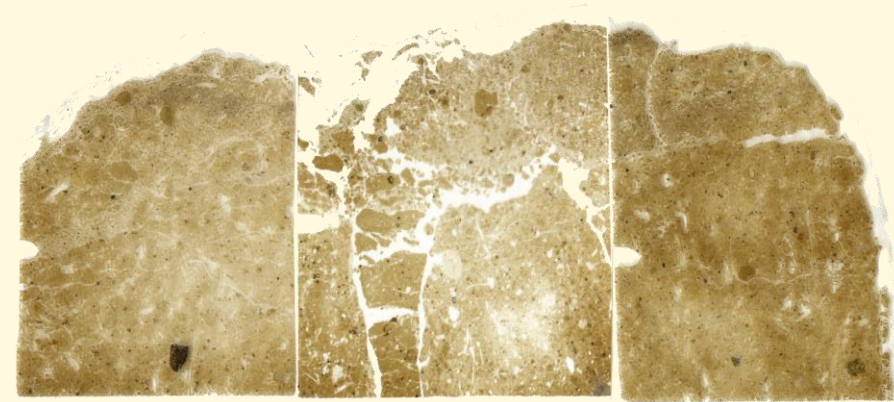


A MATTER OF SCALE!

FIELD OBSERVATIONS AND MICROMORPHOLOGICAL ANALYSIS ON EARTHEN MATERIALS AT MENTESH TEPE (AZERBAIJAN) IN THE NEOLITHIC PERIOD

EAA 2021 Kiel 7 - 11 september *Widening Horizons*,
Session 496: A World of Clay I: Widening Analytical Horizons

M. BELLAT ¹, E. BAUDOIN ², C. CAMMAS ^{3,4}



¹ Museum National d'Histoire Naturelle

² Université Toulouse Jean Jaurès – UMR 5608 TRACES

³ AgroParisTech – UMR 5140 ASM

⁴ Institut National de Recherches Archéologiques Préventives

The South Caucasus:
 a Late Neolithisation process ca. 6000 B.C.

ORIGIN OF SEDENTARY COMMUNITIES?

Local and autonomous origin ?



Originality of architectural techniques



Contribution of Mesopotamian communities



Exchange of know-how (herding/farming), materials or artifacts (ceramics)

A NEW WAY OF SEIZING EARTHEN ARCHITECTURE

Macroscopic



Structural, stratigraphy, layout, stigmata, “*chaîne opératoire*”

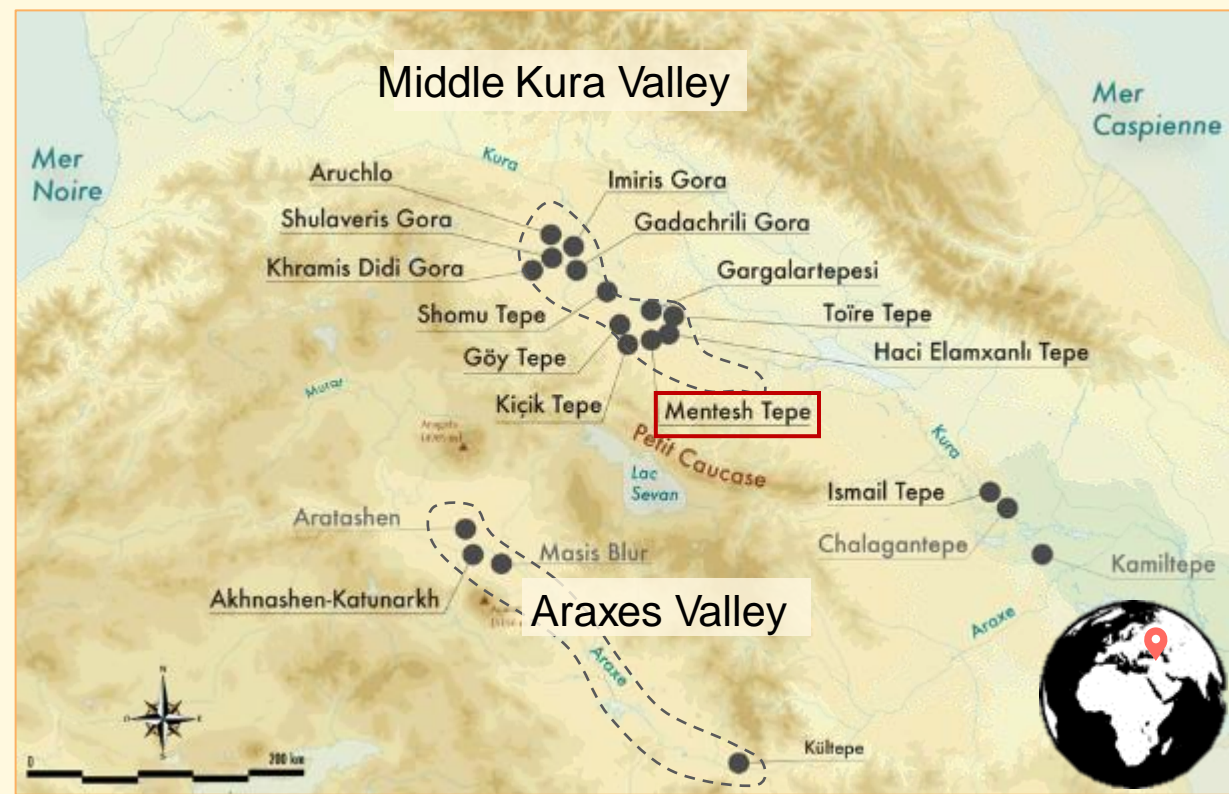


Microscopic



Composition, origin, preparation, layout

How can we characterize technical development and knowledge exchange during the Neolithic in the Southern Caucasus toward a cross macro / micro approach on earthen material ?



Main Neolithic sites in the South Caucasus (6000-5300 B.C.)

MATERIAL

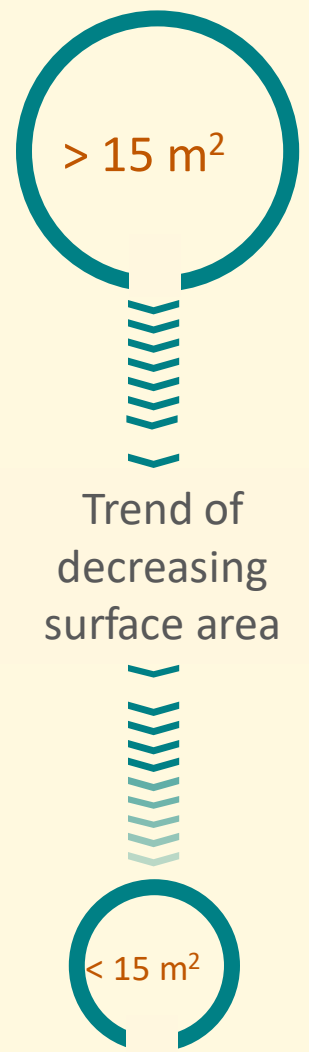
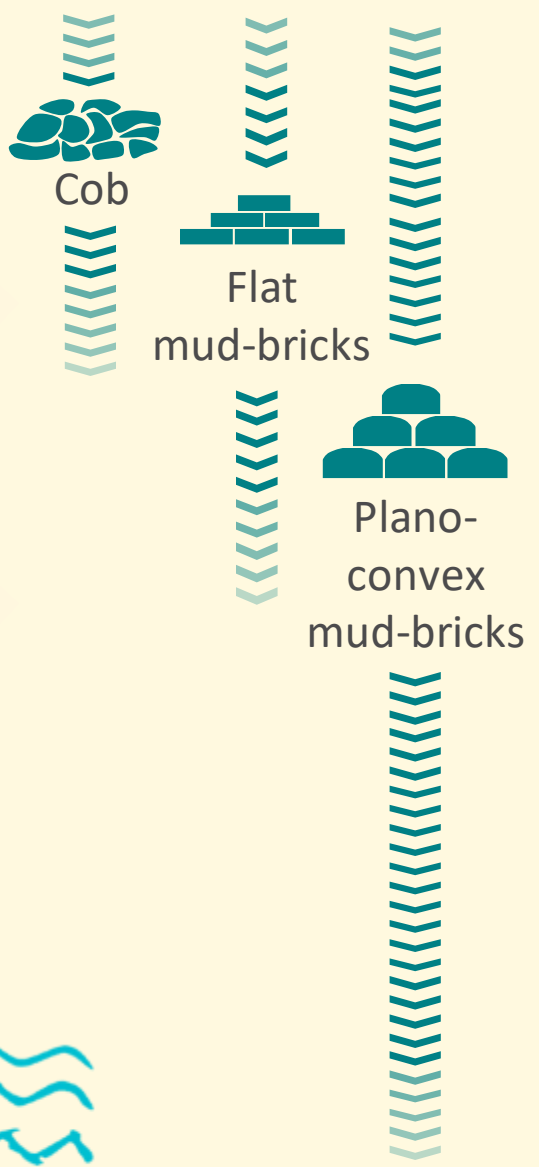
SURFACE AREA OF BUILDINGS

MICROMORPHOLOGY

“The study of undisturbed soils in thin blade under polarized microscope. This is completed by electric, microscopy observations and microanalysis” Fedoroff & Courty in Duchaufour 1994

- Recent development of earthen material study (Cammass 1993, Matthews 1997, Wattez 2003, Cammass and Wattez 2009, Friesem 2011)
- Few studies for the period and the area, first *corpus*

6000
5700
5500





Archaeological site

Macroscopic analyse
(colour, layout,
stigmata...)
Stratigraphy
Spatial organisation
(site)

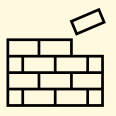


Wall 293 Mentesh Tepe

Sampling



Micro analysis

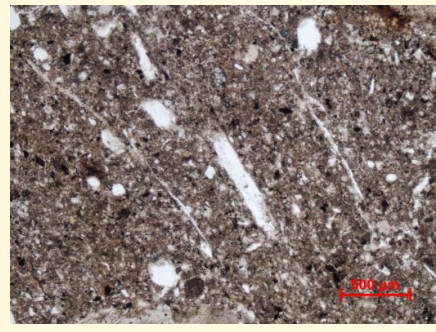


Macro analysis



Laboratory

Micromorphology analysis
(features)
"Second looks" (context,
stigmata, similar elements),
chaîne opératoire



Aligned void on microscope

Results



Reflexion

Collection comparison
Additional experience
Bibliography
Ethnoarchaeology
Experimental archaeology



Removal of the wooden frame – technique so-called « à coup d'eau » – Tibet (1938)

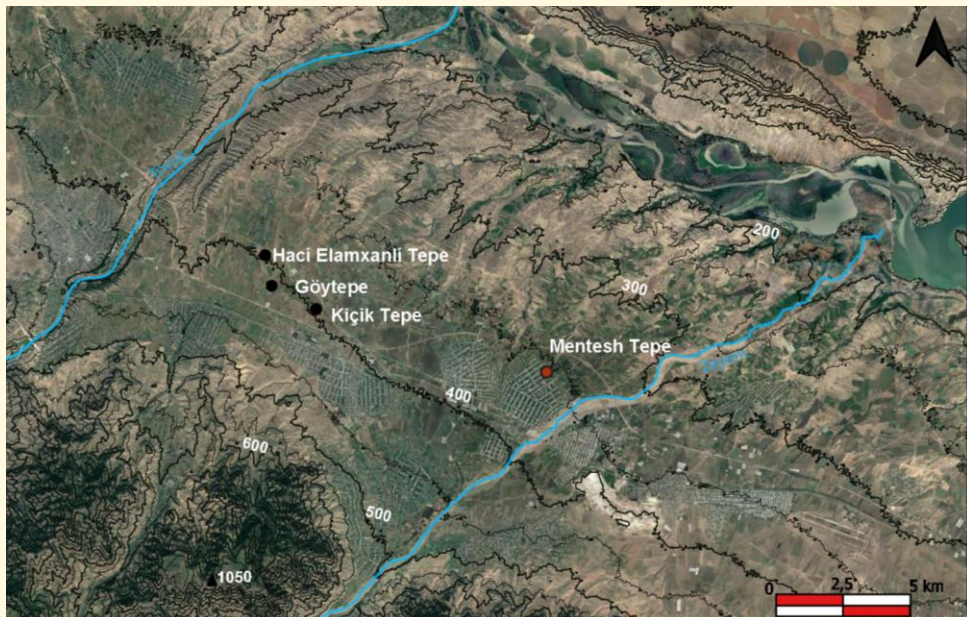
Discussion



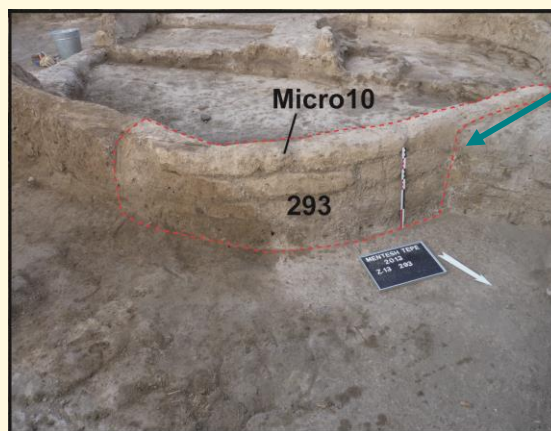
Cross analysis

Conclusion

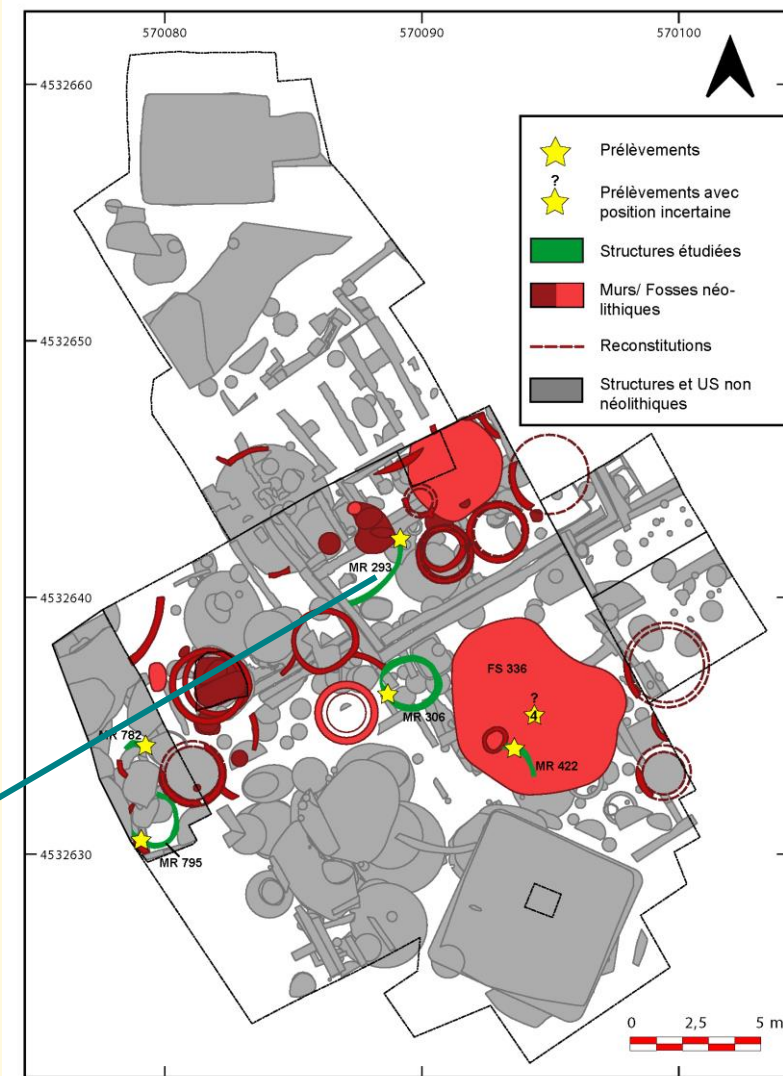
New reflexion on
technical transfer and
development
Regional corpus



- Middle Kura valley, alluvial deposit loamy-sandy, volcanic area, cambisols and calcisols
- Neolithic dates : 7 750 – 7 600 cal. B.P.
- 10 samples from 6 structures

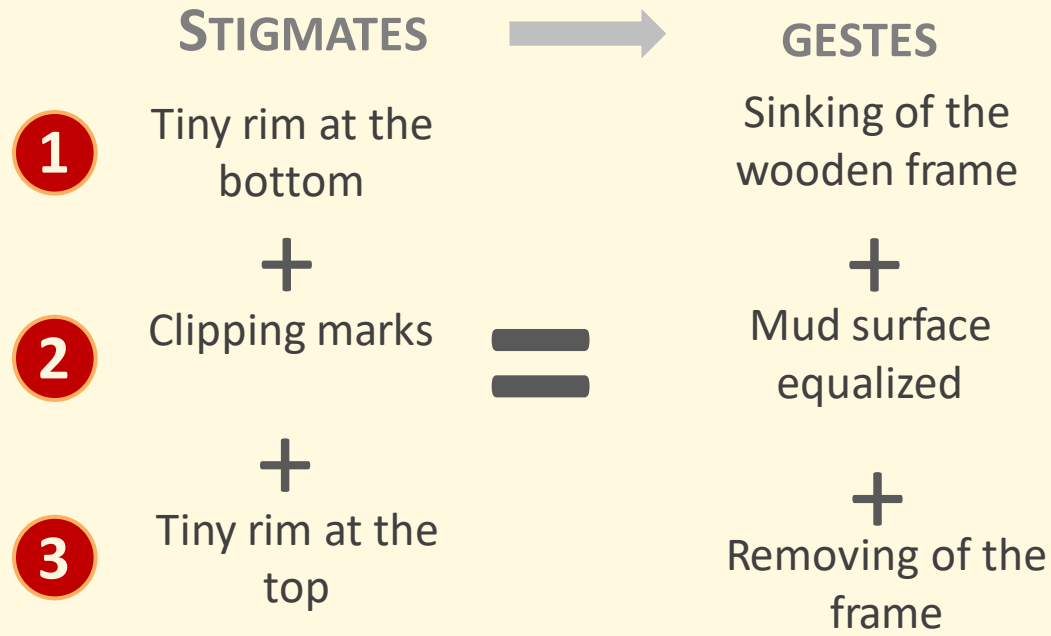


Wall 293 @Mission Boyuk Kesik



Mentesh Tepe Neolithic phase structures
Mathias Bellat, Emeline Degorre @Mission Boyuk Kesik

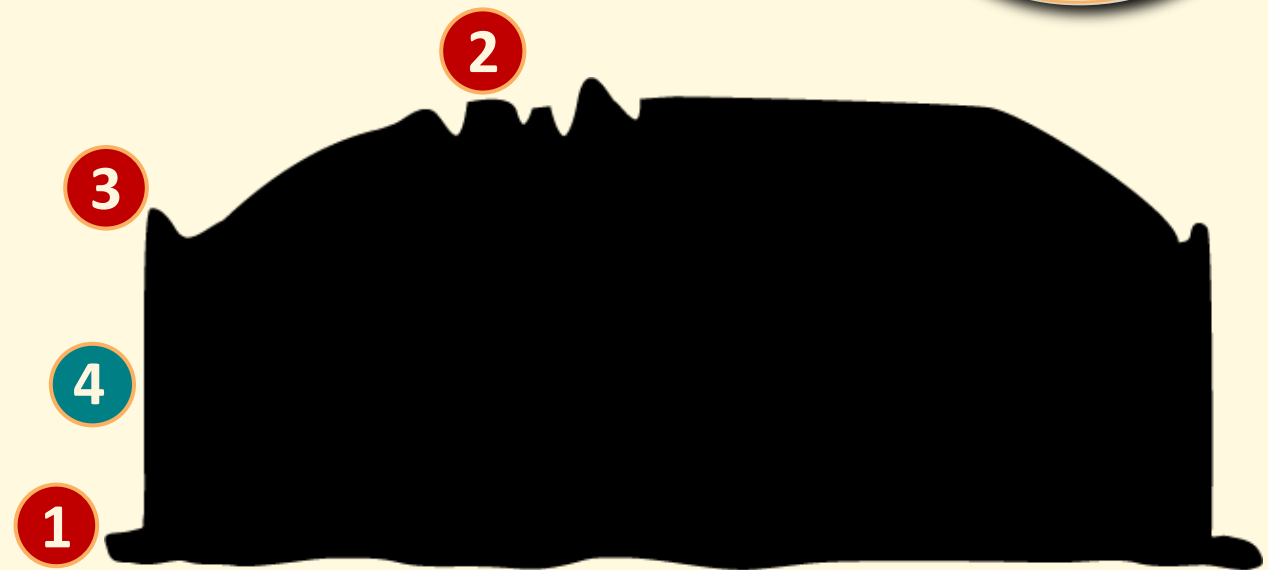
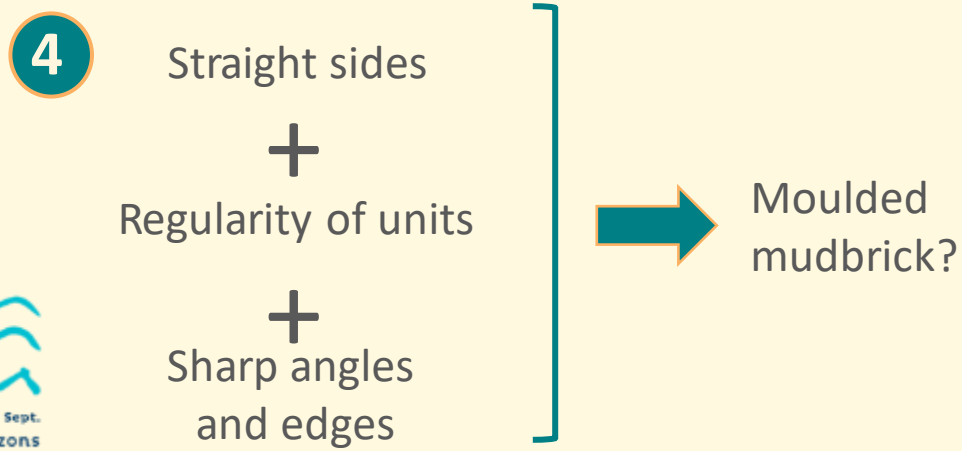
Primary requirements:



Technique:
so-called
« à moule enfoncé »?

Manufacturing process	Moulded mud brick		
	« à coup d'eau » (Doat et al. 1979 : 113-118)	« moule enfoncé » (Auzenche 1981 : 65)	« à coup de sable » (Doat et al. 1979 : 118)
Material selection	Mixture of earth and water + additional organic or mineral temper		
Texture of mud	soft mud	soft mud? = water used in abundance?	hard mud
Material preparation	Lump made by hand, leaved on an insulating layer (organic matters?) → heavy raising → fine prints on the bottom side → pressed in a mass brick mould → cracks → surface equalized and or with a tool → Scraping marks on the top of the mud brick removed from above → the top	Lump spread on an insulating layer (organic matters?) → heavy raising → Sinking mould in the lump → Tiny rim at the bottom → Mud surface equalized by hand or with a tool → Scraping marks on the top of the mud brick → Mould removed from above → Tiny rim at the top	Mud projected with a drilled bit previously wetted, sprinkled with sand, removable both → Point of drilled bit → Mud surface equalized by hand or with a tool → Straight cracks
Stages related to the manufacturing technique			
Drying			

Secondary requirements:



Theoretical profile of a moulded mud-brick according to the so-called « à moule enfoncé » technique

Aruchlo (Georgia), Moulded mud-brick fired accidentally.
After Ioseliani 2017



Tiny rim at the bottom

Sharp angles and edges

Straight sides



Kiçik Tepe (Azerb.), detail of a mud-brick wall
© Mission Boyuk Kesik



Tiny rim at the top

Clipping marks



Mentesh Tepe (Azerb.), Wall 293 *in situ*.
After Baudouin 2020

MAIN FEATURES



INTERPRETATION ON EARTHEN MATERIAL

- 1** Vegetal shape voids
- 2** Vesicles
- 3** Polyconcave voids, clay crust
- 4** Fine coarse well shorted
- 5** Residual aggregate
- 6** Striation, curvilinear reorganization (border)
- 7** Fissural void

Vegetal temper

Very wet state

Moist state

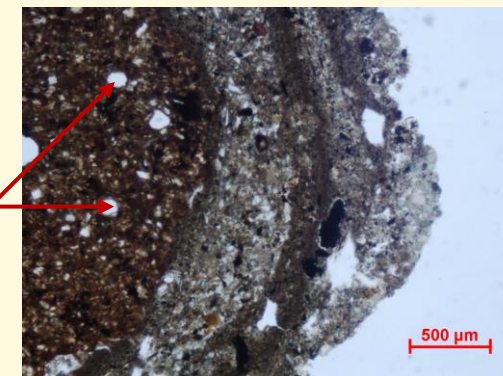
Well mixed material

Low mixed material

Moulded module

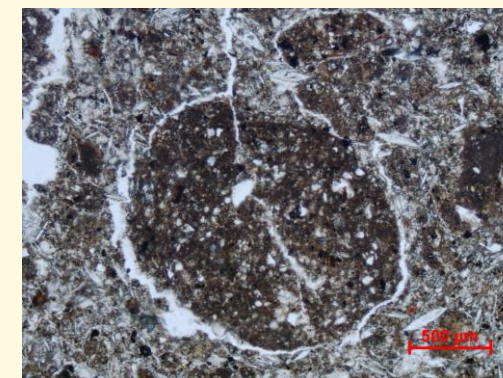
Humectation, dessication, compaction

2



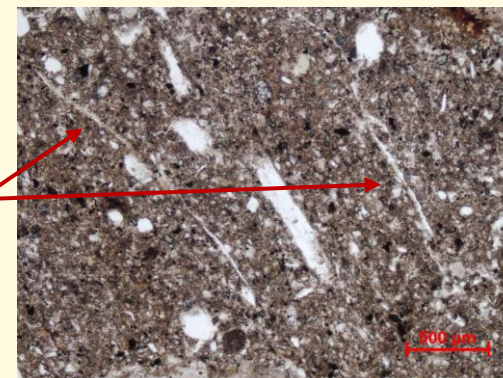
Pit 336

5



Wall 795

7



Wall 306

FEATURES

INTERPRETATION

Colour, well preserved vegetal fibers, iron oxyhydroxydes



Burnt material

+

Fine coarse well shorted, vesicles void, vegetal shaped void (C; D)



Wet state, well mixed, temper

+

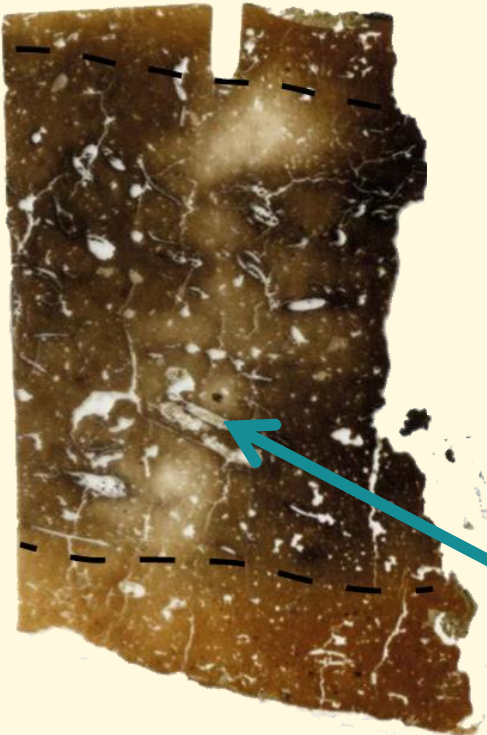
Packing, aligned parallel voids (from vegetal shape)



Compaction (moulded ?)

=

Moulded mud-brick, burnt, well prepared and mixed, muddy state, vegetal temper

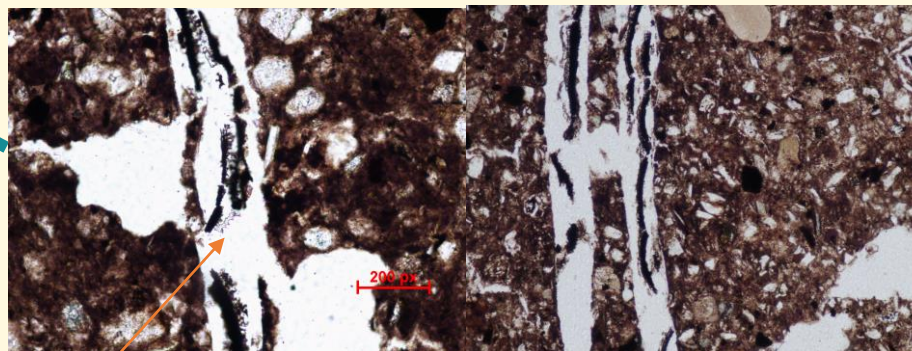


0 2 cm

F:

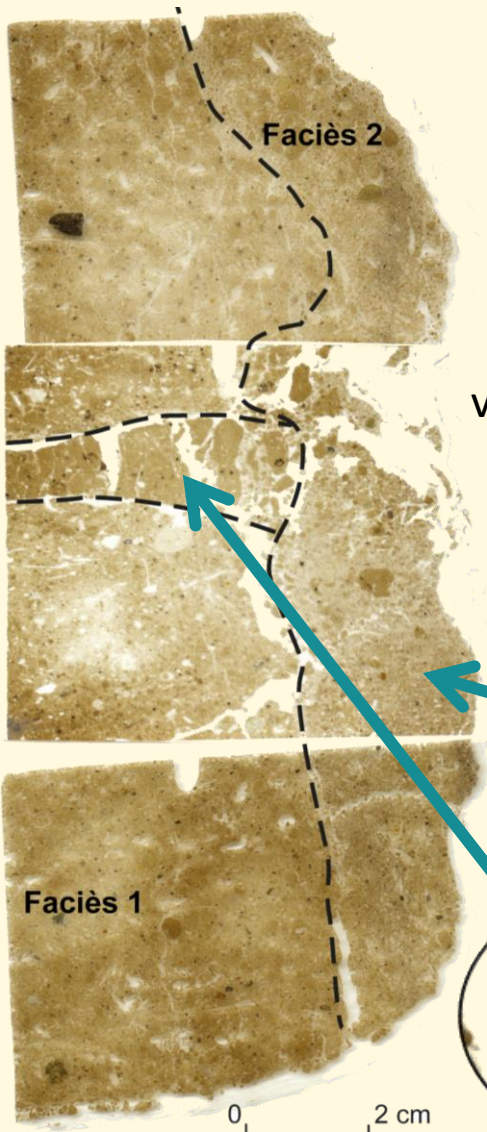
CONTEXT

Founded in a pit, plano-convex moulded mud-brick



Dendritic phytoliths

Burnt vegetal element and phytoliths (PPL)



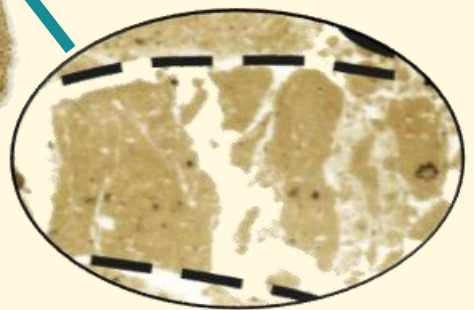
FEATURES

- Lenticular gypsum
- Vesicles, fissure void, no vegetal void, fine coarse well shorted
- Fine coarse well shorted, no void, calcitic material

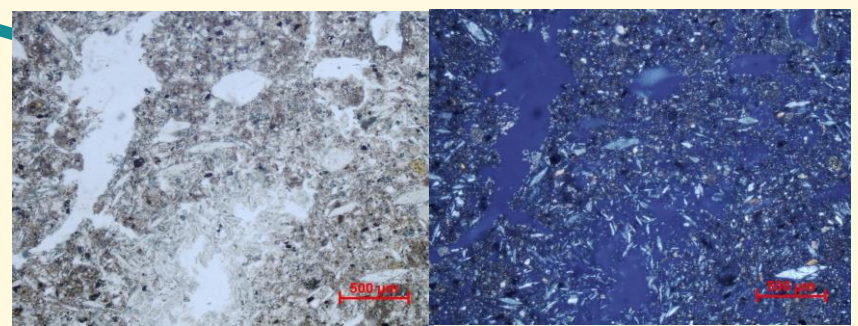
INTERPRETATION

- Gypsum material
- + Well prepared, mixed, moist, few temper
- + Very well prepared material (bond)

}]
 = **Gypsum material well prepared in a semi wet state with few temper, degraded, calcitic bonds**



Zoom on the calcitic bond



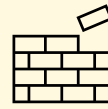
Lenticular gypsic precipitation (left : PPL, right : XPL)

CONTEXT

Very well preserved wall, mud-brick, hole around the building, extraordinary size, visible bonds with vegetal decreasing, rim, clipping marks

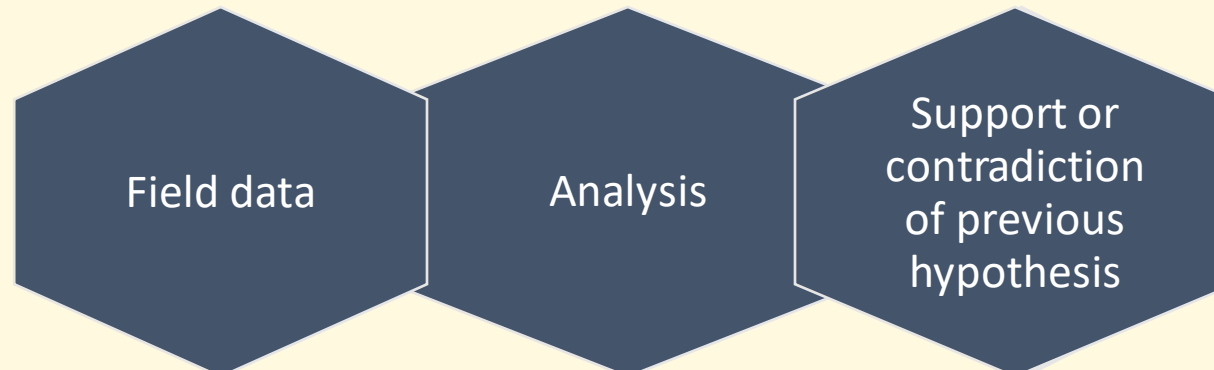
WHICH MATERIAL AT MENTESH TEPE NEOLITHIC?

- ❑ A distinction in the care taken for preparation (3 assemblies)
- ❑ Uses of local sediment only (expected wall 293)
- ❑ Three distinctive layout techniques (cob/moulded/shaped mud-brick)
- ❑ The existence of a moulded plano-convex mud-brick in the earliest occupation stages.
- ❑ Original building and mud-brick shape



Wall 293 and its structure @ Mission Boyuk Kesik.

CROSS ANALYSIS



WHAT TECHNICAL DEVELOPMENT FOR EARTHEN ARCHITECTURE DURING THE EARLY NEOLITHIC?

Near East influence

Distinctive buildings

Late cob development

Autonomous development

Early moulded mud-brick

Plano-convex shape


Absence of lime in the bond

WIDENING CAUCASUS EARTHEN ARCHITECTURE HORIZONS :

- Multiple site (6) and periods
- Inner structure sampling
- Near East comparison

Site were macro-study and samples has or will be done in the next two years. Two are not on the map *Qaraçinar* and *Uçan Ağıl*.



An aerial view of an archaeological excavation site. The site features several large, rectangular stone foundations and numerous circular pits of varying sizes, some of which appear to be storage pits or wells. The soil is light brown and shows clear signs of being dug up. In the background, there is a grassy area and a fence line.

Thank you for your attention !