A. Description of Etapa 1, Tipologia, mineralogia, petrografia si compozitia chimica a artefactelor litice din situri selectate din Transilvania

The work in grant started by visiting the “Ion Raica” Municipal Museum in Sebeș where there were stored a huge number of archaeological pieces. We selected a total of 322 siliceous lithic tools, whose characteristics corresponded to our project. These pieces came from the Limba – Oarda de Jos site (SW Transylvania, Romania), a complex Neolithic settlement inhabited from early Neolithic (Preciș and Starčevo-Criș cultures) to the middle Neolithic (Vinča culture).

The outcrops of siliceous rocks were mapped around the site (within a radius of 30 km) and there were collected samples which could be used as raw materials for knapping lithic stone tools.

The set of pieces was cleaned, photographed and macroscopically investigated using a SMZ645 Nikon stereomicroscope and also several pieces selected as representative were prepared for further analysis.

Some of them were thin sliced, cut with a diamond saw and used to prepare thin sections for polarized light Optical Microscopy (OM). A Zeiss Axios Imager.A2m petrographic microscope (Geology Department at Babeș-Bolyai University in Cluj-Napoca) was used for microscopic/mineralogical study. The microphotos were captured by an Axio Cam ICc5 video camera.
For study at the Electron Probe Microanalyzer (EMPA) millimeter slices were also cut from which polished sections of diamond paste.

To obtain information on the composition and microstructure of the material, several pieces were investigated by Scanning Electron Microscope (SEM) using a Field Emission Gun Scanning Electron Microscope Hitachi SU8230 at National Institute of Development of Research for Isotopic and Molecular Technology (INCDTIM). Different quantities of samples have been mortared (both archaeological and siliceous rocks) for the next different analysis.

For Fourier Transform Infrared Spectroscopy (FTIR), samples were analyzed using a JASCO 6200 spectrometer (Nanostructured Materials and Bio-Nano-Interface Center in the Interdisciplinary Research Institute on Bio-Nano-Sciences at Babeș-Bolyai University in Cluj-Napoca).

X-ray diffraction (XRD-XRPD) and geochemical analyses through Inductively Coupled Plasma Mass Spectrometry (ICPMS) has been already done to selected pieces at Geology department (UBB).

Electron Paramagnetic Resonance (EPR) analysis have been also done to selected pieces at Geology department (UBB).

The results were presented at the International Colloquium Raw Materials and Lithic Artefacts from Prehistory to Middle Ages in Europe 2018 held in Piatra Neamt, Romania and the XXI International Congress of the Carpathian Balkan Geological Association CBGA 2018 held in Salzburg, Austria.

The project activities fall within the original time graph and include:

- Selection of a set of archaeological lithic stone tools from a Neolithic site from Transylvania (Limba-Oarda de Jos, Alba Iulia) (part I)
- Geological mapping in the field (including geological documentation and research for lithic raw materials) and lithic raw materials collect (part I)
- Preparation of samples - lithic artifacts and lithic raw materials (rocks) -: cleaning, cutting, grinding, thin sections and polished thin sections, mortars, separation (part I)
- Optical microscopy and X-ray diffraction microscopy (XRD-XRPD) for siliceous artifacts and raw materials (rocks) (part I).
- Analysis of Electron Probe Microanalyzer (EMPA) for siliceous artifacts and raw materials (rocks) (part I)
- Analysis of Electron Paramagnetic Resonance (EPR) for siliceous artifacts and raw materials (rocks) (part I)
- Execution of chemical analyses and their geochemical interpretation for lithic artifacts and siliceous raw materials (rocks) (major elements, minor elements and REE through ICPMS) (part I)
- Complementary investigations on lithic artifacts and raw materials (rocks) by other methods (SEM, FTIR) (part I)
- Primary dissemination of results: oral presentations and poster at national and international scientific events (1 oral communication and 2 posters)
- Dissemination of results: sending articles for publication at international journals (1 paper in review)

B1. Papers sent for publication in 2018 (November 2018) and at the stage of review (in evaluation) of ISI magazines (names of team members, in bold):


B2. Communication of the results at international and national scientific conferences or scientific events (names of team members, in bold):

XXI INTERNATIONAL CONGRESS CARPATHIAN BALKAN GEOLOGICAL ASSOCIATION CBGA (Salzburg, Austria, 10 to 13 of September of 2018)
(https://cbga.sbg.ac.at/images/PDF/2018-Sessions-Programm-and-Poster-Presentations.pdf)

Cultural geology session: Composition, technology and provenance of archaeological artifacts.

INTERNATIONAL COLLOQUIUM RAW MATERIALS AND LITHIC ARTEFACTS FROM PREHISTORY TO MIDDLE AGES IN EUROPE (Piatra Neamt, Romania, 23 to 25 of October 2018)

- Rey-Solé, M., Ionescu, C., Ciuta, M-M., Muresan – Pop, M., Simon, V.,
  “Archaeometric investigation on Neolithic siliceous tools from Limba-Oarda de Jos (Alba County, Romania)”. Poster. In: poster’s session.

<table>
<thead>
<tr>
<th>Mineralogical and chemical composition of some lithic artifacts (stone tools) and the identification of potential lithic raw materials</th>
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<tbody>
<tr>
<td><strong>Predicted</strong></td>
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<tr>
<td>Documentantion of siliceous lithic artifacts and rock samples</td>
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<td>Analyze of samples by X – Ray Diffraction (XRD-XRPD)</td>
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<td>Execution of geochemical analysis (ICPMS) to archaeological and geological samples</td>
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<tr>
<td>Presenting posters and oral communications to international and national congresses</td>
</tr>
<tr>
<td>Sending articles for publication in international journals</td>
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</tbody>
</table>

23/11/2018

PROJECT DIRECTOR

DR. MAR REY SOLE
Preliminary archaeometric investigation on Middle Neolithic siliceous tools from Limba-Oarda de Jos (Transylvania, Romania)

Mar Rey-Solé (1, 2), Corina Ionescu (1, 3), Marius-Mihai Ciută (4), Marieta Muresan-Pop (5), Viorica Simon (6)

(1) Babes-Bolyai University, Department of Geology, Cluj-Napoca, Romania (mar.reysole@ubcluj.ro); (2) University of Barcelona, Faculty of Geography and History, Department of History and Archaeology, Section of Prehistory and Archaeology, SERP, Barcelona, Spain; (3) Kazan (Volga Region) Federal University, Archeotechnologies & Archeological Material Sciences Lab., Tatarstan, Russia; (4) Lucian Blaga University, Sibiu, Romania; (5) Babes-Bolyai University, Nanostructured Materials and Bio-Nano-Interface Center, Interdisciplinary Research Institute on Bio-Nano-Sciences, Cluj-Napoca, Romania; (6) Babes-Bolyai University, Faculty of Physics, Interdisciplinary Research Institute on Bio-Nano-Sciences, Cluj-Napoca, Romania.

Abstract:

The present archaeometric study is focused on a set of archaeological siliceous lithic tools assigned to an early Vinča culture period (Vinča A and Vinča B1) found at Limba-Oarda de Jos (SW Transylvania, Romania), an open settlement dated between 5405 and 5310 cal BC, in Middle Neolithic. A total of 322 retouched tools and débitage pieces were typologically and macroscopically investigated. From these, 20 pieces have been analysed by polarized light optical microscopy (OM) and 10 pieces by Fourier-transform infrared spectroscopy (FTIR), in order to identify compositional characteristics, to define the petrographic type and to figure a spectral fingerprint for each material.

Four petrographic types have been discriminated: radiolarite, chert, fossiliferous chert and siliceous limestone. Mineralogically, the tools consist basically of a mass of microquartz and fibrous microquartz (chalcedony), associated with radiolarians remnants (in radiolarites), fossil shell fragments (in the fossiliferous chert) and limestone components such as ooliths and pellets (in the siliceous limestone). All samples show distinct FTIR bands, mostly assigned to microquartz, quartz and fibrous microquartz. The deconvolution of the FTIR spectra in the 950-1300 cm⁻¹ domain revealed the contribution of several other phases such as quartz and microquartz.

---

1 The site belongs to a pit-house in the sector Băducă, being the earliest Vinča Habitation from Limba-Oarda de Jos. Oral communication of Marius-Mihai Ciută
The results support the assumption that the tools made of chert, fossiliferous chert and siliceous limestone were produced at site, from nodules probably originated from the Upper Jurassic chert-bearing limestones cropping out in the Trascău Mts. The tools made of radiolarite, most likely were brought at the site as finished products from the Trascău Mts.

**Keywords:** Siliceous tools, Early Neolithic, optical microscopy, FTIR, Vinča culture, Limba-Oarda de Jos, Romania

### 1. Introduction

In the south-western part of the Transylvanian Basin, Romania (Fig. 1), there is a complex Neolithic settlement at Limba-Oarda de Jos. This open settlement (Fig. 2) was inhabited from early Neolithic (Precriş and Starevo-Criş cultures) to the middle Neolithic (Vinča culture) (Ciucă & Ciucă, 2015). More than twenty years of research at the location has resulted in a large collection of various archaeological artefacts, presently stored at the “Ion Raica” Municipal Museum in Sebeș. The site, a pseudo-tell, was emplaced on the Mureș River left bank, at cca 4 km in straight line SSE east of the present-day city of Alba Iulia. Most likely it was a strategic location that allowed to control the routes connecting the eastern and the southern areas of Transylvanian Basin with Banat, the Hungarian Plain and the areas south of the Southern Carpathians (Suciu 2009).
Dear Dr. MAR MARIA REY SOLÉ

Motto:
Our heritage: where the past meets the future.

We would like to invite you to the International Colloquium Raw Materials and Lithic Artefacts from Prehistory to Middle Ages in Europe, organized to the Cucuteni Eneolithic Art Museum from Piatra-Neamț (Romania), in 23-25 October 2018.

This cultural and scientific event celebrates the European Year of Cultural Heritage.

During the colloquium different consecutive sessions will deal about:

- lithic raw materials;
- lithic sources / areas;
- chipped stone artefacts;
- polished stone artefacts;
- production and exchange;
- experimental archaeology.

An excursion will guide the participants to different sites from Piatra-Neamț and its surroundings
- Doamna-Poiana Cireșului (Upper Paleolithic), Vălenii-Cetăţuia (Neolithic-Chalcolithic), Doamna-Bâca Doamnei (Antiquity) and Piatra-Neamț - Curtea Domnească (Middle Ages).

During the colloquium, all costs of accommodation and meal to the Grand Hotel „Ceahlău” in Piatra-Neamț will be covered by the organizers.

We would be very pleased if you would attend to this event! Your contribution(s) can be submitted as paper(s) or poster(s).

Please tell us to which of these sessions you intend to contribute and send your title(s) until 31 July 2018 and your abstract(s) (250-300 words) in English, French or German, with 3-5 keywords and 1-3 figures (in greyscale – 300 dpi; in colour – 600 dpi) until 15 September 2018. The posters size is A0 (1189 x 841 mm).

Your abstract(s) will be edited in a volume before this event. Proceedings of the colloquium – in extenso – will be edited in a volume in 2019, with no space limits (text and illustration).

Contact person:
Dr. Constantin Preoteasa (tel.: 004-0722515932; e-mail: constantin.preoteasa@yahoo.com)
Official e-mail of the colloquium: cucuteni130@gmail.com

Sincerely yours,

Dr. Ciprian-Dorin Nicola (Piatra-Neamț),
Dr. Constantin Preoteasa (Piatra-Neamț),
Prof. Dr. Marin Cârciumaru (Târgoviște),
Prof. Dr. Andrzej Pelisiak (Rzeszów)
RAW MATERIALS AND LITHIC ARTEFACTS FROM PREHISTORY TO MIDDLE AGES IN EUROPE

INTERNATIONAL COLLOQUIUM

Programme and Abstracts

Editors:

CONSTANTIN PREOTEASA
MARIN CĂRCIUMARU
ANDRZEJ PEŁSIĄK
CIPIRIAN-DORIN NICOLA

Editura „Constantin Matasă”
Piatra-Neamț
Romania
2018
ARCHAEOMETRIC INVESTIGATION
ON NEOLITHIC SILICEOUS TOOLS
FROM LIMBA – OARDA DE JOS (ALBA COUNTY, ROMANIA)

Mar Rey-Solé,
Corina Ionescu,
Marius-Mihai Ciută,
Marieta Mureșan-Pop,
Viorica Simon

Keywords: Neolithic, Vinča culture, lithic tools, optical microscopy, FTIR.

Limba – Oarda de Jos (Alba County, Transylvania, Romania), dated between 5405-5310 cal BC, is regarded as a key-site in understanding the complexity of the Neolithic processes from this part of the Intra-Carpathian area. The huge collection of archaeological artefacts that resulted during more than twenty years of research is actually stored at the „Ion Raica” Municipal Museum of Sebeș.

The present archaeometric study regards a set of lithic industry set dated in early Vinča culture period (Vinča A and Vinča B1). It consists of a total of 322 pieces (siliceous tools and débitage) (fig. 1/A-D), from which 20 pieces have been analysed by polarized light optical microscopy and 10 pieces by Fourier-transform infrared spectroscopy (FTIR) in order to identify compositional characteristics which would allow inferring the provenance of the raw material.

Several petrographic types have been discriminated, including: a) radiolarites, b) cherts i.e. micro-quartzites, c) fossiliferous chert and d) siliceous limestones (fig. 2/A-D). All samples analysed show FTIR bands at 452, 781-797 and 1086 cm⁻¹ which can be assigned to Si-O vibrations in quartz (fig. 3). The samples made of fossiliferous chert and siliceous limestones have an additional wide band at 1425 cm⁻¹, due to the presence of carbonates. All samples show a broad band centered at 3500 cm⁻¹ which is determined most likely by the hydroxyl group.
These results support the classification of the lithic tools according to the mineralogical and petrographic composition and may be further used for tracing the sources of the rocks.

This investigation is part of a larger outgoing project focussed on the provenance of lithic raw materials. The study of the lithic industries at Palaeolithic and Neolithic settlements in Transylvania (Romania) will help to understand better the reasons for certain social and economic environment of the prehistoric communities.

Acknowledgements

This contribution is possible thanks to the UEFISCDI project PN-III-P1-1.1-PD-2016-0859 granted to Mar Rey-Solé by the Romanian Ministry of Research and Innovation.

Corina Ionescu acknowledges support of the Russian Government Program of Competitive Growth of Kazan Federal University.
Fig. 1. Macroscopic images (dorsal and ventral) of some of the studied lithics from Limba - Oarda de Jos: A – flake, sample 4472; B – fragment, sample 4576 (15); C – flake, sample 4446; D – blade, sample 4469.

Fig. 2. Polarized light optical microphotos: A – radiolarite, sample 4472; B – chert; C – fossiliferous chert; D – siliceous limestone. All images with polars, except A (one polar).
Fig. 3. FTIR spectra of main lithic groups.
ARCHAEOOMETRIC INVESTIGATION ON NEOLITHIC SILICEOUS TOOLS FROM LIMBA-OARDA DE JOS (ALBA COUNTY, ROMANIA)

Mar Rey-Soldà, Corina Ionescu, Marius-Mihai Ciuti, Marieta Muresan, Viorica Simon

INTRODUCTION & OBJECTIVES

Limba-Oarada de Jos, located in Alba County (Transylvania, Romania) (Fig. 1) and dated between 5,005 and 5,010 cal BC, is regarded as a key site in understanding the complexity of the Neolithic processes from this part of the Inner-Carpathian area (Ciuti & Ciuti, 2015). More than twenty years of research (Figs. 2 & 3) has resulted in a huge collection of technological artifacts carved in different siliceous raw materials as obsidian (Glazovskiy et al., 2015), marble (Ciuti & Ciuti, 2011) and different kind of silicate rocks, mostly stored at the "Ion Rațiu" Municipal Museum in Sebeș.

MATERIALS & METHODOLOGY

The present archeometric study targets a set of lithic industry dated in early Villeneuve culture period (Nita V and Nita B1). It consists of a total of 322 pieces (siliceous tools and artifacts), from which 20 pieces have been analyzed by polarized light optical cathodoluminescence and 10 pieces by Fourier-transform infrared spectroscopy (FTIR) in order to identify compositional characteristics which would allow inferring the provenance of the raw material.

RESULTS

Four petrographic types have been distinguished, including: 3) radiolites, 4) cherts, 5) microquartzites, 6) obsidian and 9) silicified bryozoans (see Fig. A, B, C, D and Table 1).

All samples analyzed show FTIR bands at 462, 781/797 and 1089 cm⁻¹ which can be assigned to Si-O vibrations in quartz (Fig. 5). The samples made of obsidian chert and silicified bryozoans have an additional wide band at 1035 cm⁻¹ due to the presence of carboxylics.

The results support the classification of the lithic tools according to the microscopical and petrographic composition and may be further used for tracing the sources of the rocks.

CONCLUSIONS

This investigation is part of a larger ongoing project focused on the provenance of lithic raw materials. The study of the lithic industries in Transylvania and Neolithic settlements in Romania will help to understand better the reasons for certain social and cultural movements of the prehistoric populations.

ACKNOWLEDGEMENTS

This research is partially funded by the 6902014IS/7.1.1.1.1.0/1408/1.5/099928 project (code 14/5) by the Romanian Ministry of Research and Innovation. E.S acknowledges support of the European Governance Program of Competitive Growth of Babeș-Bolyai University.
ARCHAEOMETRIC INVESTIGATION ON NEOLITHIC SILICEOUS TOOLS FROM LIMBA-OARDA DE JOS (ALBA COUNTY, ROMANIA)

Mar Rey-Solda1,2, Corina Ionescu1, Marius-Mihai Ciofi3, Marieta Muresan-Pop, Viorica Simon4

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2 University of Barcelona, Faculty of Geography and History, Department of Prehistory and Archaeology, Section of Prehistory and Archaeology, SEPI, Barcelona, Spain
3 Transylvanian Institute of Archeology, Sibiu, Romania
4 Babeș-Bolyai University, Institute of Physics, Interdisciplinary Research Institute of Bio Nano Sciences, Cluj-Napoca, Romania

INTRODUCTION & OBJECTIVES

Limba-Oarda de Jos, located in Alba County (Transylvania, Romania) (Fig. 1) and dated between 5,405 and 5,310 cal BC, is regarded as a key site in understanding the complexity of the Neolithic processes from this part of the Eastern Carpathian area (Ciofi & Ciofi, 2011). More than twenty years of research (Figs. 2 & 3) has resulted in a huge collection of technological artefacts carved in different lithic raw materials as obsidian (Glassroth et al., 2005), marble (Ciofi & Ciofi, 2011) and different kinds of siliceous rocks, usually named at the “Ion Raca” Municipal Museum in Sibiu.

MATERIALS & METHODOLOGY

The present archeometric study regards a set of lithic industry dated to early Villaric culture periods (Villafranca I and Villafranca II). It consists of 902 pieces of siliceous tools and artifacts, from which 200 pieces have been analyzed by polarized light optical petrography and 10 pieces by Fourier transform infrared spectroscopy (FTIR) in order to identify compositional characteristics which would allow inferring the provenance of the raw material.

RESULTS

Four petrographic types have been discriminated, including: 1) radiolites, 2) cherts, 3) microcrystalline, 4) obsidians from different localities (see Fig. 4). Each of them have been named as A, B, C, D and E (Table 1).

All samples analyzed show FTIR bands at 862, 781.797 and 1016 cm⁻¹ which can be assigned to Si-O vibration in quartz (Fig. 3). The samples made of obsidians, cherts and siliceous materials have an additional band at 1425 cm⁻¹, due to the presence of carbonate admixture. All samples show a broad band centered at 3500 cm⁻¹ which is determined most likely by the hydration of silicates.

These results support the classification of the lithic tools according to the petrographic and compositional composition and may be further used for tracing the sources of the rocks.

SILICEOUS TOOLS TYPES SUMMARY

<table>
<thead>
<tr>
<th>Classification</th>
<th>Acronym</th>
<th>Description</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Siliceous</td>
<td>A</td>
<td>Siliceous and stiffer rock</td>
<td>12.7%</td>
</tr>
<tr>
<td>Chert</td>
<td>B</td>
<td>Very dark gray brown</td>
<td>74.7%</td>
</tr>
<tr>
<td>Fossiliferous</td>
<td>C</td>
<td>Yellowish brown</td>
<td>33.5%</td>
</tr>
<tr>
<td>Slate</td>
<td>D</td>
<td>Very dark brown</td>
<td>32.8%</td>
</tr>
</tbody>
</table>

CONCLUSIONS

This investigation is part of a larger ongoing project focused on the provenance of lithic raw materials. The study of the Lithic Industries at Palaenolithic and Neolithic settlements in Transylvania (Romania) will help to understand better the reasons for certain social and economic environment of the prehistoric communities.

ACKNOWLEDGEMENTS

This research was partly funded by the project "PA021/2003-2005" supported by CNCS-UEFISCDI through the project no. 49/2005. The authors acknowledge support from the European Commission Program of Competitiveness Growth through Industry University.
Geologica Balcanica

Abstract

Advances in Geology in Southeast European Mountain Ranges

By: [Author Name]

Published by: [Publisher Name]

[Publication Date]
XXI International Congress of the Carpathian Balkan Geological Association (CBGA)

ABSTRACTS

Advances of Geology in southeast European mountain belts

Franz Neubauer, Uwe Brendel & Gertrude Friedl
(Editors)

September 10–13, 2018
University of Salzburg, Austria

XXI International Congress
Carpathian Balkan Geological Association
Salzburg (Austria), September 10–13, 2018
CBGA 2018 - Austria

CBGA 2018 – AUSTRIA
XXI International Congress of the Carpathian Balkan Geological Association (CBGA)
University of Salzburg (Austria), September 10–13, 2018

Session programme

All oral & poster presentations
Archaeopetalogical studies nowadays: knowing the provenance of lithic tools by applying multidisciplinary analysis, from mineralogy to geochemistry


In the last decades the successful application of some geological analytical methods to the study of archaeological lithic raw materials has allowed the development of a new discipline, the Archaeopetalogy. The combination of mineralogical, chemical and physical methods from geology to social sciences as archaeology goes beyond the research on sourcing the lithic raw materials in prehistory and provides accurate technological responses. Furthermore, the addition of geotechnical techniques to the archaeopetalogical method generates quantifiable data, helping us to complete the previous mineralogical analysis.

This study regards the lithic industry at two Paleolithic rockshelters, l’Hort de la Boquesa (Margalef de Mostoles, Tarragona) dated from 12.200±160 BP to 11.770±145 BP, and La Rovira (Villatora, Castelló) dated from 11.350±20 BP both located in the north-eastern part of Ibiza (Spain). A total of 26 412 flint artifacts and geological samples from the surrounding area were investigated by a combination of techniques such as microscopy, polarized light optical microscopy, scanning electron microscopy, micro-Raman, X-ray diffraction and laser ablation inductively coupled plasma mass spectrometry.

Based on the comparison of lithic tools and geological samples it has been possible to identify the flint component. For the l’Hort de Boquesa site, three types of flint were distinguished: Type 1 — coming from the Cauzon; Ulldecona Complex; Type 2 — collected from Quaternary terraces of Ebro River and Type 3 — originating from the Oligocene La Torre Formation. At the La Rovira site, four types of flint were distinguished: Type A (collected from an anthropogenic encrop, "Mas del Pau"), the Mesarcholithic-Miocene Teruel La Serna and the Eocene-Oligocene Font de la Salut Formation; Type B (from the Miocene Ma del Quinyó Formation); Type C (with an unknown origin so far); and Type D (coming from the Miocene terraces of Gualtale and Muntóllé Rivers).

This work is an example of the great potential of the archaeopetalogical approach and the study of provenance of the lithic raw materials in addressing the archaeological concepts of territory, taking into account the geographical space exploited by the prehistoric communities. An ongoing research of lithic raw materials from several Paleolithic and Neolithic settlements in Transylvania (Romania) will benefit of the application of these methods in order to answer to the archaeological questions such as the economy of the prehistoric communities. Finally, the reasons for certain human behavior in prehistory will be better understood.

Acknowledgements. This contribution is possible thanks to the UEFISCDI project PN-II-P1-11-01-20102 granted to M-RS by the Romanian Ministry of Research and Innovation. SEM, micro-Raman and XRD analyses were performed in the National Museum of Natural History - CSIC (Madrid) with the help of Dr. María Angeles Bustillo. LA-ICP-MS analyses were performed at the "AQM" Geology Lab (Lund University, Sweden). Thanks are also due to Dr. Deborah Claussen (Department of Archaeology and Ancient History, University of Lund, Sweden) and Dr. Leif Johansson (Department of Geology, University of Lund, Sweden). This research was supported by grants from HÅ2011 06 project and EPIC programme, (Ministerio de Economía y Competitividad, Gobierno de España).
Poster presentations

Mar Rey-Solé, Xavier Mangado, Didac Román, Maria Pilar García-Argüelles: Differential use of flint varieties in prehistoric lithic industry: A case study

Differential use of flint varieties in prehistoric lithic industry:
A case study

Mar Rey-Solé1, Xavier Mangado2, Didac Román2, Maria Pilar García-Argüelles2

1. University of Barcelona, Department of Prehistory and Archaeology, Faculty of History and Archaeology, University of Barcelona, Spain.
2. University of Barcelona, Department of Prehistory and Archaeology, Faculty of History and Archaeology, University of Barcelona, Spain.

This study is the first attempt to study the raw materials through an archaeologically-based perspective and to determine the relationship between different flint tools recovered from the site and the four types of flint used in this study. In addition, an additional analysis has been conducted, and as far as possible, possible for the analysis of the raw materials and the variety of flint.

The site of La Riojilla, located at 11,350 ± 50 BP, is located in the eastern part of the Iberian Peninsula (Spain). The site tool assemblage from La Riojilla contains a total amount of 3,876 pieces of flint, including 286 retouched tools, 20 cores and 2,753 flint flakes.

The methodological approach used in this study, allowed to discriminate four types and five varieties of flint used for their manufacture. Two of the main types, Type A (with its two chromatic varieties, Light A and Type B), have a Tertiary/Quaternary origin. The next in order of importance, is Type D with a marine origin. The last one, Type C, has an unknown origin so far. According to the typological classification of the archaeological materials, the same type tools were identified.

The relation between the variety and typology shows that two predominant flint types have been used to manufacture a higher number of typological groups. The Type A variety 1, of very high quality, has been used to manufacture denticulated tools, while the Type B, of low quality, has been used to manufacture the end scrapers, drills, side-retouched tools, scrapers and the only microburins recovered from the rockshelter.

The Type C, despite its frequent use, was almost exclusively used to manufacture the “blade supports” tools, composite tools and scapules.

Thus, the archaeological analysis demonstrates that the human groups of hunter-gatherers from La Riojilla were conditioned by the characteristics, and the unequal offer of emplaced mineral resources by social and experience, among them a number of primary and secondary options available and the levels of technology that could be exploited to their benefit along daily needs.

Acknowledgements. This contribution is possible thanks to the UEFICDI project PN-III-P1-1.1-2016-7189 granted by the Romanian Ministry of Research and Innovation. This research was conducted within the Digital de España project.
DIFFERENTIAL USE OF FLINT VARIETIES IN PREHISTORIC LITHIC INDUSTRY: A CASE STUDY

INTRODUCTION & OBJECTIVES
The archaeological excavations of "La Ramada" (area 1) in the Cuenca de Xàtiva (Valencia) have been carried out since 1994 by the excavation team of the University of Valencia. This project has been supported by the Spanish Government's Ministry of Culture and Tourism. The study aims to provide insights into the lithic industry and the use of flint varieties in prehistoric contexts.

MATERIALS & METHODOLOGY
The analyses were carried out using a combination of macroscopic and microscopic techniques. The samples were analyzed under a microscope to identify the different flint varieties. The results were compared with archaeological data from other sites in the region.

RESULTS
The results indicate that different flint varieties were used for different purposes. The use of certain flint varieties was restricted to specific periods, suggesting a possible chronological order.

FLINT TYPES SUMMARY (Table 1 from Rey-Solé, 2004)

<table>
<thead>
<tr>
<th>Flint Type</th>
<th>Description</th>
<th>Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A</td>
<td>Black</td>
<td>10%</td>
</tr>
<tr>
<td>Type B</td>
<td>Grey</td>
<td>20%</td>
</tr>
<tr>
<td>Type C</td>
<td>White</td>
<td>50%</td>
</tr>
</tbody>
</table>

TECHNO-TYPOLICAL ANALYSIS OF LITHIC INDUSTRY IN RELATION WITH FLINT VARIETIES

CONCLUSIONS
The results of this study highlight the importance of using different flint varieties for different purposes. The use of certain flint varieties was restricted to specific periods, suggesting a possible chronological order.

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