



10TH MEETING



OF THE

WORKED BONE RESEARCH GROUP

of the International Council of Zooarchaeology

10. SKUP RADNE GRUPE ZA OBRAĐENU KOST

Programme and abstracts



BEOGRAD, 25–30. AVG. 2014.

10th Meeting of the Worked Bone Research Group of the ICAZ.
Beograd, 25-30. Avg. 2014.

**10TH MEETING OF THE WORKED BONE
RESEARCH GROUP OF THE INTERNATIONAL
COUNCIL OF ZOOARCHAEOLOGY:
PROGRAMME AND ABSTRACTS**

organized by:
Archaeological institute, Belgrade

in cooperation with
National museum, Belgrade

BEOGRAD, 25-30 AUGUST 2014.



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Dr Slaviša Perić, director, Archaeological Institute, Belgrade, Serbia
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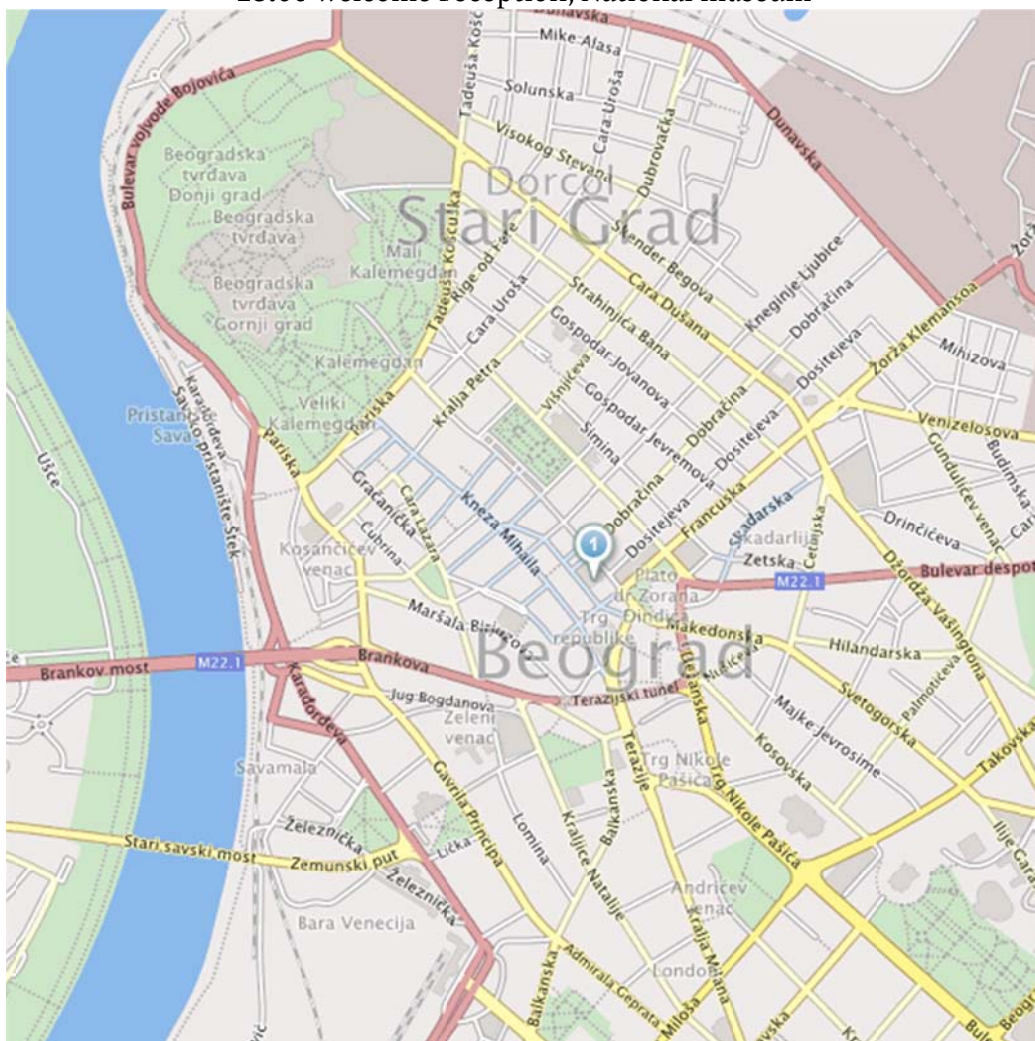
25-30. 08. 2014.

PROGRAMME

Monday, Aug. 25th

REGISTRATION FROM 15.00h at National museum, Belgrade, Trg Republike 1 (Republic Square 1):

18.00 welcome reception, National museum



10th Meeting of the Worked Bone Research Group of the ICAZ.
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Tuesday, Aug 26th

REGISTRATION FROM 8.30 at National museum

09.00-09.15	Introduction
09.15-09.45	András Markó, Recent Studies on the Osseous Industry From the Lower Layer of the Istállóskő Cave (North-Eastern Hungary)
09.45-10.15	Bernadeta Kufel-Diakowska, Jarosław Wilczyński, Piotr Wojtal, Krzysztof Sobczyk, Mammoths Hunting? – Usewear Studies of Backed Implements from Mammoth Bone Accumulation at Kraków Spadzista Site (S Poland)
10.15-10.45	Marcin Diakowski, Jarosław Wilczyński, Upper Palaeolithic pendants from the child burial in the Borsuka Cave (southern Poland)
10.45-11.15	B R E A K
11.15-11.45	Eva David, Animal Heads Used as Trophies at the Mesolithic/Neolithic Transition
11.45-12.15	Loretta Dibble, Lake Turkana/Omo Basin Holocene Worked Bone: Understanding the Barbed Bone Points from Kenya and Ethiopia
12.15-12.45	Sarah MacIntosh, Levent Atici, Taphonomic Insights into Antler Working at Körtik Tepe, Southeastern Anatolia
12.45-13.15	Christopher Arabatzis, Bone industry from the prehistoric settlement Anargiroi IXa, Greece
13.15-15.00	B R E A K
15.00-15.30	Zsuzsanna Tóth, Tool assemblage and raw material composition on the Late Neolithic site Polgár-Csőszhalom
15.30-16.00	Giedrė Piličiauskienė, Heidi Luik, Bone and antler tools from Neolithic sites in coastal Lithuania
16.00-16.30	Pierre de Maret, Isabelle Sidéra, An ideal bone for the Neolithic Barbie? Focus of Neolithic figurines on ruminant metapodials
16.30-17.00	B R E A K
17.00-17.30	Sean Rice, Neolithic dress pins and Bronze Age rib points from the Links of Noltland Worked bone assemblage
17.30-18.00	Sally Evans, Women and Whale bone: Iron Age-Norse relationships and whale bone textile tools on the Western Isles of Scotland

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Wednesday, Aug 27th

REGISTRATION FROM 8.30 at National museum

09.00-09.30	Alice M. Choyke, The Beginnings of serial Production at late Chalcolithic Arslantepe: The Bone Tools
09.30-10.00	Andreea Vornicu, Luminița Bejenaru, Astragali use in Chalcolithic sites from eastern Romania. The construction of a hypothesis
10.00-10.30	Petar Zidarov, Bone needles and combs: more evidence on tattooing techniques in prehistoric Europe
10.30-11.00	B R E A K
11.00-11.30	Erika Gál, Animal bone tool use in South-west Transdanubia (Hungary) during the Early Bronze Age
11.30-12.00	Marcin Diakowski, Justyna Baron, Tomasz Stolarczyk, Bone and antler processing at the late Bronze and early Iron Age lake settlement in Grzybiany, SW Poland
12.00-12.30	Monica Mărgărit, Exploitation of the <i>Unio sp.</i> valves for non-alimentary purposes in the Romanian Eneolithic. Archaeological and experimental data
12.30-13.00	Ninna Manaseryan, Nora Yengibaryan, Worked Bones And Shells From Lake Sevan Basin
13.00-15.00	B R E A K
15.00-15.30	Kinga Winnicka, More than meets the eye: microscopic and technological studies of Early Bronze Age bone and antler beads from Kichary Nowe, SE Poland
15.30-16.00	Vinayak, Possible Polish Techniques Practiced During Iron Age on Bone and Antler Arrow-heads at Atranjikhera and Jakhera
16.00-16.30	B R E A K

16.30 – VISIT TO ARCHAEOLOGICAL SITE VINČA-BELO BRDO

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Thursday, Aug 28th

REGISTRATION FROM 8.30 at National museum

09.00-09.30	Chong Yu, Bone tool of Dadiwan site, Northwest China, an application on the use of correspondence analysis
09.30-10.00	Justin Bradfield, Exploring bone micro-fracture using micro-CT: potential application in studies of ancient bone tool function
10.00-10.30	Felix Lang, Antler Working and Objects in the Roman municipium Iuvavum / Salzburg
10.30-11.00	B R E A K
11.00-11.30	Marina Kovač, Several observations on semi-finished bone products supporting the existence of a bone workshop in Mursa
11.30-12.00	Sofija Petković, Bone Fibulae As Grave Gifts in Upper Moesia
12.00-12.30	Mira Ružić, An unusual bone object found in Late Roman cemetery in Bela Palanka (Remesiana)
12.30-13.00	Nemanja Marković, Sonja Stamenković, Antler Workshop in Caričin Grad (Justiniana Prima)
13.00-15.00	B R E A K
15.00-15.30	Marko Janković, Roman bone dice and counters in the territory of present day Serbia
15.30-16.00	Zlatko Kovancaliev, Bone cylindrical objects from Stobi
16.00-16.30	Ariel Shatil, Early Islamic Bone Dolls – thoughts on their chronology, origin and style
16.30-17.00	B R E A K
17.00-	POSTER SESSION

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Friday, Aug 29th

REGISTRATION FROM 8.30 at National museum

09.00-09.30	Ivan Bugarski, Carved Antler Tools from Nosa and Mandjelos Reassessed: A Glimpse into the Avar Pictorial Evidence
09.30-10.00	Steven P. Ashby, Chasing Reindeer: Material Networks in Viking-Age Antlercraft
10.00-10.30	Johnny Karlsson, Bone, teeth, antler and horn – Manufacturing waste from medieval Sigtuna
10.30-11.00	B R E A K
11.00-11.30	Günther Karl Kunst, Philipp Jettmar, Ronald Salzer, A broken skate and scattered chessmen? – worked bones from the castle of Grafendorf (Stockerau, Lower Austria)
11.30-12.00	Marloes Rijkelijkhuisen, From liturgy to lice – The development of the double sided ivory comb in the Netherlands
12.00-12.30	Vesna Manojlović Nikolić, A contribution to the study of the bone industry from the site Pontes – Trajanov most (IX –XI century)
12.30-13.00	Heidi Luik, Bone working in the suburbs of medieval and early modern Tallinn, Estonia
13.00-15.00	B R E A K
15.00-15.30	Paul Stokes, A New Interpretation of Post-Medieval Bone Scoops from the Foreshore of the River Thames in London
15.30-16.00	Vesna Bikić, Selena Vitezović, Bone Working and Army: An Early Eighteenth-Century Buttons Workshop at the Belgrade Fortress
16.00-16.30	B R E A K
16.30-	GENERAL DISCUSSION

20.00 GALA DINNER

Saturday, Aug 30th

EXCURSION TO LEPENSKI VIR:

8.00 departure from Belgrade

Arrival to Lepenski Vir

Visit to the Museum of Lepenski Vir

Lunch

(possible detour to visit Viminacium)

Return to Belgrade in the evening



ABSTRACTS

(in order of appearance):

András Markó, National museum, Budapest, Hungary

RECENT STUDIES ON THE OSSEOUS INDUSTRY FROM THE LOWER LAYER OF THE ISTÁLLÓSKŐ CAVE (NORTH-EASTERN HUNGARY)

The lower culture bearing layer of the Istállóskő cave in the Bükk mountains was excavated in 1950-51 by L. Vértes. Beside the rather undiagnostic lithic tools, including retouched blades and a leaf shaped scraper, more than 100 antler and ivory artefacts were found. After the presence of split based points the industry was identified as belonging to the Aurignacian I industry.

During the recent revision of the artefacts directly dated to the period of 35-33 kys B.P. traces of characteristic fragmentation (possibly projectile damages) and several taphonomic agents were identified, basically after the study of the single artefacts but partly by refits too. The results suggest that the artefacts were produced outside of the cave and were introduced to the site as ready-made and often fragmented tools. Some of the broken pieces were rejuvenated, but the evaluation of the osseous industry is quite problematic because of the chemical and mechanical factors and the occasionally intense reworking of the cave infilling after the sedimentation.

Bernadeta Kufel-Diakowska, Institute of Archaeology, Wrocław University,
Wrocław, Poland

Jarosław Wilczyński, Institute of Systematics and Evolution of Animals,
Polish Academy of Sciences, Kraków, Poland

Piotr Wojtal, Institute of Systematics and Evolution of Animals,
Polish Academy of Sciences, Kraków, Poland

Krzysztof Sobczyk, Institute of Archaeology, Jagiellonian University, Kraków, Poland

MAMMOTHS HUNTING? – USEWEAR STUDIES OF BACKED IMPLEMENTS FROM MAMMOTH BONE ACCUMULATION AT KRAKÓW SPADZISTA SITE (S POLAND).

Kraków Spadzista is one of the most famous Gravettian sites in Central Europe, known for the huge accumulation of mammoth bones. The bones are accompanied by the specific stone inventory including high ratio of retouched tools - shouldered points and backed blades. A few opposing interpretations have been put on the studies of the origination of similar structures from Central Europe. In the recent times mammoths hunting, at least in some sites, become increasingly accepted.

This paper presents results of usewear analysis of 198 stone implements discovered at Kraków Spadzista, sector B+B1. One-fourth of examined tools show complete set of clear, characteristic impact traces and should be interpret as points of thrown weapon.

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Marcin Diakowski, Institute of Archaeology, Wrocław University, Wrocław, Poland
Jarosław Wilczyński, Institute of Systematics and Evolution of Animals,
Polish Academy of Sciences, Kraków, Poland

UPPER PALAEOLITHIC PENDANTS FROM THE CHILD BURIAL IN THE BORSUKA CAVE (SOUTHERN POLAND)

The Borsuka Cave is located in the southern area of the Kraków-Częstochowa Upland (southern Poland). The excavations were carried out in 2008–2010. In course of the excavations, 112 pendants made from the teeth of European elk and steppe wisent or aurochs were discovered. These artifacts were found together with six deciduous teeth of a modern *Homo sapiens* infant.

In course of research, detailed study on production technology and use of the pendants were done. They allowed to obtain new data on burial rites performed ca. 25 000 years ago. Most of the pendants were made the same way with only three exceptions where polishing traces were observed in crown areas.

Moreover, we focused on a wear degree of individual pendants what allowed to identify if all its elements were produced at the same time or come from various pendants.

Eva David, CNRS, Laboratoire Préhistoire et Technologie, Maison Archéologie Ethnologie,
Université Paris Ouest Nanterre-La-Défense, Nanterre Cedex

ANIMAL HEADS USED AS TROPHIES AT THE MESOLITHIC/NEOLITHIC TRANSITION

Recent technological observations and experiments on animal skulls led to confirm the use of heads of large cervids (elk, red deer) as trophies, at the transitional phase between Mesolithic and Neolithic, in Northern Europe, ca. 5500 Cal BC. After they have been stripped of fur and flesh, skulls have been sliced into specific parts using indirect percussion. The mid part - the one that is still holding the new grown antlers - has been eventually used as trophy. Description of the observed patterns are presented and discussed, together with implications of this result to understand Mesolithic-Neolithic interactions in Northern Europe.

Loretta Dibble, Department of Anthropology, New Brunswick, New Jersey, USA

LAKE TURKANA/OMO BASIN HOLOCENE WORKED BONE: UNDERSTANDING THE BARBED BONE POINTS FROM KENYA AND ETHIOPIA

African Holocene era (9,000 to 6,000 BP) worked bone artifacts (harpoon and points) indicate fishing as a dietary strategy and document change in subsistence tactics from foraging and hunting. These artifacts are found in several geographic areas within Africa in sediments situated along ancient river ways and lakes. As unambiguous markers of the utilization of aquatic foods these artifacts hold many clues to understanding technological, cultural, and resource utilization shifts. Considerable variation exists in harpoon shape and

size, including barb shape, spacing and size, and in proximal and distal end treatments (points and butts). Is the variation related to function or style?

Worked bone artifacts are found from more than 30 archaeological localities from around Lake Turkana and along the former Omo and Kibbish Rivers. In the summer of 2010, more than 800 bone harpoons housed in the National Museums of Kenya and the National Museum of Ethiopia were measured, described and photographed. Included in this study are worked bone artifacts recently recovered during systematic survey and excavation in east Lake Turkana.

This paper reports on the development of a typology that catalogs the technological and stylistic variation of worked bone artifacts from the Turkana/Omo basin. The inter- and intra-site worked bone variation is presented. Finally a regional synthesis of artifact variation, density and distribution is presented, with possible connections to similar worked bone artifacts from North and Central Africa.

Finally since very limited study has been undertaken on the manufacture and usage of barbed bone harpoons this paper reports preliminary results on a series from a series of experimental projects on the manufacture of barbed bone harpoon points from mammal bone, the methods of attaching these bone points to spear shafts, and the use of these harpoon spears for fishing.

Sarah MacIntosh, Department of Anthropology, University of Nevada, Las Vegas,
Las Vegas, NV, U.S.A.

Levent Atici, Department of Anthropology, University of Nevada, Las Vegas, Las Vegas,
NV, U.S.A.

TAPHONOMIC INSIGHTS INTO ANTLER WORKING AT KÖRTIK TEPE, SOUTHEASTERN ANATOLIA

Previous archaeological research on the Neolithic Revolution has conventionally focused on zoological, botanical, and lithic evidence, leaving antler technology largely neglected. We probe antler use and technology at Körtik Tepe, a Pre-Pottery Neolithic A (10th Millennium BC) site in Southeastern Anatolia (present-day Turkey), through an experimental approach that provides insights into manufacturing strategies for expedient and proficient antler tool technologies. By comparing tines from modern shed antler, tines used for pressure flaking experiments, and tines from the archaeological antler sub-assembly, we have identified processes generating striae and cut marks, and discovered that striation and cut marks on tines, which are usually characterized by researchers as deliberate working, were quite often produced without human involvement. Therefore, many archaeological tines typically attributed to pressure flaking may perhaps be non-anthropogenic. Through our experimental work and using a comparative antler assemblage from Körtik Tepe, we demonstrate that revealing the impacts of often overlooked taphonomic filters on worked bone and antler tools may significantly contribute to better understanding of worked bone and antler manufacturing techniques and typological studies. Our research particularly highlights the importance of understanding surface modifications, as misidentifying these can lead to misinterpretations of past human activities, especially at prehistoric sites like Körtik Tepe where other lines of evidence do not often survive. It is thus crucial to improve the

accuracy and explanatory power of currently available analytical tools through incorporating taphonomy, and thereby develop more innovative ways to study archaeological worked bone and antler.

Christopher Arabatzis, Aristotle University of Thessaloniki, Greece

**BONE INDUSTRY FROM THE PREHISTORIC SETTLEMENT ANARGIROI IXA,
GREECE**

Recent investigations in the Florina prefecture yielded a great number of prehistoric settlements near to the coal mining zone at the vicinity of Aminteo. In this presentation I will try to present the osseous artifacts of the settlement Anargiroi IXa that consists mainly of pointed tools, cutting and bevel ended tools, spindle whorls and decorative artifacts. Main focus will be placed on the technology and the typology of the objects as there will be an attempt to reconstruct their manufacture sequence and provide information about their use.

Zsuzsanna Tóth, Eötvös Loránd Science University, Faculty of Humanities, Institute of Archaeological Sciences, Department of Archaeometry and Archaeological Methodology, Budapest, Hungary

**TOOL ASSEMBLAGE AND RAW MATERIAL COMPOSITION ON THE LATE NEOLITHIC SITE
POLGÁR-CSÓSZHALOM**

Polgár-Csószhalom is one of the most important Late Neolithic archaeological sites in Hungary. It is situated on the northern part of the Great Hungarian Plain and consists of a tell and a flat settlement surrounding it. The worked osseous assemblage is studied from both the tell and the flat settlement, and here I would like to share my first conclusions regarding the typological composition of the toolkits and the raw material preferences. The tell was for long interpreted as a special area connected more to the spiritual life, a contrast to the flat settlement as the area of the everyday household activities. This was reflected in the archaeozoological material, too, merely containing wild animal species, dominated by aurochs on the tell, and still large amounts of wild species on the flat settlement, but clearly dominated by domesticated cattle. I focused on this by my study and try to prove or confute the overwhelming predominance of wild species in the tool assemblage on the tell opposing the flat settlement. The worked osseous assemblage will be compared on the tell and the flat settlement by typological composition and patterns and proportions of raw material selection as well.

Giedrė Piličiauskienė, Lithuanian Institute of History, Vilnius, Lithuania
Heidi Luik, Institute of History, Tallinn University, Tallinn, Estonia

BONE AND ANTLER TOOLS FROM NEOLITHIC SITES IN COASTAL LITHUANIA

Very few Neolithic sites with bone and antler material exist in Lithuania, the most famous sites being on the coast. This paper presents the Middle – Late Neolithic bone and antler material found at the coastal sites of Šventoji, Palanga, and Smeltė. Both the size of excavated areas and the number of finds differ greatly at these places, making the comparison of the manufacture and use of bone tools in these sites difficult. The use of antler, however, seems to differ considerably. Of the 250 Šventoji objects made of skeletal materials, only about a dozen tools and some manufacturing refuse were identified as antler, i.e. about 5% of the bone finds. Over half of the osseous objects were made of antler at Smeltė and a quarter at Palanga. This percentage at the latter site might have been influenced by the small number of finds, but it is striking that most of the antler tools at Smeltė and Palanga are heavy duty implements: axes and hammers with shaft holes, which are completely absent at Šventoji. Artefacts closer to the osseous material at Smeltė and Palanga were found at inland Neolithic sites in W Lithuania. The differences in the aforementioned bone – antler tools could have been caused by cultural traditions, site function, and chronology. The AMS dating of the animal bone and antler tools as well as a typological and direct technological investigation of the tools should contribute considerably to the analysis of these sites. This presentation's aim is to discuss all these factors and find what caused the differences at these three sites.

Keywords: bone, antler tools, Neolithic, coastal, Lithuania.

Pierre de Maret, Université Libre de Bruxelles, Belgique
Isabelle Sidéra, CNRS, Nanterre, France

AN IDEAL BONE FOR THE NEOLITHIC BARBIE?

FOCUS OF NEOLITHIC FIGURINES ON RUMINANT METAPODIALS

This talk will relate the use of ruminant metapodial for making figurines during Neolithic in the old world. The context of these objects is either settlements or graves. Though, their value is clear, but remains quite mysterious. In the publication they often considered as idols.

Many examples of these objects can be cited, either from archaeological or ethnographical contexts. Ruminant metapodial is a frequent support for making dolls in Africa.

After having depicted the characteristics of those we know in Neolithic, we will discuss the fonction of such objects, on the basis of use-wear and ethnographical comparison.

Sean Rice, University of Cardiff & Historic Scotland

**NEOLITHIC DRESS PINS AND BRONZE AGE RIB POINTS FROM THE LINKS OF NOLTLAND
WORKED BONE ASSEMBLAGE**

The Links of Noltland is a prehistoric site on the north west coast of the island of Westray in Orkney. The survival of Neolithic and Bronze Age settlements, field systems and burials within their contemporary surrounding landscape is a unique feature of this site, as is the remarkable condition of the remains, particularly those of bone. Since 2007 some 1,200 worked bone artefacts have been discovered. Many of these are familiar objects found on virtually all prehistoric sites where worked bone has survived. Two types of workedbone find, however, have rarely been found anywhere else in Orkney or in Britain as a whole and certainly not in such quantities. This paper will focus on these two very different but equally enigmatic workedbone artefacts and attempt to shed some light as to their possible function.

Sally Evans, Cardiff University, Cardiff, UK

**WOMEN AND WHALE BONE: IRON AGE-NORSE RELATIONSHIPS AND WHALE BONE
TEXTILE TOOLS ON THE WESTERN ISLES OF SCOTLAND**

The nature of the Iron Age-Norse interface on the Scottish islands has been the subject of lengthy debate, with evidence for peaceful integration and violent intrusion at different sites. Along with changes in agriculture a marked shift in marine exploitation has been recorded in fishing industries over this period, with studies of whale exploitation also suggesting change.

This paper examines the use of whale bone textile tools over the Iron Age- Norse transition in the Western Isles. As an artefact group for which whale bone was routinely used in both Iron Age and Norse contexts, textile tools provide an indication of change or continuity over these periods. The persistent use of cetacean bone as the raw material indicates potential commonalities between native populations and possible incomers. Additionally the forms and use-wear patterns evident on whale bone textile tools from Late Iron Age and Early Viking sites contribute to our understanding of the nature of the relationships between tool users. Analysis has revealed varied patterns of tool form and use, suggesting continuity and change on different sites which hint at the complexity of relationships between the women of Western Isles at the interface period.

Alice M. Choyke, Central European University, Medieval Studies Department,
Budapest, Hungary

**THE BEGINNINGS OF SERIAL PRODUCTION AT LATE CHALCOLITHIC ARSLANTEPE:
THE BONE TOOLS**

One general characteristic of technology in earlier prehistoric periods in Europe and the Near East is the production of individual objects, shaped according to proscribed, traditional models of technical and formal style. The cultural consensus involved in household and village level acceptance of mundane tools represents part of the social glue, binding (or acting as materialization of social instability where even the technical style changes) small communities together. Ornaments, as objects of display, often have far larger spatial distributions and shorter temporal distributions because they encompass shared social understandings over larger regions, amongst settlements but are more sensitive to changes in fashion.

Thus, it is not very surprising that at a time and place where other object categories begin to be mass produced, it is bone ornamental pins which seem to be produced using aspects of serial production seen en masse in later prehistoric and proto-historic periods. The late Chalcolithic layer (VII) tell settlement of Arslantepe, located at a junction between Caucasian and Mesopotamian spheres of influence in East-Central Anatolia, represents just such an early attempt (even if not a lasting one in this region) at serial production which was beginning to infiltrate many technical aspects the manufacture of ceramic, lithic and bone pins at this complex settlement. This is the moment at Arslantepe that sees the first centralized monumental building efforts and political and economic structures emerging. At the same time, ordinary, utilitarian bone tools such as awls and spindle whorls, remain wedded to the individual character of household production found in the small dwelling units on the tell but outside the central monumental/temple part of the site.

Andreea Vornicu, “Alexandru Ioan Cuza” University, Iași, Romania
Luminița Bejenaru, “Alexandru Ioan Cuza” University, Iași, Romania & Institute of
Archaeology, Romanian Academy – Iași Branch

**ASTRAGALI USE IN CHALCOLITHIC SITES FROM EASTERN ROMANIA.
THE CONSTRUCTION OF A HYPOTHESIS**

Astragali are found in different degrees of modification in many archaeological assemblages, within a wide chronological and geographical frame. Their use in prehistoric societies was subject of intense debate, both practical and symbolic function being assigned thereto. Our study brings into focus several collections of astragali from five sites located in the eastern part of Romania and dated from the Early to the Final Chalcolithic. The assemblage comprises a total amount of 602 astragali, from which 497 form a single deposit. In order to construct a viable hypothesis on the functionality of this category of artifacts, we pointed our investigation on the relationship between three sets of data. The first one deals with the patterns and intentionality of the modification procedures. Varied types of astragali were found within the collections: flattened on one or more faces, longitudinally divided or perforated.

The underlying problem is whether some of the applied treatments (i.e. the flattening) are the results of shaping procedures or of intense use.

The second set of data is the result of raw material examination and brings to light a specific pattern of exploitation according to the chronological context. More precisely, there is a shift from the use of cattle and other large ruminants' astragali in Early Chalcolithic sites onto small ruminants, especially sheep and goat towards the end of the Chalcolithic.

Finally, the third category of information comes from the analysis of the archaeological context. The modified astragali are usually found grouped together, in some cases along with unmodified astragali. These clusters are discovered in specific places within the settlement: in houses, in pits, in clay layers of house foundation or deposited in a clay vessel.

Acknowledgement: this work was supported by a grant of the Romanian National Authority for Scientific Research, CNCS -UEFISCDI, project number PN-II-ID-PCE-2011-3-0885.

Petar Zidarov, New Bulgarian University, Sofia, Bulgaria

BONE NEEDLES AND COMBS: MORE EVIDENCE ON TATTOOING TECHNIQUES IN PREHISTORIC EUROPE

At an earlier occasion, I summed up cumulative evidence for substantiating the hypothetical reconstruction of tattooing practices among the population of the Late 5th mill BC population of tell Pietrele (Măgura Gorgana) on the Lower Danube (Zidarov 2009). The main argument was based on the discovery of mineral pigment residues on very fine and sharp bone needles, iconographic analysis of anthropomorphic figurines, modern experiments and ethnographic evidence from the Southern Pacific. Subsequent excavations at the same site provide spectacular new evidence along similar line contributing to the diversification of the reconstructed tattooing techniques.

Erika Gál, Institute of Archaeology, Research Centre for the Humanities, Hungarian Academy of Sciences, Budapest, Hungary

ANIMAL BONE TOOL USE IN SOUTH-WEST TRANSDANUBIA (HUNGARY) DURING THE EARLY BRONZE AGE

Rescue excavations from three sites located in South-west Transdanubia (Hungary) yielded Early Bronze Age animal bone assemblages that included a number of remains with manufacture and/or use marks. Two of these assemblages showed similar characteristics regarding the number of bone artefacts and raw material and/or workshop debitage, as well as the main type of tools. The major difference is the presence of thong smoothers made from cattle mandibles at the site of Dombóvár-Tesco, and the presence of polished astragali from large Bovinae at the site of Paks-Gyapa. Not only the number of bone tools was small at Dombóvár-Tesco and Paks-Gyapa (1.8 and 0.4% of the whole assemblage, respectively), but evidence for metal working is also missing from both sites.

The third assemblage coming from the fortified site of Kaposújlak-Várdomb presented different features in all aspects. Bone and antler artefacts were found in a rather great number making up 2.5% of the complete bone assemblage. Especially the points of various type and the hafted antler tools were well represented. The abundance of antler tools, workshop debitage and raw material deposited at the settlement evidence permanent antler working at Kaposújlak-Várdomb. Traces of metal working were also identified from this site, suggesting that it may have had a higher social status, and even may have been a trading centre in the region.

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BONE AND ANTLER PROCESSING AT THE LATE BRONZE AND EARLY IRON AGE LAKE SETTLEMENT IN GRZYBIANY, SW POLAND

Grzybiany site is a Late Bronze and early Iron Age settlement in SW Poland at southern shore of the Koskowice Lake. Multi-seasonal excavations (1950-1980s', 2010-2011) of this lake settlement produced abundant faunal data of which over 150 pieces demonstrated traces of deliberate modification. Half of them are half-products, production waste and ready products made of bone, antler and horn. Numerous traces allowing identification of tools and techniques applied on various stages of production were observed as well.

Among bone and antler artefacts, awls, points, arrowheads, pins, skates, rib-tools, axe, hammer, hafts and undetermined tools were identified. Many half-products and production waste prove a local production with a particular focus on antler processing. Moreover, some artefacts wear use-traces typical for leather and wool processing, hoe-farming, hunting, transportation and hafting.

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EXPLOITATION OF THE UNIO SP. VALVES FOR NON-ALIMENTARY PURPOSES IN THE ROMANIAN ENEOLITHIC. ARCHAEOLOGICAL AND EXPERIMENTAL DATA.

From the settlements of Gumelnița culture (the second half of the 5th millennium B.C.), come valves of the *Unio* sp. processed to be made into personal adornments. The recovered series of *Unio* sp. valves includes pieces in different stages of transformation, from entire valves simply perforated, and irregular splinters, to finished beads, used as personal adornments. In this case, we interpreted the raw material as local, obtained as a by-product of the gathering process. Among the food waste products from the few settlements, the *Unio* sp. valves are well-represented quantitatively, their nutritional contribution being quite substantial.

In order to identify the costs invested in the manufacturing of this type of items, both in point of time and in point of effort, we have developed an experimental program, allowing us to record all the variables (means of obtaining the raw material, technological stages,

time recorded for each operation, tools used, evolution of the wear following the usage etc.). Later on, the items were put together in a bracelet, tracking the evolution of the surface wear and of the perforation, which would allow us an evaluation of the use of archaeological pieces.

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WORKED BONES AND SHELLS FROM LAKE SEVAN BASIN

Beads and box for incense, pendant, awl (for pricking the skin), decorative knife hilt, cheekpieces, nails and arrowheads made from bones and horns of various animals were found among the numerous archaeological finds from the excavations of the Lake Sevan basin.

Tubular and square shaped beads made of bone with schematic images in the shape of eyes and shells of mollusks (Hexagonal *Conus*, *Cypraea annulus*, *Dentalium*) represent the oldest decorations. A strand of 19 beads from cowry was discovered in the material collected in Sodq. Apart from their value as barter items, these shells are also known to be used against the evil eye (shaped as necklaces which used to be sewn down to clothing and cradle).

Among other interesting finds was a box made from the cattle bone and its surface was decorated with irregularly carved «eye-shaped» images. The lid of the box was probably made of wood which did not preserve, but small bone nails in the openings which kept them attached remained intact.

Four types of cheekpieces - flat, quadrangular with two holes, the other one is made of a canine tooth of wild boar with a hole in the middle. The other two types of cheekpieces are made of horn, decorated with eye-shaped images and have 3-4 holes on different sides for fastening the bit of the horse.

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MORE THAN MEETS THE EYE: MICROSCOPIC AND TECHNOLOGICAL STUDIES OF EARLY BRONZE AGE BONE AND ANTLER BEADS FROM KICHARY NOWE, SE POLAND

This presentation aims to highlight the most interesting developments in the studies conducted for author's MA thesis: *Manufacture, utilization and symbolic meaning of Mierzanowice culture bone personal ornaments in the light of technological and microscopic data*. Analyzed material consists of 64 worked bone and antler beads of different shapes and sizes. The artifacts originate from a multicultural site Kichary Nowe located in south-eastern Poland and they are associated with Mierzanowice culture burials. This material required interdisciplinary approach, thus archaeozoological, microscopic, technological, taphonomic and contextual analysis has been conducted. Main part of the studies aimed to

identify micro-traces and use wear traces on bone and antler and it has been carried out using stereoscopic and optical microscopy, as well as SEM analysis. Different scrape and cut-marks have been observed, some of them strongly resembling experimentally generated micro-traces made by bronze implements. It is very interesting in terms of metal consumption in the Mierzanowice culture which manifests only as personal adornments made of copper alloys and deposited as grave goods. Other identified micro-traces, mainly minute polish scratches allowed a better understanding of bone beads use-life and the way they were worn. Unexpectedly, on some of the artifacts cellulosic fibers have been observed, some of which in undisturbed context. In order to confirm the findings, additional SEM analysis has been carried out. This microscopic and technological approach shed some light on the life cycle of bone beads and on “hidden” aspects of the Mierzanowice culture, such as the suspected use of metal implements and plant textiles.

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**POSSIBLE POLISH TECHNIQUES PRACTICED DURING IRON AGE ON BONE AND
ANTLER ARROW-HEADS AT ATRANJIKHERA AND JAKHERA**

Bone and antler arrow-heads from two Iron Age sites in Upper Ganga Plains of northern India were examined microscopically for traces of manufacture. The rich assemblage of bone and antler arrow-heads discovered at Atranjikhhera and Jakhera are unique and provide evidence of the technical sophistication attained by the bearers of Iron Age culture. Manufacturing techniques and wear pattern were examined in order to understand local and regional variations. The careful examination of the bone and antler arrow-head assemblage from both sites several new polish techniques were first time recognized in India. This study show that bone and antler arrow-head manufacturing was a complex process and required decent investment of time and expertise.

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**BONE TOOL OF DADIWAN SITE, NORTHWEST CHINA,
AN APPLICATION ON THE USE OF CORRESPONDENCE ANALYSIS**

Six hundred thirteen bone tools, which can be identified to genus or species levels, out of 2227 from Dadiwan site, were put into correspondence analysis. Result of the analysis shows a strong relation among factors, namely, the genus or species of the animal, the element for making bone tools and the categories of the bone tools (namely, hairpins, awls, shovels, arrowheads, chisels, knives and dagger).

Dadiwan site is located in Gansu Province, Northwest China, which dates back to 7800 to 4900 BP. The four phases which yielded bone tools are discontinued, phase 1 dates back from 7800 to 7300 BP, phase 2 dates back from 6500 to 5900 BP, phase 3 dates back from 5900 to 5500 BP and phase 4 dates back from 5500 to 4900 BP.

Among these four phases, phase 2 comprised 427 pieces of bone tools and phase 4 comprised 116 pieces, and these two phases yielded the vast majority of the whole assemblage.

Correspondence analysis concluded that in phase 2, metacarpal, and metatarsus; radius and tibia of ruminant (most corvine and bovine) were the most common raw materials of bone tool manufacturing. They were made into nearly all kinds of bone tools.

In phase 4, the main raw materials continued to be limb bones of ruminant. But the distance of relation coefficient of pig fibula in hairpin decreased, which means that pig fibula became a common material for making hairpin, and did not used that widely in other kinds of bone tools. The scale of pig domestication do increased when compared to phase 2, pig fibula then became more widely available. Awls, shovels, arrowheads, chisels, knives and dagger are tools for manufacturing; higher hardness will be needed when compared to hairpin, which is a kind of ornament.

In conclude, strong relation was shown among these three factors. Characteristics of each kind of raw material were considered before putting into manufacturing.

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**EXPLORING BONE MICRO-FRACTURE USING MICRO-CT:
POTENTIAL APPLICATION IN STUDIES OF ANCIENT BONE TOOL FUNCTION**

Many experiments have sought to recreate the types of damage that would be expected in ancient stone and bone weapon tips. This damage is usually presented as visible fractures or microscopic surface modification. Fatigue tests conducted on bovine bones, however, show the development of internal micro-cracks that result from stress, prior to actual breakage. In this paper I present the results of an experimental investigation of bone points subjected to a variety of activities. I assess the presence of microdamage using micro-focus computed tomography. The results show that two patterns of micro-cracks develop in bone and are best viewed in longitudinal section. Micro-cracks are a cumulative feature dependent on the amount of load applied and the duration of activity. When subjected to high enough loading rates, micro-cracks will merge together to eventually form a fracture. Although further tests are needed to confirm the exact point at which these fatigue fractures begin to form, micro-focus computed tomography has the potential to reveal whether an individual bone point underwent multiple or prolonged impacts and thus to elucidate the probable function/s of ancient pointed bone tools where no visible damage is apparent. Micro-focus computed tomography is a non-destructive and non-invasive procedure and therefore safe to use on archaeological artefacts.

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ANTLER WORKING AND OBJECTS IN THE ROMAN MUNICIPIUM IUUVAVUM / SALZBURG

In Iuvavum quite an amount of antler waste as well as (half) finished objects has been found by excavations. On the bases of the waste material it is possible to reconstruct for the most part the 'chaîne opératoire' of the main antler product of Iuvavum: handles for knives or other implements.

The waste is concentrated in certain areas, thereby referring to crafting activity nearby. Most of this spots show also metal working. A possible connection of these activities will be discussed as well as the unusually high amount of antler working in compare to bone, which is the more common material in Roman times.

Marina Kovač, Museum of Slavonia, Osijek, Croatia

SEVERAL OBSERVATIONS ON SEMI-FINISHED BONE PRODUCTS SUPPORTING THE EXISTENCE OF A BONE WORKSHOP IN MURSA

The holdings of the Museum of Slavonia in Osijek (Croatia) keep a large number of Roman bone objects which are forming the Collection of Roman bone objects of the Archaeological Department. Collection consists of more than 800 objects which include various types of sewing, knitting and embroidering needles, pins, cosmetic implements, dice, tokens, spoons, combs, knife handles and other types of handles, weaving equipment, different decorative rings and plaques, writing tablets, parts of furniture etc. Due to the lack of archeological context, the analysis relies on a general chronological framework of the certain types. Collection also holds a dozen of semi-finished products and raw materials (bovine horns). These objects were acquired by the Museum in late 19th century and in the first half of the 20th century (purchases, accidental finds and donations). This paper deals with typological problems and *chaîne opératoire* during the manufacturing process of certain types of objects, such as needles, pins or parts of furniture. Although a bone workshop has not been archaeologically confirmed in Mursa (Osijek), both the great number of bone objects from the old Museum holdings and various bone objects recently found in archaeological excavations in the Mursa area put forward a hypothesis about the existence of local workshops in Mursa.

Sofija Petković, Archaeological Institute, Belgrade, Serbia

BONE FIBULAE AS GRAVE GIFTS IN UPPER MOESIA

This paper deals with the bone specimens of Roman fibulae in *Moesia Superior*. Although, some parts of some types of Roman brooches were made of bone or ivory, it is quite unusual that a whole fibula, or its major part has been manufactured of osseous material. Generally, bone fibula would not be functional – it could easily break or bend, especially considering the composite construction of Roman brooches. The reason for the use of bone

material for the production of fibulae may be their ritual character. Namely, in Upper Moesia Roman bone brooches were discovered only in burial context, as grave gifts.

The first example is a knee - fibula completely executed of bone, discovered in a rich tumulus - grave of Thracian women in *Ulpiana*, dated in the 3rd century.

The second specimen comes from a cremation burial in *Viminacium*, dated in the second half of 2nd - the first half of 3rd centuries. This bone fibula in the shape of dove had once a bronze spring and needle.

Both burials belonged to the type of cremation graves with a strong indigenous tradition (Thracian, Dardanian or Triballian) and could express the autochthonous beliefs about the afterlife.

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Belgrade, Serbia

A STRANGE BONE OBJECT FROM LATE ROMAN NECROPOLIS GLADNO POLJE IN BELA PALANKA (REMESIANA)

Archaeological site Gladno Polje in Bela Palanka (Roman Remesiana) was explored during 2011 within the project of highway E 85 construction. Two unities from Late Roman period were excavated on the flat plateau up above the north bank of the river Nišava: necropolis situated right above the river and economy building north from it. According to archaeological material and stratigraphical and osteological analyzes data the building was in function during IV and V century and its residents were buried in the explored part of the cemetery during the mid IV century.

More than 50 graves were explored within the necropolis. The deceased were deposited in the simple rectangular graves in two ways: with head on the east or with head on the west. Grave finds and the position of the spikes inside the grave suggest that there were the wooden coffins. Beside adult individuals a great number of children were buried here, with pathological changes on the bones that confirm performing hard labor among the children. The inventory of the explored graves is usual for the period. Beside the personal jewelry (earrings, diadems, necklaces, bracelets, rings), clothing components (fibulae, sections of belt sets) and rare iron or bronze tools, the pottery vessel was placed next to the feet and bronze coin put in the mouth of deceased.

The unique and strange bone object was discovered in grave no. 1. It is a grave of a child. According to grave finds (two bronze bracelets, diadem) a girl (3/4 year) was buried. She was placed in the grave on her back, with head to the east. The bone object we are speaking about laid next to her left foot. The item is arched in shape, square in cross section and with thinner ends each with two holes. At the first sight it seemed like a handle of a small bucket. We do not find any similar object in the available literature. A well preserved bronze coin of Crisp, a son of Constantine the Great, not for long time in usage was found next to mandible.

We point out that some raw materials, such as glass and bone or antler, that were bountifully used during IV century, are very rare in cemetery Gladno Polje as well as in the economy building nearby. The described item is the sole bone object in necropolis while the glass vessels are not present at all as a grave inset.

Only two bone objects (one comb and one bracelet) and one antler item (a handle of the iron tool) were discovered in economy building among more than 750 mainly bronze and iron finds.

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Sonja Stamenković, Archaeological Institute, Belgrade, Serbia

ANTLER WORKSHOP IN CARIČIN GRAD (JUSTINIANA PRIMA)

The ruins of Caričin Grad are believed to be the site of the once important regional centre of Justiniana Prima, the city built by Emperor Justinian I (527-565) to honor his birthplace. Archaeological excavations brought to light many traces of bone-working which could easily be dated within a short span of time, from c. 535 to c. 615. During the excavations in the area of the city's southeastern corner tower, numerous evidences of craft production were recorded. A total of 81 pieces of craft material, unfinished, semi-finished, and finished products made from antler have been found. The workshop was active, according to coin finds, during the reign of Emperor Justinian I. The objects were made *in situ*, from the preliminary processing of material to the final stage of production, as testified by numerous diverse elements of unfinished and semi-finished combs. This kind of activity is also confirmed in the southwestern quarter of the Lower Town, with additional 37 pieces of antler waste and semi-finished combs originating from there. Specialized craft tools have also been found, which allowed us to reconstruct some aspects of antler production, like procurement of raw materials and manufacturing technology.

ROMAN BONE DICE AND COUNTERS IN THE TERRITORY OF PRESENT DAY SERBIA

Marko A. Janković, Department of Archaeology, Faculty of Philosophy,
University of Belgrade

From over forty Roman sites in Serbia more than 300 dice and counters were discovered so far. Only few were made of stone, shell or glass paste, and for majority of them, bone was used as raw material. Great number of these artifacts were found within burial contexts (more than 70%), and the rest was discovered within other contexts – houses, baths, military forts. In only one case, we have confirmed context of discarded counters in dump pit of a bone carver workshop. Still, we are not in a position to argue on raw material or production of these artifacts. Lack of accurate analysis and excavated workshops is a problem yet to be solved. On the other hand, we are able to discuss the distribution of these small finds and their usage in everyday life of Romans.

The fact that they were found in graves, in vast majority of cases, tells us that their symbolic usage was far from being only practical. Several interpretations were offered during the last three decades, but none of them holds firm arguments.

My intention here is to try to offer a different approach, leaning on the usage of board games accessories and its relations to everyday life.

Most of the artifacts found, were just the parts of “gaming set”, and only in one case, in a 4th century tomb from Gradsko polje-Niš, we have enough evidence to argue on a complete set used for probably some local game.

Partialization of such gaming sets may provide us with a useful hint in understanding of its symbolic meanings in the context of burial practices. Finally, comprehending such social practices would give us the better understanding of the Roman provincial society.

Zlatko Kovancaliev, NI Stobi, Archaeological site Stobi, Gradsko, Republic of Macedonia

BONE CYLINDRICAL OBJECTS FROM STOBI

Stobi is one of the largest and best-preserved archaeological sites from the Roman and Late Antique period in the Republic of Macedonia. The archaeological data reveals long habitation in this area beginning with the late Bronze Age, although urban development is recorded much later, in the early 2nd cent. BC. In the 1st century A.D. the city was raised to a rank of *municipium* with citizens that possessed *ius Italicum*. In the 4th cent. AD, Stobi was established as an important Early Christian center and a Bishop's seat. Later in the 5th century the city is recorded as a capital of Macedonia Secunda. The town was abandoned during the last decade of the 6th cent. AD.

During a 100 years of excavation more than 1200 worked bone objects were revealed at Stobi. A group of 18 objects from the second half of the 6th century deserve special attention because of their disputable use. The same objects are found at many Late Antique sites in the Balkans, and usually interpreted as knife handles. Some scholars consider these objects as part of looms, where they serve as heddle holders. They are cylindrical, perforated in the middle, with rectangular cutting at one end. Their surface is decorated with lines, and circle and dot motif. A newly discovered object at Stobi (from 2012), with a rectangular supplement inserted in the cutting, fully discards their identification as knife handles. Few of the ascertained use wear traces support the possible idea as heddle holders or at least usage with a thread. Presenting the context of the finds, this is another attempt to understand their exact function.

Keywords: worked bone, cylindrical objects, heddle holders, Stobi, Late Antiquity, Macedonia

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EARLY ISLAMIC BONE DOLLS – THOUGHTS ON THEIR CHRONOLOGY, ORIGIN AND STYLE

Female 'Coptic' bone dolls of the Early Islamic period are a favored object in many archaeological and art museums around the world. They were first published more than 100 years ago by Strzygowski, and the discussions regarding them was limited for many years to mostly unprovenanced museum specimens. Since the 70's a growing number of these dolls are being unearthed from sites across Egypt and the Levant. In the last decades a few discussions emerged regarding their use, style, origins, execution and typology, yet a full and thorough analysis of the 70 or so excavated specimens was never conducted.

Everything about these unique objects is still controversial: their chronology and origin, their use, and even the term denoting them – 'Coptic'. In my presentation I will discuss a large group of newly discovered dolls from Jerusalem, and try to fit them and the large corpus of recently excavated dolls into coherent chronological, regional and stylistic frames.

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**CARVED ANTLER TOOLS FROM NOSA AND MANDJELOS REASSESSED:
A GLIMPSE INTO THE AVAR PICTORIAL EVIDENCE**

Two previously published antler tools, so-called disentangling hooks, are commented on in this paper. The finds come from Nosa and Mandjelos, located in the southern area of the Avar Khaganate, i.e. in present-day northern Serbian province of Vojvodina. What is special about these tools is that they bear carved representations of – presumably – Avars and their horses. To this author's knowledge, these are the only detailed representations of the Avars on antler objects. The conducted archaeological (and art-historical) analyses lead us to the conclusion that the finds come from the second half of the seventh century. In the case of the stray find from Nosa, such a date could be proposed on the basis of the depicted shape of the saddle, while the find from Mandjelos comes from a horseman's grave which can be safely dated around 650. Various details point to a Central Asian (Altai) origin of the representations.

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CHASING REINDEER: MATERIAL NETWORKS IN VIKING-AGE ANTLERCRAFT

Northern Europe's three large cervid species – red deer (*Cervus elaphus*), reindeer (*Rangifer tarandus*), and elk (*Alces alces*) – all produce a product that was invaluable in pre-modern craft and industry: antler. In the early medieval period, this raw material gained a particular currency, as it found a role in the production of a range of valued items: most notably hair combs. As a result, it began to be exploited on a previously unprecedented scale.

This paper will present preliminary findings of the largest application of ZooMS proteomic analysis to artefactual material. Used in concert with traditional zooarchaeological analysis, as well as consideration of form, ornament, and manufacturing methods, this biomolecular technique provides an important addition to the toolbox of the worked-bone specialist, as it allows us to identify the species from which bone objects are made. In the context of combmaking, it has important implications for the provisioning and organisation of craft and trade. The results from the analysis of both finished combs and workshop debris from sites at Aggersborg, Ribe, and Aarhus (Denmark) will be explored, alongside previous work on finished combs from the Northern isles of Scotland, with a view to producing a broader understanding of long-distance trade patterns and flows of raw material in the Viking world.

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**BONE, TEETH, ANTLER AND HORN –
MANUFACTURING WASTE FROM MEDIEVAL SIGTUNA**

Sigtuna is the oldest still existing town in central Sweden. It was founded in the late 10th century when the nearby Viking Age town Birka ceased to function as a port of trade. Along the Main Street in medieval Sigtuna thick layers of waste material from manufacture activities reveals a long and sometimes intensive production of mainly combs, but also other small objects such as needles, handles, spindle whorls, gaming pieces and dice. So far hundreds of kilos of waste material have been collected at different excavations in the town.

In a recent study the waste material from the excavations in the Trädgårdsmästaren block has been osteologically determined. The material consist of more than 700 kilos of waste material and comes from four adjacent town plots that can be studied from the foundation in about 985 A.D. until 1260 A.D., and divided into ten different phases, each representing a time period of circa 25-50 years. The identified material reflects both spatial changes in manufacture activities within the individual town plots as well as chronological changes in the use of various raw materials.

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Philipp Jettmar, Vienna Institute for Archaeological Science, University of Vienna
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**A BROKEN SKATE AND SCATTERED CHESSMEN? –
WORKED BONES FROM THE CASTLE OF GRAFENDORF (STOCKERAU, LOWER AUSTRIA)**

In 2002 and 2003, archaeological investigations were carried out in the area of the castle of Grafendorf (Stockerau, Lower Austria). The lowland castle, of which mostly subsurface features and parts of the ramparts survived, became abandoned in the 1st half of the 16th century. A comprehensive study of the archaeological finds and relevant historical sources has been completed recently. The seat of a local lordship is evidenced, among others, by high-status items like a sundial and a mould for ceremonial bakery.

The animal bone samples, with over 2.500 remains altogether, were collected mainly in the core area of the castle. The cultural strata can be dated from the late 14th to the early 16th century. The faunal assemblages are dominated by the major domesticated mammals. Domestic and wild birds and wild mammals form a minor, but steady element. Nine specimens, comprising 11 individual bones, were identified as worked objects. None of these were recognized prior to the animal bone investigations. A few pieces of waste from pin or pearl production were already singled out during excavation.

Three proximal phalanges of cattle, although differing slightly in appearance, form the most uniform group. The production marks comprise a smoothing of the basis, further trimming of the body and the distal extremity, and axial perforations of the proximal or distal articulation surfaces. A slight, homogenous polish of the body surfaces is a common feature of all three specimens. The production marks, mostly inflicted by a heavy metal

blade, enhanced stability when the phalanges were placed upon their proximal extremity, or allowed for the application of differential markers; the polish may be related to repeated handling. It is therefore suggested that these objects represent gaming pieces, or, more specifically, chessmen. This interpretation may also be applied to a cylinder of red deer antler, sawn off on both ends, and a trimmed cattle metatarsal. The surface polish and the absence of any other signs of use wear serve as arguments in these cases. In the case of the cattle remains, the treatment of the artefacts can be compared to the modification patterns present on the ordinary butchery refuse, which is likewise characterized by the use of heavy choppers.

Two more artefacts comprise sets of two bones each: the fragments of a horse metatarsal, found in different areas of the same horizon, were clearly broken before deposition. This bone was worked into either a bone skate or a sledge runner and is characterized by the typical use wear, overlapping across both fragments. The other item is the shaft of a goose ulna, into which a radius, probably also from goose, was inserted. From slight carvings and polish on the surfaces it becomes clear that these bones were used as a composite tool, possibly as a writing device. The two remaining pieces are a sawn-off distal extremity of a humerus from wolf or very large dog, and a shaft splinter of a cattle-size mammal, which was hollowed out on one side and polished on the other. While the humerus may be the only manufacture debris among the whole material, if not an artefact in its own right, the diaphyseal fragment is likely to represent an element of a more complex device or construction, which it is hardly possible to identify.

According to the scarcity of manufacture debris and semi-products, the aforementioned objects were probably produced elsewhere and deposited on the site after they went out of use or were broken. Some objects (writing tool, gaming pieces) may be linked to the “raised” status of the former inhabitants. It can be further demonstrated that 1 – even in medieval contexts, many worked bones escape attention if not recognized in the course of an animal bone study and 2 – the interpretation of bone artefacts of a given assemblage may be mutually influential.

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**FROM LITURGY TO LICE –
THE DEVELOPMENT OF THE DOUBLE SIDED IVORY COMB IN THE NETHERLANDS**

Double sided ivory ‘lice combs’ or fragments of these combs are found at almost every excavation from post-medieval sites. They are often seen as unimportant finds, because of the quantities in which they were found, but also because of their simple and undecorated appearance. The small fragments seem unappealing to a large audience, however they tell a tale of trade, craft and a changing view of a raw material from an exotic provenance.

In the medieval period ivory was a luxury raw material, used mainly for religious items. Gradually it was also used for profane objects and eventually even objects for everyday use were made of this material. The view of ivory as a raw material changed throughout time. As an example of this changing perspective we can look at the development of the double sided ivory comb. In this presentation the development of the double sided ivory comb in the Netherlands is described, along with their crafters and users.

Who made these items and where did they purchase their raw material? What was the use of these combs and by whom?

Vesna Manojlović Nikolić, Faculty of Philosophy, Department of History, University of Novi Sad, Novi Sad, Serbia

**A CONTRIBUTION TO THE STUDY OF THE BONE INDUSTRY FROM THE SITE
PONTES – TRAJANOV MOST (IX –XI CENTURY)**

Archaeological excavations of Roman site Pontes – Trajanov most, in the village of Kostol (near Kladovo), were carried out from 1979 to 1991. The excavations were a part of the project that included protective research of cultural heritage that was jeopardized by constriction of the hydropower plant Djerdap II. Numerous important data were obtained concerning settlement and everyday life in the Middle Age. A part of Slave settlement was discovered inside the walls of the Roman fortress, including semi undergrounded houses, furnaces and pits. According to the stratigraphical data, architecture and archaeological finds they are dated to the period from IX to XI century.

Among numerous archaeological finds we pay attention to the bone and antler objects. More than 200 objects were found: various tools required for everyday works, decorative and game objects, combs and semifinished items. The types of the objects suggest that they were not produced in some craft center but in the settlement itself. The most interesting are numerous astragals. The majority of the bone and antler objects were used for everyday jobs: leather processing, making shoes, sewing, decoration of pottery products, fishing nets working. All of this activities were practiced within the homework. Thus all the most necessary objects were produced inside the settlement being simple for producing and made of materials that were easy to achieve. According to osteological analyses the bones of the sheep and goat were used (exceptionally the bones of the pig), as well as the deer antlers. This suggests that beside the agriculture, that was the main occupation of the population, the husbandry and hunting had important role in the economy of the settlement.

Heidi Luik, Institute of History, Tallinn University, Rüütli 6, Tallinn, Estonia

BONE WORKING IN THE SUBURBS OF MEDIEVAL AND EARLY MODERN TALLINN, ESTONIA

The paper discusses bone tools found from medieval and early modern suburbs of Tallinn. Most of the studied find material comes from the excavations at Tartu Road 1 in 2011–2012 and at Roosikrantsi Street 9/11 in 1996. The plot at Tartu Road 1 was located in the suburb by the road to Tartu and also to northeastern Estonia. The earliest finds there date from the 14th–15th centuries and the latest from the 18th–19th centuries. Both artefacts and working debris have been found, the most abundant among the debris were waste of bead and button making. Some antler objects and antler working refuse were also found. Antler working waste as well as bead making refuse originated from the contexts dated to the 15th–16th centuries. Button making waste is later, belonging to the 18th century context. The plot at Roosikrantsi Street 9/11 was located by the road to Pärnu and western Estonia.

Both bone and antler artefacts and working refuse were quite numerous there, the earliest finds belonging to the 13th–14th centuries and latest to the 17th–18th centuries. At the present stage of investigation the greatest share of bone and antler working waste in Tallinn has been found from the excavations in the suburban areas. The bone and antler working refuse found at these suburbs may refer to itinerant bone workers who stayed and worked there.

Paul Stokes, St. Cuthbert's Society University of Durham, Durham, UK

**A NEW INTERPRETATION OF POST-MEDIEVAL BONE SCOOPS FROM THE
FORESHORE OF THE RIVER THAMES IN LONDON**

I have had an interest in the problematic category of bone tools conventionally referred to as “scoops”, which has generated speculation as to their actual use. My prime interest is in a kitchen tool used in post-medieval food preparation, called an “apple corer”. An expanding interest in the date and use of such artefacts has led to the collection of antique and vintage examples, amassed in the past eight years. During this time, I came across a number of superficially similar bone tools recovered from the River Thames foreshore near to Tower Bridge. Though realising the importance of this typologically distinct artefact, due to limited funds, I was only able to purchase 92, the majority of a larger collection amassed by a Mud Lark over a very long time. It is the typology and function of these bone tools that is the subject of the present research and the results that I am going present. The current evidence indicates that these artefacts were probably manufactured between the late 16th and early 18th century, from carcase bones deriving from The Royal Navy victualling yard, East Smithfield opposite Tower Hill, London. I have identified their probable use, by comparison with modern examples, manufacturing replicas and teaching myself to use them and examination of the microscopic wear patterns on both types of original tools. The diagnostic features of these tools will be presented, to aid future separation and identification of these artefacts from the amorphous category of “bone scoop”.

Vesna Bikić, Archaeological Institute, Belgrade, Serbia
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**BONE WORKING AND ARMY: AN EARLY EIGHTEENTH-CENTURY
BUTTONS WORKSHOP AT THE BELGRADE FORTRESS**

During the Middle Ages and at the beginning of the Modern Age bone, horn and antler were much used for making different items, like toilet and textile combs, knife handles, crossbow nuts, beads, buttons, needles, and playing pieces, etc. Yet, the use of osseous raw material has been less explored topic so far. The archaeological context will be interpreted and workshop for making buttons for military purposes will be hereby identified. In addition, some important issues related to the production of bone items will be discussed.

Bone waste was uncovered within a defensive structure sitting atop the Upper Town's south-eastern wall of the Belgrade fortress; it was tentatively named the Blockhouse, and thoroughly explored in 2008. The Blockhouse was built between 1718 and 1721 as a defensive structure, but remained unfinished due to changes of construction plans. Shortly afterwards its aboveground portion was partly torn down and the vaulted subterranean chamber was largely filled with waste, that is with items used by the Austrian troops in a relatively brief period from 1717 to 1725 at the latest. In addition to many other items, mainly ceramic and glass vessels, then knives, leather shoe soles, buckles, etc. – parts of worked bones was uncovered among organic debris within the subterranean chamber.

Over eighty fragmented ribs that represent waste from button manufacture were discovered. Good preservation and relatively large number of fragments enabled a detailed analysis of the production. It was possible to reconstruct entire chaîne opératoire, and to analyse diverse technological aspects – raw material selection, level of curation, quality of final products. Exclusively large herbivore ribs were chosen, probably kitchen debris, roughly pre-shaped by breaking, chopping, adzing, hacking and cutting, and then the buttons were produced by drilling a perforation from two sides.

Two variants were noted – smaller button, of diameter 1,15-1,20 cm, and larger, 1,4-1,5 cm. Minimal curation (rough surfaces, edges sometimes torn) and relative low quality indicates rapid production and requirements for a large number of items. When it comes to the military, it could be buttons for shirts/uniforms or, possibly, for pillowcases. On the other hand, used raw material, and that is kitchen waste, confirms button craft workshop within one of the nearby barracks. The manner in which this workshop operates further indicates a well-organized, resourceful and economical army.

POSTERS *(in alphabetical order):*

Dragana Antonović, Archaeological Institute, Belgrade, Serbia
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STONES AND BONES: STONE TOOLS USED IN MANUFACTURING OF BONE

Prehistoric grinding stone tools are usually related with manufacturing of stone, at least much more than with production of bone objects. This opinion is not supported by results of analyses of consumption of grinding stone tools. The aim of this work is to present some new apprehension of usage of grinding stone tools.

Numerous grindstones made of fine-grained sandstone are discovered at Neolithic and Eneolithic sites in Serbia. A considerable number of them have very smooth working surfaces, like whetstones, which suggest that those tools were probably used in manufacturing of objects made of material softer than stone like bone, antler, pottery or wood. Some of them bear traces in the form of narrow and shallow grooves, typical for sharpening of awls and needles. A certain number of whetstones suggest that this kind of tools was used for sharpening of blades and knives. Those discovered in Eneolithic horizons are usually connected with sharpening and shaping of metal blades, knives and other metal objects. On the other side, whetstones found in Neolithic layers (contexts) have to be considered as tools of the same purpose but used for processing of raw material of the same hardness as the first invented metal – copper. We consider that Neolithic whetstones and other grindstones with smooth working surfaces were mostly used for sharpening of various kinds of blades and pointed tools made of bone about which testify traces of manufacturing on bone tools discovered at numerous Neolithic and Eneolithic sites in Serbia.

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OBJECTS OF SPECIAL USE FROM LATE NEOLITHIC/CHALCOLITHIC SITE OF VODEN, THRAE (SE BULGARIA)

Osseous raw materials are used for producing a wide range of artefacts – everyday tools, weapons, decorative items. Most of the prehistoric bone industries, however, also contain a group of practical objects that do not have an active working end or working surface (point, cutting edge, percussion surface, etc.), used as auxiliary instruments, intermediary pieces, etc. These artefacts usually receive less attention than tools with well-preserved usewear traces or attractive jewellery pieces, mainly because it is difficult to classify them, due to their diversity in both shapes and functions (they are often just grouped as “varia”), although they may offer interesting technological solutions for optimised use of natural qualities of certain bones, such as shape.

Some of the possibilities for use of osseous raw materials in the Neolithic and Chalcolithic period can be seen from a rich bone industry assemblage discovered at site of Voden (Thrace, SE Bulgaria), excavated in 2012. These include used short bones (astragals, phalanges), diverse handles and hafts, spoons, etc. Particularly interesting are handles and hafts, some just using natural shape of long bones and their interior for inserting other tools, and some more elaborated, such as cylinders made from antler beam segments. The most attractive find is a fragment of an antler handle with fragmented antler tool still embedded in it.

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Marius Gheorghe Barbu, Museum of Dacian and Roman Civilisation, Deva

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MICROSCOPY OF THE PREHISTORIC TECHNOLOGY. BRONZE AGE ARTEFACTS MADE OF PERFORATED SHELLS DISCOVERED IN A RITUAL COMPLEX FROM TRANSYLVANIA

The archaeological site of Uroi-“Sighet”, Hunedoara County is placed on the Mureş Valley, 100 meters far of the river, in its floodplain area (Km 20+280 – 20+512). The research team included: Bodó Cristina – scientific leader, Ioana Lucia Barbu, Marius Gheorghe Barbu, Ionuţ-Cosmin Codrea, Mihaela Maria Ion (Barbu), Antoniu Marc, Costin Daniel Țuțuianu from the Museum of Dacian and Roman Civilisation, Deva. In 2011, 230 de complexes were excavated. These were dated from: Bronze Age, (Wietenberg culture), the First Iron Age, Early Middle Ages and Contemporary Epoch. The Bronze Age complexes are huts, pits with various destinations, and two graves. The Bronze Age settlement is placed between km 20+290 - 20+450 and it continues to South on the area of Deva - Orăștie Motorway.

The Complex 13 is a pit with depositions whose purpose was probably a ritual one. It is dated from the Bronze Age (Wietenberg culture). Its shape is oval, with a diameter of 2.70 x 2.30 m and depth of 1.10 m. It partially enters in the Northern profile of the surface affected by the construction of the motorway. Starting with the depth of -0.30 m, a thick layer of ash, pigments and pieces of coal appears. The inventory comprises: numerous fragments of clay pots – cups, entire bowl, a miniature vessel, a decorated piece of clay, a fragment of an undetermined clay object, a fragment of a miniature wheel, shells, two chipped pieces of flint (one of them being retouched), a pendant probably made of a dog canine.

The complex comprises several dozens of freshwater shells (*Unio* sp.). From these, 38 present each a technical/intentional perforation placed on the area of maximum convexity. The perforations are irregular/oval and were shaped by percussion. Their diameter is around 5 - 10 mm. An important issue in the analysis of the complex is related to the signification of the perforated shells in the ritual deposition from the pit. The analysis should bring arguments to support or to reject several hypotheses: the perforation was done by applying the same technical procedures (by a single person during a single stage?); the perforation was done with the purpose of creating a simple device to which the shells could have been sewn or tided. The shells were probably used as adornments (pendants) or as decorative elements sewn on a piece of textile or leather.

10th Meeting of the Worked Bone Research Group of the ICAZ.
Beograd, 25-30. Avg. 2014.

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BONE ANVILS FROM THE ROMAN CITY OF VIMINACIUM

Among faunal material from the Roman city of Viminacium, two peculiarly marked cattle bones, a mandible and a distal metatarsal bone, were noted. The surfaces of the bones were covered with regular rows of triangular marks – a characteristic use wear marks which, according to recent ethnographic studies, identify bones used as anvils to create teeth on blades of iron sickles. Based on the context of the find it was possible to date both finds back to the late Roman period, i.e. to the 4th century AD.

It is noted that a large number of known bone anvils date back from the Middle ages to the modern times and that they are mostly found in the western Mediterranean region. As the Roman period bone anvils were only recorded in the north-western coast of the Black sea, and there is a single find in Southern Italy, specimens from Viminacium certainly represent a complement to these finds in Europe.

In this paper we will discuss the process of making and utilization of Viminacium bone anvils: from the butchers' to the blacksmiths'. We will also try to discuss agricultural activities in the vicinity of Viminacium, which were indirectly linked to the presence of bone anvils.

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THE LATE HOLOCENE BONE TOOLS FROM QUEBRADA DEL REAL 1 (SIERRAS OF CÓRDOBA, ARGENTINA)

The Quebrada del Real 1 is a rock-cave archaeological site located in the Sierras of Córdoba (Córdoba province, Argentina). The site presents a long-term human occupation from ca. 7400 years BP to the final Late Holocene (1000-500 years BP). Bone tools were recovered only in the Component 2, dated at the early Late Holocene (ca. 3000 years BP). The assemblage was composed by different kinds of morpho-functional groups as pin-like tools, spatulas, and bones with perimetral sawing.

The cultural context of the Component 2 showed that the rock-cave was used by foragers as a seasonal base-camp, where processing and consumption of ungulates, small-game and seeds were the main activities developed. However, the morphological, physical and microscopic diversity of bone tools suggest that multiples activities were also carried out.

Results draw to the conclusion that a broad-spectrum diet and the need to process their by-products may not have been an exclusively phenomena of the Late Prehispanic Period (ca. 1100-360 BP). Thus, its origins may be found during the early Late Holocene ca. 3000 years BP.

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**THE WORKED BONE HUMAN IN MESOAMERICA.
CASE STUDY TEOTIHUACAN**

In Mesoamerica as in many other places was used what had on hand like stone, wood and bones. Teotihuacan was one of the main cities in the continent of America in the century I to the VII. As a big city it was concentrated in several activities, which highlighted the specialization of the craftsmen. For the production of tools or objects, the craftsmen employed the animal and the human bone as a raw material; some artifacts were obtained from the excavations in the site. The discussion of this paper is focused on how the groups in Teotihuacan made it and used the human bone.

Momo Cvijović, Museum of Yugoslav History

**IVORY ARTEFACTS FROM THE COLLECTION OF THE MUSEUM OF YUGOSLAV HISTORY:
PRESENTATIONS OF GODS AND HUMANS**

The Museum of Yugoslav History has an extraordinary collection of modern and sub-modern ivory objects from all over the world, given as present to Yugoslav president Tito. The poster and accompanying exhibition will present some of these fascinating artefacts.

Toni Čerškov, Institute for the cultural heritage preservation, Niš, Serbia

Gordana Jeremić, Archaeological Institute, Belgrade, Serbia

Selena Vitezović, Archaeological Institute, Belgrade, Serbia

ZOOMORPHIC DECORATIONS FROM OSSEOUS MATERIALS FROM NAISSUS (Niš)

Roman Naissus (modern Niš, Serbia) was one of the most important cities in Late Antiquity in the province of *Dacia mediterranea*. Well developed economy (based on agriculture, mining and metallurgy, crafts and trade), as well as the fact that this was the birth city of emperor Constantine I (306-337), were the main reasons for the city's prosperity in this period, today visible in rich and diverse archaeological remains, that include villas, baths, palaces, churches and other secular and sacral buildings, necropolises and individual mausolea, rich portable archaeological material.

In 1987-88 at the area of the fortification from Late Antiquity one building was explored, for which it was assumed that it was used as *palatium* for high officials. This was a monumental building, oriented west-east, rectangular in base, and five rooms with floor and wall heating system, atrium and porches were discovered.

The building itself was erected in early IV century AD, and used probably until the end of VI century, although it may have been damaged during invasions of Western Goths 378-380 AD or, more probably, Huns in 441 or 447 AD.

In the western part central position was occupied by one square room decorated with mosaic floor with geometrical motives, fresco-painted walls and rich architectural decorations in marble and other stones. Immediately above the mosaic floor, in the layer of ashes and debris was discovered a group find of fragments made from red deer antler.

The find includes zoomorphic and geometrical shapes, decorated with incisions and carving, all made from red deer antler. Zoomorphic decorations include representations of fish and water birds, and geometric elongated stripes, circles and lozenges, all decorated in the same manner.

They were made from antler cortex segments, all carefully chosen and carefully made – they have approximately same thickness, and most of geometric ornaments are identical in shape and size, suggesting they were made according to standards (perhaps some sort of mould was used), suggesting a skilful craftsman, that had good knowledge in antler carving.

Although fragmented and damaged by burning, it may be assumed that this find represents remains of some sort of panel decoration, probably on (wooden) furniture, that was inlaid into the wood the similar manner as mosaic tiles were arranged to form a composition (in *opus sectile* technique).

This is a unique find in the central Balkan area, and after stylistical traits may be dated into mid- or second half of IV century.

Ben Elliott, University of Leicester, Leicester, UK

T'S ON THE HIGH SEAS: PLOTTING THE SPREAD OF T-AXE TECHNOLOGY AROUND THE NORTH SEA BASIN

Red deer antler T-axes form a key element of the osseous technological repertoire for the Ertebølle in the Late Mesolithic of Southern Scandinavia – with some even going so far as to describe them as a ‘type fossil’ of this period (Andersen 1973). However, T-axes have subsequently been found to extend over a much wider area of Europe than was originally thought. This has been previously said to include Southern Scandinavia, the Southern Baltic Coast, Central Europe and the Balkans (Zvelebil 1994).

A series of more recent finds from around the North Sea Basin, coupled with the re-identification of artefacts previously referred to as ‘mattocks’ has changed our understanding of this distribution, and demonstrates the occurrence of T-axes around a significant portion of the North Sea Basin. Direct AMS dating of individual artefacts has allowed the speed at which this particular type of technology to spread across this maritime region to be assessed, and suggests the existence of a complex network of interconnected hunter-gatherer communities capable of exchanging ideas and technologies across land and sea within the late 6th and early 5th millennium cal. BC.

Louisa Gidney, Archaeological Services, University of Durham

BONE ARTEFACTS FROM MEDIEVAL POSTMILLS

Excavations on the sites of two medieval postmills in north-east England have recovered unusual suites of bone artefacts, principally manufactured from horse bones. These objects appear to have formed part of the working mechanisms of the mills, probably being parts of the gearing and bearings.

Elisabetta Grassi, Dipartimento di Scienze della Natura e del Territorio,
Università degli Studi di Sassari, Italia

BONE ANVILS FROM THE CITY OF SASSARI (XVITH -XVIIITH CENTURIES AD)

This paper presents a series of bone objects brought to light during archaeological excavations in the city of Sassari, dated to the XVIth -XVIIIth centuries AD. The artifacts were fashioned from the diaphysis of long bones (metapodial, tibiae, radii) of cattle and horses, and they present on their surface parallel rows of tiny triangular-shaped indentations across the longitudinal axis of the diaphysis. By confronting the data with those of other archaeological and ethnographic research from the Franco-Iberian area, it was therefore possible the identification as bone anvils used to sharpen serrated blades of agricultural sickles. The presence of these findings is not uncommon in the archaeological contexts of France, Iberian Peninsula, Ukraine and North Africa but, until now, was unknown in Sardinia. The first data lead to hypothesize an import of this practise from the Iberian Peninsula.

Aleta Nikolova Guadelli, UMR5199-PACEA, Université Bordeaux 1, France

THE “ECONOMY” AWLS DURING THE UPPER PALEOLITHIC AND THE BEGINNING OF THE NEOLITHIC IN BULGARIA.

The awls of “economy type” or sparing awls are made primarily on fragments of long bones from larger animals and medium-sized to mid-large herbivores. They have appeared in Bulgarian Palaeolithic since the beginning of the Upper Palaeolithic about 43-42 Ka BP (non calibrated dates) at Kozarnika cave and we observed them during the entire Paleolithic (Kozarnika cave, Temnata dupka, Redaka II cave) until the end of the Upper Paleolithic in Bulgaria dated about 11 Ka BP without an important development.

The study of the collection from Iabalkovo dated at the beginning of a Bulgarian Neolithic shows their development later that we supposed. The presence of such a quantity of sparing awls is rather unusual for the tool assemblages of this period. The awls are clearly predominant, a fact that is typical for the worked bone and antler assemblages of this period. Interestingly, the group of sparing awls prevails, which is quite unusual for such collections, but this situation is similar in the Early Neolithic Kovachevo where 30% of the pointed tools are of this type and only 25 % of metapodials from small herbivores (Sidera 1998, 202).

The analyse shows a tendency toward standardization, not of the objects, but of their distal parts. In other words there is an obvious aspiration to prepare working parts of certain sizes and proportions, which produces objects with similar functional characteristics.

The comparison of the Palaeolithic and Neolithic assemblages gives the possibility to compare an existing type during a long period and to discuss the possibility to provide some answers to better understand the Neolitisation of Europe. Here we presented the beginning of a large research project for study Bulgarian bone assemblages.

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Aleksandar Jašarević, Museum in Doboj, Doboj, Bosnia and Herzegovina

Jelena Bulatović, Laboratory of Bioarchaeology, Faculty of Philosophy,
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Selena Vitezović, Archaeological Institute, Belgrade, Serbia

EARLY IRON AGE BONE ARTEFACTS FROM NORTHERN BOSNIA: SOME PRELIMINARY RESULTS

Despite the increasing interest into zooarchaeology and bone tools studies in recent decades, different regions and periods differ greatly regarding the level of research. Some periods and some regions are still underexplored, amongst others, Metal Ages in the Balkan area. In this poster will be presented some preliminary results on the bone artefacts from Early Iron Age.

The site of Vis is situated in northern Bosnia, and several archaeological campaigns from 1957-1959. exposed a settlement at Vis site with an area of more than 5000 m² dated from Early Iron Age, approximately from late 9th century to mid 8th century B.C. During these campaigns Z. Marić investigated some 120 m² and defined two main phase Vis I-II. Excavation was subsequently carried out on one of terrace/suburbia below Vis hillfort.

Faunal remains were collected selectively, however, some data can be extracted. Only larger, identifiable or complete bones were collected (phalanges, teeth, metapodial bones, etc.). Most of them were identified, and belong to pig, cattle, sheep, goat, red deer, wild swine. Numerous red deer and one roe deer antler were discovered.

Assemblage of osseous objects encompasses approximately thirty-five artefacts, mainly from red deer antlers. Especially interesting are two objects of unclear functions, particularly nicely made, one probably represents horse harness, and the other, heavily polished from intense use, was most likely part of an outfit. Previously unknown tool type are daggers from large herbivore ulnae, sometimes perforated at the base. Most of the assemblage are blanks and manufacture debris – tines and cortex segments with traces of cutting with diverse tools. They clearly demonstrate a workshop for antler manufacture once existed on Vis settlement. Antler working was an important activity even after the metals came into wide use an future reasearch may yield more data on its role in everyday life and economy.

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BONE BEADS IN LATE BRONZE AGE BURIAL RITE OF THE SOUTHERN CARPATHIAN BASIN

Poster will present exceptional find of bone beads deposited in urn found during recent excavations of Late bronze age cemetery of Mačkovac. This find will be contextualized with similar finds of this sort from other Late Bronze Age burial sites in the region of the southern part of Carpathian Basin and the northern Balkans. Community known as Barice-Gređani group inhabited region in question during the Late Bronze age. Main characteristic of this community is distinctive incineration burial rite with urns reversed upside down. This paper will try to examine significance of bone jewelry in burial rite of this cultural group, especially due to the fact that in the past decade several Late Bronze Age cemeteries have been thoroughly excavated, so today it is possible to discuss patterns in burial customs and rites. Analysis done for this poster is trying to reveal detail characteristics of bone beads used in burial ritual. In this regard, scanning with computed tomography proved to be valuable in obtaining detailed insight in the structure of the bone used for the beads, and results of this method will be also presented on this poster.

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BONE TOOLS AT THE NEOLITHIC SITES OF ŠVENTOJI, LITHUANIA: MATERIALS AND WORKING METHODS

The research of bone tools from the Neolithic sites of Šventoji is part of the scientific project 'Neolithization of coastal Lithuania' (2013–2015). The aim of the project is to integrate traditional archaeological and bio-archaeological methods with modern techniques of biochemistry in the research of settlement history of coastal Lithuania during the period 4000–1800 cal BC. The sites of Šventoji are the best known Neolithic sites on the western coast of Lithuania. During the excavations numerous bone and antler artefacts and working debris have been found. Most bone tools found at Šventoji could be dated to the period 3500–2500 calBC. The authors have studied about 250 bone objects in the collections of the Lithuanian National Museum. The aim of the research is to identify the materials (animal species, skeletal parts) and the working methods used for making bone and antler items. The poster presents the preliminary results about the used materials and working methods. The most used animal species have been elk (*Alces alces*). The use of seal (*Phocidae*) bones for making artefacts is also noteworthy. Several manufacturing techniques have been used, e.g. grooving, splitting, breaking, scraping, grinding, drilling, incising. Only a few decorated artefacts have been found at Šventoji.

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SPECIALIZED BONE TOOLS: AN EXPERIMENTAL APPROACH TO PRODUCING *LISSOIRS*

Recently, we have found that Neandertals were capable of producing standardized bone tools, called *lissoirs* (a French term that means “smoothers”), a technology previously thought to have been restricted to modern humans (Soressi et al. 2013. PNAS 110: 14186–90). These finds come from some of the youngest Middle Paleolithic layers at two sites in the southwest of France, Pech-de-l’Azé I and Abri Peyrony. My research plan is designed to investigate the manufacture and use of these bone tools, which are similar to ethnographic tools used in hide production. In contrast to when bone is knapped in similar ways to stone, *lissoir* production shows an innovative recognition of bone as a raw material to be used for a different kind of technology. In addition, the Middle Paleolithic *lissoirs* are all produced on ribs, which demonstrate systematic choice for a standard element. Through experimentation, this research investigates the changes in tool form during use in hide production, which will be used to investigate the *chaîne opératoire* of the archaeological specimens. Initial analyses suggest that the four *lissoir* fragments come from deer or bison, so the remains of similar taxa are used to reproduce *lissoirs* on dry and fresh as well as split and unsplit ribs. Many Upper Paleolithic *lissoirs* were produced on split ribs, while at least one of the Middle Paleolithic tools was made on an unsplit rib. This project investigates the properties of using the tools from both manufacturing processes on both wet and dry hides to determine the differences in wear and breakage patterns between these processes. An experimental reference collection of *lissoirs* and their discarded end products will be necessary for interpreting both Middle and Upper Paleolithic archaeological pieces in the next phases of my research. This experimental design will provide a component to understanding Neandertal bone tool technology and the relationship between Neandertals and early modern humans.

George Nuțu, Eco-Museum Research Institute, Tulcea, Romania

Simina Margareta Stanc, Faculty of Biology, Alexandru Ioan Cuza University,
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CARVED BONE AND ANTLER IN NORTHERN DOBRUJA

The authors made a first attempt to analyse the caved bone and antler discovered in north Dobruja (Tulcea district, SE Romania). The finds were discovered in early Roman, late Roman and early Byzantine sites in this area that belonged to *Moesia Inferior* (1st-3rd

centuries AD) and *Scythia* (4th-6th centuries AD). Although the assemblage is rather reduced in number, there is a remarkable variety. Some of the finds are typical to Lower Danube *limes*.

Toilette objects occupies first place among discoveries, due to large amount of hairpins and combs of various types. The jewellery is represented by several types of pendants (so-called Hercules crook or Donar/Thor amulets) and bracelets made of single-piece or bone beads. Dress accessories consist in buckle, cloak fasteners, purse dumb-bell fasteners (*Taschenbeschlägen*), and decorative belt-plates. The objects of daily-use are typical for Roman and early Byzantine settlements in this area: spoons, sewing needles, handles used for knives and knot loosener. The military equipment and parts of weapons are few in number. Just a bow stiffener, two bone chapes and a sword pommel of Köln-Kishfine type, were discovered in sites placed along the Danube, mainly in military milieus. A heterogeneous category consists in furniture decorations for wooden-boxes, gaming pieces (counters and dices), medical/cosmetical instruments, but also two bone skates. The last two find were discovered at *Halmyris* / Murighiol, on the Danube, and were probably used during harsh winters on the local ponds. A series of waste are also presented, in connection with local producing centres.

The workshop evidence in this area is scarce. However, several production centres has been identified in both urban, as well as in rural settlement.

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TWO MESOLITHIC BONE HARPOON HEADS FROM SITE WIELE 33, CENTRAL POLAND

Abstract: While digging a fish pond, near the shore of Wieleckie Lake, two Mesolithic bone harpoon heads were found. Both artefacts were subjected to use-wear analysis, which gave a possibility to interpret the way they were produced and allowed to put forward some interesting hypothesis about the entire site function. Both of these issues are the main subject of proposed presentation.

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EARLY NEOLITHIC BONE AND ANTLER ARTIFACTS FROM SITE TRZCIANO 40. TECHNOLOGY AND FUNCTION

Abstract: During the excavations of the early Neolithic site Trzciano 40 (central Poland) a collection of bone and antler tools of a different types were found. They were subjected to use-wear analysis, which gave a possibility to interpret the way they were produced and what was their function. The results of these studies are the subject of proposed presentation.

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**STUDYING CURIOUS SPIRAL USE-WEAR ON ANTLER POINTS FROM
LATE BRONZE AGE ESTONIA**

Around fifteen elk antler points with spiral use-wear have been found from two Late Bronze Age fortified settlements on Saaremaa, Estonia. The spiral traces are located around the tips of the objects. The other, thicker ends are either unworked, cut smooth or gouged, implying hafting. Some similar objects are known only from Smuszewie settlement in Poland. The points have been interpreted as spearheads, awls or tools for making cord or rope. While studying them for my Bachelor's thesis, I coupled microscopic studies with experiments on elk antler with different fibres – stinging nettle (*Urtica dioica*), linen (*Linum usitatissimum*), hemp (*Cannabis sativa*), elk (*Alces alces*) sinew and horsehair (*Equus ferus caballus*). The patterns left by horsehair and elk sinew were the closest matches to the use-wear on the artefacts. The results have thus confirmed the interpretation of these items having been some sort of fibre-working tools.

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**ROMAN BUCKLES MADE FROM BONE AND IVORY DISCOVERED
AT THE SITE OF VIMINACIUM**

In this paper will be presented three buckles, two made from bone, and the third made from elephant ivory. All three were discovered within graves of Viminacium necropolises. Bone examples were fastened with the belt buckle tang, also made from bone, which was fastened with buckle ring by a metal shaft. Third belt set consists of ring-shaped buckle and a calotte-shaped button with made from elephant ivory. Also, two buckle fittings made from copper alloy belong to this belt set. Based on the representations on the funeral monuments, the reconstruction was made of belt sets of this type – first pierced ends of leather belt pass through the buckle, and then they are attached to the buttons. After relatively large number of buckles that have just one button, as the case with here presented belt set, it may be assumed that one end of the leather belt was permanently attached to the buckle. For the above mentioned ring-shaped buckle from elephant ivory, only analogies exist at the site of Dura Europos in Syria.

All three represented finds are considered to be equipment used by military. However, such an interpretation is now questioned, since the two bone buckles were discovered in children graves. Apart from these buckle, in children graves are also encountered bone belt frames, and a common offering were also *crepudia* necklaces, which consist of mollusc shells, marine snail shells, perforated canines of predator animals, and pendants in a shape of falus or made from bone or copper alloys. The fact that these artefacts were made from organic materials and have magic-apotropaic role, suggest that perhaps here the interpretation should be sought.

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EARLY MEDIEVAL BONE TOOLS FROM NORTHERN CROATIA

In recent years several systematic archaeological excavations of early medieval sites in northern Croatian territory were conducted. In some structures bone tools were found, mostly made of hollowed sheep or goat tibiae bones, pointed at one side. In scientific literature these objects are mostly known as bone awls or rarely as bone thatching needles. Apart from this group of objects, made of hollow bones pointed at one end and sometimes perforated at the other, wider end in order to allow thatching fibres, a flat object with a sharp tip on one side was found. The first group of objects was probably in daily use as a tool for thatching wicker, straw and other fibres, and possibly as an awl, while the object with clear traces of use on the top, was only used as an awl. A similar, slightly smaller bone object found as a grave good indicates a possible spiritual aspect of these objects during the early Middle Ages.

Although relatively rarely represented among early mediaeval finds in northern Croatia, bone tools found enabled their clear division into two groups considering the external features and the primary usage in everyday life. Consequently, in order to distinguish them terminologically, the term "bone thatching needles" is proposed for the first group of objects and "bone awl" for the second.

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SYMBOLIC RED DEER ANTLER ARTEFACTS IN THE WIETENBERG CULTURE AREA

The paper presents the data issued from the analysis regarding two special symbolic artefacts made of red deer antler. These belong to the Wietenberg culture, middle phase (II). The objects were recovered during the 2000 and 2013 excavation campaigns from two complexes (Hut 8 and Hut 32). The study was done using a unitary methodology (Beldiman 2007) which takes into account all quantifiable data. Systematic examination of pieces using an optical microscope (x10 - x40) and a digital microscope (x10 - x400) has been performed; photos taken (general views, detailed views, and microscopic views) were added to the previous image database. A special attention was drawn to technological aspects (manufacturing, traces of use) that have been studied and defined on the basis of data issued from microscopic analyses. There are attested some specific procedures as fracturing, splitting, abrasion, chopping, grooving. These are two types which had not been met in other systematically studied Bronze Age sites and assemblages from Transylvania. We have here rare/unique red deer antler plates that have been attested for the first time in this site and are rarely present in the area of Wietenberg culture.

The analysis offers new chrono-cultural, typological and paleotechnological markers for complex and extensive analysis of symbolic behaviour of Bronze Age communities from Transylvania region.

1 Decorated plate. Fragment. Catalogue Code PCD/IV 3. Type: IV E2 b. Owner: National Museum of the Eastern Carpathians, Sf. Gheorghe. Inventory number 5456 Context data: 2000 S I Square B 8 L 7 -0,60 m. Wietenberg Culture, phase II. Red deer antler. Triangular fragment. Circular? plate made from a red deer antler beam fragment (*compacta* tissue). Black uniform colour resulted by burning. The ornamentation consists in two parallel grooves, made probably with a metal blade. The possible manufacturing chain had the following stages: 1. extraction of the red deer antler; 2. shaping of the surfaces by abrasion; 3. drawing the ornamentation (circle). The surface placed around the circle was chopped with the purpose of highlighting the circle. On the surface of the circle, the two parallel grooves were incised. The piece seems to have been intentionally broken; this fact is sustained by a splitting that is ulterior to the procedure of abrasion. Probably, intentional burning in order to obtain the black colour. Dimensions (in mm): length 35; width 24; thickness max. 9; diameter of circle cca 50.

2 Zoomorphic plate. Catalogue Code PCD/IV 3 – 2013. Type: ?. Plate. Owner: National Museum of the Eastern Carpathians, Sf. Gheorghe. Inventory number 18294. Context data: 2013 S I Square L/1 Complex / Hut 32 Plan 8-9. Wietenberg Culture, phase II. Massive zoomorphic plate (*compacta* tissue). Very good stat of conservation. The piece has the general aspect of an unfinished zoomorphic plaque (head of a bovid or deer?). It is manifest the technical intention to exploit the natural shape of the raw material (upper part of beam). Dimensions (in mm): total length cca 125; medial width 62.20; thickness max. 11.93.

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ANTLER (BONE) LATHS FROM CUCCIUM (ILOK)

When the Romans conquered the area around Ilok in the first century AD, it became part of Lower Illyricum. After Trajan's division of Pannonia into Upper and Lower sections, Ilok, i.e. *Cuccium* (Ilok), was part of Lower Pannonia until Diocletian's division and after *Cuccium* was part of *Pannonia Secunda* (*Sirmiensis*). *Cuccium* was an important point in this part of the Danubian Limes, on strategically place where the Danube was easy to cross. The site of the fortress has still not been discovered but data about the Roman settlement (fort) of *Cuccium* are preserved in several Itineraries, with different forms of name: *Cucci*, *Catio*, *Cuccio*, *Cuccium*, *Cuccis castelum*. Thus *Notitia Dignitatum* mentions two cavalry units in *Cuccium*: *Cuneus equitarum promotorum* and *Equitas sagittarii*. Antler (bone) laths confirmed presence of *Equitas sagittarii*. They are finding in deposit with late antiquity: money, fibula, glass and ceramics. Material found in the systematic archaeological excavations conducted by the *Institute of Archaeology* in 2006 in the castle of Ilok's princes. Antler (bone) laths can be found in province situated along the Roman limes from *Britannia*, *Germania Superior*, *Germania Inferior*, *Raetia*, *Noricum*, *Pannonia*, *Moesia Superior*, *Syria* to *Aegyptus*.

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**LIFE ON THE MEDIAEVAL CASTLE: BONE ARTEFACTS AS INDICATORS OF
HANDICRAFT AND LEISURE**

The castle of Vrbovec lies on a steep slope offering a splendid view of the Sutla river valley, in the village Klenovec Humski in very northwestern part of Croatia. Vrbovec Castle or *castrum Vrbovec* is directly or indirectly mentioned in historical sources in the period between 1267 and 1497. Archaeological excavations point to an even earlier time of its upbuilding, i.e. the very end of the 12th century, and to an even longer continuity of its use until the mid 16th cent. The polygonal layout of the Romanesque castle has been preserved only at foundation level and in the lower portions of walls of ground-floor rooms.

Archaeological investigations brought to the light a lot of faunal remains from all periods of life at the castle. The sample consists of a total of around 6850 fragments of bones, teeth and horns (mostly mammals, a few bird and fish bones).

Few of them show traces of butchery marks or even different marks of primary treatment in the process of making a bone artefact. That indicates these activities at the very castle of Vrbovec. There is also evidence of bone-objects of different purposes, which mainly originate from the layer of backfill of the castle medieval cistern, most of them dating back to the late 15th and first half of the 16th century. There are awls and bodkins which were most probably used by servants. Few bone artefacts tell us also a story on how the nobleman and noblechild spent their leisure time (fife, rattle), as well as how noblewoman spent her day in the castle (knitting-needle, lace bobbin).

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**PERFORATED TEETH FROM THE COLLECTION OF THE
"ALEXANDRU IOAN CUZA" UNIVERSITY OF IAȘI, ROMANIA**

The purpose of the poster is to present an uncommon collection of perforated teeth (canines and incisors), which has recently come to our attention, after being kept more than 70 years in the collection of the "Alexandru Ioan Cuza" University. The 14 objects that compose the assemblage were collected by the geologist and archaeologist Nicolae N. Moroșanu, known for his interest in the study of Paleolithic artefacts from the Dniester – Pruth region.

The controversy over this collection is related to the chronological and cultural origin of the artefacts. In order to solve this problem, a technological study was conducted, regarding the raw material identification and the methods, techniques and schemas of manufacturing.

The raw material examination shows that the canines and incisors belong to large felines that could have lived in Palaeolithic in Dniester – Pruth area. This fact limits the chronological frame to this specific period.

Relative to manufacturing procedures, we identified two schemas of technological transformation. The first one, applied to canines, implies an axial division of the raw material, followed by an intensive shaping, while the second one involves the use of complete incisors. The techniques recognised are grooving in debitage and abrasion for shaping. Multiple drilling sequences were identified on several teeth in order to reuse the object after the breakage of the previous perforations.

For the Palaeolithic of Dniester – Pruth region there are not known such elaborated and well preserved artefacts, the collection being unique from this point of view. Therefore we are taking also into consideration the possibility that the artefacts could have been discovered in other region than the presumed one.

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**MANUFACTURING TECHNIQUES IN THE EARLY NEOLITHIC:
MANUFACTURING BONE AND ANTLER AT STARČEVO-GRAD (NORTHERN SERBIA)**

The site of Starčevo-Grad is the eponymous site of the Early/Middle Neolithic culture Starčevo-Körös-Criş, situated on the Danube bank in the modern village of Starčevo, 13 km from Belgrade. It yielded a rich portable material, including over 200 artefacts from osseous materials – tools and jewellery from bone, antler, boar tusks and mollusc shells. Although these were excavations carried out in the first half of the 20th century, it seems that most of the bone materials were carefully collected, including several unfinished objects with traces of manufacture that enabled the reconstruction of the manufacturing techniques.

In this poster will be presented some of the characteristic manufacturing techniques:

-for shaping bone – methods for transversal division of long bones into blanks for further shaping, methods for making large perforations, as well as a specific way of making thin pointed tools from ovicaprine metapodials by abrasion;

-for shaping antler – methods for dividing antlers into blanks for further shaping, and some *façonnage* methods (making perforations, smoothing outer surface, etc.).

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**A NOTCHED HUMAN RADIUS FROM THE MESOLITHIC-NEOLITHIC SITE OF
LEPENSKI VIR (SERBIA)**

Regular linear cuts on bone, termed as ‘notches’, have been reported at prehistoric European sites (e.g. Buisson 1990; d’Errico and Cacho 1994; Marshack 1970, 1972; Morley 2013). Notches have been found on animal bones and antler, and are interpreted as musical instruments (flutes and rasps), calendars, or counting devices. The engraving of human bones is generally rare in the archaeological record, and creation of notches on human bones is unreported in European prehistory.

A set of notches on a human radius (in burial 52) have recently been identified at the Mesolithic-Neolithic (c. 9,500–5,500 cal BC) site of Lepenski Vir (Serbia). Both primary and secondary burial rites were practiced at the site, resulting in a large number of articulated

inhumations as well as isolated, commingled, and scattered human remains. The notched human radius was found on the floor of a domed oven along with the secondarily buried remains of least five individuals. It is presented in detail in this paper, including results from micro-morphometric analysis of the cuts using the Alicona InfiniteFocus 3D imaging microscope.

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THE CHARACTER OF ROMAN BONE FINDS FROM IŽA - LEÁNYVÁR (SLOVAKIA)

The poster shows the structure of bone and antler carvings from the Roman military camp in Iža - Leányvár. During the archaeological excavations there were found 220 pieces from different objects. There are finds from Early Roman period, but most of them come from Late Antiquity. During the Migration Period were the ruins used by germanic groups. From this period comes a small group of bone artefacts (mostly combs). Character of the finds is very wide. Among the finds dominated jewellery, represented with the decorative pins, pins fragments, pearl and bracelets. The second group consists of fragments from military weapons (from sheaths and bows). Materials from all periods also consists of bone objects used for textile and leather work. There are 6 pieces used as knife handle, some *calculae* and *stilus*. Among specific finds are three pieces used as panpipe and one hinge from big cupboard, with one found in the Principia Building. About 14 finds show that roman soldiers also carved bones and horns and produce pins and handle for knives.

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