

Pottery production in prehistoric cultures of Croatian and Austrian Danube regions

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Conference presentation / Izlaganje na skupu

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Download date / Datum preuzimanja: **2024-05-09**



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Bilateral Croatian – Austrian Project:

Pottery production in prehistoric cultures of Croatian and Austrian Danube regions



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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

5th CROATIAN
GEOLOGICAL
CONGRESS

Osijek 2015



Arhiva Gradskog muzeja Vinkovci
voditeljica istraživanja: dr.sc. Ivana Iskra Janošić

About 1,000 miles (1,609 km) across

Temporal context

Neolithic

Copper age

Bronze age

Iron age

Hallstatt

1500-800 BC

Turopolje i Podravina

1400-1150 BC

Virovitica

Tell Damića Gradina i Ervenica

cca. 5000-4000 BC

2860-2480 BC

5. – beginning 3. c. BC

Sopot

Baden Vučedol

Vinkovci

Bosut La Tené

3630-3500 BC

2460-2200 BC

sec. half of 2. – 1. c. BC

Steps in archaeoceramic investigations	Objectives
Typological classification and statistical analysis	• easier orientation during processing material and forming typology of the vessels
Chronological - typological analysis	• set ceramic material in the spatial and temporal context at the level of cultural groups
Macroscopic analysis of technology	• determine the composition and type of clay pastes and to determine pottery production techniques and methods of final processing vessels • determine firing methods
Archaeometry	• Determine composition of ceramics – firing method; raw material
Experimental archaeology	• experimental studies
Ethnoarchaeology	• 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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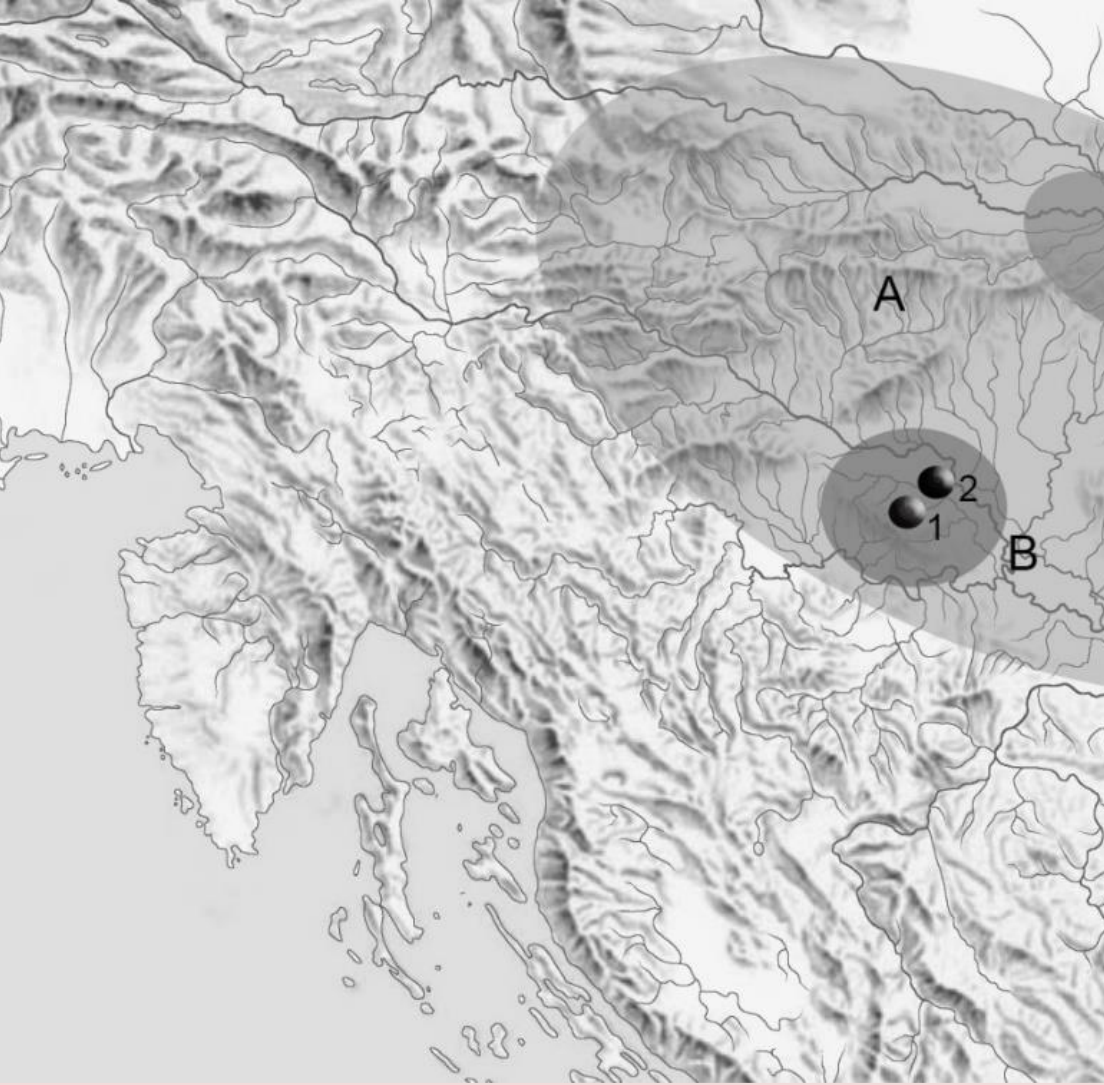
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Samples:
30 ceramic sherds
4 clayey sediments
4 experimental
ceramic

About 1,000 miles (1,609 km) across





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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5th CROATIAN GEOLOGICAL CONGRESS
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23-25. september 2015.
Osijek, CROATIA

INTRODUCTION

A Bronze Age pottery technology in the area of Turpolec (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 to 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: Kulovec-Belodolac and Saboca in Turpolec and Podravina, Vratiec, Podgorica, Podgorac, Močar and Jadrane in Podravina. For the purposes of this study clayey 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 Vinčica, which dates to the period from the 10th to the 12th century BC.



Microscopic image of clay material from the vicinity of archaeological sites. The image shows a granular texture with small inclusions, characteristic of the clay used in the pottery.



Podgorac, 2015. A shallow bowl-shaped pottery vessel.



Top: A small, simple wooden building. Bottom: A pottery workshop with various vessels and tools.

MATERIALS AND METHODS

THE COURSE OF THE POTTERY ANALYSIS OPERATIONAL SEQUENCE

Type of analysis and approach	Objectives
Typological classification and statistical analysis	• define correlations during processing material and forming topology of the vessels
Chronological - typological analysis	• set ceramic material in the spatial and temporal context at the level of cultural groups
Microscopic analysis of technology	• determine the composition and type of clay paste and determine pottery production techniques and methods of their processing
Archaeometry	• determine firing methods • determine composition and origin of the raw material and temper
Experimental archaeology	• experimental studies
Ethnoarchaeology	• ethnographic analogies



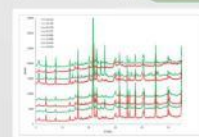
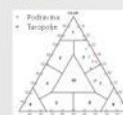
ARCHAEOOMETRY

Type of analysis
Mineralogical analysis: X-ray diffraction (XRD)
Elemental analysis and spectroscopy (EDS)
Petrographic analysis
Thin section optical microscopy
Thermal analysis: differential scanning calorimetry (DSC)
Thermogravimetry (TG)
Gravimetric analysis: weight analysis
Stability analysis (weathering)
Statistical analysis
Inductively coupled plasma atomic emission spectroscopy (ICP-AES)
Inductively coupled plasma optical emission spectroscopy (ICP-OES)



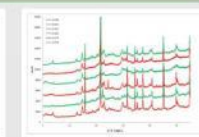
Photograph of a pottery workshop with various vessels and tools.

RESULTS



Composition of clay material from Turpolec and Podgorica.

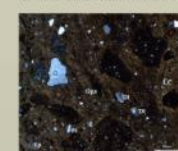
Samples of clay material from the vicinity of the archaeological sites were collected. Comparison between the data obtained from the analysis of potential raw materials and those obtained from the analysis of the archaeological remains suggests that local clay can be used for pottery making in the Vinčica group. It is determined that the local clay material from Turpolec is suitable for the production of archaeological clay. Clay material from Podravina is also suitable and clayey.



Composition of clay material from Turpolec and Podgorica.

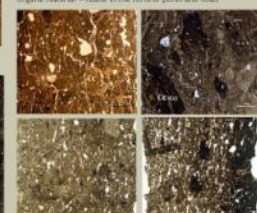
Composition of clay material

Chert
Quartz (Qz)
Feldspar (Fs)
Plagioclase (Pl)
Orthopyroxene (Opx)
Ullmannite (Ull)
Sillimanite (Sil)
Chert



Temper added to clay paste

Organic material – visible in the form of pores and voids



CONCLUSION

OPERATIONAL SEQUENCE OF POTTERY PRODUCTION



Samples:
36 ceramic sherds (each culture 6)
2 clayey material

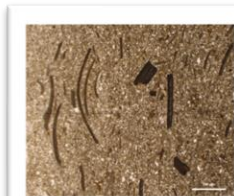


About 1,000 miles (1,609 km) across

Bosut La Tené



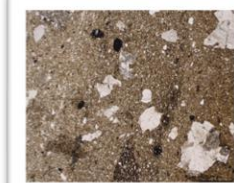
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Vinkovci



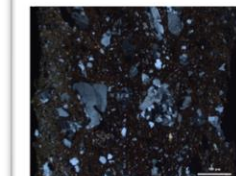
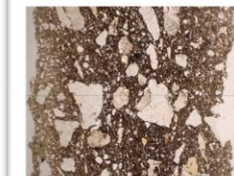
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Vučedol



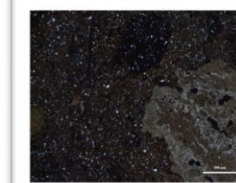
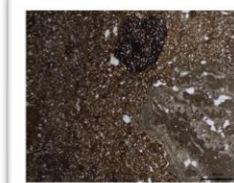
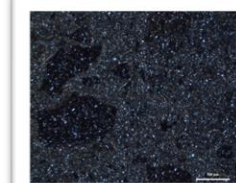
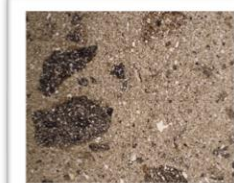
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Sopot



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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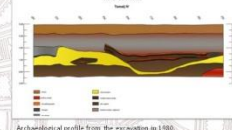


Introduction

Archaeological site Damića gradina is situated in the centre of Stari Bilogori in eastern Slavonia. First archaeological excavations were conducted by Vinkovci Town Museum in 1980, when an archaeological 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 Eneolithic, Eneolithic, Vinčica and Eneolithic cultures, and ends with fortified settlement in the last phase of the middle La Tène period (second half of the 1st. century).



Tell Damića gradina - ruins of the Vinčica Town Museum



Archaeological profile from the excavation in 1980.



Pottery vessel from the Vinčica culture (displayed in Vinkovci Town Museum)

Aims and methods

Pottery, as other handmade artefacts, reveal a social context of man in the past – his behaviour 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 ca. 6000 years and who have used the same raw material. This type of analysis requires interdisciplinary approach and the cooperation of scientists from two completely different areas, natural sciences (pottery) and the humanities (archaeology). Technology of pottery production is considered:

- (1) preparation of clay paste (mixing of clay with different temper material)
- (2) modelling 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

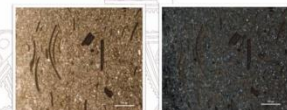
The sherds for analysis are sampled from vessels of known type (pot, bowl, cup, jug), from different parts of the vessel (base, body, rim) and different surface treatment (polished and deep incised fragments). Samples of possible raw material (clayey material) is collected at several locations in the proximity of the archaeological site. Detailed mineralogical (XRD), ceramic (shards and clayey material), petrographic (optical microscopy – ceramic sherds), grain size (wet sieving and sedimentation using sedimentograph – clayey material) and chemical analyses (ceramic sherds and clayey material) were performed.



Examples of the sampled sherds

Preliminary results

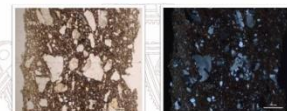
Preliminary results suggests different recipes in pottery making which can be recognizable as potter's technological choice (a). Temper, or inclusions that have been artificially added to the clay, plays very important role in defining technological styles. Adding different kinds of temper with different size of particles may result in different thermal and physical properties of clay and fired pottery vessel. Technological choice of the potter is also related to the functional properties of the finished vessel (the cooking, storing or serving food) so the necessary performance characteristics of the vessel are thermal shock resistance, strength and toughness to survive transport storage or high level of porosity. Based on the analysed data, some very recognizable differences between some cultures (that as temper was added only in Eneolithic (a) and La Tène culture (f) while in the pottery sherds from Eneolithic period (Eneolithic, Eneolithic, Vinčica and Eneolithic cultures) is missing: (a) or crushed pottery sherds, together with organic material is the most common temper intentionally added in the clay since the Neolithic. It can be observed as cultural (traditional) choice as well as technological (related to the function of the vessel). 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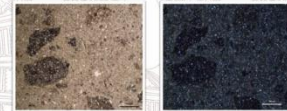
f) La Tène culture



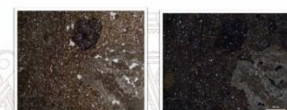
e) Eneolithic culture



d) Vinčica culture



c) Eneolithic culture



b) Eneolithic culture



a) Eneolithic culture

Archaeometric analyses were conducted in the frame of the bilateral Croatian project "Pottery in prehistoric culture, with an emphasis on the Halstatt culture, in the Croatian and Austrian Danube Region".

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

