University of Zabol
ISMEO
Society of Iranian Archaeology

Semiannual, Volume 1, Issue 1, 2021

JSBS

Journal of Sistan and Baluchistan Studies

Print ISSN: 2821-0794
Online ISSN: 2821-0808

Detail of the Miho Museum chlorite vessel (Jiroft Civilization, 23rd century BC), with the two-faced Marhashean "god".

University of Zabol, Iran

Journal of Sistan and Baluchistan Studies

Year 2021, Volume 1, Issue 1

Publication Ethics

Journal of Sistan and Baluchistan Studies It is rigorously following the **Committee on Publication Ethics COPE**. This enforces a rigorous peer-review together with strict ethical policies and standards to ensure adding high-quality scientific works to the field of scholarly publication. Unfortunately, cases of plagiarism, data falsification, inappropriate authorship credit, and the like, do arise. **JSBS** takes such publishing ethics issues very seriously and our editors are trained to proceed in such cases with a zero-tolerance policy. To verify the originality of content submitted to our journals, we use iThenticate to check submissions against previous publications. Authors are responsible for obtaining permission to reproduce materials subjected to copyright.

About the Journal

Publisher: University of Zabol, Iran
Director-in-Charge: Reza Naseri *Associate Professor, Department of Archaeology, Faculty of Art and Architecture, University of Zabol, Zabol, Iran.*
Editor-in-Chief: Hossein Sarhaddi-Dadian *Associate professor, Department of Archaeology, Faculty of Art and Architecture, University of Zabol, Zabol, Iran*
Managing Editor: Babak Shaikh Baikloo Islam
Address: Department of Archaeology, Faculty of Art and Architecture, University of Zabol, Zabol, Sistan and Baluchestan, Iran, Post Code: 9861335856
E-mails: **Website**: JSBS@uoz.ac.ir ; Hossein.Sarhaddi@gmail.com
Review Time: 6-12 Weeks
Frequency: Semiannual
Publication Type: Paperback & Electronic
Open Access: Yes
Licenced by: CC BY-NC 4.0
Policy: Double Blind Peer Review
Language: English
Abstracts Available in: English
Article Processing Charges: No
DOI: 10.22034/JSBS
Print ISSN: 2821-0794
Online ISSN: 2821-0808
Manager: Dr. Babak Shaikh Baikloo Islam *Department of History & Archaeology, Science and Research Branch, Islamic Azad University, Tehran, Iran.*

Guide for Authors

Preface

The ***Journal of Sistan and Baluchistan Studies (JSBS)*** is devoted to South-Eastern Iran and welcomes articles in various areas of the world with a Sistan and Baluchistan legacy, especially adjacent areas such as Afghanistan, Pakistan, India, Oman, the Persian Gulf, and Central Asia with a chronological span from Paleolithic to Modern times. Contributions must be original and have not previously been published elsewhere. Please be ensure that there are no conflicts between the authors before submitting. Before being published, manuscripts submitted to the ***Journal of Sistan and Baluchistan Studies (JSBS)*** are critically reviewed. The purpose of the review is to reassure readers that the papers have been approved by competent and unbiased professionals. Manuscripts should be written in English, with the use of one spelling style throughout the entire manuscript. Both British and American spelling will be accepted. The manuscript should be submitted only via the ***Journal of Sistan and Baluchistan Studies (JSBS)*** the Editorial System (http://www.jsbs.uoz.ac.ir/). All papers are available free of charge at the Journal's webpage.

Types of article

The following types of contribution are published in the ***Journal of Sistan and Baluchistan Studies (JSBS)*:**

Original research article: Papers in all disciplines dealing with the mentioned geographical scope are the most welcome, with a specific focus on cultural heritage studies with new and innovative data based on archaeology, natural science applied to archaeology, history and art history, ancient technology, linguistics, ethnoarchaeological perspective, traditional architecture, and conservation as well as digital heritage and critical reviews. It should describe novel and well validated findings, and experimental techniques should be described in sufficient detail to allow the study to be verified. Research papers of 6000-8000 words in length, with tables, illustrations, and references, in which hypotheses are tested and results reported.

Review article: Review and perspective on current issues are accepted and encouraged. The format and length of review papers are more flexible than for a full paper. Typical reviews are less than 12000 words including references.

Short Communications: It is appropriate for recording the results of small-scale research including new projects, significant fieldwork discoveries, and innovative applications of technology. Research papers of 1500-2500 words in length and 6 figures maximum, with tables, illustrations, and references.

Structure of Articles

The structure of the articles can be modified based on their subject. The text should be written in a succinct and cohesive manner, with an emphasis on significant points, conclusions, breakthroughs, or discoveries, as well as their broader relevance. All running text should be saved as a Word document with Times New Roman 12, 1.5 spacing. Figures and tables can be put within the text or at the bottom. Figures should have a high enough resolution to allow for refereeing.

Short communication consists of title page, text, acknowledgments, and references with figure and table captions.

The original research articles should contain the following sections:

Title page

The title page must contain the title that should be clear, intelligible to experts in different disciplines, and represent the substance of the article. Moreover, full name(s) of the author(s),

affiliation(s) of the author(s) containing the full name of the institution. The postal address and email address of the corresponding author must be mentioned.

Abstract

The title's information does not need to be duplicated in the abstract. The abstract should not be more than 350 words long. It must include the study's goal, methods, findings, and conclusions.

Keywords

Provide three – seven keywords, covering the most precise phrases in the article. They should explain the subject and results and should not be the same as the terms used in the title.

Introduction

State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

Material and methods

Provide sufficient details to allow the work to be reproduced by an independent researcher. Methods that are already published should be summarized and indicated by a reference. If quoting directly from a previously published method, use quotation marks and also cite the source. Any modifications to existing methods should also be described.

Results

Results should be clear and concise.

Discussion

This should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

Conclusions

The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

Appendices

If there is more than one appendix, they should be identified as A, B, etc.

Acknowledgments

Acknowledgments of persons, grants, money, and so forth should be included before the reference list in a distinct section.

References

References are in “Harvard style” and all the sources in the final bibliography should be placed alphabetically. The authors are listed with comma separation up to three ones. When four or more authors are listed, please use first author + *et al*. The full list of authors is required in the final bibliography.

In-Text Citation:

Citing one author: (Curtis, 2012)

Citing two: (Piperno and Salvatori, 2007)

Citing three or more authors: (Kavosh *et al*., 2019)

Reference list:

Book

Curtis, J. (2012). *The Oxus Treasure*. London: British Museum Press.

Piperno, M. and Salvatori, S. (2007). *The Shahr-I Sokhtya graveyard (Sistan, Iran): excavation campaigns,1972-1978*. Roma: ISIAO.

Chapter in an edited book

Vidale, M. (2020). Chlorite Containers from the Oxus civilization between technical choices and iconographic codes. In: B. Lyonnet, and N. A. Dubova, (eds.), *The World of the Oxus Civilization*. London: Routledge, pp.293-332.

Journal paper (electronic)

Perrot, J. (2008). Jiroft iv. Iconography of Chlorite Artefacts. *Encyclopædia Iranica*, 14, pp.656–664. [Online]. Available at: https://www.iranicaonline.org/articles/jiroft-iv-iconography-of-chlorite-artifacts [Accessed 25 August 2021].

Journal paper (printed copy)

Sajjadi, S. M. S. (2007). Wall painting from Dahaneh-ye Gholaman (Sistan). *Ancient Civilizations from Scythia to Siberia*, 13(1-2), 129–154.

Jarrige, J. F., Didier, A. and Quivron, G. (2011). Shahr-i Sokhta and the chronology of the Indo-Iranian regions. *Paléorient*, 37 (2), 7–34.

Website

Shahr-i Sokhta - UNESCO World Heritage Centre. [Online]. Available at: http://whc.unesco.org/en/list/1456/ [Accessed 25 August 2021].

Thesis

Shirazi, R. (2008). *Etudes typologiques et comparatives des représentations humaines en terre crue, en terre cuite et en pierre de l'Asie centrale et de l'Iran oriental du Chalcolithique à l'âge du Bronze (4000-1800 av. J.-C.).* Ph.D. Thesis. Panthéon-Sorbonne University.

Tables and Figures

Please submit tables as editable text and not as images, each table should be numbered consecutively (1, 2, etc.). Please avoid using vertical lines in tables. All tables should be embedded while correctly positioned and be referred to in the text. Please use "Table" in both text and captions in bold.

Figures should be used only if they clarify or reduce the text. All photographs, graphs, and diagrams should be referred to as a 'Figure' and they should be numbered consecutively (1, 2, etc.). Data should be presented only once in a graph or a table, not in both. Figures should be submitted in separate files. The required resolution is 300 DPI for greyscale images and at least 600 DPI for black-and-white drawings. All figures must be referred to in the text and the references should be typed in bold. Use (Fig.) at the end of the sentence and captions and use (Figure) in text.

Abbreviations

dates: 1980-1985, not 1980-85

pages: 250-275, not 250-75

following/s: f./ff.

centimeter/s: cm

meter/s: m

etcetera: etc.

circa: c.

videlicet: viz.

exempli gratia: e.g.

volume/s: Vol./Vols.

chapter: Chapt.

column: Col.

folio/s: Fol./Fols.

translator: transl.

second [II] century: 2nd century, etc.

century and millennium: never abbreviated

before Christ: BCE

after Christ: CE

plate/s: only when referring to author's plates within one's own text: Pl./Pls.

figure/s: only when referring to author's figures within one's own text: Fig./Figs.

fig./figs., pl./pls. in all other cases

note/s: fn./fns.

number/s: n./nn.

editor/s: ed./eds.

no place: n.p.

no date: n.d.

doctor: Dr

Mister: Mr

Suggest Reviewers

With the manuscript, the author should include a list of three qualified, independent, prospective reviewers who could perform quality peer reviews of your document. Be sure to include their complete names, affiliations, and current e-mail addresses.

JSBS Journal of Sistan and Baluchistan Studies
Volume 1, Issue 1 (2021) 1-9
Doi: 10.22034/JSBS.2022.326153.1007

MONSOON OSCILLATION AND CULTURAL EVOLUTION: THE FLOURISHING AND COLLAPSE OF CIVILIZATION IN SOUTHEAST IRAN DURING THE THIRD MILLENNIUM BCE

Babak SHAIKH BAIKLOO ISLAM

Department of History and Archaeology, Science and Research Branch, Islamic Azad University, Tehran, Iran, (babak.bagloo@yahoo.com).

Received: 23 August 2021 Accepted: 10 November 2021 Available online: 20 December 2021

Abstract: During the third millennium BC, while most parts of Iran were in cultural decline, the civilizations of the southeast were experiencing a period of prosperity. It was only at the end of this millennium that the stress of the 4.2 ka BP dry event (2200-1900 BCE) was able to lead to the collapse of the Bronze Age civilizations. The Akkadian dynasty, the old Egyptian kingdom, and the Indus Valley civilization were also affected by this great drought. The climatic event was probably due to a decrease in solar energy and, as a result, the cooling of the North Atlantic waters and a drop of westerlies and monsoon-related rainfalls. The climate of southeast Iran, which is mainly dominated by monsoons, had been absorbing relatively good humidity for most of the third millennium BCE, but with the occurrence of the 4.2 ka BP event, witnessed a significant drop in rainfall, which led to the gradual decline of civilization in this region. Furthermore, the beginning of the cultural decline of this region from around 2200 BCE could be due to the severe economic recession and the instability of the political system of Mesopotamia due to the pressures of drought, famine, migration, and war that affected the economic system throughout the region. Since then, luxury goods consumers have likely lost their purchasing power due to economic weakness. Besides, the occurrence of severe droughts at the peak of the Mesopotamian population growth no longer allowed the country to export grain. Therefore, the regular customers of Kerman region products decreased sharply, and as a result, these workshops went bankrupt. This article, while reconstructing the climate of southeast Iran in the third millennium BCE based on paleoclimate research of Iran and neighboring regions, tries to explain the direct and indirect effects of climate on the cultural evolution of human societies and the history of ancient civilizations of the Middle East. It seems that unbalanced population growth and socio-economic complexity of societies have been the main reasons for the inability of civilizations of the third millennium BCE to adapt to climate change.

Keywords: Paleoclimate, The 4.2 ka BP event, Third millennium BCE, Southeast Iran.

چکیده: در هزارهٔ سوم ق.م درحالی‌که اغلب مناطق ایران دچار افول فرهنگی شده بودند، اما تمدن‌های جنوب شرق دورهٔ شکوفایی خود را می‌گذراندند. تنها در اواخر این هزاره بود که تنش حاصل از رویداد خشک ۴/۲ هزارسال‌پیش (۲۲۰۰ – ۱۹۰۰ ق.م) توانست طومار حیات این تمدن‌های باستانی را درهم بپیچد. شاهنشاهی قدیم مصر و سلسلهٔ بین‌النهرینی اکد نیز متأثر از این خشک‌سالی عظیم شدند. رویداد اقلیمی مذکور احتمالاً به دلیل کاهش انرژی خورشیدی و در نتیجه، سرمایش آب‌های اطلس شمالی و تضعیف بارش‌های ناشی از بادهای غربی و موسمی‌ها رخ داده است. منطقهٔ جنوب شرقی ایران که از لحاظ آب‌وهوایی متأثر از موسمی‌ها است، بر اساس پژوهش‌های دیرین‌موسمی، در طی هزارهٔ سوم ق.م رطوبت مطلوبی را جذب می‌کرده است، ولی در حدود ۲۰۰۰ ق.م با دومین اوج رویداد ۴/۲ هزارسال‌پیش سیستم موسمی به طور قابل ملاحظه‌ای ضعیف شده است. آغاز افول تدریجی فرهنگی این منطقه از حدود ۲۲۰۰ ق.م می‌تواند بیشتر به دلیل رکود شدید اقتصادی و تزلزل نظام سیاسی بین‌النهرین در اثر فشار حاصل از خشکسالی، قحطی، مهاجرت و جنگ با گوتی‌ها در اولین اوج رویداد مذکور باشد که بازارهای جنوب شرقی ایران را نیز به شدت تحت تأثیر قرار داد. از این زمان، متقاضیان کالاهای ارزشمند مانند ظروف و اشیای سنگ صابونی (سری قدیم) احتمالاً به دلیل ضعف اقتصادی توان خرید خود را از دست دادند و همچنین، وقوع خشکسالی شدید در بین‌النهرین که در زمان اوج افزایش جمعیت رخ داد، اجازهٔ صادرات غله را به این کشور نمی‌داد. بنابراین، کارگاه‌های صنعتی منطقهٔ جنوب شرقی ایران که اغلب تبادلات اقتصادیشان با غلات و دیگر مواد خوراکی بین‌النهرینی بود، احتمالاً در مدت کوتاهی دچار ورشکستگی شدند. این مقاله با هدف بازسازی اقلیم جنوب شرقی ایران در هزارهٔ سوم ق.م بر اساس پژوهش‌های دیرین‌اقلیم و دیرین‌موسمی ایران و مناطق همجوار، سعی دارد تأثیر مستقیم و غیر مستقیم آب‌وهوا را در دگرگشت فرهنگی جوامع انسانی و سرگذشت تمدن‌های باستانی منطقهٔ مزبور روشن نماید. به نظر می‌رسد، افزایش شدید جمعیت، پیچیدگی اجتماعی و درهم‌تنیدگی اقتصادی جوامع از دلایل اصلی ناتوانی تمدن‌های به ظاهر نیرومند هزارهٔ سوم ق.م در سازگاری با تغییر اقلیم بوده است.

کلمات کلیدی: دیرین‌اقلیم، دیرین موسمی، رویداد خشک ۴/۲ هزارسال‌پیش، هزارهٔ سوم ق.م، جنوب شرقی ایران.

I. Introduction

Holocene climate variations have been larger and more frequent than is commonly recognized, although generally weaker in amplitude than the dramatic shifts of the last glacial cycle. Comparison of paleoclimate records with climate forcing time series suggests that changes in insolation related both to earth's orbital variations and to solar variability played a central role in the global-scale changes in the climate of the last 11500 cal. year (Mayewski *et al.*, 2004: 243-244). The abrupt Holocene climate change, which, according to polar ice records, began within a decade or two and lasted 150 to 400 years, has had far-reaching effects on ancient societies. These changes are often considered as one of the main environmental factors that have caused socio-economic and cultural evolution, migration, and even collapse. According to this climatic determinism, an abrupt climate change could have made it very difficult for human societies to adapt, and consequently, led to fundamental social changes (Berger *et al.*, 2016).

During the Holocene, the continent of Asia in the south of the orbit 45° latitude witnessed the emergence and collapse of many farming communities at the same time as abrupt climate change (Staubwasser and Weiss,

2006). These collapses occurred quite suddenly and often involved regional abandonment, a change in subsistence system (for example, from agriculture to animal husbandry), or a weak socio-political organization (such as a change from a vast empire to a local government) (Weiss and Bradley, 2001: 609). One of the most important and influential climatic events that has caused severe and long-term droughts in many parts of the northern hemisphere, as the Bronze Age cultures and civilizations have been severely challenged, was the 4.2 ka BP event.

This period of climate change in Southwest Asia and northeastern Africa (the so-called Middle East) has brought such severe living pressures that it has led to the rapid collapse or gradual decline of glorious civilizations with powerful political systems from the Nile to the Indus Valley (Weiss, 2017). During this event, which lasted for about 300 years, the cultural region of southeastern Iran, while flourishing, suddenly fell into decline and in the early second millennium BCE stopped moving completely (Ascalone, 2015: 58-103).

Before high-resolution paleoclimate research, the cause of this gradual cultural decline and destruction of southeastern Iranian civilizations, such as Shahr-e Sokhta (Seyyed Sajjadi, 2002), Shahdad (Hakemi, 2006), and Jiroft (Madjidzadeh, 2003) was unclear. However, today it can highly likely be said that climate change and its dire consequences have been a major cause of the massive collapse. In the study, while reconstructing the climate of the third millennium BCE, the direct and indirect effects of the 4.2 ka BP event on the socio-political changes in the Middle East, especially the civilizations of southeastern Iran, are discussed.

II. Material and methods

In this study, human-climate interaction in the third millennium BCE is discussed by examining the paleoclimate proxies of Southwest Asia and Northeast Africa.

Climatic archives studied are extracted from Lake Faiyum and Nile Delta in Egypt, Soreq and Jeita caves in the eastern Mediterranean, Lake Gölhisar in Turkey, southern Konar Sandal of Jiroft, Lake Neor, Lake Hamoun, Lake Zeribar and Gol-e Zard cave in Iran, Qunf cave in Oman, the M5-422 core in the Gulf of Oman and the 63KA core in the northeastern Arabian Sea (near the Indus Delta) (Fig. 1).

The results of these studies reconstruct the climatic conditions and dry events of this period. The socio-political conditions of the civilizations of the third millennium BCE, which relied heavily on water and favorable climatic conditions, are endangered by climate change, which is discussed in this discussion. The main focus of the research is the reasons for the rise and fall of civilizations in the southeastern region of Iran.

Figure 1. Location of important ancient cities of the third millennium BCE and Paleoclimate sites in the Middle East; (1) Shahr-e Sokhta, (2) Shahdad, (3) Konar Sandal of Jiroft, (4) Tepe Yahya, (5) Susa, (6) Ur, (7) Uruk, (8) Kish, (9) Mari, (10) Memphis, (11) Mohenjo-Daro, (12) Harappa, (A) Lake Neor, (B) Lake Hamoun, (C) M5-422, (D) 63KA, (E) Qunf Cave, (F) Soreq Cave, (G) Jeita Cave, (H) Lake Gölhisar.

III. Reconstruction of Climate

During the transition from the Chalcolithic to the Bronze Age (between 3300 and 3000 BCE), an arid climatic event at 5.2 ka BP occurred. Evidence of this climate change can be found in the proxies of Lake Neor in Ardabil (Sharifi *et al.*, 2015), Jeita Cave in western Lebanon (Verheyden *et al.*, 2008), and Soreq Cave in Jerusalem (Bar-Matthews and Ayalon, 2011)

observed, but did not appear to have had a significant effect on monsoons, as did the flow of the Indus River (Staubwasser *et al.*, 2003) and the moisture content of the Qunf and Hoti caves in Oman almost as they do today (Fleitmann *et al.*, 2007), but research into the sedimentary core of the Gulf of Oman confirms this arid event (Cullen *et al.*, 2000).

According to the research of Soreq Cave, it is probable that the peak of this dry period was between 3250 and 3150 BCE.

Greenland Ice Sheet Project 2 indicates that the early third millennium BCE was associated with a dramatic drop in temperature, possibly leading to a period of climate change with extreme rainfalls and flooding (the 4.8 ka BP event).

This situation in North Central Iran has led to a major cultural recession (Shaikh Baikloo *et al.*, 2016, 2020b). According to paleoclimate research of Iran and neighboring regions, in the first half of the third millennium BCE, there was a very humid period in SE Iran, and monsoons were regularly active. From about 2500 BCE, the climatic conditions gradually became drier and reached a peak around 2200 BCE. This highly dry period, known as the 4.2 ka BP megadrought event, lasted until about 1900 BCE.

The deterioration of climatic conditions at this time is visible in most paleoclimate proxies of the Middle Eastern and generally in the Northern Hemisphere (Sharifi *et al.*, 2015; Wasylikowa *et al.*, 2006; Eastwood *et al.*, 2007; Roberts *et al.*, 2011; Gurjazkaite *et al.*, 2018; Railsback *et al.*, 2018; Giesche *et al.*, 2019; Bini *et al.*, 2019).

This climatic event has occurred due to the decline of solar energy and North Atlantic cooling (Bond *et al.*, 1997, 2001) and has led to a significant decrease in rainfall (Weiss, 2015; Gupta *et al.*, 2003; Cullen *et al.*, 2002). In this region, from the Nile Valley to the Indus Valley, the flow of all permanent rivers has dropped sharply, and seasonal rivers have dried up. The continuation of this arid condition has led to a decrease in vegetation, the drying of some wetlands, and a decrease in the level of many lakes.

Because this climatic event was accompanied by atmospheric anomalies and an increase in extreme weather events, it also led to torrential rains and severe floods. Sediments of this period indicate very dry and flood conditions. As will be seen, the 4.2 ka BP event had devastating effects on all civilizations of the third millennium BCE.

It is worth mentioning that high-resolution research in the Gol-e Zard cave in Damavand has shown the intensity of this climatic event (Carolin *et al.*, 2019) (Figs. 1 and 2).

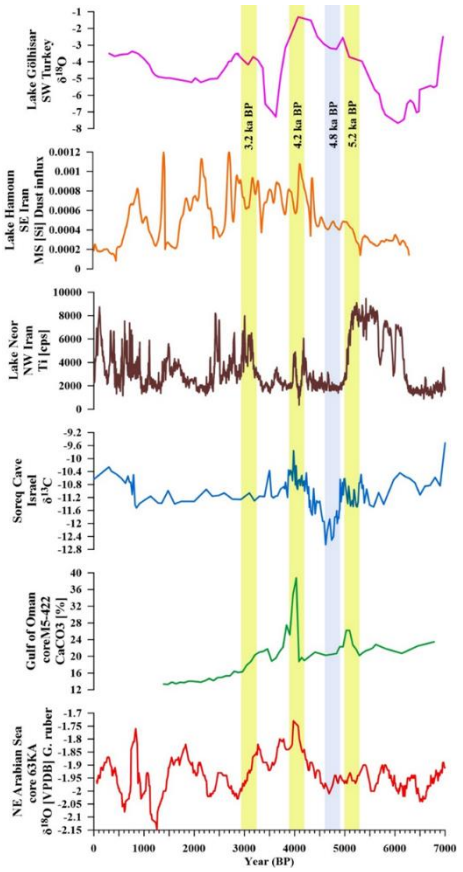


Figure 2. Changes in humidity over the past 7000 years; the yellow bar indicates a dry event and the blue bar indicates a cold event.

IV.1. Mesopotamia

Early in the 300-year-old 4.2 ka BP event, droughts, dust, and decreasing seasonal temperatures across the Habur Plain (Northern Mesopotamia) caused settlements to evacuate in the Akkadian Empire, leaving only a handful of settlements in strategic areas. Field surveys in a 30 km long, 1,900 km² area border region between Iraq and Turkey illustrate that 74 percent of the sites have been abandoned and 93 percent of the total residential sites reduced during the arid event. According to Harvey Weiss *et al.* (1993), the migration of the people of northern Mesopotamia to the south during the drought period may have upset the balance of supply and demand and led to socio-political unrest. Further, invasions of famine-stricken Gutians have also been instrumental in the fall of Akkad (cf. Cullen *et al.*, 2000; Ristvet and Weiss, 2005; Staubwasser and Weiss, 2006).

IV.2. Egypt

Paleoclimate research in Egypt suggests a decrease in the level of Lake Faiyum and regular floods of the Nile during the 4.2 ka BP event, which has led to lands

drying and increased dust (Hamdan *et al.*, 2016; Bernhardt *et al.*, 2012) (Fig. 3).

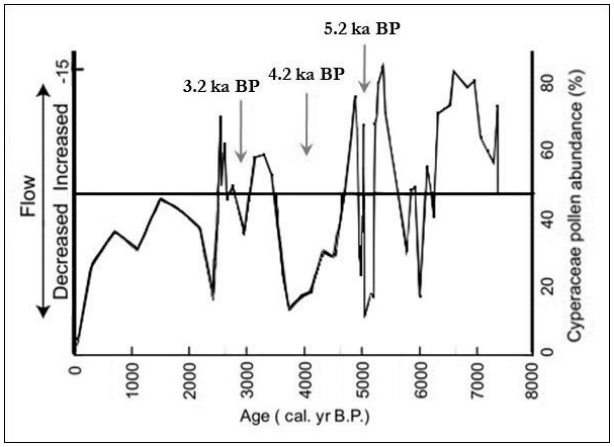


Figure 3. Changes in the flow of the Nile (Bernhardt *et al.*, 2012).

Probably the cause of these unfavorable climatic and environmental conditions in this region was the southward movement of the Intertropical Convergence Zone (ITCZ) and the North Atlantic Oscillation (NAO), which reduced rainfall in sources of the Nile, and torrential rainfalls in northern Egypt, respectively (Welc and Marks, 2014).

In Egypt, with the onset of this dry event, the first intermediate/dark period has begun. After the end of the old Egyptian Kingdom, between 2181 and 2055 BCE, the country lost its unity and was involved in socio-political disorder and turmoil. Little evidence remains of this period, especially from its earliest years. Egypt seems to have been divided into two parts in the lower and upper Nile regions (Gardiner, 1961: 107-109). It is believed that during this period, temples were looted and many artifacts and statues of kings were destroyed (Breasted, 1908: 133). Eventually, the kings of Thebes were able to occupy the northern region of Egypt and end this period of unrest.

IV.3. Indus Valley Civilization

Due to the decrease in monsoon rainfall caused by the 4.2 ka BP event, the Indus Valley farmer communities that relied on summer and winter monsoons gradually became vulnerable, and this change in rainfall in both seasons reduced their resilience and sustainability. Archaeological studies of the Harappa (Indus Valley Civilization) indicate the transition from advanced urbanization (2600-1900 BCE) to post-urbanization/ rapid de-urbanization (1900-1600 BCE) with the abandonment of major cities in the Indus River region and the evacuation of most western areas. It occurred at the same time as the concentration of rural settlements in some areas east of the Indus River. This transition phase in Mohenjo-Daro began right after the 4.2 ka BP event with the abandonment of the Great Bath (about 200 years before leaving the entire city). The villages and the few surviving cities of the Indus civilization, which were smaller than the cities of the growth and prosperity period, were almost completely destroyed at the beginning of the 3.2 ka BP arid climate, and the late Harappa cultural period ended around 1300/1200 BCE (Giesche *et al.*, 2019; Green and Petrie, 2018; Petrie *et al.*, 2016; Dixit *et al.*, 2014; Staubwasser and Weiss, 2006; Possehl, 1997b).

V. The rise and fall of civilization in southeast Iran

The cultural region of southeastern Iran, according to geographical location, climatic and environmental conditions, and common socio-political history and culture in ancient times, includes the provinces of Sistan and Baluchestan, Kerman, South Khorasan, and Hormozgan. In fact, the cultures of these areas were so closely intertwined that civilization emerged, flourished, and declined downward almost simultaneously. This vast region has been influenced more by monsoons than by Westerlies. In the late fifth millennium BCE, when the Earth's axis and orbit reached its current state, ITCZ moved to the southern latitudes, and the influence of monsoons on this region became less than in the first half of the Holocene. Thus, since then, the climate and environment of southeastern Iran, such as the Arabian Peninsula and North Africa, have become arid, creating vast desert areas (Djamali *et al.*, 2010; Claussen *et al.*, 1999). Coinciding with this event, solar energy also declined, affecting the oceanic circulation and atmospheric conditions of the North Atlantic, creating cold and dry climatic events in the northern hemisphere (Bond *et al.*, 1997, 2001). These climate changes sometimes weakened both the westerlies and the monsoons, and sometimes did not affect the monsoons much. Paleoclimate research in Southwest Asia suggests that despite declining rainfall related to the westerlies and the occurrence of a dry period from about 3300 to 3000 BCE that affected the eastern Mediterranean, Mesopotamia, Anatolia, and many parts of Iran, but the monsoons had relatively good conditions. The research of Lake Hamoun (Hamzeh *et al.*, 2017), Jazmourian Playa (Vaezi *et al.*, 2018), Oman and Yemen Caves (Fleitmann *et al.*, 2007), and the flow of the Indus River (Staubwasser *et al.*, 2003) confirm this. Civilizations in the southeastern region of Iran have gradually emerged since then.

In Shahr-e Sokhta I and Tepe Yahya IVC, proto-Elamite clay tablets belonging to the late fourth millennium BCE have been found (Hessari, 2013: 23, 25), which shows that from the beginning of the emergence of civilization, they were involved in extensive economic activities and used the writing technique. Besides, in one of the mass graves of Shahr-e Sokhta, belonging to about 2800 BCE, the skull of a young deceased was found, the right part of which had surgical symptoms for the

treatment of a disease called hydrocephalus. Another deceased, a 28- to 32-year-old woman, had a prosthetic eye, the oldest known specimen in the world. On this eye, which is probably made of natural bitumen mixed with animal fat, the smallest capillaries have been designed with gold wires with a diameter of less than half a millimeter (Seyyed Sajjadi, 2015: 270-275).

However, 400 years had to pass from the beginning of the third millennium for southeastern Iran to flourish like the Indus Valley (the Harappan civilization). Atmospheric anomalies related to the cold period of 2900-2600 BCE (the 4.8 ka BP event), which has been identified by evidence of floods in Iran and Mesopotamia (Shaikh Baikloo *et al*., 2020a), may have been the reason for the slow growth of these civilizations. North Central Iran also experienced a long-term cultural decline during the Bronze Age (Shaikh Baikloo *et al*., 2020b; Schmidt *et al*., 2011).

From about 2600 BCE, coinciding with the beginning of the Early Dynasty III in Mesopotamia and the Harappa IIIA period, the civilizations of Shahr-e Sokhta (III), Jiroft, Yahya (IVB), and Shahdad (III2) reached considerable growth, and flourishing. Economic prosperity with long-distance trade had a great impact on the development of these civilizations, which, of course, was mostly the result of the luxury-oriented of the Mesopotamian nobles. At this time, the people of the Tigris and Euphrates region were at the height of their glory, and this situation included the aristocracy of "Enclosure of the Ka of Ptah" (the ancient name of Egypt). Needless to say, the great pyramids of the Nile Valley were built at the same time. The most important products of southeastern Iran in this period were luxury objects made of marble and chlorite/steatite. A chlorite mine has been found near Tepe Yahya, and a soapstone production workshop has been revealed inside the site (Lamberg-Karlovsky and Potts, 2001).

Between 2600 and 2200 BCE, intercultural style soft stone artifacts (Kohl, 1974) or the Old Series (deMiroschedji, 1973) had a best-selling market in a large area from eastern Syria to the Indus Valley as an aristocratic commodity. These cultural materials in Mesopotamia have often been obtained from temples, but in Iran, a large number of these objects have been found in the graves of Jiroft (Madjidzadeh, 2003) and Shahdad (Hakemi, 2006), which may have indicated the different use or ritual belief of the natives of this region (Shaikh Baikloo, 2015). It is worth mentioning that in Shahr-e Sokhta, unlike Jiroft, Yahya, and Shahdad, soapstone has only been used to make some small objects, especially flat seals, but instead, a number of conical and cylindrical marble vessels have been found (Seyyed Sajjadi, 2015: 250).

The latest report on the absolute dating of Shahr-e Sokhta by Massimo Vidale *et al.* (2019) shows that the city was abandoned around 2350 BCE. This dating takes the end of the Shahr-e Sokhta civilization far back than previously stated. Although Ascalone believes that there was another settlement on this site in the late third millennium BCE, Vidale emphasizes this date as the time of the end of urban life in Shahr-e Sokhta (Vidale, 2021). It seems that this date can be considered between 2350 to 2300 BCE, i.e. the early Akkadian dynasty. It is possible that with Sargon's rise to power, some economic interactions in the region have changed, to the detriment of Shahr-e Sokhta. Of course, Gol-e Zard cave studies in Damavand show a hundred-year drought between 2500 and 2400 BCE (Carolin *et al*., 2019), which may not have been ineffective in the decline of this civilization.

Seyyed Sajjadi writes about the possible causes of the decline of this ancient city (2015: 281): "The results obtained from the excavations of Shahr-e Sokhta show that this society suffered from a political-economic and social crisis in the middle of the third millennium BCE, which provided the main reason for its gradual decline and collapse, so that at the end of the period IV, the population and the city in size has shrunk. The most plausible view about the abandonment of the city is the drying up and displacement of the Helmand River delta and its bed, which has forced people, in search of water and more favorable living conditions to migrate to areas we are currently unaware of." Thus, it is possible that both climate and economic factors were involved in the collapse of the Shahr-e Sokhta civilization.

At a time when the Sistan region was in decline, the Kerman region was at the height of its prosperity, until the 4.2 ka BP dry event. This event in a short time degraded the economy of the whole region. The high-quality and beautiful products of the old series of soapstones lost their customers, which implicitly indicates the severe weakness of the aristocracy in this period. The beautiful motifs engraved on the chlorite vessels were simplified to circles and dots. As a result of this climate catastrophe, the civilization of the Indus Valley was affected, the Akkadian dynasty collapsed within half a century, and the Egyptian kingdom declined. Furthermore, the glorious civilization of Jiroft disappeared early in the event. Absolute dating of the southern Konar Sandal suggests the decline of this civilization around 2150 BCE (Madjidzadeh and Pittman, 2008: 77). A paleoclimate research in this site also indicates the severity of the 4.2 ka BP dry event and the severe weakening of the monsoons (private conversation with Dr. Reza Safaierad).

By the collapse of the powerful and centralized Akkadian state in Mesopotamia, a period of disorder and civil war ensued. Even the Ur III dynasty could not get rid of the waves of drought and famine and finally perished after its short life around 2000 BCE. Due to the political weakness in Mesopotamia, the Shimashki dynasty emerged in southwest Iran, but the conflicts with its

neighboring country continued. Shahdad and Yahya in southeast Iran were the last civilizations that were able to survive until the early second millennium BCE. The weakening of the monsoons, which had intensified since 2200 BCE, imposed severe droughts on the region and the Indus Valley. The Late Mir Abedin Kaboli wrote about Shahdad (2015: p. 306): "At the end of the third millennium BCE, this region was faced with a continuous and long period of drought. The drought was so severe that the inhabitants of the area were forced to leave their homes, towns, and villages and move to other areas, the location of which is currently unknown" (Table 1).

Table 1: Chronology of the Bronze Age civilizations of southeastern Iran in comparison with the civilizations of Susa, Mesopotamia, and the Indus Valley.

<table>
<tr><th>Time BCE</th><th colspan="2">Indus Valley</th><th>Mesopotamia</th><th colspan="2">Susa/ Elam</th><th>Jiroft</th><th>Yahya</th><th>Shahdad</th><th>Shahr-e Sokhta</th></tr>
<tr><td>1800</td><td colspan="2" rowspan="2">IV
Post-urbanization</td><td rowspan="2">First Babylonian Dynasty</td><td rowspan="2">Sukkalmah</td><td rowspan="2">A XV</td><td rowspan="5"></td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="6"></td></tr>
<tr><td>1900</td></tr>
<tr><td>2000</td><td rowspan="3">Gradual decline</td><td rowspan="3">IIIC</td><td>Isin-Larsa</td><td rowspan="3">Shimashki</td><td>VB2</td><td rowspan="4">IVA</td><td>II2</td></tr>
<tr><td>2100</td><td>Ur III</td><td>VB1</td><td rowspan="2">III1</td></tr>
<tr><td>2200</td><td>Gutian</td><td>VA</td></tr>
<tr><td>2300</td><td rowspan="4">Flourishing</td><td rowspan="3">IIIB</td><td rowspan="3">Akkadian Empire</td><td rowspan="3">Awan</td><td rowspan="3">IVB</td><td>Decline</td></tr>
<tr><td>2400</td><td rowspan="3">Flourishing</td><td rowspan="3">IVB</td><td rowspan="3">III2</td></tr>
<tr><td>2500</td><td>ED IIIb</td><td rowspan="2">IVA</td><td>IV</td></tr>
<tr><td>2600</td><td>IIIA</td><td>ED IIIa</td><td></td><td rowspan="3">IV1</td><td>III</td></tr>
<tr><td>2700</td><td colspan="2" rowspan="2">II
Early Harappa</td><td rowspan="2">ED II</td><td colspan="2" rowspan="2">IIIB</td><td rowspan="3">Formation</td><td rowspan="2"></td><td rowspan="2">II</td></tr>
<tr><td>2800</td></tr>
<tr><td>2900</td><td colspan="2" rowspan="4">I
Formation</td><td>ED I</td><td colspan="2" rowspan="3">IIIA</td><td rowspan="3">IVC</td><td rowspan="4">IV2
Surface survey</td><td rowspan="4">I</td></tr>
<tr><td>3000</td><td rowspan="2">Jemdet Nasr</td><td rowspan="2"></td></tr>
<tr><td>3100</td></tr>
<tr><td>3200</td><td>Late Uruk</td><td colspan="2">II</td><td></td></tr>
</table>

VI. Conclusion

The emergence of Bronze Age civilizations in southeastern Iran coincided with the favorable climate and activity of the monsoons. These civilizations flourished in the mid-third millennium BCE in trade with Mesopotamia and the Indus Valley. In fact, luxury-oriented nobles gave them the opportunity to become rich by producing and exporting valuable goods. With the rise of Akkadian rule and the end of the early Mesopotamian dynasties, some economic interactions probably changed to the detriment of Shahr-e Sokhta, leading to the decline of this civilization. Of course, in this regard, climatic and environmental factors should not be overlooked. After that, the civilizations of Jiroft,

Shahdad, and Yahya flourished. Around 2200 BCE, with the onset of the 4.2 ka BP dry event, all the civilizations of Southwest Asia and Egypt experienced enormous tensions, which led to the cultural decline and collapse of the Middle Eastern civilizations. The severe economic downturn and the weakening of the Mesopotamian political system due to the pressures of drought, famine, migration, and the Gutian invasions early in the climate event severely affected economic exchanges throughout the region. Since then, consumers of luxury goods, such as soapstone artifacts (old series) probably lost their purchasing power due to economic weakness. Besides, the occurrence of severe droughts in Mesopotamia during the peak of population growth would no longer allow the country to export grain. Therefore, the regular customers of Kerman region products fell sharply, and as a result, these workshops went bankrupt. On the other hand, the severe weakening of the monsoons put the severest subsistence pressure on the Indus River region and southeast Iran. The evidence found in Shahdad confirms this fact. During the late third and early second millennium BCE, the urbanization situation in the eastern regions changed to ruralization, and the remnants of the southeast Iranian civilizations disappeared. Unbalanced population growth and socio-economic complexity of Bronze Age societies seem to have been the main reasons for the inability of civilizations of the third millennium BCE to adapt to climate change, although paleoclimatologists consider the 4.2 ka BP event to be the most severe drought period of the second half of the Holocene.

References

Ascalone, E. (2015). *Archeologia dell'Iran Antico: Interazioni, integrazioni e discontinuità nell'Iran del III millennio a.C.*, Translated by Seyyed Sajjadi, S.M., Tehran: SAMT (in Persian).

Bar-Matthews, M. and Ayalon, A. (2011). Mid-Holocene climate variations revealed by high-resolution speleothem records from Soreq Cave, Israel and their correlation with cultural changes. *The Holocene*, 21(1), 163-171.

Berger, J.F., Lespez, L., Kuzucuoğlu, C., Glais, A., Hourani, F., Barra, A. and Guilaine, J. (2016). Interactions between climate change and human activities during the early to mid-Holocene in the eastern Mediterranean basins. *Climate of the Past*, 12(9), 1847-1877.

Bernhardt, C.E., Horton, B.P. and Stanley, J.D. (2012). Nile Delta vegetation response to Holocene climate variability. *Geology*, 40(7), 615-618.

Bini, M., Zanchetta, G., Perşoiu, A., Cartier, R., Català, A., Cacho, I., Dean, J.R., Di Rita, F., Drysdale, R.N., Finnè, M. and Brisset, E. (2019). The 4.2 ka BP Event in the Mediterranean region: an overview. *Climate of the Past*, 15(2), 555-577.

Bond, G., Kromer, B., Beer, J., Muscheler, R., Evans, M.N., Showers, W., Hoffmann, S., Lotti-Bond, R., Hajdas, I. and Bonani, G. (2001). Persistent solar influence on North Atlantic climate during the Holocene. *science*, 294(5549), 2130-2136.

Bond, G., Showers, W., Cheseby, M., Lotti, R., Almasi, P., DeMenocal, P., Priore, P., Cullen, H., Hajdas, I. and Bonani, G. (1997). A pervasive millennial-scale cycle in North Atlantic Holocene and glacial climates. *science*, 278(5341), 1257-1266.

Breasted, J. H. (1908). *A history of the ancient Egyptians*. Smith, Elder and Company.

Carolin, S.A., Walker, R.T., Day, C.C., Ersek, V., Sloan, R.A., Dee, M.W., Talebian, M. and Henderson, G.M. (2019). Precise timing of abrupt increase in dust activity in the Middle East coincident with 4.2 ka social change. *Proceedings of the National Academy of Sciences*, 116(1), 67-72.

Claussen, M., Kubatzki, C., Brovkin, V., Ganopolski, A., Hoelzmann, P. and Pachur, H. J. (1999). Simulation of an abrupt change in Saharan vegetation in the mid-Holocene. *Geophysical research letters*, 26(14), 2037-2040.

Cullen, H.M., Kaplan, A., Arkin, P.A. and Demenocal, P.B. (2002). Impact of the North Atlantic Oscillation on Middle Eastern climate and streamflow. *Climatic Change*, 55(3), 315-338.

Cullen, H. M., Demenocal, P. B., Hemming, S., Hemming, G., Brown, F. H., Guilderson, T. and Sirocko, F. (2000). Climate change and the collapse of the Akkadian empire: Evidence from the deep sea. *Geology*, 28(4), 379-382.

deMiroschedji, P.R. (1793). *Vases et objets en stéatite susiens du Musée du Louvre*. Association paleorient.

Dixit, Y., Hodell, D.A. and Petrie, C.A. (2014). Abrupt weakening of the summer monsoon in northwest India~ 4100 yr ago. *Geology*, 42(4), 339-342.

Djamali, M., Akhani, H., Andrieu-Ponel, V., Braconnot, P., Brewer, S., de Beaulieu, J.L., Fleitmann, D., Fleury, J., Gasse, F., Guibal, F. and Stevens, L. (2010). Indian Summer Monsoon variations could have affected the Early-Holocene woodland expansion in the Near East. *The Holocene*, 20(5), 813-820.

Eastwood, W.J., Leng, M.J., Roberts, N. and Davis, B. (2007). Holocene climate change in the eastern Mediterranean region: a comparison of stable isotope and pollen data from Lake Gölhisar, southwest Turkey. *Journal of Quaternary Science: Published for the Quaternary Research Association*, 22(4), 327-341.

Fleitmann, D., Burns, S.J., Mangini, A., Mudelsee, M., Kramers, J., Villa, I., Neff, U., Al-Subbary, A.A., Buettner, A., Hippler, D. and Matter, A. (2007). Holocene ITCZ and Indian monsoon dynamics recorded in stalagmites from Oman and Yemen (Socotra). *Quaternary Science Reviews*, 26(1-2), 170-188.

Gardiner, A.H. (1961). *Egypt of the Pharaohs: An Introduction*. Oxford University Press on Demand.

Giesche, A., Staubwasser, M., Petrie, C. A., & Hodell, D. A. (2019). Indian winter and summer monsoon strength over the 4.2 ka BP event in foraminifer isotope records from the Indus River delta in the Arabian Sea. Climate of the Past, 15(1), 73-90.

Green, A.S. and Petrie, C.A. (2018). Landscapes of urbanization and de-urbanization: A large-scale approach to

investigating the Indus civilization's settlement distributions in Northwest India. *Journal of Field Archaeology*, 43(4), 284-299.

Gupta, A.K., Anderson, D.M. and Overpeck, J.T. (2003). Abrupt changes in the Asian southwest monsoon during the Holocene and their links to the North Atlantic Ocean. *Nature*, 421(6921), 354-357.

Gurjazkaite, K., Routh, J., Djamali, M., Vaezi, A., Poher, Y., Beni, A. N., Tavakoli, V. and Kylin, H. (2018). Vegetation history and human-environment interactions through the late Holocene in Konar Sandal, SE Iran. *Quaternary Science Reviews*, 194, 143-155.

Hakemi, A. (2006). *Report of eight seasons of survey and excavation at Shahdad (Lut Plain)*, Mousavi M. (ed.), Tehran: Cultural Heritage Research Institute.

Hamdan, M.A., Hassan, F.A., Flower, R.J. and Ebrahim, E. (2016). Climate and collapse of the Egyptian Old Kingdom: a geoarchaeological approach. In *Archaeology and Environment. Understanding the Past to Design the Future, a Multidisciplinary Approach. Proceedings of the International Workshop "Italian Days in Aswan",* 15th-18th November 2013. Rome: Archaeological Heritage and Multidisciplinary Egyptological Studies, pp. 89-100.

Hamzeh, M., Mahmudy Gharaie, M., Alizadeh Lahijani, H., Moussavi Harami, R. and Djamali, M. (2017). Aeolian sediments deposited in Lake Hamoun; the proxy of frequency and severity of dust storms in Sistan since the late glacial. *Journal of Stratigraphy and Sedimentology Researches*, 33(1), 1-24 (in Persian).

Hassan, F.A. (1997). Nile floods and political disorder in early Egypt. In: H.N. Dalfes, G. Kukla and H. Weiss, (Eds.), *Third Millennium BC Climate Change and Old World Collapse*, NATO ASI Series, vol. I 49. Berlin, Heidelberg: Springer, pp. 711–723.

Hessari, M. (2013). *The Formation and development of Proto-Writing in Iran (from Pre-Writing to Proto-Elamite)*. Tehran: SAMT (in Persian).

Kaboli, M.A. (2015). New excavations at Shahdad. Second appendix in: AScalone, E., *Archeologia dell'Iran Antico: Interazioni, integrazioni e discontinuità nell'Iran del III millennio a.C.*, Translated by S.M. Seyyed Sajjadi. Tehran: SAMT, pp. 284-308 (in Persian).

Kohl, P.L. (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*. PhD diss. Unpublished: Harvard University.

Lamberg-Karlovsky, C.C. and Potts D.T. (2001). *Excavations at Tepe Yahya, iran,* 1967-1975*: The Third Millennium*. Cambridge: Harvard University Press.

Madjidzadeh, Y. (2003). *Jiroft, The Earliest Oriental Civilization, Ministry of Culture and Islamic Guidance.* Tehran: Ministry of Culture and Islamic Guidance.

Madjidzadeh, Y. and Pittman, H. (2008). Excavations at Konar Sandal in the region of Jiroft in the Halil Basin: first preliminary report (2002–2008). *Iran*, 46(1), 69-103.

Mayewski, P.A., Rohling, E.E., Stager, J.C., Karlén, W., Maasch, K.A., Meeker, L.D., Meyerson, E.A., Gasse, F., van Kreveld, S., Holmgren, K. and Steig, E.J. (2004). Holocene climate variability. *Quaternary research*, 62(3), 243-255.

Petrie, C.A., Bates, J., Higham, T. and Singh, R.N. (2016). Feeding ancient cities in South Asia: dating the adoption of rice, millet and tropical pulses in the Indus civilisation. *Antiquity*, 90(354), 1489-1504.

Possehl, G.L. (1997a). Climate and the eclipse of the ancient cities of the Indus. In: Dalfes, H.N., Kukla, G., and H. Weiss (Eds.), *Third Millennium BC Climate Change and Old World Collapse*, NATO ASI Series, vol. I 49. Berlin, Heidelberg: Springer, pp. 193-243.

Possehl, G.L. (1997b). The transformation of the Indus civilization. *Journal of World Prehistory*, 11(4), 425-472.

Railsback, L.B., Liang, F., Brook, G.A., Voarintsoa, N.R.G., Sletten, H.R., Marais, E., Hardt, B., Cheng, H. and Edwards, R.L. (2018). The timing, two-pulsed nature, and variable climatic expression of the 4.2 ka event: A review and new high-resolution stalagmite data from Namibia. *Quaternary Science Reviews*, 186, 78-90.

Ristvet. L. and Weiss, H. (2005). The Hâbûr Region in the Late Third and Early Second Millennium B.C., In: W. Orthmann, (Ed.), *The History and Archaeology of Syria*. Vol. 1. Saarbrucken: Saarbrucken Verlag.

Roberts, N., Eastwood, W. J., Kuzucuoğlu, C., Fiorentino, G. and Caracuta, V. (2011). Climatic, vegetation and cultural change in the eastern Mediterranean during the mid-Holocene environmental transition. *The Holocene*, 21(1), 147-162.

Schmidt, A., Quigley, M., Fattahi, M., Azizi, G., Maghsoudi, M. and Fazeli, H. (2011). Holocene settlement shifts and palaeoenvironments on the Central Iranian Plateau: investigating linked systems. *The Holocene*, 21(4), 583-595.

Seyyed Sajjadi, S. M. (2002). *Shahr-e Sokhta, 1997-2001*, Tehran: Research Institute of the Cultural Heritage Organization (in Persian).

Seyyed Sajjadi, S. M. (2015). Excavation at Shahr-e Sokhta. First appendix in: AScalone, E., *Archeologia dell'Iran Antico: Interazioni, integrazioni e discontinuità nell'Iran del III millennio a.C.*, Translated by S.M. Seyyed Sajjadi. Tehran: SAMT, pp. 223-283 (in Persian).

Shaikh Baikloo Islam, B. (2015). The difference between the use of soapstone vessels and objects in Iran and Mesopotamia in the third millennium BC. *The second national conference of Iranian archaeology*, University of Birjand, pp.1-21 (in Persian).

Shaikh Baikloo Islam, B., Chaychi Amirkhiz, A. and Niknami, K. (2020b). Late Holocene climatic events, the main factor of the cultural decline in North Central Iran during the Bronze Age. *Documenta Praehistorica*, 47, 446-460.

Shaikh Baikloo Islam, B., Chaychi Amirkhiz, A. and Valipour, H. (2016). On the Possible Correlation between the Collapse of Sialk IV and Climatological Events during the Middle–Late Holocene. *Iranian Journal of Archaeological Studies*, 6(1), 45-57.

Shaikh Baikloo Islam, B., Chaychi Amirkhiz, A., Valipour, H. and Safaierad, R. (2020a). Study on the Effects of the Mid-Holocene Climatic Changes on Sialk III Societies in North Central Iran Based on Environmental Sedimentology of Mafin Abad, Islamshahr. *Journal of Archaeological Studies*, 12(3), 143-166 (in Persian).

Sharifi, A., Pourmand, A., Canuel, E.A., Ferer-Tyler, E., Peterson, L.C., Aichner, B., Feakins, S.J., Daryaee, T., Djamali, M., Beni, A.N. and Lahijani, H.A. (2015). Abrupt climate variability since the last deglaciation based on a high-resolution, multi-proxy peat record from NW Iran: The hand that rocked the Cradle of Civilization?. *Quaternary Science Reviews*, 123, 215-230.

Staubwasser, M., Sirocko, F., Grootes, P. M. and Segl, M. (2003). Climate change at the 4.2 ka BP termination of the Indus valley civilization and Holocene South Asian monsoon variability. *Geophysical Research Letters*, 30(8), 1-7.

Staubwasser, M. and Weiss, H. (2006). Holocene climate and cultural evolution in late prehistoric–early historic West Asia. *Quaternary Research*, 66(3), 372-387.

Vaezi, A., Ghazban, F., Tavakoli, V., Routh, J., Beni, A.N., Bianchi, T.S., Curtis, J.H. and Kylin, H. (2019). A Late Pleistocene-Holocene multi-proxy record of climate variability in the Jazmurian playa, southeastern Iran. *Palaeogeography, palaeoclimatology, palaeoecology*, 514, 754-767.

Verheyden, S., Nader, F.H., Cheng, H.J., Edwards, L.R. and Swennen, R. (2008). Paleoclimate reconstruction in the Levant region from the geochemistry of a Holocene stalagmite from the Jeita cave, Lebanon. *Quaternary Research*, 70(3), 368-381.

Vidale, M., (2021). A Warehouse in 3rd Millennium BC Sistan and Its Accounting Technology, in: *Seminar Early Urbanization in Iran*, Lecture minute 11:12 onwards. [Online]. Available at: https://www.youtube.com/watch?v=zDAJHf1w3H4 [Accessed March 15th,2021].

Vidale, M., Fazeli Nashli, H. and Helwing B. (2019). Radiocarbon dates and absolute chronology. In: Kavosh, H.A., Vidale, M. and H. Fazeli Nashli, (Eds.), *Tappeh Graziani, Sistan, Iran: stratigraphy, formation processes and chronology of a suburban site of Shahr-i Sokhta*. Antilia, pp. 151-154.

Wasylikowa, K., Witkowski, A., Walanus, A., Hutorowicz, A., Alexandrowicz, S.W. and Langer, J.J. (2006). Palaeolimnology of Lake Zeribar, Iran, and its climatic implications. *Quaternary Research*, 66(3), 477-493.

Weiss, H. (1997). Late third millennium abrupt climate change and social collapse in West Asia and Egypt. In: Dalfes, H.N., Kukla, G. and H. Weiss, (Eds.), *Third Millennium BC Climate Change and Old World Collapse*, NATO ASI Series, vol. I 49. Berlin, Heidelberg: Springer, pp. 711–723.

Weiss, H. (2015). Megadrought, collapse, and resilience in late 3rd millennium BC Mesopotamia. In: Arz, H.W., Jung, R., Meller, H. and R. Risch, (Eds.), *2200 BC-A climatic breakdown as a cause for the collapse of the old world?*. Tagungen des Landesmuseums für Vorgeschichte Halle, pp. 35-52.

Weiss, H. (Ed.). (2017). *Megadrought and collapse: from early agriculture to Angkor*. Oxford University Press.

Weiss, H. and Bradley, R.S. (2001). What drives societal collapse? *Science*, 291(5504), 609-610.

Weiss, H., Courty, M.A., Wetterstrom, W., Guichard, F., Senior, L., Meadow, R. and Curnow, A. (1993). The genesis and collapse of third millennium north Mesopotamian civilization. *Science*, 261(5124), 995-1004.

Welc, F. and Marks, L. (2014). Climate change at the end of the Old Kingdom in Egypt around 4200 BP: new geoarchaeological evidence. *Quaternary International*, 324, 124-133.

JSBS Journal of Sistan and Baluchistan Studies
Volume 1, Issue 1 (2021) 11-19
Doi: 10.22034/JSBS.2021.146230

ADULT SEX RATIO IN THE NECROPOLIS OF SHAHR-I SOKHTA, BRONZE AGE BACTRIA MARGIANA, AND INDUS VALLEY SITES

Pier Francesco FABBRI[1] ✉ and Giorgia VINCENTI[2]

[1] Dipartimento Beni Culturali, Laboratorio di Antropologia Fisica, Università del Salento, Italy - MAIPS, Multidisciplinary Archaeological Italian Project at Shahr-i Sokhta, (Corresponding author: pierfrancesco.fabbri@unisalento.it).
[2] Department SAGAS, Università di Firenze, Italy - MAIPS, Multidisciplinary Archaeological Italian Project at Shahr-i Sokhta - Dipartimento Beni Culturali, Laboratorio di Antropologia Fisica, Università del Salento, Italy.

Received: 22 September 2021 Accepted: 13 December 2021 Available online: 20 December 2021

Abstract: A common observation in skeletal samples discovered during archaeological excavations is that male adult skeletons significantly outnumber female ones, while in living adult populations, the adult sex ratio (m/f) is close to 1. Male-biased archaeological sex ratios could partly be due to the rapid degradation of the more delicate female skeletons. In a large sample of necropolises from Southern Mediterranean, Northern Africa, and Middle East countries ranging from Neolithic to Middle Ages, we observed a mean sex ratio of 1.40. On the contrary, samples of adult skeletons from the necropolis of Shahr-i Sokhta, sexed by different authors using different methods, constantly show an overrepresentation of females (about 42% males and 58% females), i.e., a sex ratio of 0.72. Similar values have been observed in necropolis from chronologically close sites in the Bactria-Margiana and Indus Valley cultures (Gonur Depe, Mohenjo-Daro, Djarkutan, Rakhigarhi), We speculate that the most likely interpretation of this particular observation could be the uxorilocal settlement pattern in these populations.

Keywords: Bronze Age, Shahr-i Sokhta, Bactria Margiana Archaeological Complex, Indus Valley, Necropolis, adult sex ratio, mobility, matrilocality.

چکیده: از مشاهدات معمول و رایج در بقایای اسکلتی به‌دست‌آمده از کاوش‌های باستان‌شناسی آن است که اسکلت افراد بالغ مذکر به صورت معناداری بیشتر از نمونه‌های مربوط به افراد مؤنث است، در حالی که در جمعیت‌های افراد زندهٔ بالغ، نسبت جنسیت افراد بالغ (مذکر/مؤنث) نزدیک به ۱ است. سوگیری در مورد نسبت جنسیت مردان در مطالعات باستان‌شناسی تا حدی به خاطر فرسایش سریع استخوان‌های شکننده‌تر زنان است. ما در نمونه بزرگی از تعدادی قبرستان، از مدیترانهٔ جنوبی، آفریقای شمالی و کشورهای خاورمیانه، از دوره نوسنگی تا قرون وسطی، شاهد نسبت میانگین جنسیت ۱٫۴۰ بودیم. در مقابل، نمونه‌های اسکلت‌های افراد بالغ در قبرستان شهر سوخته که محققان مختلف با استفاده از روش‌های متفاوت آن‌ها را تعیین جنسیت کرده‌اند، به صورت مکرر، وجود بیش از حد جنس مؤنث را نشان می‌دهد (حدود ۴۲٪ مردان و ۵۸٪ زنان)، یعنی ۰٫۷۲ درصد نسبت جنسیت. از گورستان محوطه‌هایی با گاهنگاری نزدیک به فرهنگ‌های باختری–مروی و دره سند (گنور تپه، موهنجو دارو، جارکوتان، راخیگاری) مقادیر مشابهی مشاهده شد. حدس و گمان بر این است که محتمل‌ترین تفسیر در این مورد مشاهده شده خاص می‌تواند ناشی از الگوی سکونت در موطن همسر (زن) در این جمعیت‌ها باشد.

کلمات کلیدی: عصر مفرغ، شهر سوخته، مجموعه باستان‌شناسی باختر(بلخ)–مرو، درهٔ سند، گورستان، نسبت جنسیت افراد بالغ، جابجایی، محل سکونت مادرزادی.

I. Introduction

A common observation in skeletal series coming from archaeological excavations is that male adult skeletons significantly outnumber female ones producing a sex ratio (m/f) >1, while in living adult populations sex ratio is close to 1. Weiss (1972) assembled a large (n=12,064) worldwide sample of adult archaeological skeletons and found that the sex ratio was 1.19, that is about 54.5% males and 45.5% females, on the contrary, in pre-industrial living people (n=39,843) the sex ratio is 0.98, that is 49.6% males and 50.4% females. Halstead (1977) studying demography in Bronze Age Crete observed (page 108) that "…men usually outnumber women by a wide margin. This might be interpreted as, for example, an indication of systematic female infanticide, but might simply result from the better preservation of the more robust male skeleton…". Bennike (1985) agreed that male biased archaeological sex ratios could partly be due to rapid degradation of the more delicate female skeletons. This cannot be taken as a general rule; Walker *et al.* (1988) noticed that young adults of both sexes were equally well preserved as compared with older or younger individuals in the skeletal collection of the Mission La Purisima. Nonetheless, skeletal preservation in elderly women is significantly lower than in men as can be seen in the case of Saint Bride's church where the sex was based on the coffin plates (Walker, 1995). Male overrepresentation could also be partly due to the tendency of sexing as male and female individuals from robust prehistoric populations as in many older studies skull features were commonly used in sex determination. By taking into account the year in which the anthropological study took place as well as the methods applied to the sex determination in each site, Bone (1993) observed that male overrepresentation tends to disappear in more recent works (1972–1993) in pelvis sexed samples. Although rare, the overrepresentation of females can be found in some cases, Triantaphyllou (2000), observing it in several skeletal samples from Northern Greece, proposes three interpretations: matrilocal residence; long-distance travel for men who were more likely to die and be buried abroad; female-biased parental investment.

II. Materials and methods

We collected from published anthropological studies a sample of 34 necropolises (6,368 adult individuals of both sexes) from a broad geographical area (Southern Europe, Egypt, Middle East) ranging from Neolithic to Middle Ages, Appendix Table 1.

We then collected data from three different anthropological samples issued from the necropolis of Shahr-i Sokhta: Macchiarelli and Passarello, 1988; Shadmehr *et al.*, 2017; Ascalone and Fabbri, 2019. Data regarding anthropological samples from Bronze Age sites ascribed to Bactria Margiana Archaeological Complex (BMAC) and Indus Valley (IV) are available for Dzharkutan, Farmana, Gonur Depe, Harappa, Mohenjo Daro, and Rakhigarhi, see appendix information for references.

We also considered the Chalcolithic necropolis of Mehrgarh where cranial and dental measures and features are closely similar to those observed in the Bronze Age necropolis of Harappa (Hemphill *et al.*, 1991).

III. Sex ratio

Considering three different skeletal samples from the necropolis of Shahr-i Sokhta, Table 1, we observe that in all of them, female skeletons outnumber male ones and that in the total sample, the sex ratio is 0.73, i.e., 42.1% males and 57.9% females.

Ref.	m/f	unsexed	m	f	tot	%m	%f
Ascalone and Fabbri, 2019	0.66	-	19	29	48	39.6	60.4
Macchiarelli and Passarello, 1988	0.84	-	48	57	105	45.7	54.3
Shadmehr *et al.*, 2017	0.69	409	143	206	349	41.0	59.0
Shahr-i Sokhta total	0.73	409	191	263	454	42.1	57.9

Table 1. Sex ratio in different adult samples from Shahr-i Sokhta.

We grouped the necropolises data in the reference sample on a chronological basis, regardless of their geographical origin, Table 2, the mean sex ratio ranges between 1.15 (pre-Bronze Age) and 1.64 (Medieval) in the chronological subsamples. In the total sample, we observe a mean sex ratio of 1.42 (range 0.80-2.70).

We then took into account a sample of necropolises from BMAC and IV Bronze Age and Shahr-i Sokhta, and we found a significantly lower sex ratio, a mean of 0.69 and a narrower range (0.61-0.73) outside the range observed in the comparison sample. Interestingly the Chalcolithic sample from Mehrgarh is within SiS-BMAC-IV's range.

	n (individuals)	n (necropolises)	m (m/f)	sd (m/f)	min (m/f)	max (m/f)
SiS-BMAC-IV	1,558	10	0.69	0.0405	0.61	0.73
Mehrgarh	48	1	0.71			
pre-Bronze Age	702	4	1.36	0.8168	0.86	2.58
Bronze Age	809	8	1.15	0.5019	0.80	2.36
Iron-Historic preMed.	3,174	8	1.35	0.3730	0.95	2.00
Medieval	1,683	14	1.64	0.5267	1.00	2.70
Total	6,368	34	1.42	0.5404	0.80	2.70

Table 2. Sex ratio in the necropolises from Shahr-i Sokhta, BMAC, and IV Bronze Age (Shahr-i Sokhta, Mohenjo Daro, Farmana, Harappa, Djarkutan, Rakhigarhi, and Gonur Depe), Mehrgarh and reference sample (see appendix Table 1).

As previously noted, Bone (1993) observed that due to improvement in sex determination, male overrepresentation is less marked in recent papers (1972–1993). Our reference sample is generally recent (31 out of 36 have been issued after 2000 and coxal bone sex determination is by far the most frequently used and there is no correlation between sex ratio and year of issue (r2=0.029). Nevertheless, males are over-represented as the total m/f is 1.43. Regarding Shahr-i Sokhta, BMAC, and IV Bronze Age sites, published between 1962 and 2019, the sample where males are mostly underrepresented is the earliest published one from Harappa (1962). We can conclude that male overrepresentation in reference samples and male underrepresentation in Shahr-i Sokhta and BMAC and IV sites are not related to methods of sex determination or year of publishing.

The shortage of males in Indus Valley sites has long been noticed. Ghosh *et al.* (1962) observed that in the total sample from Harappa, males were 44% and females the 56% of sexed adult skeletons. Their interpretation of the find is surprising: "The sex proportions, except in the Mound Area, are abnormal. The excess or shortage of females may be explained by

supposing that as Harappa was a central city – one of the joint capitals, the structure, both age structure and sex ratio, was artificial. Normally there would be a shortage of females; but if females are employed as slaves or impressed as laborers in certain periods, there would be an excess", pag.7. Women should be few in places where power was exerted, as power is a male business, but if there were many women they could only have been laborers or slaves. It seems more a product of sexism than a sound archaeological interpretation. Regarding BMAC sites, Babakov *et al.* (2001) observed the predominance of women in the necropolis of Gonur Depe, m/f=0.64 in their sample, supposing that ".. a portion of the women (about 36%) could be included in the population from outside or else that a group of some newcomers came to the new territory, pressed out some of the local men and incorporated local women into their composition.

IV. Mobility

The common basis in studies addressing mobility and patrilocality versus matrilocality is that the sex showing higher variability is assumed to be the more mobile.

Greater male variability means greater male migration and thus should indicate matrilocality, greater female variability should indicate patrilocality. This can be investigated in morphological traits of the skeleton and, more often, of the dentition (Stojanowski and Schillaci, 2006), in stable isotope analysis in dental enamel (Bentley *et al.*, 2012), in mtDNA and Y-chromosomal haplotypes (Bentley *et al.*, 2005).

Narasimhan *et al.* (2019) analyzed aDNA in some human samples from Shahr-i Sokhta and Gonur Depe. Out of 22 individuals from Shahr-i Sokhta, 8 (36.4%) are genetically classified as outliers, among them, five are males and three females.

Anthropological studies on cranial and dental measures and morphology in Harappa (IV) suggest that women could have been related to each other by descent, while men were not (Hemphill *et al.* 1991). Biodistance studies indicate that females in Harappa retain closer genetic affinity to each other than to males, a feature that has been interpreted as evidence for matrilocality (Kennedy, 2000). In a human sample from Sanauli (IV), Valentine (2013) notes that females are relatively robust and of slightly greater stature than males, concluding that this could suggest a genetic distance between the sexes.

Moreover, isotopic data from Farmana and Harappa indicate that Integration Era cemeteries were reserved for immigrants who left their natal groups at a young age, and the isotopic distinction between the sexes agrees with distances studies of population affinity at Harappa that suggests a genetic distance between males and females (Hemphill *et al.*, 1991; Kennedy, 2000).

V. Nutritional stress indicators

In previous analyses, sex based differences in nutritional stress indicators have not been investigated in Shahr-i Sokhta and the data we collected are still not enough for meaningful conclusions.

In Harappa lines of enamel hypoplasia are more frequent in women than in men (Hemphill *et al.*, 1991; Lukacs, 1992).

Hemphill *et al.* (1991) suppose that the higher dental enamel hypoplasia prevalence in women could result from generally lower parental investment in girls. In Gonur Depe, the frequency of enamel hypoplasia among adults shows no significant differences between the sexes (Babakov *et al.*, 2001).

VI. Dwelling

Collecting data on mean habitation floor area (MFA) in samples of matrilocal and patrilocal traditional societies, Ember (1973) was the first to note that the former have significantly higher MFA than the latter. Apart from the exceptionally high MFA observed in patrilocal Nootka (227.6 m2), in Table 3, patrilocal societies range between 2.8 and 45.1 m2, while matrilineal ones range between 45.0 and 209.8 m2.

Ember proposes that MFA could be a simple archaeological indicator of Matri- versus patrilocality. Subsequent papers confirmed Ember's observation (Divale, 1977; Porcic, 2010; Hrncir *et al.* 2020).

		n	mean	sd	min	max
Ember, 1973	Matrilocal sample 1	4	80.6	16.6	55.7	90.3
	Matrilocal sample 2	5	114.8	75.6	45.0	209.8
	Patrilocal sample 1	18	30.3	50.8	2.8	227.6
	Patrilocal sample 2	10	21.6	13.0	5.2	45.1
Biscione *et al.*, 1977	Shahr-i Sokhta				90	150

Table 3. Mean habitation floor area (MFA), m², in ethnographical samples from Ember (1973) compared to the MFA range in Shahr-i Sokhta's Period 2 from Biscione *et al.* (1977).

MFA range in Shahr-i Sokhta's Period 2 was 90-150 m², Biscione *et al.* (1977), would place the site society between the matrilocal ones.

VII. The social role of women

Following Clark (2003), pag.318, "In any case, the figurines may lend support to Kenoyer's (1998: 133) suggestion that, "some women of the cities may have had important social and ritual positions," which may be corroborated by possible matrilocal burials in the Harappan period cemetery at Harappa. Regarding Shahr-i Sokhta, Ameri (2020) has shown the important role of women in administrative sealing. A strong social role and prestige for women in BMAC Bronze Age societies has been suggested by Luneau (2008).

VIII. Long-distance trade

Indications of intense trading activities connecting Shahr-i Sokhta and BMAC and IV Bronze Age sites as well as Mesopotamian ones come both from anthropological and archaeological studies (Piperno and Salvatori, 1982, 1983; Hemphill *et al.* 1995; Cortesi *et al.*, 2008). The burial of a monkey, Macaca mulatta, has been recently discovered in the necropolis of Shahr-i Sokhta (Minniti and Sajjadi, 2019), as no non-human primate species are native to Iran and Macaca mulatta inhabits South and South-East central Asia, this is further and indisputable proof of long-distance trade.

IX. Conclusions and perspectives

The shortage of adult males in anthropological samples is a constant observation in Shahr-i Sokhta and Bronze Age sites from BMAC and IV sites. In all of these samples, we observe a male-to-female ratio ranging from 0.61 to 0.73, in a large reference sample dating from the Neolithic to the Middle Ages the male-to-female ratio range is 0.86 to 2.70. Genetic data point to the high frequency of outliers among Shahr-i Sokhta individuals. Several papers on Indus Valley sites suggest a closer genetic relationship among women than between women and men and a more frequent local origin for the former. Nutritional stress indicators do not show lower parental investment in boys as compared to girls. The mean habitation floor area in Shahr-i Sokhta, 90-150 m2, would place the population of the site among matrilocal societies. A high social role and prestige for women has been observed in many of the sites under examination comprising Shahr-i Sokhta. These observations lead us to the hypothesis that the shortage of men in the necropolis of Shahr-i Sokhta could be the result of different factors affecting an exogamic, matrilocal, and possibly uxorilocal society where men, coming from abroad and married to local women, were involved in long-distance travel and a significant percentage of them died far from the site itself and hence were not buried in the necropolis. Archaeological and anthropological indicators seem to support our hypothesis which, we hope, we shall be able to test in the next years.

References

Ameri, M. (2020). Who holds the keys? Identifying female administrators at Shahr-i Sokhta, Iran. *Journal of the British Institute of Persian Studies*, Available at DOI: 10.1080/05786967.2020.1718542.

Ascalone, E., Fabbri, P. F. (2019). Considerazioni insediamentali sull'abitato e demografiche sulla necropoli di Shahr-i Sokhta. In: E. Ascalone, S. M. S. Sajjadi, (Eds), Scavi e Ricerche a Shahr-i Sokhta. Tehran, pp.137-157.

Babakov, O., Rykushina, G.V., Dubova, N.A., Vassiliev, S.V., Pestryakov, A.P., and Khodzhayov T.K., 2001. Human skeletal remains from the necropolis of Gonur-Depe 1. In: V.I. Sarianidi, (Ed.), Necropolis of Gonur and Iranian Paganism, Appendix 1. Mir-media: pp.219-240.

Bennike, P. (1985). *Paleopathology of Danish skeletons: A comparative study of demography, disease and injury*. Copenhagen: Akademisk Forlag.

Bentley, R. A., Bickle, P., Fibiger, L., Nowell, G. M., Dale, C. W., Hedges, R. E. M., Hamilton, J., Wah, J., Francken, M., Grupe, G., Lenneis, E., Teschler-Nicola, M., Arbogast, R.-M., Hofmann, D., Whittle, A. (2012). *Community differentiation and kinship among Europe's first farmers*. Proc. Natl. Acad. Sci. USA, 109, 9326-9330.

Bentley, R. A, Pietrusewsky, M, Douglas, M. T., Atkinson, T. C. (2005). *Matrilocality during the prehistoric transition to agriculture in Thailand?* Antiquity, 79, 865–881.

Biscione, R., Salvatori, S., Tosi, M. (1977). Shahr-I Sokhta: l'abitato protostorico e la sequenza cronologica. In: AA.VV., La Città Bruciata nel Deserto Salato, Venezia, pp.77-112.

Bone K. E. (1993). *A Bias in skeletal sexing*. Master's Thesis, University of Tennessee.

Clark, S. S. (2003). *Representing the Indus body: sex, gender, sexuality, and the anthropomorphic terracotta figurines from Harappa*. Asian Perspectives, 42, 304-328.

Cortesi, E., Tosi, M., Lazzari, A., Vidale, M. (2008). *Cultural Relationships beyond the Iranian Plateau: The Helmand Civilization, Baluchistan and the Indus Valley in the 3rd Millennium BCE*. Paléorient, 34, 5-35.

Divale, W. T. (1977). *Living floor area and marital residence: a replication*. Behavior Science Research, 12, 109–15.

Ember, M. (1973). *An archaeological indicator of matrilocal versus patrilocal residence*. American Antiquity, 38, 177-182.

Ghosh, A., Datta, J. M., Gupta, P., Dutta, P. C., Basu, A. (1962). *Human skeletal remains from Harappa*. Anthropological Survey of India, Memoire 9

Halstead, P. (1977). *The Bronze Age Demography of Crete and Greece: A note*. The Annual of the British School at Athens, 72, 107-111.

Hemphill, B. E., Chrisstensen, A. F., Mustafakulov, S. I. (1995). Trade or travel: an assessment of interpopulational dynamics among Bronze Age Indo-Iranian populations. In: R. Alchin, B. Alchin, (Eds.), Proceedings of the 13th Conference of the European Association of South Asian Archaeologists, Cambridge, 5-9 July, 1995, 2, 855-871.

Hemphill, B. E., Lukacs, J. R., Kennedy, K. A. R. (1991). Biological adaptations and affinities of Bronze Age Harappans. In: R. H. Meadow, (Ed.), Harappa excavations

1986-1990: a multidisciplinary approach to third-millennium urbanism, Monographs in World Archaeology, Prehistory Press, Madison, Wisconsin, pp.137-182.

Hrncir, V., Duda, P., Saffa, G., Kvetina, P. ,Zrzavy, J. (2020). *Identifying post-marital residence patterns in prehistory: A phylogenetic comparative analysis of dwelling size*. PlosOne, 15:e0229363.

Kennedy, K. A. R. (2000). God-Apes and Fossil Men: Paleoanthropology of South Asia. Ann Arbor: University of Michigan Press.

Lukacs, J. R. (1992). *Dental paleopathology and agricultural intensification in South Asia: New evidence from Bronze Age Harappa*. Amer. Jour. Physical Anthropology, 87, 133-150.

Luneau, É. (2008). *Tombes féminines et pratiques funéraires en Asie centrale protohistorique. Quelques réflexions sur le « statut social » des femmes dans la civilisation de l'Oxus*. Paléorient, 34, 131-157.

Macchiarelli, R., Passarello, P. (1988). *Analisi paleodemografica comparativa della popolazione di Shahr-i Sokhta (Sistan, Iran, III millennio a.C.)*. Rivista di Antropologia, 66, 5-36.

Minniti, C., Sajjadi, S. M. S. (2019). *New data on non-human primates from the ancient Near East: The recent discovery of a rhesus macaque burial at Shahr-i Sokhta (Iran*). Int. J. Osteoarchaeol., 29, 538-548.

Narasimhan, V. M. *et al.* (2019). *The formation of human populations in South and Central Asia*. Science, 365, eaat7487.

Piperno, M., Salvatori, S. (1982). Evidence of Western cultural connections from a phase 3 group of graves at Shahr-i Sokhta. In: H.-J., Nissen, J. Renger, (Eds.), Mesopotamiem und seine nachbarn, Berliner Beitrage zum Vorderen Orient, 1, 79-85.

Piperno, M., Salvatori, S. (1983). *Recent Results and New Perspectives from the Research at the Graveyard of Shahr-i Sokhta, Sistan, Iran*. Annali dell'Istituto Universitario Orientale, 43, 173-191.

Porcic, M. (2010). *House floor area as a correlate of marital residence pattern: a logistic regression approach*. Cross-Cultural Research, 44, 405–424.

Shadmehr, A., Hajizadeh, E., Baghestani, A., Sajjadi, S.M.S. (2017). *Comparing the Determined Age at Death between Men and Women Based on the Human Bones Excavated from Shahr-e Sokhta Archaeological Site: A Survival Approach Using Life-Table and Kaplan-Meier Methods*. International Journal of the Society of Iranian Archaeologists, 3, 55-60.

Stojanowski, C. M., Schillaci, M. A. (2006). *Phenotypic approaches for understanding patterns of intracemetery biological variation*. Yearbook of Phys. Anthropology, 49, 49-88.

Triantaphyllou, S. (2000). *A bioarchaeological approach to prehistoric cemetery populations from Central and Western Greek Macedonia*. Unpublished: University of Sheffield. PhD.

Valentine, B. T., (2013). *Immigrant identity in the Indus civilisation: a multi-site isotopic mortuary analysis*. Unpublished: University of Florida. Ph.D.

Walker, P.L. (1995). Problems of preservation and sexism in sexing: Some lessons from historical collections for palaeodemographers. In: S. R. Saunders, A. Herring, (Eds.), Grave reflections, portraying the past through cemetery studies). Toronto: Canadian Scholars' Press, pp.31–47.

Walker, P. L., Johnson, J. R., Lambert, P. M. (1988). *Age and sex biases in the preservation of human and skeletal remains*. Amer. Jour. Physical Anthropology, 76, 183-188.

Weiss, K. (1972). *On the systematic bias in skeletal sexing*. Amer. Jour. Physical Anthropology, 37, 239-249.

Appendix

Necropolises. BA Bronze Age; I-H-PM Iron-Historical premedieval ; M Medieval; P-BA pre-Bronze Age

Site	m/f	Country	Ref.	Unsexed	m	f	tot	% m	% f	% unsexed	Period
Harappa,	0.61	Pakistan	Ghosh *et al.*, 1962	-	36	59	95	37.9%	62.1%	-	BA
Harappa, R37C	0.66	Pakistan	Hemphill *et al.* 1991	42	19	29	48	39.6%	60.4%	46.7%	BA
Shahr-i Sokhta	0.66	Iran	Ascalone and Fabbri, 2019	-	19	29	48	39.6%	60.4%	-	BA
Mohenjo Daro	0.68	Pakistan	Hemphill *et al.*, 1991	55	57	84	141	40.4%	59.6%	28.1%	BA
Djarkutan	0.69	Uzbekistan	Hemphill, 1998	-	46	67	113	40.7%	59.3%	-	BA
Rakhigarhi	0.70	India	Shinde *et al.*, 2018	16	7	10	17	41.2%	58.8%	48.5%	BA
Gonur Depe	0.72	Turkmenistan	Kufterin *et al.*, 2013	-	142	196	338	42.0%	58.0%	-	BA
Farmana	0.73	India	Mushrif-Tripathy *et al.* 2012	1	11	15	26	42.3%	57.7%	3.7%	BA
Shahr-i Sokhta	0.73	Iran	Ascalone and Fabbri, 2019; Macchiarelli and Passarello, 1988; Shadmehr *et al.*, 2017	409	191	263	454	42.1%	57.9%	47.4%	BA
Dzharkutan	0.73	Uzbekistan	Luneau 2008	-	117	161	278	42.1%	57.9%	-	BA
Mehrgarh	0.71	Pakistan	Sellier, 1989	25	20	28	48	41.7%	58.3%	34.2%	P-BA
VBQ	0.98	Italy	Bernabò Brea *et al.*, 2010	11	44	45	89	49.4%	50.6%	11.0%	P-BA
Early-Dynastic	2.58	Egypt	Castillos 1982	-	111	43	154	72.1%	27.9%	-	P-BA
Tepe Hissar I-III	1.02	Iran	Afshar, 2014	28	172	168	340	50.6%	49.4%	7.6%	P-BA
Naga ed-Der	0.86	Egypt	Podzorski 1990	146	55	64	119	46.2%	53.8%	55.1%	P-BA
Macedonia	0.80	Greece	Triantaphyllou 2000	52	61	76	137	44.5%	55.5%	27.5%	BA
Luristan	0.93	Iran	Riesle and Dastugue, 1983	14	13	14	27	48.1%	51.9%	34.1%	BA
Canaan LBA	0.94	Palestine	Kennedy, 2013	-	89	95	184	48.4%	51.6%	-	BA
Buston VI	0.97	Uzbekistan	Avanesova *et al.*, 2010	-	34	35	69	49.3%	50.7%	-	BA
Tell Tweini	1.00	Syria	Ricaut, 2008	34	6	6	12	50.0%	50.0%	73.9%	BA
Urkesh (Tell Mozan)	1.00	Syria	Kharobi, 2015	36	15	15	30	50.0%	50.0%	54.5%	BA
Demircihöyük-Sarıket	1.21	Turkey	Massa, 2014	-	105	87	192	54.7%	45.3%	-	BA
Tell al-Judiadah, Anatolia	2.36	Turkey	Krogman, 1940	-	111	47	158	70.3%	29.7%	-	BA
San Nicolàs (Murcia)	0.95	Spain	Sánchez-Aparcero *et al.* 2020	60	206	216	422	48.8%	51.2%	12.4%	I-H-PM
Timmari Montescaglioso (MT)	1.09	Italy	Marchi and Borgognini Tarli, 2002	25	25	23	48	52.1%	47.9%	34.2%	I-H-PM

Timarghara	1.10	Pakistan	Bernhard, 1967	20	44	40	84	52.4%	47.6%	19.2%	I-H-PM
Rome (varia)	1.13	Italy	De Angelis *et al.* 2015	-	1236	1092	2328	53.1%	46.9%	-	I-H-PM
Apollonia Pontica	1.27	Bulgaria	Keenleyside *et al.*, 2011	-	33	26	59	55.9%	44.1%	-	I-H-PM
Himera	1.78	Italy	Lonoce *et al.*, 2018	-	57	32	89	64.0%	36.0%	-	I-H-PM
Mégara Hyblaea	2.00	Italy	Duday and Gras, 2018	-	36	18	54	66.7%	33.3%	-	I-H-PM
North-West (Estark, Liarsangbon, Shahne Poshte, Qareh Tepe, Mersin)	1.50	Iran	Soltysiak *et al.* 2016; 2017; 2019a, b, c, d	25	54	36	90	60.0%	40.0%	21.7%	I-H-PM
San Juan de Momoitio (Vizcaya)	1.00	Spain	Sánchez-Aparcero *et al.*, 2020	14	24	24	48	50.0%	50.0%	22.6%	M
La Torrecilla (Granada)	1.04	Spain	Sánchez-Aparcero *et al.*, 2020	50	50	48	98	51.0%	49.0%	33.8%	M
Xarea (Almeria)	1.22	Spain	Sánchez-Aparcero *et al.*, 2020	3	101	83	184	54.9%	45.1%	1.6%	M
San Peré (Barcelona)	1.24	Spain	Sánchez-Aparcero *et al.*, 2020	4	62	50	112	55.4%	44.6%	3.4%	M
S. Pietro di Cavallermaggiore (CN)	1.35	Italy	Barbiera, 2008	6	81	60	141	57.4%	42.6%	4.1%	M
Santa Eulalia (Álava)	1.40	Spain	Sánchez-Aparcero, *et al.* 2020	0	28	20	48	58.3%	41.7%	0.0%	M
St John's Divinity School	1.48	UK	Inskip *et al.*, 2019	-	80	54	134	59.7%	40.3%	-	M
Roma, Palazzo della Cancelleria	1.54	Italy	Barbiera, 2008	2	97	63	160	60.6%	39.4%	1.2%	M
Dueville	1.60	Italy	Carrara, 2013	-	40	25	65	61.5%	38.5%	-	M
Monte d'Argento, Minturno (LT)	1.79	Italy	Barbiera, 2008	2	70	39	109	64.2%	35.8%	1.8%	M
Castro dei Volsci	1.80	Italy	Barbiera, 2008	0	101	56	157	64.3%	35.7%	-	M
Maro (Málaga)	2.21	Spain	Sánchez-Aparcero *et al.*, 2020	8	188	85	273	68.9%	31.1%	2.8%	M
South Greece	2.55	Greece	Bourbou, 2003	117	84	33	117	71.8%	28.2%	50.0%	M
Fuerte de Santiago (Cádiz)	2.70	Spain	Sánchez-Aparcero *et al.*, 2020	28	27	10	37	73.0%	27.0%	43.1%	M

Table 1. Necropolises. BA Bronze Age; I-H-PM Iron-Historical premedieval ; M Medieval; P-BA pre-Bronze Age.

Appendix references

Afshar, Z. (2014). *Mobility and economic transition in the 5th to the 2nd millennium B.C. in the population of the Central Iranian Plateau, Tepe Hissar*. Unpublished. Durham University: PhD.

Ascalone, E., Fabbri, P. F. (2019). Considerazioni insediamentali sull'abitato e demografiche sulla necropoli di Shahr-i Sokhta. In: E. Ascalone, S. M. S. Sajjadi, (Eds), Scavi e Ricerche a Shahr-i Sokhta. Tehran, pp.137-157.

Avanesova, N. A., Dubova, N. A., Kufterin, V. V. (2010). *Skeletal remains from Buston VI - A Sapalli culture cemetery in Uzbekistan*. Archaeology, Ethnology and Anthropology of Eurasia, 38, 118-137.

Barbiera, I. (2008). *Il mistero delle donne scomparse. Sex-ratio e società nel medioevo italiano*. Archeologia Medievale, 35, 491-501.

Bernabò Brea, M., Maffi, M., Mazzieri, P., Salvadei, L. (2010). *Testimonianze funerarie della gente dei Vasi a Bocca Quadrata in Emilia occidentale. Archeologia e antropologia*. Rivista Scienze Preistoriche, 60, 63-126.

Bourbou, C. (2003). *Health Patterns of Proto-Byzantine Populations (6th-7th centuries AD) in South Greece: the Cases of Eleutherna (Crete) and Messene (Peloponnese)*. Int. Jour. Osteoarchaeology, 13, 303-313.

Carrara, N. (2013). *The Lombard necropolis of Dueville (Northeast Italy, 7th-9th c. AD): burial rituals, paleodemography, anthropometry and paleopathology*. Available at: Antrocom Online Journal of Anthropology, 9, 259-271.

Castillos, J., 1982. *A reappraisal of the published evidence on Egyptian predynastic and early dynastic cemeteries*. Toronto: Benben

De Angelis, F., Pantano, W., Battistini, A., (2015). *L'analisi paleodemografica*. Medicina nei secoli Arte e Scienza, 27, 805-872.

Duday, H., Gras, M. (2018). *Mégara Hyblaea 6. La nécropole méridionale de la cité archaïque. 1. Les données funéraires (notices des tombes et données biologiques)*. Collection de l'École française de Rome.

Ghosh, A., Datta, J. M., Gupta, P., Dutta, P.C., Basu, A. (1962). *Human skeletal remains from Harappa*. Anthropological Survey of India, Memoire 9.

Hemphill, B. E. (1998). *Biological Affinities and Adaptations of Bronze Age Bactrians: III. An Initial Craniometric Assessment*. Amer. Jour. Physical Anthropology, 106, 329-348.

Hemphill, B. E., Lukacs, J. R., Kennedy, K. A. R. (1991). Biological Adaptations and Affinities of Bronze Age Harappans. In: R.H. Meadow, (Ed.), Harappa Excavations 1986-1990: A Multidisciplinary Approach to third Millennium Urbanism, Monographs in World Archaeology, Prehistory Press, Madison, Wisconsin, pp.137-182.

Inskip, S., Scheib, C. L., Wohns, A. W., Ge, X., Kivisild, T., Robb, J. (2019). *Evaluating macroscopic sex estimation methods using genetically sexed archaeological material: The medieval skeletal collection from St John's Divinity School, Cambridge*. Amer. Jour. Physical Anthropology, 168, 340–351.

Keenleyside, A., Schwarcz, H. P., Panayotova, K. (2011*). Oxygen isotopic evidence of residence and migration in a Greek colonial population on the Black Sea*. Jour. of Archaeological Science, 38, 2658-2666.

Kennedy, T.M. (2013). *A demographic analysis of Late Bronze Age Canaan: ancient population estimates and insights through Archaeology*. Unpublished: University of South Africa. PhD.

Kharobi A., 2015. *Approche archéo-anthropologique des tombes de Tell Hamoukar et Tell Mozan (Syrie de 3700 à 1600 av. J.-C.): taphonomie et diversité des pratiques funéraires. Archéologie et Préhistoire*. Unpublished: Université de Bordeaux. PhD.

Krogman, W.M. (1940). *Racial types from Tepe Hissar, Iran from the late fifth to the early second millennium B.C.* Verhand. der Konink. Nederland. Akad. van wetenschappen. Afeeling natuurkunde (Tweedie Sectie), 39, 1–87.

Kufterin, V. V., Dubova, N. A. (2013). *A preliminary analysis of Late Bronze Age human skeletal remains from Gonur-depe, Turkmenistan*. Bioarchaeology of the Near East, 7, 33–46.

Lonoce, N., Palma, M., Viva, S., Valentino, M., Vassallo, S., Fabbri, P. F. (2018*). The Western (Buonfornello) necropolis (7th to 5th BC) of the Greek colony of Himera (Sicily, Italy): site-specific discriminant functions for sex determination in the common burials resulting from the battle of Himera (ca. 480 BC)*. Int. Jour. Osteoarchaeology, https://doi.org/10.1002/oa.2702.

Luneau, É. (2008). *Tombes féminines et pratiques funéraires en Asie centrale protohistorique. Quelques réflexions sur le « statut social » des femmes dans la civilisation de l'Oxus*. Paléorient, 34, 131-157.

Massa, M. (2014). *Early Bronze Age burial customs on the central Anatolian plateau: a view from Demircihöyük-Sariket*. Anatolian Studies, 64, 73-93.

Marchi, D., Borgognini Tarli, S. M. (2002). *The skeletal biology of two Italian peninsular Magna Graecia necropoles, Timmari and Montescaglioso*. Homo, 53, 59-78.

Mushrif-Tripathy, V., Shinde, V., Chakraborty, K.S. (2012). *Preliminary findings on human skeletal remains from Harappan site of Farmana*. Iranian J. of Archaeol. Studies, 2,51-64.

Podzorski P. V. (1990). *Their Bones Shall Not Perish*. New Malden: SIA.

Ricaut, F.X. (2008). Human remains from a Middle Bronze Age population from Tell Tweini: preliminary results of the anthropological study. In: J. Bretschneider, K. Van Lerberghe (Eds.), In Search of Gibala: An Archaeological and Historical Study based on Eight Seasons of Excavations at Tell Tweini (Syria)

in the A and C Fields (1999-2007). Sabadell, Editorial AUSA, pp.87-101.

Riesle, P. S., Dastugue J. (1983). *The Population of the Konamazan Region of Luristan in the Late Bronze Age and in the Iron Period*. East and West, 33, 177-216.

Sánchez-Aparcero, B., Alemán, I., Botella, M. C. (2020). *The necropolis of Maro (Málaga, Spain): an anthropological study*. Archaeological and Anthropological Sciences, 12, 153.

Sellier, P. (1989). *Hypotheses and Estimators for the Demographic Interpretation of the Chalcolithic Population from Mehrgarh, Pakistan*. East and West, 39, 11-42.

Shinde, A. S., Kim, Y. J., Woo, E. J., Jadhav, N., Waghmare, P., Yadav, Y., Munshi, A., Chatterjee, M., Panyam, A., Hong, J. H., Oh, C.S., Shin, D. H. (2018). *Archaeological and anthropological studies on the Harappan cemetery of Rakhigarhi, India*. PlosOne, 13: e0192299.
https://doi.org/10.1371/journal.pone.0192299.

Soltysiak, A., Hosseinzadeh, J., Javeri, M., Montazerzohouri, M. (2016). *Human remains from Estark, Iran, 2016*. Bioarchaeology of the Near East, 10, 75-81.

Soltysiak, A., Hosseinzadeh, J., Javeri, M., Bebel, A. (2017). *Human remains from Estark, Iran, 2017*. Bioarchaeology of the Near East, 11, 84–89.

Soltysiak, A., Jahani V. (2019a). *Human remains from Liarsangbon, Iran, 2016-2017*. Bioarchaeology of the Near East, 13, 49-53.

Soltysiak, A., Jahani V., (2019b.). *Human remains from Liarsangbon, Iran, 2016-2017*. Bioarchaeology of the Near East, 13, 49-53.

Soltysiak, A., Malekzadeh, M., Naseri, R., (2019c). *Human remains from Mersin, Iran, 2014*. Bioarchaeology of the Near East, 13, 136-141.

Soltysiak, A., Nashli, H. F., Safari, M., Moradi, G. (2019d). *Human remains from Shahne Poshte, Iran, 2019*. Bioarchaeology of the Near East, 13, 85-96.

Szymczak, J., Hosseinzadeh, J., Javeri, M., Soltysiak, A. (2018). *Human remains from Estark 1, Iran, 2018*. Bioarchaeology of the Near East, 12, 69–75.

Trebicka, J., Farnam, E., Dehpehlavan, M., Alinezhad, Z., Soltysiak, A. (2019). *Human remains from Qareh Tepe, Iran, 2017-2018*. Bioarchaeology of the Near East, 13, 126-135.

JSBS Journal of Sistan and Baluchistan Studies
Volume 1, Issue 1 (2021) 21-30
Doi: 10.22034/JSBS.2021.146217

A STUDY OF THE ARCHITECTURE AND URBAN PLANNING OF DAHANEH-E GHOLAMAN IN SISTAN, IRAN

Jamshid DAVTALAB[1]✉, Abolfazl HEIDARI[2] and Zahra SARABANDI[3]

[1] Assistant professor at the Department of Architecture, University of Zabol, Zabol, Iran, (Corresponding author: jdavtalab@uoz.ac.ir).
[2] Assistant professor at the Department of Architecture, University of Zabol, Zabol, Iran.
[3] Master student at the Department of Architecture, University of Zabol, Zabol, Iran.

Received: 05 September 2021 Accepted: 06 December 2021 Available online: 20 December 2021

Abstract: The Achaemenid architecture is a prominent example of the Achaemenid art. The Achaemenids were very interested in constructing palaces and terraces adorned with columns. The remains of these structures can be seen in Susa and Persepolis. Due to the expanse of the Achaemenid Empire and the extent of their political activities, they established satrapies at every corner of their empire to protect their lands. Dahaneh-e Gholaman (the gateway of slaves) is one of these satrapies, which is believed to have served as a political center in the Achaemenid Empire. Located in Sistan in the east of Iran, Dahaneh-e Gholaman is the only mudbrick city surviving from the Achaemenid Era. Traces of the Achaemenid architecture and urban planning can still be observed in the remaining buildings. This study sought to identify the features of the Achaemenid architecture in Dahaneh-e Gholaman using an interpretive-historical methodology. The findings show that, unlike other Achaemenid structures that are generally made of stone, clay was used to construct the buildings of Dahaneh-e Gholaman due to the availability of certain construction materials and the region's climatic conditions. In addition, unlike other Achaemenid structures which have flat roofs, the buildings constructed in Dahaneh-e Gholaman have domed roofs. This shows that the residents were very knowledgeable about the region's climatic conditions. Other elements of the Achaemenid architecture such as corner towers, apadana, military barracks, and columned halls are also present in Dahaneh-e Gholaman, all of which indicate the influence of the Achaemenid architecture and urban planning on this historic city.
Keywords: Achaemenid architecture, Dahaneh-e-Gholaman, Mudbrick City, Sistan.

چکیده: معماری دوران هخامنشیان از نمونه‌های بارز هنر دوره هخامنشی است. هخامنشیان علاقه زیادی به بنای کاخ‌ها و ایوان‌های ستوندار داشته‌اند که در شوش و تخت جمشید نمونه‌هایی از آن را می‌توان مشاهده کرد. با توجه به بزرگ بودن امپراطوری و مسائل سیاسی هخامنشیان، آن‌ها ساتراپی‌هایی در اقصی نقاط سرزمین هایشان می‌ساخته‌اند که به نوعی از سرزمین‌هایشان مراقبت کند. یکی از این ساتراپی‌ها که از مراکز سیاسی امپراطوری هخامنشیان بحساب می‌آید، دهانه غلامان در در شرق ایران واقع در سیستان است. دهانه غلامان تنها شهرخشتی باقی‌مانده از دوران هخامنشیان است که با در نظر گرفتن شرایط اقلیمی و بومی منطقه، کما بیش تاثیر معماری و شهرسازی هخامنشیان در بناهایش دیده می‌شود. این مقاله با روش پژوهش تفسیری–تاریخی با معرفی ویژگی‌های معماری هخامنشی و معرفی ساختمان‌ها، در پی یافتن ویژگی‌های معماری هخامنشی در منطقه دهانه غلامان می‌باشد. نتایج تحقیق نشان می‌دهد که بر خلاف دیگر بناهای هخامنشی که عموماً از سنگ ساخته شده‌اند، در بناهای دهانه غلامان با توجه به مصالح موجود و اقلیم منطقه، از خشت در ساختار بناهایشان استفاده کرده‌اند و بر خلاف معماری هخامنشیان که عموماً سقفها بصورت صاف و مسطح بوده در دهانه غلامان سقفها بصورت گنبدی شکل طراحی شده‌اند که خود نشانه آشنایی و علم مردمان آن زمان به اقلیم و محیط بوده است. همچنین عناصر دیگری از معماری هخامنشیان نیز مانند برج‌های گوشه‌ی، آپادانا، وجود پادگان نظامی در شهر، تالارهای ستوندار در معماری و شهرسازی دهانه غلامان به چشم می‌خورد که همه این‌ها نشانه وجود و تاثیر ساختار معماری و شهرسازی هخامنشیان بر شهر دهانه غلامان می‌باشد.

کلمات کلیدی: معماری هخامنشیان، دهانه غلامان، شهر خشتی، سیستان.

I. Introduction

Nowadays, knowledge, science, and research are the most important rails of progress and development in any society. In other words, research can directly produce science. Studying ancient societies, the life of our ancestors, and the process of formation of cities and their place in human history can be very beneficial. Each generation builds its history not on the ruins of its predecessors but on the achievements and developments made in the past. In order to know the social institutions and technologies of historic civilizations, one needs to study history. Knowing the history of a society can help us understand its culture and create an authentic identity for that society. Studying history helps humans better understand their society and avoid getting caught up in the turbulent currents of time. One of the important ways to know the history of our ancestors is to study the historical monuments and relics left by them. Ancient Iran saw the rise and fall of many empires in different periods, including the Achaemenids. The remains of this empire show that a great civilization once lived during the Achaemenid Era. The historical site of Dahaneh-e Gholaman is the only city that remains of that period (Sarhaddi-Dadian *et al.*, 2017). Examining the structure and buildings of this site can shed more light on the history of the Achaemenid Empire (Sarhaddi-Dadian, 2013).

Evidence shows that the formal Achaemenid architecture of Dahaneh-e Gholaman was influenced by the vernacular architecture of the region and the local climatic conditions. Dahaneh-e Gholaman holds great significance in archeological studies as it is a clear example of Achaemenid architecture and urban

planning. The fact that no other city remains of that era adds to the importance of this historic site. While the remains of the palaces in Persepolis, Susa, and Pasargadae also belong to the Achaemenid period, Dahaneh-e Gholaman is the only bona fide city that remains of that age. There is no other historic settlement with comparable expanse and architectural features such as districts, buildings, and applications that can be said to belong to the Achaemenid Era (Mohammadkhani, 2009). The orderly and accurate plan of Dahaneh-e Gholaman, the buildings, the public and religious spaces as well as the private areas of the city are indicative of the advanced urban planning utilized in the eastern half of the Iranian plateau during the Achaemenid Era (Mousavi Haji and Mehrafarin, 2009).

This study aimed to provide a better understanding of the architecture and urban planning of the historical site of Dahaneh-e Gholaman in an attempt to answer the following questions:

- How did the architecture and urban planning of Dahaneh-e Gholaman take shape and develop?
- How did the architectural characteristics of the Achaemenid Era affect the architecture of Dahaneh-e Gholaman?

I.1. Research background

Dahaneh-e Gholaman was discovered by Italian archaeologists in 1960 and was excavated from 1962 to 1965. These excavations were led by Umberto Scerrato, a member of the former International Association for Mediterranean and Oriental Studies (ISMEO) and a professor of archeology at the University of Naples and the University of Rome (Mohammadkhani, 2009). The second iteration of excavations in Dahaneh-e Gholaman began in 2000 by a group of archaeologists headed by Seyyed Sajjadi under the auspices of the then Cultural Heritage, Handicrafts and Tourism Organization of Iran (Seyyed Sajjadi, 1996b). Many reports and articles have been authored by Seyyed Mansour Seyyed Sajjadi about Dahaneh-e Gholaman. Hassan Ali Arab has also discussed this historic site in his articles and MA thesis published in 2005. A paper titled *The reflection of the natural conditions of the Sistan Plain in the Architecture of Dahaneh-e Gholaman* authored by Mahdi Keykhaei and published in 2015, a book titled *A Study of the historical geography of Sistan: from the Beginning of the 9th Century* AH authored by Mousavi Haji and Mehrafarin and published in 2009 and a book titled *Historical research on ancient Sistan* authored by Italian orientalist and historian Gherardo Gnoli and translated into Persian by Seyyed Mansour Seyyed Sajjadi in 2016 are among the published works that explore Dahaneh-e Gholaman.

II. Research methodology

The methodology of this study was interpretive-historical with a descriptive-analytical approach. In other words, the history of Sistan and Dahaneh-e Gholaman as well as the characteristics of the Achaemenid architecture were reviewed using the interpretive-historical method, and the architectural findings were expressed in a descriptive-analytical way. The required data were collected by library research and field surveys. The documents used to this end include old and new photographs, geographical maps, initial construction surveys, satellite images, historical texts, written works, etc.

III. History of Sistan

Sistan spans a large expanse of land in the southeast of Iran and the major portion of this region is in Afghanistan (Sarhaddi-Dadian et al., 2021). The ancestors of the current residents of Sistan, who have descended from the Scythians, were an Aryan tribe who, after a period of turbulent and migratory life in the east of Iran, settled in a land that was later called Sajistan or Sistan as it is known today. The region had an independent culture and civilization. During the time the Silk Road passed through Sistan, important cities, towns, kingdom centers, towers, and fortifications were built along the road. But strong winds have buried most of these structures throughout time. In a book titled *Ancient Iran*, proposes that while the west of Iran was influenced by the Babylonian and Greek cultures, the east of Iran has always been the core of the Iranian culture. Sistan was one of the centers of Zoroastrianism. The three sons of Zoroaster will emerge next to Hamoun in Sistan according to Zoroastrian beliefs (Kalbaali, 1996).

IV. Achaemenid architecture and urban planning

The Achaemenid architecture incorporates elements from different lands. The Achaemenids harmonized these elements and altered them based on the geographical requirements and local conditions of ancient Iran. They constructed their buildings on large platforms and raised the roofs of their structures on high columns. Platforms, large columns, corner towers, memorial gates, apadana, sculptures, and decorations are among the components of the Achaemenid architecture (Mohammadifar and Mirsafdari, 2014). Achaemenid palaces were initially asymmetrical and rectangular but they gradually became symmetrical and square (Motamedmanesh, 2018). The major characteristics of the Achaemenid architecture are as follows:

Placement: Choosing a place higher than the surrounding area with a commanding view was very important. Achaemenid buildings were designed in a way to impress the visitors from the moment of entering them.

A courtyard often lay before the entrance porches and two-sided stairs surrounded the central hall. Wooden or stone columns and side rooms connected to the end of the main hall by semi-dark spaces were a common sight. Using these columns had two advantages: the need for fewer pedestals and more roofed open spaces.

Decoration: The place and number of decorative elements in Achaemenid buildings corresponded to the rank and position of the owners. For example, the places that belonged to the king were elaborately decorated (Keikhaei, 2015).

Colors: Vivid, bright, and intense colors such as purple, azure, and green were commonly used to show the grandeur and glory of the Achaemenid Empire (Fotouhi Ghiam, 1995).

American orientalist and Iranologist Frye believed that the most important feature of Persian architecture was not the height of the columns or the delicate motifs, but the skillful use of spaces and platforms (Frye, 1998). The barrel arch later developed in Iran, paved the way for the construction of halls with large ceilings. During the Achaemenid Era, trade relations expanded and money-based business became common. Bazaars were established inside city walls for the first time and adopted a new role. A special design was implemented in building cities.

Achaemenid cities were built in strategic places and special attention was paid to environmental issues in their construction. Such considerations were unprecedented before the Achaemenid Era. Green spaces and gardens were incorporated into the body of these cities and buildings were raised based on the social class of the owners. In this period, the city became the place where the government was stationed. The function of the governments could go beyond the sphere of influence of cities and often corresponded to the power of the governments (Arab, 2005). According to Soltanzadeh (1983), garrisons were located inside Achaemenid citadels.

The city where the king dwelled was heavily guarded and well cared for. In addition, garrisons were often constructed inside the forts built in the middle of the city, around the citadel and the royal neighborhoods as well as the residential areas with high fences raised for protection.

V. Dahaneh-e Gholaman

Dahaneh-e Gholaman is located in the east of Iran, 2 km from Qalehno Village near Zahak City and 45 km from Zabol City (Fig. 1). It rests on a series of natural heights with a length of 1.5 km and a width of 300-800 meters, next to the dried delta of Senaroud. The remains of a few buildings and monuments belonging to the Achaemenid Era can be seen in the area. In the first half of the 1960s, an archeological team led by Italian archaeologist and Iranologist Umberto Scerrato excavated this area for three seasons and discovered grand buildings, including a temple (Gnoli, 2016). The area of the central section of the city is estimated to have been about 88 hectares and the whole city about 100 hectares (Seyyed Sajjadi, 1996b). The remains are scattered over land with a length of 1.5 km and a width of 300-800 meters. Similar to the ancient cities of Persepolis and Pasargadae, Dahaneh-e Gholaman is relatively higher than the surrounding areas (Scerrato, 1962).

The inscriptions of Darius the Great refer to this area as Zaranke. Zaranke was one of the four satrapies of the Achaemenids whose representatives offered gifts such as spears, shields, and cows to the king of Persia during the Nowruz celebration (Herodotus, 1957). The people of Zaranke fought alongside other Iranians in many wars and rushed to the aid of the Achaemenids when needed because of their shared characteristics such as religion, race, and language. Cyrus the Great named these people the Evergetáes (meaning "good") and exempted them from paying tax in appreciation of their help. When Cyrus the Great and his soldiers were starving in a desert, this tribe gave them 3,000 chariots filled with foodstuff (Pirnia, 1983). The Achaemenid inscriptions mention Zaranke as a state but do not mention the name of its cities. Nevertheless, the capital of this state was probably called Zaranke as well. The exact boundaries of Zaranke remain unknown but its neighboring regions were Gedrosia, Arachosia, Mecca, and Ariana. Ctesias, the physician of Ardashir II, mentions Zaria as a city close to the shores of Lake Hamoun, which was built by Darius the Great. During the reign of Darius II, Zaria fell to rebellion, and an independent government was subsequently formed (Mousavi Haji and Mehrafarin, 2009). The history of Sistan holds that when Alexander entered Sistan, he settled in a castle in the north of the region, which had been built by Kay Khosrow. Another castle built in the south of Sistan by Ardeshir I has also been mentioned (Anonymous, 1994).

Figure 1. The location of Dahaneh-e Gholaman in Sistan (by authors).

Gnoli (as cited in Azarniousheh, 1990) suggested that Nad Ali is the same pre-Achaemenid Zarin City which continued to exist during the Achaemenid Era but was probably not the capital and that Dahaneh-e Gholaman is the New Zarin City, which was built by the Achaemenids (more specifically Darius the Great) not far from the original Zarin (about 24-25 km) after they conquered the region.

Sistan bore other names during the Achaemenid Era including Zarangeh, Sarangeh, Zarangianeh Darangianeh, Darangis, Darangeh, Dardaneh, and Zarang (Olmstead, 1978). Studies show that Dahaneh-e Gholaman was built based on a specific plan to serve a specific goal during a relatively short lifespan as the city does not have various urban layers. It is perhaps the only city from the Achaemenid Era in which private homes were constructed alongside governmental and religious buildings. In addition, it is probably one of the few ancient sites on the Iranian plateau that contains valuable information about the informal and formal religious rituals and practices in ancient Iran (Mohammadkhani, 2009).

V.1. The name of Dahaneh-e Gholaman and the religion of its residents

The common religion in Dahaneh-e Gholaman was probably early Zoroastrianism or pre-Zoroastrianism practices. There is no consensus among historians as to what the religion was but the most accepted theory suggests that it was one of the common religions shared by both Iranians and Indians. Considering that Iran and India are geographically close to one another, this does not seem unlikely. During the Achaemenid Era, this city was known as Zarak or Zaranka, to which Greek historians have referred as Zarrineh. But it is not the same as Zaranj of the Islamic Era. There is disagreement among historians about the location of Zarak. The three locations often suggested in this regard are the Sorkh Dagh hills in Nad Ali in the Afghan part of Sistan, Dahaneh-e Gholaman near Chah Nimeh, and the ruins of the old Zahedan. Despite this difference of opinion, there is no fundamental difference between the related theories (Seyyed Sajjadi *et al.*, 2009).

V.2. Urban planning and architecture in Dahaneh-e Gholaman

The residential area of Dahaneh-e Gholaman is divided into two approximately equal parts connected by a long flat piece of land. The buildings of the western section are along a river while those of the eastern section collectively form a square with a total area of 200 m^2. Seven structures are especially prominent among these buildings, which might have had social, religious, or private uses. Regardless of the uses of these buildings, there is a large area in the middle section which is surrounded by porches or houses in some places. These buildings are different in terms of form but their structure is based on the same principles. All the buildings are square, lack a courtyard, and have a main foyer with columns and cubic or circular pillars in the central part. In the eastern section of the residential area, a very detailed plan has been implemented that bespeaks strict and regular governmental and administrative control (Scerrato, 1966a).

Although the cemeteries of ancient cities can be different in terms of the size of the graves, the type of burial, and the objects buried along with the deceased (based on their social class), there is no information available on this subject in Dahaneh-e Gholaman because no cemetery has been discovered in the city. A waterway divides Dahaneh-e Gholaman into a northern section which houses larger buildings used by aristocrats and a southern section which houses smaller buildings used by common people. The southern section, which itself has an eastern section and a western section, is divided into smaller lots with a precise arrangement and this remarkable order was implemented under the supervision of an overseer (Hojabri Nobari *et al.*, 2007).

The buildings of this city have been constructed based on a relatively accurate geometry. Because of the 120-day winds of Sistan blowing from the northwest to the southeast, openings, and entrances were made on the south side of the buildings, opposite to the direction

of the winds. The main walls are made of strong mudbricks and the rooms have right angles and arched roofs, utilizing the aesthetic principles of architecture (Seyyed Sajjadi, 2002). Although roofs were horizontal and flat in the Achaemenid architecture, the local architects of the ancient Sistan used arches to build roofs because of the climatic conditions of the region (Mariani, 1996). Table 1 shows the comparison of the architectural features of Achaemenid buildings with those of the buildings found in Dahaneh-e Gholaman.

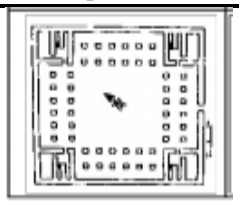
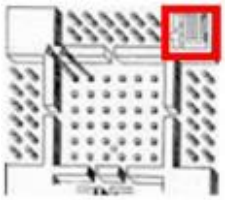
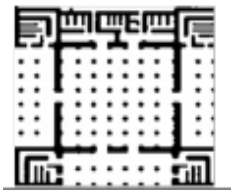
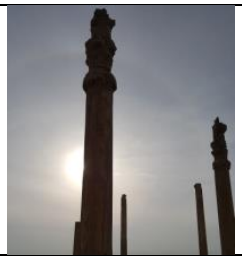
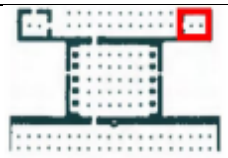
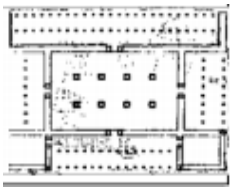
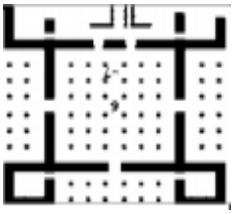
	Corner towers	Apadana	Columns	Platforms
Dahaneh-e Gholaman				-
Persepolis				
Pasargadae				
Susa				

Table 1. The comparison of the architectural features of Achaemenid buildings with those of the buildings found in Dahaneh-e Gholaman (by authors).

A total of 27 recognizable structures have been discovered in the excavations and surveys performed in Dahaneh-e Gholaman. These buildings are remarkable in terms of size, plan, room arrangement, and other architectural features (Seyyed Sajjadi, 2003).

The most important buildings in Dahaneh-e Gholaman can be classified into five groups (Fig. 2): (1) offices/government buildings: buildings no. 1 and 2, (2) religious buildings: building no. 3, (3) residential houses: buildings no. 4, 5, 6 and 7 (Dahaneh-e Gholaman is one of the few ancient sites belonging to the Achaemenid Era in which residential houses can also be found in addition to royal, public and religious buildings), (4) industrial workshops: building no. 15, (5) military area (Mohammadkhani, 2009).

The remains are divided into two groups of main buildings and several single buildings (Fig. 3). The 27 buildings are grouped into an eastern part and a western part.

The eastern part itself is divided into two equal sections. The remains stretch as far as the tomb of Zoroaster. Three buildings are located in the eastern part and five buildings are in the western part of the city. These buildings had religious, social, and public uses.

A large building (no. 3), some small and medium-sized buildings, and residential houses are located in the western part of the city. Large buildings, which served as barracks and had military applications, are in the southern section.

These buildings are about two kilometers away from the core section of the city.

The buildings used to have large walls approximately 200 meters long and 3-4 meters wide (Mohammadkhani, 2009).

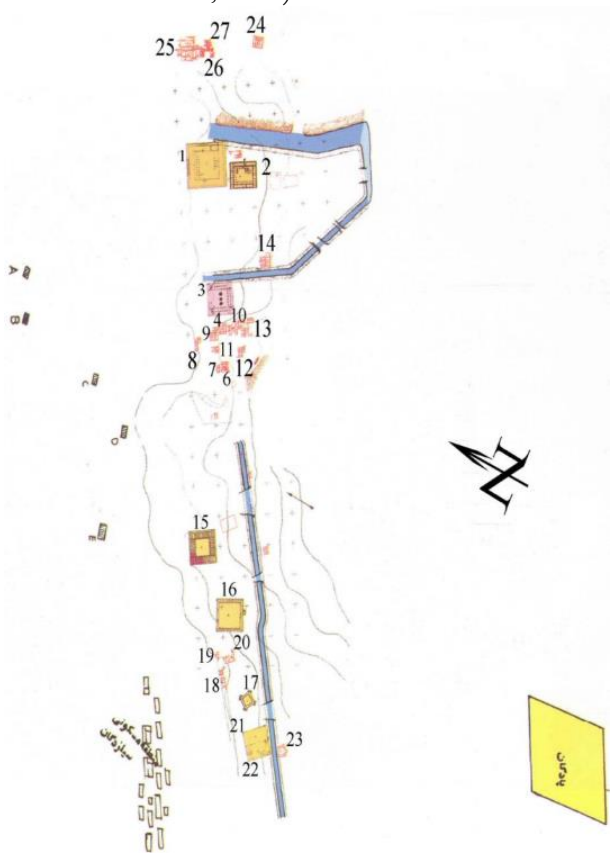


Figure 2. The dispersion of the buildings of Dahaneh-e Gholaman (Seyyed Sajjadi, 2003).

Figure 3. The dispersion of the buildings discovered in Dahaneh-e Gholaman (Mohammadkhani, 2009).

Building no. 1: This building had a general and public use. Similar to buildings no. 2 and 3, it had a large central courtyard with a porch, which was used for holding public and religious ceremonies. Its proximity to buildings no. 2 and 3 further strengthens this theory. The main use of the building has not yet been determined in the excavations (Seyyed Sajjadi, 1996a).

Building no. 2: This building (Fig. 4) has a size of 43x53 meters and has 45 main rooms and two annexed rooms (Mariani, 1996). Thick 1.2x1.2-meter square columns can be seen inside the building. It has been covered with a layer of mud. The courtyard can be accessed via a rectangular porch. The entrances are 50, 70, and 100 cm wide with platforms on both sides probably used for sitting (Mariani, 1996). Based on his comparison of the ceramics, Genito (1990) refers to this building as a treasure house. This building had a central courtyard that could be accessed through the entrances of the porch. Although the architectural style with which Genito has made comparisons is similar to the Achaemenid architecture of Dahaneh-e Gholaman, the design principles of the latter are based on the local climatic conditions in the sense that there is a courtyard in the center and a few rooms surround the courtyard with a minimal number of entrances and openings. Scerrato proposes that this building had public uses and compares its design with that of the hallways of Central Asia. He also proposes that the plan of this building is comparable to that of Persepolis (Arab and Khaledian, 2019). Both structures are large and square. Similar buildings with the same application have been found in Georgia (Knauss, 2001). A central courtyard surrounded by some rooms is a feature of the Iranian architecture observed in Susa as well (Velayati, 2010).

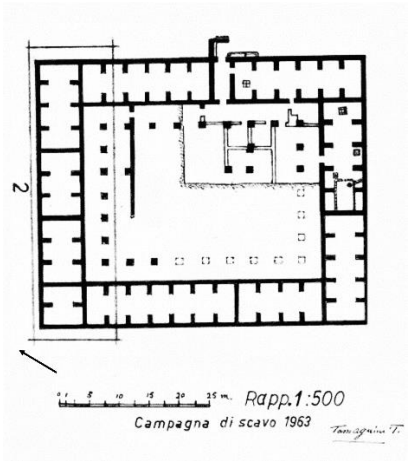


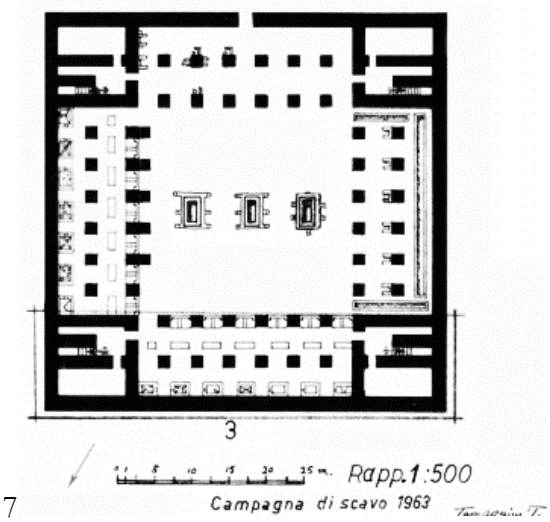
Figure 4. A photograph and the plan of building no. 2 (Mohammadkhani, 2009).

Building no. 3: This building (Fig. 5) is the most important building in the city. The existence of braziers,

fireplaces, altars, and platforms shows that this building was used for religious purposes (Seyyed Sajjadi, 2003; Scerrato, 1966b). The building is located on the eastern half of the water canal and two waterways separate it from the residential area and buildings no. 1 and 2. There is an entrance to the south and the central courtyard is surrounded by four unconnected porches. The excavations revealed that five columns had been reinforced with supporting piles (Scerrato, 1966b). These piles seem to have served as decoration, however, since no structural weakness has been found in the building (Seyyed Sajjadi, 1996a). The most important feature of this building is the columned porches, which were common in the Achaemenid architecture. This feature was very beneficial in the dry climate of the region. Oval arches have also been used in Dahaneh-e Gholaman. While brick arches have been discovered in the temple of Chogha Znabil and the presence of curved structures in Haft Tappeh hints to the use of this architectural technique back in the second millennium BC, the oval arches in Dahaneh-e Gholaman built in this way to be more compatible with the climatic conditions of the region are considered important because roofs were majorly flat in the Achaemenid architecture (Mohammadkhani, 2009). Another important feature of this building is the use of curved bricks (Mariani, 1996). A few steps can be seen in the corners of this building which were most probably used for accessing the roof because a second floor could not have existed considering the domed top of the building. In general, the residents of arid areas are not inclined toward raising their buildings high. They always build their yards lower than the level of the adjacent passage to protect themselves from the elements (Arab and Khaledian, 2019). Scerrato suggests that the characteristics of building no. 3 hint to a certain stage of an Indo-Aryan religion, which might have been the early stage of Zoroastrianism. Seyyed Sajjadi proposes that the religion practiced in Dahaneh-e Gholaman was probably one of the common Indo-Iranian religions in the region (Arab, 2005).

Building no. 4: Two rooms have been discovered in building no. 4 (Fig. 6). There is a column with a diameter of about 90 cm in the middle of one of the rooms which is probably the more important of the two. This building is rectangular and its dimensions are 22.20x15.60 meters (ISMEO, 1975). There is a small altar in the southwest corner. The plan of this building is very similar to that of building No. 6, both of which have much in common with the special Achaemenid structures on the terrace of Persepolis (Scerrato, 1966b). On a smaller scale, the building is similar to the house of a high-ranking person in Persepolis (Genito, 1990).

Buildings no. 5, 6, and 7: These buildings can be considered typical examples of private houses in the typology of Achaemenid structures. There are two square columns at the central section of building no. 5. One of the characteristic features of building no. 6 is a central hall surrounded by eight rooms. There is a pyramid-shaped brazier with stairs in the southeast corner of the main central space. Although this building is small, its form is similar to that of other urban structures in the city. Building no. 6 is located near Building no. 3 (a public shrine) and probably belonged to a religious leader. Similar to building no. 13, building no. 7 has circular columns in its central hall. Buildings no. 4, 5, 6, 7, and 13 have columns in the middle of their rooms, which was a common architectural feature of private houses at that time (Arab and Khaledian, 2019) (Fig. 7).



7

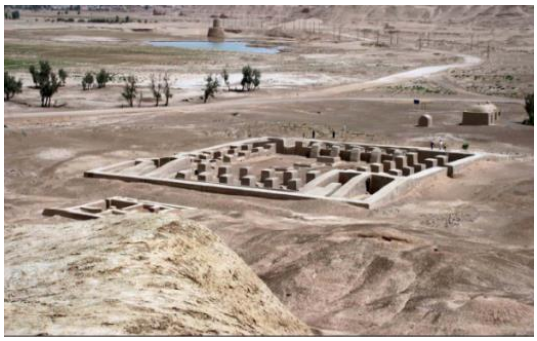


Figure 5. A photograph and the plan of building no. 3 (Mohammadkhani, 2009).

Figure 6. Building no. 4 (Mohammadkhani, 2009).

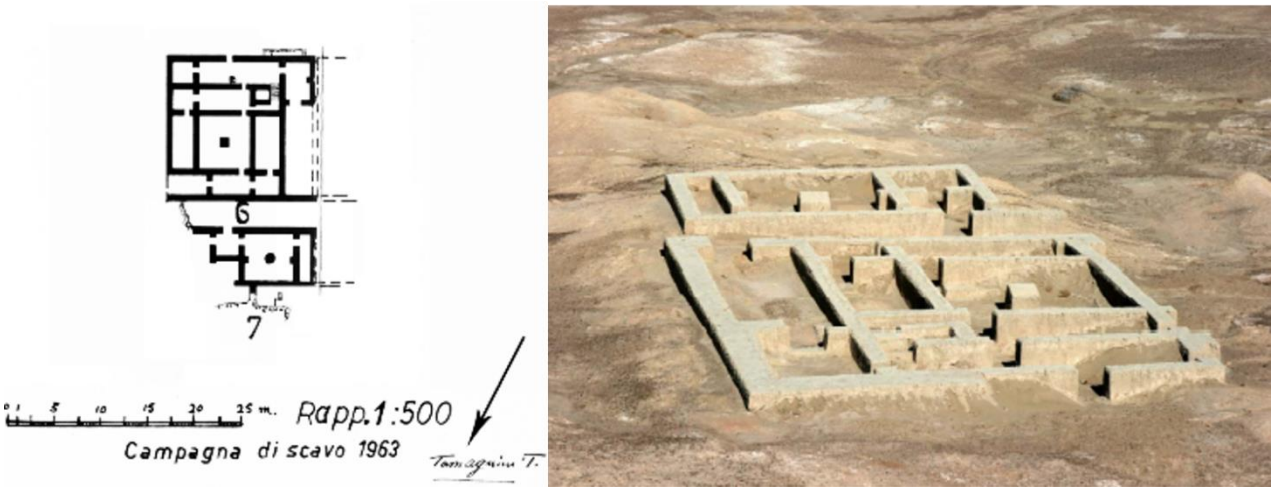


Figure 7. A photograph and the plan of buildings no. 6 and 7 (Mohammadkhani, 2009).

Building no. 15: This building has 36 rectangular rooms that surround a 50x50-meter central square courtyard. Six types of mudbricks have been used in this building, including a curved type (Seyyed Sajjadi, 2003). No skylight or window has been found in building no. 15. Narrow entrances connect the rooms of this building and to the courtyard (Seyyed Sajjadi, 2003). The roof of the first room of this building is believed to have been curved (Seyyed Sajjadi, 2004). Seyyed Sajjadi proposes that this building and Altyn Tepe 10 archaeological site in Turkmenistan and the sixth and fifth-century buildings in Central Asia that had religious and industrial uses have comparable similarities. The building has been built on a platform with a height of 50 cm on which clay-engaged pillars rise to the ceiling (Fig. 8). There is a small altar similar to the one found in building no. 3, which was used to bless religious objects and workshop products (Seyyed Sajjadi and Saber Moghaddam, 2003). If Scerrato's theory about one of the three altars in building no. 3 being devoted to Anahita is correct, it is very likely that the statue of a woman found next to the altar in room 25 is Anahita (Arab, 2005).

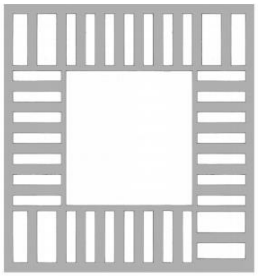


Figure 8. The plan of building no. 15 (Mohammadkhani, 2009).

The unique feature of this building is the presence of small clay pillars (Fig. 9). These pillars are hollow and are approximately 20-25 cm in size. The use of this space is not exactly known. However, the gaps between the clay pillars, the possibility of wind flow through the pillars, the low roof and the coolness of the corridors suggest that this building was probably a cold storage.

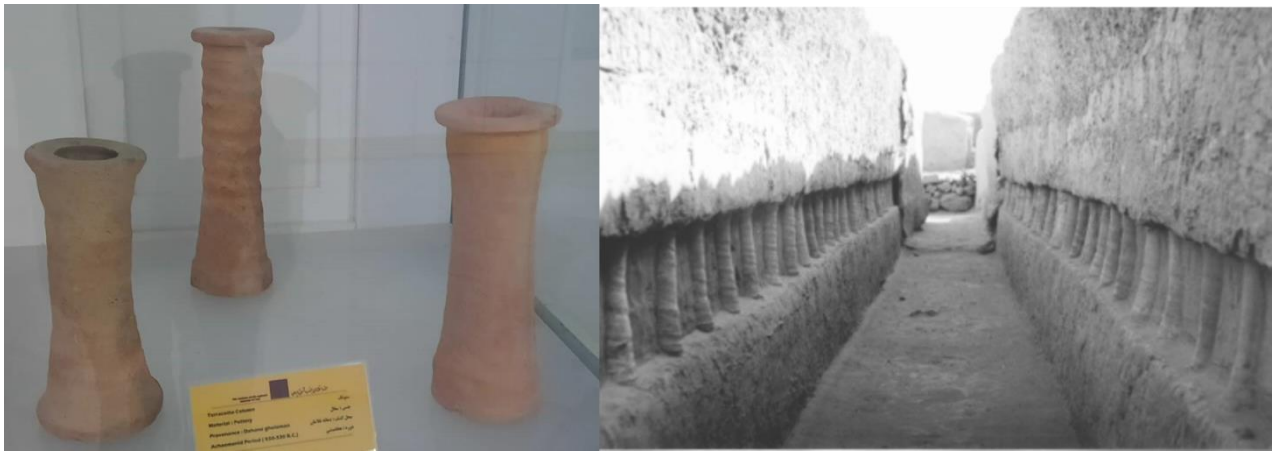


Figure 9. The small clay pillars in building no. 15 (Sajjadi, 2007).

Building no. 16: Scerrato found a brazier in building no. 16 (Fig. 10). The building is estimated to have been built in the 5th or 6th century BC. It is located near the large buildings of the site and is considered a medium-sized structure that most likely belonged to a special person such as a member of the nobility who was interested in religious matters. The origins of such a hierarchical structure of society can be traced back to the time when Darius expelled the inhabitants of the Elamite city of Susa to build his palace on the acropolis (Boucharlat, 2001).

Figure 10- Building no. 16 (Mohammadkhani, 2009).

Seyyed Sajjadi suggests that the explorations made in 1978 and 1979 in the margins and bed of the large pit now covered by the waters of Chah Nimeh revealed the remains of metal and pottery kilns, large bricks, ceramic objects, and pieces of molten metal. It seems that the main industrial area of the city is now buried under the waters of this pit (Seyyed Sajjadi, 2001).

While war and conflagration had no role in the decline and destruction of the city, storms, political decisions and the sudden drying of the river feeding the city were major reasons. Almost no significant object or artifact was found in the excavations of Dahaneh-e Gholaman. This may indicate that the residents had sufficient time to prepare for the evacuation (Mohammadkhani, 2009). This city had a very short life span of 150-200 years in the 5th and 6th centuries BC. Unlike many ancient settlements that gradually grew, developed and evolved from small villages to large cities, the construction of this city was planned beforehand based on specific goals. As such, it is a significant case for studying the Iranian architecture and urban planning during the Achaemenid Era (Seyyed Sajjadi, 2003).

VI. Conclusion

The Achaemenids built one of the greatest empires of the ancient Iran. Because of the extent of their ruling system and political factors, they established satrapies in all lands under their rule. Dahaneh-e Gholaman was one of these satrapies, which is located in Sistan in the east of Iran. It is the only mudbrick city that remains of the Achaemenid Era. Due to its political status, Dahaneh-e Gholaman is also the only Achaemenid city in which aristocratic, public, and political buildings can be seen next to residential houses. Unlike other Achaemenid establishments which were generally made of stone, the buildings of Dahaneh-e Gholaman are made of various types of mudbricks including curved ones due to the availability of this material. In addition, the roofs of the buildings are barrel arches, which is a unique feature since roofs were flat in the Achaemenid architecture. The dome-shaped roofs of the buildings in Dahaneh-e Gholaman were beneficial for the residents due to the environmental conditions and the arid climate of Sistan. Such architectural choice bespeaks the knowledge of the historic residents of Dahaneh-e Gholaman about the region's climate and shows that they were able to use the environment to achieve more comfort. The other features of the Achaemenid architecture such as corner towers, apadana, barracks within the city, and columned halls are also present in the architecture and urban planning of Dahaneh-e Gholaman, all of which point toward the influence of the Achaemenid architecture and urban planning on the city.

References

Anonymous (1994). *The history of Sistan: a rereading the texts of Jafar Modarres Sadeghi* (1st ed.). Tehran: Markaz Press.

Arab, H. (2005). *An archaeological approach to the structure and management of prominent Achaemenid settlements and the quality of adaptation of the development models of these settlements with natural capabilities: a case study of Dahaneh-e Gholaman in Sistan* (MA thesis) Tehran: Tarbiat Modares University.

Arab, H. and Khaledian S. (2019). Formation of urban architectural features of the Achaemenid period at the Dahan-e Gholaman. *Journal of Maremat & Me'mari-e Iran, 9*(19), 21-34.

Azarniousheh, A. (1990). *The historical geography of Sistan up to the end of the Mongol Era* (doctoral dissertation). Tehran: University of Tehran.

Boucharlat, R. (2001). The Palace and the Royal Achaemenid city: two case studies- Pasargadae and Susa, in I. Nielsen (ed.), *The Royal Institution in the First Millennium BC. Regional Development and Cultural Interchange between East and West* (Monographs of the Danish Institute at Athens 4): 113—123.

Fotouhi Ghiam, M. (1995). The transfer forms of the concepts and values of the Achaemenid architecture. *Proceedings of Iran's Architecture and Urbanism Congress* (vol. 2, 1st ed.). Tehran: Cultural Heritage, Handicrafts and Tourism Organization of Iran.

Frye, R. N. (1998). *The Ancient Heritage of Iran* (5th ed.) (M. Rajabnia, trans.). Tehran: Scientific and Cultural Publications.

Genito, B. (1990). The Most Frequent Pottery Types at Dahan-e Gholaman (Sistan) and Their Spatial Variability, Taddei, M. and Callieri, P. (eds.) *South Asian Archaeology 1987: Proceedings of the Ninth International Conference of the*

Association of South Asian Archaeologists in Western Europe, held in the Fondazione Giorgio Cini, Island of San Giorgio Maggiore, Venice, 2, 587—604. Roma.

Gnoli, G. (2016). *Historical research on ancient Sistan* (1st ed.) (S. M. Seyyed Sajjadi, trans.). Tehran: Pishin Pajouh Press.

Herodotus (1957). *History of Herodotus* (H. Hedayati, trans.). Tehran: University of Tehran Press.

Hojabri Nobari, A., Arab, H. and Noorghasemi, N. (2007). The Achaemenid city of Dahaneh-e Gholaman: its social hierarchy and classes. *Payam-e Bastanshenas Journal, 4*(7) 47—57.

ISMEO Activities (1975). *East and West New Series, 25*(3-4), 538—558.

Kalbaali, A. (1996). *The civilization of Shahr-e Soukhteh, its urban fabric and the development of human settlements*. Zahedan: Cultural Heritage, Handicrafts and Tourism Organization of Sistan and Baluchestan Province.

Keikhaei, M. (2015). The reflection of the natural conditions of the Sistan plain in the architecture of Dahaneh-e Gholaman. *Journal of Iranian Archaeology*, *5*(2), 66—83.

Knauss, F. (2001). Persian rule in the north Achaemenid palaces on the periphery of the empire, In Inge Nielsen (ed.). *The Royal Palace Institution in the First Millennium BC*. Aarhus: Aarhus University Press, 125—143

Mariani, L. (1996). *Reconstruction at Dahaneh-e Gholaman* (S. A. Mousavi, trans.). Tehran: Cultural Heritage, Handicrafts and Tourism Organization of Iran.

Mohammadifar, Y. and Mirsafdari, Sh. (2014). Studying the styles of Achaemenid architecture. *Journal of Studies on Iranian Islamic City*, 16, 19—28.

Mohammadkhani, K. (2009). *A report on the archaeological study of Dahaneh-e Gholaman in Sistan*. The Research Institute of Cultural Heritage, Handicrafts and Tourism Organization of Iran.

Motamedmanesh, M. (2018). Achaemenid imperial architecture: a symbol of technology and wisdom in antiquity. *Journal of Architecture Studies*, 13, 5—32.

Mousavi Haji, S. R. and Mehrafarin, R. (2009). *A study of the historical geography of Sistan: from the beginning of the 9th century AH* (1st ed.). Zahedan: Cultural Heritage, Handicrafts and Tourism Organization of Sistan and Baluchestan Province.

Olmstead, A. (1978). The imperial history of the Achaemenid Empire (M. Moghaddam, trans.). Tehran: Amirkabir Press.

Pirnia, H. (1983). *Ancient Iran* (vol. 2, 2nd ed.). Tehran: Donyaye Ketab Press.

Sajjadi, S. M. (2007). Wall painting from Dahaneh-ye Gholaman (sistan). *Ancient Civilizations from Scythia to Siberia*, 13, 129—154.

Sarhaddi-Dadian, H. (2013). *Archaeology of Sistan, Iran during the Achaemenian Empire (from 550 BC to 331 BC)* (doctoral thesis). National University of Malaysia.

Sarhaddi-Dadian, H., Moradi, H., Zuliskandar, R. and Purzarghan, V. (2017). X-Ray fluorescence analysis of the pottery shards from Dahan-e Ghulaman, the Achaemenid Site in Sistan, East of Iran. *Interdisciplinaria Archaeologica 8*(1), 35—41.

Sarhadd-Dadian, H., Zuliskandar, R., Moradi, H. and Jozi, Z. (2021). Compositional analysis of the pottery shards from Kuh-i Khawja historical site, Sistan, east of Iran. *Journal of Ancient History and Archaeology, 8*(1), 127—133.

Scerrato, U. (1962). A probable Achaemenid zone in Persian Sistan. *Journal of East and West*, 13, 186—197.

Scerrato, U. (1966a). A lost city in Sistan (Z. Nikubonyad, trans.). *Journal of Historical studies, 1*(5-6), 14—18.

Scerrato, U. (1966b). Excavation at Dahan-e Ghulaman (Seistan-Iran): first preliminary report (1962-1963). *Journal of East and West*, 16, 9—30.

Seyyed Sajjadi, S. M. (1996a). Dahaneh-e Gholaman: an Achaemenid city in Sistan-Part 1. *Journal of Archeology and History, 2*(10), 37—54.

Seyyed Sajjadi, S. M. (1996b). Dahaneh-e Gholaman: an Achaemenid city in Sistan-Part 2. *Journal of Archeology and History*, *1-2*(11), 43—52.

Seyyed Sajjadi, S. M. (2001). *Notebooks on Shahr-e Soukhteh 4: exploring an industrial workshop in Dahaneh-e Gholaman* (1st ed.). Zahedan: Sistan and Baluchestan University Press.

Seyyed Sajjadi, S. M. (2002). *Dahaneh-e Gholaman:2000-2001* (1st ed.). Tehran: Cultural Heritage, Handicrafts and Tourism Organization of Iran.

Seyyed Sajjadi, S. M. (2003). *A guidebook to the antiquities of Sistan* (1st ed.). Zahedan: Sistan and Baluchestan Management and Planning Organization.

Seyyed Sajjadi, S. M. (2004). *A report on the activities of the station of Shahr-e Soukhteh archaeological site: 1997-2007* (1st ed.). Tehran: Institute of Archaeological Research of the Research Institute of the Cultural Heritage, Handicrafts and Tourism Organization of Iran.

Seyyed Sajjadi, S. M. and Saber Moghaddam, F. (2003). Three images of Dahaneh-e Gholaman in the Achaemenid Era. *Archeology Journal of the Research Institute of the Cultural Heritage and Tourism*, 2, 11—25.

Seyyed Sajjadi, S. M., Sarhaddi-Dadian, H., Shirazi, R. and Moradi, H. (2009). *A collection of articles about Shahr-e Soukhteh 1*. Zahedan: Cultural Heritage, Handicrafts and Tourism Organization of Sistan and Baluchestan Province.

Soltanzadeh, H. (1983). *The process of formation of cities and religious centers in Iran*. Tehran: Nashr Agah Press.

Velayati, R. (2010). Influence Affiliated Nations Art on the Achaemenid Art and Architecture. *Journal of Bagh-e Nazar, 7*(14), 87—94.

JSBS Journal of Sistan and Baluchistan Studies
Volume 1, Issue 1 (2021) 31-48
Doi: 10.22034/JSBS.2021.146228

THE PRELIMINARY RESULTS OF THE ARCHAEOLOGICAL MISSIONS OF THE ITALIAN POST-EARTHQUAKE COOPERATION PROJECT AT ARG-E BAM, UNESCO WORLD HERITAGE SITE, IN COLLABORATION WITH ICHTO SINCE 2004

Michael JUNG[1] ✉ and Vincenzo TORRIERI[2]

[1] Museo d'Arte Orientale 'Giuseppe Tucci', Museo delle Civiltà, Roma, Italy, (Corresponding author: michael.jung@beniculturali.it).
[2] Soprintendenza Archeologia, Belli Arti e Paesaggio dell'Abruzzo, sede di Teramo, Italy.

Received: 22 October 2021 Accepted: 03 December 2021 Available online: 20 December 2021

Abstract: Immediately after the disastrous earthquake in 2003, ICHTO, together with UNESCO, ICOMOS, and ICCROM, set about planning for the recovery of Bam's cultural heritage. Italy was involved in the project from the very outset. The Italian Ministry of Cultural Heritage selected as project seismic improvement measures and restoration of the imposing tower n. 1 of its city walls. The assistance of archeologists during the work was of paramount importance to ascertain the very nature of the tower, in order to contribute to a correct methodology for consolidation and restoration. The sondage revealed a complex stratification of the monument, with at least five major building phases and numerous secondary phases due to secondary restoration and routine maintenance works consequent upon earthquakes and wars. Once the restoration was concluded, a new project was inaugurated in 2017, involving the excavation of Shator Galu/ or Tower n° 46. We supposed that the ruins of one ancient city gate were to be found beneath the debris of the fortifications that had collapsed during the earthquake. The preliminary findings of the new excavation and the stratigraphic analysis undertaken in collaboration with the Iranian team under the direction of Joodaki Azizi and Leila Fazel identified some important architectural elements of the ancient settlement. Starting from our supposition, the discovery of the northern and southern wing of the city gate in its last phase constitutes definitive proof of its existence. Other important discoveries include the partial excavation of a conduit, possibly part of the Shotor Galu mentioned in written sources. The resumption of the interrupted excavation, much to be desired, could shed new light on the ancient history of Arg-e Bam.
Keywords: Bam Post-Earthquake restoration, Italian-Iranian mission, excavation, tower n° 1, western bastion, city gate.

چکیده: بلافاصله پس از زلزلهٔ فاجعه‌بار سال ۱۳۸۲، سازمان میراث فرهنگی، صنایع دستی و گردشگری به همراه یونسکو، ایکوموس و ایکروم جهت مرمت میراث فرهنگی بم برنامه‌ریزی کرد. کشور ایتالیا از همان ابتدا با این پروژه همکاری داشت. وزارت میراث فرهنگی ایتالیا پروژهٔ اقدامات بهسازی لرزه‌ای و مرمت برج شمارهٔ ۱ حصار شهر را انتخاب کرد. کمک باستان‌شناسان در طول پروژه برای تعیین ماهیت برج بسیار مهم بود، تا با روش‌شناسی صحیح به تحکیم و مرمت بنا کمک کند. گمانه‌ها، لایه‌نگاری پیچیدهٔ بنا را آشکار کردند. در طول این پروژه حداقل پنج فاز ساختمانی اصلی و تعداد فراوانی فاز ثانویه شناسایی شد که این بازسازی‌های ثانویه و کارهای معمول مربوط به نگهداری بنا به خاطر زلزله‌ها و جنگ‌ها بوده است. پس از اتمام مرمت، پروژهٔ جدیدی در سال ۱۳۹۶ آغاز شد که شامل کاوش شتر گلو یا برج شمارهٔ ۴۶ بود. گمان ما بر این بود که خرابه‌های یک دروازه شهر باستانی در زیر آوار استحکاماتی که در اثر زلزله فرو ریخته بود، پیدا شود. نتایج اولیه کاوش جدید و تحلیل لایه‌نگاری با همکاری گروه ایرانی و به سرپرستی جودکی عزیزی و لیلا فاضلی انجام شد، که برخی از عناصر مهم معماری مربوط به استقراری باستانی را شناسایی کردند. یافتن بال شمالی و جنوبی دروازهٔ شهر در فاز آخر آن با فرض ما آغاز شد و در نهایت دلیل قطعی وجود آن اثبات شد. دیگر یافته‌های مهم شامل کاوش بخشی از یک کانال یا مجرای آب بود که احتمالاً قسمتی از یک شترگلو است که در منابع نوشتاری به آن اشاره شده است. از سرگیری کاوش‌های منقطع که مد نظر ما است، می تواند تاریخ باستانی ارگ بم را روشن کند.
کلمات کلیدی: مرمت بم پس از زلزله، هیئت ایتالیایی– ایرانی، کاوش، برج شمارهٔ ۱، استحکامات غربی، دروازهٔ شهر.

I. Introduction

On 26 December 2003, early in the morning, a devastating earthquake of 6.5 on the Richter scale shook a large area of the Kerman province. Half of the population of Bam died, New Bam was destroyed, and Old Bam (Arg-e Bam) was reduced to a mere heap of rubble (Fig. 1)[1].

The international community responded quickly, not only to address the human tragedy but also to take steps for the endangered cultural heritage. Arg-e Bam is not only a tourist destination, but also an essential part of the Iranian past with a role in the present, and so a symbol of its history, a landmark of the local and national sense of identity, and indeed a source of interest and pride. Therefore, together with the Iranian Cultural Heritage Organization (ICHTO), *UNESCO* set about planning for the recovery of Bam's cultural heritage. In 2004, Bam and its landscape were entered into *UNESCO*'s World Heritage List[2].

Italy was involved in the recovery project from the very outset. The first Italian mission visited the ruined site only six days after the disaster[3].

[1] Documentation…2004, Vatandoust and Mokhtari, 2004.
[2] Bam Citadel (Iran) n° 1208, ICOMOS Evaluations, Addendum, WHC-04/28. COM/Inf. 14A ADD, 2004, 27-38. https://whc.unesco.org/uploads/nominations/1208bis.
[3] Bosi, Naso, and Lai, 2003.

The Iranian authorities asked for help and proposed different structures to be studied and recovered. Restoration of tower n° 1 of the city wall and seismic improvement measures were selected as the basis of the Italian post-earthquake cooperation project (Figs. 2 - 4)[4].

Figure 1. Arg-e Bam after the earthquake.

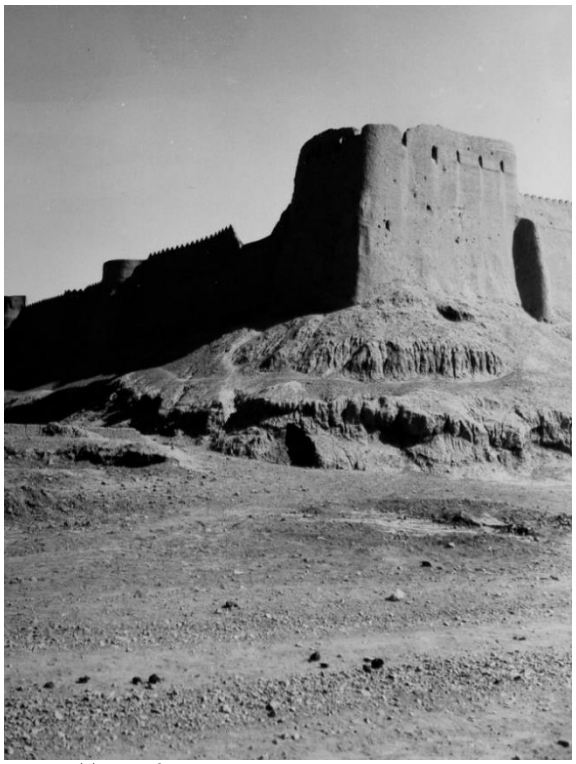


Figure 2. Tower n° 1 before the disaster, photographed in 1965 (Graziani, archive IsIAO, MAO, n° 4608 11).

Figure 3. The tower after the calamity.

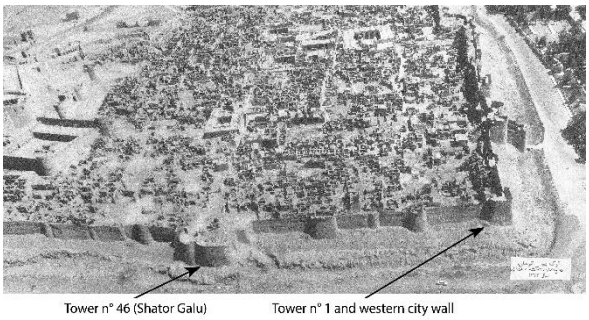


Figure 4. Aerial photo of Arg-e-Bam (archives Bam, ICHTO).

[4] On the restoration project, see Lolli Ghetti, 2005; *La cittadella* … 2005; Proietti, 2007; Tavan, 2010; Prosperi Porta, 2012; Proietti *et. al.*, 2013, 73.

The *Tower n° 1 project* was organized by the *Italian Ministry for Cultural Heritage/Department of Research, innovation and organization*. The planning and implementation of the work was entrusted to the *Istituto Centrale di Restauro* (ICR), coordinated by Gisella Capponi and Mario Lolli Ghetti in collaboration with Eskandar Mokhtari, then Director of the *Iranian Cultural Heritage & Tourism Organization/ Bam*. On 5th October 2011, the Italian Mission was able to formally hand over the finished project of restoration to the Iranian authorities (Figs. 5-7).

Figure 5. The tower was during restoration work in 2007.

Figure 6. The restored tower, west side.

Figure 7. Commemorative plaque recording the restoration project.

II. Research background of the first project: Tower n° 1

Here, on the occasion of the Zabol Conference, only the archaeological research of the Italian project is discussed.[5] The results of the archaeological studies were used to verify the presence and nature of discontinuities in the tower structure to draw up a plan for coherent consolidation and seismic improvement works.

During the site investigations, it was found that Tower No. 1 (following the numbering assigned by the Iranian authorities to each of the towers around the city wall) was the result of a complex stratification, having been built over a number of phases, with varying degrees of importance. The modifications were carried out given functional changes or destruction caused by natural or man-made events. Each of these transformations modified not merely the shape and external appearance of the tower, but also its internal structure. As well as contributing towards a correct methodology for the consolidation and restoration works, the investigations were geared towards a more detailed understanding of the structure, to place it correctly within its historical context.

In addition to a form of preliminary reconnaissance, the aim of the first three brief archaeological missions (2004-2005) was to outline an initial stratigraphy of the wall structures of the tower that could be identified without excavation[6]. Based on the wall structures that could be observed on the surface, it was assumed that the tower, in the form it took before the earthquake, was the result of several construction phases, as well as numerous repairs which progressively increased the size of the original core of the structure. The reconstructions appear as a series of juxtapositions or enlargements, with the aim of containing and stabilizing the pre-existing structures around the internal core, towards the outside.

The first result of our studies was a hypothetical model of the monument during its various phases (of which at least five major phases have been identified, in addition to secondary restoration and routine maintenance works).

In order to verify the development model we had arrived at, in collaboration with Narges Ahmadi and Mehdi Keramatfar of the Bam ICHTO organization, we carried out various investigations in 2006-2007 to bring light to bear on certain specific problems. Even though our excavation was limited in extent, it was found to be useful not only for a clearer picture of the monument but also for planning and conservation works.

III. Survey and excavation

As proposed during the 2005 mission, the trial pits (Fig. 8) effectively enabled the identification of the elements of the earliest construction phases.

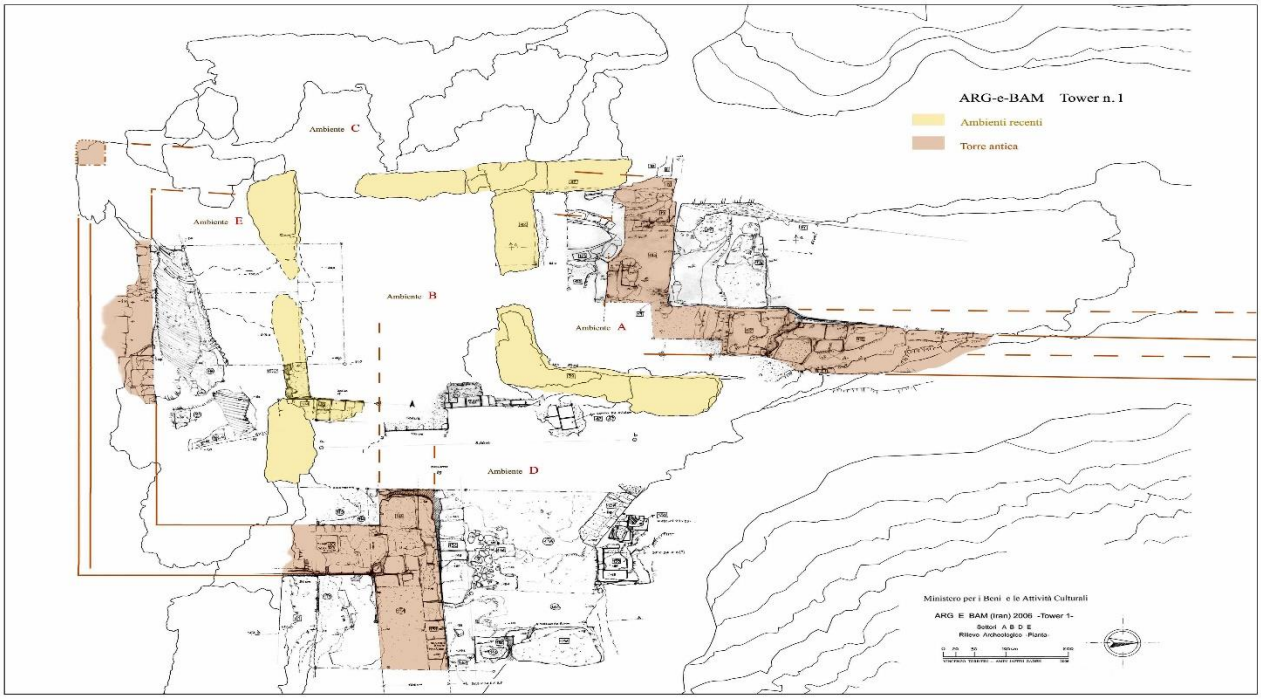


Figure 8. Plan of tower n° 1. In brown, tracing of the ancient tower and adjoining city walls (plan Vincenzo Torrieri).

[5] See our previous publications: Callieri *et al.* 2005; Jung, Torrieri, Ahmadi, 2008; Jung, Torrieri, 2010; Jung, Torrieri, Ahmadi, 2010; Jung, Torrieri, 2013.

[6] Pierfrancesco Callieri, Gianfranco Conti (in 2004), Anna Filigenzi and Danilo Rosati (in 2005) also participated in the research of the Mission of the Italian Ministry of Cultural Heritage.

The discovery of the southwest corner of the oldest tower (previously missing from our evidence) enabled the definition of a complete layout. (Figs. 9-11) It was also possible to discover a short section of the city wall connected to the ancient tower, and it was seen that the original defensive system had been moved backward with a slight modification to the alignment. (Fig. 12).

The oldest tower is rectangular in plan; it was built with regular layers of mud bricks, protruding approx. 3.80 m concerning the relative city wall. However, even older wall structures may exist. Note that the trial excavations have reached an average depth of no more than 70 cm, but this is still sufficient to understand the extreme complexity of the construction history of the tower, which had mostly remained buried under the rubble, and is now hidden by the restoration work.

Figure 9. Southwest corner of the ancient tower (US 97) highlighted in brown.

Figure 10. Southeast corner of the tower (US 40)Figure 11 – North wall of the tower (US 19).

Figure 11. North wall of the tower (US 19).

Figure 12. Section of southern city wall adjoining the ancient tower (US 131).

The archaeological trial excavations have also enabled documentation of historical traces of earthquakes at various points in the tower. A negative stratigraphic phase, characterized by the collapse of structures during an earthquake before that of 2003, was discovered at various points. (Fig. 13) It is also possible that the collapse of the vault in room E to the south, and possibly also the collapse of the western walls during the earliest phase so far identified within the tower n° 1 site, were caused by the same event, the disastrous consequences of which called for consolidation of the foundation base and complete reconstruction of the upper parts of the tower. Even though, as far as has been seen to date, there is only one reference to earthquakes in the historical and documentary sources[7], the archaeological evidence

[7] As serious doubts have often been raised about the occurrence of earthquakes in Bam in historic times, it is worth quoting the source. Under the date of 22nd, 23rd 1866 of his diary Goldsmith (1867, 284) writes: *The old city, now the fort, is a mass of ruins, but the walls are in a good state of preservation…Pottinger observes that until the expulsion of the Afghans, this was held to be the frontier town of Persia on the south-east. His description is now sixty years old…Since he wrote, it has been the scene of an international struggle, which added to an* ***earthquake****, resulted in the almost utter destruction of the town within the walls. Nearly thirty years ago the Commander of the Shah's army besieged there, the well-known Agha Khan Mehlati, then a rebellious Governor of Kirman….*

seems to suggest that earthquakes have occurred several times in the history of Bam. The new seismological and technical studies of the structures brought to light could confirm this evidence.

Figure 13. Negative interface (US 106) from pre-2003 seismic event documented near the southern walls standing on the eastern side of the ancient tower.

Another interesting feature was the vaulted roof unearthed in the buried room in the south of the tower. The construction technique shown by the vault complies with the Iranian cultural model: with sloping layers of mud bricks, and with a parabolic curve inclined at approximately 20°, to provide support during the construction phase (Figs 14-17)[8].

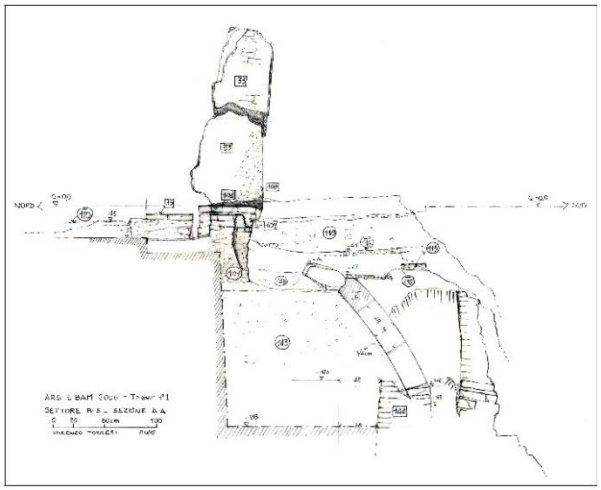


Figure 14. Cross-section of vault of south room E in II phase of restructuring of the ancient tower (US 2, design Vincenzo Torrieri).

Figures 15. Vault of south room.

Figures 16. Vault of south room.

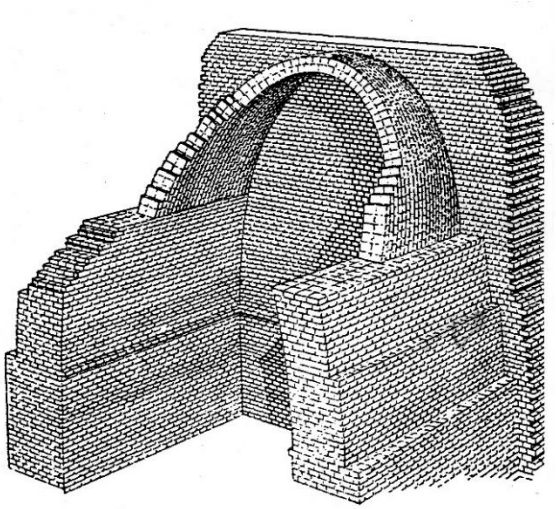


Figure 17. The "Iranian" or "Egyptian" vault (after Galdieri 1982: fg. 39).

Pottinger's report was published in 1816. The siege of Āqā Khan Maḥallātī took place in 1840-41 (or, rather, 1837-8 according to Adle, 2006, 61). A part of Bam had been damaged and was reconstructed or (restored) by Abasqoli Khan Kort in 1843 (or some years earlier). Thus, we can deduce that a strong seismic event took place between the siege and 1866, the year of Goldsmid's visit.

[8] Cf. Van Beek, 1987.

The techniques applied in construction of the tower, which have been observed and documented, are as used for mudbrick structures and a particular type of pisé: walls with regular layers of bricks bound with a colloidal mortar, supported on large overlying base segments, made from progressive casting of mud, and raised without the use of formwork or wooden scaffolding.

The external extensions of the tower consist of a system of parallel walls with filling between them (the *muro a sacco* technique) resting on the pre-existing structures. The oldest bricks are larger (36.5 x 36.5 x 9.5 cm), whilst the more recent ones are smaller (22 x 22 x 4.5 cm).

A section of the western wall, on the north-west side of the tower, represents a major departure from the construction techniques generally used at Bam (Fig. 18). It is a wall, now further out and exposed during the last earthquake, made on a row of roughly worked reclaimed stones, one of which, showing a chiseled finish, appears to be a discoidal millstone with a conically shaped central hole (although the thickness of the piece and the cross-section of the hole may justify some doubt about this use). The row of stones constituted the impost wall of a third mudbrick vault found within the western city wall. To our present knowledge, the technique shown by this wall represents an exception at Bam.

Figure 18. Section of west city wall with vault impost made with reused building materials.

The investigation carried out on the rampart of the city wall (*agger*), over a length of 20.0 m at a short distance from the tower (at approx. 2.5 m), brought to light the phases of growth of the external embankment, formed with a slope with the aim of reinforcing the fortification towards the trench downstream (Fig. 19). The phases in the cladding of the outer surfaces have also been documented; it was performed to even out and consolidate the outer profile, following collapses and slipping of the rampart. The need for these reinforcements probably arose after a violent earthquake before the 2003 tremor.

Figure 19. Excavation of the city wall rampart.

The investigations carried out on the trench of the city wall revealed a stratigraphy of scour in a northern direction (Fig. 20). The layers with a sterile silty-sandy matrix failed to show the remains of organic and human activities we had hoped to find.

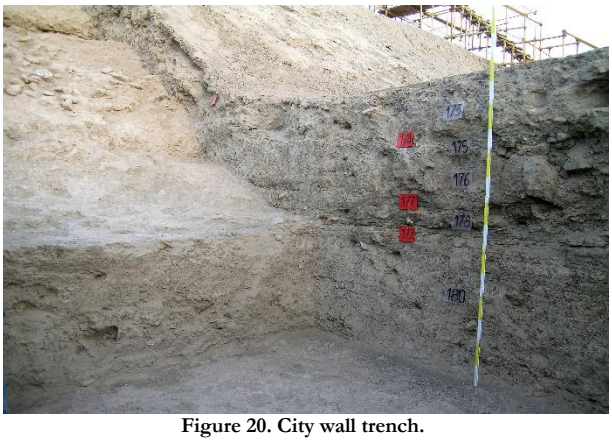


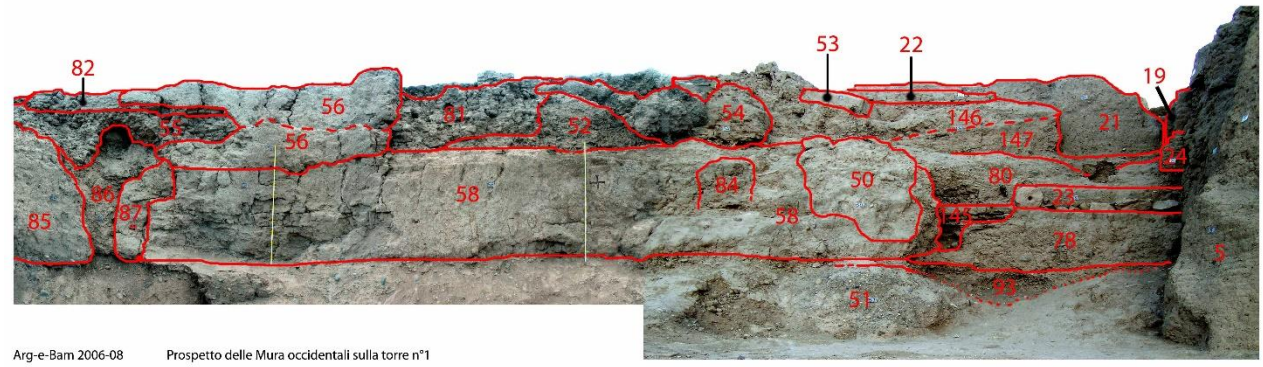
Figure 20. City wall trench.

A most interesting discovery was made in the form of a cross imprinted on the outer kaghel cladding of the Western Wall, not far from the Tower (Figs. 21-22). It is a – probably Nestorian – cross with four arms of equal length (about 24 cm each), imprinted on a wooden or metal matrix. The location and chronology of the find are important for the history of the City of Bam and this territory.

Figures 21. West city wall with cross symbol incised in mud brick to the right of the folding ruler.

The section of the wall on which it was found belongs to a relatively early phase in the life of the wall, which was later incorporated into the last phases of expansion and consolidation of the entire fortification.

The cross, together with a small portion of the wall, was removed[9] to protect it and keep it safe; it is now stored in the restoration workshops (Fig. 23).



Figures 22. West city wall with cross symbol incised in mud brick to the right of the folding ruler.

[9] On the removal and consolidation of this find, see Mohseni, Bagheri Zadeh, Zarghani, 2008.

Figure 23. Removal of the cross motif by the Iranian restorers.

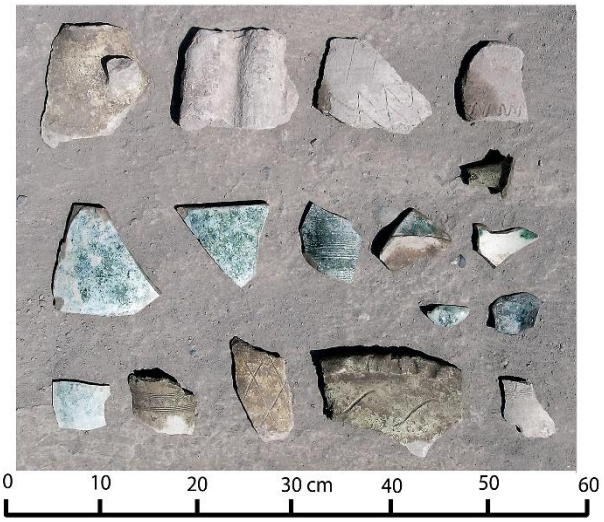
The symbol of the Nestorian cross was also identified on several ceramic fragments discovered later during surveys within the city walls; as far as we know, these finds represent the first evidence of a Christian presence in Bam and the entire region (Figs. 24-25).

Figures 24. Shards with Nestorian cross pattern.

Figures 25. Shards with Nestorian cross pattern.

Amongst the finds and materials discovered during the investigations, there were iron arrow tips, one of which in particular, given its size and weight, would appear to be the tip of a crossbow arrow (?) (Fig. 26). The ceramic fragments, glazed and un-glazed, may be placed within a broad chronological range, starting from the late Achaemenid period (Figs. 27-28).

Figure 26. Arrowheads, the left one probably from a crossbow.



Figures 27. Pottery fragments found during the excavation.

Figures 28. Pottery fragments were found during the excavation.

IV. Research background of the second project: Tower n° 46 (*Shotor Galu*)

As our archaeological work was largely limited in favor of the main goal of the Italian Mission, i.e. restoration of the tower, it proved impossible to extend the excavation and to determine a chronology for the various documented construction phases of the tower. It was therefore proposed, in agreement with the Iranian authorities, to carry out a new archaeological project which should also yield further data for a better understanding of the tower n° 1 building phases.

The area of the huge tower 46 (*Shotor Galu*) was chosen together with the late Charyar Adle as the new site to be excavated (Figs. 29-30).

Figure 29. West side of tower n° 46 (Shotor Galu) before excavation.

Figure 30. East side of the tower seen from the inner city before excavation.

With Adle, we supposed that the ruins of a former ancient city gate must lie beneath the remains and debris of the collapsed fortifications left by the 2003 earthquake. This site constitutes a focal point within the city walls. It is aligned with one of the major road axes of the settlement, exactly in line with the East-West direction (Fig. 4).

At this point it will be useful to take a general look at the map of Bam[10] (Fig. 31). We can easily distinguish three main parts, also in the light of the descriptions by Arabian and Iranian geographers like al-Iṣṭakhrī, al-Muqadassī, Ibn Ḥawqal, Yāqūt or Ḥamdallāh Mustawfī.[11] We have a citadel (*arg* or *ḥiṣn*) on a natural hill, the seat of the Government Quarters and center of the administration, a circumvallated inner city (*qal'a, medina* or *sharistān*) with the bazaars and the better living quarters in which are also integrated the Friday Mosque, and an outer city (*rabaḍ*) with the modest dwellings, craftsman's establishments, and orchards. A third additional wall also protected this part of Bam.

10 On the history of Bam, see the following publications: Lockhart, 1960; Nurbakhsh *et al.*, 1355/1974; Bastani Parizi, 1989; De Planhol, 1989; Jung, Torrieri, 2010; Tayari, (n.d.). The best and most comprehensive study on the history of Bam is still Adle, 2006.

11 On the sources in Arabian and in Persian, see Adle, 2006 and Jung, Torrieri, 2010.

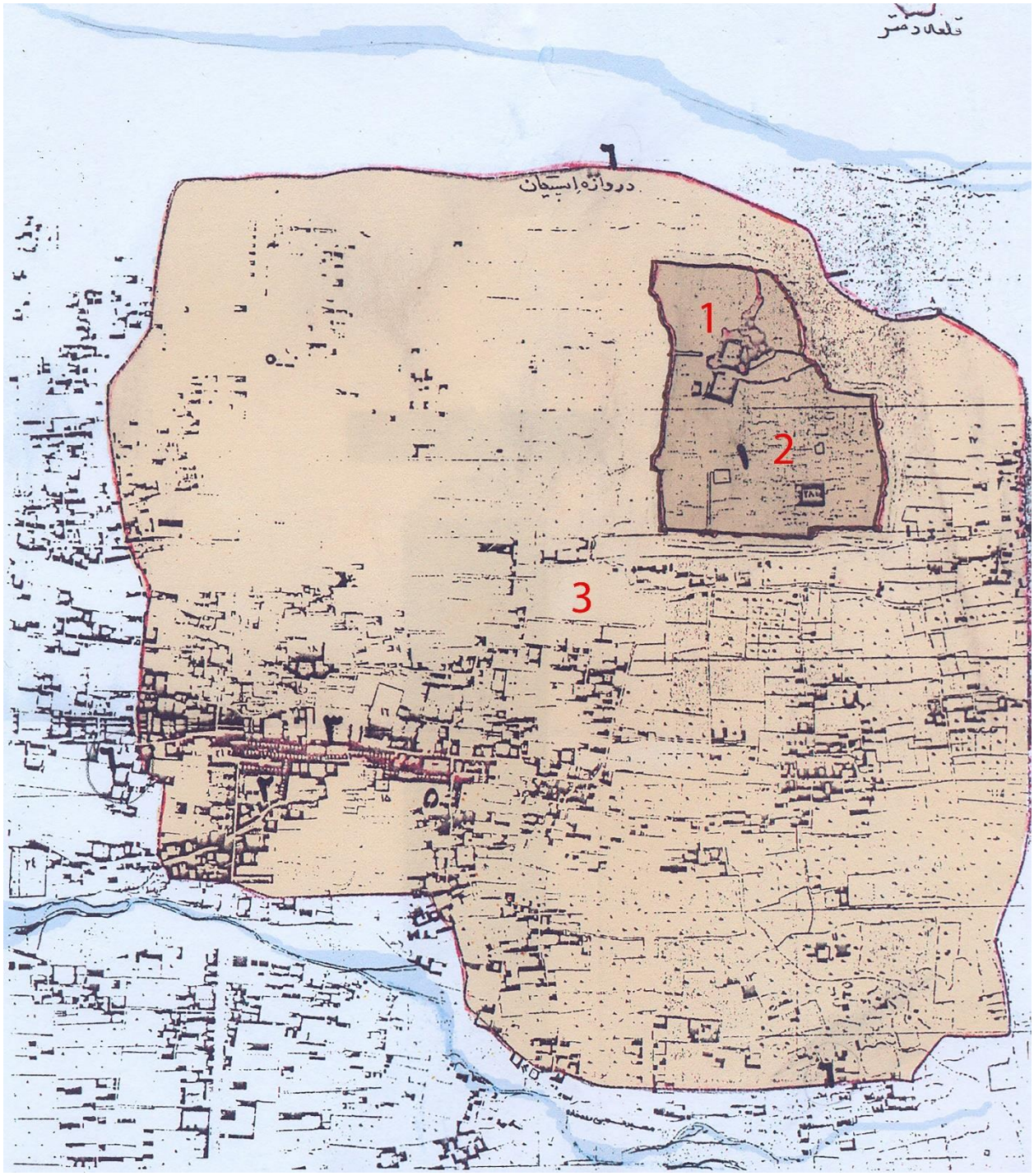


Figure 31. Plan of ancient Bam, with arg (1), sharistān (2), surrounded by internal walls, and rabaḍ (3) enclosed by the external walls (sharbast) (plan after Tayari 2006).

Thus we can identify in Bam the typical tripartite division of the ancient and medieval towns of Central Asia, going back to the most ancient traditions of Khorāsān and Khwārazm[12] (Figs. 32-33). This partition of a town in three separate parts is thought by some researchers to reflect a social order based on the economic-productive organization of a feudal system.

[12] There is ample literature on the urbanism of Central Asia; see, e.g., Jakubiak, 2006; Rante, 2008, Leriche, 2009.

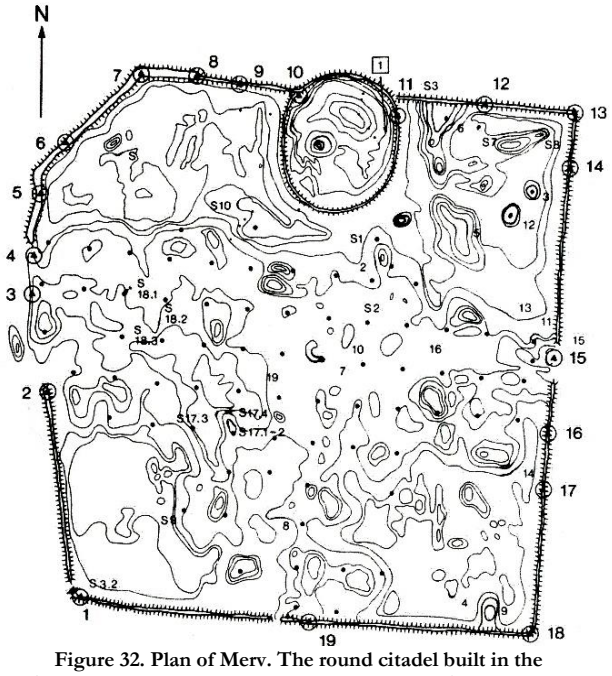


Figure 32. Plan of Merv. The round citadel built in the Achaemenid period, the rectangular layout of Gyaur Kala of Hellenistic design (after Rante 2008: 197, fig. 9).

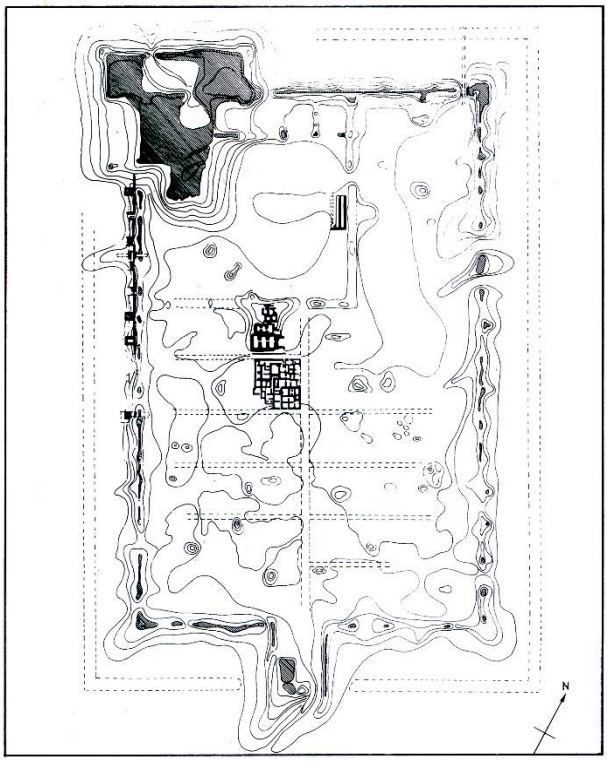


Figure 33. Plan of Toprak Kala, built by Artabanos, ruler of Khwarezm, in the second half of the 2nd century AD (after Cuneo 1986: fig. 111, p. 70).

The circumvallated inner town measures about 425 x 300m and is rectangular in form. Its city wall follows the cardinal points (Fig. 34). The walls are very tall and massive, reinforced by 52 sturdy towers.

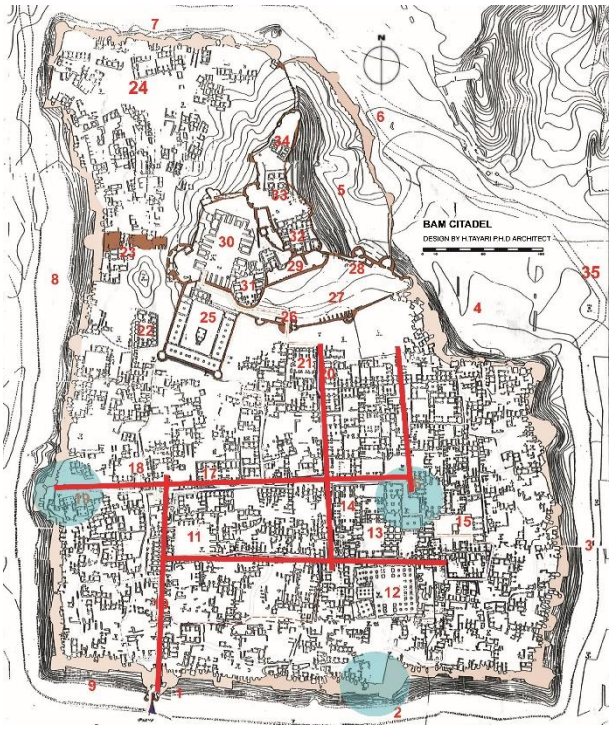


Figure 34. Plan of Arg-e Bam. In red is the main street axis, and the two upper circles in light blue corresponding to the west city gate and the presumed east city gate. The lower circle indicates the position of the supposed ancient southeast tower (modified plan after Tayeri 2006).

Nowadays there are only two city gates in the south wall. The main SN axis of the *sharistān* departs from the main gate set in the SW section of the wall. However, Heinz Gaube had already conjectured the existence of two further city gates in the past, positioned in the West and East walls, indicated on his plan with a question mark. About this conjecture, he mentioned the author al-Muqaddasī (who wrote around 985). This author recorded that Bam had four city gates:

… The fortress (ḥiṣn) has four gates: Bāb Narmāsīr, Bāb Kūskān, Bāb Asbīkān, Bāb Kurgīn. In the center, the citadel (qal'a) rises …[13]

The late Paolo Cuneo[14] discussed Arg-e Bam briefly in his handbook of Islamic urbanism published in the 1980s. He suggests possible identification of an urban installation of Alexandrine-Seleucid type in the approximately regular road network of Bam, with city quarters (of the *insulae* type) subdivided by streets and paths arranged in axial alignment. The main road axis started from the main city gate of Bam. We may recall here – about a possible Hellenistic settlement at Bam – the recent find of shards of common pottery with Greek inscriptions in the southern part of the Bam fault.[15] These shards testify to the activity of Greek potters in the Bam area (Fig. 35).

[13] al-Muqaddasī, 465.

[14] Cuneo, 1986, 67, note 14, 279-282, figs. 376-379.

[15] Zare, 2007.

Figure 35. Shards with Greek inscriptions were found in the Afrāz fault, ca. 25km south of Arg-e Bam giving the names of Dionysios and […]nois (after Sharam Zare 2007: 119).

In 2006 Chahryar Adle[16] dedicated a chapter to the early history of the citadel in his essay on the *Qanats of Bam*. He, too, defines its general plan as a Central Asian one inspired by Hellenistic forms, with its rectangular layout in contrast to the circular or irregular plans of the neighboring provinces. As a comparison to Bam, he cites a number of cities such as Delverzin Tepe, Kerk Tepe, or Herāt, the Alexandria in Aria (Fig. 36).

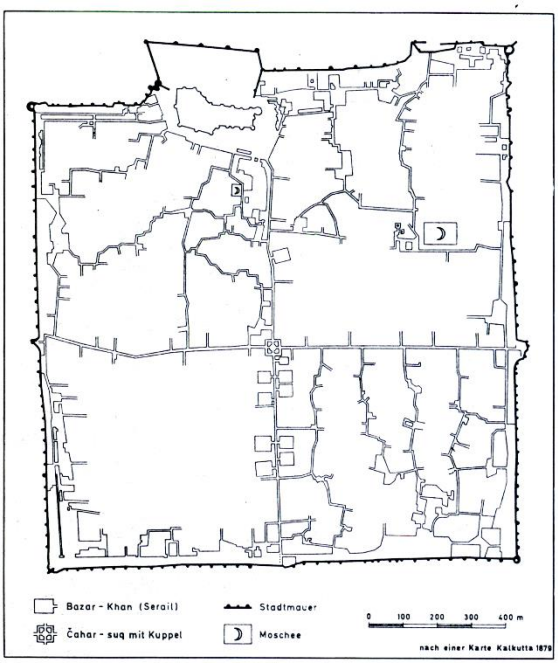


Figure 36. Plan of Herat. The city plan probably goes back to a Greek-Bactrian foundation (after Cuneo 1986: fig. 396, p. 290).

To his mind, the lower city of Bam below the Arg had originally a square plan (Fig. 34). The eastern part of the settlement would have been only a secondary addition to the original core. The hook in the S wall would mark the probable SE tower, from where the East city wall departed, running up to the Ḥiṣn. The main WE axis started from Tower n° 46 /Shator Galu, probably in fact once a city gate, which may have found a counterpart – another city gate, and more specifically the East Gate – in the presumed former E wall at approximately the NE corner of the Mirzā Naʿim complex. These were the premises of our second project started in 2017, in collaboration with the Iranian team under the direction of Joodaki Azizi and Leila Fazel.

V. Survey and excavation

Some important architectural elements of the ancient and/or medieval settlement were already identified with the excavation and the stratigraphic analysis of the first campaign.[17] Excavation and surface cleaning were carried out in the areas selected for our research: i.e. in the external (DE 19-20) and internal (DE 20-21, B 20) sectors (Fig. 37). Here we will briefly draw attention to the most significant discoveries:

In the external sector, on top of the bastion and the embankment of the city walls, we were able to discover the northern and southern wings (Figs. 38-40) of the city gate in its last phase (US 36 e US 42). The northern wing is made of mud bricks and is positioned orthogonally concerning the west walls of the town. It is linked to a pre-existing tower (US 37) which was curved in form (Fig. 41). This discovery constitutes evidence bearing out our conjecture of a city gate on the west of the walls. Because the excavated structures stand high at the level of the bastion, we expect to find even earlier phases of the city gate and the corresponding towers in the lower layers remaining to be excavated. The large dimensions of the adobe (30 x 30 x 5.5cm) are almost the same as those applied in the initial shell of the towers on either side of the entrance to the southern bastion. The stratigraphic-structural elements and the ceramic materials found in this first phase of the excavations describe a dynamic sequence of growth of the walls with added layers at the top.

16 Adle, 2006, 55-60.

17 See, now, the short paper by Joodaki *et al.*, 2019.

Figure 37. Plan of west city gate and adjacent tower indicated in light brown (plan Vincenzo Torrieri).

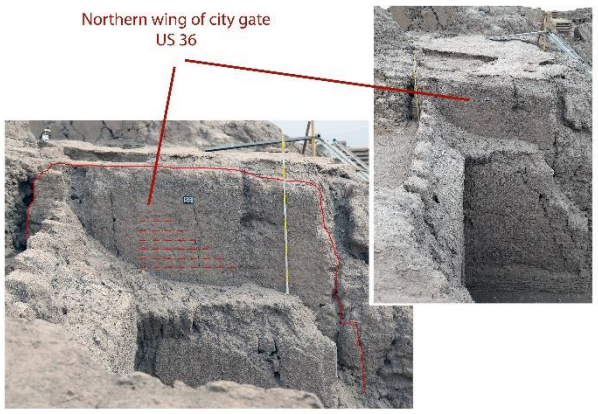


Figure 38. Northern wing of city gate (US 36).

Figure 39. Southern wing (US 42).

Figure 40. The city gate ensemble (in light brown).

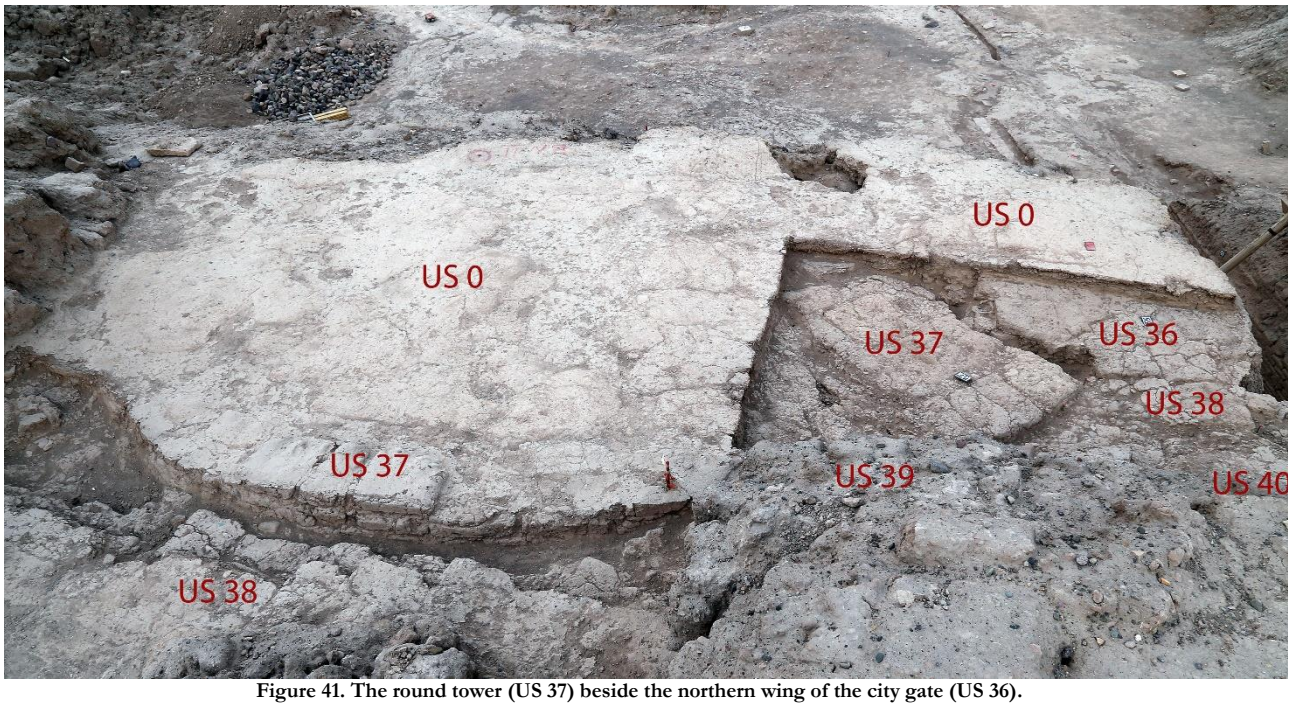


Figure 41. The round tower (US 37) beside the northern wing of the city gate (US 36).

The growth of external additions, providing lateral support ("onion" growth), amply documented in previous research on Tower No. 1, is associated with phases of elevation of the defensive structures, progressively obliterating the earlier structures. Based on this documented dynamic, the structures of the Western Gate of Bam, found in this first excavation campaign, must have been very early, having been obliterated in the innermost core of the multi-layered complex of the city walls.

The study of the ceramic material found in the various stratigraphic units lends support to this thesis, which will certainly have to be verified in the next campaign. The ceramic materials discovered in the obliteration phases of the city gate are attributable to the filling and overlapping added in the Islamic period. The earliest ceramic materials, Achaemenid and possibly Seleucid, that can be related to the structures found, occur sporadically in the internal surface areas of the city, in a well-silo sealed within the walls and in the rubble from the collapse of the walls filling the room that closes the inner side of the ancient Gate.

It is clear that the walls have grown, both in plan and in elevation, with construction materials and various recovered or reused materials. The current surface area of Bam is the result of continuous levelling and decortication which resulted, in relatively recent historical phases, from scavenging for suitable materials to consolidate and reinforce the walls. The ground levels of the city were lowered and the earliest levels emerged from time to time, while the walls rose and grew outwards with spoliation materials from the interior. The dynamics of the documented material lead us to believe that the structures of the Gate that have been found, sealed within phases related to Islamic culture, are indeed very ancient. The next research campaign will be fundamental to complete and verify our assumption, substantially supported by the data already in our possession, that we are dealing with the Western Gate of the Hellenistic City of Bam.

Further discoveries (Figs. 42-43). include a vaulted room (called room B) on the West side, on the embankment of the walls. Within the room is a small well or silo (US 44). The well is rich in pottery shards and anthropic material, including burnt animal bones, seeds, ashes, carbons, and a child's shoe.

In the internal sector we were able to find and partly excavate a conduit (US 6- 7) (Fig. 44). The surveyed part starts below the dromos of the gate and leads to the Hammām (dating to the Seljuk, or rather Safavide, period?) east of the city wall. This conduit is probably part (a branch) of the Shotor Galu mentioned in the written sources, an important component of the water supply system situated below the huge tower n° 46, which replaced the West gate. The system consists of a longitudinal row of clay gutters covered with bricks in their original surface structure. A significant portion of these bricks and parts of the gutter body was destroyed, but the structure can be estimated to be approximately ten meters in length. The western length of this hydraulic structure is buried beneath the adobe structure of the tower.

We were also able to find a section of a huge wall (US 15) of mud bricks (30 x 30cm), running in a south-north direction, situated within the settlement east of the present city walls (Fig. 45). These walls are certainly to be attributed to earlier phases of Arg-e Bam, and are still to be chronologically defined.

The finds made during our work include pottery, a few glasses, organic material, but also very recent materials such as plastic. The pottery includes shards, probably from the Achaemenid, Parthian, and Sassanid periods, and the first Islamic period (‘Abbāsid), through the middle Islamic period (Būyid, Seljuk, Ilkhānid, Timūrid) to the late Islamic period (Safavīd). Of very rare occurrence are the shards of the Qājār period (1779-1924), but this reflects the fact that Arg-e Bam had been abandoned after the siege of the town defended by Āgā Khān Mahāllatī in 1840-1.

Since the excavated and documented levels were somewhat disturbed by recent pre- and post-earthquake contamination (including plastic fragments), the relative chronologies of the various phases of the rampart and the walls are yet to be verified and defined. Therefore, any definitive chronological attribution must be postponed to the next archaeological seasons.

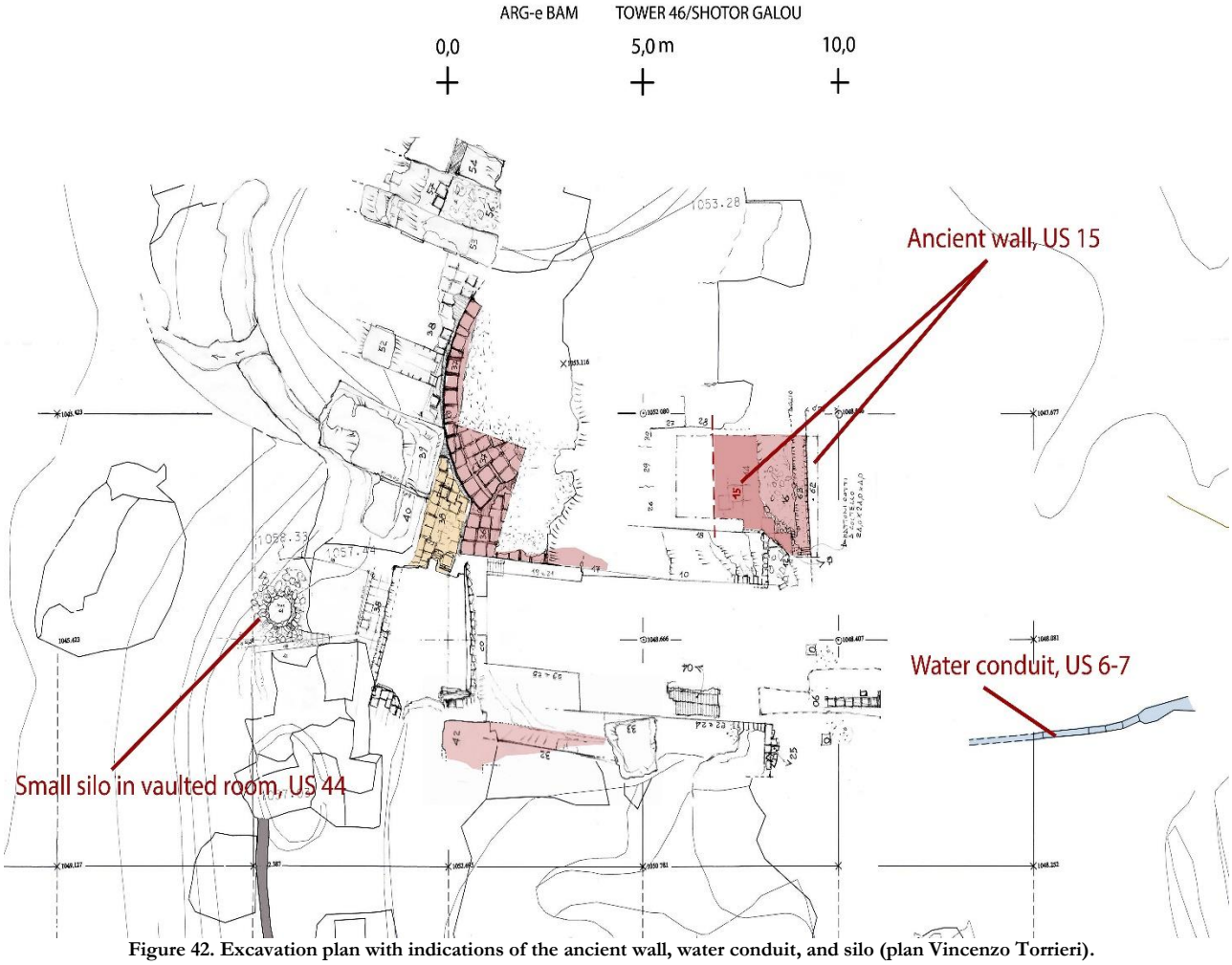


Figure 42. Excavation plan with indications of the ancient wall, water conduit, and silo (plan Vincenzo Torrieri).

Figure 43. Vaulted room B with silo (US 44).

Figure 44. Water conduit of Shotor Galu (US 6).

Figure 45. Wall running in the South-North direction now inside the city parallel to the present city wall.

VI. Conclusions

Since 2004, the Italian Mission of the Ministry of Culture has collaborated with ICHTO in the framework of international post-earthquake projects in Bam. Initially set up to support the restoration project of Tower No. 1, the mission's archaeological team had the opportunity to conduct several campaigns. Our work allowed us to define the different phases of construction of part of the city walls. They reflect the rich and often dramatic history of Arg-e Bam. The discovery of the western gate, which is still largely buried under tower No. 46 (Shotor Galu), can demonstrate the Hellenistic roots of the urban layout of the inner circumvallate city (sharistān).

The project was to have seen three campaigns, but for various reasons, only one has as yet been undertaken. We would gladly welcome the continuation of our promising work, possibly conducted by Iranian experts, and with the possibility of shedding light on the early beginnings of Arg-e Bam. A second excavation was also suggested by Adle, to be carried out at the end of the west-east axis near the site of Mir Ali's house, where he expected to locate the corresponding east gate.

Acknowledgments

We would like to thank here the former Directors of the *Bam Cultural Heritage Base and its Cultural Landscape*, Eskandar Mokhtari and Afshin Ebrahimi. We wish to express our deep gratitude to the late Chahryar Adle, Foreign Relations delegate of *ICOMOS-Iran*, mentor and a real friend of our mission, to the ever-kind and generous Hossein Tayeri, director of the *Bam Cultural Heritage Base* before the earthquake. We are pleased to take the opportunity to thank the former Local Managers of the Arg-e Bam site, Mahmoud Nejati and Nima Naderi, and the engineer Ali Pandidan.

Our archaeological colleagues Narges Ahmadi, Mehdi Keramatfar, Joodaki Azizi, Leila Fazel, and Nazanin Khojasteh Behzai were great companions and collaborators. In Italy, we wish to express our warm thanks to Giuseppe Proietti, former *General Secretary of the Ministry of Cultural Heritage*, to Mario Lolli Ghetti, *Director General for Architecture, Fine Arts, Landscape and Contemporary Art and Architecture*, to Gisella Capponi, former director of the *Istituto Centrale per il Restauro* and the architects and engineers Pia Pietrangeli, Walter Santoro, Alberto Torsello, Claudio Prosperi Porta, all of them playing key roles in the restoration project.

The archaeologists Pierfrancesco Callieri, Anna Filigenzi, and Danilo Rosati gave precious support at the beginning of our mission.

The commitment, help, and enthusiasm of Felicetta Ferraro, former cultural attaché at the Italian Embassy in Tehran, will long be remembered. The members of this mission also wish to express their gratitude to all the workers and assistants in Arg-e Bam for their hospitality, support, kindness, availability, and assistance provided during the mission.

References

Adle, C. (2006) *Qanats of Bam: An Archaeological Perspective: Irrigation system in Bam, its birth and evolution from the Prehistoric Period up to Modern Times*. In: Honari, M. et al. (Eds.), Qanats of Bam. A Multidisciplinary Approach, UNESCO Tehran Cluster Office.
Tehran, 33-85.

Bam Citadel (Iran) n° 1208, ICOMOS Evaluations, Addendum, WHC-04/28. COM/Inf. 14A ADD, 2004, 27-38. https://whc.unesco.org/uploads/nominations/1208bis. [Accessed 1 November 2021]

Bastani Parizi, M. E. (1989) Bam, Ruins of the old town. *Encyclopaedia Iranica*, III, 651-654.

Bosi, V., Naso, G. and Lai, G. (2005) *Relazione sismotettonica sul terremoto di Bam (Iran) del 26 December 2003,* lecture given at the *International Technical Meeting on the Rehabilitation of the Cultural Heritage of Bam and its Cultural Landscape*, Roma, 10-11 May 2005. Complesso di San Michele a Ripa (unpublished).

Callieri, P.-F., Filigenzi, A., Jung, M. & Rosati, D. (2005) *The Historical City of Arg-e Bam. Iran. Archaeological Survey Report September 2005,* Ministry of Cultural Heritage and Activities Research, Innovation and Organization Department.

Cuneo P. (1986) *Storia dell'urbanistica. Il mondo islamico.* Bari.

De Planhol, X. (1989) Bam, History and modern town. *Encyclopaedia Iranica*, III, 650-651.

*Documentation… (*2004) *Graphic and photographic documentation on the city of Bam before and after the earthquake of 2004,* Iranian Cultural Heritage Organization (ICHO), Teheran.

Galdieri, E. (1982) *Le meraviglie dell'architettura in terra cruda*, Bari.

Gaube, H. (1979) *Iranian Cities, New York* [on Bam, 99-132].

Goldsmid, F.J. (1867) Notes on Eastern Persia and Western Beluchistan. *Journal of the Royal Geographical Society*, XXXVII, 269-297.

Jakubiak, K. (2006) The origin and development of military architecture in the province of Parthava in the Arsacid period. *Iranica Antiqua*, XLI, 127-150.

Joodaki Azizi, A., Jung, M., Fazel, L., Torrieri, V. (2019) Archaeological excavation of Tower 46/Shotor Galou in the Western Rampart /Citadel of the Arg-e Bam Complex. 16th *Annual Symposium on the Iranian Archaeology*, 5-7 March 2019 (in Persian).

Jung, M., Torrieri, V., Ahmadi, N. (2008) Objectives and Activities of the Iranian-Italian Archaeological Team at Bam (Report February 2008). In: *Arg Annual Report of Arg*-e *Bam Research Foundation*, 2, 8-11.

Jung, M., Torrieri, V., Ahmadi, N. **(**2010) Apporti italiani alle problematiche di conservazione promosse dall'UNESCO in conseguenza di calamità naturali. Arg-e Bam. Archaeological Research of joint Iranian-Italian Mission. Italian post-earthquake cooperation project of MiBAC. I-The archaeological research (2005-2010). *Bollettino d'Arte,* 6, 145-152.

Jung, M., Torrieri, V. (2010) II - Fortificazioni, sistemi difensivi ed eventi bellici a Bam. Fonti storiche e archeologia, *Bollettino d'Arte,* 6, 153-165.

Jung, M., Torrieri, V. (2013) Ritorno nel deserto dei Tartari. Le ricerche archeologiche italiane a Bam. *Archeo* 343, 30-41.

La cittadella … (2005) La cittadella fortificata di Bam. In: Proietti, G. (ed.) *L'eccellenza del restauro italiano nel mondo*. Ministero per I Beni e le Attività Culturali. Roma, 147-155.

Leriche, P. (2009) Das Baktrien der 1.000 Städte. In: *Alexander der Grosse und die Öffnung der Welt. Asiens Kulturen im Wandel.* Publikationen der Reiss-Engelhorn-Museen, 36. Regensburg, 155-167.

Lockhart, L. (1960) Bam. *The Encyclopaedia of Islam*, I, 1008.

Lolli Ghetti, M. (2005). *Iran, Arg-e-Bam. Italian cooperation proposal on the post-seismic phase. Action plan on the southwest tower*, lecture given at the *International Technical Meeting on the Rehabilitation of the Cultural Heritage of Bam and its Cultural Landscape*, Roma, 10-11 May 2005. Complesso di San Michele a Ripa (unpublished).

Mohseni, F., Bagheri Zadeh, F., Zarghani, L. (2008) Introduce & opening part of restoration (in Persian). In: *Arg Annual Report of Arg*-e *Bam Research Foundation*, 2, 155-158.

al-Muqaddasī = *Kitāb aḥsan al-taqāsīm fi ma'rifat al-aqalim/ Descriptio Imperii Moslemici, Bibl. Geographorum Arabicorum*, III, ed. M. J. de Goeje, 2. edit. Leiden 1906.

Nurbakhsh, H. *et al.* (1976) *Arg-e-Bam along with a short introduction about urban and urban-like development in Iran*, Tehran, (in Persian).

Pottinger, H. (1816) *Travels in Baloochistan and Sinde accompanied by a geographical and historical account of those countries with a map*. London.

Proietti, G. (2007) Bam: la rinascita di una città. *Il Quirinale*, 3, 5, 57-88.

Proietti, G. *et al.* (2013) Bam, Iran: progetto di cooperazione italo-iraniana per il restauro e il miglioramento sismico della Torre 1. *Bollettino ICR*, 27, luglio/dicembre, 73.

Prosperi Porta, Cl. (2012) Ritorno a Bam. Il restauro della torre 1 di Arg-e-Bam, *BioArchitettura*, 75, 30-9.

Rante, R. (2008) The Iranian City of Rayy: Urban model and military architecture. *Iran*, XLVI, 189-211.

Zare S. (2007) An introduction to some Greek pottery inscriptions, new findings from Bam, *Bāstānpazhuhī. Persian Journal of Iranian Studies (Archaeology),* 2,3, 118-119, (in Persian).

Tavan, G. (2010) Ritorno a Bam. Restauri Bam la Rinascita. *Archeo*, XXVI, 4 (302), 50-57.

Tayari, H. (without date and title) but: typewritten English version of Introduction to General plan of Arg-e Bam, in *Third Congress of the History of Iranian Architecture and Urbanism, Bam Citadel, Kerman-Iran*, April 14-19, 2006, 35-57 (in Persian)

Van Beek G. W. (1987) Archi e volte nell'antico vicino Oriente. *Le Scienze*, 229, 82–90.

Vatandoust, R., Mokhtari, E., (2004) Die Erdbebenkatastrophe in Bam. Iran - Strategien für eine aus Lehm gebaute zerstörte Stadt, in *Lehm 2004, Tagungsbeiträge der 4. Internationalen Fachtagung für Lehmbau, Weimar*, 220-233.

JSBS Journal of Sistan and Baluchistan Studies
Volume 1, Issue 1 (2021) 49-85
Doi10.22034/JSBS.2022.309973.1004

THE MARḪAŠEAN TWO-FACED 'GOD': NEW INSIGHTS INTO THE ICONOGRAPHIC AND RELIGIOUS LANDSCAPES OF THE HALIL RUD VALLEY CIVILIZATION AND THIRD MILLENNIUM BCE SOUTH-EASTERN IRAN

François DESSET[1], Meysam SHAHSAVARI[2] and Massimo VIDALE[3]

[1] CNRS team Archéorient (Lyon, France; UMR 5133) / University of Tehran, (Corresponding author: dessetfrancois@gmail.com).
[2] Faculty of Literature and Humanities, University of Jiroft, Iran.
[3] Department of Cultural Heritage, University of Padova / ISMEO, Rome, Italy.

Received: 11 September 2021 Accepted: 29 November 2022 Available online: 20 December 2022

Abstract: This paper discusses a truncated-cone chlorite vessel currently held in the Miho Museum, in Japan. It was probably produced around 2300-2200 BCE in the Halil Rud Valley or Jiroft region and comes perhaps from a grave. This vessel displays a fascinating iconography, including the depiction of a hybrid character combining bovine, human, lion, and bird features. After discussing the hybrid characters that are observed on chlorite artifacts and glyptics in third millennium BCE south-eastern Iran, available textual data are considered for a narrative interpretation of the possible religious landscape of the polity called in Mesopotamian sources Marḫaši or Paraḫšum. It is also suggested that the so-called 'Treaty of Naram-Sin' might provide additional insights into the pantheon worshipped in Marḫaši around 2250 BCE.
Keywords: Iran, Bronze Age, Jiroft/Halil Rud Valley civilization, Marḫaši, religion, iconography, chlorite artifacts.

چکیده: مقاله پیش‌رو به بررسی ظرف مخروطی که در حال حاضر در موزه میهو ژاپن نگهداری می‌شود، می‌پردازد. ظرف مذکور احتمالا در حدود سال‌های ۲۳۰۰ تا ۲۲۰۰ پیش از میلاد در دره هلیل‌رود یا منطقه جیرفت تولیده شده است و به احتمال زیاد در یک گور کشف شده است. این ظرف منقوش به شمایل‌نگاری حیرت‌انگیزی از موجودی مرکب از گاو، انسان، شیر و پرنده است. پس از بررسی ویژگی‌های موجود چند رگه‌ی منقوش روی ظروف و سایر آثار سنگی هزاره سوم پیش‌ازمیلاد در جنوب‌شرقی ایران، به بررسی داده‌های بدست آمده از متون برای رسیدن به تفسیری روایی از چشم‌انداز مذهبی دولت موسوم به مرهشی با پراشوم در منابع میان‌رودانی خواهیم پرداخت. همچنین این نظریه مطرح خواهد شد که قرارداد معروف به "معاهده نارام–سین" شامل اطلاعات زیادی از خدایان مورد احترام مرهشی در ۲۲۵۰ پیش‌از میلاد است.
کلمات کلیدی: ایران، عصر مفرغ، تمدن درهٔ هلیل رود/ جیرفت، مرهشی، دین، شمایل‌شناسی، دست‌ساخته‌های کلریتی.

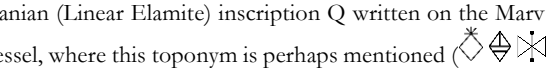
I. Introduction

Since the beginning of the 2000s, many chlorite (dark soft stone) artifacts from third millennium BCE graveyards in the Jiroft or Halil Rud Valley, such as Mahtoutabad, Riganbar, and Nazmabad (see Fig. 1, for the location of the sites mentioned in the text), have reached antiquity markets and private collections all over the world[1]. According to Steinkeller[2], most of the southern Iranian Plateau, from the borders of Baluchistan to eastern Fars (and probably Western Fars, at a certain moment of its history), seems to have belonged to a powerful polity called *Marḫaši* in Sumerian, *Paraḫšum* in Akkadian and in Hatamtite[3] perhaps *Marapša(y)t*[4], mentioned in Mesopotamian

[1] The geographical origin of this material has been shown by fieldwork in this valley, at Konar Sandal South, Konar Sandal North (Madjidzadeh and Pittman 2008), Mahtoutabad (Vidale and Desset 2013, Desset *et al.* 2013 and Desset *et al.* 2017), Hajjiabad-Varamin (Eskandari *et al.* 2020; Eskandari *et al.* 2021) and several surveys (for the recent surveys led south of Jiroft, see Pfälzner and Alidadi Soleimani 2015 and Pfälzner *et al.* 2019).

[2] See Steinkeller 1982, 1990, 2012 and 2014. This proposition is mainly based on the hymn of Išbi-Erra (van Dijk 1978, 193-194) describing the extent of the territory controlled by Kıntatu ca. 2000 BCE: "[from] Pašime, the 'breast' (i.e., the coast) of the sea, to the border of Zapša[li], (and) [from] Arawa, the lock of NIM (ELAM), to the border of Marḫa[ši]". Assuming that Kıntatu was controlling then at least south-western Iran, this would locate Marḫaši east or north of this area. As Marḫaši is furthermore regularly mentioned in cuneiform sources either between Anzan and Meluhha or between Magan and Meluhha (Steinkeller 1982, 249), this would point at a southern location, not too far from the Persian Gulf.

[3] In this paper, Middle chronology dates and labels recently proposed by Desset (2017 and Desset *et al.*, forthcoming a and b) are used: Hatamtite language instead of Elamite language, Early Proto-Iranian writing / Early PIW instead of Proto-Elamite writing and Late Proto-Iranian writing / Late PIW instead of Linear Elamite writing. The following abbreviations are used: ElW, see Hinz and Koch 1987; MDP: Mémoire de la Délégation en Perse.

[4] This would be the local original designation or autotoponym of this polity: see Desset *et al.*, forthcoming a and b, and the Late Proto-Iranian (Linear Elamite) inscription Q written on the Marv Dasht vessel, where this toponym is perhaps mentioned ( = *ma-ra-p-š-ša-i*). However, the presence of the consonant /p/ in the root of the term vs. its absence in the Mesopotamian references, where is present instead the consonant /ḫ/, remains at present unexplained:
/m-a-r-a -p- š-a(y)i/ (Hatamtite)
/m-a-r- ḫ-a-š-i/ (Sumerian; spelled *mar-ḫa-ší*)
/p-a-r-a-ḫ- š-um/ (Akkadian; spelled *pa$_2$-ra-aḫ-šum*)
Because of the absence of distinction between voiced and voiceless consonants (plosives) in the notation of the Hatamtite language in Late PIW and cuneiform scripts, and as the voiceless series is more neutral and traditionally preferred in the Elamite/Hatamtite studies, the voiceless plosives *k*, *p* and *t* were favored in the transcription of Hatamtite words or names (instead of *g*, *b* and *d*). Geminated or redundant consonants were avoided

sources for more than 500 years, at least since the time of Sargon of Akkad, ca. 2300 BCE (in middle chronology). This polity was probably much older than this date, which approximately matches the expansion of the Mesopotamian geographical scope and the introduction in cuneiform texts of new toponyms such as Marḫaši/Paraḫšum, Magan, or Meluhha. Written mentions of Marḫaši/Paraḫšum continued until Ḫammurapi's times, ca. 1750 BCE when most of the urbanized world of eastern Iran (plus Central Asia and the Indus Valley) experienced centuries of important devolution and localization processes.

In the third millennium BCE, the Jiroft plain, based on the still partial evidence of urbanization in the fourth millennium BCE (the Aliabad period), was the hub, or one of the main centers of ancient Marḫaši. During Old Akkadian (around 2300-2150 BCE) and Ur III times (2100-2000 BCE), Marḫaši/Paraḫšum was mentioned as a highly hierarchized society ruled by kings (such as Apalkamaš, Arpimazpi, and Lıpan-ůkšapaš), judges (Kundupum) and generals (Sıtkaů and Ůlůl), managing intensive diplomatic contacts with the west by the means of messengers or ambassadors. Cuneiform onomastics suggest that Marḫaši was a multi-linguistic and composite ethnic society, with probably a dominant Hatamtite component. Its religion is unknown and may only be approached through iconography, notably of chlorite artifacts labeled 'Série Ancienne' by P. de Miroschedji (1973), 'Intercultural style' by P. Kohl (1975), and more recently 'Halil Rud Valley or Jiroft style'[5].

The number of objects confiscated in the Halil Rud Valley made clear that most of the chlorite artifacts found in excavations all over the Ancient Near East were manufactured in this area, originally for local use. They were culturally relevant only in south-eastern Iran and only a few reached Mesopotamia, where they were probably seen as precious exotica (Marchesi 2016). Paradoxically, the most ancient archaeological contexts available so far for these goods are documented in Mesopotamia, in Early Dynastic II layers (ca. 2700/2600 BCE)[6]. The most recent specimens were notoriously found in a peripheral site of the Halil Rud Valley civilization, Tepe Yahya (phases IVB4-1 and even in IVA layers, where these artifacts were interpreted as heirloom),[7] dated around 2100/2000 BCE. We are thus dealing with some 600 years of iconographic, artistic, and craft tradition, whose evolution and history still need to be understood and described.

Many artifacts found in the Halil Rud Valley come from confiscations and having no provenience, cannot be precisely dated. They can only be provisionally ascribed (without mentioning the problems of forgeries) to between 2700 and 2100/2000 BCE, perhaps more specifically to ca. 2600-2200 BCE. The abundant chlorite vessel fragments and white inlays elements found on the surface or among the looters' dirt of graveyards in the Halil Rud Valley region, such as Mahtoutabad[8], imply that these artifacts are funerary objects that might have played a specific role during funerals, maybe as branded containers for specific scented oils (J. Perrot[9]) or for the distribution of highly caloric sweets like halva or dates (S. Cleuziou[10]). Meanwhile, one should keep in mind that complete luxury artifacts are usually found in graves or hoards because such objects are simply not abandoned in domestic contexts due to their value. Consequently, that chlorite artifacts are mainly found in graves does not mean that they were produced to be deposited in graves. They could have been used before being deposited in graves as suggested by vessel fragments and inlaid elements recorded in domestic contexts as well as a near complete scorpion-man game board found at Konar Sandal South[11].

in the transcriptions of Hatamtite words or names (Nahhůnte>Nahůnte) while *ů* and *ı* mean that their precise vocalic value is not yet established, hesitating between /o/ and /u/ (*Nahůnte* is to be understood either /nahonte/ or /nahunte/) and /e/ and /i/ (*Kıntatu* is to be understood either /kentatu/ or /kintatu/; see Desset *et al.*, forthcoming a and b, for these conventions).

5 As soon as 1986, Amiet had labelled this as "art de Marḫaši" (Amiet 1986, 138).

6 Delougaz 1960; De Miroschedji 1973, 25; Lamberg-Karlovsky 1988, 55-68; Potts T. F. 1994, 250 and 270; and Philips and Simpson 2018, 14. In Mesopotamian contexts, Halil Rud Valley style chlorite artefacts were mainly found in temples from ED II to Akkad/Ur III periods: Mari: temples of Šamaš, Eštar, Eštarat and Ninnizaza and in houses north and east of the Priests quarters (ED III contexts); Tell Agrab: temple of Šara (ED II/III); Khafajah-Tutub: temple of Sin (layer IX: ED II/III) and a fragment from a domestic context; Nippur: temple of Inanna (levels VIII, VIIB which are ED II-ED IIIA contexts and level IV); Uruk: in the Eanna area; Ur: in the Enunmah (in layers dated of the second half of the second millennium BCE); Susa: Šulgi's temple of Insušinak. Notoriously, some come also from funerary contexts in the Royal Cemetery of Ur (in two graves including Pu-abi's tomb, where 7 plain and 2 decorated vessels were found) and domestic ones (in Ur, Mari and Khafajah). Some artefacts were also found in Abu Habbah, Adab-Bismaya, Fara-Šuruppak, Kiš, Tell Asmar, Kisurra, Larsa, Sippar, Obeid, Al-Hiba-Lagaš and Girsu-Tello (see the catalogue with bibliographical references in Lamberg-Karlovsky 1988, 55-68).

7 Notably a fragment of a plaque, probably a 'handbag' (weight?) (Lamberg-Karlovsky 1972, 92 and 1973, 41; Lamberg-Karlovsky and Tosi 1973, fig. 136; Kohl 2001, 214, 221-222 and 226 and fig. 9.10).

8 Vidale 2015, 16-17 and Vidale *et al.* forthcoming.

9 Perrot and Madjidzadeh 2005, 129.

10 Cleuziou 2003.

11 Madjidzadeh and Pittman 2008, fig. 12 (on a floor in trench III, C14 dated between 2400 and 2290 BCE). Additionally, Roberto Micheli (personal communication) found a footed cup bearing two entwisted snakes (one with turquoise, the other with red limestone inlays) while he was digging a house at the foot of the Konar Sandal South citadel.

This paper focuses on these chlorite artifacts, more specifically on an exceptional truncated-cone-shaped vase from the Miho Museum (Japan) and additional objects from online auction sites and private collections. We believe that these objects come from the Halil Rud Valley and were sold over the past twenty to thirty years. We are well aware of the dire situation, our role, and the ethical problem in publishing unprovenanced artifacts (notwithstanding the publication of forgeries). Considering the hypothetical damage our paper could do compared to its actual benefit for Iranian history and cultural heritage, we firmly believe that the second exceeds the first in this particular case. As stated by Frenez and Vidale (2014, 7): "All archaeologists sooner or later face the same dilemma about studying artifacts retrieved from the antiquary market. On one side, publishing antiquities illegally unearthed and exported for sale supports the market, eventually giving credit and enhancing the value of pieces that have been stolen and robbed forever of their archaeological and historical context. This choice possibly promotes further destruction. *On the other hand, there are exceptional pieces that are so relevant in themselves that ignoring them would only add damage to damage, by hiding forever important historical evidence*". For this reason, we have decided to bring this important artifact to the attention of the scientific community.

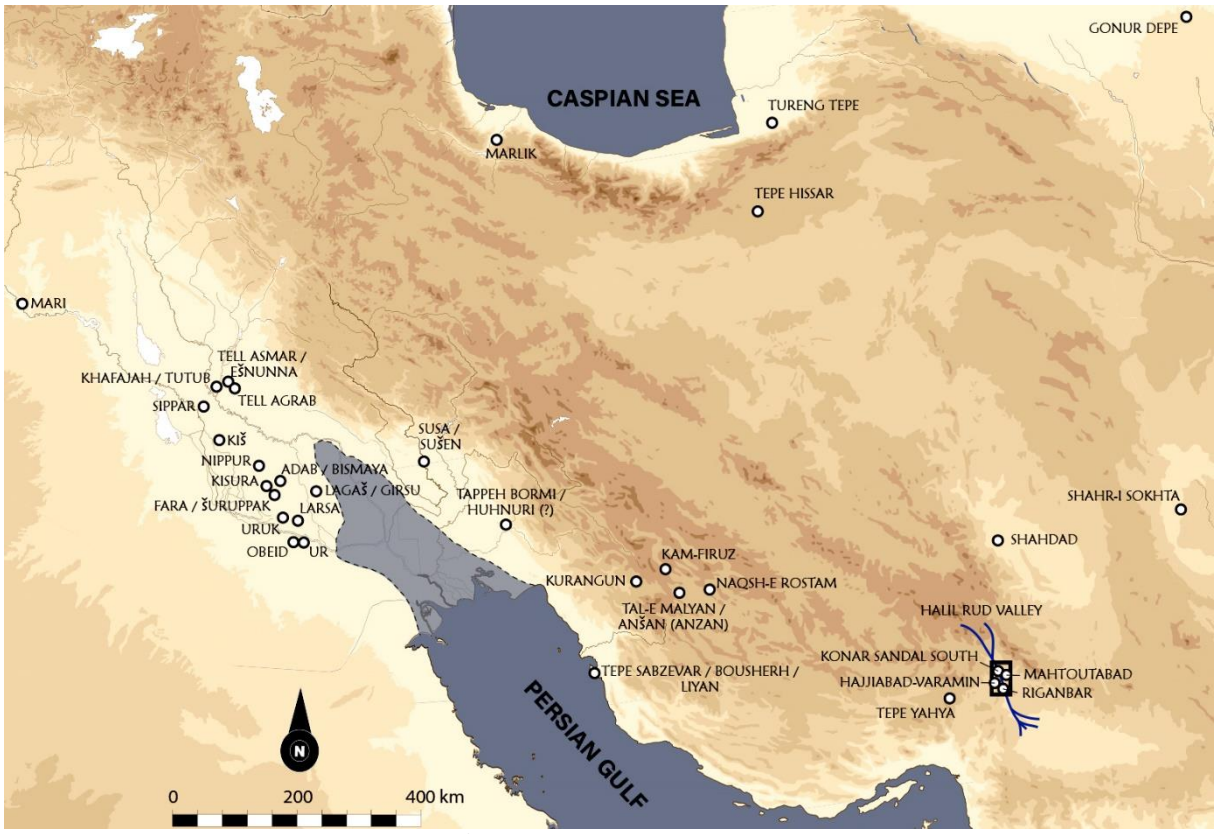


Figure 1. General map of the sites mentioned in the text.

The main argument of this paper is based on two, still hypothetical, assumptions:

- The Kerman area, including the Halil Rud valley, was in the third millennium BCE part of the polity of Marḫaši[12];
- and the so-called 'Treaty of Naram-Sin' was established between Akkad and Marḫaši (see below, section IV.2.b.1).

These assumptions are the premises of a syllogism leading to the proposition that the 'Treaty of Naram-

[12] Steinkeller's proposition had been recently (and unconvincingly) challenged by Francfort and Tremblay (2010), notably on the arguments that Kerman was part of 'Elam' while Marḫaši is said to be in cuneiform sources outside of 'Elam' and that the period during which Marḫaši is attested in cuneiform sources (from Sargon of Akkad to Ḫammurapi of Babylon, ca. 2300-1750 BCE) corresponds to the chronological span of the southern Central Asian civilization (Bactria-Margiana Archaeological Complex/Greater Khorasan Civilization). These arguments can both be refuted. First, 'Elam' is a Mesopotamian notion without any value from the point of view of the ancient inhabitants of the Iranian plateau (so Kerman area cannot be fundamentally part of 'Elam'; Desset 2017), while the first attestations of Marḫaši/Paraḫšum in cuneiform sources around 2300 BCE are rather just related to the widening of the Mesopotamian geographical horizon at a time when other toponyms, such as Magan or Meluhha, seemingly also 'appeared'.

Sin' may document third millennium BCE Kerman/Halil Rud valley and notably its iconography, in an attempt to bring together texts and objects and bridge the gap between philological and archaeological data.

Figure 2. Pictures and drawings of the Miho Museum truncated-cone vessel.

II. Description of the chlorite vessel from the Miho Museum

The truncated-cone chlorite vessel currently held in the Miho Museum (Fig. 2) was purchased in London in 2001. It is 22 cm high and has a 13 cm base diameter and a 9.5 cm rim diameter. It bears wear traces in the bottom part of the bird (tail), corresponding also to cracks and a different color on the base surface, apparently due to post-depositional alteration. Its rim was chipped during the digging, and traces of a pickaxe are visible on the rim and other parts of the vessel (on the left feline, the left lion, and the bird in the battle scene). Most of the inlays fell out, but otherwise, the vessel can be said to be quite well preserved.

The decoration of this vessel is a fascinating example of *horror vacui*. It is organized around two main themes: a battle theme (Fig. 3a) and a theme that relates to the 'control of water streams' (Fig. 3b).

II.1. The battle scene

A crowded, frantic scene of combat (Fig. 3a) shows a prominent hybrid character standing on the wings of a bearded vulture turned to the right. This central group fights against three pairs of animals, the raptor against two snakes, while the hybrid character is holding the paws of two lions and probably drives his horns into the rear body of the felines. This scene is broadly reminiscent of the 'Master of animals' theme, attested since the late fifth/fourth millennium BCE in Ubaid/Uruk Mesopotamia (man holding snakes or lions)[13] and on the Iranian Plateau (horned man holding animal of prey or snakes on Susa I stamp seals)[14].

[13] Charvát 2002, 96.

[14] Amiet 1972, 76-77, n°219-220, pl. 49 and 1980, 70-71, pl. 6 n°117-120.

Figure 3a and b. Miho Museum truncated-cone vessel scenes; A: the battle scene; B: the 'control of water streams' scene.

The snakes (Fig. 4) are covered with the two typical rows of oval white (limestone?) inlays (on the right snake, a light blue inlay may be turquoise) and bear two grooved lines in their terminal part. The heads display four small while inlays below the jaw. Fragile teeth are preserved in the jaw of the right snake (as well as for the left feline). These reptiles, as usual in the Halil Rud Valley chlorite art, have ears carved like two inverted commas, and a very feline-like muzzle. Eyes were orange-colored disks set into white rings. Save for the zebus, the eyes of all the creatures present on this vessel were made in this same way.

Figure 4. Miho Museum truncated-cone vessel; details of the snakes in the battle scene.

While inlays are used to depict the snakes' ocelli, feline pelage, the forepart of the zebus, the mountains, and the body and neck of the bearded vulture, the only inlaid decoration on the lions (Fig. 5, n°1-2) consists of a dark bluish circle in a white ring in their eyes (similar to the felines and hybrid character). The lions' manes are delicately treated with carved groups of three to four grooved strands and parallel curvy bands on the belly (similar to the lion's part of the hybrid character), strongly contrasting with their smooth bodies and paws.

Their upper and lower jaws are decorated with parallel arcs. Teeth were probably present in their mouths. The tuft of the tail is an oval, leaf-like motif.

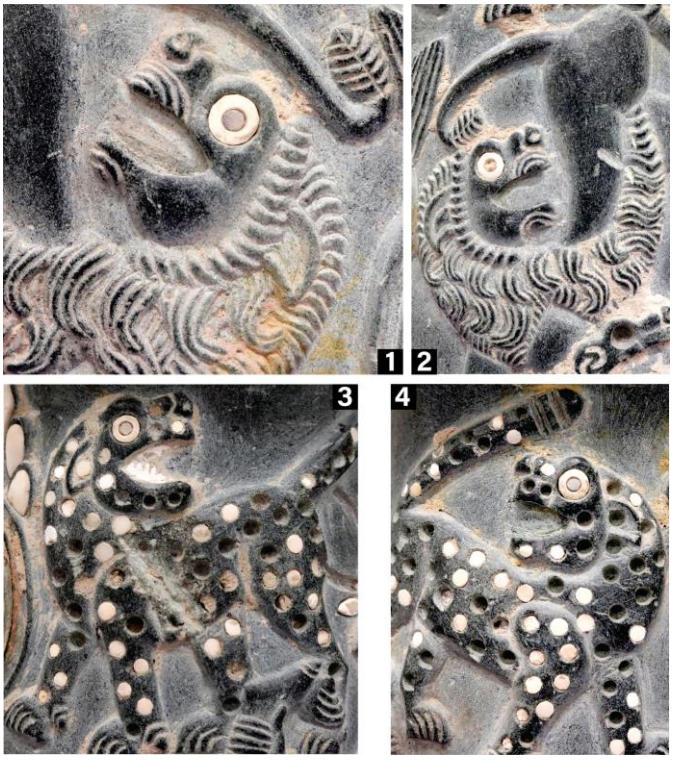


Figure 5. Miho Museum truncated-cone vessel; details of the lions (n°1-2) and the felines (n°3-4) in the battle scene.

The felines (Fig. 5, n°3-4) are possibly cheetahs (*Acinonyx jubatus*)[15]. They are completely covered with white circular (limestone?) inlays, more or less regularly positioned in quincunx (three on the muzzle, four on the lower jaw, one in the ear). Their teeth are made with a white material and their eyes with a bluish circle in a white ring (like lions). Their paws are designed with grooves for the claws and a circular element in the rear (as for the lions). Tails are straight (unlike the lions) and decorated with two parallel strips (also attested in other cases). In contrast to the zebus and like the lions, their external sexual organs are not displayed, either because it was omitted or they were meant as females.

The bird (Fig. 6, n°1-2) is, as in most cases in the Halil Rud Valley chlorite art, a bearded vulture (*Gypaetus barbatus*). Although it looks like a hawk, it is not a bird of prey but rather a scavenger that feeds on carrions and bone marrow (although it may attack small animals such as tortoises and lizards). Its head is turned to the right (as a rule in Halil Rud Valley iconography) and has two inlays, one for the eye (a disk within a white ring) and a white 'collar' on the neck (attested in other examples). The plumage on the head, body, and claws are rendered with lozenges filled with two grooves. Parallel lines simulate the feathers of the wings and the tail rectrices. The 'shoulders bear a woven pattern, and the beard and beak are clearly outlined.

The making of the hybrid character (Fig 7, n°1) is based on the synoptical principle of *pars pro toto* involving substitutes and ligatures[16]. Standing on the bird, in the center, the hybrid has the lower body of a lion below a human torso with muscular arms holding the lions' lifted paws, thumbs up. It has two beardless heads, with long strands of hairs hiding the body in the foreground (but also visible in the background, below the chin), and is strictly restricted to the human part. The eyes, as usual, are blue circles inserted in oval white rings; the nose is prominent above a small mouth. Bovine parts were added on top with whitish-greenish inlays standing for oval ears, and two pairs of symmetrically slightly arched, grooved horns[17] that perhaps lost their inlays. These horns are driven into the back of the felines. They depart from a headdress, shown as an oval green inlay (better preserved on the other scene; see Fig. 7, n°2). The hybrid is thus a complicated array of bovine, human, lion, and bird body parts[18].

The different actors are arranged to fill the limited available field and care, as much as possible, to avoid super-impositions, but the pattern also indicates a

[15] Perrot and Madjidzadeh 2005, 137.

[16] Winkelmann 2018, 91-93; Vidale 2015, 38.

[17] The horns of goats and ibexes, on stone cups for example, are not depicted in this way. They are either straight (not arched) or following a parallel curve (not symmetrically opposed).

[18] Surprisingly recalling the Ezekiel's four living creatures or *cherubim* (Ezekiel 1:10) and later the symbols used in Christian iconography for the four evangelists.

specific order among them. The felines are behind the lions, the lions and the bird behind the snakes (the left front pawn of the left lion is thus completely missing), and the hybrid character behind the bird (its right leg is behind the head of the eagle) but probably ahead of the felines. Perspective[19] is indicated according to the position: the upper part is the background, and the lower part is the foreground.

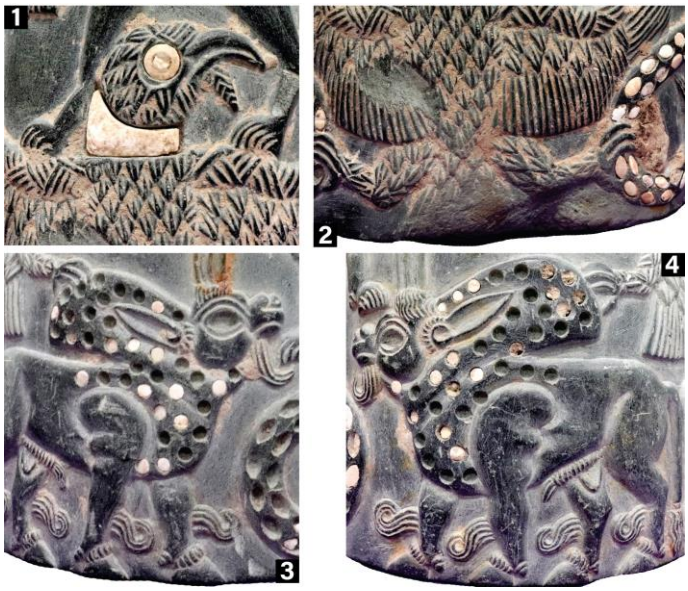


Figure 6. Miho Museum truncated-cone vessel; details of the bird (n°1-2) in the battle scene and of the zebus (n°3-4) in the 'control of water streams' scene.

Figure 7. Miho Museum truncated-cone vessel; details of the hybrid character in the battle scene (n°1) and the 'control of water streams' scene (n°2).

II.1.a. Hybrid characters in the Halil Rud Valley chlorite art

Scenes of clashes or domination are very frequent in the Halil Rud art, in particular between felines or birds and snakes; or among humans/hybrids and felines, scorpions, scorpion-men, or snakes. This vessel however displays the single scene known so far in chlorite art where lions are overpowered.

Hybrid (animal/human) characters[20] are always involved in fights or domination scenes (save for

[19] As also remarked in Vidale 2015.

[20] On the hybrid characters in the Halil Rud art, see also Perrot and Madjidzadeh 2005, 140-142 and 2006, 106; Winkelmann 2014, 214-216.

scorpion-men, which appear also in isolation). Variable and complex, hybrids can be described in six separate characters:

- 1) the bovine/human/lion/bird hybrid character of the Miho Museum vessel is also observed on another vessel (Fig. 8, n°1) but here the rectrices feather and claws merge directly with a lion body, topped by two human heads and arms; while bovine ears and horns are not repeated for each head[21]. Another possible example is in Fig. 8, n°2 (the left character in the drawing, with bovine horns and ears, sitting on bulls and dominating snakes).

This character is probably also present in the 'handbag' from Fig. 10, n°5, where it is two-headed, with bovine horns and ears on each head, and a bovine lower part. It stands on two felines and holds snakes (the awkward position of the character standing on the felines, ensures that the bovine part is seen in a restricted space)[22]. The bird and lion elements are surprisingly absent and replaced by a bovine one.

Fig. 8, n°3, from a private collection, depicts a variation of the bovine/human/lion/bird hybrid: a standing man, bare-chested, wearing a fluted skirt, with clawed feet and a lion depicted behind him (probably to highlight the lion component). This character has bovine horns and ears and a small inlay in his hair-dress. He fights against snakes (it is reportedly represented twice, once with a lion, in the other case with a scorpion[23]).

This character suggests that the man with clawed feet, fluted skirt, bare chest, long hair, with or without a beard, with or without any inlay on the chest or in the hair-dress, with or without bovine horns, fighting against snakes, felines or scorpions, is a graphic variation of the same bovine/ human/ lion/ bird hybrid character depicted in several examples. These include Fig. 8, n°4 (fake?: no ear for the snake, specific treatment of the hair and beard of the hybrid character)[24]; Fig. 8, n°5 (hair treated differently, the fluted skirt was probably represented with a now disappeared inlay, snakes with three rows of oval inlays instead of the usual two rows); Fig. 9, n°1 (right character in the drawing), Fig. 9, n°4 (left character in the drawing); Fig. 9, n°5 (left character in the drawing), Fig. 10, n°1 (character on the left side).

Figure 8a. Hybrid characters on Halil Rud Valley chlorite artifacts 1.

[21] See Perrot and Madjidzadeh (2006, 109) for a description of this vessel.

[22] The other side of this 'handbag' represents couples felines and snakes, topped by a scorpion on both sides of the main scene: a man kneeling on the back of two zebus (cf. Fig. 8, n°2, merged for lack of space) holds streams of water flowing from the heads of the bovines (see below the 'control of water streams' scene).
http://www.barakatgallery.com/store/index.cfm/FuseAction/ItemDetails/UserID/GVwcDbGFsmBWBGO/CFID/15226816/CFTOKEN/19113361/CategoryID/36/SubCategoryID/357/ItemID/44464.htm

[23] https://www.auction.fr/_fr/lot/vase-tronconique-aux-maitres-des-animaux-region-de-kerman-jiroft-iv-iiie-13109909

[24] https://www.timelineauctions.com/lot/bactrian-vase-with-god-holding-two-serpents/83462/
https://www.youtube.com/watch?reload=9&v=SeceUUwH_uU

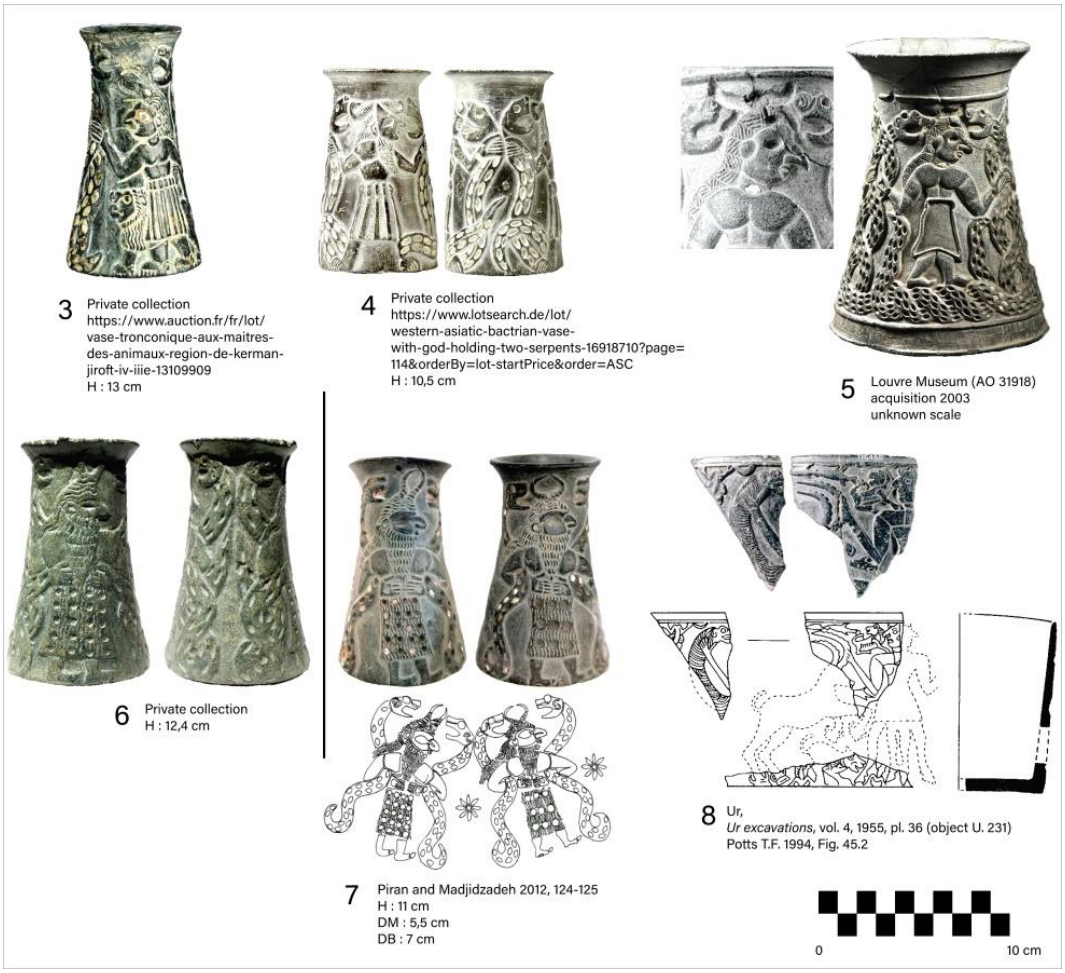


Figure 8b. Hybrid characters on Halil Rud Valley chlorite artifacts 1.

- 2) a man with (bovine?) horns, wearing a skirt decorated with regularly spaced circular inlays, sometimes bearded (Fig. 8, n°1, 2, 6, 7), is often observed dominating snakes (or bulls in Fig. 8, n°2). Snakes are not grabbed by hands, but trapped under the arms.

- 3) a bull-man, is commonly seen fighting against the usual enemies (snakes, felines, or scorpions) and is frequently symmetrically associated with the hybrid character n°1 with the fluted skirt and clawed feet (Fig. 9, n°4-5; Fig. 10 n°1). He has a bovine lower part, with sometimes an inlaid red disk (pierced with five holes disposed in quincunx) on the thigh and orange lozenge inlays on the leg. He wears a belt, is bare-chested, sometimes has a blue inlay in his hair-dress or on the chest, and has long hair with or without horns (Fig. 9, n°3[25], character repeated twice; Fig. 9, n°4, character on the right; Fig. 9, n°5, character on the right; Fig. 10, n°1, character on the right[26]; Fig. 10, n°2, where the five cavities in quincunx are directly pierced on the thigh instead of having a red disk. The other side of this 'handbag' is unknown).

Considering the regular association of the bull-man with the hybrid character n°1 as well as with the two-headed hybrid character shown with a belt and a lower bovine part in Fig. 10, n°5 and that the hybrid character n°1 displays bovine horns and ears, the bull-man may be interpreted as an emanation/avatar, or a variation of the hybrid character n°1.

- 4) scorpion-men are also depicted (Figs. 9, n°1 and 10, n°4; they also are very frequently represented on the 16/20 boxes game boards[27]). They probably belong to the 'enemies', along with snakes, scorpions, and felines.

- 5) a cylindrical vessel displays a man fighting against felines, a clawed-footed man with a fluted skirt (see above, hybrid character n°1) fighting against

[25] https://www.barbier-mueller.ch/collections/collections/antiquite/proche-orient-au-iiie-millenaire/

[26] Considering Fig. 9, n°4 and 5 and Fig. 10, n°1, either these three artefacts come from the same workshop or they belong at least to the same period (look at the symmetrical posture of the felines with three cavities on the jaw and the use of identically treated scorpions to separate the scenes).

[27] See Madjidzadeh 2003, 135; Madjidzadeh and Pittman 2008, fig. 12.

snakes, and a lion-man fighting against scorpion-men (Fig. 9, n°1; central character), the unique representation of this hybrid character known thus far (all with an inlay on the chest and in the hair-dress). An interpretation of this scene could be that, instead of representing three different characters, it illustrates the metamorphosis of the man into the hybrid character n°1 (represented only with his lion component) and the progression of the dominated creatures (felines/snakes/scorpion-men). As in the case of the bull-man (see above, hybrid character n°3), the lion-man was probably a further variation of the bovine/human/lion/bird hybrid character n°1, with an emphasis on his lion component.

- 6) A 'handbag' bears the single depiction known at present of a feline man (Fig. 10, n°3; the other side of this 'handbag' is not documented) who is seen fighting snakes.

Figure 9a. Hybrid characters on Halil Rud Valley chlorite artifacts 2.

Figure 9b. Hybrid characters on Halil Rud Valley chlorite artifacts 2.

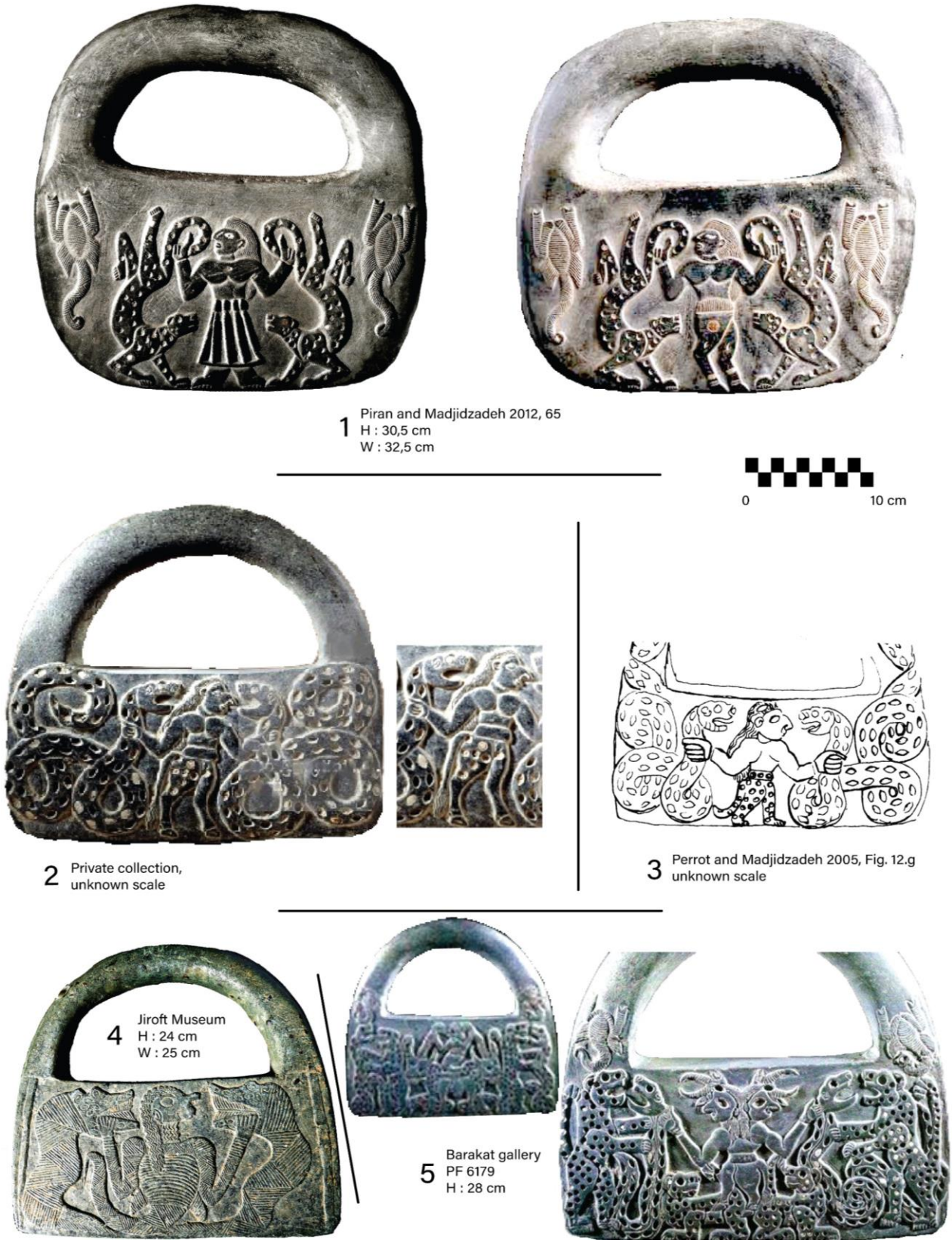


Figure 10. Hybrid characters on Halil Rud Valley chlorite artifacts ('handbags') 3.

These elements suggest that there was only one main hybrid character, with bovine, human, lion, and bird components. The man with clawed feet and wearing a fluted skirt, the bull-man, and the lion-man may be considered variations (depending on the specific period or area/workshop of production, or a specific context or

purpose?) or avatars of the same character (bird-man depictions may also be expected; see below on seals). The man with (bovine?) horns, wearing a skirt decorated with regularly spaced circular inlays (hybrid character n°2; they are shown together in Fig. 8, n°1) and the scorpion-man (hybrid character n°4) may be considered distinct characters. It is difficult to interpret the single example of feline-man (hybrid character n°6).

Additional characters are particular cases that do not fit in the known Halil Rud repertories, such as the creature from Ur, on Fig. 8, n°8, with multiple legs, short horns, and a lion on the shoulder, fighting an ibex/goat(?), and the character on Fig. 9, n°2 with a bull head in the lower part and bird claws as feet, fighting snakes.

II.1.b. Hybrid characters in the Halil Rud Valley non-chlorite art

Fig. 11, n°1-5 depicts five copper alloy figurines from irregular excavations. N°2-4 are certainly from the Halil Rud Valley. These figurines are best understood with additional, unpublished, copper figurines representing men, women, and animals that probably had an important role in the Halil Rud Valley funerary furnishings[28].

These five figurines represent a two-faced character with bovine horns and ears (the horns in Fig. 11, n°5 are described as lioness heads), long hair represented by two triangular strands on his bare chest (a male character save perhaps for Fig. 10, n°4 where a female chest seems to be represented), bearded, wearing a simple skirt. This character has his hands on his hips, except in Fig. 11, n°1 where he holds a feline/lion, and Fig. 11, n°5 where he holds a snake in both hands. These figurines probably represent the above-described bovine/human/lion/bird hybrid character n°1. They prove that this character was not two-headed but two-faced (as previously surmised[29]) and was depicted, with variations, on different supports. Some of these figurines are reported with a cavity opening on the top of the head (Fig. 11, n°5 is described as a 'bottle') and were probably used as a container (for perfume or cosmetics applied with a pin?). This character is also represented on two pinheads: Fig. 11, n°6 is a lapis-lazuli disk, displaying on both sides the upper part of a winged human with long hair (one-faced on one side, two-faced on the other) fighting against snakes; Fig. 11, n°7 is a silver pin that was regularly collected on the surface of the graveyard at Shahdad, depicting a kneeling/sitting character, bare-chested, holding (?) a snake in both hands, with long hair (a strand on the chest) and horns.

Lastly, Fig. 11, n°8-9 are exceptional objects from the Miho Museum. One is a human-bird figurine (Fig. 11, n°8; wings and claws), and the other is probably a human deer/Cervidae (?) (Fig. 11, n°9; antlers and hooves). We cannot ensure that they belong to the Halil Rud Valley, although their prominent noses and eyes, long hair, and skirts seem to hint at the iconography of this area. They must consequently be taken into consideration when dealing with the Halil Rud Valley hybrid characters.

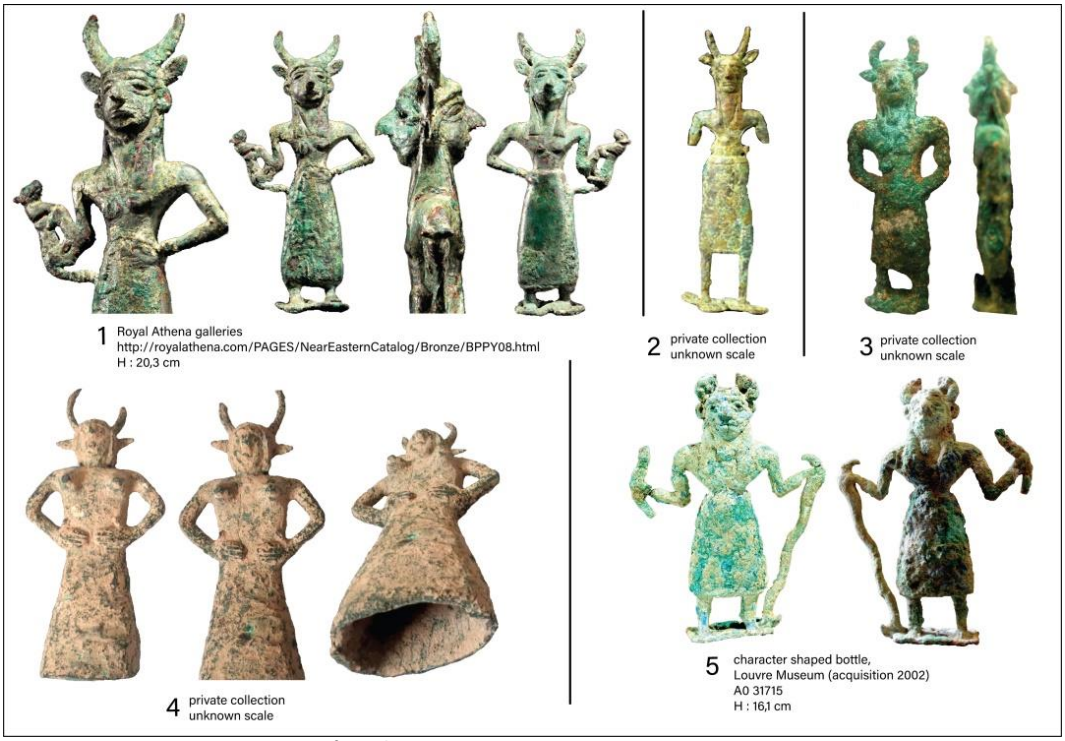


Figure 11a. n°1-5: Copper-alloy figurines of the two-faced hybrid character.

[28] See Eskandari *et al.*, forthcoming for the publication of a feminine figure holding a snake.

[29] "Le personnage est à double face (plutôt que bicéphale)" (Perrot and Madjidzadeh 2006, 109).

Figure 11b. n°6-9: Kermani depictions of hybrid characters (pinheads and figurines).

II.2. The 'control of water streams' scene

The second scene on the vessel from the Miho Museum (Fig. 3b) shows a hybrid character, probably the above-described bovine/human/lion/bird hybrid character n°1. It is on top of two male zebus, grasping their hump with their claws and clutching the flows that spring out of the animals' heads.

The front parts of the humped bulls or male zebus (Fig. 6, n°3-4) bear white round inlays (like the felines) set in quincunx. There are no horns and the sockets of the oval eyes are empty. They have long ears (slightly different in the two cases) and unnatural curvy clumps[30] on each lower leg. Below the mouth a 'beard' hints to a water flow[31]. Sexual organs are emphasized. Between the hooves and the lower legs, around the base of the ears, and above the head, parallel lines may evoke fur, while tails end in hairy tufts. From the upper part of the head of both zebus, a wavy band of three parallel lines emerges to frame the field where the hybrid character appears, topped by three groups of white inlaid scale-like mountains (three rows of three, two, and one ogive elements, thus depicted since the late 4th millennium BCE 'Proto-Elamite'/ Urukean glyptics).

The central hybrid character (Fig. 7, n°2) is probably a variation of the character depicted on the other side. The lion part was probably skipped and the bird one directly 'ligatured' with the human element for the reason that space is more limited on this side. The bird is here slightly different, with circular white inlays to fill the lozenges on the center of the body (instead of grooves).

The 'irregularities' in this scene, the mountain motif only on the left side, the missing horns of the zebus, and the merging of the bird and human parts, suggest that the main theme of this vessel was the battle scene and that the 'control of water streams' (from now on designated as 'CWS') scene was carved as a secondary theme within the remaining space.

II.2.a. Parallels for the 'control of water streams' scene in the Halil Rud Valley chlorite art

Vidale (2015, 20-32) interprets this scene as a 'flood' scene, where zebus are sky creatures (with small wings attached to their legs), symbolizing thundering clouds emitting rain (bulls are frequently the symbol of the storm god Adad/Addu in the ancient Near East, particularly in Syria and Anatolia). Water spreads from their heads (or snakes in one case, consistently with the correspondence snake/water); this flood[32] would later be stopped by a deity, the end of the storm being signaled by a rainbow in the sky.

Six additional representations of this scene are currently known (Fig. 12 a and b, n°1-6, plus the other side of the 'handbag' in Fig. 10, n°5). They usually depict two

[30] Interpreted as supernatural wings in Vidale 2015.

[31] These curvy clumps can be found contemporaneously on the legs of bulls, human-headed bulls and bull-men depicted in the Mesopotamian ED IIIb/Old Akkadian cylinder-seals contest scenes (see for example the 'jeweler's seal' contest scene in the lower register of Fig. 17a or Amiet 1980, pl. 77 bis N and pls. 81 to 84 and Rohn 2011, t. 10, n°70; t. 11, n°72a, 74) as well as (more surprisingly) on some of the bulls depicted on the metallic vessels found in graves of the second half of the second millennium BCE Marlik culture (Negahban 1996, vol. 2, fig. 3.9; obj n°14698/7698 in grave 45 and Inagaki 2019, fig. 28).

[32] Geomorphological analysis has shown that the Halil Rud Valley was regularly flooded (Fouache *et al.* 2005).

male zebus (with or without curvy water clumps on their legs; because of the lack of space, the zebus are merged in Fig. 12b, n°6 and Fig. 8, n°2), with an arched stream spreading out of their heads and in some cases a horizontal stream going backward parallel to their body (Fig. 12a, n°2) and/or a vertical downward stream spreading from their mouth (Fig. 12a, n°1 with stepped streams; Fig. 12a, n°3 and 5). In Fig. 12b, n°5 (the vase from Khafajah and probably the other side of Fig. 10, n°5), the streams spreading from the zebus' heads do not merge (probably because of the lack of space), indicating that the arched stream in other vessels should probably not be interpreted as an arch or a bow, but just as a stylized rendition of two merging streams. Fig. 12b, n°4, 6, and 7 (left side) display a variant in which the water streams are replaced by a snake or intertwined snakes (for the merging streams), which strengthens the view that a structural link exists between snakes and water streams/rivers. Fig. 12b, n°6 is a sealing. It shows that this scene was represented on supports other than chlorite vessels, although as discussed below, iconographies on chlorite vessels and seals are usually quite distinct in the Halil Rud Valley. One lapis-lazuli disk (Fig. 12b, n°7) shows a man sitting on a zebus from whom snakes seem to spread out (while birds are surprisingly depicted in the upper part of this scene).

A human figure stands or kneels on top of the zebus, sometimes wearing a fluted skirt (Fig. 12a and b, n°2-4), in cases with an inlay in the hair-dress (Fig. 12a, n°3) and bearded (Fig. 12b, n°4), holding in both hands merged or separate water streams. Between the two zebus, there may be a kneeling man, apparently the same character in a different moment, either holding zebus from the dewlap (Fig. 12a, n°2) or dominating two snakes (in Fig. 12b, n°4, perhaps a depiction of the vertical downward stream gurgling from animal's mouth).

The so-called 'CWS' scene overlaps with the domination-clash scenes so distinctive of the Halil Rud repertory, and its antagonistic iconography. Water streams/rivers/snakes emitted by zebus could well be interpreted as due to clouds or storms, but also to the mountains surrounding the Halil Rud plain. More than a 'flood' story, this scene evokes the threats that rivers posed episodically on the inhabitants and subsistence in the Halil Rud Valley, one of the greatest concerns of the early agricultural urban communities that were usually located along rivers or on foothills. In addition to this threat, it shows that these communities believed in extra-natural entities (perhaps divinities) that controlled natural forces and whose depiction possibly evolved. As illustrated by the artifacts in Fig. 12a and b, one of these divinities was probably involved in the control of water streams/rivers. Star (possibly the sun), moon crescent, and mountain motifs (as well as vegetation and cloud motifs (?) in Fig. 12b, n°5) are also frequently represented. The astral motifs are usually near the character holding the arched merged streams (e.g., Fig. 12a and b, n°2, 4 and 5). These motifs are not always present so it is unclear whether they have a specific value or are just intended to represent a natural setting.

Figure 12a. 'Control of water streams' scenes in the Halil Rud Valley chlorite art.

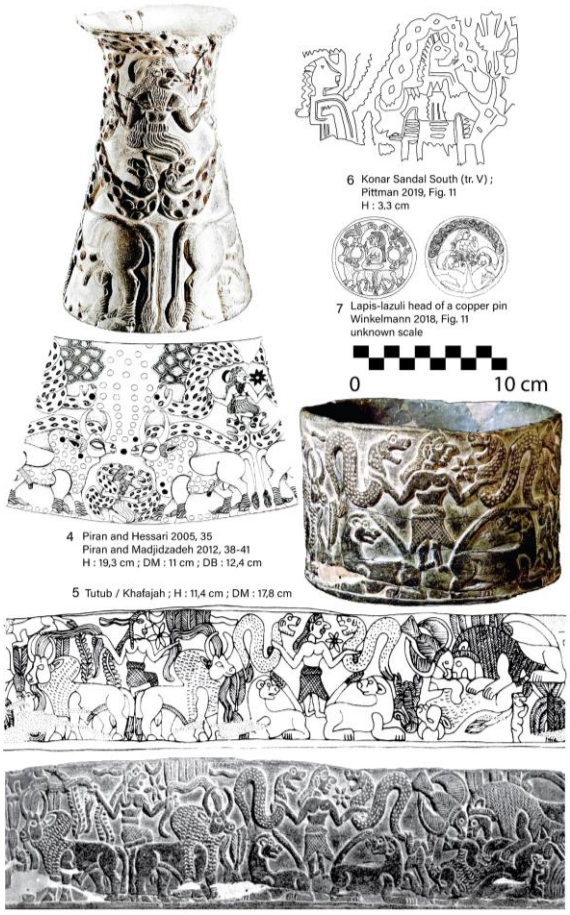


Figure 12b. 'Control of water streams' scenes in the Halil Rud Valley chlorite art (n°6 and 7 are a sealing and a lapis-lazuli pin-head).

II.3. Relation between the battle and 'CWS' scenes

Most artifacts presented here display either a battle scene involving fighting hybrids or the 'CWS' scene. The Miho Museum vessel combines both, establishing a connection between them. Additional associations are worth mentioning (see Table 1):

- vessel Fig. 8, n°1 also combines fighting hybrid characters with 'water zebus';

- vessel Fig. 8, n°2 displays in its lower register a horned man with bovine ears, kneeling on bulls, controlling snakes as well as a horned man kneeling on felines, controlling bulls. The former is repeated twice on top, with a raptor struggling with a snake;

- in Fig. 10, n°5 ('handbag'), one side shows a two-faced hybrid character with a bovine lower part standing on felines, while the other side shows a kneeling man on top of two merged zebus, probably controlling water streams spreading out of the animals' heads;

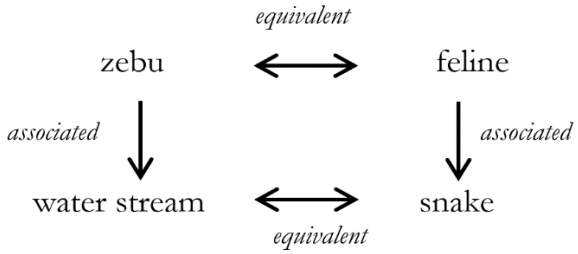
- vessel Fig. 12b, n°5 (from Khafajah) combines a man on top of two zebus holding water streams coming out of their heads, near a vibrant vegetation growth; in contrast, a similar human figure stands on top of two felines and holds two snakes. A scorpion separates this group from a crowded scene of scavenging, where a lion and a raptor feed on a carrion bovid. From this third group, grow the same plants seen in the first group. A small unidentified animal stands erected under a palm-date tree;

- Fig. 12b, n°7 (lapis-lazuli pinhead) displays a man sitting on zebus on one side and a woman (?) sitting on felines on the other. The *guilloche* motif on top of the latter side may represent stylized interwoven snakes or water flows.

	Character on zebus	Character on felines
Fig. 8, n°2	horned man with bovine ears holding snakes	horned man holding bulls
Fig. 10, n°5	man holding water streams (?)	two-faced man with bovine horns and a lower part holding snakes
Fig. 12b, n°5	man holding water streams	man holding snakes
Fig. 12b, n°7	man water streams depicted with snakes (?)	woman (?) *guilloche* motif

Table 1: artifacts showing simultaneously characters on zebus and felines

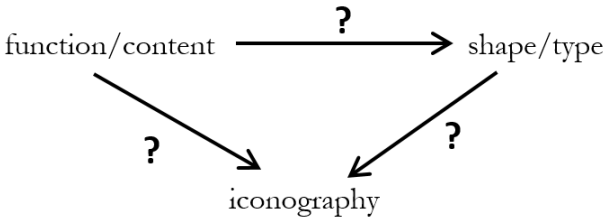
Considering that Fig. 8, n°2 and Fig. 12b, n°7 are probably specific cases, Fig. 10, n°5 and Fig. 12b, n°5 establish the association between zebus and water streams, and between felines and snakes. Besides the well-known equivalency water stream/snake, the zebus and felines are perhaps, in a way still to be determined, equivalent:



II.4. Preliminary considerations about the relations between the type/function of the Halil Rud Valley chlorite artifacts and their iconography

"L'ornementation d'un vase a pour but de lui donner un sens en relation avec son usage, avec sa place dans le rituel ; elle est supposée accroître l'efficacité du rite" (Perrot and Madjidzadeh 2006, 108).

Since virtually all the Halil Rud Valley chlorite vessels come from illegal excavations, we have no information about their content, spatial location in the graves, or associations with other artifacts. However, their shapes reflect probably their function (and content) while the decoration used may depend on their shape and consequently their function. A regressive method based on iconography and shape/type of vessels could perhaps help in determining the function and content of some of these containers.



In 2021, published[33] and unpublished artifacts in Jiroft and Kerman museums amount to 370 Halil Rud Valley carved chlorite artifacts, including 81 truncated-cone vessels, 84 'handbags', and 84 cylindrical vessels (ca. 67% of the corpus). Among 'narrative scenes', besides clashes involving hybrid characters and the 'CWS' scenes, range the following:

- women hiding from snakes in big, decorated jars (four occurrences);
- a man bald, shaved, or with short hair standing on the back of a bull tied to a menorah-like tree, or falling (three occurrences);
- scavenging scenes, either involving lions and fallen/dead zebu (as in the Khafajah vessel)[34], or felines and fallen/dead caprine (14 occurrences);
- architectural representations that Vidale (2017a) interpreted as related to the *vara*, an underground fort which, according to the Avestic version of a flood legend, was built by Yima to be used as a shelter (see below, section IV.2.a.1).

Among the 19 artifacts showing fighting hybrids, ten are on truncated-cone vessels, five on 'handbags', two on cylindrical vessels (including the vessel from Ur), one on a globular vessel (Fig. 9, n°4), and one on a footed cup (Fig. 9, n°5). Of the seven artifacts showing a 'CWS' scene, five are on truncated-cone vessels, one on a cylindrical vessel (from Khafajah, Fig. 12b, n°5), and one on a 'handbag' (Fig. 10, n°5). In this light, the truncated-cone vessels were the most common support for the fighting hybrids (along, less frequently, with 'handbags') and 'CWS' scenes. This tends to imply a connection between these scenes and the function(s) of these vessels.

Among the 81 decorated truncated-cone vessels, twelve bear geometric patterns (five with beveled squares, four with whirls, and three with mats). Five show rows of scorpions. On thirteen objects, felines fight snakes (among the 21 known cases, 13 are on truncated-cone vessels seven are on cylindrical vessels, and none on 'handbags'). Five have birds against snakes (fourteen cases known, including eight on 'handbags', their favorite support, five on truncated-cone vessels, and none on cylindrical vessels). Four have scavenging scenes involving lions and dead zebus near a palm-date tree. Finally, as previously mentioned, ten are decorated with fighting hybrids and five bear 'CWS' scenes.

[33] De Miroschedji 1973; Lamberg-Karlovsky 1988; Madjidzadeh 2003; Madjidzadeh and Pittman 2008; Perrot and Madjidzadeh 2005, 2006; Piran and Hesari 2005; Piran and Madjidzadeh 2012; Zarins 1978.

[34] Concerning the scavenging scenes involving lions and dead bovines, see Vidale *et al.* 2021.

Architectural patterns (45 scenes currently known) rarely appear on truncated-cone vessels. In contrast, 25 out of the 84 known cylindrical vessels and 17 out of the 84 known 'handbags' bear architectural motifs. Another strong relationship is between the pedestalled cups and groups of grazing ibexes, wild sheep, and gazelles among shrubs (twelve scenes attested). Among the twelve cups currently known, nine are decorated with such scenes (one with a fighting hybrid, cf. Fig. 9, n°5, and two, with date palms). Ceramic and bronze versions of these cups also display scenes with ibexes or gazelles.

This review (see below, Table 2) suggests that truncated-cone vessels frequently hosted the scenes of 'CWS' and 'fighting hybrids', illustrating the coherency of the iconography depicted on the Miho Museum vessel. Unfortunately, as previously said, the precise function of this type of vessel and its placement in the grave remain unknown as long as one is not found in a regular excavation and its content analyzed. Considering the tall closed shape, this container could have been used to store liquids, such as intoxicating drinks, perfumes, or ointments (Perrot and Madjidzadeh 2005, 129).

truncated-cone vessel	'handbag'	cylindrical vessel	pedestalled cup
scavenging scene involving lions and fallen/dead zebus with a date palm			
control of water streams			
fighting hybrids	fighting hybrids		
birds fighting against snakes	birds fighting against snakes		
felines fighting against snakes		felines fighting against snakes	
	architectural patterns	architectural patterns	
	date-palm		
			ibexes/gazelles among shrubs

Table 2: recurrent relationships currently known in the Halil Rud Valley chlorite art corpus between some types of artifacts and their decorative patterns (not all the types and decorative patterns are considered here)

II.5. Mesopotamian connections, comparisons, and dating

The decoration of the Miho Museum truncated-cone vessel has numerous parallels in Mesopotamia. Relations between Kerman and the West have been documented since the late fourth millennium BCE by the presence in the Halil Rud Valley of Uruk/Proto-Elamite-related materials at Mahtoutabad III (and Tepe Yahya IVC)[35]. Mesopotamian ED I-III sealings dating to the first two-thirds of the third millennium BCE were found in Konar Sandal South[36]. These seals are:

- a Mesopotamian City seal on a door-sealing (trench XIV; cf. ED I/II Ur);
- seals with bovids emerging from both sides of a structure displaying standards with a hemispherical loop (symbol of Innana; this scene is attested from the Late Uruk to the Late ED Period);
- seals with contest scenes with animals (one notably very similar to exemplars from the ED IIIb Ur Royal cemetery).

When the Akkadian empire took shape ca. 2300 BCE, the Mesopotamian geographical scope widened, evidence of direct relations with Kerman dramatically increased and the first mentions of Paraḫšum/Marḫaši (and Magan and Meluhha) appeared in cuneiform texts, mostly for military reasons. Current data suggest that Fars was at that time mostly void of settlements[37] and, as such, probably an obstacle to movement and communication. On the other hand, the Persian Gulf and its maritime (trade) route probably played an important role in the relationships between Kerman and Mesopotamia. The distribution of Halil Rud Valley chlorite artifacts and Kermani *Waagenophyllum* limestone artifacts (particularly at the time of the second dynasty of Lagaš) illustrates this[38].

If Marḫaši was the archenemy of Akkad in South-western Iran at the time of Sargon, Rimuš, and Maništušu (ca. 2320-2250 BCE), the situation changed dramatically at the time of Naram-Sin (ca. 2250/2230 BCE). With this ruler, Marḫaši was not mentioned anymore as an enemy. The so-called 'Treaty of Naram-Sin' may probably be interpreted as a peace treaty between Akkad and Marḫaši (see below section IV.2.b.1, for the religious implications of this hypothesis), agreeing on their different spheres of influence in South-Western Iran. One of Naram-Sin (or Šar-kali-šarri)'s sons (perhaps Ubil-Eštar) went to Marḫaši to marry a Marḫašean princess and bring her back to Mesopotamia. This is the first recorded instance of a royal wedding between 'Mesopotamian' and

[35] Desset *et al.* 2013.

[36] Pittman 2012, 81-92; 2013a, 307-310; 2018, 26-32.

[37] *Contra*, see Miller and Sumner 2003.

[38] Desset *et al.* 2016; Desset, Vidale *et al.* forthcoming.

'Iranian' dynasties, as it will be abundantly documented later (e.g., the wedding of Liwwir-mittašu, the daughter of Šulgi, with the king of Marḫaši in 2076/2075 BCE = 18th year of reign of Šulgi).

The alliance between Marḫaši and Mesopotamia proved to be surprisingly strong, surviving dynastic changes and continuing through the third dynasty of Ur. Both States probably shared common interests in South-Western Iran, considering Puzur-Sušinak's military episode (ca. 2150-2100 BCE) and the subsequent emergence of Šimaški (2100-2000 BCE), as common enemies threatening respectively their western and eastern borders. Marḫašean ambassadors and messengers are continually attested in the Mesopotamian cuneiform texts from Šulgi 46 to Ibbi-Sin 1 (2048-2027 BCE).

Gift exchanges were performed between the two courts[39] while an unprecedented direct military alliance is implied from the documented presence of Marḫašean soldiers in Mesopotamia.

The Miho Museum truncated-cone vessel probably needs to be approached in the framework of these relations between Mesopotamia and Kerman.

Its two scenes are opposed in a generally opposed triangular (VΛ) structure (Fig. 13). Such structure is observed as early as the late fourth millennium BCE on the sealing impressions on Early PIW tablets and on elite cylinder seals from Kerman such as one from the Rosen collection and a gold one from the Al-Sabah collection (the latter probably depicts the bovine/human/lion/bird hybrid character n°1; see below). These comparisons point to a common artistic background in the production of chlorite vessels and cylinder seals.

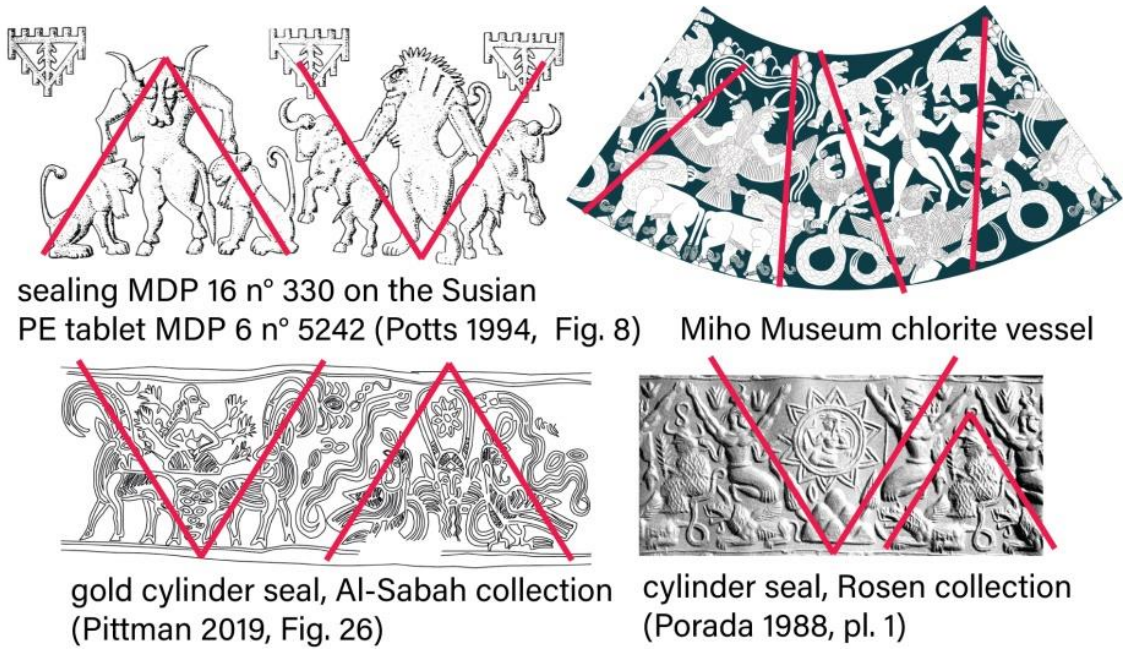


Figure 13. Comparisons of the opposed triangles (VΛ) structure in the articulation between two scenes.

The depiction of the hybrid character in the 'CWS' scene parallels representations of the Mesopotamian leptocephali bird Anzu/Imdugud, which is frequently shown grasping lions, deers, or ibexes similarly since the ED I(?)-II Periods[40] (ca. 2800-2700 BCE; it is abundantly represented on ED IIIb 1st dynasty of Lagaš-related artifacts, such as the silver vessel of Entemena; see also two representations on chlorite pots, one from Mari and one from Tarut). Since representations of Anzu in Mesopotamia are earlier, they may have influenced that of the hybrid character in the 'CWS' scene on the Miho Museum vessel. The overpowered lions in the battle scene on the Miho Museum vessel can be directly paralleled to Mesopotamian cylinder seals from the late ED IIIb/Old Akkadian Period (Fig. 14; parallels are also observed on Central Asian glyptics)[41]. Parallels with Mesopotamian late ED IIIb/Old Akkadian glyptics for the position of the dominated animals are observed on other Halil Rud Valley chlorite artifacts which show animals turned upside down, the back towards the dominating character and held by the tail and hind legs (Fig. 15).

[39] Potts 2002.

[40] Braun-Holzinger 1987.

[41] The position of the dominated animals is attested as early as the late fourth millennium BCE (Winkelmann 2000, 47-48).

Figure 14. Similar position of the dominated animals (turned upside down, belly oriented towards the dominating character and held by back legs) comparisons.

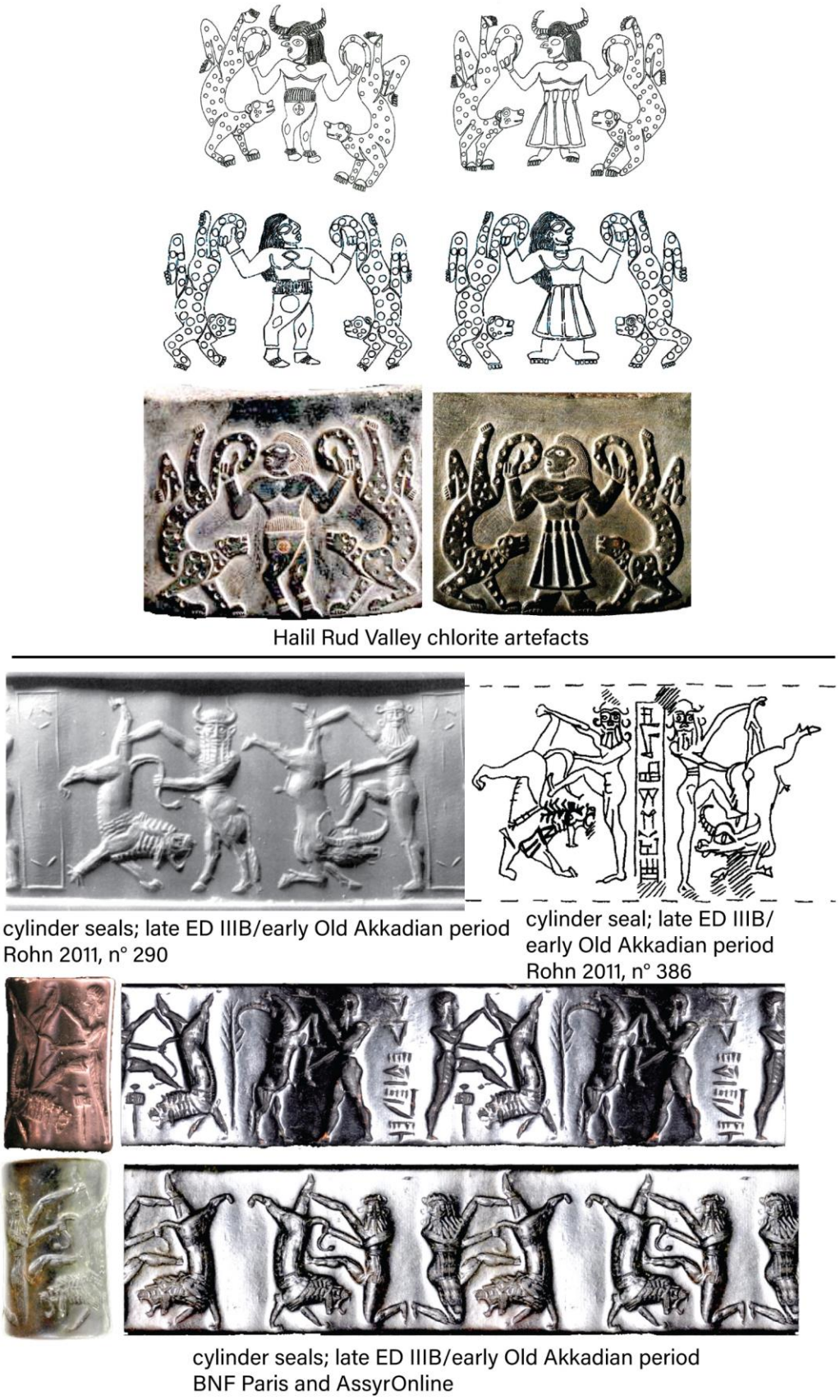


Figure 15. Similar position of the dominated animals (turned upside down, back oriented towards the dominating character and held by the tail and back legs) comparisons.

Figure 16. The cylinder seal of Adda the scribe.

These similarities are reinforced through comparisons with the Mesopotamian (Sippar?) cylinder-seal of Adda the scribe, dated around 2300-2200 BCE (Fig. 16). Mountains here, take the form of the same scale patterns as on the Miho Museum vessel as well as on the cylinder-seal from the Rosen collection (attributed by Porada to the Old Akkadian period, 23rd century BCE [42]). Streams of water and the muscular bodies of the characters are also depicted similarly. The bicephaly of the hybrid character n°1 in its most recent attestations on chlorite artifacts is probably a graphic convention showing that he is two-faced (as proven by the copper figurines; see Fig. 11, n°1-5). This convention relates to the depiction of the Mesopotamian god Isimud/Ušmu (e.g., the seal of Adda, on the right, see Fig. 16), the messenger of Enki/Ea, the god of the underground sweet water (*apsû*), who emanates streams of water from shoulders. This could be one of the attributes of the Halil Rud Valley region bovine/human/lion/bird hybrid character n°1 too, as shown in the 'CWS' scenes. The earliest representations in Mesopotamia of the two-faced god Isimud/Ušmu date to the Old Akkadian period[43].

The parallels with the seal of Adda and Mesopotamian iconography in general for the depiction of dominated lions, mountains, streams of water, bodies, and two-faced characters suggest that the Miho Museum vessel dates to the early Old Akkadian Period, ca. 2300-2200 BCE. Consequently, it likely belongs to the recent phase of the Halil Rud Valley chlorite art. Furthermore, the fact that representations of dominated upside-down lions are more frequent in Mesopotamia suggests an influence of Mesopotamian glyptics. On the other hand, it is unclear whether the Halil Rud Valley bovine/human/lion/bird hybrid character, in its more recent two-faced representation phase (see below section III.2), is older or more recent than the depiction of the Mesopotamian god Isimud/Ušmu.

III. Supernatural iconography of Bronze Age Kerman

III.1. Based on glyptics

Kerman glyptic iconography (see Fig. 17a and b) does not overlap with the Halil Rud Valley chlorite art. Kermani seals very rarely share the motifs carved on chlorite. Exceptions are a 'CWS' scene in sealing Fig. 12b, n°6 or the bovid/human/lion/bird hybrid on the al-Sabah collection gold seal (see also a seal from Gonur Depe in Fig. 17a). Chlorite artifacts, in turn, never show the scenes or actors which commonly appear on seals. In particular, they completely exclude goddesses who are paramount in seal imagery[44].

A number of supernatural entities and/or divinities are represented in third millennium BCE Kerman glyptic art. These are observed on: seals and sealings from Kerman province (Konar Sandal[45], Shahdad, and Tepe Yahya); materials originating from or related to Kerman found at other Iranian sites such as Susa and Jalalabad (Fars); materials from Gonur Depe and the southern Central Asian civilization (Bactria-Margiana Archaeological Complex/Greater Khorasan Civilization) in general, largely influenced by[46] or

[42] Porada 1988, 141.

[43] Boehmer 1976-1980.

[44] Female characters, in general, are exceedingly rare on chlorite artefacts; the motif of women (with a very specific buckle-bun hair style) hiding in large, decorated jars are unique. Females are also portrayed in copper figurines and in 'couple' scenes on the copper or lapis-lazuli heads of copper pins.

[45] For the sealings and seals found at Konar Sandal, see Madjidzadeh and Pittman 2008, 95-100; Pittman 2012; 2013a; 2013b; 2014a; 2014b; 2018, 21-33; 2019.

[46] "As the Kerman culture is older than the Bactrian one and both cultures partly overlap chronologically, one may assume that the

imported from Kerman[47]; and objects from private collections[48]. We list below these characters (see Fig. 17a and b for all the documents used here and their references):

- 1) a vegetation/grain goddess with vegetal branches growing from the body, sitting on two ibexes (or on a snake in one case) or standing, rarely winged (two cases);

- 2) a horned, winged goddess, standing or sitting (sometimes on a chair), in some cases associated with snakes;

- 3) a less defined goddess on the Rosen collection seal. She sits on two horned lion dragons, wears a kaunakes-like robe with a horned cap, and holds a vegetal element[49]. An eight-like sign appears on the head. This goddess is also represented on Central Asiatic metallic compartmented stamp seals (e.g., Fig. 17b), sitting on a dragon or standing by lions, wearing a kaunakes-like robe, and winged in some cases or with animals springing from her arms. She could be a variation of a previously described goddess. This character probably achieved important success in the southern Central Asian civilization (BMAC/GKC);

- 4) what appears to be a male divinity sitting on a chair/throne or standing with snakes emanating from shoulders (Fig. 17b)[50]. Three images are known, respectively in the Foroughi collection, the former Bailey collection, and from a seal said to come from Jalalabad. In this last example[51], the god stands with multiple arms transformed into snakes, worshipped by three bent women in a kaunakes dress. The seal from the Foroughi collection shows a bull-head above the head of this god. He resembles the kneeling character with snakes emanating from his arms and capped with a bull-head (and 'tulips') on the Rosen seal and the sitting figure on the left side of a large cylinder-seal from Konar Sandal South (Trench V) with a bull-head above his head and a snake behind him. In the Bailey collection seal, the chair of the god is on a platform very similar to that of Insušinak or Napireša on the so-called 'stele of Šir-ůktůh' and the seal of Tan-Ůlı dated to the first half of the second millennium BCE (Fig. 17a). The three worshipping women on the Jalalabad seal remind the three standing ones in front of the god on the Bailey collection seal, while a bird (maybe on the shoulder of the god on the Jalalabad seal), a lute/lyre (played or not) and tulips seem to be regularly associated with this divinity;

- 5) four images show a god sitting or kneeling in a halo (two seals in the Rosen collection, one in the Foroughi collection, and one from Gonur Depe), all of them associated with goddesses. In two cases, he holds a snake or a bow, and in two cases he is probably wearing a horned cap. In the Rosen seal, the halo rises on a scale-like mountains motif like those in the 'CWS' scene on chlorite artifacts (e.g., Miho Museum vessel, Fig. 12a, n°1-2), with two trees. The halo is framed by two kneeling males raising their arms, one bearing a hat (with a lion-head?) and a quiver and a bow, the other with snakes protruding from his arms and a bull-head cap. In the Foroughi collection seal, this god sits on an arched platform with animal legs, framed by two halves of a bovine and rope-like element on both sides (probably as a depiction of the halo). A character kneels in front of him, holding a snake or bow. In the sealings of a large cylinder seal found in Konar Sandal South (Trench V), the sitting character on the left is holding a bow and an arrow and could be assimilated into this figure. As he faces the god with a bull-head cap (see above, character n°4), the Trench V sealing can be compared to the Rosen specimen. The halo may identify him as a sun god (rising on mountains in the Rosen seal), while the bow and arrow could hint at solar beams. If this is correct, he might be Nahůnte, the 'Hatamtite' solar god, the equivalent of the Mesopotamian god Utu/Šamaš;

- 6) the bovine/human/lion/bird hybrid character previously described in chlorite art is probably represented on two cylinder seals from the al-Sabah collection and Gonur Depe. The bird component of this character is here more emphasized; his body is that of a bird, and his head is that of a horned human with a curved beard (Fig. 17a). The Al-Sabah gold cylinder-seal shows the head of the god with a sun-motif between the horns, flanked on both sides by a human-headed bird (two-faced characteristics?) and a snake, the animal he is usually dominating. On this last seal, it accompanies the vegetation goddess n°1 and an upward-oriented lunar crescent. The association of goddesses and lunar crescent is attested in other cases; these astral representations are exactly similar to the moon crescent and star/sun displayed in some 'CWS' scenes (see Fig. 12a and b, n°1, 2, 4 and 5). On the seal from Gonur Depe, the same god may appear with two bird heads

Iranian Kerman culture has also influenced the Bactrian culture in the field of religion" (Winkelmann 2014, 200).

47 According to Pittman (2019, 272), the 5 cylinder-seals found in Gonur Depe were all imported, one from Mesopotamia, the four others from Kerman.

48 See Winkelmann (2000, 70-80; 2014, 202-216) for a similar reconstructive attempt and the identification of five different divinities

49 This representation is very close to the statue of the goddess found in Susa commissioned by Puzur-Sušinak and which can now be identified as *Bēlat-ekallim*, the "Lady of the palace", a well-known byname of Innana/Eštar thanks, to the decipherment of Late Proto-Iranian writing (Desset *et al.* forthcoming a and b; inscription I: 1, *pe-l-ti-ka-li₃-m*).

50 See Eskandari *et al.* forthcoming, for a discussion of snake imagery in third millennium BCE iconography.

51 See Vidale *et al.* 2021.

(see below). On the sealings of a large cylinder seal from Konar Sandal South (Trench V), the figure standing on the right has horns and could also be ascribed to this character;

- 7) one of the most ancient depictions of the (double) bird (vulture)-headed (winged) entity, sometimes with claws instead of feet, may be recognized on the upper register of the 'jeweler's seal' from Susa (Fig. 17a)[52].

He appears on two cylinder seals from Gonur-Depe (probably originally from Kerman), and many additional representations of this character or an analogous deity or demon are recorded in Central Asia on stamp seals, ('amulets'; see Sarianidi 1998, 171, 173), axes, and a circular gold seal with a Late PIW inscription (G'). Muscular, wearing a short skirt and a pendant, he is usually shown overpowering snakes, scorpions, ibexes, a dragon, or a wild boar. He may be a variation of the bovine/human/lion/bird hybrid character/god (they share a similar bicephalic/two-faced feature), although his bird (vulture) component is emphasized (compare the depiction of the lapis-lazuli pin-head Fig. 11, n°6 with the cylinder-seal from grave 1393 at Gonur Depe). This character, like the goddess associated with dragons or lions, underwent a specific development in Central Asia. On the contrary, it could be also hypothesized that both are from Central Asia and arrived later in Kerman.

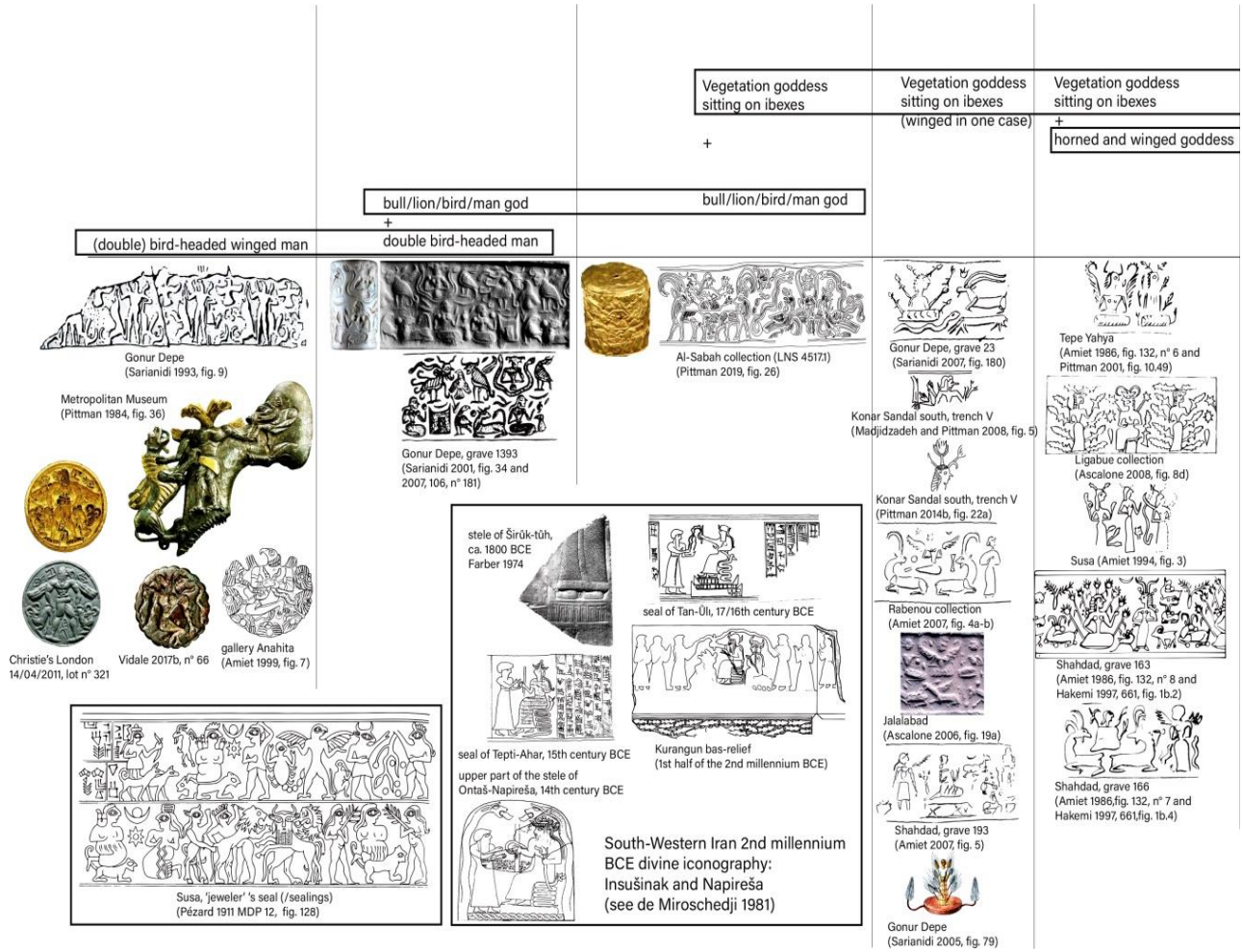


Figure 17a. Third millennium and early second millennium BCE Kermani and Central Asiatic divine iconography on glyptics and comparisons.

[52] This fascinating seal mixes Mesopotamian elements (cuneiform inscription and the contest scene on the lower register) with typically Eastern-Iran/Kerman ones. It may have belonged to an Eastern-Iranian (Marḫašean) person, acculturated to Mesopotamian iconography probably in Susa where he/she lived or was active (this is a door-sealing). As cuneiform writing was probably adopted in Susa with the Akkadian annexation of the city by Sargon, this could be a terminus *post quem* for the dating of this seal to be attributed then to the 23rd century BCE, like the Miho Museum vessel (it is usually dated earlier: Winkelmann 2000, 45 and 67: 2500-2350 BC/EDIII; *contra* Pittman 2002, 219 and 229: "while the specific iconography belongs to the middle of the [third] millennium according to Mesopotamian development, it could as well have been copied into the Early Old Akkadian period, perhaps as much as 200 years later. […] It was carved during the period between 2400 and 2200 BC".

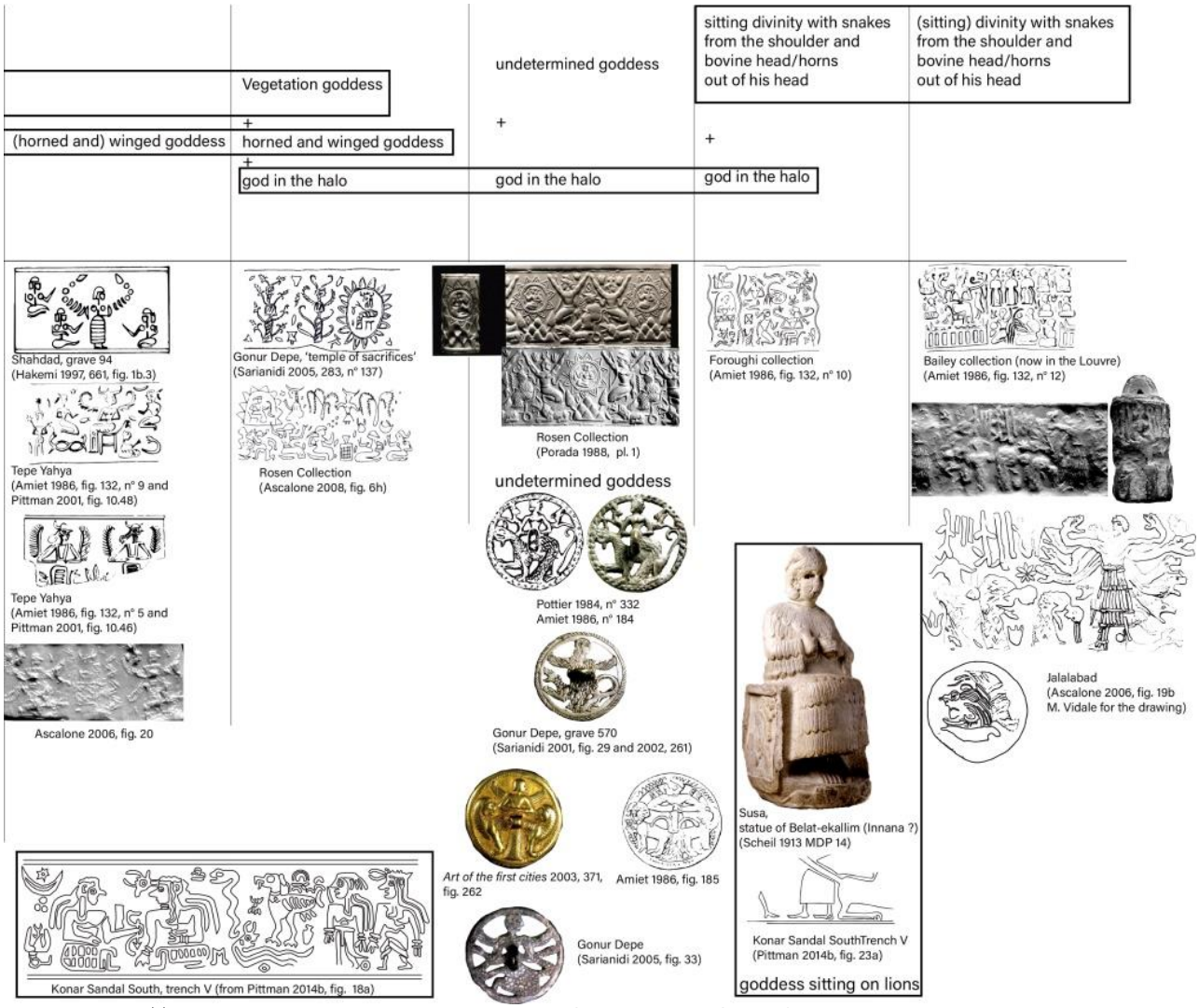


Figure 17b. Third millennium and early second millennium BCE Kermani and Central Asiatic divine iconography on glyptics and comparisons.

III.2. Synthesis and iconographic evolution of the bovine/ human/ lion/ bird hybrid character/god

The above review suggests that goddesses are most common in glyptic art[53], while specific divinities, also displayed in glyptics, are represented on chlorite objects, whereas goddesses are not. Since there is very little overlap between the chlorite and glyptic arts iconographic spheres, this dichotomy may be explained in the following terms: 1) chlorite artifacts are essentially containers, implying that a specific content could have been associated with particular divinities; 2) considering the probable funerary context of most chlorite artifacts from the Halil Rud Valley region, and tentatively hypothesizing that they were made to be deposited in graves[54], we might assume that the divinities and stories or myths potentially illustrated on them relate to death.

Many characters in the Kermani supernatural imagery are horned, wear horned caps, or are topped by bull-heads, birds, or scorpions, reflecting the hybrid animal/human character associated with their extra-human/divine status. This might be linked to the horned cap used in Mesopotamia as a distinctive headdress for divinities since ED IIIa times (ca. 2600-2500 BCE)[55], although it is impossible to tell whether this motif appeared first in Mesopotamia or South-Eastern Iran. The Mesopotamian horned cap may be seen as a local interpretation of the animal/human hybrid divinities typical of South-Eastern Iran, who are directly horned characters or have animal heads or

53 As previously stated by Winkelmann (2000, 78): "If this interpretation is correct we have here the central figure of the Southeast Iranian pantheon: a main goddess".

54 See Vidale and Micheli 2012 about the funerary function of the chlorite 'handbags'.

55 Boehmer 1972-1975 and Braun-Holzinger 2013, 148 ("Die Hörnerkrone als allgemeines Göttermerkmal ist daher eine 'Erfindung' der jüngeren frühdynastischen Zeit").

headdresses. Animal/human hybrid characters are observed since the fifth millennium BCE (animal-headed humans)[56] and during the late fourth millennium BCE Uruk Mesopotamia/Proto-Elamite Iran, with characters that combine lion and bird of prey attributes, and animals engaged in human activities. A shared imaginary substrate must have existed, upon which the third millennium BCE hybrid creatures were elaborated, on a relatively limited scale in Mesopotamia (leptocephali bird Anzu, human-headed lion, bull-man, human-headed bull, scorpion-man, bird-man, boat-god) and in the Indus (Harappan 'chimera', attested on 31 seals, combining cobra/snake, tiger, unicorn, markhor goat, elephant, human face and zebu[57]). It probably developed on a much larger scale in eastern Iran (and of course Egypt), where human/animal hybrids could stand for divinities.

The iconographic evolution of the bovine/human/lion/bird hybrid character between ca. 2700 and 2200 BCE, whose Miho Museum vessel depiction is probably among the most recent examples, reflects this tendency to take animals to represent divinities (perhaps for distancing them from the human sphere). We propose here a tentative reconstruction of the different stages of this iconographic evolution (Fig. 18), based on a hypothetical unilinear 'complexification' process (simpler = older; more complex = more recent):

1) a simple horned man;

2) bovine legs or lion feet are added;

3) the animal part gains more importance with a full-lion/bird (on seals) body on a (horned) human-headed character;

4) the two-faced aspect appears;

5) the most recent representations of this character combine bovine, lion, bird, and human attributes with a human upper body and a two-faced head.

A feline/bird/human character depicted on metallic vessels from the Marlik culture is probably worth mentioning (Fig. 19) as a potential continuation of the third millennium BCE Kermani bovine/human/lion/bird hybrid character into the second millennium BCE. One silver vessel from tomb 50 at Marlik displays a winged character with a lower bird part, an upper human part, and two animal (feline?) heads, controlling two sphinxes (winged lions with a woman-head) (vessel n°21; Fig. 19, n°1)[58]. One electrum goblet at the Louvre Museum (AO 20281), probably from Marlik culture, displays a winged character with a lower (reptile?) twisted part with bird claws, an upper human part, and two animal (feline?) heads, controlling two ibexes/gazelles (Fig. 19, n°2).

The position of the ibexes/gazelles is very similar to that of the dominated animals in Fig. 14 and seems to be a direct loan from the late third millennium BCE iconography.

IV. Third millennium BCE South-Eastern Iran / Marḫašean pantheon

IV.1. Iconographic data

The above review of glyptic and chlorite iconographic evidence suggests that three female and six male super-natural entities, that we hypothetically interpret as goddesses and gods, are represented in third millennium BCE South-Eastern Iran:

- a) a vegetation/grain goddess (in glyptics);
- b) a horned and winged goddess (in glyptics);
- c) a goddess sitting on or associated with horned lion/dragons, wearing a kaunakes-like robe and a horned cap, and holding a vegetal element (in glyptics);
- d) a god sitting on a chair, kneeling or standing with, in some cases, snakes emanating from his shoulders and arms, and a bull-head emanating from his head (in glyptics);
- e) a god sitting or kneeling in a halo (Nahůnte?; in glyptics);
- f) a bovine/human/lion/bird hybrid god (mainly attested on chlorite artifacts but also in glyptics), fighting against animals (mainly snakes) and probably controlling streams of water (/snakes) originating from zebus. Its image probably evolved between 2700 and 2000 BCE, as his two-faced characteristics probably only appeared ca. 2300 BCE. The bull-man, the lion-man, and the man with clawed feet wearing a fluted skirt may be considered variations or avatars of this character;
- g) a (double) bird-headed (winged) man, sometimes with claws instead of feet, fighting against various animals (in glyptics);
- h) a god with (bovine?) horns, wearing a skirt decorated with regularly spaced circular inlays, fighting or controlling snakes (in chlorite art);
- i) in the chlorite artifacts corpus, scorpion-men are also attested. It is not certain if they represented a specific divinity, just a genius, or a manifestation of negative forces.

[56] Pittman 2014a, 630-631.

[57] Frenez and Vidale 2012.

[58] Negahban 1996, vol. 1, 81-82.

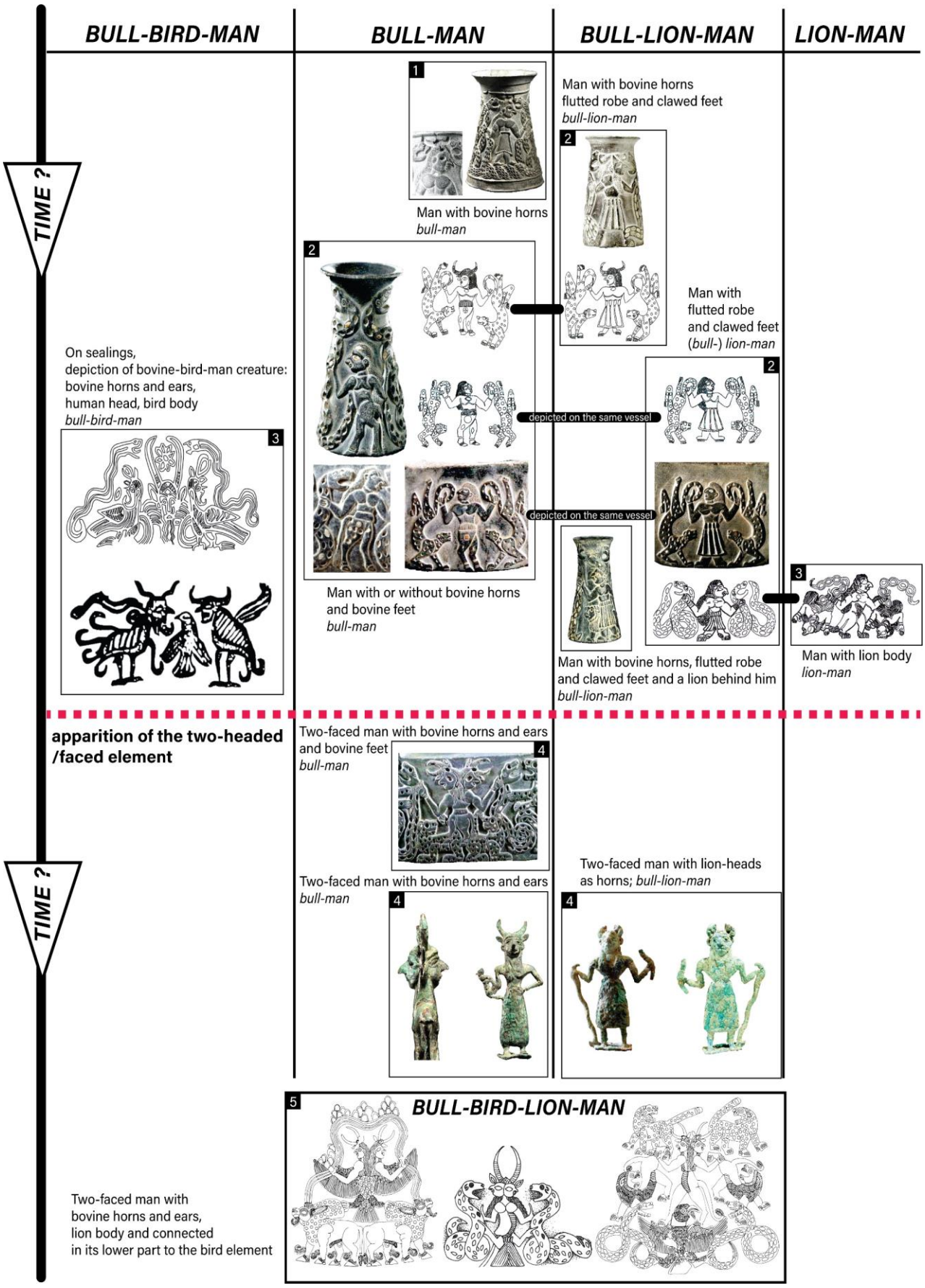


Figure 18. Hypothetical iconographic evolution of the bovine/human/lion/bird hybrid (two-faced) god.

Figure 19. Later iconographic comparisons are available for the bovine/human/lion/bird hybrid (two-faced) god.

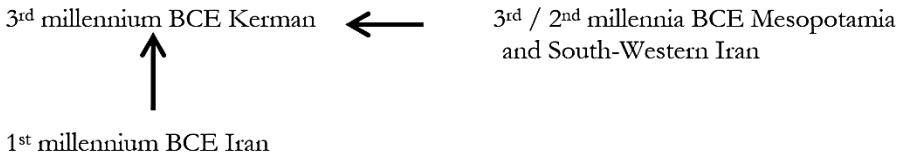
This list should be considered at best tentative and not comprehensive, because: 1) it may superimpose and mix different periods and areas along with the risk of interpreting actual variations of the same figure as distinct entities (or actual distinct entities as the variations of the same figure); 2) it is based on selected objects that come from different periods and regions, which implies the possibility that the iconographic themes did not necessarily always reflect the same meanings. Of specific concern here is the sharing of iconographic themes between south-eastern Iran and Central Asia in the second half of the third millennium BCE, as apparent similarities might have been the expressions of different ideologies. The iconography of south-eastern Iran in the third millennium BCE, on which this preliminary list is proposed, nevertheless hints at a religious landscape including different feminine and masculine entities, probably identified by specific symbols and attributes and playing specific roles in distinct myths. From this point of view, it seems to correspond to a 'typical' Near-Eastern-type pantheon, characterized by specific hybrid characters.

At this point, only textual information could lead us to break the surface of the images and move beyond this very general statement to reach the underlying, lost narratives.

IV.2. Textual data and narrative interpretation

IV.2.a. Indirect approaches

In the absence of solid knowledge about the Iranian Plateau during the third millennium BCE, later Iranian narratives (Avesta) and third/second millennia BCE sources from Mesopotamia and South-Western Iran provide important information that helps in understanding third millennium BCE Kermani iconography.



IV.2.a.1. Later Iranian evidence: an Avestic text

Considering that basic mythemes survived in the same territory and could be traced as a Proto-Indo-Iranian substrate/heritage in subsequent religious conceptions, Vidale (2017a) hypothesizes that the architectural representations on the Halil Rud Valley chlorite art are models of the *vara/var* known in the Avesta. *Vara/var* is a walled space built by Yima (Videvdad, Fragard 2, 22-43) under divine instructions as a shelter for mankind, plants, and animals when threatened by the ice of a deadly cataclysmic winter (it could be a variation of a substrate myth from which the Mesopotamian flood myth, as documented in the epic of Atra-Ḫasis, also sprung). The reference to palm dates in the quoted Avestic passages seems to support a south-eastern Iranian scenario for the narrative.

However, an important issue with this approach is that the toponyms in the Avestic texts usually correspond to territories located north and east of Kerman, in current North-Eastern Iran, Central Asia, or Afghanistan[59]. This issue could be overcome if one considered that the third millennium BCE Kerman religion influenced the late third/early second millennia BCE southern Central Asian civilization (BMAC/GKC), a possibility suggested by certain aspects of its glyptic art (see above). This latter area, from the points of view of presumed times and locations, could be considered as sharing or overlapping the possible religious substrate of the Avestic texts. In this perspective, a southern Central Asian civilization (BMAC/GKC) substrate, itself influenced by Kermani templates, might have been fragmentarily reflected in archaic cores of the Avestic texts. Although this scenario remains problematic, it seems logically possible.

3rd millennium BCE Kerman/Marḫaši
↓
Late 3rd / early 2nd millennium BCE southern Central Asian civilization (BMAC/GKC) proto-Indo-Iranian substrate
↓
Avestic texts

IV.2.a.2. Contemporary and later evidence from Mesopotamia and South-Western Iran (Susiana and Fars)

"Dans la recherche concernant la spiritualité de l'Orient «pré-historique», nous avons été trop souvent portés à nous satisfaire de notions tirées de la littérature mésopotamienne du IIème, voire du Ier millénaire; c'est-à-dire de notions anachroniques qui faussent toute tentative d'interprétation"[60].

An alternative to the first approach considers that contemporary societies in direct contact might have shared similar religious conceptions, through influences, and/or a common religious background. As such, Mesopotamian narratives may help in explaining the Halil Rud Valley iconography[61]. The myth of Etana, including the initially independent tale describing the opposition between the bird and the snake, recalls the abundant fighting scenes between birds (bearded vultures) and snakes in the Halil Rud Valley chlorite art. Also, the scenes of 'CWS' may be related to the Mesopotamian flood myth (Vidale 2015).

Third and second millennia BCE cuneiform texts document also the South-Western Iranian/Susian ('Elamite') religion[62], characterized by the cults of Insušinak and Napireša. Late third millennium BCE Susa is characterized by the temples of Insušinak and Ninḫursaĝa, built on the Acropolis on both sides of the early fourth millennium BCE *Haute terrasse* and restored by Šulgi in the 21st century BCE. We know from the texts that:

- Ešpum, the Akkadian governor of Susa at the time of Maništušu (ca. 2260 BCE), dedicated a statue to the goddess Narůte;
- the local ruler Puzur-Sušinak (ca. 2150-2100 BCE) mentioned in his texts Insušinak, Šamaš, Enlil, Enki, Innana/Eštar, Sin, Ninḫursaĝa, Nergal and Narůte to which list we may add Šimot (probably the equivalent of Nergal) from the Late PIW text D[63]. He described specific rituals for the gate of Insušinak, dedicated statues to AL.UR$_4$?.KA? and Bēlat-Terraban, and votive 'nails' to Insušinak. He also commissioned the statue of a goddess (previously wrongly identified as Narůte), designated in the Late PIW inscription (I) written on it as *pe-l-ti-ka-li$_3$-m*, Bēlat-ekallim, a byname traditionally reserved in Susa for Innana/Eštar (this identification is confirmed by the lions carved on the throne of the goddess and under her feet). Additionally, Puzur-Sušinak built or restored the temple of ŠU-GU (an unknown god). Insušinak is probably local to Susa (his name in Sumerian would mean "the lord of Susa"), whereas all the other gods mentioned by Puzur-Sušinak seem to have Mesopotamian origins, save for Narůte and Šimot (and maybe ŠU-GU);
- late third millennium BCE onomastics at Susa reflect an even more Mesopotamian-related pantheon, since people's names are almost always those of Mesopotamian deities, especially Ea, Šamaš, Erra,

59 Lecoq 2016, 57-58 (geographic scope of the Avestic texts) and 124-125 (hypotheses about the life of Zarathuštra and where his prophetic career could have been led).
60 Perrot and Madjidzadeh 2006, 99.
61 See Winkelmann 2014, 211-213; 2018; Vidale 2015, 32-38.
62 Vallat 1998; Quintana 2018, 729-731.
63 See Desset *et al.* forthcoming a and b.

Adad, and Eštar/Innana, as well as Amal, Enzu, Nabium, Nisaba, Enki, Ningirsu and Nindar. Besides Narûte and Manzat, few Hatamtite/highland divine names are attested in Susian onomastics, which suggests that the late third millennium BCE pantheon in Susa was already syncretistic with a main local/tutelary god (Insušinak), a major Mesopotamian component (Enlil, Enki, Ea, Šamaš, Innana/Eštar, Sin, Ninḫursaĝa, Nergal, Adad, Ningirsu, etc.), and a minor highland component (Narûte, Šimot, Manzat);

- early second millennium BCE school tablets from Susa record only Mesopotamian divinities, especially those of the pantheons of Lagaš, Ur, Isin, Nippur and Kiš, such as Bau, Ningirsu, Ningišzida, Nanna, Šulpae(a), Sin, Nin-gal, Ninkarrak, AN-a-ba, Zababa, Adad (IŠKUR) and Nergal as well as (In)Sušinak (Tsujita 2016). More than just a reflection of the religious landscape prevalent at that time in Susa, these gods probably betray the importance of the Mesopotamian scribal practices in the cursus of the Susian students.

Some additional information for areas further east of Susiana is provided by a text mentioning the cult of Rûhû-rater (or Rûhû-razer) in Hûhnûrı, probably located at Tappeh Bormi, near Ram Hormuz, at the time of Amar-Sin of Ur (ca. 2040 BCE)[64]. With the recent decipherment of the Late PIW, the corpus of *kunanki* vessels from Kam-Firuz has shed light onto the relationships of the Šimaški/early Sukkalmaḫ rulers (ca. 2000-1880 BCE) outside of the Susian context, at Anzan, with Napireša, Nahûnte (assimilated to Utu/Šamaš) and Pinekir (assimilated to Innana/Eštar). Later, according to an inscription of Šimot-wartaš (18th century BCE), we witness a specific relation between the goddess Kirıreša and Liyan (Bushehr)[65]. In Western Susiana, the patron god of Pašime (Tell Abu Shija) was probably Šuda[66] (at least during the Old Akkadian Period and probably during the Ur III Period).

IV.2.b. Direct approaches

Important textual data that inform us directly about the South-Eastern Iran/Kerman and Marḫašean religious landscape in the second half of the third millennium BCE deserve mention. In order of importance, we may use the so-called 'Treaty of Naram-Sin', Late PIW inscriptions from Kerman or relating to Kerman, and Marḫašean onomastics.

IV.2.b.1. The 'Treaty of Naram-Sin'[67]

In the Old Akkadian Period, South-Western Iran (corresponding to the Mesopotamian geographic concept of NIM/ELAM[68]) was probably under Mesopotamian control (Khuzestan) or influence (Fars). As said above, with Naram-Sin's accession (ca. 2254-2218 BCE), there was probably a modification in the Akkadian Eastern diplomacy since, after him, Marḫaši was never mentioned anymore as an enemy. For this reason, it seems reasonable to consider Marḫaši as the counterpart of Akkad[69] in the so-called 'Treaty of Naram-Sin' found in Susa.

This peace treaty is one of the most ancient documents written in the Hatamtite language, dating to ca. 2240/2230 BCE. Its purpose was to phonetically record the oath pledged by the counterpart of Naram-Sin, probably a Marḫašean ruler (notably "the enemy of Naram-Sin shall be my enemy, the friend/ally (?) of Naram-Sin shall be my friend/ally (?)"). This document is introduced by a long series of divinities invoked to guarantee it (see below, Appendix 1). If the hypothesis of a peace treaty between Akkad and Marḫaši proves to be correct, it would give them an exceptional insight into the Marḫašean pantheon around 2240/2230 BCE (i.e, roughly at the time the Miho Museum vessel was produced), resulting from a long history already characterized by the adoption of foreign divinities.

At least half of the divinities invoked in this text are mentioned only here (another proof that this treaty is not related to the Susiana/South-Western Iran religious landscape). Among the others, eleven had cults in Susa or Fars at some point and probably already shared in the third millennium BCE a pan-Iranian/Hatamtite status: Pinekir, Hûmpan, Nahûnte, Insušinak, Šimot, Hûtran, Siašûm, Manzat (?), Narûte, Niarzına, and Kirwasır (Kirwaš).

The absence of Napireša (and Kirıreša) in this text, as well as in Susa before 2000 BCE, is remarkable. The most ancient attestation of this god known at present is in a cuneiform Hatamtite inscription written on the *kunanki* vessel of Kıntatu (ca. 2000 BCE; Mahboubian 2004, 46-47; Desset *et al.* forthcoming b). Probably initially related to the Šimaškian polity, he appears in the inscriptions left by the Šimaški/Sukkalmaḫ rulers in the graveyard of Kam-Firuz in Fars. His cult, possibly centered on Anzan, was widespread into Susiana around 1350 BCE at the time of Ontaš-Napireša's reign. At the time of the 'Treaty of Naram-Sin', either he did not exist

64 Mofidi-Nasrabadi 2005; 2018.

65 Pézard 1914 MDP 15, fig. 15, pl. 13, n°4-5.

66 Hussein *et al.* 2010.

67 Scheil 1911 MDP 11, 1-11 for the original edition. See also König 1965, 29-34, Hinz 1967, 91-95, Koch 2005, 283-287 and Quintana: https://www.um.es/cepoat/elamita/?cat=81

See also the transliteration in the CDLI internet site : https://cdli.ucla.edu/search/archival_view.php?ObjectID=P480691

68 Desset 2017.

69 See also Steinkeller (2018, 189) who reached a similar conclusion.

yet, or his cult was restricted to what would become the cradle of the Šimaškian dynasty (the earliest mention of Šimaški dates back to the time of Puzur-Sušinak, ca. 2150-2100 BCE).

The mention in the Treaty of Mesopotamian divinities (NIN. URTA and NIN-Karak, as well as maybe Ilaba, Maziat, and Išhara) and of the god of Susa, Insušinak, suggests that this pantheon was a syncretistic construction where the diversity of local gods was rationalized to develop a unified religious landscape (like in Susa around the same time), maybe not spared yet by any overlapping phenomenon with similar attributes and functions shared by distinct gods. As gods listed as Hatamtite may have been worshipped in different locations of the Iranian Plateau, it remains difficult to identify proper Marḫašean divinities. Divinities only mentioned here, such as *Sır-napir, Hůsa, Ůk(?)kapna*, *Imitka, Tůlat, Hůrpi, Kůků-můktir, Hůmšat*[70]*, Růhů-išna, Růhů-sa*-[?], *Lan/mpani, Hůr-pahır, Nitůtir, Tiuk* and *Sımit-sara*[*ra*]*r*, apparently absent from any other Susian texts, could be good candidates. We may reasonably consider them as Eastern Iranian deities, and perhaps more specifically Kermani deities. However, their ranks in the 'Treaty' suggest that they were probably not the main deities.

At the time of Puzur-Sušinak (ca. 2150-2100 BCE), the 'highland' divinities *Narůte*, *Šimot* (=*Nergal*?) and *Manzat* were present in Susiana while *Šamaš* may have already been equivalent to *Nahůnte,* and *Innana/Eštar* (*Bełat-ekallim*) to *Pinekir*. The other paramount gods *Hůmpan, Hůtran, Niarzına,* and *Kirwasır* (/*Kirwaš*?), not present then in Susa, could be considered, too, as originating from eastern Iran.

IV.2.b.2. Decipherment of Kerman and Kerman-related late PIW inscriptions

The recent decipherment of the Late PIW (Desset *et al.* forthcoming a and b) sheds new light onto the inscriptions from Shahdad (text S) and Konar Sandal South (texts B', C', D' and E') in Kerman. Among them, the possible appearance of the theophorous name *Tinra*-?-*r* with the theonym *Tinra* in inscription S is noteworthy (cf. ^{d}*te-en-ru* / *Tenru*; see Zadok 1984, 44, 247b).

Five Late PIW inscriptions on metallic vessels (M', A'/O', N' and W) are thought to have been redacted east of western Fars and maybe in Kerman. This hypothesis is based on the shape of these vessels and the sign variants used on them (similar to the inscriptions from Shahdad and Konar Sandal, and different from the inscriptions found in south-western Iran, at Susa, Kam-Firuz, and in Marv Dasht). Vessels M' and O' were dedicated to god *Šikwat* (cf. the god *Šikat*, ElW: 1155, and Zadok 1984, 39), A' to *Hůmpan* (the dedicator of inscription M' is *Hůnpar-intata*, in which a version of the theonym *Hůmpan* may be recognized), while *Insušnak* was invoked in blessing and curse formulae in A' and O'. It is worth remembering that *Hůmpan* and *Insuš*(*i*)*nak* are both mentioned in the 'Treaty of Naram-Sin', in the 3rd and 7th positions respectively (in contrast, *Šikwat* is not mentioned in this text).

The title of the dedicatee on the Marv Dasht vessel bearing Late PIW inscription Q suggests that she may come from the East. The beginning of the inscription reads: *za-na* | *ma-ra-p*$_2$*-š-ša-i-r* | *šu-wa-r-a-su*, "(I?) the lady of Marapša(y)i, Šůwar-Asu". First, this inscription may reveal the Hatamtite name (autotoponym) of Marḫaši: *Marapša(y)i* (see above, footnote n°5). Secondly, the name Šůwar-Asu is probably to be understood with the theonym *Asu* (like for Napir-^{d}Asu, the wife of Ontaš-Napireša; see Zadok 1984, 7, n°17). Considering that this Šůwar-Asu is said to be from Marḫaši/Marapša(y)i, it seems possible that the goddess *Asu* was also worshiped there.

IV.2.b.3. Marḫašean onomastics through cuneiform texts

Paradoxically, although many individuals are qualified as coming from Marḫaši or Paraḫšum in the late third/early second millennia BCE Mesopotamian cuneiform sources, theonyms are rare in this onomastic pool. Examples include Ta(n)-Hůmpan (*Da-Hunban*, attested at the time of Amar-Sin of Ur) with the mention of the god *Hůmpan,* as well as maybe a (Hurrian?) god **Kfi,* as proposed by Francfort and Tremblay (2010, 179).

IV.3. Preliminary attempt at identification of the bovine/human/lion/bird hybrid (two-faced) god

In the list of nine supernatural beings displayed in south-eastern Iranian Bronze Age art, none seem to match the south-western Iranian depictions of Insušinak (in Susa) or Napireša (in Fars) as attested since the early second millennium BCE on the glyptics, on the reliefs of Kurangun and Naqsh-e Rostam, and the steles of Šir-ůktůh and Ontaš-Napireša (Fig. 17a). These gods '*aux serpents et eaux jaillissantes*', like Mesopotamian divinities, wear a horned cap and a robe. Their distinct attribute was indeed probably the snake (sometimes with a bearded human head, sometimes horned). They sit on a coiled snake throne (sometimes on top of a stepped platform very similar to that of the god with snakes emerging from shoulders in the Bailey/Louvre seal) and bear in their left hand a snake

[70] Read up to now Hůmkat (^{d}*hu-um-ka*$_4$*?-at?*), it may be corrected as Hůmšat based on Late PIW text Q (*hu*$_2$*-m-š-ša-t*).

as a scepter (a coiled snake is sometimes above their hat)[71].

The identity (or identities) of the hybrid two-faced being (if actually, it was a god, and not an accessory manifestation of a deity) on the Miho Museum vessel could be searched for among Sır-napir, Hůsa, Ůk(?)kapna, Imitkı, Tůlat, Hůrpi, Kůků-můktir, Hůmšat, Růhů-išna, Růhů-sa-[?], Lan/mpani, Hůr-pahır, Nitůtir, Tiuk, Sımit-sara[ra]r, Hůmpan, Hůtran, Niarzına, or Kirwasır (Kirwaš?). However, considering his preeminence in chlorite art, this list could be hypothetically reduced to Hůmpan, Hůtran, and Kirwasır (Kirwaš?; while Niarzina can probably be excluded as she is a goddess). Hůmpan is a good candidate as he is mentioned in the Late PIW inscription A' and is present in Marḫašean onomastics (Hůnpar-intata? and Ta-Hůmpan). On the other hand, supposing that the depictions of the bovid/human/lion/bird (two-faced) hybrid on chlorite artifacts (and the copper alloy figurines) were meant for graves (which currently cannot be proven), this funerary character could relate to Šimot, acknowledged as equivalent of the Mesopotamian underworld god Nergal[72].

The goddess Pinekir may be one of the two major goddesses represented on Kerman glyptics (either the vegetation/grain goddess or the horned and winged goddess). Indeed, Pinekir is the first divinity mentioned in the 'Treaty of Naram-Sin' and should be considered the paramount character in the Marḫašean pantheon around 2240/2230 BCE. Hatamtite Pinekir was considered the equivalent of the Mesopotamian goddess Inanna/Eštar (see above) and is described by Vallat (1998) as the "goddess of love and procreation, who was worshipped throughout Elamite History and had an AŠTAM, or temple of fertility" built-in Dur-Ontaš (Chogha Zanbil) by Ontaš-Napireša[73].

V. Conclusion

Marḫašean onomastics in the late third millennium BCE seem to reflect a multi-linguistic/ethnic society, with probably a main Hatamtite linguistic component including also Akkadian, Sumerian, and still undetermined anthroponyms[74], plus a probably important Amorite presence in the Persian Gulf.

This linguistically composite onomastic pool suggests a multi-cultural society that might have worshipped a syncretistic pantheon. The Persian Gulf, as a 'commercial highway'[75] connecting Marḫaši to Mesopotamia, Susiana, the Arabian Peninsula (Magan and Dilmun), and Meluhha, played an important role in this cosmopolitism, creating a kind of Persian Gulf proto-*koine* during the third millennium BCE. On the other hand, the relationship between Marḫaši and the southern Central Asian civilization (BMAC/GKC), and a hypothetical iconographic (and religious?) influence from the former on the latter, may only be explained through the existence of relatively more difficult inland connections through Sistan and oases in and/or along the Kavir and Lut deserts.

Even though a definitive identification of the Marḫašean bovid/human/lion/bird (two-faced) hybrid is still impossible, it might have been the representation of deities such as *Hůmpan, Hůtran, Kirwasır* (*Kirwaš*?) or *Šimot*. Considering that the archaeological remains in the Halil Rud valley were only brought to the full academic attention at the beginning of the 2000s (in spite of the pioneering survey led by A. Stein in 1932-1933[76]), one should admit our ignorance and the need of being cautious in formulating hypotheses in the 'name game'. Those that we offer here have been built upon the perspective that the History of ancient Iran should be written with an emphasis on the Iranian sources. This perspective is fully in line with the proposal that the Mesopotamian notion of ELAM should be dismissed and that the more emic (but still poorly understood) concept of *Hatamti* is promoted[77]. Little by little, the light shed on third-millennium BCE Iran will contribute to *de-mesopotamianizing* the History of the Ancient Near East, making it more representative of its complexity.

Acknowledgments

We would like to thank Dr. Hajime Inagaki, curator of the Miho Museum (Kyoto, Japan), for his kind permission to publish here this artifact, Gianni Marchesi for his invaluable help concerning the Mesopotamian references as well as Kambiz Tabibzadeh and Benjamin Mutin for their remarks and important editing work.

71 See de Miroschedji 1981.

72 Zadok 1984, 40.

73 According to Malbran-Labat 1995, 195 and footnote n°311: "Dans l'aštam ont été recueillies des figurines marquant son caractère de déesse de la procréation et de la fécondité. Le mot aštam évoque la prostitution sacrée".

74 Glassner 2005, 14: "au sein des élites sociales de Marḫaši, certains membres portent des noms se rattachant à une langue inconnue alors que d'autres portent des noms aisément interprétables en une langue sémitique ou en élamite".

75 Steinkeller 2013, 413.

76 Stein 1937, 137-157; see 149-150 for the first descriptions of the southern and northern tepes of Konar Sandal and Qaleh Koutchek.

77 Desset 2017.

References

Amiet, P. (1972). Glyptique susienne, des origines à l'époque des Perses Achéménides. *Mémoires de la Délégation Archéologique en Iran* 43.

(1980). *La glyptique mésopotamienne archaïque*. 2ème édition, Editions du CNRS, Paris.

(1986). *L'âge des échanges inter-iraniens, 3500-1700 avant J-C*. Notes et documents des Musées de France 11, Editions de la réunion des musées nationaux, Paris.

(1994). Un sceau trans-élamite à Suse. *Revue d'assyriologie et d'archéologie orientale* 88(1), 1-4.

(1999). Textes et monuments: à la recherche de concordances à propos des cachets de Bactriane. *Revue d'assyriologie et d'archéologie orientale* 93, 97-106.

(2005). Les sceaux de l'administration princière de Suse à l'époque d'Agadé. *Revue d'assyriologie et d'archéologie orientale* 99, 1-12.

(2007). Elam et trans-Elam, à propos de sceaux-cylindres de la collection du Dr. Serge Rabenou. *Revue d'assyriologie et d'archéologie orientale* 101, 51-58.

Aruz, J. and Wallenfels, R. eds. (2003). *Art of the first cities, the third millennium BC, from the Mediterranean to the Indus*. The Metropolitan Museum of Art, New York.

Ascalone, E. (2006). Cultural spheres on the Iranian Plateau as seen from glyptic evidence. Distribution and development of seals in Iranian regional contexts during Mesopotamian Akkadian and Post-Akkadian periods (ca. 2400-2150 BC), in F. Baffi, R. Dolce, S. Mazzoni and F. Pinnock (eds.), *Ina Kibrat Erbetti, Studi di Archeologia Orientale dedicati a Paolo Matthiae*, Universita di Roma 'La Sapienza', Roma, 29-72.

(2008). Cultural interactions among Mesopotamia, Elam, TransElam, and Indus civilization. The evidence of a cylinder-stamp seal from Jalalabad (Fars) and its significance in the historical dynamics of south-eastern Iran. *Proceedings of the 4th ICAANE*, vol. 1, 255-275.

Boehmer, R. M. (1965). *Die Entwicklung der Glyptik wa ährend der Akkad-Zeit*. Untersuchungen zur Assyriologie und vorderasiatischen Archäologie n°4, Walter de Gruyter, Berlin.

(1972-1975). Hörnerkrone. *Reallexikon der Assyriologie und vorderasiatischen Archäologie* 4, Berlin-New-York, 431-434.

(1976-1980). Isimu. B. *Reallexikon der Assyriologie und vorderasiatischen Archäologie* 5, Berlin-New-York, 179-181.

Braun- Holzinger, E. A. (1987). Löwenadler. *Reallexikon der Assyriologie* 7(1-2), 94-97.

(2013). *Frühe Götterdarstellungen in Mesopotamien*. Orbis biblicus et orientalis, series archaeologica, n°261, Academic Press / Vandenhoeck Ruprecht, Fribourg / Göttingen.

Charvát, P. (2002). *Mesopotamia before history*. Routledge.

Cleuziou, S. (2003). Jiroft et Tarut sur la côte orientale de la péninsule arabique. *Dossiers d'archéologie* n°287 (Octobre 2003), 114-125.

Delougaz, P. (1960). Architectural representations on steatite vases. *Iraq* 22, 90-95.

Desset, F. (2017). Here ends the history of 'Elam': toponomy, linguistics, and cultural identity in Susa and south-western Iran, ca. 2400-1800 BC. *Studia Mesopotamica* 4, 1-32.

Desset, F., Marchesi, G., Vidale, M. and Pignatti, J. (2016). A sculpted dish from Tello made of a rare stone (Louvre-AO 153). *Journal of Near Eastern Studies* 75(1), 71-84.

Desset, F., Tabibzadeh, K., Kervran, M., Basello, G.-P. and Marchesi, G. (forthcoming a). The decipherment of Linear Elamite writing. *Zeitschrift für Assyriologie und Vorderasiatische Archäologie* 112(1).

(forthcoming b). *Linear Elamite inscriptions and related cuneiform texts*. OrientLab Series Maior, Ante Quem editor, Dipartimento di Storia Culture e Civiltà dell'Università di Bologna.

Desset, F., Vidale, M. and Alidadi Soleimani, N. (2013). Mahtoutabad III (province of Kerman, Iran), a 'Uruk-related' material assemblage in Eastern Iran. *Iran* 51, 17-55.

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 practices. *Iranica Antiqua* 52, 25-60.

Desset, F., Vidale, M., Marchesi, G., Shahsavari, M., Pignatti, J. and Conti, L. (forthcoming). Waagenophillum coral limestones. Another article of long-distance trade between the Iranian Plateau and southern Mesopotamia in the 3rd millennium BC.

Dijk, J., van. (1978). Ishbi-erra, Kindattu, l'homme d'Elam, et la chute de la ville d'Ur. *Journal of cuneiform Studies* 30(4), 189-208.

Eskandari, N., Desset, F., Hessari, M., Shahsavari, M., Shafiee, M. and Vidale, M. (2020). A late 4th to early 3rd millennium BC grave in Hajjiabad-Varamin (Jiroft, south-eastern Iran): defining a new period of the Halil Rud valley protohistoric sequence. *Iranica Antiqua* 55, 1-48

Eskandari, N., Desset, F., Shahsavari, M., Anjamrouz, S., Caldana, I., Shafiee, M., Patriarca, M., Nicosia, C., Deiana, R and Vidale, M. (2021). Preliminary report on the survey of Hajjiabad-Varamin, a site of the Konar Sandal settlement network (Jiroft, Kerman, Iran). *Iran* 58.

Eskandari, N., Desset, F., Caldana, I., Shafiee, M., Zorzi, F. and Vidale, M. (forthcoming). La déesse entourée par le serpent, a copper statuette from south-eastern Iran (3rd millennium BC).

Farber, W. (1974). Eine elamische Inschrift aus der 1. Hälfte des 2. Jahrtausends. *Zeitschrift für Assyriologie und Vorderasiatische Archäologie* 64, 74-86.

Fouache, E., Garçon, D., Rousset, D, Senechal, G. and Madjidzadeh, Y. (2005). La vallée de l'Halil Roud (région de Jiroft, Iran): étude géoarchéologique, méthodologie et résultats préliminaires. *Paléorient* 31, 107-122.

Francfort, H.-P. and Tremblay, X. (2010). Marhaši et la civilization de l'Oxus. *Iranica Antiqua* 45, 51-224.

Frenez, D. and Vidale, M. (2012). Harappan chimaeras as 'symbolic hypertexts'. Some thoughts on Plato, Chimaera, and the Indus civilization. *South Asian Studies* 28(2), 107-130.

(2014). Translated symbols. Indus reminiscences in a carved chlorite artifact of the Halil Rud civilization. *Rivista di Archeologia* 38, 7-18.

Glassner, J.-J. (2005). L'onomastique de Marhashi. *N.A.B.U.*, 11-14.

Hakemi, A. (1997). *Shahdad, Archaeological Excavations of a Bronze Age Center in Iran*. IsMEO, Rome.

Hinz, W. (1967). Elams Vertrag mit Naram-Sin von Akkade. *Zeitschrift für Assyriologie und Vorderasiatische Archäologie* 58, 66-96.

Hinz, W. and Koch, H. (ElW). (1987). *Elamisches Wörterbuch*, (*Archäologische Mitteilungen aus Iran*. Ergänzungsband 17), Berlin.

Hussein, A. M., Hamza, H. A., Thaher, A. K., Kadhum, S. J., Hashem, M., Taha, H. M. and Altaweel, M. R. (2010). Tell Abu Sheeja / Ancient Pašime, report on the first season of excavations, 2007. *Akkadica* 131, 47-103.

Inagaki, H. (2019). Sacred symbols from the West Asia and Western Central Asia 1, Wings and horns (revised). *Bulletin of Miho Museum* 19, 1-18.

Koch, H. (2005). Texte aus Iran. in: B. Janowski and G. Wilhelm (eds.), *Omina, Orakel, Rituale und Beschwörungen*, Texte aus der Umwelt des Alten Testaments, Neue Folge, n°4, Gütersloher Verlaghaus, 283-306.

Kohl, P. L. (1975). *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*. Harvard University Ph. D. dissertation, Ann Harbor.

(2001). Reflections on the Production of Chlorite at Tepe Yahya: 25 Years Later. *Excavations at Tepe Yahya, Iran 1967-1975, The Third Millennium*, Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, Massachusetts, 209-230.

König, F. W. (1965). *Die elamischen Königsinschriften*. Archiv für Orientforschung, herausgegeben von Ernst Weidner, Beihoft 16, Graz.

Lamberg-Karlovsky, C. C. (1972). Tepe Yahya, 1971. Mesopotamia and Indo-Iranian Borderlands. *Iran* 10, 89-100.

(1973). *Urban Interactions on the Iranian Plateau: Excavations at Tepe Yahya, 1967-1973*. Proceedings of the British Academy LIX, Oxford University Press, London.

(1988). The 'intercultural style' carved vessels. *Iranica Antiqua* 23, 45-95.

Lamberg-Karlovsky, C.C. and Tosi, M. (1973). Shahr-i Sokhta and Tepe Yahya: Tracks of the Earliest History of the Iranian Plateau. *East and West* 23, 21-53.

Lambert, W. G. (1991). The akkadianisation of Susiana under the sukkalmahs. *Mésopotamie et Elam, actes de la XXXVIème Rencontre Assyriologique Internationale (Gand, 10-14 Juillet 1989)*, Mesopotamian history and environment, occasional publications 1, Université de Gand, 53-57.

Lecoq, P. (2016). *Les livres de l'Avesta, les textes sacrés des Zoroastriens ou Mazdéens (textes présentés, traduits et annotés par Pierre Lecoq)*. Les éditions du Cerf.

Löw, U. (1998). *Figürlich verzierte Metallgefäße aus Nord-und Nordwestiran*. Altertumskunde des Vorderen Orients 6, Ugarit Verlag, Münster.

Madjidzadeh, Y. (2003). *The Earliest Oriental Civilization*. Ministry of Culture and Islamic Guidance, Tehran.

Madjidzadeh, Y. and Pittman, H. (2008). Excavations at Konar Sandal in the region of Jiroft in the Halil basin: first preliminary report (2002-2008). *Iran* 46, 69-103.

Mahboubian, H. (2004). *Elam, art and civilization of ancient Iran, 3000-2000 BC*. BAS Printer, Salisbury.

Malbran-Labat, F. (1995). *Les inscriptions royales de Suse, briques de l'époque paléo-élamite à l'Empire néo-élamite*. Musée du Louvre, département des antiquités orientales, Réunion des musées nationaux, Paris.

Meier, D. and Vidale, M. (2013). The "Man with Serpents" revisited. On a Figurated Pin from the Bronze Age Site of Shahdad (Kerman, Iran). *Iranian journal of archaeological studies* 3, 1-9.

Miller, N. F. and Sumner, W. M. (2003). The Banesh-Kaftari interface, the view from operation H5, Malyan. *Iran* 41, 8-19.

Miroschedji, P. de (1973). Vases et objets en stéatite susiens du Musée du Louvre. *Cahiers de la Délégation Archéologique Française en Iran* 3, Association Paléorient, 9-80.

(1981). Le dieu élamite au serpent et aux eaux jaillissantes. *Iranica Antiqua* 16, 1-26.

Mofidi-Nasrabadi, B. (2005). Eine steininschrift des Amar-Suena aus Tappeh Bormi (Iran). *Zeitschrift für Assyriologie und Vorderasiatische Archäologie* 95(2), 161-171.

(2018). Who was '^{d}MÙŠ.EREN.EŠŠANA.DINGIR.MEŠ'. in: B. Mofidi-Nasrabadi, D. Prechel and A. Pruss (eds.), *Elam and its Neighbors, recent research and new perspectives, Proceedings of the International Congress held at Johannes Gutenberg University, Mainz, September 21-23, 2016*, Elamica 8, Verlag Franzbecker, Hildesheim, 113-126.

Negahban, E. O. (1996). *Marlik, the complete excavation report* (2 vols). University Museum Monograph 87, The University Museum, University of Pennsylvania, Philadelphia.

Perrot, J. and Madjidzadeh, Y. (2005). L'iconographie des vases et objets en chlorite de Jiroft (Iran). *Paléorient* 31, 123-152.

(2006). A travers l'ornementation des vases et objets en chlorite de Jiroft. *Paléorient* 32(1), 99-112.

Pézard, M. (1911). Etude sur les intailles susiennes. *Mémoires de la Délégation en Perse* 12, 79-122.

(1914). Mission à Bender-Bouchir, documents archéologiques et épigraphiques, *Mémoires de la Délégation en Perse* 15.

Pfälzner, P. and Alidadi Soleimani, N. (2015). The ICAR - University of Tübingen South-of-Jiroft archaeological survey (SOJAS). Results of the first season 2015. *Archäologische Mitteilungen aus Iran und Turan* 47, 105-141.

Pfälzner P., Alidadi Soleimani, N. and Karimi, 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), 107-124.

Philips, C. S. and Simpson, S. J. (2018). Introduction. in: C. S. Philips and S. J. Simpson (eds.), *Softstone approaches to the study of chlorite and calcite vessels in the Middle East and Central Asia from prehistory to the present*, British foundation for the study of Arabia Monographs, n°20, 2-54.

Piran, S. and Hesari, M. (2005). *Cultural around Halil Roud and Jiroft, the catalogue of exhibition of select restituted objects*. National Museum of Iran, Tehran.

Piran, S. and Madjidzadeh, Y. (2012). *Objects from the Jiroft treasury, soft stone and alabaster objetcs (recovered collection) from the Halil river basin.* National Museum of Iran, Pazineh Press, Tehran.

Pittman, H. (1984). *Art of the Bronze Age, Southeastern Iran, Western Central Asia, and the Indus Valley*. The Metropolitan Museum of Art, New York.

(2001). Glyptic Art of Period IV. *Excavations at Tepe Yahya, Iran 1967-1975, The Third Millennium*, Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, Massachusetts, 231-268.

(2002). The 'jeweler's' seal from Susa and art of Awan. in: E. Ehrenberg (ed.), *Leaving no stones unturned, essays on the*

Ancient Near East and Egypt in honor of D. P. Hansen, Eisenbrauns, Winona lake, Indiana, 211-235.

(2012). Glyptic art of Konar Sandal south, observations on the relative and absolute chronology in the third millennium BCE. in: H. Fahimi and K. Alizadeh (eds.), *Namvarnameh, papers in honour of Massoud Azarnoush*, Iran Negar Publication, Tehran, 79-94.

(2013a). Eastern Iran in the early Bronze Age. in: D.T. Potts (ed.), *The Oxford Handbook of Ancient Iran*, Oxford University Press, 304-324.

(2013b). New evidence for interaction between the Iranian plateau and the Indus valley: seals and sealings from Konar Sandal South. in: S.A. Abraham, P. Gullapalli, T. P. Raczek and U. Z. Rizvi (eds.), *Connections and complexity, new approaches to the archaeology of south Asia*, Left Coast Press, Walnut Creek, California, 63-90.

(2014a). Hybrid imagery and cultural identity in the age of exchange: Halil River basin and Sumer meet in Margiana. in: C. C. Lamberg-Karlovsky and B. Genito (eds.), *'My life is like the Summer Rose', Maurizio Tosi e l'Archeologia come modo di vivere, papers in honour of Maurizio Tosi for his 70th birthday*, BAR International Series 2690, B. Cerasetti, 625-635.

(2014b). Anchoring institution in evidence: a continuing discussion of cylinder seals from southeastern Iran. in: E. Bleibtreu and H. U. Steymans (eds.), *Edith Porada, a centenary volume*, Orbis Biblicus et Orientalis 268, Academic Press Fribourg, Vandenhoeck and Ruprecht Göttingen, 375-393 and 629-639.

(2018). Administrative role of seal imagery in the Early Bronze Age: Mesopotamian and Iranian traders on the Plateau. in: M. Ameri, S. K. Costello, G. Jamison and S. J. Scott (eds.), *Seals and sealing in the Ancient World, case studies from the Near East, Egypt, the Aegean and South Asia*, Cambridge University Press, 13-35.

(2019). Bronze Age interaction on the Iranian Plateau, from Kerman to the Oxus through seals. in J.-W. Meyer, E. Vila, M. Mashkour, M. Casanova and R. Vallet (eds.), *The Iranian Plateau during the Bronze Age, development of urbanization, production, and trade*, Archéologie(s) 1, MOM éditions, 267-288

Porada, E. (1988). Discussion of a cylinder seal, probably from southeast Iran. *Iranica Antiqua* 23, 139-143.

Potts, D. T. (2002). Total prestation in Marhashi-Ur relations. *Iranica Antiqua* 37, 343-357.

Potts, T. F. (1994). *Mesopotamia and the East, an archaeological and historical study of foreign relations ca. 3400-2000 BC.* Oxford university committee for archaeology monograph 37, Oxford.

Quintana, E. (2018). Elamite religion and ritual. in J. Alvarez-Mon, G.-P. Basello and Y. Wicks (eds.), *The Elamite world*, Routledge World Series, Taylor and Francis, 729-740

Rohn, K. (2011). *Beschriftete mesopotamische Siegel der Frühdynastischen und der Akkad-Zeit*. Orbis biblicus et orientalis, series archaeologica n°32, Academic Press / Vandenhoeck Ruprecht, Fribourg / Göttingen.

Sarianidi, V. I. (1998). *Myths of Ancient Bactria and Margiana on its Seals and Amulets*. Pentagraphic, Moscow.

(2001). *Necropolis of Gonur and Iranian paganism*. Moscow.

(2002). *Margush, ancient oriental kingdom in the old delta of Murghab River*.

(2005). *Gonur Depe, city of kings and gods*. Miras, Ashkhabat.

(2007). *Necropolis of Gonur*. Kapon editions.

Scheil, V. (1911). Textes élamites-anzanites (quatrième série). *Mémoires de la Délégation en Perse* 11.

(1913). Textes élamites-sémitiques (cinquième série). *Mémoires de la Mission Archéologique de Susiane* 14.

Stein, A. (1937). *Archaeological Reconnaissances in Northwestern India and Southeastern Iran*. Macmillan and CO, London.

Steinkeller, P. (1982). The question of Marhashi: a contribution to the historical geography of Iran in the third millennium BC. *Zeitschrift für Assyriologie und Vorderasiatische Archäologie* 72(2), 237-265.

(1990). Marhashi. *Reallexikon der Assyriologie und vorderasiatischen Archäologie* 7, 381-382.

(2012). New light on Marhashi and its contacts with Makkan and Babylonia. in: J. Giraud and G. Gernez (eds.), *Aux marges de l'archéologie. Hommage à Serge Cleuziou*, Travaux de la Maison René-Ginouvés 16, De Boccard, 261-274.

(2013). Puzur-Inshushinak at Susa: a pivotal episode of early Elamite history reconsidered. in: K. de Graef and J. Tavernier (eds.), *Susa and Elam. Archaeological, philological, historical and geographical perspectives (proceedings of the International congress held at Ghent University, December 14-17, 2009)*, Brill, Leiden, 293-317.

(2014). Marhashi and beyond: the Jiroft civilization in a historical perspective. in C.C. Lamberg-Karlovsky and B. Genito (eds.), *'My life is like the Summer Rose', Maurizio Tosi e l'Archeologia come modo di vivere, papers in honour of Maurizio Tosi for his 70th birthday*, BAR International Series 2690, B. Cerasetti, 691-707.

(2018). The birth of Elam in history. in: J. Alvarez-Mon, G.-P. Basello and Y. Wicks (eds.), *The Elamite World*, Routledge World Series, Taylor and Francis, 177-202.

Stève, M.-J, Vallat, F. and Gasche, H. (2002). Suse. *Supplément au dictionnaire de la Bible* 73, col. 359-512.

Stöllner, T., Slotta, R. and Vatandoust, A. eds. (2004). *Persiens antike Pracht: Bergbau, Handwerk, Archäologie: Katalog der Austellung des Deutschen Bergbau-Museums Bochum vom 28 November 2004 bis 29 Mai 2005*. Deutsches Bergbau-Museum Bochum.

Tsujita, A. (2016). Divine names in school texts in Susa. in: K. Maekawa (ed.), *Ancient Iran New Perspectives from Archaeology and Cuneiform Studies*, *Proceedings of the International Colloquium held at the Center for Eurasian Cultural Studies, Kyoto University, December 6-7, 2014*, Ancient Text Studies in the National Museum vol. 2, 151-157.

Vallat, F. (1998). Elam, vi) Elamite religion. *Encyclopaedia Iranica* vol. 8, 335-342.

Vidale, M. (2015). Searching for mythological themes on the 'Jiroft' chlorite artefacts. *Iranica Antiqua* 50, 15-58.

(2017a). Protohistory of the vara. Exploring the Proto-Indo-Iranian background of an early mytheme of the Iranian Plateau. *Journal of Indo-European Studies* 45(1&2), Spring/Summer 2017, 1-31.

(2017b). *Treasures from the Oxus, the art and civilization of Central Asia*. I. B. Tauris.

Vidale, M. and Desset, F. (2013). Mahtoutabad (Konar Sandal south, Jiroft), preliminary evidence of occupation of a Halil Rud site in the early 4th millennium BCE. in: C. Petrie (ed.), *Ancient Iran and its neighbours: local developments and long-range interactions in the 4th millennium BC,* British Institute of Persian Studies, Archaeological Monographs Series, Oxbow Books, Oxford, 233-251.

Vidale, M., Desset, F. and Caldana, I. (forthcoming). The ceramic context of a 'Jiroft' style chlorite vessel from a damaged grave of Mahtoutabad (Konar Sandal South, Kerman, Iran). *Paléorient* 47(2).

Vidale, M., Desset, F. and Frenez, D. (2021). The Jalalabad seal, a reappraisal. *Journal of Archaeological Studies* 12(4), 271-285.

Vidale, M., Eskandari, N., Caldana, I., Desset, F. and Shafiee, M. (2021). Animal scavenging as social metaphor: a carved chlorite vessel of the Halil Rud civilization, Kerman, Iran, Mid-Third Millennium BC. *Cambridge Archaeological Journal*, 1-18.

Vidale, M. and Micheli, R. (2012). The function of a chlorite hand-bag of the Halil Rud civilization as inferred from its wear traces. *Iranian journal of archaeological studies* 2(2), 1-11.

Winkelmann, S. (2000). Intercultural relations between Iran, the Murghabo-Bactrian archaeological complex (BMAC), Northwest India and Failaka in the field of seals. *East and West* 50, 43-95.

(2014). 'Trading religions' from Bronze age Iran to Bactria. in: P. Wick and V. Rabens (eds.), *Religions and trade, religious formation, transformation and cross-cultural exchange between East and West*, Brill, Leiden-Boston, 199-229.

(2018). Remarks on the iconography of the 'Intercultural Style'. in: C. S. Philips and S. J. Simpson (eds.), *Softstone, approaches to the study of chlorite and calcite vessels in the Middle East and Central Asia from prehistory to the present*, British foundation for the study of Arabia Monographs, n°20, 90-111.

Wooley, C. L. (1955). *The early periods.* Ur excavations 4.

Zadok, R. (1984). *The Elamite onomasticon*. Supplemento n°40 agli Annali - vol. 44 (1984), fasc. 3, Istituto universitario orientale, Naples.

Zarins, J. (1978). Steatite vessels in the Riyadh museum. *Atlal* 2, 65-93.

Appendix
Divinities mentioned in the so-called 'Treaty of Naram-Sin'

Rank	Name	mentioned only in this text ?	god /goddess ?	Origin ?	Mesopotamian equivalent
1	***Pinekir*** *pi$_2$-ni-kir*	no	goddess	maybe linguistically Hatamtite, *kir*> "goddess" (Zadok 1984, 34-35)	Innana/Eštar
2	***Paha kɪkip*** *pa$_2$-ha ki-ki-ip*	rarely mentioned, ElW: 473	?	linguistically Hatamtite, *paha kɪk-i-p*> "celestial protectors"	?
3	***Hů(m)pan*** *hu-pa$_2$-an*	no	god	interpreted as linguistically Hatamtite by Zadok (1984, 11-12)	according to Zadok, identified with Enlil
4	**A.MAL** *a-ba$_4$* transcribed: - *Amba* by Hinz, - *Aba* by Quintana (cf. the king Apalkamaš ?), - *Il-Aba* by Lambert 1991, 54, Stève *et al.* 2002, col. 426 and Koch 2005, 284	?	?	if *Il-Aba*, Mesopotamian	?
5	***Zɪt/ Sɪt*** *zi-it*	mentioned only here as a divinity	?	probably linguistically Hatamtite, *zɪt*> "salvation, luck" (ElW: 1294; Zadok 1984, 48)	?
6	***Nahɪti*** (probably *Nahůnte*) *na-hi-ti*	no	god	interpreted as linguistically Hatamtite by Zadok (1984, 29-30), *nahůnte*> "sun"	Utu/Šamaš
7	***Insušinak*** NIN.NINNI.ERIN / NIN.ŠUŠIN	no	god	Susian, but maybe linguistically Sumerian (*en susin ak*> "the lord of Susa")	no
8	***Šimot*** *si-mu-ut*	no	god	interpreted as linguistically Hatamtite by Zadok (1984, 39-40)	according to Zadok, identified with Nergal
9	***[S]ɪr-napir*** [*sĕ*]*-ir-na-pi$_5$-ir*	mentioned only here	?	linguistically Hatamtite, *s/šɪr* (Zadok 1984, 40, ElW: 1077), *napi*> "god"	?
10	***Hůsa*** *hu-sa*	mentioned only here	?	probably linguistically Hatamtite, *hůsa*> "tree, wood" (ElW: 702); "Gott des Haines" for Koch 2005, note 14.	?
11	***Ůk(?)kapna*** (or *Ůkapna*) *uk-gab-na*	mentioned only here	?	?	?
12	***Imɪtkɪ*** *im$^?$-it-ki*	mentioned only here	?	?	?
13	? ([*d*]*e$_3$*?-? for König 1965)	?	?	?	?
14	***Tůlat*** *tul-la-at*	mentioned only here	?	?	?
15	***Hůrpi*** (*Hurp* for Koch 2005, 285) *hu-ur-pi*	mentioned only here	?	?	?
16	***Hůtran*** *hu-ut-ra-an*	no	god	interpreted as linguistically Hatamtite by Zadok (1984, 15)	?
17	**NIN.URTA** NIN.URTA	no	god	Mesopotamian	no
18	***Siašům*** *si-a-šum*	rarely mentioned	goddess	? (ElW: 1069)	?
19	***Mazɪ*[?]** *ma-si*-[…] - *Maziat* according to Hinz and Lambert 1991, 54 - *Manzat* according to Koch 2005, 285	no	if *Manzat*, goddess	if *Maziat*, Mesopotamian, if *Manzat*, Hatamtite (ElW: 853)	?

20	**NIN-*Karak*** NIN.*kar-ak*	no	goddess	Mesopotamian	no
21	***Narůte*** *na-ru*$_{14}$*-de*$_3$	no	goddess	interpreted as linguistically Hatamtite by Zadok (1984, 32)	?
22	***Ků[…kŭ?]-můktir*** *ku*$_8$-[…-*ku*$_8$$^?$]-*mu-uk-ti-ir*	mentioned only here	?	probably Hatamtite, *můk-ti-r* (for *můk*, see Zadok 1984, 29)	?
23	***Hůmšat* (*Hůmkat*)** *hu-um-ka*$_4$*-at*	mentioned only here and in Late PIW text Q	?	?	?
24	***Růhů-išna*** (*Ruhušna* for Koch 2005, 285) *ru-hu-iš-na*	mentioned only here	?	linguistically Hatamtite, *růhů*> "child, progeny" (ElW: 1044)	?
25	***Růhů-sa[?]*** (*Ruhu-sak* for Koch 2005, 285) *ru-hu-sa*-[…]	mentioned only here	?	linguistically Hatamtite, *růhů*> "child, progeny" (ElW: 1044)	?
26	?	?	?	?	?
27	?	?	?	?	?
28	?	?	?	?	?
29	***Niarzına*** *ni-ar-ẓi-na* (probably later spelled *na-ir-si-na*)	no	goddess	?	?
30	***Lan/mpani*** *la-am*$_3$*-pa*$_2$*-ni*	mentioned only here	?	?	?
31	***Kirpisır/Kirwasır*** (maybe *Kirwaš*) *kir*-PI-*si-ir*	no	god	interpreted as linguistically Hatamtite by Zadok (1984, 20-21)	?
32	***Hůr-pahır*** *hu-ur-pa*$_2$*-hi-ir*	mentioned only here	?	probably linguistically Hatamtite, *pah/paha*> "protection" (ElW: 1044, Zadok 1984, 33)	?
33	***Ašhara*** *aš*$_2$*-ha-ra* - *Išhara* according to Hinz, Steinkeller, Lambert 1991, 54 and Koch 2005, 285	mentioned only here	if *Išhara,* goddess	if *Išhara*, Syro-Mesopotamian	?
34	***Nitůtir*** *ni-tu-ti-ir*	mentioned only here	?	?	?
35	***Tiuk*** *ti-u*$_2$*-uk*	mentioned only here	?	?	?
36	***Sımit-sara[ra]r*** *si-im-it-sa-ra*[-*ra*$^?$]-*ar*	mentioned only here	?	linguistically Hatamtite (Zadok 1984, 37) *sımit*> *Šimot* (?); *sararar*> Zadok 1984, 37	?
37	?	?	?	?	?
38	***Su-[?]-ipa*** *su*-[…]-*ip*$^?$*-pa*$_2$ - *Suhsipa* according to ElW: 1099	very rarely mentioned	?	?	?
39	[?]-***ahaš*** […]-*ah-aš*$_2$ - [?]-*ihšu* for Scheil; according to Hinz, n°39 is not the name of a divinity	?	?	?	?
40	***Napi*** (*Napir* for Koch 2005) *na-ap-ir* *Napi* is not mentioned in the opening list of divinities but appears several times after that along with Nahiti (Nahůnte), Insušinak, Siašům and Narůte.	?	?	linguistically Hatamtite, *napi*> "god" (ElW: 1044)	?

JSBS Journal of Sistan and Baluchistan Studies
Volume 1, Issue 1 (2021) 87-93
Doi: 10.22034/JSBS.2021.146219

EVOLUTION OF PATTERNS IN ARCHITECTURE OF SISTAN, EAST OF IRAN

Zohre OVEISI-KEIKHA[1] and Hosseinali KAVOSH[2] ✉

[1] Department of Architecture, Faculty of Art and Architecture, University of Zabol, Iran.
[2] Department of Archaeology, Faculty of Art and Architecture, University of Zabol, Iran, (Corresponding author: h.kavosh@uoz.ac.ir).

Received: 15 September 2021 Accepted: 27 November 2021 Available online: 20 December 2021

Abstract: The Sistan Region in the East of Iran with more than 900 villages and a history of five thousand years is one of the most important areas in Iran. Since pre-historic (Shahr-i Sokhta) so far, as well as specific climatic conditions, and economic and social structure governing it, Sistan has led to the formation of unique kinds of architecture within. However, so far, little research and scientific studies have been done on the architecture of the Sistan Region, which is mostly done by archaeologists who study other aspects of human civilization, such as pottery, effigy, and dozens of other human hand works, and the Sistan architecture has been just introduced and mentioned. However, during the study by the authors on this structure, it became evident that the architecture of Sistan had a structural discontinuity and chaos before and after Islam. In this study, a brief study was done on the historical evolution of architecture in Sistan from prehistory to the Qajar era based on the remaining buildings. The Sistan pre-Islamic architecture includes the architecture of Shahr-i Sokhta, Dahan-e Gholaman, and Khajeh Mount are great glory. They have remained steadfast and shining. Also, in the writings of Islamic historians and foreign travelers, a lot of Islamic places and cities in Sistan have been named that a large part of them are gone, and currently, examples of these architectures, such as the old city of Zahedan, Rostam Castle, Sekoheh Castle, have remained in the Sistan area, Iran. The result shows that during pre-historic and historical periods, Sistan had great architectural sites, such as Shahr-i Sokhta, Dahan-e Ghulaman, and Khajeh Mount, which can influence the all territory of Iran.

Keywords: Sistan, Architectural history, Castle, City, Helmand River.

چکیده: سیستان در شرق ایران با بیش از ۹۰۰ روستا و سابقه سکونت دائم پنج هزار ساله از شهر سوخته تاکنون و همچنین شرایط اقلیمی خاص و ساختار معیشتی و اجتماعی حاکم بر آن، باعث شده است که گونه‌های منحصر بفردی از معماری در آن شکل بگیرد. اما تاکنون پژوهش‌ها و مطالعات علمی اندکی در خصوص معماری سیستان صورت گرفته است و این بررسی‌ها بیشتر توسط باستان‌شناسان که جنبه‌های دیگر تمدن انسانی از قبیل سفال، پیکرک و ده‌ها اثر دیگر انسانی را مطالعه می‌کنند، انجام و به معماری سیستان نیز در حد شناسایی و معرفی پرداخته شده است. با این همه در خلال مطالعه صورت گرفته توسط نگارنده‌گان بر روی این معماری، آشکار گردید که معماری سیستان در قبل و بعد از اسلام از یک گُسست و آشفتگی ساختاری برخوردار است. در این پژوهش به مطالعه مختصری از سیر تحول تاریخ معماری در سیستان از پیش از تاریخ تا عصر قاجار بر اساس بناهای باقی‌مانده پرداخته شده است. معماری قبل از اسلام سیستان، معماری شهر سوخته، دهانه غلامان و کوه خواجه را شامل می‌شود که از شکوه و عظمت زیادی برخوردار است، به گونه‌ای که پس از گذشت چندین هزار سال از عمر این بناها همچنان استوار مانده و می‌درخشند. همچنین در نوشته‌های مورخین اسلامی و سیاحان و مامورین خارجی از اماکن و شهرهای اسلامی زیادی در سیستان نام برده شده است که بخش زیادی از آنها از بین رفته و هم اکنون نمونه‌هایی از این معماری از قبیل شهر زاهدان کهنه، قلعه رستم، قلعه مچی (قلعچه) و سکوهه در بخش سیستان ایران باقی‌مانده است.

کلمات کلیدی: سیستان، تاریخ معماری، قلعه، شهر، رودخانه هیرمند.

I. Introduction

Sistan and Baluchestan province is in the South East of Iran, and the Sistan area is also located in the most northern part of this province (Sarhaddi-Dadian, *et al.*, 2015; Mehrafarin, *et al.*, 2011, 2010; Mutin *et al.*, 2017). This relatively flat land is around Hamun Lake and is formed from the Helmand River sediments. Due to the fertility of the Sistan plain in the past, so many great centers of civilization had been formed in it. The presence of magnificent monuments and architecture from prehistoric, historical, and Islamic eras shows the fact that Sistan has put glorious periods behind and has had an important role in the culture and civilization of Iran and the world. The presence of magnificent architecture in Shahr-e Sukhteh, which corresponds to the period of starting writing, and the impact of this city on neighboring civilizations, have caused its high significance. The historic period city of Dahan-e Gholaman, with a massive and diverse architecture, which the city map was first designed and then, the city has been built according to archaeologists, appears to be evidence of the rule of Achaemenid control over the eastern regions of Iran. Also, the architectural monuments of Sistan Mount Khajeh are as the most important works of the Parthian and Sassanid periods, as the mountain has been frequently praised along with Hamun Lake and Helmand River in the religious texts. The Mount is considered a blessed and holy mountain for Muslims, Zoroastrians, and Christians, and is the only Iranian work that watercolor painting works and clay high reliefs have been inscribed on its walls (Kavosh, 2004). In this land, majestic brick buildings

have remained from the past Islamic days that were built by Sistani architect masters in different Islamic periods, including Rostam Castle, Old Zahedan, Ramrood Castle, Sekoheh Castle, Mil-i Qasimabad and windmills, etc., that each one has had special architectural features (Kavosh, 1999). Therefore, the aim of this study was to introduce the remaining architectural features of Sistan in different eras and study the evolution of its architectural structure and history (Fig. 1).

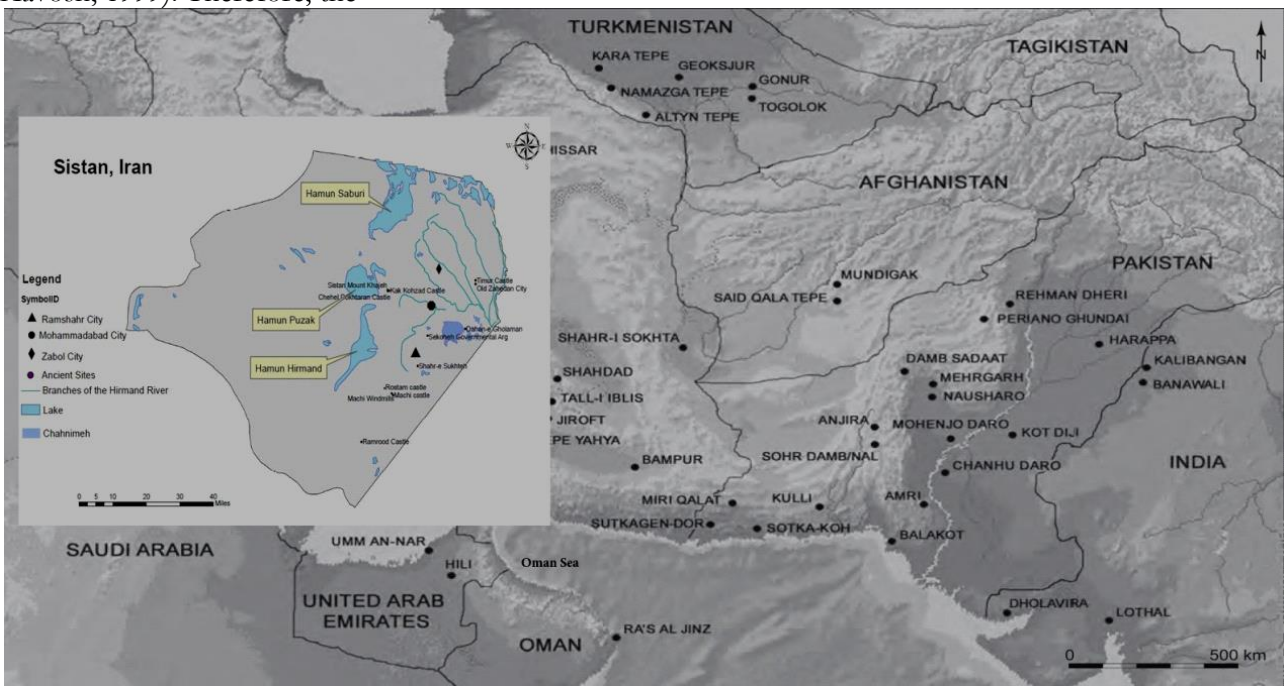


Figure 1: Sistan location and its Historical Monuments (after Sarhaddi-Dadian, 2018).

II. Sistan hydrology and its impact on human settlements

Helmand River and Hamun Lake have been the main source of the rise and flourishing of civilization in Sistan. Whenever Helmand River has had a natural and continuous flow, human groups have been deployed on its path. Then, in a short period of time, many towns and villages have been established around it. In other words, cities and villages of Sistan in the past have always been displaced by the relocation of the Helmand River. Hence, frequent ancient abandoned sites are seen in Sistan plain, including Shahr-i Sokhta and its satellite villages, that have continued to exist from 3200 BC to 1700 BC longitudinally along the old branch of Helmand River known as the Desert River. During this period, Helmand has been entering into Hamun Lake from the south (Huntington, 2000). Shahr-i Sokhta and other prehistoric sites in the region were suddenly abandoned at the end of the third millennium BC (Tosi, 1977). One of the most likely reasons for leaving the area has been the redirection of the Helmand River to the north. The antiquities identified since the early first millennium BC in the Nad Ali area (East Side of Upper Helmand) confirm this theory (Ghirshman, 1939).

On the other hand, with the outbreak of the Helmand River, massive floods occurred in the region and buried some of the towns and villages in the lowlands under a mass of mud. Their inhabitants, while migrating from these areas, constructed new settlements. Also, after the abandonment of towns and villages along the dried branches, the shifting sands began to bury and destroy the remaining buildings. As Shahr-i Sokhta site, Ramshahrestan, Dahan-e Gholaman (Sajjadi, 1987), and hundreds of other small and large ancient sites have been destructed over time as a result of 120-day winds erosion and buried under the piles of dirt and sand after a short time (Lestrange, 1995).

III. Sistan Prehistoric Architecture

Shahr-i Sokhta is the name of a great ancient site that is located 56 km from the southwest city of Zabol. This city, covering an area of over 151 hectares, is one of the largest archaeological sites of the beginning of urbanization in the central plateau of Iran, dating back to 5200 years ago (Tosi, 1983). All buildings in this city are made of adobe, clay wall, wood, and mat. The raw clays are placed longitudinally in rows. The wall's width usually does not exceed two rows of bricks; however, there are walls made up of five rows of bricks. The separator's small walls are often built of a row of clays. In some cases, piles have also been used to reinforce the walls. Most bricks are of standard sizes of 10 × 20 × 40. The walls' foundations are 30 centimeters or one meter deep, and

soil and broken large pieces of bricks are placed inside them. After the walls were built, they were lined with a layer of thatch with high amounts of lime residues. The lime was used not only on the walls, but also inside the doors, windows, and entrances (Tosi, 1969).

So far, two different types of flooring have been identified in the Shahr-i Sokhta. In the first method, a thick layer of thatch with a diameter of 5 cm was placed on the room floor. In the second method, the room floor was first carpeted with pieces of Adobe. Then, they were hammered to be tightened. For roofing the rooms in the Shahr-i Sokhta, first, a row of logs was placed on the walls of the room. Then, these logs were covered with trees, branches, and leaves. Then, a thick layer of thatch was placed on them (Sajjadi, 1996). The room's heating system is composed of several types of stoves, including rectangular central stoves, hemispherical and horseshoe ovens, and portable ceramic ovens with a domed roof (Sajjadi, 1996).

The huge architectural complex known as Shahr-i Sokhta, belonging to the fourth period of the city and dating back to 4,000 years ago, can be considered a significant architectural work that has an area of about 500 square meters (Fig. 2). Its walls are made of adobe with a 1.5 meters thickness. In central parts, the building has remained intact up to a height of approximately 3 meters. The building has four different groups of rooms. In the southern part of the building, along the outer wall, there is a row of small narrow rooms, which have probably been home depots used to store food. All the rooms are around a central courtyard, according to the tradition of architecture in the Shahr-i Sokhta (Tosi, 1977).

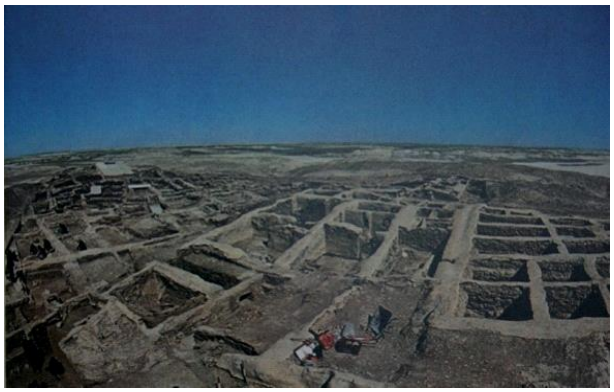


Figure 2: Architecture of Shahr-i Sokhta (Tosi, 1983).

IV. Achaemenid city of Dahan-e Gholaman

The extent of the wealth and influence of the Achaemenid Empire at the time required the construction of many towns and villages in the satraps under their influence, especially since they were fully familiar with the principles of urban planning, and many architects from various nations and races were present in their administration. However, the only ancient city of this period that has been so far discovered in the eastern half of Iran is Dahan-e Gholaman (Sajjadi, 1997).

Dahan-e Gholaman is located about 2 km from Ghale-e-Noo (New Castle) village and about 44 km from the city of Zabol. This Achaemenid city has been located in the past next to Sanarood River, one of Helmand branches, and the sudden leaving of Dahan-e Gholaman suggests the drying or removal of water from the area (Scerrato, 1966).

The architecture and effects of the buildings of this city are located in a so vast area on a terrace approximately 1.5 kilometers in length. Iranian and Italian archaeologists excavated the city of Dahan-e Gholaman and achieved good results. The city of Dahan-e Gholaman is the only city discovered of the Achaemenid era, which shows Iran's full sovereignty over its eastern regions well. The city has had a very short life, between 150 to 200 years in the sixth and fifth centuries BC. In this city, a significant number of large, public, and religious buildings can be seen next to the civilian houses. The eastern part of the city was divided into two equal parts, and its works and effects have continued as long as the site called Zoroaster's grave. There are 27 recognizable buildings in these two sections. These buildings have had public, religious, social, and industrial uses. In the southern part of the city core, there are the effects of a large building, which has been called "Military Building" or "Garrison". Iranologists research has shown that the place has been the political, administrative, and social center, or in other words, the Achaemenid Drangyana or Dranjay capital, at least for a short time, and is consistent with Achaemenid Zarankay and Zarrin of historians like Ctesias and Isodore of Charax (Sajjad, 1977).

Another important feature of this city is its architecture, in which the entrance doors of all houses of the city are built on the south side of the buildings, or a windbreak has been in front of them due to the blow of famous 120-day winds of Sistan that always blow from the North West to the South East. The industrial area of the city is located in a large part around the holes of mid-today's well (Sajjadi, 2004); (Scerato, 1966).

Building No. 15: This building consists of 36 long and narrow rooms that all have the same rectangular plan, and are located at four sides of the building and around a rectangular courtyard with sides of 50 meters in length. This similar and standard shape of the building, and some similarities of its plan with the buildings in the sixth and fifth centuries BC of Central Asia, induces, at first sight, the presence of probably a religious monument, an edifice, or a tomb. The mentioned building has approximately 2,500 square meters, and the main materials used in this building are also raw clays (Sajjadi, 2004). In general, this city has four main characteristics

of historical period cities, meaning it has had signs of everyday religious, economic, manufacturing, and administrative life. As a result, one can summarize the importance of Dahan-e Gholaman city in several points in terms of archaeological and historical studies and other various cultural fields:

The buildings in the city have been constructed based on a determined map with precise planning. In this regard, Dahan-e Gholaman is unique among the Iranian plateau cities during this period. Dahan-e Gholaman is perhaps the only city of this period in which a variety of personal and private houses of people can be clearly seen next to governmental, religious, and social buildings. Dahan-e Gholaman is the only city of the Achaemenid era in which the signs of influence by the official architecture and also the influence of local architecture, as well as the influence of climatic conditions in the composition of the city buildings, can be seen (Sajjadi, 1977) (Fig. 3).

Figure 3: Dahan-e Gholaman Architecture (Sajjadi, 1977).

V. Sistan Khajeh Mount

There is a rock and isolated mountain made of black basalt in the context of Hamun Lake, so that the German archaeologist, Herzfeld, believes that it is the same Oshida Mountain in Avesta, where the prophet Zoroaster had been under the auspices of King Goshtasp, the father of Darius (Herzfeld, 2013). This mountain is located within 30 kilometers southwest of Zabol. Khajeh Mount has been a center of worship in the Mithraic periods and Zoroastrian periods due to the presence of a Fire Temple. In other words, Khajeh Mount and Hamun Lake have had a special sanctity in three religions Zoroastrianism, Islam, and Christianity, so that the manufacturers of the stronghold has mostly used bricks and mud and fewer stones in the construction of its buildings because of such a sacred identity and also weather conditions (Kavosh, 2004). The Mountain appropriate position has led to the construction of splendid brick architectural works since the Parthian and Sassanid and early Islamic periods in different forms, such as palaces, temples, fortresses, cemeteries, and shrines, which have remained. These works are as follows: Khajeh Mount Palace and Temple (Kakha Castle), Kok Kohzad Castle, Chehel Dokhtaran (forty girls) Castle, Sarsang Castle, Khajeh Ghaltan Shrine, Pir Gandom Beryan Building, Sheytan (Satan) House and single tomb buildings (Kavosh, 1999).

Khajeh Mount and Its Temples are considered Iran's architectural masterpieces. English Stein introduced these works as the remains of a Buddhist temple and monastery, whose emergence in Iran is unique. He believes that the buildings of Khajeh Mount are a Greco-Buddhist art that has combined the Buddhist architecture of Central Asia and the Far East. Herzfeld offers different opinions on Khajeh Mount's works. In his latest visit to Khajeh Mount in 1932, he stated that the first period of the building has been created by instructions of a local satrap in the name of King Gundopharr Rostam, who was ruling in the South East of Iran and Sistan around 20 to 65. According to Herzfeld, the castle consists of a palace and a temple, which is known as the royal building. The palace building has allocated the high part of the castle, which has been built around a vast courtyard. There are wide roofed porches on the western and eastern sides of the courtyard. The main front is located on the north side of the yard, including an extensive corridor and gallery with a staircase that leads to the upper gallery and fire temple. Herzfeld has found a stone hearth foundation inside the temple (Herzfeld, 2013). Furthermore, clay motifs have been obtained in the Khajeh Mount, and it is the only place in Iran where clay motifs have been seen (Moussavi, 1996).

V.1. Kok Kohzad Castle

On the mountain ridge with a very wide area, and at the eastern end of the nose, there are the remains of a fortress on the highest point of the mountain that the local people refer to as Kok Kohzad Fortress. Like the central citadel, this fortress has been built with Adobe and Thatch and seems to have been built at the same time. The Kok Kohzad castle lacks a central courtyard and is a collection of large rooms and ancillary spaces, which according to the building plan, can be claimed to be the residence and site of the commanders and the governor, and has had the old aspects of the fort in the whole collection (Moussavi, 1996) (Fig. 4).

Figure 4: Kok Kohzad Castel Architecture (photograph by Kavosh).

V.2. Chehel Dokhtaran Castle

In the southwest nose of Khajeh Mount, overlooking the lake and the surrounding plains, there are the remains of another construction site that is shaped from a central courtyard with two gates, ancillary rooms and arcades, towers, and ramparts (Fig. 5). The effect is known among local inhabitants by the name of Chehel Dokhtaran Castle. It is a brick building that stone has been used occasionally in making its foundation. Depending on the building situation, it can be regarded as a defense and military bastion. It may also date back to the time of two Kak and Kakha castles, and with them, make a set that has been called Mount Khajeh Monuments (Moussavi, 1996) (Fig. 5).

Figure 5: Chehl dokhtaran Castel Architecture (photograph by Kavosh).

VI. Sistan Islamic architecture

VI.1. Rostam Castle

This castle is located in the historic area of Hozdar, about 70 km the southwest of city of Zabol. Rostam Castle can be considered the biggest fort remaining of the Islamic period of Sistan, and its greatness in the region has brought a mythical - historical aspect to it and has been named after Sistan's greatest character, i.e., Rostam. The main architectural elements of the castle include the entrance facade, located at the southeast, guard and defensive towers attached to the wall of the castle, moat, freezer, and most importantly, its king's settlement. Other residential facilities inside the castle have been partially destructed(Ovissi-Keykha and Kavosh 2016) (Fig. 6).

Figure 6: Architecture of Rostam Castel (photograph by Kavosh).

VI.2. Old Zahedan City

The Old Zahedan City is located about 27 km from the East of Zabol, in the Poshtab section and in the area of Zahak city, which has been of great importance in the Islamic period, so a group of researchers consider it the city of Zarang, the power center of Saffarids (McMahon, 2000) and others know it as Sistan city (Mousavi, 2010).

But in regard to the history of the city foundation, G.P Tate from Britain believes that Old Zahedan existed about 420 years before being destroyed by Timur and was built around 365 AH at the time (Khalaf ibn Ahmad) the Last King of Safari (Tate, 1984).

Also, according to the surveys and studies of archaeologists, this city has been continuously residential and the center of the Sistan government since the late fourth century to the early ninth century AD. This city was destroyed by the attack of Timur and destroyed by the attack of his son, Shahrukh, which was associated with the destruction of Sistan dams. In general, the city consisted of five separate parts named Ghale, First Arg, Second Arg, Sharestan, and Rabaz. Except for Rabaz, which has no walls, the other four parts of the city have been surrounded by reinforced towers and walls (Mousavi, 2010) (Fig. 7).

The set of the city's main fence (walls) has an area of several kilometers that has been constructed with adobe and clay materials. At various distances, semicircular towers have been established to defend the city and the 120-day winds of Sistan have led to the deterioration and destruction of these works (Kavosh, 1999).

The materials used in buildings are completely raw clay, along with mortar thatch and plaster coating. In some cases, cubic bricks are used amidst the adobes, but

it seems that many of the buildings in the city of Old Zahedan had been made of brick materials. The bricks by dimensions of 27 × 14 × 5 and 27 × 27 × 5 cm are widely distributed in the southern part of the city. Unfortunately, in recent centuries, the local people have moved many of them with the destruction of ancient monuments for the construction of tombs of their dead (Kavosh *et al*., 2002; 1999) (Fig. 7).

Figure 7: Zahedan Kohneh Architecture (photograph by Kavosh).

VI.3. Windmills of Hozdar area

On arrival in Sistan, the only thing that surprised the Arabs was windmills (Sistani, 1989). Right now, some of them have remained in the historic sites of Hozdar, Ramrood Castle, old Zahedan, and As Abad Randeh. Some beautiful windmills have remained sporadically in the region of Ghale Che Raes Castle and Rostam Castle, which are devastating.

Figure 8: Windmills of Hozdar area photograph by Kavosh).

This life-making building consists of three main parts, including a central room, side walls, and a room that was probably for the miller. The orientations of windmills are built all from North West to South East and in the path of 120-day winds of Sistan (Fig. 8). The largest and most important part of the building, in a rectangular shape, is located in the north of it where the millstone was operating within it. Two openings can be seen on the north side that have been directing the wind into the building. The exterior facade of the windmills has magnificent brickwork forms, so that the clay used recalls the full-shade texture of the walls and honeycomb fan, and like a curtain prevents the intense reflection of the sunlight, and for a moment, creates a feeling of the wind coldness. The elegant and prolific architect divided the wall into six parts and transferred the cross decoration from his mind to the winded wall (Kavosh, 1999) (Fig. 8).

VII. Conclusion

Due to its strategic location, specific geographical conditions, and suitable environment, the presence of professionals and experts in arts, animal resources, and fertile lands along with abundant water, has drawn the attention and settlement of humans from the Bronze Age and led to the rise of many towns and villages in different periods. On the other hand, various factors have had an impact on the construction of Sistan architecture. The most important factors affecting the formation of this type of architecture have been climatic, environmental, social, and livelihood factors. In general, studying and reviewing Sistan architectural history shows that this type of architecture is the result of the thinking, ideas, and experience of many generations with unique features that some of their characteristics have continued to date, and are still used in the creation of local settlements of the region. However, it should be noted that Sistan architectural evolution and development have not experienced an identical continuous and ascending flow since the emergence of the first cities and villages so far, and had frequent fluctuations at some times. As already stated, most of these fluctuations are concerned with water flows in Sistan. But sometimes, political tensions and regional conflicts by humans have affected the process.

In the end, it should be noted that, in addition to buildings investigated in this study, in travel books and historical texts on Sistan, the names of places have been mentioned that there are nowadays no traces of them in Sistan. We, therefore, conclude that in addition to the factors mentioned above, human intervention and unkindness have led to the full destruction of many brick buildings of Sistan in the past to be used in the construction of tombs and even contemporary residential buildings. The occurrence of floods, storms, enemy attacks, and ignorance of people are other factors that have led to the remaining of only a name of the magnificent architectural works of Sistan past.

References

Kavosh, H.A. (2004). *Sistan Mountains and lakes in the mirror of religions*, First Edition, Zabol University.

Kavosh, H.A. (1999). *Identifying and introducing works of the Sistan Islamic period*, Master's thesis, Department of Archaeology at Tehran University.

Kavosh, H.A., *et al.* (2002). *Sistan, The paradise of archaeologists*, First Edition, Zabol University.

Lestrange, G.(1995). *Historical geography of the lands of the Eastern Caliphate, Translator*: Erfan, M., Scientific and Cultural Publishing Company, Tehran.

Ghirshman, R. (1939). *Fouilles de Nad-i-Ali dans le Seistan Afghan*. Revue des arts asiatiques, 13(1), 10-22

Herzfeld, E. (2013). *Iran in Ancient East*, Translated by Sharifi Nematabad, Mohammad., First Edition, Scientific and Cultural Publishing Company, Tehran.

Huntington, A. (2000). *Eastern Iran Bowl and Sistan, In: Historical Geography of Sistan, (Travel with itineraries)*, Translation and editing by Ahmadi, Hassan., First Edition, Tehran.[2]

McMahon, H. (2000*). Mapping and new discoveries in Sistan, Sistan historical geography (Travel with itineraries)*, Translation and editing by Ahmadi, Hassan., First Edition, Tehran.

Mehrafarin, R., and S.R.M. Haji. (2010). *"In Search of Ram Shahrestan the Capital of the Sistan Province in the Sassanid Era."* Central Asiatic journal 54, no. 2 256-72.

Mehrafarin, R, S. R. M. HADJI, and S. A. FEYZ. (2011). *A Study of the Ceramics of East Iran during the Later Parthian Era with Special Reference to Tapa Gowri*. Central Asiatic journal 55, no. 2, 240-58.

Mousavi, M., (1996). *Adobe Memorial of Mount Khajeh*, Proceedings of the Congress on Architectural and Urbanization History of Iran, Volume IV, Cultural Heritage Publications, Tehran.

Mousavi, H. S. R. (2010). *Old Zahedan: A city asleep in Sistan*, First Edition, Pazh Publishing, Mashhad.

Mutin, B., H. Moradi, H. Sarhaddi-Dadian, H. Fazeli Nashli, M. Soltani. (2017). *New Discoveries in the Bampur Valley (South-Eastern Iran) and Their Implications for the Undrestanding of Settlement Pattern in the Indo-Iranian Borderlands During calcolitic period*, Iran 55(2), 99-119.

Oveisi-Keikha, Z., & Kavosh, H.A. (2016). *Rostam Castle: The largest castle (fortress) remaining from Sistan Islamic period*; Second National Conference on Archaeology of Iran, Mashhad, 1-15

Sajjadi, S.M.S.(1996). *Archeology and History of Baluchistan*, First Edition, Cultural Heritage Organization of Iran, Tehran.

Sajjadi, S.M.S.(1977). *Dahan-e Gholaman: An Achaemenid City in Sistan*, Journal of Archeology and History, Year 11, No. 1&2, 1997 & 1998, eleventh year, University Press, Tehran,43-52

Sajjadi, S.M.S. (1987). *An Overview of Urbanism and Urbanization in Iran*, By Kiani, M.Y., Ershad Publications, Tehran.

Sajjadi, S.M.S. (2004). *Concise Guide on Sistan Antiquities*, First Edition, Management and Planning Organization of Sistan and Baluchestan, Zahedan.

Sajjadi, S.M.S.(2010). *Notebooks of Shahr-e Sukhteh 2*, First Edition, Cultural heritage and tourism base of Shahr-e Sukhteh, Zabol.

Sarhaddi-Dadian, H., Ramli, Z., Rahman, N. H. S. N. A. & Mehrafarin, R. (2015). *X-ray diffraction and X-ray fluorescence analysis of pottery shards from new archaeological survey in south region of Sistan*, Iran. Mediterranean Archaeology and Archaeometry, 15(3), 45-56.

Scerrato, U. (1966). *Excavations at Dahan-i Ghulaman (Seistan-Iran)* First Preliminary Report (1962-1963). East and West: 9-30.

Sistani, M. A (1989). *Sistan (Land of Sands and Epics)*, Volume II, Publisher Center for Social Sciences, Academy of Sciences, Volume I, Afghanistan, 49-68.

Tate, G. P., (1984). *Sistan, By the efforts of Raisolzakerin*, Gh.,Volume II, First Edition, Directorate General of Islamic Guidance of Sistan and Baluchestan, Mashhad.

Tosi, M. (1969). *"Excavations at Shahr-i Sokhta. Preliminary report on the second campaign"*, East and West 19/3–4: 283–386.

Tosi, M. (1977). *The Proto-urban cultures of Eastern Iran and the Indus Civilization. Notes and suggestions for a spatio-temporal frame to study the early relations between*, South Asian Archaeology.

Tosi, M.(1983). *Prehistoric Sistan 1*. Rome: IsMeo

Yate, E. C. (1984). *Khorasan and Sistan Travel Book*, Translated by Rahbari, M. & Roshani, Gh., Tehran.