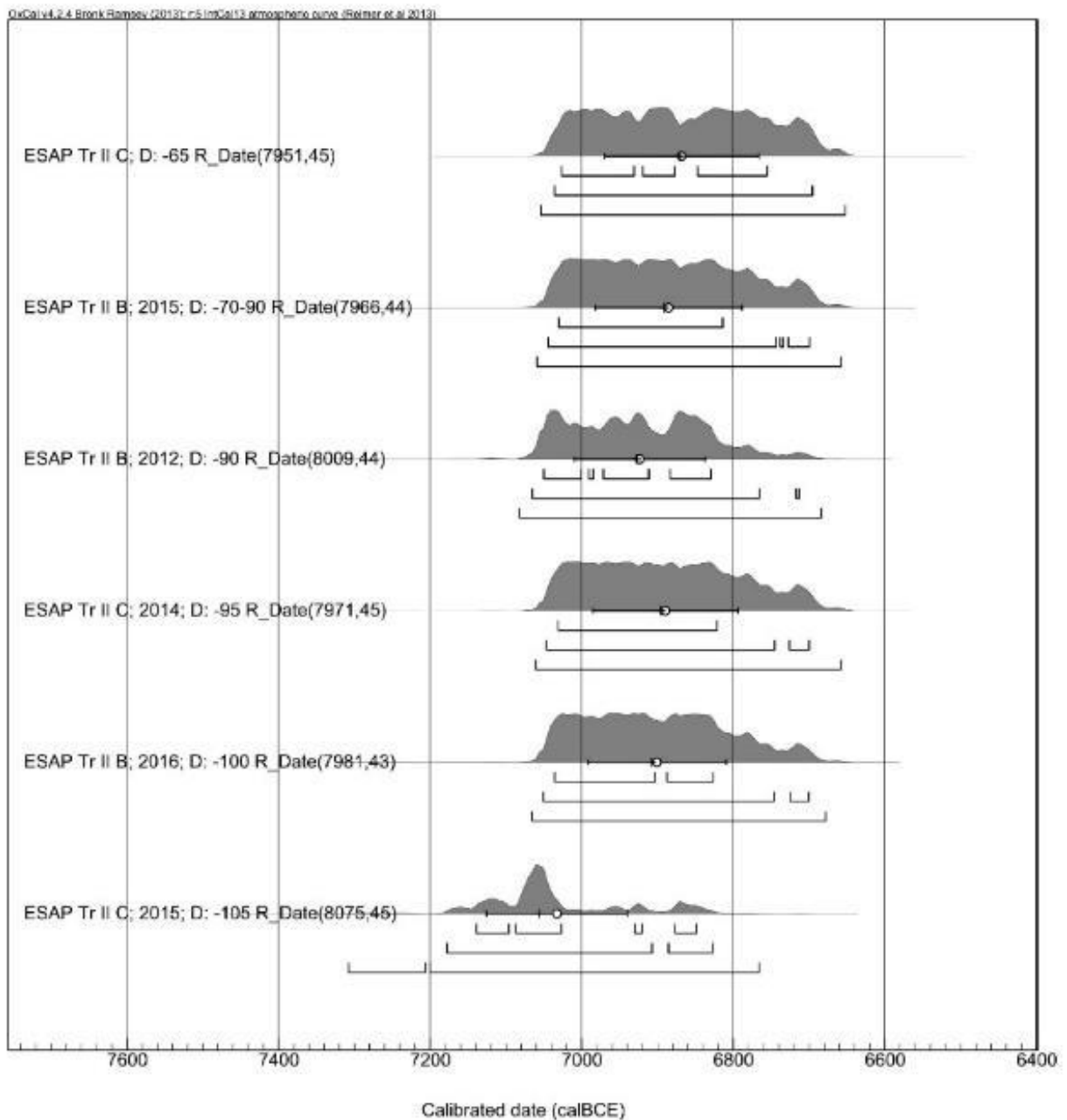
Illustrations

Sample number	Locus	14C Age [yr BP]	cal 1sigma	cal 1sigma intervals	cal 2sigma	cal 2sigma intervals	C [%]
VAR17A-q0038	Loc1025	4427	3261-3020 calBC	3262-3255 calBC (3,0%) 3098-3019 calBC (65,2%)	3314-2928 calBC	3316-3293 calBC (2,4%) 3288-3273 calBC (1,6%) 3266-3237 calBC (8,4%) 3168-3165 calBC (0,3%) 3112-2927 calBC (82,7%)	62,0
VAR17A-q0045	Loc1010	4218	2892-2764 calBC	2893-2866 calBC (35,1%) 2804-2763 calBC (33,1%)	2901-2698 calBC	2903-2856 calBC (43,0%) 2811-2747 calBC (43,5%) 2725-2698 calBC (8,8%)	5,1
VAR17A-q0037	Loc1027	4584	3487-3341 calBC	3488-3472 calBC (13,2%) 3373-3341 calBC (55,0%)	3495-3125 calBC	3496-3460 calBC (18,5%) 3377-3331 calBC (59,2%) 3215-3183 calBC (9,7%) 3158-3125 calBC (8,0%)	7,6
VAR17A-q0041	Loc1030	4164	2873-2681 calBC	2873-2851 calBC (11,7%) 2813-2742 calBC (37,6%) 2729-2695 calBC (18,8%)	2878-2636 calBC	2880-2833 calBC (19,4%) 2819-2662 calBC (73,6%) 2649-2636 calBC (2,4%)	52,4
VAR17A-q0052	Loc1035	4558	3363-3137 calBC	3365-3335 calBC (38,7%) 3211-3191 calBC (17,4%) 3153-3137 calBC (12,1%)	3481-3112 calBC	3371-3321 calBC (45,0%) 3272-3269 calBC (0,2%) 3235-3113 calBC (50,2%)	58,0
VAR17A-q0070	Loc1039	4578	3482-3198 calBC	3483-3476 calBC (4,6%) 3371-3339 calBC (58,2%) 3205-3196 calBC (5,4%)	3492-3126 calBC	3494-3468 calBC (10,3%) 3375-3331 calBC (62,7%) 3215-3183 calBC (12,3%) 3158-3124 calBC (10,1%)	46,3
VAR17A-q0054	Loc1035	4527	3353-3119 calBC	3353-3325 calBC (15,4%) 3232-3173 calBC (29,3%) 3161-3118 calBC (23,6%)	3358-3104 calBC	3359-3264 calBC (31,7%) 3241-3104 calBC (63,7%)	49,2
VAR17A-q0064	Loc1037	4618	3494-3361 calBC	3495-3466 calBC (44,8%) 3375-3360 calBC (23,4%)	3500-3351 calBC	3501-3431 calBC (64,6%) 3381-3350 calBC (30,8%)	3,9
VAR17A-q0067	Loc1039	4532	3355-3120 calBC	3356-3326 calBC (17,4%) 3230-3225 calBC (1,9%) 3220-3174 calBC (25,8%) 3161-3119 calBC (23,1%)	3360-3104 calBC	3361-3264 calBC (31,6%) 3241-3104 calBC (63,8%)	56,1
VAR17A-q0071	Loc1043	4754	3632-3522 calBC	3632-3620 calBC (9,9%) 3609-3558 calBC (44,0%) 3538-3522 calBC (14,3%)	3636-3385 calBC	3637-3515 calBC (89,4%) 3422-3419 calBC (0,4%) 3412-3405 calBC (1,3%) 3399-3388 calBC (4,2%)	29,2
VAR17A-q0078	Loc1044	4839	3654-3541 calBC	3655-3633 calBC (53,4%) 3553-3541 calBC (14,8%)	3694-3533 calBC	3695-3679 calBC (4,0%) 3668-3628 calBC (61,4%) 3582-3532 calBC (30,0%)	55,1

Illustrations

VAR17A-q0079	Loc1044	4500	3335-3106 calBC	3335-3309 calBC (11,7%) 3299-3283 calBC (6,5%) 3276-3265 calBC (4,9%) 3240-3211 calBC (13,4%) 3192-3152 calBC (17,7%) 3137-3106 calBC (13,9%)	3345-3098 calBC	3347-3261 calBC (33,3%) 3256-3097 calBC (62,1%)	56,3
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Table 13: Results of the Radiocarbon dates from Tr. I, Site of Varamin-e Jiroft



Illustrations

Fig 81: Radiocarbon dates from Tepe Gav Koshi (after Soleimani and Fazeli 2018)

<i>Sample</i>	<i>Operation/Phase</i>	<i>Radiocarbon age</i>	<i>Calibrated age range (1 sigma 68% probability)</i>	<i>Calibrated age range (2 sigma)</i>
Beta 207285 KSS0501 Charred material AMS	KSSStr. 7:301—70–80 from north wall 1.9–2.05m above floor of step trench 7. Possible pit associated with mud brick	3920+/-40 BP	2470–2340 Cal B.C.	2490–2290 Cal B.C.
Beta 207286 KSS0502 Charred material AMS	KSSStr. 8:303—south wall, burned organic with small pebbles 1.20 m depth predates or dates to construction of massif. Under first row of big mud bricks	3880+/-40 BP	2450–2290 Cal B.C.	2470–2210 Cal B.C.
Beta 207287 KSS0503 Charred material AMS	KSSStr. 9:31515 cm north of south wall. 2.5 m depth. Charcoal under vessel A in southeast corner along wall. Room predates the massif	3830+/- BP	2330–2210 Cal B.C.	2450–2140 Cal B.C.
Beta 207292 KSS0508 Charred material AMS	KSSTr. XI:325. depth 0.84 meters. Floor surface. Lowest phase (3)	4130+/- BP	2860–2800 Cal B.C. 2760–2600 Cal B.C.	2880–2580 Cal B.C.
Beta 207293 KSS0509 Charred material AMS	KSSTr III: 306 depth .80 meters. On floor surface where seal impressions were found. Citadel earliest phase	3880 +/- BP	2450–2290 Cal B.C.	2470–2210 Cal B.C.
Beta 207294 KSS0510 Charred material AMS	KSSTr III:306 depth .80 meters. On floor surface where seal impressions were found. Citadel earliest phase	3910+/-BP	2470–2330 Cal B.C.	2480–2290 Cal B.C.

Fig 82: Radiocarbon dates for Konar Sandal South (after, Madjidzadeh and Pittman 2008)

Illustrations

Table 14: Proposed chronological table for the South-East Iran

Illustrations

Date BC	Period	Kerman Region					Sistan & Baluchistan	
		Shahdad	Bardsir	Soghun	Jiroft	Bam	Sistan	Baluchistan
2000	Middle Bronze Age	Cemetery. B&C		Yahya IV A	KSN			
	Early Bronze Age II-IV	Shahdad City		Yahya IV B	KSS City		S.sokhta IV	Bampur V,VI
3000	Early Bronze Age I	Dehno III	Iblis V	Yahya IV C	Varamin period		S.sokhta II&III	Bampur I-IV
3300	Late Chalcolithic	Dehno II			Matotabad III		S.sokhta I	
			Iblis IV	Hiatus		Khaje-Askar	?	
4000	Middle Chalcolithic	Dehno I	Iblis III	Yahya V A	Mahtotabad I&II			Chah-Hussini
4700					Gaz Saleh?			
5500	Early Chalcolithic	East Dehno	Iblis II	Yahya V C-B		Aceramic Atashi		
			Iblis I	Yahya VI			?	?
6000	Late Pottery Neolithic	?	Iblis 0					
7000	Early Pottery Neolithic			Yahya VII				
			?					

Bibliography

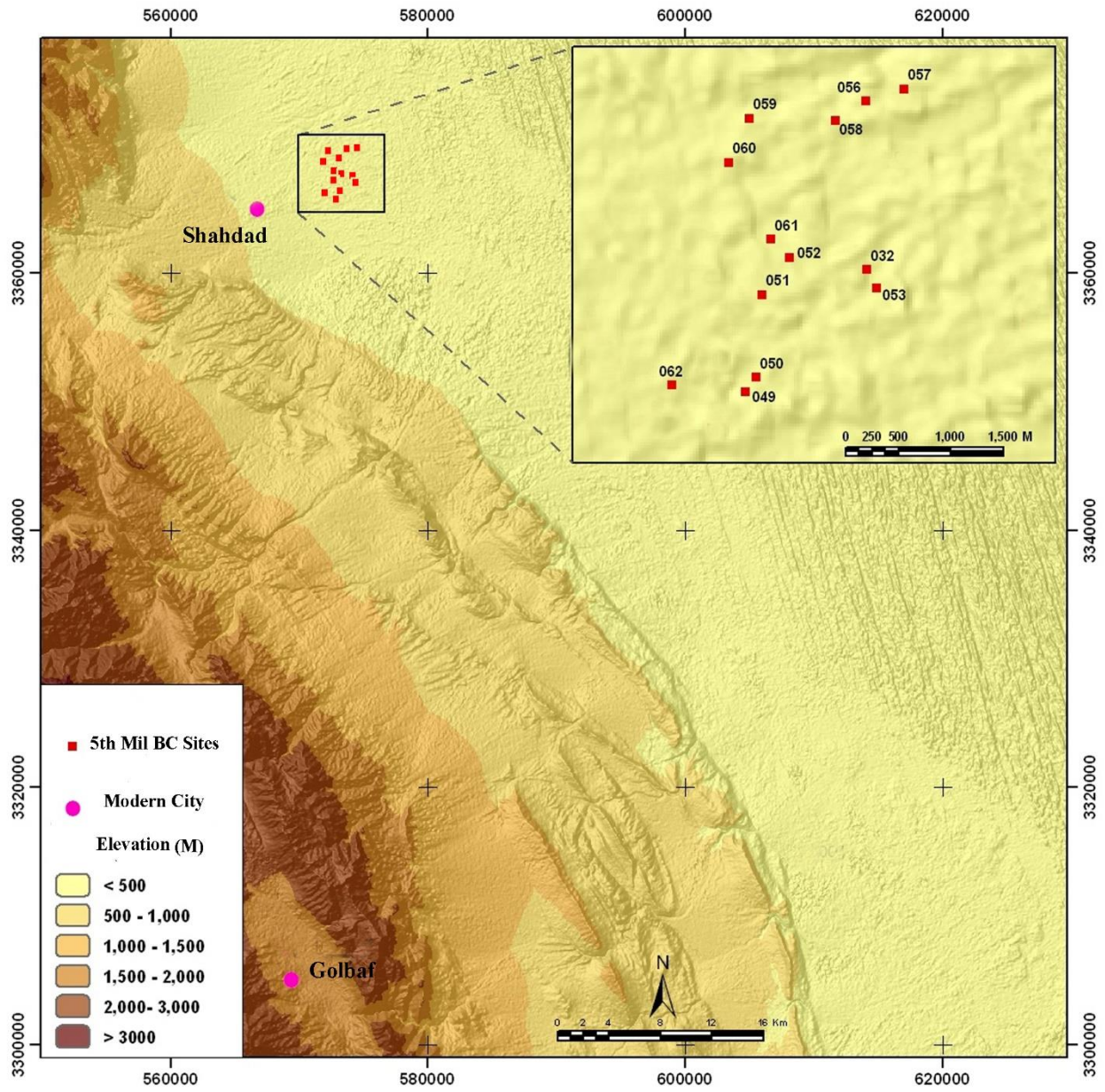


Fig 83: GIS map showing the distribution pattern of 5th millennium settlements on the Lut area (GIS map by author)

Bibliography

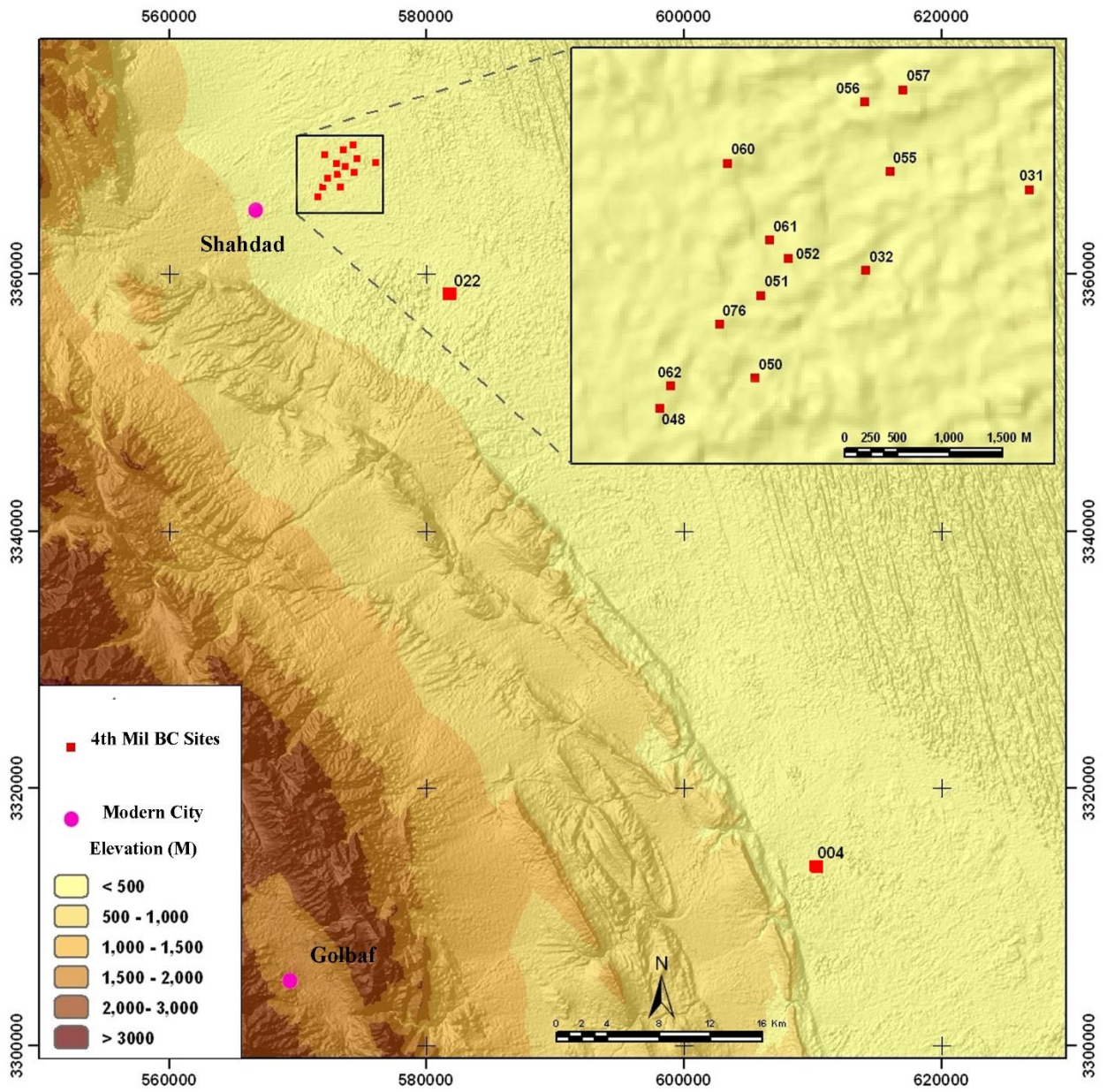


Fig 84: GIS map showing the distribution pattern of 4th millennium settlements on the Lut area (GIS map by author)

Bibliography

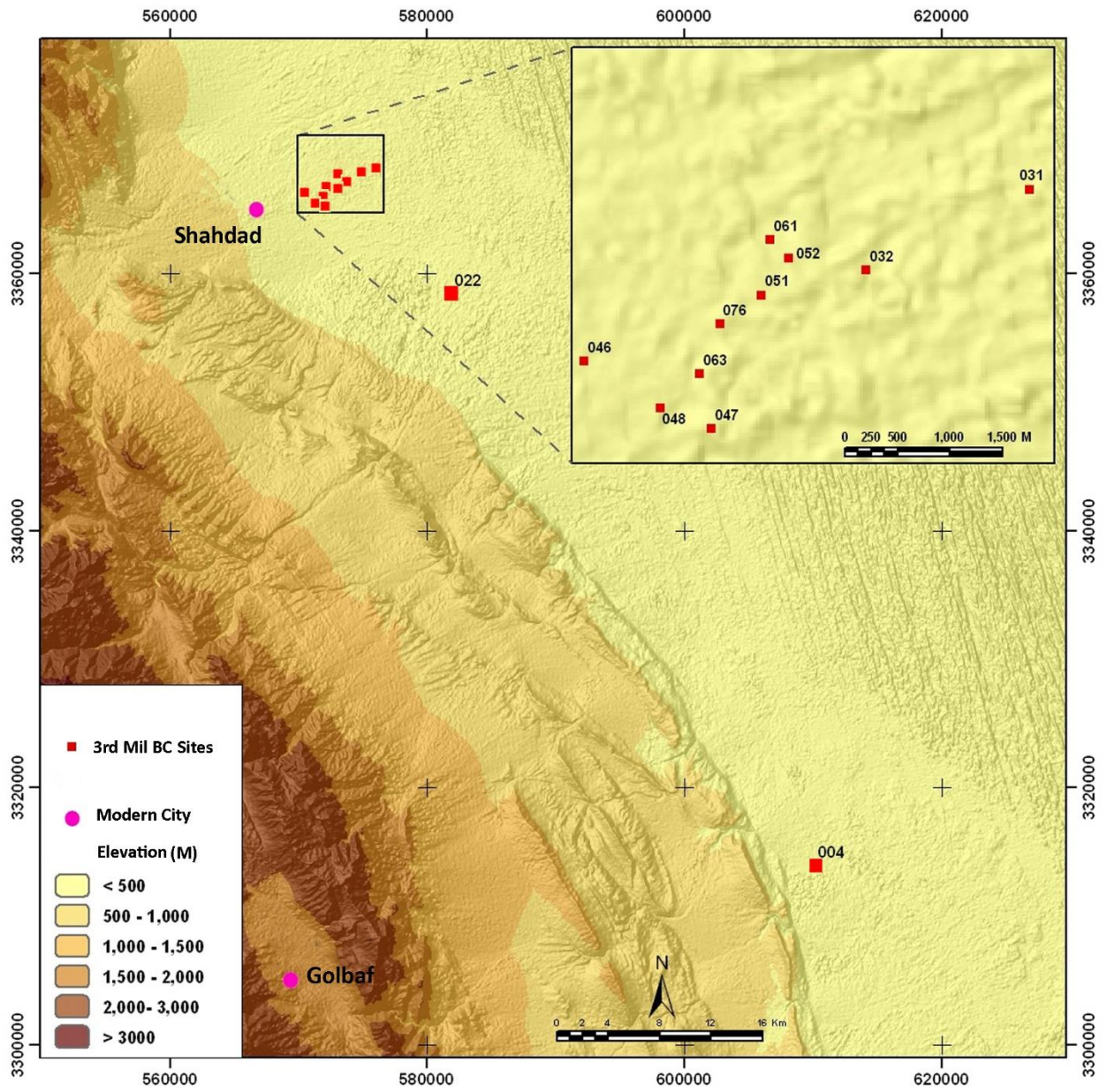
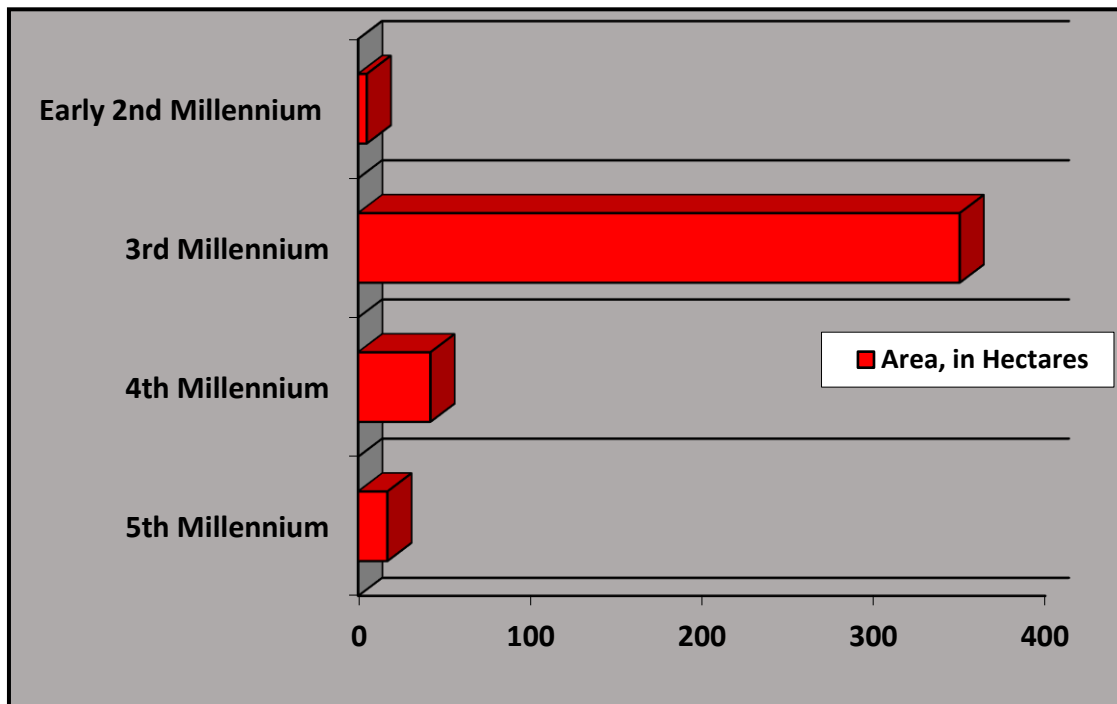


Fig 85: GIS map showing the distribution pattern of 3rd millennium settlements on the Lut area (GIS map by author)



Bibliography

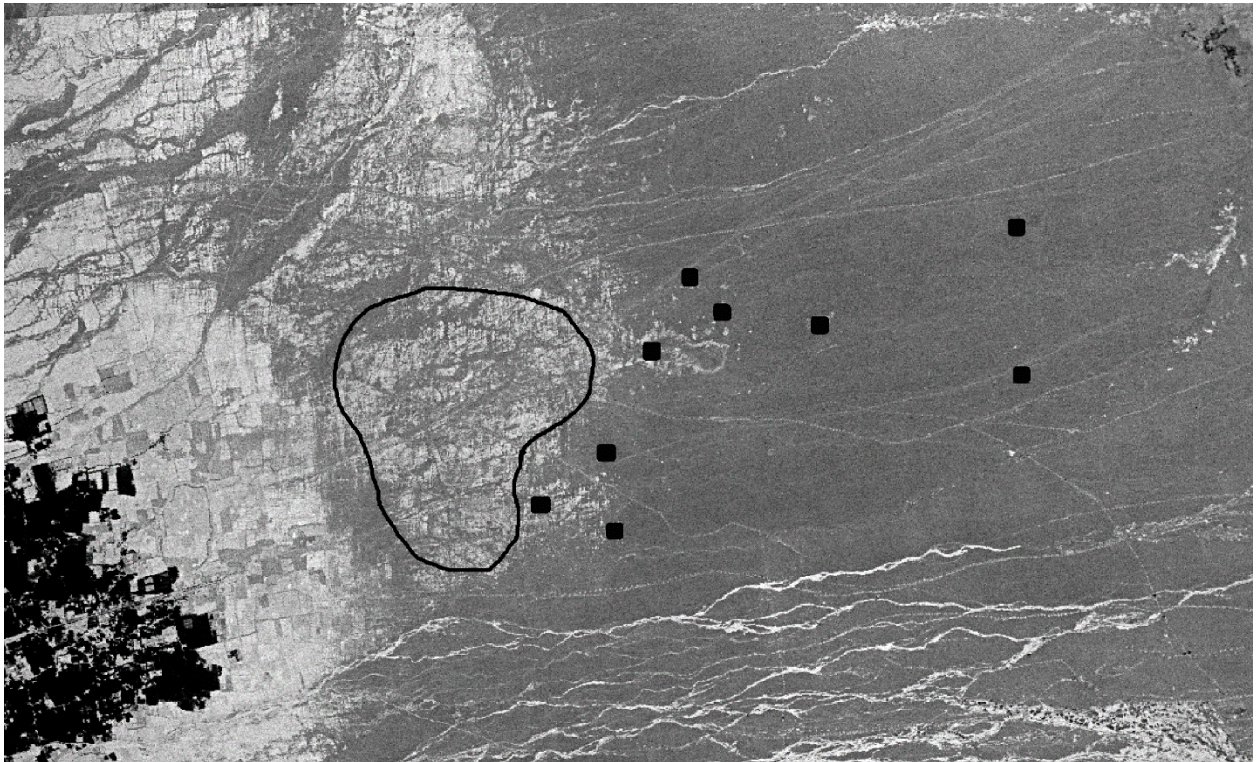
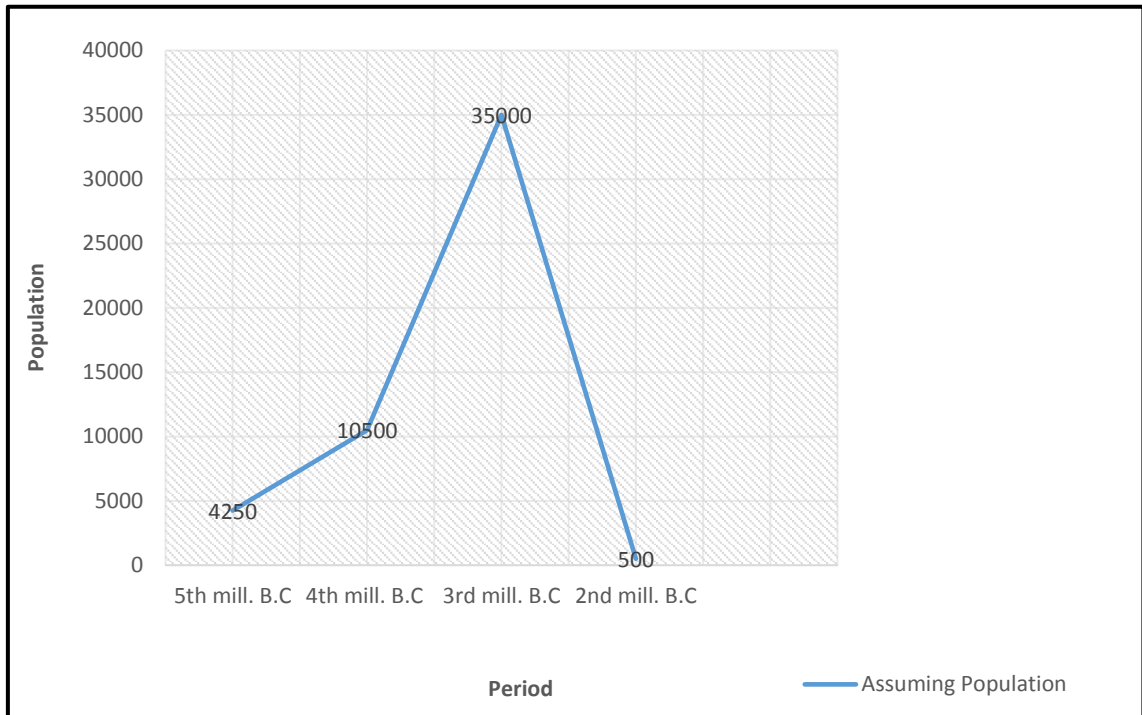
Fig 86: Exposure of graves on surface and erosion of burial goods at the 3rd millennium Site of Mokhtarabad on the west of Lut desert (Photo by author)



Bibliography

Table 15: Settled Areas of Lut in different periods derived from survey data

Table 16: Long-term population trend from Lut area



Bibliography

Fig 87: Urban center of Shahdad and its contemporaneous small satellite occupations (CORONA Image, modified by author)

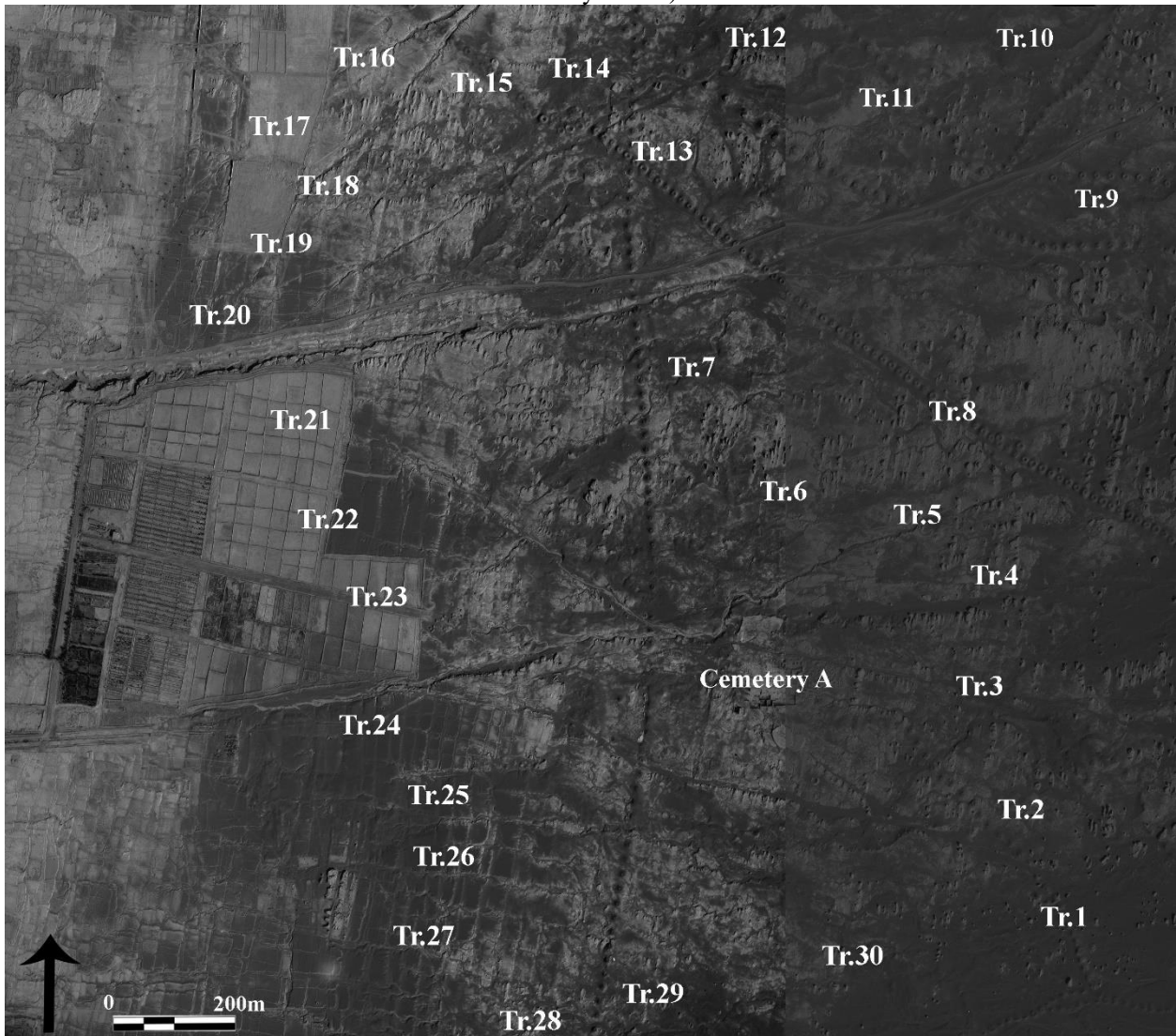


Fig 88: Aerial photograph showing the location of the trenches excavated in 2016 for delimiting the site (photos from National Cartographic Centre, Iran, taken in 1993)

Bibliography

Recorded settlement core	Location	Size (in sqm)	Extent (in ha)
Area 1	SW of the site complex	200 × 200	4
Area 2	SW of the site complex	250 × 200	5
Area 3	S of the site complex	250 × 200	5
Area 4	S of the site complex	400 × 200	8
Area 5	SE of the site complex	55 × 45	0.25
Area 6	SE of the site complex	100 × 100	1
Area 7	Central part	750 × 250	18.8
Area 8	Central part	300 × 200	6
Area 9	Central part	200 × 200	4
Area 10	Central part	200 × 100	2
Area 11	W of the site complex	200 × 200	4
Area 12	N of the site complex	400 × 200	8
Area 13	N of the site complex	100 × 100	1
Area 14	N of the site complex	70 × 50	0.35
Area 15	N of the site complex	250 × 250	6.3
Area 16	N of the site complex	90 × 55	0.5
Area 17	N of the site complex	150 × 100	1.5
Area 18	NE of the site complex	600 × 370	22
Total size of the settlement cores (in ha)			93

Table 17: Location and size of 18 individual settlement cores surveyed within the limits of the Shahdad site complex (see also Fig 89).

Bibliography

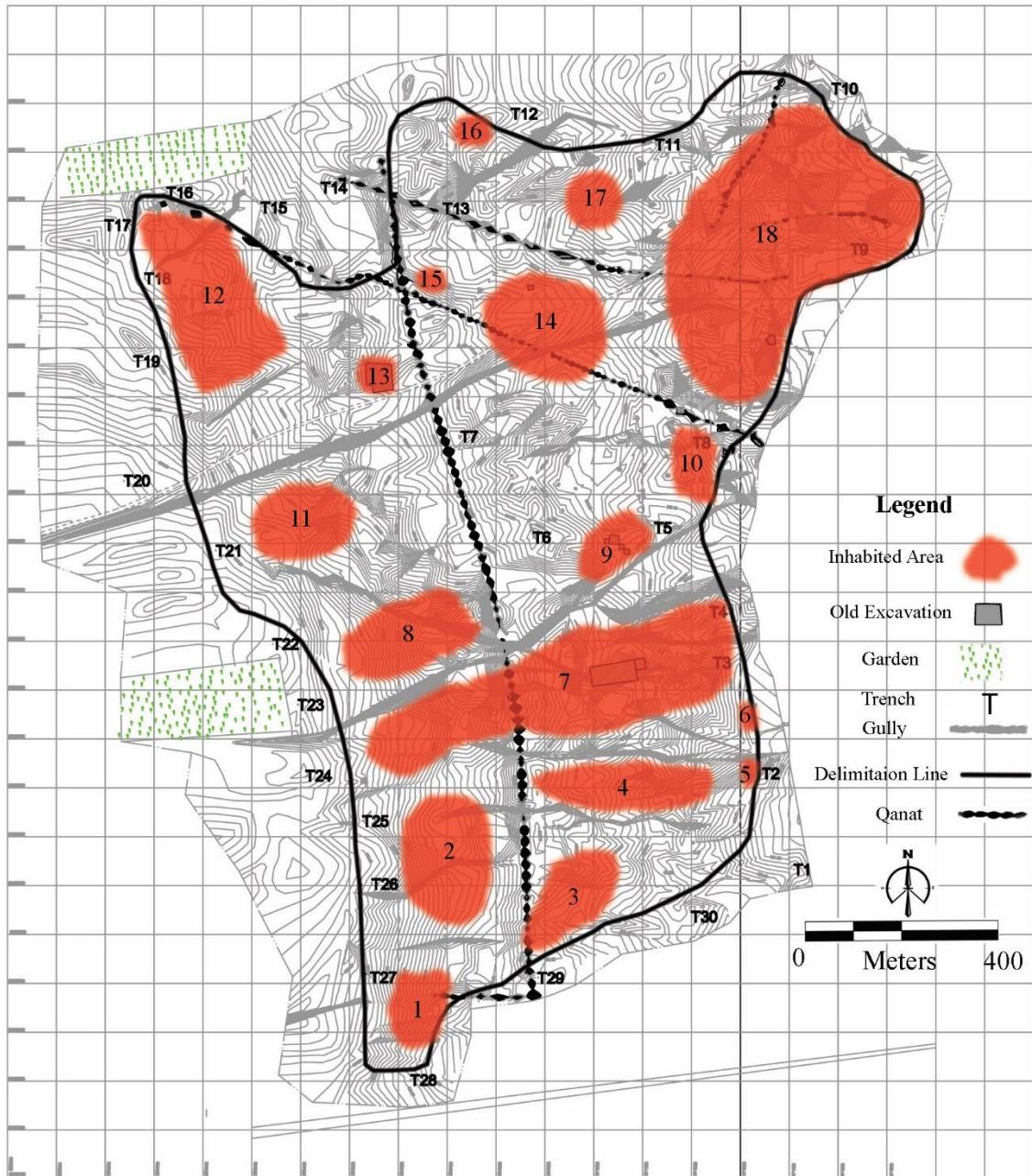


Fig 89. The new topographic map of Shahdad showing in orange the settlement cores or inhabited areas of the site. Contour lines: 1 m.

Bibliography

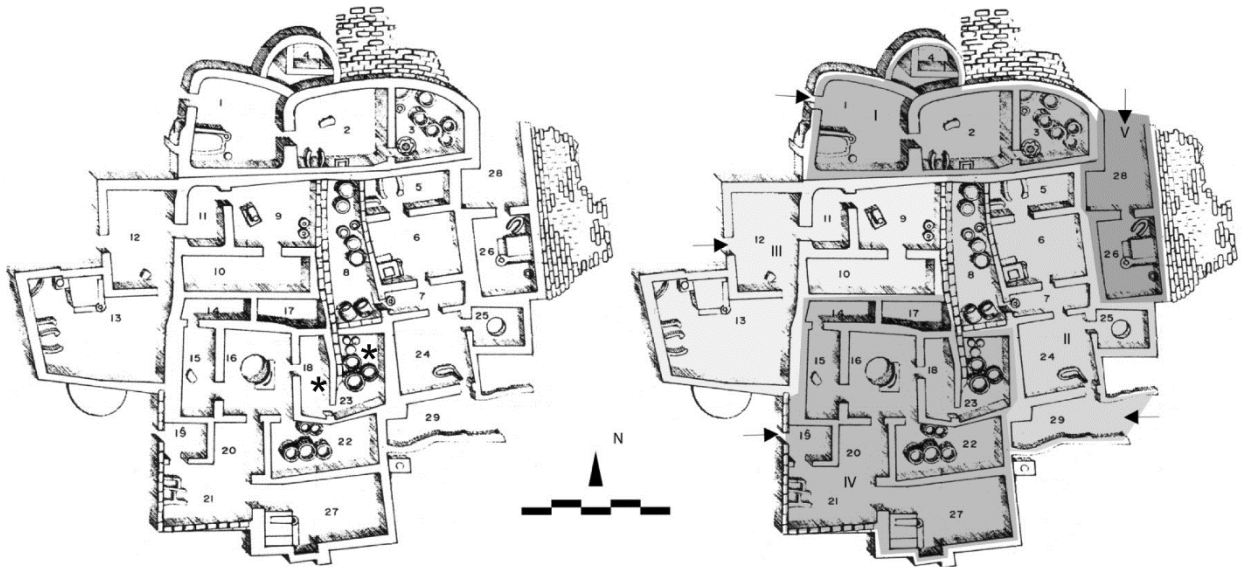


Fig 90: Shahdad. Map of Site D, excavated by A. Hakemi and E. Bayani in 1979. The stars mark the two rooms where hoards with unfinished beads in chalcedony and carnelian were found, below the level of the copper ores processing craft spaces. The arrows point to the entrances of five different dwellings. (Courtesy of M. Vidale)