

Pottery production in prehistoric cultures of Croatian and Austrian Danube regions

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Bilateral Croatian – Austrian Project:

Pottery production in prehistoric cultures of Croatian and Austrian Danube regions



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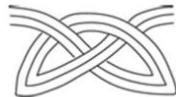
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Kudelić, A.



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Miloglav, I.



Goals:

to determine the availability and types of raw materials
and the reconstruction of technological processes at selected
archaeological sites

Purpose:

to determine to what extent Danube can be seen as a unique area
in prehistoric times

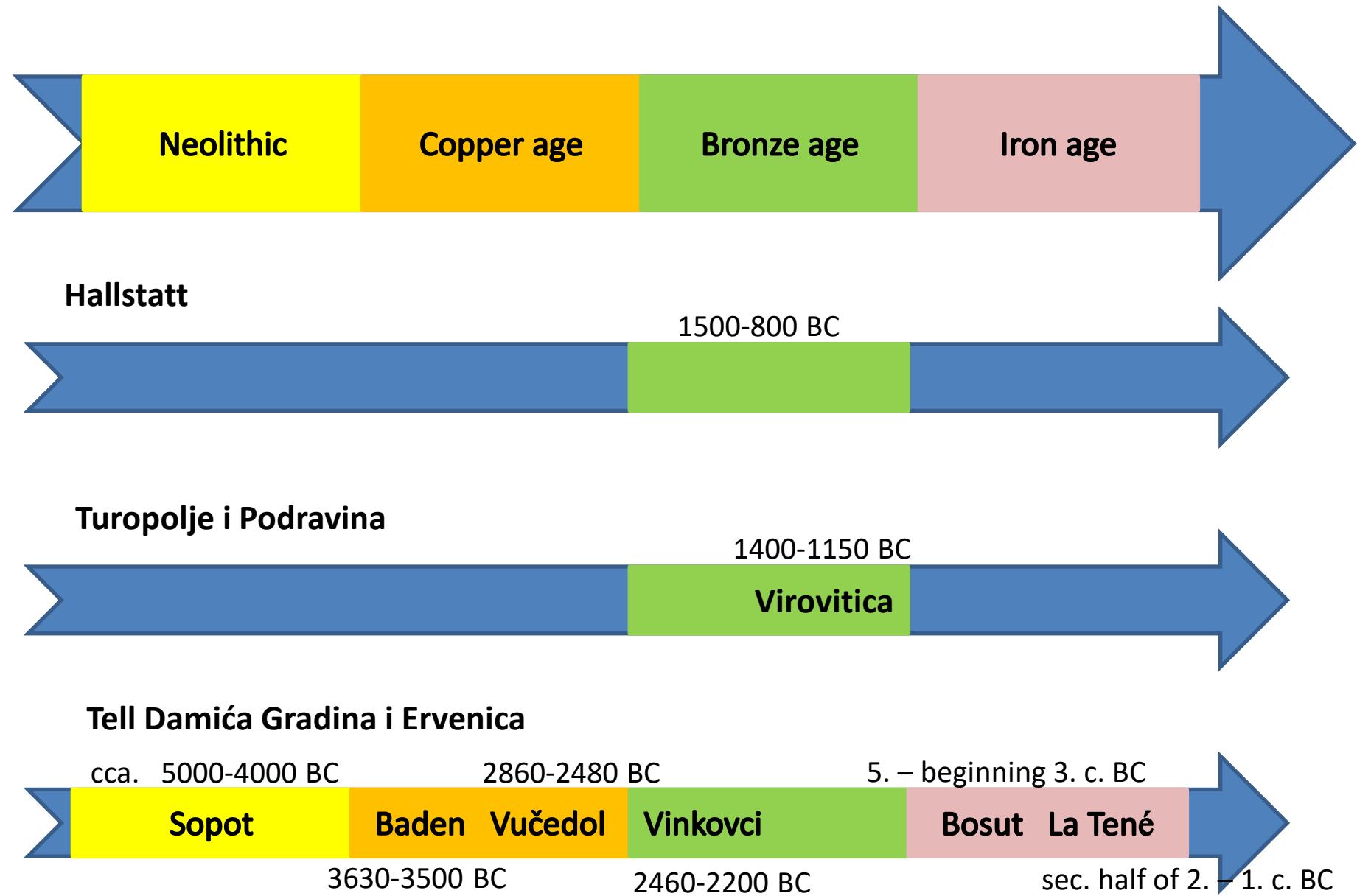
- (1) did the exchange of material goods included the exchange of technology (at the level of cultural horizon or at the level of smaller communities), or it is always related to the production center
- (2) to which extent technological processes were conditioned by landscape (availability of raw materials), economic or social factors (matter of choice).

Spatial context

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Temporal context



Steps in archaeoceramic investigations	Objectives
Typological classification and statistical analysis	<ul style="list-style-type: none"> • easier orientation during processing material and forming typology of the vessels
Chronological - typological analysis	<ul style="list-style-type: none"> • set ceramic material in the spatial and temporal context at the level of cultural groups
Macroscopic analysis of technology	<ul style="list-style-type: none"> • determine the composition and type of clay pastes and to determine pottery production techniques and methods of final processing vessels • determine firing methods
Archaeometry	<ul style="list-style-type: none"> • Determine composition of ceramics – firing method; raw material
Experimental archaeology	<ul style="list-style-type: none"> • experimental studies
Ethnoarchaeology	<ul style="list-style-type: none"> • ethnographic analogies

Types of analyses

Mineralogical analysis:

- . X-ray diffraction (XRD)
- . Fourier transform infrared spectroscopy (FTIR)

Petrographic analysis:

- . Thin section optical microscopy

Thermal analyses:

- . differential scanning calorimetry - DSC
- . thermogravimetry – TG

Grain size analysis:

- . wet sieving
- . sedimentation analysis (sedigraph)

Chemical analysis

- . Inductively coupled plasma mass spectroscopy (ICP-MS)
- . inductively coupled plasma optical emission spectrometry (ICP-OES)

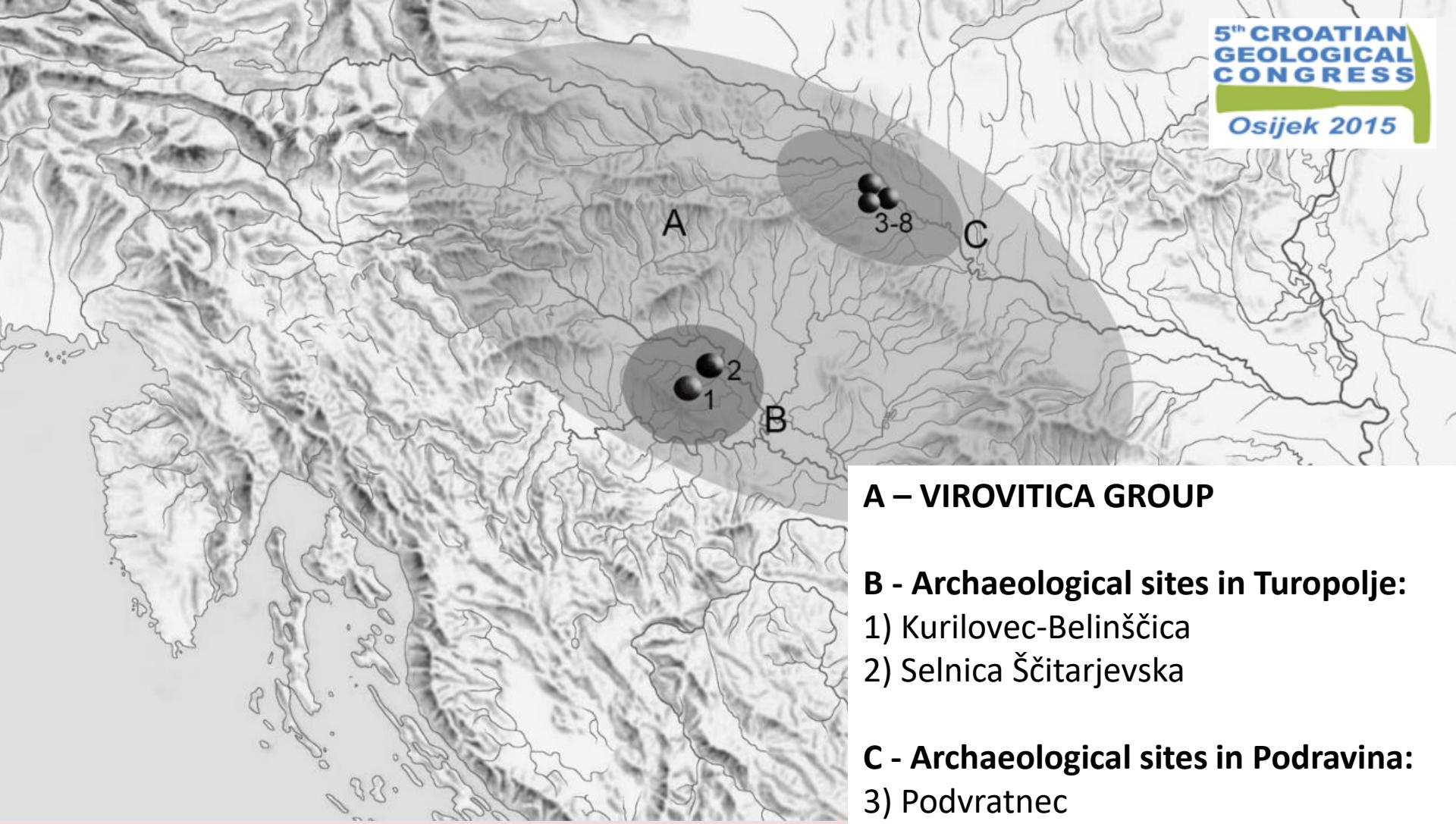


NEXT PRESENTATION!

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A – VIROVITICA GROUP

B - Archaeological sites in Turopolje:

- 1) Kurilovec-Belinščica
- 2) Selnica Ščitarjevska

C - Archaeological sites in Podravina:

- 3) Podvratnec
- 4) Vratnec
- 5) Podgorica
- 6) Podpanje
- 7) Močvar
- 8) Jablanec

Samples:

26 ceramic sherds

8 clayey material

21 experimental ceramics

PRELIMINARY CONCLUSIONS:

1) Raw material

- local material

2) Preparation of clay paste

- clays refined by decantation
- addition of temper material,
dominantly grog!

3) Shaping of vessels

- combination of coiling, slab building, pinching

4) Firing conditions

-temperatures: 600-850°C
- firing atmosphere: oxidisable to oxidisable/reducible

VISIT POSTER: P-43

Bronze Age pottery in NW Croatia – raw materials and technology

Brončanodobno lončarstvo u SZ Hrvatskoj – sirovine i tehnologija

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Osijek, CROATIA

INTRODUCTION

4 Bronze Age pottery technology in the area of Tropolje (Sava valley) and Podravina (Drava valley) in northwest Croatia has been studied. The main goal of this study is to determine the availability and types of raw materials, as well as reconstruct the technological processes: preparation of raw material and firing techniques of pottery making. The study was carried out on ceramic material, from the settlements remains on the sites Čukurovac-Bilješnica and Selca in Tropolje and Podravina, Vratče, Podgorica, Podgorje, Močvar and Žabnik in Podravina. For the purposes of this study, raw material was collected (potential raw material) from the vicinity of archaeological sites. The pottery found within the remains of Bronze Age settlements belongs to the cultural group Vinča, which dates to the period from the 15th to the 12th century BC.



MATERIALS AND METHODS

THE COURSE OF THE POTTERY ANALYSIS OPERATIONAL SEQUENCE

Type of analysis and approach	Objectives
Typological classification and statistical analysis	• determine orientation during processing material and forming technique of the vessels
Chronological-typological analysis	• set ceramic material in the spatial and chronological context at the level of cultural groups
Microscopic analysis of technologies	• determine the composition and type of raw material and determine pottery production techniques and methods of final processing (grogs)
Archaeometry	• determine composition and origin of the raw material and temper
Experimental archaeology	• experimental studies
Ethnoarchaeology	• ethnographic analogies

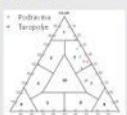


ARCHAEOOMETRY

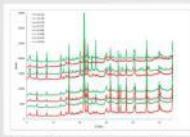
Type of analysis	Method
Mineralogical analysis	X-ray diffraction (XRD) Scanning electron microscopy (SEM)
Petrographic analysis	Thin section optical microscopy Infrared scanning calorimetry (ISC) Thermal analysis (TA) – TG
Grain size analysis	Wet sieving Underwater analysis (vadograph)
Chemical analysis	Inductively coupled plasma mass spectrometry (ICP-MS) Inductively coupled plasma optical emission spectrometry (ICP-OES)
Gold – results of the analysis presented in chapter	



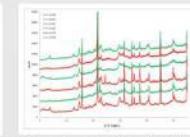
RESULTS



Samples of clay materials from the vicinity of the archaeological sites were collected. Comparison between the data obtained from the analyses of potential raw materials and those obtained from the analysis of the archaeological ceramics suggest that local clay material from Tropolje is likely to be of Albian origin. Clay material from Podravina is dominantly the clayey silt.



Diffractograms of clay material from Tropolje and Podravina



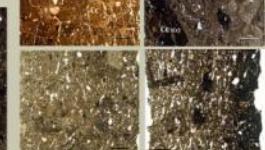
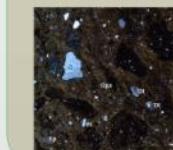
Diffractograms of ceramic material from Tropolje and Podravina



Composition of clay material



Temper added to clay paste



CONCLUSION



Samples:

36 ceramic sherds (each culture 6)

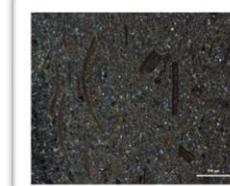
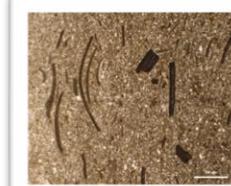
2 clayey material



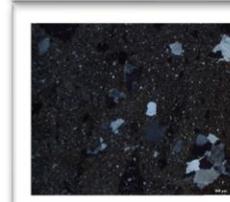
Sopot Baden Vučedol Vinkovci Bosut La Tené



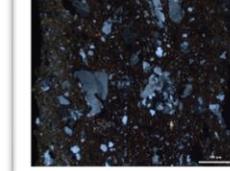
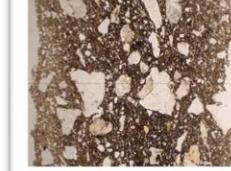
Gradski muzej Vinkovci



Gradski muzej Vinkovci



Gradski muzej Vinkovci



Muzej Slavonije
Osijek



Gradski muzej Vinkovci

PRELIMINARY CONCLUSIONS:

1) Raw material

- should be local material

2) Preparation of clay paste

- big difference between cultures

VISIT POSTER: P-42

Preliminary investigations of changes in pottery technology through prehistory on the tell site Damića gradina

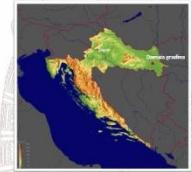
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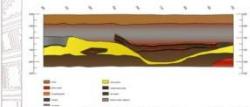
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Introduction

Archaeological site Damića gradina is situated in the centre of Stari Jankovci in eastern Croatia. Four archaeological excavations were conducted by Vinčevci Town Museum in 1980, when an elementary school was held on the site. This multi-layered tell site represents a very good example of continuous settlement on one place from the Neolithic to the beginning of the Roman period. It was occupied during Šopar, Baden, Vučedol, Vinčovci and Esatot cultures, and ends with fortified settlement in the last phase of the middle La Tène period (second half of the 1st century).



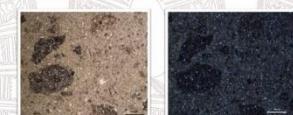
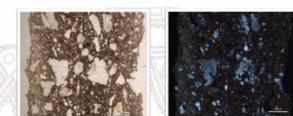
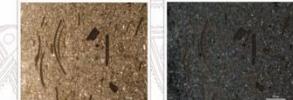
Aims and methods

Pottery, as other handmade artifacts, served as a social marker of time in the past – for behavior and activities, as well as the social, economic, and political context. The main goal of the study was reconstruction of technological processes of pottery production on tell site Damića gradina from different cultures who lived in the same place during c. 6000 years and who have used the same raw material. This type of analysis requires interdisciplinary approach and the cooperation of scientists from completely different areas, natural sciences (geology) and the humanities (archaeology).

Technology of pottery production is considered:

- (1) Technology of clay paste making (clay with different temper material)
- (2) modeling techniques
- (3) firing methods
- (4) styles of decoration

The purpose of investigation was to determine different cultural recipes and to define to which extent technological processes were conditioned by economic, social or traditional factors, i.e. to which extent they were matter of choice because the influence of the landscape (availability of raw materials) is reduced to the minimum.



Material and methods

The sherds for analysis are sampled from vessels of known type (pot, bowl, cup, jug), from different parts of the vessel (base, body, rim) and different surface treatment (polished and deep textured fragments).

Samples of possible raw material (clayey material) are collected at several locations in the proximity of the archaeological site. Detailed mineralogical (DRE - ceramic sherd and clayey material, petrographic (optical microscopy - ceramic sherd), grain size (wt sieving and sedimentation using sedigraph - clayey material) and chemical analyses (ceramic sherd and clayey material) were performed.



Preliminary results

Preliminary results suggest different recipes in pottery making which can be recognizable as potter's technological choice (a-f). Temper, or inclusions that have been artificially added to the clay, plays very important role in defining technological styles. Adding different kinds of temper with different size of particles may result in different thermal and physical properties of clay and fired pottery. Potter's technological choice of adding temper is also related to the historical periods of the analyzed vessel. The stone of certain periods was added to the clay as a temper to increase strength of the vessel and to reduce the risk of cracking due to temperature changes or high level of humidity.

Based on the analyzed data differences in clay matrix are very recognizable between some cultures: shell as temper was added only in Šopar (a) and La Tène culture (f) while in the pottery sherds from Vučedol period (Baden, Vučedol, Vinčovci and Esatot) and Early Iron Age (Esatot culture) no tempering was done. It can be seen that the texture of the pottery sherds from Vučedol culture is more uniform than the others. It can be seen that the texture of the pottery sherds from the Baden culture is more granular related to the function of the vessel. Grog has a lower thermal expansion coefficient than clay so it is usually added to the cooking pots to increase thermal stress resistance.

In the analyzed sherd grey is the most predominant quantity in the Vučedol culture (c). Adding different amounts of grog and different size of its particles in the pots showed certain differences in the clay mixture compared to bowls. Pots display a larger quantity of grog and its particles are larger than in bowls. This similarity suggests the utilization of grog as technological choice related to the function of the vessel as a receptacle for thermal processing of the food. Significant amount of larger quartz grains are characteristic of Vučedol (d) and Baden culture. Quartz sand is probably intentionally added to the claypaste.

Sampled clayey material never left consisting mainly of quartz, calcite, plagioclase, k-feldspar, lithic material, insectile, kaolinite and small amount of chlorite. Differences are also visible in firing conditions. While in Baden, we have reddish brown in the Copper and Bronze Age vessels are fired in reduction atmosphere. Styles and decoration decreased from each other regarding different cultural changes, trends and traditions.

OUTLOOK:

Tell Damića Gradina and tell Vinkovci (eastern Slavonia)

Span of cultures (from 7000 – 2000 years before present)

In addition to answering question „where?” and „how?” – test
the dating using rehydroxilation



THANK YOU FOR YOUR ATTENTION

