Universitat Autònoma de Barcelona

THE ROLE OF THE HUSKING TRAYS IN THE LATE NEOLITHIC COMMUNITIES OF THE NEAR EAST

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alla mia famiglia

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ABSTRACTS

El paper dels *Husking trays* a les comunitats del Neolític final del Pròxim Orient

Aquest projecte de recerca es centra en entendre millor el paper d'una de les formes de ceràmica que més van caracteritzar el Neolític final al Pròxim Orient: el *husking tray*.

Els *Husking trays* són grans recipients fets de ceràmica grollera, i que presenta una spuerfície interna decorada per impresions o incisions seguint una gran varietat de patrons decoratius. Aquesta característica i la seva presència generalitzada han fascinat als investigadors que, al llarg del temps, han proposat diverses hipòtesis sobre la seva funció. En aquesta recerca, s'investiga el *Husking Tray* mitjançant l'adopció de diversos enfocs mutidisciplinars amb la voluntat d'obtenir una imatge multi-perspectiva i integral d'aquest tipus de contenidor ceràmic. D'una banda, el treball s'ha centrat en la recollida de dades publicades den la literatura arqueològica sobre aquesta forma ceràmica i aquestes han permès comprovar amb detall les seves característiques, així com la dinàmica del seu origen, desenvolupament i desaparició.

Una anàlisi estilística detallada dels patrons de les impressions/incisions de les superfícies internes d'aquests atuells ha permès també identificar grups morfomètrics i decoratius homogenis entre les diverses regions del Pròxim Orient.

L'anàlisi de les traces tecnològiques, juntament amb els coneixements aportats per la implementació de l'arqueologia experimental i l'establiment d'analogies etnogràfiques, ha permès comprendre millor els mètodes i tècniques adoptades per produir aquests contenidors ceràmics.

La funció d'aquest recipient s'investiga mitjançant un estudi en profunditat de possibles comparacions etnogràfiques, una àmplia anàlisi experimental i, finalment, una anàlisi de traces d'ús de 58 fragments de *husking tray* i, aquests recolzats amb anàlisis addicionals de residus (fitòlits i lípids). Els resultats suggereixen, fonamentadament, que els *husking tray* s'utilitzaven generalment com a paelles per coure el pa en un forn amb cúpula. Des d'aquest punt de vista, les impressions/incisions són un mètode per optimitzar el recipient, permetent treure més fàcilment el contingut de l'atuell un cop feta la cocció. A més, els exemples etnogràfics constitueixen un referent que permet interpretar el "fenomen del *husking tray*" com una pràctica culinària àmpliament adoptada a gran part del Pròxim Orient. La combinació de tots aquests elements permet als estudiosos comprendre millor el paper que van tenir aquests atuells en les comunitats neolítiques.

El papel de los H*usking Trays* en las comunidades del Neolítico Final del Próximo Oriente

Esta investigación tiene por objetivo comprender el papel de una de las formas cerámicas que más caracterizan el Próximo Oriente del Neolítico Final: el *husking tray*.

Los *husking trays* son grandes bandejas, realizadas con cerámica grosera, cuya superficie interna está decorada por impresiones y/o incisiones siguiendo una gran variedad de patrones.

Estas características y su presencia generalizada han fascinado a los estudiosos que, a lo largo del tiempo, han propuesto diversas hipótesis sobre su función.

En este trabajo se investiga el *husking tray* adoptando un enfoque multidisciplinar con el fin de obtener una imagen integral de este tipo de contenedor cerámico.

Por un lado, la recopilación de datos publicados en la literatura arqueológica sobre esta forma cerámica se ha realizado con el objetivo de comprobar en detalle las características y dinámicas de origen, desarrollo y desaparición de los *husking trays*.

Un análisis estilístico detallado de los patrones de impresiones/incisiones presentes en la superficie interna de las vasijas ha permitido identificar grupos grupos morfotécnicos y decorativos homogéneos para el Próximo Oriente.

La realización de análisis de las trazas tecnológicas, junto con evidencias experimentales y analogías etnográficas, también ha permitido avanzar posibles hipótesis sobre los métodos y técnicas de producción de estas vasijas.

La función de este contenedor se investiga mediante un estudio en profundidad de posibles comparaciones etnográficas, un extenso análisis experimental y, finalmente, análisis de trazas de 58 fragmentos de *husking trays* se ha completado con algunos análisis de residuos (fitolitos y lípidos).

Estos análisis permiten sostener con fundamento que los *husking trays* se utilizaban generalmente como bandejas para la cocción del pan. Desde esta perspectiva, las impresiones/incisiones actúan como antiadherente de la sartén permitiendo que el contenido se desprenda más fácilmente de la superficie cerámica una vez cocinado.

Además, los ejemplos etnográficos construyen un eferentque permite interpretar el 'fenómeno de *husking tray*' como una práctica culinaria ampliamente utilizada en gran parte del Próximo Oriente.

La combinación de todos estos elementos permite comprender mejor el papel que estos recipientes cerámicos debieron haber jugado en las comunidades neolíticas.

Il ruolo degli *Husking Tray* nelle comunità Tardo Neolitiche del Vicino Oriente

Questa ricerca è volta a comprendere il ruolo di una delle forme ceramiche che più caratterizza il Tardo Neolitico Vicino Orientale: l'*husking tray*.

Gli *husking tray* sono grandi bacini, realizzati con ceramica grossolana, la cui superficie interna è percorsa da impressioni e/o incisioni secondo una grande varietà di schemi figurativi.

Questa sua caratteristica e la diffusa presenza hanno affascinato gli studiosi che nel tempo hanno proposto diverse ipotesi circa la sua funzione.

In questa ricerca, l' *husking tray* viene indagato adottando un approccio multidisciplinare al fine di ottenere un'immagine plastica.

Da una parte la raccolta di dati presenti nella letteratura archeologica circa questa forma ceramica ha permesso di verificare nel dettaglio le caratteristiche e le dinamiche di origine, sviluppo e scomparsa di questa forma ceramica.

Una dettagliata analisi stilistica dei pattern di incisioni presenti sulla superficie interna di questi vasi ha consentito di individuare aree omogenee per gusto formale all'interno del quadro vicino orientale.

L'analisi delle tracce tecnologiche, unitamente a evidenze sperimentali e analogie etnografiche, permette di avanzare possibili ipotesi circa le modalità e le tecniche di produzione di questi vasi.

La funzione di questo contenitore è stata indagata attraverso l'approfondimento di possibili confronti etnografici, un'estesa analisi sperimentale e, infine, *l'use-wear analysis* di 58 frammenti di *husking tray* integrata da alcune analisi dei residui (fitoliti e lipidi).

Queste analisi permettono di sostenere su solide basi che gli *husking trays* venissero in generale usati come teglie per la cottura del pane. In questa prospettiva, le impressioni/incisioni sono una ottimizzazione della teglia che consente al contenuto di staccarsi più facilmente dalla superficie ceramica una volta cotto.

Inoltre, esempi etnografici costituiscono una base che consente di interpretare il 'fenomeno *husking tray*' come una pratica culinaria ampiamente applicata in larga parte del Vicino Oriente.

L'insieme di tutti questi elementi permette di poter meglio cogliere il ruolo che questi vasi hanno avuto nelle comunità neolitiche.

The role of *Husking Trays* in the Late Neolithic Communities of the Near East

This research project is an attempt to better understand the role of one of the pottery forms that most characterised the Late Neolithic Period in the Near East, that is, the *husking tray*.

Husking trays are large basins made out of coarse straw-tempered clay whose internal surfaces are crossed by impressions and / or incisions arranged according to a wide variety of patterns. This characteristic and its widespread presence have fascinated scholars who, over time, have proposed various hypotheses as regards its function.

In this research work, the *husking tray* is investigated by adopting several different approaches in order to obtain a multi-perspective picture of the object.

On the one hand, the collection of published data from the archaeological literature on this pottery form makes it possible to verify its characteristics in detail, as well as the dynamics of its origin, development and disappearance.

A detailed stylistic analysis of the score patterns on the internal surfaces of these vessels allow one to identify homogeneous areas of aesthetic taste within the Ancient Near East.

The technological traces analysis, together with insights provided by experiments and ethnographical analogies, make it possible to better understand the methods and techniques adopted to produce these vessels.

The function of this vessel is investigated by way of an in-depth study of possible ethnographical comparisons, an extensive experimental analysis and, finally, a use-alteration analysis of 58 *husking tray* fragments supported by further residue (phytoliths and lipids) analyses. The results strongly suggest that *husking trays* were generally used as pans for the baking of bread in a domed oven. From this point of view, the scores are a method to optimise the pan, allowing the contents to be removed more easily from the tray once baked. Furthermore, ethnographical examples form a base that allows one to interpret the '*husking tray phenomenon*' as a baking practice widely adopted in a large part of the Near East.

The combination of all these elements allows scholars to better grasp the role that these vessels must have had in Neolithic communities.

INTRODUCTION

'A more active *perspective on pottery production and consumption is called for, in which context is the key. Huge potential exists for studies on pottery function and the social role of food and drink. Whereas pottery style and decoration have always received scholarly attention, the social meaning of technologies remains largely unexplored.'*

O.P. Nieuwenhuyse 2013

In recent times, archaeological and historical research has focused its attention on the aspect of nutrition in the past, much so that a branch of research entitled 'food archaeology' is developing.[1] This new focused interest is due, on the one hand, to the adoption of increasingly updated analysis techniques, for example, in the field of organic residues and isotopes and, on the other, it is a reflection of the great echo that the theme of food has taken on more generally in Western Society.

Food is a necessary and daily element for all and permeates every aspect of human life. This was even truer as regards bygone eras, during which 'much of the energy and time

[1] For example, BESCHERER - BEAUDRY 2015; HASTORF 2016:

was devoted to procuring, storing and processing food'.[2] Investigating the eating behaviour of a human group means much more than simply knowing the type of nourishment that sustains that group.

Eating is a cultural issue.[3] This is evident in the fact that we do not eat everything that our bodies are able to digest; rather, we make choices on the basis of our culture. When eating, we always communicate something about ourselves, not only as individuals, but also as regards the culture to which we belong.[4]

Indeed, food is loaded with numerous meanings that go far beyond its nutritional value, from affirming identity to being a meeting point, from indicating social ties to highlighting power relations, from expressing symbolic concepts to defining traditions and so on. Thus, studying food habits in the past enable the social, economic and religious aspects and so on, which are linked to food and in which they are reflected, to be better understood; that is, not only 'what' is eaten, but also 'how' and 'why' that food is produced, processed and consumed. Investigating the eating behaviour of a human group can enable one to obtain a lot of information about its culture, society, relationships and so on.

The data gleaned from the archaeological research appears to be appropriate for the study of food habits that occur in each step of the cycle from its production to its consumption and so to its discard. Eating behaviour, if contextualized and analysed from an anthropological and sociological perspective,[5] can provide important contributions to the interpretation of the archaeological data and offer a more complete view of the culture under investigation.

How important food was for people in the past is also evident from the amount of artefacts relating to food found during archaeological excavations; these include the infrastructure

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[2] CAMPANELLA 2008: 13.
[3] LÉVI-STRAUSS: 1955
[4] CONNOR - ARMITAGE 2002.
[5] In recent years, this aspect has increasingly attracted the attention of archaeologists leading to numerous articles on feasting and commensality.

for its production and storage, the domestic instruments, the cooking installations, the remains of meals and, above all, the pottery.[6] Since its first appearance, pottery has played a key role in the understanding of archaeological contexts.
Thus, thanks to its frequency and ability to endure over time, pottery has become a key element for reconstructions of the past. Its malleability has meant that it has assumed infinite forms and connotations over time, helping to define time spans, both historically and culturally.

Pottery is also particularly useful for investigating eating habits. In this respect, its use-alteration analysis can provide substantial evidence for the understanding of the function of a vessel and, consequently, the culinary practice beyond it.[7] Indeed, analysing the wear of and residue in a pottery artefact enable its actual function to be inferred.

This research work is part of the study of eating behaviour relating to past cultures beginning with the archaeological data. It examines a type of pottery form, the so-called *husking tray,* whose presence spread in the Late Neolithic Period amongst the communities of the Ancient Near East. This vessel was shaped like an oval pan and was generally large in size. The vascular shape was mainly characterised by the presence of impressions and / or grooves on its internal surface.

The ambitious aim of this research project is to understand the role that this vessel played within and between the Neolithic communities; that is, how was this vessel 'experienced' by the people who produced and used it. Many questions have been born out of this curious and fascinating artefact, including:

- What is a *husking tray*, including its origin, development and diffusion?
- What are its areas of distribution?
- How was it made?
- How was it used?

[6] SAMUEL 2006.

- What value was attributed to it? What was its role?

In order to be able to answer these questions, it is necessary first of all to study this archaeological artefact in its context. Thus, in the first chapter, the general spatial, chronological and cultural context within which this artefact developed is briefly recalled.

In the second chapter, the data from the archaeological literature related to this ceramic form, including its chronology, distribution, shape, size and context of provenance are gathered together. Furthermore, in this chapter, the data relating to the pattern of scores on the internal surfaces of the husking trays are analysed. The stylistic analysis provides indications as regards groups in which the formal aspect, that is, the one most sensitive to change, is perhaps shared, suggesting cultural affinities.

Chapter III is dedicated to defining the methodologies principally adopted in this research work, in order to understand the production process and the functions of this vessel.

In Chapter IV, the ethnographical comparisons, on which the functional hypotheses suggested for the *husking trays* have thus far been based, are presented. In particular, the culinary practices related to the functional hypothesis mainly shared by scholars is analysed in depth.

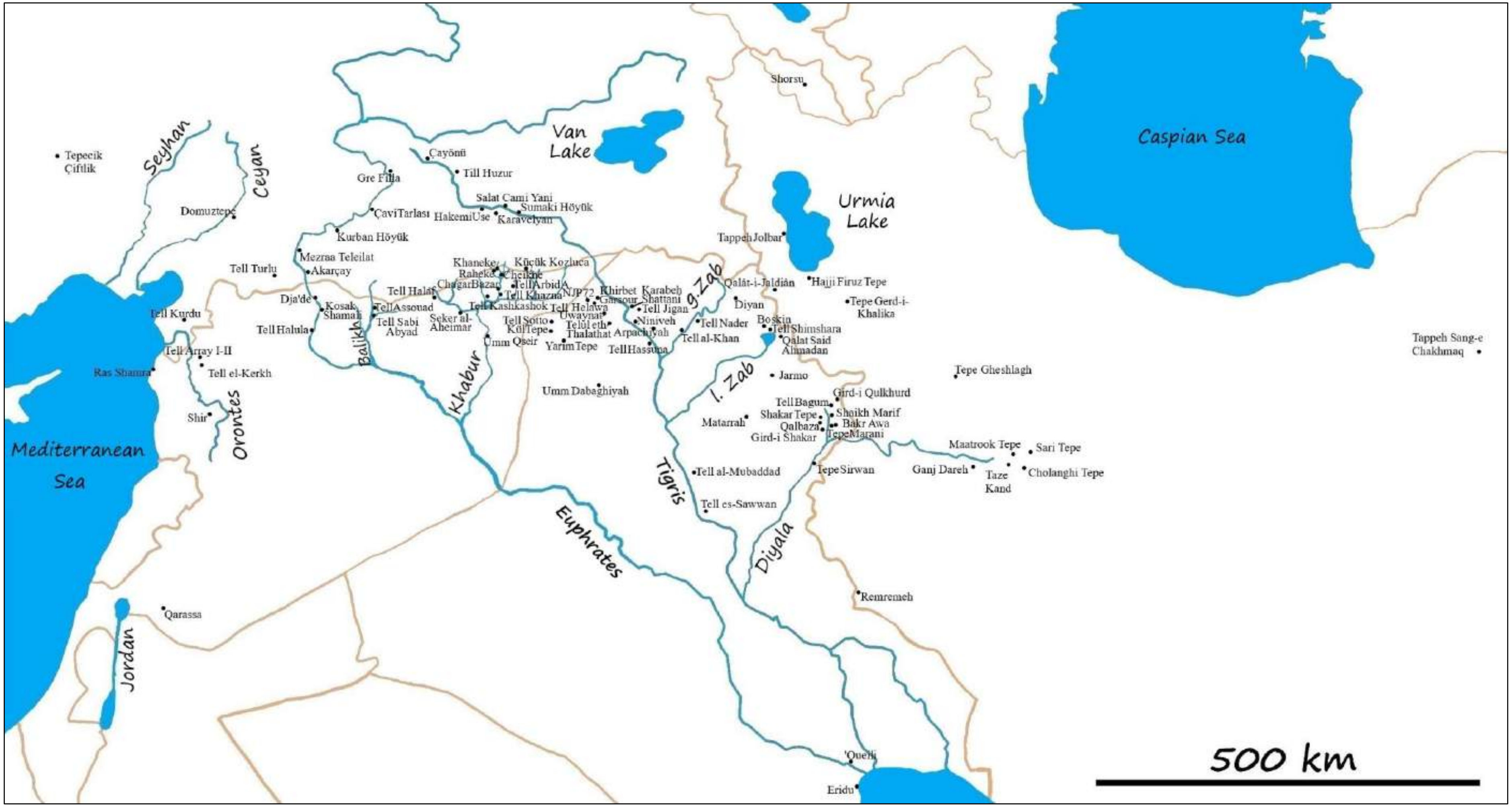
In the fifth chapter, the results of the morpho-techno-functional analysis of the ceramic form, performed by way of an experimental approach, are put forward. This enables one not only to verify the adequacy of a pottery shape with respect to different functional hypotheses, but also to evaluate its performance with respect to a specific activity.

The analysis of the technological and functional traces is then laid out in Chapters VI and VII. In particular, in the sixth chapter, the collection of experimental traces are set out. These constitute the reference point for the interpretation of the archaeological sample of

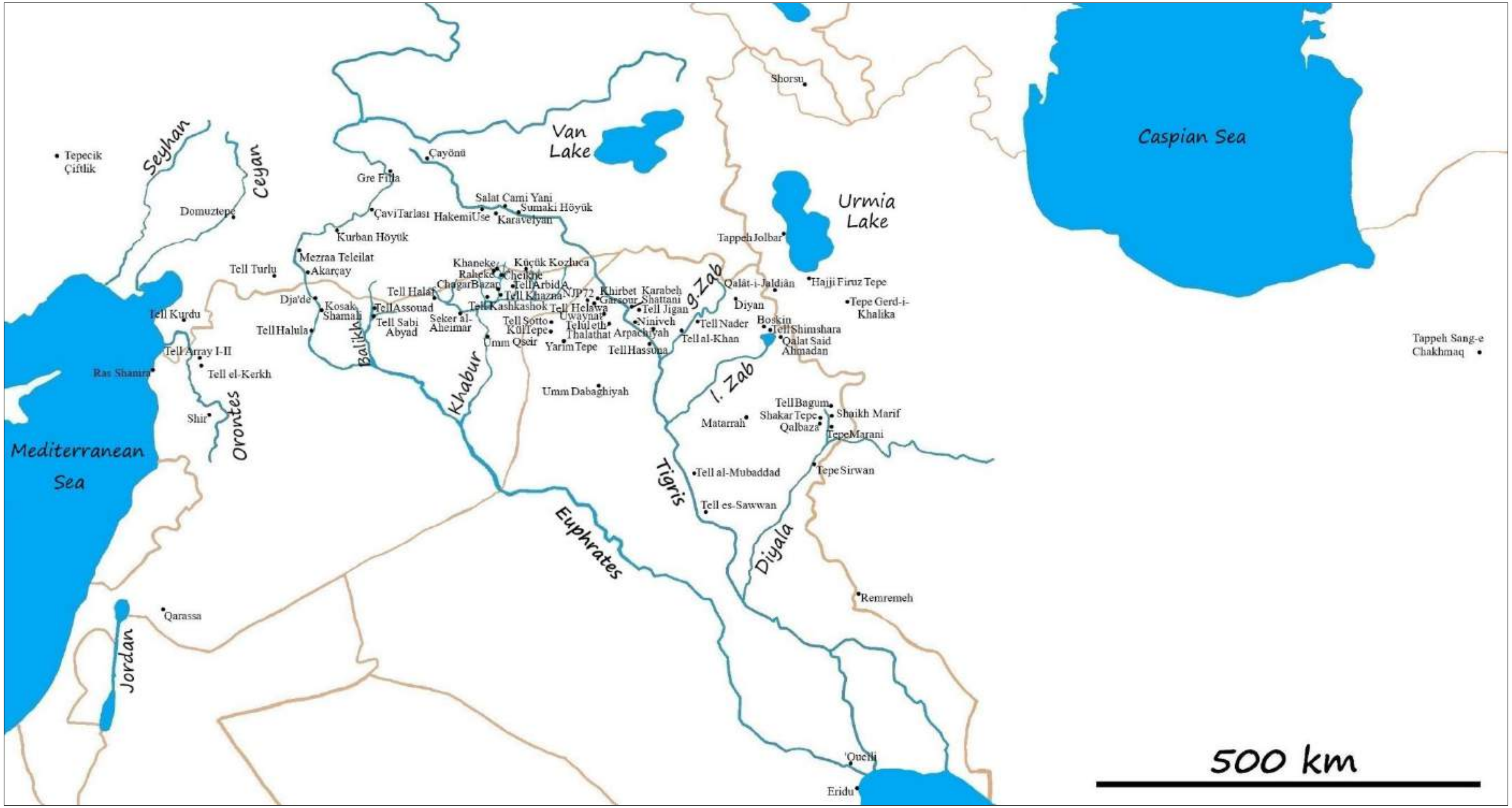
[7] cf. SKIBO 1992.

58 *husking trays* fragments from the Near East analysed in Chapter VII. The results are also integrated with selected residue analyses (phytoliths and lipids) carried out by specialists and listed in the Appendix to this work.

In the conclusion, based on the interactions between the data obtained throughout the research process, I have attempted to provide answers to the questions laid out at the beginning of this project. The aim of this work is to provide the reader with a vivid image of the artefact in its context of production and use.



Map. 1 The sites mentioned in the text



Map. 2 Archaeological sites were HT shards were found

Chapter I

THE BACKGROUND

I.1 INTRODUCTION

This research project is an attempt to better understand the role of one of the pottery forms that most characterized the Late Neolithic Period in the Near East, that is, the *husking tray* (hereafter HT).

In this chapter basic notions for understanding the temporal, spatial and cultural context in which this artifact was conceived, produced and used will briefly introduce (maps 1 and 2).

I.2 THE LATE NEOLITHIC NEAR EAST AND ITS CHRONOLOGIES

In the text, various elements and settlements will be indicated as belonging to a cultural horizon being aware of the formality of this subdivision.

These concepts are used to bring order and define clear boarders in that fluid, nebulous and uninterrupted becoming that has been reality. Unfortunately, 'we *need* labels'.[1]

In prehistoric research, cultural entities are generally defined by a set of recurrent items in a specific area during a specific period: the so-called material culture.[2] Although these are arranged in a scattered manner and according to overlapping patterns, it was proposed that it is possible to archaeologically distinguish delimited 'core areas' of which members 'are perceived to have shared similar cultural traits.[3]

Cultural traits can be structural (a mode of production, rules of kinship, alliance, residence, a form of ideology, etc.) or formal, that is, all those elements that are part of

[1] NIEUWENHUYSE 2013a:129.
[2] CHILDE 1929;1933; 1956.
[3] The polythetic model of culture (CLARKE 1968). BERNBECK- NIEUWENHUYSE 2013.

the style and belong to the 'cultural arbitrary'[4] (clothing habits, table manners, architectural peculiarities, decorative repertoires, etc.).

The shared use of the latter one creates a feeling of group membership: a feeling of identity. Identifying these traits allows us to define horizons, that is, to distinguish them geographically and chronologically from each other.

It is necessary to keep in mind that among these defined 'cultural areas' phenomena of reception, reinterpretation or rejection can develop.

The subject of this work is an artifact, the husking tray (hereafter HT) which has found great diffusion among the Late Neolithic communities of the Near East.

Due to the vast area and the long period interested by the presence of the HTs, in relation to the synchronization between the different areas of the Near East, reference explicitly made to the framework elaborated by Bernbeck - Nieuwenhuyse (2013) as will be illustrated below. Even though not completely agreed by scholars it represents so far the only available tentative to unify chronologies throughout the near-eastern area putting in relation relative and absolute chronology.

[4] BOURDIEU - PASSERON 1977.

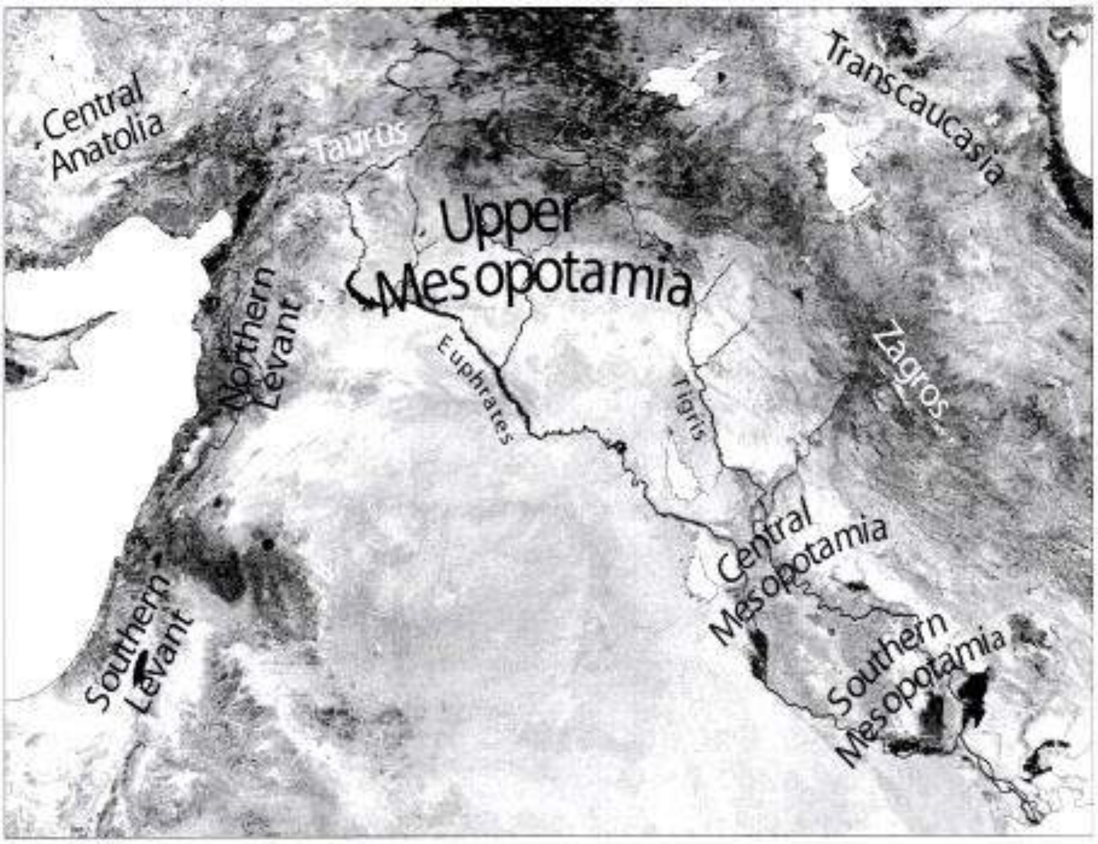


Fig. I.1 The near-eastern area (BERNBECK – NIEUWENHUYSE 2013 fig. 1.2)

The Near East here means the region enclosed to the west by the Mediterranean coast, to the north by the Taurus arc, to the north-east by the Zagros chain, to the south by the low-Mesopotamian alluvial plain (Fig. I.1).

Near East is therefore a very large area characterized by numerous environmental situations and ecosystems that are very different from each other: from lush river valleys to deserts, from huge steppe expanses to foothills and mountain areas.

As regards the chronological framework, 'Late Neolithic' refers to the period that roughly goes from 7000 to 5300 BC, that is, since ceramic began to be used in the region to the period in which societies turn into more complex organizations.

During the first half of the 20th century, the culture-historical scheme was created by organizing Late-Neolithic period into three monolithic blocks: Samarra, Halaf and Hassuna.[5]

[5] HERZFELD 1930; OPPENHEIM 1943; LLOYD - SAFAR with BRAIDWOOD1945.

On the basis of formal aspects of pottery were identify entities that were named from the site where they were first identified: Samarra, Tell Halaf and Tell Hassuna.[6]

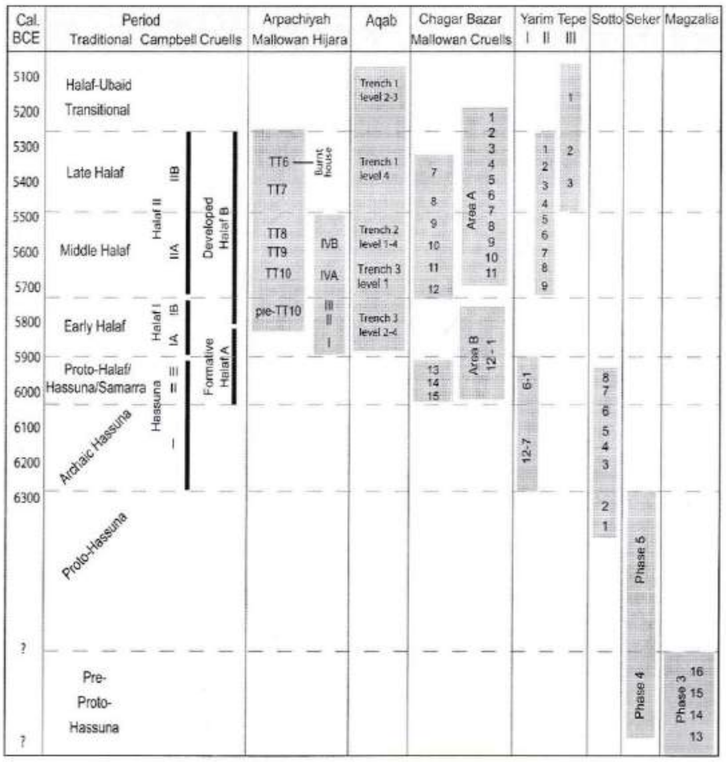


Table. I.2 Absolute and relative chronologies for northern Iraq and northeastern Syria (BERNBECK – NIEUWENHUYSE 2013).

Subsequently, thanks to progress in archaeological research and the new discoveries, authors have proposed more defined chronological frames; moreover, other space-time segments have been grafted on those already knows that have greatly expanded the areas believed to be interested by the development of these entities such as the Pre-Halaf, Proto-Hassuna and Pre-proto-Hassuna period.[7]

Finally, it has to be considered that these horizons obviously developed at different periods in different areas but it is not easy to put in relationship the different areas. In fact, the absolute chronology is still a huge problem for each area and above all comparing them; not always these correspond to relative chronologies.

The Hassuna culture was defined on the basis of the early excavations in the eponymous site; two development phases were identified here: Archaic Hassuna and Standard Hassuna.[8] Following new discoveries, levels belonging to the same cultural horizon, but even earlier, have come to light; in order to define them, the term ‘Proto-Hassuna’ was coined.[9]

Today this term indicates a large space-time framework in northern Iraq and northern Syria, wider than previously supposed for the Hassuna culture (Table. I.2).

[6] Cf. LLOYD – SAFAR with BRAIDWOOD 1945; OPPENHEIM 1943; HERZFELD 1930.
[7] NISHIAKI - LE MIÈRE 2005; NISHIAKI 2007; BADER – LE MIERE 2013.
[8] Cf. LLOYD - SAFAR CON BRAIDWOOD1945.
[9]The term ‘Proto-Hassuna’ was coined by Bader (1975), but in reality such material had already been found in Tell Hassuna Ia, however it had not been defined as such (NIEUWENHUYSE 2013: 119).

In the early 1990s the chronological sequence proposed for Hassuna was reformulated by Campbell[10] who identified three successive phases: Hassuna I, II and III; these substantially concerned the Hassuna period only starting from the Archaic phase.

Furthermore, recent excavations at Tell Seker al-Aheimar and the re-analysis of older Soviet excavation missions at Tell Maghzalia have revealed even older material from the Proto-Hassuna period that has been provisionally called 'Pre-Proto Hassuna'.[11]

For Northern Iraq, several radiocarbon dates were provided with regard to the development of the Proto-Hassuna and Hassuna horizons.

Radiocarbon dating only suggests that the Proto-Hassuna phase ends around 6300 BC. [12]

Then, the Archaic and Standard Hassuna phases follow; they would end around 5900 BC, a period in which this cultural horizon is gradually disappearing as the Halaf groups expand.

The Samarra cultural horizon was first discovered in the early 1900s by E. Herzfeld who identified the prehistoric cemetery at Tell Samarra.[13]

In general, this culture seems to have developed between the end of the 7th and the beginning of the 6th millennium BC.

Samarra pottery was found during 1950s further to north of Lower Mesopotamia in the site of Matarrah; thus, it was put in relation to the Hassuna culture hypothesizing a direct relation.[14]

In reality, the lack of data for the area does not yet make it possible to have a clear idea of the origin dynamics of the so-called Samarra culture.

Recently it has been proposed that these should rather be found in central Mesopotamia directly from the 'Proto-Hassuna' cultural horizon.[15] In fact, Samarra pottery seems to follow Proto-Hassuna pottery in several sites.

The relationship between some elements Samarra and Hassuna would thus be explained by the very strong influences that the Proto-Hassuna cultural horizon exerted on both as well as by the geographical proximity.

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[10] CAMPBELL 1992.

[11] NISHIAKI - LE MIÈRE, 2005.

[12] CAMPBELL 1992: 96- 97.

[13] HERZFELD 1930.

[14] BRAIDWOOD et al. 1952; Furthermore, Bernbeck (1994) has proposed to identify a 'Northern Samarra', which developed locally during the late Standard Hassuna phases and a 'classic' Samarra from central Iraq, which had developed as an independent entity.

[15] OATES 2013: 408.

The presence of Samarra ceramics outside its ‘area of relevance’ is more easily explained with simple exchange relationships in a world in which, as will be seen, there is a strong interaction between communities.

The Samarra communities culturally show closer relations on the one hand with Jezira and Middle Euphrates areas[16] and on the other with the Proto-Hassuna cultural horizon of the Khabur; moreover, it presented elements that connect it to both Bouqras and Tell es-Sawwan.[17]

Similarly to what happened for Hassuna, the development of the Halaf culture (Table. I.3), based on the earliest excavations, was divided by M. Mallowan into three phases called 'Early', 'Middle' and 'Late' Halaf.[18]

In 1992, at a later stage, S. Campbell[19] proposed a subdivision of the period into only two phases: Halaf I 5900-5700 and Halaf II 5700-5300. Recently, W. Cruells has proposed a small modification distinguishing an initial phase A and its development, phase B.[20]

In this case, in addition to a more precise chronological definition, it has been realized that this culture affected a much larger area and longer period than previously supposed.

[16] FRANGIPANE 1996: 90.
[17] OATES 2013.
[18] The organization in three phases was first defined for Tell Arpachiyah in 1933 (MALLOWAN - ROSE 1935).
[19] CAMPBELL 1992; 2007.
[20] CRUELLS 2006.

In the Balikh valley the site of Tell Sabi Abyad I[21], represent the key-site of which chronological periodization is the referring point for the area.

Date cal. BC	Balikh Phase	Period	Tell Sabi Abyad I - operations I	II	III	IV	V	Assouad	Damishliyya	Shenef
5300										
5400	IIID	Late Halaf			level D					
5500										
5600	IIIC	Middle Halaf								
5700										
5800	IIIB	Early Halaf	level 1, level 2		level C1					
5900			level 3	level 1, level 2	level C2/8					
6000	IIIA	Transitional Proto-Halaf	level 4, level 5, Burnt Village, level 7	level 3, level 4, level 5, level 6, level 7	level B1, level B2, level B3		phase III			
6100	IIC	Pre-Halaf	level 8, P15 - 8, P15 - 9		level B4, level B5, level B6, level B7		phase II			
6200			P15 - 10		level B8, level A1					
6300					level A2	level 1	phase I			
6400			P15 - 11		level A3, level A4	level 2				
6500	IIA	Early Pottery Neolithic			level A5, level A6, level A7					
6600					level A8, level A9					
6700					level A10					
6800		Initial PN			level A11, level A12					
6900					level A13					
7000					level A14, level A15					

Table. I.3 Absolute and relative chronologies for the Balikh valley of northern Syria (BERNBECK – NIEUWENHUYSE 2013).

Here, the Late Neolithic sequence was organized in an initial Pottery Neolithic (7000-6700 BC), followed by the early Pottery Neolithic (6700-6300 BC), Pre-Halaf (6300-6000 BC), Transitional (6000-5900 BC) and followed by the Halaf phase (Table I.3).

Along the Euphrates valley, the site of Tell Halula[22] has revealed a very long chronological sequence that covers the entire Late Neolithic period for which was used the term Pre-Halaf.[23]

It was simply organized in progressive numbers: I (7000-6700 BC), II (6700-6300 BC), III (6300-6000 BC) and a transition period Proto-Halaf (6000-5900 BC) followed by the Halaf latest stages (Table I.3);

[21] AKKERMANS 1993; LE MIÈRE - NIEUWENHUYSE 1996; AKKERMANS et al. 2006; NIEUWENHUYSE 2008, NIEUWENHUYSE et al. 2010.
[22] MOLIST et al. 2008; MOLIST et al. 2013a; 2013b.
[23] The term 'Pre-Halaf' differs largely from the sequence of Tell Sabi Abyad. Here it is used to refers to the entire 7th millennium.

Further to north along the Euphrates valley, a Late Neolithic sequence was detected at Mezraa Teleilat[24] and Akarçay Tepe.[25] (Table I.4).

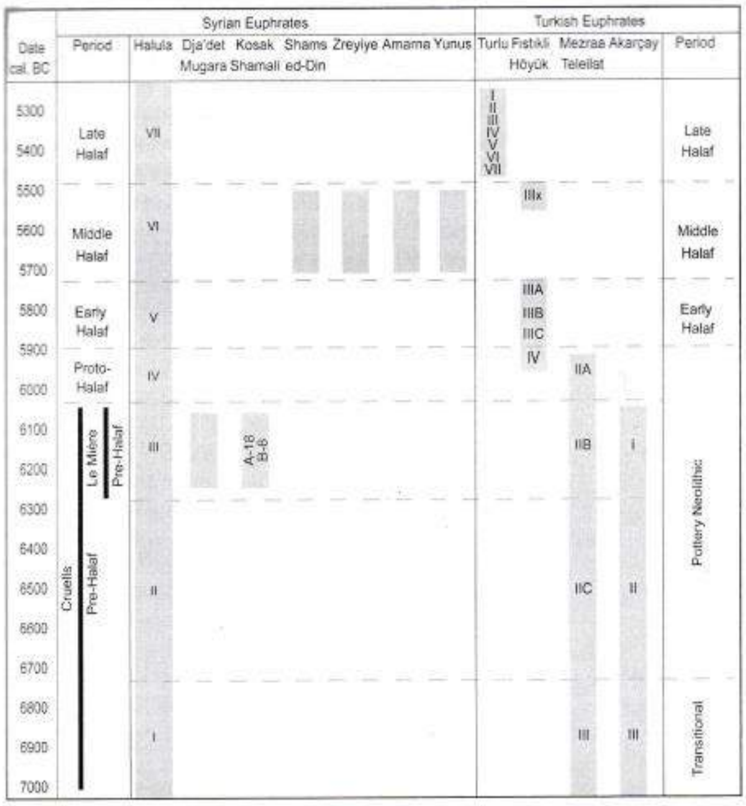

Table I.4 Absolute and relative chronologies for the Syrian and Turkish bends of the Euphrates. (BERNBECK – NIEUWENHUYSE 2013).

Here, material culture notwithstanding Mesopotamian influences maintain a specific local character. At Mezraa Teleilat the Pottery Neolithic (the 7th millennium) is organized in a Phase III that represent the ‘Transitional’ period from Pre-Pottery Neolithic to Pottery Neolithic, phase IIC (early Pottery Neolithic ca.), Phase IIB (Middle Pottery Neolithic that may chronologically correspond to the Proto-Hassuna period)[26] and a Phase IIA (Late Pottery Neolithic that may correspond to Proto-Halaf).[27] At Akarçay, the 7th millennium is divided into three phases: Transitional’ Phase III, Phase II and Phase I.

As regard the Late Neolithic Northern Levant, different terminologies are used to define its chronological periodization from those of Upper Mesopotamia. Already since the 1930s excavation campaigns a chronological sequence of the area begins to take shape: that of the Amuq[28] (Table I.5). While the Amuq A and B phases refer to the 7th millennium, while the Amuq C and D phases chronologically correspond to the Halaf period.

[24] KARUL et al. 2002; ÖZDOĞAN 2003; 2009.
[25] ARIMURA et al. 2000, 2001; BALKAN-ATLI et al. 2002, 2004;
[26] ÖZDOĞAN 2003.
[27] ÖZDOĞAN 2003.
[28] BRAIDWOOD - BRAIDWOOD 1960.

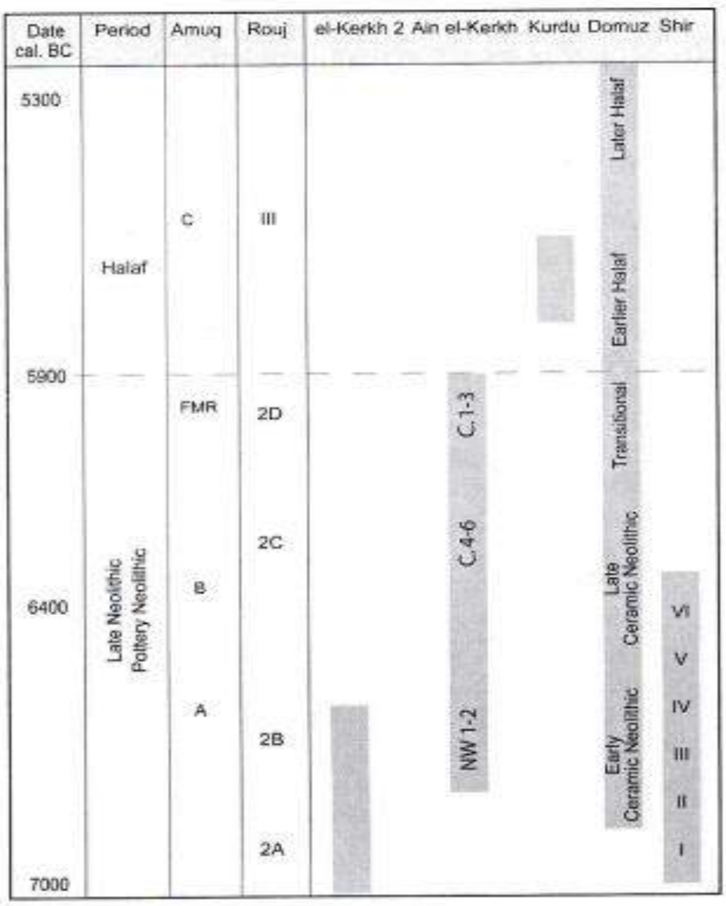

Table I.5 Absolute and relative chronologies for the northern Levant (BERNBECK – NIEUWENHUYSE 2013).

In more recent years, also a new chronological sequence has been became available for the nearby region of the Rouj Basin. Here the phases from Rouj 2a to Rouj 2d covered the first part of the Late Neolithic, while the Rouj 3 phase chronologically corresponds to the Halaf period of the Upper Mesopotamia (Table I.5).

I.3 THE ‘CULTURAL’ HORIZONS OF LATE NEOLITHIC NEAR EAST

Summarizing, the ‘culture horizons’ currently believed to have participated in the development of the Late Neolithic Near East are: Pre-Halaf and Proto-Hassuna, Hassuna, Samarra and Halaf.

I.3.1 The Pre-Halaf and Proto-Hassuna period

The western area between the Levant, the Middle Euphrates and the the Balikh river is interested by the development of the Pre-Halaf cultural horizon, while the area between the easter part of the Khabur river, the middle Tigris up to the shores of the Urmia Lake refers to the Proto-Hassuna culture (fig. I.2);

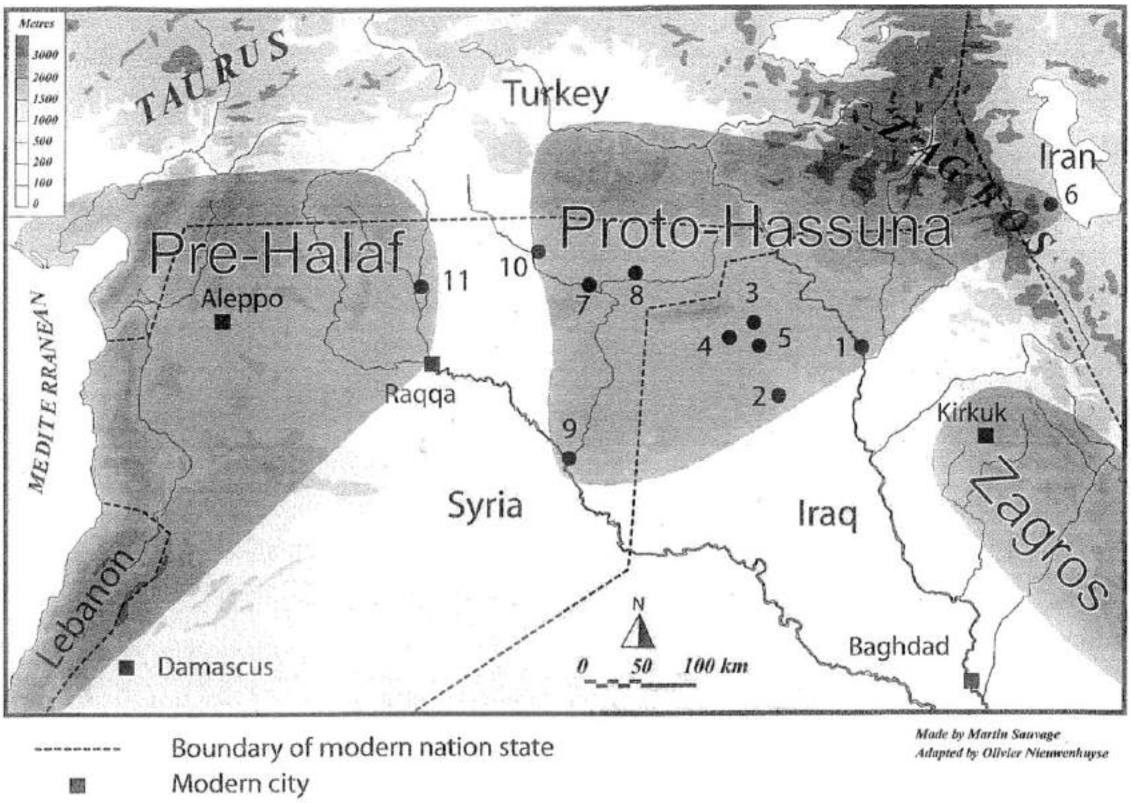

Fig. I.2 Late Neolithic horizons in the northern Syria and northern Iraq (ca. 6500-6000 cal. BC), showing the boundaries of the Pre-Halaf, Proto-Hassuna and Zagros groups (after Aurenche et al. 2004: Fig. 2). Some of the main sites: 1: Tell Hassuna; 2: Umm Dabaghiyah; 3: Tell Sotto; 4: Kultepe; 5: Yarim Tepe I; 6: Hajji Firuz Tape; 7: Tell Kashkashok II; 8: Tell Khazna II; 9: Tell Bouqras; 10: Tell Seker al-Aheimar; 11: Tell Sabi Abyad (NIEUWENHUYSE 2013a).

The vast, relatively arid plains between the Balikh and Khabur rivers are in part interpreted as 'the border' between the two blocks. To the east of the Proto-Hassuna area there are other Neolithic communities that occupy the intermountain valleys of the Zagros chain.

In recent years, further to north, the Taurus piedmont where Upper Euphrates and Tigris rivers come closer has been archeologically explored ; here several sites, such as Hakemi Use, Salat Cami Yani, and Sumaki Hoyuk has shown to have had contacts with the Proto-Hassuna horizon.

The Pre-Halaf and Proto-Hassuna pottery horizons develop in the period from the beginning of the Pottery Neolithic to 6300 BC, when there seems to have been a marked change in the socio-economic aspects of the communities.

Inevitably, the dynamics and order of archaeological discoveries determine how we perceive the past[29] and the Proto-Hassuna and Pre-Halaf groups are examples.

[29] BERNBECK 2008; CAMPBELL 1999; NIEUWENHUYSE 2013a;

As already mentioned, initially, the Near East was divided into three cultural blocks (Hassuna, Halaf and Samarra); subsequently, with the developing of archaeological research, the supposed direct antecedents of these entities were defined as Proto-Hassuna and Pre-Halaf.

The new archaeological discoveries, in addition to expanding the area considered influenced by these entities, they have also had the effect of dampening their specificity.[30]

In fact, at the beginning, the material culture from few archaeological sites, far away from each other, were distinctly different and, consequently, reflected an image of separated pottery horizons; subsequently, thanks the increasing of the sites subject to archaeological investigation, the gap between the intermediate areas has been filled; as consequence, the differences between blocs have progressively decreased. Moreover, within each of these blocks there is heterogeneity of styles and characters that makes difficult to consider them as homogeneous unit.

Therefore, the sharp line drawn to divide these two pottery cultures between Balikh and Khabur could be weakened in a lack of data.[31]

In general it can be said that both Proto-Hassuna and Pre-Halaf societies were egalitarian in structure. They were based on a mixed economy made of rainfall agriculture, rising livestock and, in part, hunting.

Probably, both two groups, although different in size of the communities, were organized in a communitarian lifestyle: the houses raised close with probably shared courtyards domed ovens, fireplaces and tools for processing food.

Among the architectonical elements that characterized the settlements of these communities, there were large cellular buildings that has been interpreted as storage buildings (Fig. I.3).

One of these, for example, was found at the site of Umm Dabaghiyah[32] that belong to the Proto-Hassuna block (Fig. I.7.1); here a large building divided into several small room was probably used to storage of goods in some way related to the specialized onager hunting; this activity certainly represented the main economic activity of the settlement given the amount of bones found there. The large size of the building in contrast to the (probably) limited inhabited area could indicate that the storehouse referred to a larger number of people who evidently did not lived permanently there. Moreover, in the storage

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[30] NIEUWENHUYSE 2013a.
[31] NIEUWENHUYSE 2013a.

[32] KIRKBRIDE 1973; 1974; 1975;

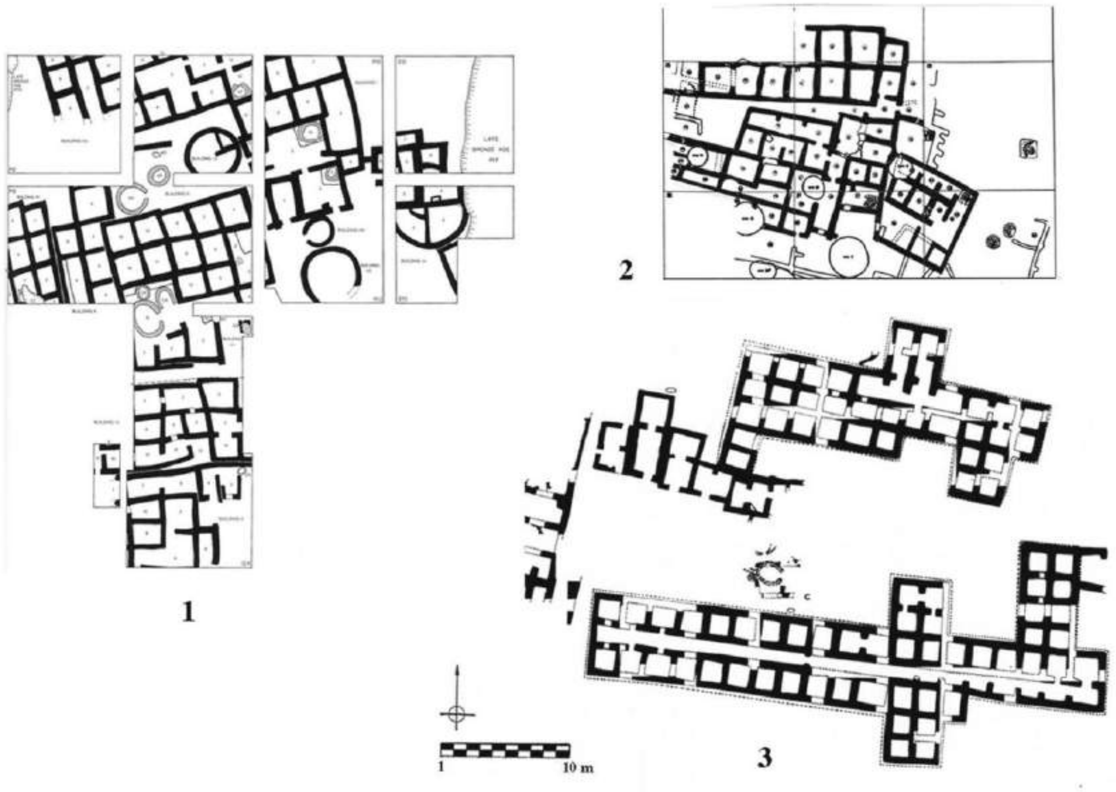

Fig. I.3 Large Neolithic 'storage' buildings in Pre-Halaf settlements: 1: Tell Sabi Abyad Level 6, the 'Burnt Village' (VERHOEVEN - KRANENDONK 1996:Fig. 2.7); 2: Yarim Tepe I Level 5 (MERPERT - MUNCHAEV 1993a:Fig. 6.3); 3: Umm Dabaghiyah (KIRKBRIDE 1975: Pl. I) (FRANGIPANE 2013, fig. 6.2).

building a large number of clay balls were found; these could have been used to facilitate counting in goods management.

Also in the Pre-Halaf settlements there were the multicellular buildings interpreted as storage buildings; for example those of Tell Sabi Abyad[33] (Fig. I.7.1).

In the small rooms that composed them, in addition to charred cereals and tokens, several seals were found. These were lumps of clay impressions bearing the impression of a seal to finalize the closure of containers. These, in addition to avoiding possible breakins, could have possibly provide informations about to the goods present in the containers.

The communities belonging to the both groups shared many other cultural aspects. Both of them were characterized by the absence of striking cult symbols.

They shared construction methods, tools and, as will emerge from this work, culinary practices.

[33] AKKERMANS - DUISTERMAAT 1996.

Each one of these horizons is currently defined on the basis of differences in ceramic repertoire which includes a series of vessels different from each other in shape, size, technology, decoration, style and, evidently, in function.
However, in recent years, it became more clear that the distribution of certain artifacts crosses the boundaries previously traced for the Proto-Hassuna and the Pre-Halaf areas; for example, plant tempered ware, decoration on *applique*, red slip ware designs and Dark Faced Burnished Ware are found in both cultural spheres, albeit in very different proportions.[34]
It has been proposed that the differences between Proto-Hassuna and Pre-Halaf ceramic repertoires rather than cultural expressions of regional limits could be attributable to differences in socio-economic adaptation.[35]

In conclusion, despite two clearly distinct ceramic groups can be identified whose demarcation line passes between the Balikh and the Khabur,[36] this limit is permeable.[37]
The cultural panorama of this period could, perhaps, be thought as a fragmentation of local areas eager to interact; consequently, some items, in a certain extent, have become unifying; one of them could be the HT and what its presence implies.

I.3.2 The Proto-Hassuna and Hassuna horizons

The Proto-Hassuna horizon also known as the Umm Dabaghiyah-Tell Sotto culture developed during the second half of the 7th millennium and was preceded by the so-called Pre-proto-Hassuna period; from it originated

Date cal BC	Balikh valley	Khabur headwaters	North Iraq
5750 5950	Early Halaf	Early Halaf	Early Halaf
6100	Transitional	Proto-Halaf	Standard Archaic Hassuna
6300	Pre-Halaf	Proto-Hassuna	Proto-Hassuna
6900	Early Pottery Neolithic	Pre-Proto-Hassuna	Final PPNB (post-Nemrikian) ?
	Final PPNB	Final PPNB	Final PPNB (Nemrikian) ?

Table I.6 Simplify chronology of Balikh, Khabur and north Iraq areas (NIEUWENHUYSE 2013, table 1).

34 NIEUWENHUYSE 2013a.
35 NIEUWENHUYSE 2013a.
36 LE MIERE 2000.
37 LE MIERE, PICON 1987; BADER et al. 1994; NIEUWENHUYSE 2013.

the Hassuna horizon which developed between 6300 and 5900 BC (Table I.6).

In general terms, the communities interpreted as belonging to these entities were organized in small villages that were not permanently settled, temporary occupations or outposts.[38]. Certain villages were, perhaps, periodically abandoned.

It could indicates that the communities could temporary move in connection to pastoralism and hunting or cultivating fields, which were the main activities of food resources procurement.[39]

Proto-Hassuna and Hassuna had to be egalitarian communities with little rigid social structure.

At architectural level, in fact, there were no 'urban' planning, the houses were small, not standardized and they were leaning against each other and with parts in common.

In fact, it is often impossible to identify the housing units.

Domestic activities took place in the open areas in front of the houses. Here there were hearths, platforms, ovens. These were arranged without any type of subdivision or belonging to specific recognizable family units . Everything was probably shared by the whole group.

In various settlements, as mentioned before, large rectangular buildings have been found. These were divided into rows of small rooms interpreted as collective storage houses. They could have been probably managed by some individuals in the interest of the community.

The Proto-Hassuna pottery found its roots in the so-called Pre-proto-Hassuna pottery identified at Tell Seker al-Aheimar and Tell Feyda in the Khabur and possibly in other sites of upper and middle Tigris Valley.[40]

Proto-Hassuna appears distributed over area larger than the following Hassuna pottery. It involved the Khabur basin (Tell Seker al-Aheimar, Tell Kashkashok, Tell Khazna II and several surveyed sites), the middle Euphrates valley (Bouqras), south to the Wadi Tartar (Umm Dabaghiya), and the upper and middle Tigris valley (Tell Hassuna, Salat Cami Yanı and Sumaki Höyük) (Fig. I.4).[41]

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[38] MELLAART 1975; FRANGIPANE 1996; 2006; OATES 1973;
[39] FRANGIPANE 1996.
[40] BADER - LE MIÈRE 2013.
[41] BADER - LE MIÈRE 2013; LE MIÈRE - PICON 1998.

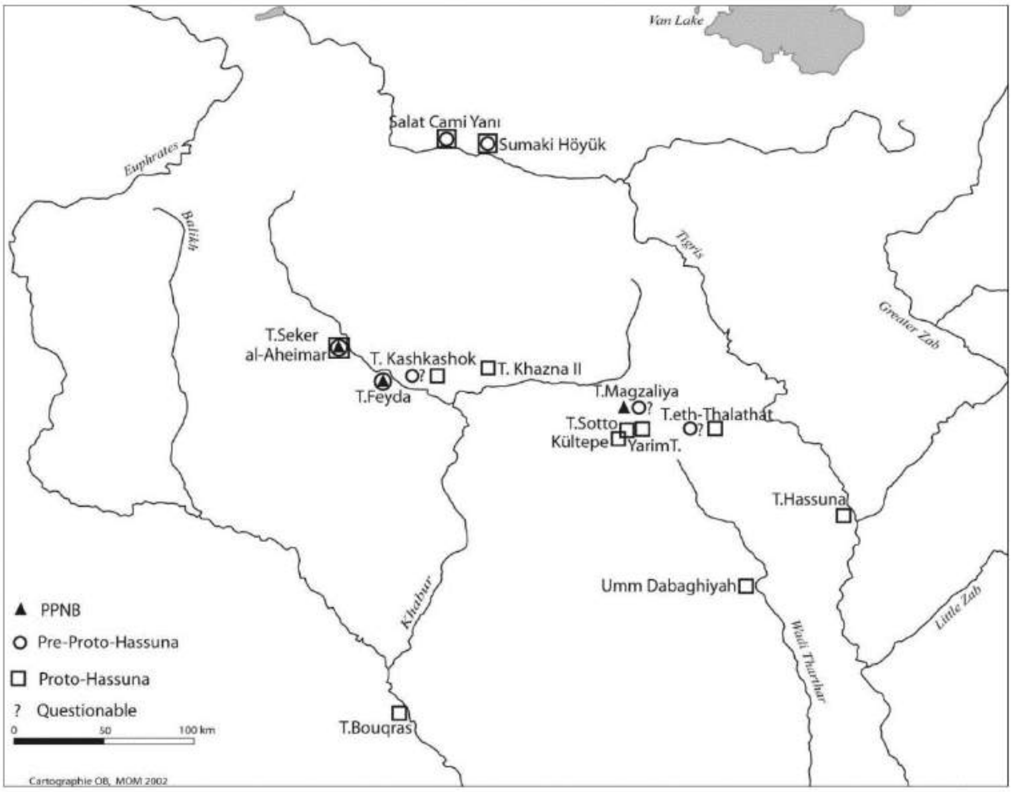

Fig. I.4 Distribution of pre-proto-Hassuna pottery and proto-Hassuna pottery in the Khabur and Tigris Valley areas (BADER - LE MIÈRE 2013, fig. 46.1).

The Proto-Hassuna pottery is characterized for the 80/90% by light colored coarse tempered with plant inclusions. The remaining part mainly consists of pottery tempered with fine mineral inclusions called 'Fine Ware' and small quantities of Dark-Faced Burnished Ware and Grey-Black Ware.[42]

Shapes were simple. These were carinated shapes like the characteristic 'double ogee' (that could have been partly buried)[43] and smaller concave forms; open shapes like the HTs, as well as the addition of necks, widespread just at the end of the period.

The fine pottery can be decorated by throughout red or cream-slipping or red-painting the vessels with simply motifs of rows of triangles, chevrons or diagonal lines.[44]

To the external surface of the vessel were applied plastic decoration occurs already in Level showing like simple knobs, ledges or figural motifs like animal heads, snakes,

[42] LE MIÈRE 2001; BADER - LE MIÈRE 2013.
[43] BERNBECK 1995: 31.
[44] NIEUWENHUYSE 2013; MELLAART 1975.

crescents, human faces. At the end of the period pottery began to be decorated with simple incision patterns.[45]

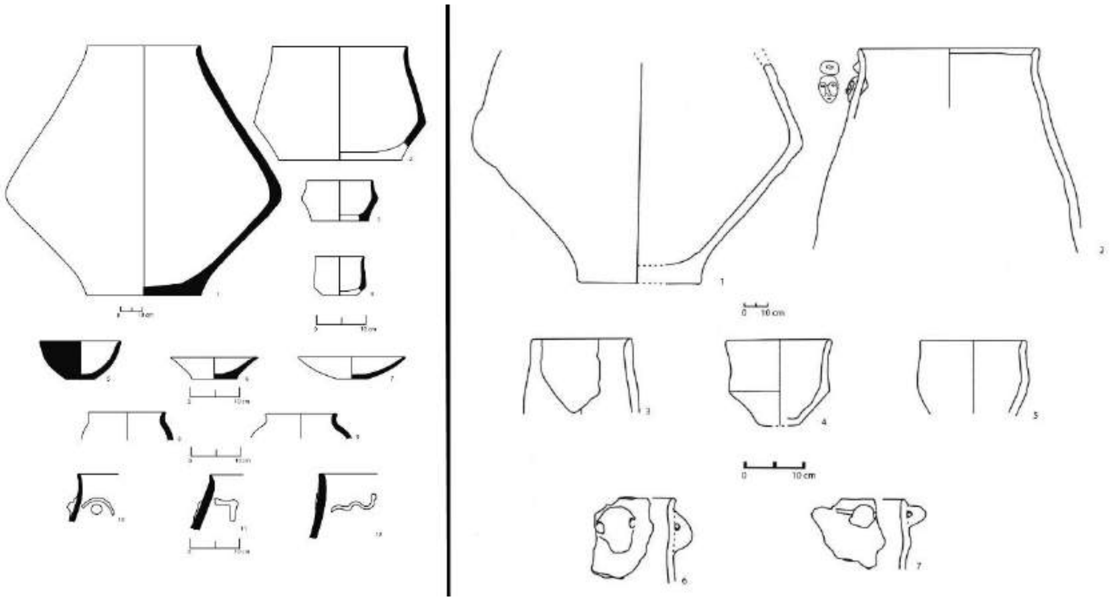

Fig. I.5 Proto-Hassuna assemblages from Tell Sotto (on the left) and from Telul eth-Thalathat (on the right) (BADER – LE MIERE 2013: figs 46.2, 46.3).

The Hassuna pottery production is more elaborate than Proto-Hassuna one, but certainly does not reach the levels of the subsequent Halaf pottery horizon.

The pottery classification is distinguished in ‘Early Hassuna’ (Hassuna Ib-II, Yarim Tepe I levels X-VI) and the later ‘Standard Hassuna’ (Hassuna III-VI, Yarim VI-I). In both of them there is a fine and a coarse ceramic class.

Technological advances, due to the use of kilns, had to allowed the Hassuna communities to produce more resistant pottery and, at the same time, to enrich the repertoire of forms and decorations. Thus, the Hassuna style is much more varied and homogeneous than that of the Proto-Hassuna one.

The Hassuna pottery production is more elaborated than Proto-Hassuna one both in relation to variability of shapes, decorations and, probably, technological aspects.

The distribution of this assemblage covers the Khabur/Tigris Valley and beyond (Fig. I.6).

The pottery classification is distinguished in ‘Archaic Hassuna’ (Hassuna Ib-II, Yarim Tepe I levels X-VI) and the later ‘Standard Hassuna’ (Hassuna III-VI, Yarim VI-I). In both of them there is a fine and a coarse ceramic class.[46]

[45] NIEUWENHUYSE 2013; MELLAART 1975; BADER - LE MIÈRE 2013.
[46] DABBAGH 1965.

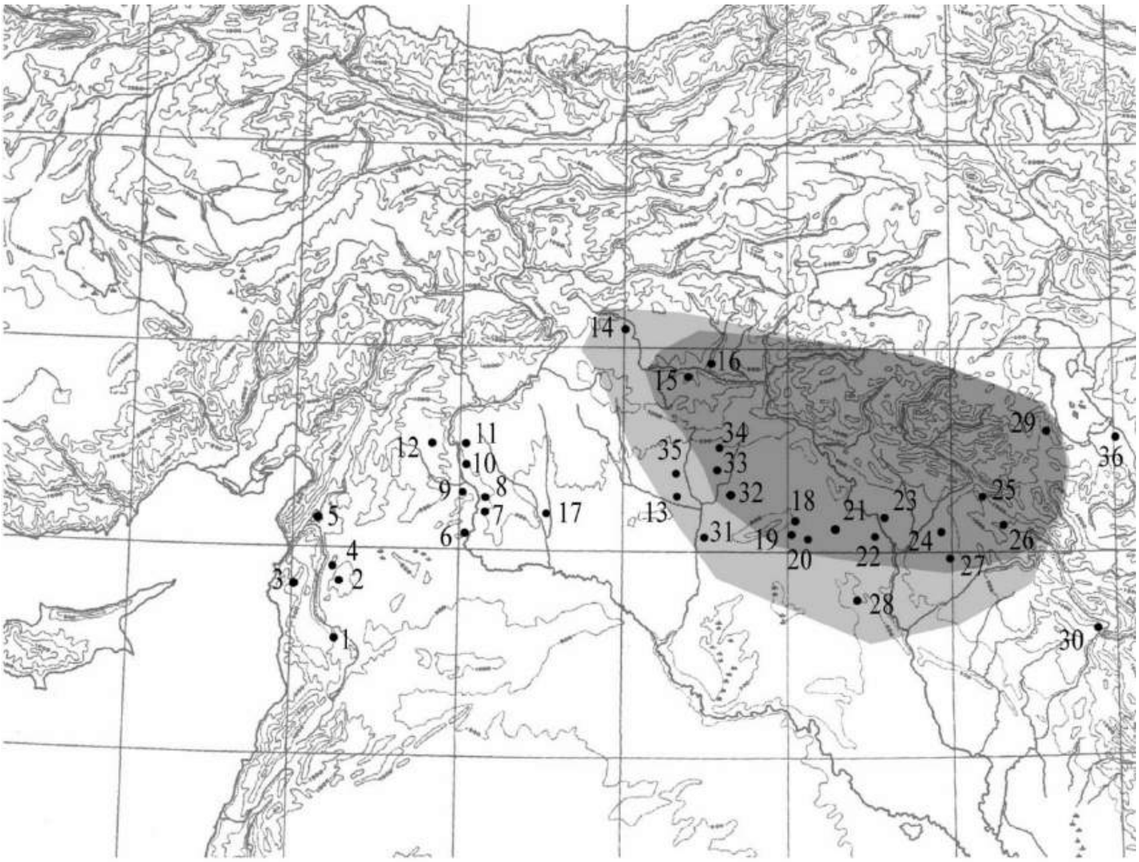

Fig. I.6. Map with indication of some sites where HT were found in relation to so-called Standard Hassuna area (in grey) and the area for which this distribution is hypothetical (in lighter grey). Sites: 1. Shir, 2. Kherkh, 3. Ras Shamra, 4. Aray, 5. Amuq, 6. Halula, 7. Kosak Shamali, 8. Djad'e Mughara, 9. Amarna, 10. Akarçay, 11. Mezraa Teleilat, 12. Turlu, 13. Kashkashok, 14. Çayönü, 15. Hakemi Use, 16. Salat Camii, 17. Sabi Abyad, 18. Sotto, 19. Kultepe, 20. Yarimtepe, 21. Thalathat, 22. Hassuna, 23. Nineveh, 24. Nadar, 25. Diyan, 26. Shimshara, 27. Matarrah, 28. Umm Dabaghiyah, 29. Hajii Firuz, 30. Begum, 31. Umm Qseir, 32. Brak, 33. Arbid, 34. Küçük Kozluca, 35. Chagar Bazar; 36. Tappeh Sang-e Chakhmaq (BALOSSI 2021).

In general, Hassuna pottery was handmade; the clay was could be both mineral (in particular limestone) or organic tempered (consisting in plant fragments or even dung).[47] It was noted that Hassuna pottery appears better fired than that one of previously periods, suggesting that it was fired in kilns.[48]

Four main ware groups were identified already in the Tell Hassuna excavation[49]:

- *Corase ware* was made of coarse straw-tempered clay buff in color with blackened core continued from previous period but its number decrease by the time. large storage vessels doble ogee large jar the so-called 'milk jars' large almost vertical-sided oval vessels with lug handles and flat oval trays, the so-called HTs (the subject of this research).

[47] PETROVA 2012.
[48] MELLAART 1975.
[49] LLOYD and SAFAR with BRAIDWOOD 1945; DABBAGH 1965; ODAKA 2021;

The external surface is wet-smoothed or, sometimes, slight burnished.

- *Burnished ware* of which fabric could be buff to pink or brown and tempered with grit temper. The external surface bowls very often were burnished above all in the earlier period.

- *Archaic painted ware* fabric was pink, buff, or brown.

The external surface was slipped in cream or pinkish-cream color according to different treatments. The earliest painted pottery clearly distinguishable from the standard painted ware, because the both paint and surface are always mat.

Shapes like bowls and spherical jars with almost vertical necks belong to this ceramic group. Painting interested the neck and the shoulder area of these vessels and was in red. Designs consisted of row of crosshatched triangles or of reversing groups of concentric triangles.

- in the *Hassuna Standard ware,* the fabric was buff or pinkish clay and fine mineral-tempered. Shapes consist of jars and bowls widely varied in size, from large storage jars to tiny carinated bowls.

The external surface was slipped with a thin cream layer and then the vessel was incised, painted, or painted-and-incised. This kind of decoration becomes common in the Standard Hassuna phase.[50]

The incised standard ware was scored when clay was still fresh with sharp tools. The decoration remained almost invariably linear and often was decorated according to a herringbone pattern.

The standard painted ware was decorated in red (during the archaic phase) or red-brown brown, and dark brown (during standard period).

Basically to this group can be ascribed bowls with slightly flattened or round bottoms or squat jars with short necks. Paintings consisted in crosshatching patterns or groups of opposed oblique lines.

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[50] Balossi 2021.

The painted-and-incised ware began in the Hassuna Archaic phase as ordinary incised ware with occasional painted additions. In the later phase this technique was more frequently was adopted in series of shapes and designs combinations.

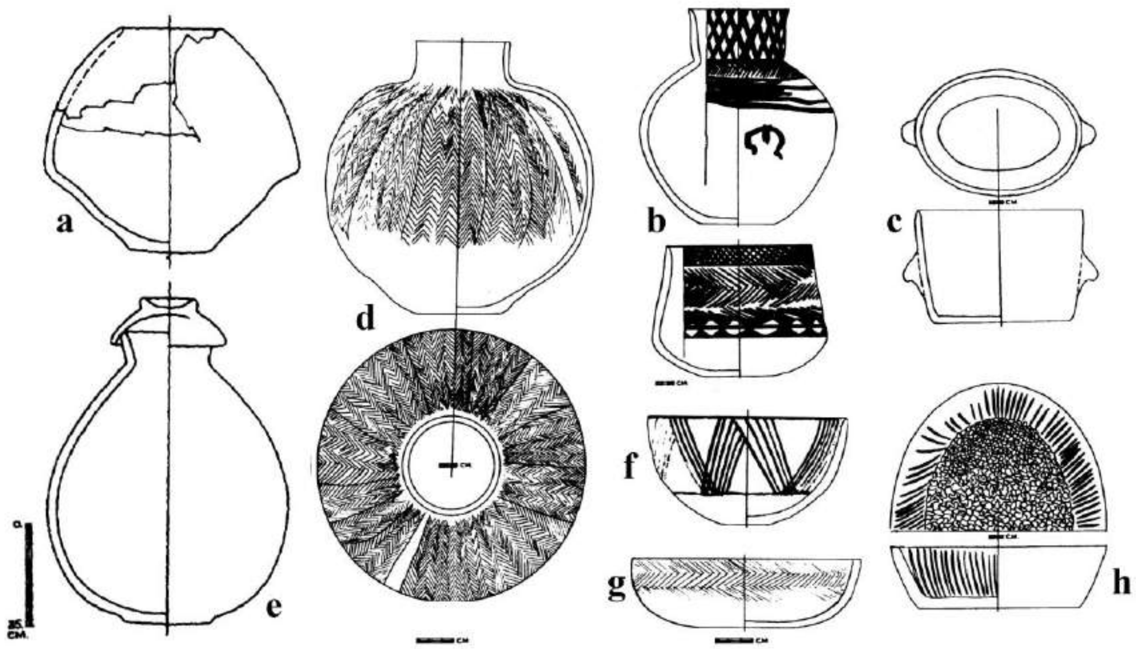

Fig. I.7 Some pottery forms from Hassuna assemblage (a) Hassuna Archaic double ogee b) Hassuna Standard painted-incised jar, c) 'milk jar', d) Hassuna incised necked jar e) Hassuna Archaic large jar f) Hassuna Standard painted ware, g) Hassuna Standard incised bowl, h) 'husking tray' (elaborated from Lloyd and Safar with Braidwood figs. 2,3,4,6).

I.3.3 The Samarra horizon

The Samarra horizon spread around 6200 BC in central Mesopotamia (Hamrin and Mandali area), but the dynamics that led to its formation are not entirely clear due to the fact that few sites belonging to this pottery culture have been archaeologically investigated. However, 'both the pottery style known as 'Hassuna' and the so-called 'Samarran' from central Mesopotamia seem to develop directly from the Neolithic 'Proto-Hassuna''.[51]

Samarra culture had to develop in the northern part of the Lower Mesopotamian alluvium and the site that best represents it is Tell es-Sawwan.[52] Other important sites belonging to the Samarra cultural horizon are: Tell Baghouz[53], just south of the middle Euphrates; to

[51] OATES 2013: 408.
[52] ABU AL-SOOF 1968; YASSIN 1970; WAHIDA 1967; IPPOLITONI 1970, BRENIQUET 1992.
[53] BRAIDWOOD et al. 1944.

the north, Matarrah[54] while to the east Choga Mami[55], Songor[56] and Tell Shimshara[57] in the intermountain valleys of the Zagros mountains.[58]

Anyway it seems to have exerted influence also in the Upper Mesopotamia and beyond as finds of pottery ascribable to this entities demonstrate.[59]

During its late stage, in 5700 BC, Samarra came into contact in lower Mesopotamia with the 'Ubaid communities of the alluvial plain. Here it gave rise to a hybrid culture, Choga Mami Transitional, which developed a little further east starting from 5400/5300 BC.

The Samarra villages belonged to fully sedentary communities; inhabitants lived in very large houses with a standardized plan and were probably intended for extended families that represented the basic socio-economic units.

In addition to the dwelling, storage houses have also been found in these villages.

Samarra communities were essentially based on irrigated agriculture[60] and the breeding of both ovicaprids and cattle.

Other important elements of the Samarra communities are the presence of seals. An unusually particular building was discovered at the site of Tell es-Sawwan. Its plan echoed the multiplied internal subdivision of a house but, it was large and well-constructed. This building had to play a particular role for the entire community. Inside, no domestic materials were found and under the floors there were more than 400 children burials.

As for the pottery repertoires of the Samarra sites, these are characterized by a fine ceramic with its own decorative characteristics. However, the repertoire includes other forms, including a good number of HTs. These were traditionally interpreted as the result of the aforementioned close relations with the Hassuna groups.

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54 BRAIDWOOD et al. 1952.
55 OATES 1968;1969a,1969b; OATES – OATES 1976,
56 FUJI 1981 ; MATSUMOTO 1987
57 MORTENSEN 1970.
58 OATES 2013.
59 For example Tell Hassuna (LLOYD AND SAFAR WITH BRAIDWOOOD 1945), Tell Sabi Abyad (LE MIERE – NIEUWENHUYSE 1996; AKKERMANS et al. 2006); Tell Boueid (SULEIMAN - NIEUWENHUYSE 2002); Chagha Sefid and Chogha Mish (HOLE 1977; DOLLFUS 1987).
60 The exploitation of cereals as a food commodity in these warm areas cannot be explained except by the adoption of irrigated agriculture (HELBAEK 1972).

I.3.4 The Pre-Halaf and Halaf horizons

According to the most recent studies, the Halaf culture has gradually emerged from a variety of earlier entities: Pre-Halaf and Proto-Hassuna.[61] This formation process constitutes the so-called Proto-Halaf period and developed quite rapidly between the 6100 and the 5900 BC; during this period the foundations of the subsequent Halaf phenomenon were laid.[62]

Halaf spread in a short time starting from 5900 BC. and after a first moment it begins to expand throughout the Upper Mesopotamian area. Around ca. 5200 BC it finished.

Small communities of people inhabited villages characterized by an architecture based on circular-plan buildings sometimes preceded by a rectangular rooms. These buildings could largely vary in size. It was proposed that, while the smaller ones could have been used as store houses, the others could have been like different rooms of the large house of the village.

In addition, quadrangular buildings with small room arranged side by side are also known from several sites such as Yarim Tepe II, Tell Sabi Abyad I, Khirbet esh-Shenef (Fig. I.3).

The society had to be strongly egalitarian, family units are not recognizable and goods were probably shared within the group.

The communities were sedentary; they grew cereals and legumes and raised livestock. Settlements do not generally have a long occupation sequence: after a certain period they were abandoned.

During the Halaf period there was a significant demographic increase which produced an expansion of the area occupied by these communities, probably as consequence of fission mechanisms: segments of a community that systematically split up from a mother village to occupy new territories.[63]

Changes in the ceramic repertoire refers to technology, shape of the vessels, as well as in their decorative style. The rough and relatively simple forms of the Pre-Halaf period turns into a new ceramic forms, mineral tempered and finely finished such as the so-called Fine-Ware.

[61] NIEUWENHUYSE 2013b: 136.
[62] CRUELLS - NIEUWENHUYSE 2004.
[63] FRANGIPANE 2006.

This process is observable, for example, in archeological sites such as Tell Sabi Abyad,[64] Tell Halula[65] and Chagar Bazar;[66] also the Tell ‘Ain el-Kerkh[67] region participated to some degree to the Proto-Halaf phenomenon as demonstrated by the presence (in limited quantities) of the comparable Fine Painted Ware.

Influences and similarities existed also with Hassuna and Samarra pottery.[68]

In this perspective the presence of HT shards was traditionally explained. These were found in several Pre-Halaf and Proto-Halaf sites, sometimes in very large amount. On the contrary, when Halaf period began this pottery form abruptly decreased in number until disappear (Chapter II)

Halaf horizon was characterized by a no comparable complexity in style of painted decoration of the vascular shapes (Fig. I.8).[69]

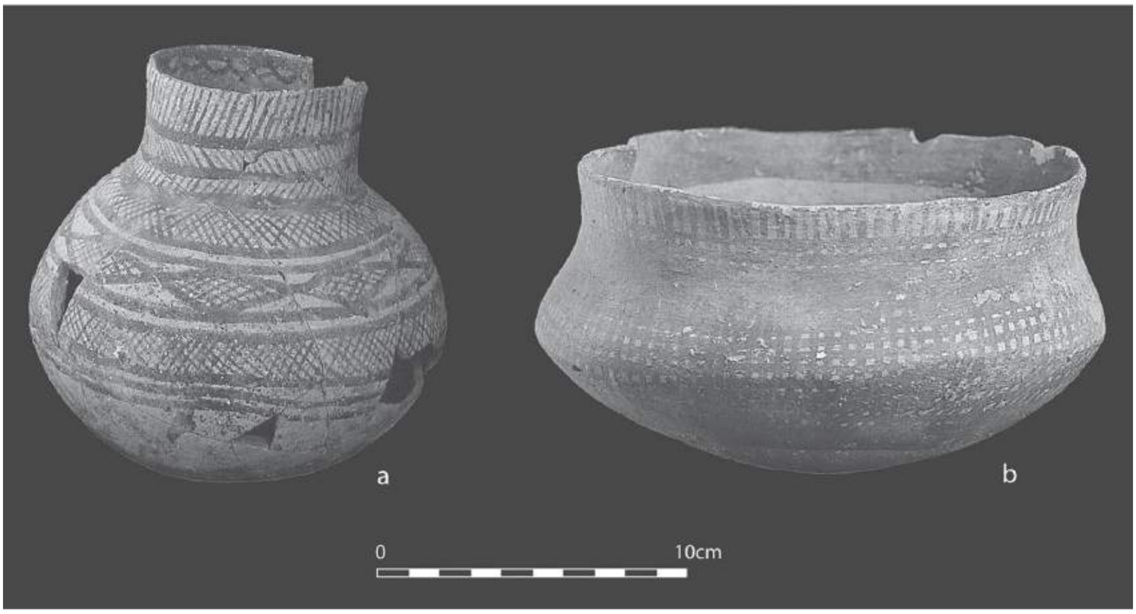

Fig. I.8 Tell Sabi Abyad: a: Standard Fine Ware; b: Halaf Fine Ware (NIEUWENHUYSE 2017, fig. 10.4).

The very refined Halaf painted pottery, given its high quality, was produced by specialists that could possibly identified in the women.

This hypothesis, combined with the evidence of the very strong homogeneity that characterizes the ceramics of the entire Halaf area has led to think to exogamous practices

[64] LE MIERE – NIEUWENHUYSE 1996; CRUELLS - NIEUWENHUYSE 2004; NIEUWENHUYSE 2008; AKKKERMANS et al. 2014.

[65] FAURA 2013; CRUELLS 2013; GÓMEZ-BACH 2011; 2013.

[66] CRUELLS 2006; GÓMEZ-BACH – CRUELLS 2018;

[67]CRUELLS - NIEUWENHUYSE 2004: 57.

[68] OATES 2013.

[69] CRUELLS et al. 2017.

that would generate a continuous circulation of specialists from village to village;[70] it could have generated a consequent mixing of the pottery production techniques and decoration patterns.

Given the enormous amount of work used for the pottery production, it had to play a very significant role among these communities. It was maybe related to cultural identity.

[70] BRENIQUET 1987; FOREST 1996.

Chapter II

THE ARCHAEOLOGICAL DATA

II.1 THE STATE OF ART

Since Northern Mesopotamia was first investigated archaeologically as regards its Neolithic phases, basins with strangely scored internal surfaces have been found. In fact, as early as the 1930s and 1940s, shards of these vessels were discovered during the archaeological excavations at Nineveh[1], Tell Halaf[2] (Fig. II.1) and Tell Hassuna[3].

Fig. II.1 Selected pottery from Tell Hassuna (Lloyd – Safar with Braidwood 1945 Pl. XII.1)

Indeed, the excavation directors of Tell Hassuna, Lloyd, Safar & Braidwood, found a wide variety of these vessels. Attempting to attribute a possible function to these curious

[1] In 1931 HT fragments were found at Nineveh by R. Campbell Thompson and M.E.L. Mallowan but remained unpublished: https://www.britishmuseum.org/collection/object/W_1932-1212-423-l

[2] OPPENHEIM-SCHMIDT , 1943:25-31,Textabb. 3.

[3] LLOYD - SAFAR with BRAIDWOOD 1945: 262, 277-278.

trays, they suggested that they could have been used to separate cereal grains from their husks ('husking'). [4] They likely hypothesized that this activity was carried out by rubbing the ears of the cereal plants against the scored surface of these vessels. This hypothesis remained alone and unchanged for quite some time, and so the name *husking tray* (hereafter HT) became commonly used to refer to this particular pottery form. While some archaeologists accepted this proposition as regards its function[5], others, though unpersuaded by the theory, nevertheless adopted the term as a 'handle' to facilitate scientific communication over and beyond the actual function of this type of vessel.[6]

In the following decades, as archaeological research continued, more and more pottery shards, morphologically similar to the HTs, were found. In Northern Mesopotamia, several archaeological campaigns brought to light some Late Neolithic sites; the culture-historical approach employed led to the configuration of what was labelled the *Hassuna Culture*, including the sites of Tell Hassuna[7], Diyan[8], Matarrah[9], Gird Ali Agha, Tell al-Khan[10], Tell Shimshara[11] and Yarim Tepe I[12]. Remains of so many HTs were uncovered at these sites that they were defined as one of the essential components of the ceramic assemblages of these communities.

Subsequently, thanks to progress in archaeological research, what could be defined as the antecedents of these communities, which arose during the so-called *Proto-Hassuna* period, came to light in different sites, that is, Umm Dabaghiyah[13], Tell Sotto[14], Telul eth-Thalathat[15] and Kul Tepe[16] . HTs were also found at these earlier sites. Further, rare fragments of *husking tray*-like pottery forms have been found outside the 'proper' Hassuna area[17] at sites such as Tell es-Sawwan[18] and Tell al-Mubaddad[19] in the Hamrin;

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[4] Ibid.
[5] MERPERT et al. 1976: 35.
[6] BRAIDWOOD 1952: 11; MELLAART 1975: 148.
[7] LLOYD - SAFAR with BRAIDWOOD 1945
[8] FIELD 1951.
[9] BRAIDWOOD et al. 1952;
[10] BRAIDWOOD et al. 1960;
[11] MORTENSEN 1962, 1970;
[12] MERPERT - MUNCHAJEV 1971; 1973a;1973b;
[13] KIRKBRIDE 1972,1973, 1975;
[14] MERPERT et al 1976, 1978;
[15] FUKAI - MATSUTANI 1977, 1981;
[16] AA.VV. 1977, MERPERT et al 1981.
[17] OATES 1973:163.
[18] ABU AL-SOOF 1968; IPPOLITONI 1971;
[19] AA.VV. 1972; YASIN 1968;

some have even been found in more faraway places such as Eridu[20] in Southern Mesopotamia, and Ras Shamra[21] and Tell Kurdu[22] on the Levantine coast. These discoveries both astonished and perplexed scholars. The general understanding of that period, based on the evidence available, suggests that ‘considerable ethnic movement took place’.[23] Thus, the HT fragments automatically indicate presence, or at least some kind of relationship with the *Hassuna Culture*.[24]

In 1983, HTs were found in Hajji Firuz Tepe near Lake Urmia. Mary Voigt, who led the archaeological expedition, when speaking about them for the first time, questioned Lloyd and Safar's earlier interpretation of the function of them. She noticed that this pottery form did not seem to be suitable for carrying out an activity such as husking, as they were too heavy and cumbersome.[25] Instead, Voigt proposed that such pots could have been used as portable ovens for baking bread. Their corrugated bottoms would in fact have facilitated the detachment of the bread loaf, as is the case in the Middle East today with the sang-ak oven.

Since then, many archaeologists have found Voigt's hypothesis to be convincing and they have begun to support this hypothesis pointing out other pieces of evidence (see Chapter IV).[26]

Over time, the focus of archaeological investigations in the Near East has shifted to other areas, such as South-Eastern Anatolia (Çayonü[27], Çavi Taralası[28] & Kurban Höyük[29]), the Rouj Valley[30], the Middle Euphrates (Dja’de el-Mughara[31] & Tell Turlu[32]), Balikh (Tell Sabi Abyad[33]), the Khabur Basin (Tell Kashkashok II[34]), and again from more sites

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[20] LLOYD - SAFAR 1948: 125; SAFAR et al 1981;
[21] SCHAEFFER ET AL. 1961; CONTENSON 1963, 1977, 1992;
[22] BRAIDWOOD – BRAIDWOOD 1960: 142-143.
[23] KIRBRIDE 1971: 15.
[24] Eg. CONTENSON 1963: 36; 1966;OATES 1960: 43; WATSON 1965; BRAIDWOOD - BRAIDWOOD 1960: 506; THOMPSON 1969;
[25] VOIGT 1983: 159
[26] CONTENSON 1992: 155; CHAZAN - LEHNER 1990: 27;
[27] ÇAMBEL - BRAIDWOOD 1980; ÖZDOGAN - ÖZDOGAN 1993;
[28] VON WICKEDE 1984;
[29] ALGAZE 1990;
[30] NISHINO ET AL. 1991; IWASAKI - NISHINO - TSUNEKI 1995.
[31] COQUEUGNIOT 1999;
[32] BRENIQUET 1991
[33] AKKERMANS 1989;
[34] MATSUTANI 1989, 1991; MERPERT - MUNCHAJEV 1994; NISHIAKI - LE MIERE 2005;

located in the Tigris Valley (Khirbet Garsour[35], Kharabeh Shattani[36], Tell Jigan[37], and so on), and Southern Mesopotamia (Oueili[38]). It is surprising to note that HTs were detected in large quantities at some of these sites.

Thus, finds, that in the previous phase appeared enigmatic, being isolated and distant from the core zone (traditionally associate with Hassuna), began to appear more understandable. It started to become clear that the previous interpretation of the HTs was too limited given that they were to found over a wider geographical area and temporal span than previously supposed. Therefore, they were deemed less significant as chronological and cultural markers[39]

Beginning in the early years of the new millennium, subsequent excavations have consolidated and further expanded this picture.[40] Thus, HTs were found in Southern Cappadocia (Tepeck Çiftilik[41]), South-Eastern Anatolia (Hakemi Use[42], Akarçay[43], Mezraa Teleilat[44], Salat Cami Yani[45]), the Northern Levant (Tell 'ain el-Kerkh[46], Shir[47]), the Southern Levant (Qarassa[48]), the Euphrates Valley (Tell Halula[49]), Khabur (Seker al-Aheimar[50], Tell Arbid Abyad[51], Umm Qseir[52], Chagar Bazar[53]), the Tigris Area (Tell Nader[54]), Lake Urmia (Tappeh Joblar[55], and so on), the Ranya and Sharizor Plains (Qalat

[35] CAMPBELL 1992;
[36] MCADAM 1995; BAIRD - CAMPBELL - WATKINS 1995;
[37] MCADAM 1995; II - KAWAMATA 1985;
[38] BRENIQUET 1996: 165;
[39] LE MIERE – NIEUWENHUYSE 1996; HOURS et al. 1994;
[40] ARIMURA et al. 2000: 239; CRUELLS - NIEUWENHUYSE 2004: 59; TEKIN 2005: 190; KILIÇBEYLI 2005; MIYAKE 2010: 420-421.
[41] GODON 2011; BIÇAKÇI - GODON - ÇAKAN 2012;
[42] TEKIN 2002; 2005; 2008a; 2008b; 2008c; 2011; 2013; 2015;
[43] ARIMURA ET AL. 2000;
[44] KILIÇBEYLI 2005;
[45] YILDIRIM - GATES 2007; MIYAKE 2010; 2005;
[46] ODAKA 2000, 2013; TSUNEKI 2012; MAEDA et al. 1999; MIYAKE 1999;
[47] BARTL et al. 2010; NIEUWENHUYSE 2009; NIEUWENHUYSE - DASKIEWICZ - SCHNEIDER 2018;
[48] BRAEMER - IBANEZ - SHAARANI 2011;
[49] FAURA - LE MIERE 1999; CRUELLS 2013; FAURA 2013; FAURA et al. 2013;
[50] NISHIAKI - LE MIERE 2008;
[51] MATEICIUCOVA 2010; MATEICIUCOVA ET AL. 2010; GREGEROVA - MATEICIUCOVA - VSIANSKÝ 2013;
[52] MIYAKE 1998;
[53] CRUELLS 2006a;
[54] KOPANIAS et al. 2013; BEUGER - KOPANIAS 2018;
[55] AZARNOUSH - HELWING 2005; RAZZAGHI - FAHIMI 2004;

Said Ahmadan[56], Tepe Marani[57], Shaikh Marif I-II[58], and so on), and in Western and Central-Eastern Iran (Remremeh[59], Tappe Sang-e Chakhmaq[60]).

Thanks to progress in archaeological research, the ability to identify the extent of the area affected by the presence of HTs has improved enormously. It has reached a previously unimaginable spatial area, that is, from Southern Cappadocia to Central-Eastern Iran, and at least from the area of Lake Urmia as far as Southern Mesopotamia. An extension in space that exceeds 1500 km.

In addition, HT shards have been found in strata dating to both before and after the period of the so-called *Hassuna Culture*, the period in which the HTs were originally thought to have developed. On the basis of its material culture, by the time the *Hassuna Culture* is recognisable, the HTs seem to have already been widespread.[61] In fact, several artefacts from different areas of the Near East appear to be chronologically comparable or slightly later than those found in the Khabur / Tigris Valley area (see Section II.2.2.2).

Faced with the crumbling of the spatial and chronological limits that previously defined the concept HT, today many scholars view them more as a cross-cultural artefact belonging to the heritage of the Late Neolithic Period in the Near East.[62] In addition, with regard to the function of HTs, important steps forward were made after the 1980s. Scholars have made suggestions aimed at corroborating or rejecting the existing two hypotheses. On the one hand, many scholars have suggested, mainly by way of experimental activity, that these vessels could hardly have been used for the cereal husking activity[63], but rather were used for the processing of softer foodstuffs such as meat or yogurt[64], as suggested by some ethnographic comparisons[65]. On the other hand,

[56] TSUNEKI et al. 2015;
[57] At Tepe Marani two pottery sherds could be interpreted as HTs on the base of the drawing (WENGROW et al. 2016: 273 fig. 19.6 and 19.10);
[58] ODAKA - NIUWENHUYSE - MÜHL 2019;
[59] DARABI et al. 2020;
[60] NAKAMURA 2014; TSUNEKI 2014;
[61] BALOSSI 2021: 36.
[62] LE MIERE – NIEUWENHUYSE 1996; ARIMURA 2000: 347; CRUELLS – NIEUWENHUYSE 2004: 59; NIEUWENHUYSE 2007: 116, 2009: 325; FRANGIPANE 2020: 17-18; MOTTRAM 2013: 432; MIYAKE 2013: 182-183; ODAKA et al. 2019: 77-78.
[63] KILIÇBEYLI 2005; TARANTO 2018, 2020ª, 2021.
[64] KILIÇBEYLI 2005; NIEUWENHUYSE 2018.
[65] GÜNER 1988; KOŞAY 1957: 19.

many scholars have supported the hypothesis that HTs could have been used for baking bread, that is, on the basis of the archaeological data[66], ethnographic comparisons[67] and / or experimental analysis[68].

To date, while attempting to understand the function of HTs, only a few lipid analyses have been performed on archaeological shards[69]. The results obtained using this methodology have not provided significant data. Indeed, lipid analysis is still under development to detect the presence of cereals[70].
In order to better understand the function of the HTs, in this work its finding context data from archaeological literature are collected (see below) and ethnographic analogies further investigated (Chapter IV); moreover a sample of 58 HT fragment is analysed by way of an integration of use-alteration, phytoliths and residues analyses (Chapter VII and Appendix).

II.2 Space-time co-ordinates

As already noted, HTs have been studied from their first identification and definition to date, a period spanning approximately ninety years. In this period of time, the progress of archaeological research has made it possible to develop an in-depth knowledge of this pottery form; in particular, the presence of HTs, both geographically and chronologically, has proved to be much wider than originally thought. Evidently, archaeologists have recognised certain morphological features common to the pottery finds that have led to their definition as HTs.

Consequently, over time , the term HT has been used to refer to artefacts that share some similar characteristics to the previously discovered well-defined pottery form; in all these cases, the recognised features are the impressions/incisions on the internal surface of the shards. Thus, a rather wide range of ceramic forms with impressions/ incisions on their inner surfaces have been included in the HT pottery group.

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[66] Chazan - Lehner 1990; Tekin 2005: 190; Nieuwenhuyse 2008: 117.
[67] Contenson et al. 1992; Tekin 2015: 25; Balossi - Mori 2014: 53; M. Özdoĝan pers. comm.
[68] Kiliçbeyli 2005, Taranto 2018; 2020a; 2020b ; Taranto et al. 2021.
[69] Gregg 2010; Nieuwenhuyse et al. 2015; Roffet-Salque et al. 2018.
[70] Colonese et al. 2017.

The aim of this research project is to understand the role of HTs that were widespread during the Late Neolithic Period in Near Eastern communities. To achieve this goal, the dynamics of the general aspects of origin and development of this pottery form, together with its disappearance, have been investigated. Thus, 74 sites have been identified, that is, pottery remains attributable to the HT groups have been uncovered (see Map 2). The sites were distributed over a wide geographical area, which has been organised into 15 regions in this work: Southern Cappadocia; the Taurus Foothills; the Northern Levant; the Southern Levant; the Euphrates Valley; the Balikh, Khabur and Tigris Valley areas; the Inter-mountainous Valleys of the North-West Zagros zone (IVZ); the Plains of Ranya, Sharizor and Matarrah; Hamrin, the Mehran Plain, the Alluvial Plain, the Lake Urmia area, the Lesser Caucasus, and the Elburz Mountain Foothills (hereafter EMF).

The sites are indicated in Table II.1, as follows:

Site	Area	Source
Qarassa (north)	Southern Levant	Braemer - Ibanez - Shaarani 2011;
Shir	Northern Levant	Bartl et al. 2010; Niuwenhuyse 2009;[71]
Tell 'Ain el-Kherkh	Northern Levant	Odaka 2000, 2013; Tsuneki 2012; Maeda 1999; Miyake 1999; Odaka pers. comm.;
Tell Array 2	Northern Levant	Nishino et al. 1991; Iwasaki - Nishino - Tsuneki 1995;
Tell Array I	Northern Levant	Nishino et al. 1991; Iwasaki - Nishino - Tsuneki 1995;
Ras Shamra	Northern Levant	Schaeffer et al. 1962; Contenson 1963, 1977, 1992;
Tell Kurdu	Northern Levant	Braidwood – Braidwood 1960; Özbal 2006; R. Özbal pers. comm.;
Tepecik-Çiftlik	Southern Cappadocia	Godon 2011; Biçakçi - Godon - Çakan 2012;
Çavi Taralası	Taurus Foothills	Becker – Wickede 2018; von Wickede 1984;
Çayönü	Taurus Foothills	Çambel - Braidwood 1980; Özdoğan - Özdoğan 1993; Özdoğan 2012; M. Özdoğan pers. comm.;
Domuztepe	Taurus Foothills	Tekin 2019; Irving 2001; H. Tekin pers comm.;
Gre Fılla	Taurus Foothills	Ökse - Konak - Yurt 2019; Ökse 2020;
Hakemi Use	Taurus Foothills	Tekin 2002; 2005; 2008a; 2008b; 2008c; 2011; 2013; 2015; H. Tekin pers. Comm.
Karavelyan	Taurus Foothills	Tekin 2019; H. Tekin pers comm.
Küçük Kozluca	Taurus Foothills	Kozbe 2013;
Kurban Höyük	Taurus Foothills	Mottram 2013; Algaze 1990;

[71] Further information that will be published in an upcoming monographic volume on Shir was kindly provided to me by O. Nieuwenhuyse. The data was taken into account only in the general discussion and in the databases.

Site	Area	Source
Salat Cami Yani	Taurus Foothills	Yildirim - Gates 2007; Miyake 2010; Miyake 2007; Miyake 2005; Miyake 2013; http://rcwasia.hass.tsukuba.ac.jp/scy/research/research.html
Sumaki Höyük	Taurus Foothills	Rosenberg - Erim-Özdoğan 2011; S. Gündüzalp pers com.
Akarçay	Euphrates Valley Area	Arimura et al. 2001; Arimura et al. 2000; https://grupsderecerca.uab.cat/sappo/es/content/akar%C3%A7ay-tepe; M. Özbaşaran pers. comm.; W. Cruells pers. comm.;
Dja'de el-Mughara	Euphrates Valley Area	Faura 1996; Faura - Le Mière 1999; Coqueugniot 1992, 1999;
Kosak Shamali	Euphrates Valley Area	Le Miere 2001; Faura - Le Mière 1999; Le Miere pers communic.
Mezraa Teleilat	Euphrates Valley Area	M. Özdoğan and E. Özdoğan pers comm. Kilicbeyli 2005; M. Godon pers. Comm.;
Tell Halula	Euphrates Valley Area	Cruells 2013; Faura 2013; Faura et al. 2013; Faura - Le Mière 1999; M. Molist pers comm.;
Tell Turlu	Euphrates Valley Area	Breniquet 1991; Irving 2001;
Tell Assouad	Balikh	Hours 1994;
Tell Sabi Abyad I	Balikh	Akkermans 1989, 1993, 1996; Akkermans et al. 2006, 2014; Le Mière - Nieuwenhuyse 1996; 2018; Nieuwenhuyse et al. 2010; van As - Jacobs 1989; van As - Jacobs - Nieuwenhuyse 2004; Nieuwenhuyse 2007; 2014; 2018; O. Nieuwenhuyse pers. Comm.
Chagar Bazar	Khabur	Cruells 2006a; Cruells 2006b; Cruells 2006c; Cruells - Nieuwenhuyse 2004; W. Cruells and A. Gomez pers. comm.
Cheikne 2	Khabur	Le Mière 2000; M. Le Mière pers. comm.;
Khanekè	Khabur	Le Mière 2000; M. Le Mière pers. comm.;
Khazna II	Khabur	Merpert - Munchaev 1994;Le Mière - Merle-Thirion 2019; M. Le Miere pers. comm.;
Raheke 2	Khabur	Le Mière 2000;
Seker al-Aheimar	Khabur	Nishiaki - Le Mière 2008;
Tell Arbid Abyad	Khabur	Mateiciucová 2010; Mateiciucová et al. 2010; Gregerová - Mateiciucová - Všianský 2013;
Tell Halaf	Khabur	Oppenheim et al. 1943;
Tell Kashashok II	Khabur	Matsutani 1989, 1991;Nishiaki -Le Miere 2005; Munchaev - Merpert 1994; Gregg 2010; Nishiaki - Le Mière 2008;
Umm Qseir	Khabur	Miyake 1998; Hole 2001;
Arpachiyah	Tigris Valley Area	Hijjara 1997;
Diyan	Tigris Valley Area	Field 1951; Bernbeck 1994; Safar 1950;
Kharabeh Shattani	Tigris Valley Area	Baird - Campbell - Watkins 1995; McAdam 1995;
Khirbet Garsour	Tigris Valley Area	Campbell 1992;
Kul Tepe	Tigris Valley Area	AA.VV. 1977; Merpert - Munchaev - Bader 1981;

Site	Area	Source
Nineveh	Tigris Valley Area	Thompson - Campbell - Mallowan 1933; Gut 1995; https://www.britishmuseum.org/collection/object/W_1932-1212-423-k
NJP 72	Tigris Valley Area	Campbell 1992;
Tell al-Khan	Tigris Valley Area	Caldwell 1983; Braidwood et al. 1960;
Tell Hassuna	Tigris Valley Area	Lloyd - Safar with Braidwood 1945;
Tell Helawa area	Tigris Valley Area	Ball - Tucker - Wilkinson 1989
Tell Jigan	Tigris Valley Area	McAdam 1995; Ii - Kawamata 1985;
Tell Nader	Tigris Valley Area	Kopanias et al. 2013; Beuger - Kopanias 2018;
Tell Sotto	Tigris Valley Area	Merpert - Munchajev - Bader 1976, 1978;
Tell Uwaynat 15	Tigris Valley Area	Altaweel 2007;
Telul eth-Thalathat II	Tigris Valley Area	Fukai et al. 1970; Fukai - Matsutani 1981; McAdams 1995;Nishiaki - Le Mière 2008;
Umm Dabaghiyah	Tigris Valley Area	Kirkbride 1972, 1973, 1975;
Yarim Tepe I	Tigris Valley Area	Merpert - Munchaev 1971; 1973a;1973b; 1987;1993; Merpert - Munchaev - Bader 1976, 1978; Bashilov et al 1980;
Hajji Firuz Tepe	Lake Urmia	Voigt 1983; M. Voigt pers. comm.
Tappe Joblar	Lake Urmia	Azarnoush - Helwing 2005; Razzaghi - Fahimi 2004;
Tepe Gerd-i-Khalika	Lake Urmia	Ajorloo 2008;
Tepe Qalât-i-Jaldiân	Lake Urmia	Ajorloo 2008;
Shorsu	Lesser Caucasus	Bakhshaliyev 2014; Bakhshaliyev et al. 2017;
Boskin	IVZ	Giraud et al. 2019;
Qalat Said Ahmadan	IVZ	Tsuneki et al. 2015;
Tell Shimshara	IVZ	Mortensen 1970; Mortensen 1962; Matthews et al. 2016; Eidem 2020; Nieuwenhuyse – Robert 2020;
Qalbaza	IVZ	Altaweel et al. 2012;
Matarrah	IVZ	Odaka 2019; Braidwood et al. 1952; Caldwell 1983;
Shaikh Marif I	IVZ	Odaka - Niuwenhuyse - Müh 2019;
Shaikh Marif II	IVZ	Odaka - Niuwenhuyse - Müh 2019;
Shakar Tepe	IVZ	Odaka et al. 2019;
Tepe Marani	IVZ	Wengrow et al. 2016;
Tepe Sirwan, Fallah	IVZ	Casana - Glatz 2017;
Tell al-Mubaddad	Hamrin	AAVV 1972; Yasin 1968;
Tell es-Sawwan	Hamrin	Abu al-Soof 1968; Yassin 1970; Wahida 1967; Ippolitoni 1970-1971; https://www.treccani.it/enciclopedia/tell-es-sawwan_%28Enciclopedia-dell%27-Arte-Antica%29/

Site	Area	Source
Eridu	Alluvial Plain	Lloyd - Safar 1948; Safar - Mustafa - Lloyd 1981;
Tell Oueili	Alluvial Plain	Breniquet 1996;
Remremeh	Mehran Plain	Darabi et al. 2020;
Tappe Sang-e Chakhmaq (east)	EMF	Nakamura 2014; Tsuneki 2014; https://iranicaonline.org/articles/sang-chakhmaq

Tab. II.1 Archaeological Sites in which HT remains have been found, together with related geographical areas and bibliographical references considered in this research project.

In addition to the sites indicated in Table II.1, there are other sites in which pottery forms defined as being possible HT have been found, but due to a lack of information or characteristics, they have not been considered as such in this work. However, it is useful to point them out, that is, Ganj Dareh[72] Til Huzur - Yayvantepe[73]; Geoy Tepe[74]; Tepe Matrook Tepe I-II; Cholanghi Tepe; Sari Tape; Taze Kand[75]; and Tepe Gheshlagh[76] (see Map 1).

In addition to the works related to specific sites quoted in Table II.1, other publications in which the subject of HTs is widely discussed have been taken into consideration, such as Mellaart 1975; Bernbeck 1994; Perkins 1949; Thompson 1969; Hours et al. 1994; and Nieuwenhuyse et al. 2013, etc. Other HT shards have been found during surveys carried out in the Northern Levant, Balikh[77], Khabur[78], the Sharizor Plain and Northern Jezirah.[79]

Finally, as regards the recognition of pottery fragments as HTs, it should be noted that they are over-represented. In fact, these fragments are easily recognisable by the presence of scores on their internal surfaces. Therefore, even non-diagnostic shards can easily be included in the HT category. Further, they are remarkably thick-walled, often exceeding

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[72] LE MIÈRE - PICON 1998;
[73] CANEVA 2011;
[74] BURTON-BROWN 1951; https://www.britishmuseum.org/collection/object/W_1959-1010-32 23/06/20021
[75] The fragments presented in BALMAKI 2019 form the sites of the Hamadan Area maybe could be better interpretable as Dalma Surface Manipulated Ceramics.
[76] SHARIFI - MOTARJEM 2018; MOTARJEM - SHARIFI 2015; 2019;
[77] O. NIEUWENHUYSE pers. comm.
[78] LYONNET 2000.
[79] GAVAGNIN et al. 2016: 122; CASANA 2017: 54; GIRAUD et al. 2019: 103; ALTAWEEL 2007 ;ALTAWEEL et al. 2009: 21-22; 2012 : 21-22 ; NIEUWENHUYSE - WILKINSON 2007: 276; WILKINSON – TUCKER 1995: 90.

three centimetres in thickness. This feature makes them relatively strong; for example, in Tell Sabi Abyad, they dominate the collection of intact profiles found[80].

II.2.1 Spatial Distribution

As can be seen in Map 2, fragments of HTs have been found within an extremely extensive geographical area ranging from the coast of the Mediterranean in the west, up to the Steppes of Central-Eastern Iran, from the mountainous area of the Lesser Caucasus to the alluvial plain of Lower Mesopotamia. In order to make the data comprehensible, each site has been associated with a regional area of reference that is able in some way to reflect environmental and cultural groups (Table II.2).

The geographical areas are: Southern Cappadocia, the Southern Levant , the Northern Levant, the Taurus Foothills, the Euphrates Valley Area, Balikh, Khabur, the Tigris Valley Area, the Inter-mountainous Valleys of the North-West Zagros zone (IVZ), Hamrin, the Mehran Plain, the Alluvial Plain, the Lake Urmia Area, the Lesser Caucasus and the Elburz Mountain Foothills (EMF) (Table II.1).

Area	Widely spread	Many	Several	Few	Occur	Other	Total
Southern Cappadocia				1			1
Southern Levant				1			1
Northern Levant	1		1	1	3		6
Taurus Foothills	1		1	5	2	1	10
Euphrates Valley Area	2		1	3			6
Balikh	1			1			2
Khabur		2	2	5	1		10
Tigris Valley Area	4	2	2	6	3	1	17
Lake Urmia					2	2	4
IVZ	1	1	2	4	2		10
Hamrin			1		1		2
Alluvial Plain				2			2
Mehran Plain					1		1
EMF					1		1
Lesser Caucasus				1			1

Table II.2 – Quantities of HTs found per Geographical Area. When the quantity of fragments in the site is not specified or the number of HTs is unclear, the term 'Occur' is used. The term 'Other' indicates that the number is unknown.

[80] NIEUWENHUYSE 2018: 82.

Taking into account that different levels of information were acquired from the areas investigated, with the type of archaeological investigation and the size of the excavated area varying the HTs results are as follows (Table II.2),:

- A very concentrated presence in the Tigris (17) and Khabur Valley areas (10), but also rather widespread in the Balikh-Middle Euphrates (8), in the Taurus (11), and in the IVZ(10);
- Less present in the Northern Levant (6) and in the Lake Urmia area (4); and
- Rare in the Southern Levant (1), Southern Cappadocia (1), the Lesser Caucasus (1), Hamrin (2) and Southern Mesopotamia (2).

Due to the limited area excavated in Southern Syria and Iran, the Upper Neolithic periods are still not well known. Therefore, the cases of Tappeh Sang e-Chakmaq and Remremeh on the one hand and Qarassa on the other could possibly provide new scenarios in the future. *HTs* could be a rather widespread vascular form, but it is not easy to quantify the exact amount of fragments that have been unearthed in archaeological sites as this phenomenon, especially as regards the earliest archaeological excavations, is not clearly expressed with other variables such as the type of archaeological investigation, size of the excavated area, the typology of investigated area and excavation methods employed directly influencing outcomes. Nevertheless, an attempt has been made on the base of published data (Table II.3).

No. of Fragments	Total per Site
Widely Spread	10
Many	5
Several	11
Few	30
Occur	15
Other	3

Table II.3 - Quantity of HT fragments (<5 Few, 6> 25 Several, 25> 60 Many, 60> Widely Spread). When the quantity of fragments in the site is not specified, or the number of HTs is unclear, the term ‘Occur’ is used. The term ‘Other’ indicates that the number is unknown.

HTs appear to have been widely used in ten sites, that is, Hakemi Use, Mezraa Teleilat, Akarçay, Tell Sabi Abyad I, Tell el-Kherkh, Tell al-Khan, Tell Hassuna, Tell Sotto, Yarim Tepe I, and Matarrah.[81] Many HT shards were found in five sites, that is, Seker al-Aheimar, Kharabeh Shattani, Tell Shimshara, Tell Arbid Abyad, and Umm Dabaghiyah. HTs are infrequent in 10 sites and their presence is scant in 30 sites. In practice, less than 5 fragments were found in most sites. Therefore, these data, while indicative only, clearly illustrate an uneven distribution. In fact, observing the sites where a large number of HT shards were found, these are not concentrated in one area only (with the exception of the Khabur / Tigris regions), but rather are scattered throughout the Near East.

In this regard, it is interesting to compare the distribution of HTs in two large sites that are comparable in many respects, that is, Tell Sabi Abyad located in the Balikh Valley and Tell Halula, located in the Middle Euphrates Valley. In the first-mentioned site, more than 350 fragments were found throughout the entire chronological sequence, while, in the second site, only 11 fragments were found despite their geographical proximity. These two sites, for a long time contemporaneous, have been subjected to excavation over large areas; this has allowed scholars to surmise that this diversity is due exclusively to differences in tradition in the use of this particular artefact.

In the sites where HTs fragments were widespread, they were probably in daily use.[82]

II.2.2 Diachronic Trends

Similar to Dark-faced Burnished Ware (DFBW) and Gray Black Ware, HTs developed over a very wide chronological range. They were produced and used roughly from the middle of the 7th to the first quarter of the 6th millennium B.C. It is not currently possible to provide a synchronized periodisation between the different areas of the Near East and therefore to define in detail the development of the HTs in chronological order.

The main problem is the lack of a unique chronological framework with respect to the different areas of the Near East as regards the Late Neolithic Period. In fact, radiocarbon analyses are very limited.[83] Furthermore, a chronology based exclusively on comparisons between the artefacts could lead to distortions and a ‘flattening’ of chronological

[81] Most likely, other sites would have been included in this group. However, in particular for less recently published sites, it is not always clearly stated the amount of HT fragments found.
[82] NIEUWENHUYSE 2008: 117.
[83] HOLE 2001; BERNBECK -NIEUWENHUYSE 2013.

differences. For this reason, scholars have provided various effective interpretations on this subject.

In recent years, it has been noted that HTs appear at close intervals in several areas in the Near East. [84] Although it is not possible to define with certainty the area where HTs were first used, in light of current data, the region in which HTs may have spread for the first time would appear to be that of the Khabur/Tigris area. These vessels, in fact, were widely used in all the settlements of that region immediately after their earliest appearance. It could be assumed that the first known fragments of HTs came from the site of Tell Seker al-Ahimar. These fragments are attributable to the early Proto-Hassuna period (Layers VII/VI).[85] Practically, open forms of pottery using vegetable inclusions began to be produced on a regular basis. In addition, on the basis of the material found there, the site of Telul eth-Thalathat (XV-XVI) could be dated to between the Early and Late Proto-Hassuna phase (Level XVa).[86] These data fit well with this interpretation as only one HT fragment has been found at the site.

The HTs became an intrinsic part of the Proto-Hassuna assemblage in later sites, such as Tell Sotto (lower layer)[87], the second part of Umm Dabaghiyah (possibly since Level 4)[88] and in Tell Kashkashok (Layer 3)[89], Yarim Tepe I (Level 12, the earliest level)[90], and so on. It is worth pointing out that in sites such as in Gird Ali-Agha and Jarmo,[91] dated to an earlier phase, trays very similar to the HTs were found, though the interior surfaces were not scored.[92]

Interestingly, the earlier developments of the HTs coincides with a period of greater investment in ceramic productions with an increase in diversity of forms and, probably, uses.

Beyond this area, HTs shards have been found throughout the entire Near East in rather

[84] LE MIERE – NIEUWENHUYSE 1996; ARIMURA 2000: 347; CRUELLS – NIEUWENHUYSE 2004: 59; MIYAKE 2013: 182-183; NIEUWENHUYSE 2007: 116; ODAKA et al. 2019; BALOSSI 2021: 36.
[85] Marie Le Miere helped very much to define the first appearing of the HTs in the Sinjar/Khabur area.
[86] FUKAI – MATSUTANI 1977: 51; BADER – LE MIERE 2013.
[87] MERPERT et al. 1978:48
[88] KIRKBRIDE 1972: 14; 1973a: 5
[89] MATSUTANI 1991: 23.
[90] MERPERT et al. 1976: 35.
[91] CALDWELL 1983.
[92] McC. ADAMS 1983: 220.

comparable periods, that is, at Salat Cami Yani (Phase 3)[93], Çayönü (Horizon II)[94], Sabi Abyad I (Operation III A3 and A2 ca. 6335-6225 cal BC)[95], Tell Halula (Phase II, Middle Pre-Halaf, Level S1e-III[96]), Akarçay (Phase I)[97], and Mezraa Teleilat (IIC).[98] In the Rouj Valley, HTs first appear during Period 2c[99], in Ras Shamra VAII,[100] in Shir (VI, ca. 6300-6100 cal. BCE)[101], Tell Shimshara (from Layer 13)[102], and Tappeh Sang-e Chakhmaq (Layer 3)[103].

After their initial spread, HTs became an item of daily life in several communities, particularly in the Tigris area, for about five or six centuries. Then, in the first centuries of the 6th millennium B.C., with the advent of the Early Halaf Period, they disappeared quite quickly. [104] The last known examples of HTs belong to the Middle / Late Halaf Phase. These were found in archaeological sites such as Arpachiyah (Layers 12-11)[105], Umm Qseir[106], Tell Turlu[107], Domuztepe (Late Halaf Layers)[108], Tell Kurdu (Phase C[109] Middle Halaf Strata[110]),Tell es-Sawwan (Levels II-IV - Samarra),[111] Oueili[112] and Eridu (Levels XIX,XVII, and XV[113](Ubaid 1-2).

II.3 THE HUSKING TRAY UNIVERSE

As we have seen, a set of pottery finds, defined by archaeologists as HTs, has been configured in this research project. Evidently, the excavators or *ceramicologists* defined

[93] KIRKBRIDE ; MELLART 1975: 140, 148.
[94] ÖZDOGAN - ÖZDOGAN 1993:100.
[95] NIEUWENHUYSE 2018: 82-83.
[96] FAURA 2013.
[97] ARIMURA et al. 2000: 182-3.
[98] KILIÇBEYLI 2005.
[99] IWASAKI et al. 1995: 174 fig. 12.16–17; TSUNEKI et al. 1998: 16; TSUNEKI et al. 1999: 6 fig. 6, 22; TSUNEKI et al. 2000: 11.
[100] CONTENSON 1963: 36; 1977; 1992: 380.
[101] NIEUWENHUYSE 2009:332. BARTL et al. 2010.
[102] MORTENSEN 1970: 106.
[103] TSUNEKUI 2014: 16.
[104] ODAKA et al. 2019
[105] HIJJARA 1997: 66.
[106] MIYAKE 1998;
[107] BRENIQUET 1991; IRVING 2001;
[108] TEKIN 2019; H. TEKIN pers comm.; IRVING 2001.
[109] BRAIDWOOD – BRAIDWOOD 1960.
[110] ÖZBAL 2006; R. ÖZBAL pers. comm.
[111] IPPOLITONI 1970-01: 113.
[112] BRENIQUET 1996.
[113] LLOYD - SAFAR 1948:PI. III; SAFAR et al.1981.

a fragment as being part of a HT if they believed that its formal characteristics were associable to this pottery group. The characteristic to which they referred was essentially the presence of impressions/incisions on the inner surface of the fragment rather than their general shape; often a shard was referred to as a HT in a broader sense, even though its shape did not match that previously known archaeologically.

Reviewing the material published to date as regards HTs, seven regional sub-groups can be defined (Map 3). However, it must be emphasised that the often fragmentary state of these vessels does not allow scholars to have a clear idea of their shape. Further, the lack of precise data does not allow the boundaries of these groups to be clearly defined. In a separate section, particular forms will be gathered together and viewed – only one example of these forms has been found and it does not correspond to any of the HT versions previously described. Finally, beyond these groups, there are cases in which it is not possible to exactly define the pottery form due to scarce data or the fragmentary nature of the remains. These cases were uncovered in Qarassa, Tell Uwaynat 15 (bowls or tray), Tell Array 1 (probably shallow trays) and Tepe Qalât-i-Jaldiân (classical version).

II.3.1 Versions of Husking Trays

The Classical Version

One version of HT was reported in the scholarly literature as being 'classic'. This was due to the fact that it was the first example found in an archaeological context and became the reference point for all those subsequently found. Moreover, this is, for the most part, the most widespread and the earliest version known thus far. Originally, the term HT was used to indicate large oval basins (up to 40cm wide and 60cm long), which have a wide base compared to their relatively low walls (7 to 12 cm high approx.). These are usually either vertical or slightly everted. The ceramic walls are very thick, while the base can exceed 3cm. These vessels were made using coarse clay tempered with a large amount of plant inclusions.

Looking at the distribution of the HTs (Map 3), it can be seen that the classical version was found almost exclusively in the core area between Euphrates and Tigris Rivers. The other versions are distributed in the areas that surround it. Fragments associable with the classical version were found in: Akarçay, Arpachiyah, Çavi Taralası, Çayönü, Chagar Bazar, Cheikne, Diyan, Dja'de el-Mughara, Gre Fılla, Hajji Firuz Tepe, Hakemi Use, Khaneke, Kharabeh Shattani, Khazna II, Khirbet Garsour, Kosak Shamali, Küçük Kozluca, Kul Tepe, Kurban Höyük, Matarrah, Mezraa Teleilat, Niniveh, NJP 72, Qalat Said Ahmadan, Qalbaza, Raheke 2, Ras Shamra, Remremeh, Salat Cami Yani, Seker al-Aheimar, Shaikh Marif I, Shaikh Marif II, Shakar Tepe, Shir, Tell 'Ain el-Kherkh. Tell al-Khan, Tell al-Mubaddad, Tell Arbid Abyad, Tell Array I-II, Tell Assouad, Tell es-Sawwan, Tell Halaf, Tell Halula, Tell Hassuna, Tell Helawa area, Tell Jigan, Tell Kashkashok II, Tell Nader, Tell Sabi Abyad I, Tell Shimshara, Tell Sotto, Telul eth-Thalathat 2, Tepe Gerd-i-Khalika, Tepe Marani, , Tepecik-Çiftlik, Umm Dabaghiyah, and Yarim Tepe I.

The Levantine Version[114]

In the Northern Levantine, as in the Rouj Valley (Tell 'Ain el-Kherkh, Tell Array 2) and Shir[115], along with the classical HT, there are conspicuously flared plates. Apart from this difference, as well as the fact that they are perhaps a little smaller, they have the same characteristics as the classical HT, that is, ceramic paste, thickness and scoring on the inner surfaces.

The DFunbW–Version[116]

The site of Tell Kurdu is the only one in the 'Amuq where pottery shards attributable to the HT group have been found thus far (partly analysed in this work, see Chapter VII). These were retrieved in the stratigraphical contexts of a rather late phase of the site, that is, Amuq C.[117] Tell Kurdu represent one of the few context well-know for this period in the area. The first fragments identified by Braidwood at this site have been described as belonging to the Dark-faced Unburnished Ware group.[118] This type of pottery ware was made from a fine clay, probably tempered with mineral inclusions. It is not easy to reconstruct the shapes of the vessels beginning with the small fragments found in Tell Kurdu. Further, the external surfaces were very smooth. They differ significantly from

[114] O. Nieuwenhuyse and T. Odaka pers. Comm.; Nieuwenhuyse in publication, Plates : shards 3, 7, 8, 9, 10).
[115] NIEUWENHUYSE 2009.
[116] Plates: shards 14-17.
[117] ÖZBAL 2006.
[118] BRAIDWOOD - BRAIDWOOD 1960: 142-143

the classical HT shape; perhaps they were shaped like bowls. Other HT versions are unknown in the area.

Western Version[119]

In the sites along the Middle Euphrates (as in Mezraa Teleiat[120] and Akarçay) and perhaps also in the Taurus Piedmont zone (perhaps Sumaki Höyük and others)[121], included in the classical HT finds are some items that, although in fragmentary state, seem to be closer in shape to a bowl then to a tray. They seem to be smaller, and their walls are relatively high, concave, and slightly thinner. As well as the classical HT, some shapes were noted in a restricted number of fragments made of coarse clay and tempered with organic inclusions (see Chapter VII).

Eastern Version[122]

In the central Iranian Plateau, numerous artefacts have been found in the shape of small trays, oval in shape with walls of regular thickness, at the site of Tappeh Sang-e Chaqmakh[123]. The internal surface of these trays were regularly and densely impressed. Other HT versions are unknown in the area.

Northern Version[124]

Little data are available as regards the northern zone of Lake Urmia and the Lesser Caucasus. It is possible that during the 6th and 5th millennium B.C. pottery shapes similar to bowls with the interior surface crossed by impressions / incisions were used, as in Tappeh Jolbar[125] and Shorsu.[126] Furthermore, it should be mentioned that in the *Dalma Culture*, the external surface of pottery was decorated with scores in some way similar to those noted on the interior surface of the HTs.

Southern Version[127]

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[119] See KILIÇBEYLI 2005. Plates: shards 44, 88, 86, 51, 53, 76, 78.
[120] KILIÇBEYLI 2005.
[121] http://tayproject.org/TAYages.fm$Retrieve?CagNo=6355&html=ages_detail_t.html&layout=web. Also in Karavelyan and Domuztepe smaller HTs were found but their shape is not known to the author (TEKIN 2019 and pers. comm.).
[122] Plates: shards 258-269.
[123] NAKAMURA 2014; TSUNEKI 2014; HTTPS://IRANICAONLINE.ORG/ARTICLES/SANG-CHAKHMAQ
[124] Plates: shards 214, 207, 208, 210, 211.
[125] RAZZAGHI - FAHIMI 2004.
[126] BAKHSHALIYEV 2014.
[127] See Safar et al. 1981: 174. Plates: sherd 256.

In the lowest levels of Tell 'Oueili[128] and Eridu[129] in Southern Mesopotamia, a few fragments of 'curious, flat-bottomet'[130] clay vessels (large platters?) with very low sides and the interior surfaces crossed by incisions have been found. Other HT versions are unknown in the area.

To summarise, several regional or supra-regional HT versions are identifiable throughout the Near East, that is, vessels very similar in shape to a tray (Classical Version), shallow trays (Levantine Version, Southern Version & Eastern version) and bowls (Northern Version, Western Version & DFunbW Version). Table II.4 clearly shows that the Classic Version of HT is always present and often co-exists in the same area with the other versions. Only in the cases of the Alluvial Plain, the EMF, the Lesser Caucasus and the Eastern Version have specific versions developed in the absence of the classical form.

Area	Total No. per Site	Shallow Trays	Bowls	Particular Shapes	Trays
Southern Cappadocia	1				1
Southern Levant	1				
Northern Levant	6	4	1		5
Taurus Foothills	10		3		7
Euphrates Valley Area	6		2	1	5
Balikh	2				2
Khabur	10				10
Tigris Valley Area	17			1	16
Lake Urmia	4		1		3
IVZ	10		1		9
Hamrin	2				2
Alluvial Plain	2	2			
Mehran Plain	1				1
EMF	1	1			
Lesser Caucasus	1		1		

Table II.4 - Distribution of the Main HT Pottery Form by Region

Trays:

Akarçay, Arpachiyah, Çavi Taralası, Çayönü, Chagar Bazar, Cheikne, Diyan, Dja'de el-Mughara, Gre Fılla, Hajji Firuz Tepe, Hakemi Use, Kharabeh Shattani, Khazna II,

[128] BRENIQUET 1996.
[129] LLOYD - SAFAR 1948; SAFAR et al.1981;
[130] SAFAR et al. 1981: 174.

Khirbet Garsour, Kosak Shamali, Küçük Kozluca, Kul Tepe, Kurban Höyük, Matarrah, Mezraa Teleilat, Niniveh, NJP 72, Qalat Said Ahmadan, Qalbaza, Raheke 2, Ras Shamra, Remremeh, Salat Cami Yani, Seker al-Aheimar, Shaikh Marif I, Shaikh Marif II, Shakar Tepe, Shir, Tappeh Joblar, Tell 'Ain el-Kherkh. Tell al-Khan, Tell al-Mubaddad, Tell Arbid Abyad, Tell Assouad, Tell es-Sawwan, Tell Halaf, Tell Halula, Tell Hassuna, Tell Helawa, Tell Jigan área, Tell Kashashok II, Tell Nader, Tell Sabi Abyad I, Tell Shimshara, Tell Sotto, Telul eth-Thalathat 2, Tepe Marani, Tepecik-Çiftlik, Umm Dabaghiyah, Umm Qseir, Yarim Tepe I, and Khanekè.

Shallow Trays:

Shir, Tell 'Ain el-Kherkh, Tell Array I - II, Eridu, Tell Oueili, and Tappe Sang-e Chakhmaq.

Bowls:

Akarçay Mezraa Teleilat, Sumaki Höyük (maybe), Shorsu, Tappeh Joblar, Boskin, and Tell Kurdu.

II.3.2 Particular Forms

Umm Dabaghiyah

Umm Dabaghiyah is one of the oldest sites where pottery fragments of HTs have been found. Apart from these vessels, particular ceramic forms with incised inner surfaces,

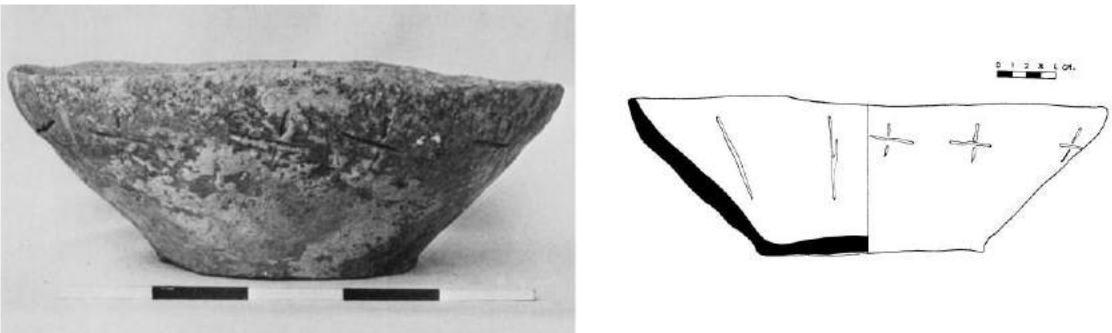

Fig II.2 Bowl from Umm Dabaghiyah with incised interior and exterior surfaces (KIRKBRIDE 1971: Plates XII No. 13 & XIIIa).

that could be related to HTs, belong to the same period (Phase III). In particular, there is a large completely preserved bowl (Fig. II.2).[131] This vascular shape presents vertical parallel incisions on the internal flared walls. Crosses are also scored at a regular distance from each other all around the external surface. This type of decoration is also known to decorate other pottery shapes from the same period at the site.

Another curious item found in Umm Dabaghiyah is a shallow, oval bowl with its interior surface scored with herring-bone incisions (Fig. II.3).[132]

Fig. II.3 Shallow, Oval Dish from Umm Dabagkhiyah (KIRKBRIDE 1972: Pl. Xd)

Kharabeh Shattani

In the Proto-Hassuna strata of a sounding at the site of Kharabeh Shattani, a shallow, sub-triangular scoop (38x26x6) coated with clay was found; its surface was scored in the same way as a HT (CCJ in Fig. II.4).[133] It was collocated to a nearby shallow oval pit, filled with coal (CCI in Fig II.4).

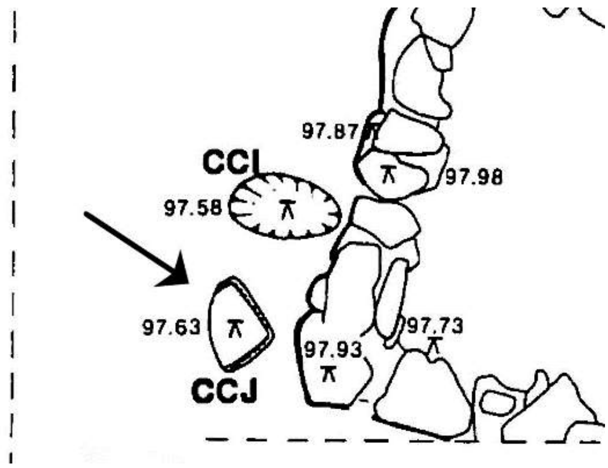

Fig. II.4 Sub-triangular scoop similar to a HT (elaborated from BAIRD 1995: 23, Fig 3.3).

[131] KIRKBRIDE 1971: 8-11.
[132] KIRKBRIDE 1972: 5.
[133] BAIRD 1995: 8.

Tell Boueid II

Plastered shallow discs with a cross grooved in the centre of the base were found in Tell Boueid II (Fig. II.5). [134] It is possible, even though unlikely according to the excavator,[135] that they could have been used as HTs. In fact, as scholars have highlighted 'the absence of HTs remains difficult to explain; their role was perhaps taken over by other vessel shapes'.[136] These examples have not been taken into consideration as HTs in this research work.

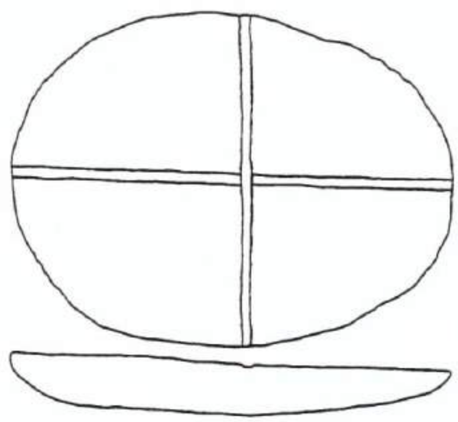

Fig. II.5 - Plastered Disc from Tell Boueid II (SULEIMAN - NIEUWENHUYSE 1999: Fig. 1.12).

Tell Turlu

In Levels VI-VII of the Tell Turlo site, what could be considered one of the most recent fragments interpreted as HT has been found.[137] This find has particular characteristics in that it is a flat plate with concentric grooves. This fragment is not considered to be a HT by some scholars.[138]

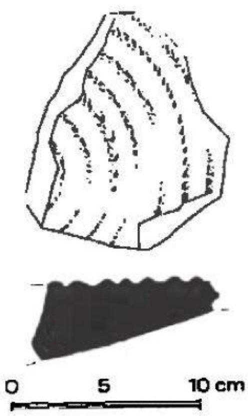

Fig II.6. Possible HT fragment from Tell Turlu (BRENIQUET 1991).

II.4 HUSKING TRAYS IN DETAIL

As already noted, in the HT horizon, the central role, not only from a geographical point of view, is occupied by the Classical Version. The overall technological and functional characteristics relating to this pottery form, deducible from the data published to date, will be detailed in this section.

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[134] SULEIMAN AND NIEUWENHUYSE 2002.
[135] O. Nieuenhuyse pers. comm.
[136] NIEUWENHUYSE – CRUELLS: 56.
[137] BRENIQUET 1991: 10;
[138] IRVING 2001;

II.4.1 Shape & Size

Apart from the internal scoring, the HT is similar in shape, size and technology to the trays whose creation could be viewed as a form of development or optimization to perform a specific activity.[139] In fact, trays are already widespread when HTs first appear.[140] HTs can be generally described as basins with low sides (7 to 13 cm approx.) when compared to a large base (can reach 60cm in length and 40 cm in width). In fact, as far as we know, they were almost always oval in shape. This fact does not make it easy to reconstruct the exact size of the vessels from the fragments unearthed by archaeologists.

The orientation of the walls can vary, although more often than not they are straight rather than convex.[141] The rim is only rarely flattened and, almost always, it too follows an irregular course so that the height of the vessel is not uniform. The wall of the entire ceramic body is generally thick or very thick; in fact, HTs are often considered to be one of pottery forms with the thickest walls of the entire pottery assemblage at some sites.[142] Thickness is not necessarily related to the dimensions of the vessel, so it should be noted that this aspect is not very significant when tracking the dimensions of the vessel starting from a small fragment. The section moving from the base to the wall can be arranged in several ways. It is usually straight, but it can also be rounded in many cases.[143] It is noteworthy that sometimes the connection between the walls and the base is evident; it results from the superimposition of the former over the latter.[144] In addition to being cumbersome vessels, the HTs were also quite heavy. It has been calculated that their weight varied between 7kg and 15kg approximately.[145]

II.4.2 Technological Characteristics

In terms of technology, the manufacturing methods seems to be rather shared.[146] According to the archaeometric data, the clays with which these vessels were produced in Tell Halula[147] and Tell Sabi Abyad were local. Moreover, the clays of the HT samples from Tell Haneke, Tell Kashkashok and Tell Khazna viewed in this study (Chapter VII)

[139] NIEUWENHUYSE 2008: 117.
[140] Eg. MCC. ADAMS: 1983: 220; CALDWELL 1983: 653
[141] NIEUWENHUYSE 2008: 116.
[142] Eg. Sabi Abyad NIEUWENHUYSE 2008: 116-7; 2018: 81-82.
[143] NIEUWENHUYSE 2008: 116.
[144] EG NIEUWENHUYSE 2008: 116.
[145] NIEUWENHUYSE 2018: 82.
[146] NIEUWENHUYSE 2008: 116.
[147] FAURA et al 2013: 441-446.

were analysed in Laboratoire UMR 5138, Archéologie et Archéométrie, CNRS - Université Lumière Lyon 2. Preliminary data indicate that all of them are most likely of local production.[148]

The HTs were almost always produced by shaping coarse clay that contained a large amount of plant inclusions. With regard to firing temperatures, these varied; for example, for those from Sabi Abyad a temperature below 900 to 950 °C is assumed[149], while, regarding Tell Arbid Abyad, firing temperatures below 750 °C[150] have been proposed. It should be noted that firing temperatures and technology could have changed over time. For example, as regards the Northern Jezirah area, it was noted that the HTs found at early Halaf sites are fired at much higher temperatures, with little or no grey core, when compared to those temperatures typical of Hassuna.[151] In fact, often the HTs are defined as being 'under-fired' because of their blackened interior. This fact should be also considered in relation to the thickness of the walls[152] of the vessels, as well as with the numerous organic inclusions in the ceramic paste.

II.4.3 Surface Treatments and Decoration

Surfaces are generally untreated or are only roughly smoothed. Thus, the vessels are so poorly finished that fingerprints left during shaping or when attaching spirals, if the vessels were made with the coiling technique, are often still visible. Surfaces are rarely scraped.[153] The red-slipped surfaces of the fragments from Hakemi Use are an exception[154], as well as another example found in the upper levels of Mezraa Teleilat.[155]

Fig. II.7 Fragment of HT with a black band around the rim (All rights a reserved © Penn Museum 2020 https://www.penn.museum/collections/object/182926).

[148] Forthcoming publication: Valérie Merle, Marie Le Miere and Sergio Taranto.
[149] NIEUWENHUYSE 2008 : 77.
[150] GREGEROVA et al. 2013
[151] CAMPBELL 1992: 42:
[152] BALOSSI 2012: 239-240.
[153] Eg. NIEUWENHUYSE 2008: 117 ; 2018 ;
[154] TEKIN 2005: 190; 2008b: 274; 2008c: 261.
[155] Nieuwenhuyse quoting M. Özdogan, pers. comm.

In some cases, HTs could have been covered with bitumen, including at Tell Hassuna[156] and, more often, at Tell es-Sawwan.[157] The internal and external surfaces of a rim of a HT from Northern Mesopotamia[158] was decorated with a black band all around the rim, probably made of bitumen (Fig. II.7). It is possible that this HT belongs to the end of 7th millennium B.C., when such decoration was usually applied to vessels.[159] Further, in Hakemi Use, one fragment seems to have been decorated with bitumen under the external rim.[160]

At Tell Sabi Abyad, several[161] vessels found were plastered. Among them were a few HT fragments. The plaster that covered the interior surface contained some pebbles whose function remains unknown. (Fig. II.8)[162]

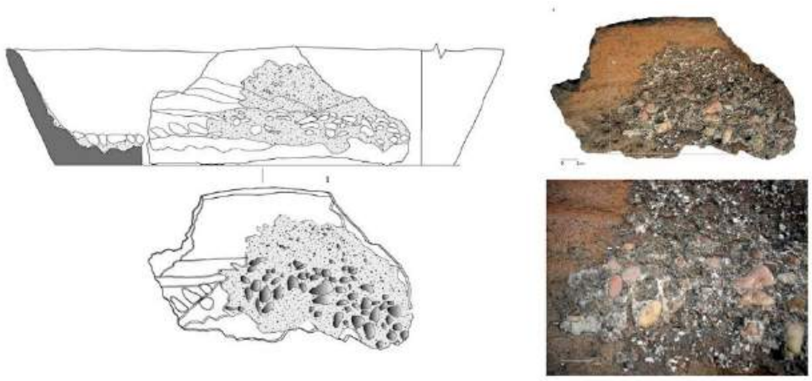

Fig. II.8 - Plastered *Husking Tray* found in Tell Sabi Abyad (Nieuwenhuyse - Koek 2018: 248, Fig. 6.6).

In addition, at the site of Tell Sabi Abyad, a miniature HT was found, but unfortunately in an unsecured context (Fig. II.9).[163] Its internal surface is further on, that it could belong to a Transitional or to the Early Halaf Period.

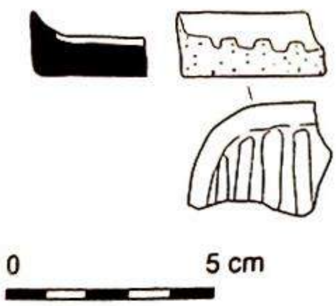

Fig. II.9 - Miniature HT found in Tell SabiAbyad (Nieuwenhuyse 2008 Pl. 17: S).

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156 Lloyd and Safar with Braidwood: 1945: 277
157 Ippolitoni 1970-71: 114.
158 Actually two large parts of HT are known with this type of decoration. One is kept at the Penn Museum, the other is exhibited at the Erbil Archaeological Museum. Since both come generically from Northern Iraq, have similar dimensions, similar ceramic paste and have undergone the same type of restoration, it is likely that they originally belonged to the same vessel.
159 W. Cruells pers. comm.
160 H. Tekin pers comm.
161 Nieuwenhuyse 2008: 116-117.
162 Nieuwenhuyse - Koek 2018: 248
163 Nieuwenhuyse 2008: 116-117.

In the archaeological site of Tepe Marani (Fig. II.10), as well as in the later site of Tell Bagum (Fig. II.11), several fragments of small vessels decorated with paint and criss-cross incisions were found. As will be noted further on (Section II.5.3), in these locations, the HTs were scored with the same pattern of incisions as those of the small bowl. Thus, it could be suggested that some kind of connection exists between the two artefacts.

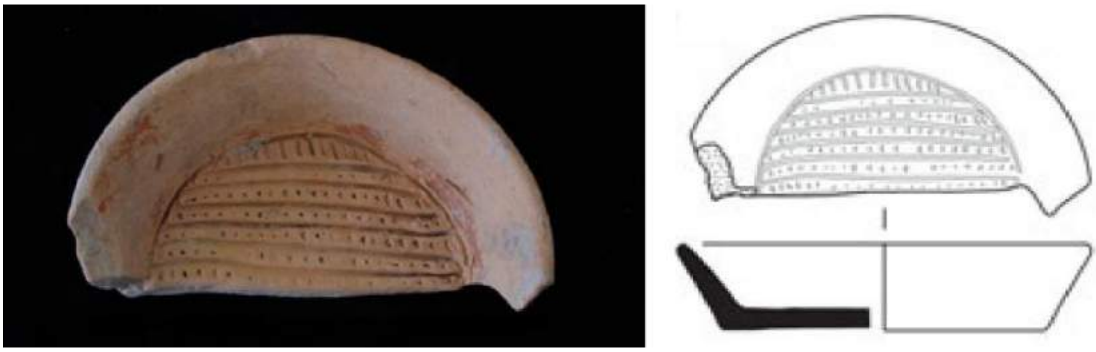

Fig. II.10 Small Bowl incised and painted, Tepe Marani (elaborated from WENGROW 2016: figs. 18, 20)

Fig. II.11 Small Vessel incised and painted, Tell Bagum (HIJJARA 1996).

It is also worth noting that a very similar decorative motif is well known in the Halaf figurative repertoire (Fig. II.12); Infact, in many sites[164] open dishes have been found depicted according to the cross motif such as those found at Tell Bagum; the only difference is the exclusive use of paint instead of incisions. Once again, given the close decorative similarity, there could be some kind of shared influence between the two finds. If so, could this figurative scheme be somehow related to the criss-crossed motif in which the HTs of that area were often scored?

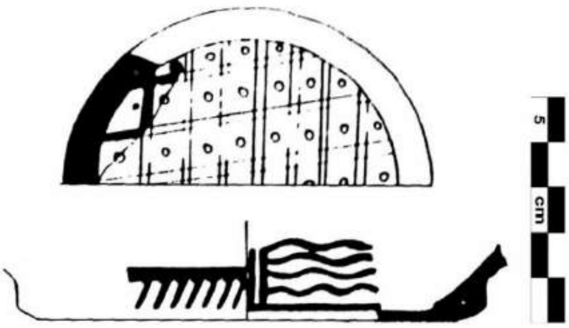

Fig. II.12 Figurative scheme of a decorated Halaf vessels similar to the criss-crossed scoring of the HTs (HIJJARA 1996: fig.144).

[164] HIJJARA 1996.

II.4.4 Contextual Data

Little information has been published regarding the contexts in which HTs have been found. Thus, the information relating to the function of the HTs, deducible from the contextual data, is limited. Moreover, the fragments belonging to this vascular form were found in contexts with little diagnostic evidence. In most cases, the HTs were left in a courtyard where domestic activities were carried out,[165] or they were thrown into pits as waste.[166]

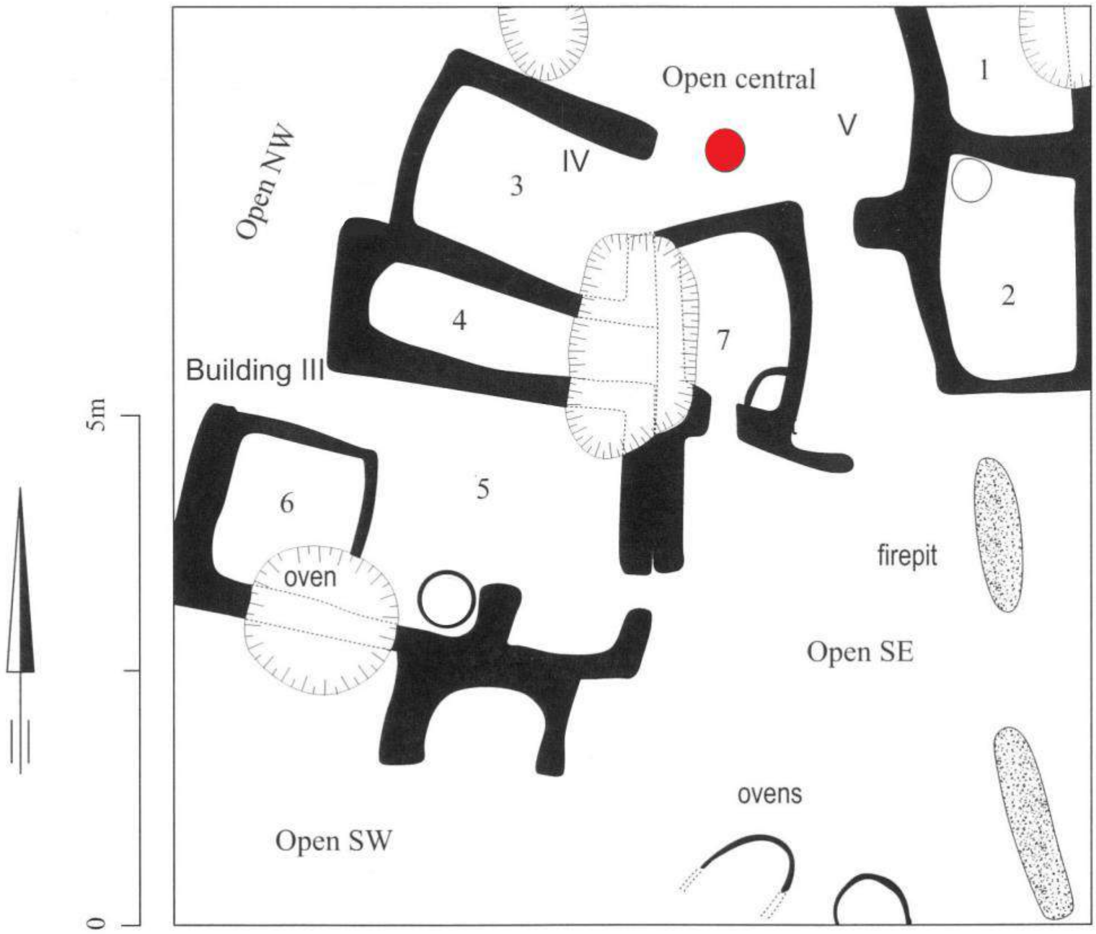

Fig. II.13 - Location of the HT fragment found upside down in the courtyard in Operation V (NIEUWEHUYSE 2018: 333, Fig. 13.11)

At Tell Sabi Abyad, a large HT fragment was found upside-down in the courtyard[167] (Fig. II.13), while one was found upside down in a fireplace in Hakemi Use[168]. In other cases, HT fragments have been found in contexts in association with fire installations. [169] For example, in Akarçay one fragment was found in horizontal position above burnt layers.

[165] MATEICIUCOVA et a. 2010.
[166] ARIMURA et al. 2001: 342
[167] NIEUWEHUYSE 2018: 335.
[168] TEKIN 2005: 190; H. Tekin personal communication.
[169] MATEICIUCOVA et al. 2010.

[170] At Seker al-Aheimar[171] and Kharabeh Shattani[172] (Fig. II.4), HT fragments were found near a hearth, while at Hajji Firuz Tepe, HT shards were found in hearths with raised edges.[173] Further, in Sabi Abyad, fragments of HT were found as 'filling' of the domed ovens. However, this could be also due to the fact that HT fragments were preferred as material to be re-used as building material in the fire installations themselves.[174] Nieuwenhuyse estimates that in each 'house' of the Tell Sabi Abyad settlement, one or two HTs could be in use at the same time.[175]

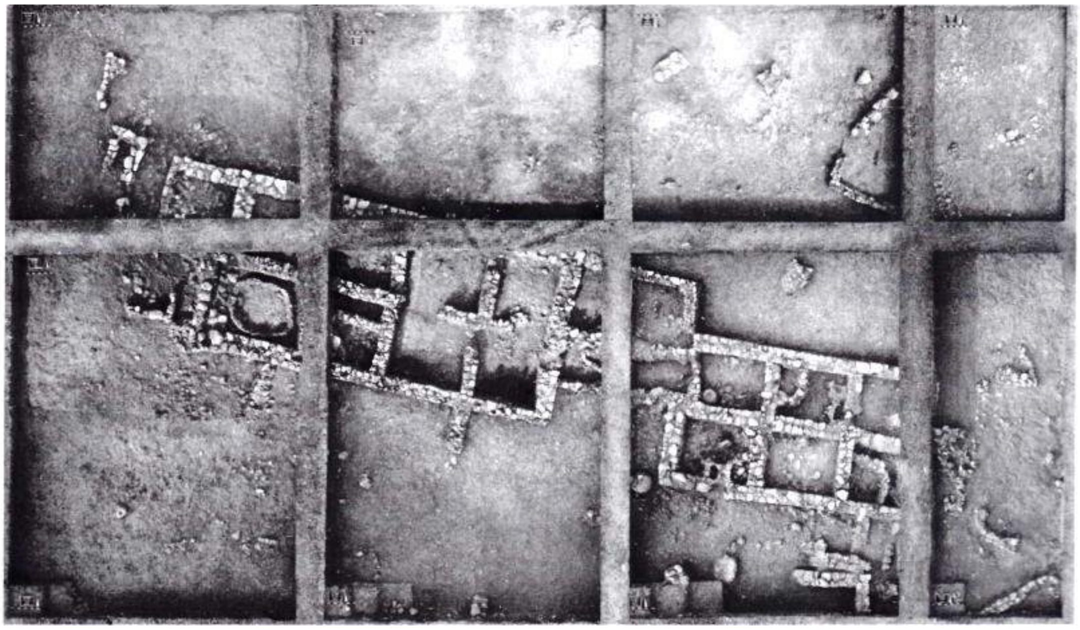

Fig. II.14 Building from Shir at least partially interpreted as storage (BARTL 2013: fig 38.15).

At the site of Shir, the presence of HTs were frequent in its building complex (in zone L-O 20-21), which has been interpreted as a building for the conservation and processing of plant foods, in particular cereals. In fact, the complex comprises a series of small quadrangular rooms, within which were found grindstones, mortars and pestles.[176]

[170] ARIMURA et al. 2001: 347.
[171] NISHIAKI - LE MIERE 2008: 381.
[172] In this case the artefact is not a conventional HT. BAIRD et al. 1995: 8.
[173] M. Voigt pers. comm.
[174] NIEUWENHUYSE 2008: 117.
[175] Ibidem.
[176] BARTL et al. 2010: 61-66.

At Tell Sotto, HT fragments were found in large multi-room houses that may have been used for the storage of foodstuffs. In fact, food remains, tools such as querns, and storage vessels were found inside the rooms[177] HTs have also been found in association with grindstones, mortars and pestles in Tell Al-Mubaddad[178] and Seker al-Aheimar[179]. In one case, that is, Yarim Tepe I, a grindstone was found inside a HT (Fig. II.15).

Fig. II.15 HT with millstone, Yarim Tepe I (MERPERT et al. 76, Pl X n2).

Finally, in Umm Dabaghiyah, HTs 'appear together with round and oval lids to keep out dust and insects'.[180]

II.4.5 Wear[181]

On several occasions, at the macroscopic level, archaeologists have evaluated the use-wear on the surface of HTs.

In Akarçay[182], the HTs were worn down to such an extent that they have a lustrous sheen in the centre on the incised and impressed internal surface, although the nature of this wear and tear could not be identified.

At Hakemi Use[183], it has been noted that on the surfaces of the HTs there are no traces of rubbing, and the impressions on the surfaces would not be suitable for such an operation. Moreover, it has been stated that almost all the HT fragments have traces of fire. [184] These

[177] MERPERT et al. 1976: 56-57.
[178] AAVV 1972: 146.
[179] NISHIAKI - LE MIERE 2008: 381.
[180] MELLAART 1975: 139-141.
[181] The data reported in this section are from archaeological literature. The data obtained in this research will be presented in the following chapters (chapters VII and VIII).
[182] ARIMURA et al. 2001: 347.
[183] TEKIN 2005: 190.
[184] H. Tekin pers comm

are often present on both surfaces. In sites such as Tell al-Khan[185], scholars have pointed out that the wear was not attributable to rubbing or to fire exposure. Several HTs have burnt traces on the external and / or internal surface. Likewise at Kurban Hoyuk, the inside of one HT is blackened by fire.[186] In Hajji Firuz Tepe, the underside of a HT appears to be less oxidized than the rest of the vessel, indicating that it could have been used for cooking.[187] At the site of Chaghar Bazar, a fragment has polished internal grooves, while the surface is blackened - probably from use.[188]

II.4.6 Residues

In recent years, in order to understand their function, HT fragments with residues have been submitted for lipid analysis, that is, four fragments from Tell Kashkashok[189] and one sample from Tell Sabi Abyad[190]. Both samples were unable to provide significant data in order to shed light on the function of the HTs.

II.5 Stylistic Analysis

Undoubtedly the most attractive feature of a HT is the presence of the particular 'decoration' on the inner surface; decoration which, as highlighted by many scholars, seems to have very little to do with aesthetic taste. HTs are made using very basic materials such as coarse clay and large plant inclusions, and were shaped in a somewhat ‘hasty’ fashion; in fact, they seem to lack symmetry – wall height can lack uniformity in the same vessel and surfaces are almost never treated or decorated externally. Indeed, the stylistic aspect seems to be completely neglected by the potter.

The inner surfaces of some of these vessels were crossed by a ‘decoration’ so particular that from the beginning it suggests that it had a to be 'most likely [..] functional rather than stylistic'[191] and that 'the potter was seemingly interested only in having a rough surface’.[192]

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185 Caldwell 1983: 658.
186 Mottram 2013.
187 Voigt 1983: 118; 159.
188 Cruells 2006a: 49.
189 Gragg 2010.
190 Nieuwenhuyse et al. 2015; Roffet-Salque et al. 2018.
191 Campbell 1992: 215.
192 Braidwood et al. 1952: 11.

The data on HT 'decoration' from the archaeological sites referred to in Table II.1 have been gathered together with the associated images. These data are analysed further on in this section. Before dealing with this aspect, it is necessary to clarify some general aspects and limits of this analysis. They are as follows:

- The documentation is very uneven. For example, there are many well-documented HT shards found at Meezraa Teleilat and Tell Sabi Abyad, while as regards other sites throughout the Near East, little space is dedicated to HT fragments in publications although theses fragments are present.
- Quite often interpretation of fragments is solely based on the viewing of drawings and photos.
- The categories adopted here to describe different kinds of score patterns do not correspond to any of those adopted thus far. In fact, scholars to date have adopted a similar way to describe the same thing. For example, in this work, the term 'groove' is used to describe what other scholars called line, ridge, ribs or sometimes incisions.
- At times, it is difficult to classify the scores according to well-defined patterns because of their high degree of variability.

II.5.1 The Scores

As already outlined, the element that characterises the HTs is the fact that their internal surfaces are in some way crossed using scoring.

The scoring presents common features. They are as follows:

- the areas affected are the base of the vessel, its walls or both; in rare cases, the join area between base and walls can also be scored;[193]
- regarding the scoring on the walls, these scores are almost always limited to the lower section of the walls;
- scores are homogenously distributed over the entire area in which they are present;
- each area is scored using a single type of pattern; for example, parallel incisions, impressions, or incisions with impressions, and so on;

[193] NIEUWENHUYSE 2018: 82

- regarding a single vessel, scores are almost always repeated and are of similar size, but they can be rather different in depth, from a few millimetres up to over one centimetre[194].

The potter was able to accomplish the scores by modifying the still malleable surface of the vessels by way of several techniques, that is, impression , incision, pinching and the addition of clay. The impressions were carried out by pressing a tool or finger against the pottery surface. The impressions could turn into incisions or grooves if more pressure was exerted, as well as pressing downwards in a directional sense - in this way, traits, symbols or signs were created. These marks appeared in large numbers and are always homogenously distributed on the surface of the base, on the sides, or both. The scores made with a pointed instrument are generally described in archaeological literature as incisions, while those made with fingers or with another type of instrument with a larger section than that of a finger are referred to as grooves. Pinching was carried out when the surface was modified by pressing it between the index finger and the thumb. Ceramic paste strips may have been added to form 'bumps' (raised strips). Further, at times, different techniques and tools were simultaneously applied by the potter on the same vessel.

II.5.2 Score Patterns

As already noted, there is a great variety of ways in which the inner surface of HTs could be scored. Score patterns could be made using fingers, tools or both together. Thus, several techniques could be adopted by the potter to score the same vessel. At times, only the walls of a vessel are decorated; sometimes only the base, and sometimes both. Furthermore, their relationship is not always known because of the fragmentation of the vessels, that is, only the base or wall is preserved.

Overall, all these specificities make it very difficult to organise the data about HTs. If one adds to this the fact that fragments have been discovered throughout the Near East since the 1930s, this has resulted in HT data not being homogeneous. It should also be emphasised that in defining HTs as a coarse pottery class, little attention has been paid to them in less recent publications.

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[194] NIEUWEHUYSE 2018,

In light of all these facts, three databases have been created. They are outlined as follows:

1. All HT images were collected in a single database (Database 1) for a visual evaluation of their score patterns. This has made it possible to homogenise the language for describing all fragments. In order to organise the data, score patterns on vessel bases and walls were evaluated separately.

2. Another database (Database 2) has collected all the possible information about HTs. All the bibliographical information relating to the patterns and the data deducible from the graphic documentation of the excavations (analysed in Database 1) have been merged together. The goal of this database is to obtain a general picture of the score patterns present in the sites throughout the Near East.

3. Finally, the typology of the score patterns on the HT fragments with complete sections have been collected in a final database (Database 3). Although the quantity is limited, this database helps provide trustworthy data about the relationship between score patterns on the walls and on the base of HTs.

A total of 282 images of fragments from 50 sites have been collected. This means that for one third of the sites, that is, twenty-four of them, there is not (or it has not been located) any published graphic documentation.

A catalogue of these images has been created (Plates).

Furthermore, in addition to the material already published, 40 fragments out of the 178 found at Mezraa Teleilat have been taken into consideration, as well as 7 fragments from Tell Sabi Abyad I, 4 from Akarçay, 3 from Tell Kurdu, 1 from Tell Halula, 1 from Tell Kashkashok, 1 from Tell Khazna II and 1 from Khaneke (Table II.5)[195]. These fragments constitute the sample analysed by way of trace analysis in Chapter VII.

[195] The HT shards were made available for this study thanks to M. Özdogan and E. Özdogan (Mezraa Teleilat), M. Le Miere (Tell Sabi Abyad, Akarçay, Tell Kashkashok, Tell Khazna II, Tell Khaneke), M. Özbasaran (Akarçay), R. Özbal (Tell Kurdu) M. Molist. and A. Gomez Bach (Tell Halula).

Mezraa Teleilat	Vessel Section	Period	Scoring on Base	Scoring on Walls
137	Base with wall	?	Parallel grooves	Parallel grooves
164	Wall	?		Parallel incisions
165	Wall	?		Parallel grooves
167	Base with wall	?	Parallel grooves	Parallel grooves
27 (1)	Wall	?		Perpendicular incisions
152	Base	I	Parallel bumps	
168	Base with wall	I	Parallel incisions	Parallel incisions
69	Wall	I		Parallel incisions
158	Base	I-II	Parallel bumps	
128	Base with wall	I-IIA	Parallel grooves	Plain
163	Wall	I-IIB3		Parallel incisions
160	Base	I-IIB3-IIB2	Parallel grooves	
136	Entire section	I-IIC2	Parallel grooves	Plain
62	Entire section	I-III	quadrangular impressions	Pinches
76	Base with wall	I-III	Parallel grooves	Parallel grooves
124	Entire section	IIA2	Parallel bumps impressed	Plain
14	Wall	IIA2		Plain
19	Wall	IIA2		Parallel incisions
162	Base	IIB	Parallel bumps?	
74	Base	IIB	Parallel incisions	
96	Base with wall	IIB	Finger impressions	Impressions base-walls
110	Base	IIB2	Pinching	
131	Wall	IIB2		Parallel incisions
135	Wall with base	IIB2	Parallel grooves	Plain
157	Base	IIB2?	Parallel bumps	
94	Wall	IIB2?		Impressions
141	Wall	IIB2?		Parallel grooves
126	Base with wall	IIB2-IIB1		Plain
24	Wall	IIB2-IIB1		Parallel incisions
107	Wall	IIB2,3	Impressions base-walls	Impressions base-walls
111	Base with wall	IIB2,3	Impressions base-walls	Impressions base-walls
39	Base	IIB2,3	Triangular impressions	
61	Base with wall	IIB3	Impressions base-walls	
28	Entire section	IIB3	Particular incisions	Plain
170	Base	IIB3	Impressions	
40	Base	IIB3- IIB2	Triangular impressions	
103	Wall	IIB3-IIB2		Triangular impressions

Mezraa Teleilat	Vessel Section	Period	Scoring on Base	Scoring on Walls
112	Base	IIC1	Impressions base-walls	
166	Wall with base	K	Parallel grooves	Parallel grooves
85	Wall	K		Impressions
Tell Sabi Abyad	**Vessel Section**	**Period**	**Scoring on Base**	**Scoring on Walls**
SAB 88 371	Base	Proto-Halaf	Finger impressions	
SAB 88, S12, 120-5	Base	end Pre-Halaf	Finger impressions	
SAB 126	Base	Proto-Halaf	Finger impressions	
SAB 88 3-4-4	Base	Halaf	Parallel incisions	
SAB 125 88-549	Base	Proto-Halaf	Finger impressions	
SAB 184	Base	Early Halaf	Parallel bumps	
SAB 88 Q14 50-24	Base	Halaf	Parallel grooves	
Akarçay	**Vessel Section**	**Period**	**Scoring on Base**	**Scoring on Walls**
AKA 16	Base		Triangular impressions	
AKA 17	Wall			Crossed incisions
AT 01 26 5 10	Wall			Parallel grooves
AT99 j KH 38	Entire section		Finger impressions	Finger impressions
Tell Halula	**Vessel Section**	**Period**	**Scoring on Base**	**Scoring on Walls**
HAL sup	Wall	Pre-Halaf		Impressions
Tell Kashkashok	**Vessel Section**	**Period**	**Scoring on Base**	**Scoring on Walls**
KAK 15	Base	Proto-Hassuna	Impressions	
Tell Khazna II	**Vessel Section**	**Period**	**Scoring on Base**	**Scoring on Walls**
KHA 30	Wall	Proto-Hassuna		Parallel incisions
Tell Khaneke	**Vessel Section**	**Period**	**Scoring on Base**	**Scoring on Walls**
HAN 15	Base	Proto-Hassuna	Finger impressions	

Table II.5 – HT Shards analysed in this research.

On the basis of figurative schemes that were repeated in the graphic and bibliographical documentation, thirty-one categories have been created.

The categories of score patterns were distributed in the archaeological sites as follows:

Base - Plain

Küçük Kozluca, Kurban Höyük, Seker al-Aheimar, Tappeh Joblar, Tell Sabi Abyad I, Umm Dabaghiyah

Base - Pinching

Hajji Firuz Tepe, Mezraa Teleilat, Tell Nader, Tell Sabi Abyad I, Umm Qseir, Matarrah

Base - Bumps

Niniveh, Tell Sotto

Base - Perforated

Matarrah

Base - Finger Impressions

Akarçay, Çayönü, Dja’de el-Mughara, Gre Fılla, Hajji Firuz Tepe, Hakemi Use, Khaneke, Küçük Kazluca, Matarrah, Mezraa Teleilat, Niniveh, Qalat Said Ahmadan, Shaikh Marif II, Shir, Tappeh Joblar, Tell Arbid Abyad, Tell es-Sawwan, Tell Nader, Tell Sabi Abyad I, Telul eth-Thalathat 2, Umm Dabaghiyah, Yarim Tepe I

Base - Circular Impressions

Chagar Bazar, Hajji Firuz Tepe, Hakemi Use, Matarrah, Mezraa Teleilat, Tell Halaf, Tell Halula, Ras Shamra, Salat Cami Yani, Shir, Tappe Sang-e Chakhmaq, Tell 'Ain el-Kherkh, Tell al-Khan, Tell Hassuna, Tell Kashkashok II, Tell Sabi Abyad I, Umm Dabaghiyah, Yarim Tepe I.

Base - Triangular Impressions

Akarçay, Hajji Firuz Tepe, Matarrah, Mezraa Teleilat, Hakemi Use, Tell Hassuna, Tell Kashkashok II, Yarim Tepe I

Base – Quadrangular Impressions

Mezraa Teleilat, Hakemi Use, Tell Sabi Abyad I

Base - Ring Impressions

Tell Shimshara

Base – Irregular Impressions

Çayönü, Kharabeh Shattani, Matarrah, Mezraa Teleilat, Niniveh, Seker al-Aheimar, Shaikh Marif I, Tappe Sang-e Chakhmaq, Tell 'Ain el-Kherkh, Tell al-Khan, Tell Array

1-2, Tell es-Sawwan, Tell Kashashok II, Tell Nader, Tell Sabi Abyad I, Tell Sotto, Umm Dabaghiyah, Umm Qseir

Base - Parallel Grooves

Chagar Bazar, Hajji Firuz Tepe, Hakemi Use, Karavelyan, Kharabeh Shattani, Khazna II, Küçük Kozluca, Kurban Höyük, Matarrah, Mezraa Teleilat, Niniveh, Remremeh, Salat Cami Yani, Seker al-Aheimar, Shir, Tappeh Joblar, Tepe Marani, Tell al-Uwaynat 15, Tell Arbid Abyad, Tell Array I, Tell Hassuna, Tell Halula, Tell Helawa area, Tell Jigan, Tell Sabi Abyad I, Tell Sotto, Tell Turlu, Yarim Tepe I, Umm Dabaghiyah, Umm Qseir

Base - Parallel Incisions[196]

Akarçay, Çayönü, Mezraa Teleilat, Niniveh, Ras Shamra, Shir, Tell Arbid Abyad, Tell Sabi Abyad I

Base - Parallel Bumps

Hajji Firuz Tepe, Mezraa Teleilat, Salat Cami Yani, Tell Arbid Abyad, Tell Sabi Abyad I, Umm Dabaghiyah, Umm Qseir

Base - Criss-crossed Incisions

Eridu, Shorsu, Tell es-Sawwan, Tepe Marani, Tell Oueili, Tell Sabi Abyad I, Tell Shimshara, Tell Bagum

Base – Particular Incisions

Boskin, Diyan, Hakemi Use, Mezraa Teleilat, Niniveh, Tell 'Ain el-Kherkh, Tell Shimshara

Base - Perpendicular Grooves

Tell Sabi Abyad I

[196] It is necessary to underline an interesting detail. As highlighted for Tell Sabi Abyad (NIEUWENHUYSE 2018: 82) and also Tell al-Khan (BRAIDWOOD 1983: 653), in several cases the incisions on the walls are arranged diagonally. Indeed in some cases the vertical incisions made with tools abruptly become diagonal.

Base - Pinched Bumps

Tell Kashkashok II

Base - Herring-bone

Umm Dabaghyiah

Base - Wall Commas

Mezraa Teleilat, Tepecik-Çifitlik

Mixed Impression Incision

Akarçay, Çayönü, Hakemi Use, Mezraa Teleilat, Tell Arbid Abyad, Tell Sabi Abyad I

Wall - Plain

Çayönü, Hajji Firuz Tepe, Küçük Kozluca, Kurban Höyük, Matarrah, Mezraa Teleilat, Seker al-Aheimar, Shaikh Marif I, Tappe Sang-e Chakhmaq, Tell Kashashok II, Tell Sabi Abyad I, Telul eth-Thalathat 2, Tepe Marani, Umm Dabaghiyah, Umm Qseir, Yarim Tepe I

Wall - Finger Impressions

Akarçay,Hajji Firuz Tepe, Niniveh, Tappeh Joblar, Telul eth-Thalathat 2, Tell Kurdu,

Wall - Circular Impressions

Tell 'Ain el-Kherkh, Tell Arbid Abyad

Wall - Triangular Impressions

Hajji Firuz Tepe, Matarrah, Mezraa Teleilat

Wall - Quadrangular Impressions

Niniveh

Wall - Irregular Impressions

Niniveh, Hajji Firuz Tepe, Matarrah, Mezraa Teleilat, Shir, Tappeh Joblar, Tell Array 2, Tell Halula, Tell Kurdu, Tell ‘Ain el-Kherkh

Wall - Parallel Grooves

Akarçay, Karavelyan, Khazna II, Matarrah, Mezraa Teleilat, Niniveh, Shir, Tappeh Joblar, Tepecik-Çiftlik, Tell 'Ain el-Kherkh, Tell al-Uwaynat 15, Tell Arbid Abyad, Tell Halaf, Tell es-Sawwan, Tell Sabi Abyad I, Tell Sotto, Tell Turlu, Umm Dabaghiyah, Yarim

Tepe I

Wall - Parallel Incisions

Akarçay, Çayönü, Hajji Firuz Tepe, Hakemi Use, Khaneke, Kharabeh Shattani, Khazna II, Küçük Kozluca, Matarrah, Mezraa Teleilat, Niniveh, Qalbaza, Qalat Said Ahmadan, Ras Shamra, Seker al-Aheimar, Shaikh Marif I, Shir, Tell Jigan, Tell al-Khan, Tell 'Ain el-Kherkh, Tell Arbid Abyad, Tell Halaf, Tell Halula, Tell Hassuna, Tell Helawa area, Tell Kashkashok, Tell Sabi Abyad I, Tell Shimshara, Umm Dabaghiyah

Wall - Criss-Cross Incisions

Akarçay, Boskin, Hajji Firuz Tepe, Khaneke, Mezraa Teleilat, Tell 'Ain el-Kherkh, Tell al-Khan, Tell Nader, Tell Sabi Abyad I, Tell Shimshara

Wall - Particular Incisions

Matarrah, Tell al-Khan, Tell es-Sawwan,Tell Shimshara, Umm Dabaghiyah

Wall - Zig-Zag Incisions

Hajji Firuz Tepe, Tepe Gerd-i-Khalika, Umm Dabaghiyah

Wall - Horizontal Incisions

Matarrah

II.5.3 Score Pattern Distribution

By observing the type of score pattern per number of sites, it is clear that the topologies are not homogeneously distributed (Table II.6). There are score patterns that are only present in some specific areas of the Near East, for example, within 1 to 3 sites, while others are present in different sites, for example, within 5 to 10 sites, while still others are widely shared, for example, within 16 to 30 sites. The bases were most commonly scored with parallel grooves or impressed using a finger, or, alternatively, scored in the shape of irregular or circular impressions by tools.

In general, walls were scored with parallel vertical lines (grooves or incisions). Often the walls were left plain compared to the scored bases or vice versa, but it is very difficult to exactly quantify this phenomenon. It should be borne in mind that while the scored surfaces are always recognisable as HTs, the plain ones, if found in the form of a simple wall or base shard, are classified as trays. These types of score patterns were adopted by potters throughout the Near East. Often the vertical lines on the walls that characterise the inner surface of the walls were crossed, usually two by two, by a horizontal line, or these were imprinted with an irregular section tool, triangular impressions or a finger.

Score Pattern	Site Quantity
Base - Ring impressions:	1
Base - Perpendicular grooves	1
Base - Pinched bumps	1
Base - Herring-bone	1
Base - Perforated	1
Wall - Quadrangular impressions	1
Wall - Horizontal incisions	1
Base – Bumps	2
Base - Wall commas	2
Wall - Circular impressions	2
Base - Quadrangular impressions	3
Wall - Zig-zag incisions	3
Wall - Triangular impressions	3
Wall - Particular incisions	5
Mixed - Impression incision:	6
Base – Pinching	6
Base - Plain	6
Base - Particular incisions	6
Wall - Finger impressions	6
Base - Parallel bumps	7
Base - Triangular impressions	8
Base - Parallel incisions	8
Base - Criss-crossed incisions	8
Wall - Criss-crossed incisions	10
Wall - Irregular impressions	10
Wall - Plain (Base scored)	16
Base - Circular impressions	18
Base - Irregular impressions	19
Wall - Parallel grooves	19
Base - Finger impressions	23
Wall - Parallel incisions	29
Base - Parallel grooves	30

Table II.6 Typology of Score Pattern per Number of Sites

					Impressions						Ridges							
Area	**Plain**	**Pinching**	**Bumps**	**Perforated**	**Finger**	**Circular**	**Triangular**	**Quadrangular**	**Ring**	**Irregular**	**Paralgrooves**	**Paral incisions**	**Paralhumps**	**Criss crossed**	**Particular incisions**	**Perpe Ndicular**	**Pinched humps**	**Herring bone**
Southern Cappadocia																		
Southern Levant																		
Northern Levant					1	3				4	2	2			1			
Taurus foothills	2				4	2	1	1		1	5	1	1		1			
Euphrates valley area		1			3	2	2	1		1	3	2	1		1			
Balikh	1	1			1	1		1		1	1	1	1	1		1		
Khabur	1	1			2	3	1			4	5	1	2				1	
Tigris valley area	1	1	2		4	4	2			6	9	1			1			1
Urmia Lake	1	1			2	1	1				2		1					
IVZ		1		1	3	1	1		1	2	2			2	2			
Hamrin					1					1				1				
Alluvial plain														2				
Mehran Plain											1							
EMF										1								
Lesser Cucasus														1				
Tot.	6	6	2	1	21	17	7	3	1	21	30	8	6	7	6	1	1	1

Table II.7 Scores on Bases number of sites per Regional Area

Area	Base wall commas	Mix impr incis	Plain	Impressions					Ridges					
				Finger	Circular	Triangular	Quadrangular	Irregular	Paralgrooves	Paral incisions	Criss crossed	Particular incisions	Zig zag	Horizontal
Southern Cappadocia	1								1					
Southern Levant														
Northern Levant				1	1			4	2	3	1			
Taurus foothills		2	3						1	3				
Euphrates valley area	1	2	1	1		1		2	3	3	2			
Balikh		1	1						1	1	1			
Khabur		1	3		1			1	3	6	1	2		
Tigris valley area			3	1			1		5	6	2		1	
Urmia Lake			1	1		1		1	1	1	1		2	
IVZ			3			1		1	1	5	2	3		1
Hamrin									1			1		
Alluvial plain														
Mehran Plain														
EMF			1					1						
Lesser Cucasus														
Tot.	2	6	16	4	2	3	1	10	19	27	10	5	3	1

Table II.8 Scores on Walls number of sites per Regional Area

Equally common finds are the bases which were scored with horizontal and vertical crossed lines that divided the surface into squares or rhombi of roughly homogeneous dimensions, or by means of sharp tools, with parallel or particular lines. Sometimes, the inner surfaces of the HTs were modified by way of techniques such as pinching or the adding of strips of ceramic paste to form “bumps”. In addition, different techniques could be simultaneously used to characterise the surface of a vessel.

The surfaces were rarely scored with quadrangular impressions or the walls by circular or triangular impressions. Moreover, in a few cases, the walls were incised by characteristic zig-zag or horizontal lines. In two cases, the section between the wall and the base were scored with short lines that look like commas. The characterisation of the internal surface of the base by ring impressions, perpendicular grooves, pinched bumps, and herring-bone patterns are *unicums*. They include:

In the case of Matarrah, the internal base of several HTs was repeatedly perforated with a circular tool.[197] The Tables II.7 and II.8, together with the Maps (3-35 in Vol. 2) indicating the score pattern distribution, help define regional sets.

First of all, it can be noted that only in few cases is it possible to attribute exclusive score patterns to a given geographical area. However, general areal tendencies can be suggested.

The few regional areas with exclusive score patterns are:

- Euphrates Valley, Balikh Valley, Taurus Foothills:
  - Quadrangular Impressions on the Base;

- Taurus Foothills, Southern Cappadocia:
  - Commas on the Base / Wall;

- Tigris Valley Area:
  - Bumps on the Base;

- Tigris Valley Area, IVZ, Lake Urmia Area:
  - Particular Incisions on the Walls;

- Tigris Valley Area, Lake Urmia Area:
  - Zig-zag Incisions on Walls;

[197] The presence of the typology with perforated holes could be indicative for understanding the function of such pottery form. In fact, this would suggest that it did not contain liquid substances. However, being few fragments, this data is not unquestionable.

- Euphrates Valley Area, Khabur Valley Area, Taurus Foothills:
  - Mix of Impressions / Incisions.

Notwithstanding the overlapping of the categories, it is maybe possible, on the bases of the collected data, to suggest some score pattern regional trends.

They can be distinguished as follows (Fig. II.16):

- Group A

This group includes base and wall finger impressions, irregular impressions, circular impressions, parallel grooves and incisions. It also includes parallel and criss-crossed incisions on walls. These types of scoring patterns are distributed throughout the Near East except for the peripheral Alluvial Plain, the Lesser Caucasus and Southern Cappadocia.[198]

- Group B

This group includes base and wall triangular impressions, base parallel bumps and pinching. These types of scores are widespread in a large area located between the Euphrates and the Tigris, including the IVZ and Lake Urmia.[199]

- Group C

This group includes mixed impression-incisions and base quadrangular impressions. These types of scores are present in the Euphrates Valley, Balikh Valley, Taurus Foothills and the Khabur Basin.[200]

- Group D

This group includes commas on bases and walls. This small group of score patterns allows one to link Cappadocia with the Euphrates/Taurus Valleys and Balikh. Moreover, it should be noted that in the Mezraa Teleilat area, and sometimes also in Tell Sabi Abyad, there are often HTs with impressions located in the joint area between the base and the

[198] For example Plates: shards: 1, 2, 4, 12, 18, 20 21 ,22, 26 31,35, 37 36 48 38, 39, 41, 48, 75, 77, 87, 93, 9096 97,98 102, 105, 114, 115, 128, 134, 135, 138, 142, 151,152 etc..
[199] For example Plates: shards: 40 42,46, and 144, 67, 97.
[200] For example Plates: shards: 29, 70, 120, 123, 139 and 106.

wall. Interestingly, this score pattern is characteristic of this area and appears to relate it to Southern Cappadocia.[201]

- Group E

This group includes particular wall incisions, zig-zag incisions and horizontal incisions. It also includes particular base incisions. These types of scoring patterns are widespread in the Tigris Valley Area, the IVZ, Hamrin and the Lake Urmia Area. [202]

- Group F[203]

This group includes criss-cross incisions on the base. This type of incision probably evolved from Group E. This type of score pattern is widespread in an area ranging from the IVZ to Hamrin, and up as far as the Alluvial Plain. It is also present in the Lesser Caucasus.[204]

In addition to those indicated above, two other areas can be pointed out in which there is a concentration of specific types of score patterns, albeit belonging to the more widespread Group A.

- Group G

In the Northern Levant Area, the use of impressions predominates, both irregular and circular. In addition, the walls are often characterised by impressions or criss-cross incisions.[205]

- Group H

In the EMF Area, in Tappeh Sang-e Chaqmakh, the bases are almost exclusively scored with irregular and circular impressions; the walls, on the other hand, appear plain.[206]

[201] One of the fragements from Tepeck-Çiftlik is very similar to shard 64 in the Plates. See for example Plates: shards: 33, 45, 57, 66, 68, 69,115, 119.
[202] Group E collects various material. In any case, the use of the shallow incised line predominates. For example see: 191,198,213, 185, 165, 153, 215, 237, 238, 239, 241 and 243.
[203] The vessels by Tepe Marani and Tell Bagum seen in the section II.4.3 could be associated with this type of score pattern.
[204] For example Plates: shards: 239, 245, 249, 250, 251, 256 and 214.
[205] For example Plates: shards: 1,2 6, 7, 9, 10, 11, 13, 15, 16, 17 and 3, 5
[206] For example Plates: shards: 258-269.

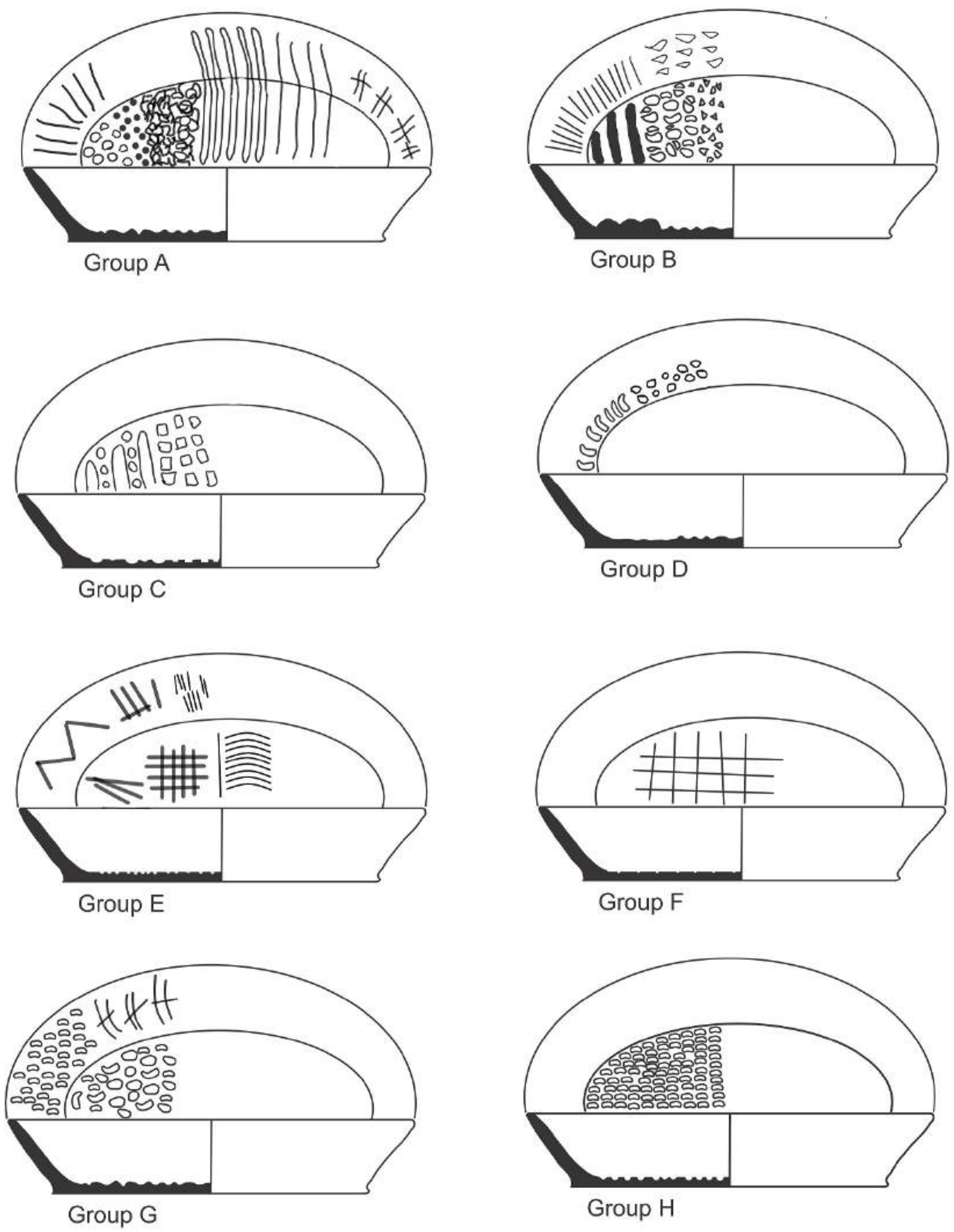

Fig. II.16 Schematic synthesis of the possible categories of score patterns (Drawing by A. Gomez Bach and S. Taranto).

II.5.4 Score Patterns: Base versus Walls Relationship

In order to verify any areal correspondence, the relationship between the score patterns of the base and the walls was also investigated (Tables II.9 and II.10).

Area	Nº fragments	Base	Walls	Tot
Northern Levant	3	Impressions	Impressions	9
	5	Impressions	Ridges	
Taurus foothills	1	Impressions	Plain	4
	1	Ridges	Plain	
	2	Ridges	Ridges	
Euphrates valley area	1	Impressions	Plain	17
	3	Impressions	Impressions	
	1	Impressions	Pinches	
	4	Ridges	Plain	
	8	Ridges	Ridges	
Balikh	1	Plain	Ridges	20
	1	Impressions	Plain	
	4	Impressions	Ridges	
	10	Ridges	Plain	
	4	Ridges	Ridges	
Khabur	2	Impressions	Ridges	6
	3	Ridges	Plain	
	1	Ridges	Ridges	
Tigris Valley area	1	Plain	Ridges	15
	3	Impressions	Plain	
	1	Impressions	Impressions	
	4	Impressions	Ridges	
	6	Ridges	Ridges	
IVZ	1	Perforated	Plain	10
	2	Impressions	Plain	
	2	Impressions	Ridges	
	5	Ridges	Ridges	
Hamrin	2	Impressions	Ridges	3
	1	Ridges	Ridges	
Urmia lake	4	Impressions	Plain	8
	1	Impressions	Impressions	
	1	Impressions	Ridges	
	1	Plain	Ridges	
	1	Ridges	Ridges	
EMF	4	Impressions	Plain	4

Table II.9 Scoring pattern relationship per area

The analysis takes into account only the fragments shown in the catalog in which the scoring of the internal base and walls of the HT is simultaneously visible (Plates).

Total	Base	Walls	No. Fragments/ Area
8	Impressions	Impressions	3 Northern Levant 3Euphrates Valley 1 Tigris Valley 1 Lake Urmia
19	Impressions	Ridges	5 Northern Levant 4 Balikh 2 Khabur 4Tigris Valley 2 IVZ 2 Hamrin 1 Lake Urmia
16	impressions	plain	1 Taurus Foothills 1 Euphrates Valley 1 Balikh 3 Tigris Valley 2 IVZ 4 Lake Urmia 4 EMF
18	Ridges	Plain	1 Taurus Foothills 4 Euphrates Valley 10 Balikh 3 Khabur
28	Ridges	Ridges	2 Taurus Foothills 8 Euphrates Valley 4 Balikh 1 Khabur 6 Tigris Valley 5 IVZ 1 Hamrin 1 Lake Urmia
3	Plain	Ridges	1 Balikh 1 Tigris Valley 1 Lake Urmia
1	Impressions	Pinches	1 Euphrates Valley
1	Perforated	Plain	1 IVZ

Table II.10 Scoring pattern relationship

The total number of fragments was only 95. Given the low number, a simplification of the data was attempted by dividing the types into more general groups, that is, impressions (including all types of impressions), ridges (including all incisions, grooves and parallel bumps), plain fragments, and the types, albeit rare, that are perforated or pinched that were not included in the previous categories.

Table II.9 indicates that, in general, in all areas, excluding peripheral areas, there is a variety of score combinations. There are limited score typologies in the areas of Hamrin, the Northern Levant and the EMF.

Table II.10 indicates that:

- Certain score combinations were widely shared between regions, that is, impressions-plain, impressions-ridges and ridges-ridges.
- The combination of an impressed base with impressed walls predominates in the western area (the Northern Levant and Euphrates). In the other areas, the walls are hardly ever characterised by impressions.
- The combination of an impressed base with ridged walls and a ridged base with ridged walls were widely used everywhere in this area.
- The combination of an impressed base and plain walls is much more common in the eastern area and exclusive to the EMF.
- The combination of a ridged base with plain walls is noted in the central area of Upper Mesopotamia in the Euphrates Area, Balikh (10 out of 20) and Khabur (3 out of 5).
- The combination of a plain base with ridged walls is not very common, while a plain base with impressed walls is completely absent. The plain base is limited to the Balikh, Tigris Valley and Lake Urmia. This could be due to the fact that scored HTs tend to be over-represented in the drawings.

5.5 Distribution of Figurative Schemes Over Time

Based on the data available today, it appears possible that the area where there was originally a significant use of HTs is that of the Khabur / Tigris. The sites where the oldest specimens have been attested are Sekher el Aheimar[207], Umm Dabaghiyah[208] and Tell Sotto. The score patterns of the oldest HT examples known are both impressions and grooves on the base, while sometimes the walls were scored with vertical lines. At Tell Sotto, the surface of the oldest HTs were manipulated into 'rough nipples' which gradually transformed into corrugated forms during the Hassuna Period.[209] A similar phenomenon happens at Yarim Tepe I, where HTs are present in all levels. The oldest specimens are

[207] Marie Le Miere pers. Comm.
[208] KIRKBRIDE 1972: 9
[209] MERPERT et al. 1978: 48.

scored on the bottom with peculiar 'hollows'. Subsequently, their internal surfaces become ribbed[210], as highlighted in Table II.11.

Horizons	Grooves	Impressions
V	4	
VI	9	
VII		
VIII		
IX	1	
X		5
XI		2
XII		3
Pits in Bedrock		1

Table II.11 Scoring patterns of the HTs found during the excavation mission to Yarim Tepe I in 1975 (MERPERT et al, 1978: :33-34, Table VIII)

However, this transformational phenomenon is not typical only to the zone of the Tigris, but it is a dynamic that affects a large part of the Near East. [211] At some sites outside the Tigris area, it is possible to observe the same development of the score patterns.

he detailed study of the HT fragments, conducted by O. Nieuwenhuyse for the excavation campaigns 1996-1999 at Tell Sabi Abyad, brings this development into focus in more detail. The scholar identifies 12 types of HT by combining the two parts of the vessel involved in the characterisation (base / inner wall) with the type of incision, groove, impression or criss-cross incision. Often the wall and / or the base are also not scored (Table II.12).

Level	8	7	6	5	4	3	Mixed	Total
Plain wall, grooved base	8	24	20	26	1	1	31	111
Plain wall, impressed base	34	14	2	-	-	-	4	54
Plain wall, incised base	-	1	-	-	-	-	1	2
Plain wall, cross-incised base	1	2	3	-	-	-	1	7
Incised wall, flat base	12	12	5	2	-	-	9	40
Incised wall, grooved base	2	-	2	-	-	-	1	5
Incised wall, incised base	-	-	4	-	-	-	2	6
Incised wall, impressed base	6	2	-	-	-	-	2	10
Grooved wall, flat base	3	2	-	-	-	-	-	5
Grooved wall, impressed base	-	1	-	-	-	-	1	2
Grooved wall-and-impressed base	1	1	1	-	-	-	-	3
Grooved-and-incised base	-	-	1	-	-	-	2	3
Total – *Husking Tray Base*	67	59	38	28	1	1	54	248

Table II.12 Score patterns of the HTs found at Tell Sabi Abyad I during the campaigns 1996-99 (NIEUWENHUYSE 2008, Table 6.4.11).

[210] MERPERT et al. 1976: 35;
[211] WILKINSON - TUCKER 1995: 90.

What emerges when analysing this table is that in the oldest phases, that is, in Levels 8 and 7, numerous varieties of score patterns were created by the potters, and the most common form was the one with a plain wall and an impressed base. This and other characteristics decreased in Levels 7 and 6, almost permanently disappearing in Level 5. As the scoring varieties decrease, one typology increases and affirms itself, that is, the one with a grooved base and plain wall. In Level 8, this score pattern is represented by few fragments, while in Levels 7 and 6 their number increases. Starting from Level 5, this score pattern also begins to decrease but, as can be seen from Fig. II.17, it continues to be present in the Early Halaf Period, albeit in a limited quantity. [212]

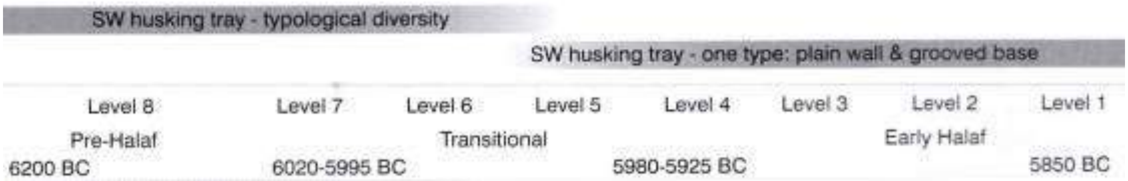

Fig. II.17 The development of types of HTs in Tell Sabi Abyad (AKKERMANS et al. 2014: 88).

In order to verify whether the development of score patterns in the Euphrates Valley follow the same dynamics as seen in other regions, a chronological score pattern grid (Table II.13) was also created for the 40 fragments found in Mezraa Teleilat.

Level \ Period	IIC1	IIB3	IIB2	IIB	IIA2	I-III	I	K	¿	Total
Impressed wall		1	1					1		3
Impressed base		2	1						1	4
Impressed wall, impressed base				1		1				2
Impressed base-wall	1	1	2							4
Pinched base			1							2
Ridged wall			3		1	3	1		3	11
Ridged base			1	2		1	1		2	7
Ridged wall, plain base						2				4
Ridged wall, ridged base						1	1	1		3
Plain wall, ridged base		1	1		1					1
Total	1	5	10	3	2	8	3	2	6	40

Table II.13 – Development of Score Patterns at Mezraa Teleilat

[212] NIEUWENHUYSE 2007: 117.

In addition, in this case it could be noted that while in the earliest phases the HTs are generally impressed, beginning with Level IIB (LN Red Slip Period), there is an increasingly common use of the groove.

Finally it should be noted that the majority of the HT shards found in many sites belonging to periods at the end of 7th millennium B.C. or later, such as Tell Arbid Abyad[213] (Table II.14), Chagar Bazar[214], Karabelyan[215] and so on, are usually finger-grooved, even if this is not 'a simple or absolute division'. [216]

Type of base	Count
broad grooves in base	52
finger impressions in base	1
incisions in wall	1
broad grooves in wall	4
incisions in base	1
broad grooves in base & in wall	5
unidentified	1
Total	65

Table II.14 Scoring patterns in Tell Arbid Abyad (MATEICIUCOVA 2010: fig 10)

II.5.6 Meanings of the Score Patterns

As anticipated, up to now, given the lack of care taken with the scores on a pottery form already made in a somewhat slipshod manner, no scholar has ever advanced the hypothesis that these were only for decorative purposes. On the contrary, all the hypotheses that have been advanced to date have always started from the idea that these score patterns had a function. However, the fact that these marks could have had a function does not prevent them from having a meaning attributed to them. In fact, some scholars have wondered why there were so many different types of decoration on the HTs. Despite the difficulty in being able to reach any definitive conclusion, working hypotheses have been put forward by some scholars. In all these cases, the hypotheses arise from the idea that HTs were used to bake bread. It has been proposed that these scores could have been related to content; for example, to make different types of bread, or to prepare bread in relation to different social contexts.[217] It has also recently been proposed that the HTs could have functioned as some kind of social communication tool: the 'decoration' left on the bread surface after baking could have had a meaning such as identity value. [218]

[213] MATEICIUCOVA 2010; MATEICIUCOVA et al. 2010.
[214] CRUELLS, W. 2006a: 48.
[215] H. Telkin pers. Comm.
[216] CAMPBELL 1992: 35.
[217] NIEUWENHUYSE 2007: 117.
[218] BALOSSI 2021.

II.5.7 Concluding Remarks

The stylistic analysis of the HTs has highlighted some areas in which the formal aspect and the technological traditions of scoring patterns are rather homogeneous. The HT variants also seem to correspond in some way to these same areas. It would seem that several areas are located around a central nucleus. These regions could have accepted this ceramic form in part by reinterpreting it by way of variants that evidently suited the local situation. Variants would have respond to different needs. These are difficult to identify, that is, differently organised societies, different environmental conditions, different culinary traditions and so on.

As regards the distribution of score patterns, while some supra-regional groups can be distinguished, the identification of other regional groups are limited, while the identification of other groups is even more limited. However, it seems possible to define overlapped groups with areal trends, rather than specific score patterns exclusive to some geographical areas.

The following areas have been distinguished:

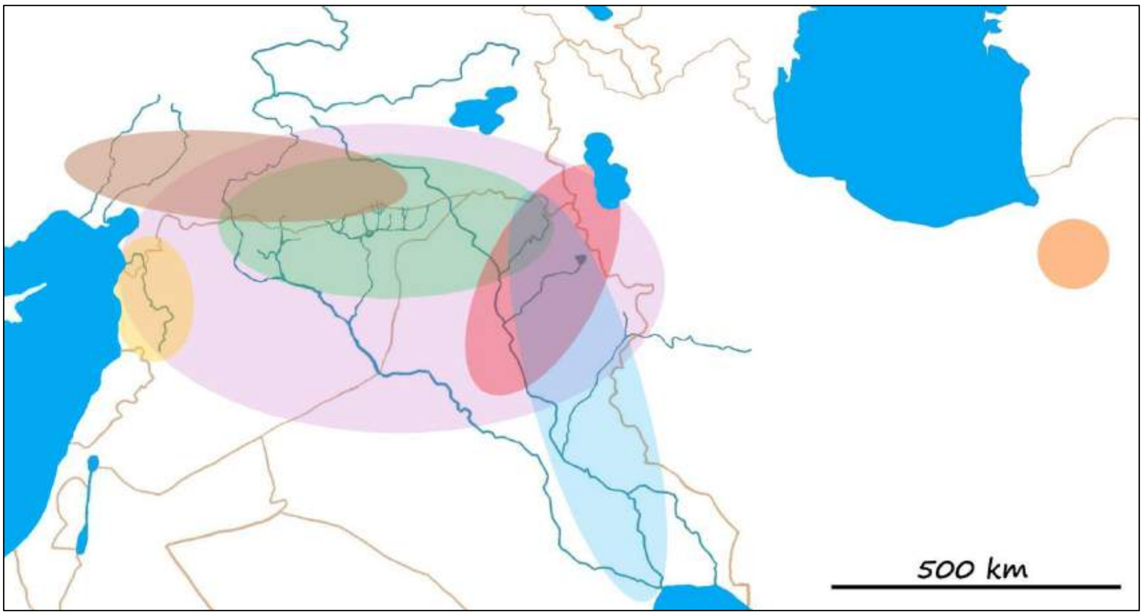

Fig. II.18 Possible areas in which HT score patterns were homogeneous.

- a basic group that seems to be shared or at least to have influenced the majority of the areas under study. Basically this group consists of the Classical Version of the HT with Group A (Pink Circle in Fig. II.18);

- a tradition that has its core properly in the area between the two great rivers Euphrates and Tigris in Upper Mesopotamia. Here the classical form is the only one known. Regarding the score pattern, in addition to those of Group A, the area is characterised by a wide variety of motifs and techniques gathered together in Group B . (Green Circle in Fig. II.18);

- in the area of the Middle to Upper Euphrates / Taurus Foothills, alongside the Classical Version of HT, is the presence of smaller bowls. In addition to Group A, characteristic score patterns of the area are those of Groups C and D. The impression of the area located between the wall and base, and in particular the parallel commas, could indicate a relationship between this area and Southern Cappadocia. (Brown Circle in Fig. II.18);

- to the West, in the Northern Levant, alongside the Classical Version of HT, there are characteristic vessels with low and everted walls defined as platters; some of these are smaller in size. The score patterns are limited to the impression on the base, often accompanied by the impression on or crossed incision of the low walls as described for Group G. (Yellow Circle in Fig. II.18);

- to the East, in the Tigris Valley Area, the IVZ and Lake Urmia, only the Classical Version is widespread. It is not only decorated according to Group A, but the use of the incised line is greatly developed (Group E) (Red Circle in Fig. II.18);

- starting from the IVZ, through Hamrin up to Alluvial plain towards the south, a particular kind of score pattern crosses the internal surface of the HTs, that is, the criss-cross incision pattern. Furthermore, the HTs from this area seem better fired and smoothed. In the Alluvial Plain, the Classical Version of HT is completely absent. In its place, there are a few large plates that have criss-cross incisions on their internal surfaces. The only fragment known from drawings of that area seems to be scored with care. It is interesting to note how the same type of score pattern (criss-cross incision) affects different pottery forms, such as the bowls (Shorsu), the classical form (Tell Shimshara Tepe Marani, Tell es-Sawwan), the platters (Eridu and Tell Oueili) and decorated small bowls (Tepe Marani and Tell Bagum) (Blue Circle in Fig. II.18).

- Finally, perhaps isolated due to the limited archaeological knowledge of the intervening area, is the site of Tappeh Sang-e Chakhmaq. Some rather thin trays found in the site could be associated with the HTs. In addition to the general shape, the internal surface of these vessels is scored in a way that is similar to the HTs. These small trays are scored with impressions on the base, while their walls seem to be plain as described in Group H (Orange Circle in Fig. II.18).

In conclusion, the classical version of HT and the Group A score patterns are the aspects shared by almost all the groups. This typology and this type of scoring are therefore those to which a possible diffusion refers. It could have already occurred immediately after the earliest appearance of the HTs. In this sense, the fact that the impression is the most common score pattern in the earliest levels of the sites in the Tigris Area, as well as in Tell Sabi Abyad, Tell Halula, Mezraa Teleilat and Çayönü, could be indicative.

Furthermore, the fact that in the area between the two great rivers there are no new versions of the HT could indicate that this was the area of origin of the classical form. With regard to the dynamics of the development of score patterns from impressions to parallel grooves, one might think that this is an autonomous development that took place in the different areas. In fact, this would seem to take place in distant sites far from each other in time and space. It may be related to a functional advantage for which the HTs were used.

The stylistic analysis give insights that, together with the data from the following chapters, allow a possible interpretation of the role of the HTs. It will be presented in the conclusive chapter of this work (Chapter 8).

Chapter III

METHODOLOGIES

III.1 INTRODUCTION

The subject of this work are the husking trays (hereafter HT).

An experimental approach is adopted in order to investigate the methods of manufacture and use of this artefact.

Experimental activity in this research involve:

- morpho-techno-functional analysis (Chapter V);
- the analysis of technological and functional traces on the ceramic surface of 58 HT sherds (Chapter VI and VII).

The respective methodologies will be presented below.

In addition to these methods, that represent the core of the present research, two types of integrative analyses have been adopted.

These were carried out by specialists and are reported in the Appendix:

- the phytoliths analysis of 24 HT sherds carried out by M. Portillo Ramirez;
- the gas-chromatography of 2 HT sherds carried out by A. Breu Barcons.

III.2 EXPERIMENTAL ARCHEOLOGY

The use of experiments, on which experimental archeology is based, is aimed at attempting to replicate past phenomena (objects, activities, situations) in order to confirm, refute or corroborate hypotheses previously formulated to interpret the archaeological data.

The procedure is based on the organization of an experimental protocol that serves to define in detail the way in which the experiment is to be carried out, guaranteeing the scientific nature of the process. This procedure involves the formulation of a hypothesis, the definition of the methods that allow its verifiability with the design of experiments and the choice of the related variables or parameters that may affect them. The hypothesis is then verified through an imitative experiment that can adopt various methods, techniques, analyzes and approaches. [1] This is achieved within a ‘closed’ system, ie an environment that allows you to keep possible variables under control and evaluate the extent of their impact on the experiment itself; the parameters placed under control can be more or less stringent.

From the evaluation of the similarity / divergence relationship between the archaeological data and the experimental reproduction, possible analogies / anomalies emerge; these allow to accept or discard the previously formulated hypotheses guaranteeing an approach to the correct interpretation of the archaeological data.

When the results of an experiment reject a hypothesis, it represent, in any case a useful data: on the one hand, the field of possible interpretations narrows; on the other, it generates greater knowledge of the dynamics of the phenomenon under study allowing the reformulation of new and more targeted hypotheses that need to be tested in a new experiment.

The experiment therefore represents, in any case, an advancement in knowledge.

III.3 Morpho-Techno-Functional Analysis

Unlike other materials, clay can be shaped in total freedom by the coroplast in terms of shape, size, proportions, thickness, composition, etc ...

This freedom means that the pots can be shaped in forms that are often highly functional to the activity for which they are created; at the same time, they pass through the technological and cultural filter of those who make them. In other words, in order to meet similar needs, pottery tends to be shaped into similar but aesthetically different shapes.

For example, in order to allow the homogeneous cooking of food within a cooking chamber of an oven, a baking tray tends to have low walls and a wide base beyond its formal aspects.

For this reason, the study of a vascular form with its intrinsic attributes (ie pertinent to the physical reality of the vessel)[2] can provide indications regarding the function for which it was created and used, regardless of its original context

[1] Mathieu 2000.
[2] Vidale 2007: 92.

The same potter form may present formally different declinations for functions with something or a lot in common. [3]

The morpho-techno-functional analysis allows, through empirical tests, to relate specific morphological and compositional characteristics of a vascular shape with the possible choices that led to its creation. Regarding this, however, it is necessary to consider morphology, technology and function not simply as successive and separate steps, but as interacting parts of a chain: one depends on the other.

Many - interdependent - factors contribute to the creation of a pot, such as: raw material, skills and technical choices, cultural preferences, functional needs, random elements, etc. The morpho-techno-functional analysis through the reproduction of experimental replicas allows to generate and test hypotheses concerning the execution and use of specific objects of the past.

The experimental replicas do not need to be necessarily faithful in every aspect to the original ones; they must, at least, present the elements that ensure the normal function of the object in order to not affect the experiment to which they are subjected. Therefore, the replicas have to be made using suitable materials and techniques.

In the case of experimental pots, the possible features that could affect its functioning are morphology, size, type of the paste and temper, thickness of the walls, surface treatment, shaping technique and firing conditions. [4]

The set of artifacts subject of this study corresponds to a group of vessels that present similar characteristics that made them recognizable as a whole to archaeologists. Potentially, similar characteristics let to think to similar intended function.

The morpho-techno-functional analysis is set on a specific context in order to restrict the field of variability to which the object itself could have been subjected throughout its space-time development.

In this case the morpho-techno-functional analysis is based on the evidence HTs from the site of Tell Sabi Abyad. [5]

Here, this ceramic form is well represented both in the quantities and variability of score patterns on their inner surface(Chapter 1 and Catalogue); moreover, it is possible to

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[3] Ibidem: 52.

[4] LEVI 2010.

[5] The morpho-techno-functional analysis was mainly based on come HT fragments from Tell Sabi Abyad I as reported in NIEUWENHUYSE 2008.

observe the evolution of this ceramic form over time and obtain comprehensive information regarding its characteristics in this context (Chapter I).

For the purpose of a correct morpho-techno-functional analysis it is necessary that, in addition to the object of the study itself, the other elements that interact with the artifact during the experiment meet certain suitability and likelihood criteria. The preparation of the context as an experiment setting requires careful study and an evaluation of 'surrounding' elements that risk appearing marginal; they, if underestimated, could modify the result of the experiment itself, invalidating the results. In the present work, therefore, particular attention during the analysis was paid on the one hand to the fire installations with which the HTs were potentially used, and on the other, to the physical and chemical processes involved in bread baking.

The morpho-techno-functional analysis constitutes the first step for the technological and functional study of a ceramic form; it allow the design of possible following working hypotheses.

III.4 TRACE ANALYSIS ON CERAMIC SURFACES

The morpho-techno-functional analysis provide a better understanding of the characteristics of the vascular form under consideration; however, in the absence of other evidence, they represent starting hypotheses.

In order to verify them it is necessary to rely on other types of analysis.

This work is mainly based on the technological and functional trace analysis on the ceramic surface.

It constitutes the most immediate interface between a pot and the reality that surrounds it. This 'sensitive' area of the vessel records a good deal[6] of what happens to it during its existence.[7] In fact, it is possible to subdivide the lifecycle of a fragment into three main phases corresponding to the formation of the three different and overlapped types of surface traces:

1. The traces related to the phase of pot production to which the fragment belonged to: shaping, drying, firing and surface-finishing steps. These activities led to the formation of the technological traces;

[6] It is necessary to be aware that not every action leaves recognizable traces on a pottery surface.
[7] VIDALE 2007: 53.

2. While the pot is being used (e.g. for cooking, storing or being cleaned) its surface is continuously modified by a mechanism of losing or adding of material. This activity leads to use-wear and residues.

3. Finally, during the stage in which the fragment is dismissed and undergoes burial, processes that lead to the formation of the post-depositional wear are activated[8].

In this perspective every single pottery fragment could be considered an archaeological micro-site[9] on whose surface it is possible to recognize and distinguish the sequence of superimposed traces by means of which the history of the fragment can be understood.

Morphology, location and typology of the traces present on the ceramic surface could be indicative of the actions that caused them.

A trace can be defined as the evidence resulting from the interaction between two surfaces. Therefore, its formation depends on the one hand on the physical-chemical characteristics of the two bodies, on the other on the nature of the interaction.

For this reason, the study of traces is divided into material categories: lithic, macro-lithic, ceramic, bone, metal.

This work takes into consideration ceramic material.

It consist of an aggregate of clay particles, minerals and inclusions held together by chemical bonds after its firing.[10]

In this work two types of evidences are taken into account:

(i) the macro-traces, appreciable at low magnification;

(ii) the micro-traces, visible at high magnification mainly on the surface of mineral inclusions present in the ceramic paste.

In this analysis, a multi-scale approach was adopted; besides the macro-traces, also the micro-traces that form on the surface of mineral fragments naturally present in the ceramic paste were investigated.

Only few works have so far explored the multi-scale approach for ceramic material[11] and taken into consideration the double nature of the ceramic paste.[12]

In this research, the analysis of the mineral inclusions of the ceramic paste is systematically adopted as an integrant part of use-alteration analysis. It constitutes an

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[8] SCHIFFER – SKIBO 1989; SKIBO et al. 1997.

[9] VIDALE 1990.

[10] FORTE 2018: 122.

[11] VAN GIJN-HAUFMAN 2008, BAJEOT et al. 2020.

[12] SKIBO 1992; VIEUGUÉ 2014; 2015.

integration of the methodological system described above and, according to the authors, it represents an essential element for a proper functional interpretation of a ceramic fragment.

In fact, ceramic material has long been considered unsuitable for use-wear analysis because it is too sensitive to external stresses.

Investigating the extensively limited but 'hard' surfaces of the mineral inclusions makes up for this possible deficiency. Their study can act as a counter-proof in the case of uncertain interpretation regarding the function of an artifact.

The distribution and coherence of the traces on an artifact are also of great importance.

They can distinguish the traces produced during the use of the artifact from those that are generated once the vessel/fragment becomes buried.

In fact, while use produces wear-patterns coherent with each other in the different parts of the vessel, the traces produced by taphonomic processes are distributed in an inconsistent and random manner; moreover, in the case of fragments, they often also affect their section.

Therefore, this methodology is often also suitable for investigating artifacts not directly found in archaeological stratigraphy.

III.4.1 Brief history of studies

The scholars interest towards visible alterations on ceramic surfaces began to be manifested since the 1960s. [13]

The trace formation dynamics, however, did not yet fall within the scope of these early works.

In the following decade, the studies related to traceology turned, especially in North America, towards a more ethnarcheological approach.[14]

Between the end of the 1980s and the beginning of the 1990s this field of study developed thanks to the research of various authors[15] and it reached full maturity thanks to the works of J. Skibo.

In particular, the scholar, on the basis of the observations of the use-alterations on the Kalinga pottery, began to lay the foundations of an initial structuring of a method for the

[13] BRAUN et al. 1967; CHERNELA 1969; MATSON 1965; PERINO 1966.
[14] DE GARMO, 1975; ERICSON et al. 1972; GRIFFITH 1978.
[15] BRUCE 1989; HALLY 1983, 1986; LUGLI - VIDALE 1996.

description of the wear and related nomenclature;[16] his work currently constitutes a reference point for the use-wear studies on ceramic surface.

In the same period, the traceologic studies began to incorporate the fundamentals of tribology;[17] namely, the branch of engineering that studies interacting surfaces in relative motion.

This approach was employed by Adams (1989), in relation to the study of the traces present on the surface of macro-lithic tools.

Subsequently, observations on wear more and more frequently became part of pottery studies on pottery but, remaining often just as isolated cases and special additions to other studies.

Furthermore, the approach adopted has always been limited to generic descriptions and superficial interpretations of the wear; not based on comparisons of dedicated experimental reference collections; at most analogies were established on vague comparisons with traditional contexts.

Steps forward regarding the trace analysis on ceramic surfaces have been taking place in recent years; in fact, studies related to this topic are developing into a more systematic; working methods.[18]

III.4.2 Trace analysis: methodology and terminology

The trace analysis on archaeological fragments aims to interpret the actions that generated them. This concerns both the technological traces, that are related to the production of the vessel, and the functional ones, that are related to the use of the vessel.

The post-depositional wear refer to the taphonomic processes; these are mainly seen by traceologists as alterations of the two types of traces previously reported.

The trace analysis is based on the comparison between the traces experimentally developed (produced by known actions) and the traces present on the archaeological fragments (produced by unknown actions)[19]. On the basis of the presence or absence of similarities, it is possible to create analogies between the actions from which the archaeological ones derived from (fi. III.1).

[16] Cf. SKIBO 1992; SCHIFFER - SKIBO 1989.
[17] CZICHOS, 1978; ADAMS 1989, 2014.
[18] FORTE 2015; FORTE et al. 2018; VIEUGUÉ, 2014; VIEUGUÉ et al. 2008; VUKOVIĆ, 2009, 2011;
[19] TARANTO 2021.

Thus, the first step is the creation of an experimental reference collection: a kind of 'glossary' that allow the traces present on the archaeological sherds to be read.[20] This experimental approach, in fact, enables the association between the technological and functional traces and the physical and chemical processes that caused them. Therefore, for the creation of a valid reference collection it is essential to take into consideration all of the factors that could influence the development of the traces: the artifact under study, the activity, the context.[21] Then traces analysis is carried out by both macroscopic and microscopic observations. The use of these tools allows the investigation of the evidences on the ceramic surface in the shape of macro-traces (visible at low magnifications) and micro-traces (visible at high magnifications). Firstly, every single experimental trace is recognized, isolated, described, documented and associated one by one to the specific action that generated them. The traces are accurately defined according to a series of measurable and, as much as possible, objective criteria (e.g. morphology, size, location, distribution, etc.) in order to make them reproducible and comparable. This process is systematically adopted, founded on a scientific approach. The same operations subsequently are applied to the traces on the surface of the archaeological fragments under

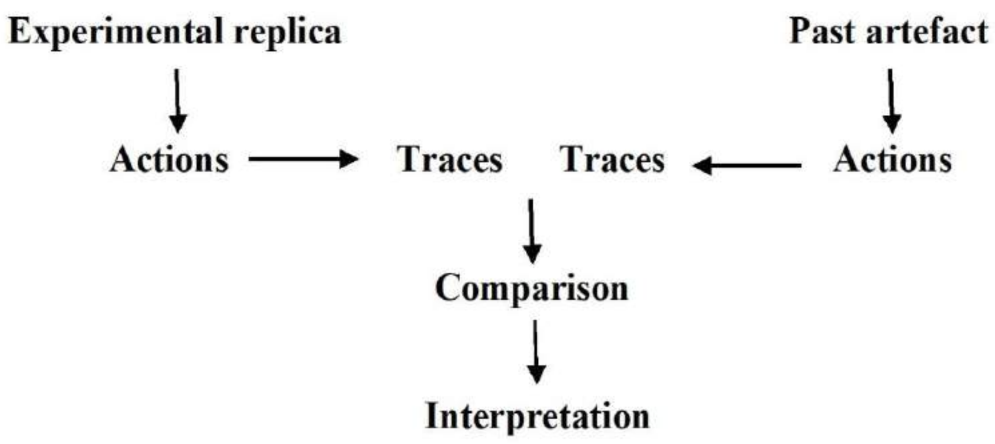


Fig. III.1 General schema of traces analysis (TARANTO et al. 2021).

study. For the description of both the experimental and the archaeological traces, the criteria adopted must be the similar to be comparable. Finally, it is possible to compare them and reach an interpretation of the activities that generated the archaeological traces. The criteria that have been taken into consideration in this work for the recognition of technological, functional traces will be specifically illustrated below.

[20] FORTE 2015.
[21] LEMORINI – NUNZIANTE CESARO 2014.

The variables combined together allow to accurately connote a trace; this, in addition to make its description as objective as possible, it facilitates the comparison between the archaeological and experimental traces making the interpretation possible.

Both the experimental reference collection and the traces evaluation criteria were selected according to the specific characteristics of the ceramic shape under study: the HT.
In fact, as pointed out by several authors[22], for a correct interpretation of an archeological trace, it is necessary refer to an entirely dedicated reference collection.
it, in fact, allows to take into consideration both the compositional and morphological characteristics of the vessel on which surface the trace develops.

III.4.3 Symbols legend

In order to make the reading of the traces in the photos and micro-photos easier arrows of different colors are used (Fig. III.2).

To make the images easier to be read, the most significant traces are marked with arrows of different colors in relation to the mechanism that generated them.
Technological traces are indicated with large black arrows.
White large white arrows indicate the direction of the action that generated the trace.
Yellow large arrow indicate material accumulations.
Use and post-depositional wear is indicate by short arrow.
Blue: fatigue mechanism
Green: adhesive mechanism
Red: abrasive mechanism
Orange: thermal mechanism
Yellow: residues and carbonizations
Purple small arrow: alteration due to chemical corrosion
White: undetermined

[22] SCHIFFER - SKIBO, 1989; SKIBO - SCHIFFER, 1987; FORTE et al. 2018.

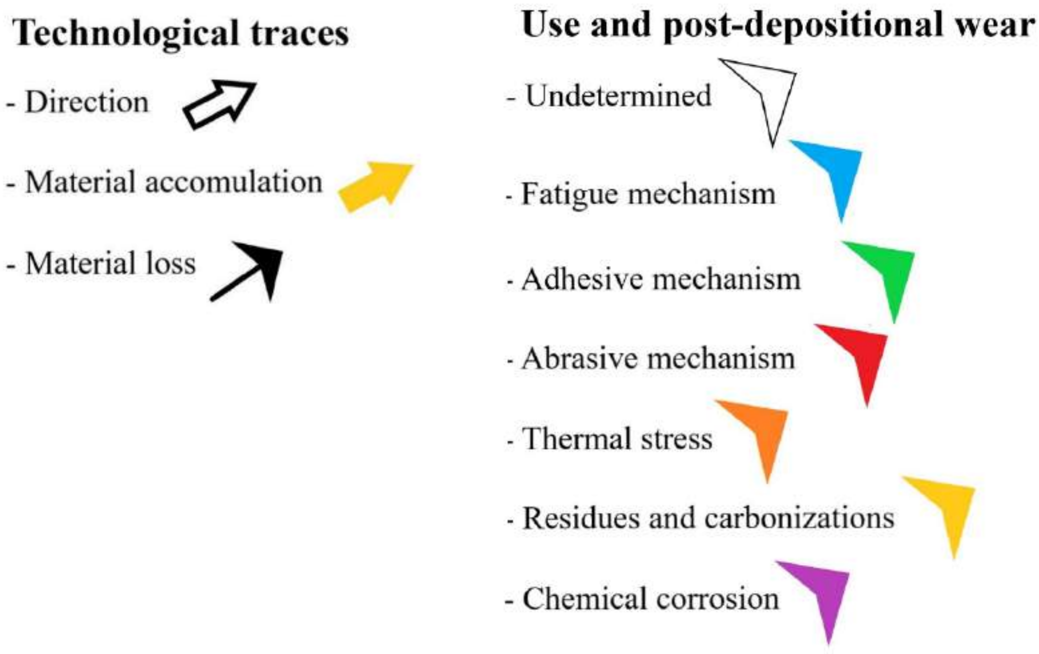


Fig. III.2 Legend of the technological, functional and post depositional

III.4.4 Equipment, cleaning procedures and software

In order to observe and document macro and micro traces, in addition to naked eye, various types of microscopes were used during this research (fig. 3):

- Nikon SMZ-U Stereomicroscope using reflected light with 1× objective, 10× eyepiece and magnification from 0.75× to 7.5× with ToupView camera.
- portable Dino-lite AM7915MZTL digital microscope
- Nikon Eclipse ME600 and LV 150 metallographic microscope with Amscope camera
- Hirox Digital Microscope RH-2000

Each of these microscopes, thanks to their specific characteristics, allows a ‘poly perspective’ study of the traces.

In particular, as regards the study of traces on pottery, naked eye and the stereoscope allow (thanks to low magnification) an overview and the study of macro-traces; the metallographic microscope and hirox allow a better definition of the micro-traces present on the mineral inclusions of the ceramic body. Finally, the portable digital microscope allows the analysis of intact vessels whose dimensions normally do not allow them to be examined the microscope.

Therefore, it is particularly useful for analyzing the trace developing on experimental vessels that can continue to be used after the microscopic analysis.

Fig. III.3 Equipment used for trace analysis (a) steroscope, (b) metallographic microscope, (c) hirox digital microscope, (d) portable digital microscope.

Regarding the software for image editing, Adobe Photoshop Express and Helicon Focus versions 6 and 7 were used in this research.

Cleaning procedure

Fig. III.4 Tools used for cleaning procedure

Archaeological fragments were gently dusted with a brush with soft bristles and distilled water before the microscopical analysis (fig. III.4).
In some case they were also blown with compressed air.

Microsoft Access was used for the description, management and reprocessing of data relating to the trace analysis.
This has allowed not only the systematized organization of information and uniformity of language, but also an easy access to data during the comparison phase between the experimental and archaeological traces.
In both cases, 5 interconnected sheets of descriptive variables were created (fig. III.5) relating to:

1) experimental replica / archaeological fragment
2) surface
3) technological traces
4) use wear
5) post-depositional traces

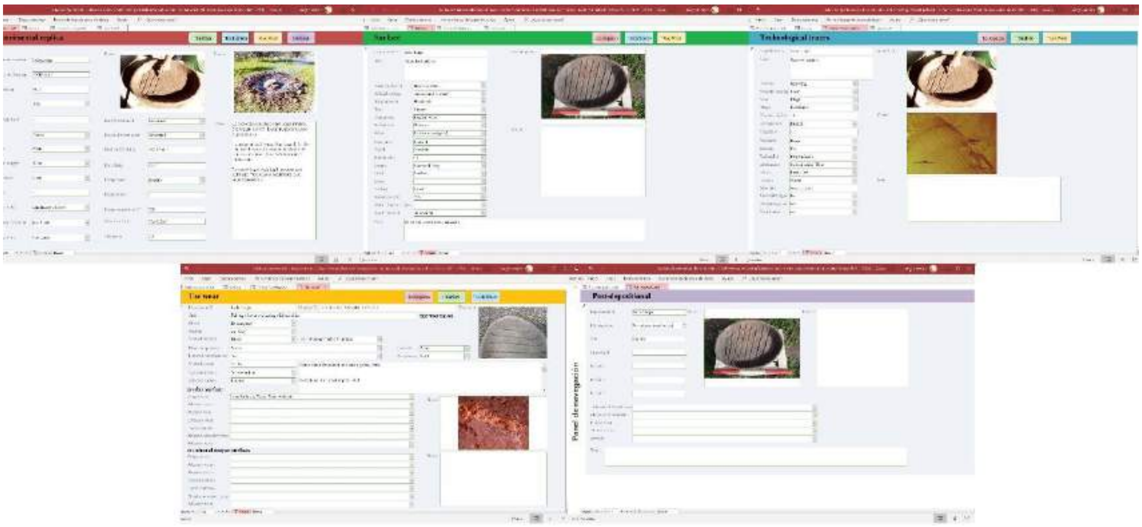


Fig. III.5 Trace Analysis Database Sheets.

III.4.5 Traces Description

As noted previously, the choice of terminology is fundamental in a discipline that is mainly based on description and observation.
In order to foster a young discipline in search of stability, it has been attempted to maintain a certain consistency with respect to previous works.

In particular, the trace analysis structure in this work is based on the methodological system defined in 'Skibo 1992; 2013; 2015'; 'Vieugué 2014, 2015' as well as 'Adams et al. 2009', 'Adams 2014', 'Forte 2015, 2018' which are also referred to for terminology.

In addition, terminology has been adapted and integrated to capture the specificities of the vascular form being analysed and the innovations unearthed by the research carried out. In the latter case, it was necessary to coin some terms. The descriptive criteria that have been used are presented below.

In some cases, the novelties of the research have made it necessary to introduce terms that have gone to integrate the previous works.

The descriptive criteria used are presented below and summarized, as regards the use-wear in the table III.1 (at the end of the chapter).

III.4.5.1 Descriptive criteria

In order to describe both technological and use-wear macro and micro traces in a coherent and shareable way, a series of standardised descriptive criteria are used taking into account previous research (Fig. III.7).[23]

- *Topography* and *Micro Topography* refer to the morphology of the ceramic surface. They are respectively the original surface of a ceramic artefact and the mineral inclusions before the vessel is used. They may be described as *flat*, *sinuous* or *irregular*.
- *Shape* refers to the general appearance of a trace. It can be *linear*, of *limited area*, or a *material accumulation*.

The *linear* traces can be described as being:

- *Striations* - narrow incisions developed in length;
- *Striation batches* - a set of small parallel and equidistant striations developed in length. These develop due to the irregularities of the dermatoglyphs on the fingers and palms of the potter, who manipulates the clay during the shaping phase;
- *Scratches* - multi-directional short, straight striations; and
- *Grooves* - large striations with U-sections that have developed in length.

[23] SKIBO 1992; FORTE 2015; 2018; 2020; ADAMS et al. 2009; ADAMS 2014: 133; SCHIFFER - SKIBO, 1989; 2015; VIEGUE 2014; VIEGUE et al. 2008; DEBELS et al. 2020.

The *limited areas* can be:

- *Depressions* – shallow, wide and deep;

- *Pits* - narrow and deep;

- *Craters* are a type of pit that is very often found on ceramic surfaces. In fact, they are formed following the collapse of fragile clay parts or mineral inclusions as a consequence of the interaction between their surfaces. This activity creates small ovoid craters due to the loss of mineral inclusions; and quadrangular voids with internal uni-directional streaks of plant inclusions that disappear during the firing stage of the ceramic vessel (fig. III.6);

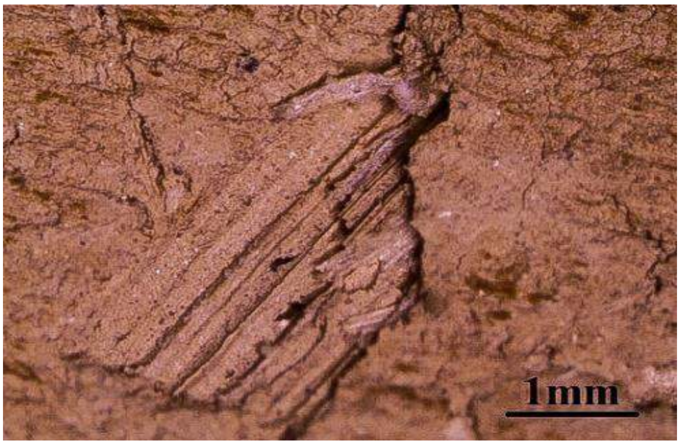


Fig. III.6 Crater resulting from the disappearance plant inclusion

- *Material accumulations* refers to the areas of added and / or resulting material concentration. These can assume any appearance;

- *Texture* refers to the morphology of the inner surface of a trace. It can be *smooth*, *striated* or *coarse*;

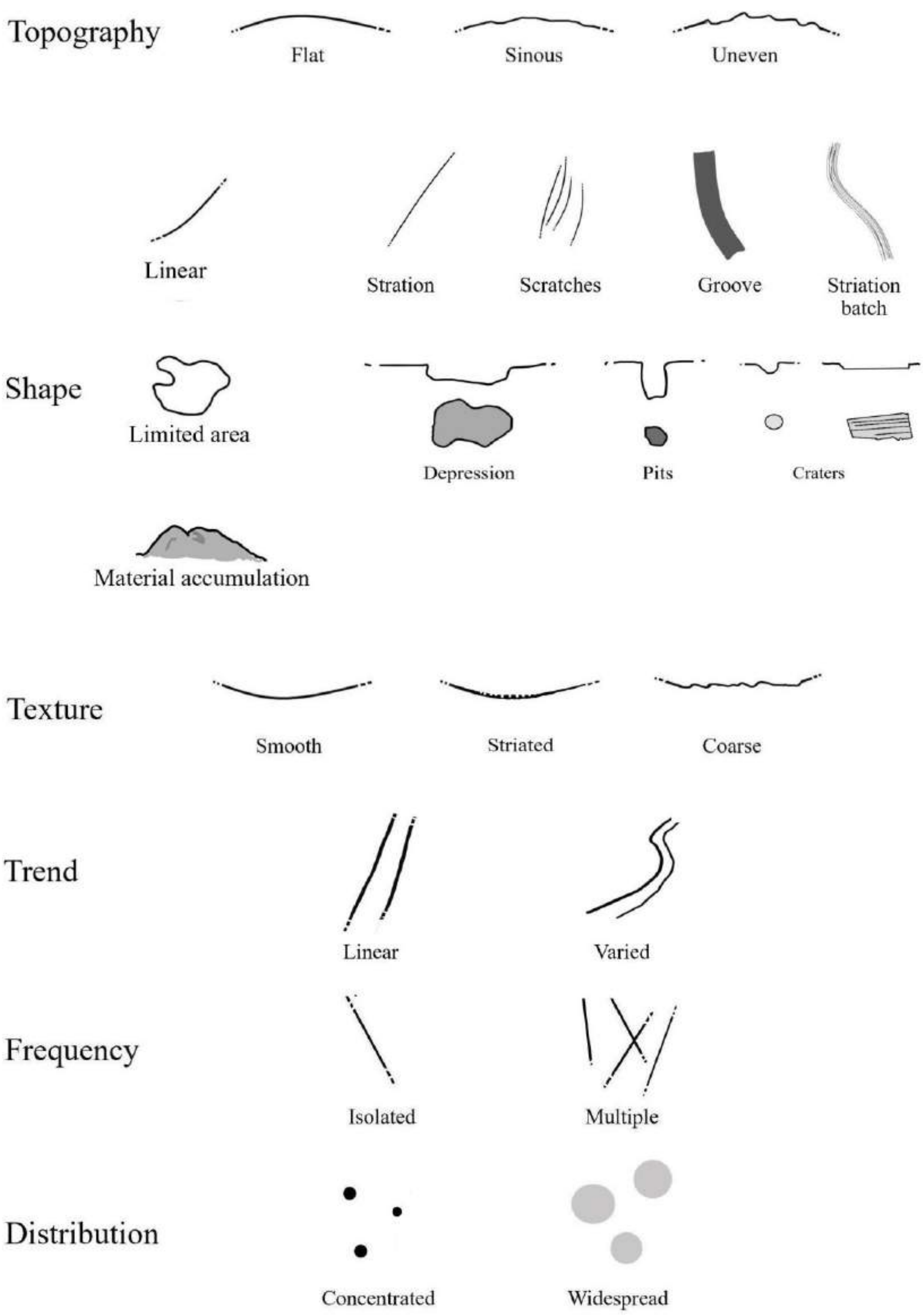
- *Frequency* refers to the repetition of a trace type in the same area;

- *Trend* refers to the direction of the trace. This can be *linear* or *varied*;

- The *incidence* refers to the height and / or depth of the trace in relation to the surface level. It can be *high* or *low*;

- *Asperity* refers to the shape of the vertex. It can be *sharp* or *blunt*;

- *Edge* refers to the morphology of the boundaries of a trace. Edges can be *rounded* or *net* when viewed in section. However, an *Edge* always features either a *straight*, *rounded*, *waved* or *jagged* profile.



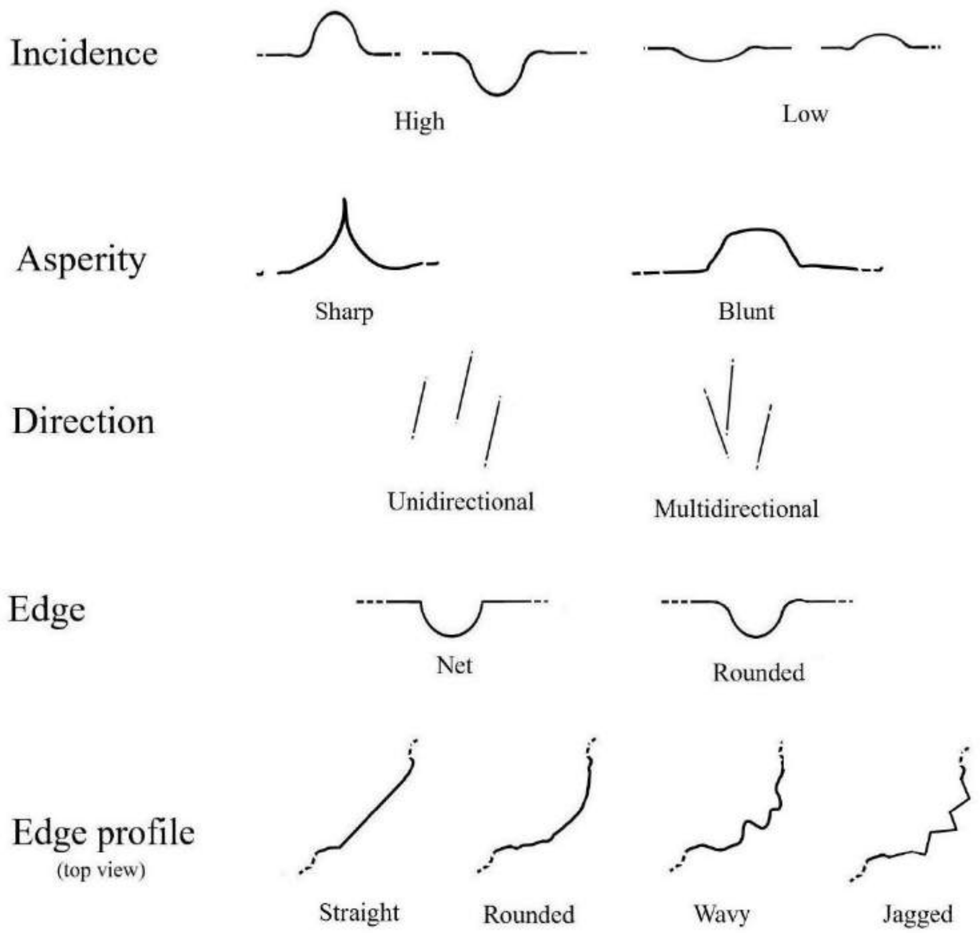


Fig. III.7 Criteria used to describe the Appearance of Traces

- *Distribution* refers to the position of traces in relation to the space they occupy. A distribution can be *concentrated* or *diffused.*
- *Direction*: linear traces can develop *uni-directionally* or *multi-directionally.*

Specific criteria accompany or, in part, replace those shared according to the specificities relating to each phase of trace formation. These will be explained in the following paragraphs.

III.4.5.2 Scores description

Analysis of the technological traces is necessary in order to understand the evidence that stems from the actions of shaping, drying and firing a vessel, that is, the dynamics engaged to produce the vessel. In the case of the Husking Trays, attention is directed to the traces present on their inner surfaces, in particular to the patterns of scores that run along their walls and / or base.

The traces on the surfaces will be analysed according to the general criteria defined above. However, with regard to the score patterns, they will be integrated into or in part substituted by specific criteria designed specifically for them, that is, *shape, arrangement, dimensional section, ends, septa cutters, secondary signs,* and *secondary morphological signs.*

- *Shape*

This criterion is used to describe the shape of the impressions / incisions (fig. III.8). Shapes can be *rounded*, *oval*, *quadrangular*, *triangular*, *half-moon*, *incised* or *grooved*. If the shape varies significantly, it will be indicated with the term *variable*.

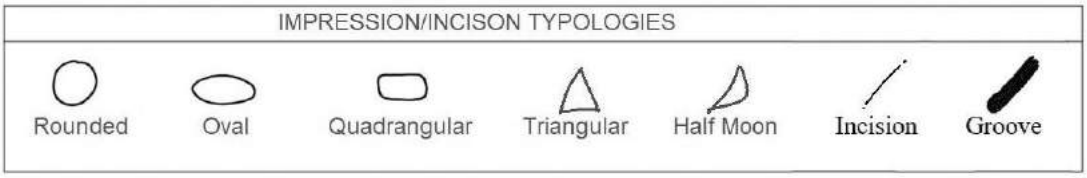


Fig. III.8 Criteria adopted to describe the *Shape* of the Scores

- Arrangement

This criterion is used to define the arrangement of the impressions / incisions (fig. III.9). These can be *symmetrical*, a*symmetrical*, *parallel* or *perpendicular*;

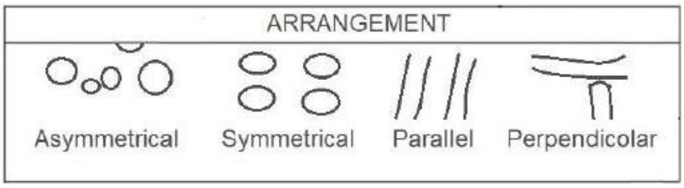


Fig. III.9 Criteria adopted to describe the *Arrangement* of the Scores

- Size

This criterion is used to define the size of the impressions / incisions. In the case of impressions, an indicative diameter will be set. In the case of incisions, each section will be measured. In each case, these variations will be indicated with the term *variable*.

- Section

This criterion is used to describe the morphology of the profile of impressions/incisions (fig. 10).

These can be a:

-*Ua* section with straight walls and a rounded bottom;
-*Ub* section with straight walls and a flat bottom;
-*Va* section with steep walls and a pointed bottom;

-*Vb* section with steep walls and a flat bottom;

- *Ωa* , which refers to section with a swollen top;

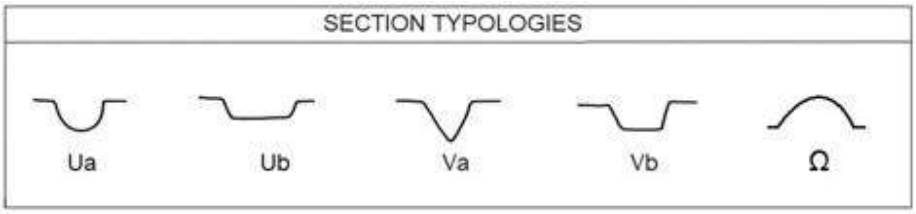


Fig. III.10Criteria adopted to describe the Profile of the Scores

- Inclination

This criterion is used to describe the inclination of the internal walls of the impressions (fig. III.11). The inclination can be *perpendicular*, *inclined*, *rounded* or *inclined & rounded*.

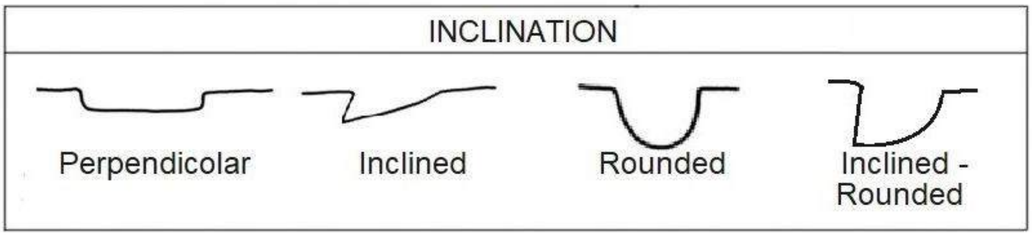


Fig. III.11 Criteria adopted to describe the *Inclination* of the Scores

- Extremities

This criterion is used to describe the morphology at the ends of the impressions / incisions (fig. III.12). Ends can be *flattened*, *semicircular*, *sharpened*, *thin* or *enlarged*.

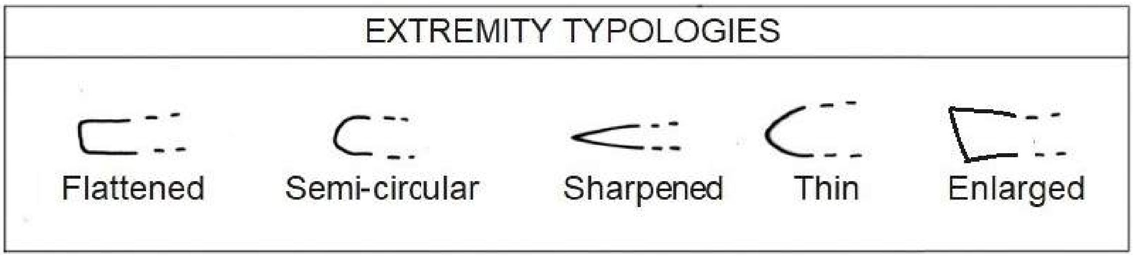


Fig. III.12 Criteria adopted to describe the *Extremities* of the Scores

- Size *setti*

This criterion is used to define the indicative distance between an impression / incision and the next one closest to it. If distances vary significantly, it will be indicated with the term *variable*.

- Secondary signs

This criterion is used to indicate the presence or absence of secondary *striations*, *semi-circular dots* or *pits*.

- Secondary signs of the morphology of the score

This criterion is used to describe the morphology of the secondary elements (fig. III.13). These can be p*erpendicular stria*, *parallel stria*, *variable direction stria* or *pits*.

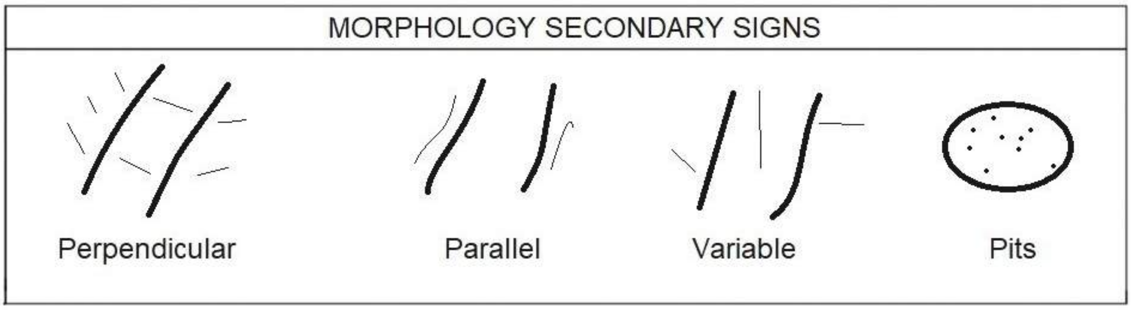


Fig. III.13 Criteria adopted to describe the *Secondary Signs of the Morphology*

- Distribution of Secondary Elements

This criterion is used to define the distribution of secondary elements. These can be *regular* or *irregular*.

III.4.5.3 Wear Description

The analysis of functionality traces allows one to go beyond the simple *intended use*[24] of a ceramic vessel as suggested by archaeological data, morpho-techno-functional analysis or ethnographic comparisons. The objective of this analysis is to infer its *actual use*.[25]

During the phase of use of a vessel, its original topographical surface is altered by actions of adding or losing material.

With this perspective, the term *use-wear* defines the evidence resulting from the removal of material from the surface of an artefact. It is caused by the mechanical and / or chemical alteration of the bonds between particles that constitute the surface of a

[24] sensu SKIBO 1992

[25] DE GARMO, 1975; ERICSON et al., 1972; FENNER, 1977; GRIFFITH, 1978; ROHN, 1971; SKIBO 1992, SKIBO - SCHIFFER, 1987.

ceramic body.[26]

The term *residue* defines the physical evidence that results from the actions of an external contribution of material to the surface of a vessel. The loss of material is often the result of tribological mechanisms.

Tribology is the discipline that studies the superficial interaction between two bodies in relative motion. Here, the wear is interpreted as ‘the progressive transformation of a surface as a result of the relative motion between it and another contact surface’.[27]
Tribological mechanisms such as *fatigue*, *adhesive* and *abrasive activity* often lead to the formation of specific surface damage (fig. III.14 and fig. III.15).[28]
Due to chemical activity and thermal stress, other trace formation mechanisms act regardless of movement following chemical reactions or exposure to extreme temperatures. Finally, the contributions deriving from the addition of organic or non-organic substances, which are deposited on the vascular surfaces, are indicated here with the term *added substances*.[29]

Fig. III.14 Friction Mechanisms on Ceramic Surfaces

Regarding the analysis of traces found on pottery in this work, two types of evidence are considered: at the macro trace level, that is, appreciable on the same ceramic surface at low magnification; and at the micro trace level, where mineral inclusions present in the ceramic paste are visible on the surface at high magnification.

These mechanisms produce patterns of damage that can be schematically collected in groups according to their formation process (table 1):

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26 FORTE 2018: 122.
27 For the definition of the concept of tribology, see Adams et al. 2009: 46 and within QUINN 1971; TEER - ARNELL 1975: 94; CZICHOS 1978: 98; SZERI 1980: 35; ADAMS 1988:310, 1993: 63; 2002a: 25; 2002b: 59; PROCOPIOU 2004.
28 ADAMS 1988, 1993, 2002a, 2002b, 2009.
29 VIDALE 1990.

Fatigue Wear

Fatigue Wear is the result of mechanical stress that is produced following some type of impact or pressure (fig. III.14).[30] Here, on the ceramic surface and on the mineral inclusions, traces can develop in the shape of *spall detachment fractures*[31] or *craters*.

Craters are types of pits often found on pottery surfaces. They are formed as a consequence of the interaction between surfaces, ascribed to the impact of fragile clay parts or mineral inclusions. This activity reveals itself as:

- Small, ovoid-shaped craters due to the loss of mineral inclusions; and / or
- quadrangular-shaped voids with inner uni-directional striations of the plant inclusions that disappeared during the firing phase of the pottery.

Adhesive Wear

The adhesive mechanism occurs when two bodies in contact with each other form inter-molecular bonds of great strength. When separated from each other, fragments of the surface of one detach and remain stuck to the surface of the other (see fig. III.14).[32]

The macro trace that this mechanism develops is described here as *rip*. This is a composite trace that could be described in general as being a shallow, flattened area, lighter in colour and bordered by irregular edges its internal texture is coarse with distinguishable craters.

The micro traces developed on mineral inclusion surfaces take the form of depressions or pits depending on the crystalline structure of the mineral itself.

Abrasive Wear

Abrasive Wear is the result of a sliding motion of varying harshness between surfaces that are in contact with each other (fig. III.14). In this case, traces such as *striations*, *scratches*, *grooves*, *depressions*, *levelling*, *rounding*, and *craters* are evident.[33] Abrasion can also cause an increase in reflectivity of the mineral inclusions; this is defined as *polish*.

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30 FORTE 2018: 122; ADAMS 2009: 47; 2014: 133.

31 FORTE 2018; ADAMS et al., 2009 and references therein; SKIBO - SCHIFFER 1987.

32 ADAMS 2009: 46; ADAMS 2014: 132.

33 ADAMS et al. 2009 and references therein; ADAMS 2014: 133; FORTE 2018; SCHIFFER - SKIBO 1989; SKIBO 2015.

Corrosive Wear

Since pottery is a porous material, it tends to absorb external substances, especially liquids. These can alter the chemical bonds that bind the surface particles, so creating corrosive wear in the form of *depressions* or *pits*.[34]

Thermal Stress

Exposure to extreme temperatures can alter the mineralogical structures of the ceramic mixture causing *thermal stress* or *thermal shock*, which in turn can cause *fractures, cracks,* and *spall detachment*.[35]

Adding Material

All types of external materials of various types (organic and non-organic) that stick to the ceramic body are known as *residues*.[36]

All these mechanisms, as described above, exist only on a theoretical level. Generally, multiple mechanisms act simultaneously and interact with each other. Moreover, they are often mediated by intermediaries that promote or inhibit wear.[37]

Examples of complex mechanisms are as follows:

Adding Material & Thermal Stress

The often bright and compact amorphous, blackish spots, generated by dehydration due to the carbonisation of organic matter such as food, are termed *charred encrustations*.[38]

Similar in appearance to the *charred encrustations*, and sometimes more opaque and blurred in appearance, are the traces of *soot*; these are caused by the incomplete carbonisation of firewood.[39]

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34 ARTHUR 2002, 2003 ; FORTE et al. 2018; SKIBO 1992, 2015.

35 HALLY, 1983; SKIBO, 1992, 2015; FORTE et al. 2018: 129

36 ADAMS et al., 2009: 46.

37 TEER - ARNELL 1975: 94; CZICHOS 1978:98; SZERI 1980:35; ADAMS 1988: 310, 2002a:25, 2002b;PROCOPIOU 2004.

38 ADAMS et al. 2009; FORTE et al. 2018; HALLY 1983; SKIBO 1992.

39 SKIBO 1992, 2013; FORTE et al. 2018: 129.

A general *darkening* of the surface develops when a ceramic surface, which has already absorbed lipid substances (oils/fats), is exposed to high temperatures.
To indicate the contextual activity of tribological and chemical mechanisms, the term ***tribo- chemical mechanism*** has been coined.[40]

Adhesive & Chemical Activity

Crumbling is produced when very low energy detaches clay particles. This happen when the contact between the ceramic surface and the other surface is mediated by substance like fat or oil. The activity produces a brittle surface.

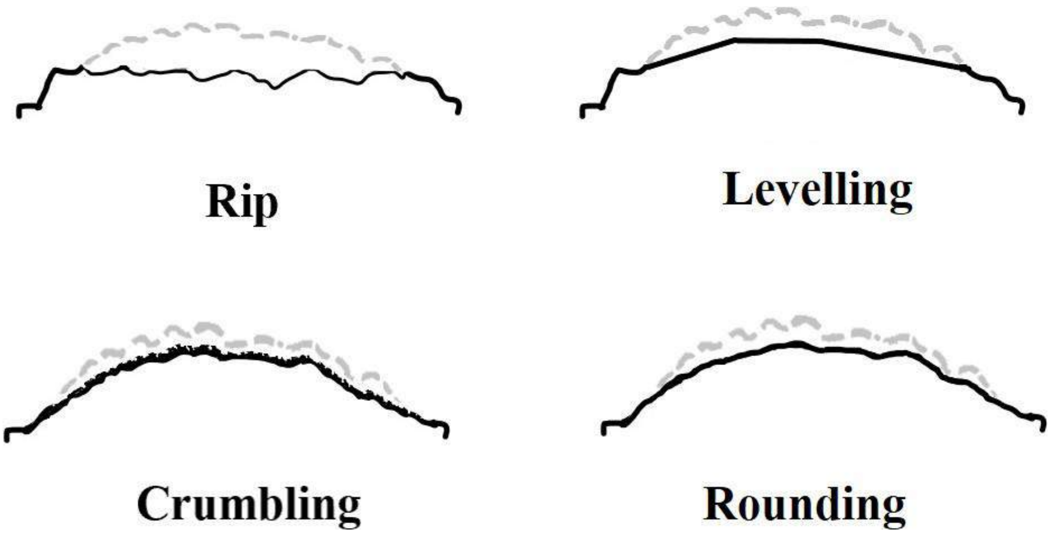

Fig. III.15 Main alterations to the ceramic surface compared to their original topography developed during the experimental trials of this research work.

The Descriptive Variable

In order to describe the use-wear in a coherent way, a series of standardised descriptive criteria are used taking into consideration previous works of this nature.

Topography and *Micro Topography* both refer to the original surface of the vessel before it is subjected to use. It can be described as either *flat*, *sinuous* or *uneven*.[41]

Texture refers to the morphology of the internal surface of
the trace. It can be *smooth*, *striated* or *coarse*.

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[40] ADAMS et al. 2009; ADAMS 2014; FORTE et al. 2018: 123.
[41] ADAMS 1986; ADAMS et al. 2009; FORTE et al. 2018: 122; SKIBO - SCHIFFER 1987.

Shape refers to the general appearance of the wear and tear.
It can be a *linear* or an *enclosed area*. The area can be regular, that is, if it has a general geometrical morphology, or irregular.

Frequency refers to the quantity of varieties of traces in an area. They can be isolated or multiple.

Distribution refers to the location of traces in relation to the quantity of traces in an area. A distribution can be concentrated or widespread.

Incidence refers to the depth of a particular instance of wear and tear in relation to the surface level. It can be shallow or deep.

Direction
Linear traces can develop in a unidirectional or a multidirectional way.

Edge refers to the morphology of the boundaries of the trace.
Edges can be rounded or net if seen in section, or present a straight, rounded or wavy profile. Once the vessel, intact or in fragments, has been abandoned by its original function, it can also be put to completely different uses from its previous one.[42] In this case, the previous tracks would be superimposed upon by those of secondary use. Thus, these traces fall within the field of use and should be evaluated according to the same criteria as set out above.

4.5.4 Post-Depositional traces description

Once the vessel / fragment has been completely abandoned, the object may become subject to a variety of non-intentional phenomena before being buried.

All the phenomena that occur between the burying of the artefact and its retrieval in an archaeological context belong to the taphonomic process. In this phase, the artefact endures physical and chemical alterations that are able to modify its macroscopic aspect, mineralogy, composition and microstructure.[43]

[42] Recycled potshards: VAN GIJN - HAUFMAN 2008; VIEUGUÉ 2015.
[43] MARITAN 2020: 198-199; SCHWEDT et al., 2006.

Post-depositional traces appear on the surface of the artefact.

Their composition mainly depends on the characteristics of the fragment and the environmental conditions surrounding it, that is, climate, temperature, the sedimentary environment, the degree of leaching of water, depth, context and so on.

Finally, the materials found are removed and studied, and then either stored or put on museum display. Even during this phase, further surface traces can be created. They are referred to as *Post-retrieval Traces*.

Post-depositional alterations on the surface of artefacts, and in particular the 'soft' pottery items, can overlap the pre-existing traces[44] or simulate them, so creating possible misunderstandings in interpretation.[45] This fact is particularly significant for the study of pottery, since some of the typological classification are based on the features of surface finishing.[46]

The main criterion for distinguishing post-depositional traces from other types of traces is by their arrangement on the surface; in the case of post-deposition traces, they do not follow any consistent pattern.[47]

Starting from its burial, a fragment can undergo various types of alterations. The underground movement, and so the mechanical activity, is limited even though not totally absent; rather, chemical activity is quite high and mainly depends on the compositional makeup of the soil. In any case, the mechanisms acting on the artefact are of a *tribo-chemical* nature.[48]

[44] FORTE – LEMORINI: 2017:167
[45] LEVI SALE 1986: 242; TSCHEGG 2009: 2156;
[46] SHEPARD 1956.
[47] SKIBO - SCHIFFER 1987; O'BRIEN, 1990.
[48] Post-depositional experiments on pottery fragments are ongoing.

Skibo Classification (1992)		Tribological Mechanisms	Use-wear: Visible Macro Traces	Use-wear: Visible Micro Traces
Attritions	by Mechanical Friction	Fatigue Wear	Spall detachment	Spall detachment
			Fractures	Fractures
			Pits	Pits
		Adhesive Wear	Rips	Depressions
				Pits
		Abrasive Wear	Striations	Striations
			Scratches	Scratches
			Grooves	Grooves
			Depressions	Depressions
			Levelling	Levelling
			Rounding	Polishing
	Without Mechanical Friction	**Chemical Mechanisms**		
		Corrosive Wear	Depressions	Depressions
			Pits	Pits
		Thermal Mechanisms		
		Thermal stress	Fractures	Fractures
			Cracks	Cracks
			Spall detouchment	Spall detouchment
			Discolouration	Discolouration
Carbonisations			Soot	Soot
		Added Material	Charred encrostations	Charred encrostations
Residues			Organic residues	Organic residues
			Darkening	
		Tribochemical Mechanisms		
		Abrasive+Corrosive Wear	Striations	Striations
			Scratches	Scratches
			Grooves	Grooves
			Depressions	Depressions
			Levelling	Levelling
			Rounding	Polishing
		Attraction+Corrosive Wear	Crumbling	
			Rounding	Rounding

Table III.1 Summary table of the wear mechanisms (elaborated from Forte et al. 2018).

Chapter IV

FUNCTIONAL HYPOTHESES & ETHNOGRAPHIC ANALOGIES

IV.1 INTRODUCTION

As mentioned in the previous chapter 2, during the 80-year period from their earliest inception, three hypotheses were put forward. These were based on ethnographical comparisons regarding the function of husking trays (HTs) and are as follows:

- the husking hypothesis
- the cheese or soft-food processing hypothesis, and
- the baking hypothesis.

These ethnographical analogies constitute a strong reference point from which to begin researching with the aim of understanding the function of such an ancient artefact.

In this chapter, they will be recalled and further investigated.

IV.2 HUSKING HYPOTHESIS

The hypothesis that the HTs were used for husking was first suggested by Lloyd and Safar, who discovered fragments pertaining to this pottery shape at the site of Tell Hassuna.

They tentatively attempted to imagine a function for this kind of vessel, suggesting that they could have been used for husking.[1]

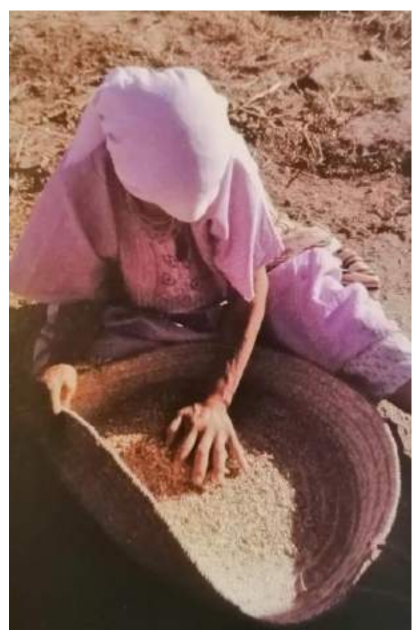

Fig. IV.1 A Rifian Farmer rubbing cereal spikelets against the inner surface of a basket (PEÑA-CHOCARRO - ZAPATA 2014: 230).

[1] LLOYD - SAFAR - BRAIDWOOD 1945: 277-278.

In reality, these scholars did not provide any reasoning to justify this suggestion, nor did they explain how husking activity would have been carried out using these vessels.

They most likely made the connection by way of the shape of the archaeological vessel, scored on the inner surface, with the ethnographically well-know baskets used in many traditional contexts throughout the world as huge graters for husking crops.

Husking (or de-husking) is, in general, the activity carried out to remove the dry outer cover of crops, in particular cereals.

In fact, after the early stages of the crop production sequence, that is, thrashing, winnowing, sieving and sometimes parching, hulled cereals need to be de-husked to be edible.[2]
For example, in the Rif, Morocco, cereal spikelets obtained by way of threshing, are rubbed, thanks to a circular piece of cork, against the inner surface of baskets in order to free the grains from the tough glumes that envelope them (Fig. IV.1).[3]

IV.3 DAIRY PRODUCTS PROCESSING HYPOTHESIS

Due to the presence of impressions on the internal base, a possible analogy to the HTs was suggested, that is, a pottery shape nowadays used for processing a kind of diary product, *kurut*.[4]
Kurut comprises a range of cheeses[5] made out of drained yogurt or sour milk. It spread throughout the Near Eastern area.

Fig. IV.2 Melting *kurut* in a modern pot.
(https://www.youtube.com/watch?v=fh4_aq4xBYc)
06/09/2020

[2] HILLMAN1984; PEÑA-CHOCARRO - ZAPATA 2014; STEVENS 2003.
[3] PEÑA-CHOCARRO - ZAPATA 2014.: 231.
[4] KILIÇBEYLI 2005: 173-175.
[5] https://en.wikipedia.org/wiki/Kashk 15/05/20

Different variants of this traditional food exist according to the region in which it is produced. It can assume different names, that is, *yoğurt* or *katık keşi, kashk*, *keş peyniri*, *kurut*, *taş yoğurt,* and *kuru*.

In Turkey, its production is particularly widespread in Central-Eastern Anatolia, including the provinces of Kars, Bitlis, Erzincan, Erzurum and Bayburt.

In general, yogurt or sour milk is filtered, drained, salted and shaped, usually in the form of balls, or cut into strips or pieces. Thus, once dried, it becomes easily transportable and can be consumed for up to one year.

Fig. IV.3 A *Çanak* for holding *kurut* (ERTUĞ 2004: 2 fig. 1)

In order to be consumed, it must be crushed and mixed in water so as to once more become a sort of yogurt (fig. IV.2) that can be drunk directly, or it can added to soups such as *keşkek* or *erişte*.

Fig. IV.4 *Çerze* from Uslu (GÜNER 1988:32, Fig. 39).

This operation took place in large clay bowls, with an internal, impressed surface that could be described in different ways depending on the area of origin; for example, '*Kurut Kabı*' (Drying Bowl) from Sivas, '*Kurdezen*' from Bitlis, '*Sırlı kurut'*, '*Çanak*' or '*Çerze*' from the Uslu area (figs. IV.3, IV.4).[6] The pot, as a result of the depth of the finger-impressions on the inner base, acts as a large grater. Against this surface, the *kurut* mixed with water is rubbed. Nowadays, there is also a modern metallic version of the pottery shape.

[6] ARISAN- GÜNAY, 1980: 59, 63,73; ERTUĞ, 2004: 86; GÜNER, 1988: 32; KILIÇBEYLI 2005: 173-175; KOŞAY, 1957: 19.

Despite its variants, the main characteristics of the pottery shape remain the same as they are strictly related to its function:

- the large size of the base allows a back and forth movement of hands and of yogurt diluted in water;
- the height of the sides prevent liquid from splashing outside the container during the activity and enable the stirring of the concentrated *kurut* with water in order to produce yogurt;
- the pouring device allows the liquid to be poured; and
- the handles permit the vessel, when it is heavy due to its contents, to be reclined in order to pour the liquid out.

IV.4 BAKING HYPOTHESIS

The most well-known hypothesis in which HTs were used for baking was suggested for the first time in 1983 by M. Voigt.

She noted that, as well as the other trays from Hajji Firuz Tepe, the external surface of their bases were "completely oxidised" suggesting that they were used for cooking.

Fig. IV.5 A man weighing "*sang-ak*" produced bread in the bazaar, in the late 19th century (https://oi-idb.uchicago.edu/id/70ced752-61f8-4dec-86d2-95922ce67aa2 01/06/2020).

She continued: "when heated, their textured, matte interiors would have provided a surface on which a thin layer of dough could have been cooked and removed with a minimum of sticking" similar to the *sang-ak* oven (Figs. IV.5 & IV.6). This is a particular type of oven widely used in the Iranian and Azerbaijani areas to bake bread. It is a domed oven and its base is covered with a bed of small pebbles.[7] Upon heating, a thin layer of dough is set on the base, which allows the dough to bake and avoid sticking.

Moreover, Voigt noted that in contradiction to the HTs shards, the domed ovens of Hajji Firuz Tepe do not belong to earliest levels, but only hearths with raised rims[8].This

Fig. IV.6 Baking steps of *sang-ak* bread (elaborated from POURAFSHAR et al 2010: 14).

fact would support the idea that the HTs served as portable ovens before the appearance of the domed oven.
In conclusion, she interpreted HTs as possible portable ovens for baking thin layers of bread.

Beyond the ethnographic analogy with the *sang-ak* oven suggested by Voigt, currently, in traditional contexts around the world, a large variety of trays exist for baking[9], that is, *prosphora*[10], *tajin*[11], *gālib gerāṣ al-ʿīd*[12], *bache*[13], *tabag*[14], *ponitse*[15], *ekmek sacı*[16], and *testo*[17]. Several of them present signs of manipulation of their inner surfaces, and as regards *bu-frah*[18], *crepulja*[19], and *pileki*[20] a comparison with the HTs was proposed by several

[7] POURAFSHAR ET ALII 2010; IZADI NAJAFABADI et ql. 2015.
[8] Marie Voigt, personal communication.
[9] Regarding the Mediterranean area, see BALFET 1975.
[10] MISHKOVA 2007.
[11] DI GENNARO - DEPALMAS 2011.
[12] BRESENHAM 1983; MERSHEN 1985.
[13] ARTHUR 2014.
[14] OCHSENSCHLAGER 1974.
[15] EFSTRATIOU 1992, 2014.
[16] UZUN - UZUN 2001b:378; ERTUĞ 2004; DOĞAN 2013.
[17] MANNONI 1965: 49; GIANNICHEDDA - ZANINI 2011; PRUNI 2003;
see also https://www.youtube.com/watch?v=KYMSxBMEbkA 28/07/2020
[18] CONTENSON 1992: 155; KILIÇBEYLI 2005: 172.
[19] BALOSSI – MORI 2014: 53-55; TARANTO 2020a: 33.
[20] Halil Tekin, pers comm.

scholars in the past. For the purposes of this investigation, it will be useful to further amplify some of these cases.

IV.4.1 *Bu-frah*

Bu-frah was the first example of a tray linked to the HTs. In 1992, when the archaeologist Contenson[21] wrote about the HT fragments found in Ras Shamra, he suggested a comparison with the trays used in Ait Smaıl, Djurdjura, Northern Algeria (fig. IV.7).[22]

Fig. IV.7 *Bu-frah* (a) during baking (b) from the Village of Bou Nouh (BALFET 1955: 295).

These commonly used baking trays are circular in shape, ca. 35 to 40 cm in diameter. Their sides are very low and quite everted, while their rims are flattened. In two opposite points of the rim, two small, triangular extensions rise. The most notable characteristic of this type of tray is the interior surface, which is accurately decorated in relief using geometrical patterns.

As stated by the scholar, the objective of decorating the bread has a clear functional purpose, that is, to isolate the bread from the hot surface of the vessel, thereby avoiding the burning of the dough.[23]

[21] CONTENSON 1992: 155.
[22] BALFET 1955: 292.
[23] Ibidem.

IV.4.2 Baking Pots in Anatolia

The Anatolian area is extremely rich in bread typologies and baking traditions.[24] However, while they are dying out, especially in the rural area, the technique used to bake bread in a pot still remains.

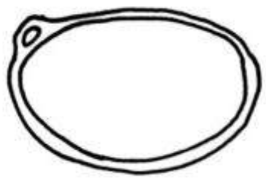

Fig. IV.8 *Ekmek duvaği* (ERTUĞ 2004: 92 fig.1)

A large variety of baking pots exists. These can be used for baking in different conditions: different types of fire installations, different varieties of flour and various cooking techniques. Thus, bread baking in pot results in several different types that often overlap and so boarders are "fuzzy": *kömeç*, *akitma*, *yufka*, *gözleme*, *bazlama*, *pide*, *lavaş, şebit,* and *cadı* etc..[25]

The vessels used for this activity are, for example, *ekmek sacı*, *ekmek duvaği* (fig. IV.8), *bazlama sacı*, *çomlek sacı*, *sac taşı*, *saç kaya*, *ekmek tepsisi*, *tepsi*, *ekmek tavalar* (fig. IV.9), and *pileki*.[26]

Fig. IV.9 *Ekmek tavalar* shaping in the Eskişehir district (GÜNER 1988:42, fig. 64).

The internal surface of several of them are incised or impressed.

[24] DOĞAN 2013; http://www.turkish-cuisine.org/search.php?search=bread 11/09/2020

[25] UZUN - UZUN 2001a: 150; 2008: 37; DÜNDAR 2019: 55-56;

The most studied case of the "baking in a pot" tradition here is the *pileki*

IV.4.2.1 *Pileki*

The term *pileki* refers to a tray or a two-piece tray, circular in shape with a wide base and low sides, in which the bread is mainly baked in the hearth using the technique of pre-heating the pot.[27]

Until the 1970s, these were quite widespread in Anatolia; in the North-East they are still used, albeit in a limited way.[28]

Two large families of *pileki* exist based on the material from which they are made, that is, the *taş pileki*[29] in stone, and the ceramic *toprak pileki* (fig.IV.10).[30]

Fig. IV.10 *Taş pileki* on the left and *toprak pileki* on the right (DOĞAN 2014: 103; ÖZTURK 2018: 469)

Often, in the same provinces, both *taş pileki* and *toprak pileki* are used. However, preferences according to area may be found (fig. IV.11).

Taş pileki were much more diffuse along the shores of the Black Sea, as in the provinces of Ordu, Rize, Bayburt, Trabzon, Samsun, Sinop, and Bartın, but they were also used in Adapazarı, İzmit, Bursa, and Bilecik. Outside Turkey, very similar vessels are also used in

26 GÜNER 1988: 38, 42; UZUN - UZUN 2001b: 378; ERTUĞ 2004: 86; ANGLE - DOTTARELLI 1989: 386; KALAKAN 2016: 1083; BIÇER 1996:69; ÖNEN 2000: 290.

27 *Pileki* can also be described according to its region of origin; for example, *bileki*, *bileği*, *pilek*, and *pilik* (see: DOĞAN 2014:103).

28 UZUN – UZUN 2001a: 151-152; DOĞAN 2013; 2014.

29 UZUN – UZUN 2001a, 2008; DOĞAN 2014.

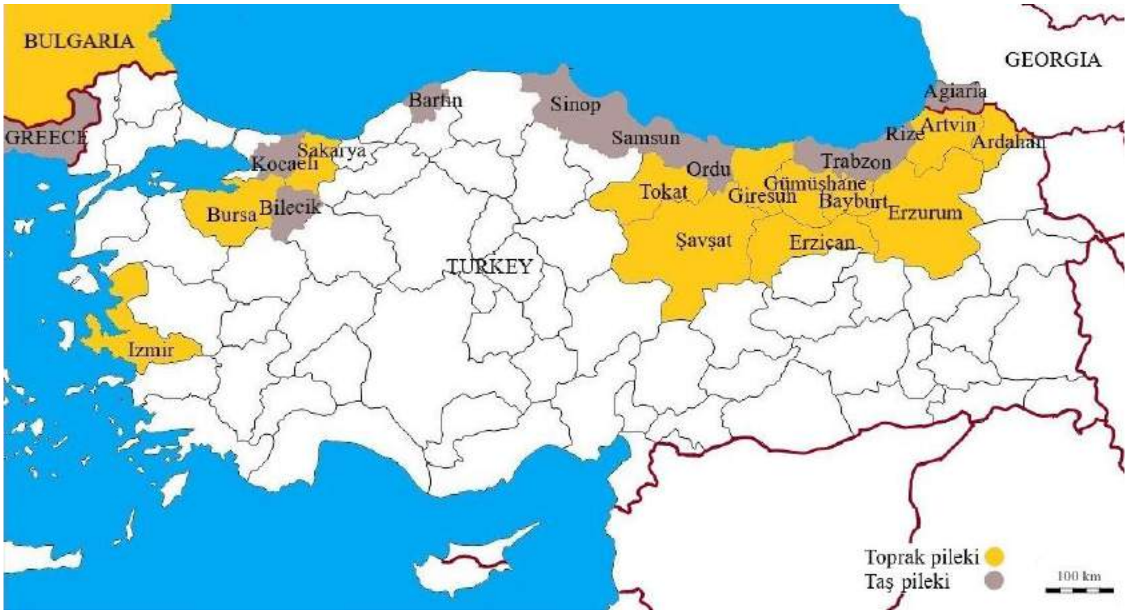

Fig. IV.11 Preferences by province regarding the type of *pileki* used (map elaborated by the writer)

the Balkans, for example, in Northern Greece (Alexandroupolis) and Georgia (Batum);[31] *Toprak pileki* were more diffuse in the interior, that is, in the provinces of Artvin, Ardahan, Tokat, Gümüşhane, Şavşat, and Giresun, but they were also known in Bayburt, Erzincan, Erzurum, Ordu, Rize, Trabzon, and Samsun. Moreover, *toprak pileki* were also used in Western Turkey; for example, in Sakarya, Bursa, and the Kemalpaşa area. Very similar vessels are used in the Balkans and Southern Bulgaria (Koşukavak).[32]

Breads made of different types of flour are produced by all *pileki*; mainly from corn or wheat flour, and more rarely from other cereals such as barley, millet, rye or oats. Different types of flour can also be mixed together.

In the western regions of Anatolia, wheat flour is more commonly used, while in the Black Sea region corn is used. This essentially depends on the type of local resources available. In fact, in the Black Sea region, corn (unknown before the discovery of America) was extensively grown in the 19th century. Here, at least until the 1960s, a large production developed thanks to the favourable climatic conditions for this crop, which is now supplanted by that of tea.

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[30] UZUN – UZUN 2001b.
[31] UZUN – UZUN 2001a:150,160; DOĞAN 2014: 103, 105, 110.

Before the introduction of this crop, *pileki* could be used for baking bread made from other types of flour.

Different types of bread are made with *pileki* depending on the ingredients and thickness; for example, *ekmek*, *yufka*, *gözleme*, *bazlama*, *miroloto*, *koloti*, *hapsikoli*, *maşin*, and *çumur*, etc.[33]
Basically the breads are based on flour, water and salt. Breads can be leavened, especially those with wheat flour; the other ingredients depend on regional traditions and the availability of local products, e.g. anchovies, oil, yogurt, nuts, flour, beans, dry cream, cabbage, chard, onion, butter and tallow.[34]

In some regions, *pileki* is also used for the preparation of other dishes. A special case is the *hamsi pilekisi*, a small oval stone *pileki* used for cooking fish, and which has a slightly inclined base with a hole for the cooking liquid to escape.[35]

In the past, these vessels could also be exchanged for agricultural products.[36] Despite a certain local variability[37], a strong homogeneity both in the production procedures and in use distinguishes the culinary tradition of *pileki*.

Some specific ethnographical cases recently reported by various scholars will be commented on further on in this work.[38]

4.2.1.1 *Taş Pileki*

IV.4.2.1.1.1Production Sequence

Taş pileki is obtained by carving basalt rocks that are soft enough to be worked, but strong enough to withstand heat; indeed capable of transmitting absorbed heat.[39] Depending on the area, the rock comes from caves or open-air quarries (fig. IV.12a).

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[32] UZUN – UZUN 2001b:379-380. DOĞAN 2013; 2014; ÖZTURK 2018: 464.
[33] ÖZTURK 2018: 465; DOĞAN 2014: 119-120.
[34] DÜNDAR 2019:55-58; DOĞAN 2014: 119.
[35] See: UZUN – UZUN 2001a: 169; 2008; DOĞAN 2014: 106.
[36] UZUN – UZUN 2001a: 165.
[37] UZUN - UZUN, 2001b: 379-384; 2008: 61; DÜNDAR 2019: 57.

A block of stone extracted from the rocky bank is roughly in the shape of a circular basin (ca. 30 to 55 cm in diameter) with very thick walls (2.5 to 4 cm) and a height of approximately 7 to 15cm (fig. IV.12b). The vessels are produced according to pre-established measurements.[40] The family baker chooses whether to use a smaller or larger one according to the needs of the family.

The *pileki* is then more accurately carved (fig. IV.12c). Thanks to sharp, compass-like tools the internal surface of the vessel is carved in order to create specific patterns called *zina* (fig IV.12d). These patterns are considered a signature of the craftsman and his school, who created the vessel. They provide us with information about who the vessel was made by and its origin.[41] Finally, its external surface is polished (figs. IV.12 e & f).

Fig. IV.12 Steps of the production sequence of a *taş pileki* in the Çarşamba district, Samsun. (elaborated from https://www.youtube.com/watch?v=pjPUf5mdljo)

IV.4.2.1.1.2 Use

Taş pileki is also used during the pre-heating technique. Once the fireplace is lit, the *taş pileki* is placed on supports or a tripod, with its interior surface facing towards the flames (fig. IV.13.b). Once its colour changes, it indicates that it is heated and can be turned. Its internal surface is cleaned with a rag and sprinkled with flour or covered with green leaves

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[38] In particolar see: UZUN – UZUN 2001a, 2001b, 2008; DOĞAN 2014; ÖZTÜRK 2018.
[39] DIZMAN, 2017: 48; ÖZTURK 2020: 668.
[40] For example, in the Rize region there are 5 sizes of *Taş Pileki*: '*büyük kotluk'*, '*kotluk'*, '*üç çeyrek kotlu'*, '*yarım kotluk'* and '*çeyrek kotluk'*. (UZUN – UZUN 2001a:149)
[41] DOĞAN 2014: 105.

(fig. IV.13a,c,d). Then the dough, usually made of corn or wheat flour, is put inside the vessel. The leaves and flour have the purpose of avoiding direct contact between the ceramic surface and the dough in order to prevent it from sticking, as well as flavouring it.

Finally, a metal lid is placed on it and covered with the still-burning embers of the hearth. It is left to bake for one hour. In this way the bread can finish baking(fig. IV.13e,f).[42] The baking of corn-bread usually takes place in homes on a daily basis.

Fig. IV.13 The baking stages of corn bread using a *taş pileki*
(elaborate from https://www.youtube.com/watch?v=gHnfAhiqp7w&t=171s)

IV.4.2.1.2 *Toprak Pileki*

The clay used for the production of a *toprak pileki* is generally from areas near the village. Its shape is circular and its size varies from 30 to 45 cm in diameter at the base. The height is between 4 and 8 cm. The walls are very thick, 3 to 4 cm.

Further, on the sides of the *pileki* there are 2 or 4 handles applied in a symmetrical way. Their dimensions are proportional to the size of the vessel.

Toprak pileki can be used in pairs or as a single piece. The two pieces of a *pileki* pair have the same diameter, but different heights: the lower *pileki*, used as the real container of the dough, is deeper than the upper one, used as a lid.

[42] For further details about the use of Taş Pileki in İyidere (Rize): DOĞAN 2014: 114-119. For other examples see: UZUN – UZUN 2001a; 2008.

Toprak pileki are usually produced and used by women. In general, they are simply shaped by hand, but also local specificity exists, that is, by hand / foot wheel[43] or using a wooden mould.[44]

Recent ethnographic research enables a better understanding of the shaping procedure sequence and the actual use of this pottery shape in North-Eastern Anatolia.

IV.2.1.2.1 Production Sequence

Fig. IV.14 The potter *bağdagül usta* Safura Yıldırım (ÖZTURK 2020: 667).

The production sequence of *toprak pileki* was studied and documented in a small village, Söğütlükaya, in the district of Posof, Ardahan.[45] Here, the *toprak pileki* production technique,performed by one of the last women who knew how to carry out this activity, that is, Safura Yıldırım (fig. IV.14), was documented. She was born in the nearby village of Aşık Zulali where she learnt to produce *pileki* from her mother. Her mother, in turn, was a native of another village, Posof-Cacun. When Safura was married, she moved to the village of Söğütlükaya were she kept making *pileki* as she had learnt.

Traditionally, the *pileki* are produced only by women, even though, in certain cases, men can produce them as specialist potters. *Toprak pileki* are only made during the summer season due to the problems that the harsh winter conditions, particularly hard in this region, can create both as regards the recovery of the clay and the formation of the vessel itself.

The *toprak pileki* is a two-piece tray. The clay used in the construction of *pileki* is found not too far from the village. This is dry sieved (fig. IV.15a) and, subsequently, water is added to the soil and kneaded with the foot in a large metal basin for about half an hour (fig. IV.15b).

Firstly, the floor where the shaping activity will take place is sprinkled with dry soil and straw (fig. 15c), thus preventing the clay from sticking to it.

[43] ÖZTURK 2018.

[44] Wooden moulds are used in the Sakarya and Tokat areas to produce *toprak pileki* (UZUN – UZUN 2001b: 379; DOĞAN 2014: 110)

[45] ÖZTURK 2020.

A large 2.5 to 3 cm thick circle is then made from the paste, which forms the base of the tray (figs. IV.15d, e). This is then measured with a string in such a way that another *pileki* of the same size can be shaped; it will constitute the upper *pileki* of the pair.

The perimeter band of the circle is then folded vertically so as to form the sides of the vessel (fig. IV.15f). The result is a vessel whose base diameter is around 40 cm with sides 8 to 10 cm in height (fig. IV.15g).[46]

The surface of the vessel is then finished by smoothing using simple water (fig. IV.15h).
The first of the two handles (fig. IV.15i) is then affixed on the side. To help align the other handles, the potter traces perpendicular grooves with her finger on the inner surface of the vessel (fig. IV.15j). The other handles can then be added to the vessel in the same direction as the lines.
Finally, a longitudinal incision (fig. IV.15k) is made with a sharp tool along the exterior side of the *pileki*. The potter asserts that this prevents possible cracks and breakages due to thermal shock during the firing and cooking phases of the *pileki*.[47] An iron wire is inserted into these grooves and their ends are affixed to each other.
Pileki are left to dry for ten days in the shade. They are then placed in the sun to complete the drying phase.
A second surface treatment is then carried out: the *pileki* are first moistened with water by hand (fig. IV.15l); once the surface is sufficiently moistened, it is scraped with a knife (m); and the vessel is then put back in the sun to dry. In all, drying lasts from twenty days to a month depending on the weather.
As for the firing of the *pileki*, wood and straw are placed under and over the *pileki* and then set on alight. The cooking process is rather short, about two hours, so the *pileki* are not completely cooked except for their surfaces (figs. IV.15n, o).

[46] According to the potter, wider trays would be too fragile to be used.
[47] Feliz Özturk, personal communication.

Fig. IV.15 The Sequence of Production of a *Toprak Pileki* in Söğütlükaya (elaborated from ÖZTURK 2020: 669-672).

IV.4.2.1.2.2 Use

Toprak pileki can be used in different ways, but always throughout the pre-heating technique of the pot. The following are the two ways of cooking bread using *pileki* that were observed by Raziye Altun in the village of Sulakyurt, (Ardahan Province, North-Eastern Anatolia):[48]

Method 1:

Two parts of *pileki* are used simultaneously, that is, a deeper tray acts as a real container for the dough, while a shallower tray has the role of a lid. These are placed almost vertically with the inner surface facing the flames while supporting each other on a pile of wood.[49]

The fire is lit and the is a pause while the wood turns into embers (fig. IV.16a); at this point the two *pileki* are boiling hot. The *pileki* container is overturned and its internal surface dusted with a goose wing (fig. IV.16b). It is then placed on the coals and filled with the bread dough (fig. IV.16c). The *pileki* lid is placed on top of it so that they fit together (fig. IV.16d). The latter is then covered with embers (fig. IV.16e).

Fig. IV.16 *Toprak pileki* used for baking according to Method 1 (elaborated from ÖZTURK 2018: 471).

This whole process takes place very quickly so that the *pileki* is still hot when it comes into contact with the dough.

The baking of the bread takes five to ten minutes in hot weather, and ten to fifteen minutes in cold weather. The bread can then be removed from the vessel (fig. IV.16f).

It would also seem that bread baked in *pileki* is not only preferred for its taste, but also because it remains soft for longer.

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[48] ÖZTURK 2018.

[49] In the past, up to 20 years ago, the fuel of the hearths used to make bread with *pileki* was made up of dung and *kerme* (sheep dung). Today wood and straw are used instead (ÖZTURK 2018).

Furthermore, there are minor local variations of this generic bread baking method. For example, in some villages in the region of Şavaş, after having pre-heated the *pileki*, they remain upright with the aid of a long iron bar (‘*kav’*). Once filled with the bread dough, the vessels are blocked in a vertical stance with heavy stones to prevent them from tipping over. Two fires are lit on both sides to complete the bread-baking process.[50]

Method 2:

It is also possible to bake bread with just a *toprak pileki* tray. It has to be fixed in the ground (fig.17). Then a fire is light on it, pre-heating the vessel. Once the wood turns into embers and the *pileki* is red-hot, it is placed on its side. The *pileki* is cleaned with a goose wing and the dough is placed in it. A plate is placed on top and over it the burning embers.

Due to the heat transmitted by the boiling *pileki* and the heat of the embers over it, the bread bakes completely.[51]

Fig. IV.17 *Toprak Pileki* fixed in the ground and its metallic lid used for baking according to Method 2. (ÖZTURK 2018: 472).

[50] UZUN – UZUN 2001b: 381.
[51] ÖZTURK 2018: 471-472.

4.3 Baking Pots in the Balkans

4.3.1 *Ponitse*

In North-Eastern Greece, a round, shallow tray mainly used for baking bread is to be found.[52]

Fig. IV.18 Serafini in the Mountains of Rhadope (EFSTRATIOU 1992:312).

Different names are used locally to refer to it: *ponitse*, *alta* and *bontze.* The same kind of pottery shape is used in other parts of the Southern Balkans, where it is known as *podnitse* or *tserpa.*

The *ponitse* is a two-piece pottery shape (fig. IV.19) made up of:

- a round flat base, 25 to 50 cm in diameter with low (5 to 7 cm high), thick and straight sides (3 to 5 cm). A longitudinal incision may be present along the external sides of the base; and
- a conical upper part specifically known as a *tsirap*, with a perforated handle on the top used as a lid. A variation of this is the *gastra*, a type of lid (today found in metal, but previously produced in pottery) used by pastoral communities in the Uplands for baking bread. Other lids used for baking in the Balkans are the *peka* and the *cripnja*.[53]

Until the mid-1970s, the *ponitse* were systematically produced and used in the Rhodope Mountains area near the border between Greece, Bulgaria and Turkey (fig. 18) by the Pomak communities, a slav-speaking Muslem minority group living this area. Due to political reasons, the area remained isolated, that is, without roads or electricity, until the 1990s; thus, to a certain extent, the area maintained its old customs. In fact, until that time, the *ponitse* were occasionally produced and used.

This peculiar situation allowed the last surviving handmade pottery of the Balkans tradition, together with its social context and use to be observed. Thus, from the 1990s, this

[52] EFSTRATIOU 1992, 2014; GOURGIOTIS, 1994; VALMOTI 2002: 10.
[53] EFSTRATIOU 1992: 314-315.

pottery became the focus of study of an ethnographic research project mainly developed in the village of Sarakini.[54]

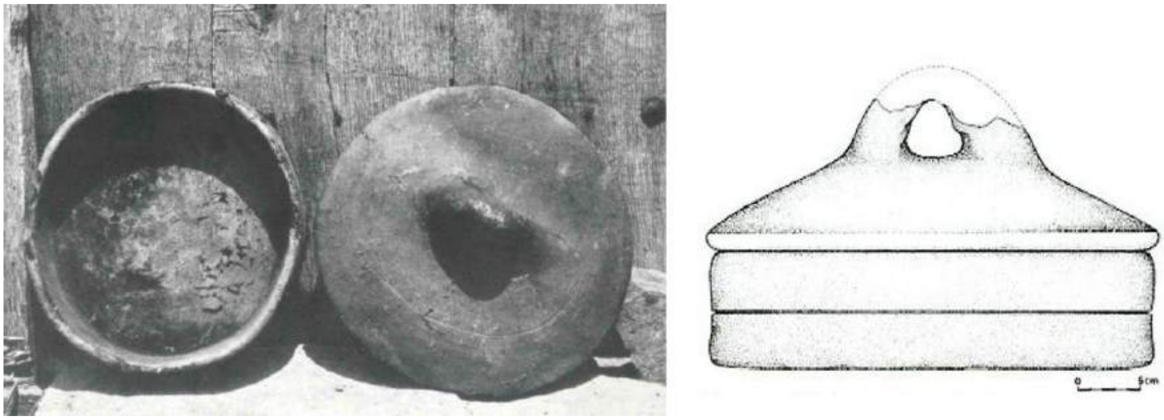

Fig. IV.19 A Photograph and Drawing of a *Ponitse* (EFSTRATIOU 1992: 314 and 2014: 23).

In this thesis, the production sequence, the function and the role of the *ponitse* was investigated in three ways:

- by reproducing the vessels thanks to the help of two women who have been producing them since they were young[55];
- by interviewing villagers pensioners and recording their oral memories; and
- by carrying out ethno-archaeological experiments.

IV.4.3.1.1 The Production Sequence[56]

The production of the *ponitse* vessels was a household practice reserved for women who could work either alone or in small groups; the groups where composed of the women from the various families in the neighbourhood. Only old and young women were involved in the production process of the *ponitse*; working together allowed the knowledge regarding the production sequence to be shared between generations, from mother to daughter to granddaughter and so on.

The *ponitse* have never been sold or traded except within a network of extended family ties; not between villages.

Only a few examples were produced in order to meet immediate requirements.

[54] EFSTRATIOU 2014.
[55] The *ponitse* were reproduced in two different occasions: in 1989 and in 1994;
[56] EFSTRATIOU 1992, 2014.

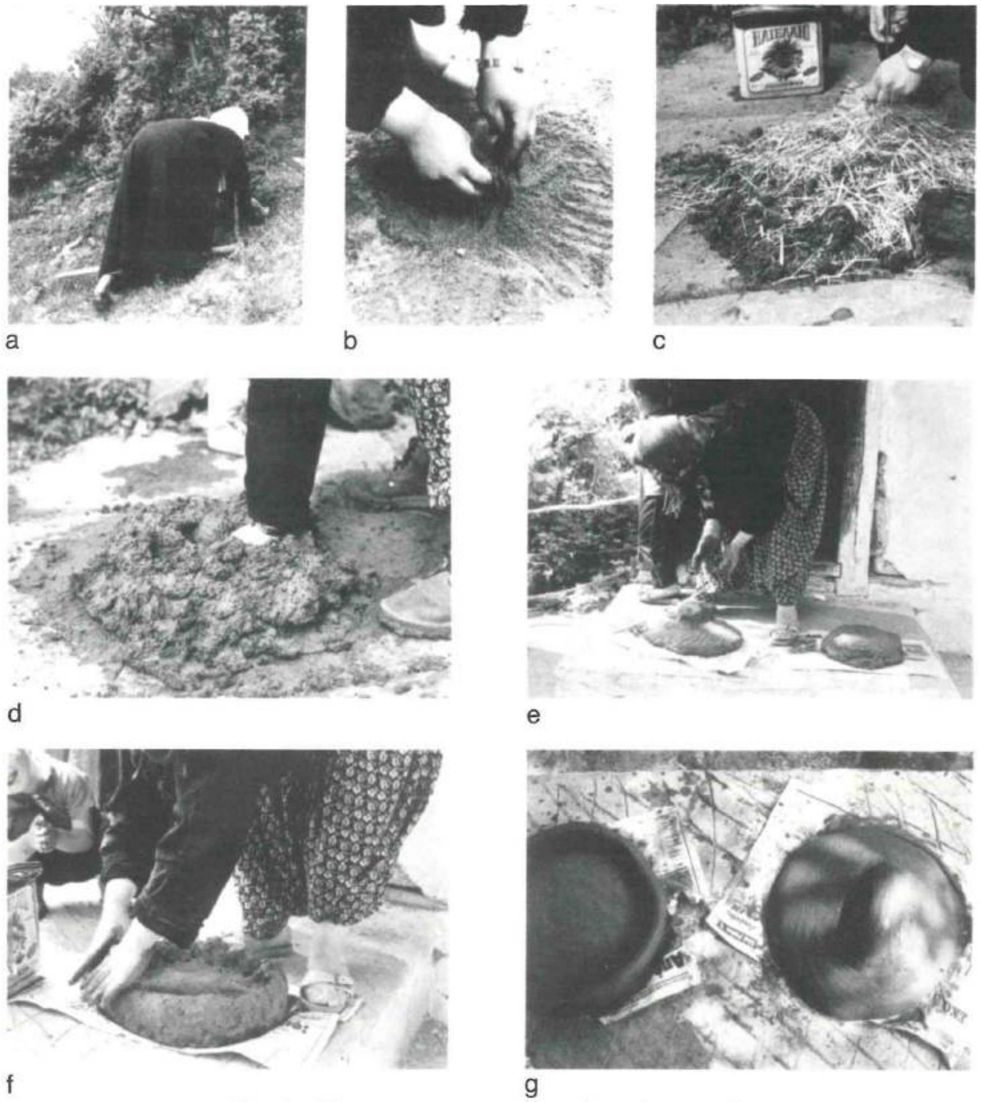

Fig. IV.20 The Production Sequence of a *Ponitse* (EFSTRATIOU 1992:316)

The production process was quite simple, and so it did not required any specialisation, only some knowledge.

The two parts created during the shaping stage of the *ponitse* were hand-made. Both the base and lid were made together except at a different rate; more lids than bases were always produced. This fact was related to its use, that is, during baking just one base was required while more lids were needed.

The *Ponitse* were produced during specific periods of time (spring or summer), and they were not standardised in either shape or size.

The clay was often collected in different places close to the village (fig. IV.20a). Often, different types of clay were mixed together to improve the quality of the ceramic paste. Impurities such as roots or small stones were removed from the paste (fig. IV.20b). It was crushed with a wooden stick and then mixed with water together with organic temper, that is, straw, goat-hair or cow dung (fig. IV.20c); often inorganic temper such as sand was added.

Subsequently the paste was treaded upon by foot or mixed by hand (fig. IV.20d). During shaping, a round, thick base was created and the sides were raised (fig. IV.20 e, f).
In the case of the lid, it was shaped before the body and then it was perforated using a bunch of straw or a wooden stick to create the handle.

Ponitse were left to dry for 15 to 20 days indoors to avoid cracks occurring due to high temperatures. Nevertheless, water could be applied if cracks began to appear during the drying stage. The surface could also be covered again using a thin layer of clay and water solution. The vessels were not properly fired and they were only exposed to fire during their actual use.

IV.3.1.2 Use

The *ponitse* were mainly used to bake bread made out of corn, wheat or rye, and sometimes they were used to cook food that contains cereals or rice.[57]

Pontise were used in fireplaces with a pre-heating technique.

The dough was directly positioned on the base, while the lid was heated traditionally using dung, straw or reeds as fuel. The lid was then placed over the dough for baking. Usually two or more lids were pre-heated and substituted in succession over the dough in order to maintain the heat and so allow the baking to complete.

Alternatively, the base can simply be replaced by a hard surface or stone. The dough is placed on top of it and then the pre-heated lids.[58]

[57] EFSTRATIOU 2014: 23.

Ponitse were often used, but not daily and so they had a very long life, that is, 10 to15 years; thus, they were only produced several years apart.
Every household had at least two *ponitse* in use simultaneously for daily life depending on the number of people in the family.

Depending on the bread needs (basically the number of people in the family) of the moment, a smaller or larger *ponitse* could be selected.

Despite their continuous use and the lack of adequate firing, they had a very long life. When damaged, they were often repaired by tightening a thread around the cracked base and later re-used. The broken pieces were often used as trays for feeding animals or as toys for children.

IV.4.3.1.3 Ethno-archaeolgical Interpretation versus Archaeological Interpretation

In addition to providing information about the stages of the *ponitse* production sequence and their use, the ethnological evidence was also used 'to test some very specific archaeological approaches in ceramic interpretation'.[59]

In practice, on the one hand, the *ponitse* have been treated and interpreted by scholars as if they were archaeological material, while on the other hand, they have been studied ethnologically, that is, being the subject of interviews with the elders of the area for whom these vessels were part of daily life in their youth.

For this study, complete *ponitse* or fragments from several villages in the area have been taken into consideration in order to further study the inner- and inter-village range of variability.

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[58] *Gastra* and *pekva* are used in the same way.
[59] EFSTRATIOU 2014: 26.

Furthermore, as regards the study of the spatial context, the locations of the vessels in two recently deserted villages in the area, Mikri and Megali Ada, were recorded. This work has made it possible to 'give a voice' to these 'semi-archaeological' sites.

The study can be divided into three main aspects: the construction of the vessels; the deposition context; and the socio-economic implications (Table IV.1).

THE MATERIAL EVIDENCE	INFERRED CAUSES	INFORMANTS' INTERVIEWS
A. VESSEL CONSTRUCTION:		
1) Morphological Variation		
a) Wall height / profile:	Lack of standardized production/Different use	Result of making of pottery freehand. As far as the wall height the vertical sections are concerned, the potter moves freely often improvising always following the technological restrictions imposed by the material and bearing functional needs in mind.
b) Base diameter:	Different use/Serving capacity	Different serving capacity. Not necessarily different function.
c) Lid shaping	Typological variation/Different use	The overall shaping of the lid is a matter of improvisation. There is, however, a minimum height for the conical lid which has to be adhered to for functional reasons.
d) Handle form	Typological variation	It depends on the material used for making the perforation of the handle (e.g. piece of wood or straw) and the need to make the vessel easier to handle.
e) Capacity	Different use/Serving capacity	Related to the number of persons it has to serve.
f) Wall thickness	Breakage rate/size	Heavy walls make the vessel more durable; it can afford minor cracks which result from the lack of proper firing.
g) Form (round)	Function/Breakage rate	No answer was given.
2) Clay Variability		
a) Color:	Different clay provenance/ware/ Workshop	Different clay sources used. Sometimes the colour is affected by the nature and quantity of the non plastic material used (straw, goat hair). Colour variations can define domestic and village workshops.
b) Non-plastic material:	Different origin/ware/use	Not all village use the same non-plastic material or in the same proportions; its use and quantity depends on the quality of the raw clay. Some village production can be identified by the use of specific types of non-plastic material.
c) Surface appearance:	Different ware/clay source/use	An essential factor here is the quality of the clay which varies considerably from village to village or even between the different clay sources used by the same village.
d) Coarse pottery:	Inexpensive/Dispensabl e/Longer lifespan/use	Coarse ware does not equate dispensability. Any one particular pot was not easily replaced. Whole specimens had a life of 10 of 15 years, while the broken ones were repaired and reused.
e) Firing (during use):	Breakage rate	Very low breakage rates are reported for the vessel despite its continuous use and the lack of proper firing.
B. DEPOSITION CONTEXT		
a) Recovered near fire-places:	Cooking pot	*Ponitse* is a household cooking pot
b) Inside the main livingroom:	Everyday use	It did not have a daily use but it is usually stored inside the livingroom.
c) Close to grinding stones:	Kinds of food eaten	The pot is functionally related to the grinding stones since it is mainly used for baking bread made of wheat, barley or rye.
d) Whole vessels in the storeroom	Other uses/Massive production	No explanation was given.

together with other implements:		
e) Broken pieces in the courtyard:	Discard/Breakage rate	It has been, and in some areas still is customary for children to play with the broken pieces of the pot. Sometimes large pieces were used as feeding trays for chickens.
f) Repaired vessels	Rarity/Limited number	Repairs to the vessel were never related to its rarity. No answers were given as to why these pots were so often repaired and not replaced by new ones.
g) Ratio between lids and bases 2:1 or 3:1	Missing parts	The disproportion between the number of lids and the number of bases was functional. Two or more ids were successively heated and placed on top of the base for keeping the heat in and baking the bread.
h) Upper part and base found:	Two different ceramics not functionally linked	There is no way the two pieces of the pot can function separately.
j) Whole vessels	Breakage and replacement rate	*Ponitse* is an extremely durable vessel, a factor which affects replacement rates.
C. Socio-Economic Implications		
a) Coarse appearance (surface, wall thickness):	Unskilled methods of production. limited economic value/Easily obtained object	The vessel's coarse appearance is the result of the unelaborate construction technique and a method of surface finishing used; functional effectiveness is a very important factor (heat-retaining thick walls).
b) Limited number of vessel in each household:	Rare object/Special function/Number of persons/Socioeconomic status of household	Their number of vessels in each household is related to their specialized use and often to the number of the people they are destined to serve. The presence of the vessel in the household context is related to the complete absence of ovens whose function it replaces.
c) Repaired vessels in the household context:	Valuable object due to limited circulation, production or high exchange value/pottery-use life/Seasonal production	The number of repairs made bore no relation to the production or exchange value of the object.
d) Ceramic variations within the village:	Different workshops or date/Relative dating/Occasional manufacture	The use of different clay sources within a village results in pottery variations. Good quality clay transported from a single distant source often produces similar results in a number of different villages. No dating variable is responsible for the observed lack of uniformity.
e) Ceramic uniformity between villages:	Same ceramic tradition/Signs of exchange or cultural and commercial contact/Network of Ceramic distribution/Craft specialization/Cross Dating	The particular pot is a household product of specialized use but with no economic significance attached to it. Specialization can be identified only in terms of the possession of the technique of manufacture. Potters did not acquire special economic or social status. No exchange mechanism concerning *ponitse* existed among the settlements of the area. It is certain that the construction technique was spread in the area by exogamous patterns. Inter-site pottery uniformity does not have any short-term cross-dating value. In a diachronic perspective, however, the opposite is, at least theoretically, possible.

Table IV.1 Material Evidence, the Villagers' Answers and the Archaeological Inferred Causes of the Construction Methods, Context and Socio-economic Implications of *Ponitse* (re-worked from Efstratiou 1992: 321-322: tabs. 1,2).

The data supporting the writer's archaeological assumptions and the ethnographic comparisons generally agree. However, the comparison has highlighted some important features:

- The rough condition of the *ponitse* is not necessarily due to economic factors such as saving time and / or labour in production, but rather may be a desirable feature given the harsh conditions of its use.

- The coarse condition of the *ponitse* is not the result of neglect, but rather of the functional efficacy of its treatment by heat.

- The size (and consequently capacity) of the *ponitse* is directly related to the number of people that would have to be served.

- The thickness of the sides has a functional purpose in that it makes the vessel more resistant and consequently more durable. In fact, despite their continuous use and the lack of adequate firing, *ponitse* were usually used for more than 10 years.

- Several fragments from different villages presented a very similar ceramic paste and, therefore, presumably the clay from which they were created came from the same source. This fact, often attributed in archaeological interpretation to exchanges of vessels between communities, based on the ethnological evidence collected is rather due to the fact that the potters from different villages collected clay in the same places.[60]

- The manufacturing technique spread throughout the area through the mechanism of exogamy.

- Both within and between villages, *ponitse* have shown different formal features, including: the inclination of the walls, colour, size, and the shape of the rim (fig. VI.21). These variables have been attributed by the people interviewed to the fact that often potters, who were not specialists, improvised during the execution of the vessels.

Fig. 21 Variations of *Ponitse* profiles from the Pomak Villages (EFSTRATIOU 1992: 320).

[60] In this ethnographic example, sometimes women came back to their birth village to obtain the clay for the production of *ponitse*.

This idea coincides with what several scholars maintain, that is, the free-hand production of vessels is more focused on the function rather than on typology-tradition or style.[61]

Consequently, in this case, variations in morphology occur independently of the cultural influences on the production process.

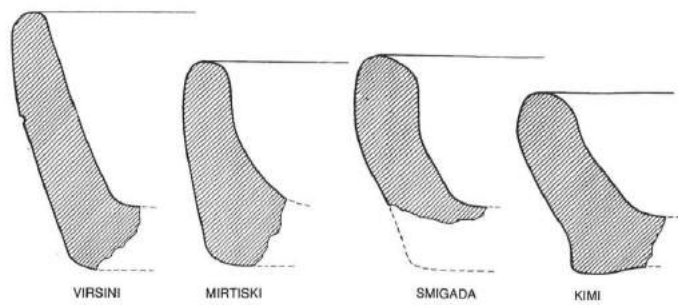

Fig. IV.21 Variations of *Ponitse* profiles from the Pomak Villages (EFSTRATIOU 1992: 320).

- As for the contextual data, fragmented or intact *ponitse* were found in most of the houses. Specifically, they were located inside the main living room or the store-room. Complete vessels were found next to almost all the fireplaces. These features were common to almost every single household within the housing complex. Fragments of pottery were also found scattered in the communal courtyards. The villagers explained that the presence of *ponitse* near the fireplaces was due to the fact that they were used for baking bread. For the same reason, they were sometimes found in association with grindstones.

Thus, being used often meant the *ponitse* were left in the living room. The fact that they were also found in the store-houses has remained unexplained.

- Once the *ponitse* has broken into fragments, it does not necessarily have to be discarded, but can be re-used in different ways. The presence of the *ponitse* in the courtyard was explained by the elders of the village as being due to their use in children's play or re-proposed as trays for feeding chickens.

IV.4.3.2 *Crepulja*

[61] DEETZ 1965, LONGACRE 1982: 62; SHERRATT 1986: 437.

The *crepulja*, also known as *crepna*, *çerep*, and *ponitse*,[62] is a particular pottery shape traditionally used for baking bread on open fires.[63] Until the 1970s, *crepulja* pots were commonly used, especially in mountainous areas, together with Montenegro, Serbia, Albania, Macedonia, North-Eastern Greece, Bulgaria and Romania.[64]

Great local variability characterises the *crepulja* both in their forming procedures[65], in their uses and in the beliefs and rituals that surround them.[66] This is due to the vast geographical area affected by their diffusion, but above all because 'each house has its own distinct custom, not to mention the village itself'.[67]

Fig. IV.22 Types of *Crepulja*: with perforated (a) plain (b) or crossed (c) internal surface (DJORDJEVIC 2011: 8,9; DJORDJEVIĆ 2019: 30);

The traditional *crepulja* (fig. IV.22) has the shape of a shallow circular tray between 25 and 60 cm in diameter. The sides can be from ca. 7 to 13 cm in height and are very thick, between 3 to 5 cm.[68] The size of the *crepulja* basically depend on the needs of the family in

[62] Comparable vessels are known in the Balkans under different names: Serbia: *Crepulja*, *çerepulja*, *crepnja*; Macedonia: *crepna*, *podnica*; Bulgaria: *podnica*, *čirepnja*, *çerepnja*, *çenep*; Romania: *ţest*; Albania: çerep; Greece: *ponitse* (DJORDJEVIC - NIKOLOV 2013: 56; MESNIL - POPOVA 2002), but also *podnitse*, *peka*, *cripnja* or *tserpo* in the formerYugoslavla (EFSTRATIOU 2014: 23).
[63] FILIPOVIĆ 1951; TOMIĆ 1983; DJORDJEVIĆ 2005; 2011; 2019; DJORDJEVIĆ - NIKOLOV 2013.
[64] DJORDJEVIĆ 2019: 26.
[65] DJORDJEVIĆ - ZLATKOVIĆ 2014; 2019: 26.
[66] DJORDJEVIĆ - ZLATKOVIĆ 2014: 32; ZLATKOVIĆ 2014.
[67] DJORDJEVIĆ 2019; FILIPOVIĆ 1951.
[68] DJORDJEVIĆ 2018: 602.

which they are produced.[69] Their interior surface can be plain (fig. IV.22b) or slight grooved, that is, mainly perforated (fig. IV.22a) or in the shape of a cross (fig. IV.22c).[70]

In the past the *crepulja* were covered by *vršnik* (fig. IV.23b), hemispherical or conical vessels used as lids and made of the same ceramic paste.[71] Nowadays, *vršnik* have been replaced by metal lids known as *sač*.

Moreover, elements very similar to loom weights completed the *crepulja* assemblage, that is, the *pop*, *popvičić* or *topka* (fig. IV.23a).[72] These served as supports for the *crepulja* or other pots when they were placed on the fire for cooking.

Traditionally in the Balkans, the prerogative of producing and using this variety of pottery shape was reserved solely to the women to the extent that these pots were known as female pots.[73]

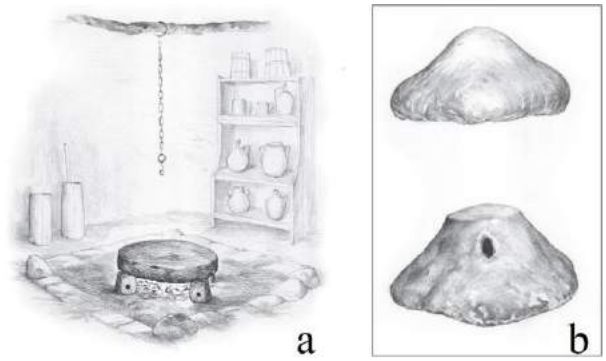

Fig. IV.23
a) Reconstruction of the process of the pre-heating of *crepulja* on top of the *popvičić*; b) reconstructive drawing of the *vršnik*, the lids placed on the *crepulja* to bake the bread (elaborated from DJORDJEVIĆ - ZLATKOVIĆ 2014: 37-38)

These vessels were produced at a family level. It was the task of the women of the house, and the vessels were never sold. Some women belonging to neighbouring families got together to make these vessels, usually married women who joined together with other women in the neighbourhood of their new family.[74]

Crepulja were normally produced from late spring until early autumn, and particularly during religious holidays when women were not engaged in agricultural activities.[75]

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[69] *Ibidem*.

[70] Perforated *crepulja* usually occur in the Western Balkans, for example, in Serbia, in Kosovo-Metohija and in Montenegro; in the Eastern Balkans (Bulgaria, Romania, Macedonia and East-Central Serbia) *crepulja* with plain or scored inner surfaces are more common (DJORDJEVIC - NIKOLOV 2013: 56;).

[71] DJORDJEVIĆ - ZLATKOVIĆ 2014: 37-38; ČAUSIDIS – NIKOLOV 2006:

[72] DJORDJEVIĆ - ZLATKOVIĆ 2014: 37-38; ČAUSIDIS – NIKOLOV 2006; DJORDJEVIĆ 2016: 317-318.

[73] FILIPOVIĆ 1951; ; MESNIL - POPOVA 2002: 245; DJORDJEVIĆ 2019: 26

[74] DJORDJEVIĆ - ZLATKOVIĆ 2014: 33.

[75] DJORDJEVIĆ AND ZLATKOVIĆ 2014: 33, table 1; DJORDJEVIĆ 2019: 26.

Both in the production and use of *crepulja*, a large number of beliefs, traditions and also taboos were involved (section IV.4.3.2.3)

A 'male' variant of the *crepulja* also exists and currently substitutes the traditional one (fig. IV.24).[76]

Fig. IV.24 The male *crepulja* (DJORDJEVIĆ 2018: 605)

The differences do not concern so much morphological or formal features, but rather the ways in which they are made; they reflect specialization in production.[77] These are in fact vessels made by expert male potters using a potter's wheel, and are intended for sale.

These pots are characterised by several elements; they present a very regular shape and thinner but homogeneous wall thicknesses. Male *crepulja* are a little larger, lighter and more resistant than traditional *crepulja*. In fact, during the drying stage they are wrapped in metal wire, which increases their resistance. Finally, unlike traditional *crepulja*, these vessels are regularly fired. Thus, they are evidently an evolution of the traditional *crepulja*.[78]

Fig. IV.25 *Pekva* (DJUKANOVIC 2011).

Related to this same baking method, there are also a series of other ceramic forms used to bake bread: the *pekva*[79] (Bosnia and Herzegovina) (fig. IV.25); *crpnja* or *cripnja* (Croatia - Montenegro)[80]; or the *testul*[81] (Romania). These are simple lids that are pre-heated; once boiling hot, they are placed on top of the dough so that it can bake into bread.

[76] Actually, it appears that at times *crepulja* are produced by males in the centre of Serbia, but only in relation to specialised labour and in a non-traditional way (DJORDJEVIĆ - NILOLOV 2013: 55).

[77] DJORDJEVIĆ - NILOLOV 2013: 55.

[78] DJORDJEVIĆ 2011: 26; DJORDJEVIĆ 2018: 603-605; DJORDJEVIĆ - NIKOLOV 2013: 53-55.

[79] DJUKANOVIC 2011.

[80] CARLTON 1988: 107-108; NANDRIS 1988: 130-131:

[81] For production sequence and use of *testul* see: https://www.youtube.com/watch?v=Bm9To8rMq5o; https://www.youtube.com/watch?v=ygHvW7DnjKE 29/09/20

IV.3.2.1 Production Sequence

Although traditional *crepulja* are practically no longer produced by local women, an ethnological project has been launched to document the techniques of production and use of the *crepulja* before their definitive disappearance.[82]

For this purpose, the production sequence and use of *crepulja* were reproduced by two women who had experienced this activities in their youth.[83] The reproduction of the sequence, carried out in the small village in Stara Planina in Serbia (Gostuša), was accurately documented.[84]

The process for producing traditional *crepulja*[85] is not elaborate.[86] The clay does not require particular characteristics, and so the local clay is usually used (figs. IV.26a, b).[87] Sometimes several clays are mixed together to improve the quality of the ceramic paste during firing. The clay is crushed, sometimes cleaned of impurities, and sieved. Then water is poured on it and it is further treated by mixing it with organic temper (fig. IV.26c).[88] In this case, oakum was used, but in other places animal hair, straw, chaff, soot, or cattle-dung were also mixed together.[89]

Before shaping the vessel, the pavement is covered in ash in order to avoid the vessel from sticking to it.

After creating a thick flat disk of clay, its edge is bent upwards in order to create the sides of the tray (figs. IV.26 d, f). The following day, the trays are generally smoothed with cow dung diluted in water to avoid future cracks during the drying phase. Vessels are

[82] In particular, in Serbia, research was conducted in a large number of villages from June 2003 to March 2011. This research is part of an international project managed by the National Museum in Belgrade and the Museum of Macedonia in Skopje (DJORDJEVIĆ - ZLATKOVIĆ 2014). https://www.youtube.com/watch?v=XpYo6kdRXRY

[83] The researchers who performed the ethno-archaeological experiments were Vera Manić and Ljubina Nikolić. These ethnographic experiments should be viewed as examples of the spread of a tradition that presents local variables. For an example, see also the production sequence of *çerep* in Kosovo: https://www.youtube.com/watch?v=3-gTthrazzM 29/09/20.

[84] DJORDJEVIC 2016.

[85] DJORDJEVIĆ - NIKOLOV 2013: 53-54; DJORDJEVIĆ 2019.

[86] DJORDJEVIĆ 2019: 26.

[87] DJORDJEVIĆ - ZLATKOVIĆ 2014: 35.

[88] Animal hair, tow, plant, husk, flour and dung.

usually undecorated, but sometimes the inner surfaces are finger-grooved in the shape of a central cross. According to the potters, these crosses do not to have a functional or aesthetic purpose, but rather the signs are intended as symbolic and protective according to tradition (see further on IV.4.3.2.3).[90] The drying period for vessels can vary from several days to several months; peculiarly, the firing of the *crepulja* corresponds to their first use in the hearth, so they are never well-fired (figs. IV.26g, h).

Fig. IV.26 Production Sequence of a *Crepulja*:
(elaborated from DJORDJEVIĆ 2019 & DJORDJEVIĆ - ZLATKOVIĆ 2014: 119).

[89] DJORDJEVIĆ - ZLATKOVIĆ 2014: 36.
[90] DJORDJEVIĆ - NIKOLOV 2013: FILIPOVIČ 1951: 22.

IV.4.2.2 Use

The ethnographic experiment carried out at Stara Planina also regarded the function of the *crepulja*.[91]

The *crepulja* is placed upside down amongst the flames of a hearth until it begins to become boiling hot (fig. 27a).

The pre-heating time depends on the size of the vessel and the thickness of its walls. Finally the vessel is removed from the fire[92] and cleaned with a rag (fig. 27b). It is filled with the bread dough (fig. 27c). It is essential that this operation is done when the tray is still boiling hot for a successful result.

Then, the tray is simply covered by the burning embers of the fire (fig. 27d) and left to continue baking (fig. 27f). More commonly, the dough is covered with a pre-heated ceramic (*vršnik*) or metallic lid on top of which burning coals are placed. Sometimes the dough is wrapped inside leaves of edible plants to avoid direct contact with coals or the ceramic surface. Alternatively, for the same purpose, the flour can also be spread on the inner surface of the vessels. This action avoids the dough from burning or sticking (figs. IV.27g, 28).

Fig. IV.27 Baking bread in a *crepulja* at Stara Planina (elaborated from https://www.youtube.com/watch?v=XpYo6kdRXRY, 29/09/2020).

[91] For the experiment at Stara Planina, please see: https://www.youtube.com/watch?v=XpYo6kdRXRY 29/09/20. For the production sequence, *crepulja* can be used locally in a variety of ways. For an example of corn bread baked with a *çerep* in Kosovo, please see https://www.youtube.com/watch?v=5NQrOOCsBM4 29/09/2020

[92] Baking by means a *crepulja* can facilitated by a hook (figs. IV.27e,f,).

In daily life, bread could be baked both in the oven or with the *crepulja*. It depended on the size of the loaf of bread needed. Large quantities of bread could be baked using an oven, while the *crepulja* was not used for more than three loaves. Moreover, this pottery shape was used for baking ritual breads. In fact, notwithstanding the carefulness with which it was done, the *crepulja* was strictly connected to the symbolic sphere (see the following paragraph).

Fig. IV.28 Potters and Baker with *Crepulja* (DJORDJEVIĆ 2019:

Crepulja were used until they fell into pieces. Even then, the fragments were usually used for another function; for example, to heal certain ailments.[93]

IV.4.3.2.3 Symbolic Values

There was a universe of symbolic values, rituals, practices, norms and taboos, magical acts and beliefs that were observed in relation to *crepulja* in the Balkans.[94]
These involved themselves in all the stages of producing and using the *crepulja*. Some affected large areas of the Balkans, while others were configured according to micro units of neighbouring villages.[95]

Some of them are briefly listed as follows:
- *crepulja* were used to bake sacred bread during celebrations;
- sexual aspects and purity are particularly affected; during the production step of *crepulja*, women must be bathed and dressed in clean clothes; they must not currently be menstruating nor have had any recent sexual intercourse; they must be virgins when they make their first *crepulja*; they must gather their skirts between their legs to hide their genitals from the clay when treading it; they cannot have had recent contact with a deceased person; and the leader's parents must still be alive, and so on;

[93] FILIPOVIĆ 1951: 151; DJORDJEVIĆ 2019:30-32.
[94] ČAUSIDIS – NIKOLOV 2006: 144. DJORDJEVIĆ - ZLATKOVIĆ 2014
[95] ZLATKOVIĆ 2014.

- *crepulja* have to be made on established days, that is, often specific holy festivals day such as St. Elisha's Day (27th June) and St. Vid's Day (28th June), but also on St. Nicholas' Day (22nd May), St. Peter's Day (12th July) and St. Elijah's Day (2nd August);
- special and recurring links with given numbers, words and attitudes, for example, the number 3; 3 or any odd number of women who work the clay; 3 places where the clay is dug; 3 days of work; and 3 phases of treading, and so on;
- elements were put in contact with *crepulja* in order to instill their properties, for example, metal for resistance, garlic for its apotropaic properties; chicken feathers to give lightness; or basil (fig. IV.29a) for its magic value.

Furthermore, protective beings existed for the *crepulja* including:

- in some Serbian villages a human-size doll accompanied several steps of the production sequence of *crepulja* in order to protect them from spells or other harm (fig. IV.29c);
- a male clay figurine (with an indicated phallus), known as *čoveče* (little man), is hung on a nail fixed in the middle of the vessel (fig. IV.29b); the figurine is to protect the vessel from cracking during the drying step; the phallic symbolism of the nail in association with the central hole of the *crepulja* as a vulva has also a fecondative aspect.

Fig. IV.29 Symbolic Objects related to the Symbolic Universe of *Crepulja* (elaborated from ČAUSIDIS – NIKOLOV 2006: 150, 151; ZLATKOVIĆ 2011).

IV.4.3.2.4 Inner-Surface Scores

As mentioned above, the interior surfaces of many *crepulja* were modified with either a hole or grooves.[96]

Crepulja with a hole in the middle were more widespread in the Western Balkans. Here they were usually called ‘navels’ (fig. IV.30a).[97]

This name would have been given in relation to the swelling of the bread that is created when baked in a pan such as this.

Crepulja with the hole in the middle were easier to lift out of the fire when boiling hot thanks to the use of a hook; however, many scholars believe that the reason for the execution of this form is not functional, but symbolic.[98]

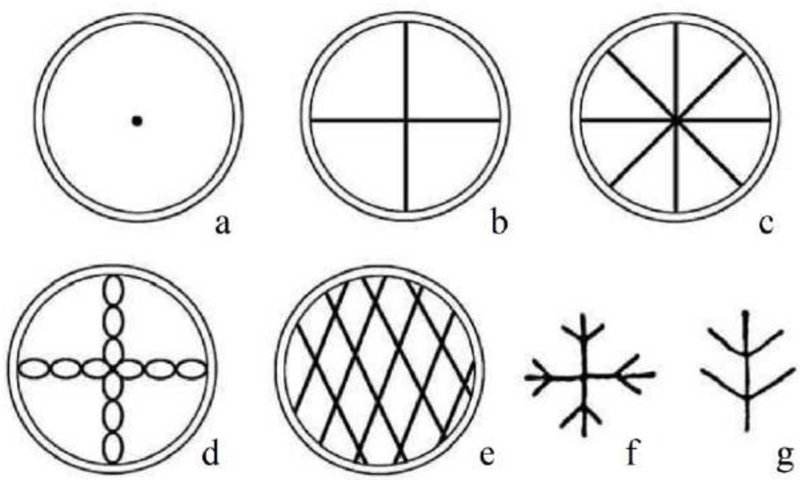

Fig. IV.30 Patterns of scores on the internal surface of a *Crepna* (ČAUSIDIS – NIKOLOV 2006: 150).

Often the internal surfaces of the *crepulja* were crossed by shallow grooves, among which the cruciform pattern greatly dominated. This was done by grooving with the finger while the inner surface of the pan was still freshly made.

The fact that there were both grooved *crepulja* or those with a plain surface, and that they were used in the same way, indicates that the reason for their presence was not due to purely functional reasons.

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[96] The data presented here are mainly related to the *crepna* ČAUSIDIS – NIKOLOV 2006:

[97] ČAUSIDIS – NIKOLOV 2006:

[98] For symbolic values of *crepulja/crepna* see: ČAUSIDIS – NIKOLOV 2006; ZLATKOVIĆ 2014; DJORDJEVIĆ - ZLATKOVIĆ 2014; DJORDJEVIĆ - NIKOLOV 2013.

Their presence is locally attributed to various reasons, always of a symbolic nature, for example:

- according to the inhabitants of the village of Gorno Lukovo (Bulgaria), the cross was placed ‘for magical’ reasons, so that the *crepulja* do not break;
- in Mirkovci (Skopska Crna Gora, Macedonia) for its resistance;
- near Vranje (Serbia), so that it was not cursed;
- often in Serbia, the *crepulja* cross is believed to protect the bread and the house; in fact in Gorna Pcinja it was said that the *crepulja* ‘baptised bread’. In reality, the sign in the shape of a cross was made not only among the Christian population, but also among Muslim community throughout the Balkans. The pre-Christian genesis of this motif is likely, and so it would appear that it was later incorporated and re-interpreted into the Christian system.[99]

In addition to the simple four-armed cross (fig. IV.30b), some sporadic variants are known such as the 8-armed cross (fig. IV.30c), an example of which was found in Skopska Crna Gora, Macedonia, or the cross with interwoven wavy lines (fig. IV.30d).

There are also other motifs, such as a reticulated motif (fig. IV.30e) or with the arms of the cross variously articulated (figs. IV.30).

[99] ČAUSIDIS – NIKOLOV 2006.

IV.4.4 PPC (Pileki / Ponitse /Crepuljia): decline of a baking tradition

All the authors of the ethnographic articles cited above agree that starting with the radical socio-economic changes brought about in the 1950s[100], households abruptly stop producing and using baking pans to bake bread.

Based on the locations they mentioned, it is possible to reconstruct an indicative area of distribution of the baking pans in those years (fig. IV.31). Their presence affected, in a widespread manner, an area extending from Georgia passing through Turkey, Bulgaria,

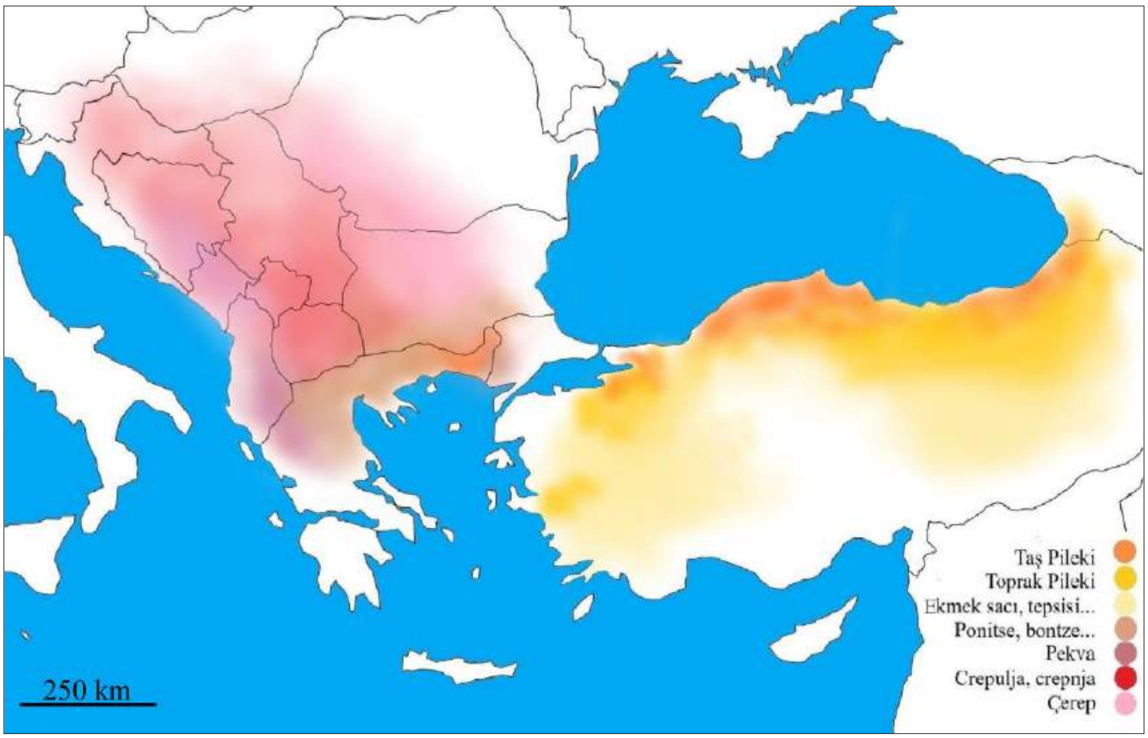

Fig. IV.31 Map of the Spread of the Baking Pan in the 1950s (picture elaborated by the writer).

Northern Greece, Romania, Macedonia, Serbia, Montenegro, Albania, Kosovo and Bosnia-Herzgovina; an area that exceeds 2000 km in longitude.[101]

Despite the great local variations, many elements of these baking pans are shared, that is, morphology, production sequence, use and also some socio-economic implications (Table IV.2.

[100] For example: UZUN- UZUN 2001a: 151; 2001b: 378; 2008, p.83; DOĞAN 2013: 29-30; 2014: 104; EFSTRATIOU 2014: 20; DJORDJEVIĆ 2018: 603; DJORDJEVIĆ - NIKOLOV 2013:53; ÖZTURK 2018: 472.

[101] Similar baking pans are also known in Italy, Central Europe, Switzerland and Germany (HABERLANDT - HABERLANDT 1928).

Pottery Shape Morphology	Taş Pileki	Toprak Pileki	Ponitse	Crepulja
Material	Stone	Clay	Clay	Clay
Shape	Round	Round	Round	Round
Diameter	30-55cm	30-45 cm	20-50cm	25-60cm
Height	7-12cm	4-8 cm	5-7 cm	7-13cm
Thickness	2.5-4cm	3-4 cm	3-5 cm	3-5cm
Inclusions	/	No	/	Yes
Inner surface scores	Yes	Yes	No	Sometimes
External side longitudinal incision	No	Sometimes	Sometimes	Sometimes
Handles	No	Yes	No	No
Lid	/	Yes	Yes	Yes
Production Sequence				
Raw material origin	Local	Local	Local	Local
Shaping tecnique	Carved	Pinching	/	Pinching
Tool	Pick axe, compass	By hand, sometimes by wheel and mould	By hand	By hand
Firing	/	Fireplace	Fireplace	Fireplace
Seasonality	/	Spring/summer	Spring/summer	Spring/summer
Potter's gender	Male	Female	Female	Female
Use				
Fire installation	Fireplace	Fireplace	Fireplace	Fireplace
Cooked food	Bread	Bread	Bread	Bread
Baking tecnique	Pre-heating	Pre-heating	Pre-heating	Pre-heating
Flour dough	Corn, wheat	Wheat, corn	Corn, wheat, rye, barley	Wheat, corn
Vessel position	Mobile	Mobile/fixed in the ground	Mobile	Mobile/fixed in the ground?
Baker's gender	Female	Female	Female	Female
Frequency of use	Daily	Daily	Weekly	Almost daily
Implications				
Transmission	/	Female line	Female line	Famale line
Knowledge spread	/	Exogamy	Exogamy	Exogamy
Inner scores function	Signature carver	To align handles	/	Symbolic value
Sold/Exchanged	Si	Si	No	No

Table IV.2 Comparison of the Main Elements that distinguish *taş pileki*, *toprak pileki*, *ponitse*, *crepulja* (table elaborated by the writer).

Based on this data, a shared generic model can be defined.

The baking is carried out in vessels mainly made of clay, of a circular shape with dimensions ranging from between 20 to 60 cm in diameter with rather low walls (approx. 10 cm). Furthermore, the walls of the ceramic body are always very thick (2.5 to 5 cm). Sometimes these vessels may present an internal surface crossed by scores (mostly cross-shaped), 2 to 4 handles and a longitudinal incision along the external wall.

The vessel constituting the base is always accompanied by a lid (*pileki*, *tsirap*, *vršnik*); in fact they are of the same diameter and wall thickness; the base and lid are made together with the same ceramic paste and therefore have the same compositional characteristics. However, the lid can have different morphologies, with the top flattened, conical or with a handle.

The vessels are made during the spring or summer months exclusively by women. For their execution, clay found locally is used, roughly sieved and, at times, degreased with (mainly organic) inclusions. Basically the vessels are hand-made. First a thick layer of the prepared clay, circular in shape, is spread on the ground; the edge of this is folded inwards so as to form the walls of the vascular shape. Apart from some smoothing, the outer surface is not treated. Once left to dry, the vascular form is not properly cooked (only on a simple hearth); sometimes the firing of the pot coincides with its use for cooking on the hearth. In fact, they always remain under-fired.

These vessels are used almost exclusively for baking bread. This bread is usually made using a base of corn or wheat flour; other types of flour can also be mixed in. In addition, various ingredients can be added to the bread. In special cases, the same pots can be used to cook other dishes.

The bread is baked using the pre-heating pot technique. The base and lid are first left to pre-heat with the inside facing the flame. Once they have become hot, they are turned over, dusted with soot and the bread dough is placed inside the base. Finally, the bread is covered with a lid, on which the glowing coals resulting from the pre-heating phase are placed. The heat released by the pre-heated pot and the lid with the embers on top allows the bread to complete its baking. Alternatively, there are other possible variations, that is, the charcoal can be placed directly on the dough or, the dough can be wrapped in leaves before placing the charcoal on top of it.

These vessels are used almost daily in exclusively in domestic environments. Their size depends mainly on the needs of the family. Women often get together with neighbours to make pots. The transmission of knowledge from generation to generation occurs through the female line, while the diffusion in space is attributed to exogamy. These baking pans are never traded or sold.

Fig. IV.32 A supposed Baking Pan found in Maliq, an Albanian Eneolithic Archaeological Site. https://www.facebook.com/arkeologjiakorce/photos/a.754615288076218/1189120727959003/

The homogeneity and territorial continuity, the extreme uniformity of the morphology, of the methods of realization, of the use and of the socio-economic implications that distinguish these vessels for baking bread, configure what as a whole can be defined as a *culinary tradition*.

This work makes it possible to highlight elements relating to a culinary tradition in the last phase of its development, that is, starting from the 1950s.

In fact, the writers of all the ethnographic articles underline how historical evidence and indirect clues relating to the presence of this culinary practice can be detected in much earlier periods. Comparisons with similar shapes are proposed, that is, with vessels from the Neolithic[102], Aeneolithic (fig. IV.32), Iron Age[103], Greco-Roman[104], and Medieval periods.[105]

[102] *Pileki*: UZUN - UZUN 2001a: 150; DAĞDEVIREN 2014: 116; *Crepulja*: DJORDJEVIĆ 2011: 21; 2018: 602. FILIPOVIĆ 1951; ČAUSIDIS – NIKOLOV 2006; VUKOVIC 2013a; 2013b.

However, at present it is not possible to define which dynamics led to the formation of this culinary tradition.

Finally, on the basis of the data presented thus far, some general considerations can be drawn with respect to this culinary tradition:

1) The potters and cooks who make bread in the same way using *pileki*, *ponitse* and *crepulja* (figs. IV.14, IV.16, IV.20, IV.28) dress differently, speak different languages, follow different rules etc.; that is, they belong to different cultures; this culinary tradition crosses several cultures.

2) The people who make and use these vessels are not aware of the vast area involved in this activity. Indeed, they perceive it as something very intimate and identifying; in fact, they continue to produce bread in the traditional way despite easier and cheaper ways of obtaining it. Moreover, all have lent themselves to the recreation and reporting of information to ethnologists regarding this practice as something characteristic of their own culture. From this, it can be deduced that people who practice this tradition may perceive it as a characteristic of their own culture, even if it is not.

Fig. IV.33 The typical position of a potter making a pan in the Balkans (elaborated from ČAUSIDIS – NIKOLOV 2006: 150).

3) The morphological aspects of the vessels used for making bread basically remain constant between the various cultures. Their formal appearances only change to a small extent and mainly involves the lid. (Figs. IV.10, IV.19 and IV.22).

[103] NANDRIS 1988:131.
[104] MESNIL - POPOVA 2002: 242, 243.
[105] *Crepulja*: DJORDJEVIC 2019: 32; ČAUSIDIS – NIKOLOV 2006.

4) The gestures with which the vessels are made remain very similar over large areas (figs. IV.20, IV.26, IV.33 & https://www.youtube.com/watch?v=3-gTthrazzM).

5) In spite of a strong homogeneity of tradition over a vast territorial area, specificities in the methods of construction and use of the vessels are more evident at the local level, that is, villages rather than entire regions.

6) The *Pileki-Ponitse-Crepulja* tradition is distinguished on a regional level by way of specific ceramic forms, that is, the *taş pileki* (the coast of the Black Sea), the *gastra-peka* (the Western Balkans Area) or *il testutl* (Romania).

7) The diffusion areas of the different vascular forms are not clear-cut and often overlap. Different forms co-exist in the same territory, for example, the *taş pileki* and the *toprak pileki.*

8) In the same way, the socio-economic implications that characterise this culinary tradition remain constant between different cultures: the particular role of women (potter and cook); the transmission of knowledge from grandmother to granddaughter regarding how to make a baking pan; its diffusion by exogamy; the neighborhood ties strengthened by the production of similar pots; and the inalienability of the product.

9) Conversely, the symbolic aspects and meanings relating to the vessels and their methods of production and use seem to vary greatly between cultures. The *crepulja* are linked to an articulated symbolic world. This does not seem to happen, or at least it is not documented, with regard to the *ponitse* or *pileki*. However, the data from the Balkans alone highlight how the aspects relating to the symbolic world and their meanings are very variable. In fact, there are symbolic elements widely recognised throughout the Balkans, while others are divided into micro-units, that is, a set of villages.

Thus, it could be said that belonging to different groups is recognisable in reference to cultural arbitrariness, but this belonging is little or not at all from the more material or structural aspects of the *pileki*, *ponitse* and *crepulja* culinary tradition. In this regard, it is interesting to note that the scores on the internal surfaces of the vessels are present both in the *pileki* and in the *crepulja*, but that they are attributed different functions; that is, as the signature of the creator of the vessel (*taş pileki*), to align the handles (*toprak pileki*), and for purely symbolic reasons (*crepulja*).

10) The culinary tradition seems to be open to change and ready to adapt.

Two examples can be cited, as follows:

- baking in pots is done using pots made of different materials, for example, it is not only the *taş pileki* that are made of metal, so also are the *saç* and *gastra*.

- bread is made with different flours. According to scholars, this culinary tradition dates back to very ancient times. However, both in Anatolia and in the Balkans, the baking of corn bread in pots is still widespread. Corn does not appear to have been as widespread in all of these areas before the 19th century. Thus, it is reasonable to think that baking pans were originally used for baking wheat bread, and only later would they also have been used for baking bread made of corn flour, a flour whose properties differ completely from that of wheat due to the low percentage of gluten.

CHAPTER V

MORPHO-TECHNO-FUNCTIONAL ANALYSIS

V.1 INTRODUCTION

As reported in the chapter II and deepened in the chapter IV, throughout the history of studies the scholars suggested several hypothesis about the function of the husking trays (hereafter HTs). The most shared suggestions were that HTs could have been used for:

- husking[1];
- baking bread[2];
- processing cheese or soft-food;[3]

In order to verify the intended function, i.e. the compatibility of the ceramic form with the supposed function, a dedicated experimental program has been undertaken since 2016.

The experimental analysis can be divided into three main phases.

The first set of experiments was dedicated to reproducing HT replicas and understanding the general dynamics of their function; in particular, these were used for in relation to the context which these could have been used (the fire installations in this case); the experimental trials have allowed to reject the least appropriate functional hypotheses and verify the suitability of other ones.

The second experimental section was dedicated to the verification and definition in detail of the most suitable functional conditions for that operation with the HT replicas; at the same time it allowed to exclude other possible minor variables.

Finally, in a third section the experimental activity was aimed at understanding the performances[4] of the HT pottery form with respect to the specific activity highlighted as

[1] LLOYD and SAFAR with BRAIDWOOD 1945: 277.
[2] VOIGT 1983: 159.
[3] KILIÇBEYLI (2005) critically discusses this hypothesis.
[4] SKIBO 2013.

possible by the other experiments; it allowed to explain many of the morphological and compositional characteristics of these vessels in relation to their possible function.
As regards the methodological aspect, reference is made to chapter III.
Experimental program was carried out from 2016 to 2019 with more than 44 cooking experiments; here the main results of the research will be summarized.

V.2 THE HT REPLICAS

During the first step of experimental activity, replicas similar to the originals were reproduced in their main aspects but on a slightly reduced scale. As already stated in the methodology, these do not need to be faithful in every aspect to the original find, but must present, at least, the elements that ensure the normal functioning of the object.
The replicas reproduced are based in particular on the base of the HTs from Tell Sabi Abyad I[5]. In this settlement this ceramic form is well represented both in the quantity (more than 350 fragments found) and in variety of score patterns;
The Tell Sabi Abyad HTs can be fully defined as belonging to the Classic version group as described in chapter II; they are made with coarse clay tempered with plant inclusions; these present an oval base, which could also exceed the length of 60 cm, and walls that had a variable height between 4 and 18 cm; although the walls were rather irregular, they were very solid and extremely thick. The surfaces rather little treated.
In the second and third phase, following the same principles, life-size replicas were made.
The primary purpose of the experimentation was to understand the functional aspect of HTs. However, the reproduction of the vessels itself made it possible to learn more about the technological aspects of the production of this ceramic form.
Several experimental replicas were reproduced. The phases of the relative experimental activity are reported below.

Experimental activity:

The ceramic paste was made using natural clay which, once dissolved in water, was roughly purified (Fig V.1). Once dry, coarse clay was mixed with abundant straw-temper so that they could homogenize.

[5] NIEUWENHYSE 2008.

Fig. V.1 First step in the production of experimental replicas of HT.

Once a malleable but fairly well structured paste was obtained, several HT replicas were shaped. To do this, three techniques were adopted on the bases of what was suggested for the Tell Sabi Abyad HTs[6]: pinching, coiling and slab tecnique [7] (See chapter VI) .

In general, the smaller HT replicas were made through the pinching technique. In this case, a mass of clay was given the shape by means of the pressure of the palm and the fingers; it was then finished.

The coiling technique was more commonly used as regards the larger vessels.

In this case, once created a flat base clay coils were superimposed all-around of it to form the walls of the vascular shape.

Finally, the so-called slab technique was adopted. That is, once the flat base was created, the walls were gradually built by pressing small contributions of clay. The HTs, large vases made with very coarse clay and with large plant inclusions, were given a very brief surface treatment. After shaping the vessels, their surface was left untreated or roughly smoothed.

[6] VAN AS - JACOBS 1989.

[7] VAN AS et al. 2004: 105.

Fig. V.2 Shaping (on the right) and surface treatment (on the left) phases.

Fig. V.3 Scoring the internal surface of the HT replicas.

Finally, several scoring patterns present on the HT at Tell Sabi Abyad were reproduced on the replicas while the clay was still fresh. Impressions, incisions and grooves were reproduced by means of the fingers or with different types of tools on the internal surface of the vessel (See chapter VI).

During the reproduction of a HT fragment from Tell Sabi Abyad (Fig. V.4), it was possible, thanks to the particular way in which its walls were incised, speculate about the possibly gestures adopted by the potter to carry out it (Fig. V.5).

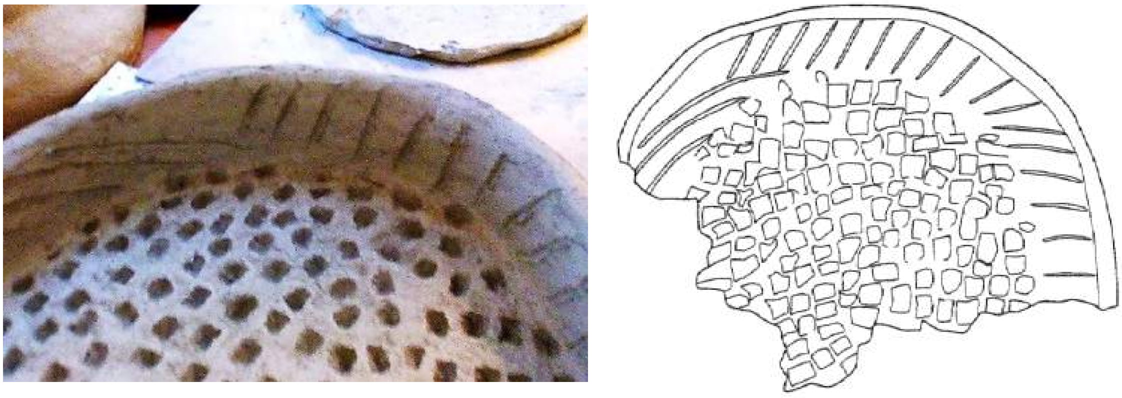

Fig. V.4 Reproducing a HT fragment from Tell Sabi Abyad (AKKERMANS et al. 2006: p.110)

The walls were scored with oblique and vertical incisions made by means of a sharp tool. It is very likely that oblique incisions at some point (missing part of the vessel) inclined until became completely vertical before rejoining the earlier incisions. If this were the case, as it seems from other HT fragments[8], this particular way of scoring the vessel would be due to a series of natural gestures carried out by the potter placed on a side of the vessel.

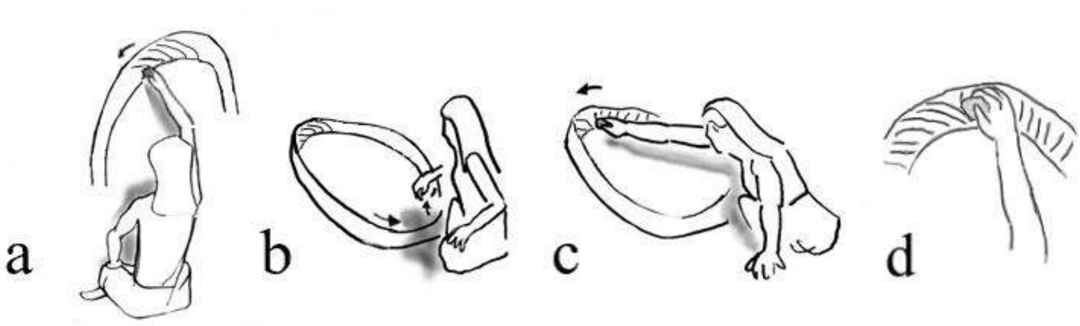

Fig. V.5 Hypothetical sequence of gestures through which the potter would have characterized a HT (author's drawing).

The potter would have scored the HT kneeled or sit-down close to one side of the ceramic form; elongating with the torso, she/he would have begin to made, by impressing a pointed object on the fresh clay, incisions on the opposite inner wall of the

[8] Similar pattern are known from HT fragments from Tell Sabi Abyad (Nieuwenhuyse 2018) and other sites. A more complete but unfortunately unpublished fragment from Yarime Tepe (II?) show the transition of incisions from oblique to vertical,

vessel. Such a movement would have involved twisting the arm to one side producing oblique incisions such as those visible on the fragment (Fig. V.5a).

Proceeding with the incisions towards the part of the vase closest to the body, the potter should have changed the position of the hand with a movement always from the bottom upwards; in this case, the action would have been performed by the movement of the wrist (Fig. V5b). Thus the incisions, in the missing part, would have been gradually transformed from oblique into vertical ones. Finally, to complete the entire wall circle, the potter would have gone back to carving the distant part of the vase but on the other direction; to do this the potter would have made an up-down movement with a rigid arm and wrist (Fig. V.5c). In this case, the incisions would have been vertical in shape as in the right part of the drawing (fig. V.5d-V.4).

Fig.V.6 HT replicas during drying phase.

The HT replicas were left to dry for more than a month in an unventilated area not exposed to direct sunlight.

The bonfire technique was used to fire most of the HT replicas.

Fig. V.7 Firing step

The HTs were fired inside a large pit surrounded by timber as fuel. It was added for about 5 hours and temperature exceeded 800ºC.[9]

Then the fire was allowed to gradually extinguish and the vessels were left under the embers until the following day (Figs. V.8, V.9).

[9] This temperature was recorded through a non-contact infrared thermometer PCE-889B.

Fig. V.8 HT replicas produced during experimental program.

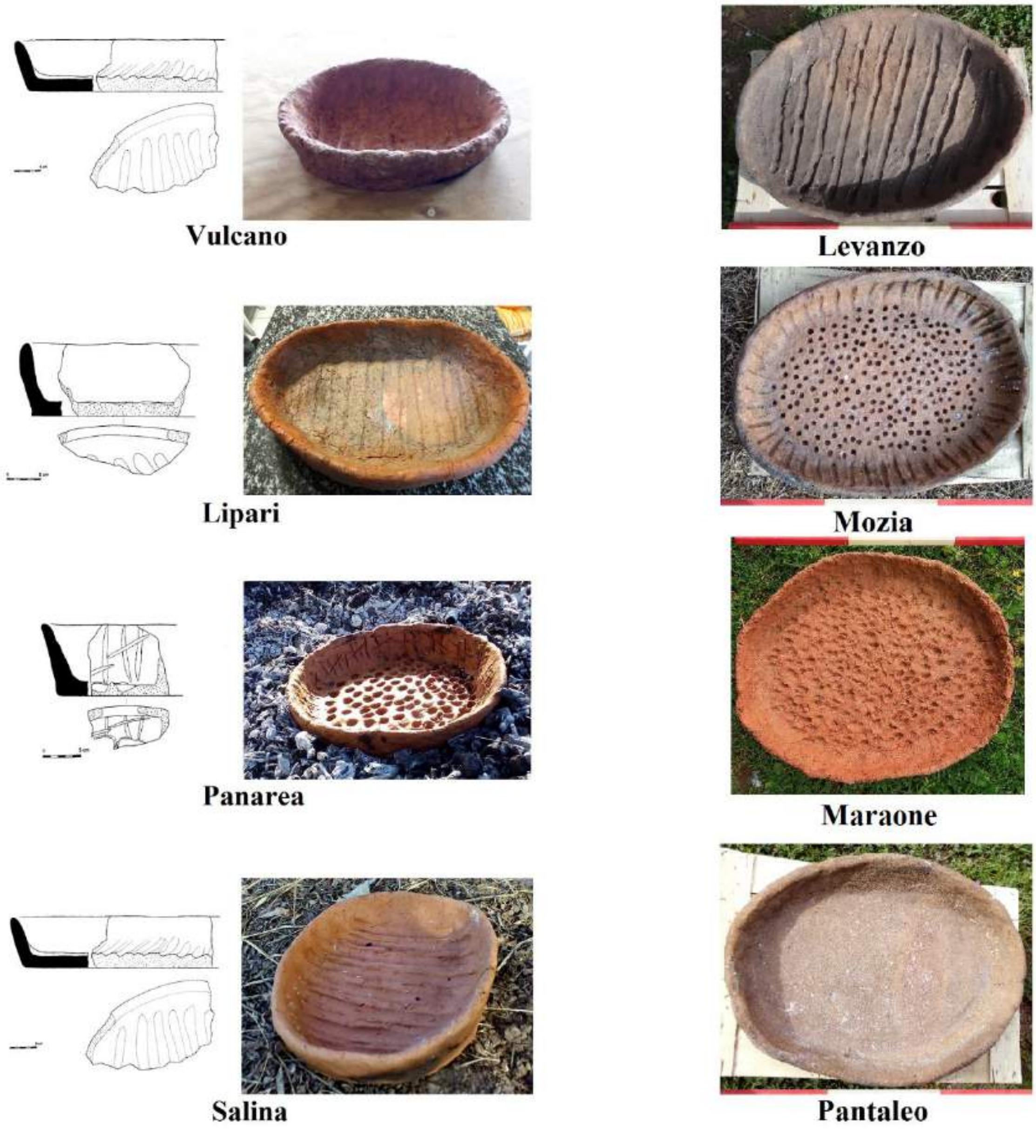

Fig. V.9 HT replicas mainly used during experimental activity.

V.3 HUSKING TESTS

Freshly harvested ears of barley were rubbed against the inner surface of two HT replicas: one scored with finger impressions (Panarea) (Fig. V.10a) and the other criss-cross incised.

Fig. V.10 Barley ears stripping.

The experimental husking activity suggested that it was really unlikely that the HTs were used as large graters for husking cereals. In fact, the ceramic surface (characterized by high porosity) is unsuitable to endure the mechanical stress caused by the rubbing of the grains. These are so hard that easily eroded the ceramic surface of the tray.

Fig. V.11 Husking activity with the HT.

Furthermore, the experiment has revealed that the majority of HTs could have hardly been used for such an activity;[10] in fact, the grooves and impressions on their surface are generally so large that whole fragments of spikes would fill them without breaking (V.11b). Therefore, the scores would have been an more obstacle than an aid for such an activity.

[10] Further husking tests with treated cereals were carried out by Kiliçbeili (2005) who also rejected this hypothesis.

V.4 Baking tests

In addition to the husking tests, a experimental procedure was dedicated to verify the functionality of the HTs according to the interpretation proposed by M. Voigt in the 1980s; she suggested that they could have been used as portable ovens for baking flat bread.

As one might easily guess, the variables that lead to the production of a bread are practically infinite. In addition, the final product is in some way unknown. In fact, ethnography made clear how foods and food consumption methods strongly depend on the culture they belong to and develop in the most varied forms.[11]

The purpose of the experimental procedure was to verify whether this category of pots is compatible with the baking of bread, limiting the parameters to be controlled as much as possible. Therefore, the the goal of the experimental tests was set on bread-like product, not raw and not charred, possibly evenly cooked. The thickness of the bread had to reach a thickness of at least 6 cm as the height of the incisions on the walls of many HTs might indicate.

In the case of experimental activities aimed at investigating the function of pottery containers used during a cooking process, it is necessary to pay particular attention to the context (the type of fire installations) and the kind of foodstuff with which they could have been used.

In this case, particular attention has been paid to both the fire installations and the flour.

V.4.1 Fire installations:

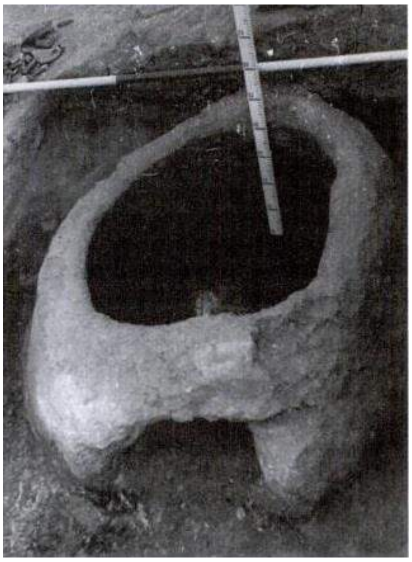

Fig. V.12 Ring oven from Yarim Tepe I, level 4 (MERPERT - MUCHAEV 1993: 77).

To be able to perform the experiments related to the hypothesis that the HTs were used for bread baking, it was necessary to build in preliminary phase the three kinds of fire installations that were supposedly present in the Late Neolithic contexts of the Near East.

In order to make the cooking conditions of food similar to those that could probably be applied in the contexts in which HTs were found, in addition to the fireplace, the two types of oven most commonly in

[11] LEVI-STRAUSS 1955, 1964.

the late Neolithic near-eastern contexts were reproduced: the domed oven and the ring oven. Using different types of ovens greatly affects the type of cooking: different temperatures, different conditions of the cooking environment, different heating modality.

While the domed oven was certainly present and widly spread in these contexts, the ring model (tannur-like oven) presence is still subject of debate; it is not easily archaeologically identifiable. Anyway, if it was present, it was not very widespread[12] This should closely resemble the type of oven commonly found today throughout the near-eastern area called *tannur* or *tabun.*

Fig V.13 Baking bread in the *tannur* (CAMPANELLA 2001: 232, fig.1).

Both the ovens were replicated on the basis of archaeological remains of fire installations; in particular those known from levels 4 and 5 of Yarim Tepe I were used as example.[13]

Both in the domed oven and the tannur-like oven a stone base was first made on which superimposed strata of rough clay mixed with a fair amount of straw fragments have been shaped.

In particular, with regard to the domed oven, the paste has incorporated a wooden frame that has made it more resistant.

Concerning to the ingredients of the dough, it were used stone-grounded flour, water and, in some trials, natural sourdough.

Fig. V.14 Domed and ring oven replicas.

[12] BALOSSI - MORI 2014: 48-49; FULLER – CARRETERO 2018;

[13] In particular as model were used examples from Yarim Tepe: MERPERT - MUACHAEV 1993:.77, 84; MULDER - HEYMANS 2002;

With regard to flour, different types of cereals known from archaeo-botanical analyzes carried out in the near-eastern late Neolithic sites were chosen as variables in the experimental analysis.

Flour of modern varietis of barley[14] (*hordeum vulgare*), durum wheat (*triticum durum*) - tumminia and russello varieties - were used in the preparation of the dough.

Throughout the experimental process, different cereals were used because their characteristics differ and can behave differently with each other during cooking.

Inside the dough, in fact, due to a series of physical and chemical transformations, the proteins bind together to create a ties so that the dough can unify: the loaf of bread. The ability to create networks inside the dough depends mainly on the type and percentage of gluten present in the flour. Each type of cereal has a different type and amount of gluten and, as a result, this feature could reveal which type of cereal could potentially be more suitable for cooking in HTs, for example.

In all cases, these were organic cereals.

The flour used in the experiments was ground by means of a stone mill.[15] The barley flour, having a lot of chaff, was subsequently roughly sieved.

As for the Near Eastern Late Neolithic there is no direct evidence of the use of yeast during bread making,[16] but it could have been.

First of all, sourdough is very easy to obtain. In fact, this can be achieved simply by letting the flour ferment with water for several days and in a sufficiently warm environment. In this way the enzymes, naturally present in the flour, are activated, starting a fermentation and leavening process.

Several authors believe that during Neolithic period could have been already used fermenting agents.[17]

Furthermore, it is really unlikely that thick breads such as those eventually produced by the HT , would not be leavened.

In conclusion, even though there are not clear evidence, it is possible that yeasts could have been used to bake bread.

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[14] Thanks to Dr. Andrea Brandolini of the C.R.A. - Research Unit for the Selection of Cereals and the Enhancement of Vegetable Varieties, who made available organic barley for the first set of experimental trials.

[15] This is a crucial factor. Industrially produced flours should not be used at all in experimental test. Their high amount of gluten made their behavior very different from stone-grounded flours.

[16] KATZ - VOIGT 1986.

[17] BALOSSI – MORI 2014: 45.

Thus, natural sourdough was included in some experimental tests.
Wood-coals were used as fuel.

V.4.2 Baking experimental activity

The experimental baking activity can be divided into three wide steps.
A first set, helped to identify the fire installation that could have been suitable for baking bread with the HT.
Once defined the types of fire installation, a second set of tests allowed to verify and detail the most suitable conditions in which HT could have worked and the precise the possible content. Finally, the performances of the HT in relation to such an activity were evaluated.
In the Table V.1 the outcomes of 29 baking tests carried out during spring-autumn 2015-2020, in the countryside of San Piero Patti-Librizzi, in Sicily, Italy are reported.

V.4.2.1 First set of experimental tests with the domed oven

Thirteen tests were executed for this first set of experimental analysis. For every one of them, variables such as the kind of fire installation, cooking time, baking temperature,[18] presence / absence of sour-dough, consistency of the dough (liquid, semisolid or solid) were changed.
The experimentation followed a circular path: in an attempt to solve the problems that arose one at a time, we returned to the starting hypothesis by re-adapting it in such a way as to be suitable for baking bread with HTs. However, this path has allowed us to fully understand the dynamics and the mechanisms regulating the baking process.

V.2.1.1 Initial experimental tests with domed oven

The earlier baking bread experiments with the HTs were carried out in the domed oven. This type of fire installation was largely diffused in Late Neolithic Near East.
These tests did not led to suitable results.
Indeed, during this step HT baking was made on the base of the current baking practice: the dough is put into preheated oven after having put the burning embers within it aside;

[18] The cooking temperatures were recorded with a pyrometer TE/XF0600F3F, AM&C.

Ex. nº	HT type	Fire installation	Cooking technique	Tempe-ratures	Cooking time	Flour/ Cosistency of the Dough	Leavening	Results	Notes
1	Lipari	Domed oven	The replica was placed in the cooking chamber after the burning coals therein were set apart	Starting from 400ºC	2h	Barley; Semisolid	18h	Bread with hard crust at the top, totally wet at the bottom; it strongly sticked to the walls of the vessel;	The vessel was sprinkled with flour before to fill it with the dough;
2	Lipari	Domed oven	The replica was placed in the cooking chamber after the burning coals therein were set apart	Starting from 150ºC	2h	Barley; Liquid	no	Bread with thin crust at the top, totally wet at the bottom;	
3	Salina	Domed oven	The replica was placed in the cooking chamber after the burning coals therein were set apart	Starting from 200ºC	2h 30m	Wheat Liquid	18h	Bread with crust at the top, totally wet at the bottom; it sticked to the walls of the vessel;	
4	Vulcano	Tannur-like oven	The replica was put at the top of the oven	200ºC	1h 40m	Wheat; Solid;	no	Bread crude at the top and totally burnt at the bottom; Heavy fire traces on the external surface of the vessel.	The fire was often lit and put out trying to maintain the cooking temperature constant
5	Vulcano	Domed oven	The replica was placed in the cooking chamber after the burning coals therein were set apart	Starting from 250ºC	2h	Barley; Semisolid	16h	Bread with hard crust at the top, totally wet at the bottom; it strongly sticked to the walls of the vessel;	
6	Lipari	Tannur-like oven	The replica was put at the top of the oven	300ºC	2h	Wheat; Semisolid;	12h	Bread burnt at the bottom and crude at the top; Heavy fire traces on the external surface of the vessel.	Fire was continuously light and extinguished trying to maintain constant the temperature
7	Panarea	Fireplace	The replica was preheated upside-down;	300ºC	1h 30m	Barley; Semisolid;	16h	Bread totally crude	
8	Vulcano	Domed oven	The replica was preheated for 15 min; once filled with the dough it was put back in the oven	Starting from 250ºC	1h	Barley; Semisolid;	no	Rather baked bread; it was easily taken out of the vessel;	The vessel was sprinkled with flour before to fill it with the dough;
9	Panarea	Fireplace	The replica was preheated upside-down; once filled with the dough the vessel	250ºC	1h 10m	Barley; Semisolid	no	Bread with hard crust at the top, and quite wet at the bottom; it	

			was buried in the burning coals					strongly stick to the walls of the vessel;	
10	Salina	Fireplace	The replica was preheated upside-down; once filled with the dough the vessel was buried in the burning coals	250ºC	1h 10m	Barley; Semisolid;	no	Bread was rather cooked at the bottom, less at the top	The dough was wrapped into grape leaves
11	Panarea	Domed oven	The replica was preheated for 15 min; once filled with the dough it was put back in the oven	300ºC	1h	Wheat; Semisolid;	no	Bread remained rather crude	
12	Panarea	Domed oven	The replica was preheated for 15 min; once filled with the dough it was put back in the oven	300ºC	1h 30m	Wheat; Semisolid	4h	Bread was take out easily, it was completely baked	The vessel was sprinkled with flour before fill it with the dough;
13	Panarea	Domed oven	The replica was put directly on burning coals	250ºC	1h 30m	Barley; Semisolid	no	Bread baked at sides but rather crude in the middle	
14	Mozia	Domed oven	The replica was put directly on burning coals	Starting from 400ºC	1h 45m	Russello wheat; Solid;	few	Bread was completely baked, it was take out easily	
15	Pantaleo	Domed oven	The replica was put directly on burning coals	Starting from 400ºC	1h 45m	Russello wheat; Solid;	12h	Bread crumbled to pieces	
16	Pantaleo	Domed oven	The replica was put directly on burning coals	Starting from 420ºC	1h 45m	Russello wheat; Solid;	No	Bread crumbled to pieces	
17	Pantaleo	Domed oven	The replica was put directly on burning coals	Starting from 400ºC	1h 45m	Tumminia wheat; Solid;	36h	Bread crumbled to pieces	
18	Mozia	Domed oven	The replica was put directly on burning coals	Starting from 420ºC	1h 45m	Russello wheat; Solid;	14h	Bread was completely baked, it was take out easily	
19	Mozia	Domed oven	The replica was put directly on burning coals	Starting from 400ºC	1h 45m	Russello wheat; Solid;	6h	Bread was completely baked, it was take out easily but into two large pieces	

20	Levanzo	Domed oven	The replica was put directly on burning coals	Starting from 400ºC	1h 45m	Tumminia wheat; Solid;	6h	Bread was completely baked, it was take out easily	
21	Mozia	Domed oven	The replica was put directly on burning coals	Starting from 400ºC	1h 45m	Barley;	6h	Bread crumbled to pieces	
22	Levanzo	Domed oven	The replica was put directly on burning coals	Starting from 400ºC	1h 45m	Russello wheat; Solid;	6h	Bread baked except the middle, it was take out easily	
23	Levanzo	Domed oven	The replica was put directly on burning coals	Starting from 4o0ºC	1h 45m	Russello wheat; Solid;	6h	Bread was completely baked, it was take out easily	
24	Mozia	Domed oven	The replica was put directly on burning coals	Starting from 420ºC	1h 45m	Russello wheat; Solid;	No	Bread was completely baked, it was take out easily	
25	Mozia	Domed oven	The replica was put directly on burning coals	Starting from 420ºC	1h 45m	Barley; Solid;	12h	Bread crumbled in four large pieces	
26	Pantaleo	Domed oven	The replica was put directly on burning coals	Starting from 450ºC	1h 45m	Russello wheat; Solid;	12h	Bread was completely baked, it was take out easily	
27	Mozia	Domed oven	The replica was put directly on burning coals	Starting from 400ºC	1h 45m	Russello wheat; Solid;	12h	Bread was completely baked, it was take out easily	
28	Mozia	Domed oven	The replica was preheated for 15 min; once filled with the dough it was put back in the oven	Starting from 400ºC	1h 45m	Tumminia wheat; Solid;	6h	Bread was completely baked, it was take out easily	
29	Pantaleo	Domed oven	The replica was preheated for 15 min; once filled with the dough it was put back in the oven	Starting from 400ºC	1h 45m	Tumminia wheat; Solid;	6h	Bread was completely baked, it was take out easily	

Table V.1 Baking experimental trials.

moreover, in many experiments the baked dough was in a semi-solid or liquid state, on the bases of the earliest picture known about pot baking from.[1]

Thus, the upper surface of the dough in contact with the high temperature of the oven, turned into a very hard crust that strongly stake at the walls of the vessel; on the contrary, the lower part of the dough, in contact with the ceramic surface, remained quite raw and wet (fig. V.15).

Fig, V.15 Earlier baking tests in the domed oven.

V.4.2.1.2 Experimental tests with the tannur-like oven

Nowadays the tannur ovens are mainly used to bake bread by putting the dough discs against the heated inner walls. During the experimental analysis two attempts were made to bake bread by means of it; the HT was placed over the upper porthole of this fire installation since it is the only possible way to arrange such large vessel.

Thus, after that the fire was lighted the tannur-like oven, the vessel filled with the dough was put at its top but:

– if the fire inside the oven was lit, its flames produced burn traces on the external surface of the tray that are generally not present on the archaeological shards. In addition, the temperature quickly reached high temperatures (at least 500ºC); the

[1] A baking pot process is depicted in the mastaba of the high-status official Ti. It dates back to the 5th dynasty (between 2514 and 2374 BC) of Old Kingdom Egypt.

resulting bread was burnt at the bottom and completely undercooked at the top. However, in this case, bread easily detached from the tray, while preserving the score marks of the container on its lower surface.

– if the fire inside the oven was extinguished, baking was impossible because the remaining heat from the preheating stage of the oven, was not high enough to allow the bread to bake.

Fig. V.15 Baking tests in the tannur-like oven.

During the experiment with tannur, different types of dough were baked. The worst results were obtained when it was liquid in consistency because it needed more energy to be cooked.

The baking tests performed with the tannur-like oven have revealed that this kind of fire installation is unsuitable for baking bread with the HTs (fig. V.15).

At the same time the experimental triala has given some useful insights:
- in order that the bread can be taken out of the vessel without crumble into pieces, the heat must come from below.
- the dough must be quite solid. Liquid dough dissipates too much heat in the evaporation of the water contained.

V.4.2.1.3 Experimental tests with the fireplace

Baking bread attempts were made with the HT replicas in a simple fireplace did not work (fig. 6). In fact, during baking, the large size of the vessel prevented the oxygen from feeding the burning-coals under it which resulted in extinguishing them.

Thus, the heat did not arrive to the dough from the top because the baking was in the open air, neither from the bottom because once the HTs were put in, the coals became extinguished in a short time. As result, the bread remained totally raw.

On the basis of ethnographical examples (see chapter IV), the baking of the dough in the fireplace was also aid by putting hot coals at the top of the HT replica; however, this attempt did not work either. The upper part of the dough turned into a hard crust that stuck to the sides of the vessel and instead the bottom part remained rather undercooked.

To facilitate the baking of the dough the idea of using lids as in the ethnographic comparisons (see chapter 4) was taken into account; however, it was discarded because these items are almost not present in the archaeological record.[2]

On the base of ethnographic comparisons, also baking with the dough wrapped into leaves within a tray was attempted; it was also buried under boiling-coals but it did not work either.

In conclusion, the experimental trial did not provide satisfactory results.

However, it allowed to understand that when large vessels, like the HTs , are putted on a layer of burning coals, it can absorb just the initially heat; then coals extinguish and no longer produce heat.

V.4.2.1.4 Final experimental tests with the domed oven

As seen before, initially many experiments failed using the domed oven.

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[2] Eg. KIRKBRIDE 1972: 9; MEELLART 1975: 139.

Anyway, the experience about baking dynamics gained during subsequent work helped to precise the variables to be used.
In fact, these made clear that the consistency of the dough was a critical variable, and this crucial insight ultimately led to positive results. In fact, using a very solid dough, prevented the incisions/impressions on the surface of the vessel from being filled.


Fig. V.16 Baking tests in the tannur-like oven.

With this method the scoring on the pottery’s surface had a function: it created a bumpy surface that prevented the dough from adhering well to the vessel therefore facilitating its extraction after baking.
Another crucial variable was the arrangement of the vessels. These needed to absorb as much heat as possible from the top as well as from the bottom. For this reson the tray had to be placed directly on the burning coals.

Since these variables were changed, the experiments began to work, and baking bread in domed oven became possible (Fig. V.17).

In conclusion the experimental baking worked:

– by simply putting the HT filled with a very solid dough in the preheated domed oven directly on the burning coals;

– by preheating the empty vessel in the oven and, once filled with a solid dough, putting it again inside the cooking chamber until it was completely baked.

Fig. V.17 Breads finally resulting from baking in domed oven

V.4.2.2 Second Set of experimental tests

Several other experiments were performed to statistically confirm and precise the conditions in which HT replicas worked as pans to bake bread in a domed oven.

Furthermore, these experiments allowed the developing of the use-wear on the HT surface for its analysis (see chapter VI).

The experimental tests has given insights about the conditions in which the HTs could successfully have been used.

Once the domed oven reaches the temperature of 400/450ºC (Fig. V.18.1), a HT filled with a (possibly few leavened) solid dough is placed directly on the burning coals (Fig. V.18.2). In this way, during baking, the dough receive heat from both the top (hot air in the cooking chamber) and from the bottom (the heat transmitted to the vessels from the initial burning coals). After ca. 1h 45m the bread is completely baked and the HT can be pulled out the oven (Fig. V.18.e). The bread can be easily taken out of the vessel after 5 minutes cooling at ambient temperature (Fig. V.18.4, 5, 6).

Fig. V.18 Final baking test with the domed oven.

Cereal with large amount of gluten (like Russellò and Tumminia wheat) were perfectly adapt for baking with the HTs: it was possible to take them out of the vessel as a whole.
On the contrary barley did not provide very positive results.
Eventually, flours with different amount of gluten can be mixed.
Dough can be unleavened or few leavened.
Tendentially, it would be better if it was not completely leavened (as we do today), because during baking the dough spreads and it could fill the score hollows making very difficult its extraction.

However, this is not the only possible way to bake bread with the HT.
For example, it is possible to do this by using the preheating the technique of pre-heating the vessel in the domed oven.
In any case it gave, in a certain sense, negative results during experimental activity. In fact, once the oven reached a temperature of 400ºC, an empty HT was placed onto the burning coals. Leaving it to store the heat there for 15 minutes. Then, the HT was pulled out and filled with a very solid dough. This action made the surface of the dough to come abruptly in contact with the heated tray immediately turning into a thin crust; once filled with the dough, the HT was left inside the oven to continue baking for about 2 hours. In this lapse of time, the dough received heat from both the oven and from the vessel thanks to the heat that it had previously retained. The bread became completely baked and it could have taken out of the vessels without crumbling.

However, this technique worked perfectly with the plain tray too.
It means that, if this technique would have been used with the HTs, scores on the HT surface would have been totally unnecessary.
In conclusion, the result of the experimental trials let to think that this technique was not adopted for baking bread with the HTs.

V.4.2.3 Further notes

In order to better understand how HTs could have been used, two further elements came to light over the long run of the experimental process.
Baking by means the HTs implies that flour, charred bread crusts or even fragments of coal accidentally fallen into the score hollows, filling little by little them.
Therefore, to ensure the functionality of this pottery form it is necessary to clean it from time to time.

Fig. V,19 Cleaning the HTs replica used for baking

The cleaning of grooved HT is quite simple: just swipe a finger, possibly with water, in the middle of the groove. On the contrary, cleaning the HTs with impressions is a rather long operation as, through a small tool it is necessary to empty each impression one by one. The use of water facilitates the operation but not too much.

Another aspect that might be pointed out about the HT function is related to its large base: this type of vessel tend to fill up immediately when it rain. In addition, the fact that it is very porous and its interior is not completely transformed into ceramic (the dark core in section) make these vessels are particularly sensitive to humidity and tend to shatter on these occasions.

V.4.3 HT performances

Once obtained these results, an attempt was made to verify their efficiency namely their performance characteristics in regard to such an activity.

As stated by Skibo these are ‘the capabilities that a vessel must have to adequately perform its functions’.[3]

In order to evaluate the HT’s performances, the main features of the ceramic shape have been broken down and tested one by one.

These are:

- the shape;
- the ceramic paste and the temper;
- the wall thickness;
- the scores on the internal surface;

Each one of these has been tested throughout repeatable experiments that, in part can be generalized for other ceramic forms that present similar characteristics.

V.4.2.4.1 The shape

The very shape of the HT with wide base and low sides configures it as ideal shape for cooking in the oven.

In fact, the pan-shape allows the arrangement of a large quantity of food for a limited thickness;

In the cooking chamber of an oven, the heat reaches the food (allowing it to cook) mainly from above (Fig. V.20a). In fact the part of the bread in contact with the bottom of the vessel remain less cooked and do not turns into crust[4] (Fig.V.20 b). Thus, thanks to the shape of the pan, large quantities of food can be evenly cooked.

It is no coincidence that our modern baking pans have the same morphology.

Also the oval morphology of the vessel can be attributed to the effort to make the baking of the food as homogeneous as possible.

[3] Skibo 2013: 9.

[4] The formation of the crust on the external surface of the bread depends on its impact with that high temperatures. It can produce a series of physical and chemical reactions as the sugar caramelization that give the brown color to the surface of the bread (AA.VV. 2010; GIORILLI - LIPETSKAIA 2017).

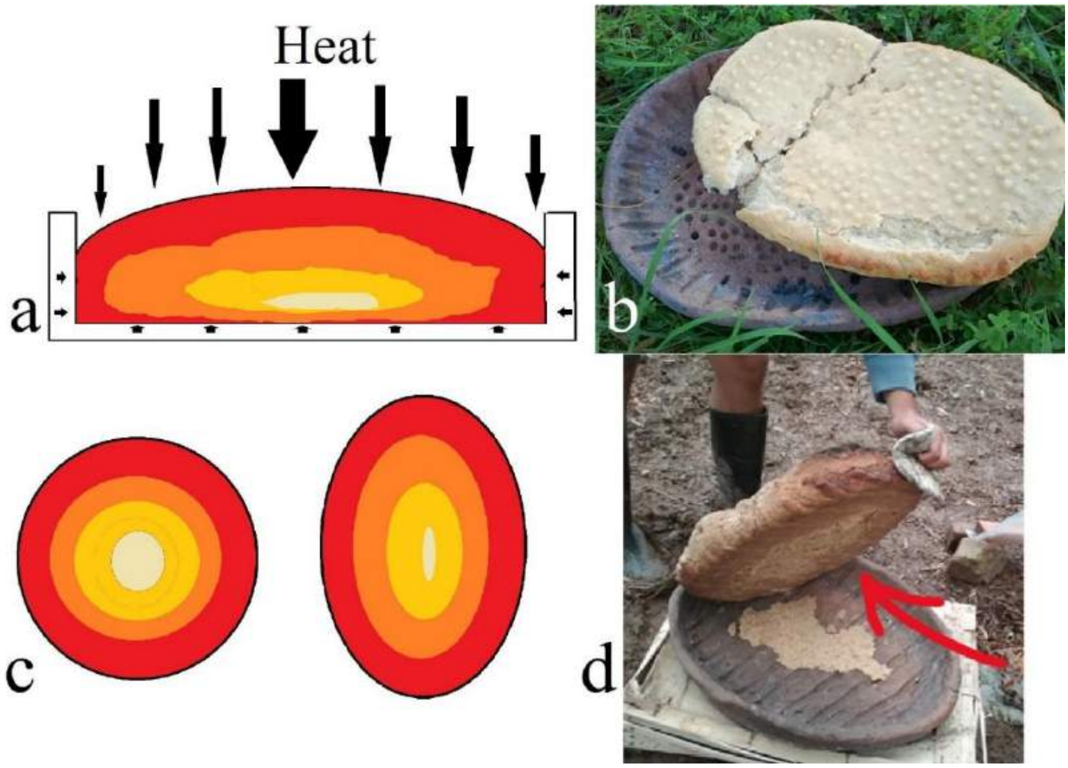

Fig. V.20 Heat affecting a HT replica during baking (a, c) and its evidences into the bread surface

As introduced before, when a pottery tray containing foodstuffs is put in a oven, the heat reaches it mainly from above, moderately from the sides and less from below.

This means that while part of the bread close to the sides of the vessels bakes regularly, the central part remains raw.

This phenomenon was evident during the experimental trials (see the red arrows in the photos on the right of Fig. V.20d).

The oval shape allows the central part of the bread to be closer to the sides of the vessel and therefore, to be more exposed to heat (Fig. V.20c). In this way its baking is more homogeneous.

In practice, it is the same concept as donuts: the hole in the middle facilitates its homogeneous cooking. Or it is enough to think of our loaves of bread which are often oval in shape.

V.4.2.4.2 The temper

Several reasons can be counted with respect to the choice of using plant fragments rather than mineral to temper the clay of the HTs.

- Often, the cooking pots are tempered with plant inclusions. It is generally accepted that this feature improves their resistance to heat and facilitate its spread.[5] Indeed, during the firing of the vessel, the organic inclusions burn producing elongated cavities inside the vessel that give it a porous consistency. A pot made with large quantities of large plant inclusions is functional for use for cooking because the pores prevent breakage during its regular exposure to heat.[6]

Fig. V.21Cracked mineral tempered replica of HT

- The large plant inclusions, working as binders, give a greater solidity to the vessel during its shaping and drying phase.[7] This is particularly true with regard to coarse clay vessels as the HTs are.

During the experimental activity, the only mineral-tempered replica of HTs cracked during the drying phase. It could be due precisely to this reason (Fig. V.21).

g184 g133

Fig V.22 Weight comparison between a mineral and plant tempered HT.

[5] EILAND 2003: 321.
[6] SKIBO et al. 1989: 132-133.
[7] RYE 1981: 27-34.

- Finally, the type of temper affects the weight of the pots.

It can be a significant factor for large vessels like the HTs are.

In fact, the experimental data suggest that a plant tempered HT could weighs roughly three-quarters that of mineral tempered ones (Fig. V.22). For example, a medium-sized 8 Kg plant tempered HT weighs about 2,5 kg less than a mineral tempered one.

V.4.2.4.3 The thickness

The sides and bases of the HT are almost always very thick. They can even exceed a thickness of 3 cm.

How a thick-walled vessel reacts to heat exposure in a domed oven was tested in an experimental test.

During the trial a thinner vessel and a thicker vessel made of coarse plant tempered clay, were heated. The experiment was conducted in a domestic oven (Whirpool AKP 601-602) at 200º C to reduce the variables. The temperatures of the two bowls were measured by thermocouples (KKmoon, DualChannel K-type Thermocouple HT-L13) and finally they were compared.

The graph fig. V.23 shows that while the thin vessel (red line in the graph) quickly reached high temperatures and cooled down just as quickly, the thicker bowl (blue line in the graph) stored heat and released it gradually.

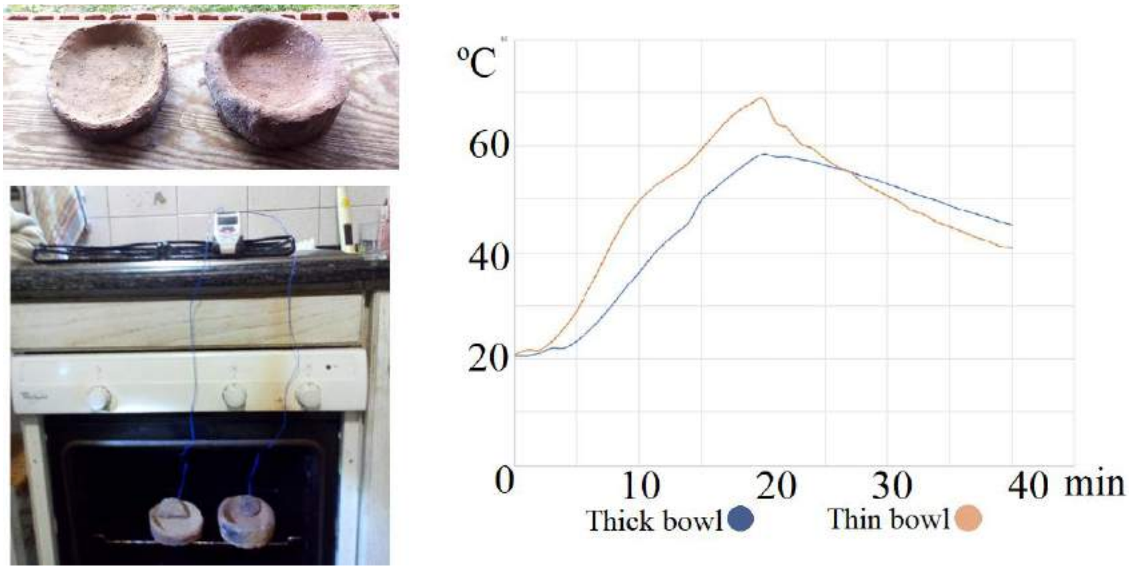

Fig. V.23 Reaction of a thinner and a thicker bowl to heat.

This feature also seems to be linked to the functioning of HT; In fact, once placed in the oven for cooking, the large HTs prevent oxygen from feeding the burning-coals under

Fig. V.24 Unconsumed embers after baking with a HT.

them. Thus, the embers extinguish and stop from generating heat. See the black spot of unconsumed embers in the photo on the right (Fig. V.24).

the thickness of the HTs sides allows them to store heat and release it gradually over time.

Again, also this characteristic makes HTs suitable for baking bread that needs relatively low and prolonged temperatures.

V.4.2.4.4 The scores

Experimental tests were also carried out to verify the effective efficiency of the scores on the internal surface of the HTs;

As hypothesized by Voigt[8] and suggested by the first set of experimental trials the scores on the internal surface of the HTs could have had the functional purpose to make easier to take the bread out from the tray.

To verify if the scores could actually facilitate such an operation, an experiment was dedicated.

A replica of HT (Mozia in fig. V.9) and a flat base tray (Pantaleo in fig. V.9) were produced from the same ceramic paste on the basis of the general characteristics of the HTs.[9] Rough clay was tempered with a large amount of plant inclusions and shaped. After a month of drying they were fired by applying the bonfire technique.

The difference in behaviour between the two replicas could have been revealed the actual reason of the scores on the surface if they had had some functionality in baking bread.

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[8] VOIGT 1983.

[9] In particular the replicas are based on the descriptions of the HTs of Tell Sabi Abyad (NIEUWENHUYSE 2008: 116-117, plates 15, 16, 17).

Stone grounded *Triticum durum*[10], water and sourdough[11] were the ingredients of the solid dough used in the tests.[12]

The two kinds of trays were always used to bake bread in a domed oven fuelled by wood coals (See table V.1).

Both replicas were used to bake bread using the preheating technique in the same way as indicated by the previous experimental tests (Paragraph 5.4.2.2).

Both the plain tray and the HT were placed empty inside an oven at ca. 400ºC and left there for 15 minutes. Once heated, they were taken out and filled with a leavened solid dough of *triticum durum.* Then, they were put inside the oven again directly onto burning coals and left for almost 2 hours. As result, in the both cases, it was possible to take the bread loaves out as a whole (fig. V.25a).

Even though this test confirms that the HTs could have been used to bake bread, as indicated in the previous study, at the same time it does not give any insight about the difference in behaviour between the plain tray and the HT.

In the second experiment the two vessels were used to bake bread by simply putting them, filled with a solid few-leavened dough of *triticum durum,* directly onto the burning coals inside the domed oven at ca. 400ºC for almost 2 hours. After baking, it was possible to take the bread out as a whole from the tray with incisions/impressions, but not from the tray with the plain-base; In the last case the bread crumbled to pieces (fig. V.25b).

Again, in a third experimental trial, the both trays were putted onto the burning coals inside the domed oven at ca. 400ºC for almost 2 hours but, in this case, filled with an unleavened dough (fig. 25c).

The results were comparable to the previous test.

Probably, compared to the plain-base tray, the surface of the HT offers less resistance to the detachment of the bread because its surface is repeatedly and rhythmically interrupted by empty spaces. Thus, the dough is prevented from adhering to the surface of the HT well. In fact the incisions/impressions, when present, cover the surface of

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[10] Experimental tests with other kind of cereal flour are ongoing.

[11] The use of sourdough is not surely attested for this period. Experimental tests without yeast are ongoing.

[12] The solidity of the dough is a really important factor to be able to bake bread with the HTs. Also the stone-grounding of the flour is a determining factor for that kind of experimental tests because of the difference in behaviour between the commercial flour and stone-grounded one. The last one contains the parts of the grains that disappeared in the flour industrially produced.

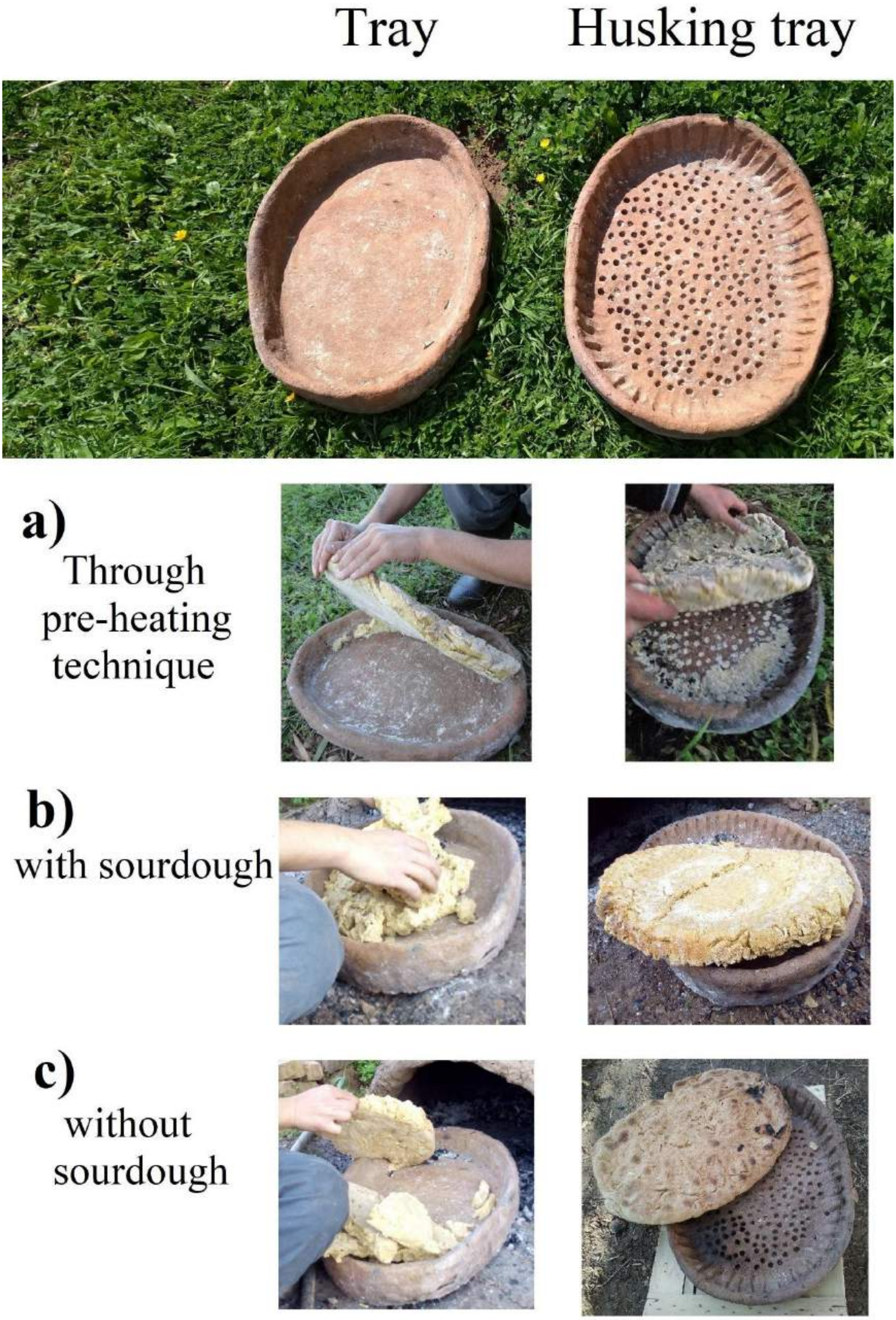

Fig. V.25 Difference in baking with a tray or an HT.

the vessel entirely and homogeneously. Moreover, it would explain why the scores seem to be done without much care and why they would be of different depths in the same tray.

Therefore, only in the case of putting the tray filled with (leavened or unleavened) dough directly into the oven, the impressions/incisions fulfil an indispensable function to detach the bread from the tray.

In conclusion, admitting that the HTs were used to bake bread in a domed oven, like the experimental analysis has shown to be physically possible, it is more probable that they were used without the pre-heating technique.

V.5 CONCLUDING REMARKS

In conclusion, experimental tests allow you to make useful considerations both in relation to the technological and functional aspects of the HTs.

From the production point of view, general conclusions can be drawn:

- produce a HTs is a rather simple operation and, in all, it can take place in a month, if the ambient temperature is suitable;
- the pinching shape-technique seem to be rather inappropriate to perform such large pots; on the contrary, the slab technique represents the simplest technique to be adopted to shape a HT;
- the finger impressions on the surface of the vessel must take place immediately after (or within a few days after) shaping; before it turns dry;
- the particular gestures used for the scoring of the walls with oblique / vertical incisions could have been adopted on a large territory given that fragments of HT of this kind have been found in numerous sites;

In relation to the function, the HT ceramic form was found to be unsuitable for the husking activity;

On the contrary, all the elements that characterize this vascular shape (shape, temper, thickness, scoring) are functional to its use as a pan for baking a solid cereal-based doughs in a domed oven.

In this case, not only such an activity is feasible but, the presence of scores on its inner surface would also find a functional purpose.
The HT would be an optimization of a pottery shape aimed at solving the practical problem of the bread sticking.
According to this perspective, the HT could be a form of cooking technology.
However, the data presented up to now are not sufficient to demonstrate the function of these vessels. To use Skibo's words not necessarily the intended function of a ceramic form corresponds to its actual use.
Therefore, HT fragments were submitted to use-alteration analysis by integrating use-wear and residues on an archaeological sample (chapters VI and VII).

Chapter VI

EXPERIMENTAL AND ETHNOGRAPHIC REFERENCE COLLECTION

VI.1 INTRODUCTION

Technological and functional trace analysis adopted in this research has the objective to allow the interpretation of archaeological artefacts, the husking trays (hereafter HT).
As previously mentioned in the methodology chapter (III), to be able "to read" the archaeological traces it is necessary to refer to an experimental/ethnological collection.
In fact, comparing the experimental traces with the archaeological ones, it is possible to establish (or not) analogies which allow to interpret the action that generated them.
In this chapter, the experimental reference collection of traces solely dedicated to the HTs will be presented.

As suggested by many scholars, it is necessary to create a specific reference collection for every type of archaeological artefact to avoid generalizations.[1]

During the life of a vessel/fragment a series of technological, functional and post-depositional traces overlap. Be able to distinguish and relate them to the activity that generated them, means understand its history.[2]
First of all, the process that led to the developing of the technological traces during the formation step of the HT replicas will be illustrated.
Then, the functional traces, developed on the surface of the vessels during their use will be showed.

[1] FORTE 2015.
[2] VIDALE 1990.

Finally a still ongoing experiment on the post-depositional traces appearing on the surface of a buried experimental HT replicas will be briefly presented.

In order to make the description of traces and scores as objective as possible, a standardized terminology has been adopted. The descriptive criteria are defined in the methodological chapter III.
As for the technological traces, these will be associated directly with the experimental action that generated them.[3]
Modifications appearing on pottery surface before and after their use will be compared in order to understand the wear forming process.
Therefore, on the base of deductive process both technological and functional traces will be linked to the specific activity that generated them.
Considering the present and past trace formation dependent on the same chemical-physical dynamics, the experimental reference collection constitutes a scientifically solid base to interpret archaeological artefacts.
Experimental and ethnological reference collection of both technological and functional traces to which this chapter refers is reported in Vol 2. The reference collection is reported according to the order in which the sections are presented below.
Every picture is reported as 'tab'.

VI.2 TECHNOLOGICAL TRACES REFERENCE COLLECTION

The analysis of technological traces can provide numerous informations:

- give scientifically based insight about the productive sequence of the HTs and the procedures to carry out the scores on their internal surface;
- knowing the most probable technological traces in order to be able to distinguish them from the use-wear and post-depositional traces overlapped on archaeological fragments.
- allowing the reproduction of more accurate experimental replicas, required for the morpho-tecno-functional and use-wear analyses.

[3] See FORTE 2020.

In particular, the technological traces reference collection here highlight the investigation of the macro-traces developing on pottery surface during:

- Shaping (pinching and slab technique)
- Surface treatment (no treatment, smoothing)
- Scoring (impressions, incisions, grooves patterns)

On a practical level, this experimental reference collection is based both on bibliographic data (chaper II and V) and a preliminary observation of a small sample of HT fragments (7 from Sabi Abyad, 1 from Tell Halula, 2 from Akarcay (Aka 16 and 17).

As mentioned in paragraph IV.4.2 , all the authors agree in saying that HT production did not required complex steps (chapter II).

In fact, they are characterized by:

- coarse clay
- large amounts of plant inclusion
- careless scoring on the inner part
- untreated or modestly smoothed surfaces
- low-temperature final firing

The preliminary screening of the small sample, confirmed these data.

Therefore, the ceramic paste used to create the reference collection was chosen according to these features.

In all the cases, the ceramic paste of experimental replicas is coarse, roughly sieved, plant-tempered and low-fired in a bonfire (for more details see chapter V).

VI.2.1 Shaping technique

As stated before (chapter II) most of the HTs were very large in size and can be up to 60cm long.

Life-size HT replicas were shaped, left drying and fired during morpho-tecno-functional analysis (section V.2).

The experimental trials have shown that not all vascular construction techniques are applicable to such large trays.

In fact, the large dimensions have a very significant impact on how the vessel is shaped.

There is no other way to build this type of trays if not first spreading a thick layer of ceramic paste on the ground and then raising the walls around it.

Therefore, during the shaping phase the only point in which the technical gesture can be significantly variable concerns with the height of the walls.

Fig. VI.1 Shaping Maraone through pinching technique.

During experimental activity pinching and slab technique were reproduced.

Pinching technique (see fig. VI.1) involves widening the core of a ceramic mixture to form a large and thick layer. The outermost areas of this surface are finally folded upwards to form the walls of the vessel itself.

The use of this technique for the construction of the HT was found to be unsuitable (maraone replica)[4]. In fact, the enormous amount of clay required for the construction of

Fig. VI.2 Shaping *levanzo* through slab technique

[4] The experimental replicas are called with invented names in order to distinguish them.

such a large vessel is difficult to manage starting from the single core. Furthermore, reproducing the ovoid shape typical of HTs poses the problem of the homogeneous distribution of the ceramic mixture. Ultimately, the inclination of the walls at the ends of the vessel is such that, at the time of their construction, these must be shaped again by adapting to their curvature. Furthermore, this delicate point can be subjected to cracks during the drying phase (tab. 4).

The term ‘slab technique’ refers to the construction of walls on a pre-existing base by means of punctual contributions of ceramic paste. These, from time to time, are pressed on the edges of the base so as to compact them with the rest of the vessel in order to form its walls (levanzo replica fig. VI.2).

The technological macro-traces created during the shaping phase were analyzed.

This technique of rising the walls of a vessel produces, in fact, several recognizable alterations on its surface.

The technological traces can be observed in specific areas of the vessel: the section, the external base and the junction point between the walls and the base.

- Section:

when the walls (pre-formed or not) are inserted on a base, the line of contact between them often remains visible in the section of the vessel (tab. 3);

- External base:

when the walls (pre-formed or not) are inserted on a base, an unevenness on the external base is created. Thus, the pressure exerted on the mixture that makes up the walls, so that it can adhere to the base, affects the base itself. This compression can culminate in a depression or even small cracks along the perimetrical area of the base (tab. 1) .

- Junction point between base and walls:

if the walls result from the bending of the base, the profile will be continuous and tend to be everted; on the contrary, when the walls (pre-formed or not) are inserted on a base, the profile will be more abrupt and tend to be closer (tab. 2)

However, these characteristics are not always visible. The junction point between base and walls can be attenuated by the potter adding clay material to the inner wall (tab. 5)

Furthermore, the surface treatment can totally obliterate the previous technological traces of construction of the vessel.

VI.2.2 Surface treatment

Regarding the surface treatment, apart from a few exceptions, several scholars have indicated that the surface of the HTs were not treated or smoothed (section II.4.3).

Fig.VI.3 Smoothed VS untreated surface

These two surface treatment methods have been reproduced and observed in order to define their main characteristics (tab 8). The observations were made on coarse straw-tempered clay.

Untreated surface

Untreated surfaces present an uneven (Fig VI.3, tabs. 1,2) and matte topography. Sometimes juxtapositions of ceramic paste remain visible (tab 7).

The technological traces that characterize it are:

- Striation batches
- Material accumulations
- Depressions
- Craters

Striation batches are isolated, rather short and a striated texture. They follow a variable trend and their incidence is low. The vertex of each striation is blunt and large in section (tab. 3) .

Depressions are tendentially isolated and have a coarse texture. They can follow a variable trend as well as the incidence. Their edges are net and jagged.

Material accumulations often present a coarse texture and sharpened vertexes (tab 4).
Craters present net edges (tab. 1).

Smoothed surface

Smoothing is referred here as the simple passage of the moistened hand by the potter on the surface of a vessel after the shaping phase to result in an even texture.
That kind of surface presents a sinuous and smoothed topography (fig VI.3, tabs. 1,2).
The technological traces that it is characterized by are:

- Striation batches
- Material accumulations
- Craters

Striation batches are multiple, long, with a striated texture. They follow a variable trend and their incidence is low. The vertex of each striation of the beam is sharp and thin in section (tab. 3) .
Material accumulations are present and show a smoothened texture and blunt vertexes (tab. 4).
Craters present round-net edges.
Furthermore, during smoothing, often plant-tempered inclusions are covered by a thin layer of clay (tab 1).

VI.2.3 Scores

As reported in chapter II, the internal surfaces of the HTs are crossed by a great variety of incisions, impressions or grooves.
These can affect both their bases, their walls or the both.
Based on archaeological data, several score patterns were experimentally reproduced and the resulting traces analyzed.

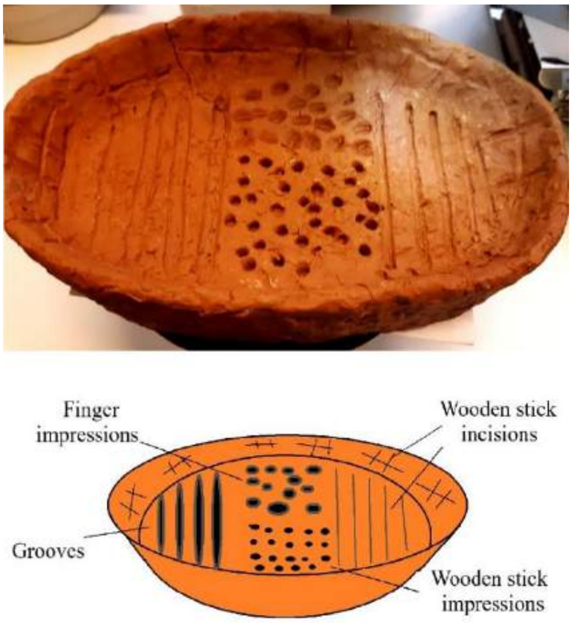

Fig.VI.4 Small experimental replica scored for technological reference collection

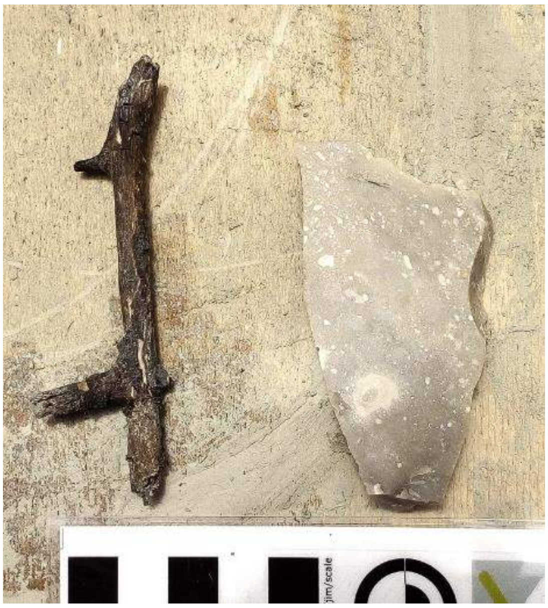

Fig. VI.5 Wooden stick and flint tool used for scoring experimental replicas of HTs

The observation of the experimental traces produced by scoring have allowed to define the specific elements that characterize different types of impressions/incisions;

In this way, it was possible to link traces with specific characteristics to the specific gestures and tools.

Scores were reproduced on small experimental replicas and tablets with different types of tools (figs. VI.4, VI.5). In fact, these can be analyzed regardless the shape of the support.[5] Instead, the material of the support is not indifferent. Also in this case the replica were done of a coarse plant-tempered clay and subsequently bon-fired.

The morphology of the traces depends on the shape of the extremity of the tool. Generally, its incidence depends on the amount of pressure exerted on it and the degree of humidity within the ceramic clay.

The tool material is determining of the shape and arrangement of the internal micro-striations.

The morphology of the micro-striations in the inner surface of the incision depends on its hardness.

Finger-impression

The impression is obtained by pressing a finger against a fresh pottery surface (tabs 1-4).

[5] MATHIEU 2000.

The finger-impression can only be made when the clay is moist.

Finger is like a composite tool: an hard semicircular part (the nail) and a softer one (the fingertip).

The resulting impression consist of two clearly different morphological traces. In fact on the impression we can recognize a vertical wall on a side (the nail part), and on the opposite we have a rounded part, with soft edges and with the presence of batches of striations from the dermatoglyphs (tab 4). On the bottom sometimes there is a semicircular depression leaved by the nail of the finger. (tabs 1,3).

Wooden-stick impression

Fig. VI.6 Impressing ceramic surface by wooden-stick

The impression is obtained by pressing a wooden tool against a fresh pottery surface (fig. VI.6, tabs 1-2).

The resulting impression is circular or oval with straight edges. and The impression has a section Vb and the morphology of the bottom depend on the shape of the wooden-stick extremity. The internal walls are vertical and parallel secondary signs are visible.

Reed impression

The impression is obtained by pressing a reed tool against a fresh pottery surface (tabs 1-2).

The resulting impression consist of a circular ring with straight edges more or less 3 mm thick. The ring is thinner or thicker depending on the inclination of the tool. The morphology of the bottom depend on the shape of the reed extremity.

Like-groove impression

The impression is obtained by pressing a wooden-stick tool arrayed horizontally against a fresh pottery surface (tabs 1-2).

The resulting impression is rectangular and present a Ua section of which edges are straight; the morphology of the bottom of the impression is irregular

The extremities depend and the shape of the stick but the walls are vertical

The most important characteristic that distinguishes the impression of a like-groove wooden stick in regards to a groove is the absent material amassed at the sides of the trace.

Finger-groove

Grooves are obtained by pressing and making a sliding motion using the finger against a fresh pottery surface (figs. VI.7, 8).

The finger-groove can only be made when the clay is still very wet. Otherwise the pressure exerted by the finger would only produce a superficial trace.

Fig. VI.7 Grooving pottery surface by finger

The more the clay dries, the more the surface of the bottom of the groove presents more resistance to the passage of the finger. The finger creates a groove with rounded edges and a striated-bottom. The resulting clay is amass to its borders and at the end of the score (Tabs 1,2,3). Dermatoglyphs on the skin of the finger produce parallel micro-striations (striation batch) on the bottom of the groove (tabs 1,2,3). The inner micro-striations are parallel, os the same wideness and distant ca. 0,8 mm from each other (fig. VI.8). During its passage the finger also creates semicircular dots on the bottom of the groove according to scoring direction (tabs 2, 4).

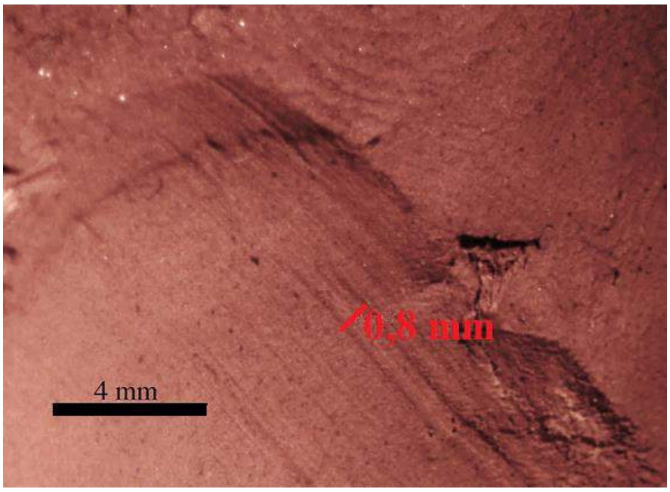

Fig. VI.8 Striation batch of a finger groove.

The entry of the finger is always rather abrupt creates a rather vertical wall and semicircular that trace the shape of the finger (tab 1). The exit of the finger, on the other hand, is more gradual, creating an elongated trace that becomes thinner (tab. 3).

Wooden stick incision [6]

The incision obtained by pressing and making slid a wooden stick against a fresh pottery surface (tabs 1, 2, 5) (fig. VI.9).

The finger-groove can only be made when the clay is still fresh. The more the clay dries, the more the surface of the bottom of the groove presents a more resistance to the passage of the stick.

During its passage the tool creates an incision characterized by Ub section, net edges and striated bottom and walls. The resulting clay is amassed to its borders and at the end of the score. Inner micro-striations are present both on the walls and the bottom of the incision (tabs 3, 5). They are different from each other in wideness; in addition, regarding their relationship, they are assymmetricallyarranged according to variable trends.

The exit of the tool is gradual, creating a sharpened extremity (tab 4).

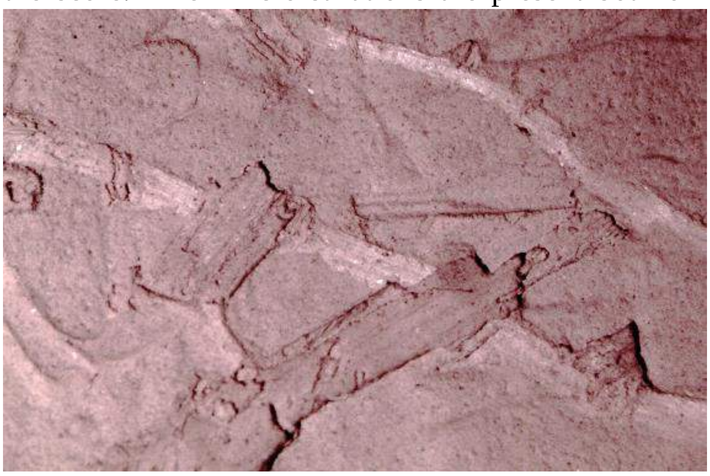

Fig. VI.9 Shallow incision passing over a surface with plant inclusions.

[6] The experiment refers to a no worked wooden stick of a quite soft wood (apricot tree).

Flint blade incision

Fig. VI.10 Scoring an experimental replica with a flint blade

The incision is obtained by pressing and gliding a flint blade against a fresh pottery surface (fig. VI.10).

The finger-groove can only be made when the clay is not dry.

During its passage the tool creates an incision of with Va section, straight edges. The bottom of the incision is striated while the walls are almost smoothed (tabs 1-3).

The resulting clay is amass to its borders and at the end of the score. Inner micro-striations are very thin, long, symmetrically arranged and follow a regular trend.

Bone incision

The incision is obtained by pressing and making slide a bone against a fresh pottery surface.

During its passage, the tool creates an incision of with Vb section, straight edges, striated bottom and walls (tabs 1- 3).

The resulting clay is amass to its borders and at the end of the score. Inner micro-striations are long, symmetrically arranged and follow a regular trend (tabs 2, 3).

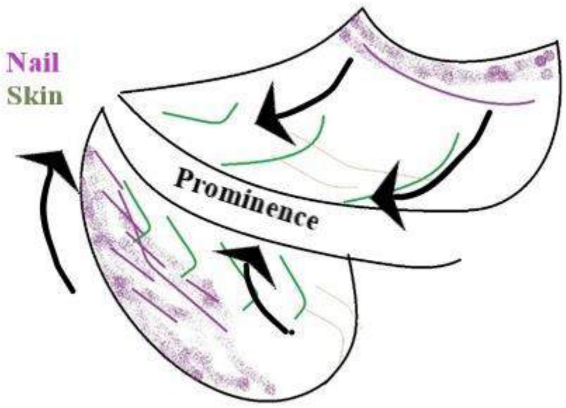

Fig. VI.11 Scheme of the trace resulted from pinching

Pinching

The pinch is obtained by pressing the fresh pottery surface between the fingertip of the thumb and the external phalanx of index finger a finger against (tabs 1-4).

The finger-impression can only be made when the clay is still fresh.

This action creates a composite trace consistent in two large opposite depressions with a central flat prominence (fig. VI.11).

Bumps

Bumps are obtained by pressing cylindrical coils previously prepared on a fresh pottery surface (fig. VI.12, tabs 1-2). Coils results in bumps with Ω section arranged parallel. In this way the surface appear in alternate bumps and ditches.

The surface of the ditches is not altered. Instead on the coils often small dimples appear where it was pressed against the surface. Moreover, the coils appear to be wider in the junction point within the walls of the vessel.

Fig. VI.12 Creating bumps on a small experimental replica.

VI.3 Use-wear Reference Collection

In order to understand the actual function[7] of the HTs, a dedicated use-wear reference collection was created.

The most shared hypothesis about the actual function of the HTs were reproduced and linked to the traces that they produce on a pottery surface.

Thus, use-wear dynamics developed during specific activities , such as husking, cheese-processing and baking activities (see chapter II) were observed, documented and interpreted.

[7] Skibo 1992.

For each activity were analyzed:

- ethnographic vessels
- life-size experimental replicas
- small experimental replicas

Each one of them provided specific indications about different degrees of use-wear alteration.
All together they offer a complete overview of the traces produced on a vessel used in such activities.

The study of ethnographic examples can help in understanding the formation dynamics of use-wear on the surface of ceramic vessels.[8]
On the one hand, these can indicate the type of traces that generally form on a vascular typology if used over time in a 'live' context with all its implications at the level of traces; on the other hand, the vessel can be studied in relation to the economic, social and political context in which it is produced and used (chapter IV).
In this case, ethnographic examples used for cheese-making and the bread-making activity were analyzed as an integral part of the research.
The vessels belong to the ethnographic collection of the Istanbul Universitesi Rıdvan Çelikel Arkeoloji Müzesi.

As regard the experimental replicas, both life-size and small replicas were used to study the development of the wear.
Both were made of coarse, natural clay tempered with abundant plant-inclusions and, once dried, fired in bonfire (see section V.2).

Each of them was used to investigate different aspects of wear development.
Life-size experimental replicas are the most suitable to reproduce a complete traces reference collection; in fact, during experimental trials they are submitted to the more comparable physical and chemical transformations to those the archaeological artefact could have been undergone in the past.

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[8] e.g. SKIBO 1992, ARTHUR 2002, 2003;

This analysis is particularly useful for defining the macro-traces with respect to their collocation on the vessel. In fact, specific use-wear patterns develop on different areas of pot when used.[9]

The macro-traces developed on natural-size were investigated through the naked eye and the portable digital microscope.

Fig. VI.13 Analyzing small replica under Hirox RH-2000 microscope

Small replicas are the most suitable to perform experiments focused on a specific type of trace.

On the one hand, the small replicas can easily be placed under different types of microscopes; these allow to analyze the micro-traces (fig. VI.13).

On the other hand, small replicas can be used for accelerated experiments; thanks to their size it is possible to reproduce easily multiple use experiments; in this way it is possible to obtain well-developed traces in a short span of time. Therefore, the small replicas are particularly useful for the analysis of the use-wear which is slow to develop.

Finally, accelerated experimental trials can be easily carried out in laboratories in order to strictly control the parameters in a closed context.

[9] SKIBO, 1992: 103-143.

Results of the analysis of the ethnographic and experimental replicas were finally integrated together to provide a framework of the general dynamics of traces-developing involved during the use of the vessel for each activity.

VI.3.1 Husking Use-wear:

VI.3.1.1 Ethnographic example

According to the author's knowledge, there are no ethnographic ceramic vessels used for husking in traditional contexts but baskets.

VI.3.1.2 Overall experiment

As stated in chapter 3, during the husking experimental trial, barley spikes were rubbed for 15 minutes against a pottery experimental replica: saturn. The replica ceramic composition was characterized by medium granulometry clay tempered with medium-size plant inclusions. The replica was slightly fired in a bonfire.

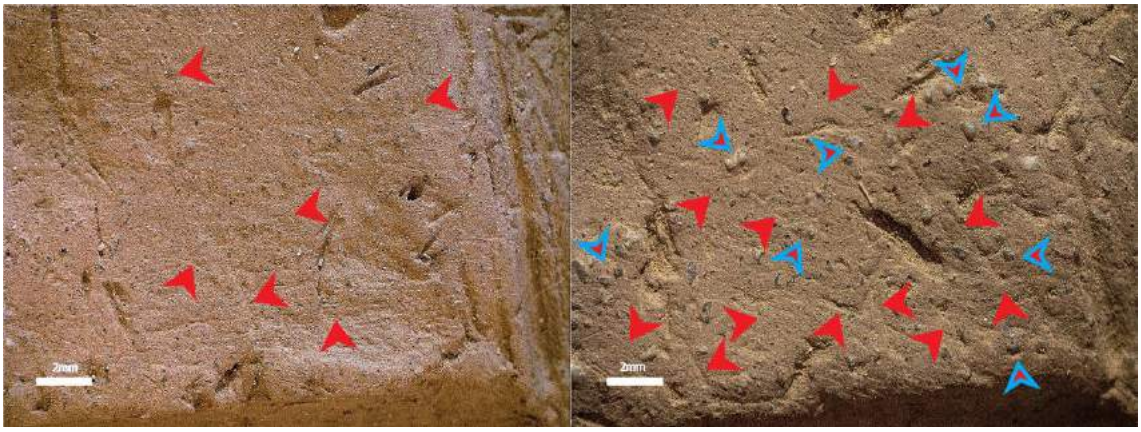

Fig. VI.14 Pottery surface replica after enduring 5 min. (a) and 15 min. (b) husking.

Use-wear analysis

The macro-traces identifiable on the high points of ceramic surface:

- On the internal base and low part of the sides, deep, multi-directional striations (fig. VI.14, red arrows) and the exposure of mineral inclusions (fig. VI.14, red/blue arrows) are shown.

Concluding remarks:

Traces-developing affected the high points of the internal base surface and the bottom part of the internal sides up to 2 cm. Here, the husking experimental activity created evidently long, deep striations on the ceramic surface reveal the mineral inclusions.

VI.3.1.3 Focused experiment

The objective of the experimental trial was to focus on the alteration process of a ceramic surface when used for husking. Hence, barley spikes were rubbed for 15 minutes against the surface of a small pottery experimental replica: saturn (fig. VI.15).[10] The ceramic replica composition was characterized by medium granulometry clay tempered with medium-sized plant inclusions. Finally, the replica was slightly fired in a bonfire.

Fig. VI15 Husking activity on saturn replica a) before, b) during and c) after the experimental husking.

Use-wear analysis

Cleaning procedure:

After the experimental activity, the replica was gently dusted with a soft-bristle brush and blown with compressed air.

The macro-traces identifiable on the high points of ceramic surface:

- deep, multi-directional striations with straight edges (tabs. 2-6)
- levelling and rounding (fig. VI.15, tabs. 1, 3-7)
- exposure of mineral inclusions (tab 1, 4, 5, 8, 9)

The micro-traces on the high points of the mineral inclusions:

- deep, multi-directional striations (tabs 8, 9)
- levelling and polishing (tabs 8-11)

[10] TARANTO et al. 2021.

Concluding remarks:

Husking activity produced traces such as striations, levelling or rounding/polishing both on the ceramic surface and mineral inclusions.

VI.3.1.4 Final interpretation

In conclusion, on the basis of the data presented above, it was possible to define an experimental reference collection of the macro and micro traces developing on a ceramic vessel during its husking use.

This activity strongly modify the ceramic surface.

The wear development affects the high points of the inner surface of the vessel where cereal spikes come interact with the pottery during rubbing.

The friction between grains (hard material) and pottery, produce almost exclusively abrasion traces both at macroscopic level (striations, rounding and levelling) and microscopical level (striations and polishing).

Furthermore, it is revealed that during friction the mineral inclusions present in the ceramic paste became more visible; in fact, unlike the ceramic particles, the mineral inclusions are more resistant to abrasive activity.

VI.3.2 CHEESE-PROCESSING USE-WEAR

VI.3.2.1 Ethnographic example

As presented in chapter 2, bowls with internal surfaces scored by finger-impressions were used to transform a kind of cheese, the *kurut*, into a product similar to yogurt (see chapter IV). The activity consists in rubbing the *kurut* with water against their inner surface. The purpose of the finger impressions is to create an irregular surface in order to increase the friction between the bowl and the *kurut*;

Nowadays metallic versions replace the large ceramic bowls.

The *kurut* is first left in water for a short time to establish softness; then it is rubbed back and forth by hands against the corrugated internal surface of the container in order to flake and dissolve in water (fig. VI.16).

Fig. VI.16 Hands gestures working *kurut* in a modern metal bowl with inner altered surface (https://www.youtube.com/watch?v=8CwW90vvdWk 16/05/20).

Practically *kurut* bowls work like huge graters, as well as the husking baskets but the activity, carried out with a softer material, is mediated by water working as lubricant.

The Istanbul Universitesi Rıdvan Çelikel Arkeoloji Müzesi has made it possible for the author to analyze two types of *kurut* bowls, present in its ethnographic collection: a *çerze* and a *sırlı kurut*.

These had traditionally been produced in the village of Uslu, in Sivrice distric, Elazığ.[11]

They share many features: general shape, large size, height and straight sides (ca. 15/16 cm), finger impressed bases and mineral tempered ceramic paste.

Furthermore, the both vessels also present handles and pouring devices even though they are different.

In fact, while the *çerze* (fig. VI.17) present a handle on the opposite side of a simple pourer; the *sırlı kurut* (fig. VI.18) presents two lateral handles and a mouth with spout.

The most evident difference between the *çerze* and the *sırlı kurut* regarding the surface treatment: the first one is simply smoothed while the surface of the other one is completely glazed green.

[11] The two mentioned pots were brought from Mardin by Dr. Halet Çambel and were produced in southeastern Anatolia. (KILIÇBEYLI 2005: 173).

Fig. VI.17 The *çerze* (photo by author)

Fig. VI.18 The *sırlı kurut* (photo by author)

Use-wear analysis:

Despite in the *çerze*, wear developed modestly probably because it was little used; the *sırlı kurut* surface is glazed in such a way that wear develops in a different way from an untreated surface such as that of the HTs, some elements can be distinguished:

The macro-traces identifiable on the high points of ceramic surface
of the *çerze*:

- on internal base, lighter and rounded areas with polished mineral inclusions (tabs 1, 2)
- on pourer device inner surface, slight rounding (tabs 3, 4)

- on external base, scratches and slight striations, spall detachment (tab 5)

of the *sırlı kurut*:

- on internal low part sides, discoloration, and areas with pits (tabs 4, 5, 10)
- no internal base, polish (?) and pits (tabs 4, 5, 6)
- on mouth and spout, rounding (tab 5 7)

Concluding remarks**:**

Tribo-chemical wear due to the water-mediated rubbing action of the *kurut* has altered the high points around the fingerprints on the bases of both *çerze* and *sırlı kurut* while their interior remained unaltered.

Here, this activity led to a general rounding/polishing of the ceramic surface and of the emerging mineral inclusions. Moreover, in the case of *sırlı kurut*, the glazed surface was also profoundly altered by chemical activity that created large areas with pits. The abrasive and chemical traces have also affected inner sides of the *sırlı kurut* in all its height testifying that it is functional to prevent the liquid from splashing out of the vessel. Some rounding of the surface is also evident in the area of the pourer devices of both the vessels from which the liquid was poured.

VI.3.2.2 Overall experiment

All live-size replicas of HT were used for processing cheese, but some considerations can be suggested.

The general shape of the HT, unlike *kurut* bowls, presents slightly everted and low sides (about 10 cm) that would not allow this activity to be carried out without spilling the liquid out of the container. In addition, the very porous ceramic paste, due to the large amount of plant inclusions that normally characterize the HTs, does not allow the vessel to retain liquids.

VI.3.2.3 Focused experiment

The objective of the experimental trial was to focus the alteration process of a ceramic surface when *kurut*-cheese is processed to prepare like-yogurt on it (chapter IV).

Therefore, a dry ball of traditional *kurut* was put in water for 12 hours to soften it (fig. 19 a). Then, it was processed in a small experimental replica, *vulcano*, composed of medium granulometry clay tempered with small plant inclusions and slightly fired in a bonfire.

Kurut was rubbed together with little water on the inner surface of the replica for 2 hours while changing the water every 15 minutes (fig. VI.19 b, c, d).

Fig. VI.19 Processing *kurut* with vulcano: a) *kurut* soaking, b,c) rubbing *kurut* against vulcano surface, d) *kurut* turned in yogurt.

Use-wear analysis:

Cleaning procedure:

In order to permit the analysis of the use-wear under the microscope, the replica was left to soak with soap for 1 hour. In this way the fat-residues superficial layer was eliminated; it would have prevented a correct vision of the traces.

The macro-traces identifiable on the high points of ceramic surface:

- lighter (tabs 5, 6) and rounded areas (tabs. 1- 8); within it mineral inclusions (tabs. 3, 9) and a few craters of plant inclusions were distinguishable (tabs. 1-3, 5, 6)

The micro-traces on the high points of the mineral inclusions:

- polish (tabs. 8,9) and widening of micro-fractures (tab. 10).
- lipidic residues covered in a thin layer all around the surface (tabs 4, 6, 8)

Concluding remarks:

The *kurut*-processing activity modified the ceramic surface that became more rounded and lighter in color; moreover some mineral inclusion emerged. These could present a strong polished surface and slightly widened fractures.

VI.3.2.4 Final interpretation

In conclusion, on the basis of the data given above, it was possible to define an experimental reference collection of macro and micro traces that develop on a ceramic vessel during its use for preparing the yogurt from *kurut*.

Traces directly related to such activity develop on the surface of the internal base and the lower part of the walls.

In fact, here, the ceramic surfaces directly interact with the fingers of the user the water and the *kurut* during its rubbing.

In particular, the highest points are affected by wear; not the bottom of the finger-impressions.

The tribo-chemical traces (rounding/polishing), are generated as a result of:

- the movement of soft material (*kurut*) against the ceramic surface (abrasion);
- the nature of the product itself (chemism).

On the surface of the pourer device the sliding of liquid generates slight rounding.

The upper part of the walls is also functional to the *kurut*-processing activity because they prevent the liquid *kurut* from splashing out from the vessel during the activity. Since it is not an area in which the cheese is moved, mainly chemical traces are formed.

Finally, abrasive traces are formed on the external surface of the base due to dragging the vessel over hard surfaces (striations, spall detachment).

VI.3.3 BAKING USE-WEAR

VI.3.3.1 Ethnographic example

As presented in chapter 2, pans with internal surfaces merely plain or finger-impressed are still used today for baking bread in Anatolia.

At the Archaeological Museum of Istanbul I was permitted to analyze two types of baking pans, in its ethnographic collection: a *ekmek sacı* (fig. VI.20) and a *tepsi* (fig. VI.21).

Ekmek sacı had traditionally been produced in the village of Uslu, in Sivrice district, in Elazığ. [12]

The origin of the *tepsi* is unclear but probably it come as well from southeastern Anatolia. Although both were used for cooking, we don't know exactly how.

The absence of sides about the *ekmek sacı* (fig. VI.20) suggests that it was used for baking a thin layer of dough directly on a heat source rather than in a domed oven.

Fig. VI.20 *Ekmek sacı*

Use-wear analysis:

The macro-traces identifiable on the high points of ceramic surface
of the *ekmek sacı*:

- on internal surface, tendentially flattened shallow areas, lighter in colour and limited by irregular edges, (fig. VI.20, tabs 1, 2); the internal texture of these areas is always highly coarse and within them mineral inclusions of the paste are exposed (tabs 1, 2). They are mainly located around the finger impressions while the inner part of the finger impressions remains untouched (tab 1).
- on external surface of the base, multidirectional striations (tab 4)
- both on internal and external surface, few carbonizations (tabs 1, 3)

[12] The two mentioned pots were brought from Mardin by Dr. Di Halet Çambel and were produced in southeastern Anatolia. (KILIÇBEYLI 2005: 173).

Fig. VI.21 *Tepsi*

Of the *tepsi*:

- on the internal surface, very shallow and flattened areas, lighter in color and limited by irregular edges (fig. VI.21, tabs 6, 7); they are mainly located in the middle of the vessel. Very few charred encrustations (fig. VI.21) and several multi-directional striations (tabs 6, 7, 8)
- all around the edge of the rim, abrasive traces (tab 5)
- on external surface of the base, multidirectional large striations and scratches (tab 8)

Concluding remarks:

Both *ekmek sacı* and *tepsi* have similar traces with each other. In fact, on the internal-base surface they both present traces in the shape of rips that can be properly connected to baking bread. They are concentrated around the finger-impressions (*ekmek sacı*) or in the middle of the vessel (*tepsi*).

The abrasive traces on the rim of *tepsi* are possible evidence of a lid applied upon the vessel when used.

Interestingly, very few fire-traces ascribed to their use are visible both on the internal and external surface of the vessels. Finally, the external-base surface of both the vessels is crossed by abrasive traces attributed to their dragging on hard surfaces.

Finally, on the *tepsi* surface, after its use for baking, as demonstrated by the overlapping of striations both on the unaltered surface and ripped areas of the internal base (tab 6), was affected by some kind of abrasive activity.

VI.3.3.2 Overall experiment

Two life-size replica[13] were used to bake bread during HT experimental stage in the domed oven: mozia (fig. VI.22) and levanzo.

These have revealed important general data about use-wear developing on pottery surfaces used to bake bread in a domed oven.

Use-wear analysis:

The macro-traces identifiable on the high points of ceramic surface:

- on the internal surface of the base (fig. VI.22 g, tabs 1, 8- 15) and low part of the sides (fig. VI.22 c, tabs 7, 8), irregular areas, lighter in colour with highly coarse internal texture. Within them, quadrangular craters with inner parallel striations.
- on internal and external surface, few charred encrustations and soot (figs. VI.22 b, d, tabs 1, 5-8).
- external base surface, levelling and striations, spall detachment (fig. VI.22 e, f, tabs.2-4)

Concluding remarks:

The baking activity altered the ceramic surface of the experimental replica in different ways.

The extraction of the bread from the tray after its cooking has generated traces of a mainly mechanical type. In fact, from the internal surface of the base and the lower part of the sides (i.e. the points where the surface of the ceramic was directly in contact with the dough), inclusions and ceramic particles detached rather remaining attached to the bread crust (fig. VI.23). Thus, adhesive wear was created on the surface of the vessel in the form of “rips” (fig. VI.24).

Furthermore, the exposure of HT with dough to high temperatures in a domed oven led to the creation of limited adding of material such as carbonized encrustations and soot.

[13] As explained in Chapter V, experimental replica are inspired for composition, size, shape, etc. to the HT found in Tell Sabi Abyad (Nieuwenhuyse 2008).

Finally, the mechanical stress due to the dragging of the vessel on hard surfaces has led to the formation of abrasive traces such as striations, spall detachments and levelling on the external base.

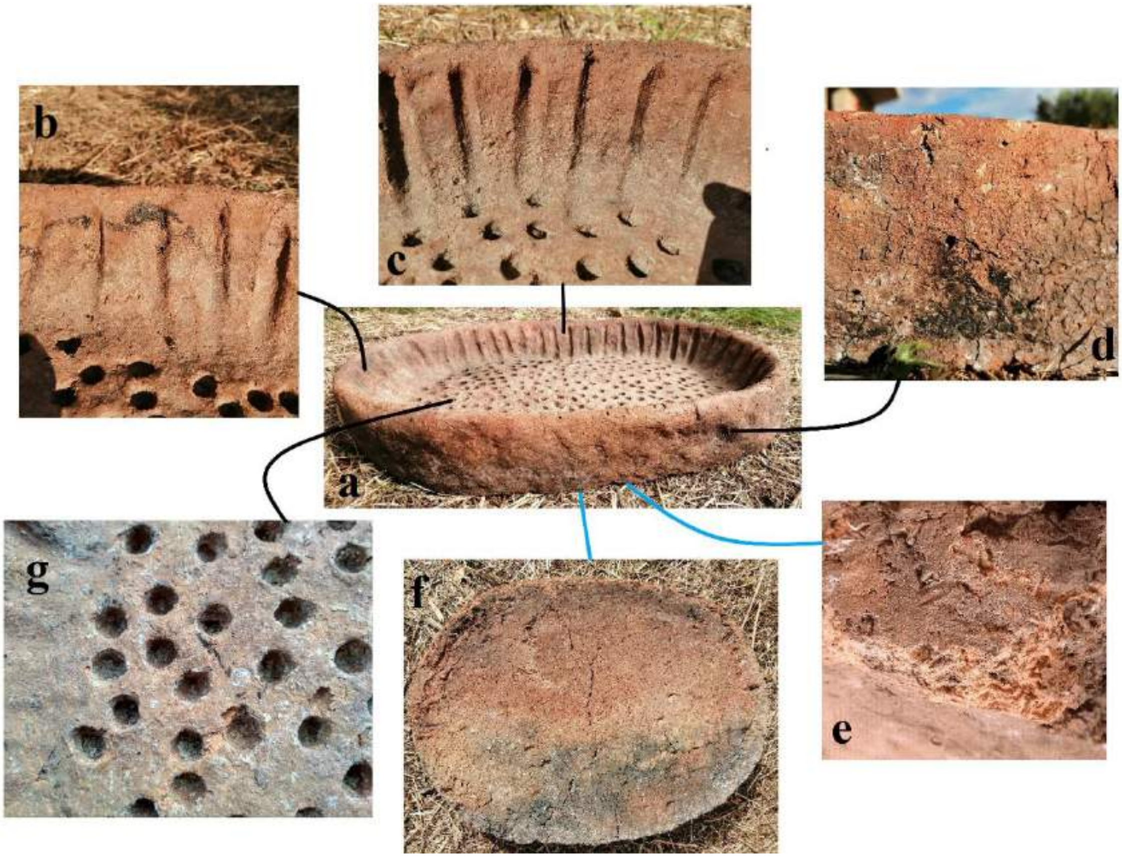

Fig. VI.22 HT experimental replica mozia after 10 baking trials and the location of generated use-wear: a) overview b) charred encrustation on inner sides, c) ripped inner surface of the sides, d) sooting traces, e) spall detachment at the border of the external base, f) abraded external base.

Fig. VI.23 Bread crust with pottery particles from the surface of Mozia replica attached.

Fig. VI.24 Rip trace due to baking on the surface of levanzo.

VI.3.3.3 Focused experiments:

Several focused experimental trials were performed with small replicas to analyze the use-wear developing on ceramic surfaces due to baking.

All of them were performed in laboratory under strictly controlled parameters and defined variables.

- They were used in electric oven allowing to keep in constant parameters such as temperature and distribution of heat during baking.
- To simulate the heating from the bottom due to the burning coals of baking in a prehistoric domed oven, the small replicas were slightly preheated before every baking.
- Tumminia-wheat flour was used as the basic ingredient of the doughs because of its compositional features; in fact, being a cultivar of *triticum durum* with a low gluten index this cereal presents a medium baking performance suitable for the experimental trials.
- The flour used in all the experimental trials was biologic, fresh stone-grounded as a whole
- In every replica 22 small cakes of solid dough were baked; this number of times was regarded as suitable for the developments of appreciable use-wear.
- The dough (as revealed by experimental activity chapter V) had to be not much leavened in order to avoid it filling the hollows spaces created by scores

Variables are relative to:

- type of pottery support (4 small replica plant-tempered replica, 1 mineral-tempered)
- ingredients of the bread (basic, with oilseeds, animal fat and vegetable oil)

Flour + water -> *Vesuvio* (mineral-tempered replica)

Flour + water -> *Mercury* and *Mars* (plant-tempered replica)

Flour + water + sesame -> *Tamu* (plant-tempered replica)

Flour + water + leaf lard -> *Mauna Loa* (plant-tempered replica)

Flour + water + olive oil -> *Timeto* (plant-tempered replica)

VI.3.3.3.1 Baking basic bread

The objective of the experimental trials was to focus the alteration process of a ceramic surface when basic dough (flour and water) is baked on top of it. Therefore, three small replicas, vesuvio and mercury/mars, were used for such activity (figs VI.25, 26).

Fig. VI.25 Baking simply bread with *vesuvio*: a) kneading the dough, b) preheating the replica, c) churning out small cakes, d) cakes and replica after baking

Vesuvio was made of coarse clay (with natural mineral inclusions). During the experimental trial, tumminia flour (400 g) and a little water were kneaded to create a solid dough. 22 little cakes were baked for ca. 12 minutes one at a time in a preheated electric oven (De Longhi YMA6) at 200º C.

Fig 26 Baking on *mars* basic bread a) replica and the dough, b) preparing the small cakes, c) baking, d) profile view of cake baked on the replica

Mercury and mars paste was made of straw-tempered clay.

This experimental trial had the objective to observe and document the use-wear developing on the ceramic surface when basic bread is baked. To more accurately define the numerous modifications produced by this activity, the experimental trial was divided into two steps with different replicas:

- on mercury 14 small cakes were baked;

- on mars 22 small cakes were baked;

Cakes were made of approximately 350 g of tumminia flour kneaded with little water to create a solid dough.

The cakes were baked for about 12 minutes one at a time in a preheated electric oven (REX FMS 50XE) at 200º C.

Fig. VI.27 Use-wear developing on *mars* surface before and after 10 and 14 baking times.

Use-wear analysis:

Cleaning procedure:

After the experimental activity, the replica was gently dusted with a soft-bristle brush and blown with compressed air.

The ceramic surface appeared to be modified on the high-points around the finger impressions that were directly in contact with the dough during baking. (tab 1)

The macro-traces identifiable on the high points of ceramic surface:

- tendentially flattened shallow areas, lighter in colour and limited by irregular edges, (fig. VI.27, all the tabs); their internal texture was always highly coarse and, within it, were distinguishable:

- small ovoidal craters due the loss of mineral inclusions (tabs 2- 4, 6, 8, 10, 20,21, 25, 28).

- quadrangular craters with inner parallel striations of the plant inclusions disappeared during firing-step (tabs 7-11, 19, 21, 23).

- straight edges of profiles (tabs 5, 6, 9, 11, 24).

- residues in the shape of small bread-crusts concentred in specific points (tabs 1, 5, 7-10, 12-14, 17, 19-22, 25, 26).

The micro-traces on the high points of the mineral inclusions:

- fallen of the surface clay (tabs 12, 13, 15)
- levelling (tab 34).
- creation of irregular small depressions and pits (tabs 14-16, 30, 32,33)
- rounding (tabs 13, 15, 16,).

3.3.3.2 Baking oilseeds bread

The objective of the experimental trial was to focus on the alteration process of a ceramic surface when dough with oilseeds (in this case sesame) is baked on it (fig. 28). Therefore, tumminia flour (360 g), processed sesame seeds (110 g) and little water were kneaded to create the dough.

Fig. 28 Baking sesame bread with *tamu*: a) ingredients, b) crushing the sesame in a mortar, c) heating the sesame, d) grinding the sesame e) kneading the dough, f) preparing the cakes, g) baking the cakes, h) baked cakes

To facilitate the spillage of the oil contained by the seeds, they were treated: crushed, fragmented and heated.
The sesame seeds were crushed in a stone mortar, then they were heated for 3 minutes in an electric oven at 180ºC and finally grounded in a grindstone.
All these treatments had the objective to allowed the oil an easier of the seeds during baking.

22 small cakes were baked during a small experimental replica, *tamu*, for approx. 12 minutes one at a time in a preheated electric oven (De Longhi YMA6) at 200º C. *Tamu* composed of medium granulometry clay tempered with small plant inclusions and low-fired in a bonfire.

Use-wear analysis:

Cleaning procedure:

After the experimental activity, the replica was gently dusted with a soft-bristle brush and blown with compressed air.

The ceramic surface appeared to be altered on the high-points around the finger impressions that were directly in contact with the dough during baking. (tab 1)
However, the part inside the impressions remain almost unaltered (tab 2).

The macro-traces identifiable on the high points of ceramic surface:

- homogeneous, rounded and flattened areas (tabs. 4, 6-8, 10);
- fallen of fragile parts and exposure of the quadrangular-voids with inner parallel striations of the plant inclusions disappeared during firing-step (tabs. 2-8)
- slightly rounded edges of profiles (tabs. 2,3,5,6)
- residues of small bread-crusts concentred in specific points and sometimes few crumbs (tabs. 1-10);

The micro-traces on the high points of the mineral inclusions:

- fracture (tab. 12)
- creation of irregular small depressions and pits (tabs. 11-13)
- rounding (tab. 12)

3.3.3.3 Baking bread with animal fat

The objective of experimental trial was to focus the alteration process of a ceramic surface when fat bread is baked on it (fig. VI.29). Therefore, tumminia flour (465g), biological leaf lard of pork (75 g) and few water were kneaded to create a solid and fatty dough.
22 little cakes were baked in a small experimental replica, *mauna loa*, for approx. 12 minutes one at a time in a preheated electric oven (De Longhi YMA6 oven) at 200º.

Mauna Loa made of medium granulometry clay tempered with small plant inclusions and slightly fired in a bonfire.

Fig. VI.29 Baking fat-bread with *mauna loa*: a) ingredients, b) kneading the dough, c) the replica, d) cake just baked on the replica, e) baked and crude cakes, f) baked cakes.

Use-wear analysis:

Cleaning procedure:

After the experimental activity, the replica was gently dusted with a soft-bristle brush and blown with compressed air.

The ceramic surface appeared to be altered on the high-points around the finger impressions that were directly in contact with the dough during baking. (tab 1)

On the contrary the parts inside impressions remain almost unaltered (tabs 2,4).

The macro-traces identifiable on the high points of ceramic surface:

- homogeneous, rounded and flattened areas (tabs 1, 3-10;
- fallen of fragile parts and exposure of the quadrangular craters with inner parallel striations of the plant inclusions disappeared during firing-step (tabs. 2, 3, 8,)
- turning into a darker color (all photos);
- spread residues of small bread-crusts and crumbs (tabs. 4-7, 9,10);
- waved edges of profiles (tabs 6,7,10)

The micro-traces on the high points of the mineral inclusions:

- fallen of the surface clay (tab 11)
- spall detachment (tabs 11 ,12)
- rounding (tabs 11-12)

3.3.3.4 Baking Bread with plant oil

The presented experimental trial aimed to focus on the alteration process of a ceramic surface when bread with vegetal oil is baked on it (fig. VI.30). Therefore, tumminia flour (630 g), cold-pressed olive oil (70 ml) and few water were kneaded to create a solid dough.

22 small cakes were baked in a small experimental replica, *timeto*, for approx. 12 minutes one at a time in a preheated electric oven (AKP 601-602) at 200º C.

Timeto is composed of medium granulometry clay tempered with small plant inclusions and slightly fired in a bonfire (chapter V).

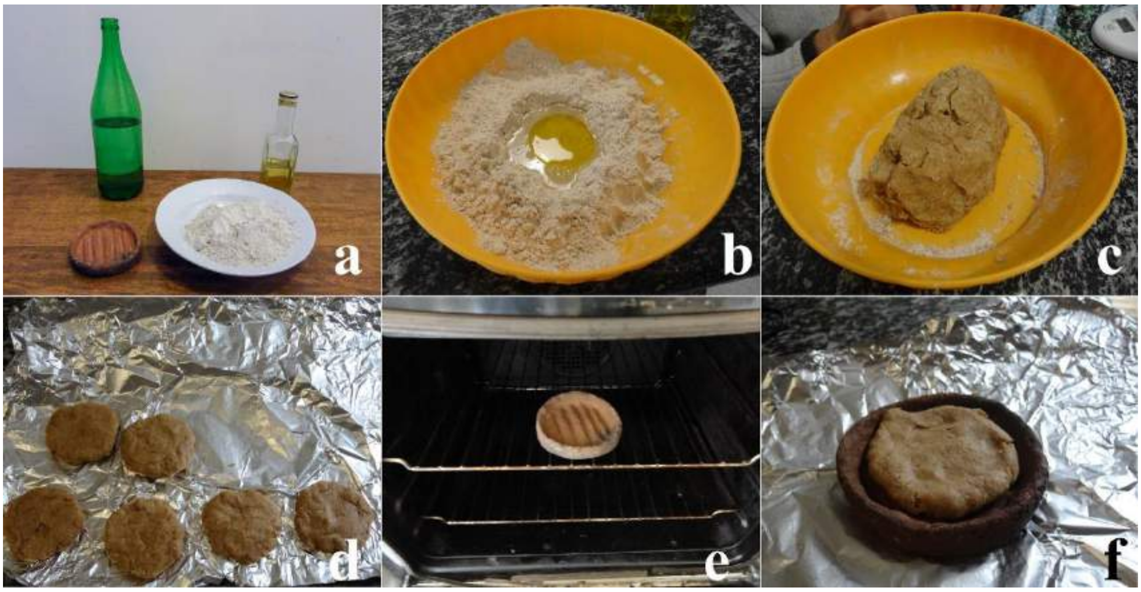

Fig. VI.30 Bread with olive oil : a, b) ingredients, c) kneading the dough, d) unbaked cakes, e) preheating the replica, f) baked cake on replica.

Use-wear analysis:

Cleaning procedure:

After the experimental activity, the replica was gently dusted with a soft-bristle brush and blown with compressed air.

The ceramic surface appeared to be altered on the high-points around the finger impressions that were directly in contact with the dough during baking (tab. 1).
However, the inside impressions remained almost unaltered (tab. 5).

The macro-traces identifiable on the high points of ceramic surface:

- homogeneous, rounded and flattened areas (tabs. 1, 2 , 6, 7, 8)
- turning into a darker color (all photos)
- spread residues of small bread-crusts and crumbs (tabs. 1-3, 6)
- slight fallen of fragile parts and exposure of the quadrangular craters with inner parallel striations of the plant inclusions disappeared during firing-step (2,4-6,8).
- slight waved edges of profiles (fig. 5-7).

The micro-traces on the high points of the mineral inclusions:

- rounding (tabs. 9, 10 and 11).

Concluding remarks:

Basic bread

The bread-baking activity has produced, on the high-points of surface, heavy changes. In fact, here the first surface layer got lost exposing the one below generally of a lighter color.
This area, tendentially flattened, presented a coarse texture.
Occasionally, within it, consequently to the loss of ceramic fragments or particles, quadrangular voids with parallel internal striations were exposed.
These which formed part of the ceramic paste, had been formed consequently to the disappearance of plant inclusions during the firing step of the vessel.
In addition, the mineral inclusions detached from the ceramic surface leaved ovoid craters.
The same phenomenon occurred on the mineral inclusion surface. Here, the loss of the fragile parts formed depressions or pits.
These, combined with increasing the number of baking, became more and more wide (compared to mineral inclusions of *mercury* and *mars*).
Furthermore, depending on location and composition of the mineral inclusions, the stress caused by baking was also able to completely level or simply round them.

All of these alterations on the ceramic surface (macro-traces) and on the mineral inclusions (micro-traces) are due to the same action: ripping.
Finally, the bread residues were distributed on the high points in small crusts.

Oilseeds bread

The bread-baking activity has produced limited changes on the surface of the high points. The surface layer tended to become more homogeneous with the flattening of small ceramic reliefs. Additionally, several ceramic elements fell exposing many quadrangular voids with parallel internal striations left by plant inclusions.
The edges of the profiles which were clearly visible in the border of the craters, for example, became slightly rounded.
On mineral inclusions surfaces the fragile parts fell resulting in depressions and pits. At the same time, inclusions were subjected to rounding.
Finally, the bread residues distributed on the high points in small crusts and some crumbs.

Bread with fat

The bread-baking with animal fat and vegetable oil has produced such similar traces that can be resumed together.
In fact, in the both cases the ceramic surface turned into a darker color, generally significantly rounded and tendentially flat.
In addition to the surface, also the edges of the profiles became rounded or in case waved. This phenomenon is also recognizable on the mineral inclusions often rounded.
Finally, the bread residues were distributed on the high points in areas with scattered crumbs and some small crusts.

VI.3.4.4 Final interpretation

In conclusion, on the basis of the data presented above, it was possible to define an experimental reference collection of traces (macro and micro) that develop on a ceramic vessel during its use for bread baking.

- Traces directly related to such activity develop on the surface of the internal base and the lower part of the walls.

  In fact, here, the ceramic surfaces directly interacts with the dough during its baking and endure the stress created when the bread is removed from the vessel.

Particularly, the highest points are affected by wear; not the bottom of the finger-impressions or scores.

Each type of use-wear is dependent upon the type of bread. In particular, the amount of oil/fat in the bread plays a substantial role as a lubricant. On the one hand, it significantly reduces friction between the vessel and the bread; on the other hand, it chemically interacts with the ceramic surface.

The table outlines principal use-wear development created by basic-bread (green) oilseed-bread (powder blue) and oil/fat bread (violet) baking (table VI.1).

Residues	Crusts	Crusts / few crumbs	Crusts / crumbs	Crumbs / crusts
Surface	Ripping	Flattening	Flattening / rounding	Flattening / rounding
Surface color	Dull	/	Darkening	Darkening
Edges profiles	Straight	Slight rounding	Rounding and waving	Slight waving
Fragile parts	Intense fallen	Intense fallen	Fallen	Slight fallen
Mineral inclusion surface	Levelling/ Ripping/ Rounding	Ripping / Rounding	Fallen fragile / Rounding	Rounding

Table VI.1 Use-wear development on a ceramic surface used for baking basic bread (blue), oilseeds bread (violet) and fat-bread (pink)

In each cases, attraction activity generated by the stickiness of the bread to the ceramic surface created adhesive wear, however:

in the first case, the use-wear are basically produced by mechanical activity; when the bread is removed from the vessel, the ceramic fragments that strongly adhere to it, detach creating wear in the shape of ripped areas.

In the last case, oil or fat radically reduces the adhesion of the bread to the vessel and consequently also the friction when the bread is removed from the vessel. The use-wear are due to a tribo-chemical mechanism produced by the low-degree of friction and the chemical alteration produced by the interaction between oil/fat and the pottery.

Finally, the case of the oilseeds bread constitutes a situation in the middle of the two previous cases. The friction is not enough high to generate rips, and the ceramic is shyly altered by chemical interactions with oil/fat.

- On the rim use-wear are absent except in the case of the use of a lid;
- On internal and external surfaces fire traces such as soot and charred encrustation results limited.
- On the external base, dragging the vessel on hard surface creates abrasive traces.

VI.4 POST-DEPOSITIONAL EXPERIMENT

VI.4.1 Experimental trial

Alterations development produced by ceramic vessels used for baking in response to taphonomic processes is investigated by an experimental trial. Mauna Loa, an experimental replica used for baking bread with animal fat, was buried in a field in Sicily. Here, the climate is completely Mediterranean: the degree of rain is medium-low and the temperatures

vary between 35ºC and 5ºC during the year.

It was buried at approx. 10 cm deep, in mainly clayish soil with pH 5.5 (fig. VI.31).

The replica was buried in order to observe the initial development of post-depositional traces on the ceramic surface modified by baking activity.

The experiment is still on going.

Chapter VII

ARCHAEOLOGICAL SAMPLE ANALYSES

VII.1 INTRODUCTION

In order to better understand the technological aspects of production and the actual use of the vessels, a sample of HTs fragments from different sites in the Near East was analyzed. The sample consisting of a total of 58 HT fragments from 7 archaeological sites was investigated through the trace analysis integrated with that of the residues (phytoliths analysis and gas-chromatography).

It was decided to proceed by analyzing an appreciable number of HT fragments from a site in which the HTs were commonly used (numerous), distributed over time and in which several variants coexist, as described in chapter II. In this way, a solid reference base was created.

The site chosen was Mezraa Teleilat in SE Turkey of which 40 HT out of 178 shards have been investigated. The fragments were chosen on the base of their conservation status and distribution over stratigraphic sequence (time).

To verify whether the same pattern of traces (and therefore a similar production and function) could be found over a larger area, numerous limited samples from various sites from several regions were subsequently compared. These are: Tell Sabi Abyad I (7 fragments), Akarçay (4 fragments), Tell Kurdu (3 fragment), Tell Khaneke (1 fragment), Tell Kashkashok II (1 fragment), Tell Khazna II (1 fragment) and Tell Halula (1 fragment) (see table II.5).

The entire chronological span of HTs development was covered: it covers periods ranging from the Pre-Halaf/Proto-Hassuna to the Middle/Late-Halaf. It can roughly correspond from 6400 to 5500 BC.

From a geographical point of view, despite the enormous widespread of the HT, a fairly extensive area was covered: the Mediterranean area (Tell Kurdu), the Euphrates Valley

(Meezraa Teleilat, Tell Halula), the Balikh (Tell Sabi Abyad) and the Khabur (Tell Kashkashok, Tell Khazna II, Khaneke).

The 58 fragments were investigated through trace analysis by the author. It is based on the principles set out in the chapter
Trace analysis was supplemented with residue analysis.
In total:
24 fragments of Mezraa Teleilat, Tell Sabi Abiad, Akarçay, Tell Kashkashok, Tell Khazna II, Tell Khaneke were studied during the analysis of phytoliths by Marta Portillo Ramirez (Appendix II).
2 fragments of Akarçay were analyzed by gas chromatography by Adrià Breu Barcons (Appendix III).

Finally, it should be emphasized that two of the analyzed fragments, MT14 and MT126, present plain surfaces. These are simple tray rather than HT.
These fragments were included to verify if there were differences at functional level between the two categories.

Site	Vascular shape	Figure nº	Vessel section	Layer	Period
Mezraa Teleilat	MT14	1	Wall	Level: IA1	IIA2
Mezraa Teleilat	MT19	2	Wall		IIA2
Mezraa Teleilat	MT24	3	Wall		IIB2-IIB1
Mezraa Teleilat	MT27	4	Wall	Level: IIB1	?
Mezraa Teleilat	MT28	5	Entire section	Level: IB2c	IIB3
Mezraa Teleilat	MT39	6	Base	Level: IB1c	IIB2,3
Mezraa Teleilat	MT40	7	Base	Level: IB1c	IIB3- IIB2
Mezraa Teleilat	MT61	8	Base with wall	Level: IB1c	IIB3
Mezraa Teleilat	MT62	9	Entire section	Level: IB1c	I-III
Mezraa Teleilat	MT69	10	Wall	Level: IB2a	I
Mezraa Teleilat	MT74	11	Base	Level: IB2a	IIB
Mezraa Teleilat	MT76	12	Base with wall	Level: IB2a	I-III
Mezraa Teleilat	MT85	13	Wall	Level: IB2a	K
Mezraa Teleilat	MT94	14	Wall	Level: IB1d	IIB2?
Mezraa Teleilat	MT96	15	Base with wall	Level: IB1d	IIB
Mezraa Teleilat	MT103	16	Wall	Level: IB1d	IIB3-IIB2
Mezraa Teleilat	MT107	17	Wall	Level: IB1d	IIB2,3

Site	Vascular shape	Figure nº	Vessel section	Layer	Period
Mezraa Teleilat	MT110	18	Base	Level: IB1a	IIB2
Mezraa Teleilat	MT111	19	Base with wall	Level: IB1c	IIB2,3
Mezraa Teleilat	MT112	20	Base	Level: IB1c	IIC1
Mezraa Teleilat	MT124	21	Entire section	Level: IB4	IIA2
Mezraa Teleilat	MT126	22	Base with wall	Level: IB4	IIB2-IIB1
Mezraa Teleilat	MT128	23	Base with wall	Level: IIA1	I-IIA
Mezraa Teleilat	MT131	24	Wall	Level: IA2	IIB2
Mezraa Teleilat	MT135	25	Wall with base	Level: IIA1	IIB2
Mezraa Teleilat	MT136	26	Entire section	Level: IIA1	I-IIC2
Mezraa Teleilat	MT137	27	Base with wall	Level: IIB2	?
Mezraa Teleilat	MT141	28	Wall	Level: IIA2	IIB?
Mezraa Teleilat	MT152	29	Base	Level: IIB2	I
Mezraa Teleilat	MT157	30	Base	Level: IIB1	IIB2?
Mezraa Teleilat	MT158	31	Base	Level: IIB2	I-II
Mezraa Teleilat	MT160	32	Base	Level: IIB2	IIIB3-IIB2
Mezraa Teleilat	MT162	33	Base	Level: IIB2	IIB
Mezraa Teleilat	MT163	34	Wall	IIb2	I-IIB3
Mezraa Teleilat	MT164	35	Wall	Level: IIB2	?
Mezraa Teleilat	MT165	36	Wall	Level: IIB2	?
Mezraa Teleilat	MT166	37	Wall with base	Level: IIB2	K
Mezraa Teleilat	MT167	38	Base with wall	Level: IIB2	?
Mezraa Teleilat	MT168	39	Base with wall	III	I
Mezraa Teleilat	MT170	40	Base	Level: IB1e	IIB3
Akarçay	AKA16		Base		
Akarçay	AHA17		Wall		
Akarçay	AT01 26 5 10		Wall with base		
Akarçay	AT99 j KH 38		Entire section		
Khaneke	HAN15		Base	Superficial	ProtoHassuna-Early Halaf
Tell Kashkashok	KAK15		Base	Superficial	Proto-Hassuna
Tell Khazna 2	KHA30		Wall		Late proto-Hassuna
Tell Halula	HAL sup		Wall	Superficial	
Tell Kurdu	TK6644		Wall		Middle Halaf
Tell Kurdu	TK7502EO		Base with wall		Middle Halaf
Tell Kurdu	TK8282E		Wall		Middle Halaf
Sabi Abyad	SAB88 S12 120-5		Base	7A/7B	Pre-Halaf-Transitional
Sabi Abyad	SAB88 Q14 50-24		Base	Level3B	Halaf
Sabi Abyad	SAB 125 88-549		Base	Level3-4	Transitional
Sabi Abyad	SAB 126		Base	Level4	Pre-Halaf(last before transitional)

Site	Vascular shape	Figure nº	Vessel section	Layer	Period
Sabi Abyad	SAB184		Base	?	Early-Halaf
Sabi Abyad	SAB88 34-4		Base	3B	Halaf
Sabi Abyad	SAB88 371		Base	3-4	Transitional

Table VII.1 Analysed archaeological sample

VII.2 THE ARCHAEOLOGICAL SITES

The mound of Tell Khaneke was prospected during the end of 1980s/early 1990s[1]. The artefacts collected on the surface suggest a long Neolithic sequence of the site[2]. In fact, many of them clearly belonging to Proto-Hassuna period. Among the coarse ware there were 11 fragments of HTs[3].

In 1991-92 Tell Khazna II was the subject of a test trench by a Russian mission[4] and recently revisited[5]. The trenches, which reached virgin soil at a depth of approx. 8.5 m allowed to ascertain that the area was occupied in different phases: Neolithic, Hellenistic and Medieval periods.
At the base of the survey, thick layers of the archaic and proto-Hassuna period have been intercepted. In particular, the pottery from here seems to belong to a relatively advanced phase of the period[6]. 11 HT fragments were found among the coarse ware.

Tell Kashkashok II is a low mound partially excavated by a Japanese team in 1987-8.[7] The site was occupied during the Proto-Hassuna period and later used as a cemetery during the Ubaid and Uruk phases. Moreover, the site was frequented during the Islamic period. 12 HT fragments belonging to the proto-Hassuna pottery were found there. To understand the pottery function, four fragments were investigated by Gregg using solvent extraction techniques without significant results[8].

[1] LYONNET 2000.
[2] LE MIÈRE 2000; NISHIAKI 2000.
[3] LE MIÈRE 2000.
[4] MUNCHAEV et al. 1993; MERPERT - MUNCHAEV 1994.
[5] LE MIÈRE - MERLE-THIRION 2019.
[6] LE MIÈRE 2000.
[7] MATSUTANI 1989; 1991.
[8] GREGG 2010.

The Tell Sabi Abyad site is located close to the Balikh river; it was discovered by Sir Max Mallowan, began to be excavated 1986 by the Leiden Mueum under the direction of P.M.M.G. Akkermans.[9] It consists of four mounds; the largest of them, Tell Sabi Abyad I, was inhabited both during the Late Neolithic (ca. 7000-5300 BC) and the Late Bronze Age (ca. 1300-1000 BC).

A long ceramic sequence was found at the site.[10]

Pottery begins to be used in Tell Sabi Abyad around c. 7000-6700 during the so-called Early Neolithic Pottery period; it is characterized, similarly to other sites of the same period, by Early mineral ware (EMW) that consist of mineral tempered vessels, dark in color and burnished.

In a second phase, called the Early Neolithic Pottery, c. 6750-6250 cal BC, in which plant tempered vessels opened and simple in shape were being widely used.

During Pre-Halaf period (c. 6250-6000 cal BC) in the assemblage predominates the Stardard Ware production characterized by the presence of plant temper; at the same time other minor productions are documented such as the Gray-Black ware and Dark Faced Burnished ware.

Finally, with the transitional period fully Halaf pottery develops.

The Late Neolithic settlement was characterized by a remarkable propensity towards an agricultural economy: a wide range of macrobotanical remains such as hulled barley, emmer wheat, lentil, chickpea and flax[11] as well as the presence of large buildings interpreted as granaries and storehouses were found[12]. More than 300 HT fragments were found among the Early Neolithic Pottery and Halaf pottery at the site[13]. HTs have often been found in open areas or as filling of domed ovens[14].

Recently, few HT fragments were submitted to lipid analyses (high temperature-gas chromatography HTGC and gas chromatography-mass spectrometry GC-MS) without satisfactory results[15].

[9] AKKERMANS 1989;1993; 1996; AKKERMANS et al. 2014.
[10] LE MIERE – NIEUWENHUYSE 1996; NIEUWENHUYSE 2008, 2018.
[11] VAN ZEIST – WATERBOLK-VAN ROOIJEN 1996; CAPPERS 2014.
[12] AKKERMANS - DUISTERMAAT 1997; VERHOEVEN 1999.
[13] LE MIÈRE – NIEUWENHUYSE 1996; NIEUWENHUYSE 2008.
[14] NIEUWENHUYSE 2008.
[15] NIEUWENHUYSE et al. 2015; ROFFET-SALQUE et al. 2018.

Tell Halula is a large mound in the middle Euphrates valley. The site was extensively excavated by a Spanish mission from 1991 to 2011[16]. The site has a very long dwelling continuity from 7800 to 5700 cal. BC in which the cultural horizons Pre-Pottery Neolithic B, Pre-Halaf and Halaf follow each other without interruption.[17]

Pottery Neolithic repertoires in Tell Halula can be divided into two large groups:

- Pre-Halaf pottery studied by M. Faura[18]
- Halaf pottery - investigated by W. Cruells[19]

Pre Halaf pottery was divided into 3 major phases: I, II and III.

Phase I is the eralies one; it characterized by the presence of the so-called Black series as well as in other sites of the area such as Akaçay and Mezraa Teleilat

During Phase II predominates the coarse ware that was usually plant tempered; it is also important to point out that the first painted productions appear during this phase.

Phase III is characterized by the presence of plant tempered pottery and the appearance of other productions such as burnished red slip ware.

Despite the wide area excavated and the relative proximity of contemporary settlements where HTs were common such as Tell Sabi Abyad[20] or Mezraa Teleilat[21], curiously in Tell Halula only 11 fragments belonging to this pottery form were found.[22] They resulted scattered along the long sequence of the settlement. The earliest one apeared in the settlement during Phase II, the last one during the Middle Halaf period.

Meezraa-Teleilat is a mound on the Easter bank of the Middle Euphrates close to Akarçay (25 km. North). It is a multi-period site with an important Iron Age phase and a long Neolithic sequence involving Pre-pottery Neolithic, Early Pottery Neolithic, Pottery Neolithic.[23]

Discovered by G. Algaze in 1989, Mezraa-Teleilat has been excavated by Istanbul University from 1999-2004 under the direction of M. Özdogan.[24]

[16] MOLIST ET AL. 2008; 2013.
[17] BUXÓ – ROVIRA 2013.
[18] FAURA 2013.
[19] CRUELLS 2013.
[20] LE MIÈRE – NIEUWENHUYSE 1996; NIEUWENHUYSE 2008.
[21] KILIÇBEYLI 2005.
[22] CRUELLS 2013; FAURA 2013.
[23] ÖZDOGAN 2010.
[24] ÖZDOGAN 2002; KARUL et al. 2000,2001; KARUL 2003.

The oldest ceramic levels are the so-called IIIA-B. This phase, as well as in Akarçay, is characterized by black series, and represent the transition from non-ceramic to ceramic period. It should belong to on a horizon located between 7000-6800 cal BC on the basis of C14 data.

The other levels of the Pottery Neolithic phase are distinguished in: a recent level IIA , associated with series of Proto Halaf and Halaf ceramics: a lower level II B (Middle Pottery Neolithic) represented by Red Slipped Pottery type ceramics (IIB1) and strata containing abundant printed decoration (IIB2 and IIB3). Finally, period IIC, Early Pottery Neolithic, is characterized by coarse ware.

On the site are more than 178 HT shards were found. These are distributed throughout all the most of Pottery Neolithic levels. The earliest few fragments were found in layers belonging to period IIC1, at the end of the Early Pottery Neolithic.

The majority of HT fragments were found in the phase IIB. In particular they had a significant increase especially in the lower phase lIB2, the impressed pottery period; In level IIA1 (Halaf period) the number of shards decrease significantly. Some HT shards were also found in Iron Age layers evidently in fillings.

Akarçay Tepe is located in the middle valley of the Euphrates river in the region of Urfa (Turkey) close to Mezraa Teleilat. It was excavated between 1999-2002 by a international team of the Istanbul University, Autonomous University of Barcelona and Tsukuba University, co-directed by M. Molist, N. Balkan, M. Özbasaran, M. Arimura.

As a continuation of a long pre-ceramic Neolithic sequence, the levels associated with the first ceramic productions have been documented. The stratigraphic sequence of this phase indicates a continuity in the occupation that would cover a considerable part of the 7th millennium[25]

The ceramic productions have been studied by W. Cruells who distinguished three different stages : phase III, phase II and phase I. These would correspond to large part of the pre-Halaf period and could be roughly situated between around the 6900 cal. BC to the 6300 cal BC.

Phase III, the oldest, appears clearly associated with the "Black Series" which is thought to be characteristics of the earliest ceramic productions; it is also present in other archaeological sites of the area as Tell Halula or Mezraa Teleilat.

[25] ARIMURA et al. 2000, 2001.

Phase II is characterized by the important decrease of the fine pottery and the increase coarse ware tempered with plant or c mixed inclusions.

Phase I, which would correspond to the most recent stage of the entire sequence, is characterized by the predominance of fine ceramics. Coarse ceramics are also present in a large percentage and basically consist of simple shapes with vegetal inclusions and some fragments with basically burnished mineral inclusions type DFBW. Other characteristics of this phase is the presence of HTs.[26] Numbers of HT fragments have been found at the site that have not yet been published in detail.

Tell Kurdu il mound is a low mound where the Oronte River flows into Mediterranean Sea in Turkey.

The firs archaeological operation in Tell Kurdu date back to the end of 1930’s with the Braidwood’s trenches.[27]

Since 1996 Tell Kurdu was object of archaeological excavation by the Oriental Institute of Chicago[28]

The site was mainly inhabited during the of Amuq C-E (and possibly earlier) revealing interactions with the Halaf and `Ubaid worlds of northern Mesopotamia

A late phase of Amuq C (or Halaf-related) could be roughly dated c. 5500-5200 BC), a phase Amuq D c. 5200-5000/4900 BC, and finally the phase Amuq E (or Ubaid-related) c. 5000/4900-4400/4300 BC.

Five fragments probably belonged to small vessels, associated in composition to DFBW, were found at the site. Being their interior surface crossed by incisions impressions they were associated to the HTs.[29]The five fragments were found in layers should belong to the late ‘Amuq C phase.

[26] M. Özbasaran and M. Molist pers. comm.

[27] BRAIDWOOD - BRAIDWOOD 1960: 142-143

[28] https://oi.uchicago.edu/research/projects/amuq/excavations-tell-kurdu 18/12/2021

[29] ÖZBAL 2006; R. Özbal pers. comm.;

VII.3 Integrated Analysis

The traces present on the surface of the archaeological HT fragments were analyzed according to the methodology set out in the chapter III.

Technological and functional traces observed on the shards were compared to those of the dedicated experimental collection (chapter VI) (fig. VII.1 and figs. VIII.1, VIII.2).

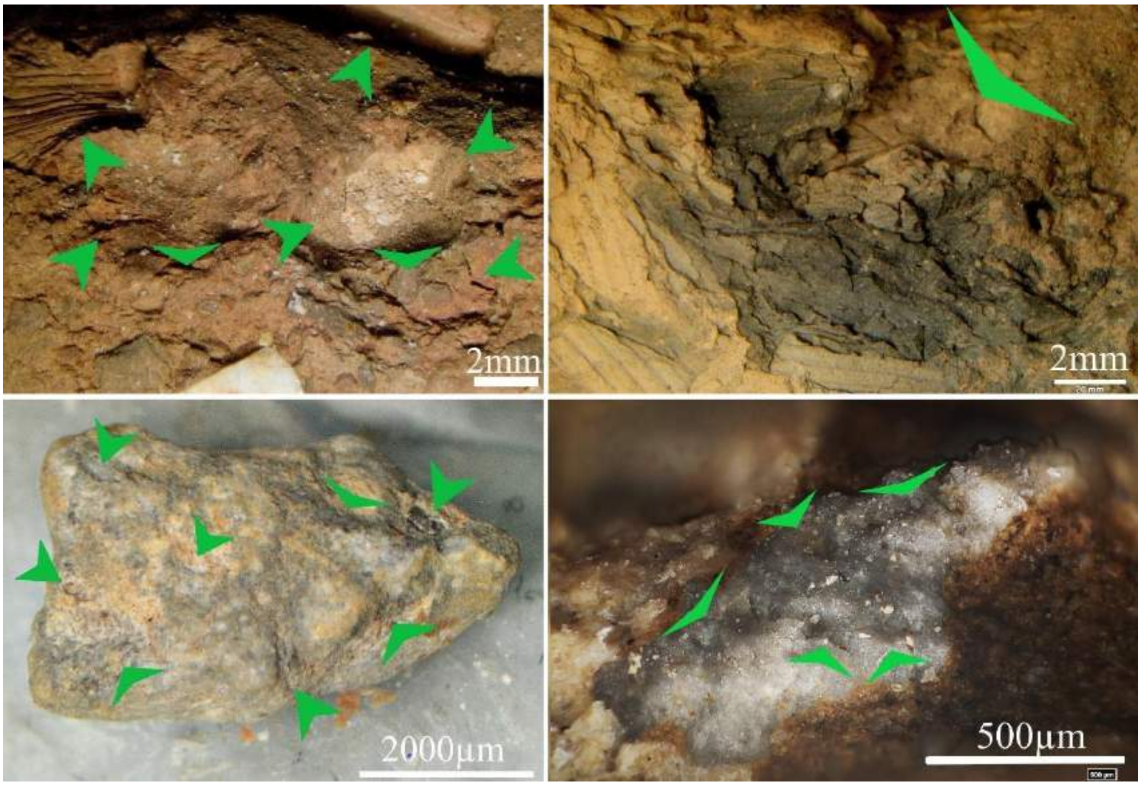

Fig. VII.1On the left rips produced by baking basic bread on ceramic surface (at the top) and mineral inclusion (at the bottom); On the right wear interpreted as due to baking basic bread present on the ceramic surface of the fragment (SAB 88 S12 120-5 3) and mineral inclusion of the fragment (KAK 15).

On the basis of their comparison it was possible to make an interpretation of the original action that generate such kind of traces on archaeological HTs.

The analyses was carried out in several laboratories.

At the La Sapienza University of Rome were analysed the fragments from Tell Sabi Abyad, Tell Halula, Tell Khaneke, Tell Khazna and Akarçay (AKA 16 and 17).

At the University of Istanbul were analysed the fragments from Mezraa Teleilat and two fragments from Akarçay (AT 01 26 5 10 and AT99 j KH 38).

At the Koç University of Istanbul were analysed the fragments from Tell Kurdu.

The microscopic observations were carried out by means:

- Nikon SMZ-U Stereomicroscope using reflected light with 1× objective, 10× eyepiece and magnification from 0.75× to 7.5× with ToupView camera.

- portable Dino-lite AM7915MZTL digital microscope
- Nikon Eclipse ME600 and LV 150 metallographic microscope with Amscope camera
- Hirox Digital Microscope RH-2000.

The summary sheets of the analysis are presented in the Appendix I (vol. 2) along with the most significant photo and micro-photographs.

In Appendix II will be presented the results of the phytoliths analysis with the methodology adopted.
Finally, in Appendix III will be reported the data of the results of the residues analysis.

VII.4 TRACE ANALYSIS DISCUSSION

On the bases of the trace analysis summarized in the Appendix I , several information can be deduced about the production and actual use of the vessels from which the analyzed fragments derive.

VII.4.1 Technological traces:

The analysis of the technological traces made it possible to investigate aspects related to the technological behaviors of the potters who produced the HTs (table VII.2).

Fragment	Vessel section	Shape	Dimension	Shaping technique	Clay	Inclusions
MT14	Wall	Tray	Medium-size	und.	Medium coarse	Plant
MT19	Wall	Bowl	Medium-size	und.	Coarse	Plant
MT24	Wall	Tray	Medium-size	und.	Fine	?
MT27	Wall	Bowl?	Small	und.	Coarse	Plant
MT28	Entire section	Tray	Large	Slab	Medium coarse	Plant
MT39	Base	Tray	Large	und.	Medium coarse	Organic
MT40	Base	Tray	Medium-size	und.	Medium coarse	Plant
MT61	Base with wall	Tray	Large	und.	Coarse	Organic
MT62	Entire section	Tray	Large	und.	Coarse	Plant
MT69	Wall	Tray	Medium-size	und.	Coarse	Plant
MT74	Base	Tray	Large	und.	Medium coarse	Organic
MT76	Base with wall	Tray	Medium-size	Slab	Coarse	Organic
MT85	Wall	Tray	Medium-size	und.	Coarse	Plant

Fragment	Vessel section	Shape	Dimension	Shaping technique	Clay	Inclusions
MT94	Wall	Tray	Large	Coiling	Coarse	Plant
MT96	Base with wall	Tray	Large	und.	Medium coarse	Plant
MT103	Wall	Tray	Medium-size	und.	Coarse	Organic
MT107	Wall	Tray	Large	und.	Coarse	Organic
MT110	Base	Tray	Large	und.	Coarse	Mineral
MT111	Base with wall	Tray	Large	und.	Coarse	Plant
MT112	Base	Tray	Large	und.	Coarse	Plant
MT124	Entire section	Tray	Medium-size	und.	Medium coarse	Plant
MT126	Base with wall	Tray	Medium-size	Slab	Coarse	Plant
MT128	Base with wall	Tray	Medium-size	und.	Medium coarse	Plant
MT131	Wall	Tray	Small	Coiling	Fine	Organic
MT135	Wall with base	Tray	Large	und.	Fine	Organic
MT136	Entire section	Tray	Medium-size	und.	Fine	Plant
MT137	Base with wall	Bowl	Medium-size	und.	Medium coarse	Plant
MT141	Wall	Tray	Medium-size	und.	Medium coarse	Plant
MT152	Base	Bowl	Large	und.	Coarse	Plant
MT157	Base	Tray	Medium-size	und.	Coarse	Plant
MT158	Base	Bowl	Medium-size	und.	Coarse	Plant
MT160	Base	und.	Medium-size	und.	Coarse	Plant
MT162	Base	und.	Medium-size	und.	Coarse	Plant
MT163	Wall	Bowl	Medium-size	und.	Coarse	Plant
MT164	Wall	und.	Small	und.	Coarse	Plant
MT165	Wall	Bowl	Medium-size	und.	Coarse	Plant
MT166	Wall with base	Bowl	Medium-size	und.	Medium coarse	Plant
MT167	Base with wall	Bowl	Medium-size	und.	Coarse	Plant
MT168	Base with wall	Bowl	Medium-size	und.	Coarse	Mineral
MT170	Base	Tray	Large	und.	Coarse	Plant
AKA16	Base	Tray	Medium-size	und.	Coarse	Organic
AHA17	Wall	Tray	Medium-size	und.	Coarse	Plant
AT01 26 5 10	Wall with base	Bowl?	Medium-size	und.	Fine	Mineral
AT99 j KH 38	Entire section	Tray	Large	und.	Coarse	Plant
HAN15	Base	Tray	Large	und.	Coarse	Plant
KAK15	Base	Tray	Medium-size	und.	Coarse	Organic
KHA30	Wall	Tray	Large	Slab	Medium coarse	Plant
HAL sup	Wall	Tray	Large	und.	Coarse	Plant
TK6644	Wall	Bowl?	Small	und.	Fine	Mineral
TK7502EO	Base with wall	Bowl?	Medium-size	und.	Fine	Mineral
TK8282E	Wall	Bowl?	Small	und.	Fine	Mineral
SAB88 S12 120-5	Base	Tray	Medium-size	und.	Coarse	Plant

Fragment	Vessel section	Shape	Dimension	Shaping technique	Clay	Inclusions
SAB88 Q14 50-24	Base	Tray	Medium-size	und.	Fine	Organic
SAB 125 88-549	Base	Tray	Large	und.	Medium coarse	Plant
SAB 126	Base	Tray	Medium-size	und.	Coarse	Plant
SAB184	Base	Tray	Medium-size	und.	Coarse	Plant
SAB88 34-4	Base		Medium-size	und.	Coarse	Organic
SAB88 371	Base	Tray	Large.	und.	Coarse	Plant

Table VII.2 Technological characteristics of the sample

The ceramic sample consists of 40 trays; 14 (potential) bowls, 4 indeterminate items. Eleven bowls seems to belong to the western HT version and the three to the DFunbW HT versions (see chapter II).

The size of the trays is generally large or medium-large, however this element is to be considered very indicative.

Except for 9 cases (among which the 3 shards from Tell Kurdu classified as DFunbW) the ceramic fragments seem to be formed from coarse clay.

Except 6 cases (among which, again, the 3 shards from Tell Kurdu) the ceramic fragments are tempered with organic inclusions. In most of the fragment are visible very large plant fragments outlines.

The internal surface generally remained untreated but, most often the wear have altered any possible recognition of its original treatment. In few very case it appears to be treated.

In 30 cases the external surface was not treated, in 13 it was treated (but it was not possible to identify the technique), in 10 it appeared smoothed. Furthermore, in 3 cases the surface appeared to be polished, in 1case scraped and in 1 case burnished.

In one case, in the hollow of the incisions of a HT, possible traces of ocher were identified: the fragment MT 24. This HT had to be particular, in fact the paste from which it was made was rather fine. Furthermore, both the inner and external surfaces were smoothed. The incisions were arranged fairly evenly and were made with a hard blade (possibly flint).

Only in a few cases it was possible to hypothesize the techniques through which these vessels were formed. In 4 cases it was possible observe that pieces of clay were superimposed and pressed against the base in order to shape the walls of the vessels. In 2 cases the walls would appear to have been built by overlapping superimposed coils of clay.

Vascular shape	Vessel section	Scoring tools	Scoring base shape	Scoring wall shape
MT14	Wall	No scored	und.	Plain
MT19	Wall	Hard balde	und.	Parallel incisions
MT24	Wall	Hard balde	und.	Parallel incisions
MT27	Wall	Adding material	und.	Bumps
MT28	Entire section	Soft blade	Parallel grooves	Plain
MT39	Base	Tool	Triangular impressions	und.
MT40	Base	Tool	Triangular impressions	und.
MT61	Base with wall	Tool	Impressions	Plain
MT62	Entire section	Tool	quadrangular impressions	Pinches
MT69	Wall	Hard balde	und.	Parallel incisions
MT74	Base	Soft blade	Parallel incisions	und.
MT76	Base with wall	Finger	Parallel grooves	Parallel grooves
MT85	Wall	Hard balde	und.	Impressions
MT94	Wall	Soft blade	und.	Impressions
MT96	Base with wall	Finger and tool	Finger impressions	Impressions base-walls
MT103	Wall	Tool	und.	Triangular impressions
MT107	Wall	Finger	Impressions base-walls	Impressions base-walls
MT110	Base	Finger	Pinches	und.
MT111	Base with wall	Tool	Impressions base-walls	Impressions base-walls
MT112	Base	Tool	Impressions base-walls	und.
MT124	Entire section	Adding material	Parallel bumps impressed	Plain
MT126	Base with wall	No scored	Plain	Plain
MT128	Base with wall	Tool	Parallel grooves	Plain
MT131	Wall	Soft blade	und.	Parallel incisions
MT135	Wall with base	Tool	Parallel grooves	Plain
MT136	Entire section	Finger	Parallel grooves	Plain
MT137	Base with wall	Tool	Parallel grooves	Parallel grooves
MT141	Wall	Tool	und.	Parallel grooves
MT152	Base	Adding material	Parallel bumps	und.
MT157	Base	Adding material	Parallel bumps	und.

Vascular shape	Vessel section	Scoring tools	Scoring base shape	Scoring wall shape
MT158	Base	Adding material	Parallel bumps	und.
MT160	Base	Finger	Parallel grooves	und.
MT162	Base	Adding material	Parallel bumps?	und.
MT163	Wall	Soft blade	und.	Parallel incisions
MT164	Wall	Soft blade	und.	Parallel incisions
MT165	Wall	Soft blade	und.	Parallel grooves
MT166	Wall with base	Soft blade	Parallel grooves	Parallel grooves
MT167	Base with wall	Hard balde	Parallel grooves	Parallel grooves
MT168	Base with wall	Hard balde	Parallel incisions	Parallel incisions
MT170	Base	Finger and tool	Impressions	und.
AKA16	Base	Tool	Triangular impressions	und.
AHA17	Wall	Tool	und.	Parallel grooves
AT01 26 5 10	Wall with base	Tool	und.	Parallel grooves
AT99 j KH 38	Entire section	Finger	Finger impressions	Finger impressions
HAN15	Base	Finger	Finger impressions	und.
KAK15	Base	Finger	Pinches	und.
KHA30	Wall	Hard balde	und.	Parallel incisions
HALsup	Wall	Tool	und.	Impressions
TK6644	Wall	Finger	und.	Impressions
TK7502EO	Base with wall	Tool	Impressions	Impressions
TK8282E	Wall	Tool	und.	Particular incisions
SAB88 S12 120-5	Base	Finger	Finger impressions	und.
SAB88 Q14 50-24	Base	Finger	Parallel grooves	und.
SAB 125 88-549	Base	Finger	Finger impressions	und.
SAB 126	Base	Finger	Finger impressions	und.
SAB184	Base	Adding material	Bumps	und.
SAB88 34-4	Base	Tool	Parallel incisions	und.
SAB88 371	Base	Finger	Finger impressions	und.

Table VII.3 Internal surface scoring of the sample.

Particular attention have been paid during the analysis to the method of performing the scores on the internal surface of the analysed HTs (Table VII.3).

First of all it must be remembered that in two cases (MT14 and MT126) the surfaces were plain.

Apart from these two fragments, the analysis of the technological traces suggests that 12 fragments were scored with the finger, 2 by means of pinching, 7 by adding material (in the shape of bumps), 2 by combining fingers and tools impression, and the remaining fragments by means of impression/incision of tools.

The pinching technique was adopted by potters at both Mezraa Teleilat, Tell Sabi abyad and Tell Kashkashok. However, while in the first two cases the pinching was carried out randomly on the entire base of the vessel, in the case of Tell Kashkashok this technique was used to create parallel lines.
The technique of adding material in the form of strips to create parallel bumps is testified to in both Mezraa Teleilat and Tell Sabi Abyad.

VII.4.2 Use-wear

In none of the cases, on the internal surface of the archaeological fragments abrasive wear was detected. This kind of wear was widely present on the experimental replicas used for husking. It allow us to infer that none of the HT archaeological fragments was used for such an activity.

On the contrary, adhesive macro- and micro-wear, perfectly comparable with those present on the vessels experimentally used to bake bread, were detected on the internal surfaces of 48 fragments out of 58.

It is particularly significant that the evidences identified on HTs surfaces are attributable to as many as three different types of experimental traces related to bread baking. Two of these, basic bread and fat bread, have very peculiar patterns. So characteristic traces patterns, can hardly both refer simultaneously to activities other than baking. The fact that these data evidences intersect each other makes the interpretation extremely solid.
At the same time, on the external surface of the HTs bases there were abrasion traces attributable to the dragging of the vessels during their use. In addition, in three cases, the abrasive wear coexisted with carbonization suggesting the use of the vessels for cooking purposes.

Again, abrasive wear and few evidences of cabonization are coherent with what experimentally observed.

Vascular shape	Inferred use
MT14	Baking basic bread
MT19	Baking basic bread
MT24	Undetermined
MT27	Basic and fat bread
MT28	Baking basic bread
MT39	Baking fat bread
MT40	Baking fat bread
MT61	Baking basic bread
MT62	Basic and fat bread
MT69	Basic and low-infat
MT74	Undetermined
MT76	Baking low-in-fat bread
MT85	Baking low-in-fat bread
MT94	Baking basic bread
MT96	Undetermined
MT103	Baking basic bread
MT107	Baking low-in-fat bread
MT110	Baking fat bread
MT111	Basic and low-infat
MT112	Basic and fat bread
MT124	Baking basic bread
MT126	Baking basic bread
MT128	Baking basic bread
MT131	Baking low-in-fat bread
MT135	Baking basic bread
MT136	Baking basic bread
MT137	Undetermined
MT141	Baking basic bread
MT152	Baking basic bread
MT157	Baking basic bread
MT158	Basic and fat bread
MT160	Baking low-in-fat bread
MT162	Baking basic bread
MT163	Baking basic bread
MT164	Baking basic bread
MT165	Baking basic bread
MT166	Undetermined
MT167	Baking fat bread
MT168	Baking basic bread
MT170	Baking basic bread
AKA16	Baking fat bread
AHA17	Baking fat bread
AT01 26 5 10	Baking basic bread

Vascular shape	Inferred use
AT99 j KH 38	Baking basic bread
HAN15	Baking basic bread
KAK15	Baking basic bread
KHA30	Undetermined
HAL sup	Baking basic bread
TK6644	Undetermined
TK7502EO	Undetermined
TK8282E	Baking basic bread
SAB88 S12 120-5	Baking basic bread
SAB88 Q14 50-24	Undetermined
SAB 125 88-549	Basic and fat bread
SAB 126	Baking basic bread
SAB184	Basic and fat bread
SAB88 34-4	Baking basic bread
SAB88 371	Undetermined

Table VII.4 Final interpretation of the actual function of the analyzed HT shards.

	Basic Bread	Low-in-Fat Bread	Fat Bread	Mixed bread	Und.
Mezraa Teleilat	20	5	4	6	5
Sabi Abyad	3			2	2
Akarçay	2		2		
Tell Halula	1				
Tell Kurdu	1				2
Tell KhaznaII					1
Tell Khashashok II	1				
Khaneke	1				
Tot.	29	5	6	8	10

Table VII.5 Summary of the use-wear analysis.

According to this interpretation the majority of HTs were used for baking basic bread (27), less frequently they were used for baking low-in-fat bread (5) or fat bread (6).

Moreover, HTs could have been used for baking different kind of bread (8).

It is worth noting that also the two possible examples of trays with plain internal surface, MT 14 and MT 126, are affected by traces compatible with basic bread baking.

This means that even simple pans, at least in part, could have been used for such kind of activities.

In ten cases the actual function of the vessels remain undetermined.

VII.5 RESULTS OF THE INTEGRATED ANALYSIS

As discussed in the section VII.4.2 , the use-wear analysis on the one hand reject for all the fragments the hypothesis that the vessels to which the belonged were used for husking; on the other hand, it suggest that 48 out of 58 of them could have been used to bake bread. In particular, based on the indications provided by the trace analysis, selected fragments of the sample were also submitted to residues analyses.

As many as 24 fragments were analyzed through phytolith analysis, the most suitable to detect eventual cereal remains (Appendix II).

The gas-chromatographic analysis, both due to the fact that previously it had not brought significant results[30], and because it was not yet particularly developed in detecting the presence of cereals[31], has been limited to few fragments.

This was carried out only in the case of two samples, AKA 16 and AKA 17, for which the traces analysis indicated compatibility with the traces produced experimentally for baking in pot fat bread (Appendix III).

The table VII.6 provides an overview of the results of the analyses.

	Use-wear analysis		Phytholith analysis	GC
	Basic Bread	Undet.		
Mezraa Teleilat	35	5	9	
Sabi Abyad	5	2	7	
Akarçay	4		2	2
Tell Halula	1			
Tell Kurdu	1	2	3	
Tell KhaznaII		1	1	
Tell Khashashok II	1		1	
Khaneke	1		1	
Tot.	48	10	24	2

Table VII.6 Results of the integrated use-wear, phytoliths and gas chromatography analyses.

Phytoliths analysis found that the shards from Mezraa Teleila and Tell Sabi Abyad were likely used in activities related to processing cereals. Furthermore, based on the phytoliths fragmentation, they were associable, rather than to husking activity, to flour remains for the production of bread-like products.

[30] GREGG 2010; NIEUWENHUYSE et al. 2015; ROFFET-SALQUE et al. 2018.
[31] COLONESE et al. 2017.

Similar conclusions, although with less evidence in part due to their limited number, are conceivable for the HT fragments of Akarçay and Tell Kurdu.
As regards the shards from Tell Khashkashok II (KAK 15) and Khanekhe (HAN 15), they unfortunately come from superficial contexts making phytoliths data little significant.
Anyway, use-wear on these fragments is clearly comparable to those experimental one and to the other archeological fragments for which phytoliths analysis gave indication.
Therefore, these fragments can be easily associated in functionality to the other ones.
Only in the case of the fragment from Tell Khazna (KHA 30) the traces are not well developed and the lack archeobotanical data prevents the determination of the original function.

Finally, both the analysis of the phytoliths and the gas-chromatography seem to confirm what indicated by the use-wear analysis of the traces for the two fragments from Akarçay (AKA 16 and AKA 17). In fact, these two fragments seem to present at the same time traces, phytoliths and residues referable to the baking of bread with fat. In addition, the gas-chromatographic analysis suggests that the fat was likely animal in origin as well as suggested by experimental data.

In conclusion, the integrated analysis of traces of use, phytoliths and fats allows us to argue with a certain reliability that the HTs analyzed were used for cooking flour-based doughs based on cereals such as bread. The flours could be of cereals such as wheat or barley. Sometimes other ingredients containing different concentrations of fat were added to the dough.
The nature of the fats is not known, however on the basis of the concentrations it could be possible discern between oil seeds in the or animal fat similarly to what has been shown experimentally;
The attestation of traces related to bread-making over such a large geographical and chronological area provides robust elements to think to the HTs as pans used for baking bread in the Late Neolithic communities of the Near East.

Chapter VIII

CONCLUDING REMARKS

VIII.1 INTRODUCTION

In light of the data examined in the previous chapters, the interpretation I have presented as regards the role of husking trays (hereafter HTs) amongst the Late Neolithic communities of the Near East will now be further examined.

As laid out in the introduction, this work has been organised in order to answer specific research objectives. The questions posed by these objectives are as follows:

- What are HTs, including their origin, diffusion and development?
- What are their areas of distribution?
- How were they made?
- How were they used?
- What value was attributed to them? What was their role?

In the previous chapters were presented the data about the HT from archaeological literature; the possible ethnographical and experimental analogies with the production sequence and intended use of these vessels; and finally a use-wear analysis (integrated with phytoliths and residues analysis that allowed to infer the actual function of 58 shards from 7 archaeological sites.

The data emanating from the different disciplines, individually presented thus far, only allow a partial reconstruction of the past. In order to avoid making this work a mere complex collection of data, the data have been made to interact forming a dynamic whole. This course of action has made it possible to provide reliable answers to the questions posed by the established research objectives. The approach adopted for the purposes of this interpretation is based in particular on analogies between archaeological data, trace and residue analyses and bodies of experimental and ethnographical evidence.

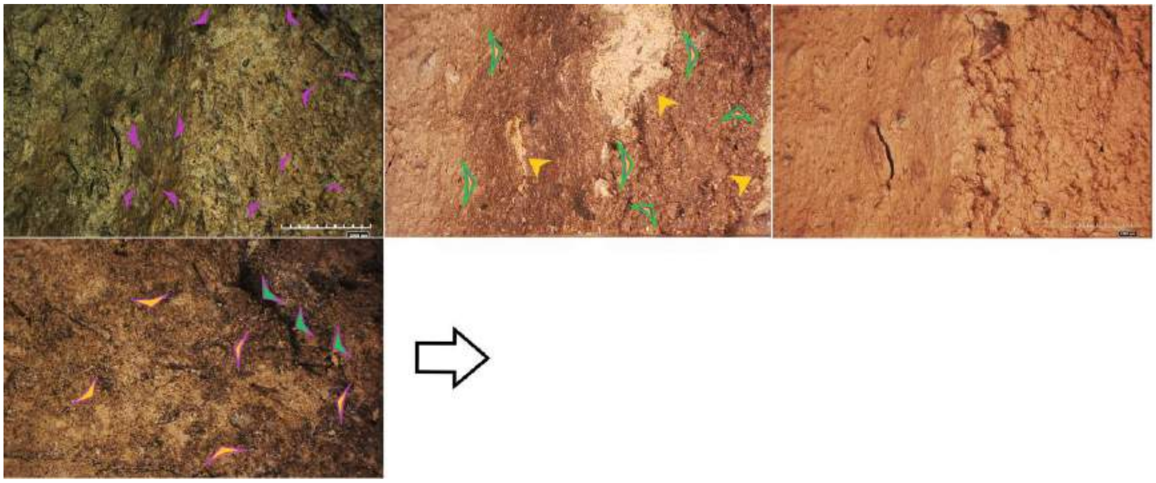

Fig. VIII.1 How experimental archaeology can help us to ‘go back towards the past’ (at the top, fat bread traces experimentally reproduced on a ceramic surface; from left: after post-depositional activity[1], after use, before use. At the bottom left, wear on the ceramic surface of the fragment AKA 16 interpreted as produced by baking bread with fat.

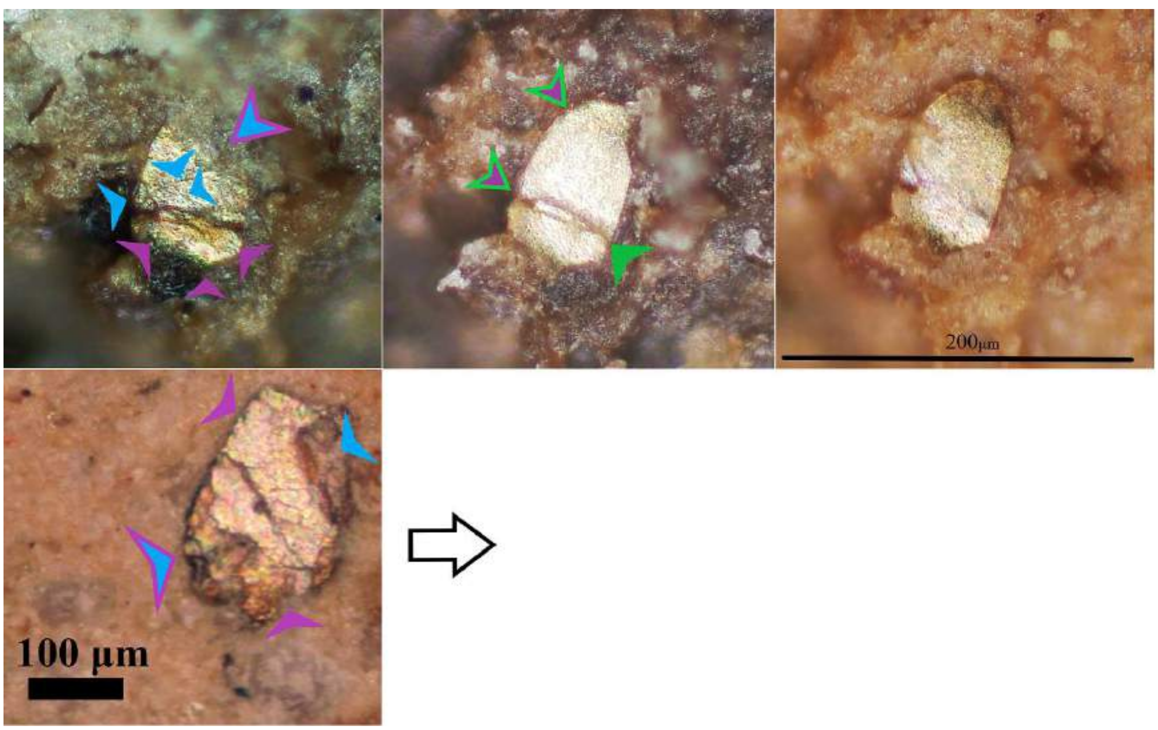

Fig. VIII.2 How experimental archaeology can help us to ‘go back towards the past’ (at the top, fat bread traces experimentally reproduced on a ceramic surface; from left: after post-depositional activity, after use, before use. At the bottom left, wear on a mineral inclusion surface of the fragment MT 39 interpreted as produced by baking bread with fat.

[1] Post-depositional analysis of the fragment is ongoing.

In my opinion, these disciplines do provide useful indicators that assist with understanding the dynamics of the past (Figs. VIII.1,2) which, otherwise, would remain incomprehensible or, worse, misunderstood and/or overlooked.

Certainly the similarities found do not seek to be direct comparisons between archaeological data and experimental / ethnological data; rather their sole purpose is to help organise the data into an intelligible framework.

VIII.2 WHAT WAS A *HUSKING TRAY*?

Understanding what an object is means understanding the reasons why it was created and what its function was. The different approaches adopted in this research have provided increasingly precise proposals as regards the function of HTs.

The set of data presented in the archaeological literature relating to the retrieval context already provides some possible clues that assist in understanding the function of these vessels (See Chapter II). The HTs have generally been found in association with tools often used to process food, such as grindstones and pestles. Indeed, HT fragments have often been found in open areas where food was normally processed, and sometimes in storehouses where food was stored. In several cases, HTs have been found in relation to fire installations, that is, fireplaces and ovens. In addition, HTs have occasionally presented evidence of fire-traces on both their inner and outer surfaces.

The bases of the main hypotheses, which have been formulated regarding the possible function of HTs, are some ethnographical comparisons (See Chapter IV). According to the most widely shared scholarly hypotheses, the HTs could have been used for:

- The husking activity. This parallel was probably established with wicker containers used for this activity in traditional contexts. Indeed, there seems to have been no ceramic vessels used for such an activity;
- To process dried-cheese. This analogy was established with vessels such as the *kurut kabi* and similar. However, when compared to these ceramic forms, apart from sharing the same trait of having impressions on their interior surface, the HTs differ in shape, with an absence of high walls and a pouring device, and

composition, that is, they were made using a very porous paste unsuitable to contain liquids;

- To bake bread. In particular, this analogy has been established with the baking tradition reported here as *Pileki-Ponitse-Crepulja* (hereafter PPC). This baking practice consists in the production of bread loaves baked by means of pans preheated over an open fire in a fireplace. These baking pans are very similar in shape and paste composition to the HTs. However, unlike the HTs, only some specimens show scores on their inner surfaces. In addition, numerous traces of fire are present on their surfaces.

Several elements, which came to light during the morpho-techno-functional analysis, have indicated that HTs are not at all suitable for the removal of husks from cereals (See Chapter V). Apart from the fact that these vessels are heavy and bulky, the ceramic paste from which they were made was too fragile to endure an activity like husking, and the scoring would have represented an obstacle. Indeed, conversely, all the characteristics of the ceramic form, that is, shape, temper, thickness and scored inner surface, make them perfect baking pans for baking dense cereal dough in a domed oven.

The use-wear analysis carried out on a sample of HTs has definitively ruled out the notion that HTs could have been used for activities producing abrasive wear. On the contrary, the level of wear on their surfaces is perfectly compatible with that generated during the baking of bread in a pottery pan (See Chapters VI & VII). In addition, cereal phytoliths, probably related to the presence of wheat or barley flour, were trapped on their internal surfaces.

Finally, there is also the case of two HT fragments on both of which there were traces and residues (phytoliths and lipids) that appear to offer clear evidence of the use of fat in the baking of bread.

The sample of archaeological fragments analysed by way of trace and residue analysis is numerically limited. However, it is representative of a vast geographical area, from the coasts of the Mediterranean as far as the Khabur area, and of the entire chronological period of development of the ceramic form, that is, from the Proto-Hassuna to the Middle / Late Halaf Period. At all the sites considered, apart from Tell Khazna II where the evidence is poor, the traces, as well as the residues, appear to be consistent with each other (Chapter VII).

Thus, on the basis of the evidence available, the HT could be interpreted as a ceramic form to which an anti-adherent device was applied for baking bread. The scores on the internal surface would be technological expedients aimed at resolving the problem of the dough sticking to the pottery surface during baking.

The following evidence further supports this fact:
- Unlike the flat tray, the bread baked in the HT can be extracted as a whole (Chapter V) (Fig. VIII.3);
- The adhesive mechanism constitutes the main form of wear and tear on this ceramic form (Chapter VII).

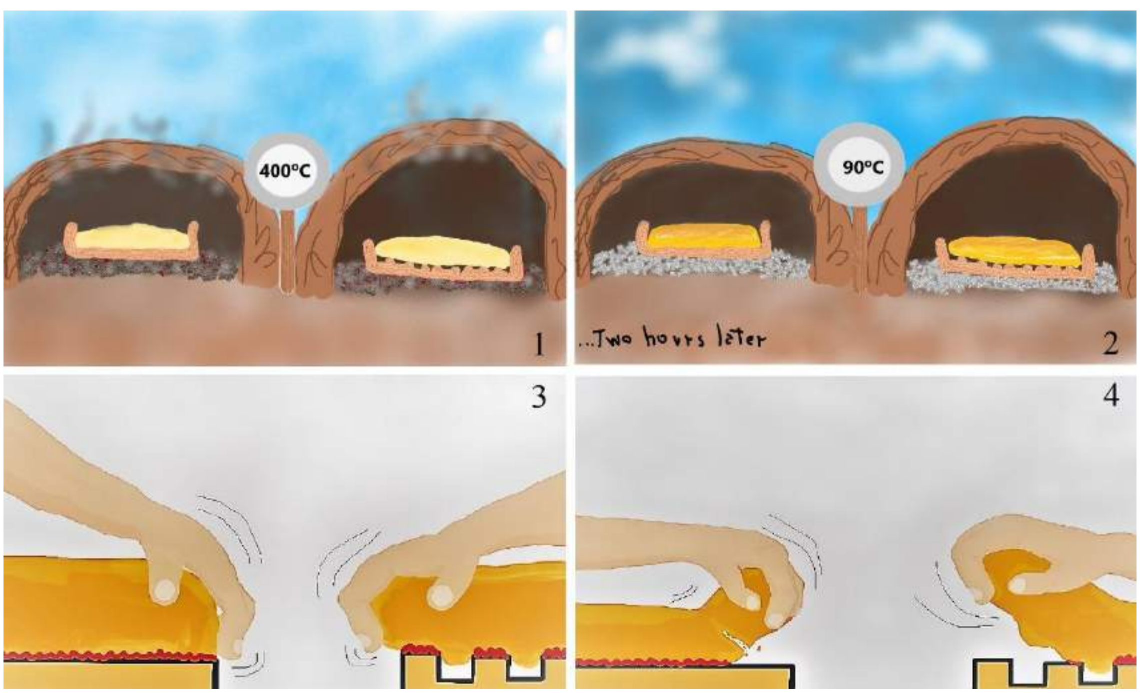

Fig. VIII.3 - Difference between Bread Baking with a Tray and a HT (drawing by the writer of this work).

The nature of these traces, as well as their distribution, coincides with those produced by bread which, due to the presence of the high percentage of gluten, is a very sticky foodstuff (Chapter VI). Therefore, on the one hand, the scores on the HTs would have allowed the ceramic surface to remain detached from the bread, making it more edible; on the other hand, this anti-adhesion mechanism would have meant the pans were less damaged, so increasing their life span. In this regard, the HT fragments could be the archaeological remains of a shared baking practice and, consequently, a mode of eating.

The writer must point out that although this work rejects the hypothesis that these vessels were used for husking, and rather were used for baking, the term *husking tray* should be retained to refer to this pottery form. In fact, this label allows one to reconnect with previous archaeological literature[2] while, at the same time, its actual function, despite its name, should warn us against simplistic interpretations.

VIII.3 Origins, Diffusion & Development

On the base of the current data, although chronological comparison between different geographical areas is still problematic, the area located between the Khabur and Tigris Valleys is the one where, for the first time, a significant number of HTs appeared (See Chapter II). The HT shards found in Seker al-Ahimar may be the oldest HT finds in the area (Early Proto-Hassuna levels).[3] The fragments found in various nearby sites, such as Telul eth-Thalathat XV[4], Umm Dabaghiyah[5], Tell Sotto[6] and Tell Kashkashok II[7] (Later Proto-Hassuna sites), would then belong to a slightly later chronology.

Fragments of HTs are also present in much early levels in other areas; for example, Salat Cami Yani[8], Çayönü[9], Tell Sabi Abyad I[10], Tell Halula[11], Akarçay[12], Mezraa Teleilat. [13]

[2] BRAIDWOOD 1952: 11.
[3] M. Le Miere pers. comm.
[4] FUKAI – MATSUTANI 1977: 51; BADER – LE MIERE 2013.
[5] KIRKBRIDE 1972: 14; 1973a: 5
[6] MERPERT et al. 1978:48
[7] MATSUTANI 1981: 23.
[8] KIRKBRIDE ; MELLART 1975: 140, 148.
[9] ÖZDOGAN - ÖZDOGAN 1993:100.

Tell ʻAin el Kherkh[14], Ras Shamra VAII[15], Shir[16] and Tell Shimshara.[17] It has been noted that it is beyond the limits of the ability of scholars to chronologically compare different geographical areas as HTs seem to appear almost simultaneously in sites located far away from each other.[18]

Nevertheless, if the idea is accepted that HTs were used to bake bread, it seems unwise to assume that the same technique was adopted simultaneously in different areas considering that there is such a wide variety of ways to achieve the same result. In fact, bread can be baked in many different ways, and there are various techniques used to make its detachment from a vessel easier; for example, the preheating technique or by placing a coating of a particular substance between the surfaces.[19]

To this first consideration, it should be added that the large size of the vessels, their fragility and weight, made it difficult to transport HTs. In addition, as the raw material used to make these vessels was easy to find and their production was poor, the hypothesis is supported that these vessels were locally produced. These data was recently confirmed by preliminary archaeometric analyses of HT shards from several different sites, including Tell Halula[20], Tell Sabi Abyad I, Tell Haneke, Tell Kashkashok II and Tell Khazna II (see Chapter II).[21]

In my opinion, the most likely hypothesis is that the HT distribution throughout the Ancient Near East is due to a sharing of technical know-how that spread from the Tigris- Khabur area. If it is assumed that the diffusion was so rapid that HTs seem to have appeared almost simultaneously in different areas, it could be thought that this may have been due to the fact that HTs were an optimization of an already known baking practice. In fact, HTs could be

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[10] NIEUWENHUYSE 2018: 82-83.
[11] FAURA 2013.
[12] ARIMURA et al. 2000: 182-3.
[13] KILIÇBEYLI 2005.
[14] IWASAKI et al. 1995: 174 fig. 12.16–17; TSUNEKI et al. 1998: 16; TSUNEKI et al. 1999: 6 fig. 6, 22; TSUNEKI et al. 2000: 11.
[15] CONTENSON 1963: 36; 1977; 1992: 380.
[16] NIEUWENHUYSE 2009:332. BARTL et al. 2010.
[17] MORTENSEN 1970: 106.
[18] MIYAKE 2013: 182-3.
[19] BATS 2020.
[20] FAURA et al 2013: 441-446.
[21] Forthcoming publication: Valérie Merle-Thirion, Marie Le Miere and Sergio Taranto.

nothing more than the optimization of the common tray, solving the problem of the bread getting stuck to the ceramic surface of a pan.

The trays had already spread throughout Upper Mesopotamia, as in Jarmo and Gird Ali Agha.[22] It is noteworthy that R. McC. Adams pointed out the similarity between Jarmo's pans and the later HTs.[23] Indeed, as per a recent doctoral research project carried out by L. Gonzalez Carretero[24], archaeobotanical remains of probable bread-like products would have been found in Jarmo itself. Carretero had already hypothesised that bread baking could have taken place using some type of container.[25]

The flat trays could have constituted, before the appearance of HTs, the support for carrying out this type of activity. Amongst the data presented is the analysis of two possible plain tray fragments from Mezraa Teleilat; the analysis indicates traces compatible with bread baking and cereal residues. Further studies in the future could deepen our knowledge as regards this hypothesis.

On the basis of the stylistic analysis, it would seem that the object of diffusion was the *Classical Version* of the HT (as defined in Chapter 2). This, in fact, is the only type is present in almost all areas where fragments attributable to this ceramic form have been found. In each of these other areas, except the area between the Euphrates and the Tigris, in addition to the *Classical Version*, other pottery forms with scored inner surfaces are present. These could have been local adaptations or re-interpretations of early versions.

In the Khabur-Tigris area (Hassuna), this practice was certainly widespread and is attested to in practically all the sites, that is, Tell Hassuna[26], Kul Tepe[27], Nineveh[28], Tell al-Khan[29], Matarrah[30], and so on. There, this practice would have become a traditional (and in certain

[22] CALDWELL 1983; MCC. ADAMS 1983: 220.
[23] MC.C.ADAMS 1983: 220.
[24] GONZALEZ-CARRETERO 2019
[25] L. Gonzalez-Carretero pers. comm.
[26] LLOYD - SAFAR WITH BRAIDWOOD 1945;
[27] AA.VV. 1977; MERPERT - MUNCHAEV - BADER 1981;
[28] THOMPSON - CAMPBELL - MALLOWAN 1933; GUT 1995;
[29] CALDWELL 1983; BRAIDWOOD et al. 1960;
[30] ODAKA 2019; BRAIDWOOD et al. 1952; CALDWELL 1983;

cases daily) baking method in the subsequent centuries, given the number of settlements in the area with HT fragments. In the areas of Balikh, the Middle Euphrates and Taurus Foothills, while HT use was widespread, it was not homogeneous. In some settlements, such as Tell Sabi Abyad, Mezraa Teleilat and Akarçay, bread would have very commonly been baked using a HT, but at most other sites it would have been little employed (see Chapter II, 2.2). This was the case, for instance, at the Tell Halula settlement where few HT fragments were found despite the long sequence of occupation recorded at the site. Further, in the Levantine sites, especially in the Rouj Valley, there is a considerable number of HTs, both the classical and platter versions.[31] The HT appears to have been well used in the IVZ area, but much less so in the areas of Lake Urmia and Hamrin. In some areas, such as Tappeh Sang-e Chakhmaq[32] and in the Alluvial Plain, only particular versions of HT have been found; their use probably started later and could already have been mediated by other communities.

VIII.4 Distribution Areas

The spatial distribution of the HT fragments is impressive. Fragments associated with this ceramic form have been found from the Mediterranean to Central Iran, from the Lesser Caucasus to the coasts of the Ancient Persian Gulf, in an area that exceeds 1,500 km in longitude. With this in mind, the HT constitutes, in a way, a *trait d'union* between the agricultural societies of the Late Neolithic Near Eastern zone.

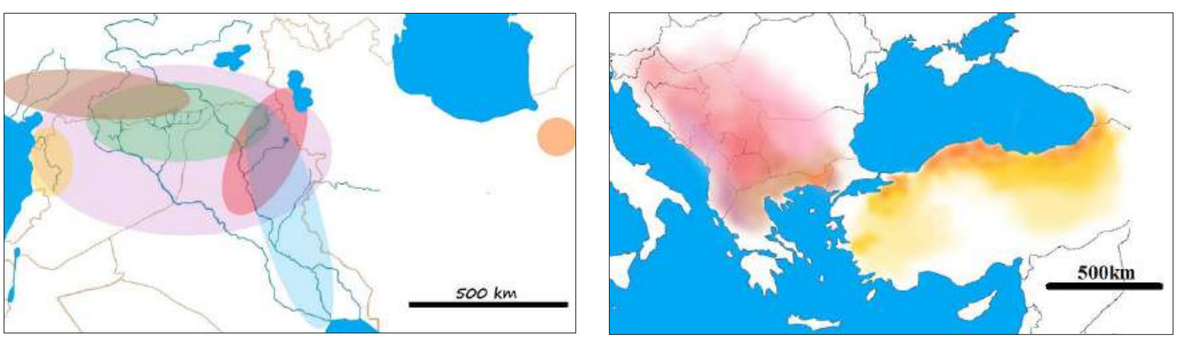

Fig. VIII.4 - On the left, a reconstruction of the possible HT baking tradition; on the right, a reconstruction of the PPC baking tradition (drawings by the writer).

The very interpretation of the HT, not so much as a pottery form in itself, but rather as a

[31] T. Odaka and O. Nieuwenhuyse pers. comm.
[32] Tsunekui 2014: 16.

piece of anti-adhering technology and as a baking practice, could explain the exceptional territorial extension involved in this phenomenon. Seen from this perspective, the extension of this baking practice is perfectly comparable to that of the PPC baking tradition (chapter IV) (fig. VIII.4).

It should be noted that as regards the PPC baking practice, the morphological aspects of the classical version of the vessels used for baking bread basically remain rather constant between the various areas. Their formal appearance only changes to a slight extent. However, this homogeneity is flanked at a regional level by similar forms that have their own specificities. The different HT versions could correspond to adaptations of this technology to meet the needs of the communities in which they began to be used. There may be many reasons why different versions developed out of one original, but currently they can only be barely conjectured.

The areas of diffusion of the different vascular forms, together with stylistic tendencies (see further on), are not clear-cut and often overlap. Some of them co-exist in the same territory, for example, the *Levantine Version* or the *Western Version*, as well as the *taş pileki*, found along the coast of the Black Sea. In other areas, there are only specific variants such as the *Southern* or *Eastern Versions*.

Finally, and also noted ethnographically, the baking tradition seems to be open to change and ready to adapt; this concerns both the cooked foodstuffs and the material in which it is baked; for example, the stone-made *taş pileki* or the *saç* and *gastra* made of metal. In this sense, the Tell Boueid[33] vessels can be explained. Further, it is very interesting to note that these areas correspond to different HTs scoring trends. These homogeneous groups could correspond to communities in some way united by a cultural affinity.

First of all, there is a central core area between the two great rivers in Upper Mesopotamia, the Euphrates and the Tigris, where the HTs have been scored by way of different techniques, using a wide variety of motifs.

[33] SULEIMAN - NIEUWENHUYSE 2002.

Further west, in the area of , the Middle-Upper Euphrates and Taurus Foothills, the HTs were scored in a somewhat similar way. However, more often, the part of the vessel located between the walls and base was scored. This element also distinguishes the few fragments from Cappadocia with whom there was evidently contact.

In a completely different way, the HTs of the eastern Tigris Valley, the IVZ and Lake Urmia were almost always incised with lines. The criss-cross incision pattern, present in the Hamrin and the Alluvial Plain areas, probably developed from there. Further, at the Tappeh Sang-e Chakhmaq site, the inner surfaces at the base of the *husking tray*-like vessels were densely and homogenously impressed, while their walls remained plain.

In conclusion, as already seen from the PPC tradition, the HT convention could have been shared between peoples who shaped and scored these vessels in different ways, dressed differently, spoke different languages, followed different rules, and so on (Fig. 4). It remains unknown as to which vectors enabled the transmission of the production, know-how and use of the HT. The suggested hypothesis that the sharing of know-how could have been in part due to the movement from village to village of women following on from exogamous marriages, as hypothesized for the following periods, remains.[34] In this regard, it is interesting to note that in all cases of the PPC tradition, the production and use of vessels is strictly reserved for the female world.

The case of the contemporary villager, Safura Yıldırım[35], in Anatolia should also be reported. After her marriage, this woman moved to another village where she continued to produce and use *pileki* as she had been taught by her mother, who came from another village in the area. This story seems to fit perfectly within the possible dynamics of the transmission of know-how (Section IV.4.2.1.2.1).

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[34] BRENIQUET 1987; FOREST 1996.
[35] ÖZTURK 2020.

VIII.5 How were the *Husking Trays* made?

HTs share a certain homogeneity in terms of ceramic technology.[36] Some characteristics, including shape, temper, wall thickness and scoring, must have enabled the ceramic shape to fulfil the function for which it was created.[37]

On the basis of the experimental and ethnographical observations when compared with archaeological and *traceological* evidence, the key steps in the production sequence of the HT can be outlined, as set out below.

A medium- and large-sized HT required a large amount of clay. Archaeometric and deductive data suggest that it had to be collected not far from the production area of the vessel. Once gathered, the clay was roughly purified and mixed with water and plant fragments and, sometimes, with other organic materials as detected during the trace analysis.[38] The amount of clay required was so large that, in order to produce just a few vessels, it was more manageable to knead it by foot as seen in the ethnographical comparisons (chapter 4).

The very shape of the vessels suggests their shaping technique. In fact, on the base of experimental experience, ethnographical comparisons and the technological traces of some analysed shards, these vessels had to be formed by firstly creating a large, thick clay base on which, subsequently, were set the walls.

The formation of the vessel, given its size, had to be developed on the ground. From a general observation of the Mezraa Teleilat fragments, it is possible to suggest that there was a higher quantity of plant inclusions in the base in order to prevent the bottom from sticking to the ground, as was also the case as regards the *pileki* (Chapter 4, Fig. IV.15). The slab technique was the most convenient mode to adopt for building a pottery shape of such size, that is, the ceramic paste could have been added little by little to form the walls. In some cases, this has been observed by way of trace analysis. Alternatively, larger parts of the

[36] NIEUWENHUYSE 2008: 116.
[37] SKIBO 1993.
[38] See PETROVA 2012.

walls could have been pre-constructed and subsequently mounted on the base of the vessel.

The pinching technique seems to have been less suitable to shape HTs. In fact, such a quantity of clay is not very manageable for vessels of such size, as well as being oval in shape (Section VI.2.2). Apart from a few cases, the surfaces of the vessels were untreated or simply smoothed; any further treatment was exceptional. The scores on the internal surfaces of the HTs had to be done immediately after their shaping, as revealed by the technological trace analysis.

In the PPC production tradition, the gestures of the potters in the production of the vessels were shared over large areas, and were probably handed down from generation to generation. The analysis of the traces reveals that this probably also happened in the production of HTs or, at the very least, for the incising of their internal surfaces.

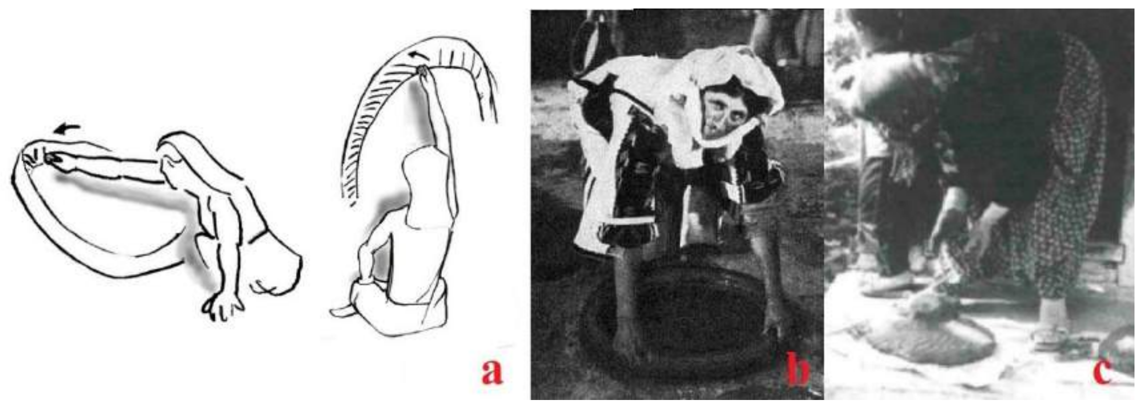

Fig. VIII.5 - Difference in gestures for shaping the HT (on the left, drawing by the writer), the *crepna* (ČAUSIDIS – NIKOLOV 2006: 150) & the *ponitse* (EFSTRATIOU 1992: 316).[39]

Indeed, by way of experiment, it has been made possible to propose the possible gestures adopted to incise the walls of a HT. After the treatment of the HT surface, the potter could have leaned down on one side of the vessel, elongating his torso in order to complete the scoring (Fig. VIII.5a). This action produce characteristic inclined scores that are know in several area of the Near East. It could means that similar gesture would have shared by potters of several communities.[40]

Technological trace analysis has highlighted how the potters could have used different

[39] The gestures are better visible in the video: https://www.youtube.com/watch?v=3-gTthrazzM).
[40] A similar gesture could have been adopted by potters several settlements (In the plates, shards: 106, 244, 247, 254 etc.)

techniques in order to obtain similar figurative scoring schemes on the inner surfaces of the HTs. For example, to create parallel lines (generally transversal with the length of the pottery form), the potters generally made incisions or grooves. However, in some cases, they also added raised clay strips (bumps), or they formed them by pinching the fresh ceramic surface.

These facts prompts two aspects that should be taken into consideration:
1) Firstly, in the archaeological literature there is no mention (except in Kiliçbeyli, 2005) of the techniques used for making lines on the HTs other than by way of incision or grooves. Evidently a more detailed analysis on the HTs may reveal a more articulated use of techniques for scoring;
2) Secondly, it seems probable that the potters were not particularly interested in the shape of the line or its thickness, but simply in organising the surface of the vessel in a general scheme of parallel lines.

The fact that the scores are evenly distributed over the entire surface of the vessel is related to their function. In fact, their distribution guarantees a continuous interruption of adhesion between the surface of the bread and that of the container. HTs are often described as not being fully fired; this is due to their blackened interior visible in section. Actually, this blackening may be related to the thickness of the vessels, as well as the organic content of the ceramic paste from which they were made. In any case, if one considers that the baking pans in the PPC tradition were simply fired on the hearth, the firing level of HTs is not a fundamental requirement for the function they had to perform. The fact that after 6,000 B.C. approximately some of these vessels were better fired, could actually indicate a change in firing condition.[41]

It is unknown who made the HT. Their manufacture may have been an activity reserved for women, in the same way as seen in the ethnographical PPC parallel . However, currently there is no clear evidence available. The fact that the scores on the HTs were often finger-impressed makes this ceramic form suitable for the study of potter dermatoglyphics. Such a

[41] CAMPBELL 1992: 42.

study could provide insights as regards the gender of those who made these vessels.[42] In my personal experience, I have observed that, in general, the size of finger impressions varies greatly. This could indicate that whoever produced the HTs did not belong to a specific age group.

VIII.6. How were *Husking Trays* used?

Contextually, HTs have often been found in open areas such as rubbish pits, and sometimes close to cooking facilities or food stores. In addition, they have often been found in association with grindstones, pestles and mortars. Indeed, HTs have been found in contexts comparable to the those in which the *ponitse* have been retrieved (Chapter 4, Table IV.1).

Experiments carried out to date have provided very clear indications as regards the conditions in which HTs could have been used (chapter V) (Fig. VIII.6).

Fig. VIII.6 Bread experimentally baked in a domed ovens by means of a HT.

According to the information gleaned, a cereal-based dough could have been baked in a

[42] For instance see Sanders 2015.

heated domed oven. The experimental results suggest that the dough could have been placed in a HT, while at the same time taking care not to press it against the bottom of the vessel. Then the HT could have been placed in a heated oven at 400ºC, located above a fair amount of glowing embers. Finally, the bread would have been left to bake for about two hours and then removed from the heat. After being left to cool for a few minutes, the bread loaf in its complete entirety could have been removed from the vessel.

This description refers to a general methodology attained by way of numerous experiments. Obviously, with respect to the method contrived, several types of variables could have been used, but the traces and residue found on the analysed HT shards seem to be fully compatible with the method. In fact, the HT surfaces were used in the same way as the experimental replicas used for the baking activity, including the presence of adhesive traces on the inner surface of the vessel, a limited number of fire traces on both its interior and exterior, and traces of dragging on the external surface of the base.

On the basis of residue analysis and the experimental results, the dough had to have consisted of mainly wheat-based flours or a wheat-barley flour mix. Indeed, barley is not suitable for baking as it does not contain enough gluten, so the dough cannot amalgamate into a single loaf. This situation is even truer for large-sized loaves such as those produced using HTs.

This piece of data fits in well with the data recently discovered by L. Gonzalez-Carretero when she analysed archaeobotanical remains of bread-like products from Jarmo and Çatalhoyuk dating to an earlier period. In addition, the experiments carried out suggested that the dough of the bread baked in HTs had to be quite solid-like in consistency and not wet in order to be able to be positioned over the scores without filling the hollows these scores created. If not, it would not have been possible to remove the bread intact.

For the same reason, the dough did not have to be very leavened as, otherwise, it would have expanded during baking and so filled the scoring hollows. Although the academic dialogue on yeast in such ancient periods is only conjectural, similar conclusions have been put forward for the bread loaves from Çatalhoyuk and Jarmo dating to earlier periods.[43]

Apart from the sample examined in this research project (Chapter VII), HTs with traces of fire were found in several sites. However, these should be considered as exceptional. In the vast majority of cases, scholars do not report the presence of fire traces on HT fragments; if there were traces of fire, archaeologists would certainly have emphasised their presence without questioning the function of these vessels.

The ethnological PPC comparison enables to observe how vessels, locally, can be used in slightly different ways from how they were commonly used. It is possible that the same is true for HTs. HTs could be locally used in a different way from how they were commonly used (Chapter IV..4.2.2.2). This could explain why HT fragments have fire traces at some sites and not at others, or why HTs have been found in coal layers; for example, at Hajji Firuz Tepe[44] and at Akarçay, where a fragment was found in horizontal position in a fireplace[45], instead of inside a domed oven as at Tell Sabi Abyad.[46]

Perhaps the most significant example of this variability is offered by the case at Hakemi Use. At this site, where I have been able to inspect the HT fragments personally, there is little evidence of domed ovens. Here, unlike other sites, the HTs present numerous fire traces both on their internal and external surfaces.[47] According to the Professor Halil Tekin, who heads the archaeological mission at the site, these vessels could have been used to bake bread in the same way as the *pileki*.[48] This thinking is further supported by the discovery of a HT vessel placed upside down on a charcoal layer.

It is probable that substantial differences in the baking method could also have affected the HT versions that differ from the classical one. The trace analysis of the HT shards from Mezraa Teleiltat revealed that some ceramic forms could have been used in the fireplace.

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[43] L. Gonzalez Carretero pers comm.
[44] VOIGT 1983: 159; M. Voigt personal communication.
[45] ARIMURA et al. 2001: 347.
[46] NIEUWENHUYSE 2008: 117.
[47] Thanks to Professor H. Tekin I was allowed to see HT fragments from Hakemi Use.
[48] H. Tekin personal communication. Professor H. Tekin let me know about *toprak pileki* and the possible analogy with the HTs.

For example, a bowl (ref. MT 168) presented adhesive wear on its internal surface and a burnt band on its external one. This vessel was probably used for baking directly over the embers. In addition, bread could have been made using a mix of wheat and barley flour, as suggested by phytolith analysis.

It is worth underlining that during the phase of experiments carried out, it was not possible to bake bread with HT replicas in the fireplace because the temperature was not enough to cook the dough. The dough had to cook only with the heat of the embers once the flame was extinguished. In fact, it must be remembered that the contact between the vessel and the open flame was not contemplated and so not included amongst the variables as it would have created fire traces on the vessel surface that do not appear on the vast majority of HTs.

VIII.7 ROLES & VALUES ATTRIBUTED TO *HUSKING TRAYS*

On the basis of what has been stated thus far, the HTs appear to represent one of the possible baking devices in which cereals could have been prepared during the Late Neolithic Period. This practice may have been part of the profound cultural changes that took place amongst the agricultural communities of the Ancient Near East in the mid-7th millennium B.C., when pottery vessels began to be used on a large scale for the preparation of food and drink.[49]

The HT baking tradition, together with that of the PPC, appears to have been strongly homogeneous over a vast territorial expanse; specific methodologies for the construction and use of the vessels seem to have been present at local and regional levels. What emerges is a picture in which local adaptations / re-interpretations of vascular forms, production techniques and baking methods are established on a general scale.

Using a medium- to large-sized HT of classical shape, it was experimentally possible to produce loaves of 3 to 3.5 kg approximately. This means that they were most likely used to feed relatively numerous groups of people. In the Tell Sabi Abyad settlement, one or two vessels were present simultaneously in each house. These groups of people were probably

[49] NIEUWENHUYSE 2015: 65.

those who made up the basic units of society and lived together in the same house. Regardless, HTs are evidence of the sharing of food and therefore of sociality.

The smaller HTs could be referred to less numerous groups of people who ate together, or different-sized HTs could have been used to produce loaves suitable for specific occasions, as seen with *crepulja*.

Bread had probably been a everyday food for a long time,[50] and it could be supposed that it was produced using different techniques. Trace and residue analyses have demonstrated that the bread produced using HTs could occasionally have contained other products such as seed oil or meat with fat. Adding other ingredients to the bread dough was probably a common practice.[51]

In addition to having a function, the scoring patterns on the HTs probably had associated meanings.[52] Indeed, some scholars have suggested that without attributed meaning the variety in the scoring motifs cannot be explained.[53] Unfortunately, there are not enough data in order to be able to define what meanings were attributed to them. No particular scoring pattern distributions have been detected within or between sites that can provide any clues. Indeed, many of the HT scoring patterns are often extensively shared between communities. In addition to this, it should be noted that the resulting decoration on the bread baked with the HT would not have been particularly evident in all the cases. HTs scored with shallow incisions or irregular impressions would have not produced recognisable breads. Thus, perhaps a simpler distinction between impressed and ridged HTs could be proposed. A distinction of this nature is actually archaeologically recognisable. In fact, the stylistic analysis has revealed that while in an earlier period the HTs were mainly impressed, later they were incised or grooved. This change appears to have affected a large part of Upper Mesopotamia, including the Tigris-Khabur area and the Balikh and Middle Euphrates areas.

From a chronological point of view, this change does not seem to have been unitary. This

[50] ARRANZ-OTAEGUI et al. 2018; GONZALEZ CARRETERO et al. 2017, GONZALEZ CARRETERO 2019; BALOSSI - MORI 2014; TARANTO 2021b;
[51] WILLCOX 2002; BALOSSI – MORI 2014;
[52] NIEUWENHUYSE 2008: 117; BALOSSI 2021.
[53] NIEUWENHUYSE 2008: 117; BALOSSI 2021.

seems to suggest that the change could have been due to functional reasons. The experimental analysis has shown that the cleaning operations, necessary for a proper functioning HT, are simpler and more effective for grooved trays than for impressed ones. However, this trait does not seem to be sufficient to explain such a radical change. It is possible that grooved HTs worked better in the long run in relation to bread making, but this is just a hypothesis.

In the PPC tradition, the symbolic aspects attributed to baking pans are largely subjected to spatial and temporal variations. For example, in the PPC tradition, people attributed different meanings and functions to the scores on the vessels in the three macro areas identified, that is, signature of carver (for the *tas pileki*), alignment of handles (for the *toprak pileki*), and symbolic value (for the *crepulja*) (Chapter IV, Table IV.2). It is also possible that the meanings attributed to the scores on HTs have varied greatly over time and space (Fig. 6). In any case, the ethnological studies on *crepulja* / *crepna* offer us a glimpse of the vivacity of norms, rules and meanings that potentially characterised traditional societies in relation to a pottery form (Chapter II). In my opinion, it is very significant that a summarily made, undecorated and everyday vessel such as a *crepulja* was so full of meaning in the Balkan world.

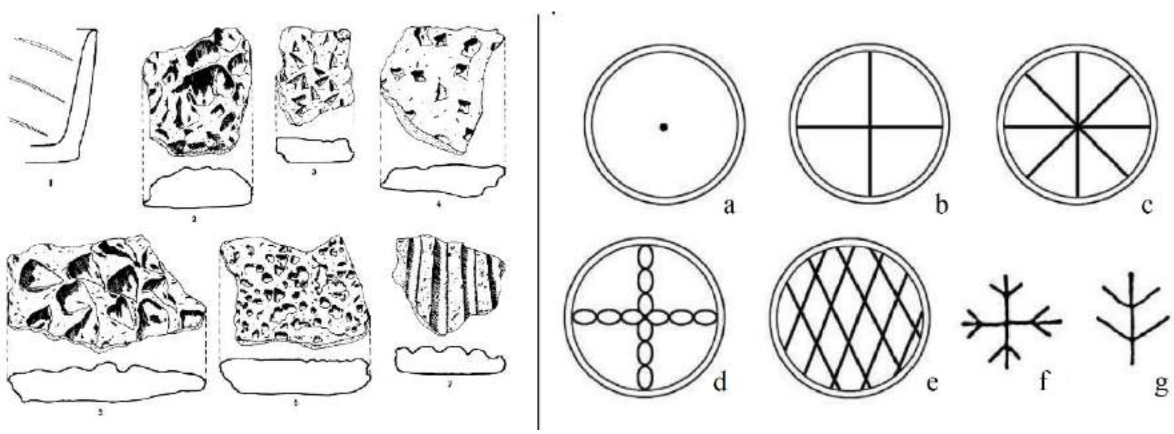

Fig. VIII.7 - On the left, score patterns on HT (Braidwood et al. 1952: Fig. 9); on the right, score patterns on *Crepna* (ČAUSIDIS -NIKOLOV 2006: 150).

Once again, on the basis of ethnographical comparison, it is possible that, beyond the score patterns, the vessels themselves were attributed specific values over time and space. It may be simply assumed that in the beginning, the HT baking practice was seen as a novelty and a positive contribution to everyday life by those who began to use it. Conversely, when this baking practice started to disappear, it could have been seen as a tradition to be honoured. In this respect, it may be significant that decorated and miniature HTs began to be used when that pottery form had started disappearing (see Chapter II).[54]

In the same way, geographically, in the Hassuna area, bread baked using a HT could have been a common, daily foodstuff. Conversely, in other settlements such as Ras Shamra, it could have been viewed as something exotic. Obviously, these are simply some suggestions to underline the complexity faced in attempting to understand all the possible roles of HTs.

VIII.8. What happens after the *Husking Trays* disappear?

During the earliest centuries of the 6th millennium B.C., HTs abruptly disappear.[55] The reasons for their disappearance are unknown. It is possible that their use, rather than having disappeared, was transformed.

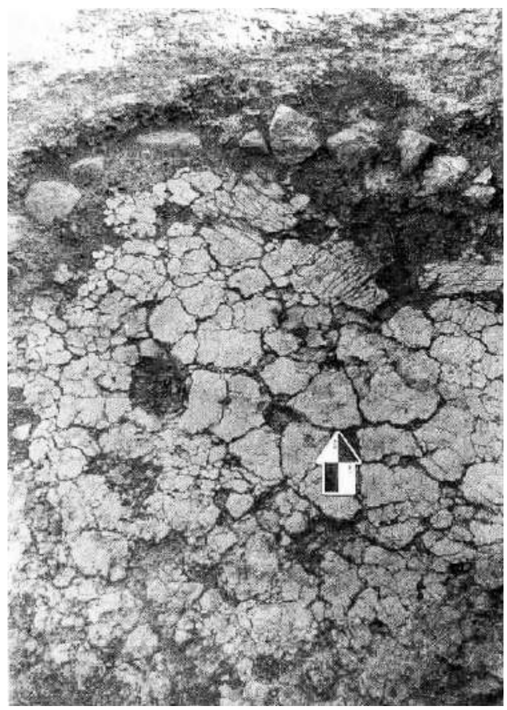

Fig. VIII.8 Floor of a oven with scratch marks from Fistikli (BERNBECK - POLLOCK 2003 Fig. 11).

The two possible scenarios suggested are as follows:

- As already noted in the experimental and ethnographical sections, the technique of preheating the vessel stops the bread from sticking to a ceramic surface. This technique was perhaps already partially practiced in the fireplaces at Hakemi Use and Mezraa Teleilat. Furthermore, pot baking by way of the technique of preheating the vessel seems to have been practised in much later periods in Egypt and possibly Mesopotamia.[56] It is possible

[54] FILIPOVIĆ 1951: 151; DJORDJEVIĆ 2019:30-32; ČAUSIDIS – NIKOLOV 2006: 144; ZLATKOVIĆ 2014; DJORDJEVIĆ - ZLATKOVIĆ 2014; DJORDJEVIĆ - NIKOLOV 2013.
[55] ODAKA et al. 2019: 78

that HT disappeared because of the adoption of such a technique.

- At the site of Fistikli, excavators identified an oven that could have been used for baking everyday foods such as bread.[57] One of the oven had scratches on the inner surface (Fig. VIII.8). This could be evidence of baking using 'HT technology'. If this is the case, the bread could only have been baked in the oven by cleaning the base so that the grooves became functional. In this regard, it is worth highlighting that the *tannur* ovens, currently used for baking bread in Afghanistan, have scoring inside them for facilitating the detachment of bread.[58]

VIII.9 New Perspectives

In a recent paper, the results of residue analysis of oval trays (Fig. VIII.9) were presented;[59] these trays had their interior surfaces scored, similarly to the HTs from Balkan Late Neolithic Period. The results suggest that these vessels could have been used for cooking meals containing meat and wild plants in combination with cereals, perhaps in the form of flour. Thus, these trays could have been used for baking bread containing plant and / or animal fats.

Fig. VIII.9 – Ceramic pans from the Ustiena Drim (elaborated from BENEŠ et al. 2021, Fig. 1)

Similarly, certain Vinça basins, preliminarily analysed by way of use-wear analysis,[60] could have been used for baking (Fig. VIII.10).

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[56] CHAZAN – LEHRNER 1990; JACQUET-GORDON 1981; GOULDER 2010; SANJURJO-SANCHEZ ET AL. 2018; BATS 2020;
[57] BERNBECK – POLLOK 2003: 34.
[58] A. Fusaro pers. Comm.
[59] BENEŠ et al. 2021.
[60] VUKOVIC 2013.

A functional analogy could be established between these vessels and the HTs. If so, pot baking could have been a constant feature of agricultural expansion.

Fig. 9 - Possible baking pan from Vinca (VUKOVIC 2013, Figs. 2a, 3a)

Finally, this research project opens up new perspectives that transcend the specific chronological and spatial context. While, on the one hand, the positive results obtained highlight the importance of a, thus far, little adopted research methodology, that is, the use-alteration analysis of ceramic material, on the other, it highlights that there is still a long way to go in order for this discipline to reach maturity.

In particular, some of the contributions presented here concern:

- the use of a multi-scalar approach and the analysis of the mineral inclusion surfaces; and
- an initial study of possible post-depositional processes on ceramic surfaces.

These should be considered as an initial approach that may be developed in the future.

Finally, this thesis demonstrates how formal and the functional aspects are complementary and inseparable in order to fully understand a pottery form.

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THE ROLE OF THE HUSKING TRAYS IN THE LATE NEOLITHIC COMMUNITIES OF THE NEAR EAST

PHD CANDIDATE

SERGIO TARANTO

VOL. 2

UNIVERSITAT AUTONOMA DE BARCELONA

IN JOINT RESEARCH WITH

SAPIENZA UNIVERSITY OF ROME

COORDINATED BY

MIQUEL MOLIST MONTAÑA, CRISTINA LEMORINI, ANNA BACH GÓMEZ

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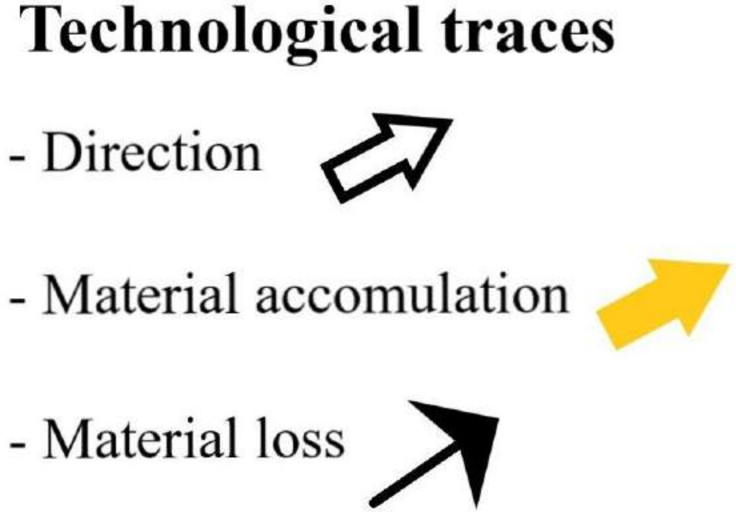
EXPERIMENTAL REFERENCE COLLECTION

TECHNOLOGICAL TRACES

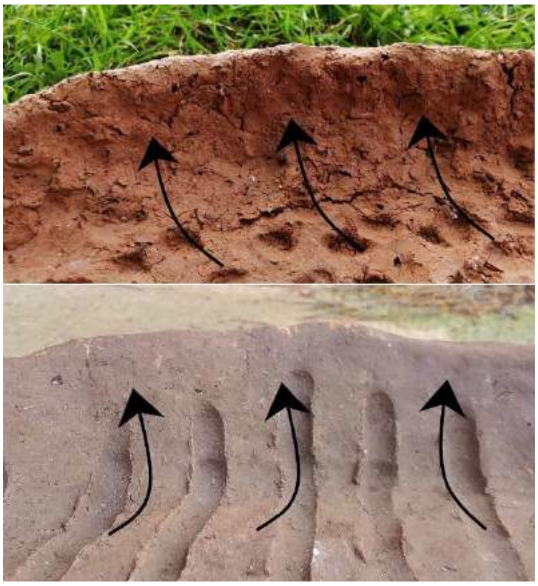
Legend


Technological traces
- Direction
- Material accomulation
- Material loss

EXPERIMENTAL REFERENCE COLLECTION: SHAPING

LEVANZO vs MARAONE

TAB 1



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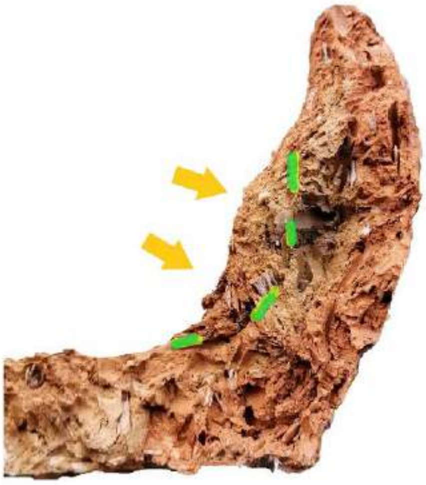
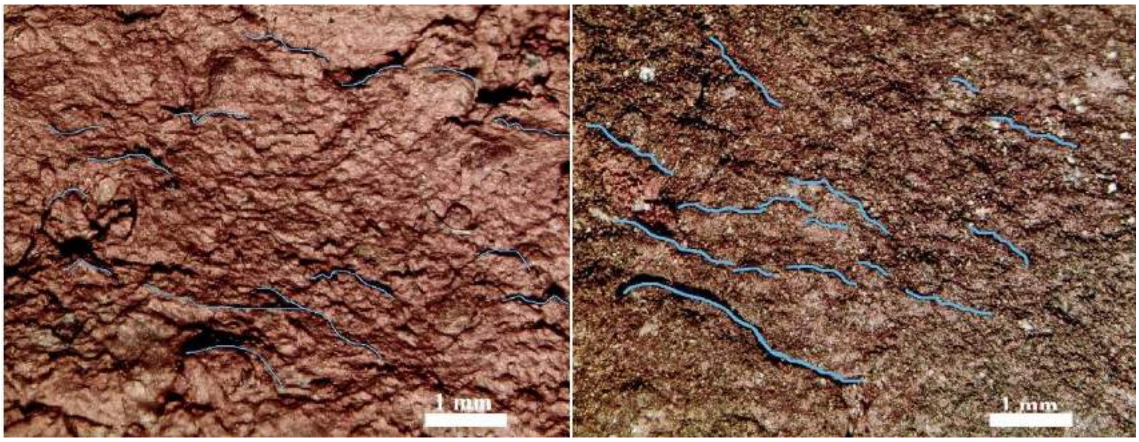


TAB 3

TAB 4

SURFACE TREATMENT

TAB 1



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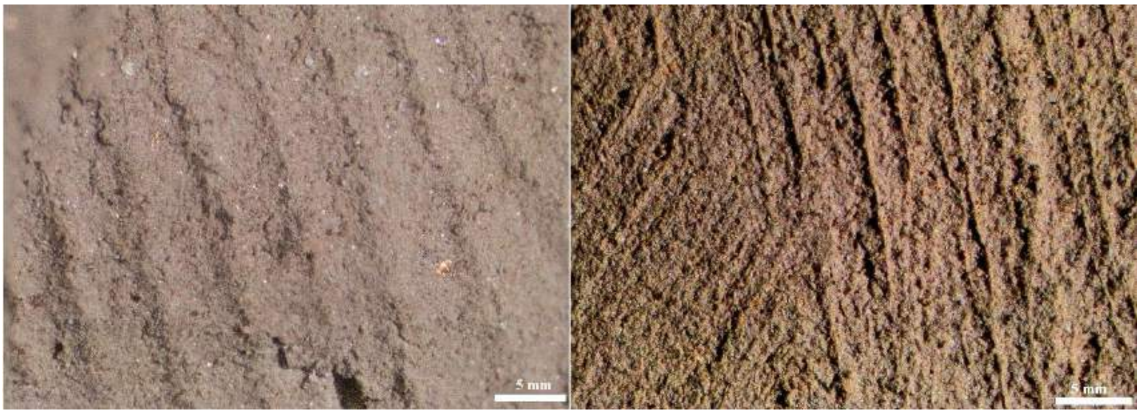

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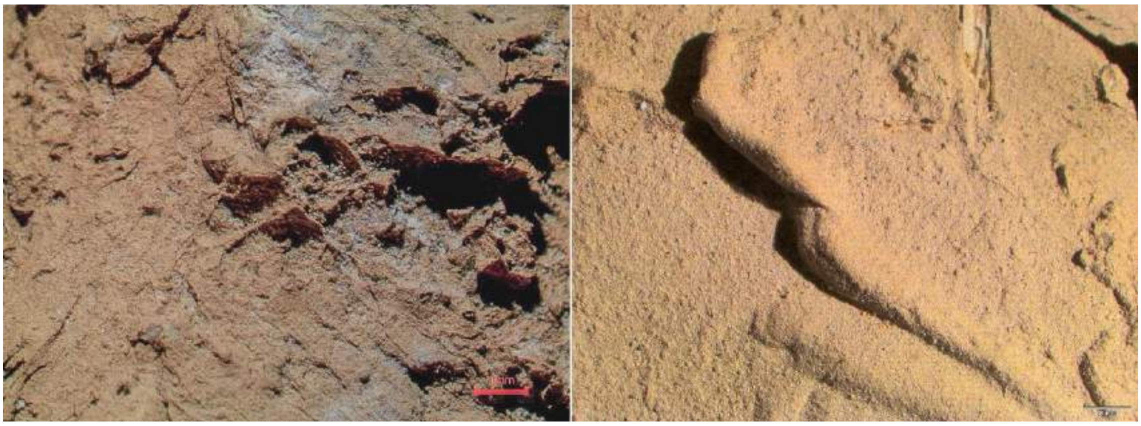

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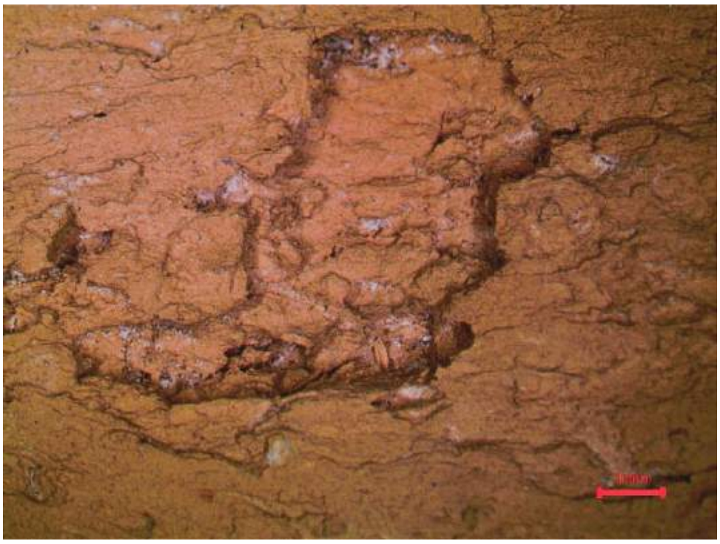

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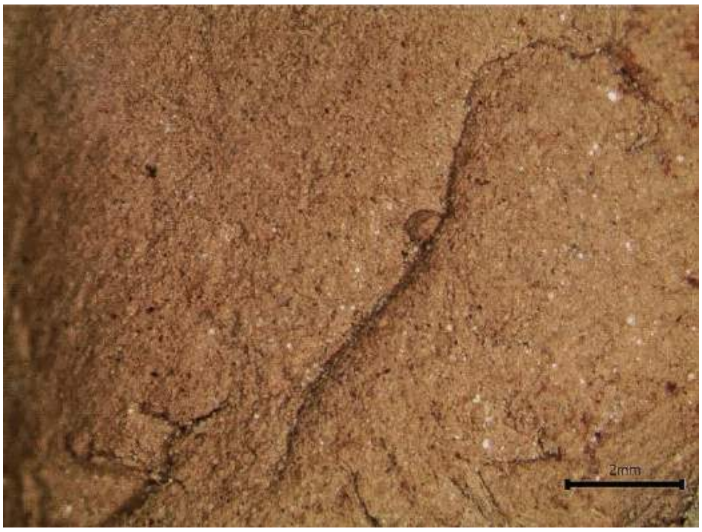
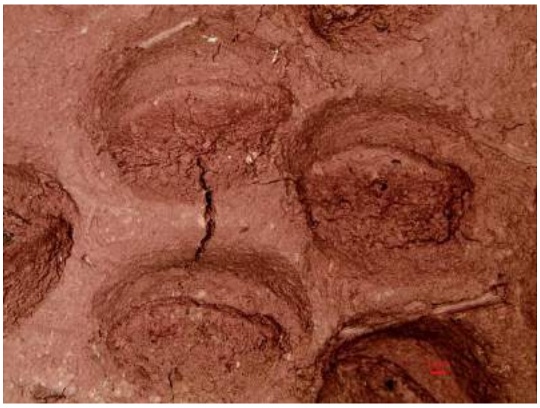


TAB 6

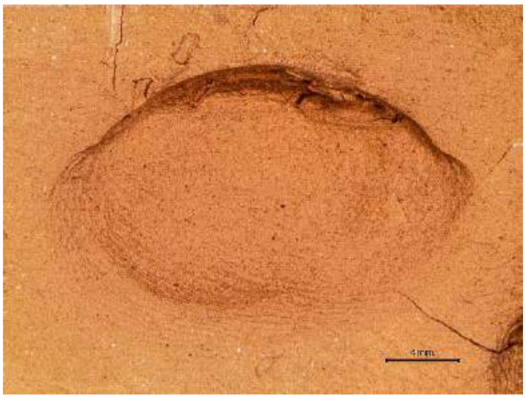
TAB 7

TAB 8

FINGER IMPRESSION



TAB 1



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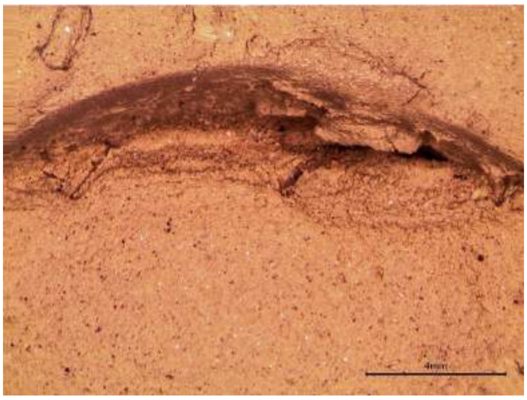

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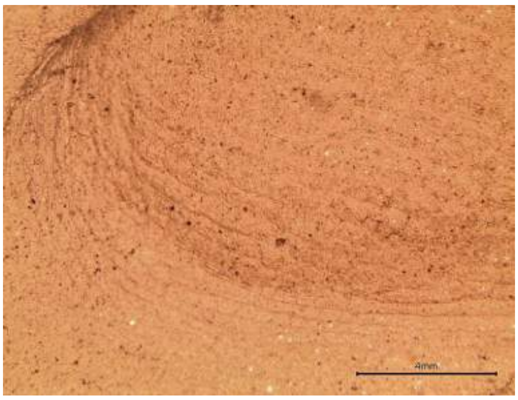

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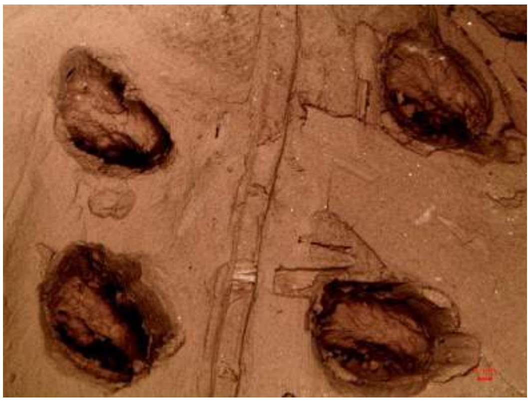
WOODEN-STICK IMPRESSION



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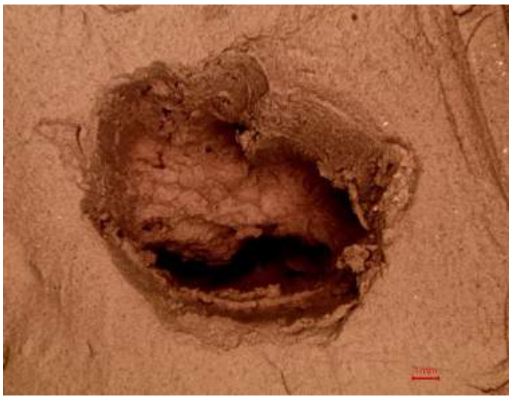

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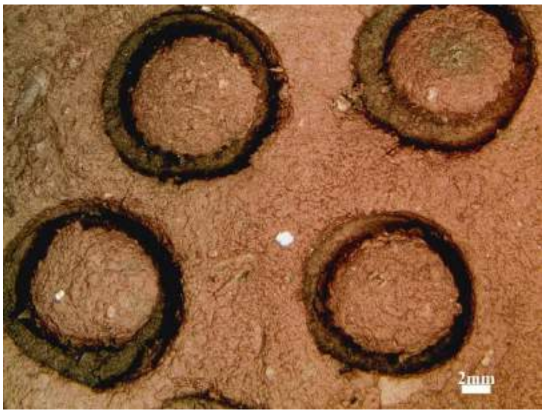
REED IMPRESSION



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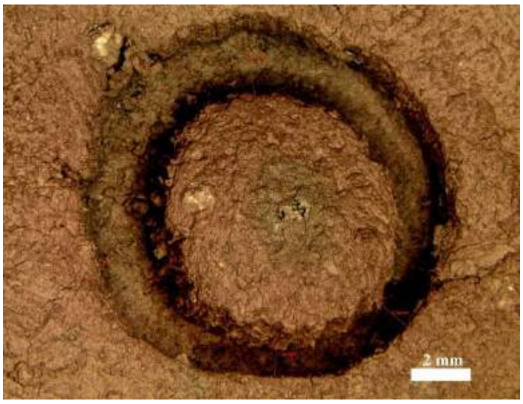
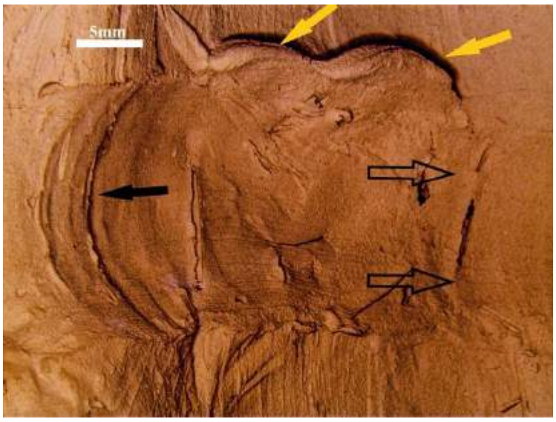


TAB 2

FINGER GROOVE



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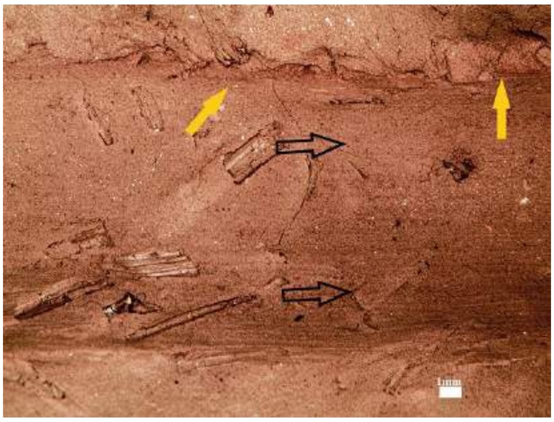

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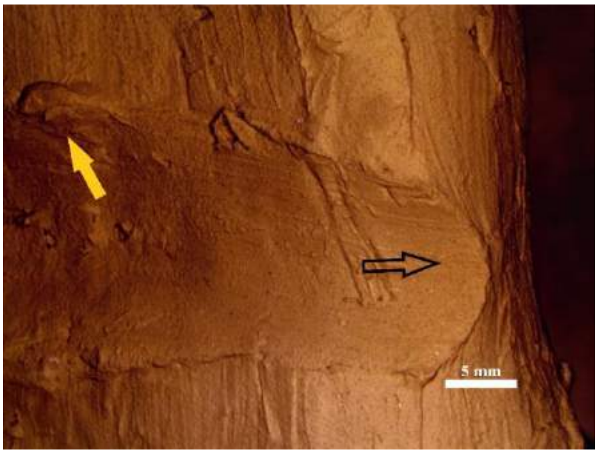

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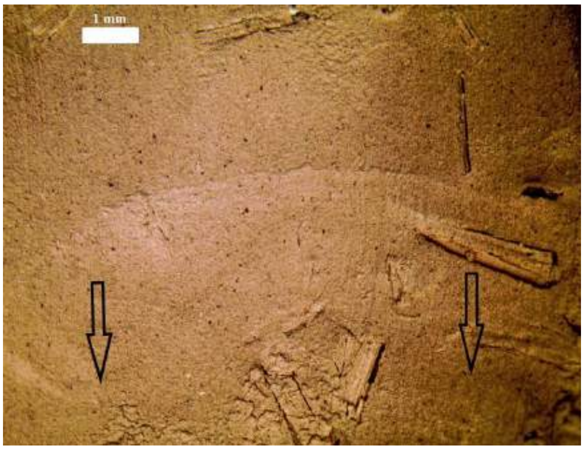
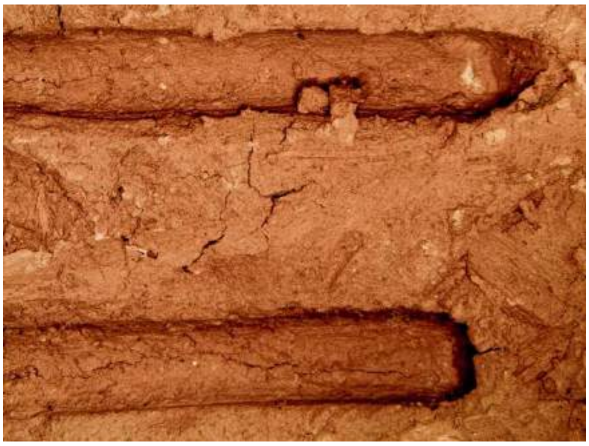


Tab 4

Like groove impression



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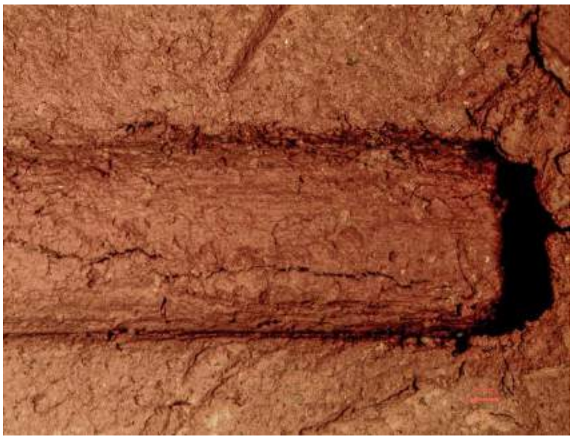
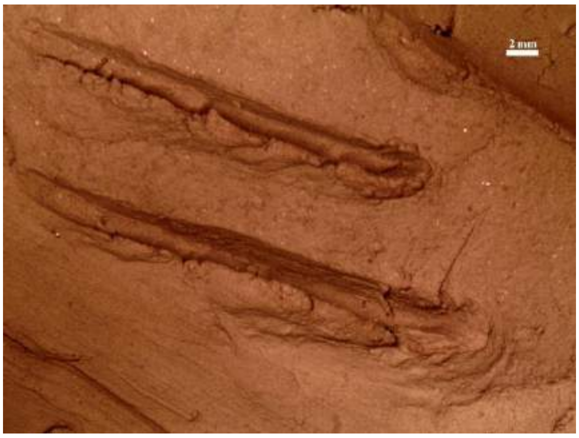


Tab 2

Wooden Stick incision



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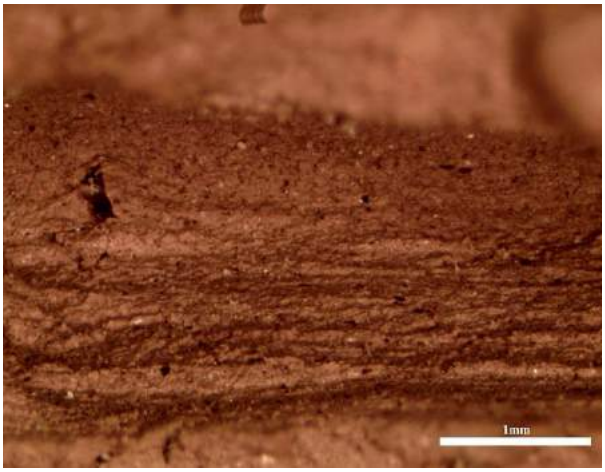
Tab 2



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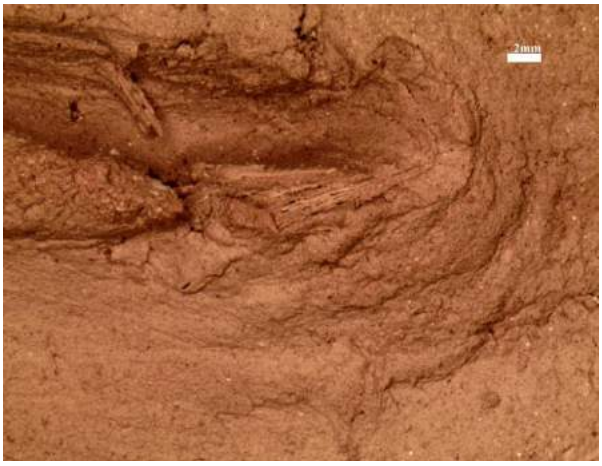

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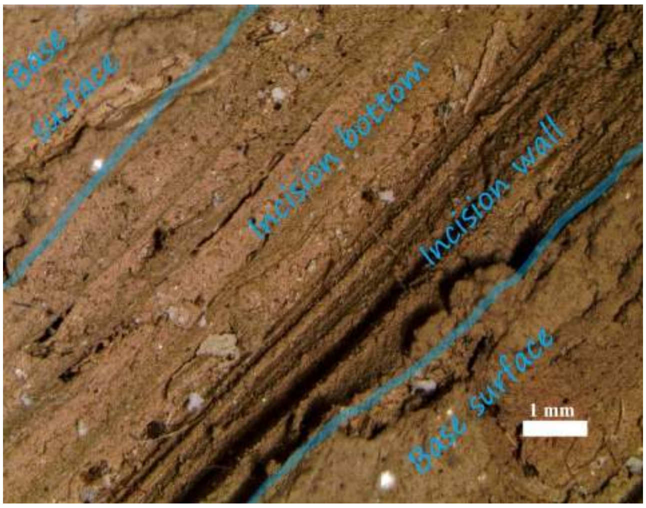
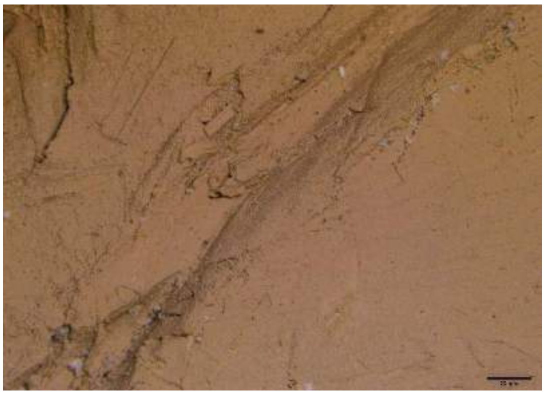


Tab 5

Flint Blade Incision

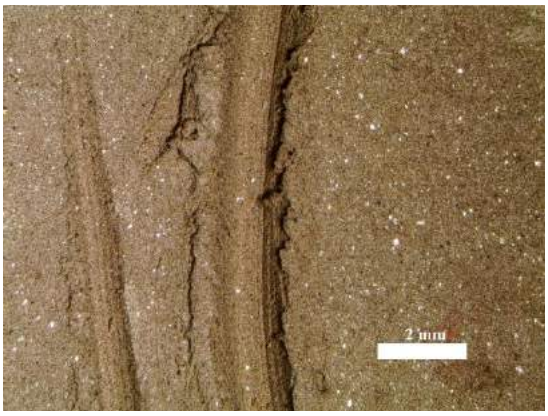
Wooden Tab1 Flint



TAB 2

TAB 3

BONE INCISION



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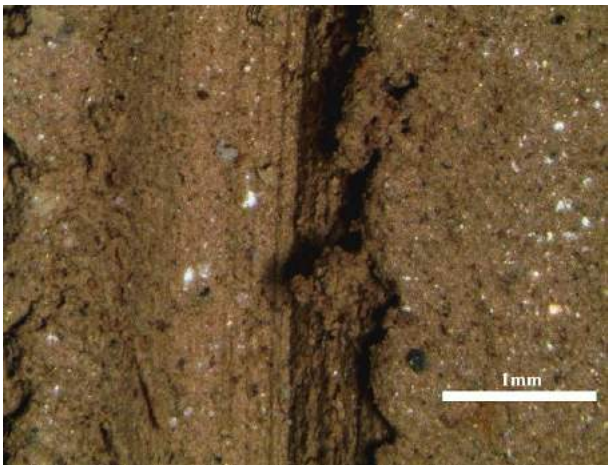
TAB 2



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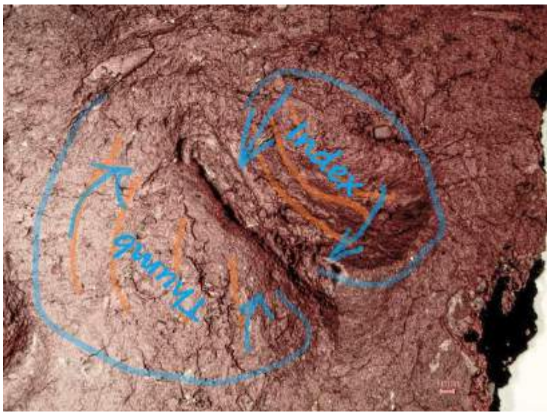
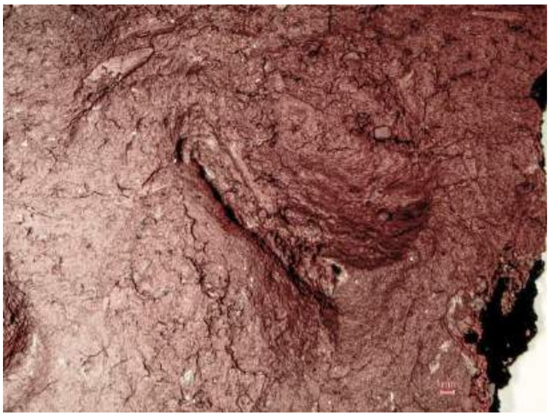
PINCHING

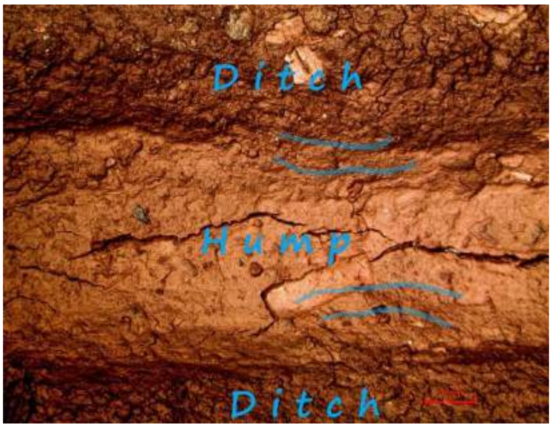


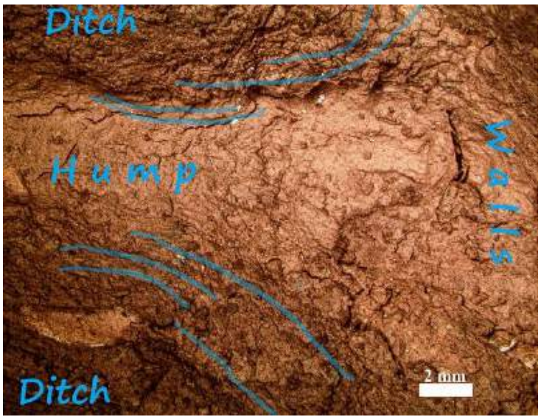


TAB 1

TAB 2

BUMP



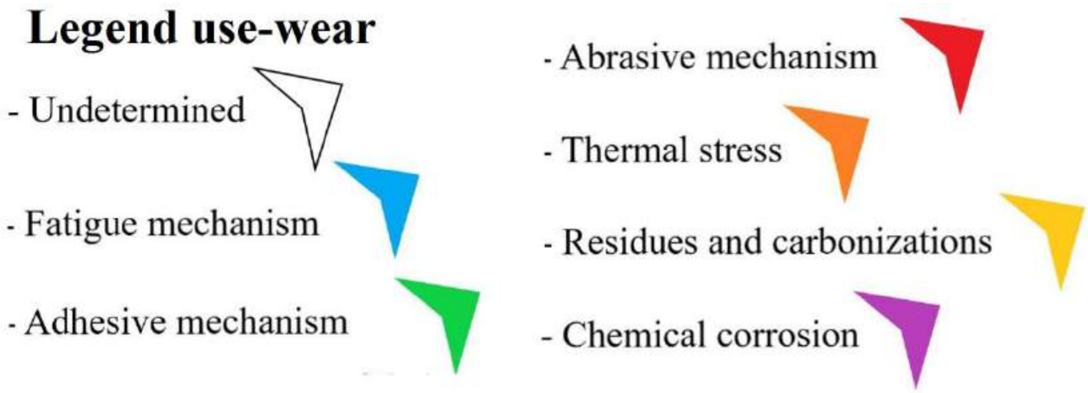


TAB 1

TAB 2

EXPERIMENTAL AND ETHNOGRAPHIC REFERENCE COLLECTION

USE-WEAR



SUMMARY TABLE OF THE WEAR MECHANISMS:

Skibo Classification (1992)		Tribological Mechanisms	Use-wear: Visible Macro Traces	Use-wear: Visible Micro Traces
Attritions	by Mechanical Friction	Fatigue Wear	Spall detachment	Spall detachment
			Fractures	Fractures
			Pits	Pits
		Adhesive Wear	Rips	Depressions
				Pits
		Abrasive Wear	Striations	Striations
			Scratches	Scratches
			Grooves	Grooves
			Depressions	Depressions
			Levelling	Levelling
			Rounding	Polishing
	Without Mechanical Friction	**Chemical Mechanisms**		
		Corrosive Wear	Depressions	Depressions
			Pits	Pits
		Thermal Mechanisms		
		Thermal stress	Fractures	Fractures
			Cracks	Cracks
			Spall detouchment	Spall detouchment
			Discolouration	Discolouration
Carbonisations			Soot	Soot
		Added Material	Charred encrostations	Charred encrostations
Residues			Organic residues	Organic residues
			Darkening	
		Tribochemical Mechanisms		
		Abrasive+Corrosive Wear	Striations	Striations
			Scratches	Scratches
			Grooves	Grooves
			Depressions	Depressions
			Levelling	Levelling
			Rounding	Polishing
		Attraction+Corrosive Wear	Crumbling	
			Rounding	Rounding

(elaborated from FORTE et al. 2018)

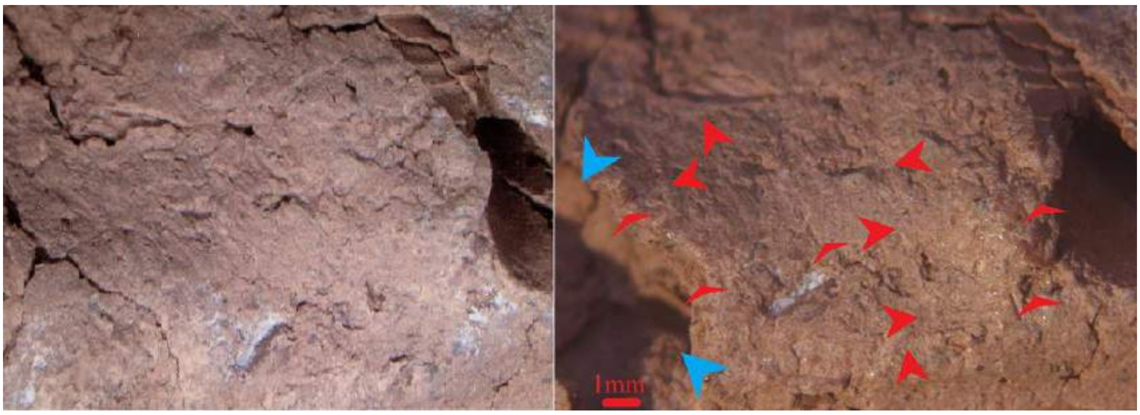
EXPERIMENTAL REFERENCE COLLECTION: HUSKING

SATURN EXPERIMENTAL REPLICA

TAB 1

BEFORE USE | AFTER USE

TAB 2



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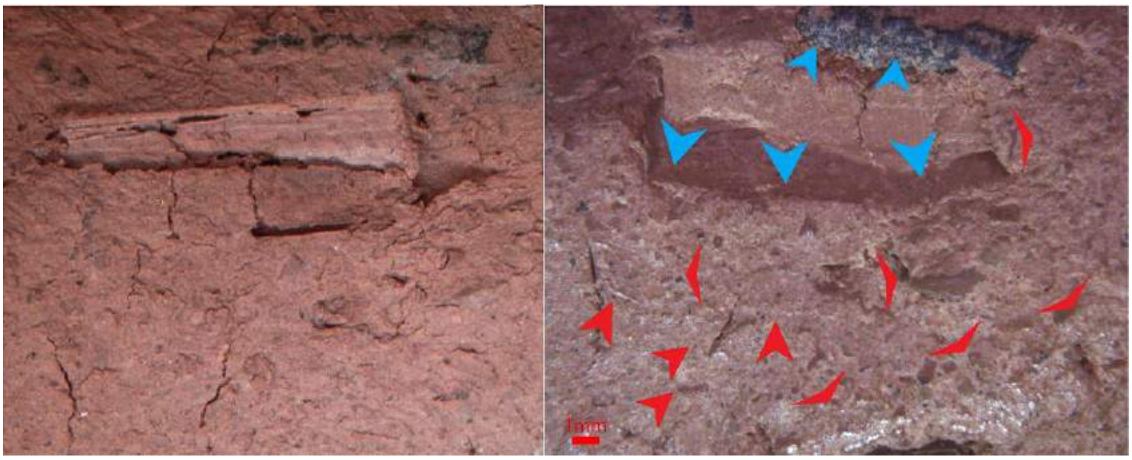

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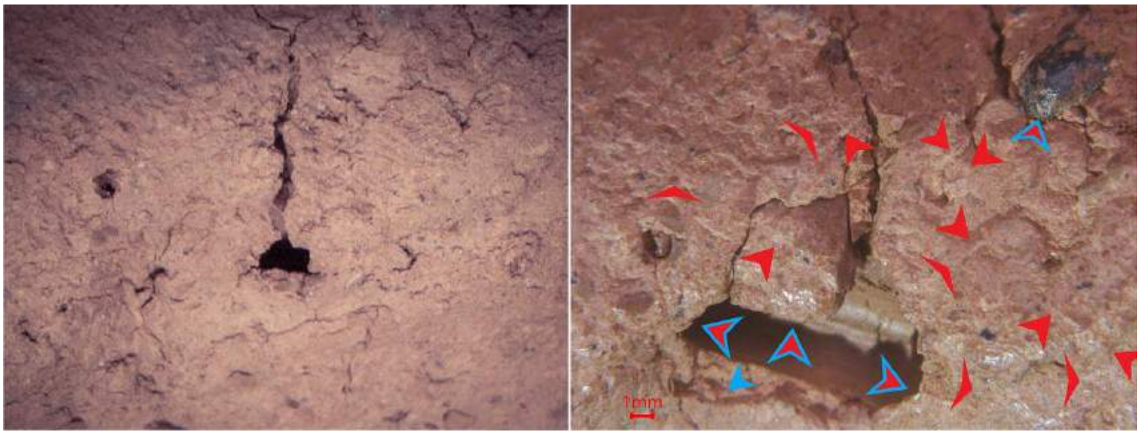

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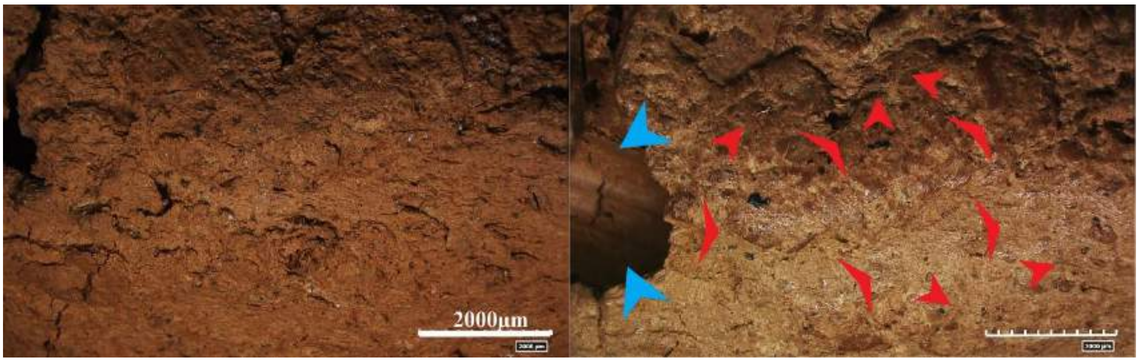

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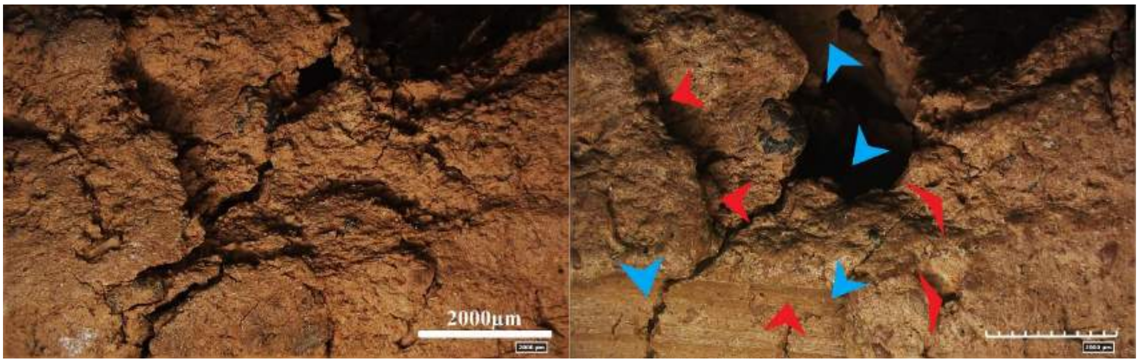

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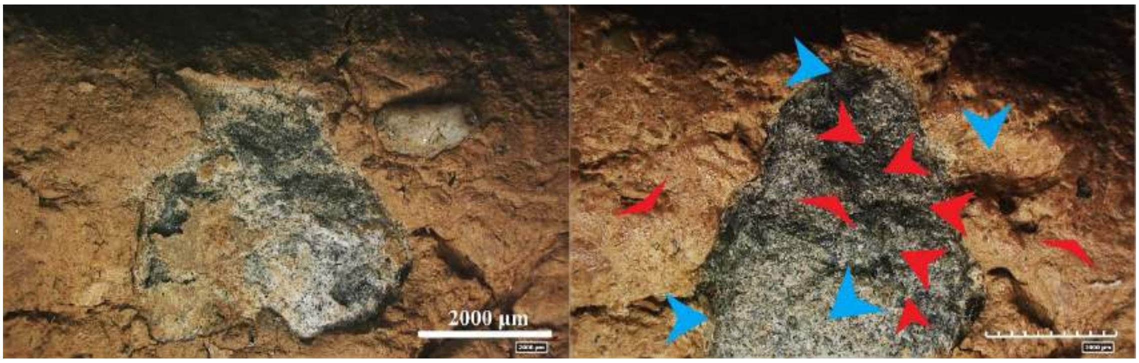

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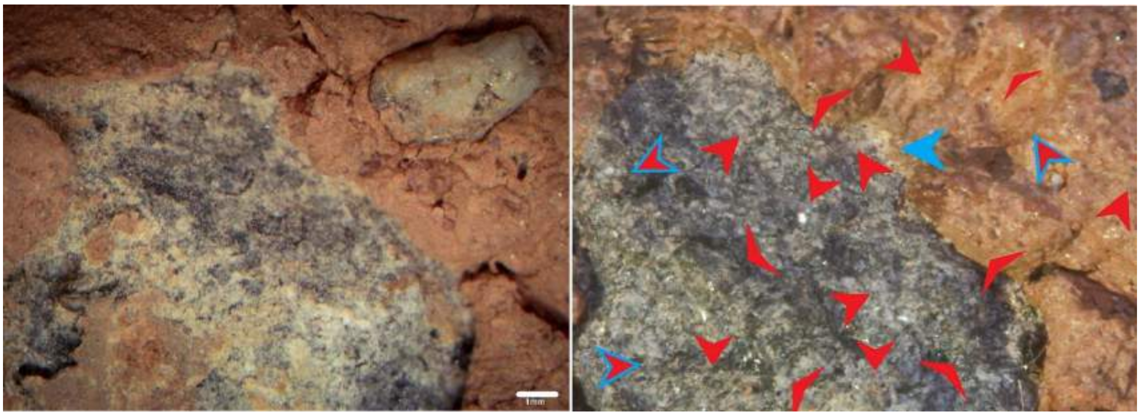

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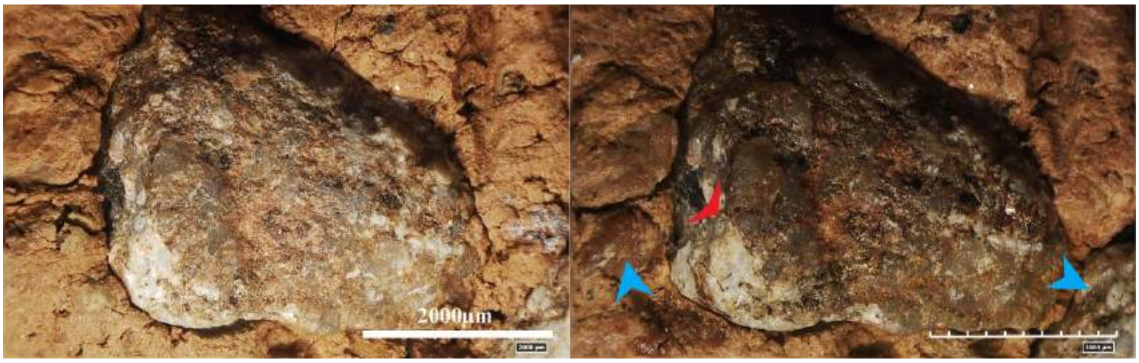

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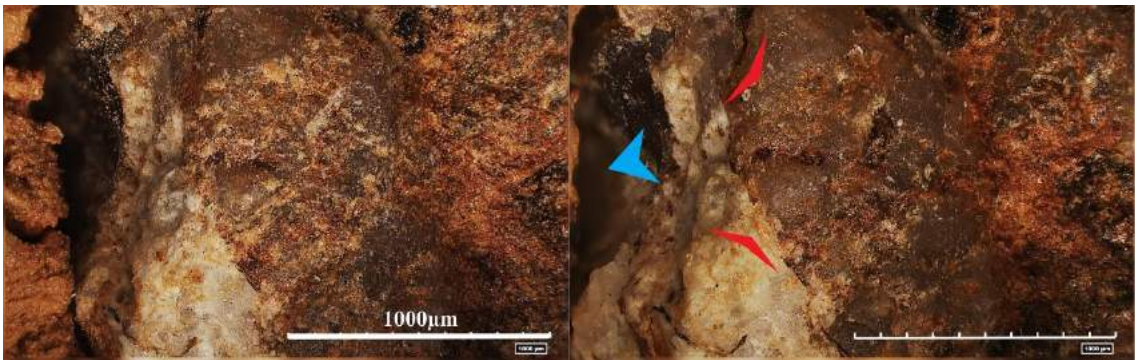
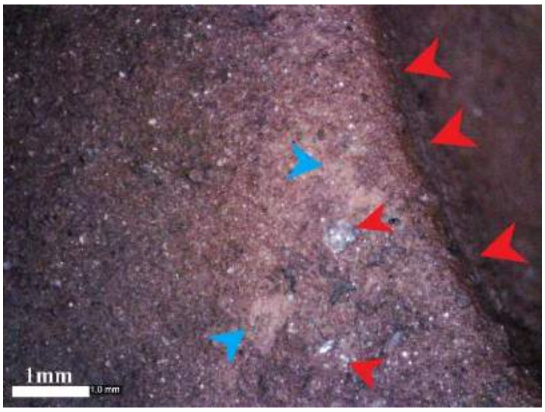


TAB 11

ETNOGRAPHIC REFERENCE COLLECTION: PROCESSING KURUT

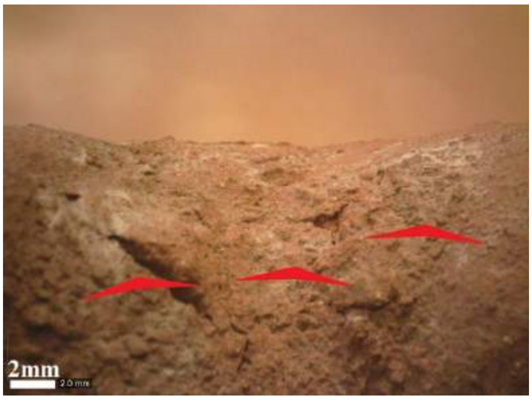
ÇERZE

TAB 1



TAB 2

TAB 3



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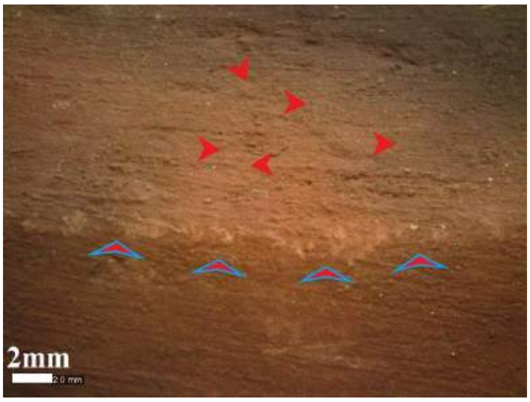
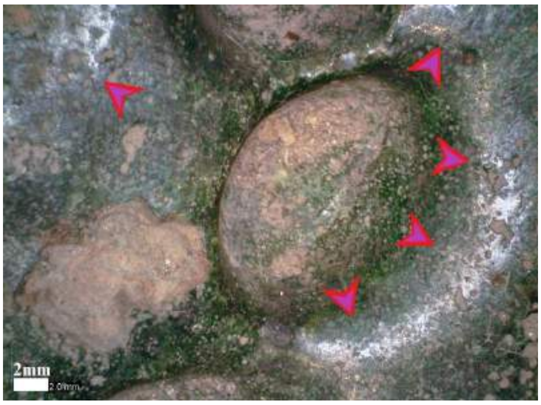


TAB 5

SIRLI KURUT

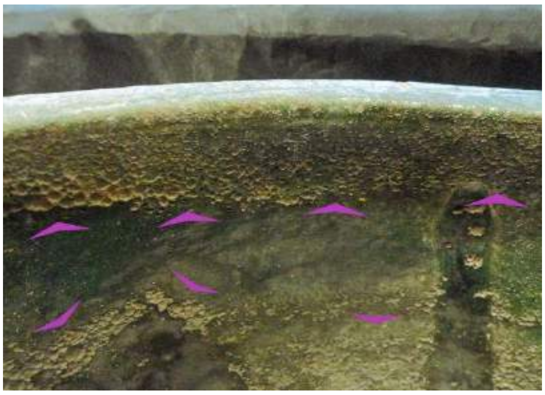
TAB 6

TAB 7



TAB 8

TAB 9

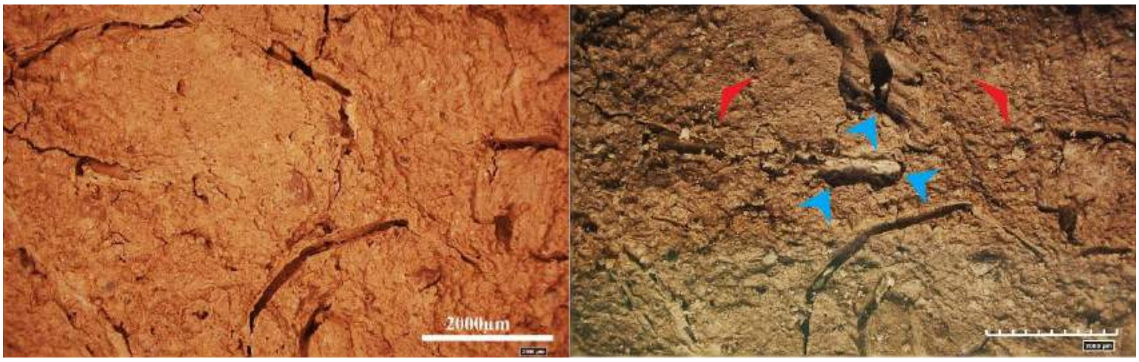


TAB 10

EXPERIMENTAL REFERENCE COLLECTION: PROCESSING KURUT

VULCANO EXPERIMENTAL REPLICA

BEFORE USE | AFTER USE



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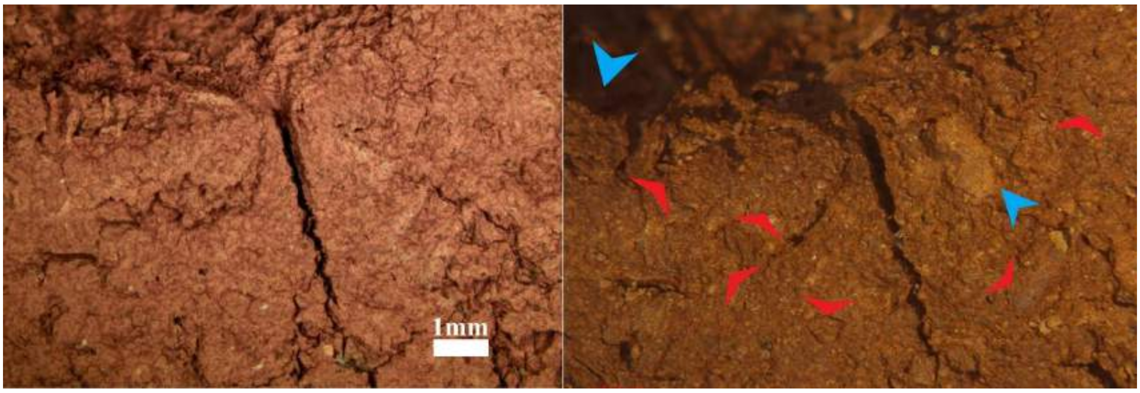

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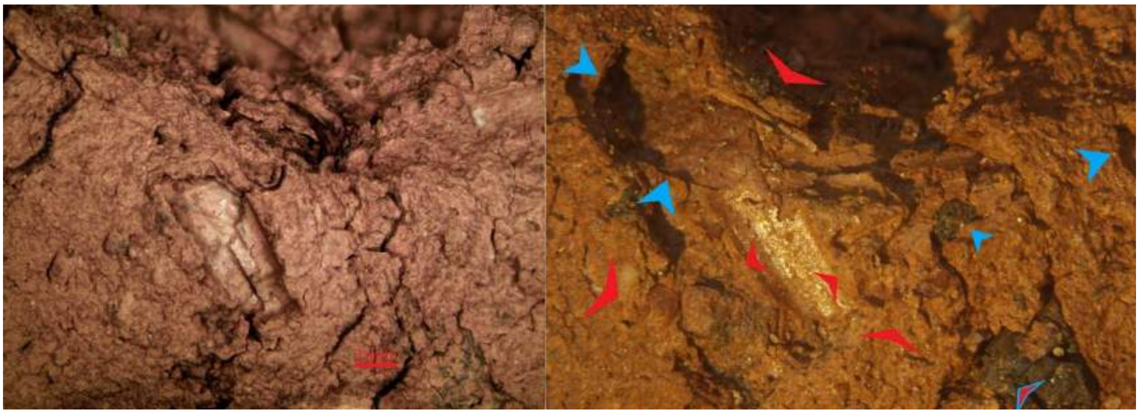
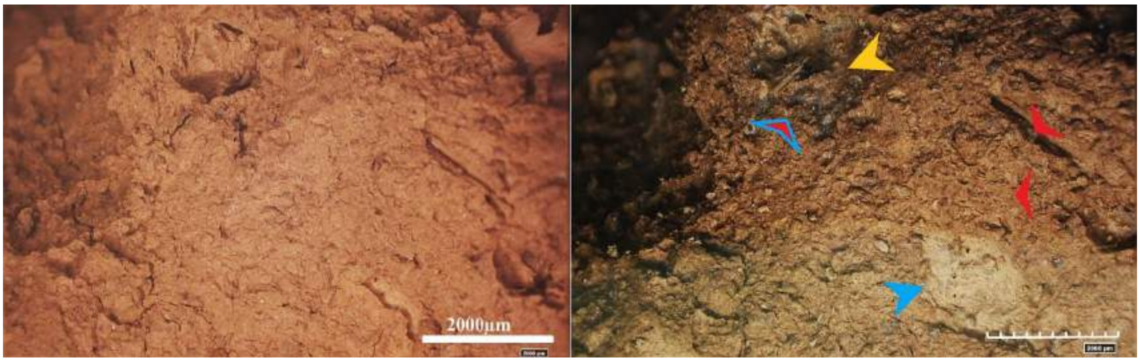


TAB 3

Tab 4

Tab 5



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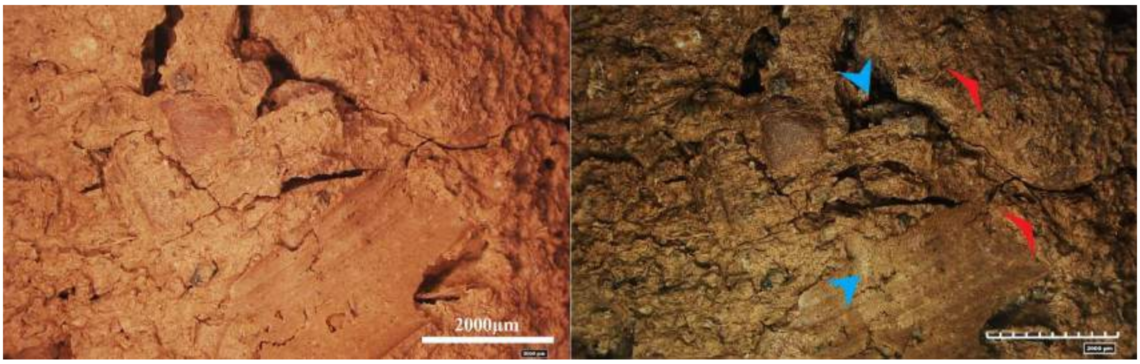

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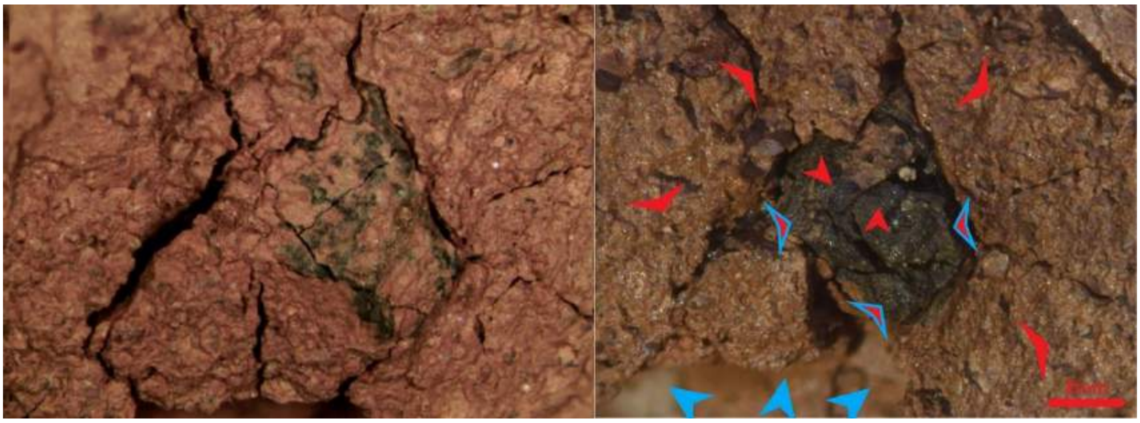

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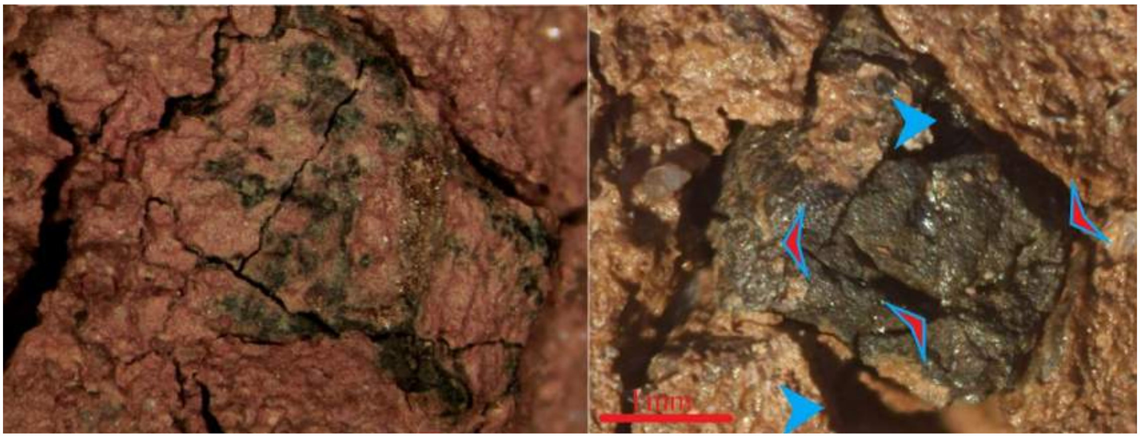

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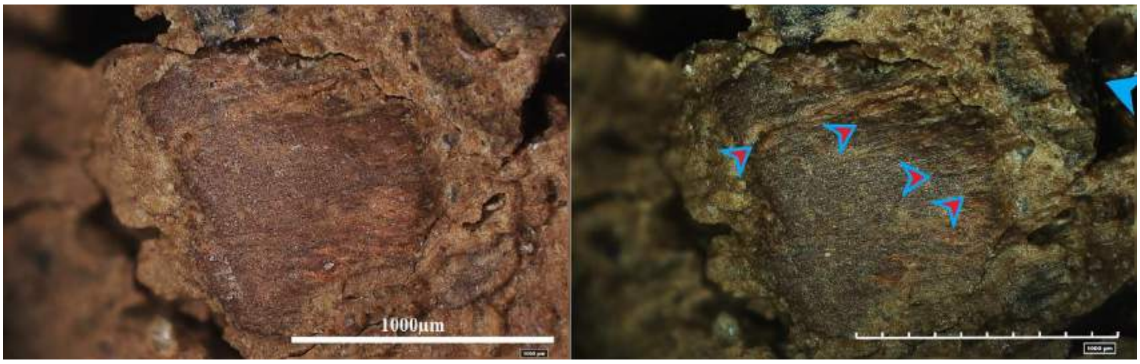


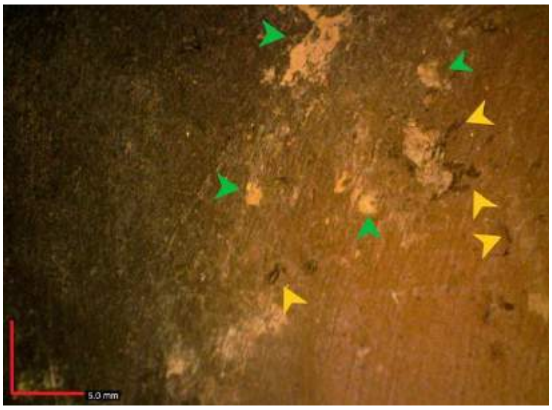
TAB 10

Ethnographic Reference Collecction: Baking

Ekmek Saci

Tab 1

Tab 2



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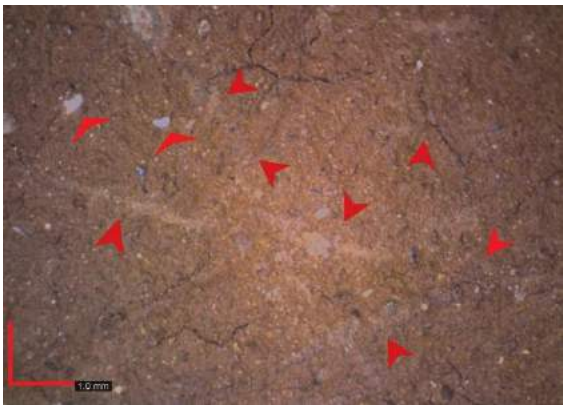

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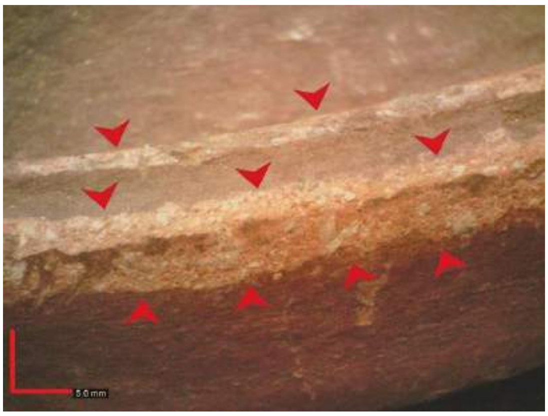

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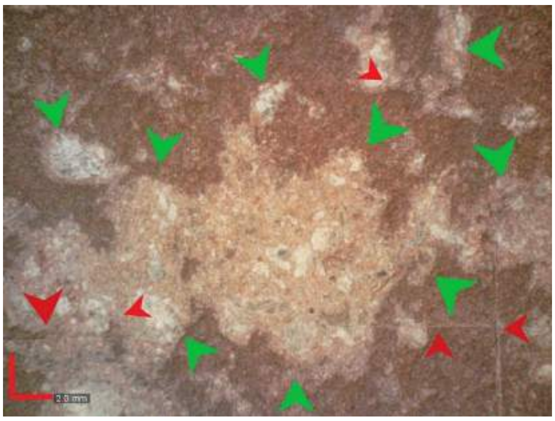

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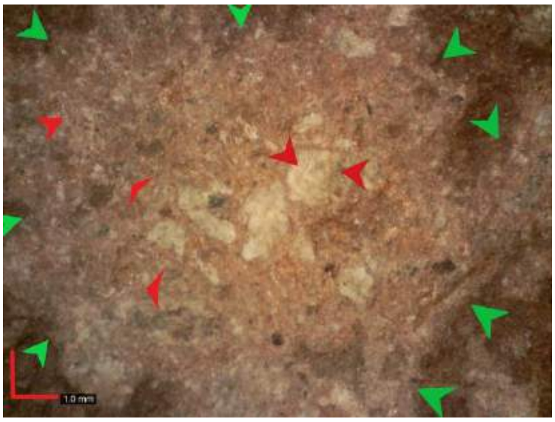


TAB 7

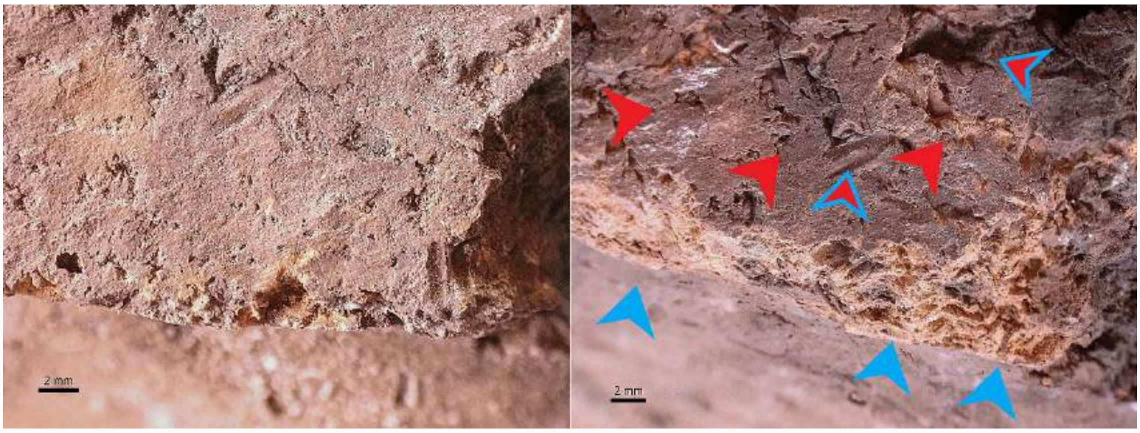
TAB 8

Experimental Reference Collection: Baking Overall Tests

Mozia Experimental Replica

Before Use　　　　　　After Use

Tab 2



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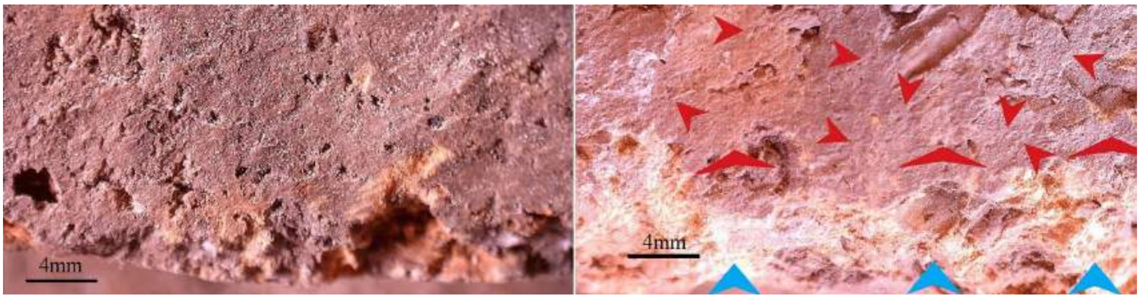


Tab 4

AFTER USE

TAB 5

TAB 6

TAB 7

TAB 8

TAB 9

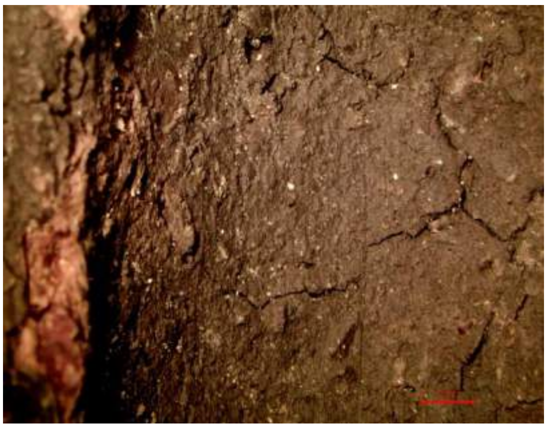
LEVANZO EXPERIMENTAL REPLICA

BEFORE USE AFTER USE

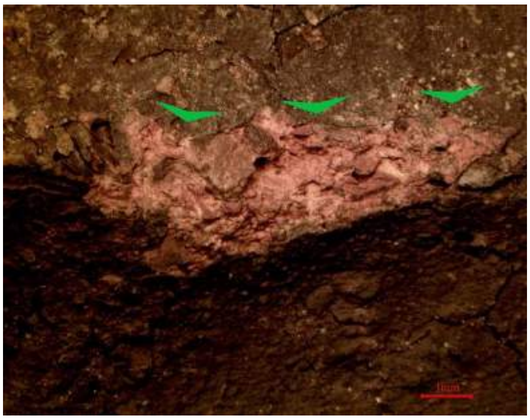
TAB 10

TAB 11

AFTER USE



TAB 12 TAB 13



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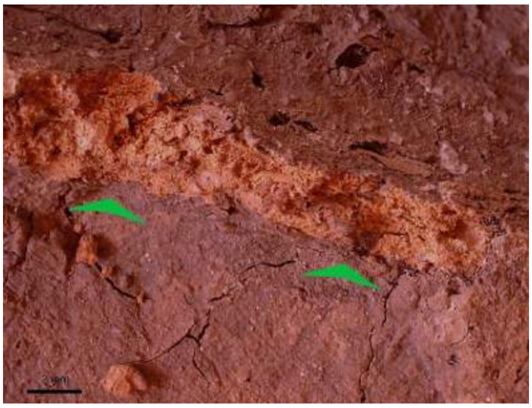

TAB 15

EXPERIMENTAL REFERENCE COLLECTION: BAKING BASIC BRED

VESUVIO EXPERIMENTAL REPLICA

BEFORE USE | AFTER USE

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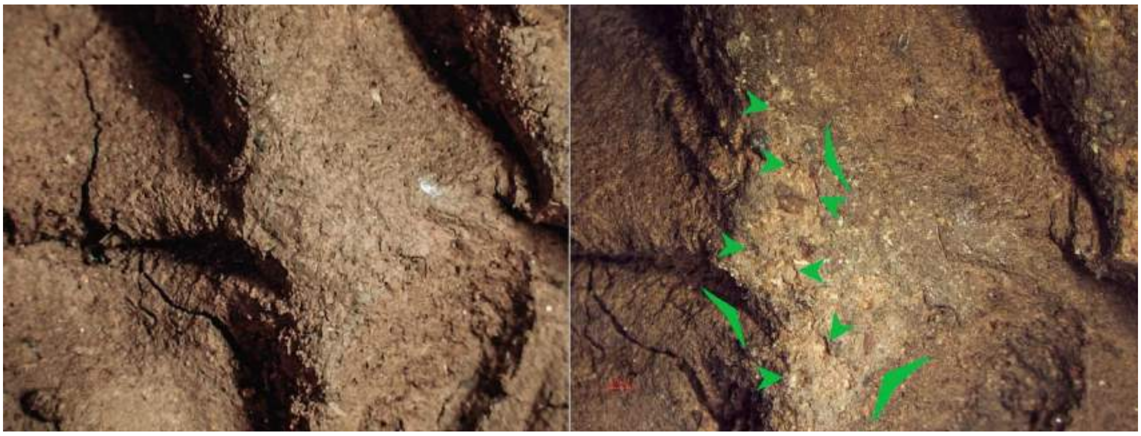

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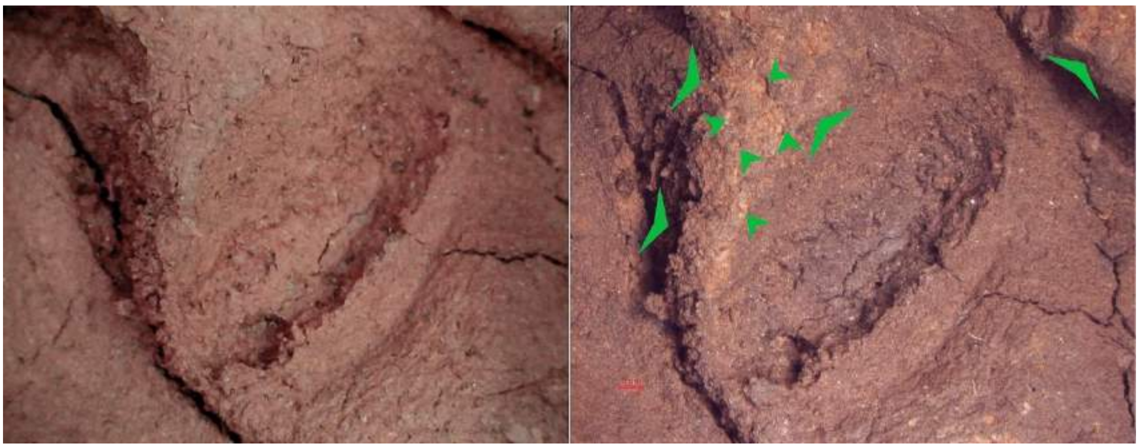
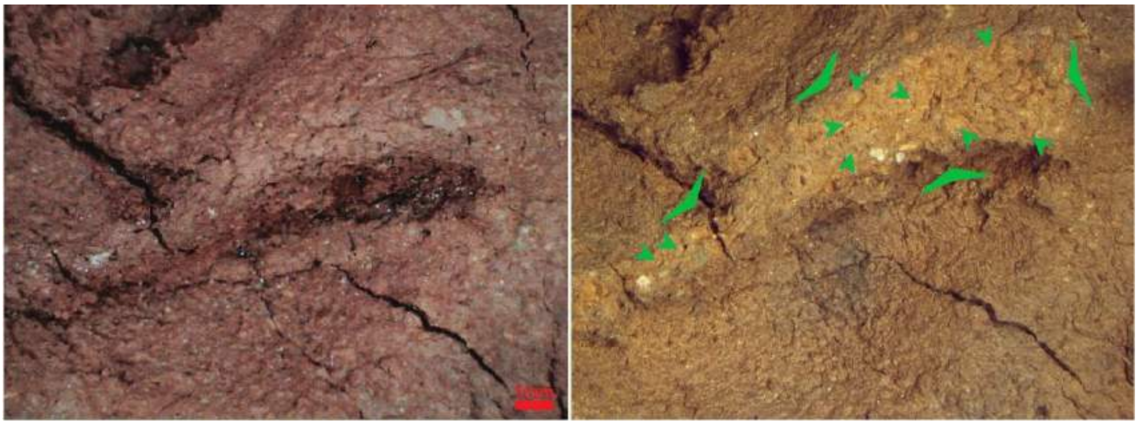
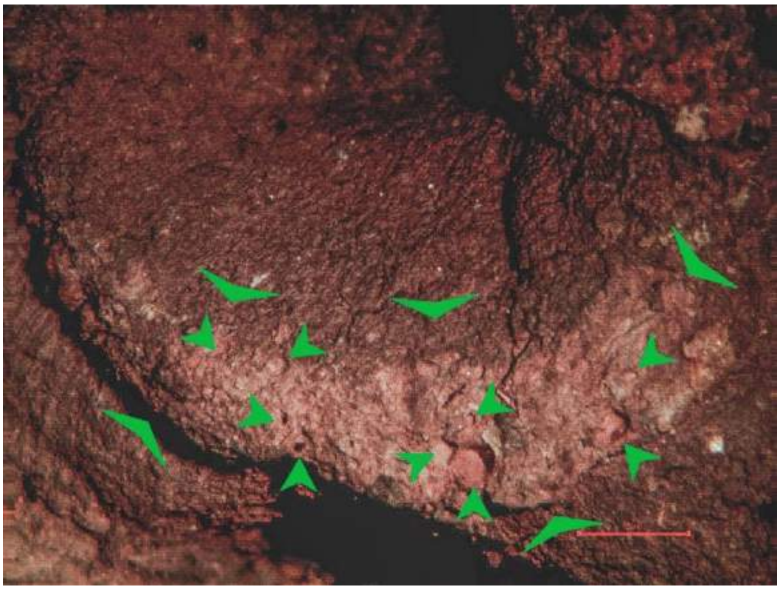


TAB 3



TAB4

TAB 5

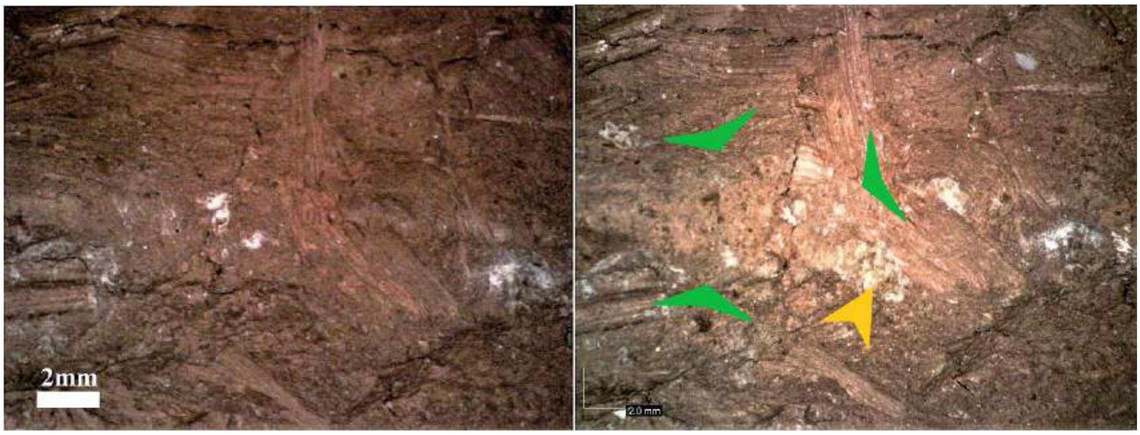


TAB 6

MERCURY EXPERIMENTAL REPLICA

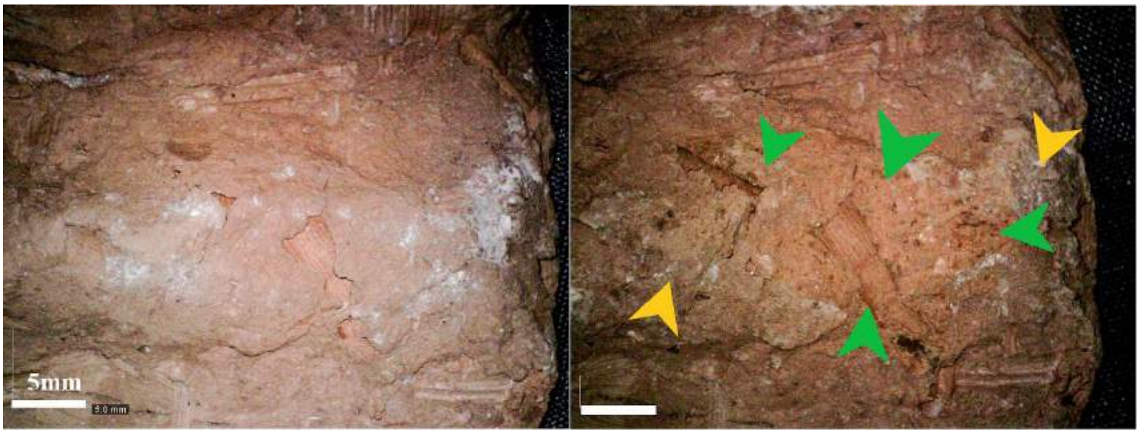
BEFORE USE | AFTER USE

TAB 7



TAB 8

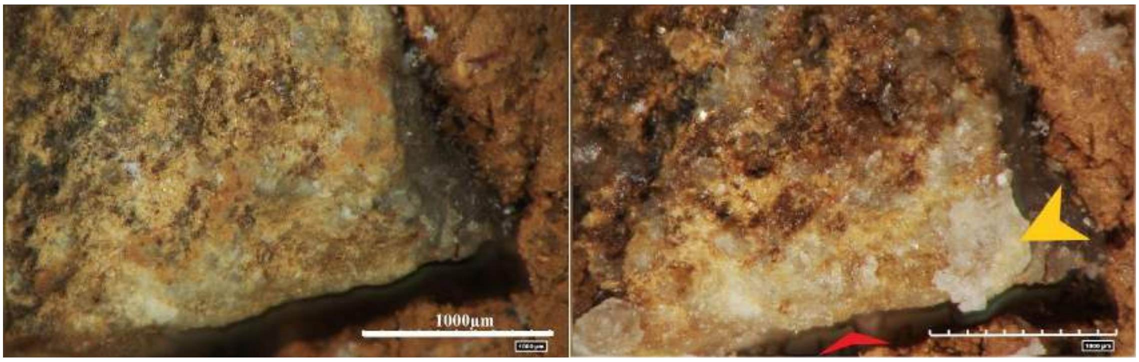
TAB 9



TAB 10

TAB 11

TAB 12



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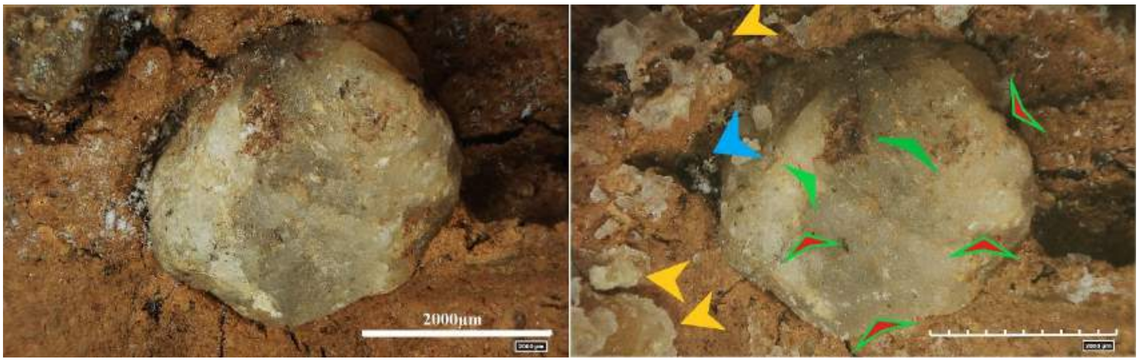


TAB 15

TAB 16

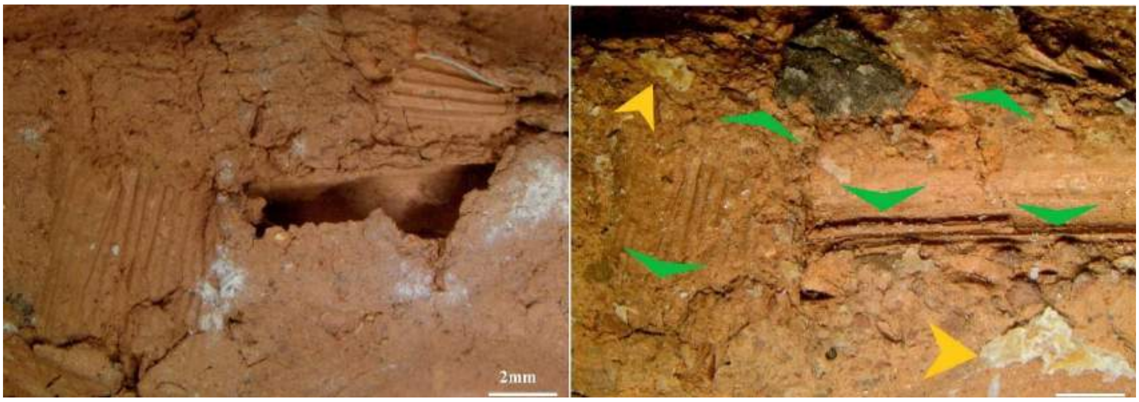
MARS EXPERIMENTAL REPLICA

TAB 17

TAB 18

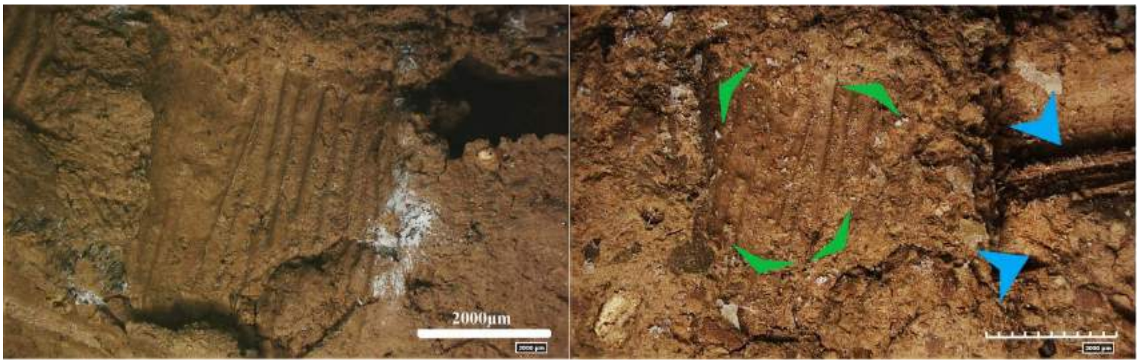
TAB 19

TAB 20



TAB 21

TAB 22



TAB 23

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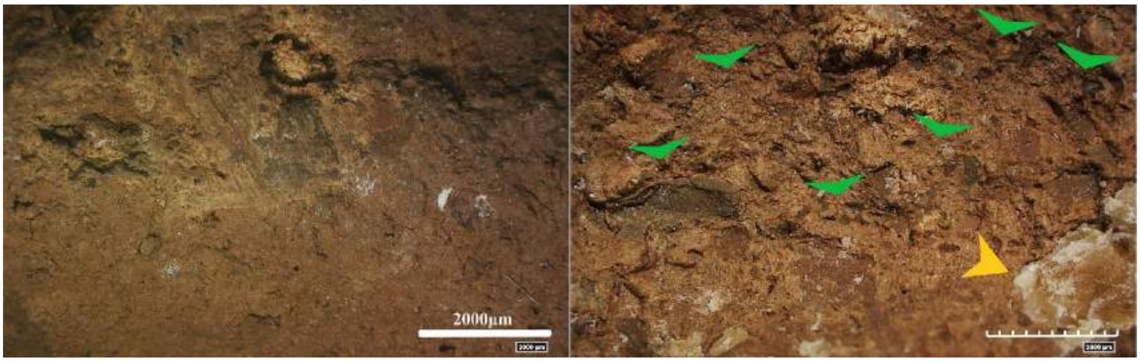
TAB 25



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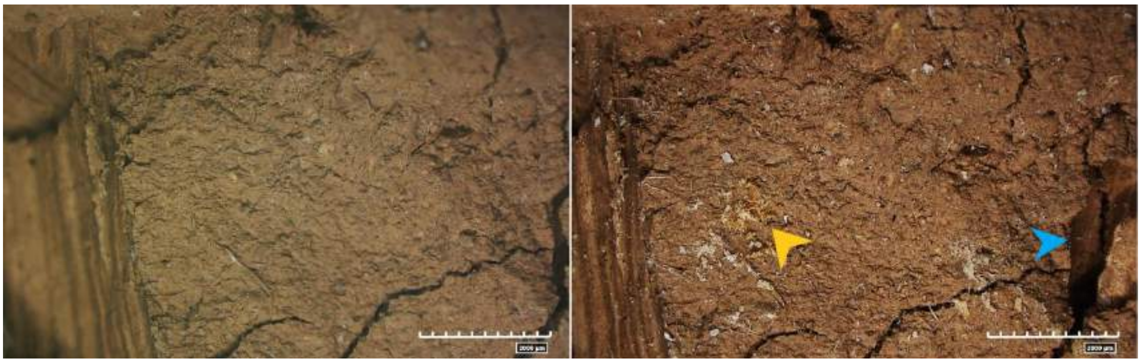

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TAB 29

TAB 30

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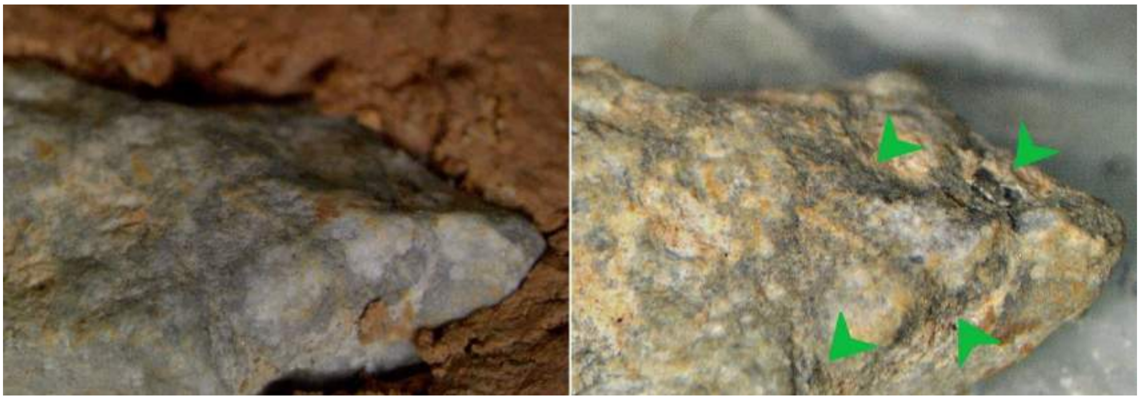

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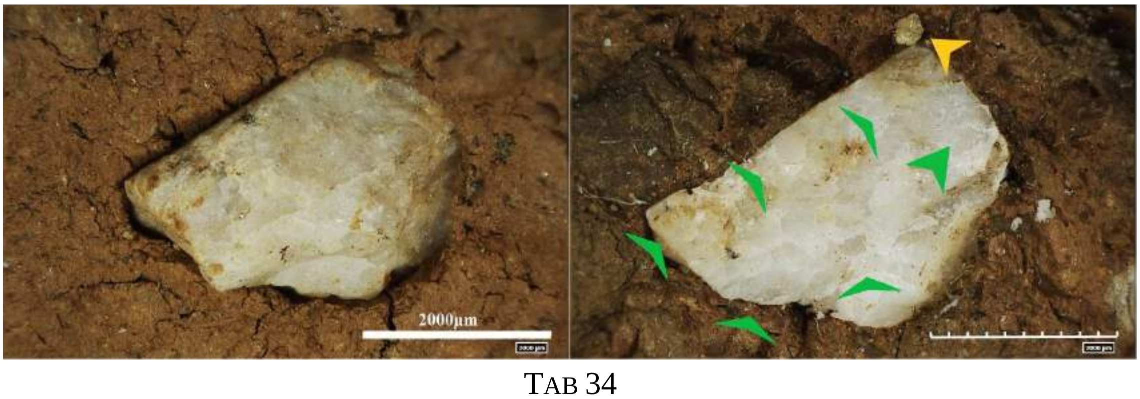
TAB 33



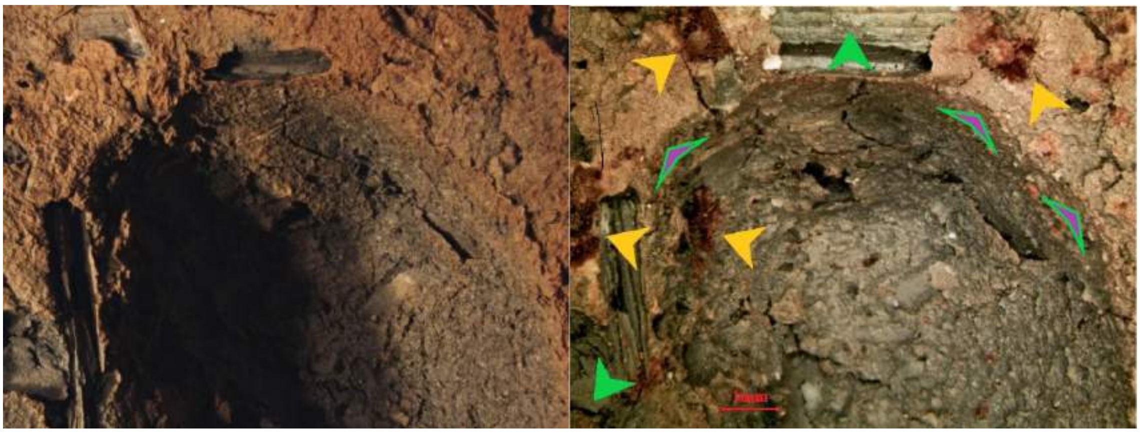
TAB 34

Experimental Reference Collection: Baking Oilseed Bread

Tamu Experimental Replica

Before Use — After Use

Tab 1



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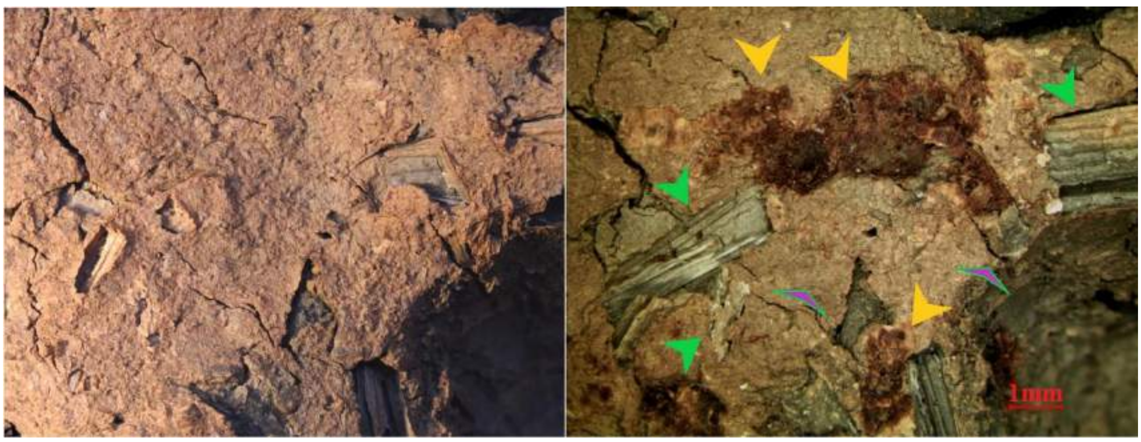

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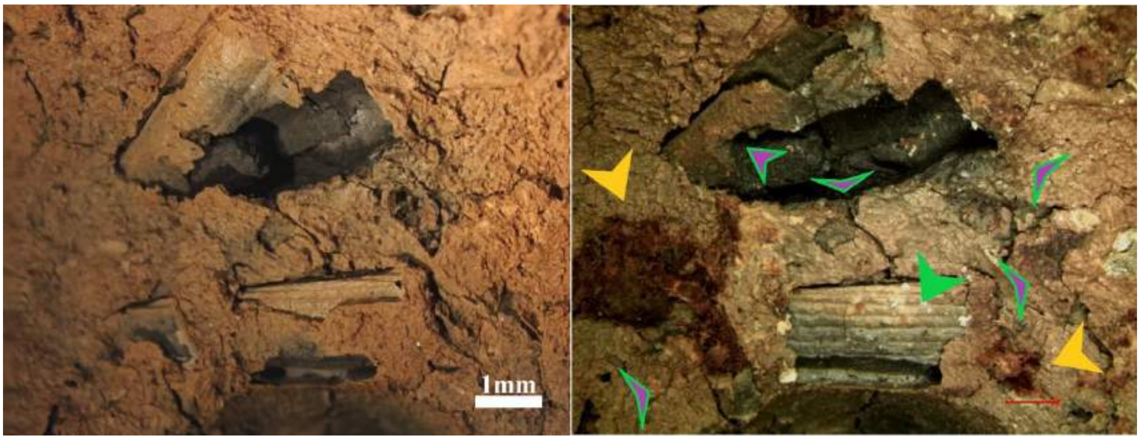

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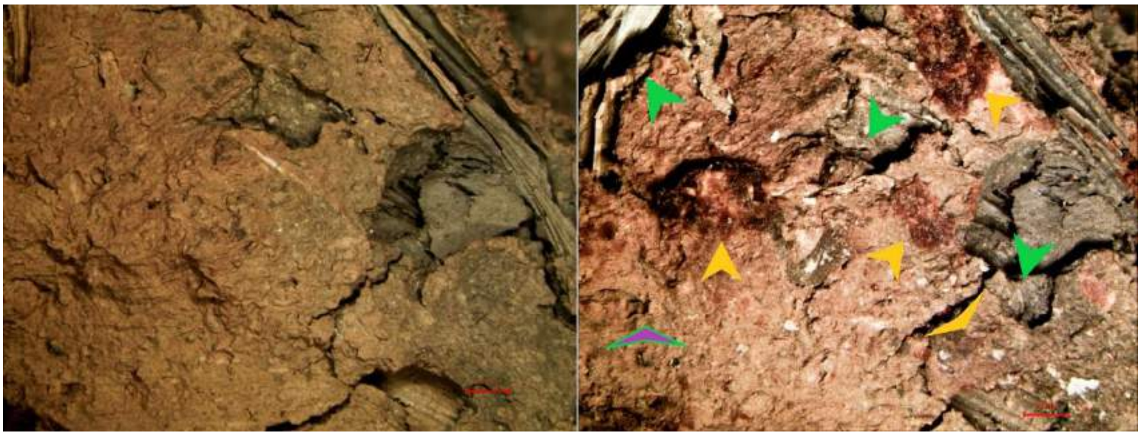

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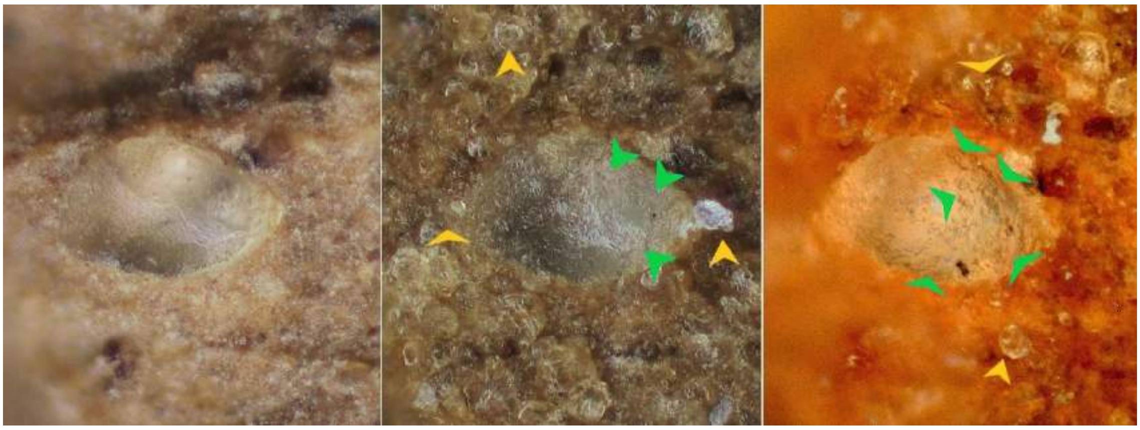
TAB 9

TAB 10



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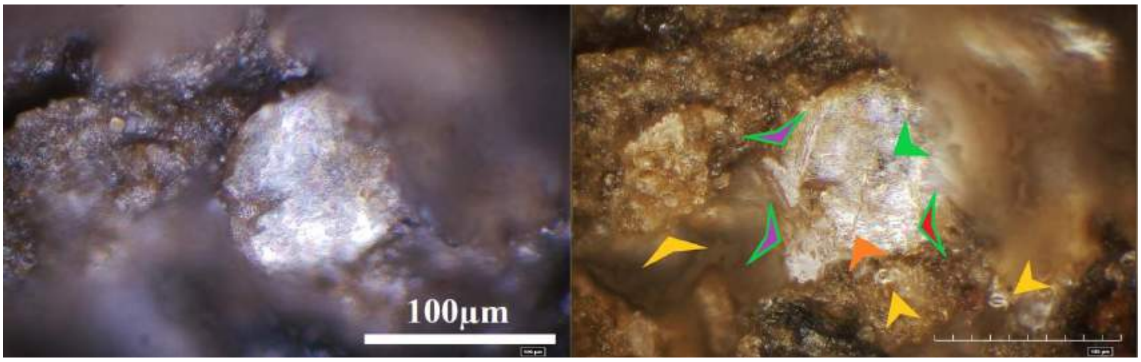

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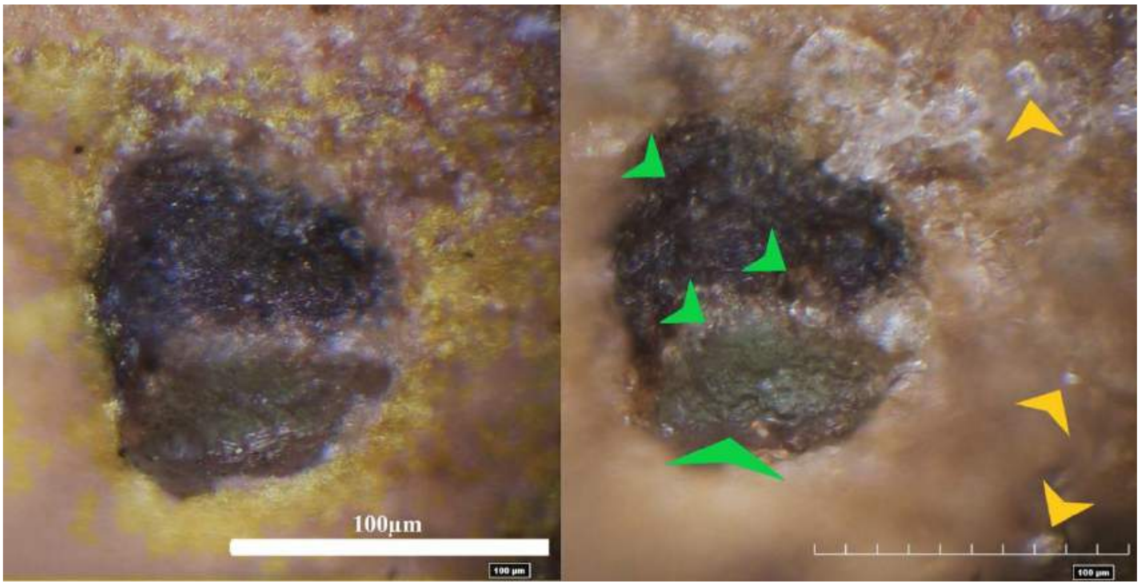
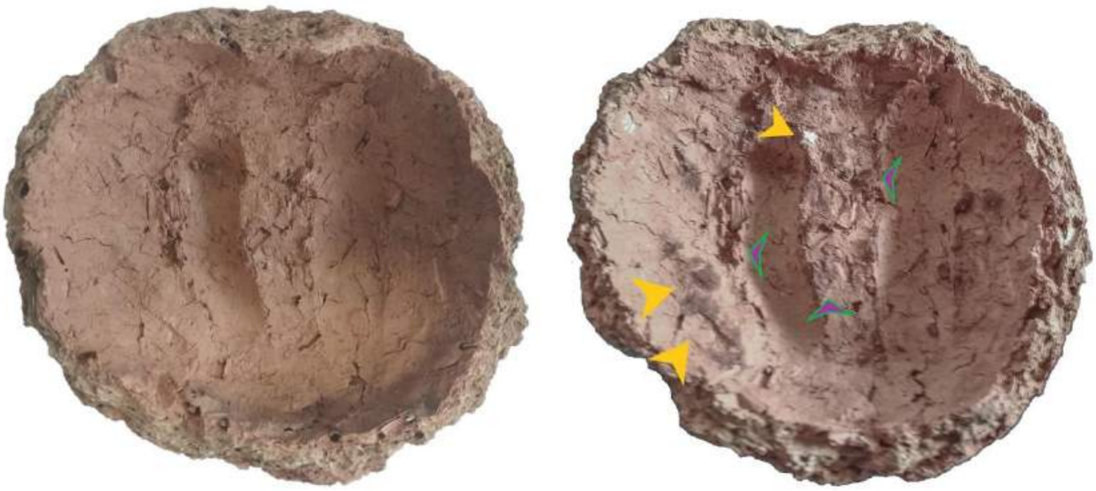


TAB 13

EXPERIMENTAL REFERENCE COLLECTION: BAKING BREAD WITH FAT

MAUNA LOA EXPERIMENTAL REPLICA

BEFORE USE AFTER USE



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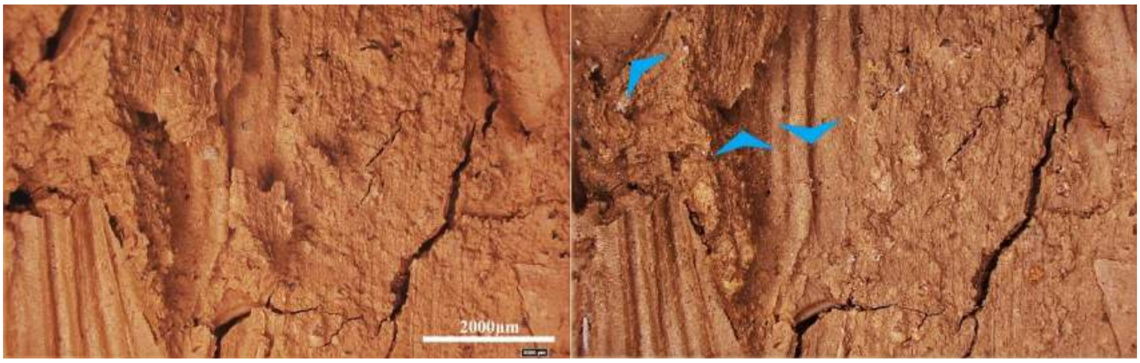

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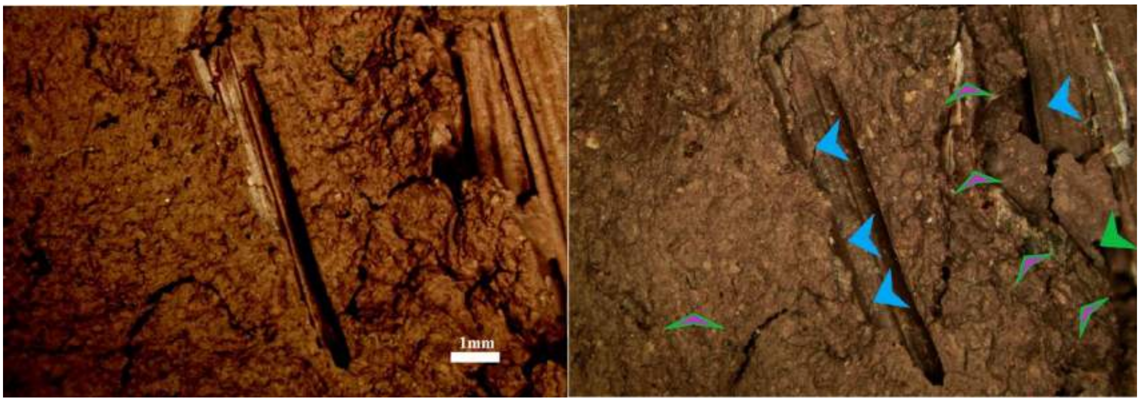

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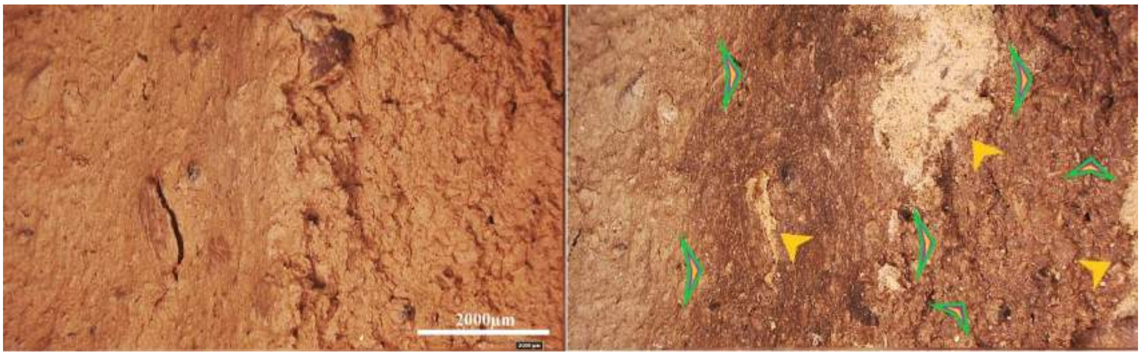

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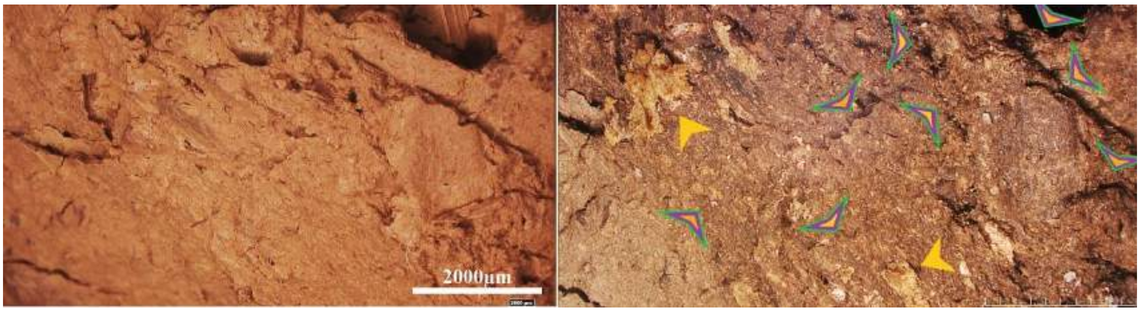

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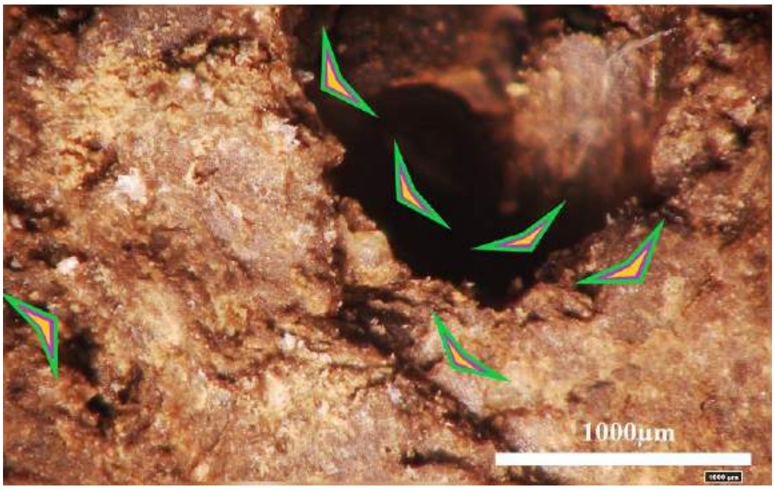

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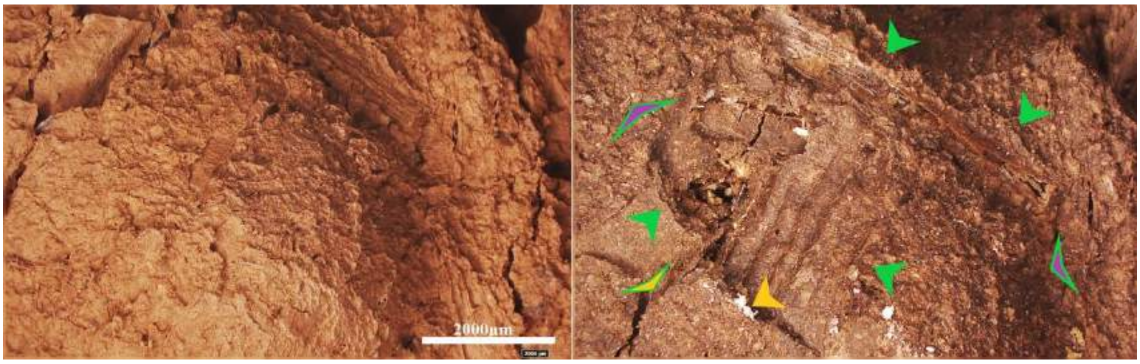

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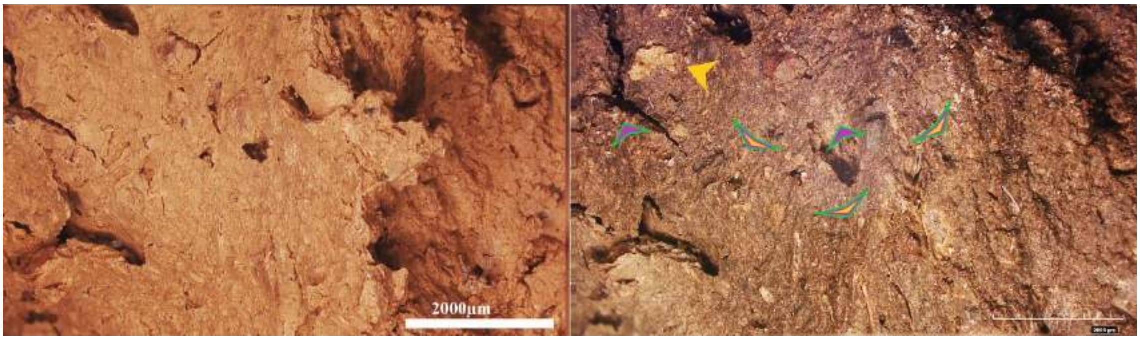

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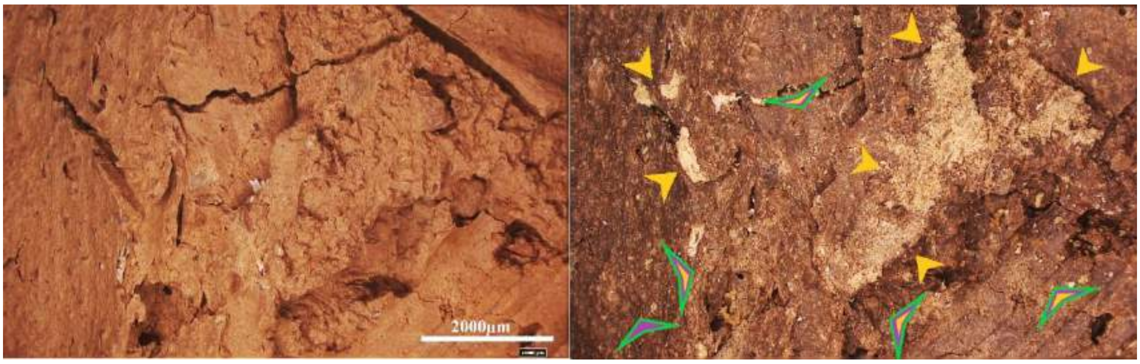

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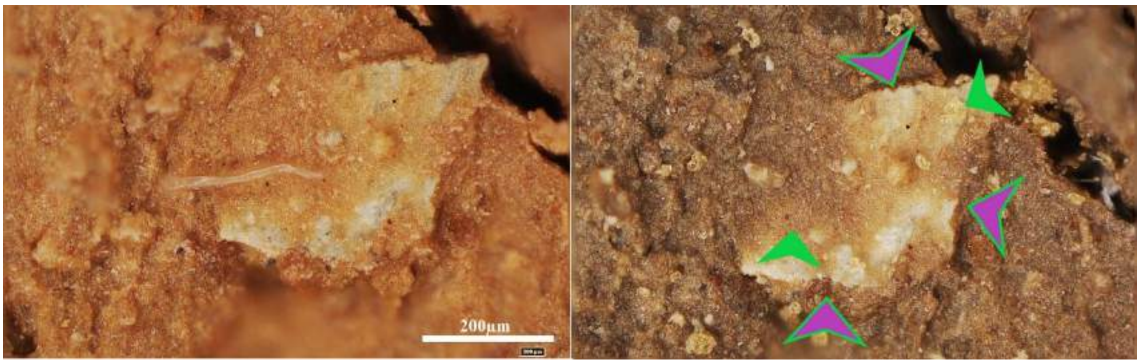


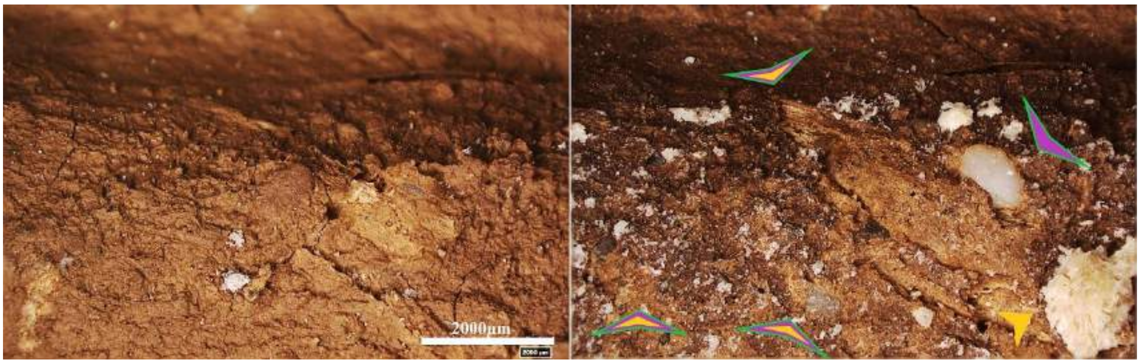
TAB 11

TAB 12

EXPERIMENTAL REFERENCE COLLECTION: BAKING BREAD WITH OIL

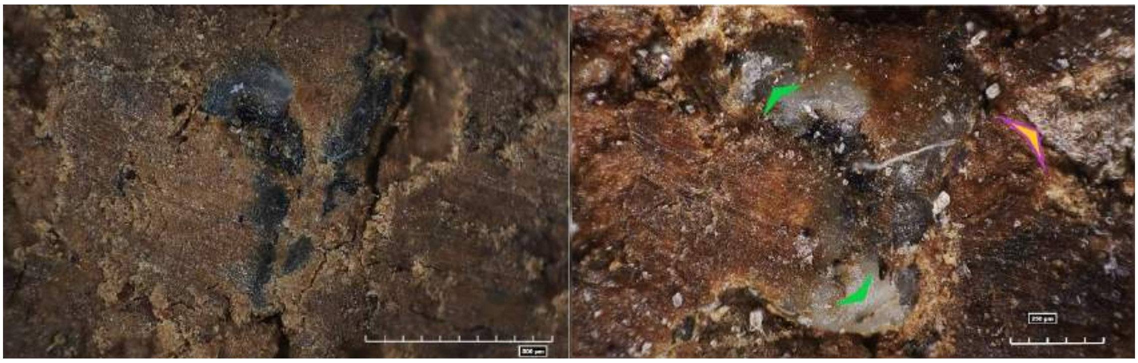
TIMETO EXPERIMENTAL REPLICA

TAB 1



TAB 2

TAB3



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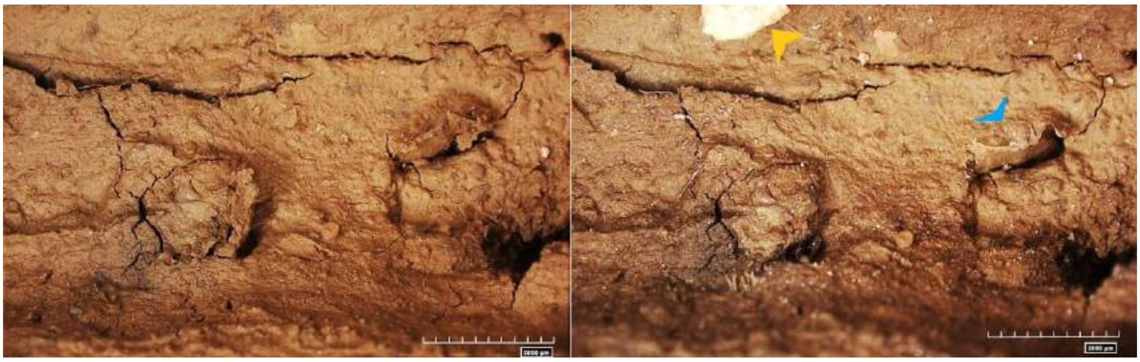

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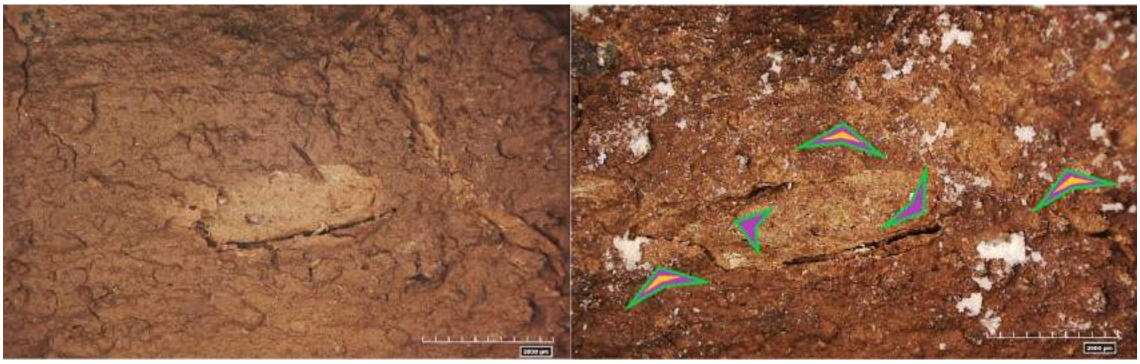

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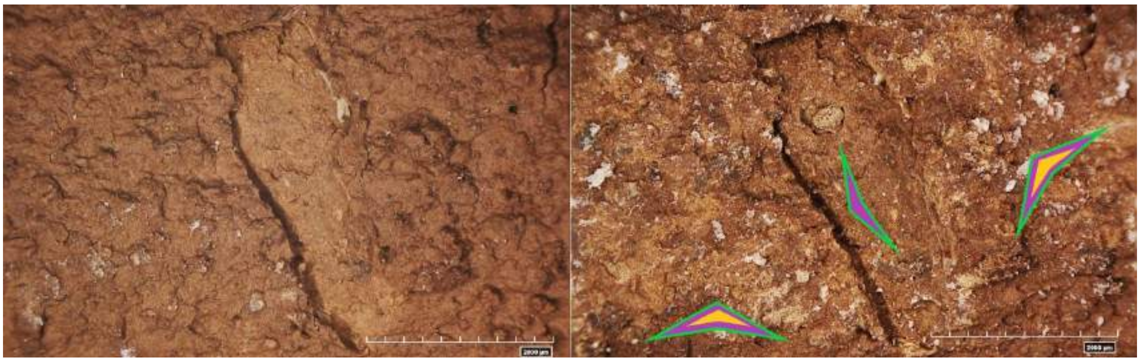

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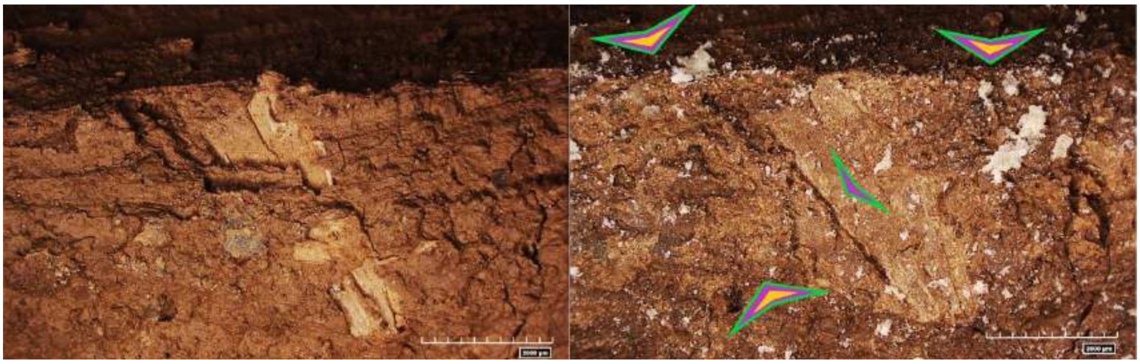

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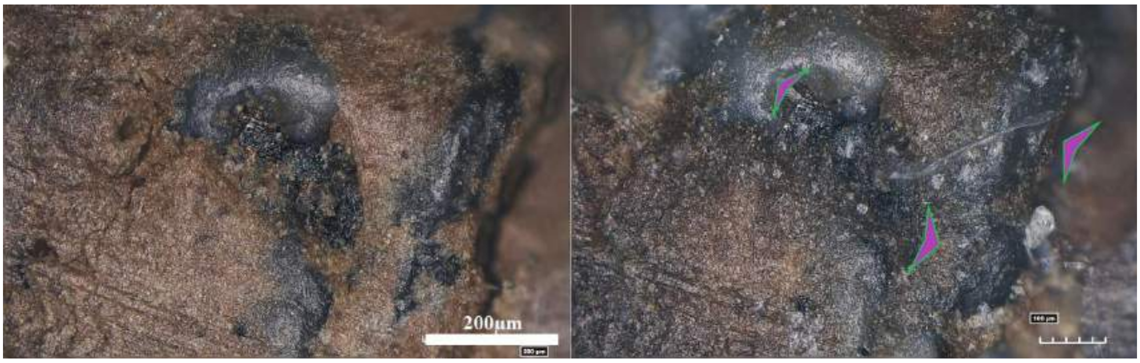

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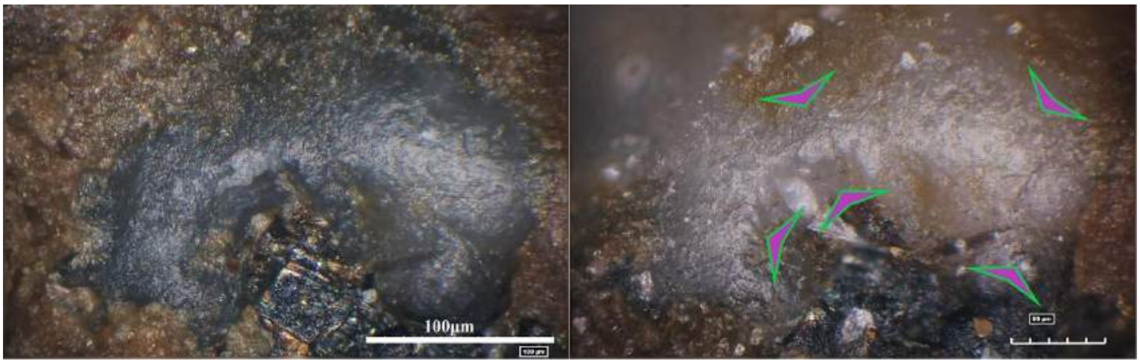

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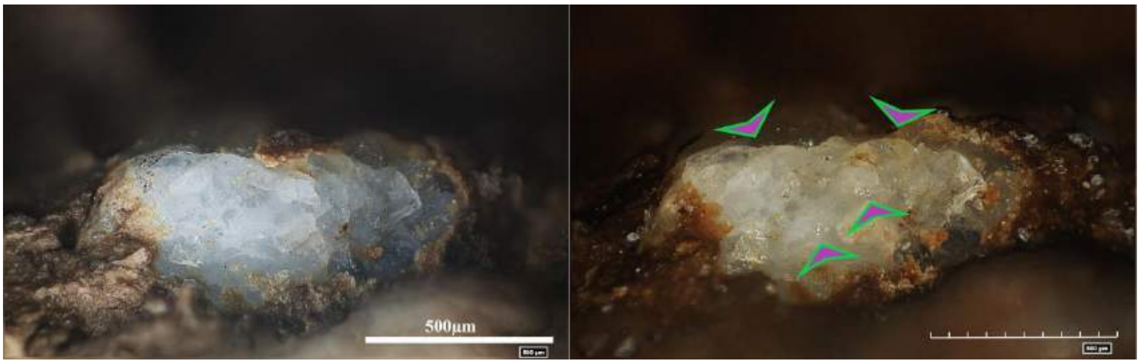
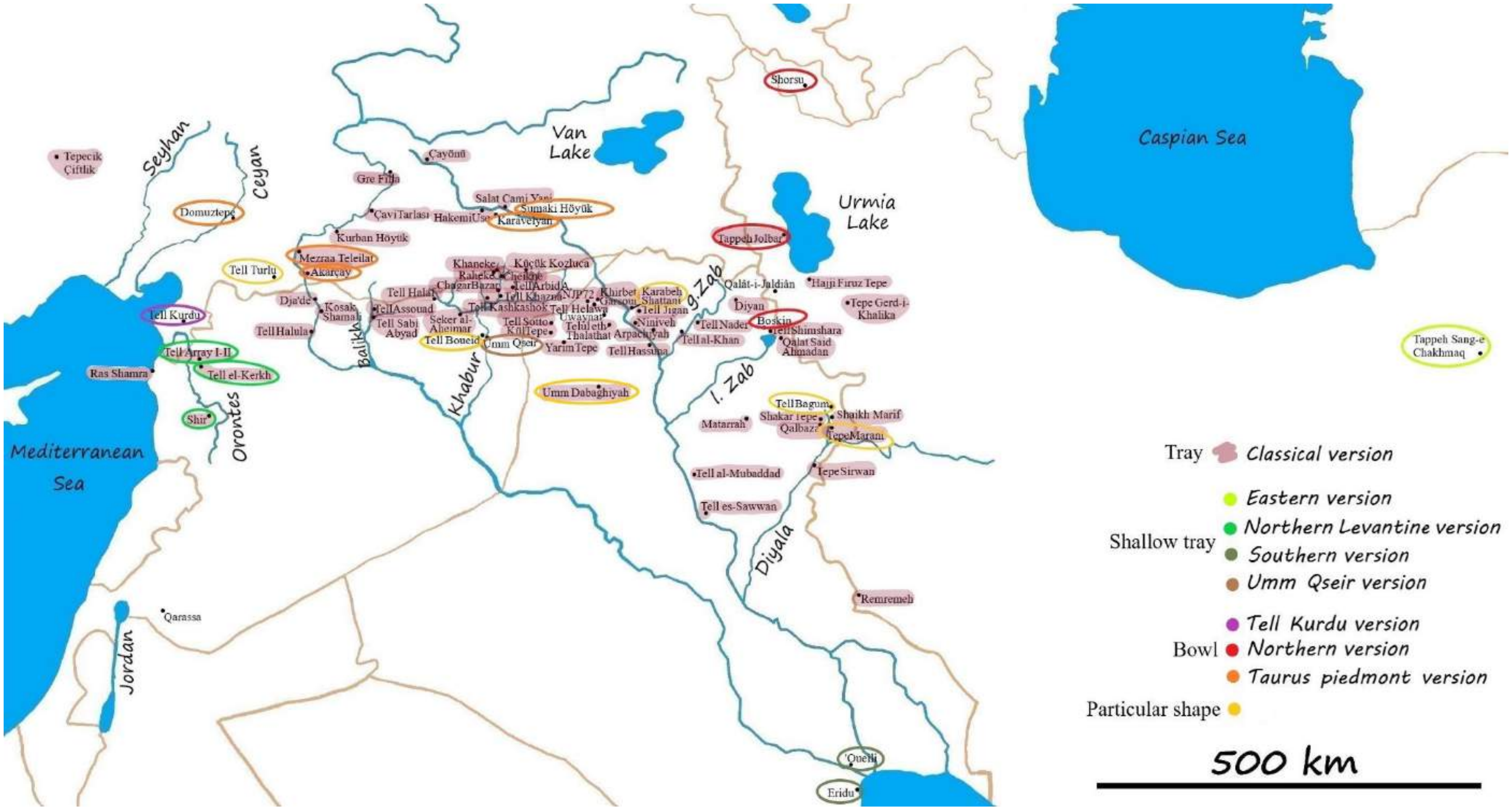
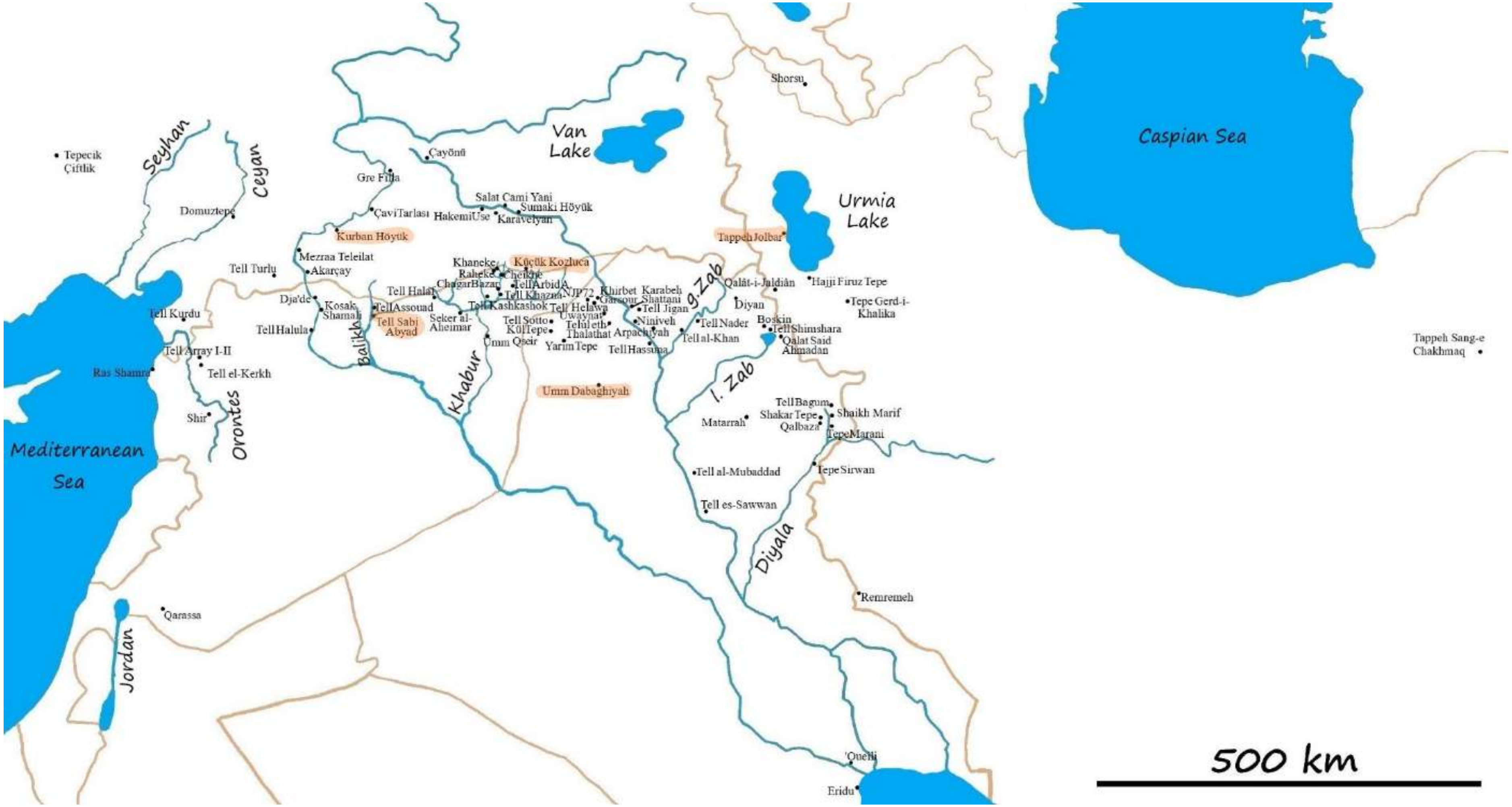


TAB 11

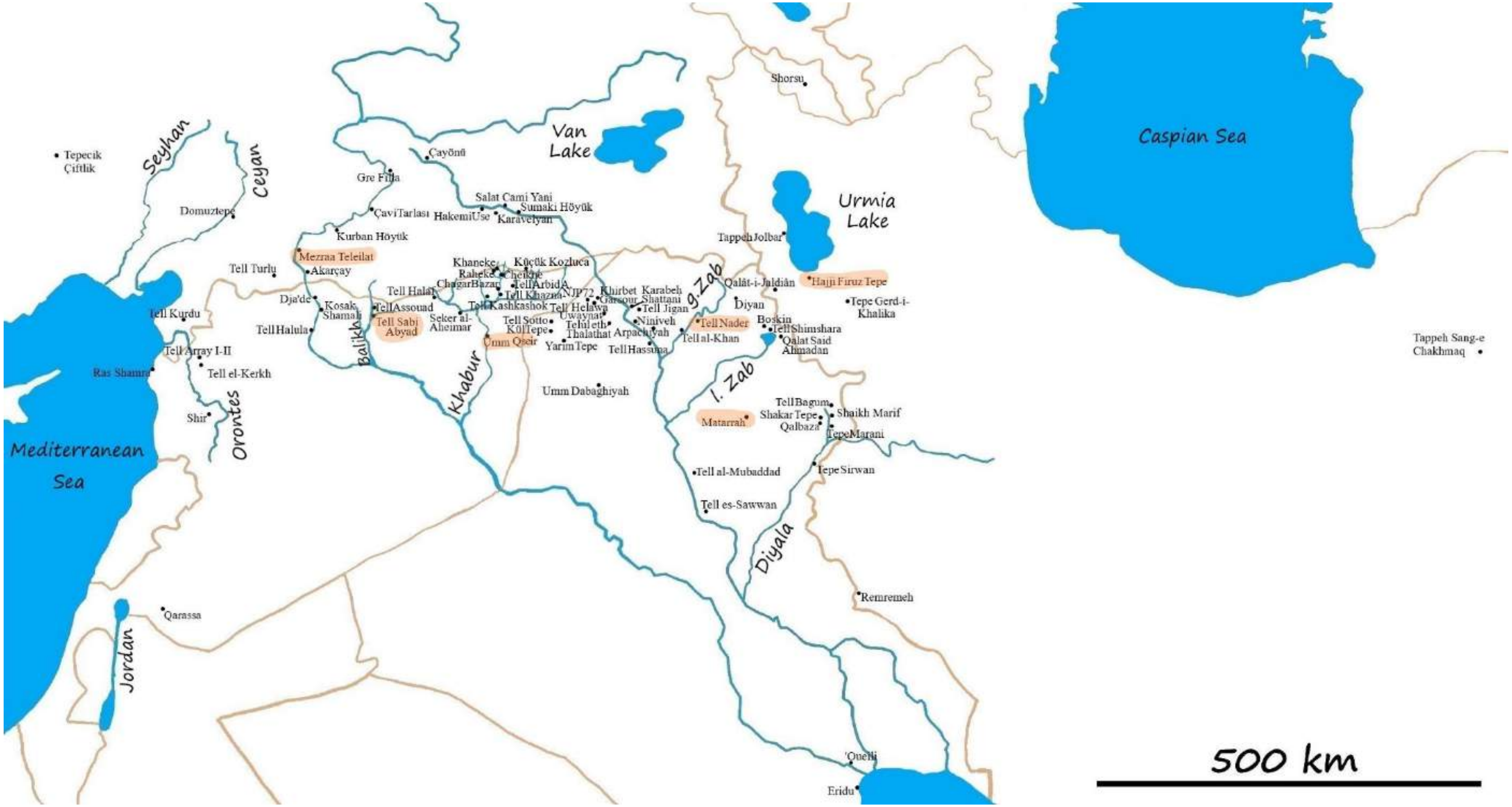
Maps



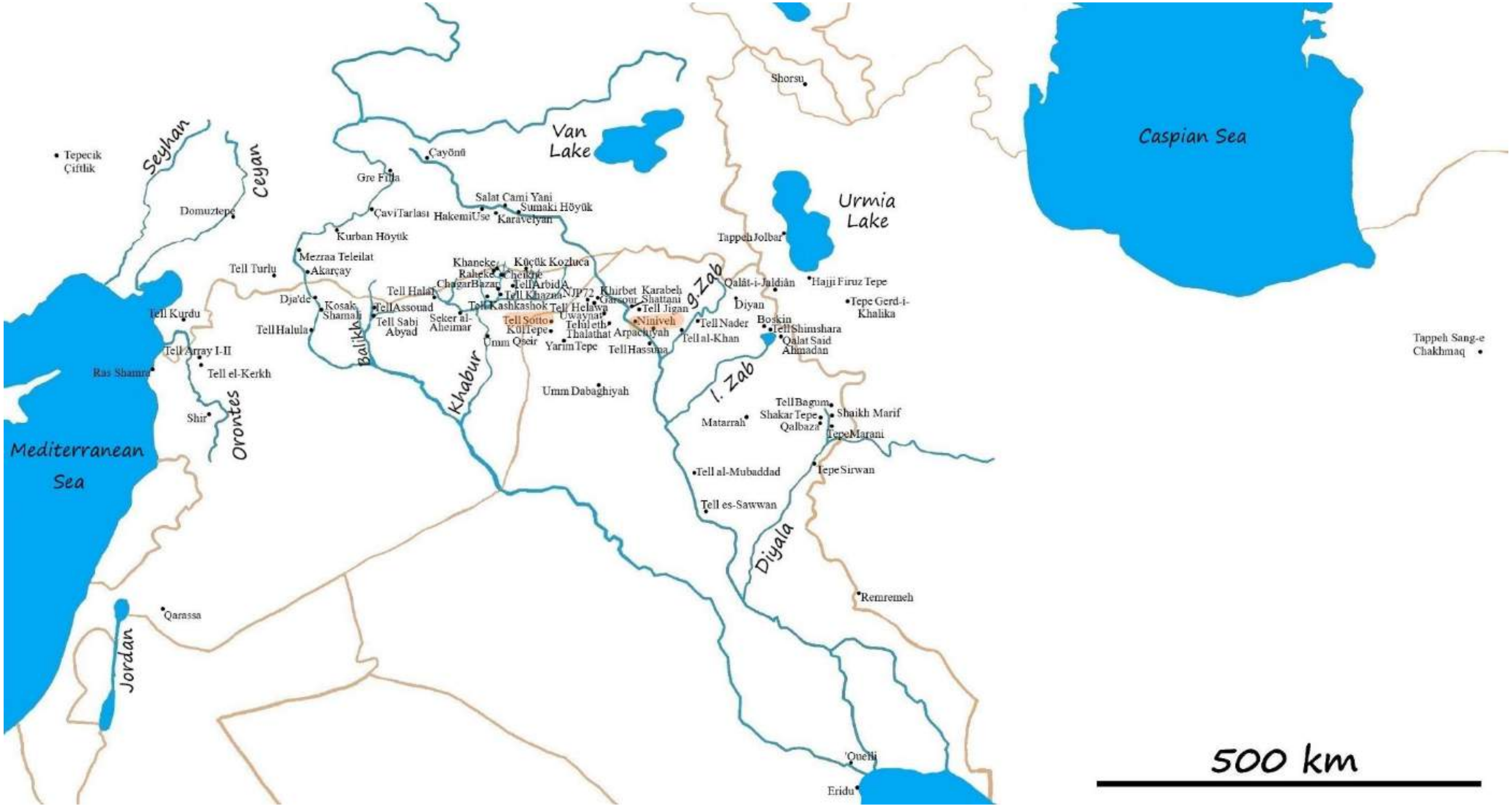
Map. 3 Distribution of the HT versions



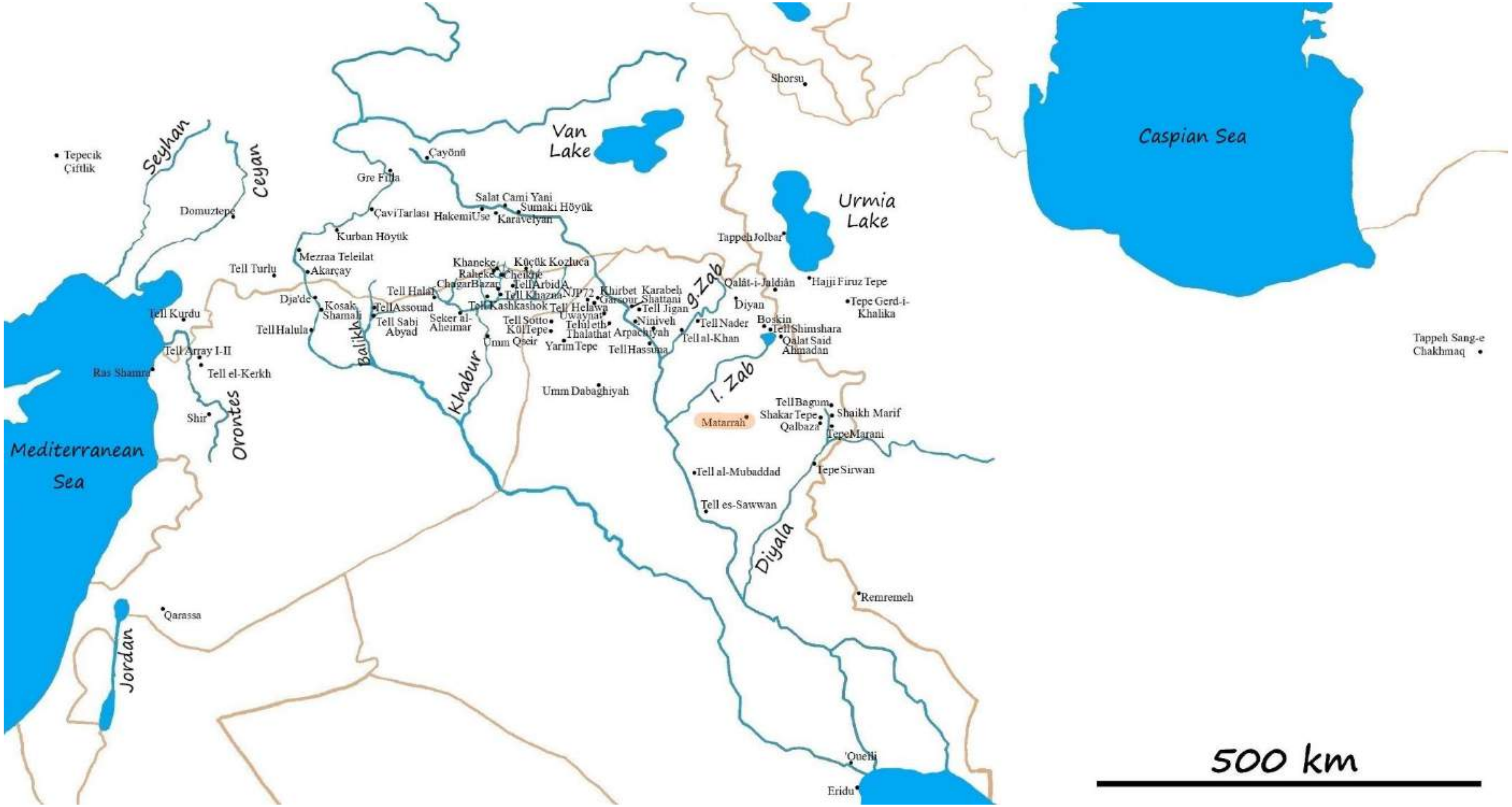
Map. 4 Score pattern distribution: plain base



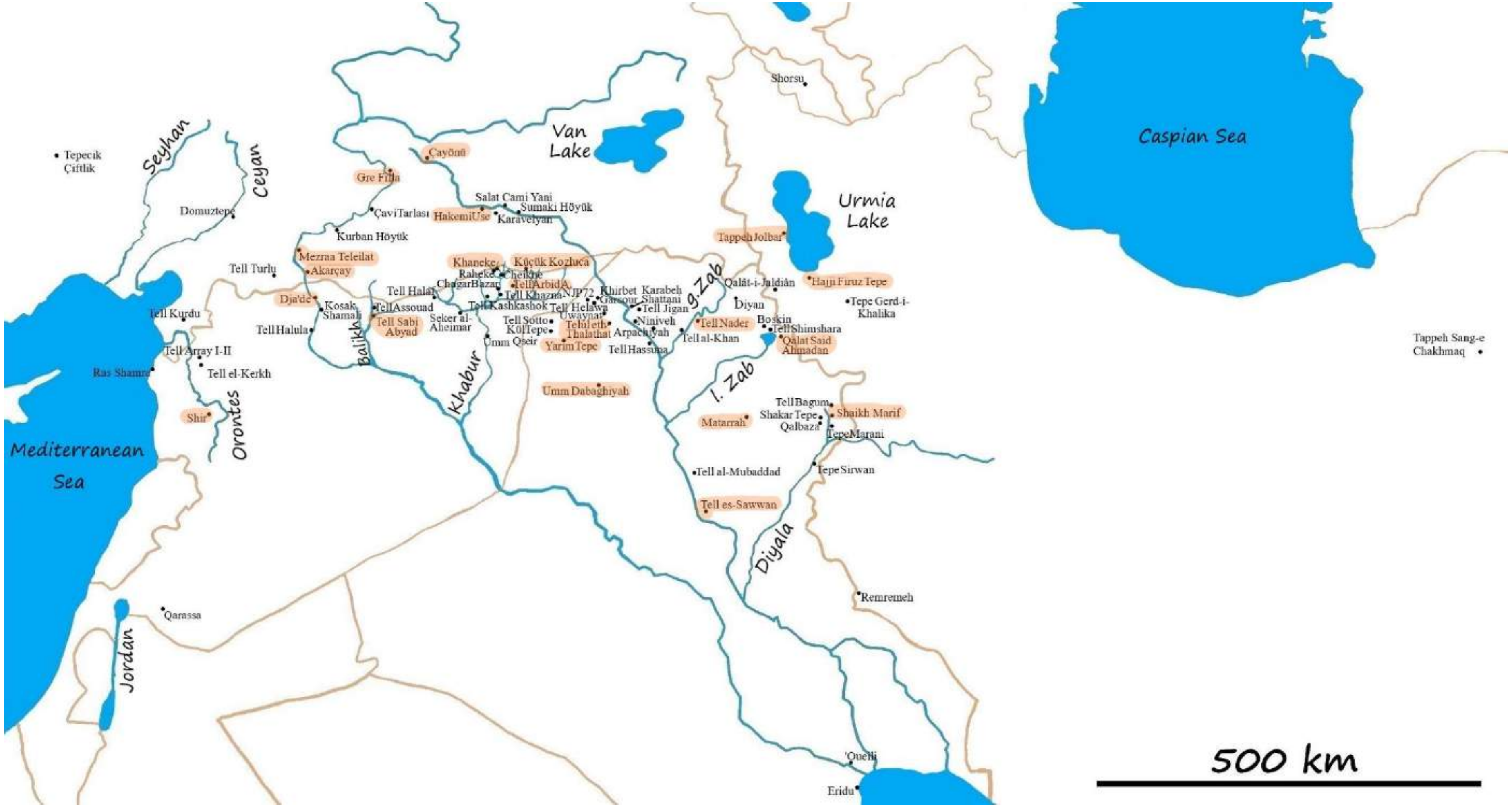
Map. 5 Score pattern distribution: base with pinching



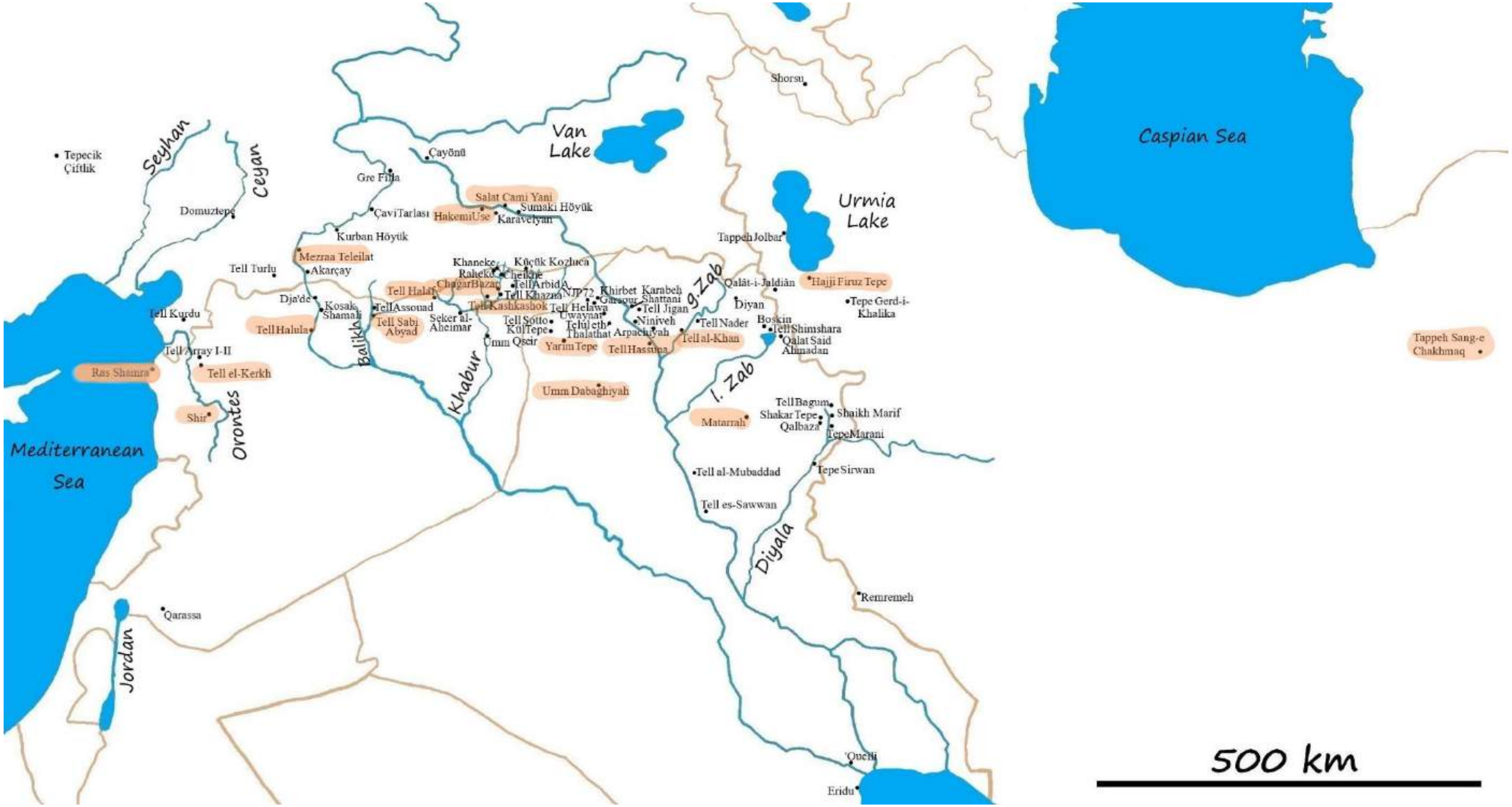
Map. 6 Score pattern distribution: base with bumps



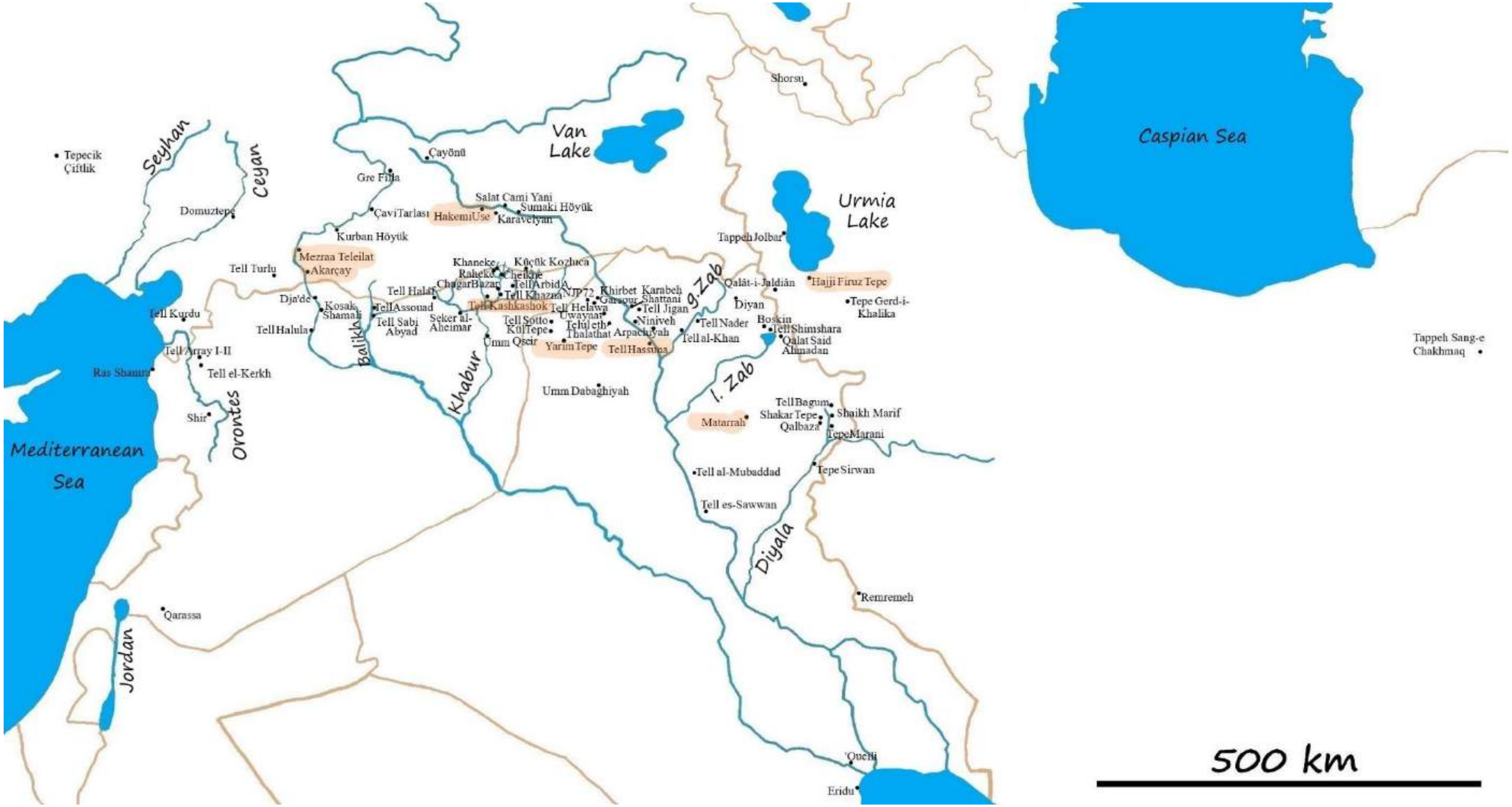
Map. 7 Score pattern distribution: base perforated



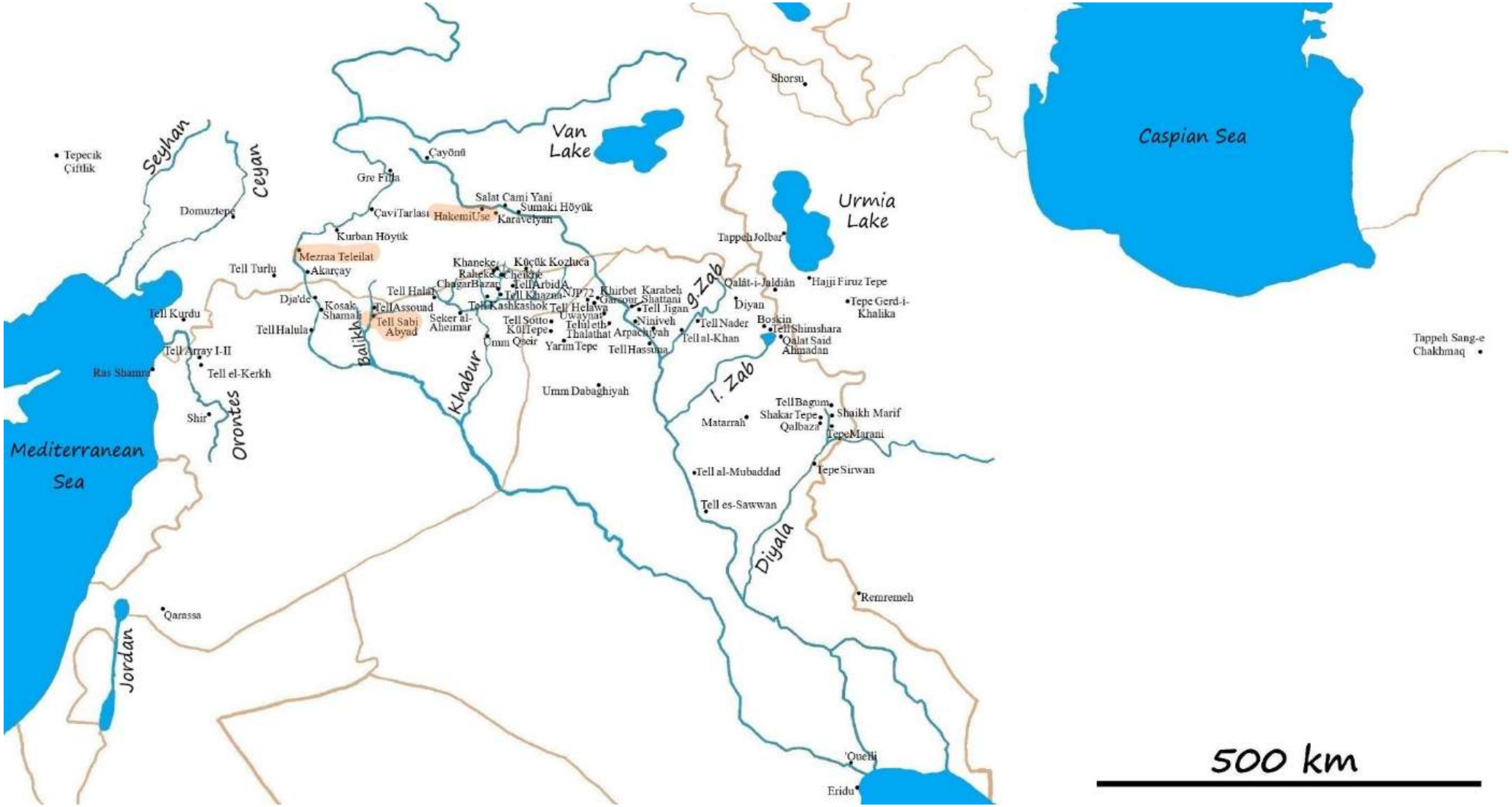
Map. 8 Score pattern distribution: base with finger impressions



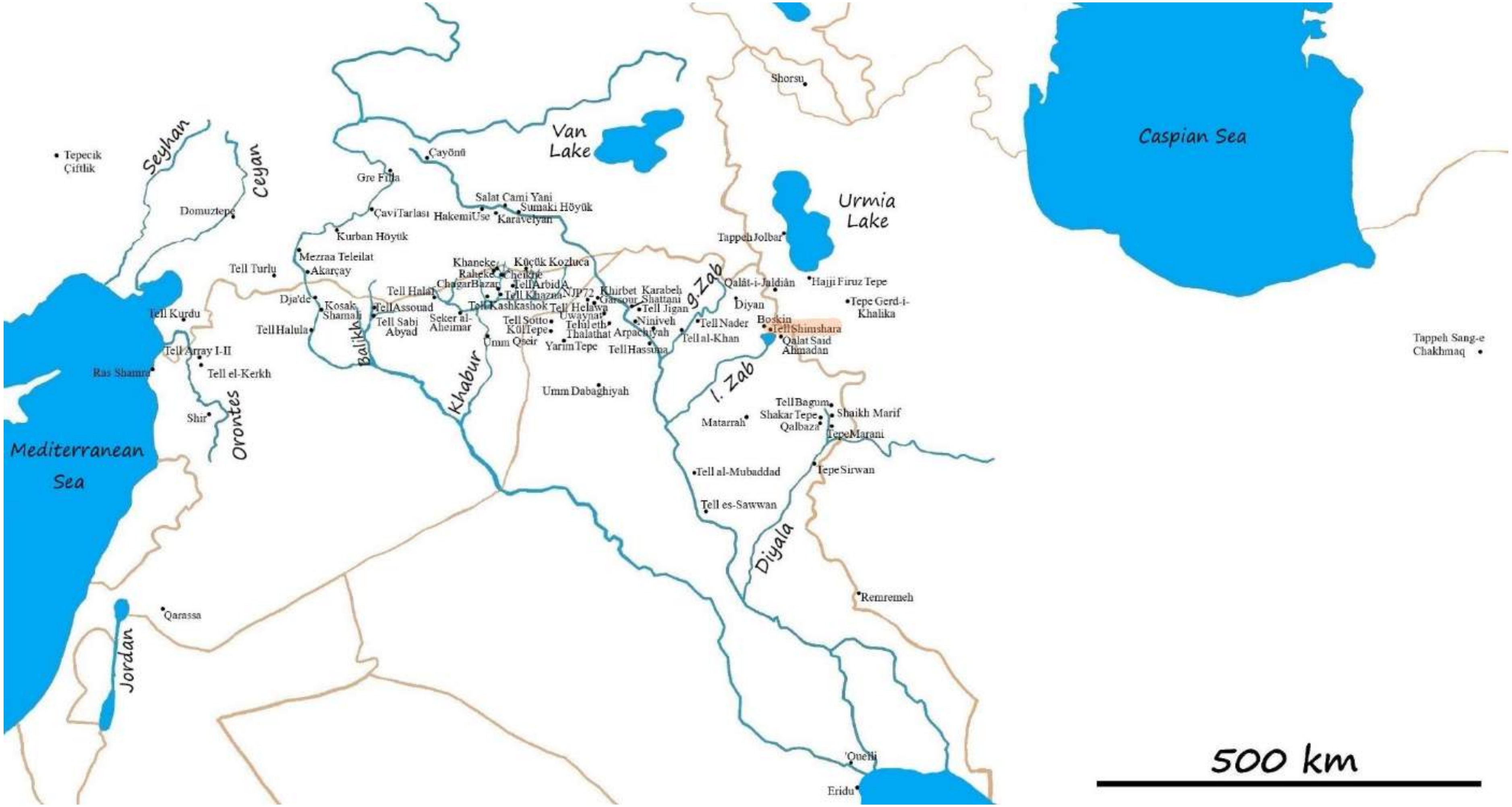
Map. 9 Score pattern distribution: base with circular impression



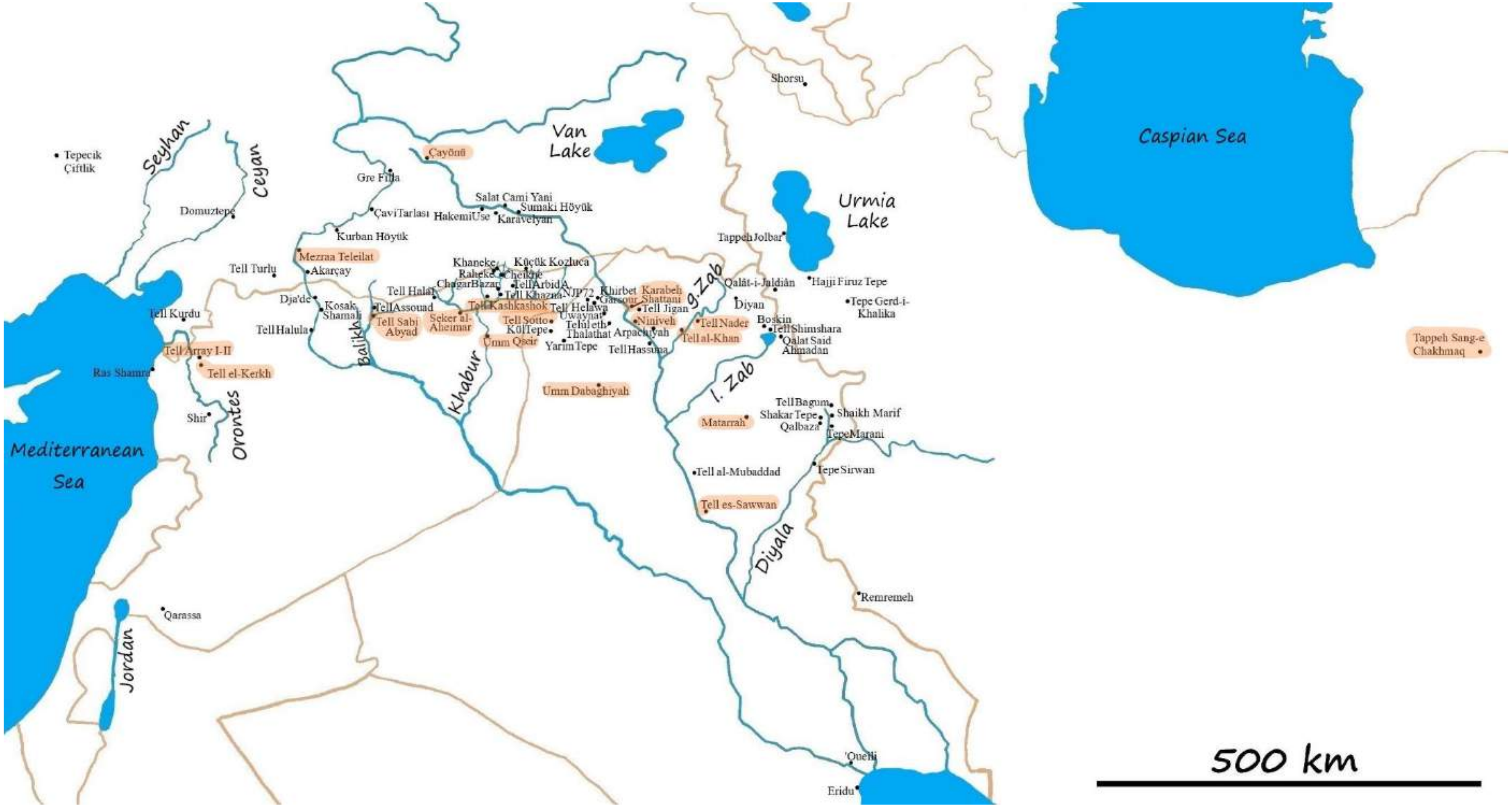
Map. 10 Score pattern distribution: base with triangular impressions



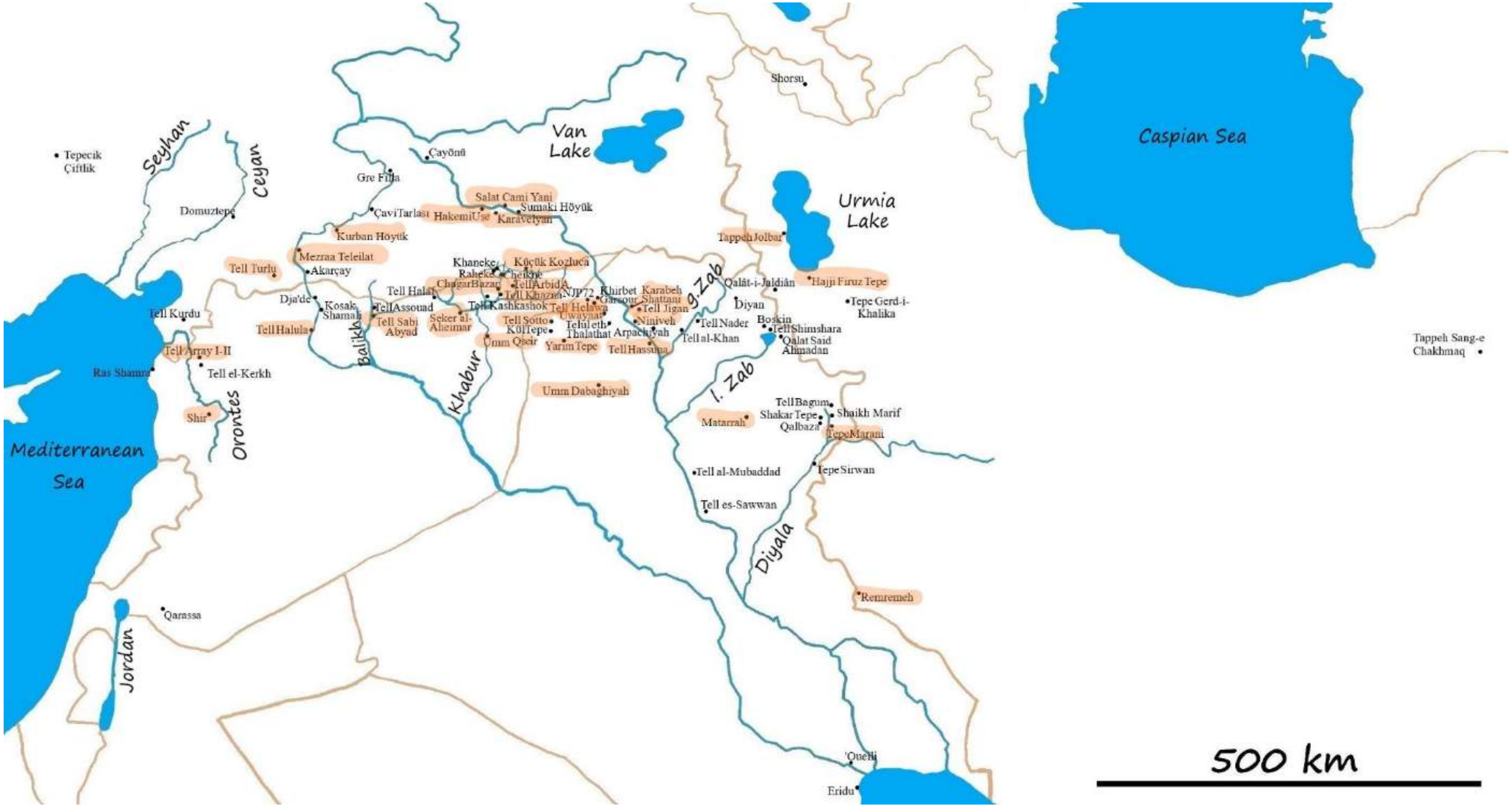
Map. 11 Score pattern distribution: base with quadrangular impression



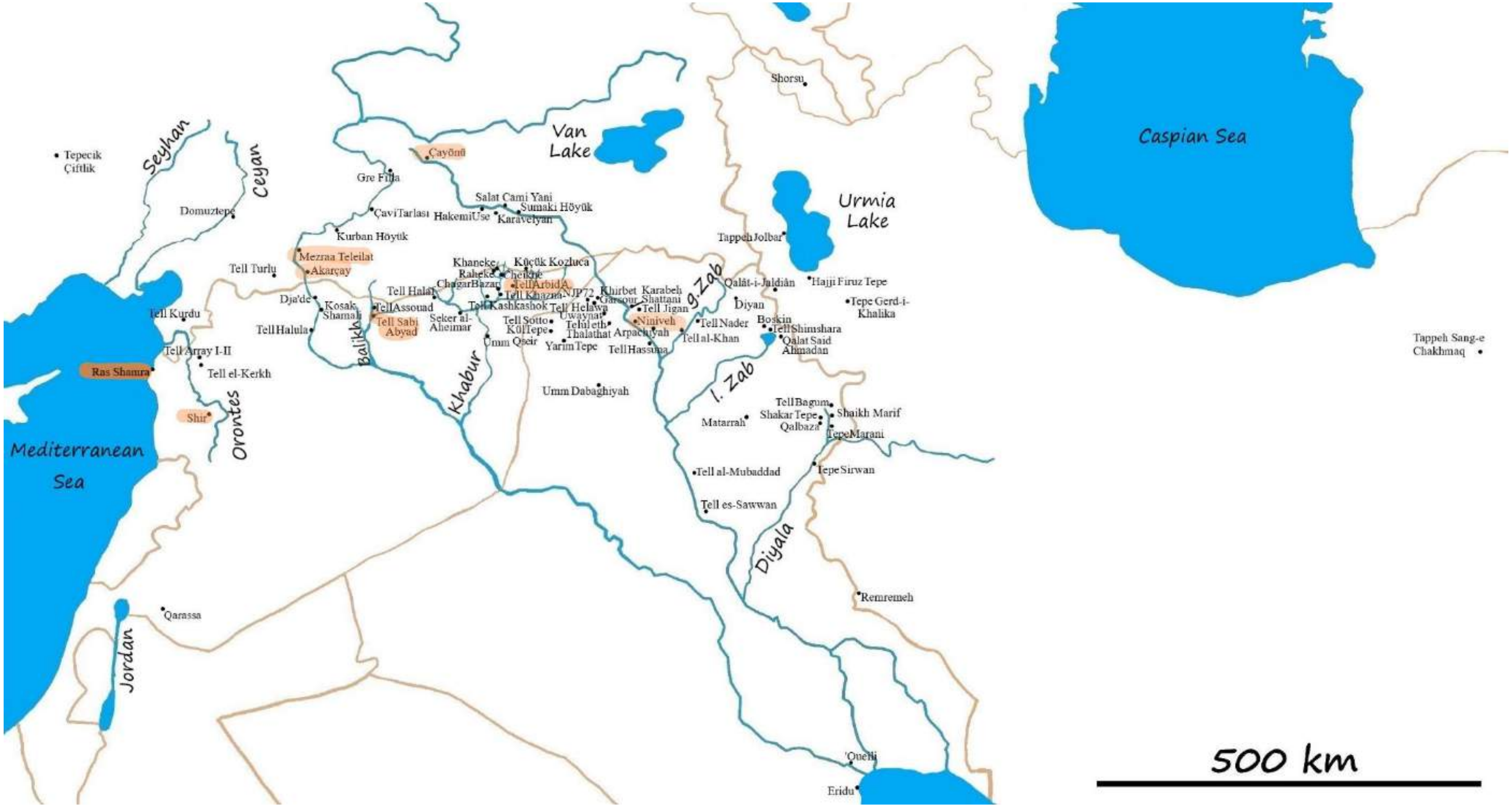
Map. 12 Score pattern distribution: base with ring impression



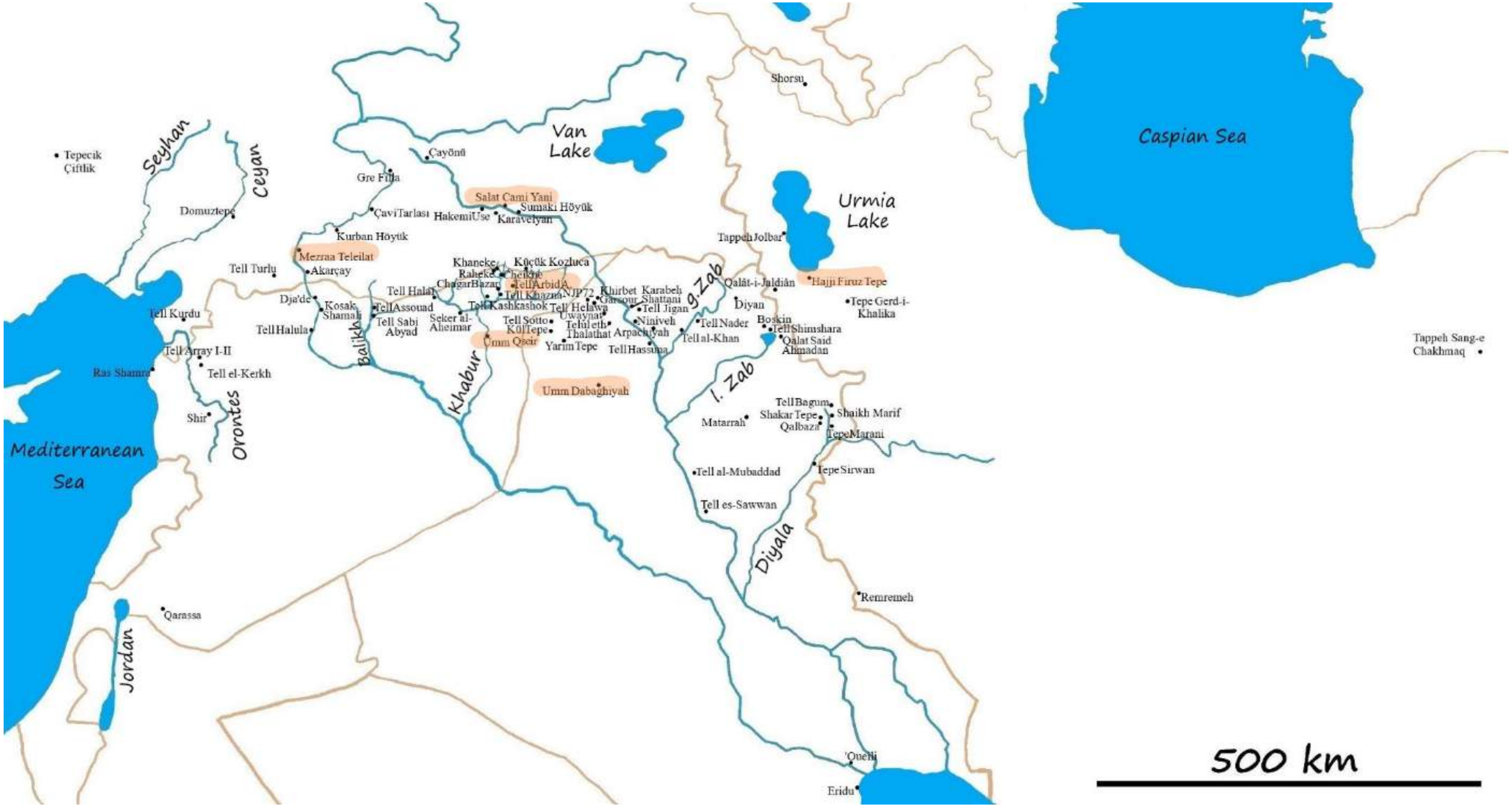
Map. 13 Score pattern distribution: base with irregular impression



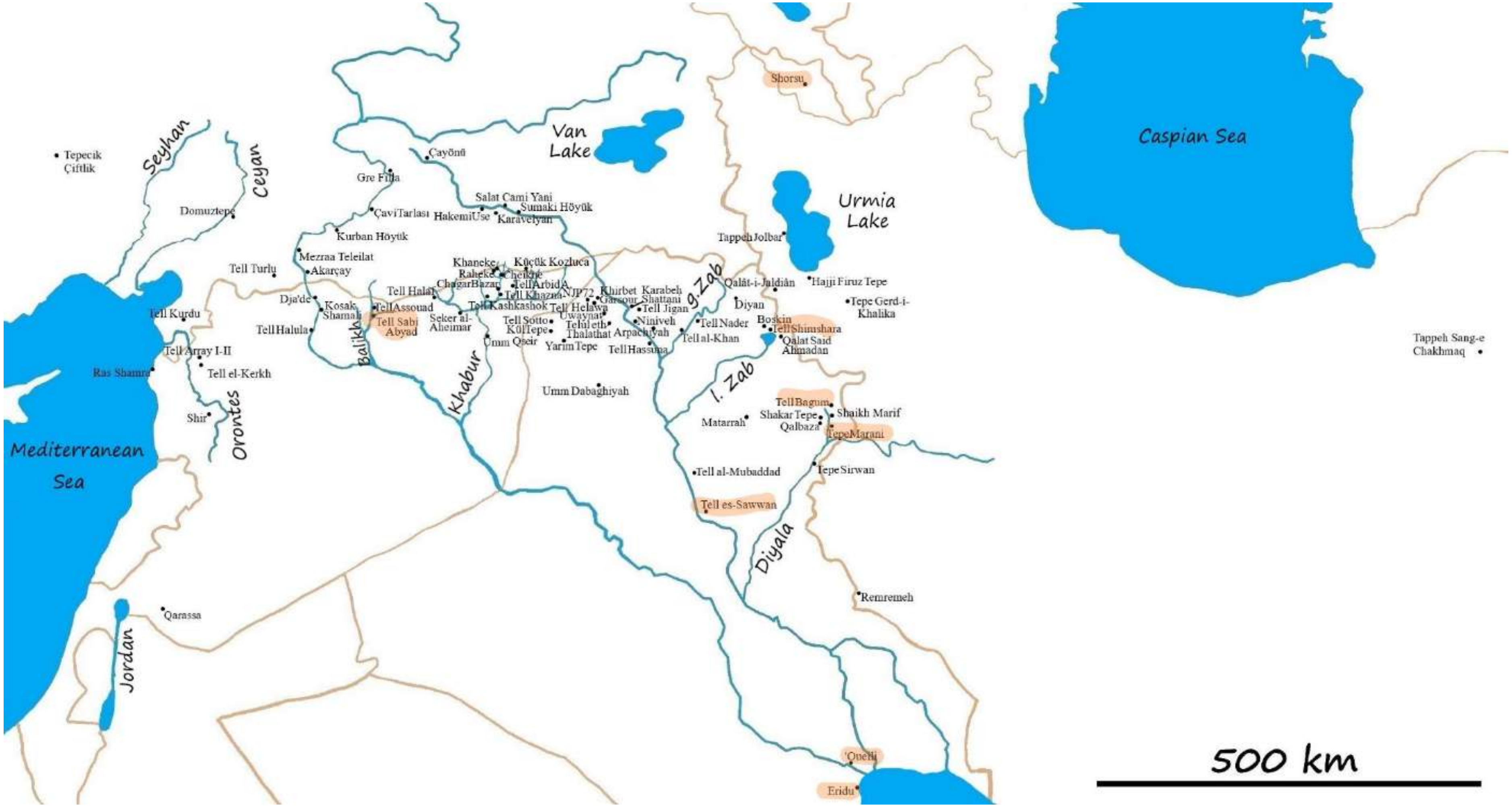
Map. 14 Score pattern distribution: base with parallel grooves



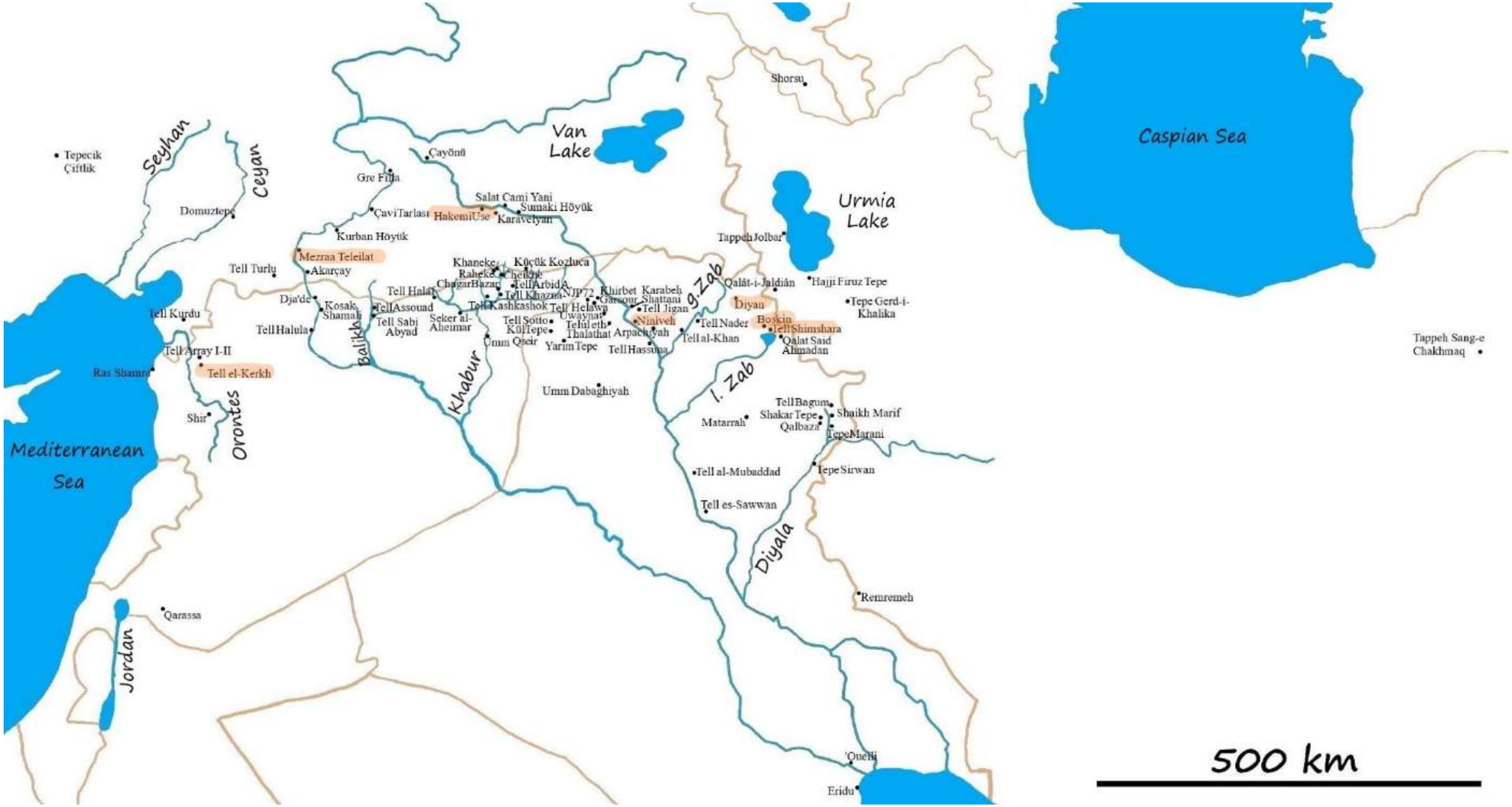
Map. 15 Score pattern distribution: base with parallel incisions



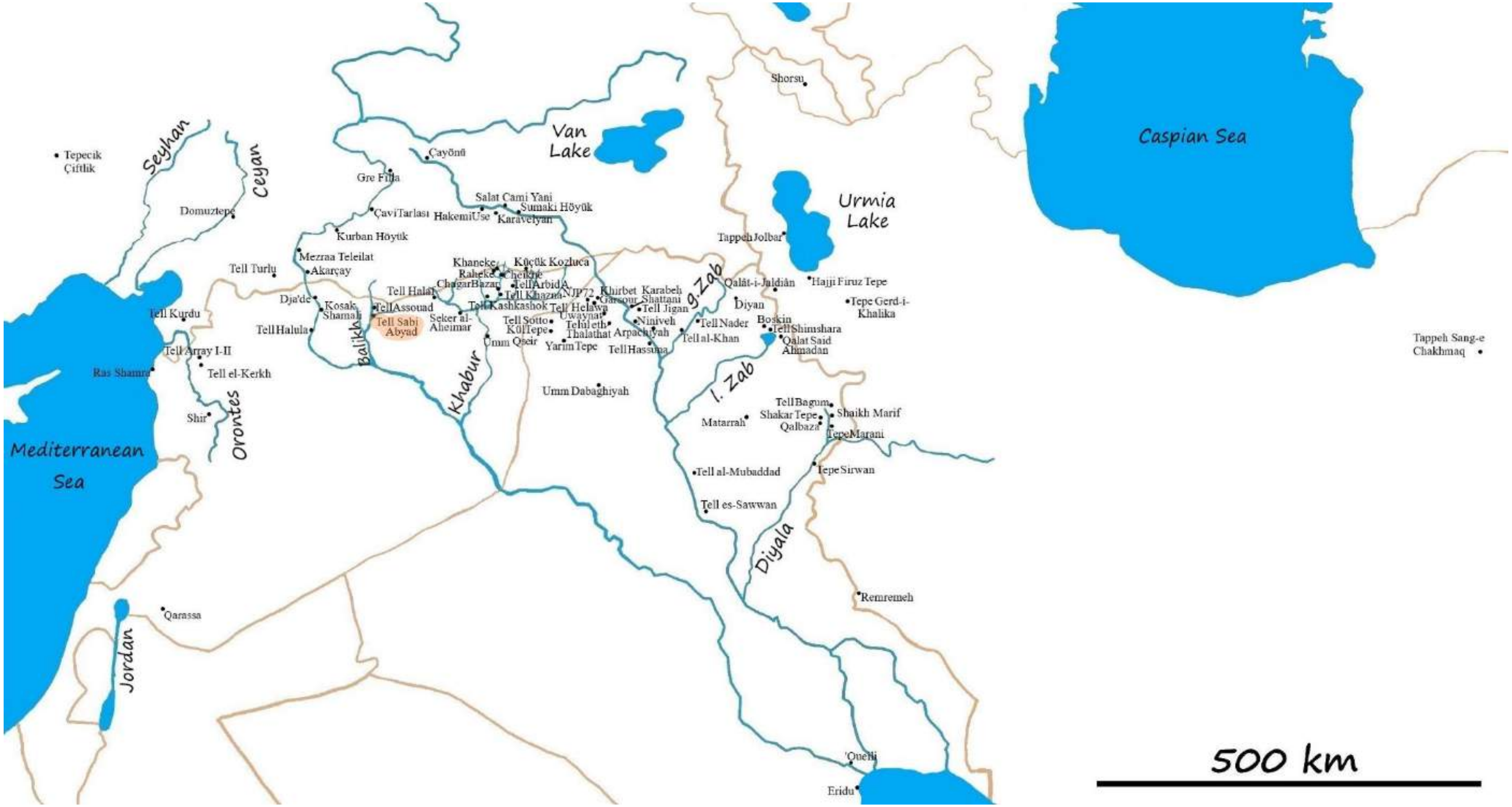
Map. 16 Score pattern distribution: base with parallel humps



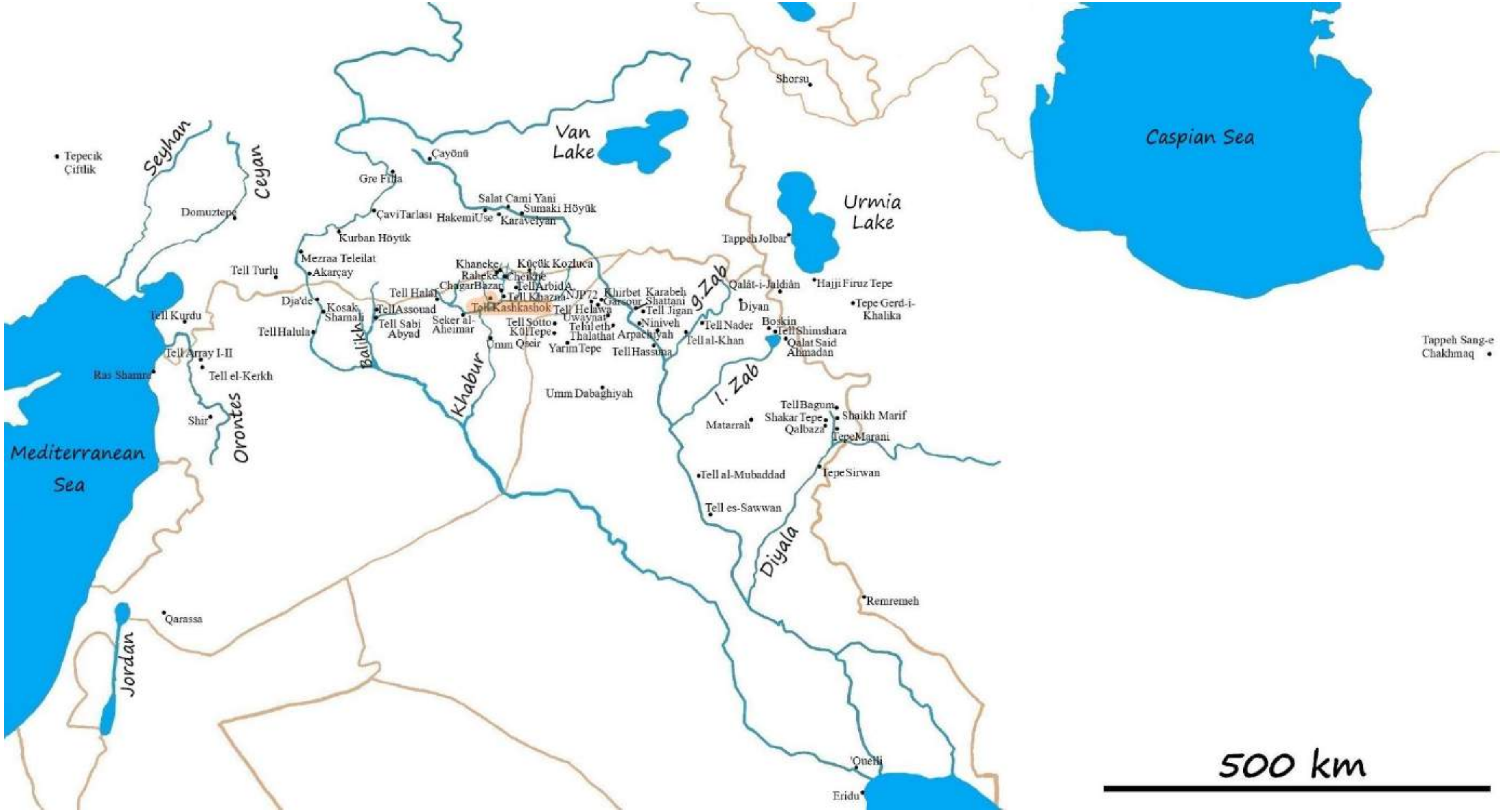
Map. 17 Score pattern distribution: base with criss-crossed incisions



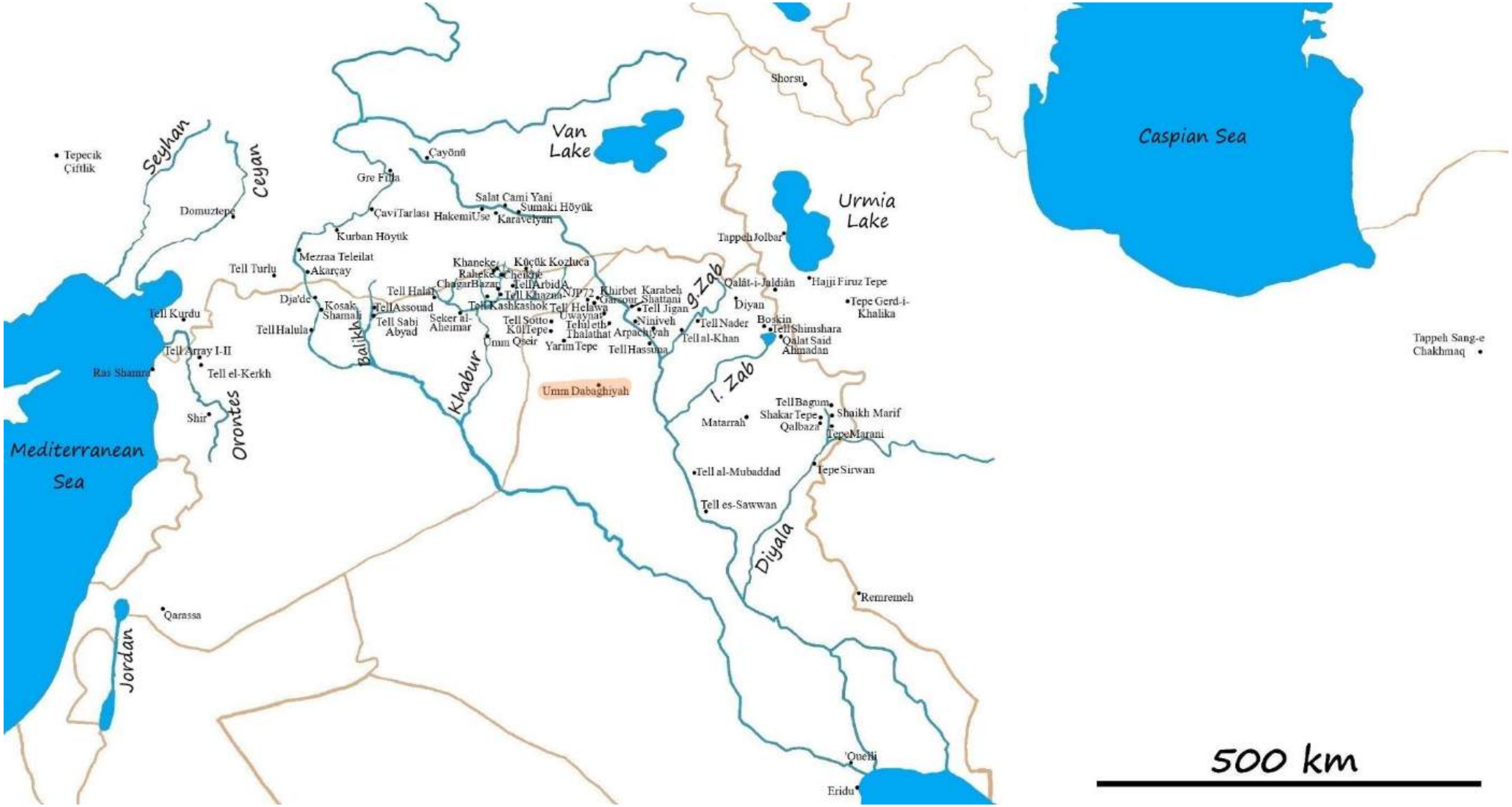
Map. 18 Score pattern distribution: base with particular incisions



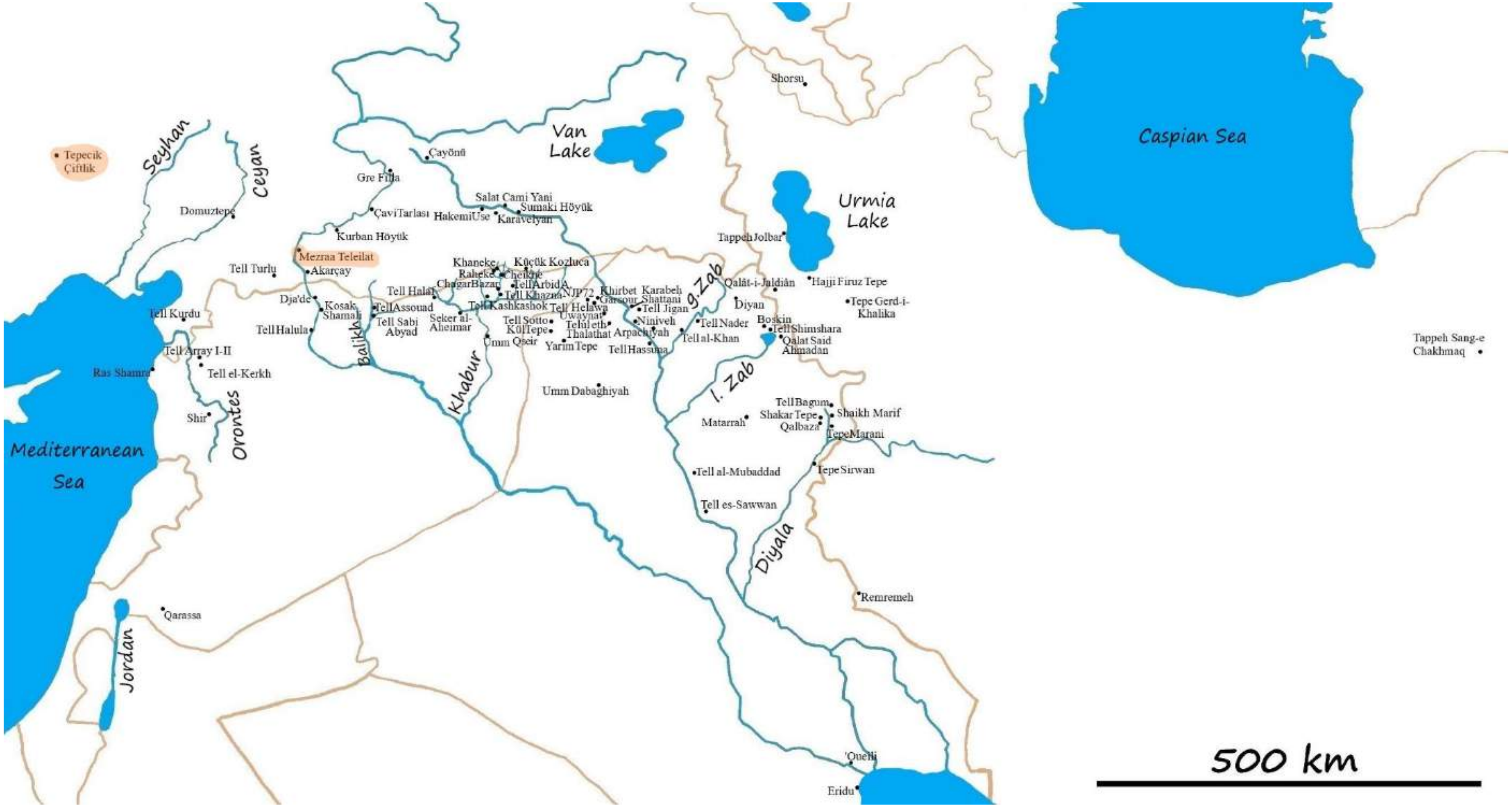
Map. 19 Score pattern distribution: base with perpendicular grooves



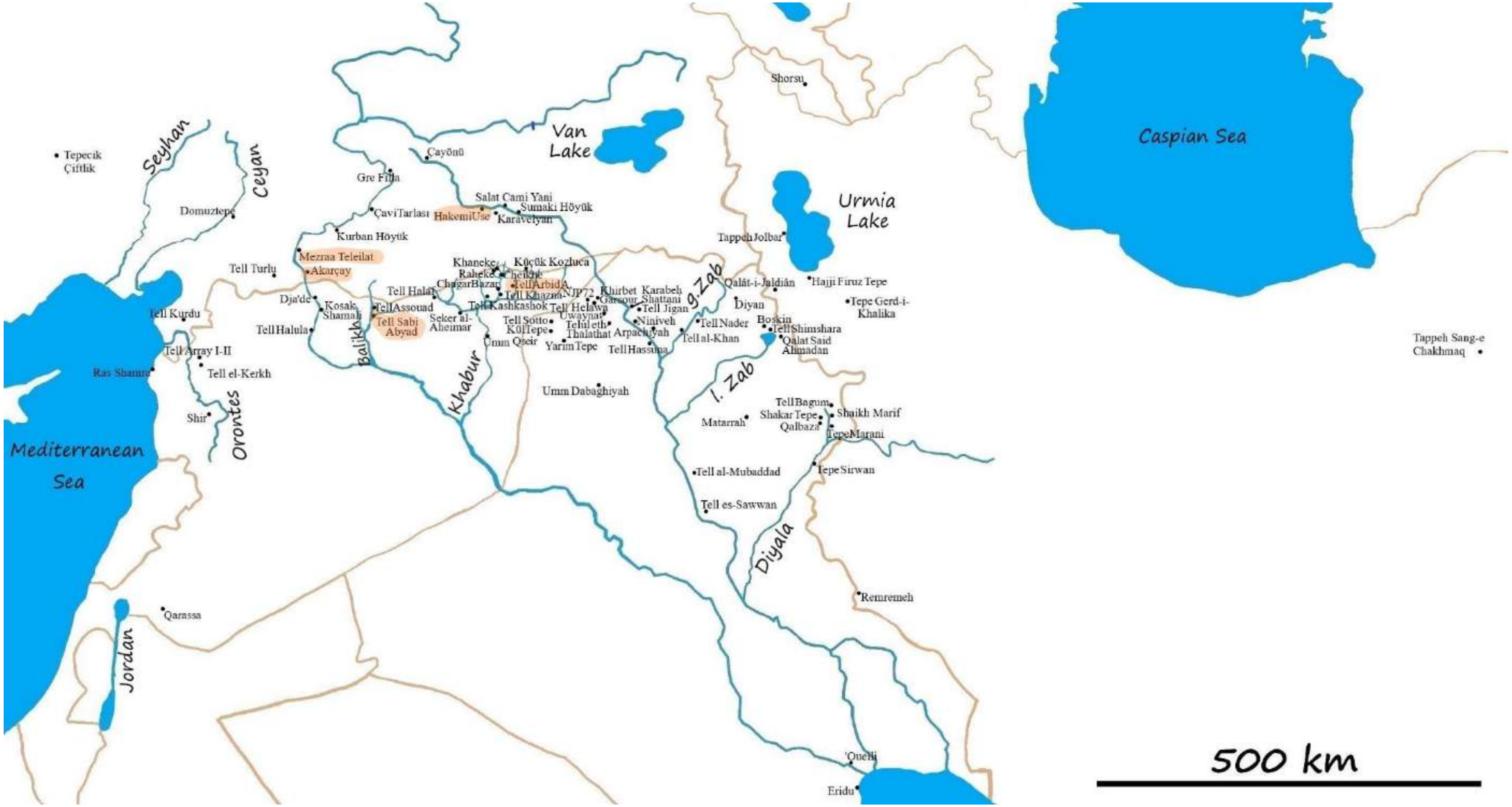
Map. 20 Score pattern distribution: base with pinched humps



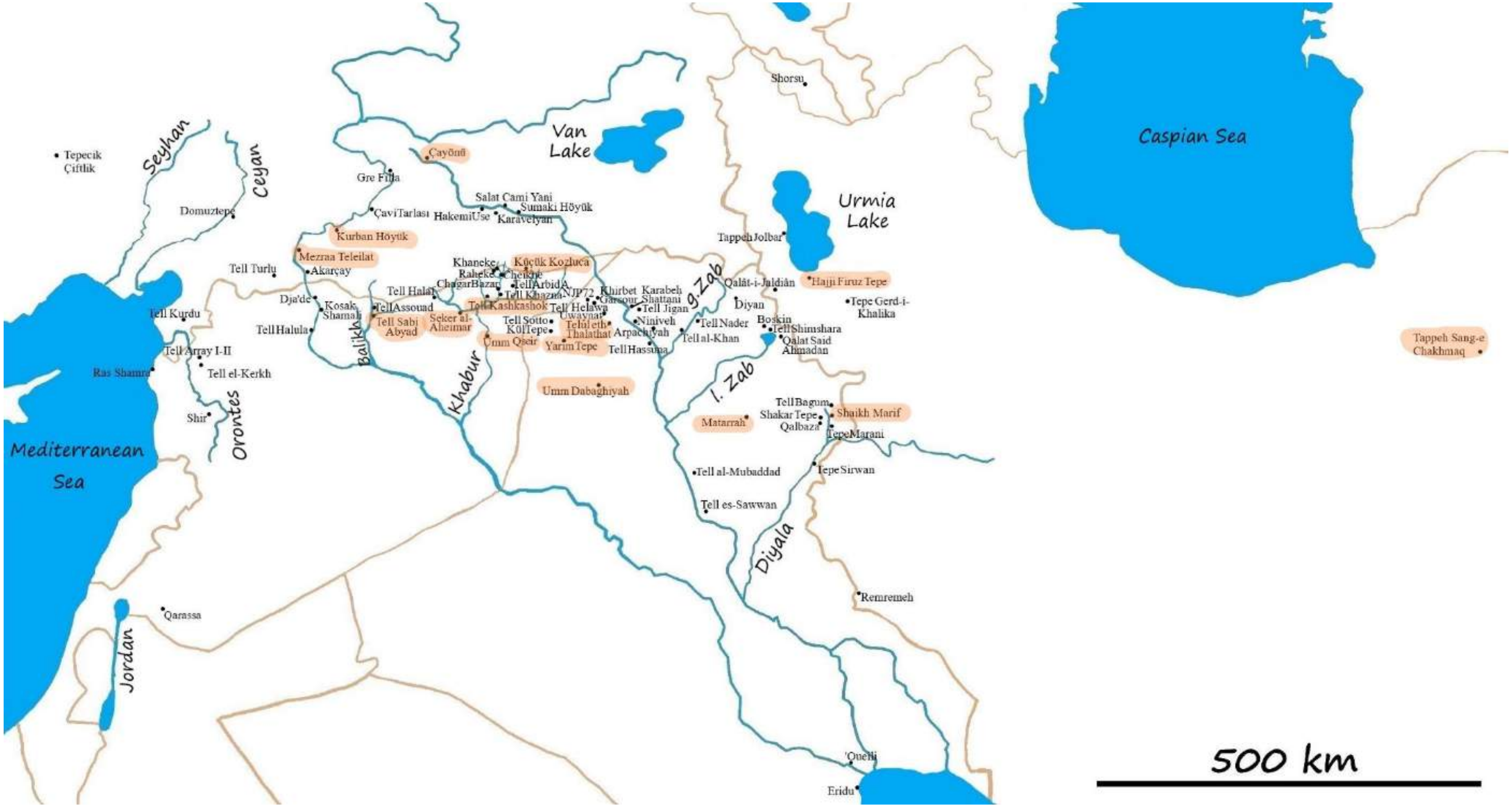
Map. 21 Score pattern distribution: base with harring-bone



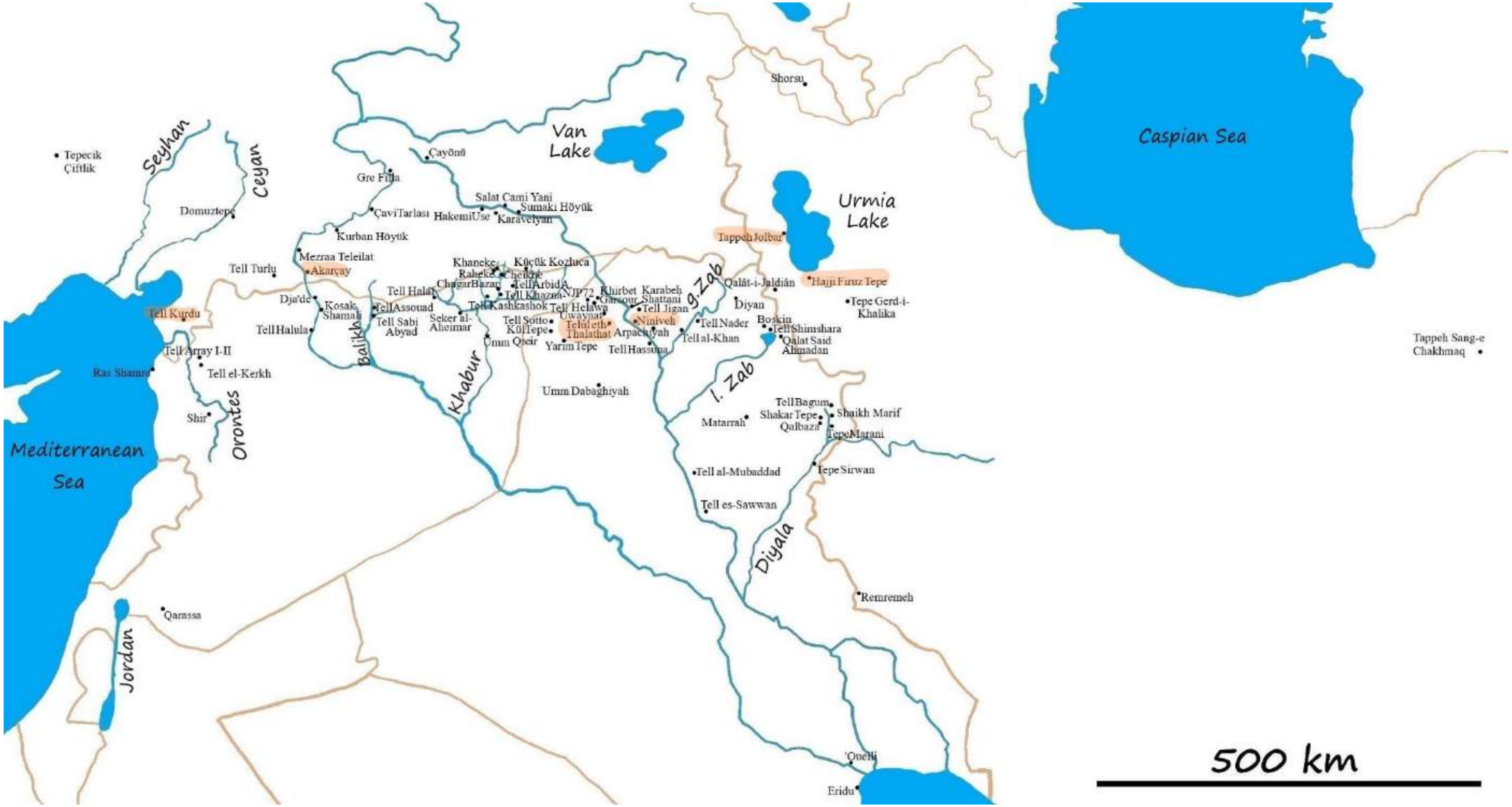
Map. 22 Score pattern distribution: base-wall with commas



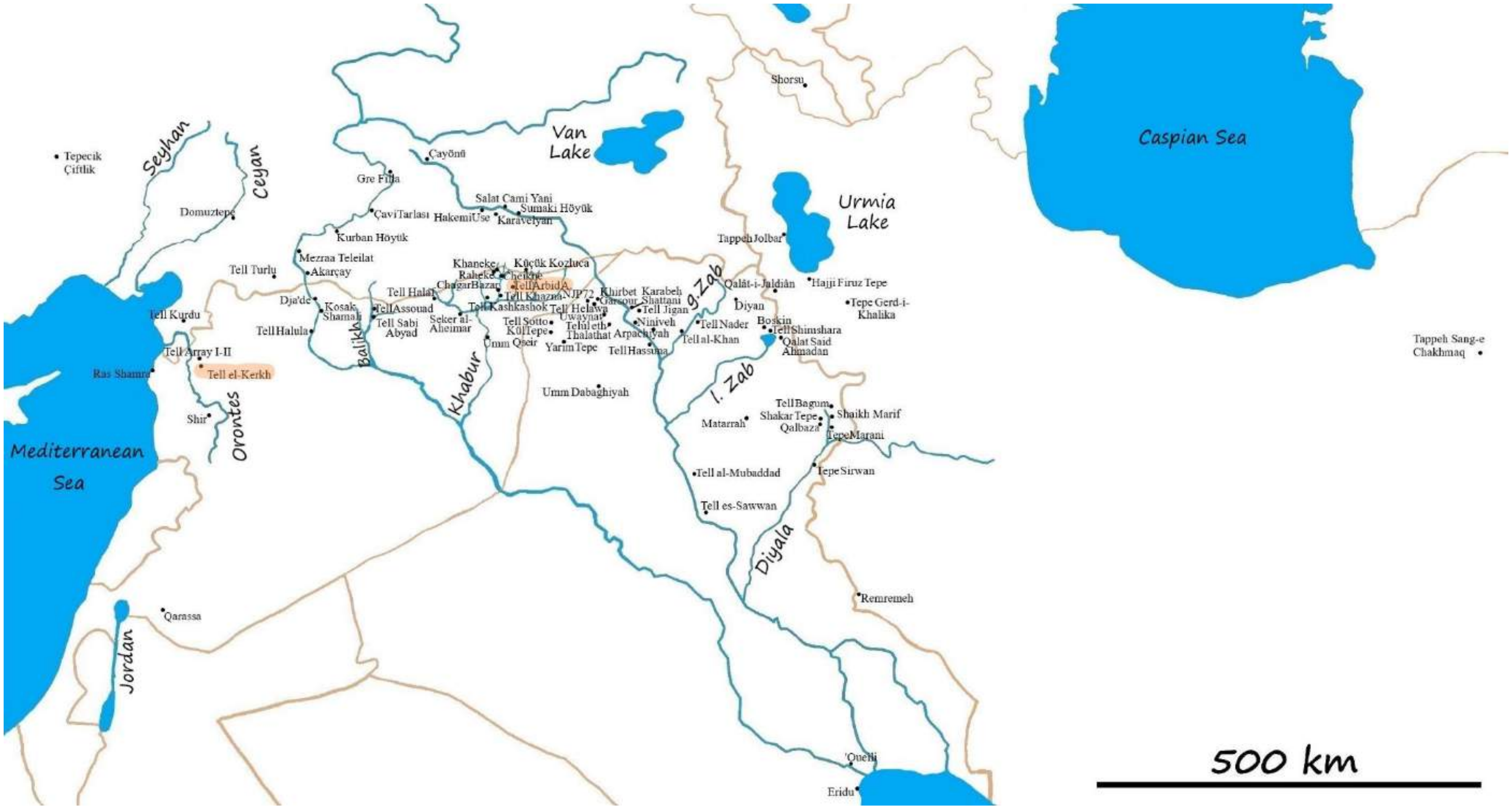
Map. 23 Score pattern distribution: HT with mixed impression incisions



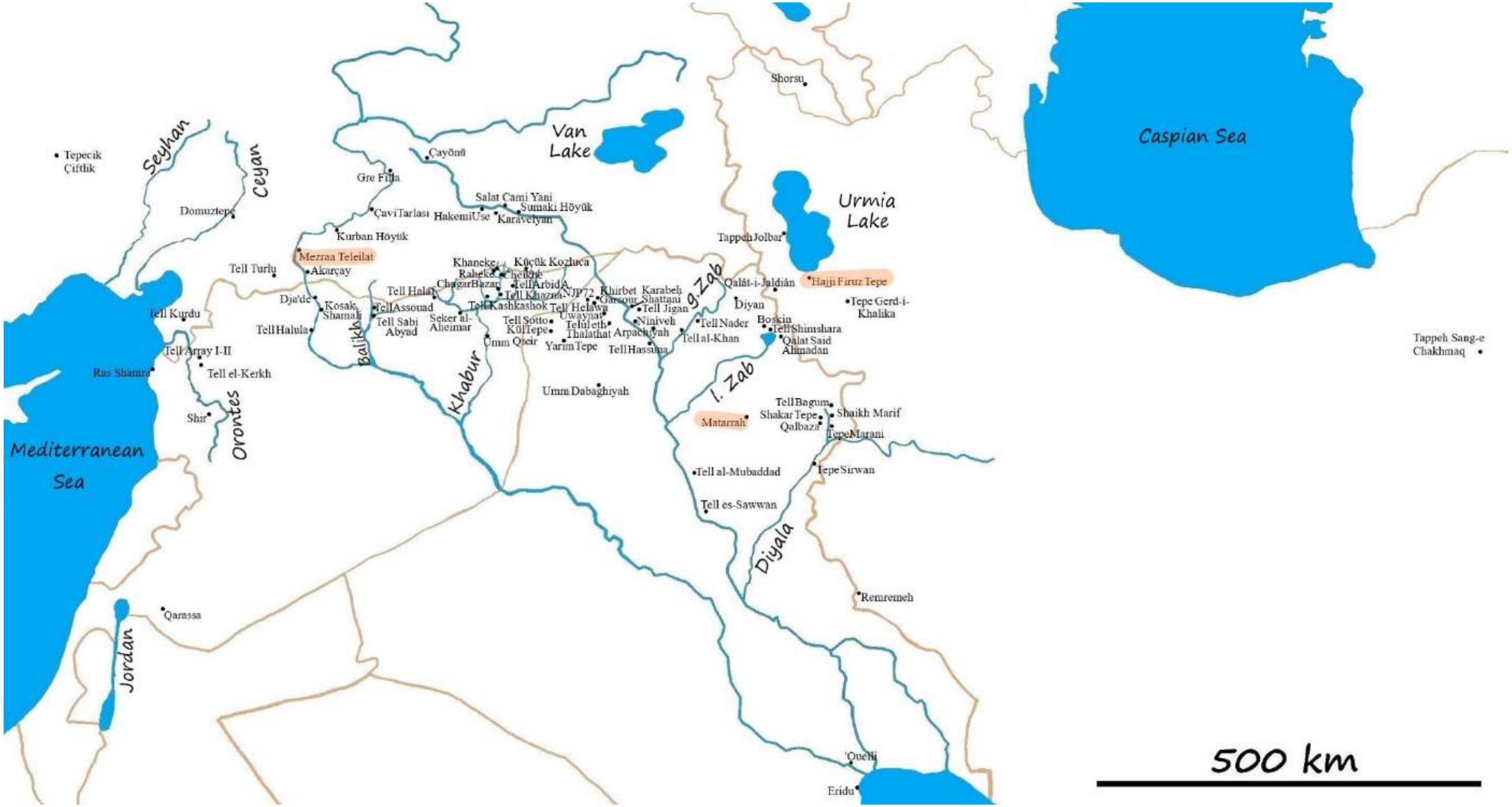
Map. 24 Score pattern distribution: plain wall



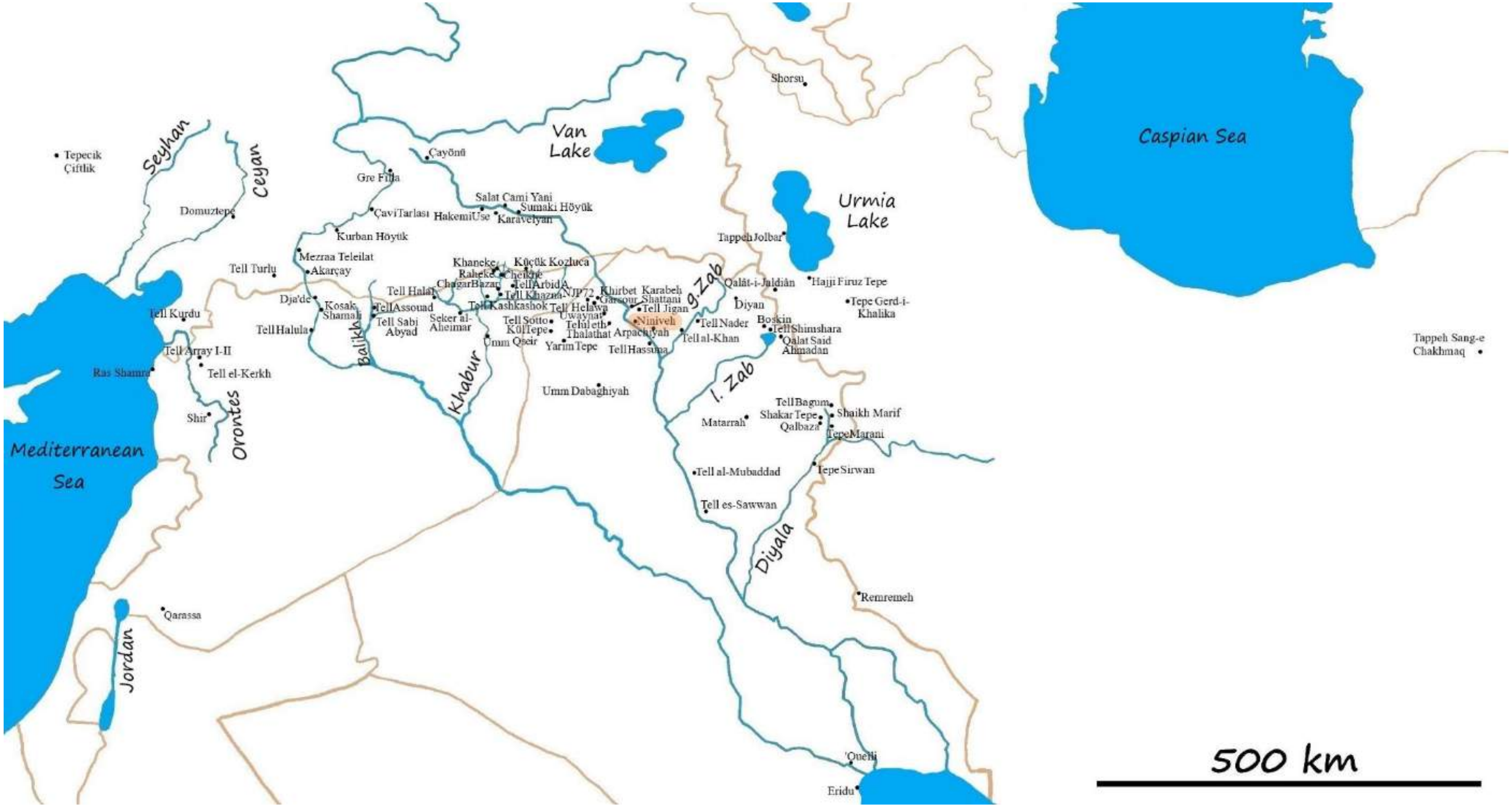
Map. 25 Score pattern distribution: wall with finger impression



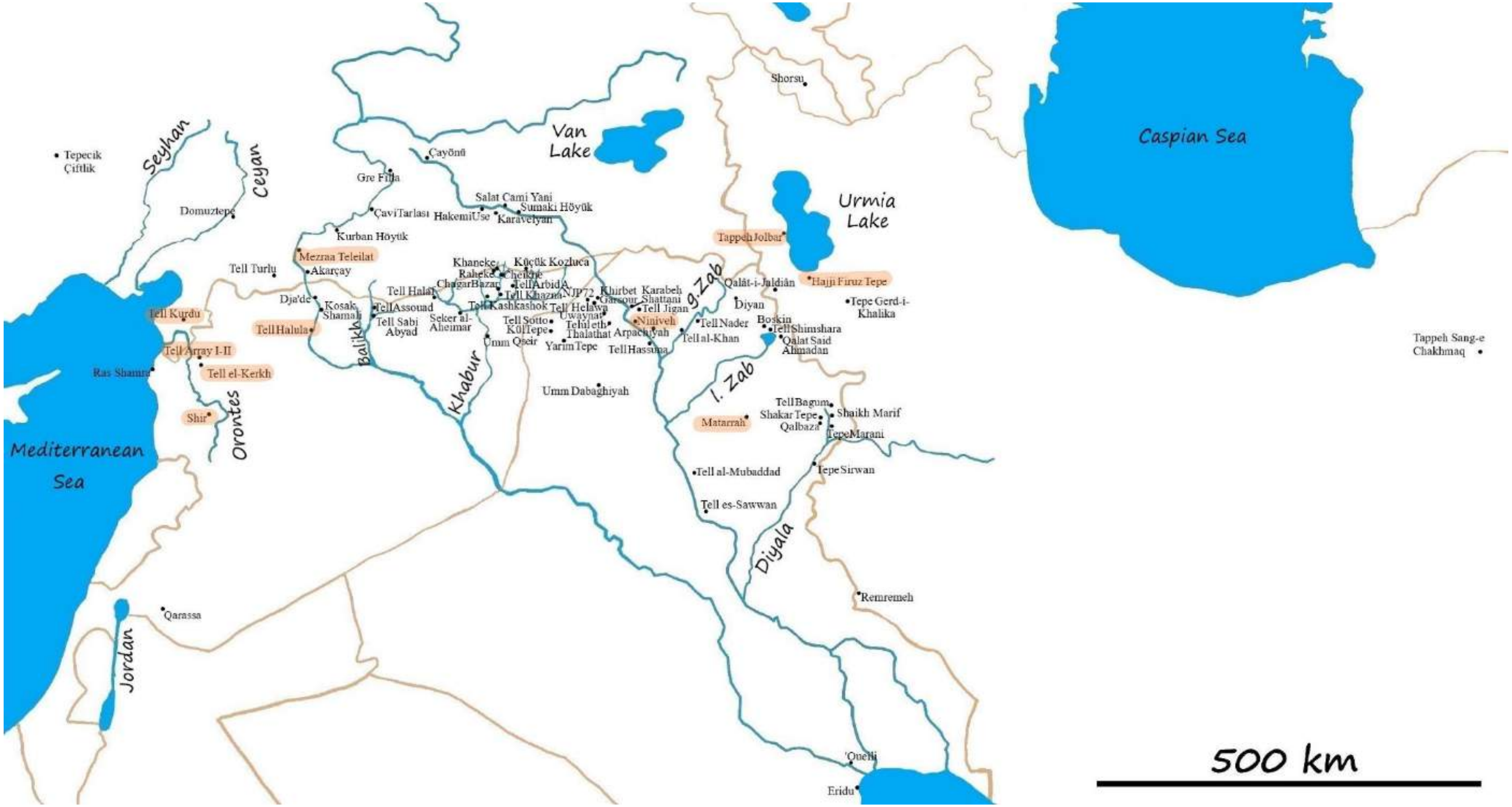
Map. 26 Score pattern distribution: wall with circular impressions



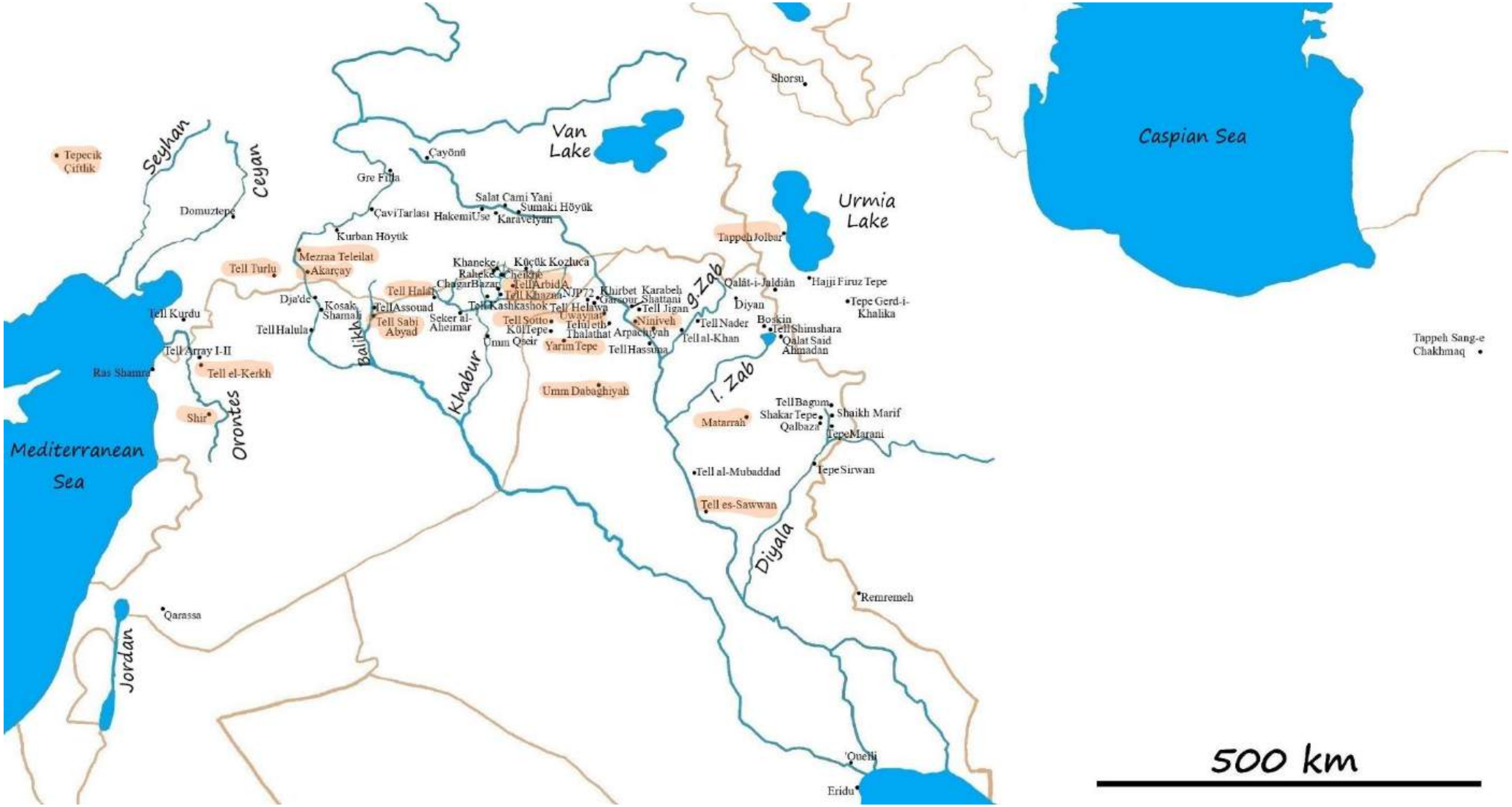
Map. 27 Score pattern distribution: wall with triangular impressions



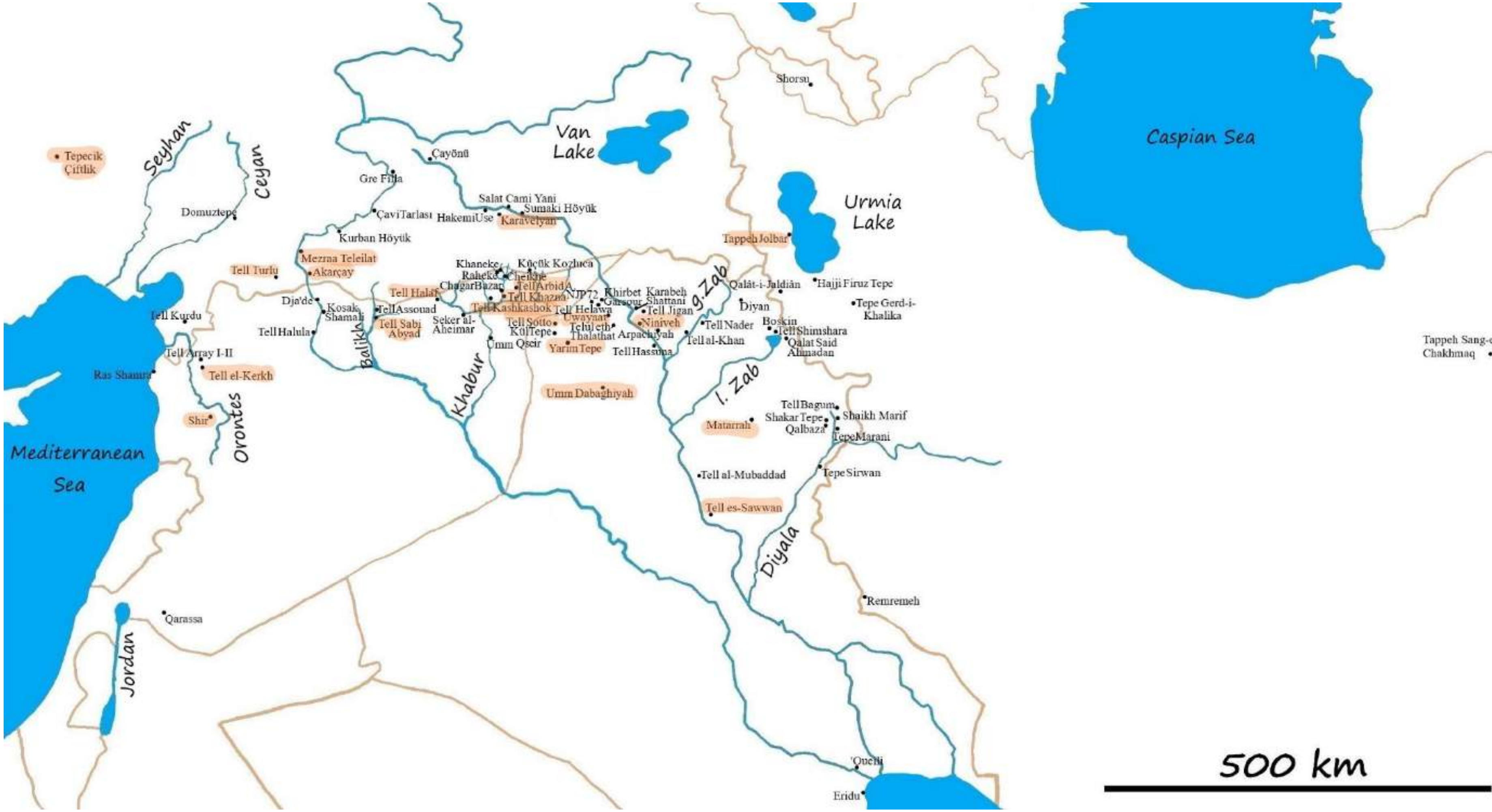
Map. 28 Score pattern distribution: wall with quadrangular impressions



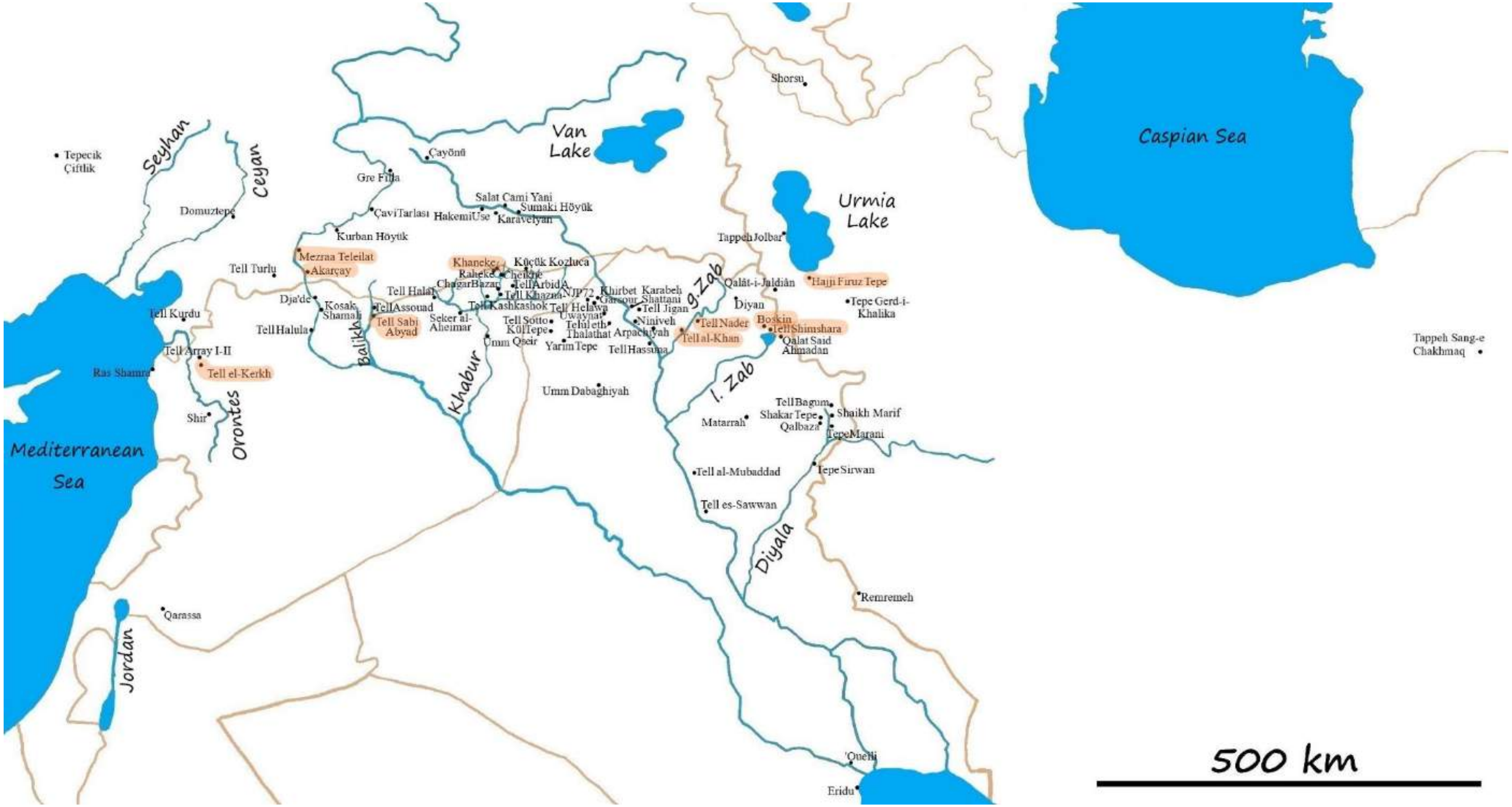
Map. 29 Score pattern distribution: wall with irregular impressions



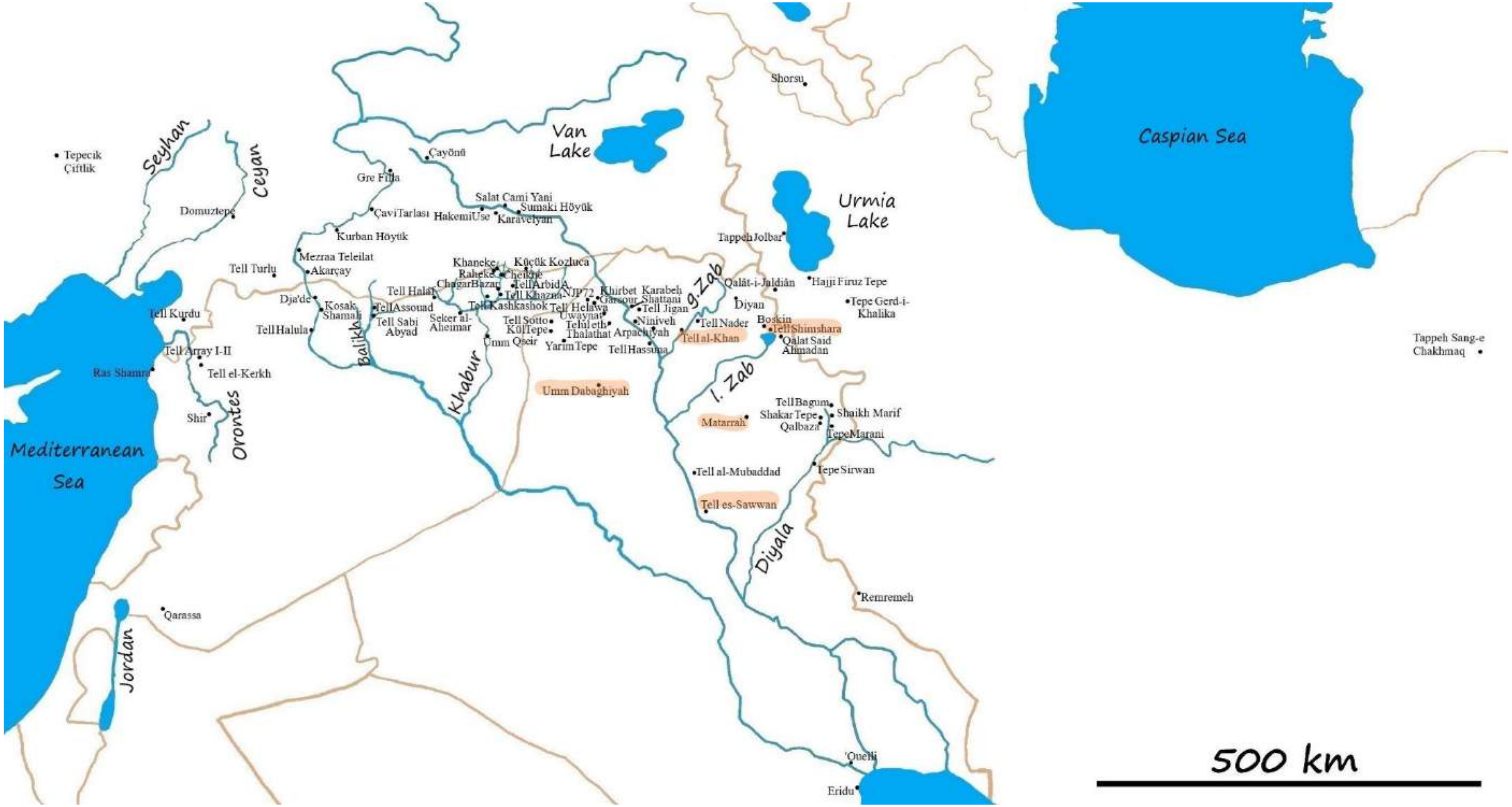
Map. 30 Score pattern distribution: wall with parallel grooves



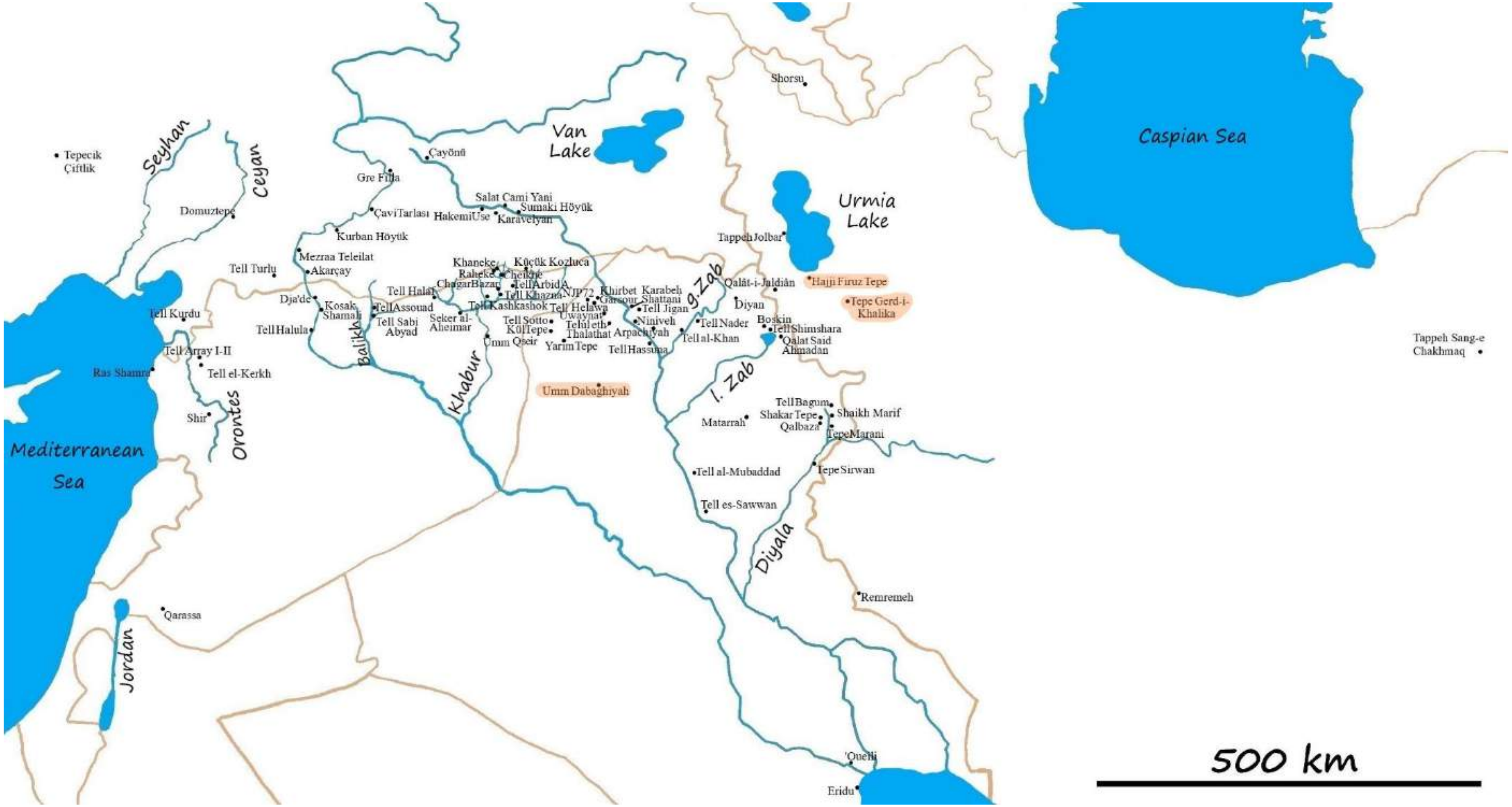
Map. 31 Score pattern distribution: wall with parallel incisions



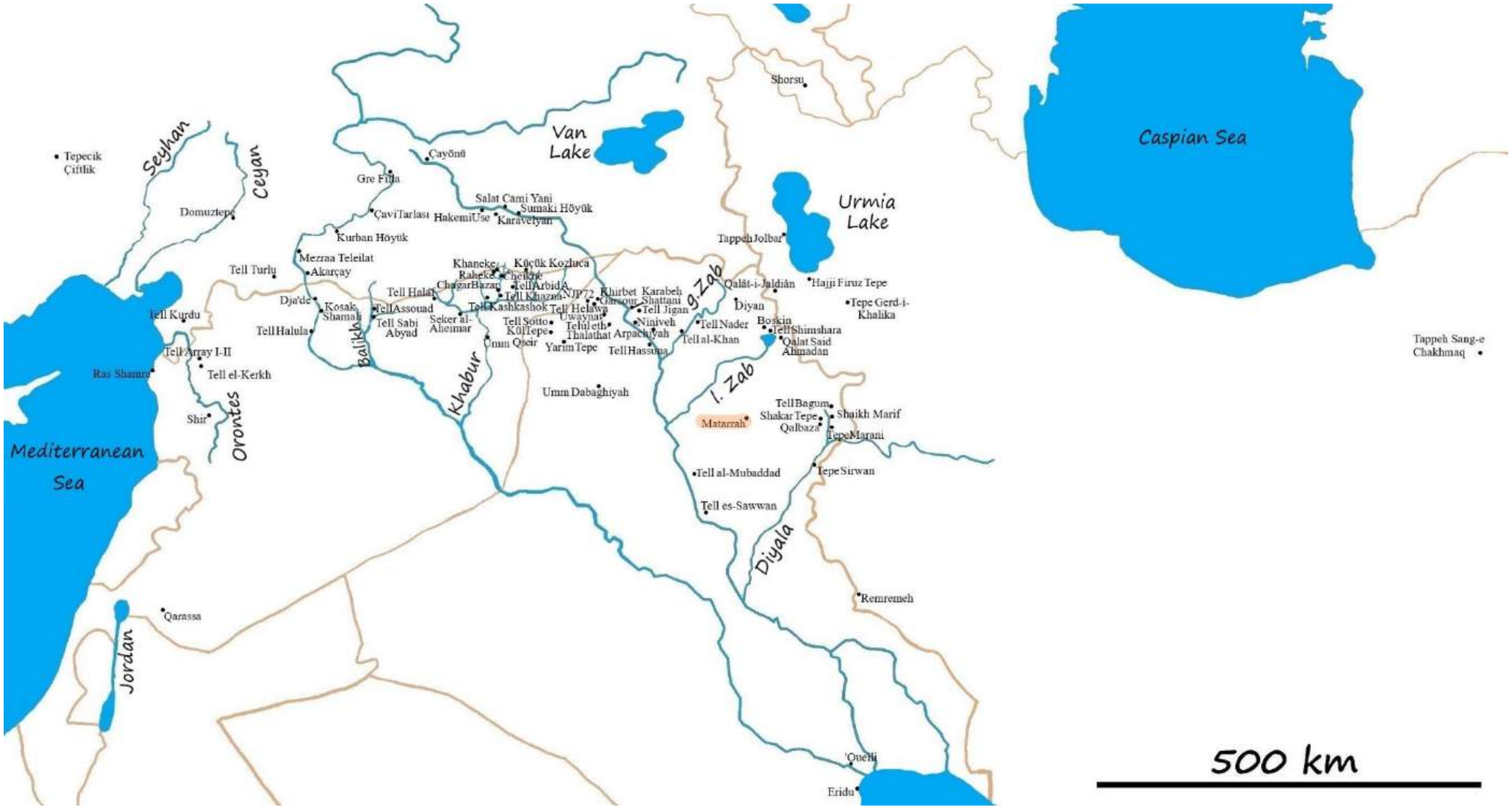
Map. 32 Score pattern distribution: wall with criss-crossed incisions



Map. 33 Score pattern distribution: wall with particular incisions



Map. 34 Score pattern distribution: wall with zig-zag incisions

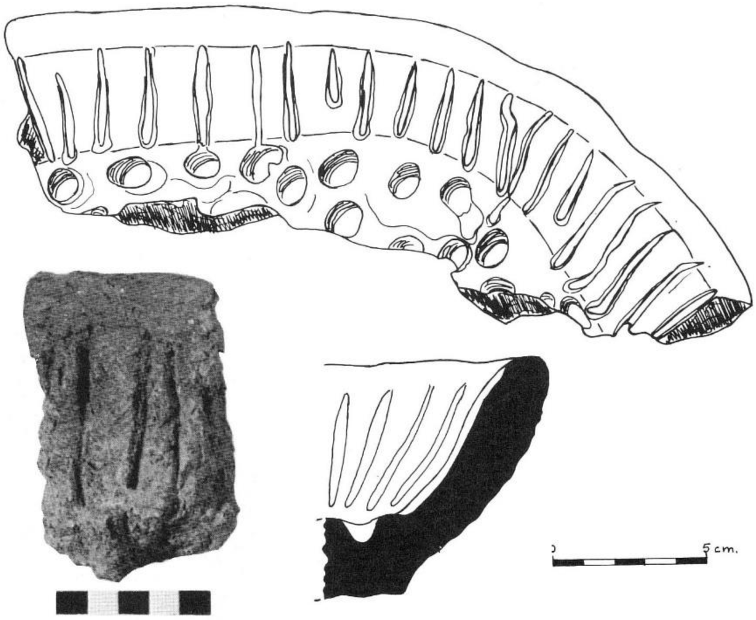


Map. 35 Score pattern distribution: wall with horizontal incisions

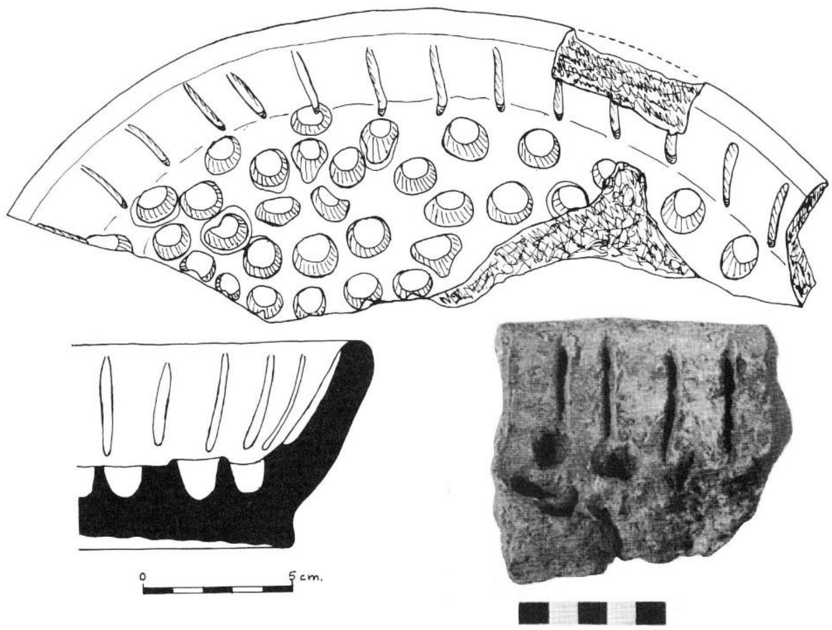
PLATES

NORTHERN LEVANT

RAS SHAMRA



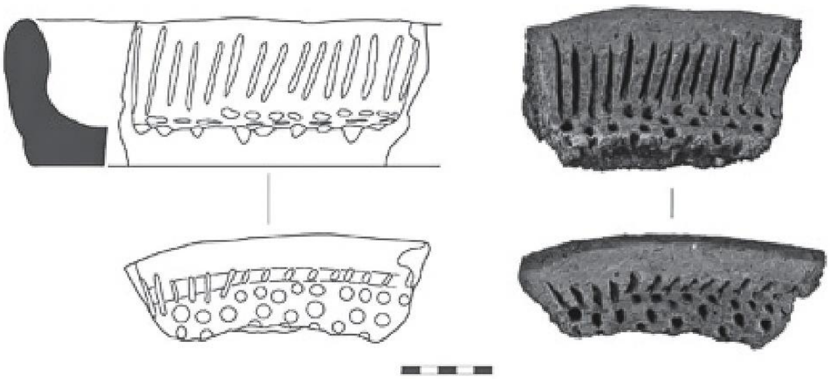
Shard 1: Ras Shamra (Contenson 1992, p.184 fig. 175,1).



Shard 2: Ras Shamra (Contenson 1992, p.184 fig. 175,2).

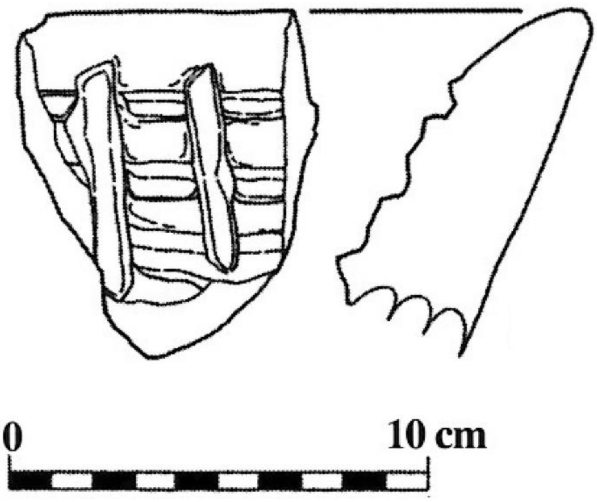
SHIR

Shard 3: Shir (Bartl et al. 2010, p.65 fig. 19)

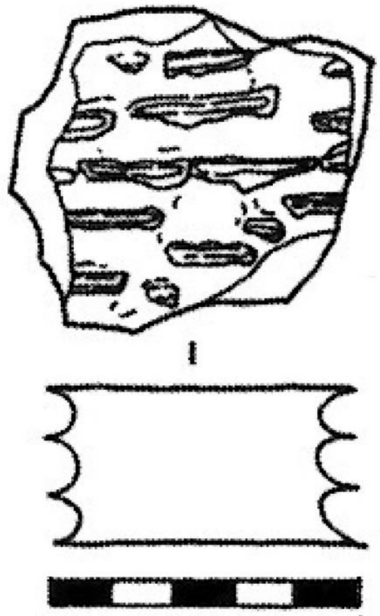


Shard 4: Shir (Nieuwenhuyse 2009, p.324 fig. 16)

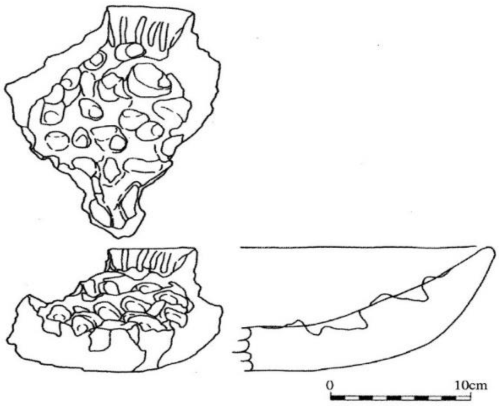
TELL AIN EL-KERKH



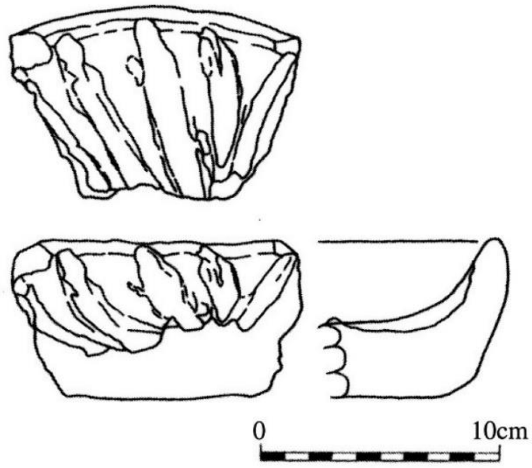
Shard 5: Tell 'Ain el-Kerkh (Maeda 1999, p.7 fig. 6.22)



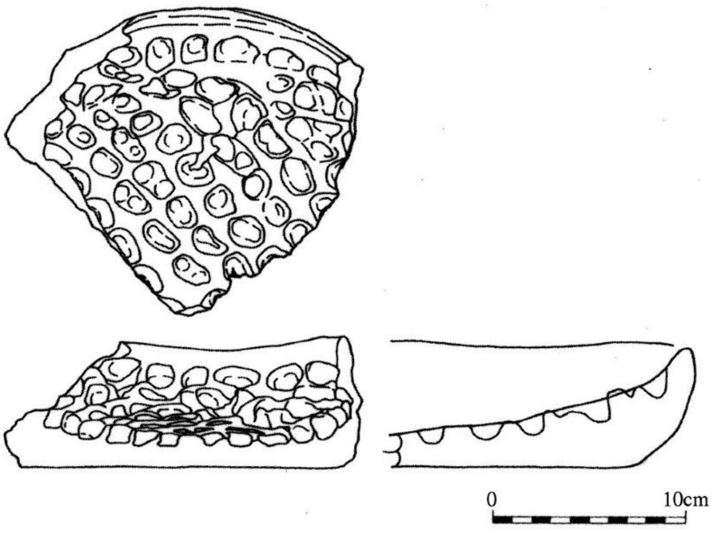
Shard 6: Tell 'Ain el-Kerkh (Maeda 1999, p.7 fig. 6.21)



Shard 7: Tell 'Ain el-Kerkh (Odaka 2000, p. 10

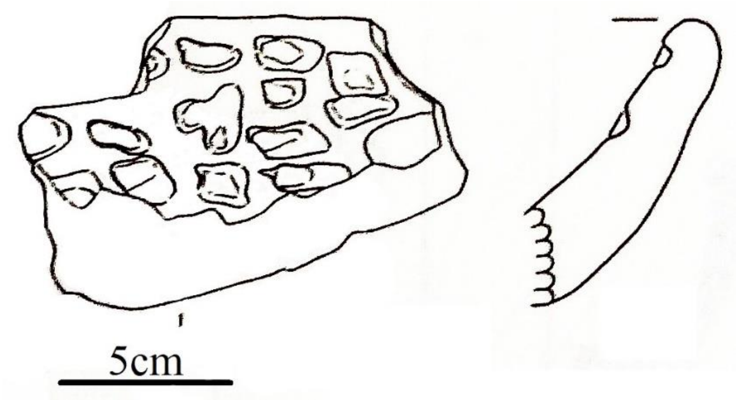


Shard 8: Tell 'Ain el-Kerkh (Odaka 2000, p.10

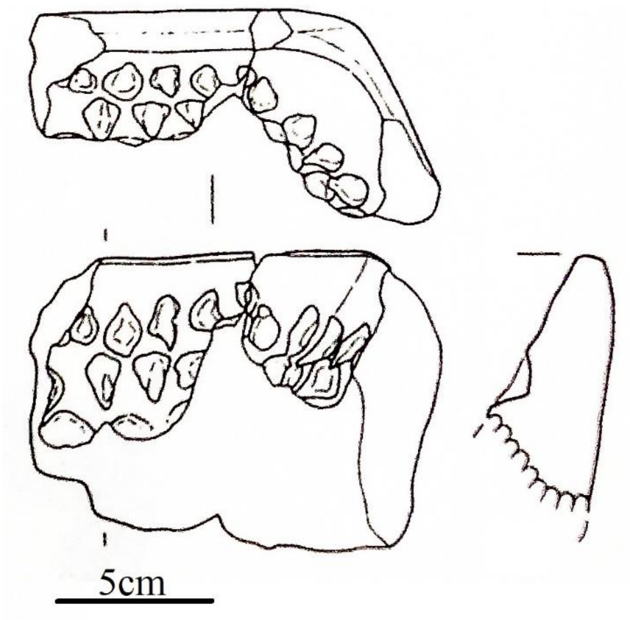


Shard 9: Tell 'Ain el-Kerkh (Odaka 2000, p.10 fig. 8.7)

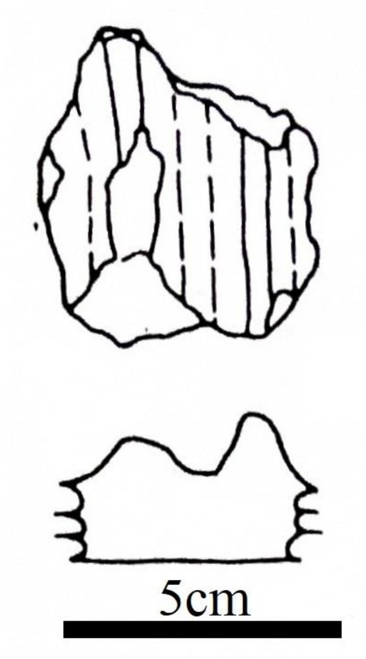
TELL ARRAY I and II



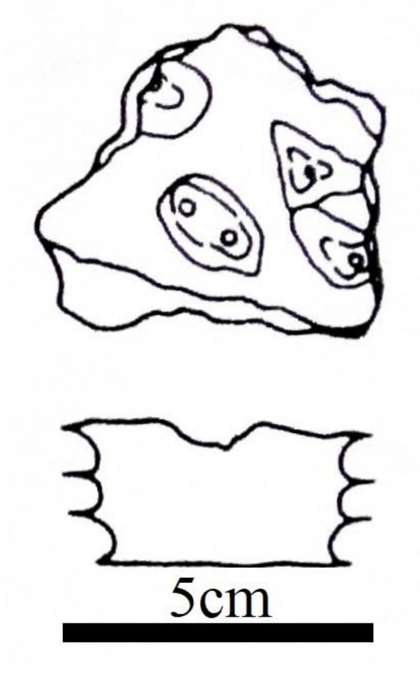
Shard 10: Tell Array 2 (Iwasaki et al. 1995, p.174 fig. 12.16)



Shard 11: Tell Array 2 (Iwasaki et al. 1995, p.174 fig. 12.17)



Shard 12: Tell Array 1 (Iwasaki et al. 1995, p.179 fig. 17.18)



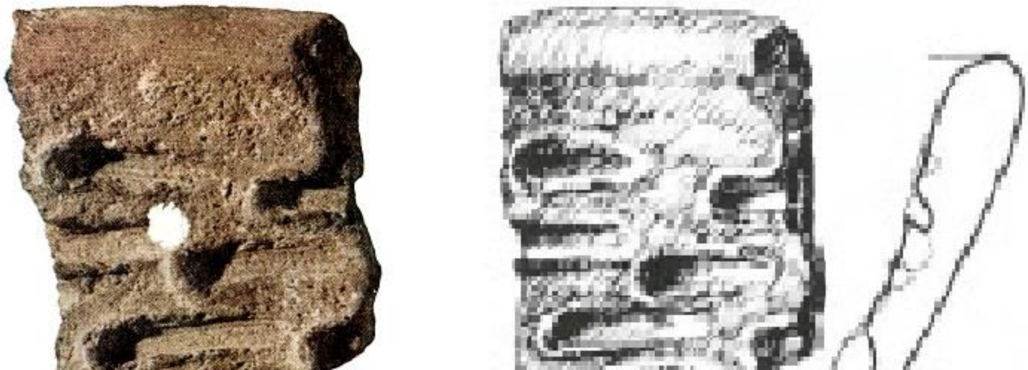
Shard 13: Tell Array 1 (Iwasaki et al. 1995, p.179 fig. 17.19)

TELL KURDU

Shard 14: Tell Kurdu TK8282E (courtesy of the Tell Kurdu archive)

Shard 15: Tell Kurdu TK6644 (courtesy of the Tell Kurdu archive)

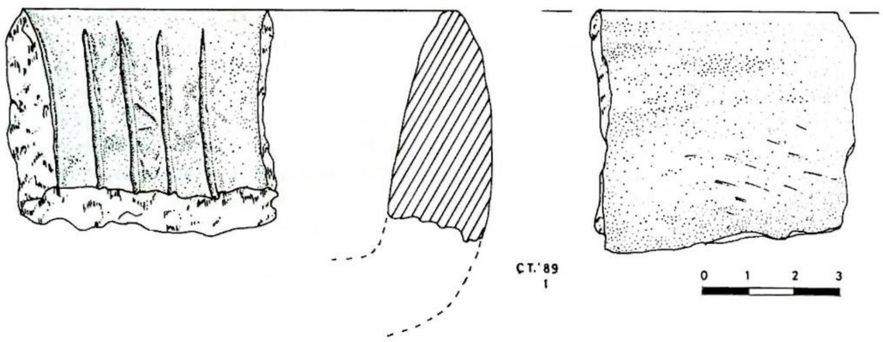
Shard 16: Tell Kurdu TK7502 (courtesy of the Tell Kurdu archive)



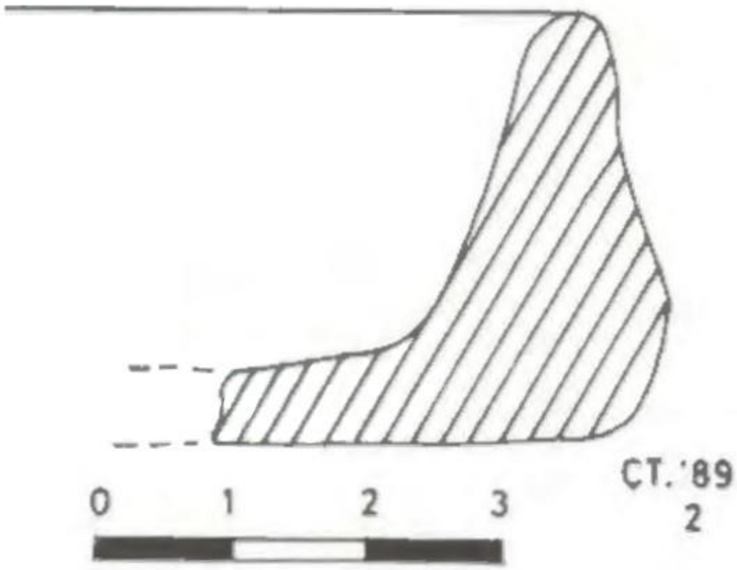
Shard 17: Tell Kurdu (Braidwood 1960, p.143 fig. 111.10)

TAURUS FOOTHILLS

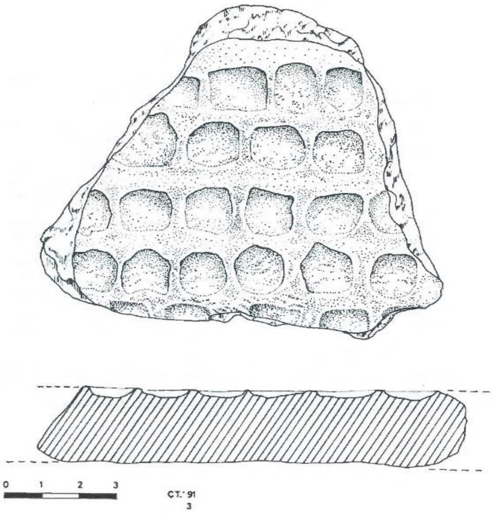
Çayonu



Shard 18: Çayonu(Ozdogan Ozdogan, 1993)



Shard 19: Çauonu (Ozdogan Ozdogan, 1993)



Shard 20: Çayonu (Ozdogan Ozdogan, 1993)

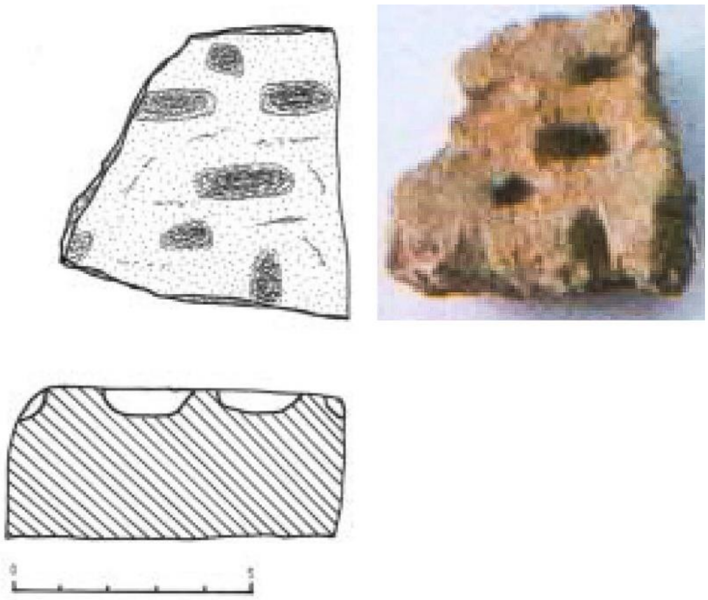
Shard 21: Çayönü (Courtesy of the Çayonu Archive)

Shard 22: Çayönü (Courtesy of the Çayonu Archive)

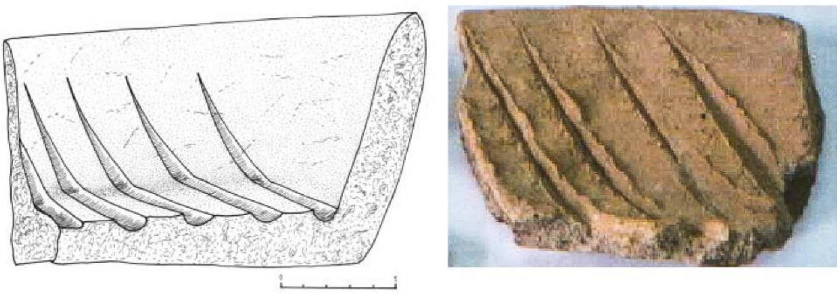
Shard 23: Çayönü (Courtesy of the Çayonu Archive)

Shard 24: Çayönü (Courtesy of the Çayonu Archive)

HAKEMI USE



Shard 25: Hakemi Use (Tekin 2005, p.202 fig. 11; Tekin 2002, p.599 fig. 20b)



Shard 26: Hakemi Use (Tekin 2005, p. 202 fig. 11; Tekin 2002, p.599 fig. 20b)

Shard 27: Hakemi Use (Tekin 2002, p.599 fig. 20b)

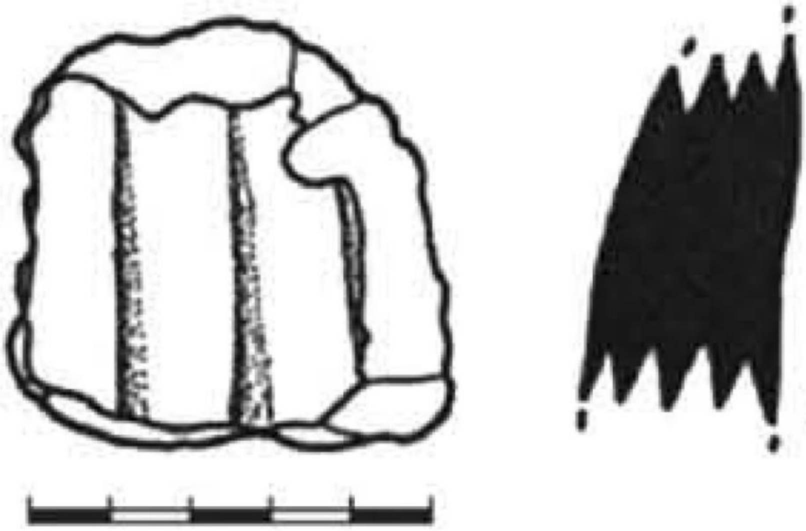
Shard 28: Hakemi Use (Tekin 2002, p.599 fig. 20b)

Shard 29: Hakemi Use (Tekin 2002, p.599 fig. 20b)

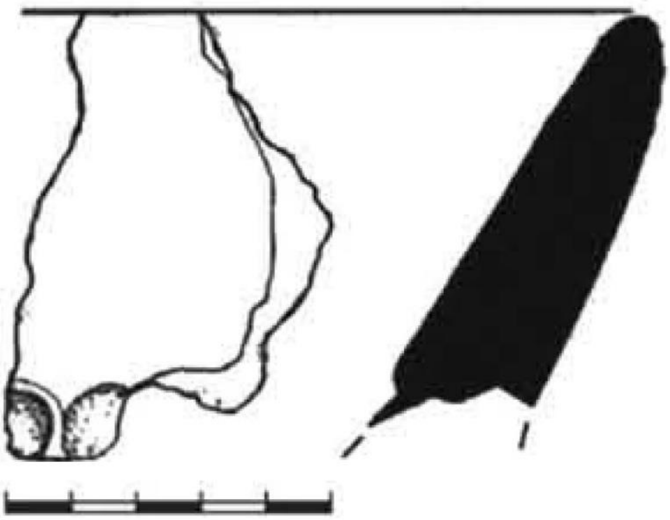
Shard 30: Hakemi Use (Tekin 2002, p.599 fig. 20b)

Shard 31: Hakemi Use (Tekin 2011, pag.171 fig. 12)

Küçük Kozluca

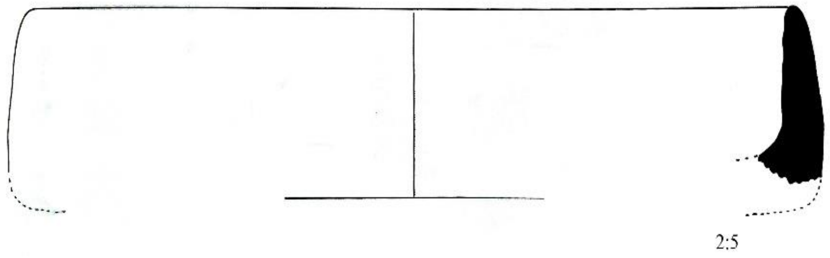


Shard 32: Kuçuk Kozluca (Kozbe 2013, p.482 fig. 43.2.15)

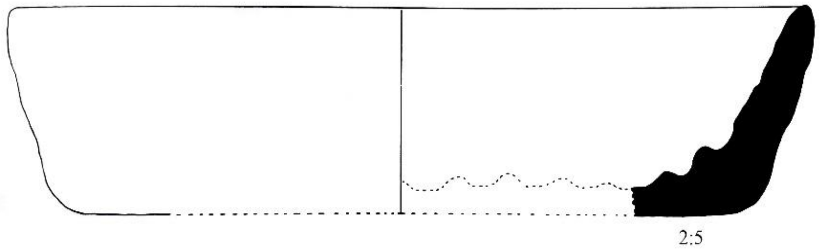


Shard 33: Kuçuk Kozluca (Kozbe 2013, p.482 fig. 43.2.14)

KURBAN HOYUK

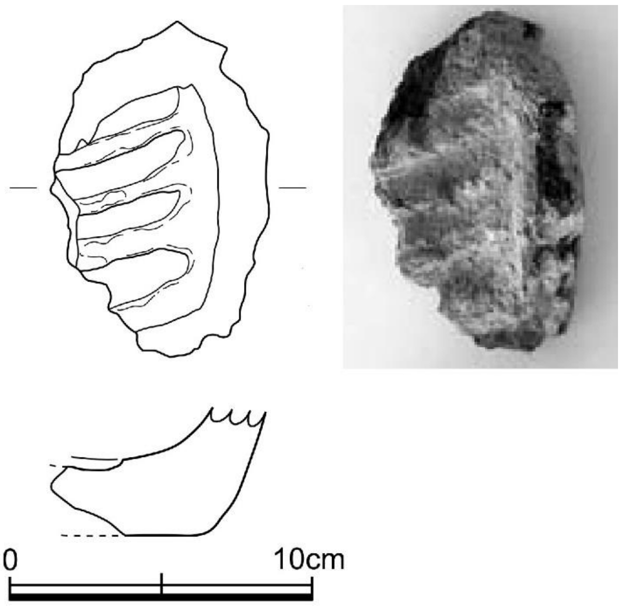


Shard 34: Kurban Hoyuk (Algaze 1990, pl.15)

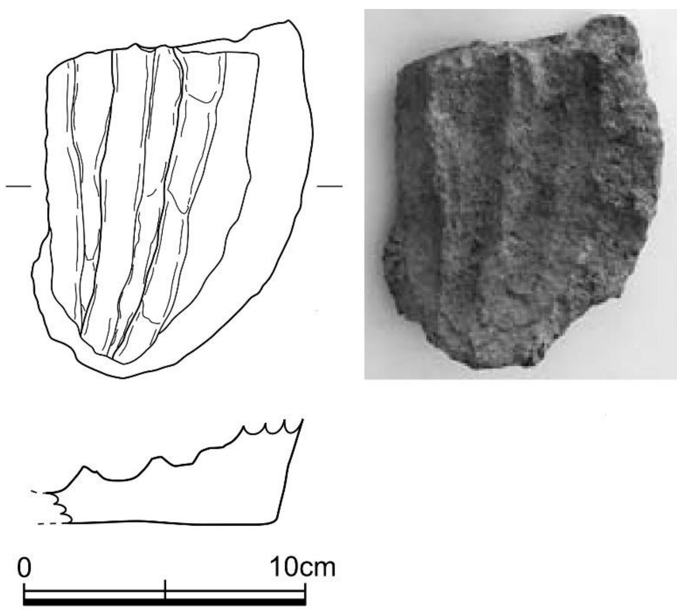


Shard 35: Kurban Hoyuk (Algaze 1990, pl.9)

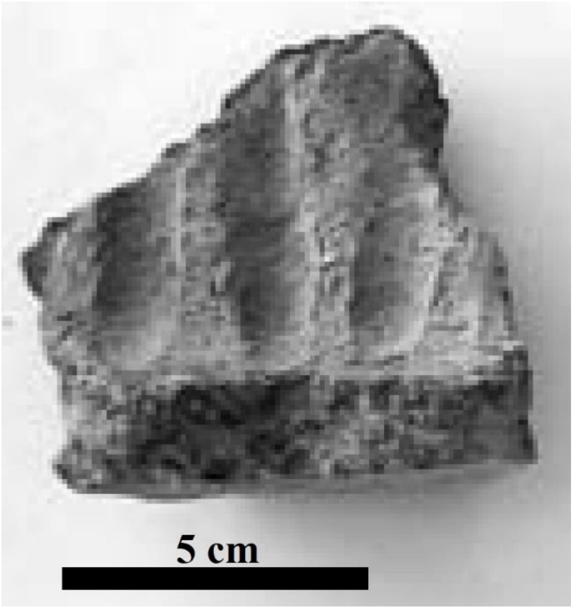
SALAT CAMI YANI



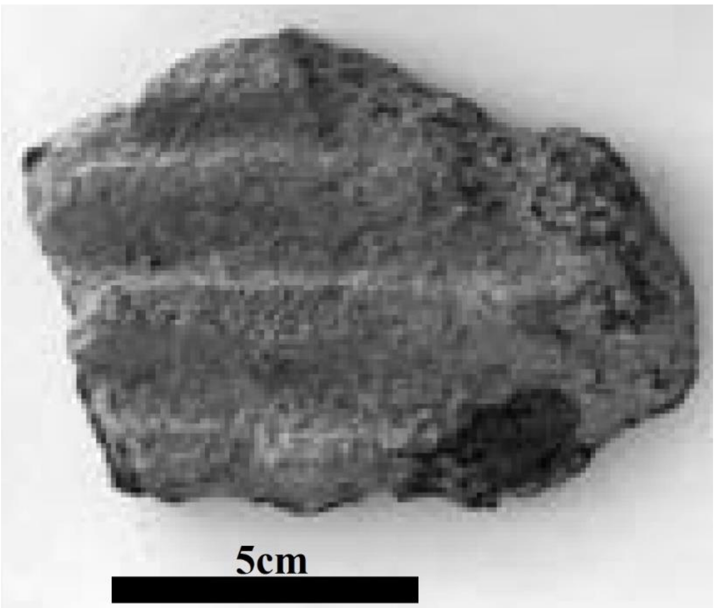
Shard 36: Salat Cami Yani (Miyake 2013, p.178 fig. 5.16; Miyake 2010, p.427 fig. 5.10; Miyake 2007, p.293 fig. 6)



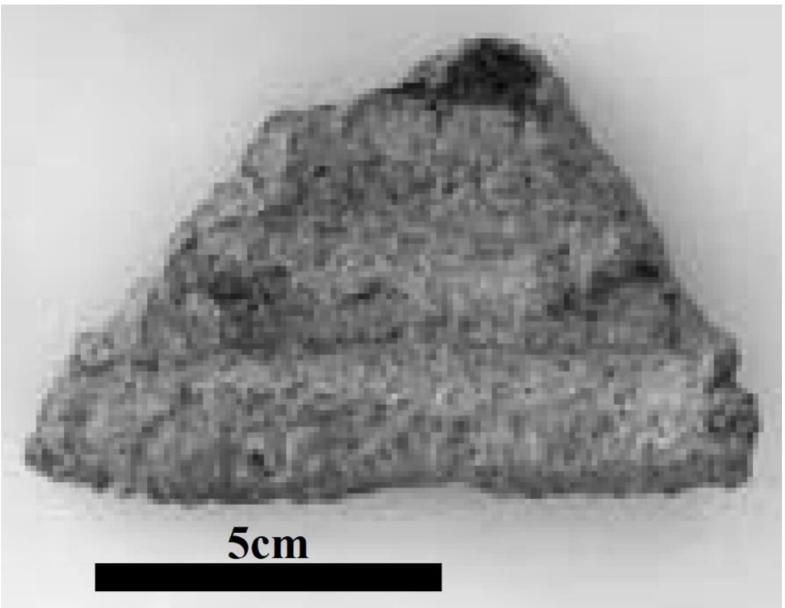
Shard 37: Salat Cami Yani (Miyake 2013, p.178 fig. 5.17; Miyake 2007, p.293 fig. 6)



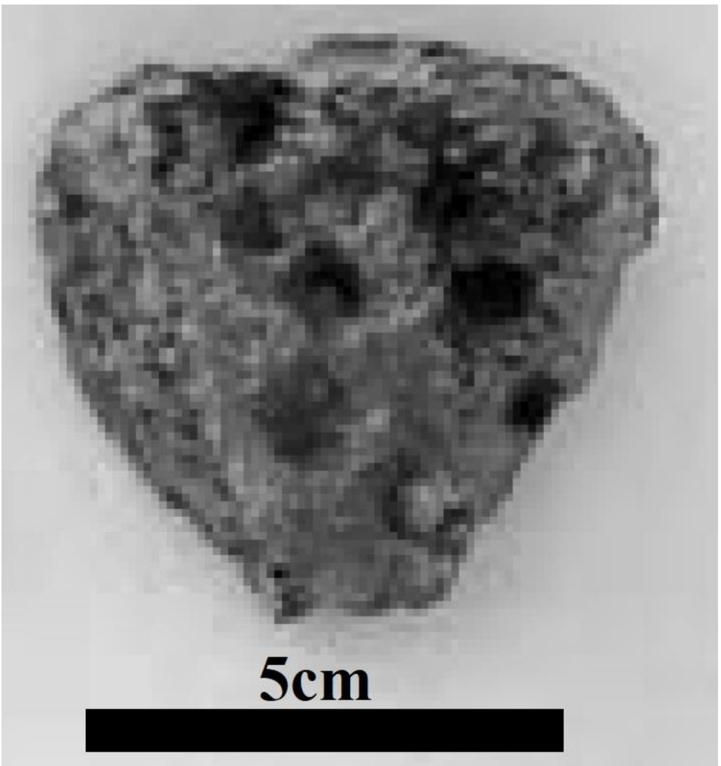
Shard 38: Salat Cami Yani (Miyake 2007, p.293 fig. 6)



Shard 39: Salat Cami Yani (Miyake 2007, p.293 fig. 6)



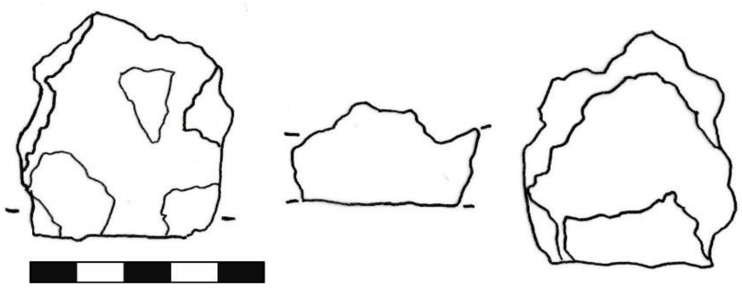
Shard 40: Salat Cami Yani (Miyake 2007, p.293 fig. 6)



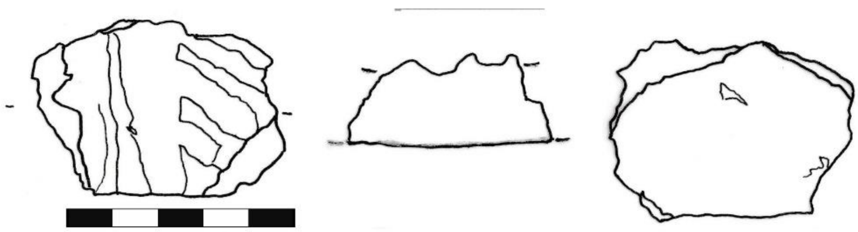
Shard 41: Salat Cami Yani (Miyake 2007, p.293 fig. 6)

EUPHRATES VALLEY AREA

AKARÇAY



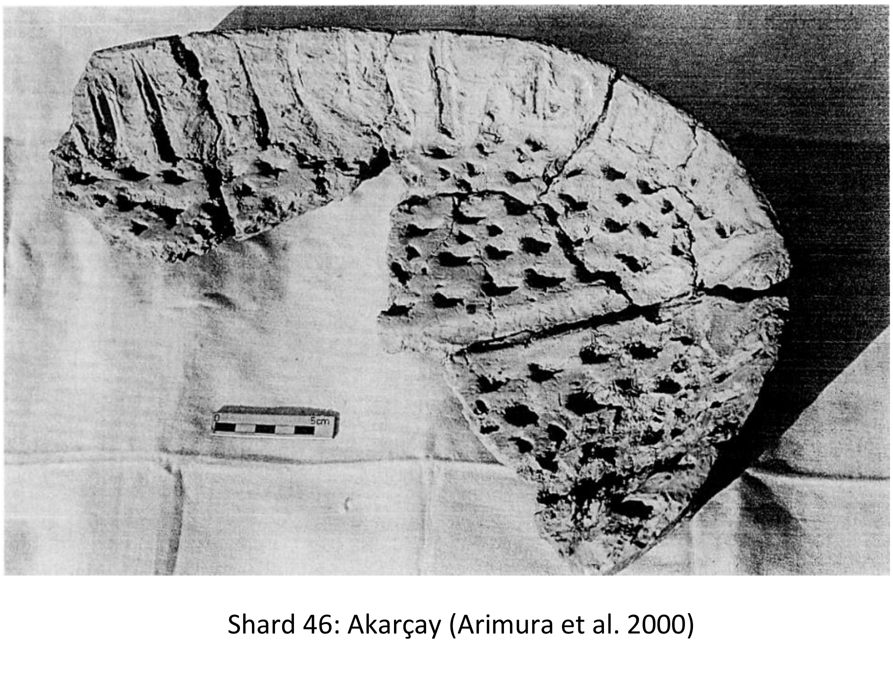
Shard 42: AKA 16 (drawing by the author, made available by M. Le Miere)



Shard 43: AKA 17 (drawing by the author, made available by M. Le Miere)

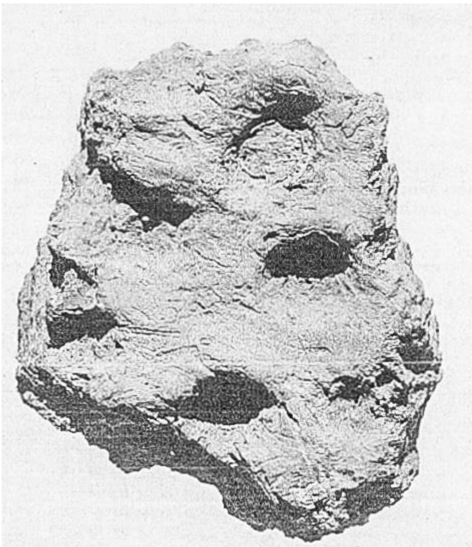
Shard 44: AT 01 26 5 10 (photo author, made available by M. Özbasaran)

Shard 45: AT 99j KH 38 (photo author, made available by M. Özbasaran)

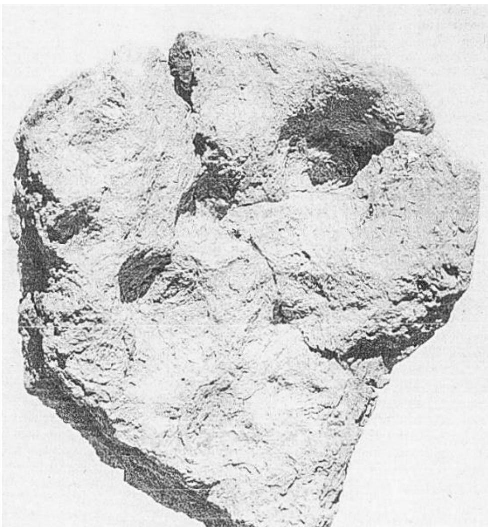


Shard 46: Akarçay (Arimura et al. 2000)

Shard 47: Akarçay (Arimura et al. 2000)

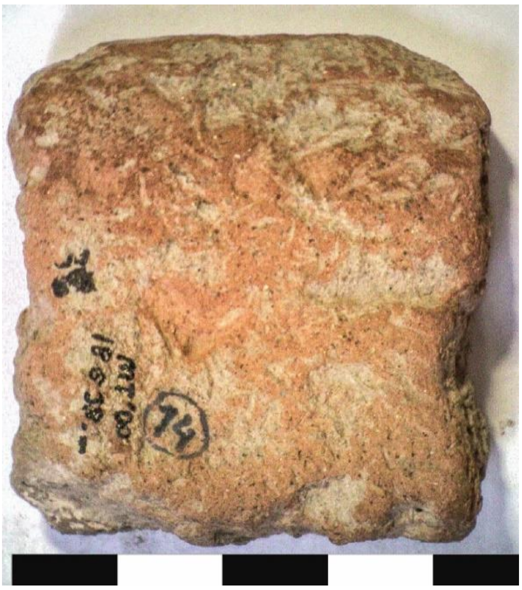


Shard 48: Akarçay (Arimura et al. 2000)



Shard 49: Akarçay (Arimura et al. 2000)

MEZRAA TELEILAT



Shard 50: MT 14 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 51: MT 19 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 52: MT 24 (photo by the author, courtesy of the Mezraa Teleilat team)

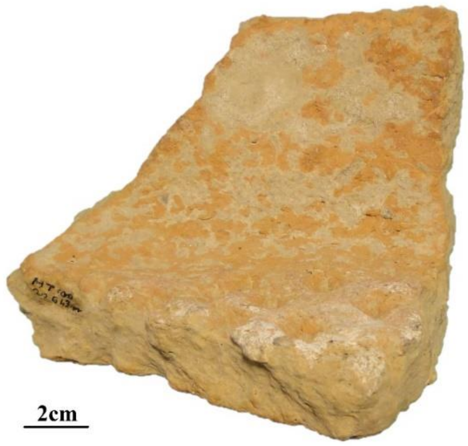
Shard 53: MT 27 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 54: MT 28 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 55: MT 39 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 56: MT 40 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 57: MT 61 (photo by the author, courtesy of the Mezraa Teleilat team)



Shard 58: MT 62 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 59: MT 69 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 60: MT 74 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 61: MT 76 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 62: MT 85 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 63: MT 94 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 64: MT 96 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 65: MT 103 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 66: MT 107 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 67: MT 110 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 68: MT 111 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 69: MT 112 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 70: MT 124 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 71: MT 126 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 72: MT 128 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 73: MT 131 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 74: MT 135 (photo by the author, courtesy of the Mezraa Teleilat

Shard 75 :MT 136 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 76: MT 137 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 77: MT 141 (photo by the author, made available by M. Özdogan)

Shard 78: MT 152 (photo by the author, made available by M. Özdogan)

Shard 79: MT 157 (photo by the author, made available by M. Özdogan)

Shard 80: MT 158 (photo by the author, made available by M. Özdogan)

Shard 81: MT 160 (photo by the author, made available by M. Özdogan)

Shard 82: MT 162 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 83: MT 163 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 84: MT 164 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 85: MT 165 (photo by the author, courtesy of the Mezraa Teleilat team)

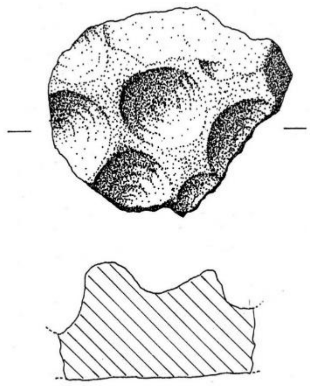
Shard 86: MT 166 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 87: MT 167 (photo by the author, courtesy of the Mezraa Teleilat team)

Shard 88: MT 168 (photo by the author, courtesy of the Mezraa Teleilat team)

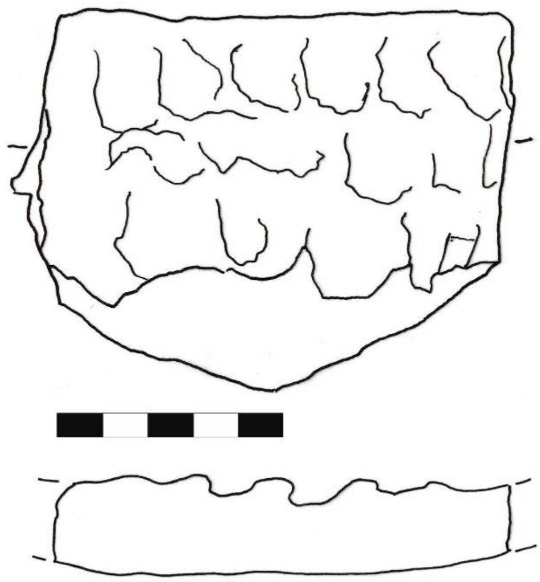
Shard 89: MT 170 (photo by the author, courtesy of the Mezraa Teleilat team)

TELL HALULA



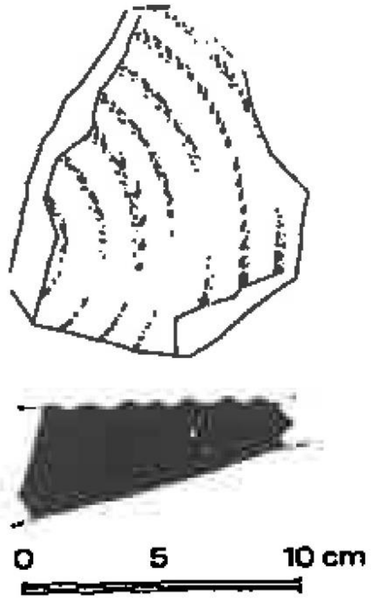
Shard 90: Tell Halula prehalaf (Faura 2013, p.35 fig. 8.28)

Shard 91: Tell Halula protohalaf (Cruells 2013 p.178 lam. 20)



Shard 92: HAL sup. (drawing by the author, courtesy of the Tell Halula team).

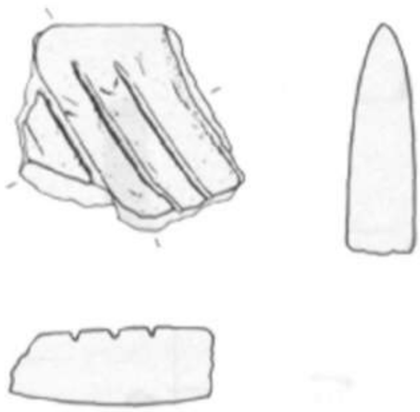
TELL TURLU



Shard 93: Tell Turlu (Breniquet 1991 p.33 fig. 14.22)

BALIKH

SABI ABYAD

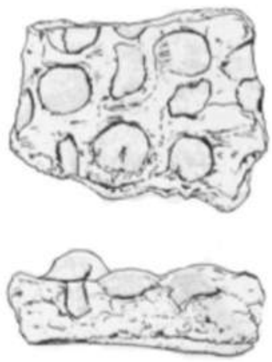


1:1

Shard 94: Tell Sabi Abyad (Akkermans 1989, p.177 fig. IV.10.78)

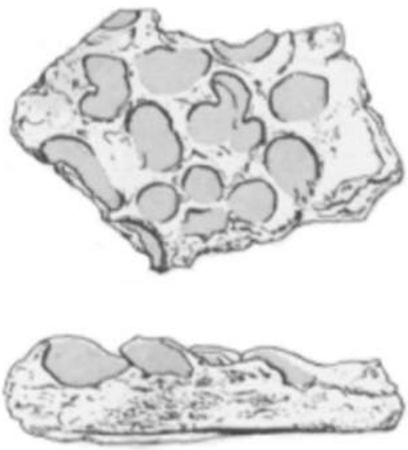
1:1

Shard 95: Tell Sabi Abyad (Akkermans 1989, p.177 fig. IV.10.79)



1:1

Shard 96: Tell Sabi Abyad (Akkermans 1989, p.177 fig. IV.10.80)



1:1

Shard 97: Tell Sabi Abyad (Akkermans 1989, p.177 fig. IV.10.81)

Shard 98: Tell Sabi Abyad (Le Miere - Nieuwenhuyse 1996, p.281 fig. 3.57)

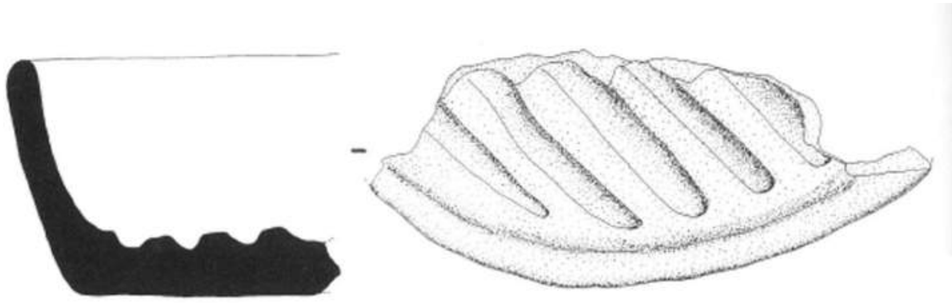
Shard 99: Tell Sabi Abyad (Le Miere - Nieuwenhuyse 1996, p.281 fig. 3.57.3)

Shard 100: Tell Sabi Abyad (Le Miere - Nieuwenhuyse 1996, p.281 fig. 3.57.4)

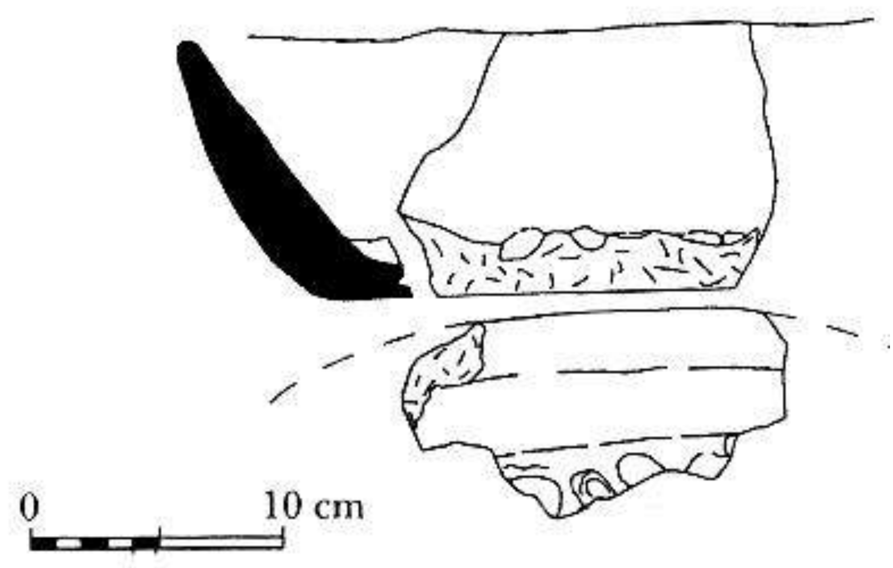
Shard 101: Tell Sabi Abyad (Le Miere - Nieuwenhuyse 1996, p.281 fig. 3.57.5)

Shard 102: Tell Sabi Abyad (Le Miere - Nieuwenhuyse 1996, p.281 fig. 3.57.6)

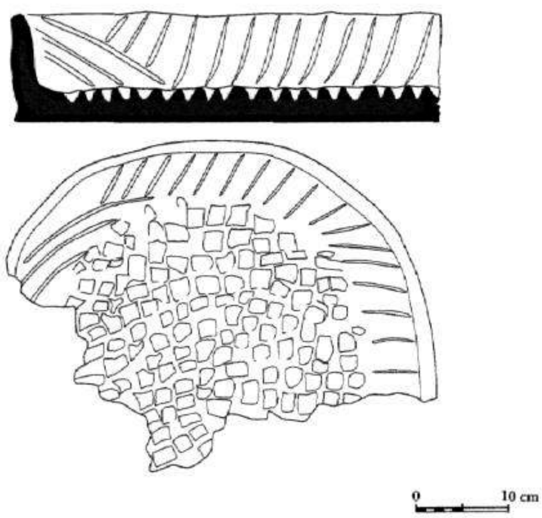
Shard 103: Tell Sabi Abyad (Le Miere - Nieuwenhuyse 1996, p.240 fig. 3.16.1)



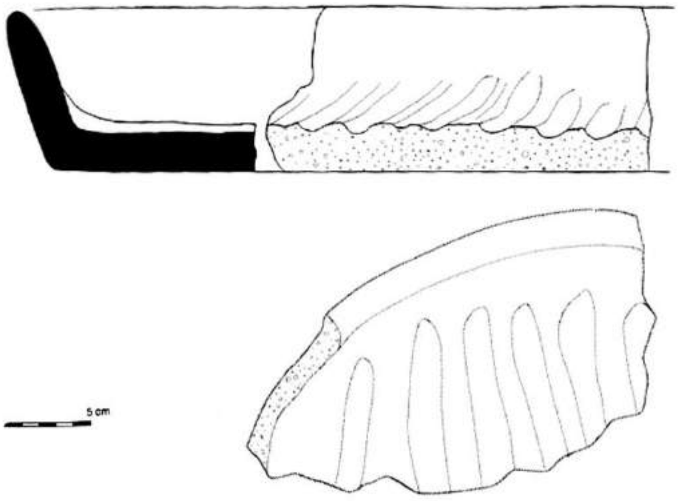
Shard 104: Tell Sabi Abyad (Le Miere -Nieuwenhuyse 1996, p.240 fig. 3.16.2)



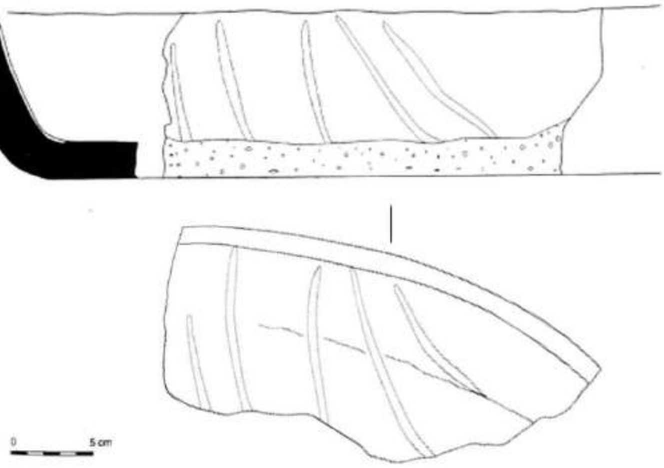
Shard 105: Tell Sabi Abyad (Akkermans et al. 2006, p.139 fig. 12n)



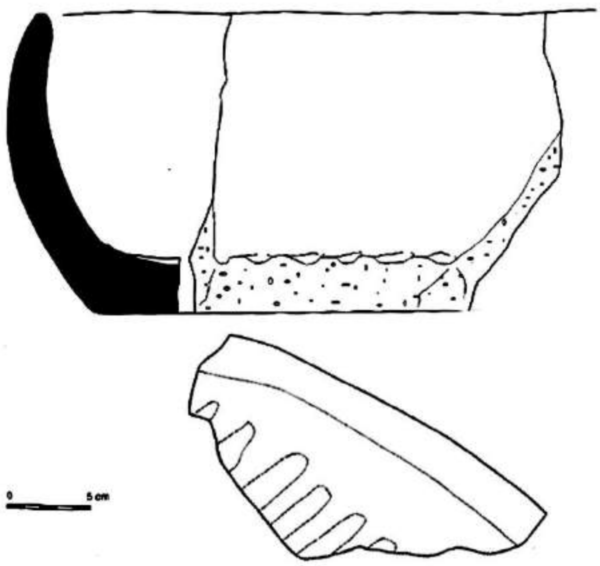
Shard 106: Tell Sabi Abyad (Akkermans et al., P.152 fig. 23a)



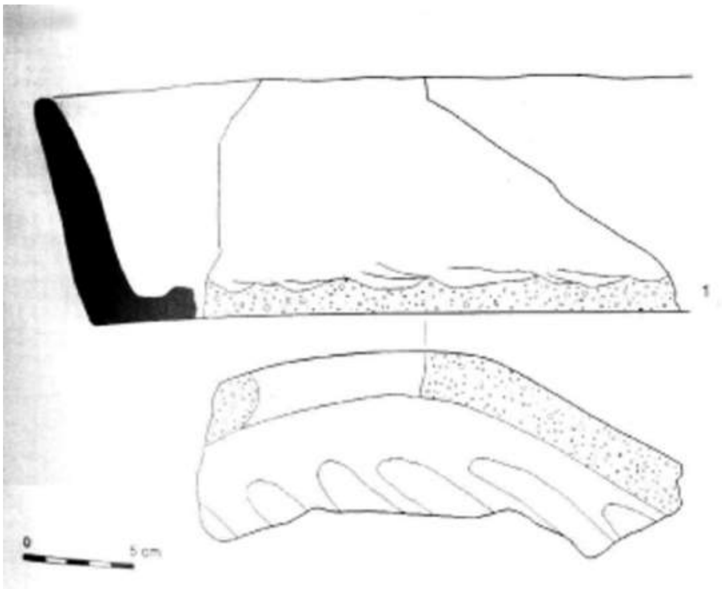
Shard 107: Tell Sabi Abyad (Nieuwenhuyse 2007, p.333 fig. 15.1)



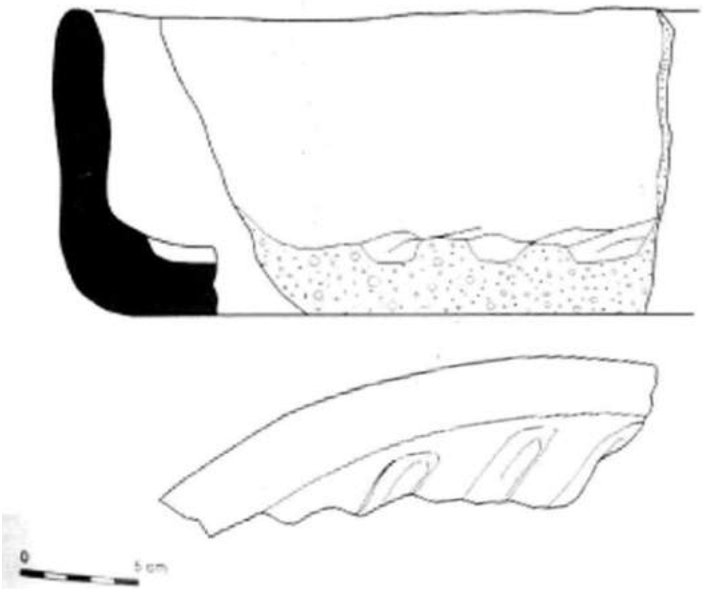
Shard 108: Tell Sabi Abyad (Nieuwenhuyse 2007, p.333 fig.< 15.2)



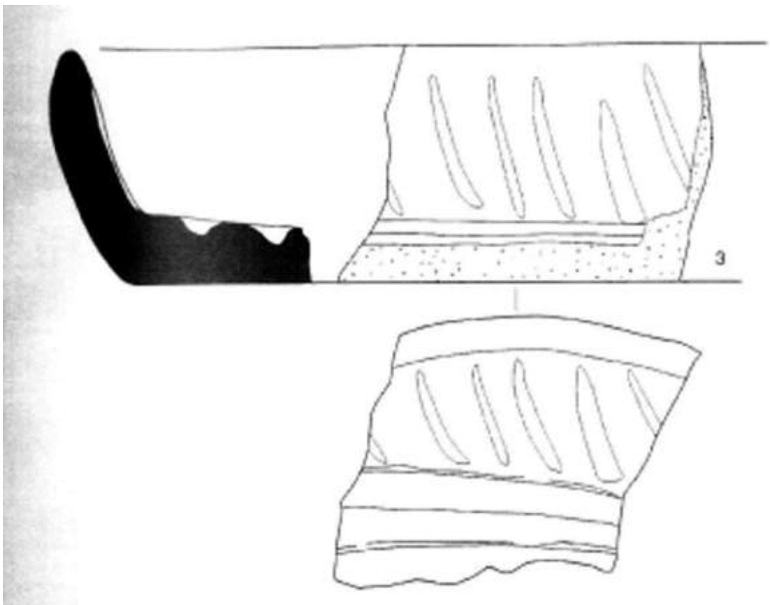
Shard 109: Tell Sabi Abyad (Nieuwenhuyse 2007, p.333 fig, 15.3)



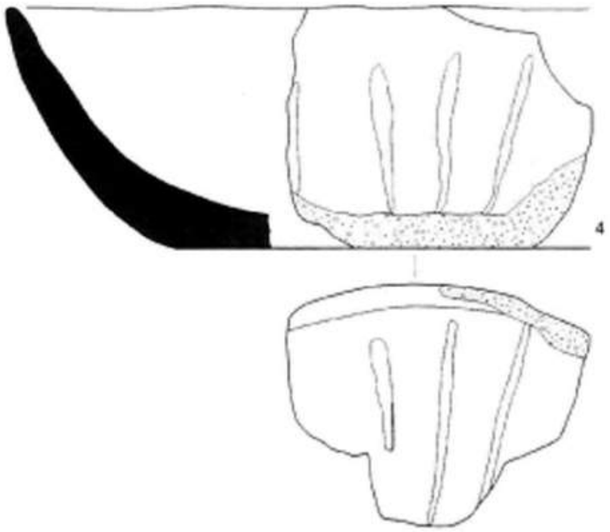
Shard 110: Tell Sabi Abyad (Nieuwenhuyse 2007, p.335 fig. 16.1)



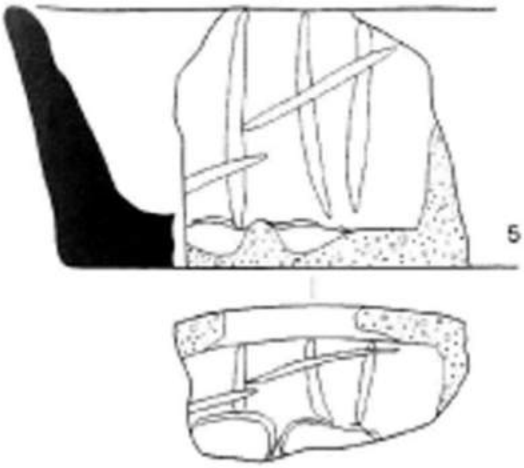
Shard 111: Tell Sabi Abyad (Nieuwenhuyse 2007, p.335 fig. 16.2)



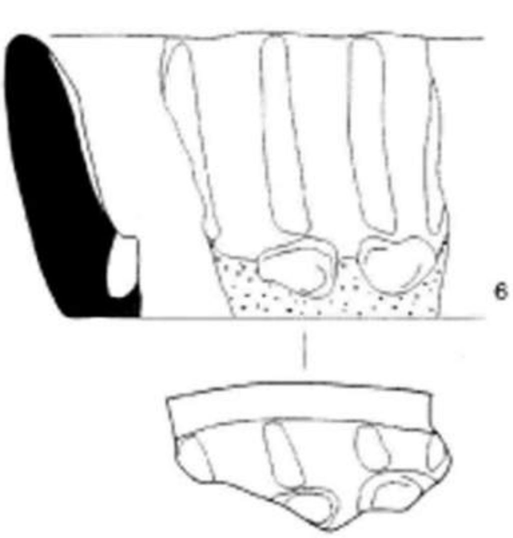
Shard 112: Tell Sabi Abyad (Nieuwenhuyse 2007, p.335 fig. 16.3)



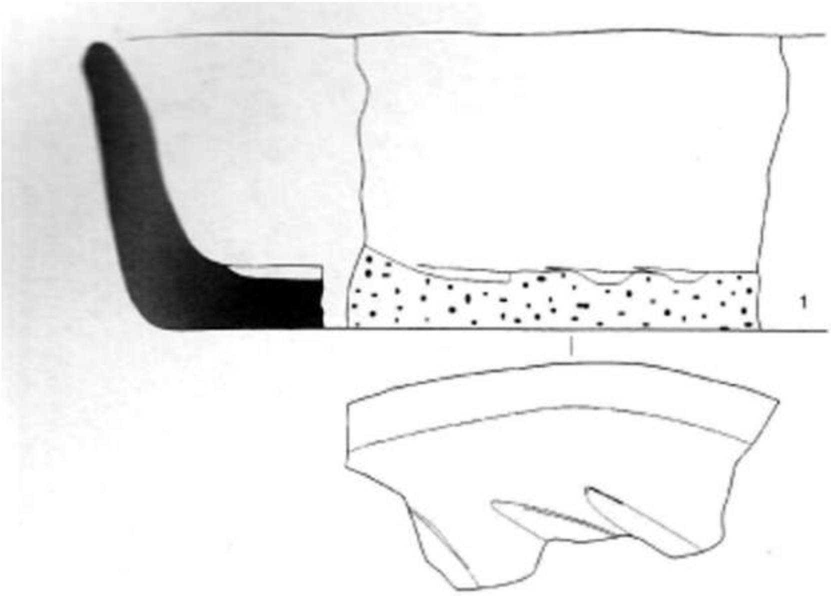
Shard 113: Tell Sabi Abyad (Nieuwenhuyse 2007, p.335 fig. 16.4)



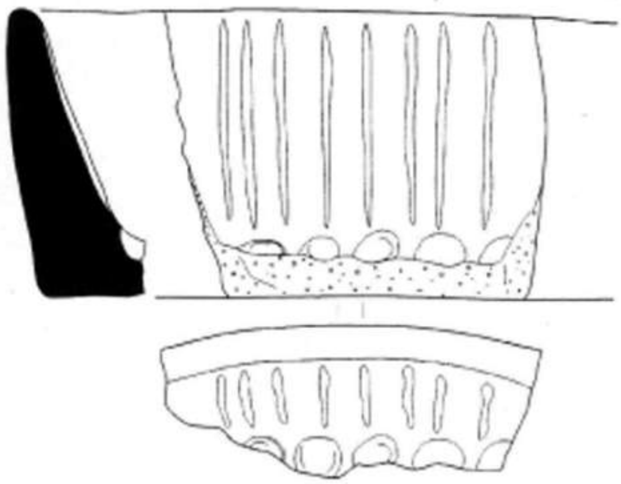
Shard 114: Tell Sabi Abyad (Nieuwenhuyse 2007, p.335 fig. 16.5)



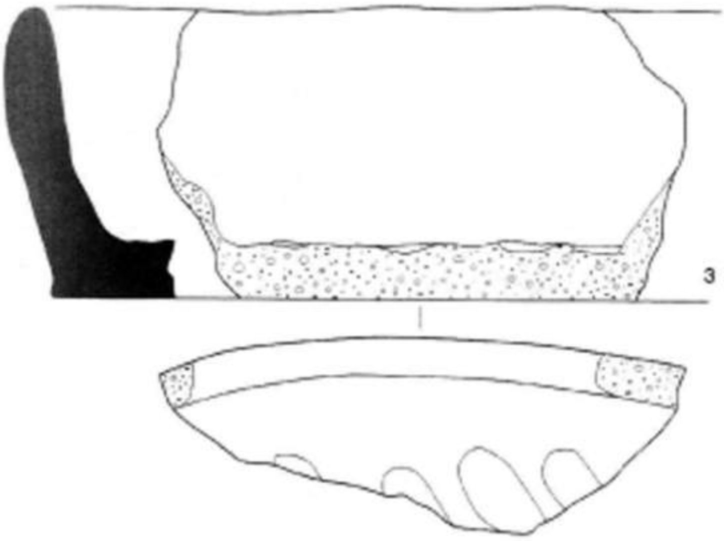
Shard 115: Tell Sabi Abyad (Nieuwenhuyse 2007, p.335 fig. 16.6)



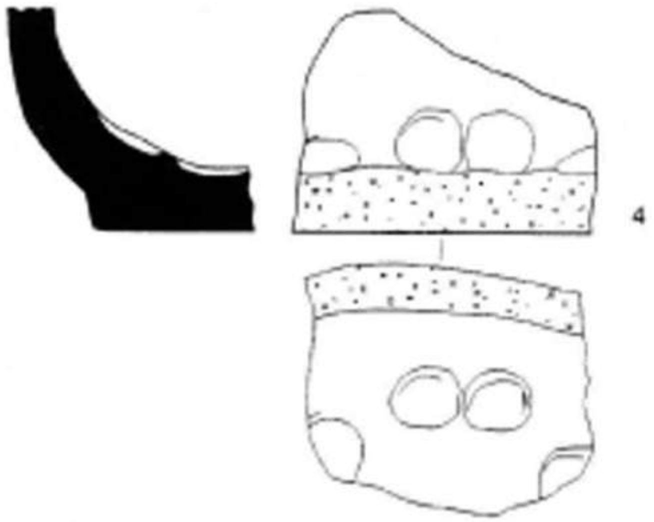
Shard 116: Tell Sabi Abyad (Nieuwenhuyse 2007, p.337 fig. 17.1)



Shard 117: Tell Sabi Abyad (Nieuwenhuyse 2007, p.337 fig. 17.2)

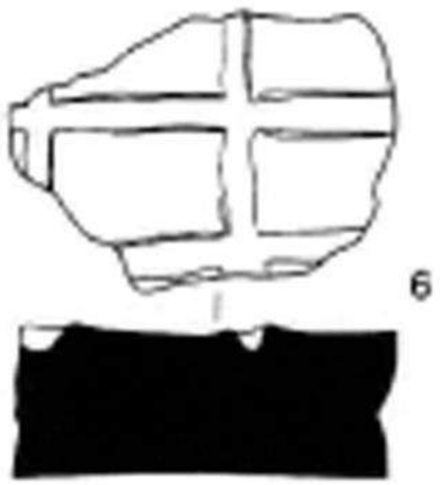


Shard 118: Tell Sabi Abyad (Nieuwenhuyse 2007, p.337 fig. 17.3)

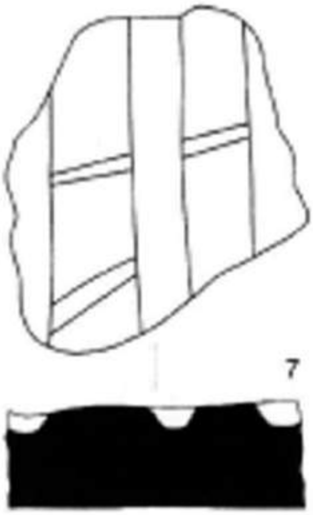


Shard 119: Tell Sabi Abyad (Nieuwenhuyse 2007, p.337 fig. 17.4)

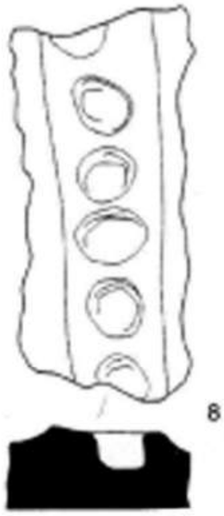
Shard 120: Tell Sabi Abyad (Nieuwenhuyse 2007, p.337 fig. 17.5)



Shard 121: Tell Sabi Abyad (Nieuwenhuyse 2007, p.337 fig. 17.6)

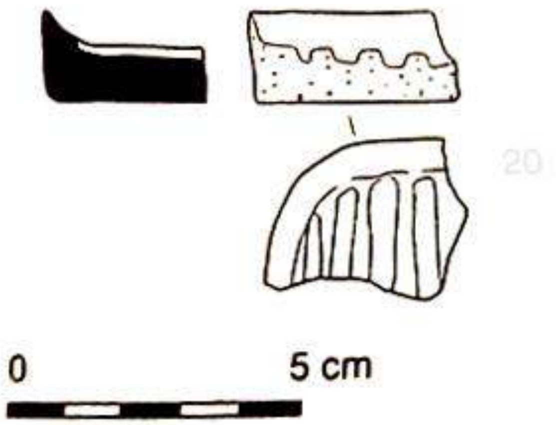


Shard 122: Tell Sabi Abyad (Nieuwenhuyse 2007, p.337 fig. 17.7)



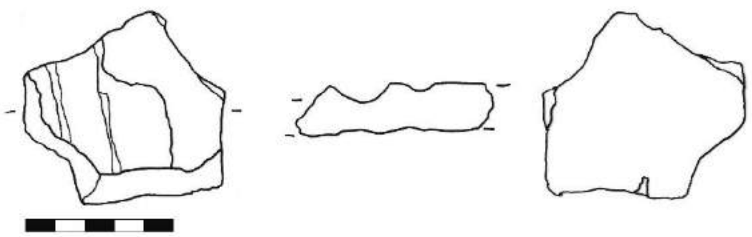
Shard 123: Tell Sabi Abyad (Nieuwenhuyse 2007, p.337 fig. 17.8)

Shard 124: Tell Sabi Abyad (Nieuwenhuyse 2007, p.337 fig. 17.9)



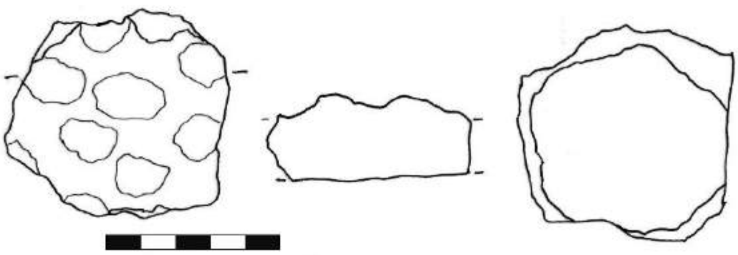
Shard 125: Tell Sabi Abyad (Nieuwenhuyse 2007, p. non ricordo)

Shard 126: SAB 88 (s) 12 120-5 (photo by the author, made available by M. Le Miere)

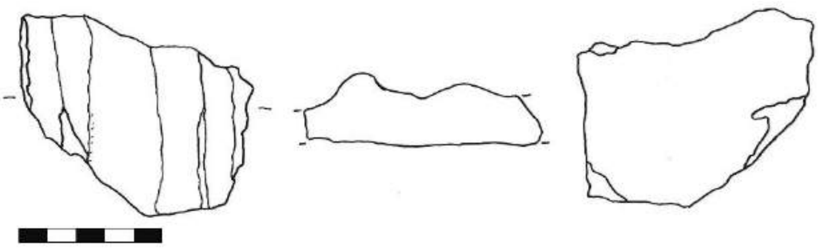


Shard 127: SAB 88 q14 50-24 (drawing by the author, made available by M. Le Miere)

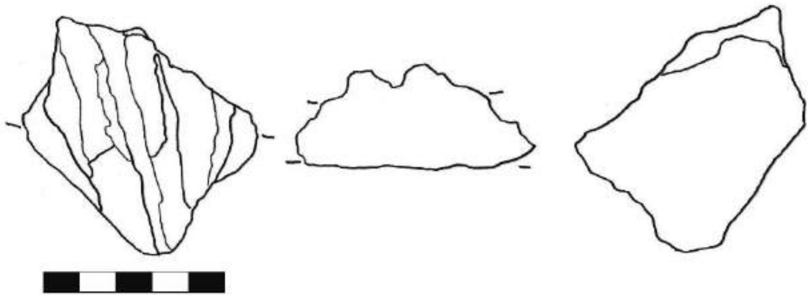
Shard 128: SAB 125 (photo by the author, made available by M. Le Miere)



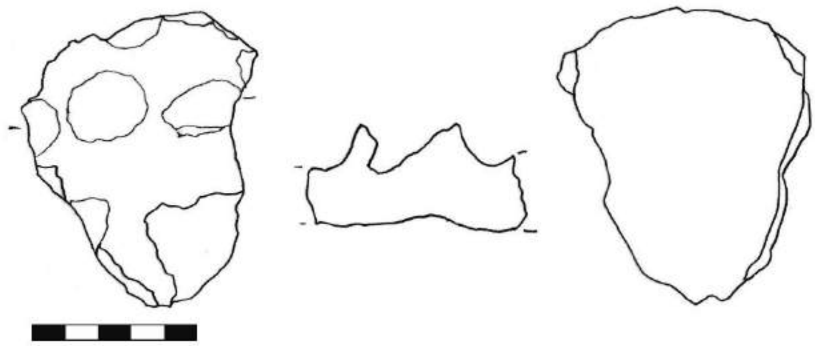
Shard 129: SAB 126 (drawing by the author, made available by M. Le Miere)



Shard 130: SBA 184 (drawing by the author, made available by M. Le Miere)



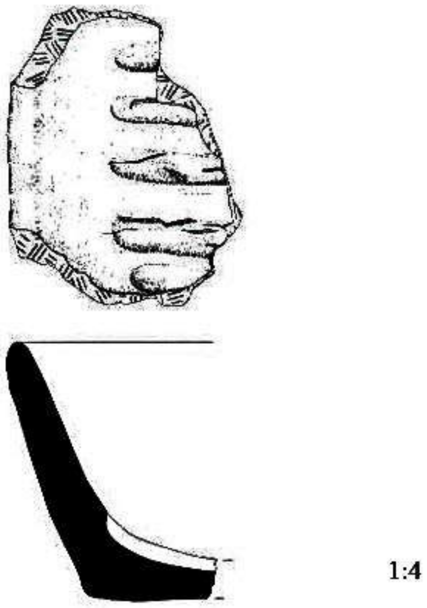
Shard 131: SBA88 q14 3-34 (drawing by the author, made available by M. Le Miere)



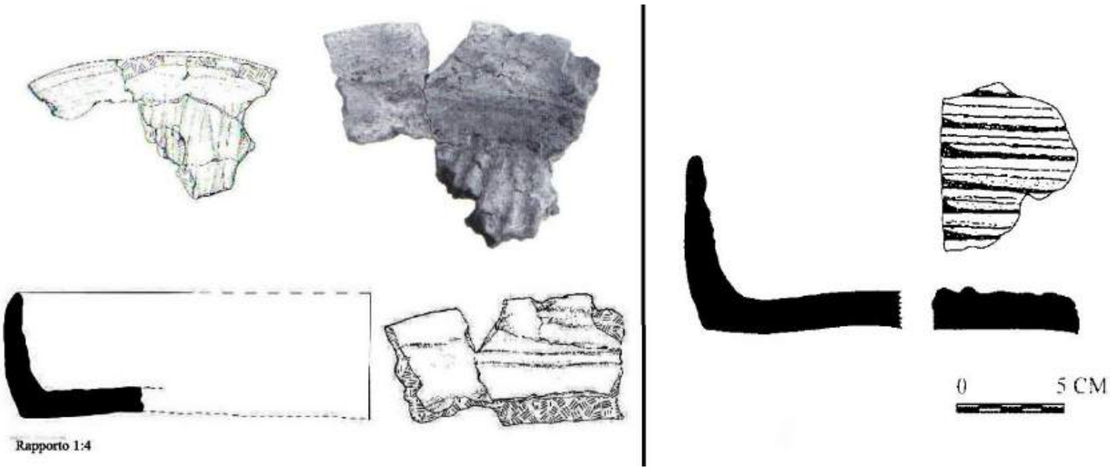
Shard 132: SAB 88 371 (drawing by the author, made available by M. Le Miere)

KHABUR

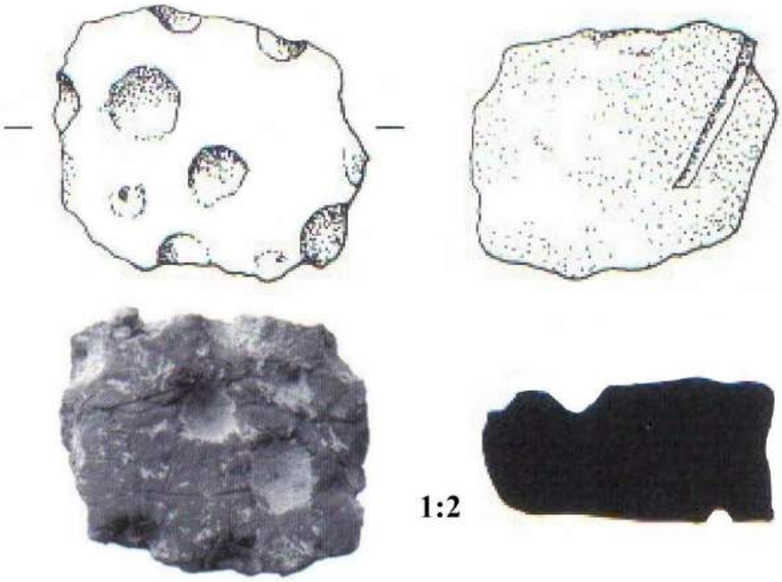
CHAGAR BAZAR



Shard 133: Chagar Bazar 3983 (Cruells 2006, Pl. 3.16)

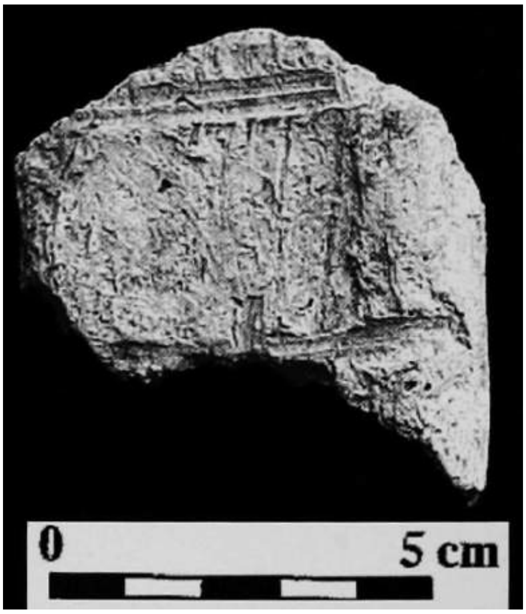


Shard 134: Chagar Bazar 4178 (Cruells 2006, Pl. 3.16; Cruells - Nieuwenhuyse 2004, p.55 fig. 7)

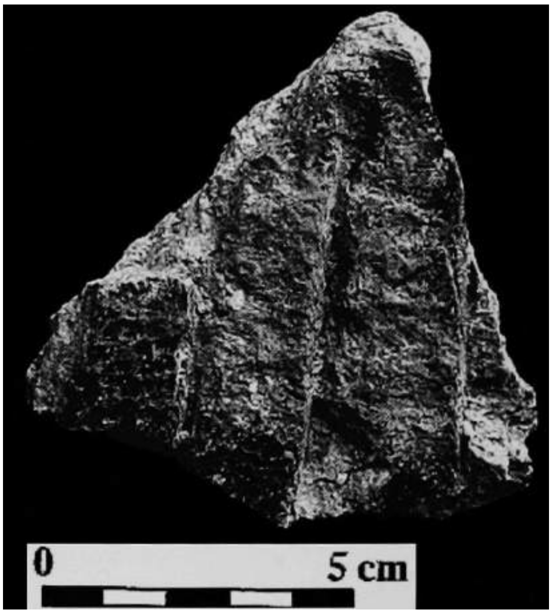


Shard 135: Chagar Bazar 1420 (Cruells 2006, Pl. 4.4)

KHANEKE



Shard 136: Khaneke (Le Miere 2000, p.146 Pl. VIIb)



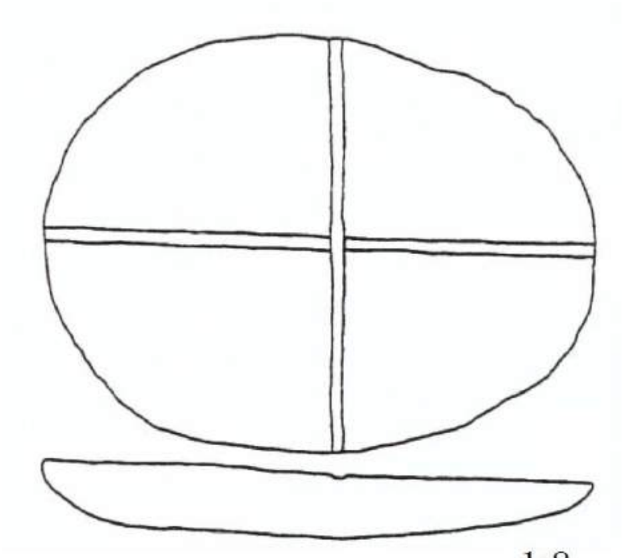
Shard 137: Khaneke (Le Miere 2000, p.146 Pl. VIIb)

Shard 138: Khaneke (Photo by the author, made available by M. Le Miere)

TELL ARBID ABYAD

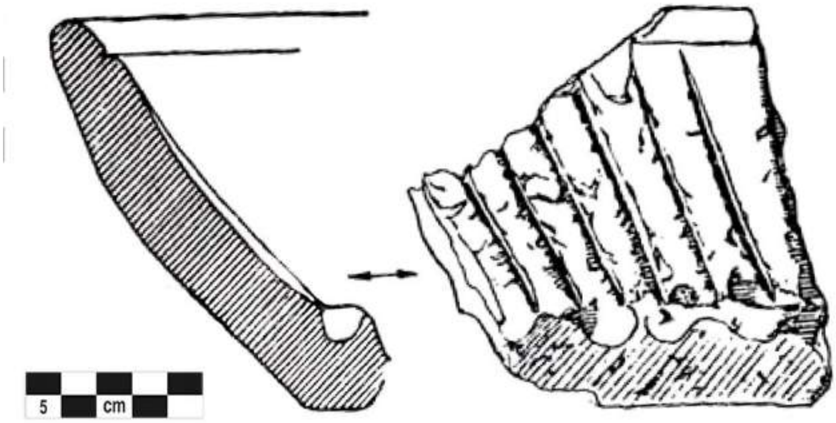
Shard 139: Tell Arbid Abyad (Mateiciucová et al. 2010)

TELL BOUEID



Sherd 140: tell boueid plaster disc (Suleiman - Nieuwenhuyse 1999, p.2 fig. 1.12)

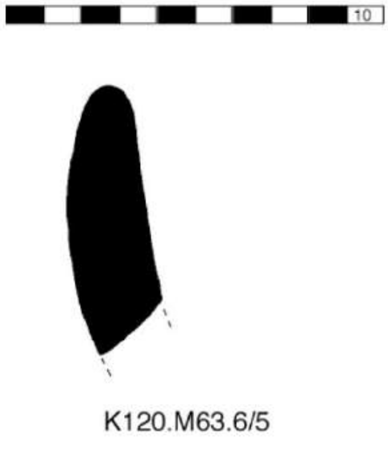
TELL HALAF



Sherd 141: Tell Halaf (Oppheneim and Schmidt 1943, 30, Text table 2).

TELL KASHKASHOK II

Sherd 142: Tell Kashkashok II (Gregg 2009, p.214 Fig. A.1.6.3.1)



Sherd 143: Tell Kashkashok II (Gregg 2009, p.214 Fig. A.1.6.3.1)

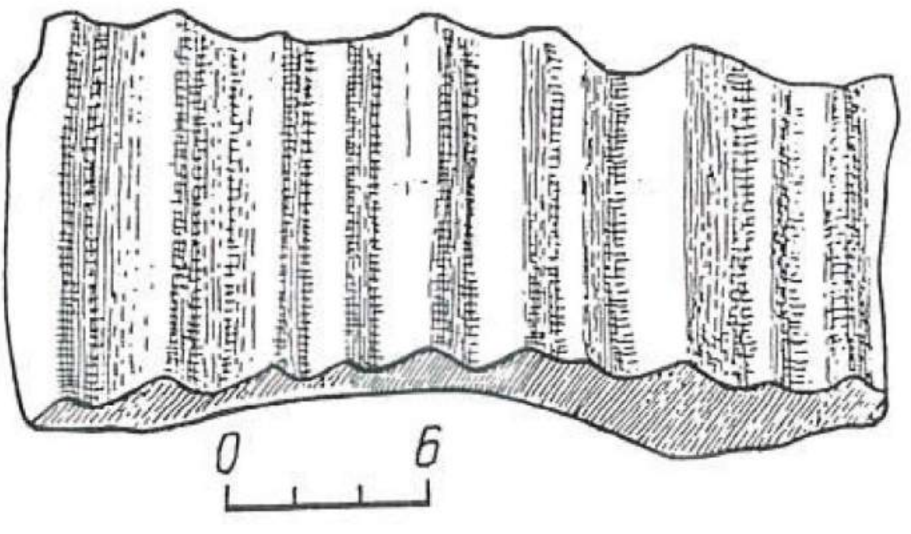
Sherd 144: Tell Kashkashok II Kak 15 (Photo by the Author, made available by M. Le Miere)

Sherd 145: Tell Kashkashok II (Matsutani 1981)

Sherd 146: Tell Kashkashok (Matsutani 1981)

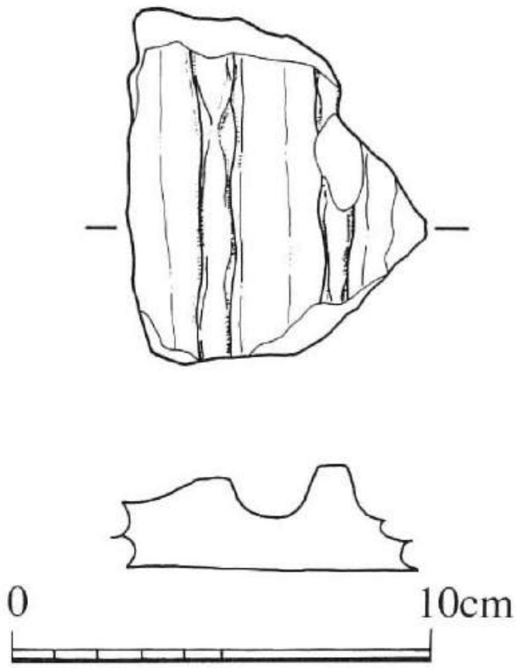
TELL KHAZNA II

Sherd 147: Tell Khazna (Photo by the author, made available by M. Le Miere)



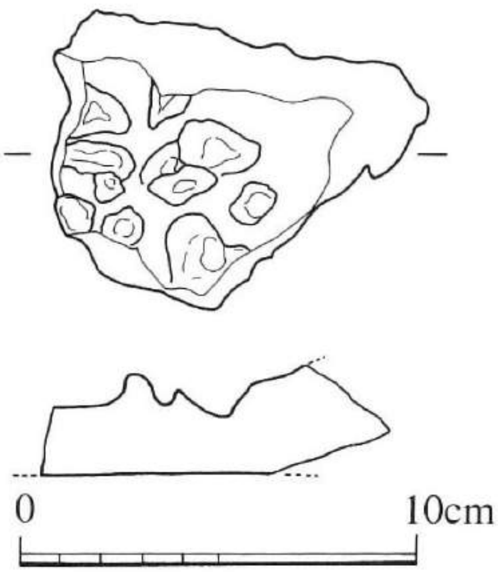
Sherd 148: Tell Khazna II p.9 (Munchaev Merpert 1994, fig. 4.5)

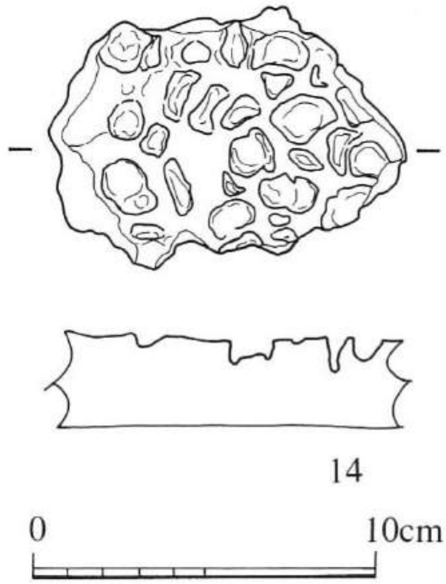
UMM QSEIR



Sherd 150: Umm Qseir (Miyake 1998, p.70 fig. 35.12)

Sherd 149: Umm Qseir (Miyake 1998, p.70 fig. 35.11)



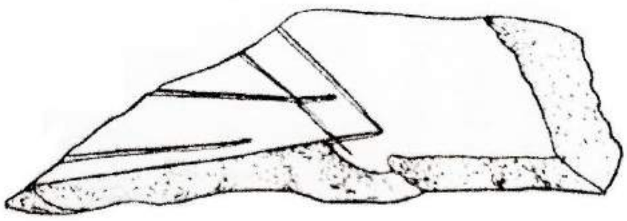


Sherd 151: Umm Qseir (Miyake 1998, p.70 fig. 35.13)

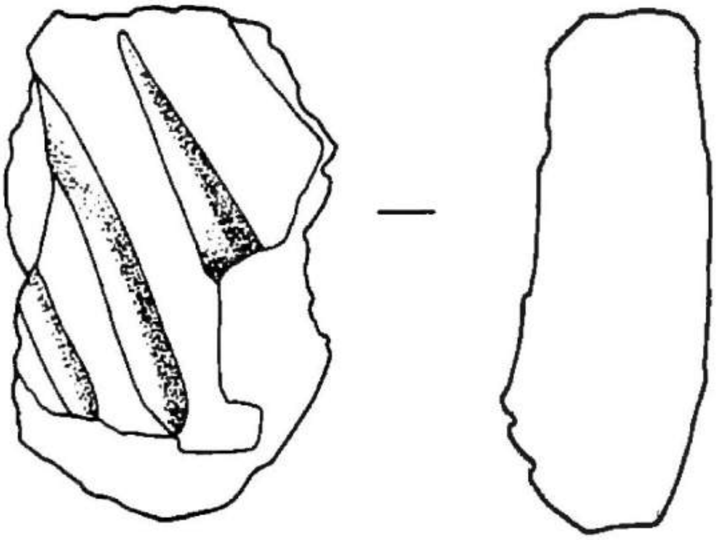
Sherd 152: Umm Qseir (Miyake 1998, p.70 fig.35.14)

TIGRIS VALLEY AREA

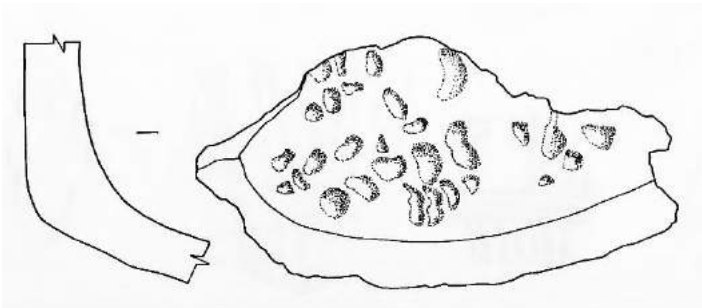
DIYAN



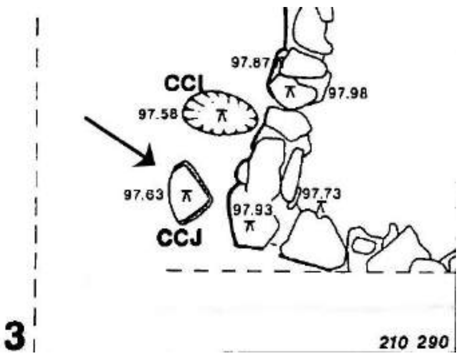
Shard 153: Diyan (Safar 1950)



Shard 154: Kharabeh Shattani (Baird et al. 1995, fig. 20.1)

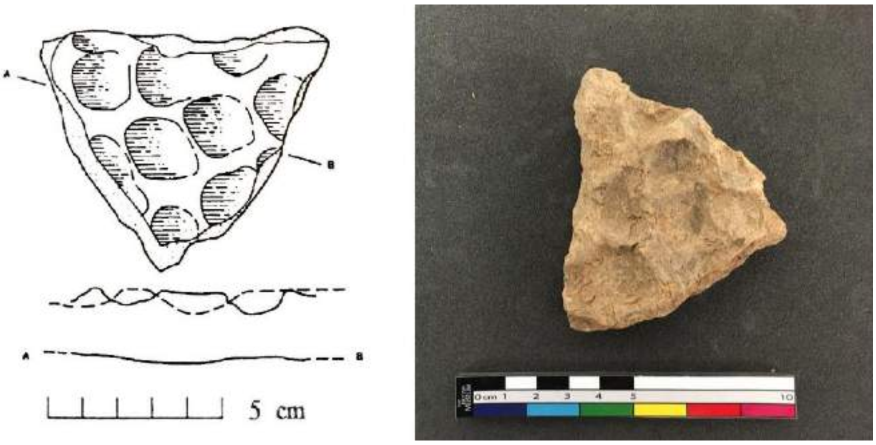


Shard 155: Kharabeh Shattani (Baird et al. 1995, fig. 20.4)

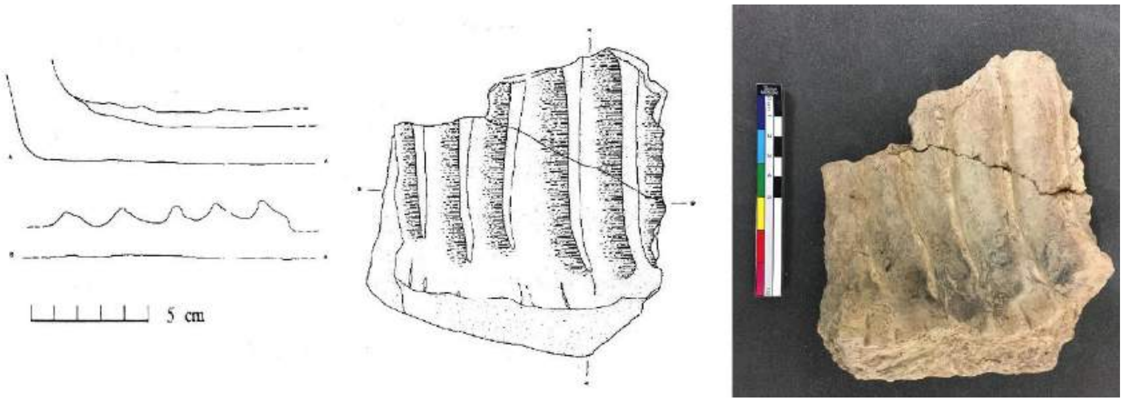


Shard 156: Plan of Proto Hassuna Period of Kharabeh Shattani (Baird et al 1995, fig. 3)

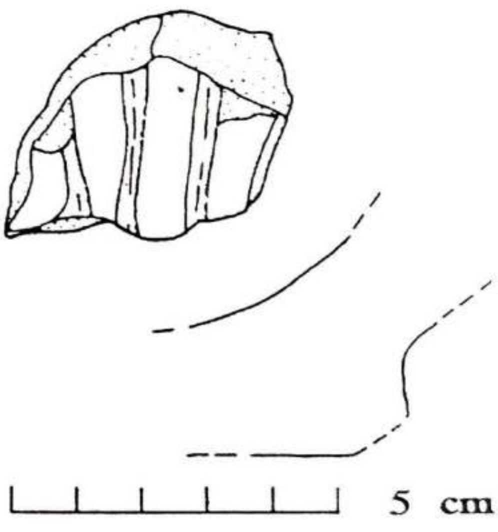
NINIVEH



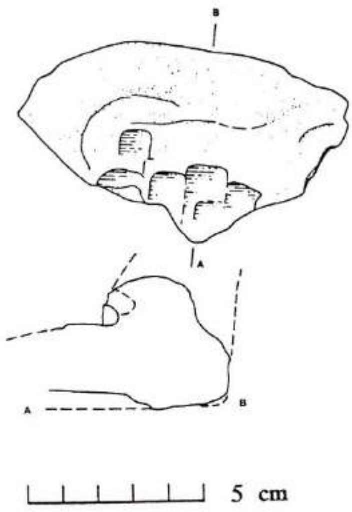
Shard 157: Niniveh (Gut 1995, fr. 58 © The Trustees of the British Museum)



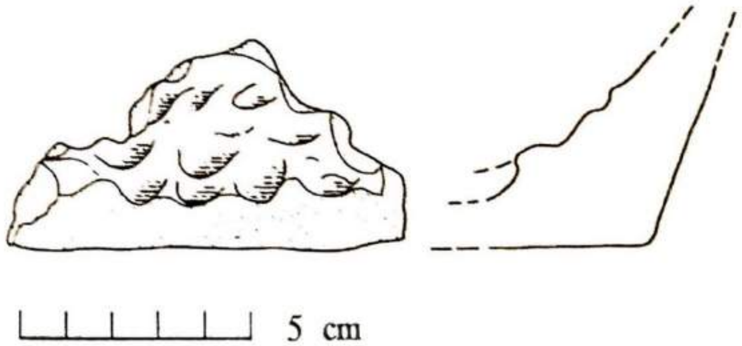
Shard 158: Niniveh (Gut 1995, fr. 55 © The Trustees of the British Museum).



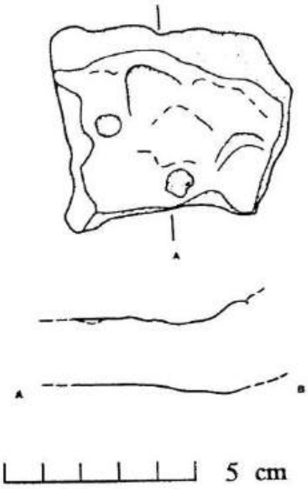
Shard 159: Niniveh (Güt 1995, fr. 62)



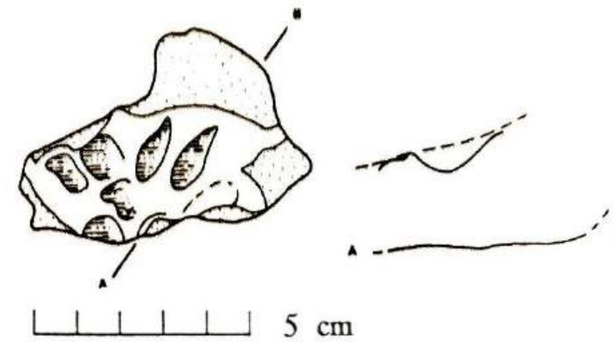
Shard 160: Niniveh (Güt 1995, fr. 61)



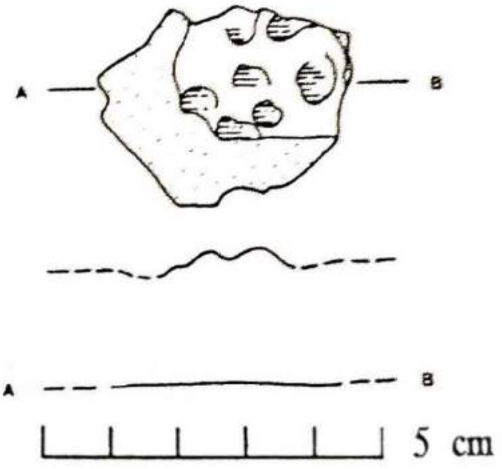
Shard 161: Niniveh (Güt 1995, fr. 56)



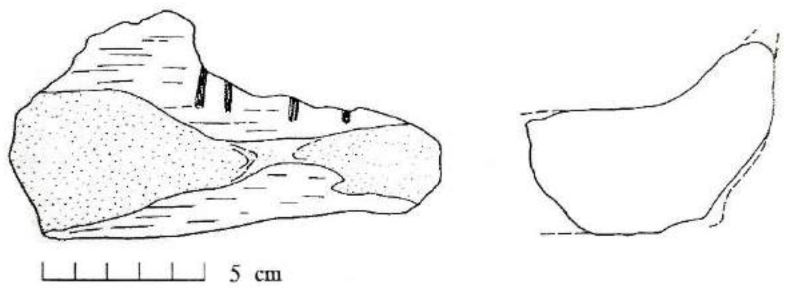
Shard 162: Niniveh (Güt 1995, fr. 60)



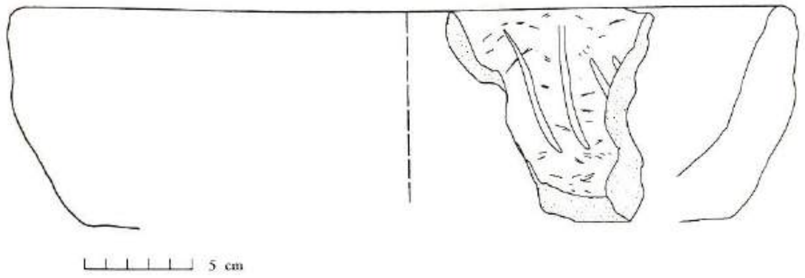
Shard 163: Niniveh (Güt 199,5 fr. 57)



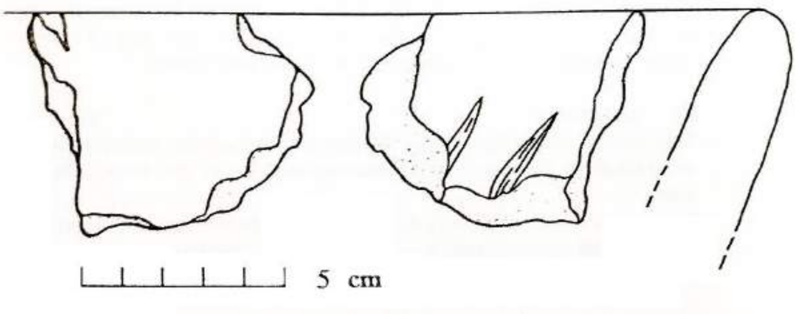
Sherd 164: Niniveh (Güt 1995, fr. 59)



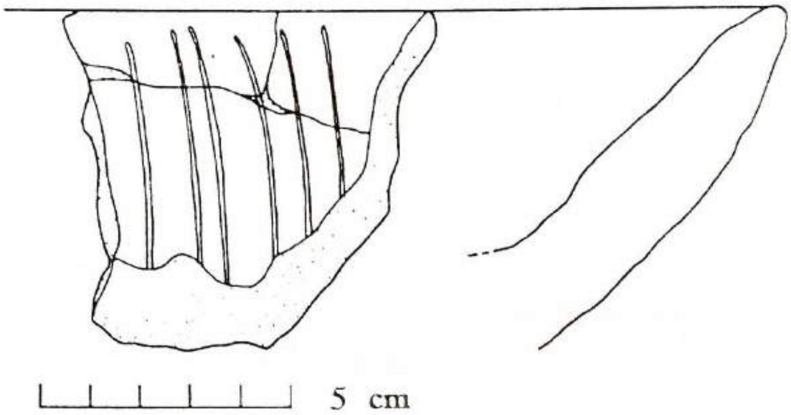
Shard 165: Niniveh (Güt 1995, fr. 63)



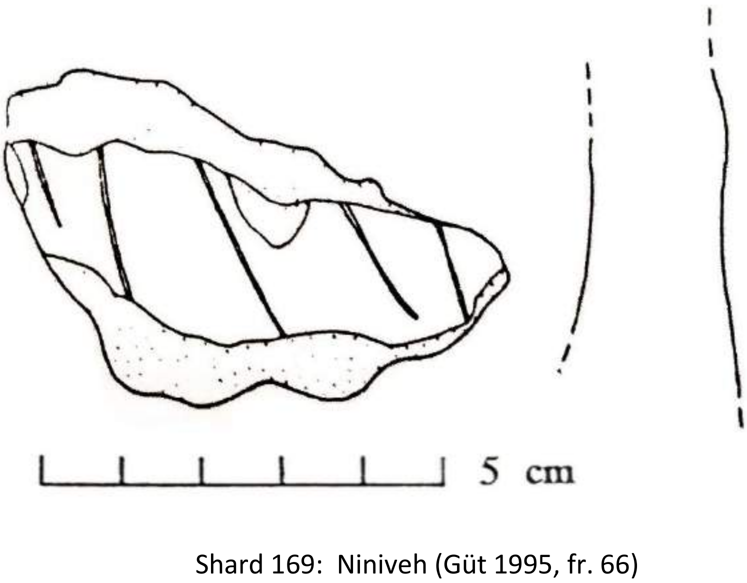
Shard 166: Niniveh (Güt 1995, fr. 64)



Shard 167: Niniveh (Güt 199,5 fr. 65)

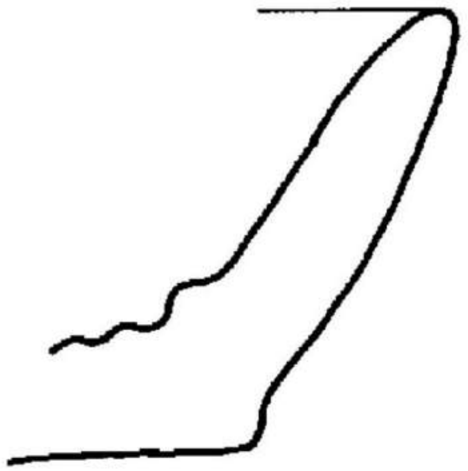


Shard 168: Niniveh (Güt 1995, fr. 67)



Shard 169: Niniveh (Güt 1995, fr. 66)

TELL AL-KHAN



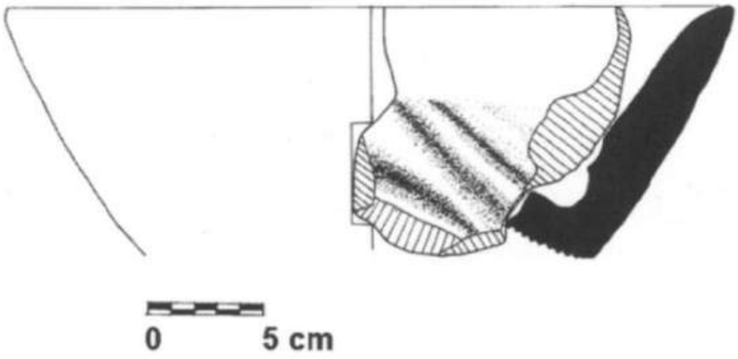
Shard 170: Tell al-Khan (Braid 83, Fig. 231, nº1)

Shard 171: Tell al-Khan (Braid 83, Fig. 231, nº2)

Shard 172: Tell al-Khan (Braid 83, Fig. 231, nº3)

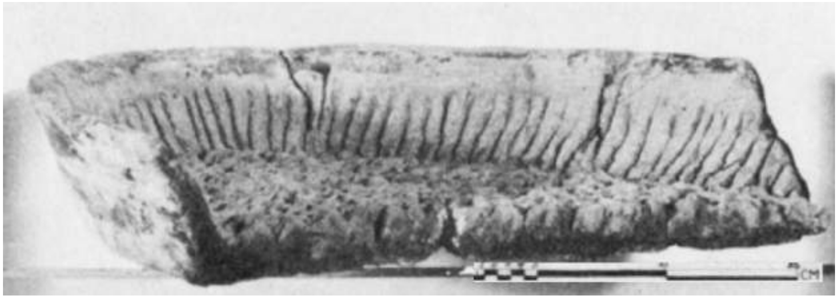
Shard 173: Tell al-Khan (Braid 83, Fig. 231, nº4)

TELL AL-UWAYNAT

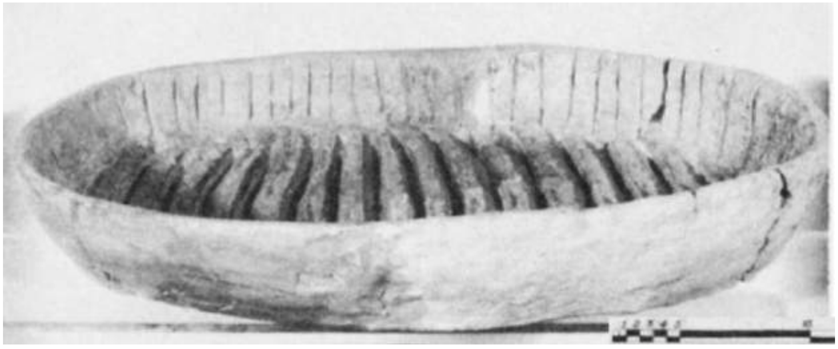


Shard 174: Uwaynat HT (ALTAWEEL 2007; 134, fig. 17.4)

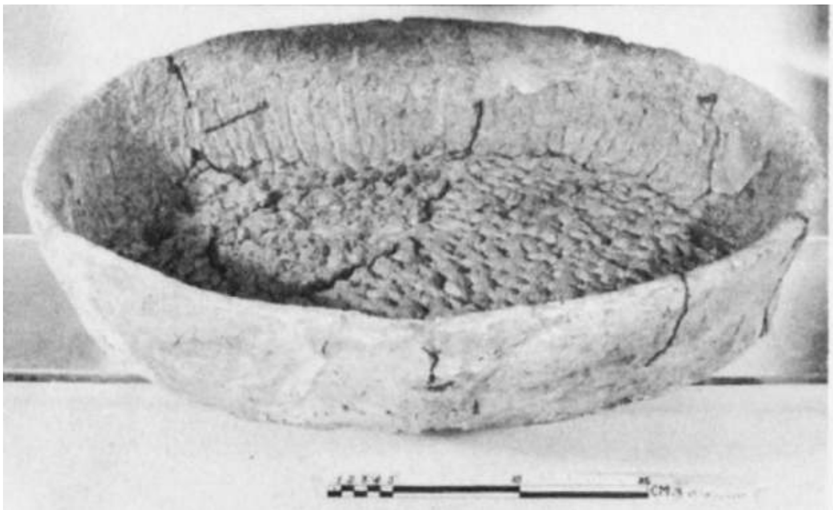
TELL HASSUNA



Shard 175: Ht Tell Hassuna (Lloyd et al 1945, Pl. XVIII 1)

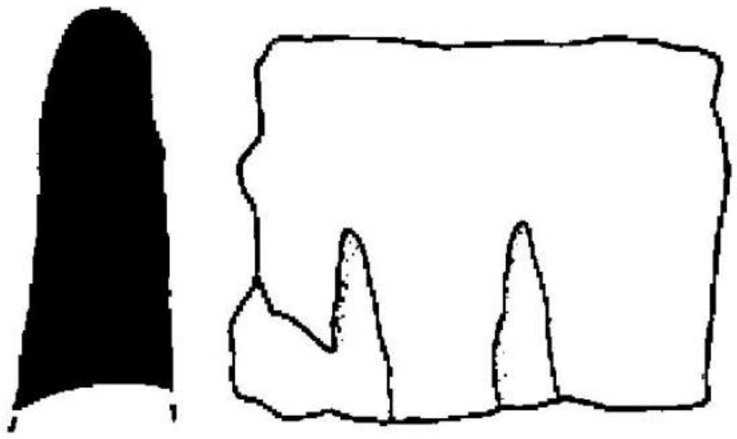


Shard 176: Ht Tell Hassuna (Lloyd et al 1945, Pl. XVIII 1)

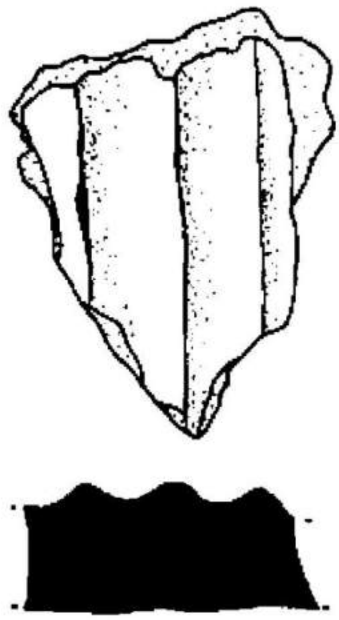


Shard 177: Ht Tell Hassuna (Lloyd et al 1945, Pl. XVIII 1)

TELL HELAWA AREA

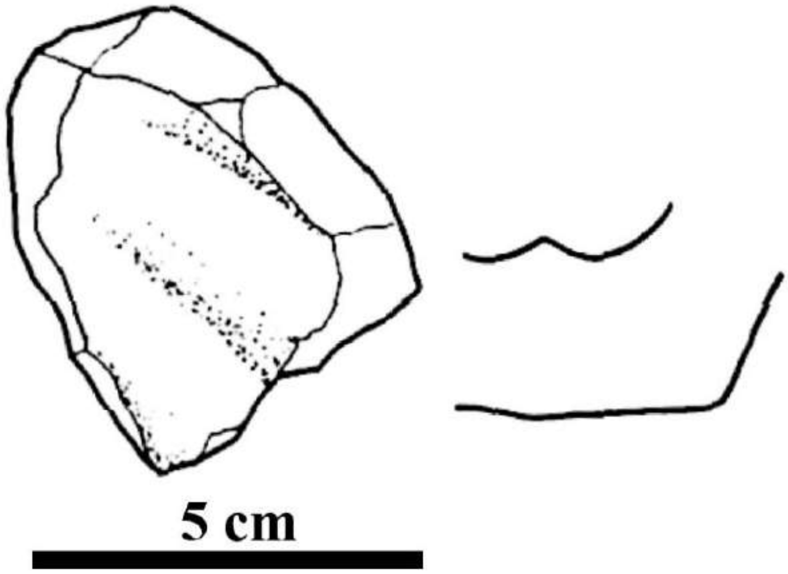


Shard 178: Tell Helawa area 1a5 (Ball et al. 1989, fig. 14.4)

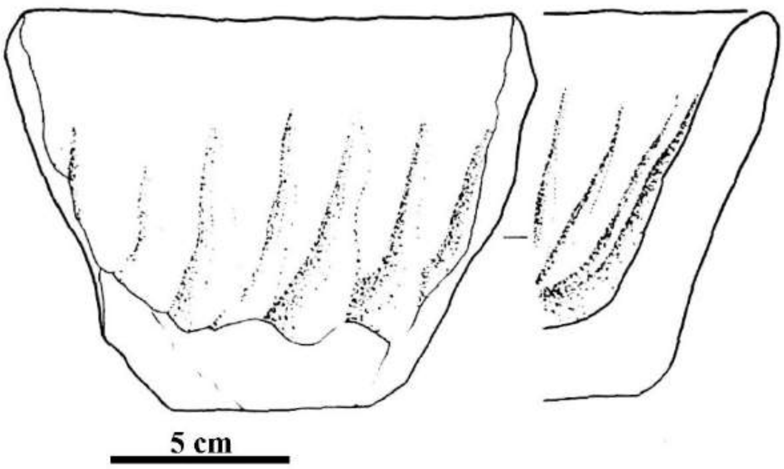


Shard 179: Tell Helawa area 1a5 (Ball et al. 1989, fig. 14.6)

TELL JIGAN



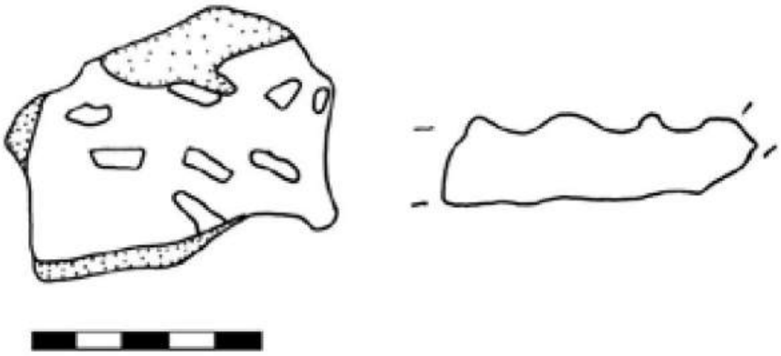
Shard 180: Tell Jigan hts - copia (Ii and Kawamata, fig. 7.79)



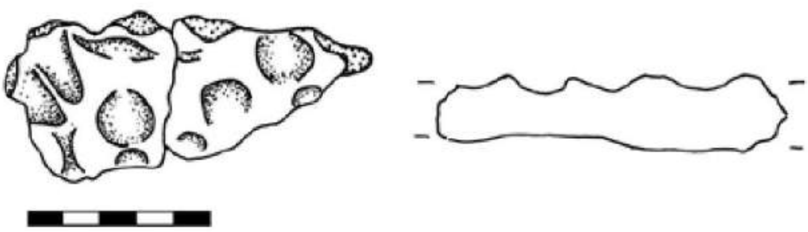
Shard 181: Tell Jigan hts (Ii and Kawamata, fig. 7. 80)

TELL NADER

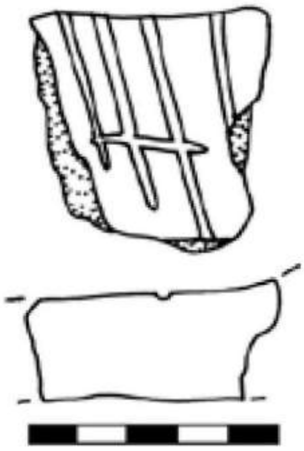
Shard 182: Tell Nader (Kopanias et al. 2013, fig. 23.3)



Shard 183: Tell Nader (Beuger et al. 2018, fig. 5d)



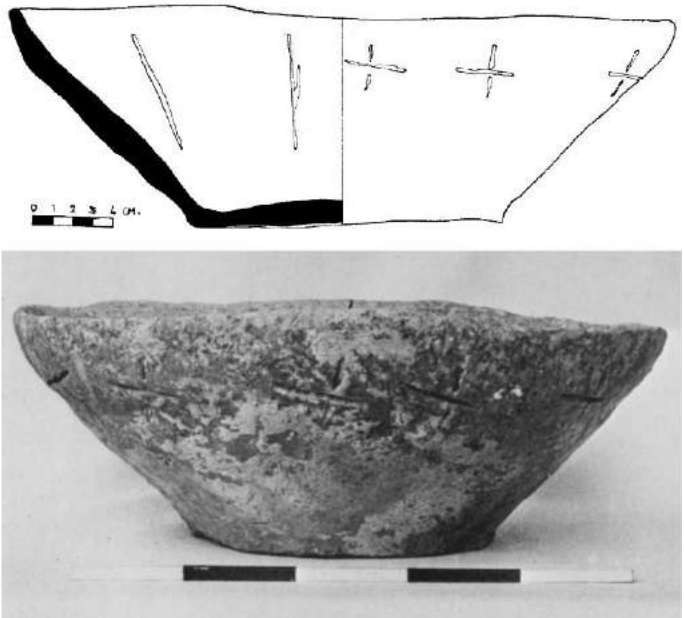
Shard 184: Tell Nader (Beuger et al. 2018, fig. 5e)



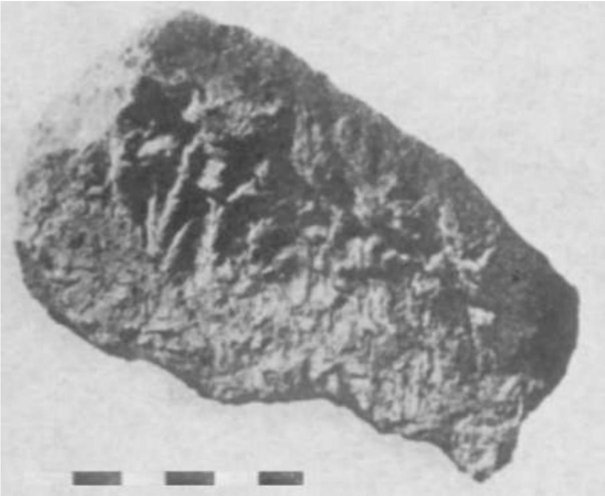
Shard 185: Tell Nader (Beuger et al. 2018, fig. 5f)

UMM DABAGHIYAH

Shard 186: HT Umm Dabaghiya Phase 3 (Kirkbride 1971)

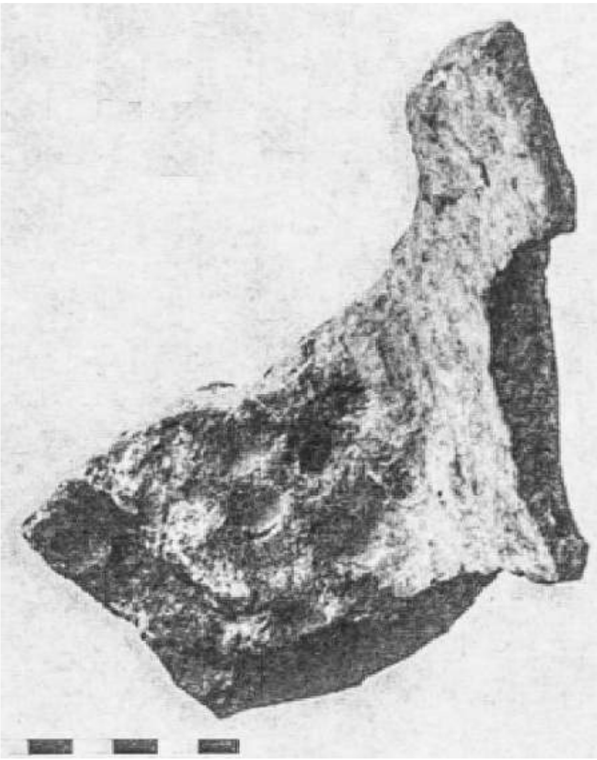


Shard 187: Bowl Umm Dabaghiyah (Kirkbride 1971, Plate XII nº13, Pl XIIIa)

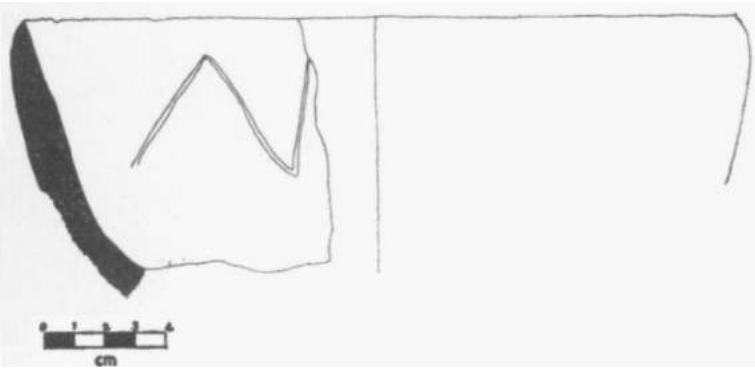


Shard 188: Umm Dabaghiyah (Kirkbride 1972)

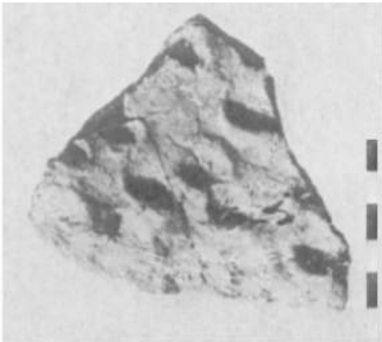
Shard 189: Umm Dabaghiyah (Kirkbride 1972)



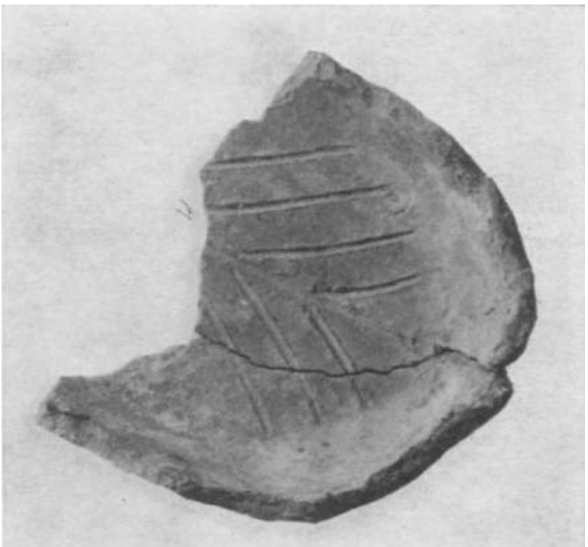
Shard 190: Umm Dabaghiyah(Kirkbride 1972)



Shard 191: Umm Dabaghiyah (Kirkbride 1972)

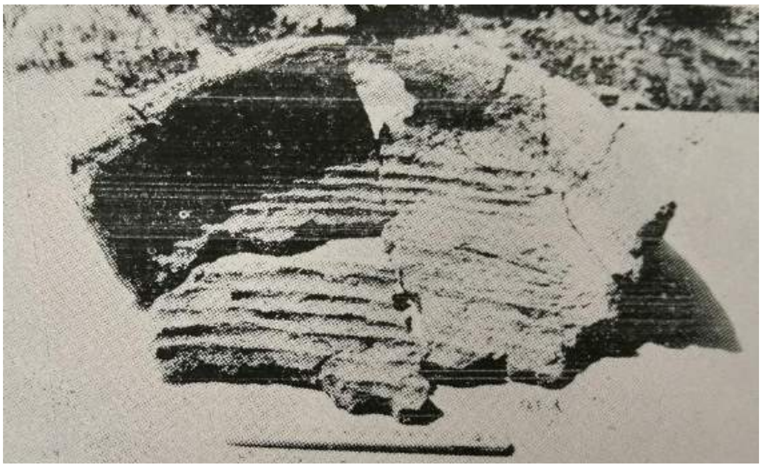


Shard 192: Umm Dabaghiyah (Kirkbride 1972)



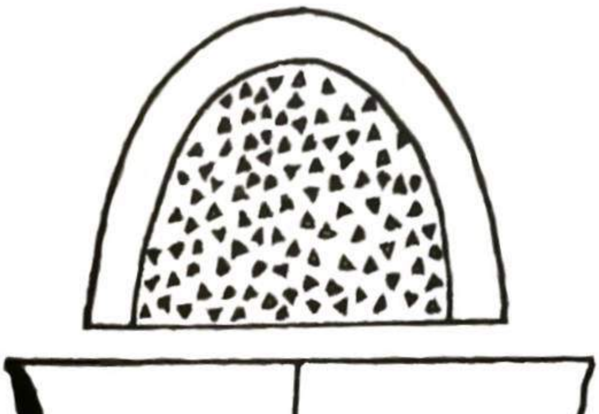
Shard 193: Umm Dabaghiyah (Kirkbride

YARIM TEPE



Shard 194: HT Yarim tepe liv 5 sq. 47 (Merpert et al 71, pl. 3d)

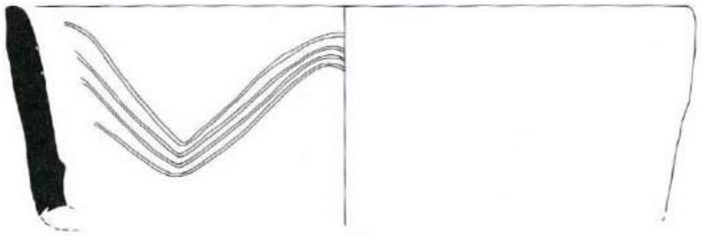
Shard 195: HT con macina (Merpert et al 76, Pl X n2 (Level 7)



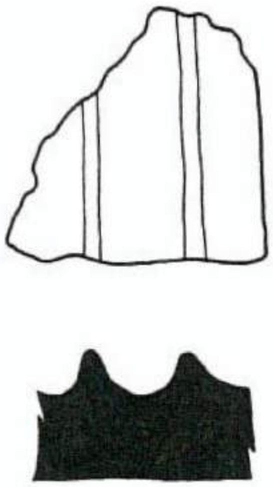
Shard 196: Yarim Tepe (Bashilov et al 1980, The earliest strata of p.51 fig. 5.5a)

URMIA LAKE

HAJJI FIRUZ TEPE

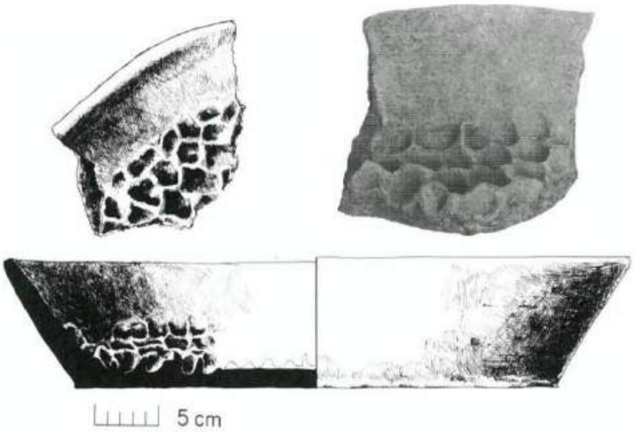


Shard 198: Hajji Firuz Tepe (Voigt 1983, p.122 fig. 80f)

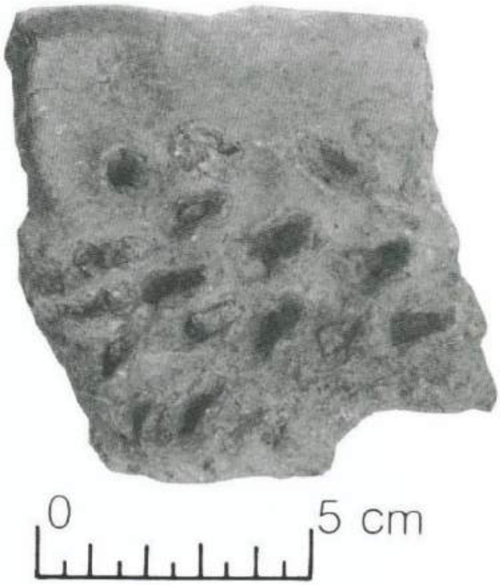


Shard 197: Hajji Firuz Tepe (Voigt 1983, P.122 fig. 80e)

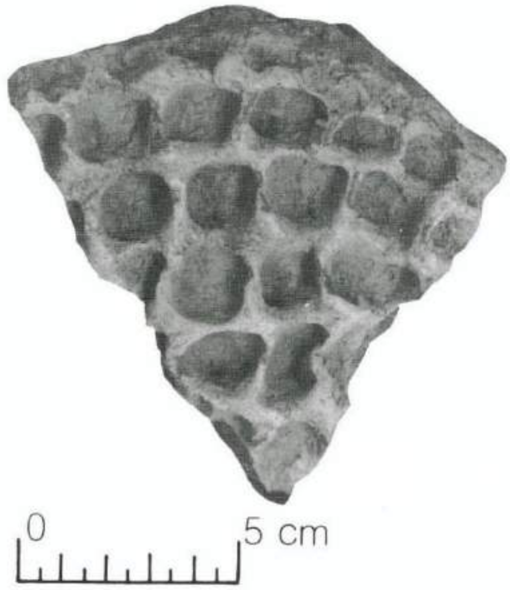
Shard 199: Hajji Firuz Tepe (Voigt 1983, P. Pl. 20a)



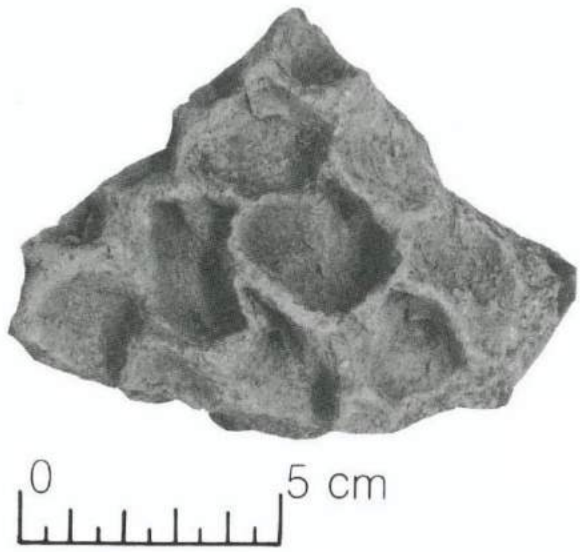
Shard 200: Hajji Firuz Tepe (Voigt 1983, P. Pl. 20b and fig. 81a)



Shard 201: Hajji Firuz Tepe (Voigt 1983, P. Pl. 20c)

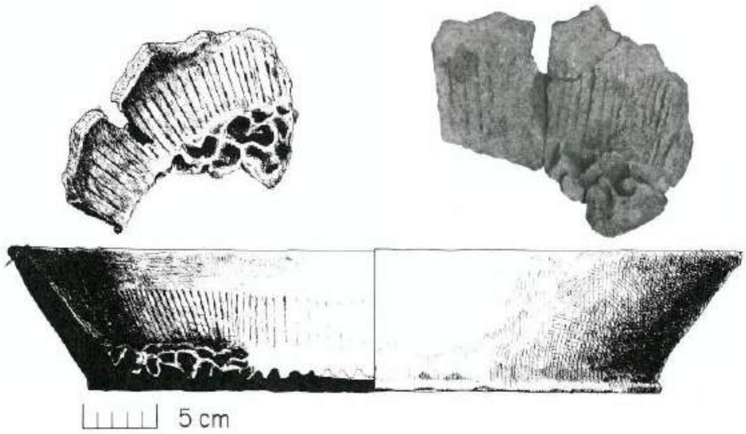


Shard 202: Hajji Firuz Tepe (Voigt 1983 P. Pl.

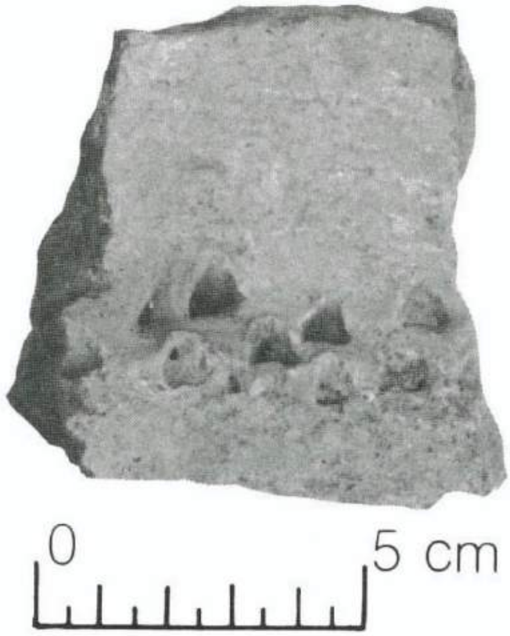


Shard 203: Hajji Firuz Tepe (Voigt 1983, P. Pl. 20e)

Shard 204: Hajji Firuz Tepe (Voigt 1983, P. Pl. 20f)

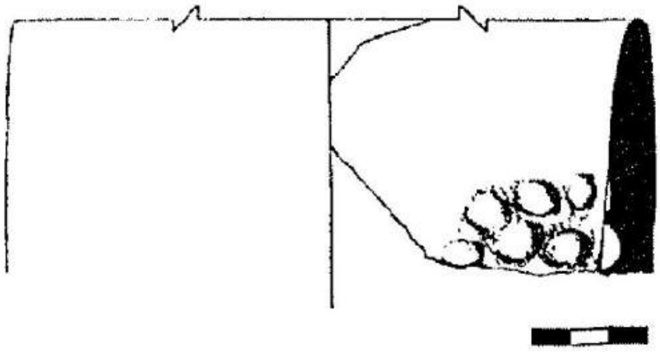


Shard 205: Hajji Firuz Tepe (Voigt 1983, P. Pl. 20g and fig. 81b)



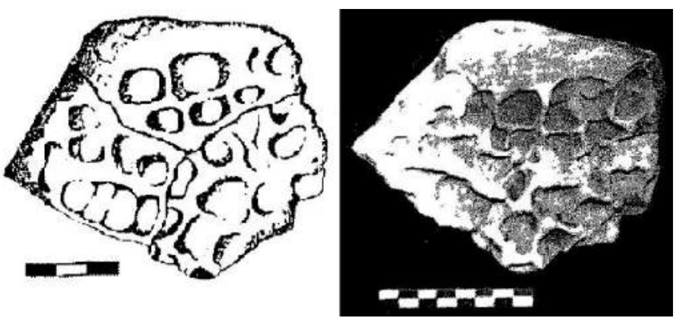
Shard 206: Hajji Firuz Tepe (Voigt 1983, P. Pl. 20h)

TAPPEH JOLBAR

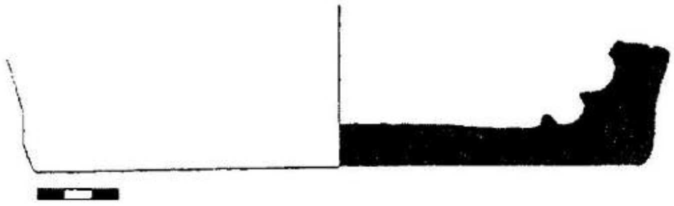


Shard 207: Tappeh Jolbar (Razzaghi - Fahimi 2004, fig. 7)

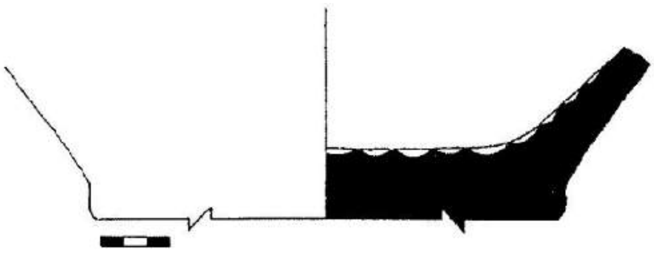
Shard 208: Tappeh Jolbar (Razzaghi - Fahimi 2004, fig. 7)



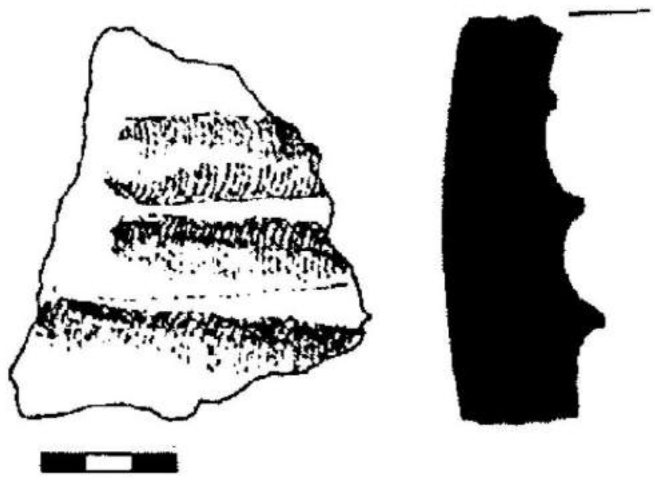
Shard 209: Tappeh Jolbar (Razzaghi - Fahimi 2004, fig. 7)



Shard 210: Tappeh Jolbar (Razzaghi - Fahimi 2004, fig. 4)

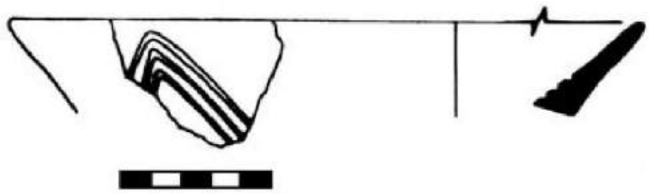


Shard 211: Tappeh Jolbar (Razzaghi - Fahimi 2004, fig. 4)



Shard 212: Tappeh Jolbar (Razzaghi - Fahimi 2004, fig. 4)

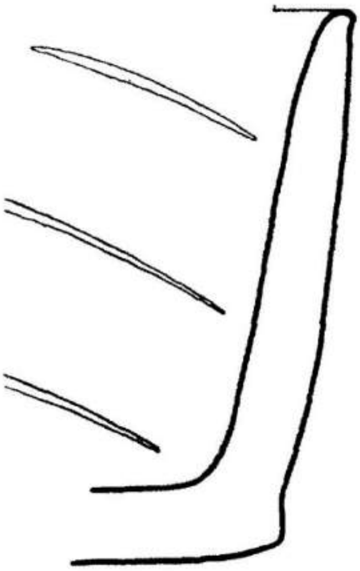
TEPE GERD-I-KHALIKA



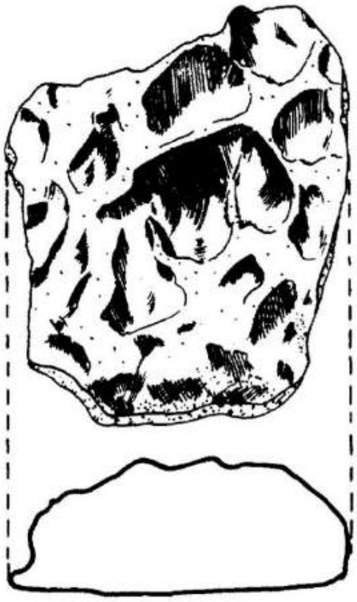
Shard 213: Tepe Gerd-i-Khalika (Ajorloo 2008, p.117 pl. 1.3)

Shard 214: Shorsu (Bakhshaliyev 2014, fig. 2)

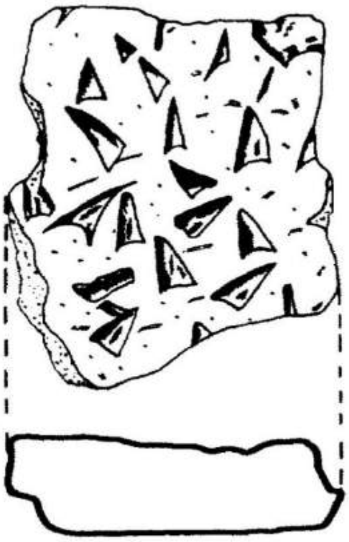
MATARRAH



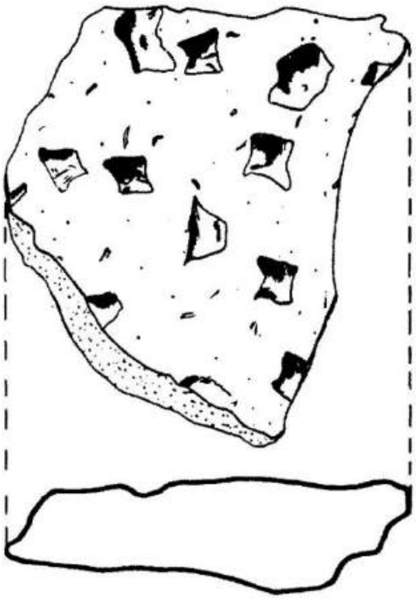
Shard 215: Matarrah 1a3 (Braidwood et al. 1952, fig. 9)



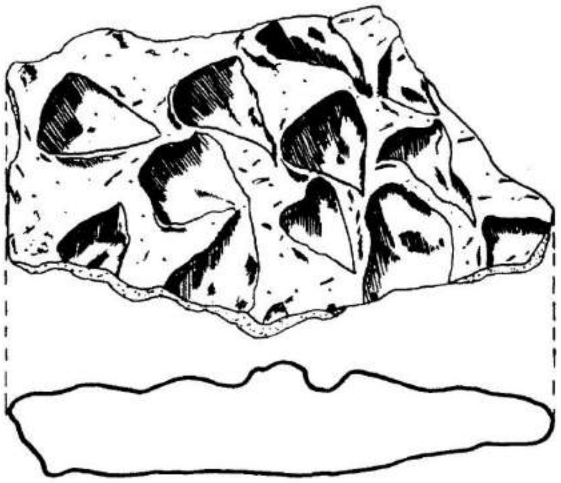
Shard 216: Matarrah 1a3 (Braidwood et al. 1952, fig. 9)



Shard 217: Matarrah 1a3 (Braidwood et al. 1952, fig. 9)

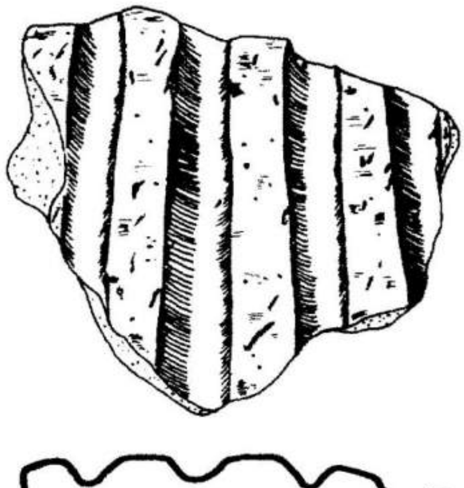


Shard 218: Matarrah 1a3 (Braidwood et al. 1952, fig. 9)

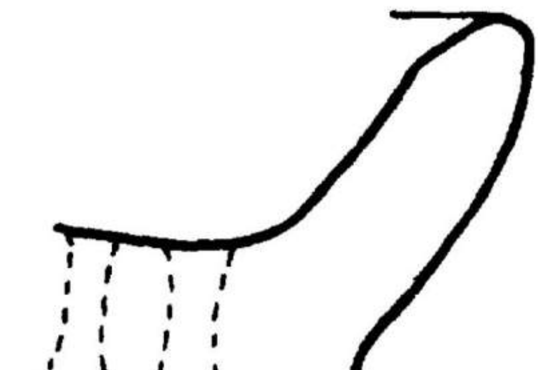


Shard 219: Matarrah 1a3 (Braidwood et al. 1952 fig. 9)

Shard 220: Matarrah 1a3 (Braidwood et al. 1952, fig. 9)



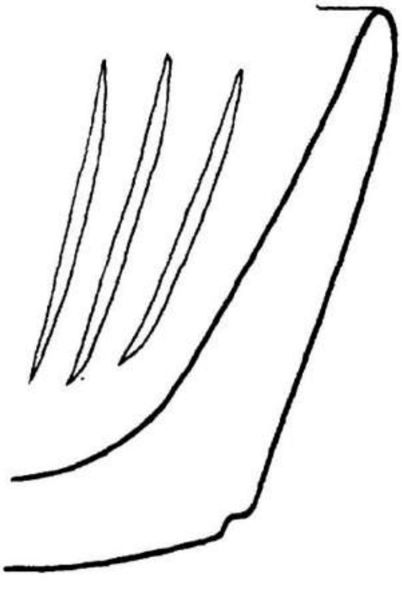
Shard 221: Matarrah 1a3 (Braidwood et al. 1952, fig. 9)



Shard 222: Matarrah 1a3 (Braidwood et al. 1952, fig. 8)

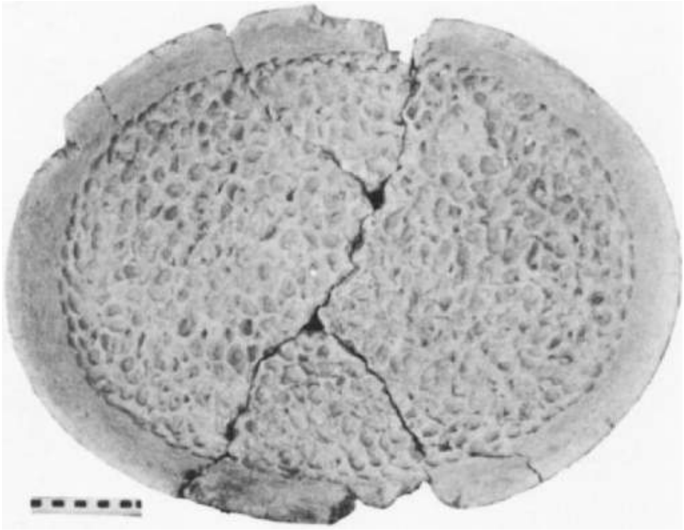
Shard 223: Matarrah 1a3 (Braidwood et al. 1952, fig. 8)

Shard 224: Matarrah 1a3 (Braidwood et al. 1952, fig. 8)

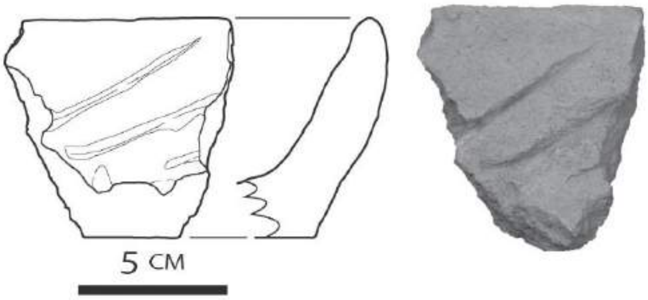


Shard 225: Matarrah (Braidwood et al. 1952, fig. 8)

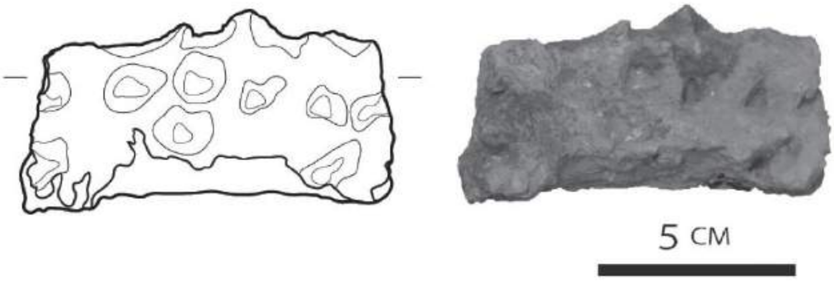
Shard 226: Matarrah (Braidwood et al. 1952, pl. IV 1)



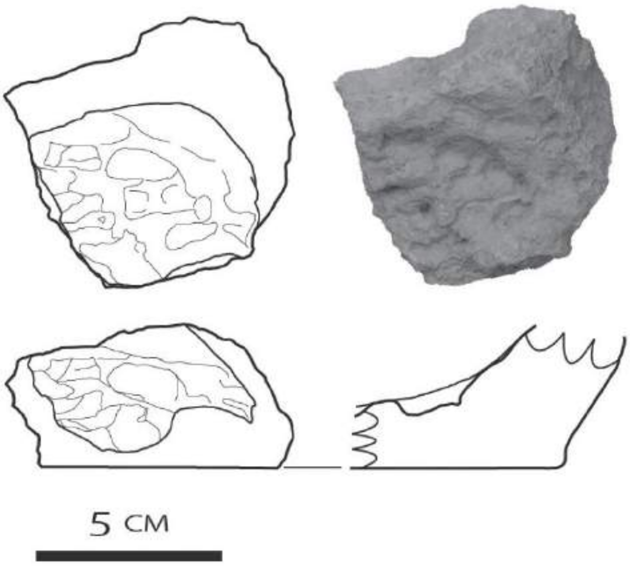
Shard 227: Matarrah (Braidwood et al. 1952, pl. V 5)



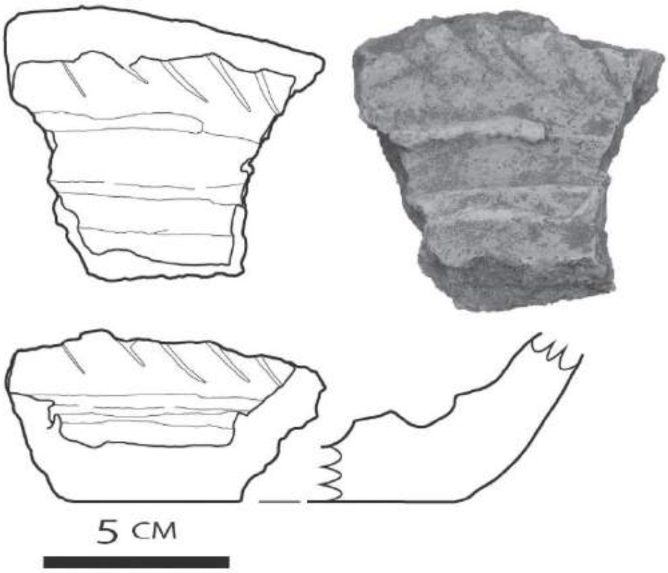
Shard 228: Matarrah (Odaka 2019, p.254 fig.3)



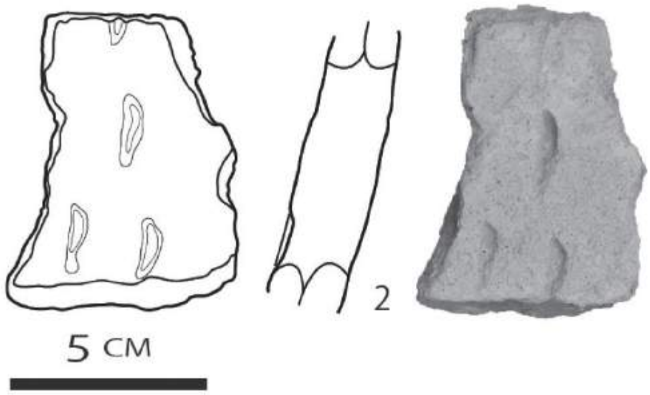
Shard 229: Matarrah (Odaka 2019, p.254 fig. 3)



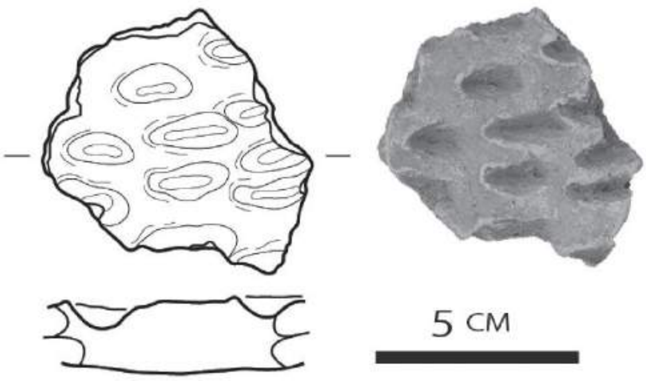
Shard 230: Matarrah (Odaka 2019, p.254 fig. 3)



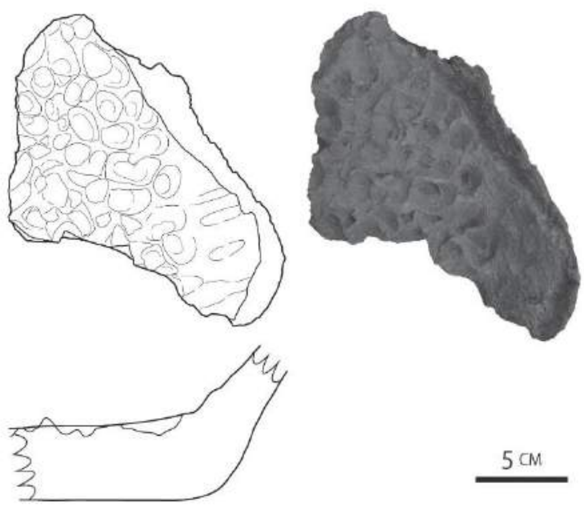
Shard 231: Matarrah (Odaka 2019, p.254 fig. 3)



Shard 232: Matarrah (Odaka 2019, p.254 fig. 3)

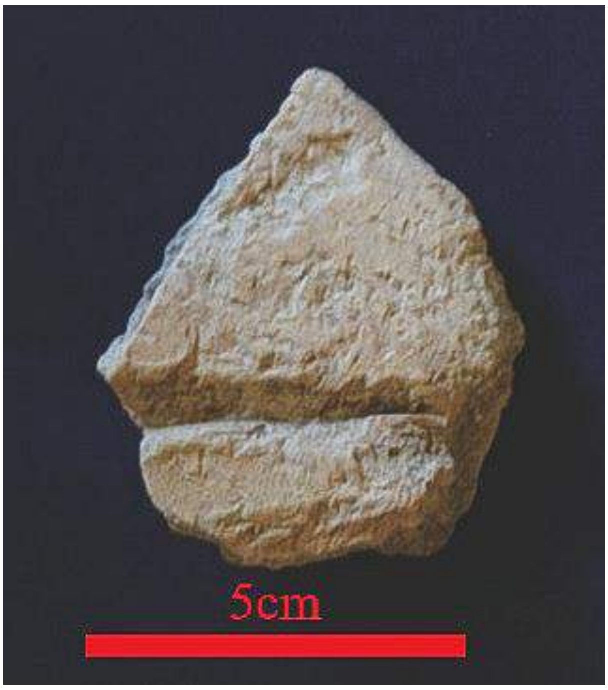


Shard 233: Matarrah (Odaka 2019, p.254 fig. 3)



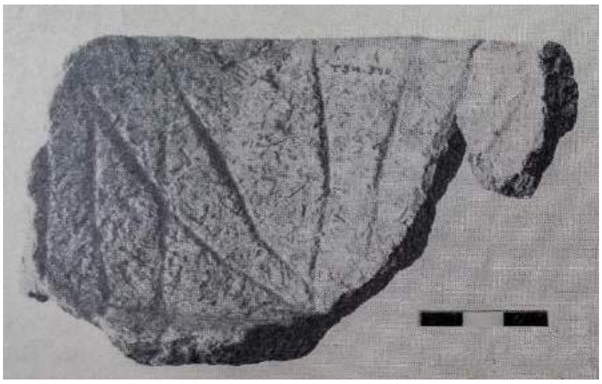
Shard 234: Matarrah (Odaka 2019, p.254 fig. 3)

RANYA PSHDAR PLAIN – IRAQ

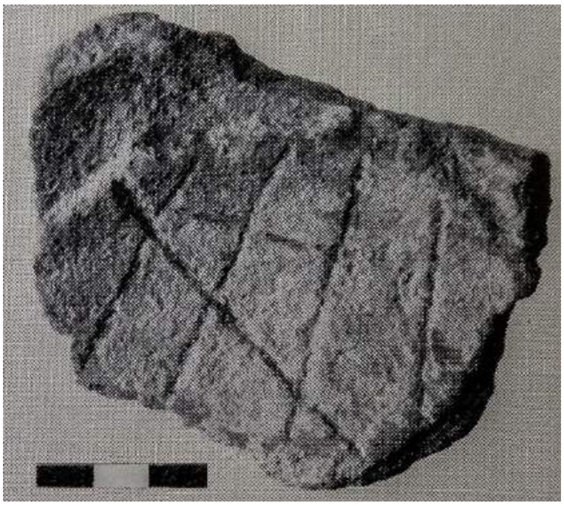


Shard 235: Qalat Said Ahmadan (Tsuneki et al. 2015, p.25 fig. 5.20)

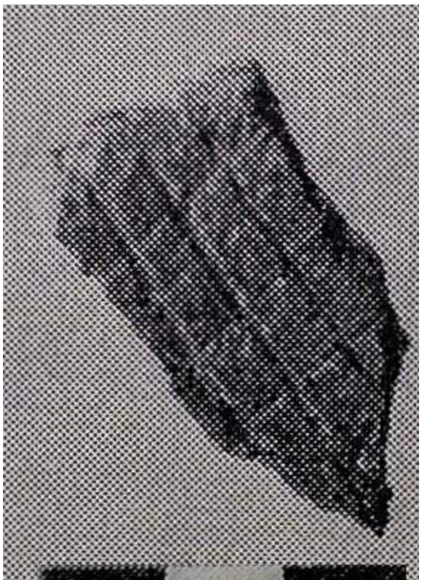
Shard 236: Qalat Said Ahmadan (Tsuneki et al. 2015, p.25 fig. 5.20)



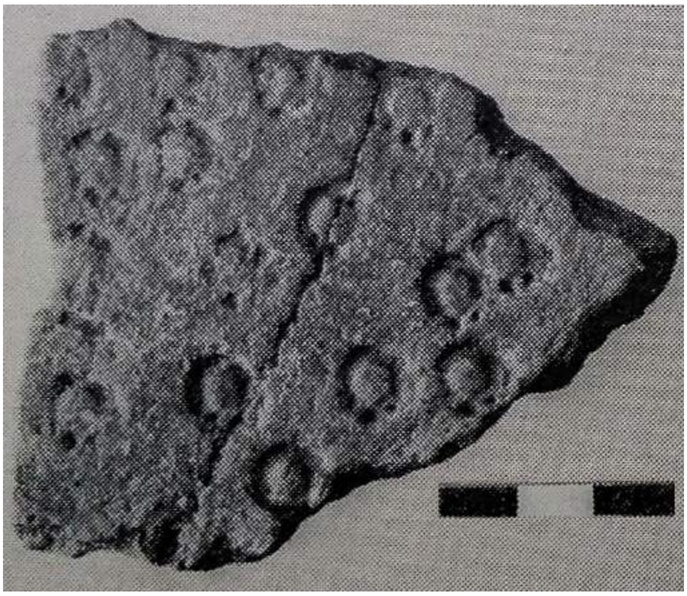
Shard 237: Tell Shimshara (Mortensen 1970, 112)



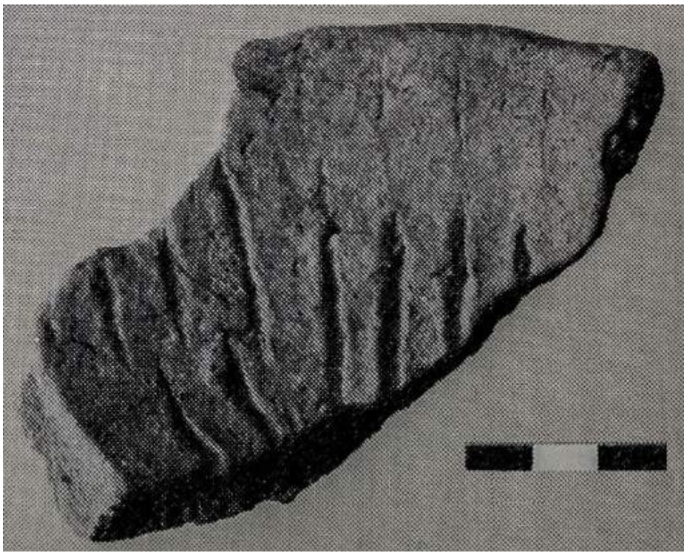
Shard 238: Tell Shimshara (Mortensen 1970, 112)



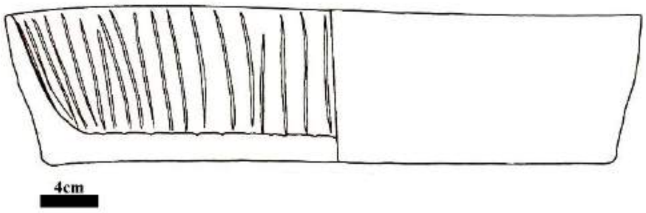
Shard 239: Tell Shimshara (Mortensen 1970, 112)



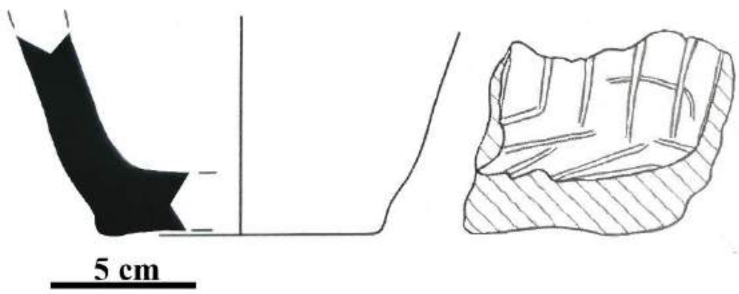
Shard 240: Tell Shimshara (Mortensen 1970, 112)



Shard 241: Tell Shimshara (Mortensen 1970, 112)

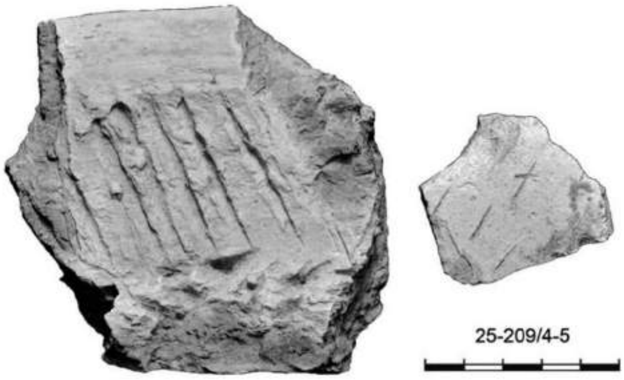


Shard 242: Tell Shimshara (Mortensen 1970, 111)

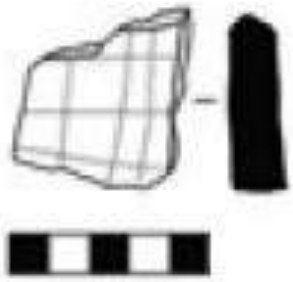


Shard 243: Boskin (Giraud et al. 2019, p103 fig. 13.1)

SHARIZOR PLAIN IRAQ

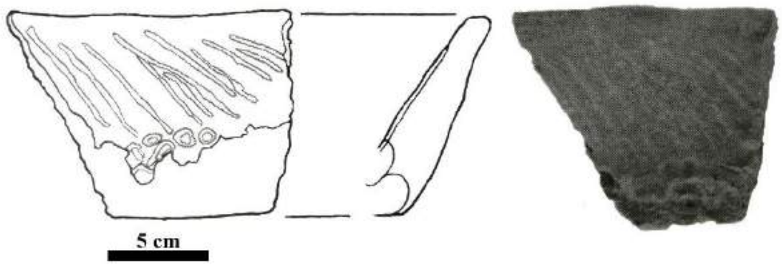


Shard 244: Survey Qalbaza (Altaweel et al. 2012)

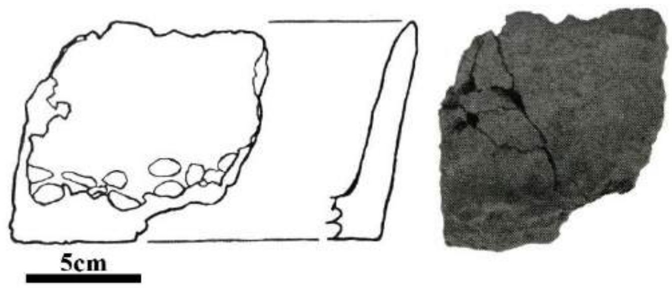


Saerd 245: Tepe Marani (Wengrow et al. 2016, p.273 fig. 19.6)

Sherd 246: Tepe Marani (Wengrow et al. 2016, p.273 fig. 19.10)

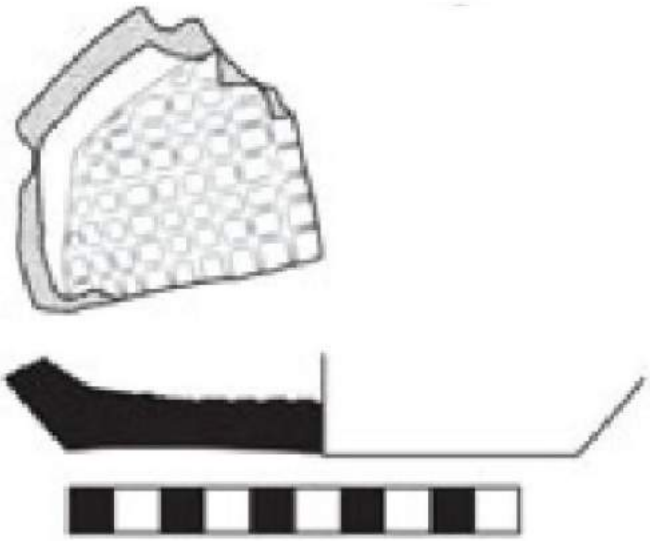


Shard 247: Shaikh Marif (Odaka et al. 2019)



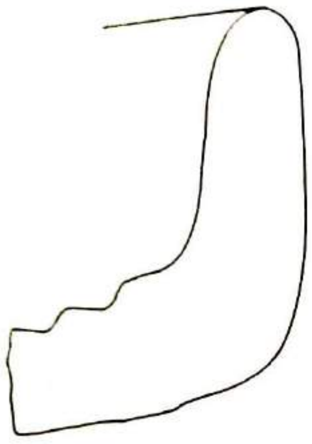
Shard 248: Shaikh Marif (Odaka et al. 2019)

Shard 249: Small decored bowls from Tell Bagum (Hijjara 1996)

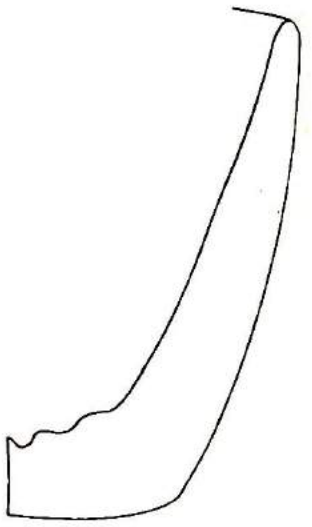


Shard 250: Small decored bowls from Tepe Marani (Wengrow et al. 2016, p.272 fig. 18.34)

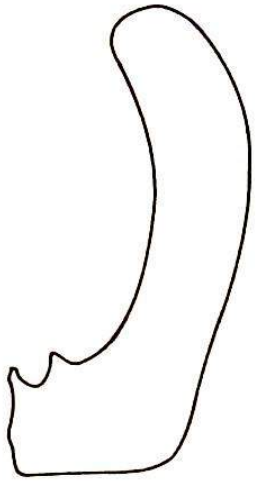
Shard 251: Small decored bowls from Tepe Marani (elaborated from Wengrow et al. 2016, p.272 fig. 18.13 and p.274 fig. 20)



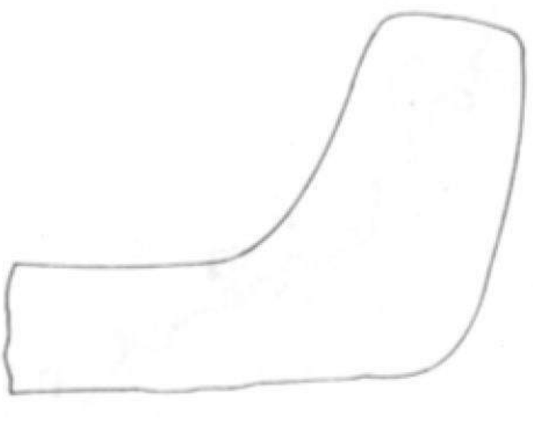
Shard 252: Tell es Sawwan (Ippolitoni 1970, p.146 n.74)



Shard 253: Tell es Sawwan (Ippolitoni 1970, p.146 n.78)

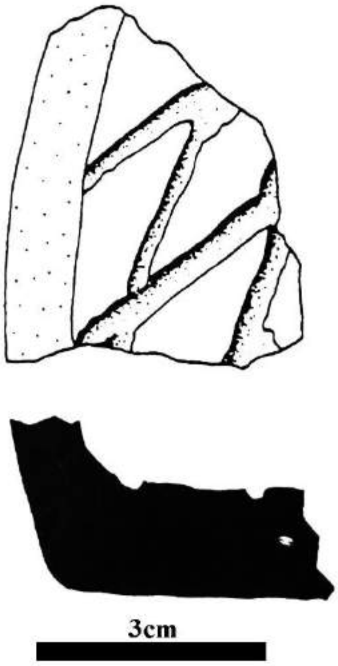


Shard 254: Tell es Sawwan (Ippolitoni 1970, p.146 n. 81)

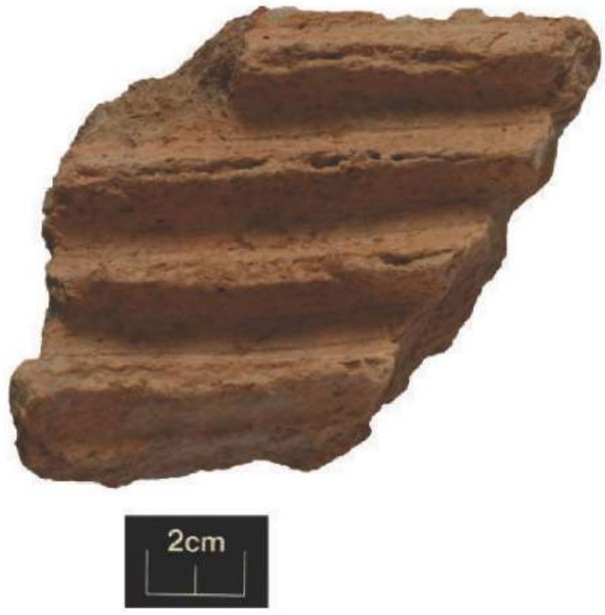


Shard 255: Tell es Sawwan (Ippolitoni 1970, p.146 n.79)

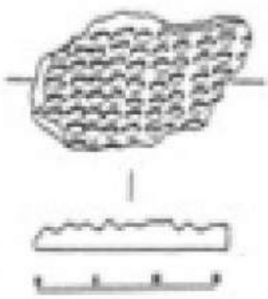
ALLUVIAL PLAIN



Shard 256: Tell Oueili (Breniquet 1996, p.178 n.4)



Shard 257: Remremeh (Darabi et al. 2020, fig. 6.3)

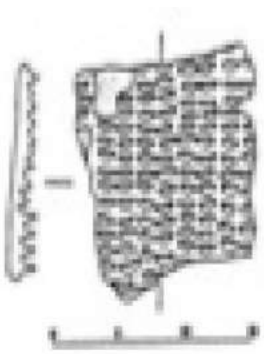


Shard 258: Tappe Sang-e Chakhmaq (Tsuneki 2014, Fig. 7)

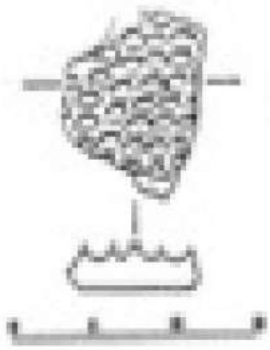
Shard 259: Tappe Sang-e Chakhmaq (Tsuneki 2014, Fig. 7)

Shard 260: Tappe Sang-e Chakhmaq (Tsuneki 2014, Fig. 7)

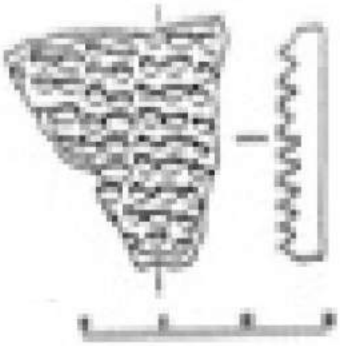
Shard 261: Tappe Sang-e Chakhmaq (Tsuneki 2014, Fig. 7)



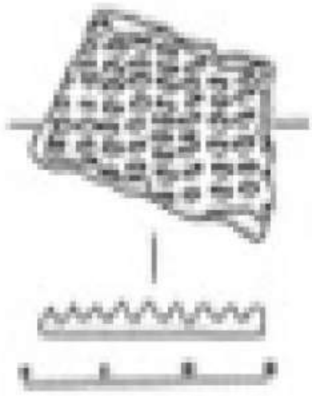
Shard 262: Tappe Sang-e Chakhmaq (Tsuneki 2014, Fig. 7)



Shard 263: Tappe Sang-e Chakhmaq (Tsuneki 2014, Fig. 7)



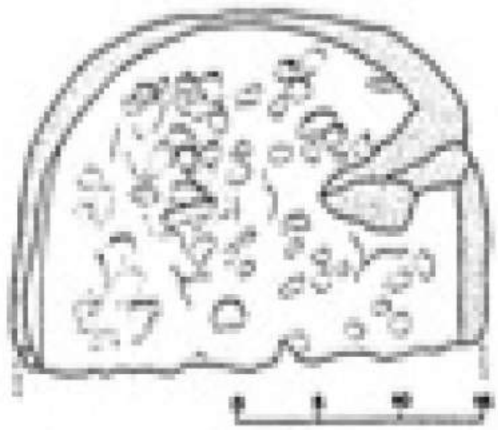
Shard 264: Tappe Sang-e Chakhmaq (Tsuneki 2014, Fig. 7)



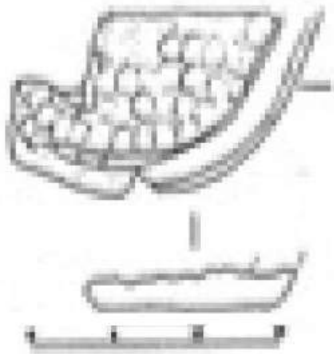
Shard 265: Tappe Sang-e Chakhmaq (Tsuneki 2014, Fig. 7)

Shard 266: Tappe Sang-e Chakhmaq (Tsuneki 2014, Fig. 7)

Shard 267: Tappe Sang-e Chakhmaq (Tsuneki 2014, Fig. 7)



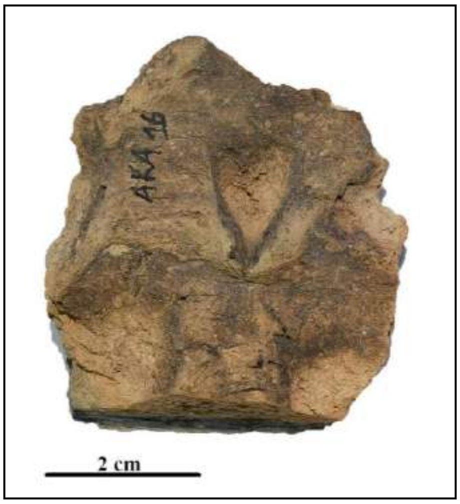
Shard 268: Tappe Sang-e Chakhmaq (Tsuneki 2014, Fig. 7)



Shard 269: Tappe Sang-e Chakhmaq (Tsuneki 2014, Fig. 7)

APPENDIX I

Fragment number: AKA16
Site: Akarçay
Level:
Period:
Grid:
Preservation Level: quite good



General characteristics:

Paste: coarse clay
Temper: organic temper
Section: base
Core: dark grey
Color s. internal: dark brown **External**: brown
Hypothesized side: medium

Technological traces analysis:

Internal surface
Topography:
Surface treatment:

External surface
Topography: uneven
Surface treatment: untreated

Internal Scores:
Shape: triangular
Texture: coarse
Size: **length:** 1,3 cm **width**: 1 cm
Incidence: high
Asperity:
Section typology: Va
Inclination: high
Direction:
Arrangement: asymmetrical
Edge: net
Extremity typology:
Secondary signs:
Distribution:
Scoring interpretation: tool impressed

Use-wear analysis:

Ceramic Surface:
Internal: crumbling, darkening, weaved edges
External:
Mineral Inclusions Surface:
Internal: polish
External:
Function interpretation: baking fat bread

Post depositional traces:

Residues: greasy residue, phytoliths.

Final interpretation:

The fragment AKA16 belonged to a fragment of the base of a medium-size pan, made with plant-tempered coarse clay.
The inner surface was impressed with a tool with a triangular section when the clay was fresh (fig. 1).
The pan was used to bake fat bread (figs. 2-5).

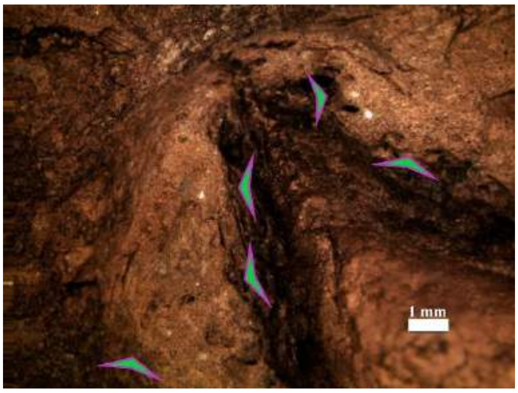


Fig. 1 Internal surface, impression

Fig. 2 Internal surface

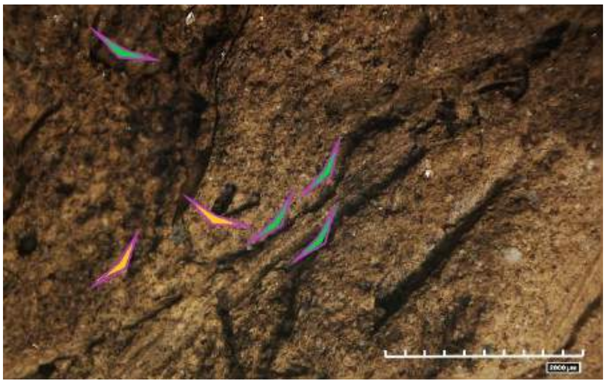


Fig. 3 Internal surface

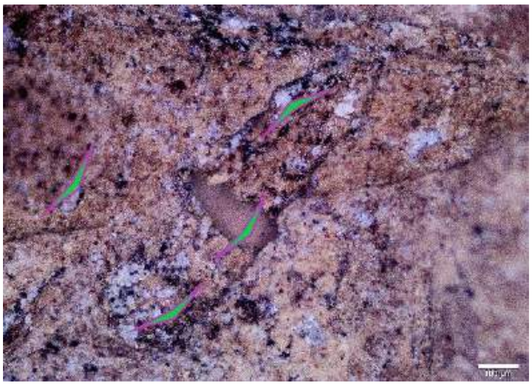


Fig. 4 Internal surface, crater

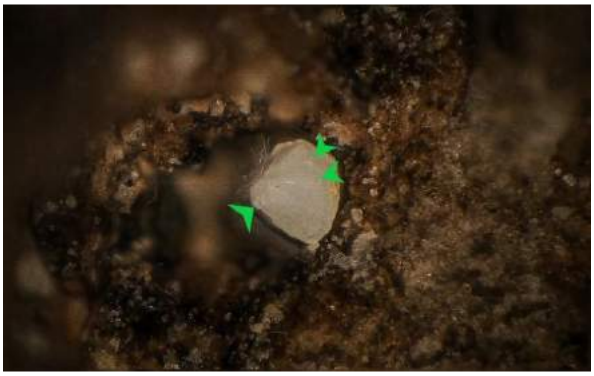


Fig. 5 Internal surface mineral inclusion

Fig. 6 External surface

Fragment number: AKA 17
Site: Akarçay
Level:
Period:
Grid:
Preservation Level: quite good

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: wall
Core: dark
Color s. internal: brown **External**: brown
Hypothesized side: medium

Technological traces analysis:

Internal surface
Topography:
Surface treatment:

External surface
Topography: uneven
Surface treatment: untreated

Internal Scores:
Shape: grooves
Texture: coarse
Size: **length:** **width**: 0.5- 0,8 cm
Incidence: high
Asperity:
Section typology: Ua
Inclination: Perpendicular
Direction:
Arrangement: Symmetrical
Edge: round
Extremity typology:
Secondary signs: no
Distribution:
Scoring interpretation: tool incised

Use-wear analysis:

Ceramic Surface:
Internal: rip, rounding, darkening, waved edges
External:
Mineral Inclusions Surface:
Internal: rip, rounding
External: /
Function interpretation: baking fat bread

Post depositional traces: corrosion, abrasion

Residues: greasy residues, phytoliths

Final interpretation:
The fragment AKA 17 belonged to the walls of a medium-sized pan.
The inner surface was grooved with a tool (fig. 1).
The pan was used to cook bread with fat. Subsequently, the fragment undergoes abrasive and corrosive activity.

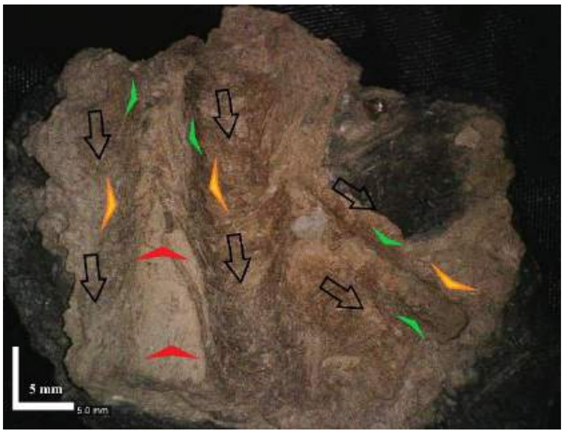


Fig 1 Internal surface

Fig 2 Internal surface, high point

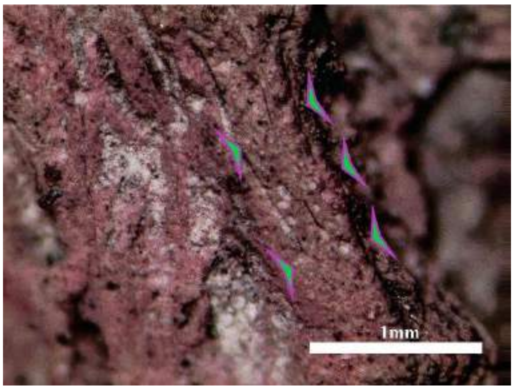


Fig 3   Internal surface, high point

Fig 4 Internal surface

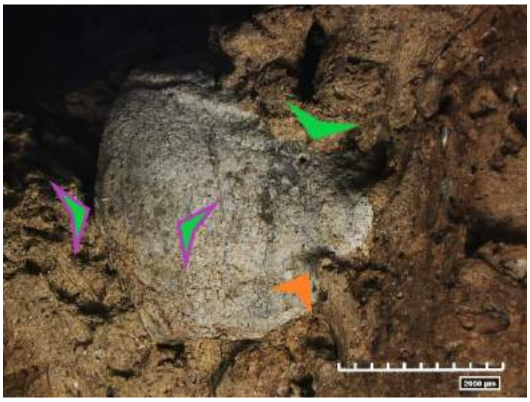


Fig 5 Internal surface, mineral inclusion

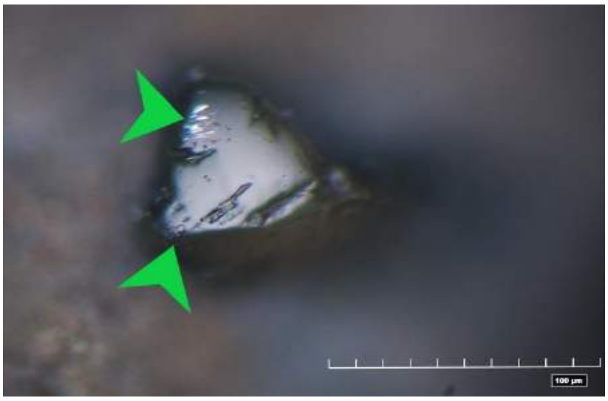


Fig 6 Internal surface, high point

Fragment number: AT 01 26 5 10
Site: Akarçay
Level:
Period:
Grid:
Preservation Level: Good

General characteristics:

Paste: fine clay
Temper: mineral and few plant inclusions
Section: base - wall
Core: dark
Color s. internal: **External**:
Hypothesized side: medium size bowl?

Technological traces analysis:

Internal surface
Topography: sinuous
Surface treatment: smoothed

External surface
Topography: flat
Surface treatment: treated (polished?)

Internal Scores:
Shape: grooves
Texture: stried
Size: **length:** **width**: 0,7-1,1 cm
Incidence: high
Asperity:
Section typology: Ua
Inclination: perpendicular
Direction: unidirectional
Arrangement: parallel
Edge: net- rounded
Extremity typology: enlarged
Secondary signs: striations
Distribution: Irregular
Scoring interpretation: tool grooved

Use-wear analysis:

Ceramic Surface:
Internal: rips
External:
Mineral Inclusions Surface:
Internal: depressions
External:
Function interpretation: baking basic bread

Post depositional traces: concretions

Residues:

Final interpretation:

The fragment AT 01 26 5 10 belonged to the base of small vessel: a bowl. It is made of a mineral-tempered fine clay and accurately finished.
The inner surface was tool grooved when the clay was fresh (fig. 1).
The bowl was used for baking basic bread (figs. 3,4).

Fig. 1 Internal surface, grooves

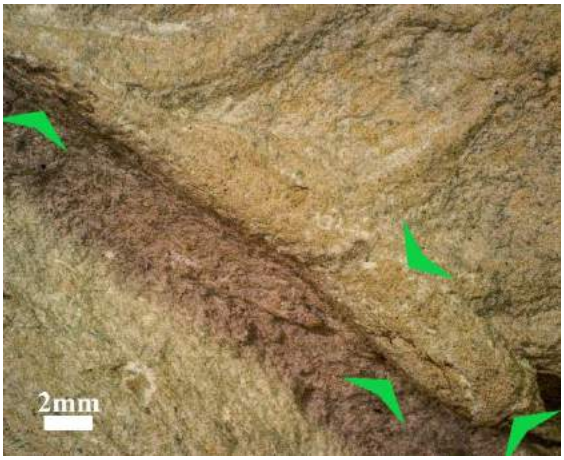


Fig. 2 Internal surface

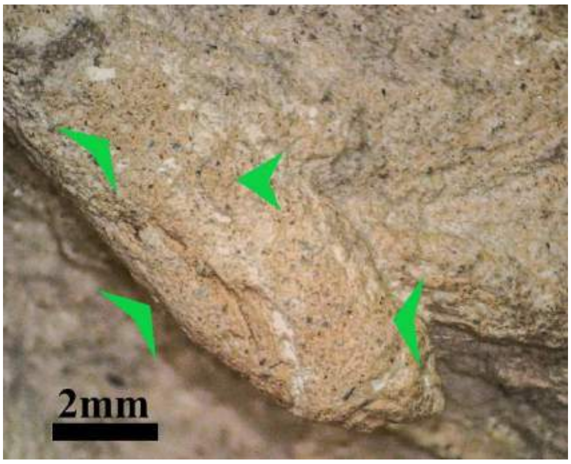


Fig. 3 Internal surface

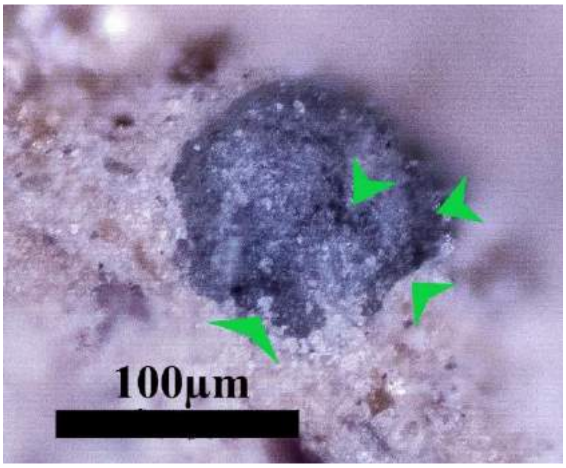


Fig. 4 Internal surface, mineral inclusion

Fig. 5 External surface

Fig. 6 External surface

Fragment number: AT99 j KH 38
Site: Akarçay
Level:
Period:
Grid:
Preservation Level: Good

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: base and walls
Core: dark
Color s. internal: orange **External**: orange
Hypothesized side: large tray

Technological traces analysis:

Internal surface
Topography: smoothed
Surface treatment: treated

External surface
Topography: smoothed
Surface treatment: treated

Internal Scores:
Shape: oval **Texture**: coarse
Size: **length:** 0,6 cm **width**: 1,7 cm
Incidence: high **Asperity**:
Section typology: Ua **Inclination**: perpendicular
Direction: **Arrangement**: asymmetrical
Edge: net-rounded **Extremity typology**:
Secondary signs: striations **Distribution**:
Scoring interpretation: finger impressed

Use-wear analysis:

Ceramic Surface:
Internal: rips
External: spall detachment, striations
Mineral Inclusions Surface:
Internal: depressions
External:
Function interpretation: baking basic bread

Post depositional traces: corrosion, breakage

Residues:

Final interpretation:
The fragment AT99 j KH 38 belonged to the base of a very thick large pan, made of a plan-tempered coarse clay and finished by smoothing (fig. 6).
The inner surface was finger impressed when the clay was fresh (figs. 2, 3).
The pan was used to bake basic bread (figs. 2-5).

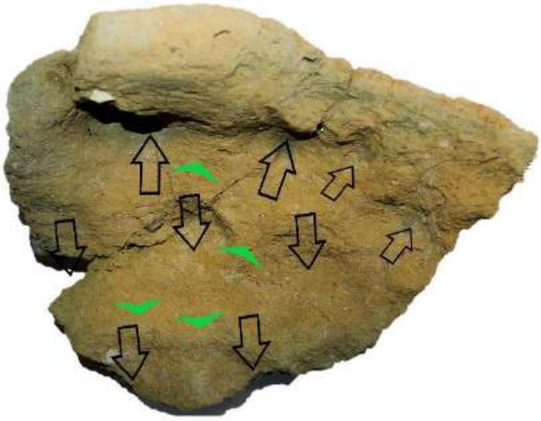


Fig. 1 Internal surface, impressions

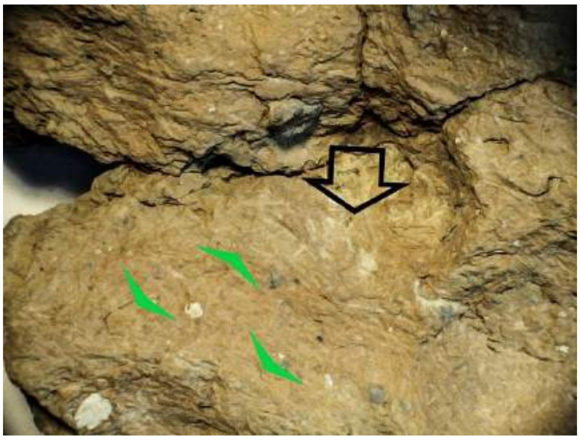


Fig. 2 Internal surface, impressions

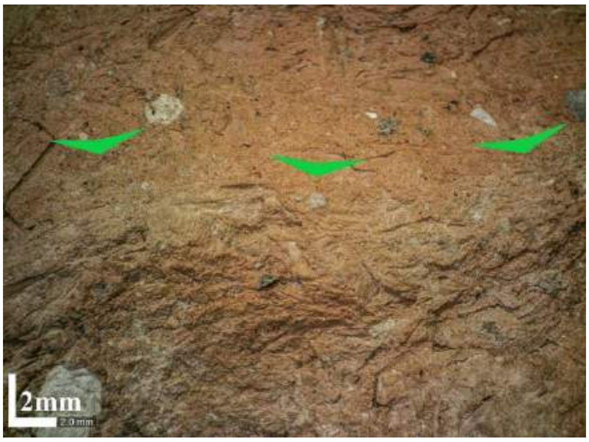


Fig. 3 Internal surface

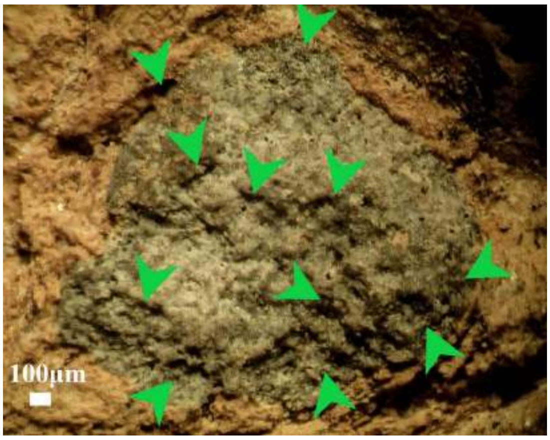


Fig. 4 Internal surface, mineral inclusion

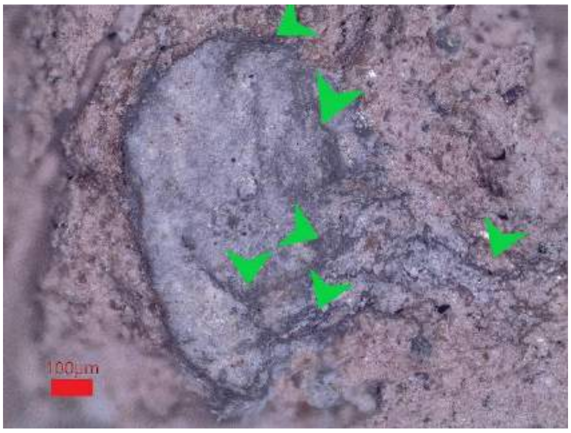


Fig. 5 Internal surface, mineral inclusion

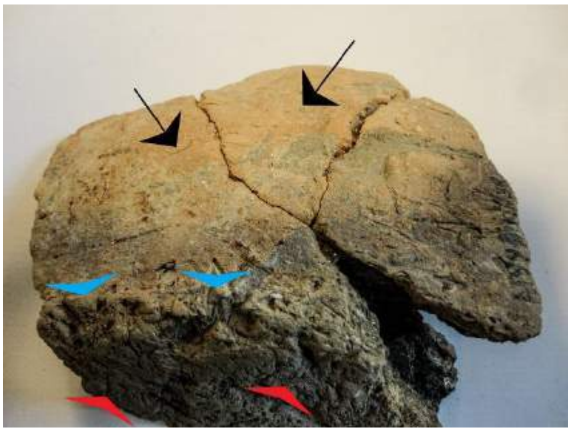


Fig. 6 External base and walls

Fragment number: HAN 15
Site: Haneke
Level: superficial
Period: Proto-Hassuna – Early Halaf
Grid:
Preservation Level: Good

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: base- wall
Core: dark
Color s. internal: light brown **External**: brown
Hypothesized side: large

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: flat
Surface treatment: treated (scraped?)

Internal Scores:
Shape: oval
Texture: coarse
Size: **length:** 1,7cm **width**: 1,1cm
Incidence: Hight
Asperity:
Section typology: Ua
Inclination: Inclined-Rounded
Direction:
Arrangement: Asymmetrical
Edges: Linear-Rounded
Extremity typology: Semicircular
Secondary signs: striation
Distribution: parallel
Final interpretation: Finger impressed

Use-wear analysis:

Ceramic Surface:
Internal: rips
External: striations, sooting
Mineral Inclusions Surface:
Internal: rips
External:
Function interpretation: baking basic bred

Post depositional traces:

Residues: phytoliths

Final interpretation:

The fragment Han 15 belonged to the base of large pan, made of a plan-tempered coarse clay. Its external surface was finished (probably by scraping) when the vessel was semi-dry (fig. 6). The inner surface was hastily finger grooved when the clay was fresh (figs. 1,2).
The pan was used to bake basic bread (figs. 1-6).

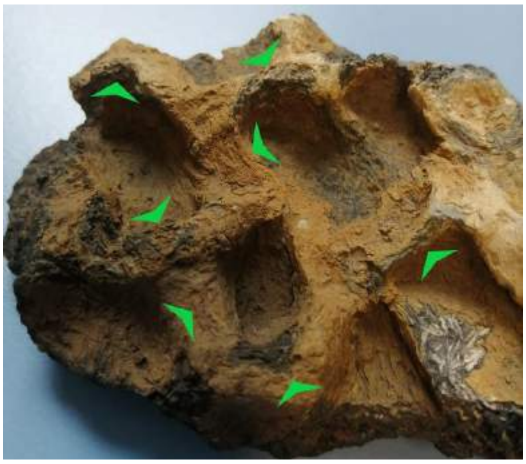


Fig. 1 Internal surface

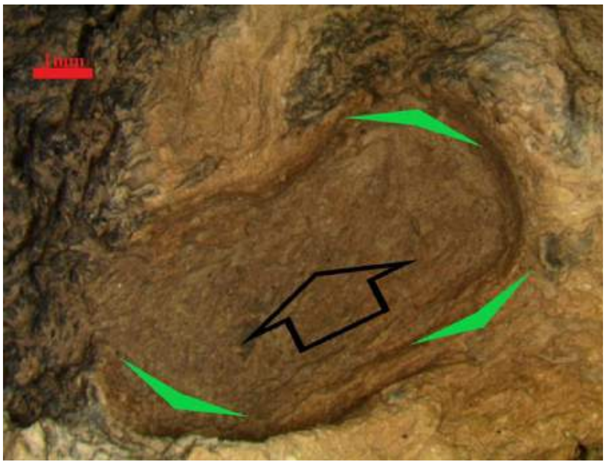


Fig. 2 Internal surface, impression

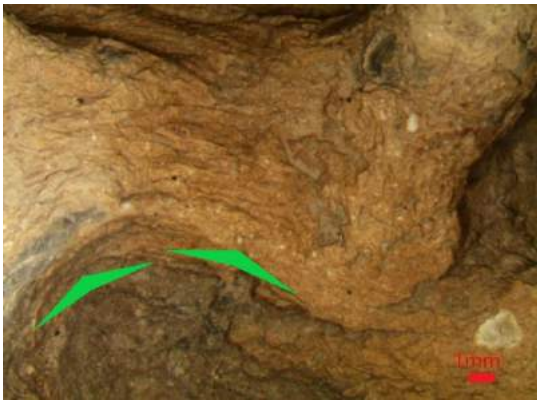


Fig. 3 Internal surface

Fig. 4 Internal surface

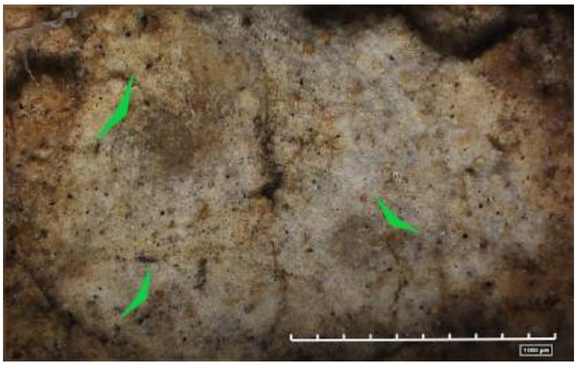


Fig. 5 Internal surface, mineral inclusion

Fig. 6 External surface (corner base-wall)

Fragment number: Kak 15
Site: Tell Kashashok
Level: superficial
Period: Proto-Hassuna
Grid:
Preservation Level: Good

General characteristics:

Paste: coarse clay
Temper: small plant inclusions and dung
Section: base
Core: dark
Color s. internal: orange **external**: orange
Hypothesized side: medium

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: uneven
Surface treatment: untreated

Internal Scores:
Shape: linear
Texture: coarse
Size: **length:** **width**: 0,5 cm
Incidence: high
Asperity:
Section typology: Ωb
Inclination: perpendicular
Direction: unidirectional
Arrangement: parallel
Edge:
Extremity typology:
Secondary signs:
Distribution:
Scoring interpretation: pinched humps

Use-wear analysis:

Ceramic Surface:
Internal: rips
External: striations
Mineral Inclusions Surface:
Internal: rips
External: striations, polish
Function interpretation: baking basic bread

Post depositional traces: concretions

Residues: phytoliths

Final interpretation:

The fragment KAK 15 belonged to the base of medium-size pan, made of organic-tempered coarse clay (figs. 1,2).
The inner surface was finger pinched when the clay was fresh in order to create parallel humps (fig. 1). The pan was used to bake basic bread (fig. 2-6). The surface of the fragment was covered by concretions during post-depositional phase (figs. 1,2).

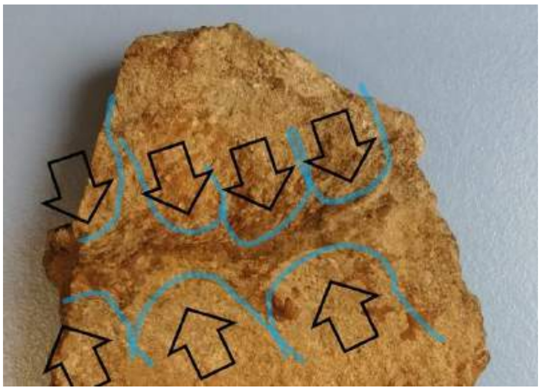


Fig. 1 Internal surface

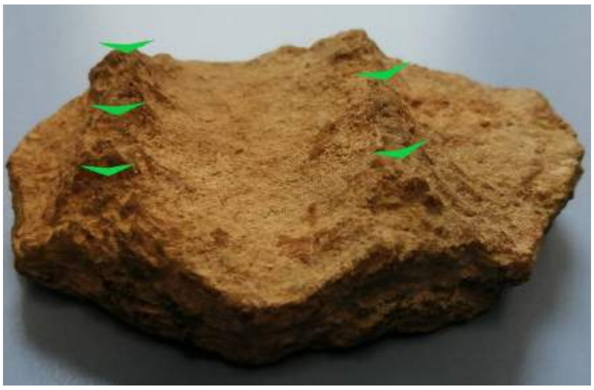


Fig. 2 Internal surface

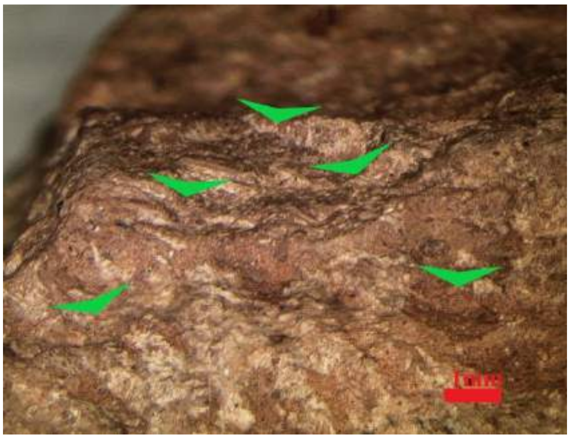


Fig. 3 Internal surface

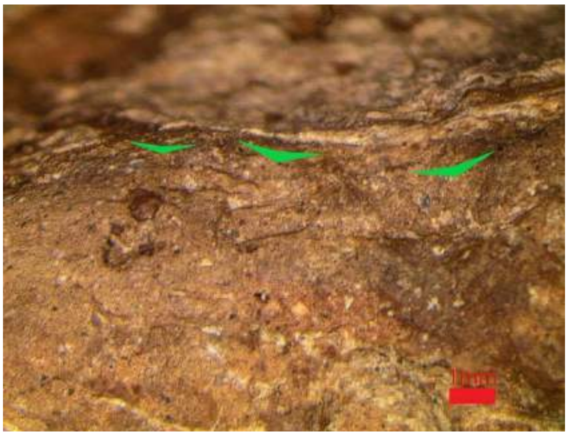


Fig. 4 Internal surface

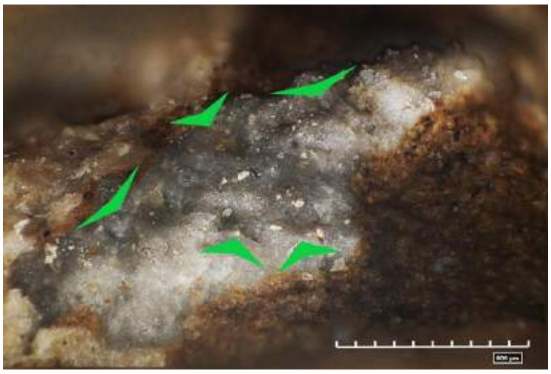


Fig. 5 Internal surface, mineral inclusion

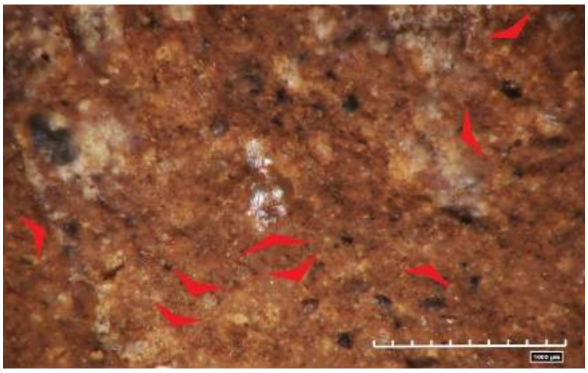


Fig. 6 External surface

Fragment number: KHAZNE 2 ’94 (KHA 30)
Site: Tell Khazna
Level:
Period: Late proto-Hassuna
Grid:
Preservation Level: Excellent

General characteristics:

Paste: medium granulometry clay
Temper: plant inclusions
Section: wall with base
Core: dark
Color s. internal: light orange **External**: light orange
Hypothesized side: large

Technological traces analysis:

Internal surface
Topography: sinuous
Surface treatment: smoothed

External surface
Topography: sinuous
Surface treatment: smoothed

Internal Scores:
Shape: incisions
Texture: striated
Size: **length:** **width**: 0,45
Incidence: high
Asperity:
Section typology: Vb
Inclination: inclined
Direction: unidirectional
Arrangement:
Edge: linear-rounded
Extremity typology:
Secondary signs:
Distribution: parallel
Scoring interpretation: hard tool incised (bone?)

Use-wear analysis:

Ceramic Surface:
Internal: Rip?
External:
Mineral Inclusions Surface:
Internal:
External:
Function interpretation: undetermined

Post depositional traces: bitumen concretion (for repairing?)

Residues: phytoliths

Final interpretation:

The fragment Kha 30 belonged to the walls of large pan, made of a plan-tempered medium granulometry clay and finished by smoothing (fig. 5). The walls were added to the base by slab technique (fig. 2). The inner surface was hard tool incised (figs. 1, 3).
The function of the pan remain undetermined because the use-wear are not enough developed (figs. 1, 4). Likely the fragment was repaired during its use (fig. 6).

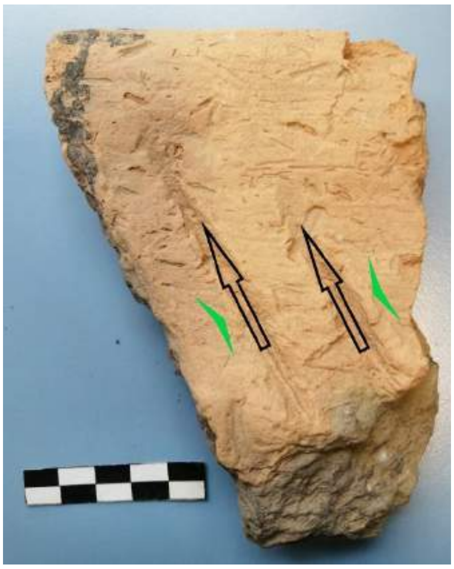


Fig. 1 Internal surface, incisions

Fig. 2 External surface and section

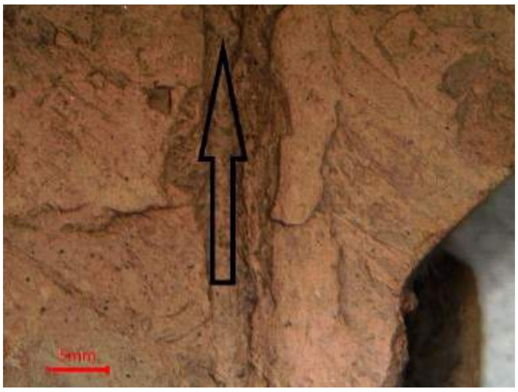


Fig. 3 Internal surface, incision

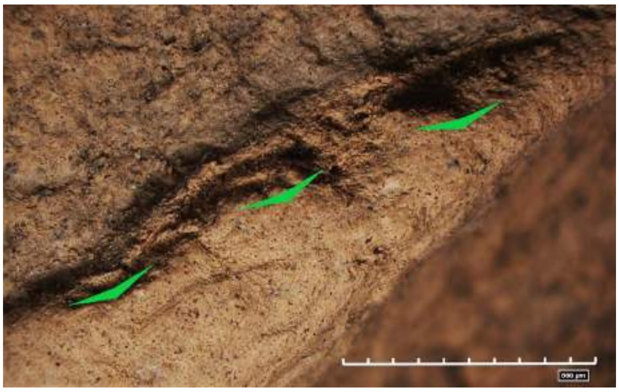


Fig. 4 Internal surface

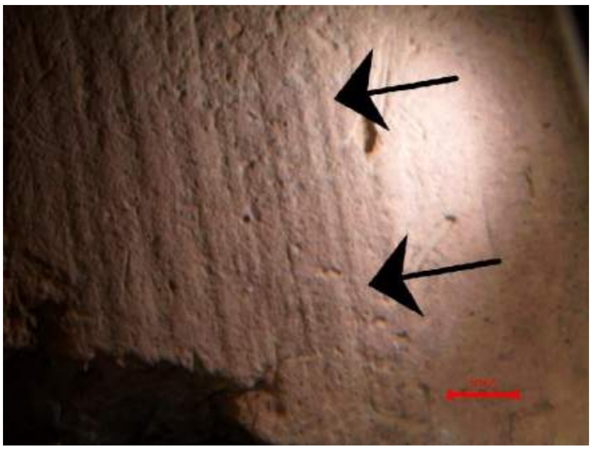
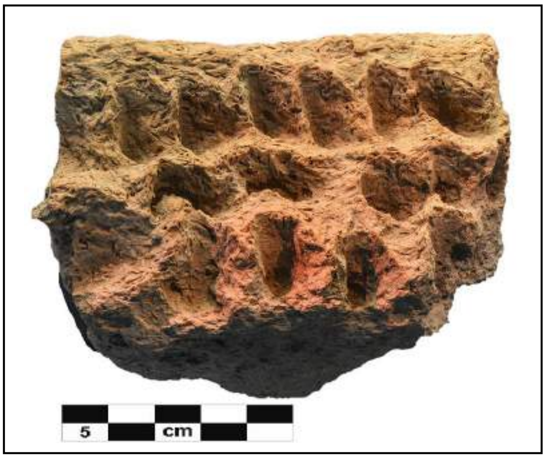


Fig. 5 External surface

Fig. 6 Section



Fragment number: Tell Halula
Site: Tell Halula
Level: superficial
Period:
Grid:
Preservation Level: quite good

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: walls
Core: gray
Color s. internal: orange **External**: orange
Hypothesized side: large

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography:
Surface treatment: treated

Internal Scores:
Shape: oval
Texture: coarse
Size: **length:** **width**:
Incidence: high
Asperity:
Section typology: Vb
Inclination: perpendicular
Direction:
Arrangement: Symmetrical
Edge: rounded net
Extremity typology:
Secondary signs: striations
Distribution:
Scoring interpretation: tool impressed

Use-wear analysis:

Ceramic Surface:
Internal: rips
External:
Mineral Inclusions Surface:
Internal: depressions
External:
Function interpretation: baking basic bread

Post depositional traces: corrosion

Residues: phytoliths

Final interpretation:

The fragment Tell Halula-superficial belonged to the walls of large pan, made of a plan-tempered coarse clay. The external surface was treated (fig. 5).
The inner surface was impressed with a tool when the clay was fresh (figs. 1, 2).
The pan was used to bake basic bread (figs. 1-4).

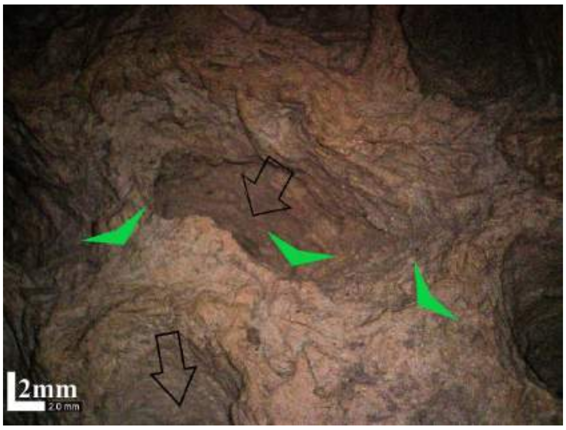


Fig. 1 Internal surface

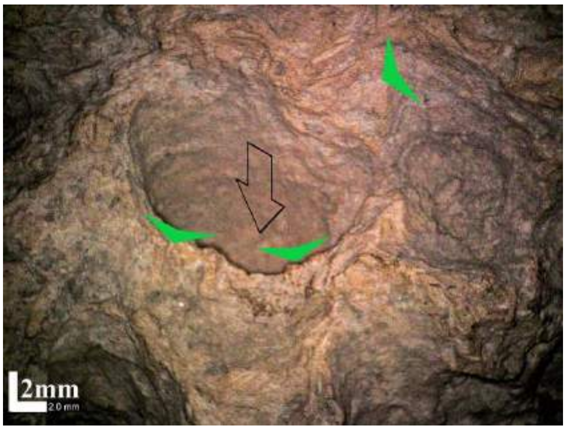


Fig. 2 Internal surface

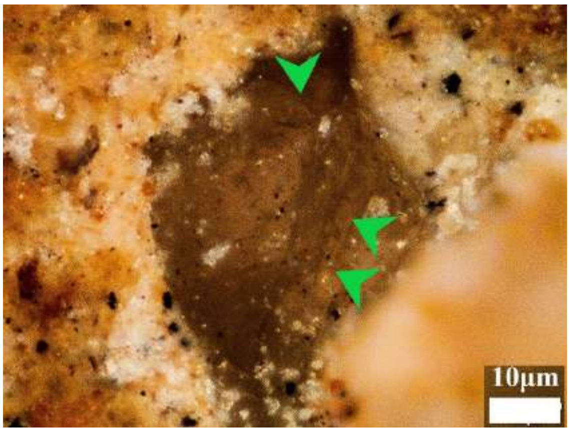


Fig. 3 Internal surface, mineral inclusion

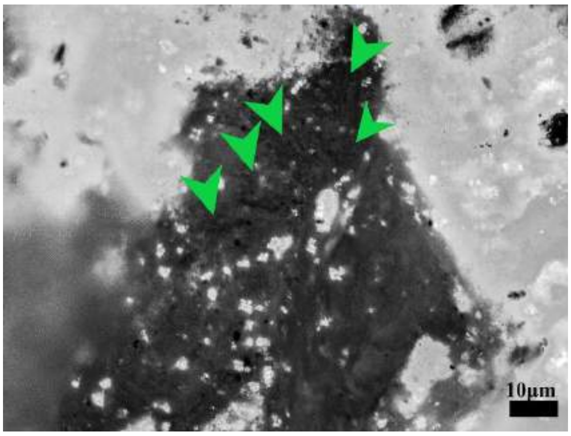


Fig. 4 Internal surface, mineral inclusion

Fig. 5 External surface

Fragment number: TK6644
Site: Tell Kurdu
Level:
Period: Middle/Late Halaf
Grid: 13 trench 22, locus 67,117, Room 28
Preservation Level: Poor

General characteristics:

Paste: fine clay
Temper: mineral inclusions
Section: wall
Core: gray
Color s. internal: gray **External**: gray
Hypothesized side: small bowl

Technological traces analysis:

Internal surface
Topography:
Surface treatment:

External surface
Topography:
Surface treatment:

Internal Scores:
Shape: oval **Texture**:
Size: **length:** **width**:
Incidence: small **Asperity**:
Section typology: Ua **Inclination**: perpendicular
Direction: **Arrangement**:
Edge: **Extremity typology**:
Secondary signs: **Distribution**:
Scoring interpretation: finger impression

Use-wear analysis:

Ceramic Surface:
Internal:
External:
Mineral Inclusions Surface:
Internal:
External:
Function interpretation:

Post depositional traces: concretion

Residues: phytoliths

Final interpretation:

The fragment TK6644 belonged to the walls of a bowl (fig. 1).
The inner surface was finger impressed (fig. 2).
The function of the bowl remain undetermined because strongly covered by concretion (figs. 2, 3)

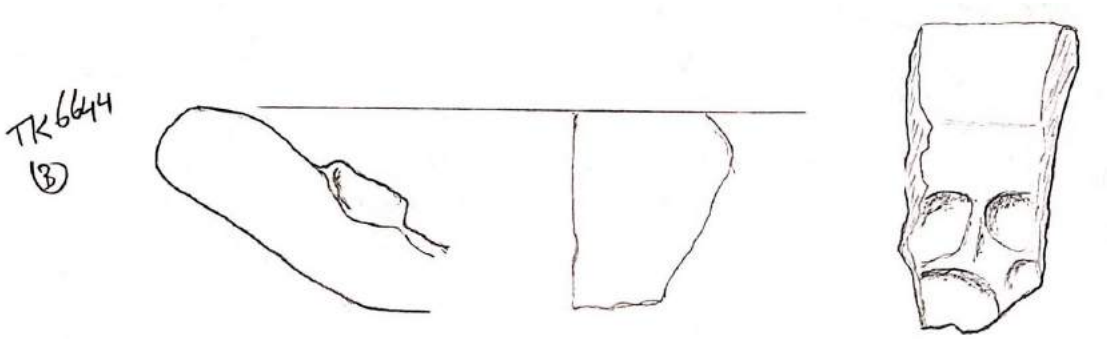


Fig 1 Fragment drawing (Kindly provided by R. Özbal)

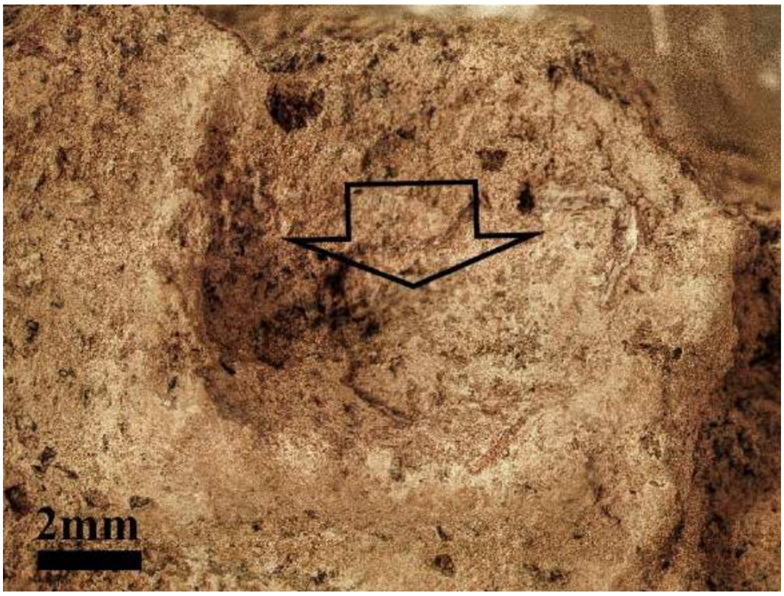


Fig. 2 Internal surface, impression

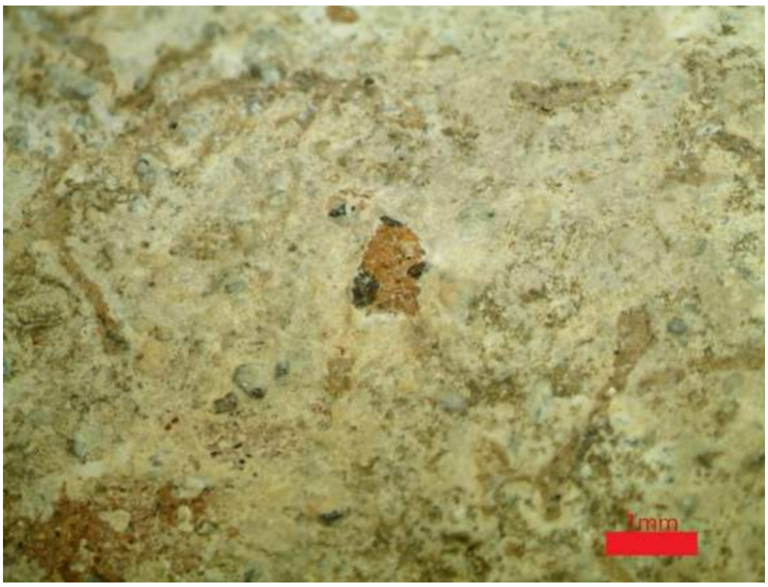


Fig. 3 External surface

Fragment number: TK7502EO
Site: Tell Kurdu
Level:
Period: Middle/Late Halaf
Grid: trench 26, locus 3, 15 Street 74
Preservation Level: Poor

General characteristics:

Paste: fine clay
Temper: mineral inclusions
Section: base-wall
Core: gray
Color s. internal: beige **External**: beige
Hypothesized side: medium bowl

Technological traces analysis:

Internal surface
Topography:
Surface treatment:

External surface
Topography:
Surface treatment: trated

Internal Scores:
Shape: oval **Texture**: coarse
Size: **length:** **width**:
Incidence: high **Asperity**:
Section typology: Vb **Inclination**: perpendicular
Direction: unidirectional **Arrangement**: symmetrical
Edge: **Extremity typology**: sharpened
Secondary signs: **Distribution**:
Scoring interpretation: impressed

Use-wear analysis:

Ceramic Surface:
Internal:
External:
Mineral Inclusions Surface:
Internal: polish
External:
Function interpretation: undetermined

Post depositional traces: concretion

Residues: phytoliths

Final interpretation:
The fragment TK7502EO belonged to the base-walls of a thin bowl (fig. 1).
The inner surface was impressed with a tool (fig. 2).
The function of the bowl remain undetermined because strongly covered by concretion (figs. 2, 3). Anyway it was dragged during its use.

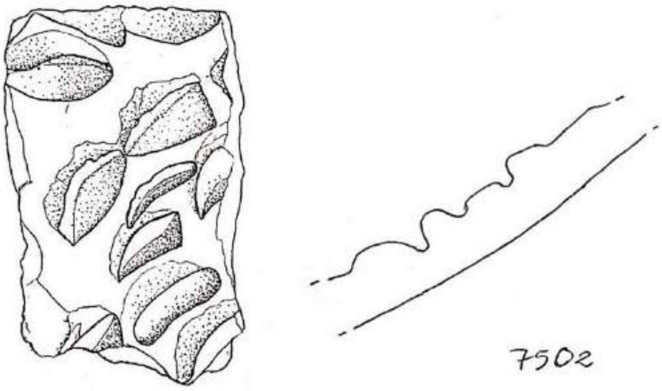


Fig. 1 Drawing of internal surface and section

Fig. 2 Internal surface, impression

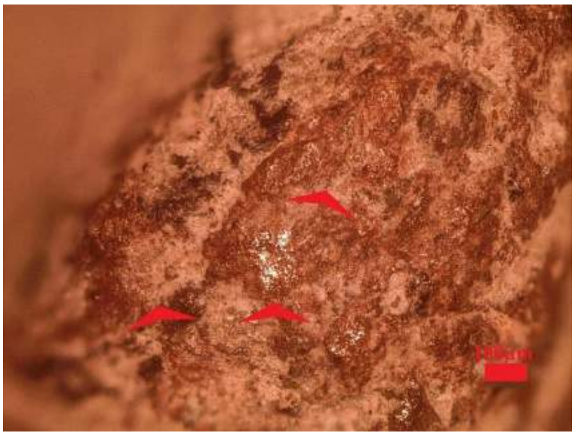


Fig. 3 Internal surface, mineral inclusion

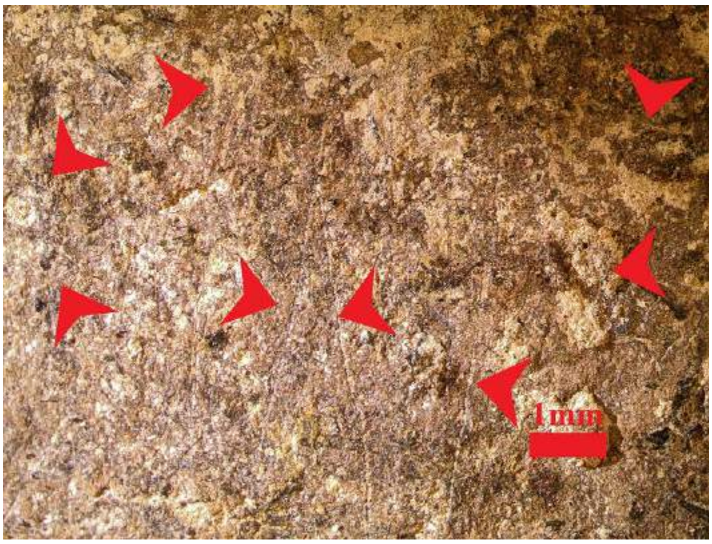


Fig. 4 External surface

Fragment number: TK8282E
Site: Tell Kurdu
Level:
Period: Middle Halaf
Grid: trench 25, locus 76, 134 H Fill room 47
Preservation Level: quite good

General characteristics:

Paste: fine clay
Temper: mineral inclusions
Core: gray
Color s. internal: gray **External**: gray
Hypothesized side: small bowl

Technological traces analysis:

Internal surface
Topography: sinuous
Surface treatment: smoothed

External surface
Topography: sinuous
Surface treatment: smoothed

Internal Scores:
Shape: semicircular
Texture:
Size: **length:** **width**:
Incidence: high
Asperity:
Section typology:
Inclination:
Direction:
Arrangement:
Edge:
Extremity typology:
Secondary signs:
Distribution:
Scoring interpretation: tool incisions

Use-wear analysis:

Ceramic Surface:
Internal: rips
External:
Mineral Inclusions Surface:
Internal: rounding, depressionss
External:
Function interpretation: baking basic bread

Post depositional traces: concretion

Residues: phytoliths

Final interpretation:

The fragment TK8282E belonged to the walls of a small bowl, made of a fine clay and both on the inner and external part finished by smoothing (figs. 1, 3, 6).
The inner surface was maybe tool incised.
The bowl was used to bake bread (figs. 1, 2, 4, 5). The surface was covered by concretion (1, 2, 6).

Fig. 1 Internal surface

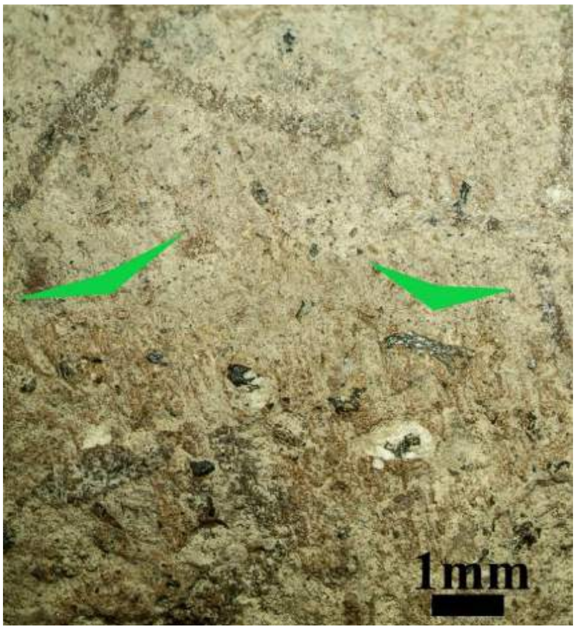


Fig. 2 Internal surface

Fig. 3 Internal surface, rim

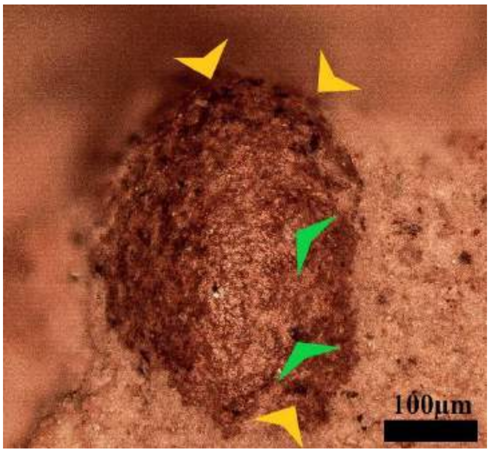


Fig. 4 Internal surface, mineral inclusion

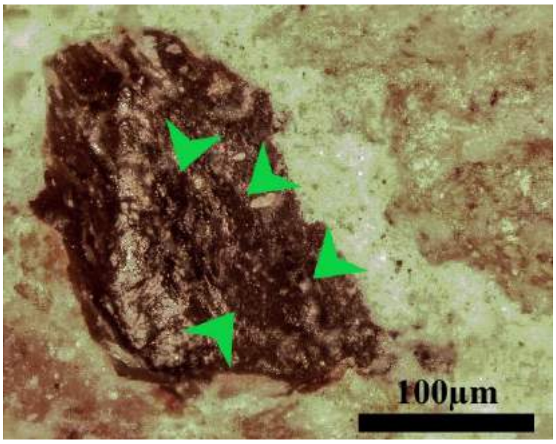


Fig. 5 Internal surface, mineral inclusion

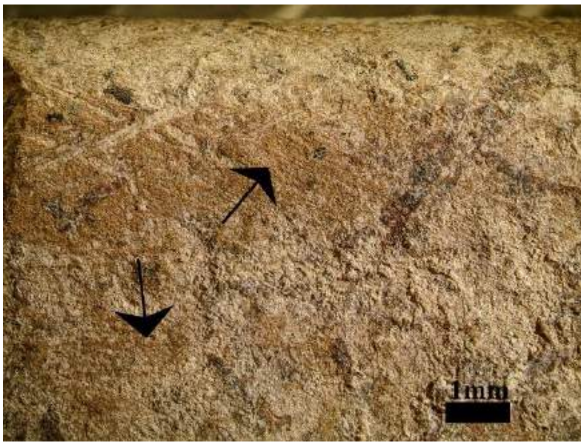


Fig. 6 External surface

Fragment number: SAB 88, S12, 120-5
Site: Tell Sabi Abyad
Level: 78?
Period: end of Pre-Halaf /beginning Transitional
Grid: Operation I, Ashy fill of fire pit east of building 7.14
Preservation Level: Excellent

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: Base
Core: Dark
Color s. internal: Brown **External**: Brown
Hypothesized side: medium-size tray

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography:
Surface treatment: Untreated

Internal Scores:
Shape: oval
Texture: coarse
Size: **length:** **width**:
Incidence: Hight
Asperity:
Section typology: Ua
Inclination: Inclined-Rounded
Direction:
Arrangement: Asymmetrical
Edges: Linear-Rounded
Extremity typology: Semicircular
Secondary signs: striation
Distribution: parallel
Final interpretation: Finger impressed

Use-wear analysis:

Ceramic Surface:
Internal: rips
External:
Mineral Inclusions Surface:
Internal: depressions
External: striations
Function interpretation: baking basic bread

Post depositional traces:

Residues: phytoliths

Final interpretation:

The fragment SAB 88 12 120-5 belonged to the base of a large pan, made plant-tempered coarse clay and finished with little care.
The inner surface was hastily finger impressed when the clay was fresh (fig. 1,2).
The pan was used to bake basic bread (figs. 1-4). Moreover, it was dragged during its use (figs. 5,6).

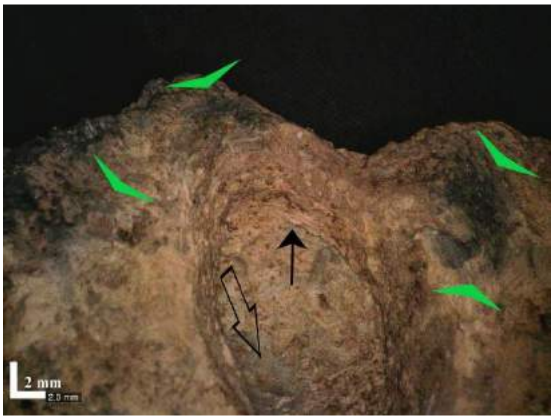


Fig. 1 Internal surface

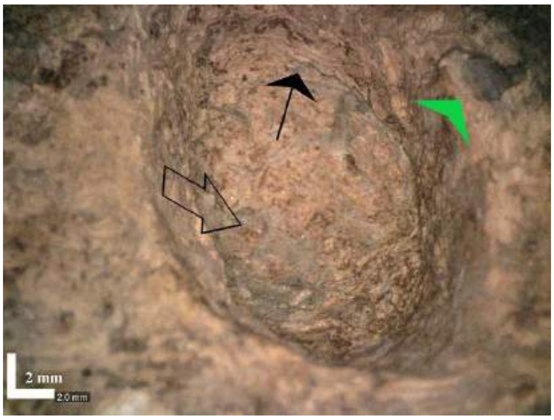


Fig. 2 Internal surface, impression

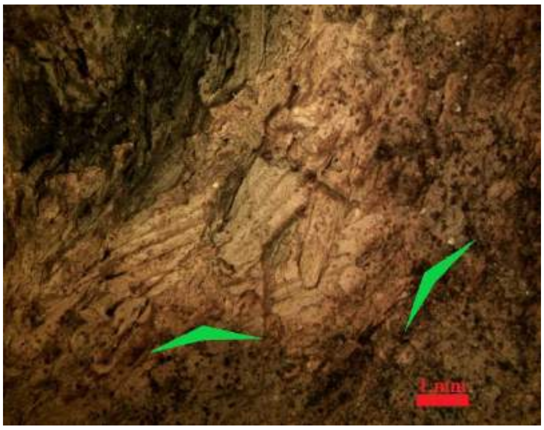


Fig. 3 Internal surface

Fig. 4 Internal surface

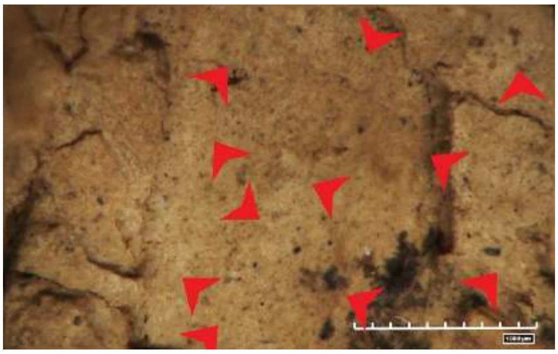


Fig. 5 External surface

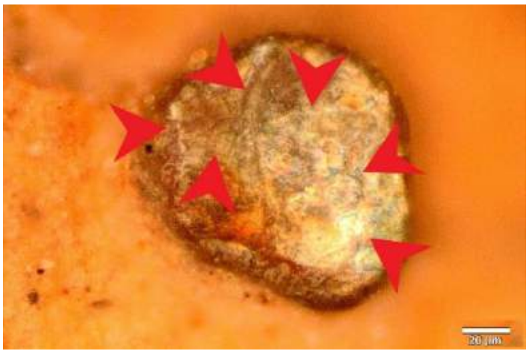


Fig. 6 External surface, mineral inclusion

Fragment number: SAB 88 Q14 50-24
Site: Tell Sabi Abyad
Level: 3B
Period: Halaf
Grid: Operation I, fill open area with loamy layers, charred grain and charcoal particle
Preservation Level: poor

General characteristics:

Paste: fine clay
Temper: mineral inclusions and dung?
Section: base
Core: pink
Color s. internal: gray **External**: gray
Hypothesized side: medium

Technological traces analysis:

Internal surface
Topography: sinuous
Surface treatment: smoothed

External surface
Topography: flat
Surface treatment:

Internal Scores:
Shape: grooves
Texture: stried
Size: **length:** **width**:
Incidence: low
Asperity:
Section typology: Ua
Inclination: perpendicular
Direction: unidirectional
Arrangement: parallel
Edge: net rounded
Extremity typology:
Secondary signs: striations
Distribution: parallel
Scoring interpretation: finger grooved

Use-wear analysis:

Ceramic Surface:
Internal:
External: striations, levelling
Mineral Inclusions Surface:
Internal:
External:
Function interpretation: undetermined

Post depositional traces: corrosion

Residues: phytoliths

Final interpretation:

The fragment SAB 88 50-24 belonged to the base of a medium-size pan, made of a mineral fine clay. The inner surface was finger grooved (fig. 1).
The function of the pan remain undetermined (fig. 3). Anyway the vessel was dragged (fig. 5).

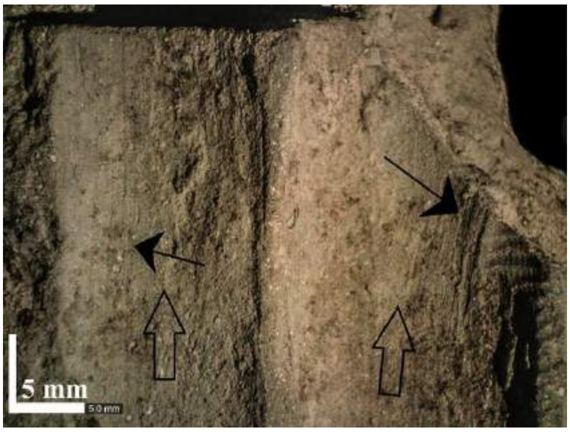


Fig. 1 Internal surface, grooves

Fig. 2 Internal surface grooves

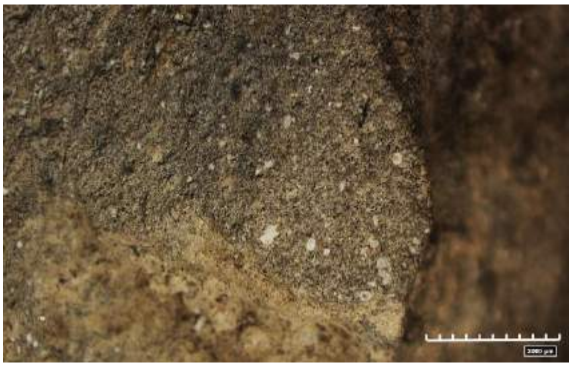


Fig. 3 Internal surface

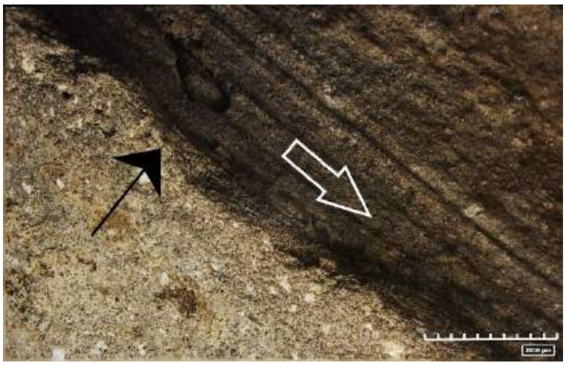


Fig. 4 Internal surface, grooves

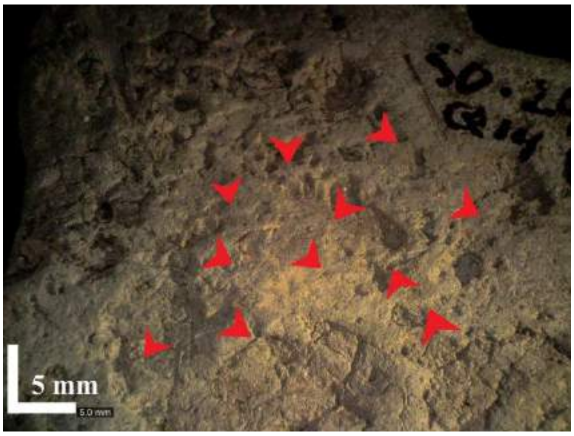


Fig. 5 External surface

Fragment number: SAB 125 88-549
Site: Tell Sabi Abyad
Level: 3-4
Period: Transitional
Grid: operation II
Preservation Level: excellent

General characteristics:

Paste: medium granulometry clay
Temper: large amount of plant inclusions
Section: base
Core: grey
Color s. internal: orange **External**: light orange
Hypothesized side: Large tray

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: uneven
Surface treatment: untreated

Internal Scores:
Shape: oval
Texture: coarse
Size: **length:** **width**:
Incidence: High
Asperity:
Section typology: Ua
Inclination: Inclined-Rounded
Direction:
Arrangement: Asymmetrical
Edges: Linear-Rounded
Extremity typology: Semicircular
Secondary signs: striation
Distribution: parallel
Scoring interpretation: finger impressed

Use-wear analysis:

Ceramic Surface
Internal: rips, darkening, rounding, waved edges
External: soot, striations
Mineral Inclusions Surface
Internal:
External:
Function interpretation: baking basic and fat bread

Post depositional traces:

Residues: phytoliths

Final interpretation:

The fragment SAB 125 belonged to the base of a large pan, made and finished with little care. The inner surface was finger grooved hastily when the clay was fresh (fig. 1).
The pan was used to bake different types of bread: both basic (figs. 3,4) and with oil (fig. 2-5). Moreover, it was dragged during its use maybe on coals (fig. 6)

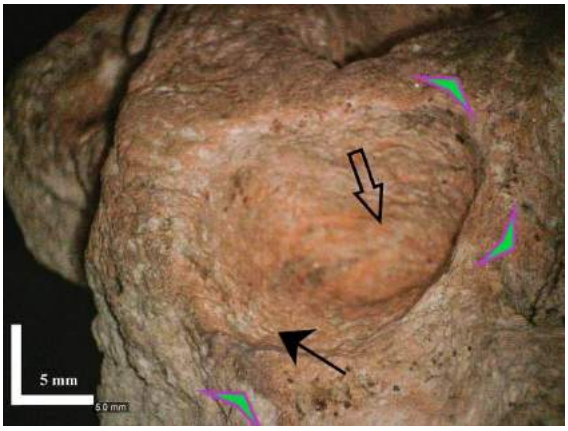


Fig. 1 Internal surface

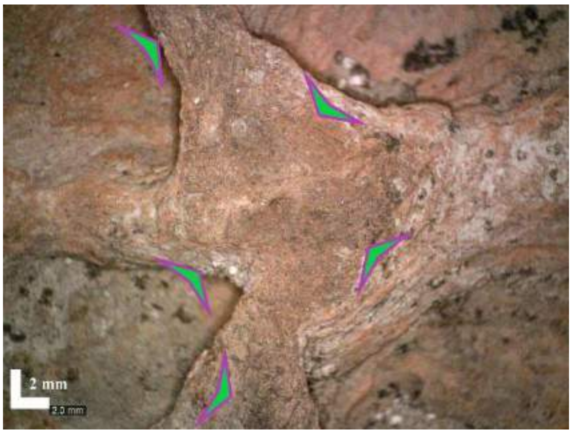


Fig. 2 Internal surface

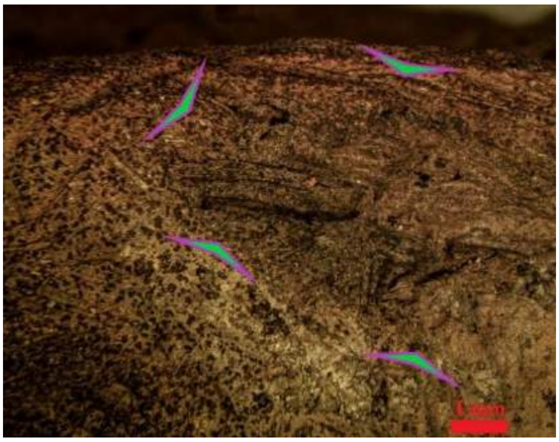


Fig. 3 Internal surface

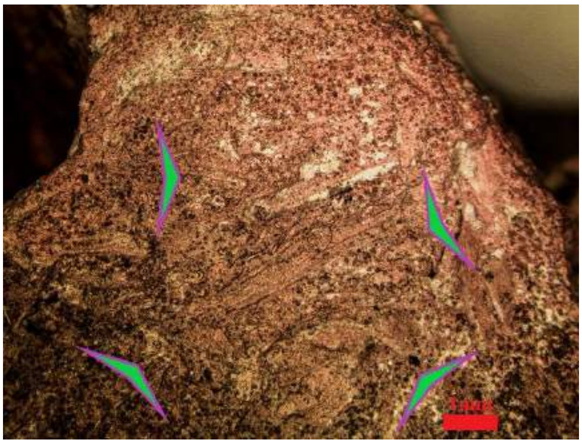


Fig.4 Internal surface

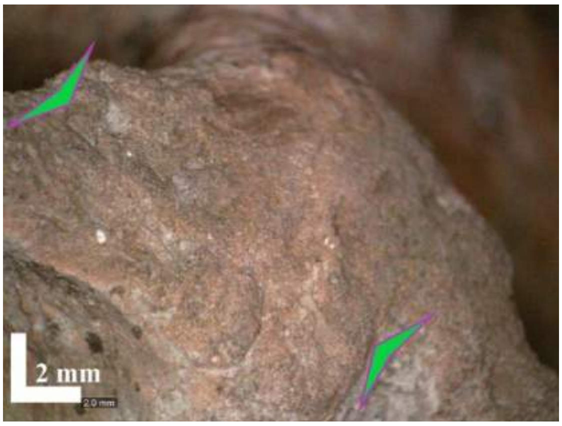


Fig. 5 Internal surface

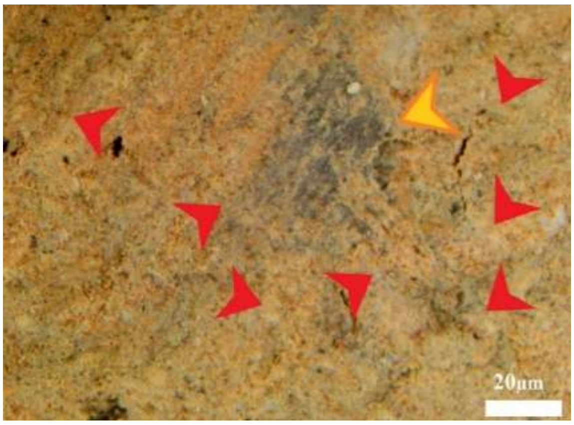


Fig. 6 External surface

Fragment number: SAB 126
Site: Sabi Abyad
Level: 4
Period: Pre-halaf (last level of the transitional)
Grid: Op. I P15 Fill of hearth locus 14
Preservation Level: good

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: base
Core:
Color s. internal: light orange **External**: light orange
Hypothesized side: medium

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment:

External surface
Topography: sinuous
Surface treatment: smoothed

Internal Scores:
Shape: oval
Texture: coarse
Size: **length:** **width**:
Incidence: high
Asperity:
Section typology:
Inclination: Inclined-Rounded
Direction:
Arrangement: Asymmetrical
Edges: Linear-Rounded
Extremity typology: Semicircular
Secondary signs: striation
Distribution: parallel
Final interpretation: Finger impressed

Use-wear analysis:

Ceramic Surface:
Internal: rips
External: striations
Mineral Inclusions Surface:
Internal: depressions
External:
Function interpretation: baking basic bread

Post depositional traces:

Residues: phytoliths

Final interpretation:

The fragment SAB126 belong to the base of a medium pan, made of plant tempered coarse clay.
The inner surface was finger grooved hastily when the clay was fresh (fig. 1-3).
The pan was used to basic bread (figs. 1-5). Moreover it was dragged during its use (fig. 5).

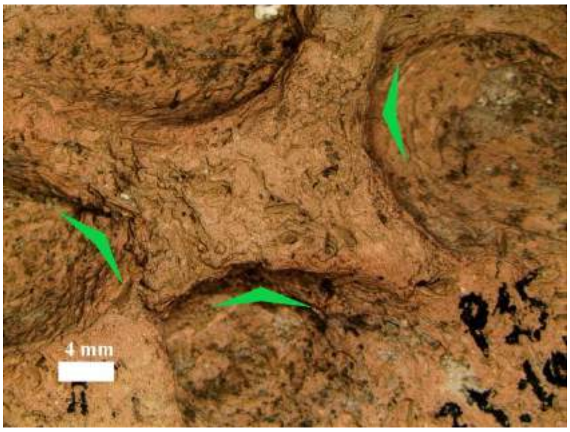
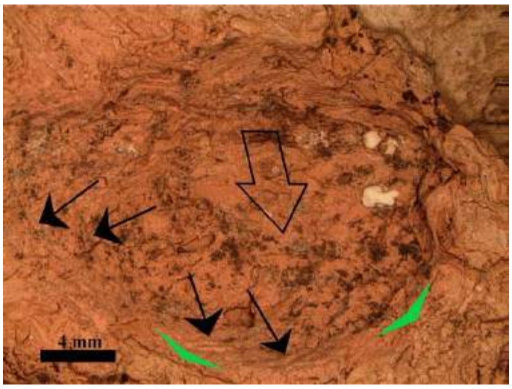


Fig. 1 Internal surface

Fig. 2 Internal surface



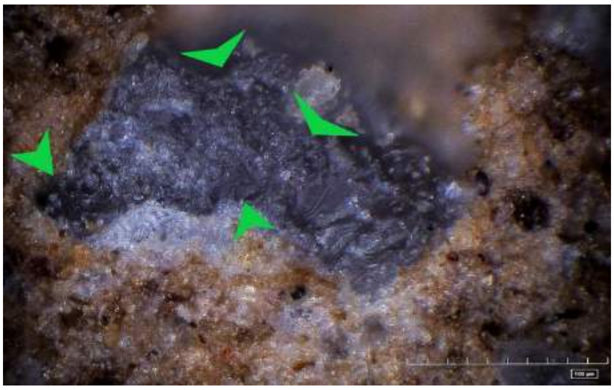


Fig. 3 Internal surface, impression

Fig. 4 Internal surface, mineral inclusion

Fig. 5 External surface

Fragment number: SAB 184
Site: Tell Sabi Abyad
Level:
Period: Early Halaf
Grid: operation I
Preservation Level: quite good

General characteristics:

Paste: medium granulometry clay
Temper: plant inclusions
Section: base
Core: gray
Color s. internal: beige **External**: beige
Hypothesized side: medium-size tray

Technological traces analysis:

Internal surface
Topography: sinuous
Surface treatment:

External surface
Topography:
Surface treatment:

Internal Scores:
Shape: linear **Texture**:
Size: **length:** **width**:
Incidence: high **Asperity**: blunt
Section typology: Ω **Inclination**: perpendicular
Direction: unidirectional **Arrangement**: parallel
Edge: **Extremity typology**:
Secondary signs: **Distribution**:
Scoring interpretation: humps added

Use-wear analysis:

Ceramic Surface:
Internal: crumbling, darkening, rips, charred encrustation
External: striations
Mineral Inclusions Surface:
Internal: rounding, depressions, soot
External:
Function interpretation: baking basic and fat bread

Post depositional traces: concretion, blackish encrustations

Residues: phytoliths

Final interpretation:

The fragment SAB 184 belonged to the base of a medium pan, made with a clay of medium granulometry and plant-tempered. Coilings were added to the internal surface in order to make up humps (fig. 1, 2). The pan was used to bake different types of bread with some fat substance (figs. 1-6).
During its use, a charred encrustation and soot adhered to the surface of the fragment (figs. 1-6).

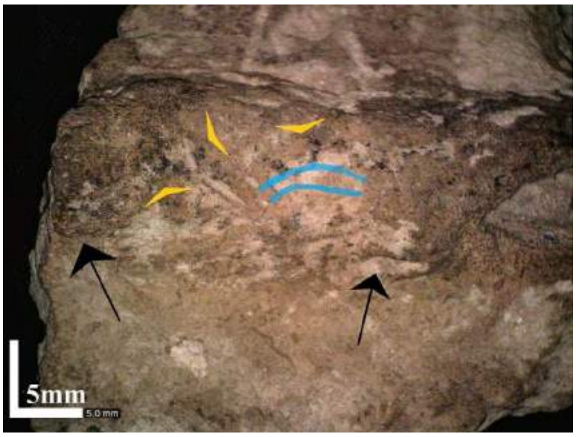


Fig. 1 Internal surface

Fig. 2 Internal surface

Fig. 3 Internal surface

Fig. 4 Internal surface

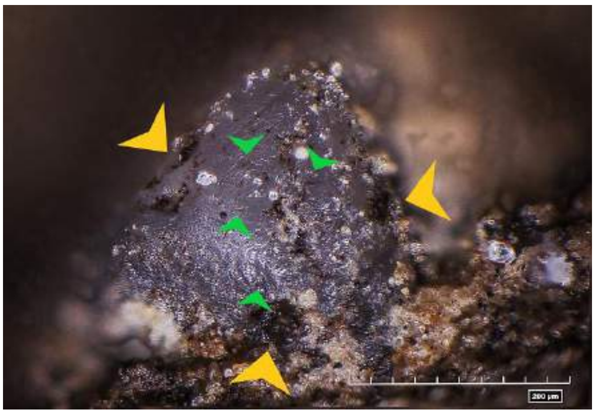


Fig. 5 Internal surface, mineral inclusion

Fig. 6 External surface

Fragment number: SAB 88 3-4-4
Site: Tell Sabi Abyad
Level: 3B
Period: Halaf
Grid: Operation I, Open area with many (fire) pits
Preservation Level: poor

General characteristics:

Paste: coarse clay
Temper: organic temper
Section: base
Core: orange
Color s. internal: orange **External**: orange
Hypothesized side: medium

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: flat
Surface treatment: treated

Internal Scores:
Shape: incisions
Texture: coarse
Size: **length**: **width**:
Incidence: high
Asperity: sharp
Section typology: Vb
Inclination: perpendicular
Direction: parallel
Arrangement: Symmetrical
Edge:
Extremity typology:
Secondary signs:
Distribution:
Scoring interpretation: tool incised

Use-wear analysis:

Ceramic Surface:
Internal: rips, charred encrustations
External: striations, levelling, soot
Mineral Inclusions Surface:
Internal:
External:
Function interpretation: baking basic bread

Post depositional traces: breakage

Residues: phytoliths

Final interpretation:
The fragment SAB 88 3-4-4 belonged to the base of medium size pan, made of a coarse clay. The inner surface was scored I n parallel incisions with a tool squared when the clay was fresh (fig. 1, 2). The external surface treated in order to became flat (fig. 5).
The pan was used to bake basic bread (figs. 2-4) in a fire installation (fig. 4-5).

Fig. 1 Internal surface, incisions

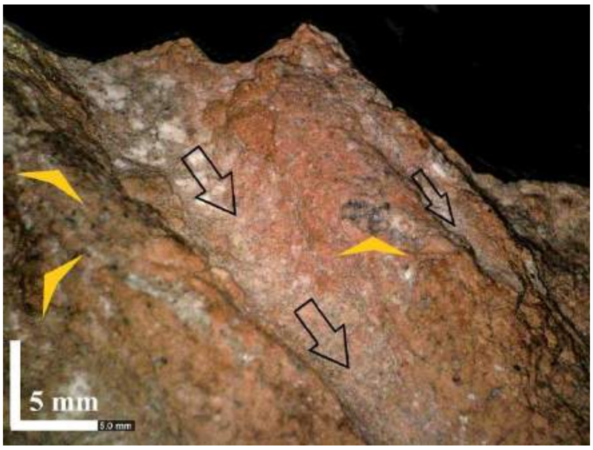


Fig. 2 Internal surface, incisions

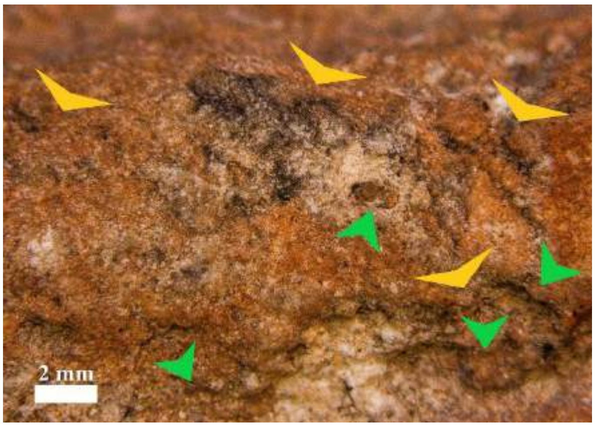


Fig. 3 Internal surface, high point

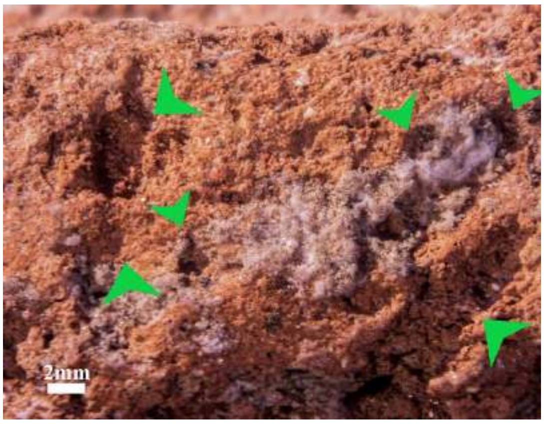


Fig. 4 Internal surface, high poin

Fig. 5 External surface

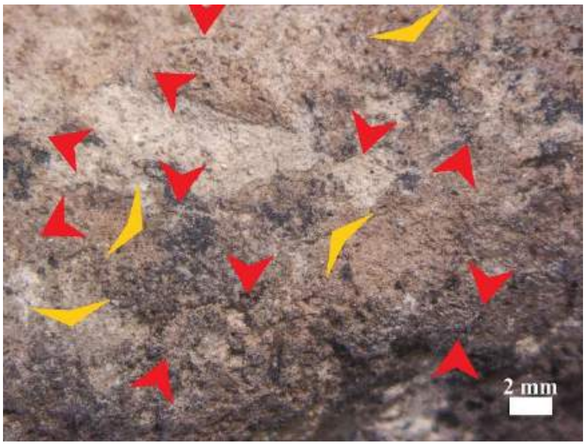
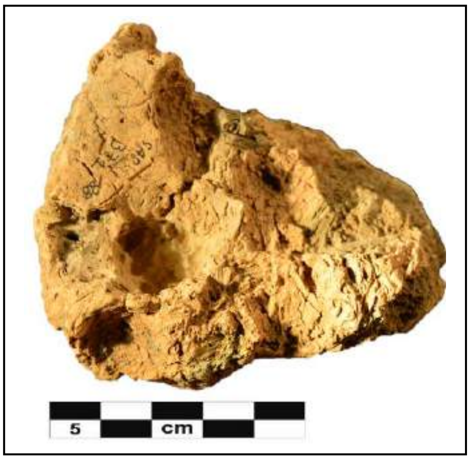


Fig.6 External surface



Fragment number: SAB 88 371
Site: Tell Sabi Abyad I
Level: 3-4
Period: Transitional
Grid: Operation II
Preservation Level: Poor

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: ?
Core: Dark
Color s. internal: light orange **External**: light orange
Hypothesized side: large

Technological traces analysis:

Internal surface
Topography: coarse
Surface treatment: untreated

External surface
Topography: coarse
Surface treatment: untreated

Internal Scores:
Shape: oval
Texture: coarse
Size: **length:** **width**:
Incidence: high
Asperity:
Section typology: Ua
Inclination: perpendicular
Direction:
Arrangement:
Edge:
Extremity typology:
Secondary signs: striation
Distribution:
Scoring interpretation: finger impressed

Use-wear analysis:

Ceramic Surface:
Internal: rips, charred encrustations, striations, polish, spall detachment
External:
Mineral Inclusions Surface:
Internal:
External:
Function interpretation: undetermined

Post depositional traces: breakage

Residues: phytoliths

Final interpretation:

The fragment SAB 371 belonged to a large pan, made of a plan-tempered coarse clay (fig. 5).
The inner surface was finger grooved when the clay was fresh (fig. 1, 2).
The pan maybe was used basic bread (figs. 1) but the numerous alterations after its use made the interpretation uncertain (2, 3).

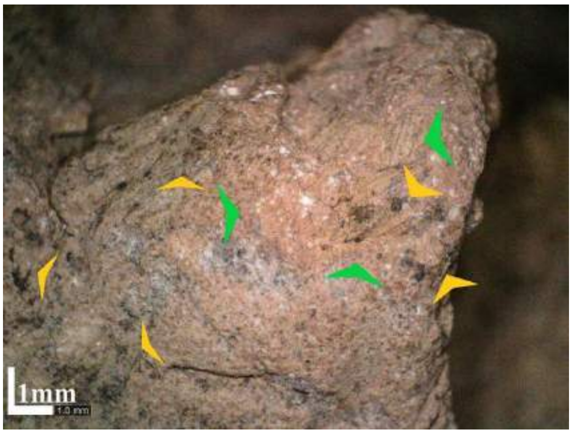


Fig. 1　Internal surface

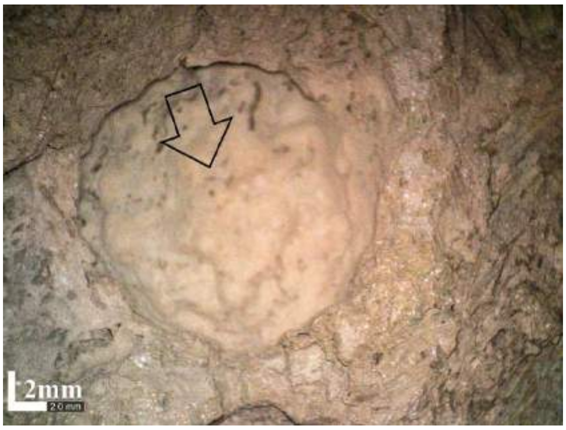


Fig. 2 Internal surface

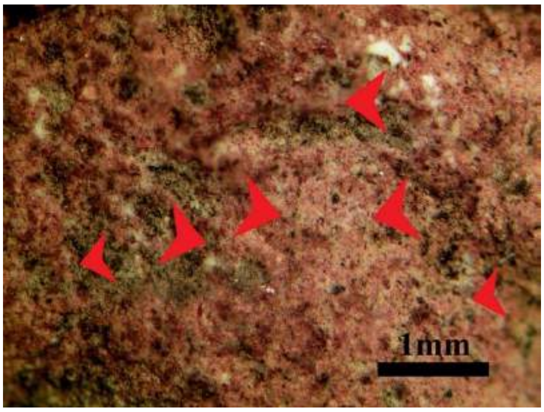


Fig. 3　Internal surface

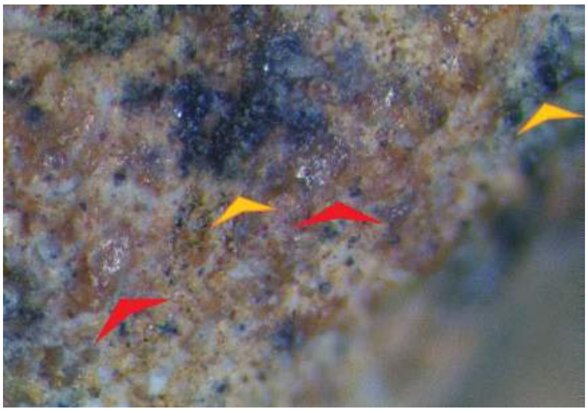


Fig. 4 Internal surface

Fig. 5 External surface

Fragment number: MT'01 23H7 (MT112)
Site: Mezraa Teleilat
Level: IB1c
Period: IIC1
Grid: 2-4/c-g
Preservation Level: quite good

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: base (walls)
Core: dark
Color s. internal: gray **External**: gray
Hypothesized side: large tray

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: sinuous
Surface treatment: smoothed

Internal Scores:
Shape: circular **Texture**: striated
Size: **length:** 0,7 cm **width**:
Incidence: high **Asperity**:
Section typology: Ub **Inclination**: perpendicular
Direction: **Arrangement**:
Edge: **Extremity typology**:
Secondary signs: striations **Distribution**:
Scoring interpretation: tool impressions

Use-wear analysis:

Ceramic Surface:
Internal: rips, crumbling
External: striations, sooting
Mineral Inclusions Surface:
Internal: rounding
External: polish
Function interpretation: baking basic or fat bread

Post depositional traces:

Residues:

Final interpretation:
The fragment MT112 belonged to the base of an extremely thick, large pan, in the joint point with its walls (fig. 1). It was made of a plan-tempered coarse clay. The external surface was finished by smoothing (figs. 5, 6).
The inner surface was tool impressed when the clay was fresh (fig. 1, 2).
The pan was used to basic or fat bread (fig. 1-4).

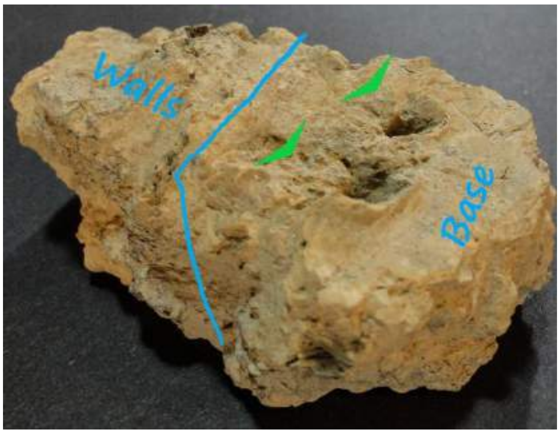


Fig. 1 Internal surface

Fig. 2 Internal surface, impression

Fig. 3 Internal surface

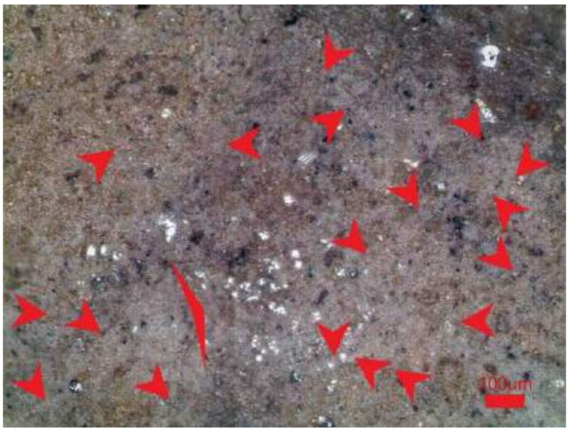


Fig. 4 External surface

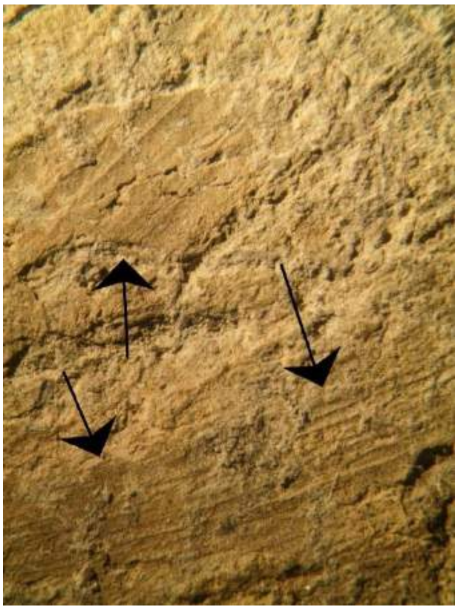


Fig. 5 External surface

Fig. 6 External surface

Fragment number: MT'01 23H 15 (MT 103)
Site: Mezraa Teleilat
Level: IB1d
Period: IIB3-IIB2
Grid: 3-9/f-k
Preservation Level: good

General characteristics:

Paste: coarse clay
Temper: plant inclusions and dung?
Section: wall
Core: gray
Color s. internal: light orange **External**: light orange
Hypothesized side: medium tray

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: flat
Surface treatment: treated

Internal Scores:
Shape: triangular **Texture**: coarse
Size: **length:** 2cm **width**: 1,2 cm
Incidence: high **Asperity**:
Section typology: **Inclination**: perpendicular
Direction: **Arrangement**:
Edge: round jagged **Extremity typology**:
Secondary signs: no **Distribution**:
Scoring interpretation: tool impression

Use-wear analysis:

Ceramic Surface:
Internal: rips
External:
Mineral Inclusions Surface:
Internal: depressions
External:
Function interpretation: baking basic bread

Post depositional traces: breakage

Residues:

Final interpretation:

The fragment MT 103 belonged to the walls of large pan (fig. 6), made of a plan-tempered coarse clay and finished with little care.
The inner surface was tool impressed hastily when the clay was fresh (fig. 2-4).
The pan was used to bake basic bread (figs. 1,5).

Fig. 1 Internal surface

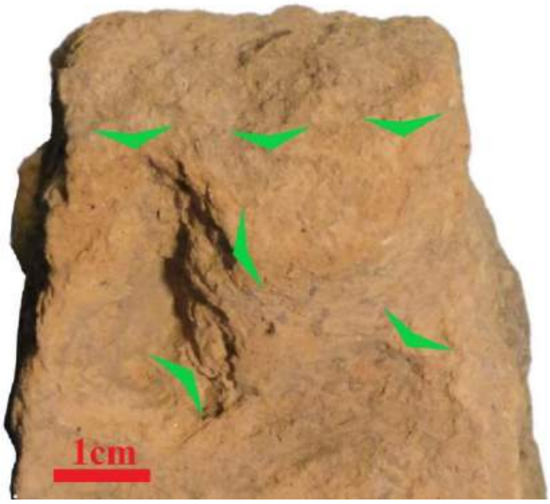


Fig. 2 Internal surface, impression

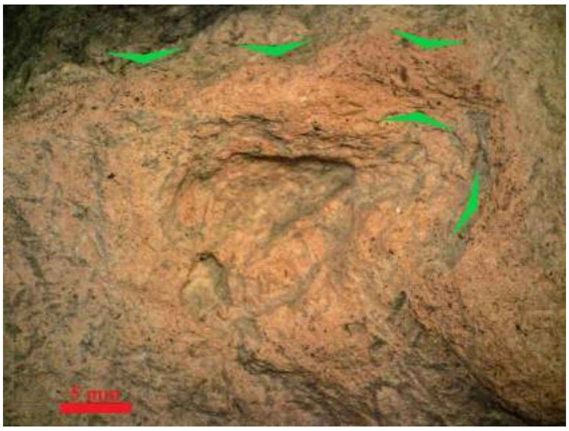


Fig. 3 Internal surface, impression

Fig. 4 Internal surface, impression

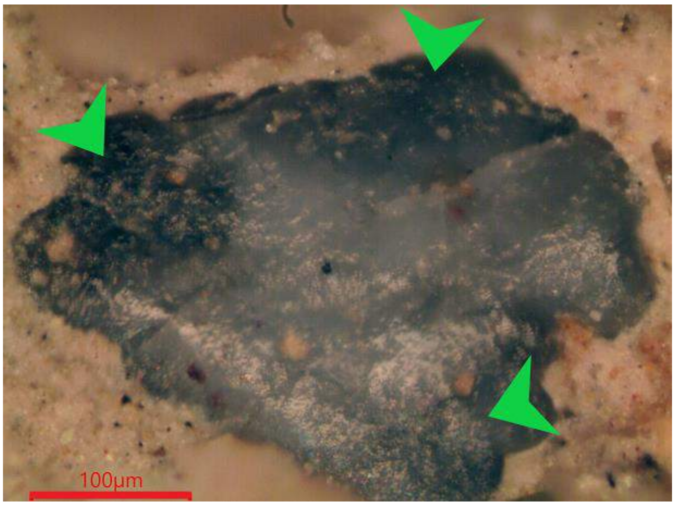


Fig. 5 Internal surface, mineral inclusion

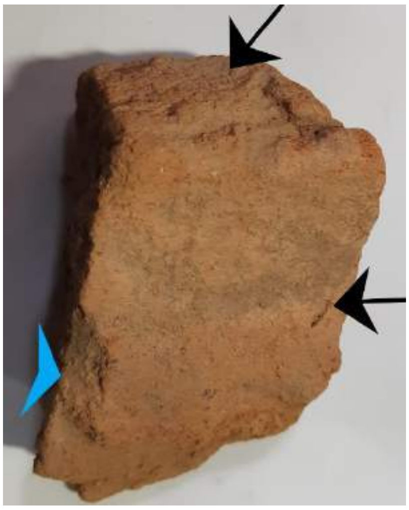


Fig. 6 External surface

Fragment number: MT'01 23H 19 (MT 40)
Site: Mezraa Teleilat
Level: IB1c
Period: IIB3- IIB2
Grid: 3-9/f-k
Preservation Level: good

General characteristics:

Paste: medium-size clay
Temper: few plant inclusions
Section: base
Core: dark-gray
Color s. internal: beige **External**: beige
Hypothesized side: medium-size tray

Technological traces analysis:

Internal surface
Topography: sinuous
Surface treatment: smoothed

External surface
Topography: uneven
Surface treatment: untreated

Internal Scores:
Shape: triangular **Texture**: coarse
Size: **length:** variable **width**: variable
Incidence: low **Asperity**:
Section typology: Va **Inclination**: perpendicular
Direction: **Arrangement**: asymmetrical
Edge: **Extremity typology**:
Secondary signs: **Distribution**:
Scoring interpretation: tool impressed

Use-wear analysis:

Ceramic Surface:
Internal: darkening, spots, rounding
External: scratches, striations
Mineral Inclusions Surface:
Internal: rounding, polish
External: striations
Function interpretation: baking fat bread

Post depositional traces:

Residues:

Final interpretation:

The fragment MT 40 belonged to the base of large pan, made of a plan-tempered coarse clay.
The inner surface was tool impressed (fig. 1,2).
The pan was used to bake fat bread (fig. 1-6).

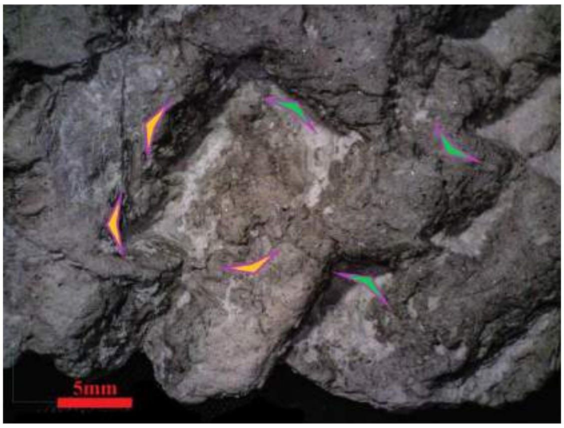


Fig. 1 Internal surface, impressions

Fig. 2 Internal surface, impressions

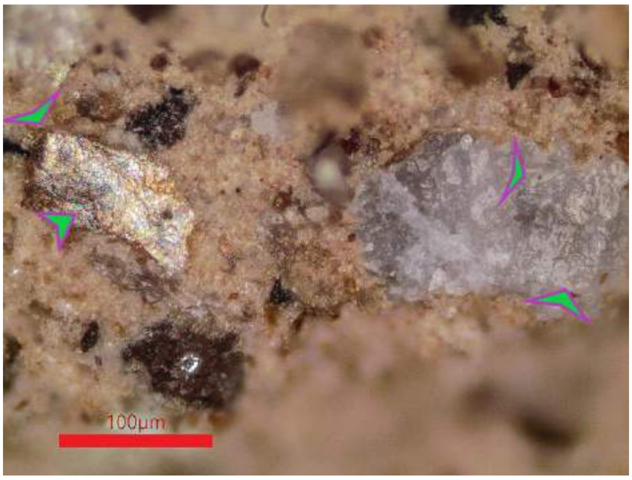


Fig. 3 Internal surface, mineral inclusion

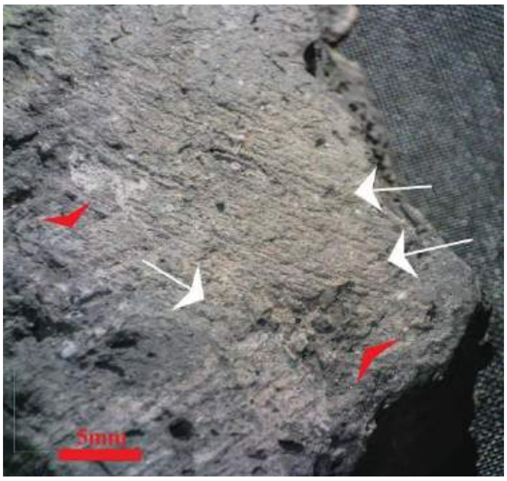


Fig. 4 External surface

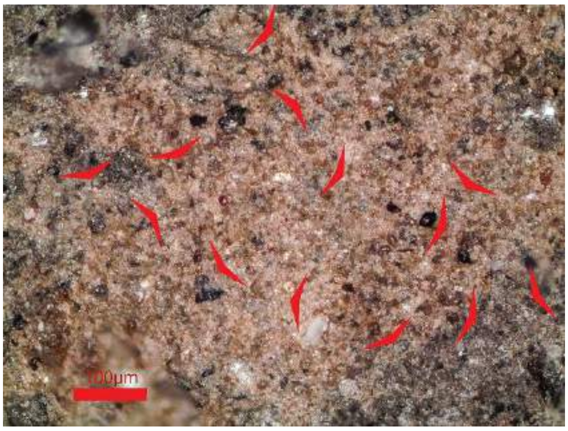


Fig. 5 External surface

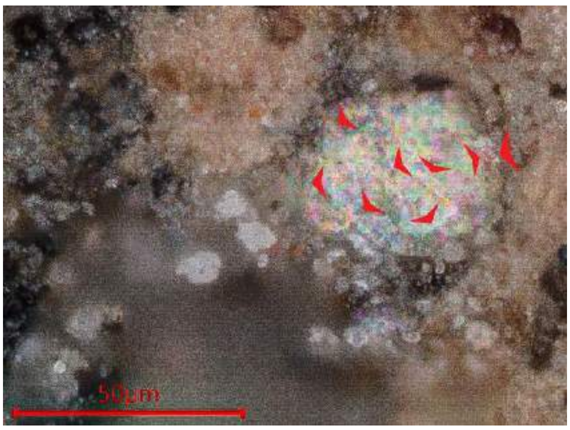


Fig. 6 External surface, mineral inclusion

Fragment number: MT 170
Site: Mezraa Teleilat
Level: IB1e
Period: IIB3
Grid: 1-10/a-f
Preservation Level: Good

General characteristics:

Paste: coarse clay
Temper: plant inclusions
Section: base
Core: dark
Color s. internal: light brown **External**: light brown
Hypothesized side: large tray

Technological traces analysis:

Internal surface
- **Topography**: uneven
- **Surface treatment:** untreated

External surface
- **Topography:** uneven
- **Surface treatment:**

Internal Scores:
- **Shape**: oval
- **Texture**:
- **Size**: **length:** **width**: 1 /1,9
- **Incidence**: high
- **Asperity**:
- **Section typology**: Ua
- **Inclination**: round/inclined
- **Direction**:
- **Arrangement**:
- **Edge**:
- **Extremity typology**:
- **Secondary signs**:
- **Distribution**:
- **Scoring interpretation:** wooden tool and finger impressed

Use-wear analysis: baking basic bread

Ceramic Surface:
- **Internal**: rips
- **External**: striations

Mineral Inclusions Surface:
- **Internal**: depressions
- **External**:

Function interpretation: baking basic bread

Post depositional traces:

Residues:

Final interpretation:

The fragment MT 170 belonged to the base of large pan, made of a plan-tempered coarse clay and finished with little care.
The inner surface was grooved both by a finger and a tool when the clay was fresh (fig. 1).
The pan was used to bake basic bread (figs. 3,4). The vessel was dragged during its use.

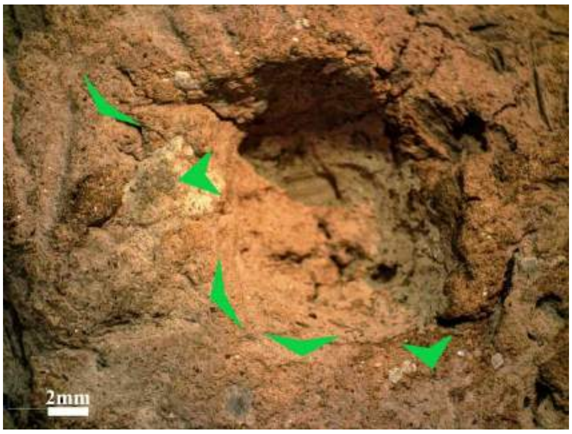


Fig. 1 Internal surface, finger impression

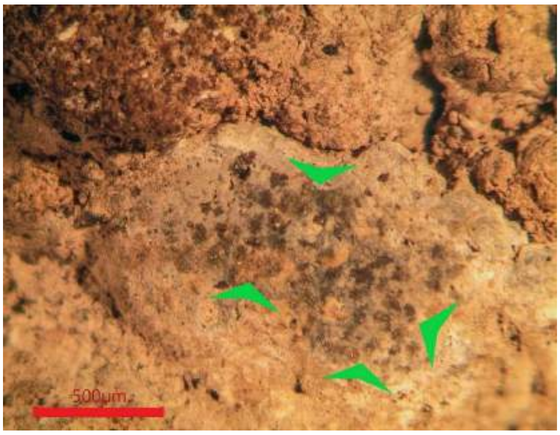


Fig. 2 Internal surface, mineral inclusion

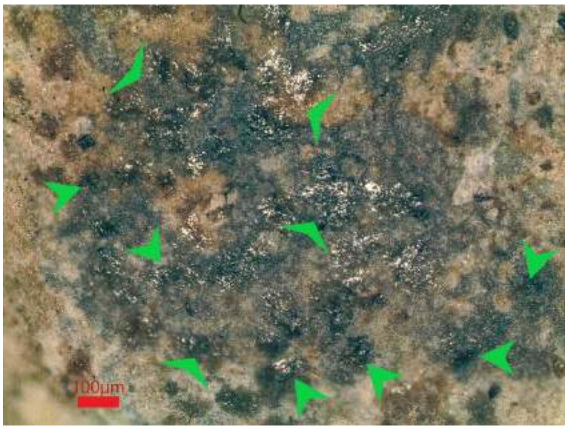


Fig. 3 Internal surface, mineral inclusion

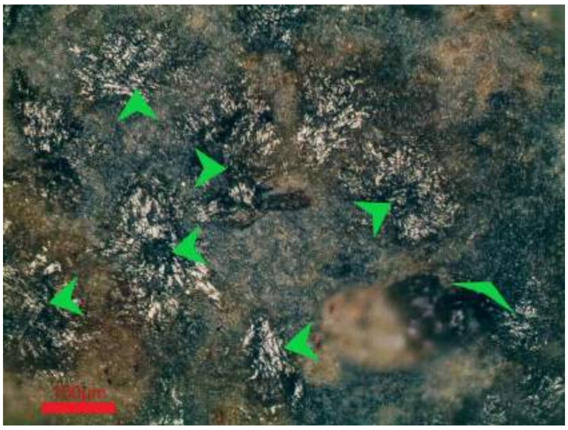


Fig. 4 Internal surface, mineral inclusion

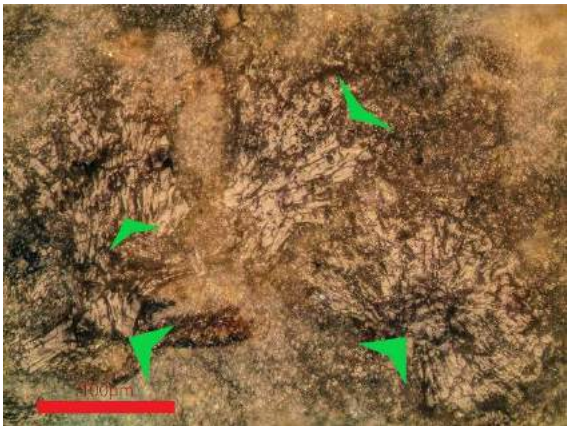


Fig. 5 Internal surface, mineral inclusion

Fig. 6 External surface

Fragment number: MT'00 22I 29 (MT 28)
Site: Mezraa Teleilat
Level: IB2c
Period: IIB3
Grid: 2-3/c-d
Preservation Level: Good

General characteristics:

Paste: medium granulometry clay
Temper: large amount of plant inclusions
Section: base and walls
Core: dark
Color s. internal: light pink **External**: light pink
Hypothesized side: large

Technological traces analysis:

Internal surface
Topography: sinuous
Surface treatment: smoothed

External surface
Topography: sinuous
Surface treatment: smoothed

Internal Scores:
Shape: incision
Texture: striated
Size: **length:** **width**: 1,4
Incidence:
Asperity:
Section typology: Ub
Inclination: perpendicular
Direction: unilateral
Arrangement: symmetrical
Edge: rounded
Extremity typology: flattened
Secondary signs: striations
Distribution: irregular
Scoring interpretation: base soft tool incised

Use-wear analysis:

Ceramic Surface:
Internal: rips
External:
Mineral Inclusions Surface:
Internal: depressions
External:
Function interpretation: baking basic bread

Post depositional traces: concretions, breakage

Residues: white substance (phytoliths?)

Final interpretation:
The fragment MT 28 belonged to a large pan, made of a plan-tempered medium-granulometry clay. On a large thick base walls were applied maybe with slab technique (fig. 5). Then The inner surface was grooved with a soft tool (fig. 1) and the vessel finished by smoothing (fig. 5). The pan was used to bake basic bread (figs. 2-4).

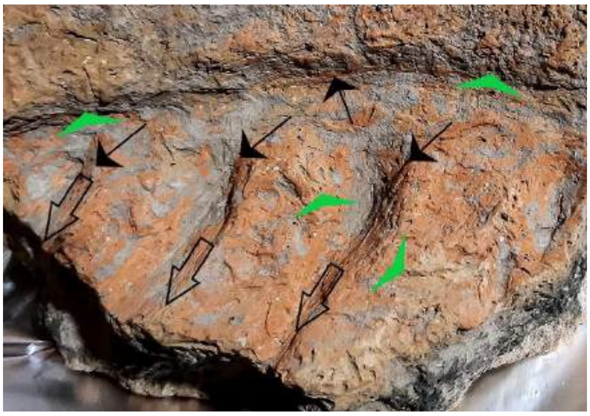


Fig. 1 Internal surface, incisions

Fig. 2 Internal surface walls

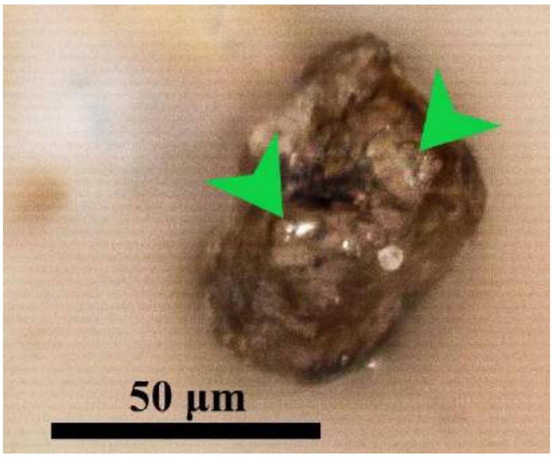


Fig. 3 Internal surface, mineral inclusion

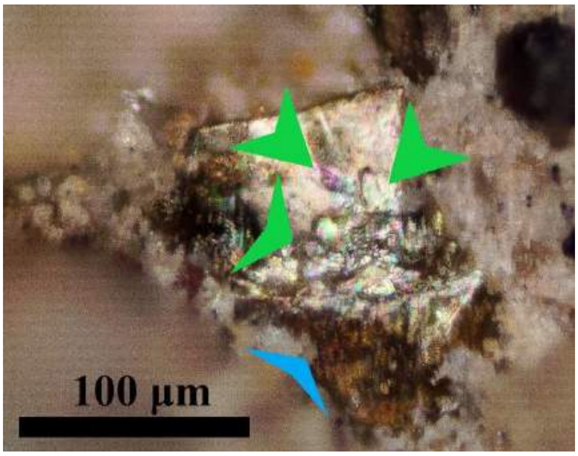


Fig.4 Internal surface, mineral inclusion

Fig. 5 External surface

Fragment number: MT'01 23H6 (MT 61)
Site: Mezraa Teleilat
Level: IB1c
Period: IIB3
Grid: 1-10/a-k
Preservation Level: Good

General characteristics:

Paste: coarse clay
Temper: plant inclusions and dung?
Section: base with wall
Core: dark
Color s. internal: light brown **External**: light brown
Hypothesized side: large tray

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated
Internal Scores:
Shape: linear
Size: **length:** **width**:
Incidence: low
Section typology: Vb
Direction: unidirectional
Edge:
Secondary signs:
Scoring interpretation: tool impression

External surface
Topography: uneven
Surface treatment: untreated
Texture: coarse
Asperity:
Inclination: inclined
Arrangement: asymmetrical
Extremity typology:
Distribution:

Use-wear analysis:

Ceramic Surface:
Internal: rips
External:
Mineral Inclusions Surface:
Internal: depressions
External:
Function interpretation: baking basic bread

Post depositional traces:

Residues:

Final interpretation:

The fragment MT 61 belonged to the base-wall of medium-size pan, made of a plan-tempered coarse clay and finished with little care (figs. 1, 2, 6).
The inner surface was hastily tool impressed (fig. 2).
The pan was used to bake basic bread (figs. 1-6).

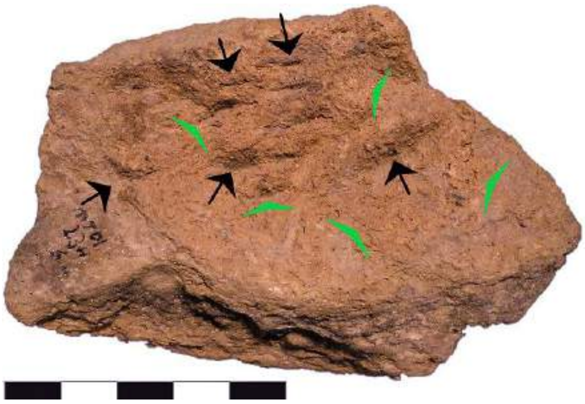


Fig. 1 Internal surface

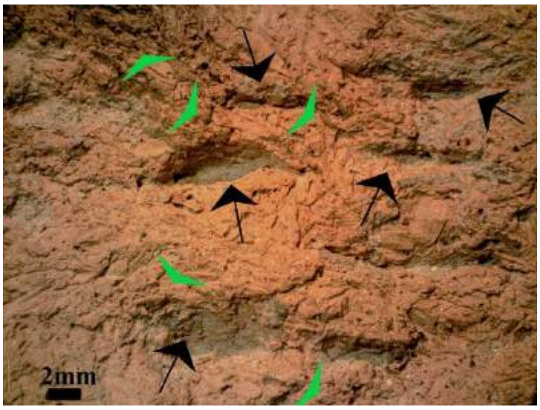


Fig. 2 Internal surface, impressions

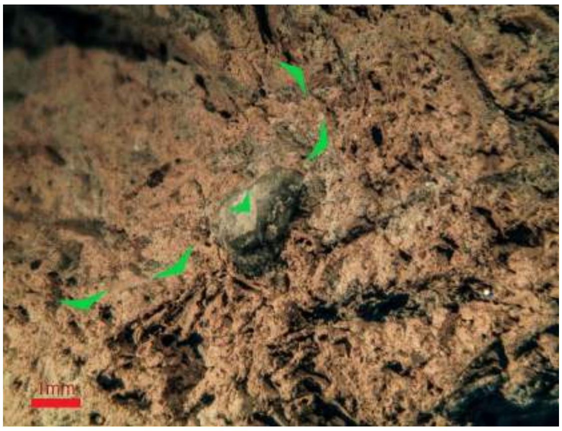


Fig. 3 Internal surface

Fig. 4 Internal surface, mineral inclusion

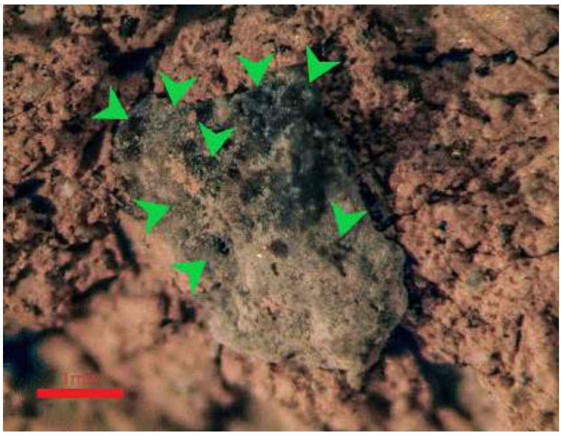


Fig. 5 Internal surface, mineral inclusion

Fig. 6 External surface

Fragment number: MT'01 23I 60 (MT 39)
Site: Mezraa Teleilat
Level: IB1c
Period: IIB2-IIB3
Grid: 1-10/a-k
Preservation Level: good

General characteristics:

Paste: medium granulometry clay
Temper: plant inclusions and dung?
Section: base
Core: dark
Color s. internal: light brown **External**: light brown
Hypothesized side: large tray

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: uneven
Surface treatment: untreated

Internal Scores:
Shape: triangular **Texture**: coarse
Size: **length:** 2 cm **width**: 0,6 cm
Incidence: high **Asperity**:
Section typology: **Inclination**: inclined
Direction: **Arrangement**: symmetrical
Edge: irregular rounded **Extremity typology**:
Secondary signs: no **Distribution**:
Scoring interpretation: tool impressed

Use-wear analysis:

Ceramic Surface:
Internal: rounding, darkening, crumbling
External: spall detachment, abrasion
Mineral Inclusions Surface:
Internal: depressions, rounding
External:
Function interpretation: baking fat bread

Post depositional traces:

Residues:

Final interpretation:
The fragment MT 39 belonged to the base of large pan, made of a organic material tempered coarse clay and finished with little care (fig. 1).
The inner surface was tool impressed when the clay was fresh (fig. 1).
The pan was used to bake fat bread (figs. 1-6).

Fig. 1 Internal surface, impressions

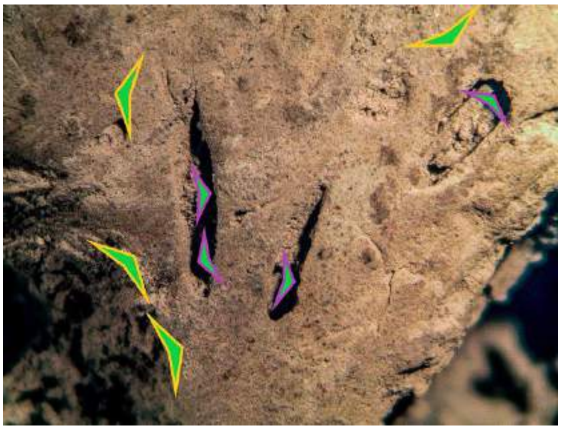


Fig. 2 Internal surface

Fig. 3 Internal surface

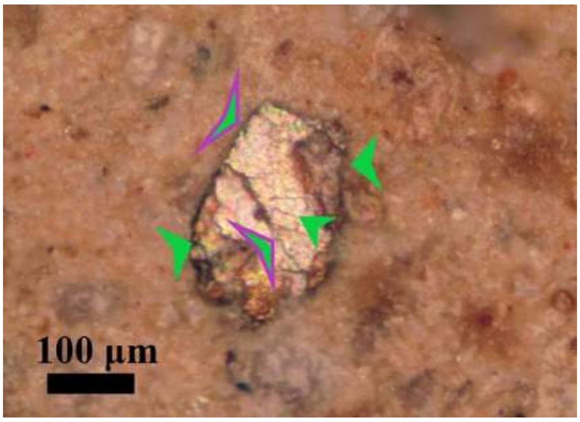


Fig. 4 Internal surface, mineral inclusion

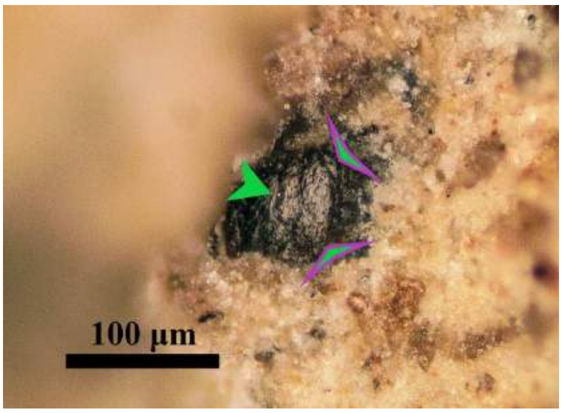


Fig. 5 Internal surface, mineral inclusion

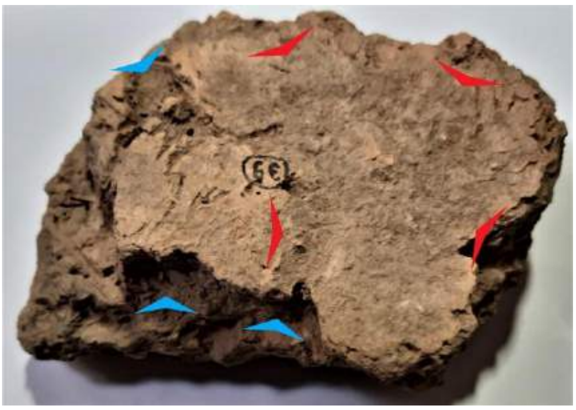


Fig. 6 External surface

Fragment number:MT'01 22I 49 (MT111)
Site: Mezraa Teleilat
Level: IB1c
Period: IIB2-IIB3
Grid: 1-10/a-k
Preservation Level: quite good

General characteristics:

Paste: coarse clay
Temper: plant inclusions
Section: base-walls
Core: gray
Color s. internal: buff **External**: buff
Hypothesized side: large tray

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: uneven
Surface treatment: untreated

Internal Scores:
Shape: elliptic
Texture: coarse
Size: **length:** 0,8 cm **width**: 0,7 cm
Incidence: high
Asperity:
Section typology: Vb
Inclination: perpendicular
Direction:
Arrangement: symmetrical
Edge: net
Extremity typology:
Secondary signs:
Distribution:
Scoring interpretation: tool impressed

Use-wear analysis:

Ceramic Surface:
Internal: rips, crumbling
External: striations, detachment (base)
Mineral Inclusions Surface:
Internal: rips, striations
External:
Function interpretation: baking basic and low-in-fat brad

Post depositional traces: abrasion, carbonization

Residues:

Final interpretation:
The fragment MT 111 belonged to the base-walls of large pan, made of a plan-tempered coarse clay and finished with little care. The inner surface was tool impressed when the clay was sei-dry (fig. 1, 2). The pan was used to bake basic and low-in fat bread (fig. 1-4, 6).
The fragment undergone to post-depositional activity like abrasion and carbonization (figs. 5, 6).

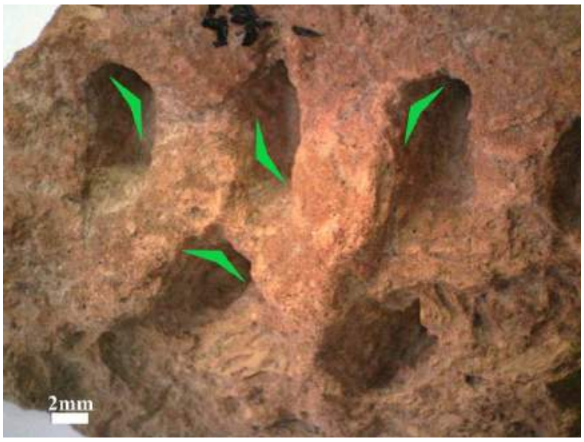


Fig. 1 Internal surface, impressions

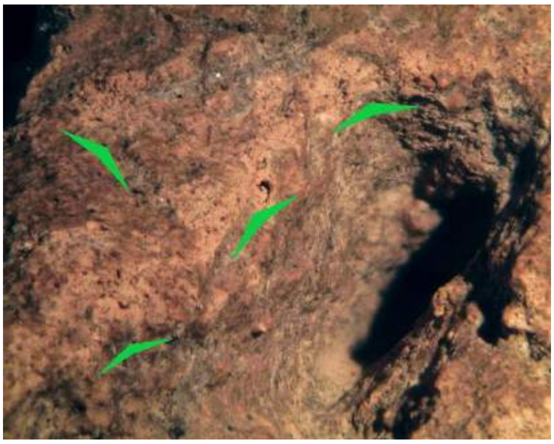


Fig. 2 Internal surface, impression

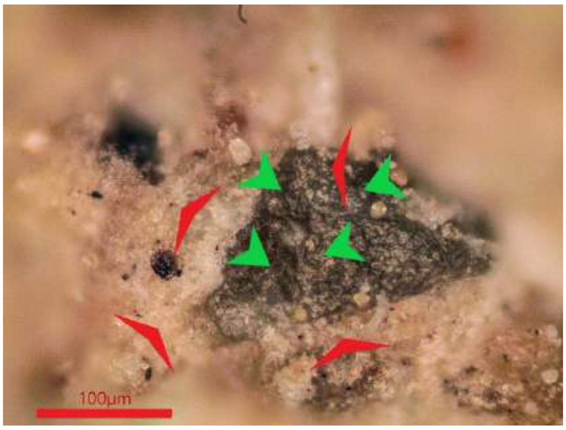


Fig. 3 Internal surface, mineral inclusion

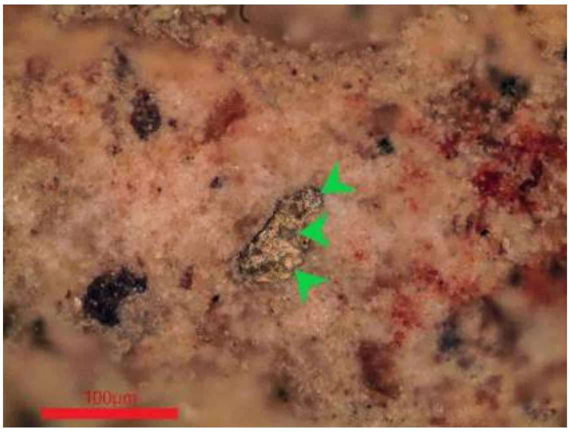


Fig. 4 Internal surface, mineral inclusion

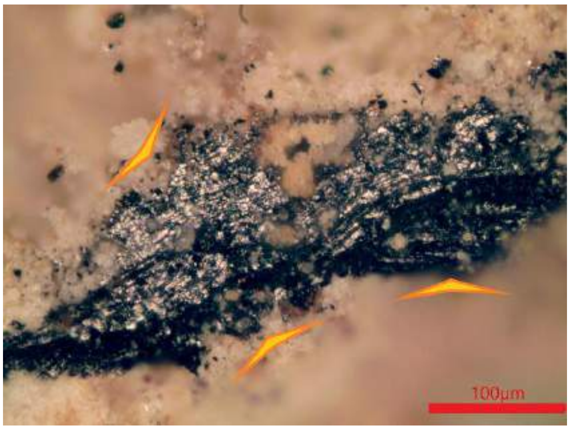


Fig. 5 Internal surface

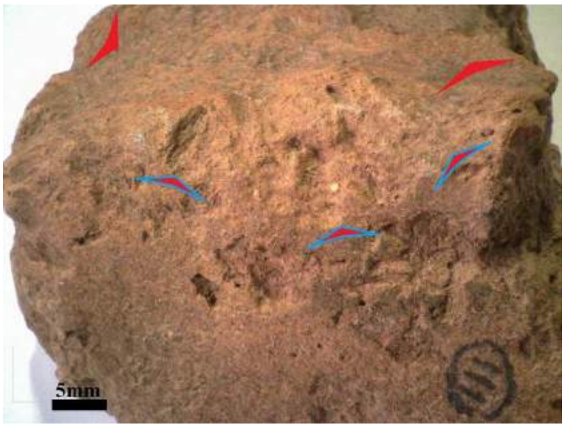


Fig. 6 External surface (upside-down)

Fragment number: MT’0123I 60 (MT 107)
Site: Mezraa Teleilat
Level: IB1d
Period: IIB2,3
Grid: 1-10/a-k
Preservation Level: quite good

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: base-walls
Core: dark
Color s. internal: orange **External**: orange
Hypothesized side: large tray

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: uneven
Surface treatment: untreated

Internal Scores:
Shape: oval
Texture: striated
Size: **length:** 0,9cm **width**: 1,8 cm
Incidence: high
Asperity:
Section typology: Ua
Inclination: inclined-rounded
Direction:
Arrangement: asymmetrical
Edge: rounded
Extremity typology:
Secondary signs:
Distribution:
Scoring interpretation: finger impressed

Use-wear analysis:

Ceramic Surface:
Internal: rips
External: base: striations, scratches; base wall: spall detachment
Mineral Inclusions Surface:
Internal: depressions, striations, polish
External:
Function interpretation: baking low-in-fat bread

Post depositional traces: abrasion

Residues:

Final interpretation:
The fragment MT 107 belonged to the base-wall of large pan, made of a plan-tempered coarse clay and finished with little care.
The inner surface was hastily finger impressed when the clay was fresh (figs. 1, 2).
The pan was maybe used to bake low-in-fat bread (fig. 1-6). The surface endured abrasion after its original use (figs. 4,5).

Fig. 1 Internal surface

Fig. 2 Internal surface

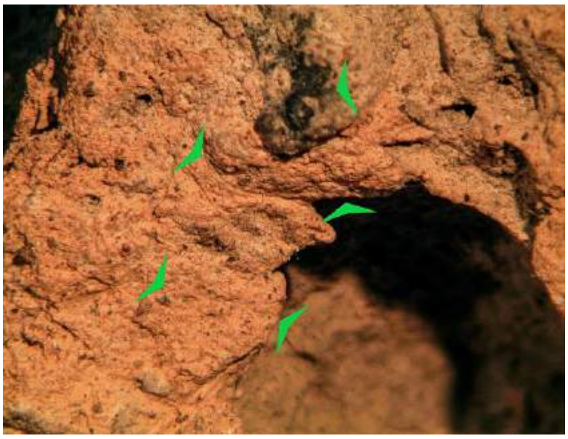
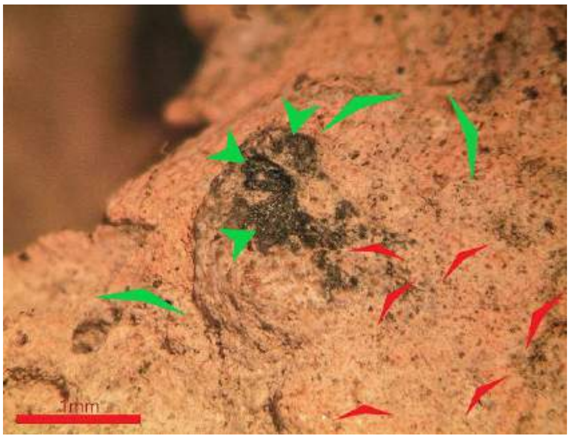


Fig. 3 Internal surface, mineral inclusion



Fig, 4 Internal surface, mineral inclusion

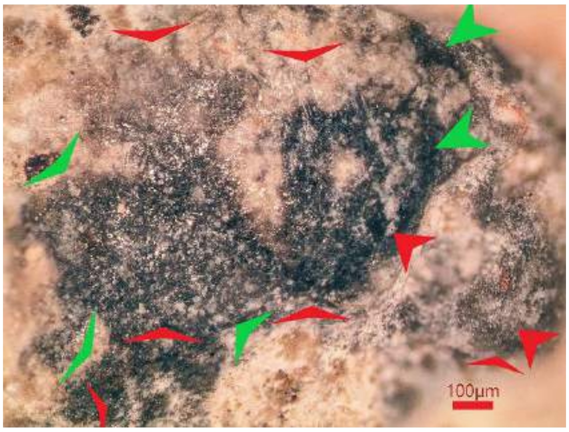


Fig. 5 Internal surface, mineral inclusion

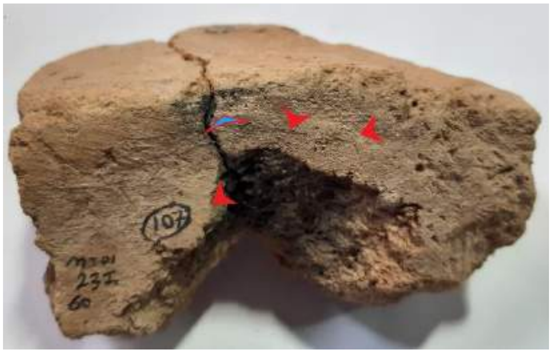


Fig. 6 External surface

Fragment number: MT'99 18H20 (MT 24)
Site: Mezraa Teleilat
Level:
Period: IIB2-IIB1
Grid: 1-10/a-k
Preservation Level: quite good

General characteristics:

Paste: fine clay
Temper: organic temper
Section: wall
Core: gray
Color s. internal: beige **external**: beige
Hypothesized side: medium-size tray

Technological traces analysis:

Internal surface
Topography: flat
Surface treatment: smoothed

External surface
Topography: flat
Surface treatment: smoothed

Internal Scores:
Shape: incisions
Texture: striated
Size: **length:** **width**: 0,3 cm
Incidence: high
Asperity:
Section typology: Vb
Inclination: inclined
Direction: unidirectional
Arrangement: parallel
Edge: net, straight
Extremity typology: sharped - flattened
Secondary signs:
Distribution: regular
Scoring interpretation: hard tool incised (silex?)

Use-wear analysis:

Ceramic Surface:
Internal: rounding
External:
Mineral Inclusions Surface:
Internal:
External:
Function interpretation: undetermined (low-in fat bread?)

Post depositional traces: corrosion

Residues:

Final interpretation:

The fragment MT 24 belonged to the walls of a medium-size tray, made of a plan-tempered fine clay. The tray was carefully finished; both internal and external surfaces were smoothed (fig. 6). The inner surface was incised with an hard tool (probably a flint blade) and decorated with ochre (?). (fig. 2-4).
The function of the tray remain undetermined (figs. 1-6).

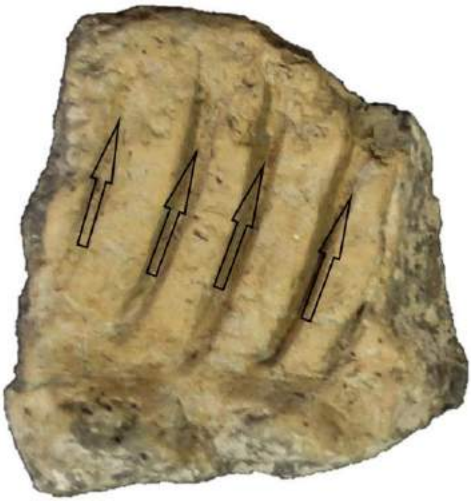


Fig. 1 Internal surface

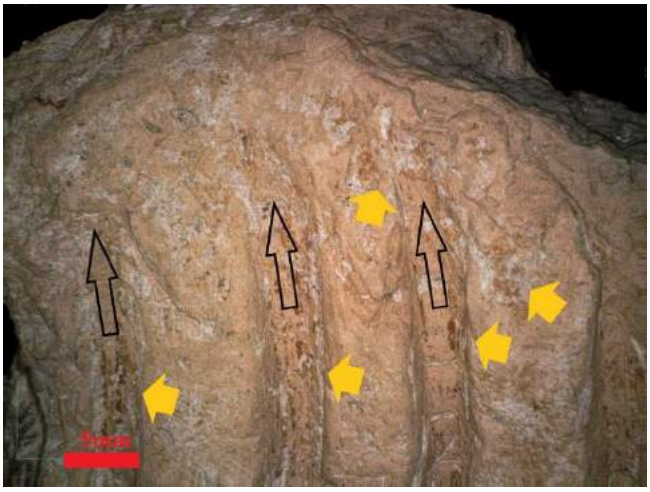


Fig. 2 Internal surface, incisions

Fig. 3 Internal surface, incision

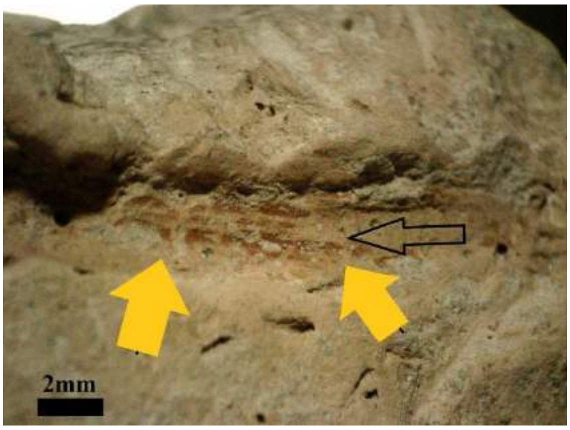


Fig. 4 Internal surface, incision

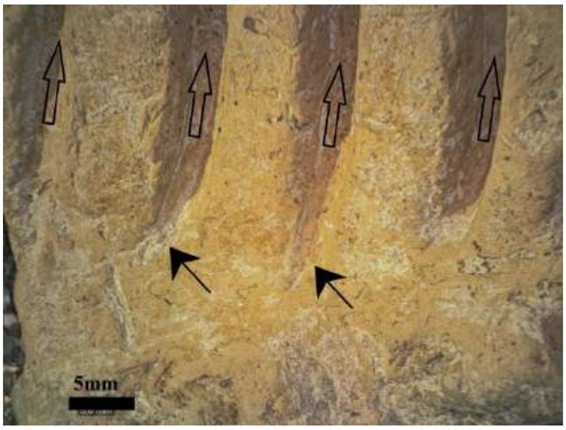


Fig. 5 Internal surface

Fig. 6 External surface

Fragment number: MT'99 18H 20 (MT 126)
Site: Mezraa Teleilat
Level: IB4
Period: IIB2-IIB1
Grid: 1-10/a-k
Preservation Level: Good

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: base-walls
Core: dark
Color s. internal: orange **External**: orange
Hypothesized side: medium tray

Technological traces analysis:

Internal surface
Topography: sinuous
Surface treatment: smoothed

External surface
Topography: sinuous
Surface treatment: smoothed

Internal Scores:
Shape: **Texture**:
Size: **length:** **width**:
Incidence: **Asperity**:
Section typology: **Inclination**:
Direction: **Arrangement**:
Edge: **Extremity typology**:
Secondary signs: **Distribution**:
Scoring interpretation: no scored

Use-wear analysis:

Ceramic Surface:
Internal: rips
External: wall: nothing; base: striations, depressions
Mineral Inclusions Surface:
Internal:
External: striations, levelling
Function interpretation: baking basic bread

Post depositional traces:

Residues:

Final interpretation:
The fragment MT 126 belonged to the walls-base of a medium pan, made of a plan-tempered coarse clay probably throughout the slab technique.
The inner surface seems to be not scored (fig. 1).
The pan was used to bake basic bread (figs. 1-6).

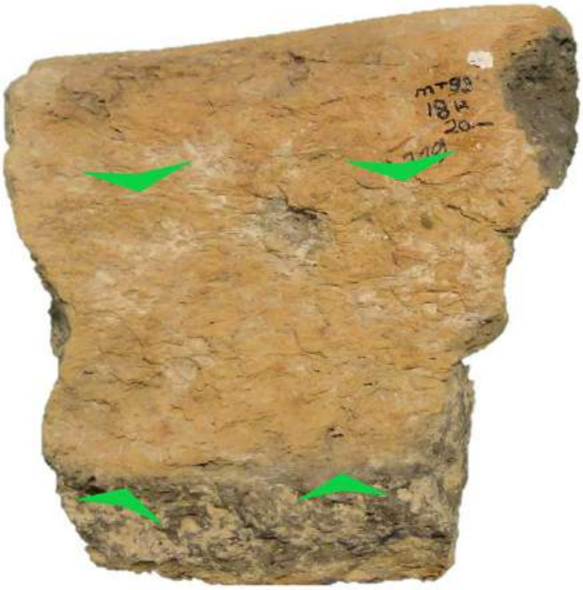


Fig.1 Internal surface

Fig.1 Internal surface

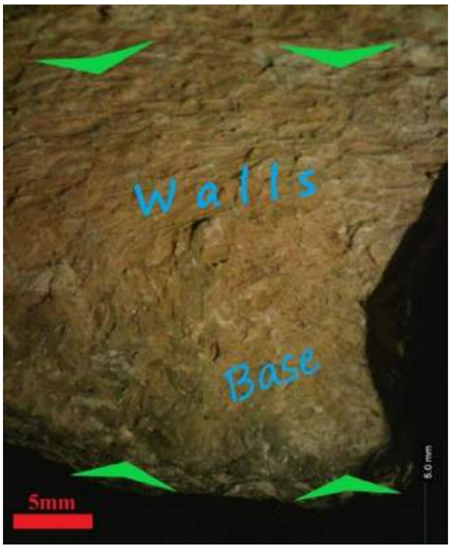


Fig. 3 Internal surface

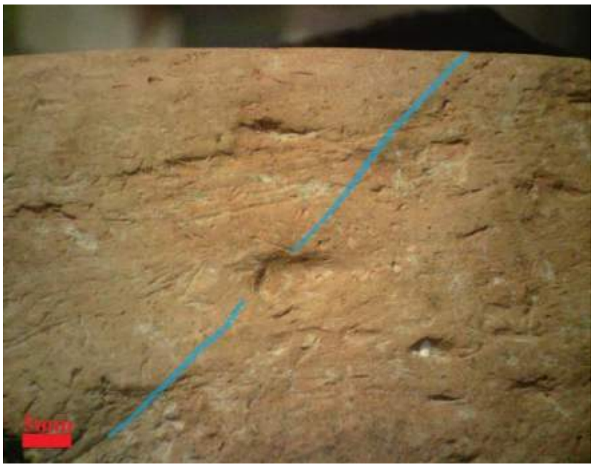


Fig. 4 External surface

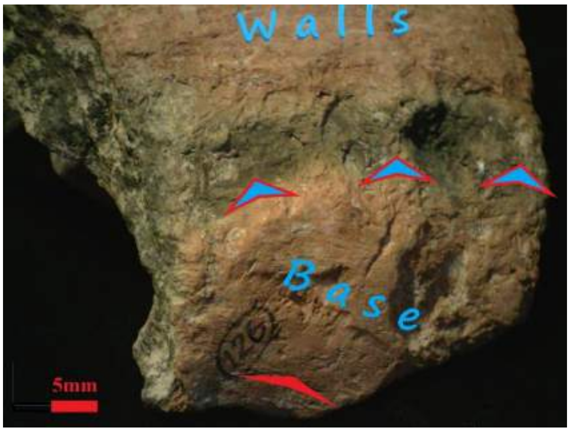


Fig. 5 External surface

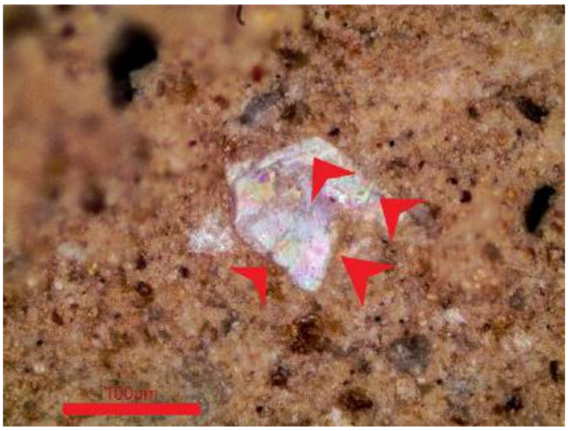
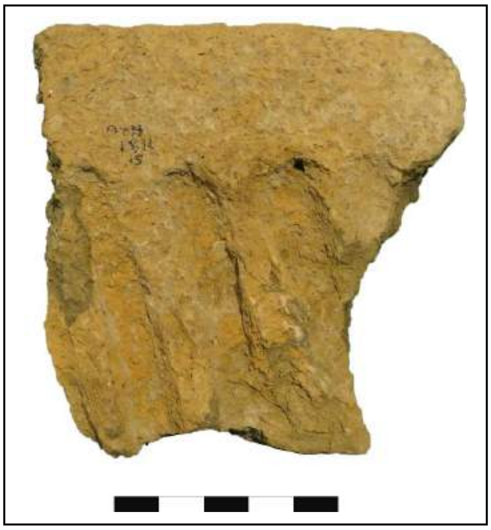


Fig. 6 External Surface, mineral inclusión

Fragment number: MT'99 18H 15 (MT 141)
Site: Mezraa Teleilat
Level: IIA2
Period: IIB?
Grid: 1-4/a-h
Preservation Level: excellent



General characteristics:

Paste: medium granulometry clay
Temper: few plant inclusions
Section: wall
Core: dark
Color s. internal: buff **External**: buff
Hypothesized side: medium-size tray

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: sinuous
Surface treatment: treated

Internal Scores:
Shape: groove
Texture: coarse
Size: **length:** **width**: 1 cm
Incidence: low
Asperity:
Section typology: Ub
Inclination: perpendicular
Direction: unidirectional
Arrangement: parallel
Edge: net-straight
Extremity typology: semicircular
Secondary signs: no
Distribution:
Scoring interpretation: soft tool grooves

Use-wear analysis:

Ceramic Surface:
Internal: rips
External:
Mineral Inclusions Surface:
Internal: depressions, polish
External:
Function interpretation: baking basic bread

Post depositional traces:

Residues:

Final interpretation:

The fragment MT 141 belonged to the walls of a medium-size pan, made of few plan-tempered medium-granulometry clay. The external surface was treated.
The inner surface was grooved soft tool in a enough dry clay (fig. 1).
The pan was used to bake basic bread (figs. 1, 3-6).

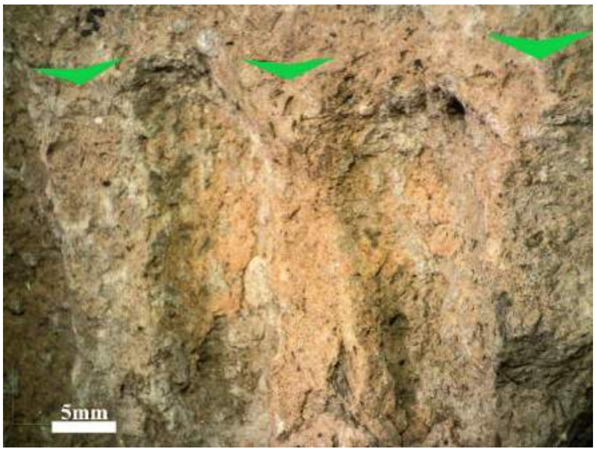


Fig. 1 Internal surface, grooves

Fig. 2 External surface

Fig, 3 Internal surface, rim

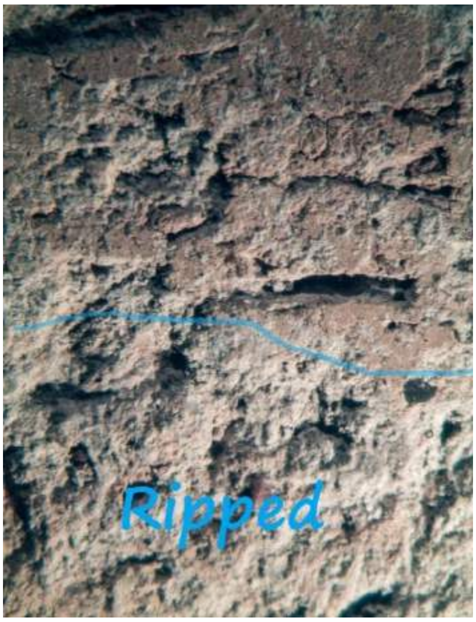
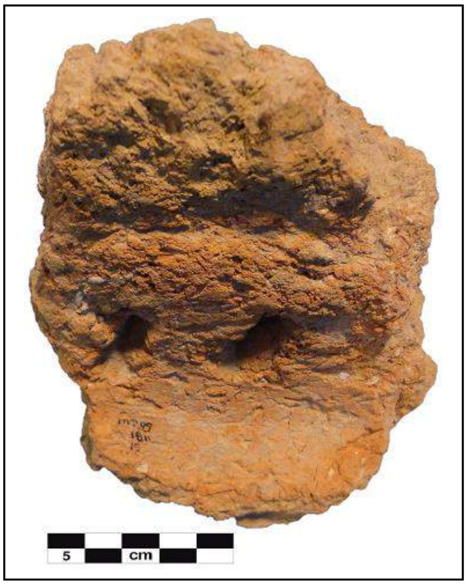


Fig. 4 Internal surface

Fig. 5 Internal surface, mineral inclusion

Fig. 6 Internal surface, mineral inclusion

Fragment number: MT'99 18H 15 (MT 94)
Site: Mezraa Teleilat
Level: IB1d
Period: IIB2?
Grid: 1-4/a-h
Preservation Level: Good



General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: wall-base
Core: dark-gray
Color s. internal: orange **External**: orange
Hypothesized side: large tray

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: uneven
Surface treatment: untreated

Internal Scores:
Shape: triangular
Texture: coarse
Size: **length:** 1,5 cm **width**: 0.7 cm
Incidence: high
Asperity:
Section typology: Vb
Inclination:perpendicular
Direction:
Arrangement: symmetrical
Edge:
Extremity typology:
Secondary signs: no
Distribution:
Scoring interpretation: soft blade impressed

Use-wear analysis:

Ceramic Surface:
Internal: rips
External: (base) spall detachment, striations
Mineral Inclusions Surface:
Internal: depressions
External:
Function interpretation: baking basic bread

Post depositional traces:

Residues:

Final interpretation:

The fragment MT 94 belonged to the wall-base of large pan, made of a plan-tempered coarse clay. The walls of the vessel was probably shaped throughout the coiling technique and the surface was not finished (fig. 4).
The inner surface was impressed with a soft blade tool (figs. 1-3).
The pan was used to bake basic bread (fig. 1-6).

Fig. 1 Internal surface

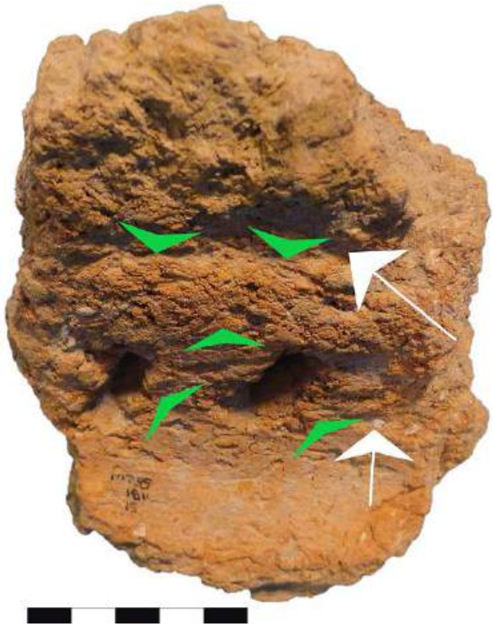


Fig. 2 Internal surface, impression

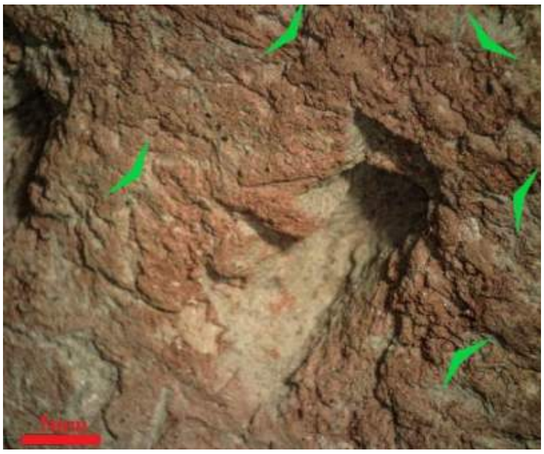


Fig. 3 Internal surface

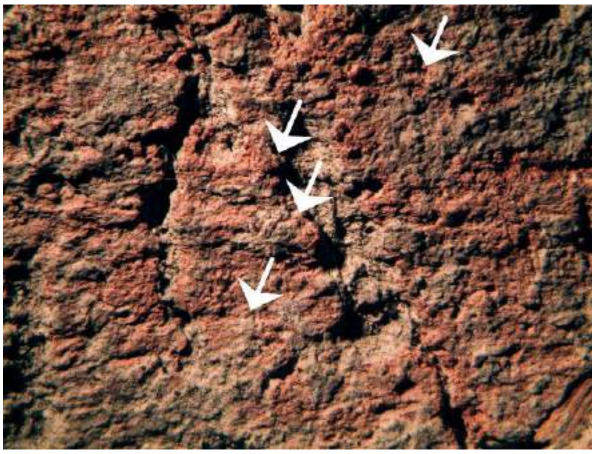


Fig. 4 Internal surface, dermatoglyphs

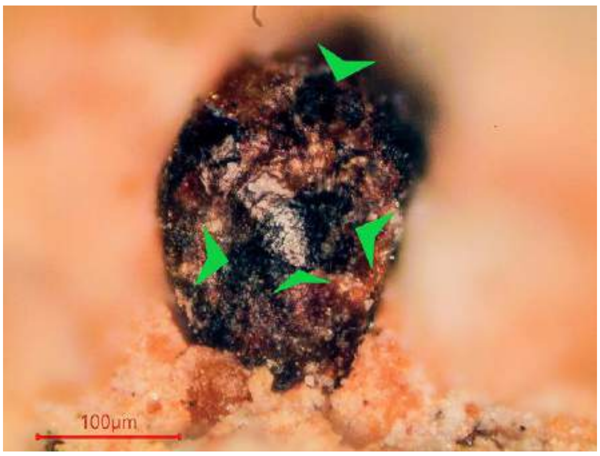


Fig. 5 Internal surface, mineral inclusion

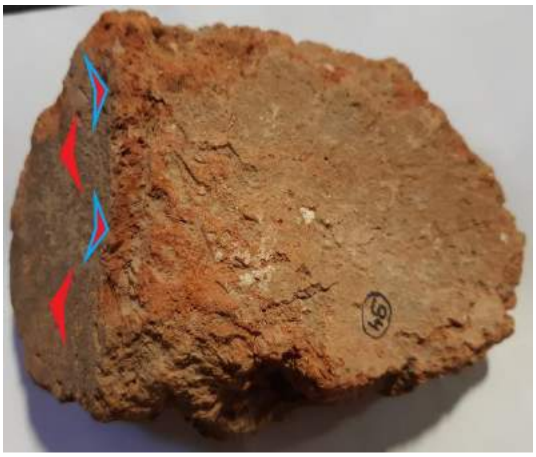


Fig. 6 External surface

Fragment number: MT'99 18H 15 (MT 157)
Site: Mezraa Teleilat
Level: IIB1
Period: IIB2?
Grid: 1-4/a-h
Preservation Level: Good

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: base
Core: gray
Color s. internal: beige **External**: beige
Hypothesized side: medium-size tray

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: uneven
Surface treatment: untreated

Internal Scores:
Shape: linear
Texture: coarse
Size: **length:** **width**:
Incidence: high
Asperity: blunt
Section typology: Ω
Inclination: perpendicular
Direction:
Arrangement: parallel
Edge:
Extremity typology:
Secondary signs: no
Distribution:
Scoring interpretation: humps added

Use-wear analysis:

Ceramic Surface:
Internal: rips
External: striations
Mineral Inclusions Surface:
Internal: depressions
External: polish
Function interpretation: baking basic bread

Post depositional traces:

Residues:

Final interpretation:
The fragment MT 157 belonged to the base of a medium pan, made with a clay of medium granulometry and plant-tempered.
Coilings were added to the internal surface in order to make up humps (fig. 1-3).
The pan was used to bake basic bread (figs. 2-5).

Fig. 1 Internal surface

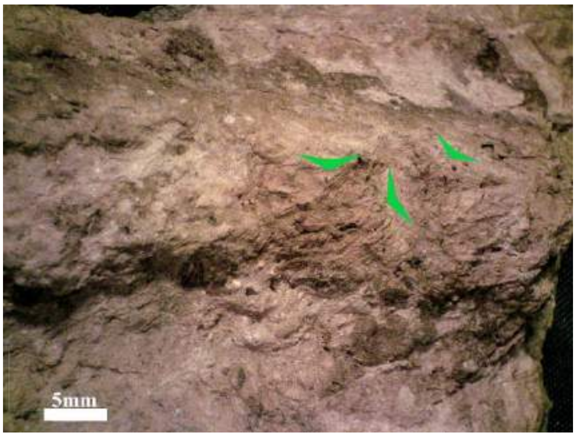


Fig. 2 Internal surface, hemp

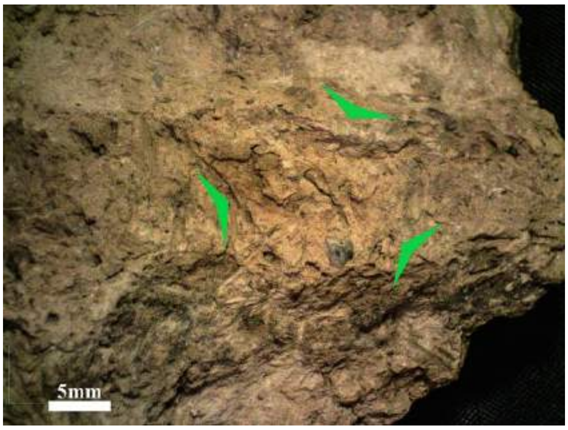


Fig. 3 Internal surface

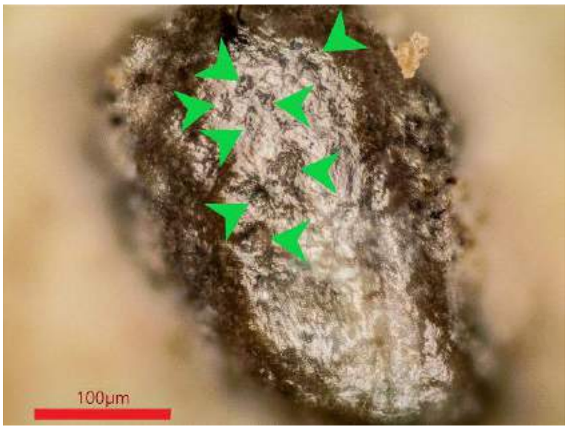
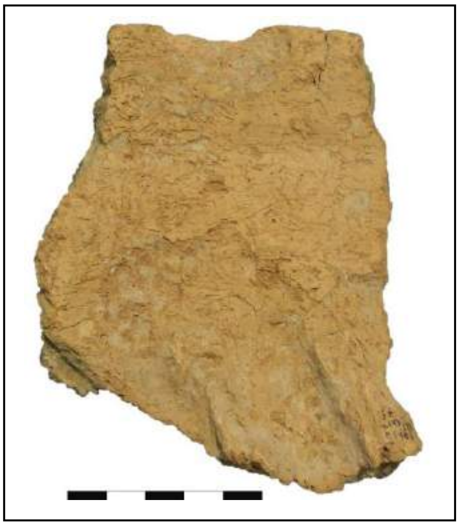


Fig. 4 Internal surface, mineral inclusion

Fig. 5 External surface

Fragment number: MT'01 23I 23 (MT 135)
Site: Mezraa Teleilat
Level: IIA1
Period: IIB2
Grid: 8-10/a-k
Preservation Level: good



General characteristics:

Paste: fine clay
Temper: plant inclusions
Section: wall with base
Core: orange
Color s. internal: buff **external**: orange
Hypothesized side: large tray

Technological traces analysis:

Internal surface
Topography: sinuous
Surface treatment:

External surface
Topography: flat
Surface treatment: polished

Internal Scores:
Shape: grooved
Texture:
Size: **length:** **width**: 2 cm
Incidence: high
Asperity:
Section typology:
Inclination: perpendicular
Direction: unidirectional
Arrangement: parallel
Edge:
Extremity typology: flat
Secondary signs: no
Distribution:
Scoring interpretation: tool grooved

Use-wear analysis:

Ceramic Surface:
Internal: rips
External:
Mineral Inclusions Surface:
Internal: fracture, depression?
External:
Function interpretation: baking basic bread

Post depositional traces: concretions

Residues:

Final interpretation:
The fragment MT 135 belonged to the base of large pan, made of a plan-tempered coarse clay.
The external surface was finished probably by polishing (figs. 5-6).
The inner surface was tool grooved hastily when the clay was semi-dry (fig. 1-3).
The pan was used to bake basic bread (fig. 1-3).

Fig.1 Internal surface, grooves

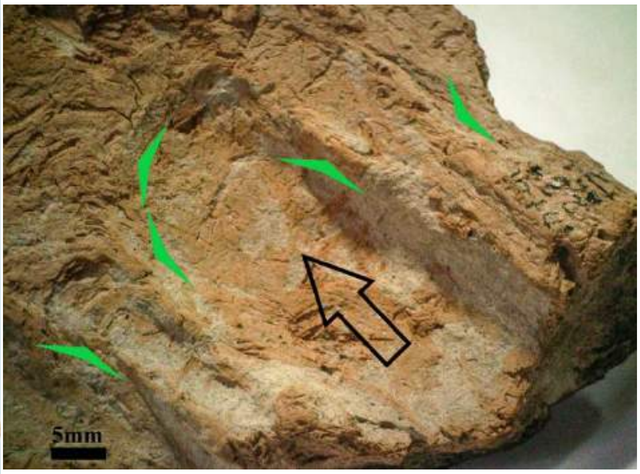


Fig. 2 Internal surface, grooves

Fig. 3 Internal surface, grooves

Fig. 4 Internal surface, mineral inclusion

Fig. 5 External surface

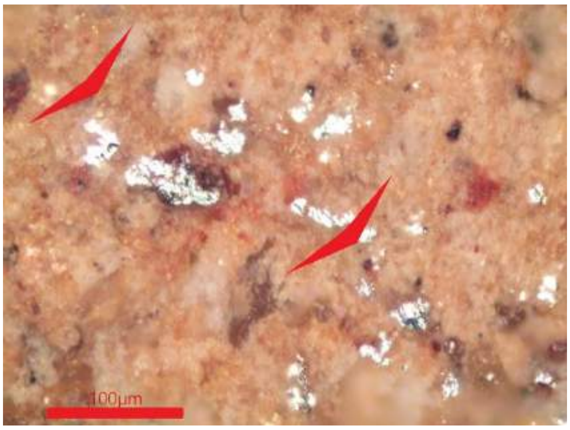


Fig. 6 External Surface

Fragment number: MT'99 19G 5 (MT 131)
Site: Mezraa Teleilat
Level: IA2
Period: IIB2
Grid: 1-10/a-k
Preservation Level: Excellent

General characteristics:

Paste: fine clay
Temper: plant inclusions
Section: walls
Core: gray
Color s. internal: buff **External**: buff
Hypothesized side: small tray?

Technological traces analysis:

Internal surface
Topography: sinuous
Surface treatment: treated

External surface
Topography: sinuous
Surface treatment: treated

Internal Scores:
Shape: incisons **Texture**: stried
Size: **length:** **width**: 0,8 cm
Incidence: low **Asperity**:
Section typology: Vb **Inclination**: perpendicular
Direction: unidirectional **Arrangement**: parallel
Edge: net, straight **Extremity typology**: sharp
Secondary signs: striations **Distribution**: irregular
Scoring interpretation: wooden tool incised

Use-wear analysis:

Ceramic Surface:
Internal: rips, crumbling, rounding
External:
Mineral Inclusions Surface:
Internal: depressions
External:
Function interpretation: baking low-in-fat bread

Post depositional traces:

Residues:

Final interpretation:

The fragment MT 131 belonged to the walls of a small tray? bowl?, made of a plan-tempered fine clay. Three superimposed swellings would suggest that the vessel was shaped through the coiling technique.
The inner surface was incised with a (maybe wooden) tool when the clay was semi-dry (fig. 1).
The pan was used to bake different low-in-fat bread (fig. 1-5).

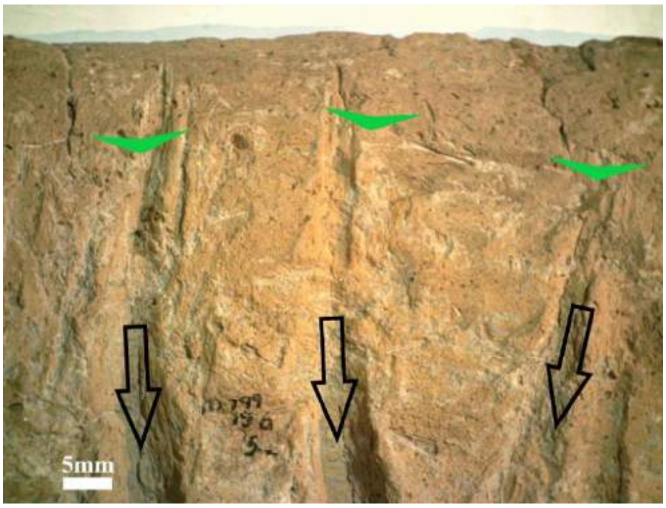


Fig. 1 Internal surface, incisions

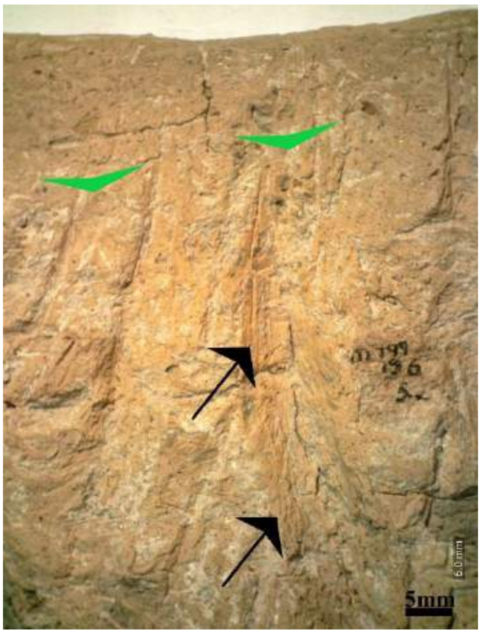


Fig. 2 Internal surface, incisions

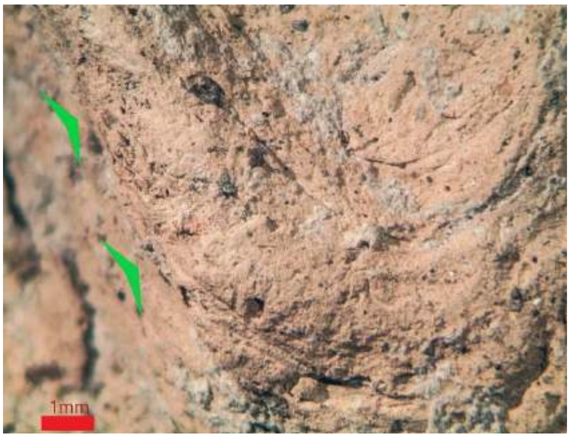


Fig. 3 Internal surface

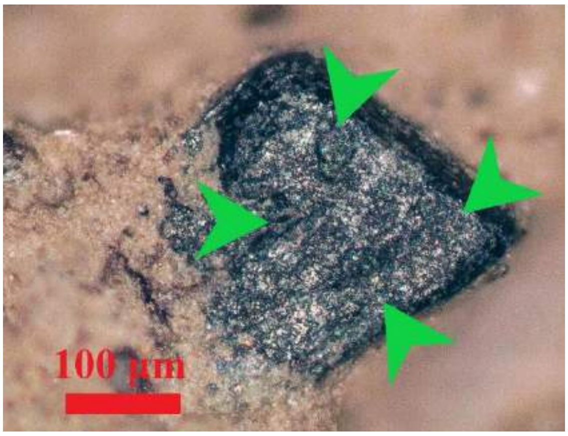


Fig. 4 Internal surface, mineral inclusion

Fig. 5 External surface

Fragment number: MT'99 19G 17 (MT 110)
Site: Mezraa Teleilat
Level: IB1a
Period: IIB2
Grid: 1-10/f-k
Preservation Level: quite good

General characteristics:

Paste: coarse clay
Temper: mineral?
Section: base
Core: gray
Color s. internal: beige **External**: beige
Hypothesized side: large tray

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: uneven
Surface treatment: untreated

Internal Scores:
Shape: trapezoidal depressions **Texture**: striated
Size: **length:** **width:**
Incidence: low **Asperity**: sharp
Section typology: Ua **Inclination**: perpendicular
Direction: **Arrangement**: asymmetrical
Edge: rounded **Extremity typology**:
Secondary signs: **Distribution**:
Scoring interpretation: finger pinched and impressed

Use-wear analysis:

Ceramic Surface:
Internal: darkening, rounding
External: striations, scratches, sooting
Mineral Inclusions Surface:
Internal: polish
External: striations, spall detachment
Function interpretation: baking fat bread and soft material movement?

Post depositional traces: abrasion

Residues:

Final interpretation:
The fragment MT 110 belonged to the base of large pan, made of a mineral-tempered coarse clay and finished with little care.The inner surface was hastily finger pinched and impressed when the clay was fresh (figs. 1-4).
The pan was used to bake fat (fig. 2-4,6). Moreover during or after its use the surface endured abrasion due to the movement of soft material on the inner surface of the tray (figs. 4,5).

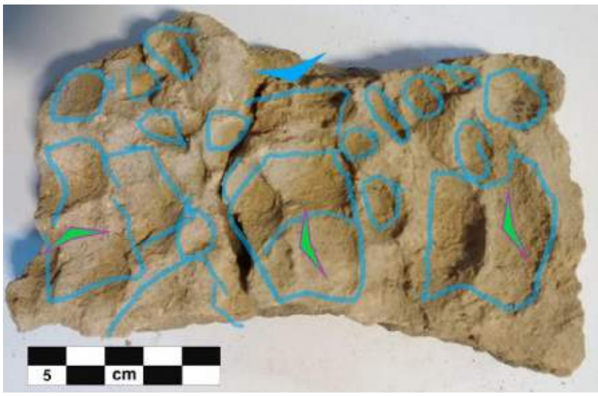


Fig. 1 Internal surfaces, pinches and impressions

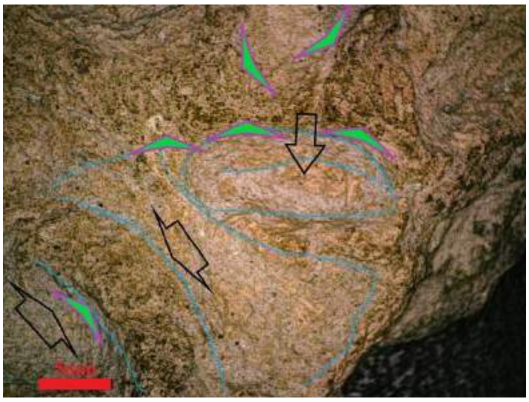


Fig. 2 Internal surface, impression

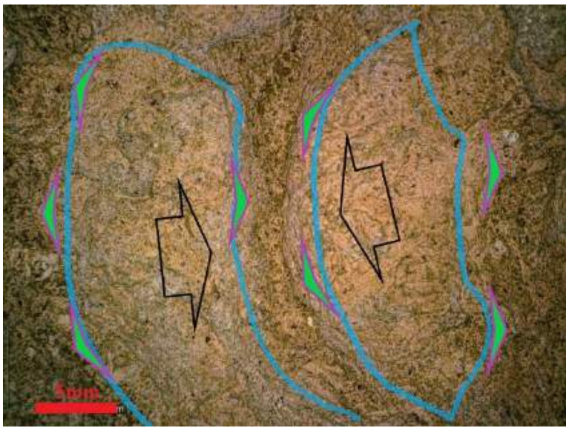


Fig. 3 Internal surface, pinch

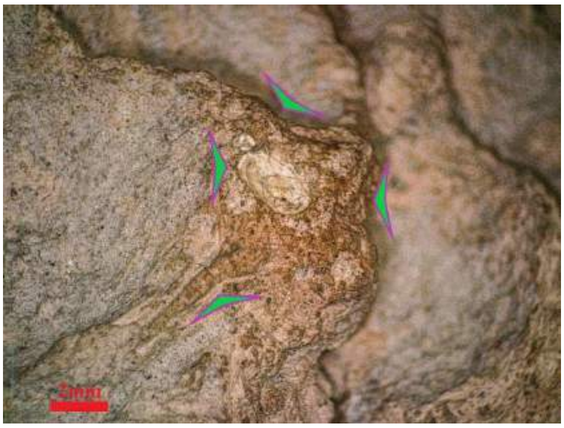


Fig. 4 Internal surface

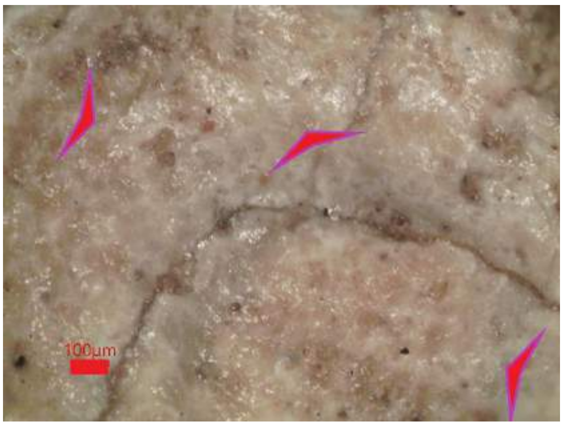


Fig. 5 Internal surface, mineral inclusion

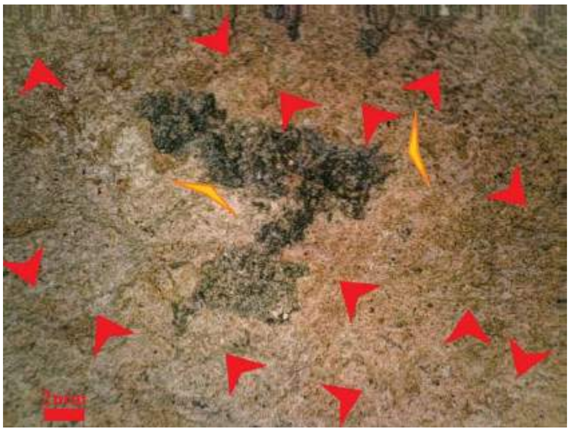


Fig. 6 External surface

Fragment number: MT'01 23I 67 (MT 96)
Site: Mezraa Teleilat
Level: IB1d
Period: IIB
Grid: 1-10/a-k
Preservation Level: Poor

General characteristics:

Paste: medium coarse clay
Temper: plant inclusions
Section: base/walls
Core: grey
Color s. internal: orange **External**: orange
Hypothesized side: large tray

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: uneven
Surface treatment: smoothed

Internal Scores:
Shape:impressions **Texture**: stried
Size: **length:** **width**:
Incidence: high **Asperity**:
Section typology:Ua(base)Vb(side)**Inclination**: perpendicular
Direction: **Arrangement**: asymmetrical
Edge: **Extremity typology**:
Secondary signs: striation **Distribution**:
Scoring interpretation: tool (side) and finger (base) impressed

Use-wear analysis:

Ceramic Surface:
Internal: rips, rounding
External: spall detachment, scratches, striations
Mineral Inclusions Surface:
Internal: rips?
External:
Function interpretation: undetermined

Post depositional traces: corrosion

Residues:

Final interpretation:

The fragment MT 96 belonged to the base of large pan, made of a plan-tempered coarse clay. The external surface was smoothed.
The inner surface of the base was finger grooved. That one of the sides was tool impressed (fig. 1). The function of the tray remains undetermined because its surface was heavily corroded (figs. 2, 3).

Fig. 1 Internal surface, base

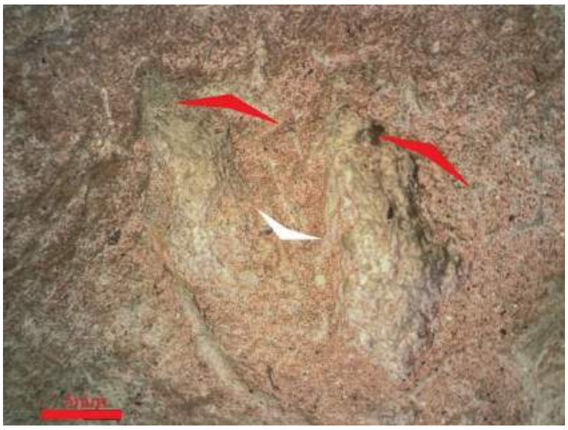


Fig. 2 Internal surface, sides

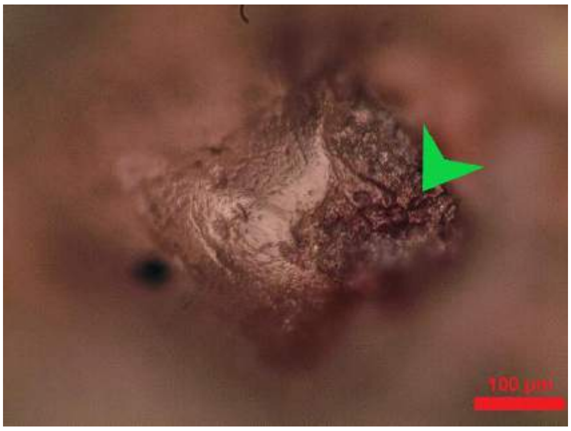


Fig. 3 Internal surface, mineral inclusion

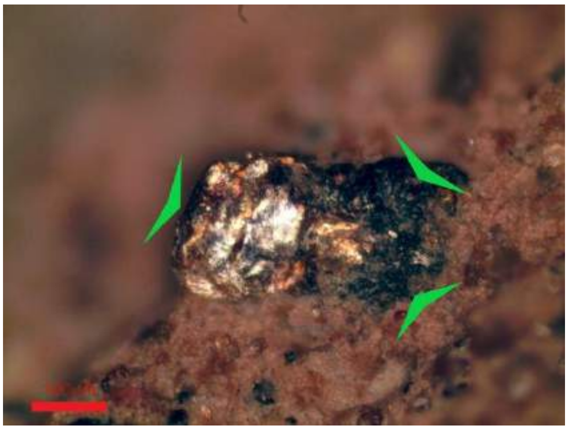


Fig. 4 Internal surface, mineral inclusion

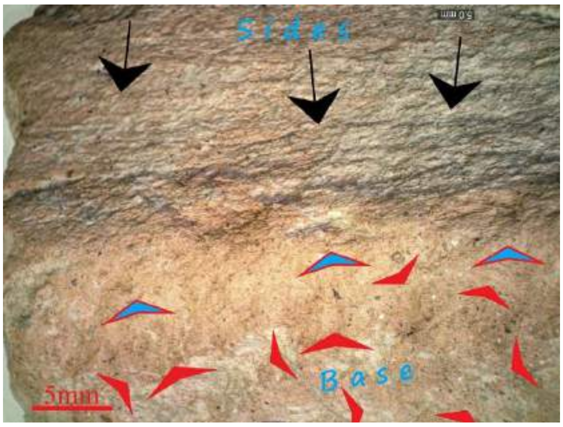


Fig. 5 Exterior surface

Fragment number: MT'01 23H 3 (MT 74)
Site: Mezraa Teleilat
Level: IB2a
Period: IIB
Grid: 1-10/a-k
Preservation Level: Poor

General characteristics:

Paste: medium-coarse clay
Temper: organic temper
Section: base
Core: grey
Color s. internal: buff **External**: buff
Hypothesized side: large tray

Technological traces analysis:

Internal surface
Topography: sinuous
Surface treatment:

External surface
Topography: sinuous
Surface treatment:

Internal Scores:
Shape: incision
Texture: striated
Size: **length:** **width**:
Incidence: high
Asperity:
Section typology: Vb
Inclination: perpendicular
Direction: unidirectional
Arrangement: parallel
Edge:
Extremity typology:
Secondary signs: striations
Distribution: irregular
Scoring interpretation: Soft material incised (wooden stick?)

Use-wear analysis:

Ceramic Surface:
Internal: rounding
External: striations
Mineral Inclusions Surface:
Internal: polish, rips?
External:
Function interpretation: undetermined

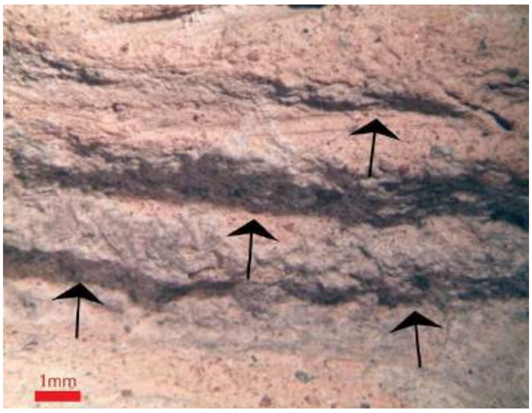
Post depositional traces: Corrosion

Residues:

Final interpretation:
The fragment MT 74 belonged to the base of large pan, made of a plan-tempered coarse clay and finished with little care.
The inner surface was incised by a soct tool stick probably made of wood. (fig. 1).
The function of the tray remains undetermined because its surface was heavily corroded (figs. 2, 3).

Fig. 1 Internal surface

Fig. 2 Internal surface



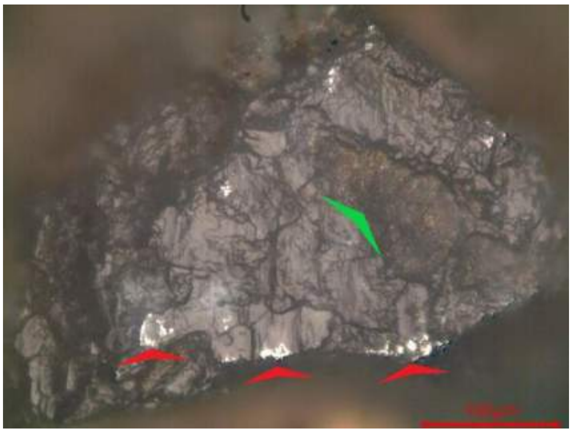


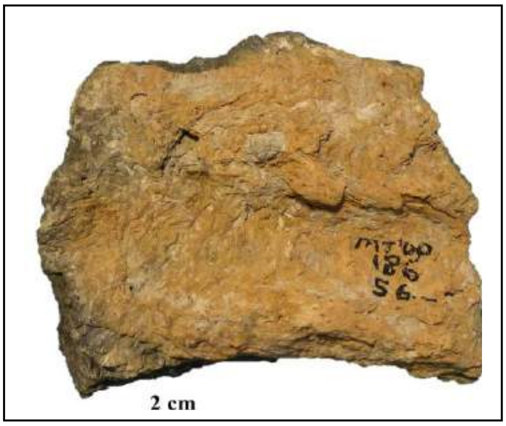
Fig. 3 Internal surface

Fig. 4 Internal surface, mineral inclusion

Fig. 5 Internal surface, mineral inclusion

Fig. 6 External surface

Fragment number: MT'00 18G56 (MT162)
Site: Mezraa Teleilat
Level: IIB2
Period: IIB
Grid: 4-10/a-h
Preservation Level: poor



2 cm

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: base
Core: dark
Color s. internal: light orange **External**: light orange
Hypothesized side: medium

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: uneven
Surface treatment: treated

Internal Scores:
Shape: linear
Texture: irregular
Size: **length:** **width**:
Incidence: low
Asperity: blunt
Section typology: Ω
Inclination: perpendicular
Direction: unidirectional
Arrangement: parallel
Edge:
Extremity typology:
Secondary signs: striations
Distribution: regular
Scoring interpretation: humps?

Use-wear analysis:

Ceramic Surface:
Internal: rips, striations, scratches,
External: striations, scratches
Mineral Inclusions Surface:
Internal: scratches, polish
External: striations
Function interpretation: baking bread

Post depositional traces: abrasion

Residues:

Final interpretation:
The fragment MT 162 belonged to the base of a medium pan, in the joint point with walls. It was made of a plan-tempered coarse clay.
The inner surface was finger grooved hastily when the clay was fresh (fig. 1).
The pan was used to bake basic bread (figs. 2-4). The pan during its use was dragged (fig. 6).
After its original function its surface endured abrasion (figs. 1, 2, 5)

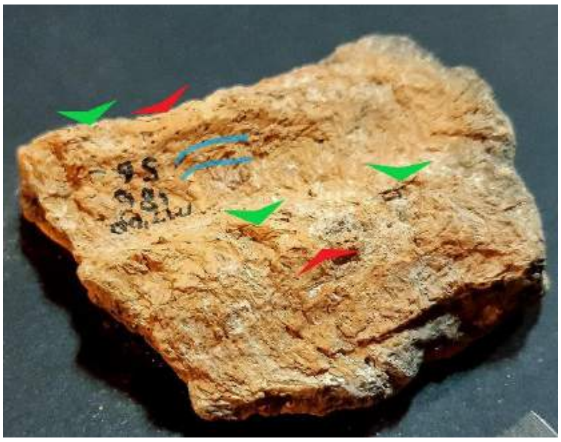


Fig. 1 Internal surface, humps

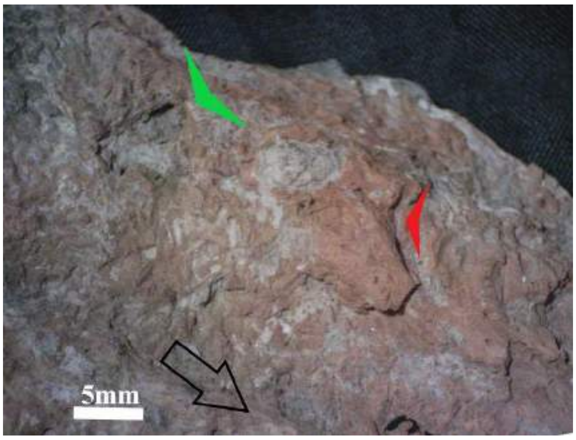


Fig. 2 Internal surface, humps

Fig. 3 Internal surface

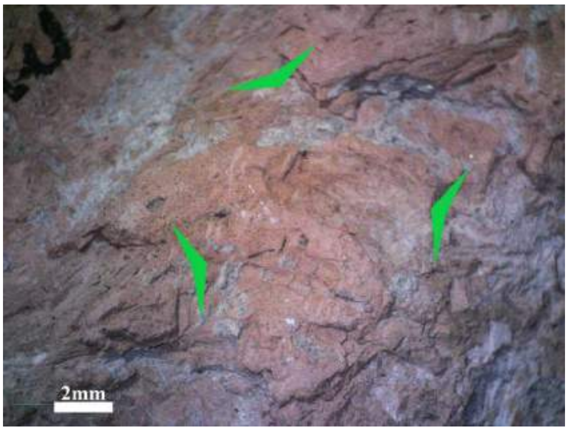


Fig. 4 Internal surface

Fig. 5 Internal surface, mineral inclusion

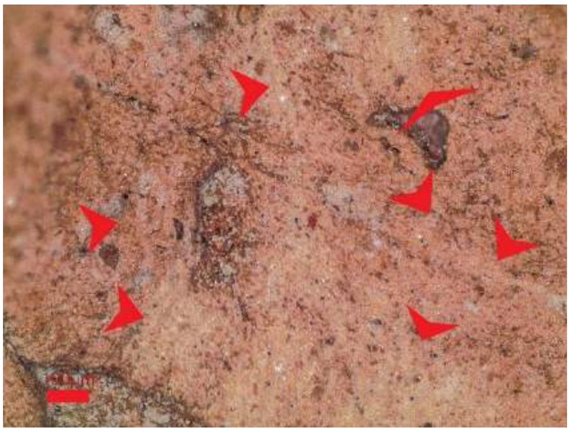


Fig.6 External surface

Fragment number: MT'00 18G 42 (MT 19)
Site: Mezraa Teleilat
Level: IA2
Period: IIA2
Grid: 4-7/c-f
Preservation Level: poor

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: walls
Core: gray
Color s. internal: light orange **External**: light orange
Hypothesized side: medium-size tray

Technological traces analysis:

Internal surface
- **Topography**: uneven
- **Surface treatment:** untreated

External surface
- **Topography:** uneven
- **Surface treatment:** untreated

Internal Scores:
- **Shape**: incision
- **Texture**: striated
- **Size**: **length:** **width**: 0,2 cm
- **Incidence**:
- **Asperity**:
- **Section typology**: Va
- **Inclination**: perpendicular
- **Direction**:
- **Arrangement**: parallel
- **Edge**: net - stright
- **Extremity typology**: rounded - sharpened
- **Secondary signs**: striations
- **Distribution**: regular
- **Scoring interpretation:** hard blade incised

Use-wear analysis:

Ceramic Surface:
- **Internal**: rounding, rips?
- **External**:

Mineral Inclusions Surface:
- **Internal**: depressions, striations
- **External**:

Function interpretation: baking basic bread

Post depositional traces: abrasion

Residues:

Final interpretation:

The fragment MT 19 belonged to the walls of a small pan, made of a plan-tempered coarse clay (figs. 1, 2). The inner surface was incised with an hard blade (probably made of bone) when the clay was semi-dry (fig. 1).
The pan was used probably used to bake basic bread (figs. 1,3,4, 6) but, after its use, endured a strong abrasion activity (fig. 3-6).

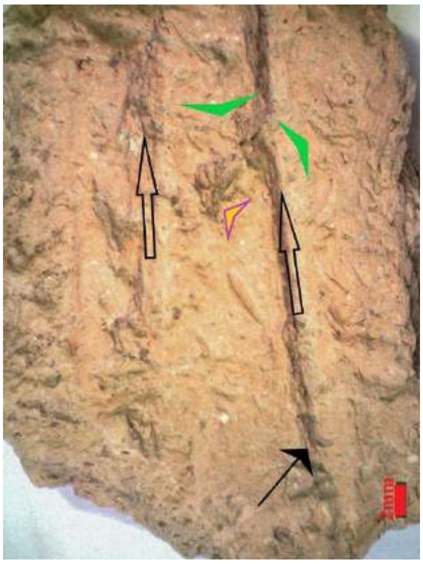


Fig. 1 Internal surface

Fig. 2 External surface

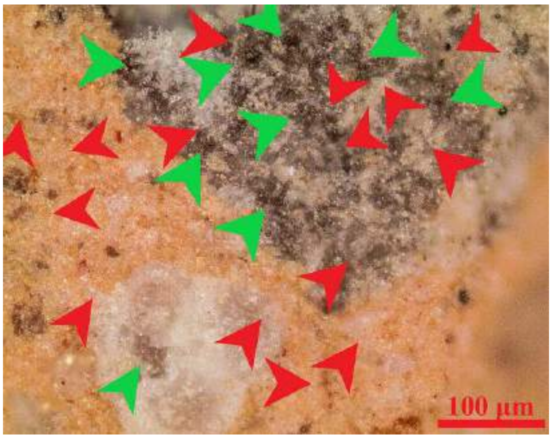


Fig. 3 Internal surface, mineral inclusion

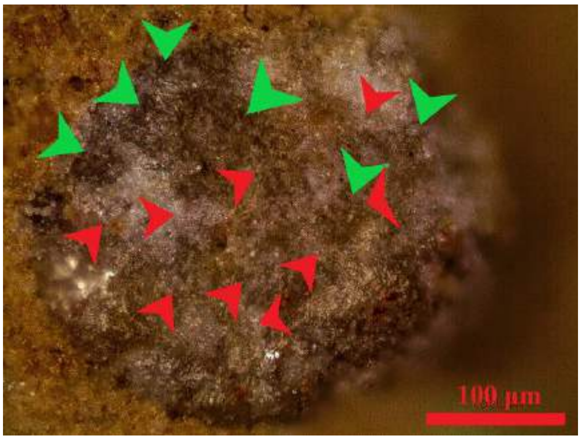


Fig. 4 Internal surface, mineral inclusion

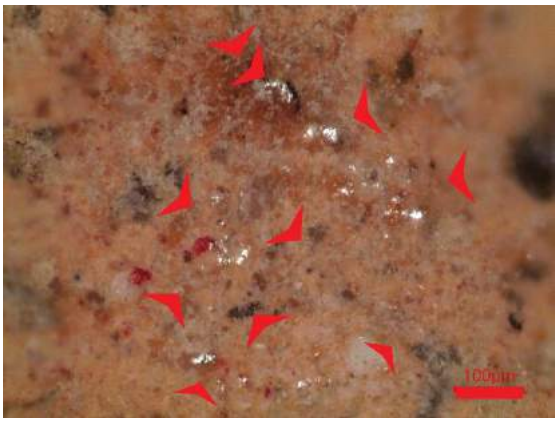


Fig. 5 Internal surface

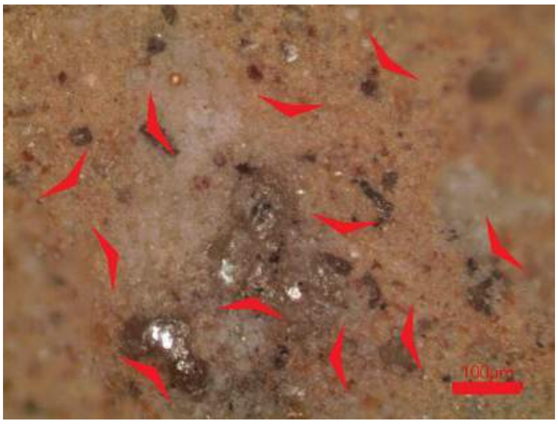
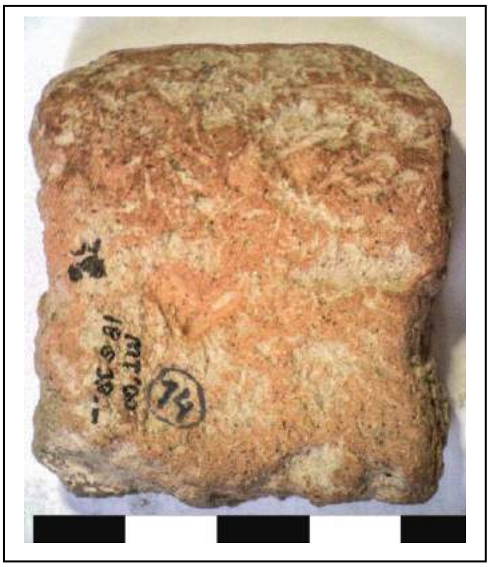


Fig. 6 External surface

Fragment number: MT'00 18G 38 (MT 14)
Site: Mezraa Teleilat
Level: IA1
Period: IIA2
Grid: 5-10/a-c
Preservation Level: good



General characteristics:

Paste: medium granulometry clay
Temper: plant inclusions
Section: wall
Core: gray
Color s. internal: orange **external**: orange
Hypothesized side: medium-size tray

Technological traces analysis:

Internal surface
Topography: sinuous
Surface treatment: smoothed

External surface
Topography: flat
Surface treatment: polished?

Internal Scores:
Shape: **Texture**:
Size: **length: width**:
Incidence: **Asperity**:
Section typology: **Inclination**:
Direction: **Arrangement**:
Edge: **Extremity typology**:
Secondary signs: **Distribution**:
Scoring interpretation: not scored

Use-wear analysis:

Ceramic Surface:
Internal: rips
External:
Mineral Inclusions Surface:
Internal: depressions, polish
External:
Function interpretation: baking basic bread

Post depositional traces: abrasion (scratches, striations), concretion, dulling

Residues:

Final interpretation:

The fragment MT 14 belonged to the walls of a small pan, made of a plan-tempered medium-granulometry clay and finished with little care.
The inner surface was not scored (fig. 1).
The pan was used to bake basic bread (fig. 2-5). After its original use, the surface endured abrasion (figs. 3,4,6), dulling (figs. 1,2) and covered by concretion (figs. 1, 2).

Fig. 1 Internal surface

Fig. 2 External surface

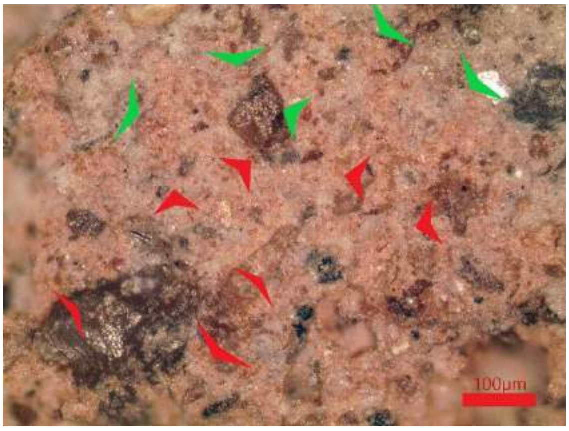


Fig. 3 Internal surface

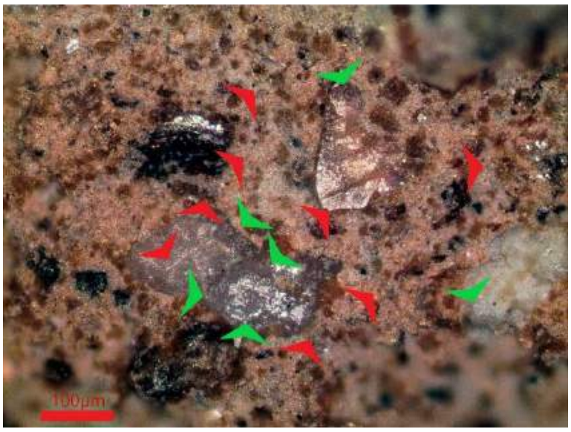


Fig. 4 Internal surface

Fig. 5 Internal surface, mineral inclusion

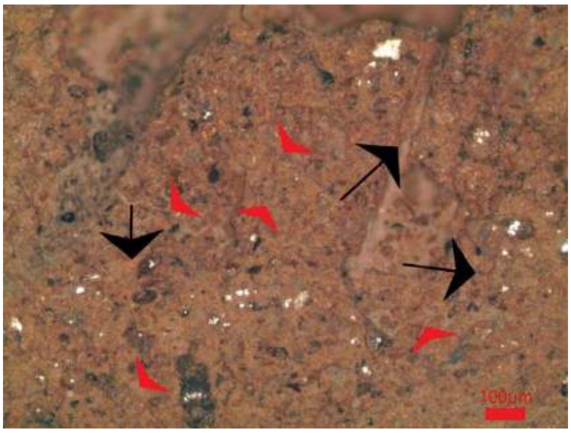
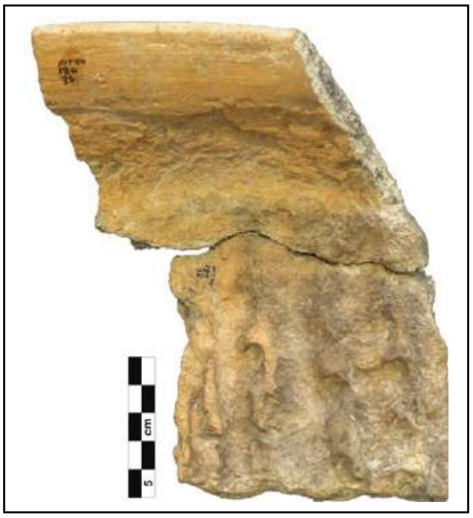


Fig. 6 External surfae

Fragment number: MT'00 18G 38 (MT 124)
Site: Mezraa Teleilat
Level: IB4
Period: IIA2
Grid: 5-10/a-c
Preservation Level: Excellent



General characteristics:

Paste: medium-coarse clay
Temper: plant inclusions
Section: complete section
Core: gray
Color s. internal: light orange **external**: light orange
Hypothesized side: medium size tray

Technological traces analysis:

Internal surface
Topography: sinuous
Surface treatment: smoothed

External surface
Topography: sinuous
Surface treatment: smoothed

Internal Scores:
Shape: humps
Texture:
Size: **length:** **width**:
Incidence: high
Asperity: blunt
Section typology: Ω
Inclination: perpendicular
Direction:
Arrangement: parallel
Edge:
Extremity typology:
Secondary signs:
Distribution:
Scoring interpretation: impressed humps

Use-wear analysis:

Ceramic Surface:
Internal: rips
External:
Mineral Inclusions Surface:
Internal:
External:
Function interpretation: baking basic bread

Post depositional traces:

Residues:

Final interpretation:

The fragment MT 124 is the entire section of a large pan, made of a plan-tempered coarse clay (fig.1).
Coilings were added to the internal surface in order to make up humps. Later, the humps were impressed with a tool (figs. 1, 2). The external surface was smoothed (fig.5).
The pan was used to bake basic bread (figs. 1-4).

Fig. 1 Internal surface

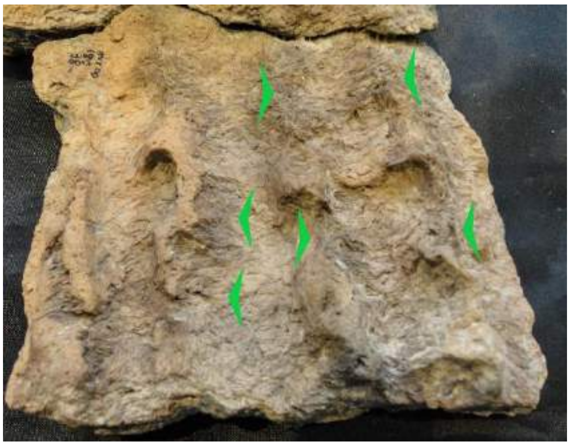


Fig. 2 Internal surface

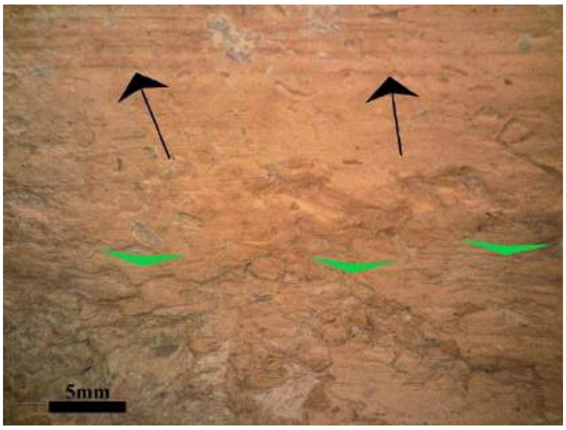


Fig. 3 Internal surface, rim

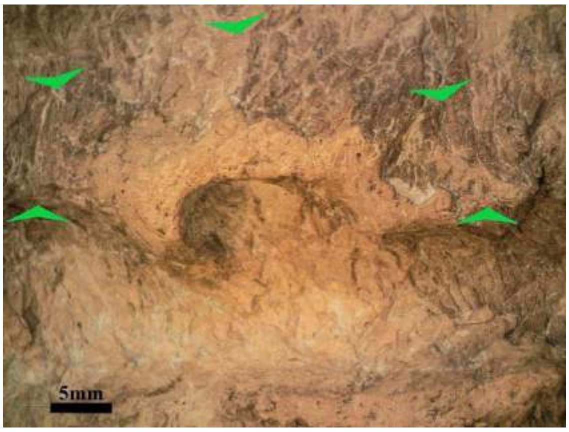


Fig. 4 Internal surface, base

Fig. 5 External surface

Fragment number: MT'00 20G43 (MT 76)
Site: Mezraa Teleilat
Level: IB2a
Period: I-III
Grid: 4-9/a-e
Preservation Level: poor

General characteristics:

Paste: medium granulometry clay
Temper: organic temper
Section: base-walls
Core: beige
Color s. internal: beige **External**: beige
Hypothesized side: medium tray

Technological traces analysis:

Internal surface
Topography:
Surface treatment: untreated

External surface
Topography: uneven
Surface treatment: untreated

Internal Scores:
Shape: grooves
Texture: striated
Size: **length:** **width**: 0,9
Incidence: high
Asperity:
Section typology: Vb
Inclination: perpendicular
Direction:
Arrangement: parallel
Edge: rounded, straight
Extremity typology: sharpened
Secondary signs: striations
Distribution: irregular
Scoring interpretation: soft tool (like wooden stick) grooved

Use-wear analysis:

Ceramic Surface:
Internal: rounding
External: striation batches, scratches, striations
Mineral Inclusions Surface:
Internal: depressions, spall detachment, rounding
External: striations, polish
Function interpretation: baking low-in-fat bread ?

Post depositional traces: corrosion

Residues:

Final interpretation:
The fragment MT 76 belonged to the base-wall of medium pan, made of a plan-tempered coarse clay (figs. 1,2). Probably was shaped by slab technique.
The inner surface was tool grooved probably with a wooden stick (figs. 1,3).
The pan was maybe used to bake low-in-fat bread (figs. 2, 3, 5,6). After its use, the fragment endured corrosion.

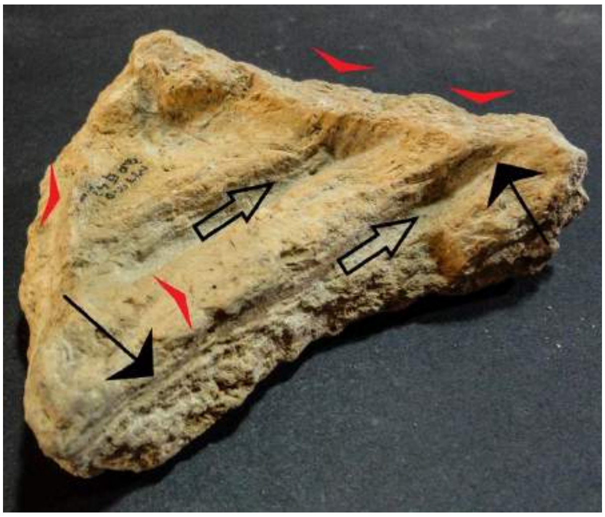


Fig. 1 Internal surface, grooves

Fig. 2 Internal surface, grooves

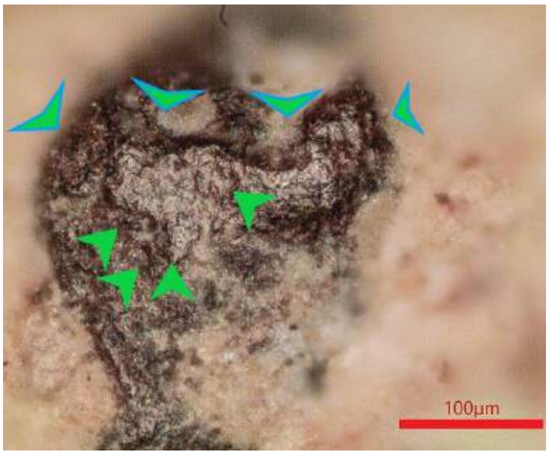


Fig. 3 Internal surface, mineral inclusion

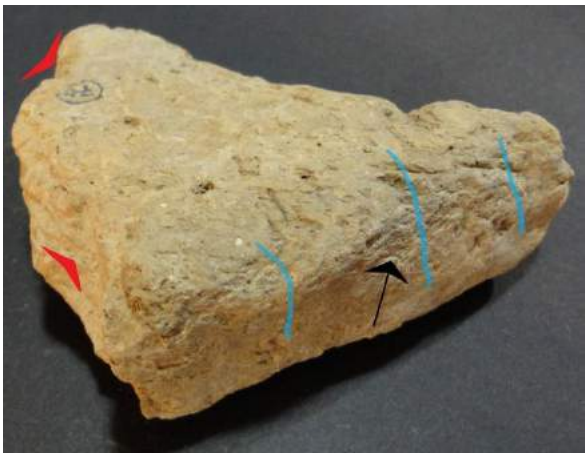


Fig. 4 External surface

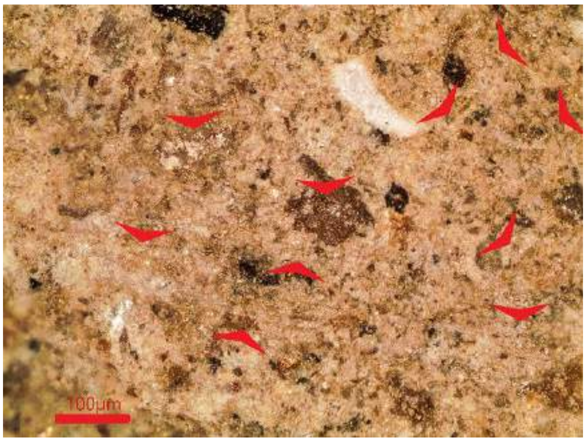


Fig. 5 External surface

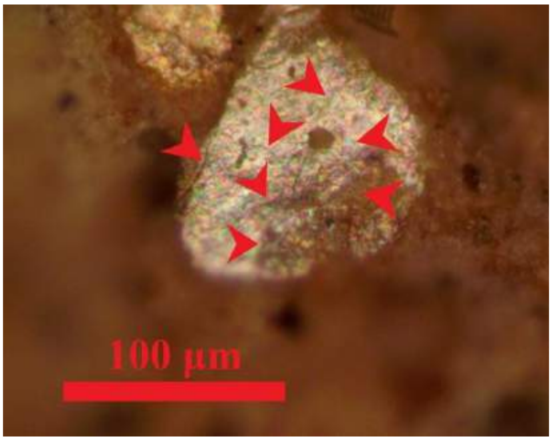
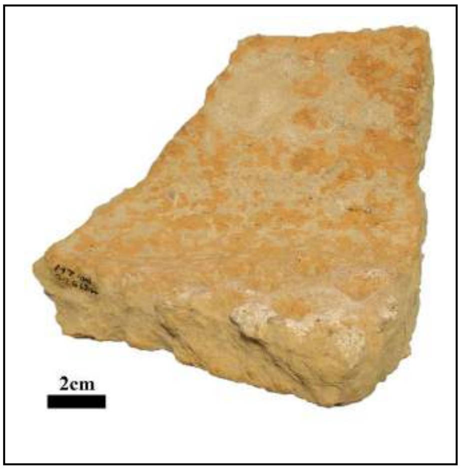


Fig. 6 External surface, mineral inclusion

Fragment number: MT’00 20G 43 (MT 62)
Site: Mezraa Teleilat
Level: IB1c
Period: I-III
Grid: 4-9/a-e
Preservation Level: Excellent



General characteristics:

Paste: coarse clay
Temper: plant inclusions
Section: base and walls
Core: gray
Color s. internal: light orange **External**: light orange
Hypothesized side: large tray

Technological traces analysis:

Internal surface
Topography: sinuous
Surface treatment: smoothed

External surface
Topography: sinuous
Surface treatment: smoothed

Internal Scores:
Shape: quadrangular **Texture**:
Size: **length:** 0,9cm **width**: 1,4 cm
Incidence: high **Asperity**:
Section typology: Ub **Inclination**: perpendicular
Direction: **Arrangement**: asymmetrical
Edge: **Extremity typology**:
Secondary signs: **Distribution**:
Scoring interpretation: tool impressed

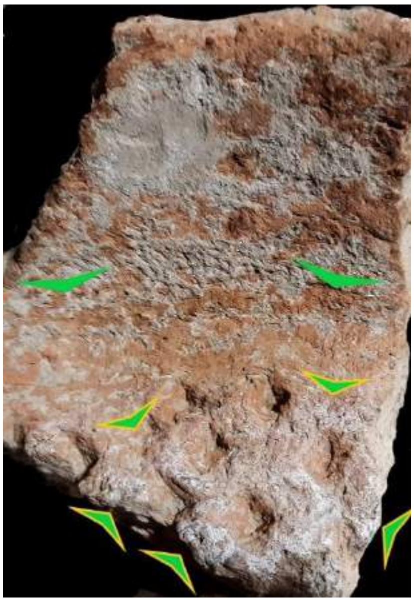
Use-wear analysis:

Ceramic Surface:
Internal: rips, rounding
External:
Mineral Inclusions Surface:
Internal: polish
External:
Function interpretation: baking basic or low-in-fat bread

Post depositional traces: corrosion, concretions

Residues:

Final interpretation:
The fragment MT 62 belonged to a large pan, made of a plan-tempered coarse clay and both on the inner and external part of the vessel was finished by smoothing.
The inner surface was finger groove tool impressed (fig. 1).
The pan was used to bake basic or low-in-fat bread (figs. 3,4). The white substance on internal base (not inside the impressions) could be composed by phytoliths.



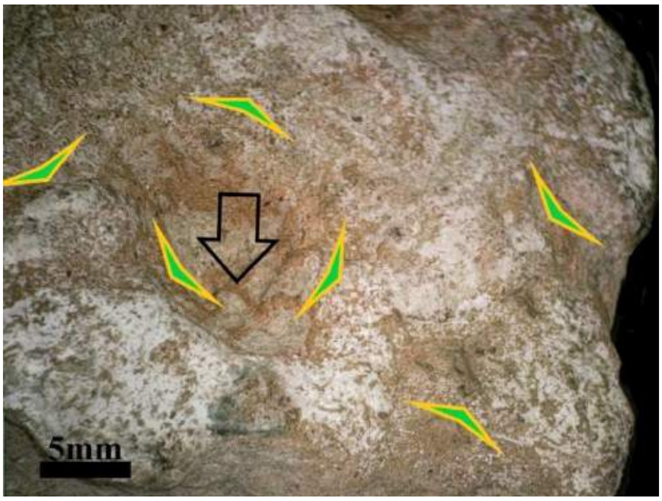


Fig. 1Internal surface

Fig. 2 Internal surface, impression

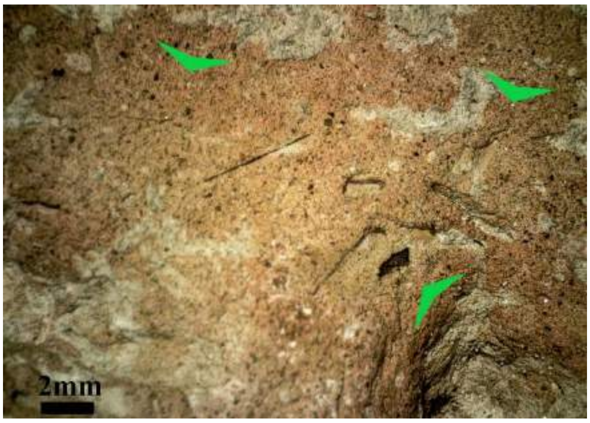
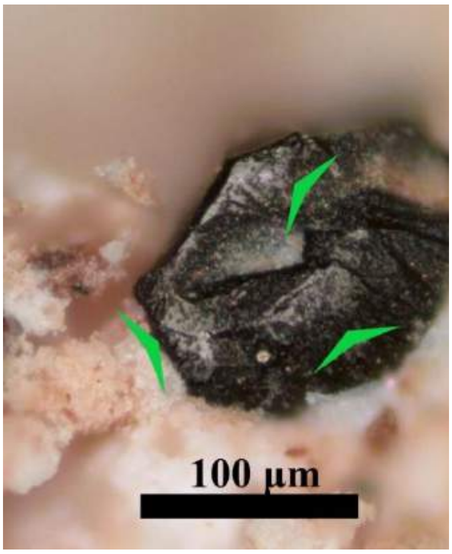


Fig. 3 Internal surface, impression

Fig. 4 Internal surface



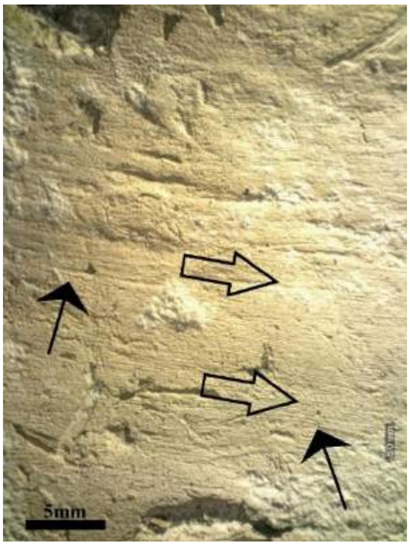


Fig. 5 Internal surface, mineral inclusion

Fig. 6 External surface

Fragment number: MT'99 19EB (MT 136)
Site: Mezraa Teleilat
Level: IIA1
Period: I-IIC2
Grid: 1-10/g-k
Preservation Level: Excellent

General characteristics:

Paste: fine clay
Temper: large amount of plant inclusions
Section: entire section
Core: orange
Color s. internal: light orange **External**: light orange
Hypothesized side: medium-size tray

Technological traces analysis:

Internal surface
Topography: sinuous
Surface treatment: smoothed

External surface
Topography: flat
Surface treatment: burnished??

Internal Scores:
Shape: grooves
Texture: sinuous
Size: **length:** **width**: 2,1
Incidence: low
Asperity:
Section typology: Ua
Inclination: perpendicular
Direction: unilateral
Arrangement: parallel
Edge: net , straight
Extremity typology: semicircular
Secondary signs:
Distribution:
Scoring interpretation: finger grooved

Use-wear analysis:

Ceramic Surface:
Internal: rips
External: rounded, levelling, sooting
Mineral Inclusions Surface:
Internal: depressions
External:
Function interpretation: baking basic bread

Post depositional traces:

Residues:

Final interpretation:

The fragment MT 136 is the entire section of a medium-size pan, made of a plan-tempered fine clay. Internal surface was smoothed (fig. 1, 3). External surface was probably burnished (figs. 2, 6).
The inner surface was finger grooved when the clay was enough dry (figs.1, 4).
The pan was used to bake basic bread (figs. 1,3-5).

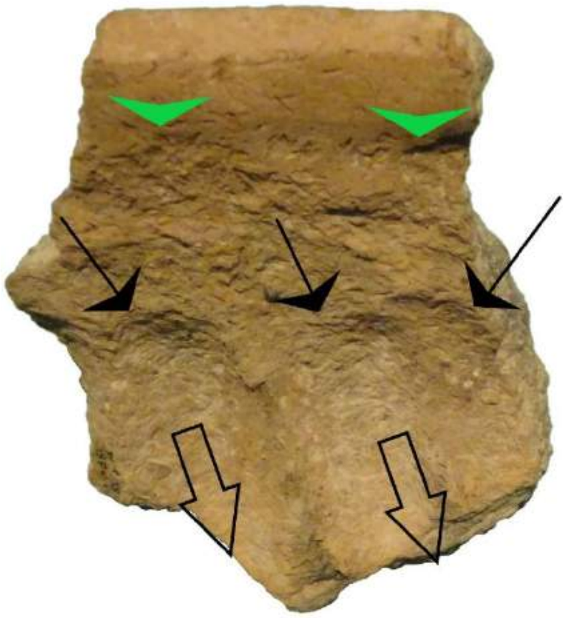


Fig. 1 internal surface

Fig 2 External surface

Fig. 3 Internal surface, rim

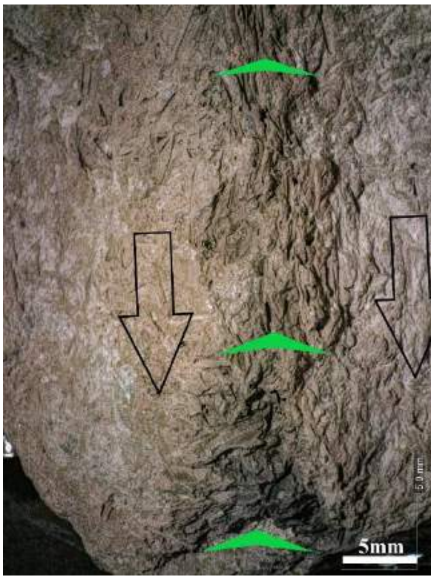


Fig. 4, Internal surface

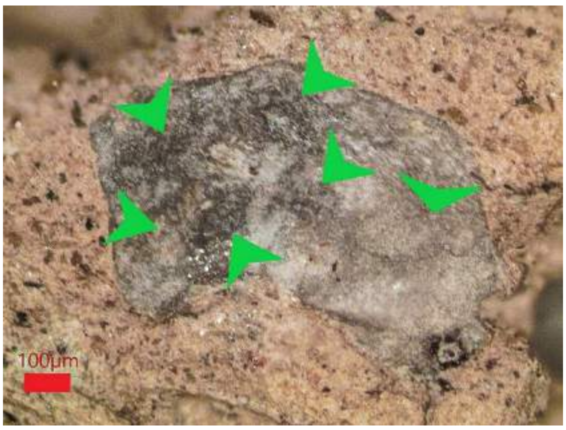


Fig. 5 Internal surface, mineral inclusion

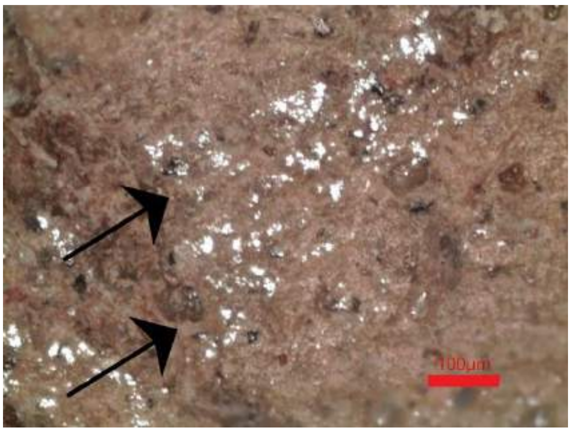
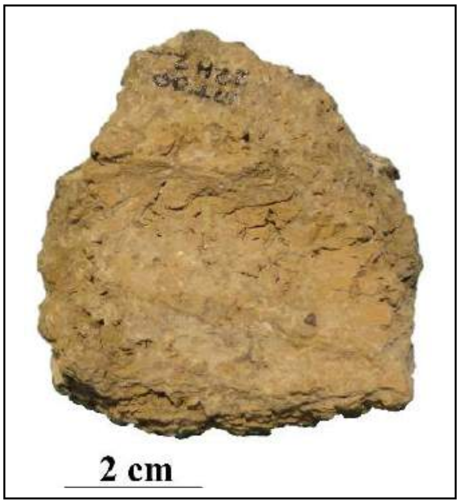


Fig. 6 External surface

Fragment number: MT’00 22H 2 (MT 160)
Site: Mezraa Teleilat
Level: IIIB3-IIB2
Period: I-IIB
Grid: 1-10/f-k
Preservation Level: Poor



General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: base
Core: beige
Color s. internal: beige **External**: beige
Hypothesized side: medium

Technological traces analysis:

Internal surface
Topography: coarse
Surface treatment: untreated

External surface
Topography: coarse
Surface treatment: untreated

Internal Scores:
Shape: grooves
Texture: striated
Size: **length:** **width**: 1,7
Incidence: low
Asperity:
Section typology: Ua
Inclination: perpendicular
Direction: unidirectional
Arrangement: parallel
Edge: rounded
Extremity typology:
Secondary signs: striations
Distribution: regular
Scoring interpretation: finger grooved

Use-wear analysis:

Ceramic Surface:
Internal: rips, scratches
External:
Mineral Inclusions Surface:
Internal: rounding, depressions, scratches, polish
External:
Function interpretation: baking low-in-fat bread

Post depositional traces: abrasion

Residues:

Final interpretation:
The fragment MT 160 belonged to the base of a medium pan, made of a plan-tempered coarse clay (figs. 1, 6).
The inner surface was finger grooved (fig. 3).
The pan was used to bake low-in-fat bread (figs. 2, 4, 5).

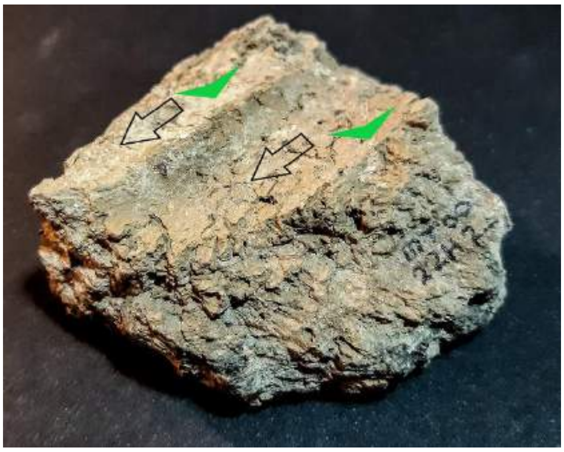


Fig. 1 Internal surface

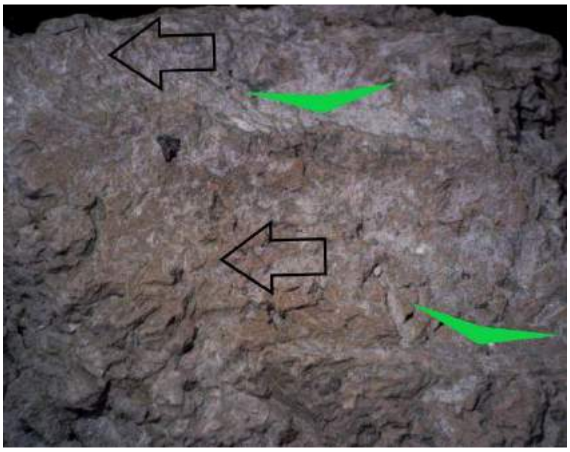


Fig. 2 Internal surface

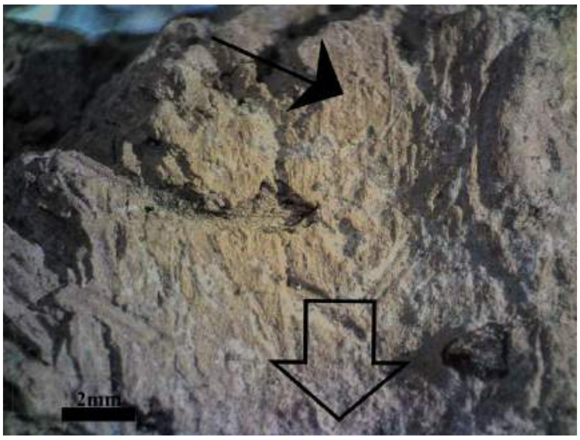


Fig. 3 Internal surface, finger grooved

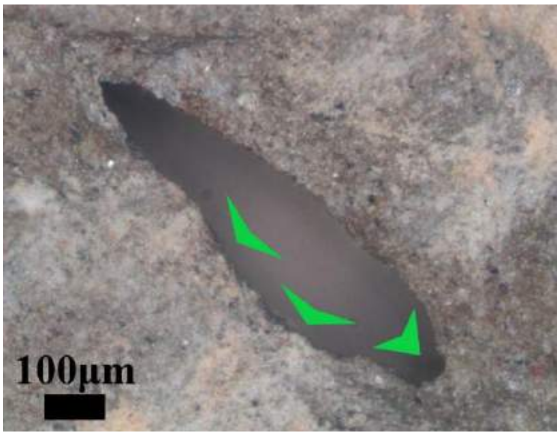


Fig. 4 Internal surface

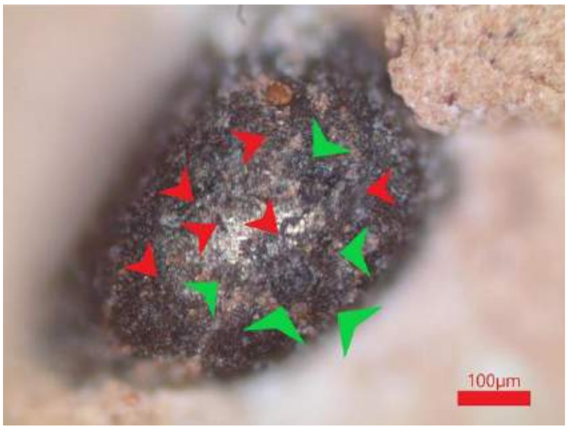


Fig. 5 internal surface, mineral inclusion

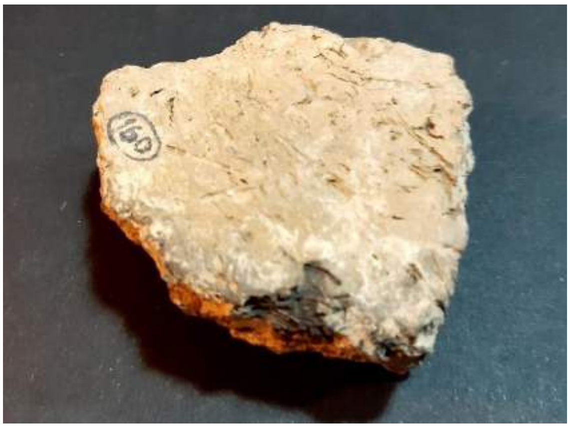
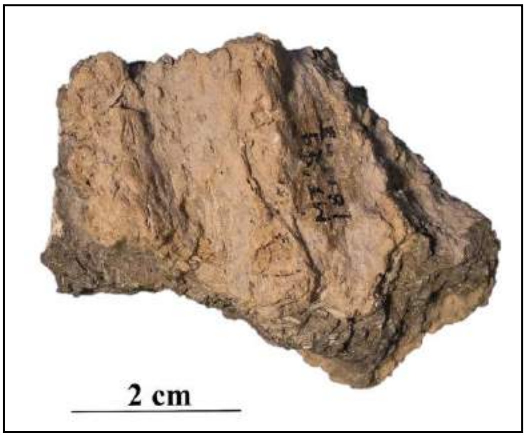


Fig. 6 External surface

Fragment number: MT'99 18H 25 (MT163)
Site: Mezraa Teleilat
Level: IIb2
Period: I-IIB3
Grid: 1-10/a-k
Preservation Level: quite good



General characteristics:

Paste: coarse clay
Temper: plant inclusions
Section: wall
Core: dark
Color s. internal: orange **External**: orange
Hypothesized side: medium bowl

Technological traces analysis:

Internal surface
- **Topography**: uneven
- **Surface treatment:** untreated

External surface
- **Topography:** flat
- **Surface treatment:**

Internal Scores:
- **Shape**: grooves
- **Texture**: striated
- **Size**: **length:** **width**: 0.8
- **Incidence**: low
- **Asperity**: blunt
- **Section typology**: Ub
- **Inclination**: perpendicular
- **Direction**: unidirectional
- **Arrangement**: asymmetrical
- **Edge**: jagged net
- **Extremity typology**:
- **Secondary signs**:
- **Distribution**:
- **Scoring interpretation:** soft tool incised

Use-wear analysis:

Ceramic Surface:
- **Internal**: rips
- **External**: scratches

Mineral Inclusions Surface:
- **Internal**:
- **External**:

Function interpretation: baking basic bread

Post depositional traces:

Residues:

Final interpretation:
The fragment MT 163 belonged to the walls of a bowl, made of a plan-tempered coarse clay. The internal surface was untreated meanwhile, the external one was finished (figs. 3, 4), The inner surface was soft tool grooved hastily when the clay was fresh (fig. 1).
The bowl was used to bake basic bread (figs. 1,2)

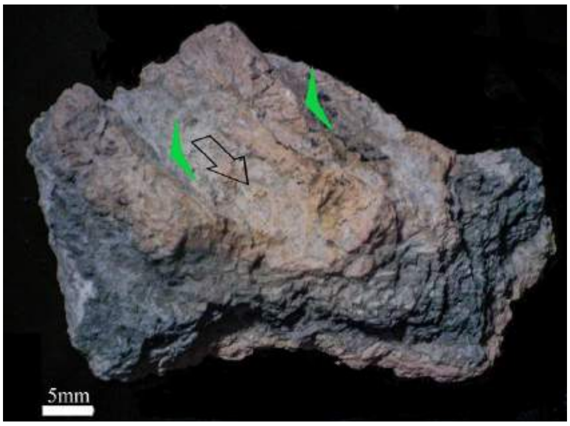


Fig. 1 Internal surface, grooves

Fig. 2 Internal surface

Fig. 3 External surface

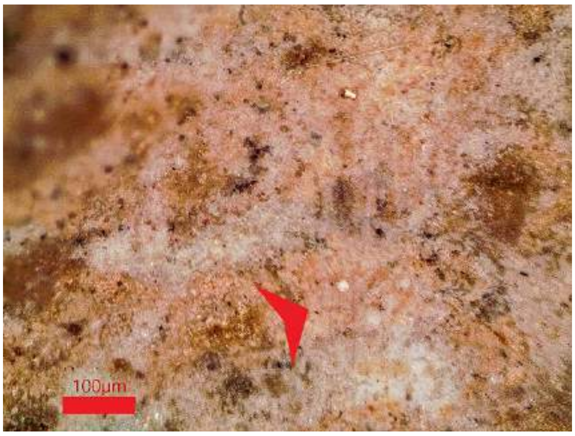


Fig.4 External surface

Fragment number: MT'99 18H 10 (MT 128)
Site: Mezraa Teleilat
Level: IIA1
Period: I-IIA
Grid:
Preservation Level: Good

General characteristics:

Paste: medium coarse clay
Temper: plant inclusions
Section: base-walls
Core: dark
Color s. internal: orange **External**: orange
Hypothesized side: medium-size tray

Technological traces analysis:

Internal surface
Topography: sinuous
Surface treatment: smoothed

External surface
Topography: coarse
Surface treatment: untreated

Internal Scores:
Shape: groove
Texture:
Size: **length:** **width**: 1,3
Incidence: low
Asperity:
Section typology:
Inclination: perpendicular
Direction:
Arrangement: parallel
Edge: rounded, straight
Extremity typology:
Secondary signs: striations
Distribution: regular
Scoring interpretation: tool grooved

Use-wear analysis:

Ceramic Surface:
Internal: rips
External: spall detachment, striations, rounding
Mineral Inclusions Surface:
Internal:
External:
Function interpretation: baking basic bread

Post depositional traces: breakage

Residues:

Final interpretation:
The fragment MT belonged to the base-walls of a small pan, made of a plan-tempered medium granulometry clay. Internal surface was finished by smoothing (figs. 1., 2).
The inner surface was finger grooved (fig. 1).
The pan was used to bake basic bread (figs. 1-4).

Fig.1 Internal surface

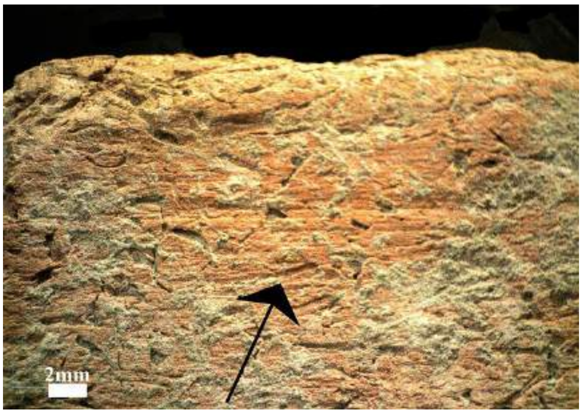


Fig. 2 Internal surface rim

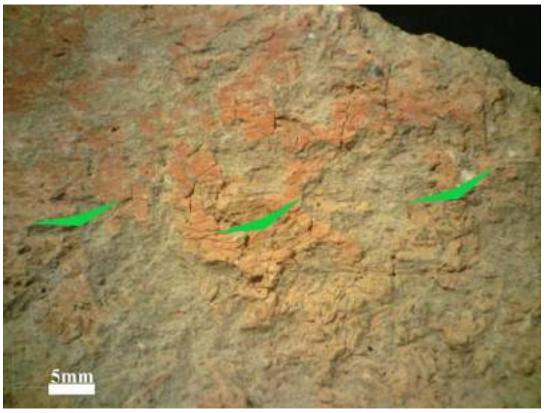


Fig. 3 Internal surface

Fig. 4 External surface

Fragment number: MT 158
Site: Mezraa Teleilat
Level: IIB2
Period: I-II
Grid: 1-10/a-k
Preservation Level: Quite good

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: base
Core: dark
Color s. internal: beige **External**: beige
Hypothesized side: medium-size bowl

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: uneven
Surface treatment: untreated

Internal Scores:
Shape: linear
Texture: coarse
Size: **length:** **width**:
Incidence: high
Asperity: blunt
Section typology: Ω
Inclination: perpendicular
Direction: unidirectional
Arrangement: parallel
Edge: rounded
Extremity typology:
Secondary signs: no
Distribution:
Scoring interpretation: humps added

Use-wear analysis:

Ceramic Surface:
Internal: rounding, darkening, crumbling
External: abrasion
Mineral Inclusions Surface:
Internal: rips, rounding
External:
Function interpretation: baking basic and fat bread

Post depositional traces:

Residues:

Final interpretation:
The fragment MT 158 belonged to the base of a medium-size bowl, made of a plan-tempered coarse clay and finished with little care (figs. 1, 3).
Coilings were added to the internal surface in order to make up humps (fig. 1-3).
The bowl was used to bake basic and fat bread (fig. 1-6).

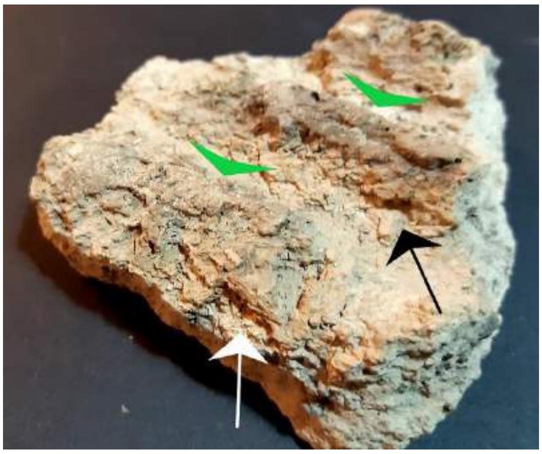


Fig. 1 Internal surface, humps

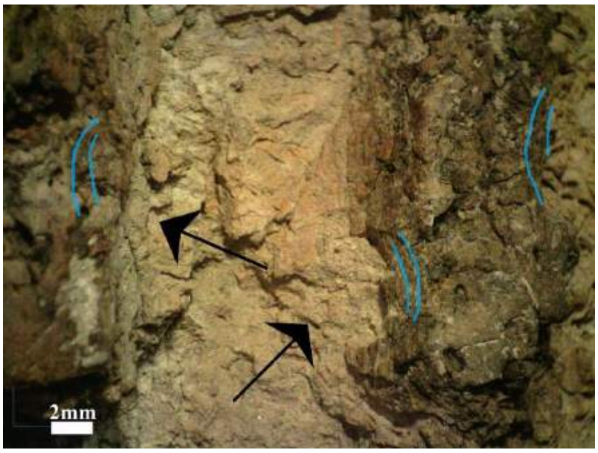


Fig. 2 Internal Surface, humps

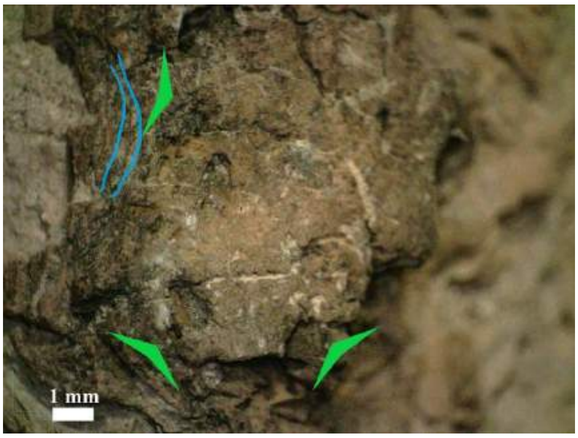


Fig. 3 Internal surface, humps

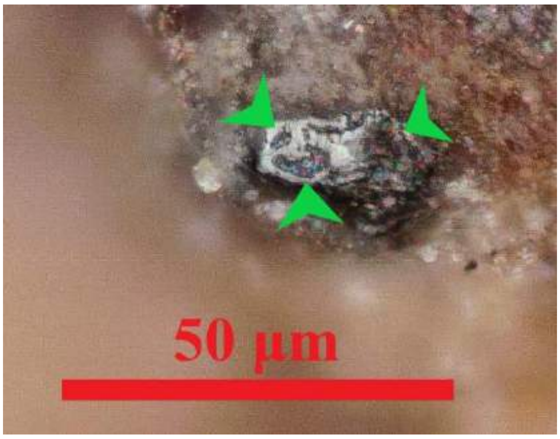


Fig. 4 Internal surface, mineral inclusion

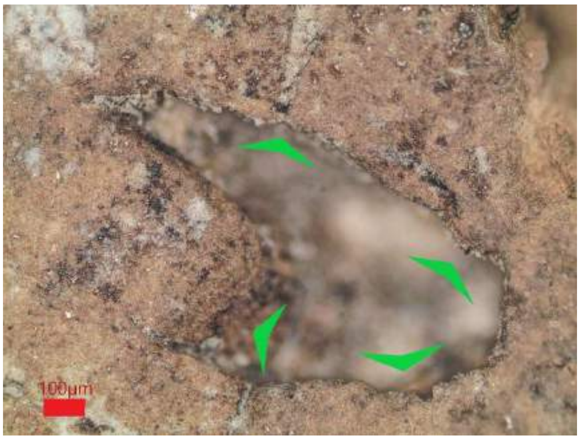


Fig. 5 Internal surface, creater

Fig. 6 External surface

Fragment number: MT'01 21M2(MT 69)
Site: Mezraa Teleilat
Level: IB2a
Period: I
Grid: 1-10/a-k
Preservation Level: quite good

General characteristics:

Paste: coarse clay
Temper: plant inclusions
Section: wall
Core: dark-gray
Color s. internal: light orange **External**: light orange
Hypothesized side: medium-size tray

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography:
Surface treatment:

Internal Scores:
Shape: incisions
Texture: striated
Size: **length:** **width**: 0,6
Incidence: high
Asperity:
Section typology: Vb
Inclination: perpendicular
Direction: unidirectional
Arrangement: parallel
Edge: net rounded
Extremity typology:
Secondary signs: striations
Distribution: regular
Scoring interpretation: hard blade (flint ?)

Use-wear analysis:

Ceramic Surface:
Internal: rips, roundings
External:
Mineral Inclusions Surface:
Internal: depressions
External:
Function interpretation: baking basic bread

Post depositional traces: concretions, rounding

Residues:

Final interpretation:

The fragment MT 69 belonged to the walls of a medium-size tray pan, made of a plan-tempered coarse clay. The internal surface was coated probably by smoothing with a thin lighter layer of clay.
The inner surface was incised with a hard blade tool like a flint one (fig. 1).
The pan was used to bake basic bread (fig. 1, 3-6).

Fig. 1 Internal surface

Fig. 2 External surface

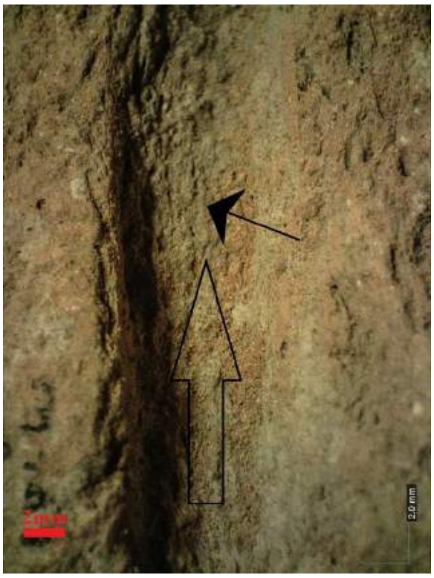


Fig. 3 Internal surface, incision

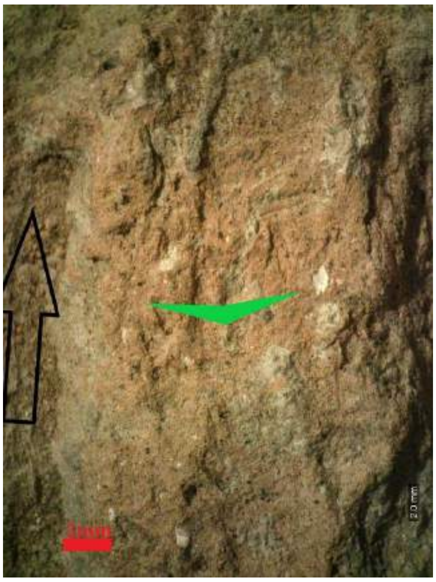


Fig. 4 Internal surface

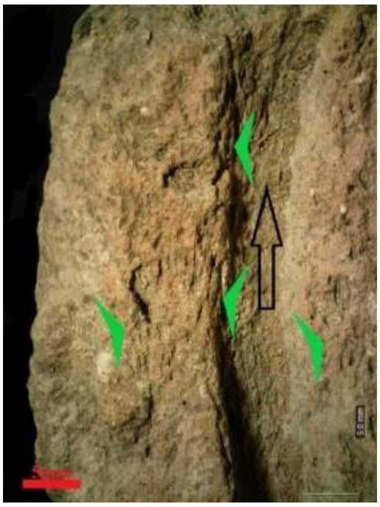


Fig. 5 Internal surface incision

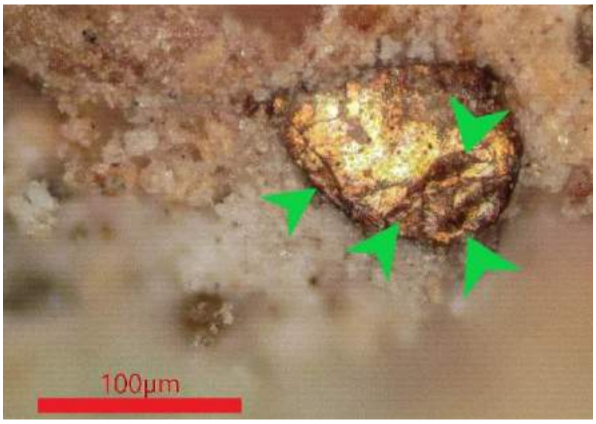
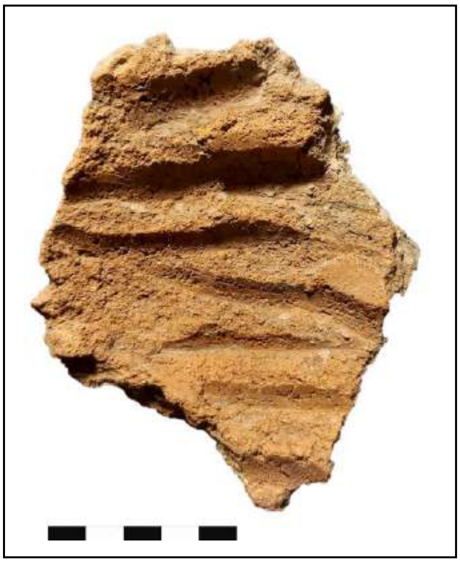


Fig. 6 Internal incision, mineral inclusion

Fragment number: MT'99 21G 35 (MT 168)
Site: Mezraa Teleilat
Level: III
Period: I
Grid: 6-10/h-k
Preservation Level: Good



General characteristics:

Paste: coarse clay
Temper: mineral
Section: base-wall
Core: buff
Color s. internal: buff **External**: buff
Hypothesized side: medium bowl

Technological traces analysis:

Internal surface
Topography:
Surface treatment:

External surface
Topography: flat
Surface treatment: treated

Internal Scores:
Shape: incision
Texture: smoothed
Size: **length:** **width**:2 mm
Incidence: high
Asperity:
Section typology: Vb
Inclination: perpendicular
Direction:
Arrangement:
Edge:
Extremity typology:
Secondary signs: striations
Distribution:
Scoring interpretation: hard tool incised (like bone or flint)

Use-wear analysis:

Ceramic Surface:
Internal: rips
External: striations, sooting, levelling
Mineral Inclusions Surface:
Internal: depressions, polish
External:
Function interpretation: baking basic bread

Post depositional traces:

Residues:

Final interpretation:

The fragment MT 168 belonged to the base-wall of medium bowl, made of a mineral coarse clay. Thew external surface was finished with a tool.
The inner surface was tool incised with a tool when the clay was fresh (fig. 1).
The pan was used to basic bread(figs. 3,4). The presence of a sooting belt and strongly abraded clearly suggested that the bowl was used for baking in a fireplace.

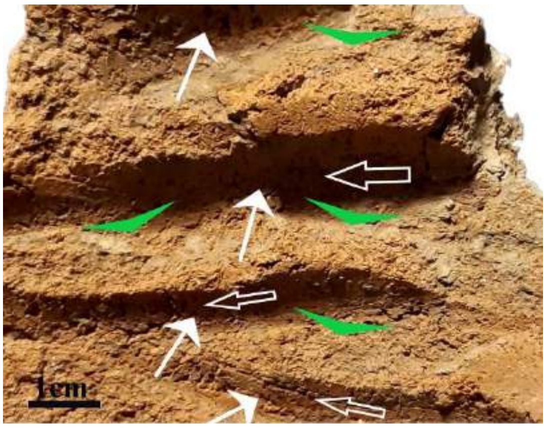


Fig. 1 Internal surface

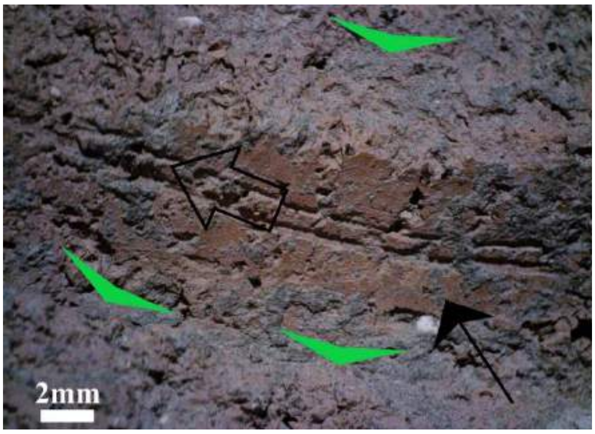


Fig. 2 Internal surface

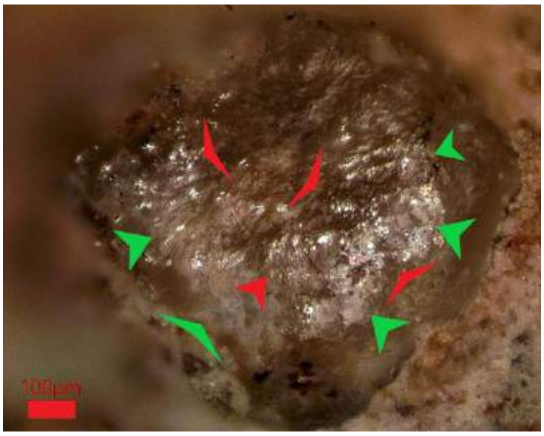


Fig. 3 Internal surface, mineral inclusion

Fig. 4 External surface

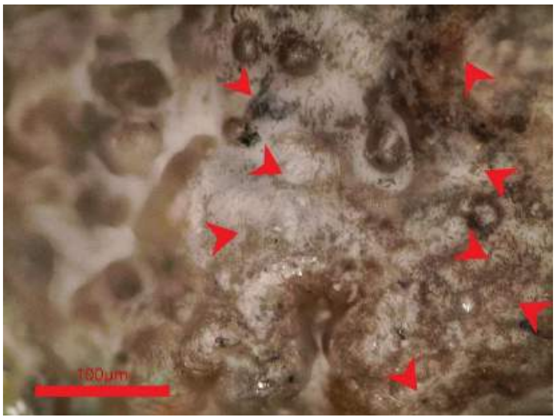


Fig. 5 External surface

Fig. 6 External surface

Fragment number: MT'99 18H3 (MT 152)
Site: Mezraa Teleilat
Level: IIB2
Period: I
Grid: 1-10/a-k
Preservation Level: Good

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: base
Core: dark
Color s. internal: light orange **External**: orange
Hypothesized side: large bowl?

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: flat
Surface treatment: treated

Internal Scores:
Shape: linear
Texture: coarse
Size: **length:** **width**: 1,8 cm
Incidence:
Asperity:
Section typology: Ω
Inclination: perpendicular
Direction:
Arrangement: parallel
Edge:
Extremity typology:
Secondary signs: no
Distribution:
Scoring interpretation: humps

Use-wear analysis:

Ceramic Surface:
Internal: rips
External: striations
Mineral Inclusions Surface:
Internal:
External: striation, polish
Function interpretation: baking basic bread

Post depositional traces: concretions

Residues:

Final interpretation:
The fragment MT 152 belonged to the base of large bowl, made of a plan-tempered coarse clay. Its external surface was finished (fig. 5).
Coilings were added to the internal surface in order to make up humps (fig. 1-3).
The bowls was used to bake basic bread for a long time (fig. 1-6).

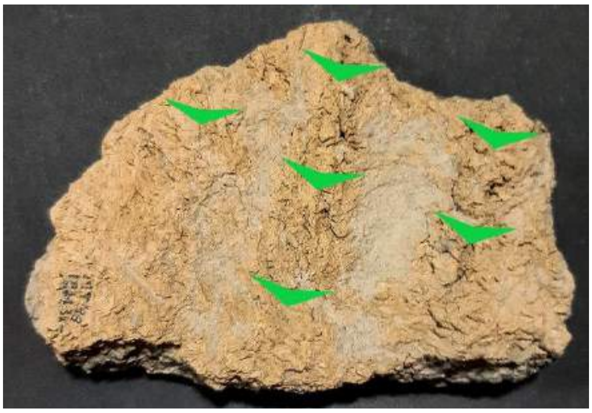


Fig. 1 Internal surface

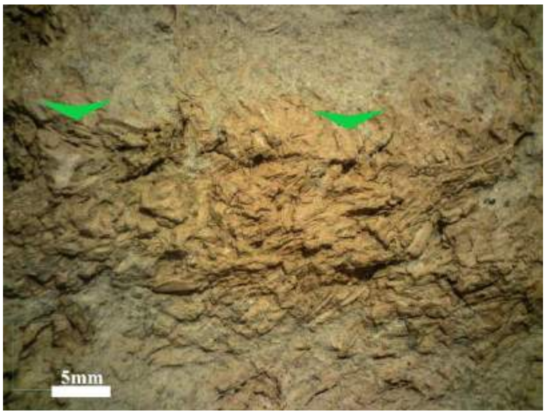


Fig. 2 Internal surface, hemp

Fig. 3 Internal surface

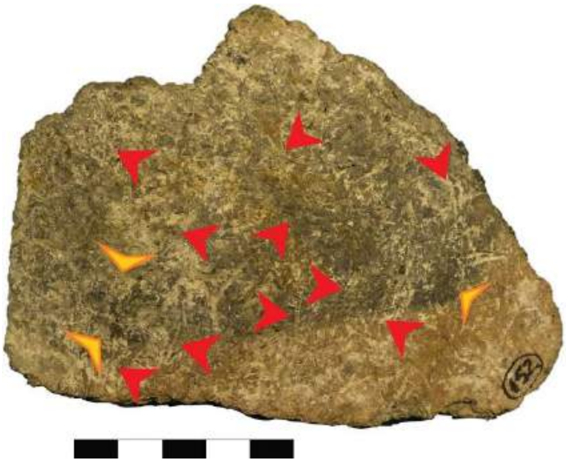


Fig. 5 External surface

Fig. 5 External surface

6 External Surface, mineral inclusión

Fragment number: MT'99 19G 8 (MT 166)
Site: Mezraa Teleilat
Level: IIB2
Period: K
Grid: 1-10/f-k
Preservation Level: poor

General characteristics:

Paste: medium-size clay
Temper: plant inclusions
Section: wall-base
Core: orange
Color s. internal: orange **External**: orange
Hypothesized side: medium-size bowl

Technological traces analysis:

Internal surface
Topography:
Surface treatment:

External surface
Topography: flat
Surface treatment: treated

Internal Scores:
Shape: groove **Texture**:
Size: **length:** **width**:
Incidence: low **Asperity**:
Section typology: Ub **Inclination**: perpendicular
Direction: **Arrangement**: parallel
Edge: **Extremity typology**:
Secondary signs: striations **Distribution**: irregular
Scoring interpretation: tool grooved (wooden stick?)

Use-wear analysis:

Ceramic Surface:
Internal:
External:
Mineral Inclusions Surface:
Internal:
External:
Function interpretation: undetermined

Post depositional traces: concretions

Residues:

Final interpretation:
The fragment MT 166 belonged to the walls-base of a large bowl (fig. 1).
The inner surface was tool grooved (fig. 1, 2).
The function of the bowl remain undetermined because strongly covered by concretions (figs. 1-3)

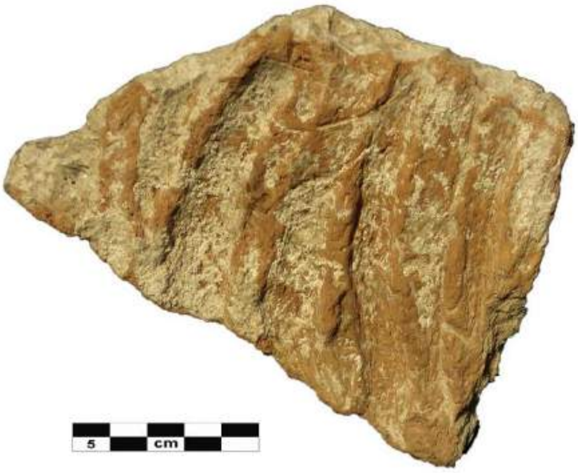


Fig. 1 Internal surface

Fig. 2 Internal surface

Fig. 3 External surface

Fragment number: (MT 85)
Site: Mezraa Teleilat
Level: IB2a
Period: K
Grid: 1-10/d-h
Preservation Level: quite good

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: wall
Core: gray
Color s. internal: orange **External**: orange
Hypothesized side: medium tray

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: uneven
Surface treatment: untreated

Internal Scores:
Shape: semicircular **Texture**: striated
Size: **length:** **width**: 0,9 cm
Incidence: high **Asperity**:
Section typology: **Inclination**: inclined
Direction: **Arrangement**: parallel
Edge: **Extremity typology**:
Secondary signs: striations **Distribution**:
Scoring interpretation: hard tool impressed

Use-wear analysis:

Ceramic Surface:
Internal: rips, rounding
External: scratches, striations
Mineral Inclusions Surface:
Internal: depressions, polish
External:
Function interpretation: baking low-in-fat bread

Post depositional traces: abrasion, concretions

Residues:

Final interpretation:

The fragment MT 85 belonged to the walls of a medium-size pan, made of a plan-tempered coarse clay and finished with little care.
The inner surface was tool impressed when the clay was fresh (fig. 1).
The pan was used to bake low-in fat bread (figs. 1-3, 5). The fragment undergone abrasion after its use (figs. 4-6).

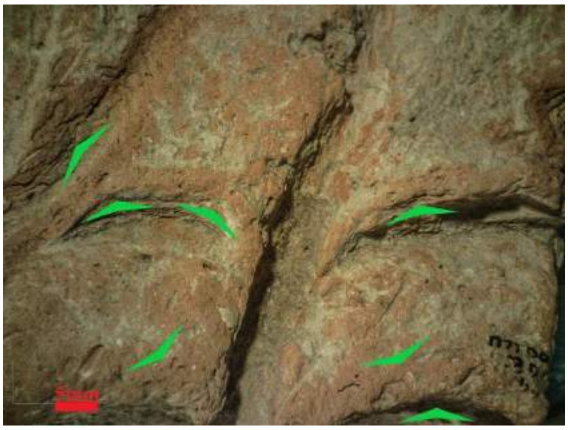


Fig. 1 Internal surface

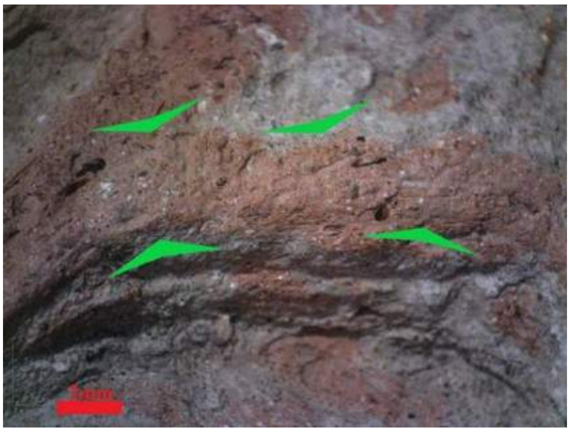


Fig. 2 Internal surface, impression

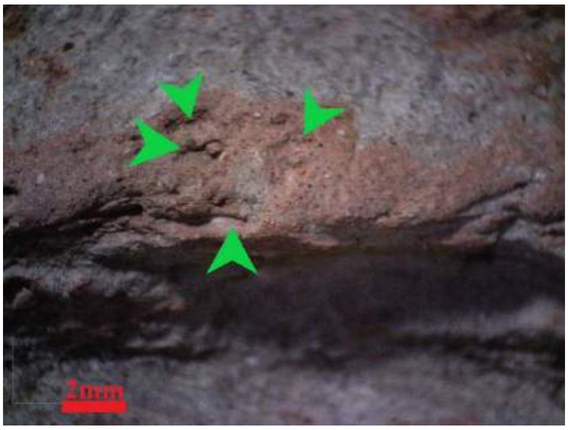


Fig. 3 Internal surface, impression

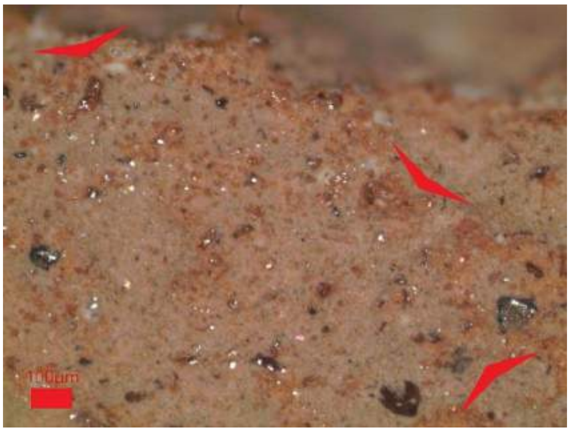


Fig. 4 Internal surface, impression

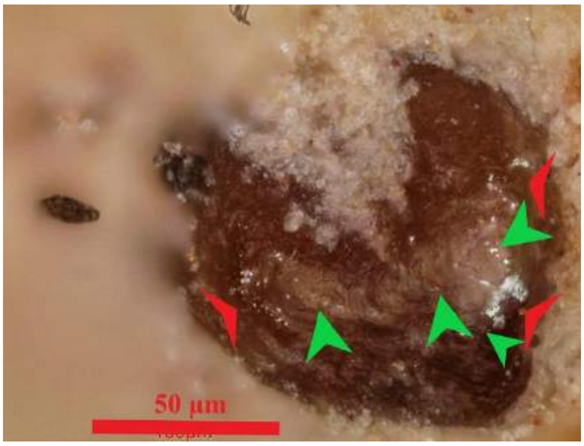


Fig. 5 Internal surface, mineral inclusion

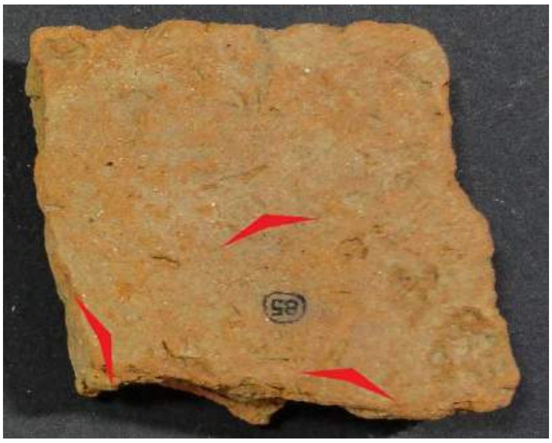


Fig. 6 External surface

Fragment number: MT’99 9F5 (MT 27)
Site: Mezraa Teleilat
Level: IIB1
Period: ?
Grid: 1-10/a-h
Preservation Level: excellent

General characteristics:

Paste: coarse clay
Temper: few plant inclusions
Section: wall
Core: beige
Color s. internal: beige **External**: beige
Hypothesized side: small bowl (?)

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: flat
Surface treatment: trated

Internal Scores:
Shape: linear
Texture: sinuous
Size: **length:** **width:**
Incidence: high
Asperity: sharp
Section typology: Ω
Inclination: perpendiular
Direction:
Arrangement:
Edge:
Extremity typology:
Secondary signs:
Distribution:
Scoring interpretation: humps added

Use-wear analysis:

Ceramic Surface:
Internal: rips
External: soot
Mineral Inclusions Surface:
Internal: depressions
External:
Function interpretation: baking basic and low-in-fat bread

Post depositional traces:

Residues:

Final interpretation:

The fragment MT 27 belonged to the walls of a bowl, made of few plan-tempered coarse clay, and finished with little care.
The inner surface was finger grooved (fig. 1).
The pan was used to bake different types of bread: both basic (figs. 3,4) and low-in-fat bread (fig. 2-5).

Fig.1 Internal surface

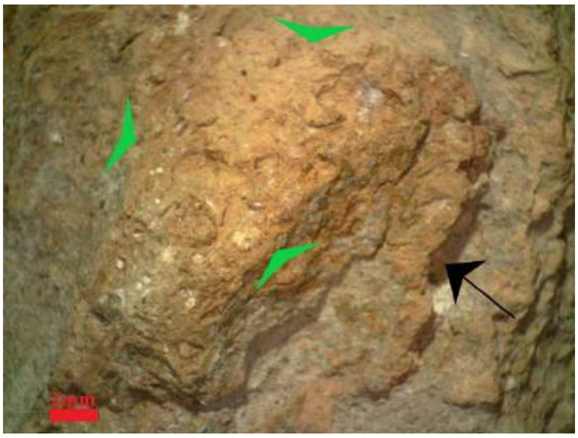


Fig. 2 Internal surface, hump

Fig. 3 Internal surface, hump

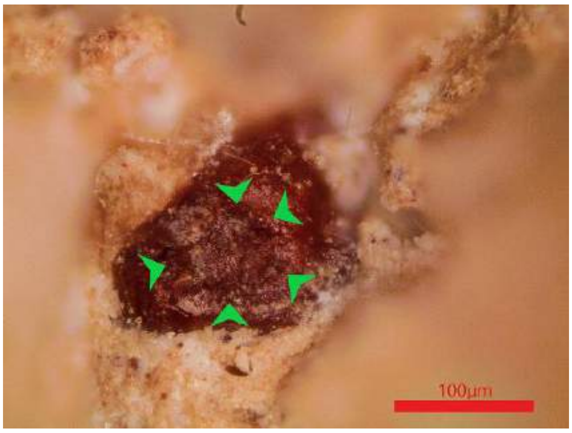


Fig. 4 Internal surface, mineral inclusion

Fig. 5 External surface

Fig. 6 External surface

Fragment number: MT’99 19H1 (MT 137)
Site: Mezraa Teleilat
Level: IIB2
Period: ?
Grid: 1-10/a-k
Preservation Level: poor

General characteristics:

Paste: medium coarse clay
Temper: plant inclusions
Section: base-wall
Core: dark
Color s. internal: pink? **External**: light brown
Hypothesized side: medium bowl

Technological traces analysis:

Internal surface
Topography: flat
Surface treatment: smoothed

External surface
Topography: uneven
Surface treatment: untreaed

Internal Scores:
Shape: groove
Texture: striated
Size: **length:** **width:**
Incidence:
Asperity:
Section typology: Ua
Inclination: perpendicular
Direction:
Arrangement: parallel
Edge:
Extremity typology:
Secondary signs: striation
Distribution:
Scoring interpretation: tool grooved

Use-wear analysis:

Ceramic Surface:
Internal: striations, rips
External: abrasion
Mineral Inclusions Surface:
Internal: polish, striation
External:
Function interpretation: undetermined

Post depositional traces: abrasion

Residues:

Final interpretation:

The fragment MT 137 belonged to the wall-base of a medium bowl, made of a plan-tempered coarse clay. The surface was covered by a thin layer of clay (figs. 1, 4)
The inner surface was finger grooved when the clay was fresh (figs. 1, 2).
The function of the bowl remain undetermined (figs. 1-5). After its original use the surface endured abrasion (figs. 1, 3, 4, 5) .

Fig. 1 Internal surface

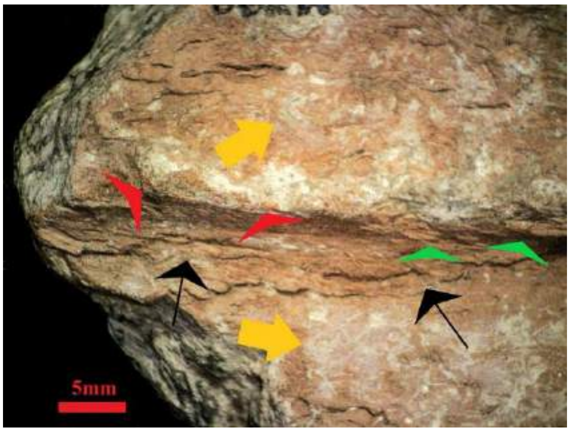


Fig. 2 Internal surface, groove

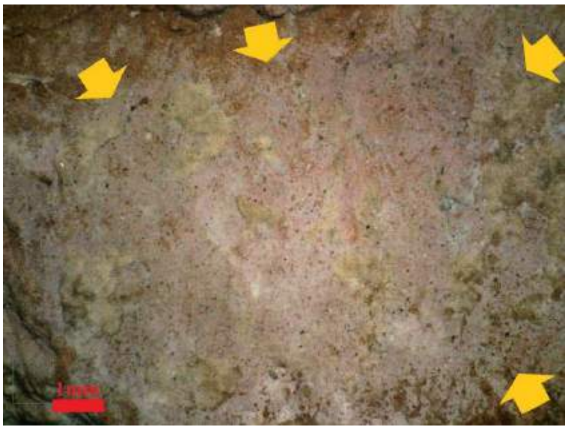


Fig. 3 Internal surface

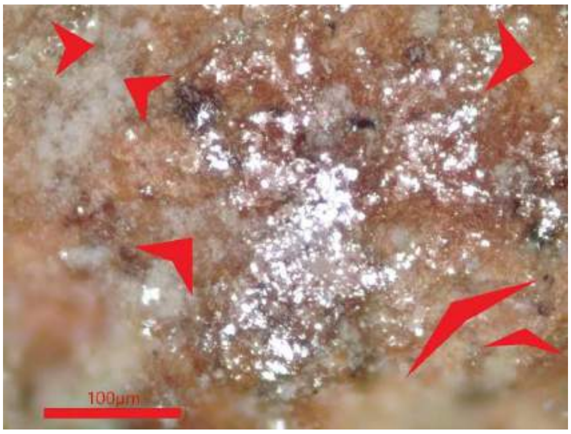


Fig. 4 Internal surface

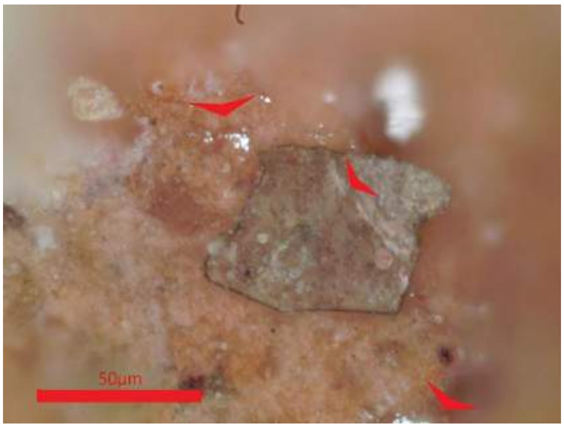


Fig. 5 Internal surface, mineral inclusion

Fig. 6 External surface

Fragment number: MT'01 23H1 (MT 164)
Site: Mezraa Teleilat
Level: IIB2
Period: ?
Grid: 1-10/a-k
Preservation Level: quite good

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: wall
Core: Dark
Color s. internal: light orange **External**: light orange
Hypothesized side: small tray

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography:
Surface treatment:

Internal Scores:
Shape: double incision **Texture**: coarse
Size: **length:** **width**: 1cm
Incidence: high/low **Asperity**:
Section typology: Ua **Inclination**: perpendicular
Direction: unidirectional **Arrangement**: parallel
Edge: rounded **Extremity typology**:
Secondary signs: **Distribution**:
Scoring interpretation: tool incised (soft blade?)

Use-wear analysis:

Ceramic Surface:
Internal: rips
External:
Mineral Inclusions Surface:
Internal: depressions
External: soot?
Function interpretation: baking basic bread

Post depositional traces: abrasion, concretion

Residues:

Final interpretation:
The MT 164 fragment belonged to the walls of a medium pan, made with coarse tempered clay.
The inner surface was hastily carved with a tool when the clay was fresh (fig. 1, 3).
The pan was used to bake basic bread (figs. 1-4).
After its use the fragment has suffered corrosion and covered by concretions (fig. 1, 5).

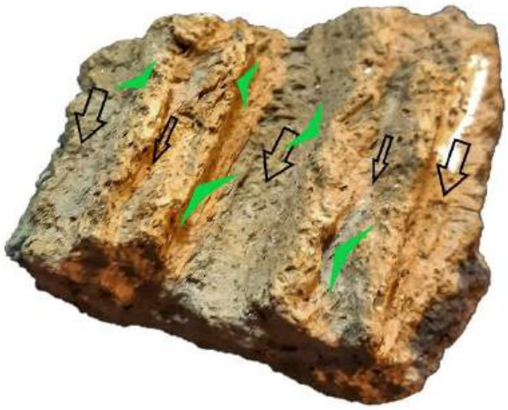


Fig. 1 Internal surface

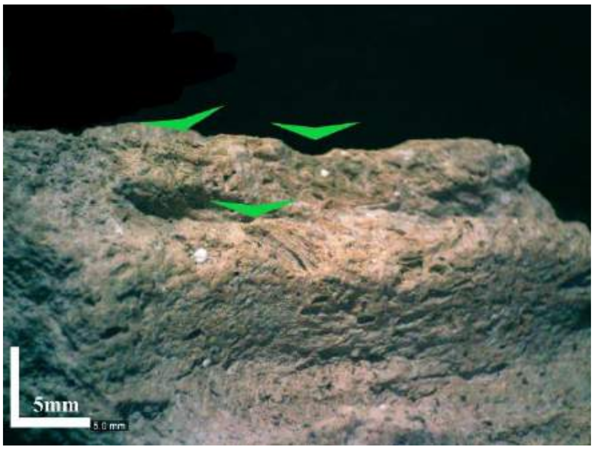


Fig.2 Internal surface, high points

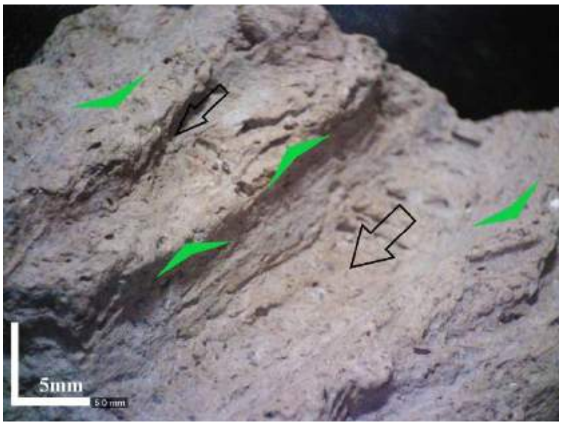


Fig. 3 Internal surface

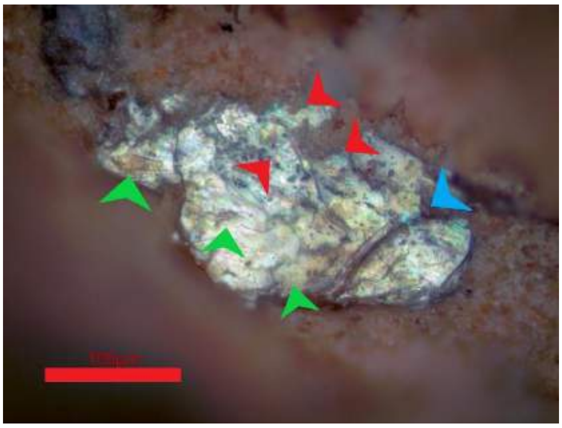


Fig. 4 Internal surface, mineral inclusion

Fig. 5 External surface

Fragment number: MT’01 23H 1 (MT 165)
Site: Mezraa Teleilat
Level: IIB2
Period: ?
Grid: 1-10/a-k
Preservation Level: quite good

General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: walls
Core: dark
Color s. internal: light orange **External**: light orange
Hypothesized side: medium-size bowl

Technological traces analysis:

Internal surface
Topography: uneven
Surface treatment: untreated

External surface
Topography: flat
Surface treatment: treated

Internal Scores:
Shape: groove **Texture**: coarse
Size: **length:** **width**: 0,7
Incidence: high **Asperity**: blunt
Section typology: Ua **Inclination**: perpendicular
Direction: unidirectional **Arrangement**: parallel
Edge: **Extremity typology**:
Secondary signs: no **Distribution**:
Scoring interpretation: soft tool grooved

Use-wear analysis:

Ceramic Surface:
Internal: rips
External: sooting
Mineral Inclusions Surface:
Internal:
External:
Function interpretation: baking basic bread

Post depositional traces:

Residues:

Final interpretation:

The fragment MT 165 belonged to the walls of a medium-size bowl?, made of a plan-tempered coarse clay. The external surface was treated (figs. 4, 5).
The inner surface was hastily tool grooved when the clay was fresh (fig. 2, 3).
The pan was used to bake basic bread: both basic (figs. 1-5).

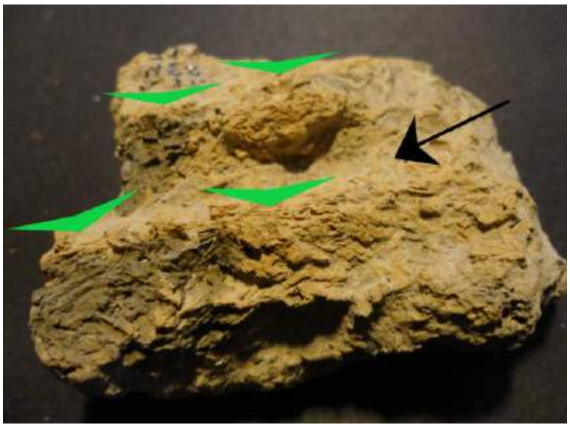


Fig. 1 Internal surface

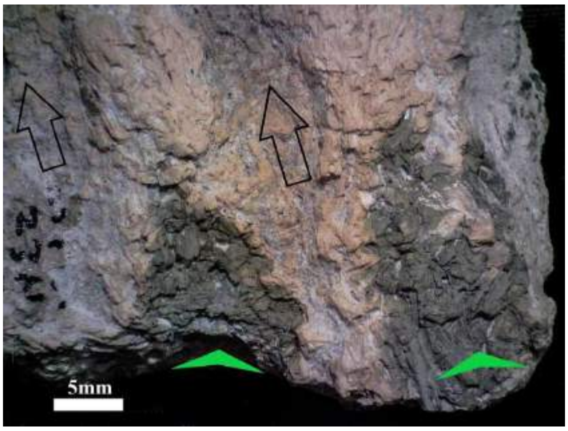


Fig. 2 Internal surface, grooves

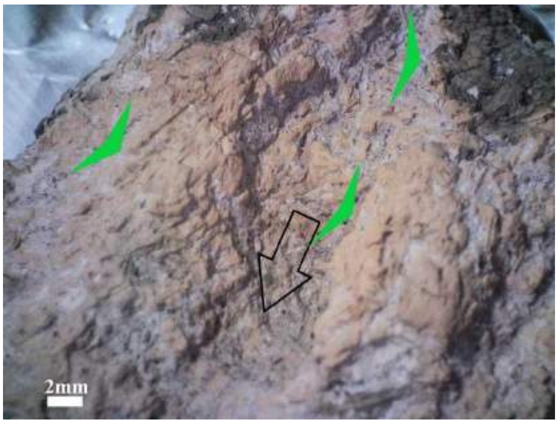


Fig. 3 Internal surface

Fig. 4 External surface

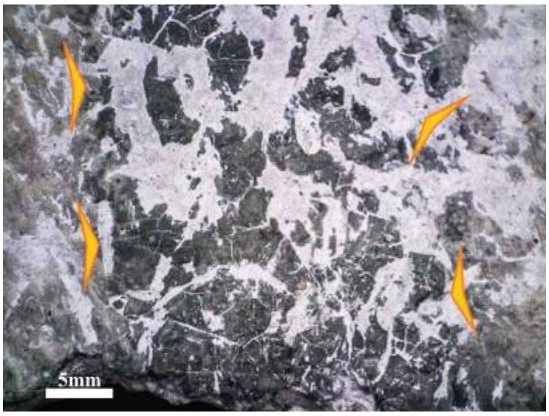
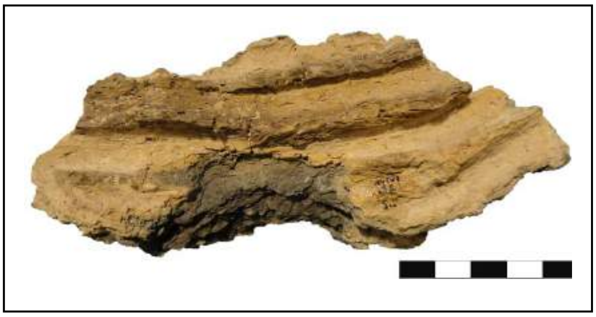


Fig. 5 External surface

Fragment number: MT'0018E5 (MT 167)
Site: Mezraa Teleilat
Level: IIB2
Period: ?
Grid: 3-10/f-k
Preservation Level: Excellent



General characteristics:

Paste: coarse clay
Temper: large amount of plant inclusions
Section: base with walls
Core: dark
Color s. internal: buff **External**: light orange
Hypothesized side: medium-size bowl

Technological traces analysis:

Internal surface
Topography: sinuous
Surface treatment: smoothed

External surface
Topography: irregular
Surface treatment: untreated

Internal Scores:
Shape: groove **Texture**: flat
Size: **length:** **width**: 0,8
Incidence: high **Asperity**: sharp
Section typology: Ub **Inclination**: perpendicular
Direction: **Arrangement**: parallel
Edge: net straight **Extremity typology**:
Secondary signs: **Distribution**:
Scoring interpretation: hard-tool grooved

Use-wear analysis:

Ceramic Surface:
Internal: crumbling, darkening, spots, rounding, waved edges
External: striations, scratches
Mineral Inclusions Surface:
Internal: rounding
External: striations
Function interpretation: baking fat bread

Post depositional traces: spots

Residues:

Final interpretation:
The fragment MT 167 belonged to the base of a bowl, made of a plan-tempered coarse clay.
The inner surface was hard-tool grooved and finished(figs. 1-3).
The bowl was used to bake fat bread (fig. 2-5).
The bowl was dragged during its use (fig. 6).

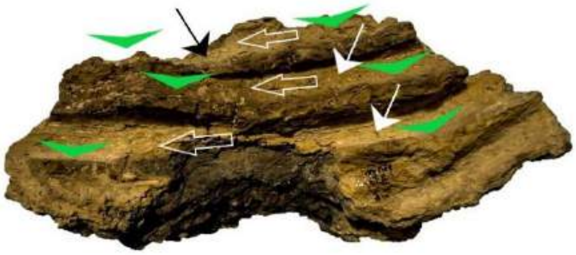


Fig. 1 Internal surface

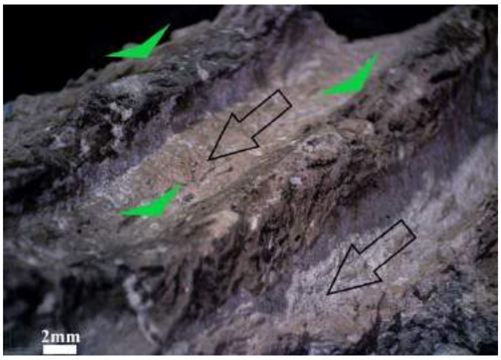


Fig. 2 Internal surface, grooves

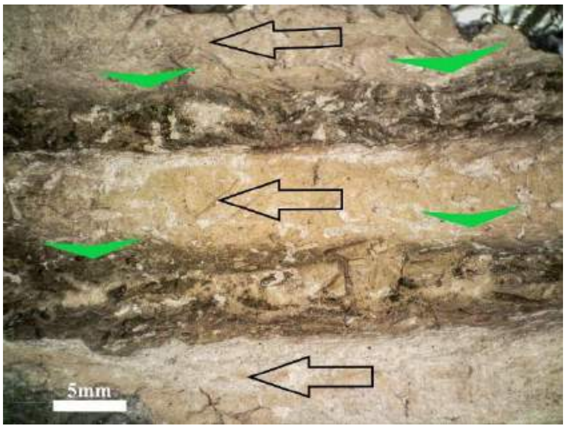


Fig. 3 Internal surface, grooves

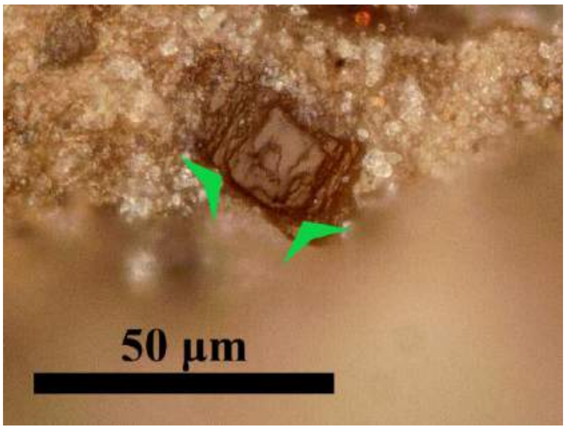


Fig. 4 Internal surface, mineral inclusion

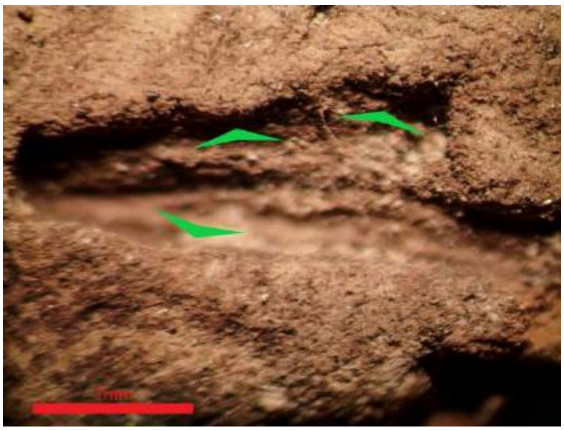


Fig. 5 Internal surface

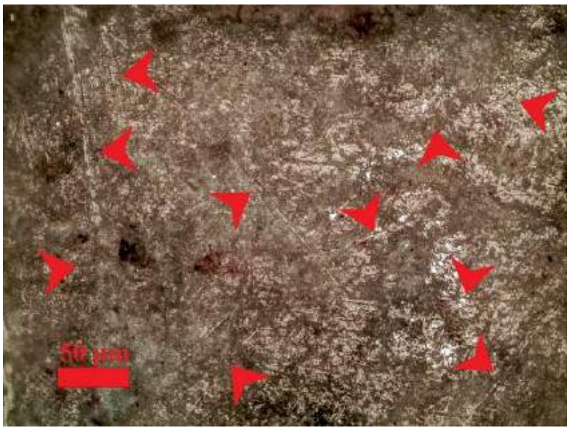


Fig. 6 External surface

APPENDIX II

First phytolith results from ceramic trays from the Near East

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1. Introduction

This report presents first results from phytolith analyses from a selection of ceramic trays from a varied range of settlement sites across northern Syria and southeastern Anatolia. The so-called 'husking tray' is attested during the 7th and the first half of the 6th millennium BC in the Near East. The ceramic materials included in this study come from Late Neolithic occupations at Tell Sabi Abyad (SAB), Mezraa Teleilat (MT), Akarçay Tepe (AKA), Tell Kurdo (TK), Tell Haneke (HAN), Tell Kashkashok (KAK), and Tell Khazna (KHA). Archaeological excavations at most of the sites have provided diverse ceramic material including storage vessels in addition to 'husking trays', as well as a wide range of plant remains found in food-processing and storage areas, including pit fillings and firing installations. These include the charred remains of domestic cereals such as two- and six-row barley (*Hordeum vulgare*), emmer wheat (*Triticum dicoccum*), einkorn (*T. monococcum*), and free-threshing wheat (*T. aestivum/durum*), along with other staple crops other than cereals such as legumes and flax which are common in the Late Neolithic archaeobotanical records in these and other sites in the study region (e.g. Van Zeist and Bakker-Heeres, 1982; Van Zeist and Waterbolk-Van Rooijen, 1996; Whitcher et al., 2009; Cappers, 2014).

Cereal-based foods played a fundamental role in subsistence patterns and long-term cultural traditions across the Near East, including varied types of porridge-like and bread-like products, the latter based on flour preparation and baking, even before cereal domestication (e.g. González Carretero et al., 2017; Arranz-Otaegui et al., 2018). While flour production through grinding has been attested based on direct microfossil evidence such as phytoliths and starch grains from ground stone tools (e.g. Piperno et al. 2004; Portillo et al., 2009, 2013), the functionality and the significance of the so-called 'husking trays' developed by Neolithic communities living in Northern Mesopotamia have been long controversial issues that require further evidence (Taranto 2018, 2020, and references therein).

In the current study phyolith analyses were conducted from a selection of archaeological ceramic trays in an effort to gain a better understanding of their functionality, and whether they may be linked to cereal processing activities and the nature of the processed material. Comparisons between the examined phytolith archaeological assemblages and the records obtained through experimentally processing of hulled cereals including hulled wheat (*Triticum dicoccum* and *T. monococcum*) and barley (*Hordeum vulgare*) dehusking and grinding into flour (Portillo et al., 2013, 2007), are further discussed.

2. Materials and methods

A total number of fifty-two sediment samples from twenty-four archaeological ceramic tray fragments were selected for phytolith analyses. Phytolith samples were obtained from washing by brushing with distilled water the inner surfaces of the ceramic trays. Additional sediment samples were collected from dry brushing from the back of the trays, and served for comparison as reference or controls, coded as C samples.

The methods used are similar to those developed by Katz et al. (2010). A weighed aliquot of *ca*. 20 mg of dried sediment was treated with 50 µl of a volume solution of 6N HCl. The mineral components of the samples were separated according to their densities in order to concentrate the phytoliths using 450 µl 2.4 g/ml sodium polytungstate solution [$Na_6(H_2W_{12}O_{40})\cdot H_2O$]. Microscope slides were mounted with 50 µl of material. A minimum of 200 phytoliths with recognizable morphologies were examined whenever possible at 200× and 400× using an Olympus Bx43 optical microscope. The estimated phytolith numbers per gram of sediment are related to the initial sample weight and allow quantitative comparisons between the samples. Phytoliths that were unidentifiable because of dissolution are listed as weathered morphotypes (WM). Multicellular structures (multi-celled or interconnected phytoliths, MC) were also recorded. The index of both weathering and the occurrence of multi-celled phytoliths may provide insights regarding the extent of silification of plant cells, as well as of general preservation conditions, although these may be dependent on a varied range of depositional and post-depositional processes (Jenkins, 2009; Shillito 2011; Cabanes et al., 2011; Cabanes and Shahack-Gross, 2015; Portillo et al., 2017). Morphological identification was based on modern plant reference collections (Albert and Weiner, 2001; Tsartsidou et al., 2007; Albert et al., 2008, 2016; Portillo et al., 2014) and standard literature (Brown 1984; Rosen, 1992; Twiss 1992; Mulholland and Rapp 1992; Piperno, 2006). The terms used follow the International Code for Phytolith Nomenclature 2.0 where appropriate (Neumann et al., 2019).

3. Results and interpretation

Phytoliths were observed in different amounts in all the samples analyzed. In general, phytolith concentrations from the inner surfaces of the ceramic trays were larger in most of the samples in comparison to the controls from the back of the trays. Indications of partial dissolution of phytoliths were noted in all samples by the presence of surface pitting and etching, and those that were not possible to identify morphologically because of their bad state of preservation were reported as weathered morphotypes. In general, the low proportions of weathered phytoliths affected by dissolution, together with the presence of multicellular phytoliths (anatomically connected) in most of the samples, often good indicators of cereals down to genus level, points towards good preservation conditions of the phytolith records.

The results obtained from this pilot phytolith study have been analyzed separately according to the different archaeological sites, described below.

3.1. Tell Sabi Abyad

Fourteen sediment samples from seven ceramic trays from Tell Sabi Abyad (SAB) were extracted for phytolith analyses (samples SAB-1 to SAB-14, Table 1). Most of the materials correspond to ceramic tray fragments found in pit fillings and firing installations (hearths) from open areas spanning from the end of the Pre-Halaf, transitional and the Early Halaf periods from operations I and II, located on the eastern side of the site.

The amount of phytoliths varied considerably among the samples (ranging between 0.2 and 3 million per 1 g of sediment, Table 1). Phytoliths were noted both in the inner surfaces and the control sediments from the back, although the inner samples showed the largest concentrations in all the examined trays. In general, the dissolution index of phytoliths (weathered phytoliths, up to 12.5%, Table 1) does not correlate with their concentrations in the samples, and the assemblages do not seem to be highly affected by post-depositional processes. Further, all samples yielded multicellular or anatomically or connected phytoliths with the only exception of the control sample SAB-12 (tray coded as SAB88,Q14), where multicelled morphologies were absent.

Sample n.	**Item n.**	**Sample type**	**Phytoliths 1 g of sediment (million)**	**Weathered phytoliths (WM, %)**	**Multicelled phytoliths (MC, %)**	**Grass phytoliths (%)**	**Infloresce nce phytoliths (%)**
SAB-1	SAB125	I	2.8	6.2	19.5	89.7	35.6
SAB-2		C	0.85	10.5	25.9	79.2	22.5
SAB-3	SAB88,S12 ,120-5	I	3.03	10.4	29.8	87.3	31.5
SAB-4		C	0.51	10.4	23.1	80.1	30.4
SAB-5	SAB88,Q1 4,50-24	I	0.92	3.5	2.7	92.7	29.6
SAB-6		C	0.32	12.5	3.6	78.9	38.5
SAB-7	SAB126, P15,35-105	I	2.91	6.1	19.1	89.4	51.6
SAB-8		C	0.92	5	11.9	91.7	57.5
SAB-9	SAB184	I	0.93	5.2	9.3	90.9	36.2
SAB-10		C	0.71	4.1	7.6	91	44.8
SAB-11	SAB88,Q1 4	I	0.71	8.1	2.7	87.8	30.8
SAB-12		C	0.23	5.3	0	82.1	32.1
SAB-13	SAB88,371	I	2.05	5.8	29.6	92.5	37.8
SAB-14		C	0.49	6.8	24	89.3	38.2

Table.1.Description of samples and main phytolith results obtained from ceramic trays from Tell Sabi Abyad (SAB). Sample type: I= inner surface, C= control sample.

The morphological results indicated that most of the phytoliths derived from monocotyledonous plants and particularly grasses (around 80-90% of all the counted morphotypes, Table 1). Most of the control samples showed lower grass phytolith proportions in comparison to their corresponding samples from the inner surfaces, with the only exception of samples SAB-8 (SAB126, P15,35-105) and SAB-10 (SAB184), although with similar percentages among these. Grass phytoliths were examined according to the different anatomical plant parts in which they were formed. Diagnostic morphotypes derived from the floral parts of these plants were noted in all the samples in variable proportions (between 22 and 57% of all grass phytoliths, Table 1). Inflorescent phytoliths were particularly abundant among the inner surface samples (over 30% of all grass phytoliths), although again control samples SAB-8 (SAB126, P15,35-105) and SAB-10 (SAB184) yielded the largest proportions (*ca*. 44-57%). Grass inflorescences were characterized mainly by decorated dendritic and dentate phytoliths in addition to epidermal cells such as hairs and *papillate* (Figure 1a). The presence of decorated cells in association to these epidermal appendages which are considered as delicate or fragile morphotypes highly susceptible to dissolution (Cabanes et al., 2011), also point towards general good preservation conditions. In addition, epidermal appendages produced by grass leaves and culms, such as bulliforms, acute bulbosus (trichomes), and stomata, were also common in all the samples in variable amounts (Figure 1b).

The most common morphotype identified in all samples were short cell phytoliths which are produced in leaves, stems and floral parts of grasses (up to 35% of the grass morphotypes, Figure 1c). According to the short cell morphologies, the subfamily Pooideae is by far the most represented in the assemblages, represented mainly by rondels and polylobates. Furthermore, panicoid grasses (bilobates and crosses) and chloridoids (saddles) were also noted although to a lesser extent (Figure 1d). These may have been brought to the site unintentionally alongside with the crops at the site and may relate to wild/weed grasses, although their presence in open settlement areas and particularly in association to food processing implements could be also related to matting and basketry, as well as to a varied range domestic items, such as sieves and brushes, and therefore linked to grain cleaning activities as well (e.g. Rosen, 2005; Portillo et al. 2014).

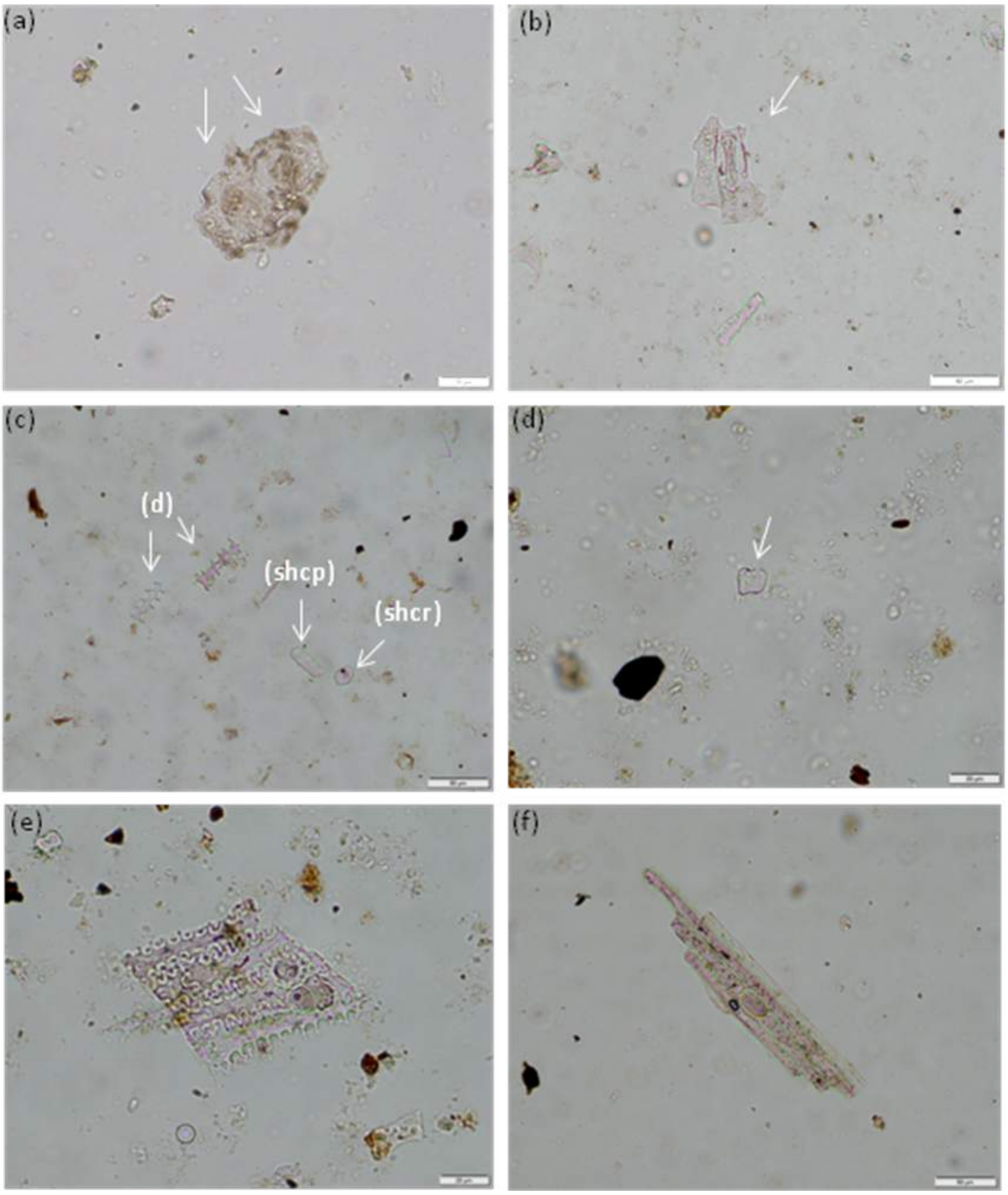

Figure 1. Tell Sabi Abyad (SAB). Photomicrographs of phytoliths identified in the samples (200× or 400×). a) *papillate* cells (sample SAB-4); b) stomata (SAB-2); c) dendriforms (d), short cell polylobate (shcp) and short cell rondel (shcr) (SAB-1); d) saddle (SAB-1); e) multicelled dendritics with rondels from the husk of wheat (*Triticum* sp.) (SAB-1); f) multicelled elongates with trichomes and rondels from grass leaves (SAB-3).

Of particular note is the presence of multicellular forms composed of dendriforms and rondels and/or *papillate* from the husks and culms of pooids, including wheat (*Triticum* sp.) and barley (*Hordeum* sp.), commonly found among the inner surfaces of the trays suggesting the processing of cereals. Wheat multicelled morphologies were noted in all the examined trays, with the exceptions of control samples SAB-5 (tray coded as SAB88Q14) and SAB-8 (SAB126, P15,35-105), and samples SAB-13 and SAB-14 (both from tray SAB88,371) which only yielded barley multicelled phytoliths (Figure 1e). These results are consistent with the Late Neolithic macrobotanical records at the site dominated by hulled (two-row) barley and emmer wheat (Van Zeist and Waterbolk-Van Rooijen, 1996; Akkermans, et al. 2006; Cappers, 2014).

Also of significance is the average number of individual phytolith mophotypes contained within multicellular structures derived from grass leaves and stems (*ca*. 10.8), whereas the average noted in multicelled forms from the floral parts of these plants was *ca*. 7 (Figures 1e-f). These averages are consistent with experimentally-produced hulled cereal dehusking, multiple sieving and processing for grinding into flour (Portillo et al., 2013, 2017). Reference experimental records obtained from the dehusking of hulled cereals (*Triticum monococcum* and *Hordeum vulgare*) show that the average number of individual phytolith mophotypes contained within multicells obtained from dehusking by-products, including light chaff, small glume fragments or bracts (lemma, palea), fragmented naked or hulled grains from cereals and weeds, is *ca*. 24-30, whereas in sieved flour (≤ 0.5 mm) reaches only *ca*. 5-6.5 (Table 3 in Portillo et al., 2013; Table 5 in Portillo et al., 2017). These experimental records demonstrate that the size of multicellular or anatomically connected phytoliths decreases as a result of mechanical degradation suffered through all processing stages. The size of multicelled forms from the inflorescences of wheat and barley recorded in this study points towards flour-based grinded products possibly linked to bread preparation, rather than the remains dehusking by-products and grain cleaning.

The current phytolith study from ceramic trays at Tell Sabi Abyad further points to cereal processing at the Late Neolithic settlement, suggesting the preparation and cooking within food-processing open areas of bread-like products made of the main cereals represented in the macrobotanical records, including hulled barley and emmer wheat (Van Zeist and Waterbolk-Van Rooijen, 1996; Akkermans, et al. 2006; Cappers, 2014).

3.2. Mezraa Teleilat

Phyolith analyses were conducted from a total number of twenty samples extracted from nine ceramic tray fragments from Mezraa Teleilat (samples MT-1 to MT-20, Table 2). The studied assemblages belong to the Late Neolithic-Hassuna impressed period, with the exception of fragment MT168 (samples MT-8 to MT-10), belonging to the Bronze Age occupation of the settlement.

Sample n.	Item n.	Sample type	Phytoliths 1 g of sediment (million)	Weathered phytoliths (WM, %)	Multicelled phytoliths (MC, %)	Grass phytoliths (%)	Inflorescence phytoliths (%)
MT-1	MT 40	I	14.8	5.7	2.8	89.4	26.2
MT-2		C	3.56	6.5	5.3	89.7	40.3
MT-3	MT 62	I	2.13	5.3	0.9	90.9	33.8
MT-4		I	3.65	15.7	3.7	81.6	30
MT-5		C	1.35	3	2.4	93.7	29.2
MT-6	MT 136	I	11.3	8.6	6.7	87.3	27.5
MT-7		C	1.84	12.1	11.2	84.8	36
MT-8	MT 168	I	2.72	14	2	79.2	35.4
MT-9		I	0.86	10.8	0	80	10.1
MT-10		C	3.18	3.6	13.1	93.8	46.3
MT-11	MT 28	I	3.02	8.2	13.1	89.2	31.3
MT-12		C	1.11	4.8	13.6	90	40.4
MT-13	MT 85	I	0.92	4.3	3.4	91.6	32.6
MT-14		C	1.03	2.7	6.6	93.5	32.9
MT-15	MT 166	I	1.01	9.9	4.9	86.3	34.3
MT-16		C	0.69	2.4	0	91.8	21.8
MT-17	MT 24	I	6.03	5.1	5.1	88.5	11.5
MT-18		C	2.79	2.9	4.6	92.2	29.6
MT-19	MT 110	I	2.11	4.2	5.6	92.1	37.1
MT-20		C	1.5	2.6	4.3	94.8	26.9

Table 2. Description of samples and main phytolith results obtained from ceramic trays from Mezraa Teleilat (MT). Sample type: I= inner surface, C= control sample.

Phytoliths were observed in different amounts in all the samples ranging between 0.6 and 14 million per 1 g of sediment (Table 2). The largest concentrations by far were noted among samples from the inner surfaces of the trays coded as MT40 and MT136 (over 10 million / 1 g of sediment, samples MT-1 and MT-6, respectively). Both the phytolith concentrations and the weathering index varied considerably among the samples (2- 15%, Table 2). The assemblages do not seem to be highly affected by chemical dissolution, and there is no a clear pattern on these microfossil abundances and phytoliths weathering between the inner samples and the control samples from the back of the trays. All samples yielded multicellular phytoliths with the only exception of the inner sample MT-9 (tray MT168) and the back sample MT-16 (MT166) where these were absent, and there do not seem to be a clear pattern between sample types (inner *vs* back) regarding the concentrations of multicelled morphologies either.

Grasses dominated the phytolith assemblages in all samples, with around 80% or more of all the counted morphotypes (Table 2). Diagnostic morphotypes derived from the floral parts of these plants were abundantly noted in most of the assemblages. The richest proportions of floral phytoliths by far were recorded in samples MT-2 (MT40), MT-10 (MT168) and MT-12 (MT28) (between 40-46% of all the counted grass morphotypes, Table 2). Grass inflorescences were represented mainly by decorated dentate (echinate) and dendritics in addition to epidermal cells such as hairs and *papillate* (Figure 2a). Further, epidermal appendages produced by grass leaves and culms, including stomata, acute bulbosus (trichomes), and bulliforms, were also common in all the samples in variable amounts (Figure 2b). Grasses mostly belonged to the Pooideae subfamily which are characterized by short cell rondels and polylobates and are common in well-watered environments (up to 50% of the total of grasses). In addition to rondels and polylobates (Pooideae subfamily), bilobates from the Panicoideae subfamily were also recorded in most of the samples, along with short cell towers which are commonly produced in the Hordeum genus (Portillo et al., 2014). Furthermore, multicellular phytoliths from the husks and culms of Pooids, including primarily barley (*Hordeum* sp.) and wheat (*Triticum* sp.) as well were also identified in most of the samples from both the inner and the back surfaces of trays. In particular, barley multicellular phytoliths were noted in trays MT62, MT85, and MT24, whereas mixed barley and wheat assemblages were recorded in trays MT136, MT168 and MT28, along with multicellular epidermal tissues from the leaves and stems of pooids.

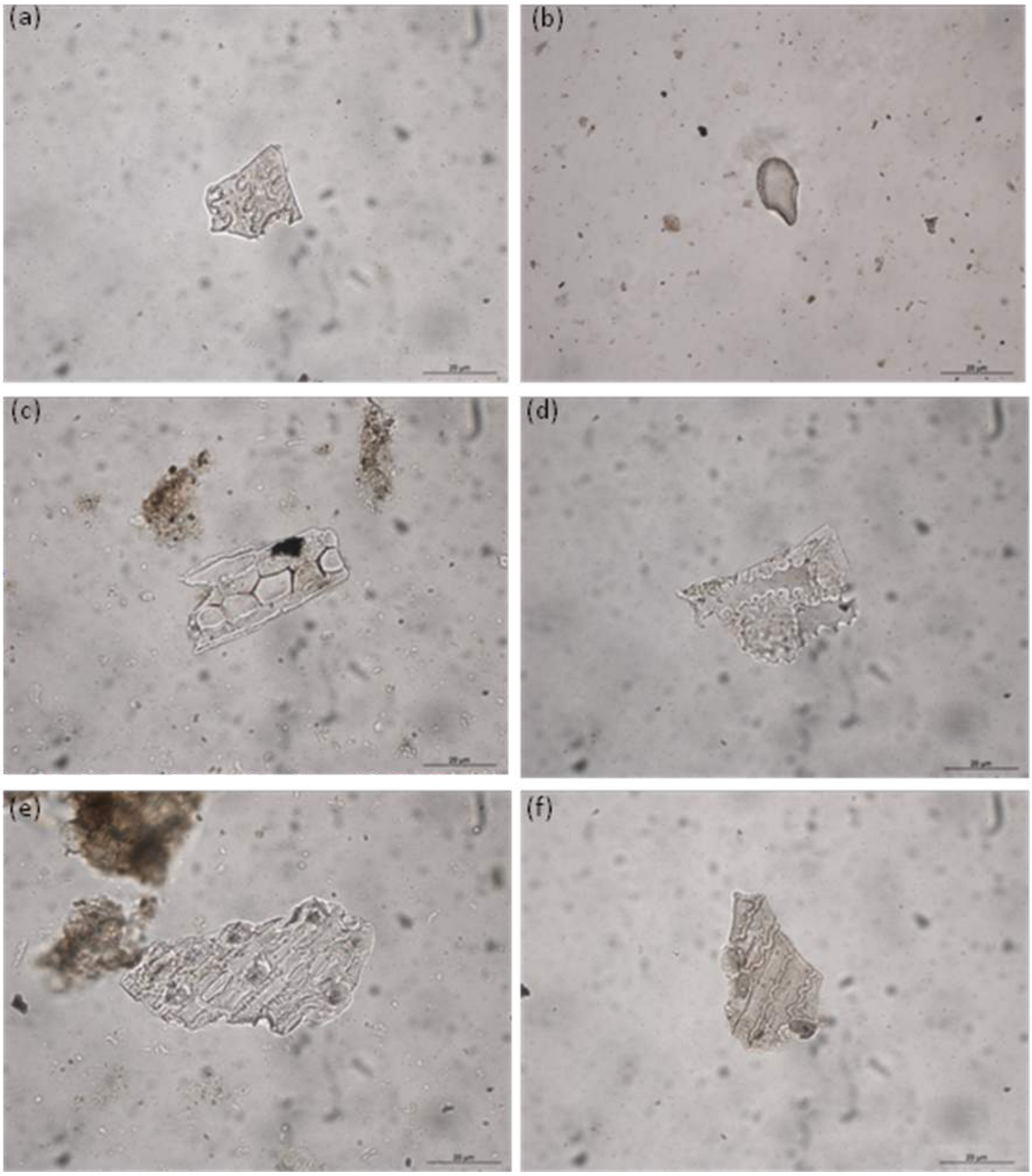

Figure 2. Mezraa Teleilat (MT), Akarçay Tepe (AKA) and Tell Kurdo (TK). Photomicrographs of phytoliths identified in the samples (200× or 400×). a) dendritics (sample MT-1); b) bulliform (MT-7); c) epidermal tissue from the leaves/stems of pooids (AKA-4); d) dendriforms and *papillate* from fragmented multicells, likely from the husk of wheat (*Triticum* sp.) (TK-5); e) multicelled dendritics with rondels and stomata (TK-1); f) multicelled dendritics with rondels (TK-5).

The average number of individual phytoliths noted within multicellular morphologies was only between 3 and 7 (Figure 2a), which are consistent with experimental flour-products obtained from the grinding of hulled cereals (Portillo et al., 2013, 2017). The size of multicelled phytoliths at Mezraa Teleilat further supports the presence of grinded flour-like products, rather than de-husking records derived from grain cleaning.

The current phytolith study indicates the processing of cereals, including both barley and wheat, in many of the examined trays, which are consistent in turn with use-wear observations pointing to patterns related to the detachment of plant foods such as bread-like materials according to experimental records (Taranto, pers.comm.), as well as with the above reported phytolith results from Tell Sabi Abyad.

3.3. Akarçay Tepe, Tell Kurdo, Tell Haneke, Tell Kashkashok and Tell Khazna

Four samples from two ceramic tray fragments from the Late Neolithic settlements of Akarçay Tepe (samples AKA-1 to AKA-4) and eight samples from three trays from Tell Kurdo (TK-1 to TK-8) were selected for phytolith analysis (Table 3). The Tell Kurdo examined materials belong to the Middle/Late Halaf occupations. Three additional tray fragments from a selection of Proto-Hasuna settlements located in the Upper Khabur region were also included in the analyses: Tell Haneke (samples HAN-1 and HAN-2), Tell Kashkashok (KAK-1 and KAK-2), and Tell Khazna (KHA-1 and KHA-2, Table 3).

Phytoliths were abundant in all samples, ranging from 0.6 to 8 million phytoliths per gram of sediment in Akarçay and Tell Kurdo samples, with comparatively larger amounts in Tell Haneke and Tell Kashkashok (between 1.2 and 11 million / 1 g of sediment, Table 3). Most of the control samples from the back of the trays showed lower phytolith concentrations in comparison with the inner surfaces, with the exceptions of Tell Kurdo control sample TK-3 (tray coded as TK7502EO) and both samples from tray AKA16 from Akarçay (samples AKA-1 and AKA-2), that yielded similar amounts (*ca*. 0.6 m / 1 g of sediment). The low proportions of weathered phytoliths affected by dissolution (between 1.2-14.1%), together with the presence of multicelled or anatomically connected phytoliths in all of the samples (5.3-24.8%), points to a general good state of preservation of the assemblages. This is especially true for Tell Kurdo samples, which displayed the largest proportions of multicellular phytoliths (up to 24.8%) along with relatively low weathering index (up to 7.9%, Table 3).

Site	Sample n.	Item n.	Sample type	Phytoliths 1 g of sediment (million)	Weathered phytoliths (WM, %)	Multicelled phytoliths (MC, %)	Grass phytoliths (%)	Inflorescence phytoliths (%)
AKA	AKA-1	AKA16	I	0.64	5.2	22.6	89.2	30
	AKA-2		C	0.65	14.1	5.9	81.9	30.2
	AKA-3	AKA17	I	3.18	5.4	8.3	90.8	40.9
	AKA-4		C	1.76	4.6	10.8	91.4	44.2
TK	TK-1	TK7502EO	I	3.13	5.3	24.8	92.2	53.8
	TK-2		I	1.03	4.8	18.1	92	45
	TK-3		**C**	3.38	5.3	21.5	91.1	42.2
	TK-4	TK8282E	I	4.96	5.3	16.5	91.3	34.6
	TK-5		I	6.78	1.2	12.6	96.9	43.5
	TK-6		C	2.82	7.9	13.6	88.1	41.3
	TK-7	TK6644B	I	8.38	3.8	13.3	91.8	30.1
	TK-8		C	3.89	3.1	11.4	93.8	29.3
HAN	HAN-1	HAN15	I	7.7	5	12.3	91.8	35.9
	HAN-2		C	1.21	3.2	16.4	92.9	30.2
KAK	KAK-1	KAK15	I	11.1	2.7	5.3	89.2	16.4
	KAK-2		C	1.42	5.4	10.4	90.8	24.3
KHA	KHA-1	KHA30	I	3.91	5.8	10.5	90.9	24.3
	KHA-2		C	2.82	1.6	6.5	91.3	35.3

Table 3. Description of samples and main phytolith results obtained from ceramic trays from Akarçay Tepe (AKA), Tell Kurdo (TK), Tell Haneke (HAN), Tell Kashkashok (KAK), and Tell Khazna (KHA). Sample type: I= inner surface, C= control sample.

Grasses dominated the phytolith assemblages in all the samples (*ca*. 82-94%, Table 3). Phytoliths derived from the inflorescences of grasses were observed in all the samples, although into variable concentrations. These were particularly rich in certain samples from both the inner surfaces and control sediments from the back from Akarçay (tray AKA17) and Tell Kurdo (trays TK7502EO and TK8282E) (*ca*. 40-54% of all the counted grass morphotypes, Table 3). In contrast, the lowest proportions were noted among the Tell Kashkashok samples (KAK-1 and KAK-2, tray KAK 15) and Tell Khazna (KHA-1, tray KHA30), with only around 16-24% of all the grass morphotypes. Inflorescences were characterized mainly by dendritics and dentate elongates, in addition to epidermal appendages including hairs and *papillate* (Figure 2d). In addition, epidermal appendages produced by grass leaves and culms, such as bulliforms and acute bulbosus (trichomes) were also common in all the samples in different amounts. Short cell morphologies from the Pooideae subfamily (rondels and polylobates) were dominant in all the samples (up to 56% of the total of grasses), and these were also common within multicellular assemblages (Figures 2e-f). Additionally, short cell bilobates from panicoid grasses were also recorded in samples from both the inner and the back surfaces from Akarçay (tray AKA17) and Tell Kurdo (trays TK7502EO and TK8282E, Table 3). The morphologies of the multicellular phytoliths noted both in inner and back surfaces of the trays derived mostly from the husks and culms of Pooids, including wheat (*Triticum* sp.) and barley (*Hordeum* sp.). *Triticum* assemblages were recorded in tray fragments from Akarçay (AKA17), Tell Kurdo (TK7502EO), and Tell Kashkashok (KAK15); *Hordeum* records were noted in Tell Kurdo (TK6644B), and Tell Khazna (KHA30); whereas a mixing of both wheat and barley were identified in Tell Kurdo (TK8282E), and Tell Haneke (HAN15), suggesting the processing of these cereals in most of the sites.

Overall, the few samples examined from each of these sites and their differences in composition of the multicellular assemblages limit what can be said of the cereal-based records from these ceramic materials, although pilot results from both Akarçay Tepe and Tell Kurdo trays suggest a similar pattern related to the processing into bread products.

4. Conclusions

The phytolith records from a selection of Near Eastern ceramic trays indicate the processing of cereals, which are consistent with the macrobotanical records for the Late Neolithic period dominated by hulled barley and wheat. Of particular significance is the size of cereal multicellular phytoliths from a selection of materials from Tell Sabi Abyad and Mezraa Teleilat, indicative of flour-based grinded products possibly linked to bread preparation, rather than the remains of dehusking by-products and grain cleaning. Pilot results from a selection of tray materials from Late Neolithic occupations at Akarçay Tepe and Tell Kurdo suggest a similar pattern related to the processing of cereals into bread-like products, although the size of these microbotanical datasets is still limited. Although reconstructing culinary practices related to cereals, breads or many other preparations based on the available archaeobotanical data is a complex task due to the difficulties involved in identifying the potential food remains and their ingredients in the archaeological record (e.g. González Carretero et al., 2017; Arranz-Otaegui et al., 2018; Fuller and González Carretero, 2018), direct microfossil evidence from phytoliths from selected ceramic trays from a number of sites across northern Syria and southeastern Anatolia, further supports the importance of bread products among Near Eastern Neolithic communities. Clearly, the development of implements such as ceramic 'husking trays' in association to firing installations within open activity areas, points to some degree of complexity in cereal-based Late Neolithic food systems and cultural traditions in which cereals and breads among other products played an important role.

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APPENDIX III

Preliminary organic residue analysis of two Husking Trays recovered at Akarçay Tepe

Adrià Breu

In order to evaluate the possible presence of surviving residues resulting from the presence of animal fat within husking trays, two samples AK16A and AK17A were extracted following the acidified methanol extraction in the ICTA-UAB laboratories.

Briefly, the extractions were performed on 1g of ground pottery spiked with 10µg of n-tetratriacontane. Four millilitres of methanol were added to the sample, and the mixture was ultrasonicated for 15 min and acidified with 0.8 ml of concentrated sulphuric acid. The mixture was heated at 70 °C for 4h, then left to cool at room temperature, extracted three times with n-hexane and neutralised with potassium carbonate. Copper turnings were added to the combined extracts to remove cyclic octaatomic sulphur and then dried. Finally, the samples were resuspended in hexane and transferred to GC vials, which had been spiked with 10µg of n-hexatriacontane as the internal standard. The samples were then analysed with a 7820A Agilent Gas Chromatograph (GC) fitted with a Flame Ionisation Detector (FID). The injection was done in splitless mode at a temperature of 300ºC and eluted trough an HP-1 capillary column (60 m length, 250 µm internal diameter, 0.25 µm film thickness) using hydrogen as the carrier gas. The oven temperature was initially set at 50ºC for 1 minute and then increased at 6ºC min^{-1} to 320ºC, where it stayed for 20 minutes.

Results:

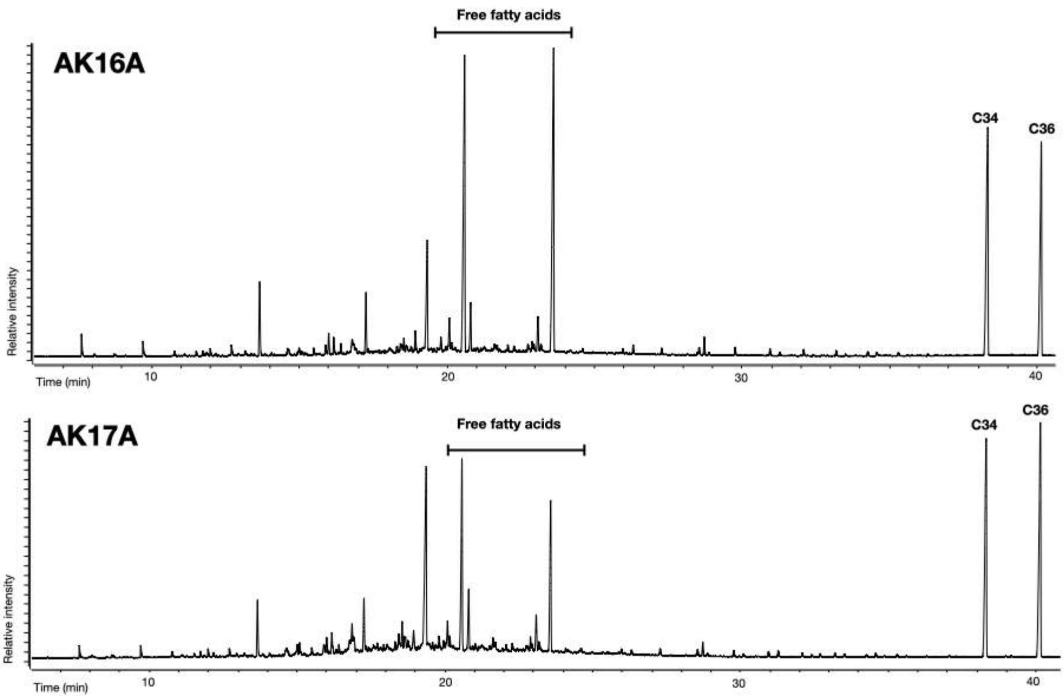

Figure 1: Chromatograms from samples AK16A and AK17A. C34: tetratriacontane (internal standard), C36: hexatriacontane (internal standard).

Both chromatograms from samples AK16A and AK17A presented peaks with retention times coherent with the presence of free fatty acids, palmitic and stearic acid being the most abundant. The significant quantity of stearic acid would not be compatible with an input from a plant oil. Alternatively, an animal origin is more likely. Further analyses will be needed to obtain more information from these residues.