Povratak u prošlost: Bakreno doba u sjevernoj Hrvatskoj

Antonović, Dragana; Balen, Jacqueline; Barbir, Antonela; Čataj, Lea; Đukić, Ana; Grabundžija, Ana; Janković, Ivor; Miloglav, Ina; Novak, Mario; Pandžić, Ivana; ...

Arheološki muzej u Zagrebu
Filozofski fakultet Sveučilišta u Zagrebu
Arheološki muzej Osijek

Povratak u prošlost
Back to the past

BAKRENO DOBA U SJEVERNOJ HRVATSKOJ
COPPER AGE IN NORTHERN CROATIA

IMPRESSUM

NAKLADNICI / PUBLISHERS
Arheološki muzej u Zagrebu / Archaelogical museum in Zagreb
Filozofski fakultet Sveučilišta u Zagrebu / Faculty of Humanities and Social Sciences, University of Zagreb
Arheološki muzej Osijek / Archaeological museum Osijek

ZA NAKLADNIKE / FOR THE PUBLISHERS
Sanjin Mihelić
Vesna Vlahović-Štetić
Tomislav Hršak

UREDNICE / EDITORS
Jacqueline Balen
Ina Miloglav
Dragana Rajković

AUTORI TEKSTOVA / AUTHORS OF THE TEXTS
Dragana Antonović
Arheološki institut, Beograd / Institute of Archaeology, Belgrade
Jacqueline Balen
Arheološki muzej u Zagrebu / Archaeological museum in Zagreb
Antonela Barbir
Institut za arheologiju, Zagreb / Institute of Archaeology, Zagreb
Lea Čataj
Hrvatski restauratorski zavod, Zagreb / Croatian Conservation Institute, Zagreb
Ana Đukić
Arheološki muzej u Zagrebu / Archaeological museum in Zagreb
Ana Grabundžija
Freie Universität Berlin, Excellence Cluster Topoi
Ivor Janković
Institut za antropologiju, Zagreb / Institute for Anthropological Research, Zagreb
Ina Miloglav
Odsjek za arheologiju, Filozofski fakultet Sveučilišta u Zagrebu / Department of Archaeology, Faculty of Humanities and Social Sciences, University of Zagreb
Mario Novak
Institut za antropologiju, Zagreb / Institute for Anthropological Research, Zagreb
Ivana Pandžić
Muzej Republike Srpske, Banja Luka / Museum of Republic of Srpska, Banja Luka
Maja Pasarić
Institut za etnologiju i folkloristiku, Zagreb / Institute of Ethnology and Folklore Research, Zagreb
Andrijana Pravidur
Zemaljski muzej Bosne i Hercegovine, Sarajevo / National Museum of Bosnia and Herzegovina, Sarajevo
Dragana Rajković
Arheološki muzej Osijek / Archaeological museum Osijek
Kelly Reed
Oxford Martin School, University of Oxford
Tihomila Težak Gregl
Odsjek za arheologiju, Filozofski fakultet Sveučilišta u Zagrebu / Department of Archaeology, Faculty of Humanities and Social Sciences, University of Zagreb
Selena Vitezović
Arheološki institut, Beograd / Institute of Archaeology, Belgrade

LEKTURA / PROOF READING
Tihomila Težak-Gregl (tekstovi na hrvatskom jeziku / texts in Croatian language)
Aleksandra Šulović (tekstovi na srpskom jeziku / texts in Serbian language)

PRIJEVOD / TRANSLATION
Ana Đukić

RECENZENTICA / REVIEWER
Tihomila Težak-Gregl

OBLIKOVANJE I PRIPREMA ZA TISAK / GRAPHIC DESIGN & DTP
Srećko Škrinjarić

TISAK / PRINT
Tiskara Zelina

NAKLADA / PRINT RUN
300 primjeraka / copies

AMZ ISBN 978-953-8143-18-2
FFZG ISBN 978-953-175-749-2
AMO ISBN 978-953-7559-10-6

CIP zapis dostupan u računalnome katalogu Nacionalne i sveučilišne knjižnice u Zagrebu pod brojem 001019517.

ARHEOLOŠKI MUZEJ U ZAGREBU • FILOZOFSKI FAKULTET SVEUČILIŠTA U ZAGREBU • ARHEOLOŠKI MUZEJ OSIJEK

Archaeological Museum in Zagreb
Faculty of Humanities and Social Sciences of the University of Zagreb
Archaeological Museum Osijek

Povratak u prošlost

Back to the past

BAKRENO DOBA U SJEVERNOJ HRVATSKOJ

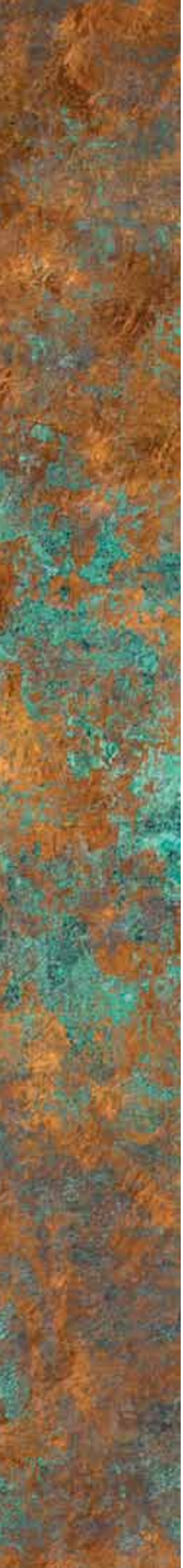
COPPER AGE IN NORTHERN CROATIA

Zagreb, 2018.

SADRŽAJ / CONTENT

DRUGI DIO / PART TWO

RAZLIČITI ASPEKTI ŽIVOTA BAKRENODOBNIH ZAJEDNICA NA ŠIREM PROSTORU / DIFFERENT ASPECTS OF LIFE OF ENEOLITHIC COMMUNITIES IN A WIDER AREA



Sve ilustracije u Uvodnom poglavlju dio su izložbe *Povratak u prošlost - bakreno doba u sjevernoj Hrvatsko*j, Arheološki muzej u Zagrebu, 2018.
/ All the illustrations in the Introductory Chapter are part of exhibition *Back to the past - Copper Age in Northern Croati*a, Archaeological museum in Zagreb, 2018. (foto / photo: I. Krajcar)

Uvod

Introduction

Tihomila Težak Gregl

Odsjek za arheologiju
Filozofski fakultet Sveučilišta u Zagrebu
Department of Archaeology,
Faculty of Humanities and Social Sciences
of the University of Zagreb
ttgregl@ffzg.hr

Periodizacija, odnosno dioba prapovijesti na razdoblja, etape, odsjeke, stupnjeve ili faze pomoćno je sredstvo koje omogućuje pregledan uvid u razvoj čovjeka i njegova društva. No, kako je svaki pojam nešto što raste i mijenja se s novim istraživanjima, tako se i podjela prapovijesti tijekom njezine primjene mijenjala i dopunjavala novim sadržajima. U tom su smislu i pojmovi bakrenoga i brončanoga doba u razna vremena različito određivani. U prvoj općeprihvaćenoj trodobnoj podjeli prapovijesti Christiana Jürgensena Thomsena koja je polazila od konkretnih materijalnih nalaza bez povijesnoteorijske pozadine nije bilo bakrenoga doba već on „oružja i oštra oruđa izrađena od bakra ili bronce“ smješta u brončano doba. Njegova trodobna podjela na kameno, brončano i željezno doba temeljila se isključivo na pojavi nove sirovine i tehnologije njezine obrade. Vjerojatno je Thomsen već tada bio svjestan da su uz tehnološka postignuća vezane i druge pojave u materijalnoj kulturi, ali nije uočio da s time moraju biti povezane i neke promjene u društvu. Ipak s vremenom tako Thomsenovi pojmovi kamenoga, brončanoga i željeznoga doba počinju dobivati i drugi sadržaj. Počelo se ispitivati što je još novoga bilo povezano s pojavom novih sirovina, jesu li se i drugi aspekti života mijenjali. I dok je za Thomsena dostatna bila pojava nove sirovine, Gordon Childe je tražio promjene u društvenoj strukturi. S obzirom na činjenicu da je Thomsenova podjela uključivala samo tri glavna doba, ubrzo se pokazalo da je nužna preciznija dioba, najprije kamenoga doba na starije i mlađe, potom i srednje, a zatim se uvidjelo da nije moguće jednostavno povući crtu između kamenih i metalnih doba. Niz novih

The periodization, i.e. the division of prehistory into periods, epochs, stages, degrees or phases, is an auxiliary agent that allows for the creation of a comprehensive overview of the development of man and society. However, as every term is a thing that grows and changes with new research, the division of prehistory also changed and was added to through its application. In that sense, the terms of the Cooper and the Bronze Age were differently defined at different times. In the first generally accepted division of prehistory into three periods, made by Christian Jürgensen Thomsen based on actual material remains without a historical and theoretical background, there was no mention of the Copper Age. The author placed “weapons and sharp tools made of copper or bronze” into the Bronze Age. His tripartite division into the Stone, Bronze and Iron Age was based exclusively on the appearance of a new raw material and the technology used to process it. Thomsen was probably already aware that technological achievements were accompanied by other occurrences in the material culture, but he did not realize that social changes had to be connected to them as well. With time, Thomsen’s concepts of the Stone, Bronze and Iron Age began to acquire new content. The questions arose on what else was connected to the appearance of new raw materials, and whether other aspects of life had changed. While the emergence of a new raw material was enough for Thomsen, Gordon Childe looked for changes in the social structure. Considering the fact that Thomsen’s division included only three main periods, it soon became apparent that a more precise division was necessary, at first of the Stone Age into Early and Late, and then the Middle.

pojava i zajednica nije se po svojoj gospodarskoj i društvenoj strukturi, ali ni po materijalnoj i duhovnoj ostavštini u potpunosti uklapao u neolitik, ali ni u brončano doba. Postalo je jasno da između ovih dvaju razdoblja postoji i neko prijelazno vrijeme koje će tek utrti put razvijenim metalnim razdobljima. Ono što je bilo na prvi pogled najvidljivije obilježje toga prijelaznog razdoblja jest sve češća pojava metalnih predmeta, u prvom redu bakrenih, ali i zlatnih te srebrnih, kao posljedica razvoja primarne metalurgije. Stoga je novo razdoblje prozvano bakrenim, a osamdesetih je godina 19. st. utvrđeno da ga kronološki valja smjestiti prije brončanoga jer se plosnate bakrene sjekire i drugi bakreni predmeti redovito nalaze udruženi s kamenim oruđem, stoga predstavljaju neki stupanj između pravoga neolitika i pravoga brončanog doba. Danas se za označivanje toga razdoblja najčešće služimo terminom eneolitik, latinskogrčkom složenicom koja upućuje na kontinuirani razvoj mlađega kamenog doba u bakreno doba, tj. da je u novostvorenim kulturnim pojavama osim novih elemenata, još uvijek vrlo prepoznatljiva tradicija mlađega kamenog doba, i to u svim sferama života. Isto značenje imaju i termini kuprolitik i halkolitik. Potonji se obično rabi u kontekstu egejskoga i maloazijskoga svijeta u značenju završnog neolitika tijekom kojega je metal već ušao u širu uporabu. Neki prapovjesničari još uvijek rado rabe i opisni naziv prijelazno doba, ali on suviše naglašava vremensku kratkotrajnost razdoblja koje traje cijelo četvrto i treće tisućljeće pr. Kr., a početci su mu još u petom tisućljeću.

Pojedinačne bakrene predmete, uglavnom ukrasne, poznavale su i neke neolitičke zajednice. Predmeti izrađeni od samorodnog bakra ili bakrenih minerala kao što su malahit, azurit i kuprit, kakvi se pojavljuju već na nekim nalazištima pretkeramičkoga razdoblja na Bliskome istoku, a potom i u nekim europskim neolitičkim zajednicama, nisu pokazatelj postojanja metalurgije. Riječ je o predmetima ukrasne namjene, najčešće zrnima za ogrlice i narukvice, koji su izrađeni primjenom jednakih tehničkih postupaka kojima se obrađivao i bilo koji drugi kamen. Ako su tijekom takvih obrada i otkrivene prve mogućnosti hladnoga kovanja, a potom i termičke obrade, sama prisutnost i uporaba metalnih predmeta nije dovoljan razlog za izdvajanje novoga prapovijesnog razdoblja ako to ne dovodi do promjena u načinu života. Metalurgija sama po sebi sasvim sigurno nije bila neko iznenadno otkriće, nego je rezultat dugotrajnog stjecanja znanja o

It then became clear that it was not possible to draw a straight line between the Stone and Metal Ages. A series of new occurrences and communities did not completely fit into the Neolithic or the Bronze Age based on their economic and social structures, or their material and cultural heritage. It became clear that there was a time of transition between these two periods that would pave the way for the developed Metal Ages. At first glance, the most visible characteristic of this transitional period was an increase in the number of metal objects, at first copper ones, but also those made of gold and silver, resulting from the development of primary metallurgy. The period was, therefore, named the Copper Age. In the 1880s, it was established that it should be the chronological antecedent of the Bronze Age, because flat copper axes and other copper finds were frequently found in combination with stone tools and, as such, represented a phase between the true Neolithic and the true Copper Age. Today, the period is most often described by the term Eneolithic, a Latin-Greek compound that points to the continued development from the Late Stone into the Copper Age, i.e. that the traditions of the Late Stone Age are still recognizable in the newly-created cultural occurrences despite new elements, and in all spheres of life. The terms Cuprolithic and Chalcolithic denote the same period. The latter is usually used in the context of the Aegean and Asia Minor, and denotes the final Neolithic, a period when metal was already widely used. Some prehistorians still like to use the descriptive term 'transitional period', but it puts too much emphasis on the short temporal span of the period that lasted throughout the entire fourth and third millennia BC, and appeared already during the fifth millennium.

Individual copper finds, mostly decorative, were used by some Neolithic communities. Objects made of native copper or copper minerals, such as malachite, azurite and cuprite, and which appeared at some sites dated to the pre-pottery period in the Middle East, as well as in some European Neolithic communities, are not indicators of metallurgy. These objects had a decorative function, most often beads for necklaces and bracelets, and were made by applying the same technological procedures that were used to process any other stone. If the possibility of cold forging and, later, thermal processing, was discovered during such processes, the mere presence and use of metal objects is not a good enough reason to establish a new period in prehistory, unless it introduced changes in the way

vlastitom okolišu i ovladavanja pirotehnologijom u proizvodnji keramičkih predmeta. Stoga mnogi stručnjaci smatraju da bakreno doba počinje s trenutkom otkrića i primjene postupka lijevanja bakra, odnosno kada neka zajednica raspolaže većom količinom bakrenih predmeta što pretpostavlja i vlastitu proizvodnju. Drugi u potpunosti odbacuju pojam bakrenoga doba i radije govore o produženome ili završnome neolitiku kada se pojedine skupine služe metalnim predmetima, čak ih i proizvode, ali to nema bitnog utjecaja na njihovu društveno-gospodarsku strukturu, nego je tek usputna djelatnost. Stoga možemo zaključiti da su uz tehnološke promjene i napredak što ih donosi razvoj metalurgije, upravo promjene u gospodarskoj i osobito društvenoj strukturi presudne za izdvajanje novoga doba – eneolitika/bakrenoga doba. U gospodarstvu se uočava prevlast stočarstva nad poljodjelstvom, a kao znatno akumulativnija grana privrede ono brže stvara viškove, omogućuje intenzivniju razmjenu i trgovinu, a time i stvaranje znatnijih materijalnih bogatstava. Osim toga iskorištavanje životinja nije usmjereno samo na dobivanje mesa, odnosno isključivo korištenje primarnih životinjskih proizvoda, nego poprima i drugu gospodarsku dimenziju višestrukog korištenja životinje: proizvodnju mlijeka i mliječnih prerađevina, vune, iskorištavanje životinjske snage za vuču u prijevozu i obradi zemlje. Ove je promjene u odnosu čovjeka i životinja Andrew Sherratt 1981. godine u radu „Plaugh and Pastoralism: Aspects of the Secondary Products Revolution“ definirao kao revoluciju sekundarnih proizvoda smatrajući pritom, slijedeći difuzionističku teoriju, da ove inovacije svoje korijene imaju u određenim područjima odakle se šire i tako pridonose preoblikovanju gospodarstva i društva starih neolitičkih zajednica u Europi. Zahvaljujući takvim sekundarnim proizvodima omogućeno je i nekim, dotad marginalnim područjima da se uključe u gospodarsko-društvene tokove novoga razdoblja. Ipak, valja naglasiti da nije riječ o paketu koji se prenosi kao zatvorena cjelina, već je riječ o više pojava koje se javljaju neovisno jedna o drugoj i u različitim vremenima. Činjenica da životinje prestaju biti isključivo izvor mesa i da njihovo korištenje dobiva višestruku dimenziju svjedoči i o promjeni svijesti čovjeka i razumijevanju svijeta oko sebe te pronalaženju idealnog omjera između uloženog i dobivenog. Zanimljivo je istaknuti da se Sherratt u svome prvotnom radu uopće nije koristio analizom ostataka faune, već se oslanjao na proučavanje simbola i ikonografije uočene uglavnom na keramičkim po-

of life. In itself, metallurgy was definitely not a sudden discovery, but a result of a long process of learning about the environment and managing pyrotechnology through the production of ceramic objects. Therefore, many experts think that the Copper Age begins with the discovery and application of copper casting, i.e. when a certain community used a large amount of copper finds that indicate independent production. Others completely reject the term 'Copper Age' and prefer to speak of a prolonged, or final, Neolithic, when certain groups used metal objects, even produced them, but without it having strong effects on their social and economic structure, and using it as a casual activity. It can, therefore, be said that, along with technological changes and advances brought on by the development of metallurgy, precisely changes in the economic and, especially, social structure were crucial for defining a new period – the Eneolithic/Copper Age. Animal husbandry became more important for the economy than agriculture, and it, as a significantly more cumulative economic branch, created surpluses, allowed for more intensive trade and exchange, and, through that, enabled the creation of more significant material riches. Additionally, the breeding of animals was not only limited to the procurement of meat, i.e. the exclusive use of primary animal products, but it also obtained a new economic dimension through the use of animals in multiple ways: the production of milk and dairy products, wool, using animal power to haul wagons, and in agriculture. In his 1981 paper "Plough and Pastoralism: Aspects of the Secondary Products Revolution", Andrew Sherratt, defined these changes in relations between man and animals as a revolution of secondary products, thereby thinking, in accordance with the diffusion theory, that these innovations stemmed from certain areas and then spread out, and contributed to the reshaping of the economy and the societies of old Neolithic communities in Europe. These secondary products made it possible for some, previously marginalized, areas to enter the new economic and social streams of the new period. However, it should be noted that this was not a package that was transferred as a closed unit, but rather, an entire set of occurrences that appeared independently and at different times. The fact that animals were no longer used only as a source of meat, but in a multitude of ways, attests to the changes in human consciousness and understanding of the world, as well as finding the perfect balance between investment and gain. It is interesting to note that, in his original paper, Sherratt did not rely on an analysis of faunal remains,

sudama i drugim predmetima, a tek je u kasnijim radovima nadopunjavao svoju teoriju analizom faune. Iako bi se iz rečenoga mogao steći dojam da je većina, barem onih vodećih eneolitičkih zajednica bila isključivo stočarska, to nije točno. Prevladavalo je mješovito gospodarstvo, stočarstvo i poljodjelstvo, a različit je bio tek odnos između tih dviju grana. U jugoistočnoj i srednjoj Europi nalaze se tragovi kultivirane pšenice (jednozrne i dvozrne), raži, ječma, ali sada i zobi te prosa. Pri žetvi reže se samo klas, bez stabljike, a oprema je istovjetna onoj neolitičkoj: srpovi s kremenim ili opsidijanskim umetcima, žetveni noževi, štapovi za mlaćenje, kameni žrvnjevi i rastirači za mljevenje. Rijetki ostatci hrane pokazuju da su žitarice uglavnom konzumirane u obliku raznih kaša ili pogača (potonje dokazuju i brojni nalazi plosnatih keramičkih tanjura). U egejskom prostoru dokazan je i uzgoj vinove loze i maslina, a u srednjoeuropskom jabuka i krušaka. U stočarstvu naglasak je na uzgoju goveda, a potom ovaca, koza i svinja, ali i kao novost – konja.

Razvoj i napredak gospodarstva zahtijevao je i sve uže specijalizacije unutar pojedinih gospodarskih grana, kako unutar pojedinih naselja tako i između različitih naselja pa i cijelih regija. Dio populacije morao se cjelodnevno posvetiti metalurškoj proizvodnji, a s tim u vezi razvijala su se različita zanimanja koja sudjeluju u tom procesu od onih koji traže rudaču, preko rudara, ali i drvosječa i tesara koji moraju opremiti rudnike, do radnika u neposrednoj obradi metala, ljevača i kovača, te trgovaca koji će dobavljati sirovinu i prodavati gotove proizvode. Kako bi se iz proizvodnje mogli namiriti svi ovi sudionici, ali i da bi preostalo za razmjenu za hranu, ona mora nadilaziti osnovne potrebe određene zajednice. Daljnje posljedice sociološke su prirode - da bi sve to funkcioniralo društvo mora biti čvršće ustrojeno u bolje povezanim i organiziranim patrijarhalnim rodovskim i plemenskim zajednicama - poglavarstvima koje su zahvaljujući takvom ustroju nadmoćnije neolitičkim populacijama. Potreba za sirovinom s jedne strane potiče trgovinu, ali s druge i teritorijalna presezanja što neminovno dovodi do sukoba među različitim zajednicama. Iako je već kod kasnoneolitičkih zajednica bilo moguće na temelju arheološke evidencije nazrijeti nejednakost i početke društvenog raslojavanja među njihovim pripadnicima, u eneolitiku će takvi pokazatelji biti sve prisutniji i izrazitiji pa često upravo ovo razdoblje smatramo vremenom prve ozbiljne društvene diferencijacije i oblikobut on the study of symbols and iconography seen on ceramic vessels and other finds. Only in his later works did he expand his theory by adding analyses of fauna. Although it could, from everything stated above, seem that most, or at least leading Eneolithic communities relied exclusively on animal husbandry, it is not true. A mixed economy, based on animal husbandry and agriculture, was prevalent, and the differences appeared only in the ration between these two branches. Southeastern and central Europe yielded traces of cultivated wheat (einkorn and emmer), rye, barley, but also oats and millet. During the harvest, only the corn was cut, not the stem, and the equipment resembled that used in the Neolithic: sickles with inserts made of flint or obsidian, harvest knives, thrashing sticks, and stone grindstones and handstones for grinding. The occasional remains of food indicate that grains were mostly consumed in the form of different porridge or cakes (the latter are also attested to by numerous finds of flat ceramic plates). As evidence indicates, vines and grapes were grown in the Aegean, and apples and pears in central Europe. Animal husbandry was dominated by the breeding of cattle, followed by sheep, goats and pigs, as well as a new animal – the horse.

Economic developments and advancements also required narrower specializations within different economic branches, both within individual settlements and between different ones, even between entire regions. A part of the population had to be engaged in metallurgical activities on an everyday basis, which caused the emergence of different vocations that took part in the process, including those who looked for raw materials, miners, but also lumberjacks and carpenters who had to supply the miners, as well as workers who directly processed metal - casters, blacksmiths, and traders who procured raw materials and sold finished products. In order to satisfy the needs of all listed participants, but also to create enough for food exchange, the production had to go above the basic needs of a given community. The consequences were social in nature – in order for everything to function, society had to be more firmly structured into better-connected and organized patriarchal familial and tribal alliances – chiefdoms that were superior to Neolithic populations precisely because of their structure. On the one hand, the need for raw materials encouraged trade and, on the other, it also caused territorial overlaps, which inevitably lead to conflicts among different communities. Although

vanja hijerarhijski organiziranih društava. To možemo iščitati iz obrasca naseljavanja, unutarnje strukture naselja, opremljenosti i veličine naseobinskih objekata, različitih pogrebnih običaja pri kojima se pojedinci razlikuju po izgledu i opremi grobova te grobnim prilozima.

Nastanak eneolitika na području jugoistočne Europe najčešće se objašnjava kroz dva suprotstavljena modela koja ovise o dosegnutoj razini neolitika: prvi podrazumijeva oštar prijelom u cijelome kulturnom habitusu neke zajednice na određenom području, dok drugi ističe tekući, postupan prijelaz između neolitika i eneolitika. Ponekad su ipak razlike u određenim segmentima materijalne i duhovne kulture između neolitičkih i eneolitičkih zajednica tako velike da ih se ne može objasniti tek pukom promjenom stila i mode, nego u objašnjenje treba uključiti novi populacijski element, odnosno migraciju stanovništva potaknutu u prvome redu klimatskim i okolišnim čimbenicima koji su utjecali na kretanje kako pojedinaca, tako i većih skupina pa i čitavih zajednica. Danas prilično sigurno, zahvaljujući peludnim dijagramima, možemo tvrditi da je smjena tople i vlažne atlantske klime toplom i suhom subborealnom i s time povezanom promjenom okoliša imala važnu ulogu u formiranju društava s novim tipom privrede i novom duhovnom kulturom proizišlom iz gospodarskih temelja u trenutku kada je poljodjelska proizvodnja smanjena.

Iako se općenito početak eneolitika u Europi smješta oko sredine 5. tisućljeća, u mnogim se područjima, osobito onima koja nisu neposredno uz ležišta bakrene rude, ništa bitno nije promijenilo te su neolitičke zajednice nastavile svoj tradicionalni način života s tek ponegdje vidljivim novim utjecajima. Također treba imati na umu da je eneolitik kao razdoblje različito definiran u pojedinim dijelovima Euroazije, u prvome redu zbog jedinstvenih okolišnih čimbenika koji su u nekim područjima potaknuli vrlo rani početak procesa koje u arheološkom smislu određujemo kao eneolitičke, dok su ih u drugim krajevima znatno odgodili. Dakle, razlike u eneolitičkom razdoblju unutar Europe odnose se ne samo na različit stupanj usvajanja tehnoloških i društvenih stečevina, već i na različitu brzinu kojom su se ti procesi odvijali. Stoga možemo zaključiti da eneolitik, ako uzmemo u obzir i početni eneolitik u stepama i njegovu najkasniju pojavu na tlu Europe, traje otprilike između 5000. i 1700. godine pr. Kr. Potonji datum odnosi se na sjevernu Europu za koju i inače vrijedi zasebna

it is, based on archaeological evidence, possible to see traces of inequality and the beginnings of social stratification among the members of Late Neolithic communities, during the Eneolithic, such indicators became more common and pronounced, so this period is often seen as the time when the first serious social differentiation and the formation of hierarchical societies appeared. This is visible from settlement patterns, the inner structure of settlements, the size and inventory of residential structures, and different burial rites wherein individuals differ based on the layout and equipment of graves, as well as grave goods.

The emergence of the Eneolithic in southeastern Europe is most often described through two opposing models that depend on the levels reached during the Neolithic: the first includes a sharp transition in the entire cultural habitus of a given community in a certain area, while the other points out a flexible, gradual transition between the Neolithic and the Eneolithic. However, the differences between certain segments of the material and spiritual cultures of Neolithic and Eneolithic communities are so great that they cannot be explained by a pure change in style and fashion, but through a new population-related element, i.e. population migrations sparked primarily by the climate and factors from the landscape that influenced the movement of individuals, larger groups, and even entire communities. With the help of pollen diagrams, it can now be said that the change from a warm and damp Atlantic to a warm and dry Subboreal one, as well as the consequential changes in the environment, had an important role in the formation of societies that practiced a new type of economy and a new spiritual culture, both of which derived from the economy once agricultural production was reduced.

Even though the beginning of the Eneolithic in Europe is generally dated to around the middle of the 5th millennium, in many areas, especially those that were not in the immediate vicinity of copper deposits, there were no important changes, and the Neolithic communities continued their traditional way of life, with only occasional traces of new influences. It should also be noted that the Eneolithic is, as a period, differently defined in some areas of Eurasia, primarily due to unique climate factors that, in some areas, sparked the very early beginning of the process, which is archaeologically seen as belonging to the Eneolithic, while, in other areas, they drastically delayed it. Therefore, the differences in the European Eneolithic do not only include

periodizaciju prapovijesti, protopovijesti i rane povijesti u odnosu na središnju i jugoistočnu Europu gdje eneolitik okvirno završava sredinom 3. tisućljeća pr. Kr.

Razdoblje eneolitika tradicionalno se dijeli na rani, srednji i kasni, ali granice među njima nisu čvrsto definirane pa će neki radije govoriti o početnom ili protoeneolitiku kada se uočavaju početci organiziranog rudarstva i prerade metala, potom klasičnom eneolitiku koji je povezan s pojavom masivnih bakrenih izrađevina te konačno o prijelaznoj etapi koju obilježuju veliki kulturni kompleksi poput badenskoga na početku i vučedolskoga na samom završetku eneolitika. S navedenim kulturama već počinje i najranija metalurgija bronce pa bi tome vremenu možda bolje odgovarao naziv protobrončano doba. Rani eneolitik određuju zajednice koje su još čvrsto utemeljene u neolitiku i koje prenose tipična neolitička obilježja, osobito u pogledu materijalne i duhovne ostavštine, a često im se ni gospodarska osnova ne razlikuje bitno od neolitičke. Srednji i kasni eneolitik predstavljaju udaljavanje od neolitičkih tradicija, s vrlo jakim naglaskom na razvoju metalurgije, ali i sa značajthe different degrees of accepting technological and social legacy, but also the different speeds at which these processes developed. Hence, it can be concluded that the Eneolithic, including the initial Eneolithic in steppes and its latest appearance on European soil, lasted from about 5000 and 1700 BC. The latter date refers to northern Europe that generally has a separate periodization of prehistory, protohistory and early history in comparison to central and southeastern Europe where the Eneolithic ended around the middle of the 3rd millennium BC.

The Eneolithic is traditionally divided into the Early, Middle and Late, but the borders between them are not firmly defined, so some authors prefer to speak of an initial, or proto-, Eneolithic, when the beginnings of organized mining and metal processing appeared, followed by the classical Eneolithic, connected to the emergence of mass copper tools, and, finally, the transitional phase, marked by large cultural complexes, such as the Baden at the beginning, and the Vučedol at the very end of the Eneolithic. The earliest bronze metallurgy appeared within the scope of the listed cultures, so the period might be better defined as the proto-Bronze Age.

nim društvenim promjenama i raslojavanjima koja će krajem eneolitika dovesti do formiranja prvih plemenskih i rodovskih aristokracija.

Kao i u vrijeme neolitika, niz inovacija pristiže bilo kulturnom bilo demičkom difuzijom iz anadolskog i egejskog prostora, no u ovome se trenutku pojavljuje i jedno novo ishodište migracija, otvara se novi povijesni put koji će veliku ulogu imati u svim kasnijim razdobljima europske povijesti. To je područje Ponta, Zakavkazja i južnoruskih stepa, a put vodi preko Šumovitih i Erdeljskih Karpata uz donji tok Dunava. Iz tih su krajeva u potrazi za novim prostranstvima za ispašu pristizali brzi, pokretljivi stočari koji su u potpunosti ovladali metalurgijom, udomaćili su i zauzdali konja, načinili kola na četiri kotača. Svojom su se pokretljivošću i prodornošću nametnuli starim neolitičkim zajednicama i postupno ih transformirali u nova, eneolitička društva. Mnogi arheolozi, slijedeći lingvističke ideje, ove stepske populacije koje sredinom 5. tisućljeća pr. Kr. započinju selidbene valove prema zapadu, smatraju prvim indoeuropskim zajednicama pa

The Early Eneolithic is defined by communities that are still firmly grounded in the Neolithic, and which transferred typical Neolithic features, especially in the sense of material and spiritual heritage. Additionally, their economic principles seldom differ from the Neolithic ones. The Middle and Late Eneolithic is marked by a deviation from Neolithic traditions, with a lot of emphasis on the development of metallurgy, but also by significant social changes and stratification that would, by the end of the Eneolithic, lead to the formation of the first tribal and familial aristocracies.

Just like during the Neolithic, a series of innovations appeared, either through cultural or demic diffusion, from Anatolia and the Aegean. However, a new source of migrations and a new historical road appeared that would play a huge part in all subsequent periods of European history - the territory of Pontus, Caucasus and south-Russian steppes. The road went over the Wooded and the Transylvanian Carpathians, and along the lower flow of the Danube. Fast and mobile cattlemen, who had complete-

tako i početak eneolitika povezuju s postupnom indoeuropeizacijom širih europskih prostora. Njemački filolog i povjesničar Gustav Kossinna, inače zagovornik ideje o germanskoj pradomovini Indoeuropljana i njihovu kontinuiranom lokalnom razvoju od paleolitika, što je stvorilo temelje za kasniju nacionalsocijalističku teoriju o ''arijevskoj rasi'', prvi je na prijelazu 19. u 20. stoljeće povezao Indoeuropljane u lingvističkom smislu s Indoeuropljanima u arheološkom smislu. Vjerujući u izjednačavanje arheoloških kultura s povijesnim i filološkim podatcima, vidio je Indoeuropljane kao samostalan etnik, a kontinuitet u smislu materijalne kulture izjednačavao je s etničkim kontinuitetom. No, brojni će drugi autori pojmu *etnički* pristupati s izrazitim oprezom pa je najbolje zaključiti da promjene koje povezujemo s eneolitičkim zajednicama, a vidimo ih kao indoeuropske, predstavljaju početak oblikovanja društava koja će se tek u svojem kasnijem razvoju profilirati kao povijesno poznate etničke zajednice Europe. U tom smislu treba naglasiti da pojam Indoeuropljani ne određuje nikakav narod već je lingvistička odrednica za govornike indoeuropskoga prajezika, odnosno za populacije koje su naseljavale prostor gdje nalazimo arheološke kulture čiju materijalnu ostavštinu određujemo kao indoeuropsku. O smještaju pradomovine indoeuropskih populacija postoje brojne teorije, no čini se da danas ipak najviše pristaša ima tzv. kurganska teorija Marije Gimbutas, nadopunjena i osvježena zahvaljujući razvoju znanstvenih metoda, ponajprije genetičkih. M. Gimbutas je kroz arheološku evidenciju stepskih područja pontsko-kaspijske regije uočila da su ta prostranstva nastanjivale stočarske zajednice koje su se koristile konjima i kolima na četiri kotača, pokojnike pokapale pod grobnim humcima – kurganima, a koje se u arheološkom smislu određuju kao kultura grobova u jami te uzimaju kao najizraženija točka iz koje je krenula indoeuropska ekspanzija. Domestikacija i uporaba konja kao sredstva kretanja jedan je od ključnih elemenata korištenih pri definiranju indoeuropskih populacija koji se odražava i u postojanju zajedničke riječi za konja u svim indoeuropskim jezicima te njegovoj ulozi u indoeuropskim mitovima i ritualima. Od alternativnih teorija treba spomenuti onu Colina Renfrewa koji je bio najglasniji protivnik kurganske teorije. On pradomovinu Indoeuropljana smješta u istočnu Anadoliju negdje oko 6500. g. pr. Kr. te Indoeuropljane izjednačuje s nositeljima neolitizacije pa širenje indoeuropskih jezika povezuje sa širenjem tzv. neolitičkog paketa, zanemarujući

ly mastered metallurgy, domesticated and tamed the horse, and created wagons on four wheels, arrived from these areas searching for new pasture grounds. Due to their mobility and aggression, they imposed themselves on the old Neolithic communities and gradually transformed them into new, Eneolithic societies Following linguistic ideas, many archaeologists consider these steppe populations, who began to migrate westwards at the middle of the 5th millennium BC, to be the first Indo-European communities and connect the beginning of the Eneolithic with the gradual Indo-Europeanisation of the wider European territory. Gustav Kossinna, a German philologist and historian and a supporter of the idea about an ancient Germanic ancient Indo-European homeland and their continual local development from the Paleolithic – that later created the foundations for the national-socialist theory about the "Arian race", was the first to connect the linguistic Indo-Europeans with the archaeological Indo-Europeans at the transition from the 19th to the 20th century. Believing that archaeological cultures should be equalized with historical and philological data, he saw Indo-Europeans as a separate ethnic, and equalized the continuity in their material culture with their ethnic continuity. However, numerous authors approach the term *ethnic* with a lot of care, so it is best to conclude that the changes connected to Eneolithic communities, and are seen as Indo-European, marked the beginning of the formation of societies that would only later develop into the known European ethnic communities. In that sense, it should be said that the term Indo-European does not denote a people, but is a linguistic determinant for the speakers of an ancient Indo-European language, i.e. the populations that inhabited the area where it is possible to find the material culture defined as Indo-European. The ancient homeland of the Indo-Europeans is discussed in many theories, but it seems that, today, the most supported one is the, so called, Kurgan hypothesis, proposed by Marija Gimbutas, but widened and refreshed with the help of new scientific methods, primarily genetic ones. Based on the archaeological record of the populations who inhabited the steppes of Pontus and Caucasus, M. Gimbutas noticed that these vast areas were inhabited by populations who used horses and four-wheeled wagons, buried their dead under burial mounds – kurgans, and that are archaeologically defined as the pit grave culture and the most prominent point of origin of the Indo-European expansion. The domestication and the use of horses as a means of getting around is one of the key ele-

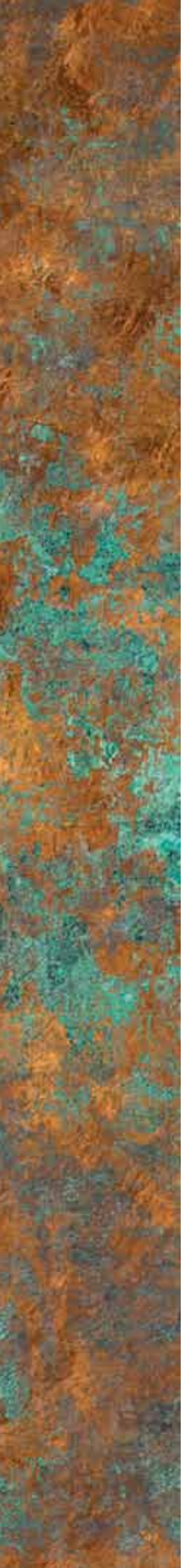
pritom lingvističke dokaze. On, naime, smatra da je proces neolitizacije jedina sveobuhvatna gospodarska i kulturna promjena u europskoj prapovijesti koja bi mogla objasniti širenje indoeuropskih jezika. No, njegova ideja ostavlja otvorenim pitanje jesu li ti jezici doista bili indoeuropski ili možda neki koji su zauvijek izgubljeni. Svoju izvornu teoriju Renfrew je višekratno revidirao ne bi li pokušao odgovoriti na niz utemeljenih prigovora, zadržavajući pritom osnovnu ideju o indoeuropskoj neolitizaciji koja iz Anadolije kreće prema Egeju i Balkanu te se Podunavljem širi u središnju Europu kao kompleks kultura linearno-trakaste keramike. Ipak, nedavno, tj. 2017. g. sâm je priznao poraz i neodrživost svoje teorije pozivajući se na najnovija genetička istraživanja te tako potvrdio doprinos Marije Gimbutas istraživanju navedene problematike.

ments used to define Indo-European populations that is also reflected in the fact that a common word is used for horses in all Indo-European languages, and their role in Indo-European myths and rituals. Other alternative theories include, e.g. that of Colin Renfrew, the loudest adversary of the Kurgan theory. The thought the original Indo-European homeland was in eastern Anatolia about 6500 BC, and equalized the Indo-Europeans with the people who spread the Neolithic, so he connected the spread of Indo-European languages with the spread of the, so called, Neolithic package, thereby ignoring linguistic evidence. Namely, he thought that the process of Neolithization was a single, all-encompassing economic and cultural change in European prehistory that could explain the spread of Indo-European languages. However, his idea does not answer the question of whether these languages were truly Indo-European or perhaps some that are forever lost. Renfrew revised his theory on several occasions in order to answer a series of justified objections, but holding on to the idea about Indo-European Neolithization that spread from Anatolia towards the Aegean and the Balkans, and then entered central

Na prostoru sjeverne Hrvatske u ranome eneolitiku i dalje svojim tradicionalnim životom žive zajednice u arheološkome smislu poznate kao kasni razvojni ili regionalni stupnjevi sopotske kulture – Sopot IV i tip Seče pa se početak eneolitika izjednačuje s produljenim neolitikom. Do znatnijih promjena dolazi sa srednjim eneolitikom i pojavom lasinjske i retzgajarske kulture, a obilježja kasnoga eneolitika ocrtavaju se kroz badensku kulturu koja se smatra jednom od prvih indoeuropskih zajednica na našemu prostoru te potom kostolačku i na kraju vučedolsku kulturu koja već jasno navješćuje sljedeće, brončano doba. O svim navedenim kulturama opširnije se govori u narednim poglavljima, ali bit će riječi i o različitim aspektima života eneolitičkih zajednica u širem i općem smislu koji upućuju na promjene u odnosu na prethodno razdoblje neolitika.

Europe through the Danube region as the complex of Linear Pottery Culture. However, recently, i.e. in 2017, he accepted defeat and admitted his theory was unsustainable, as indicated by the latest genetic research, thereby also confirming the contribution of Marija Gimbutas to the study of the issue.

During the Early Eneolithic, northern Croatia was still populated by communities that practiced a traditional way of life, and who are archaeologically known as the late or regional phases of the Sopot culture – Sopot IV and the Seče type, so the beginning of Eneolithic is equated with the extended Neolithic. More significant changes occurred during the Middle Eneolithic, when the Lasinja and Retz-Gajary cultures appeared. Late Eneolithic features were reflected through the Baden culture, considered to be one of the first Indo-European communities in our territory, the Kostolac and, finally, the Vučedol culture that clearly introduced the next period – the Bronze Age. The following chapters focus on all of these cultures in more detail, but also on different aspects of life of Eneolithic communities in a wider and more generalized sense that point to the changes in relation to the previous, Neolithic period.



Eneolitička faza sopotske kulture – kraj neolitika i početak eneolitika na području sjeveroistočne Hrvatske

The Eneolithic phase of the Sopot culture – the end of the Neolithic and the beginning of the Eneolithic in northeastern Croatia

Dragana Rajković

Arheološki muzej Osijek
Archaeological museum Osijek
dragrajkov@gmail.com

Razmišljanja koja se bave problemom prijelaza neolitika na eneolitik mogu se u grubim crtama podijeliti u dvije skupine. Jednu čine autori koji zastupaju tradicionalan pogled na ovo razdoblje, a vide ga kao posljedicu migracijskih pokreta novih etničkih grupa. Autori druge skupine proces eneolitizacije vide kao lokalni, unutarnji i pojedinačni razvoj kasnoneolitičkih zajednica (Banffy 1990-1991: 23). Promjene koje donosi eneolitik mogu se povezati s određenim socijalnim promjenama prouzročenim povećanjem broja stoke, razmjenom životinjskih proteina, primjenom plodoreda u poljodjelsvu, promjenama u klimi. Stanovništvo napušta velika naselja tipa tela i seli u manja, disperzirana naselja. Ovakav obrazac promjene naseljavanja, vidljiv je i na prostoru sjeveroistočne Hrvatske.

Rani eneolitik koji počinje oko 4500. pr. Kr. u većem dijelu sjeverne Hrvatske u početku ne donosi bitne promjene. Kasnoneolitičke zajednice poput sopotske kulture i njezinih regionalnih inačica, nastavljaju razmjerno miran tradicionalni život u istočnoj Slavoniji, zapadnoj Slavoniji i sjeverozapadnoj Hrvatskoj. Ipak, sve brojnija populacija, snažan razvoj trgovine i komunikacije sa susjednim prostorima, gomilanje sve većih bogatstava te prvobitni razvoj metalurgije postupno počinju mijenjati tradicionalno neolitičko društvo. Tome treba pridodati i značajnije pokrete stanovništva koje iz stepskih područja sjeverno od Crnoga mora i istočne Europe zbog klimatskih promjena koje su prouzročile i demografsko-gospodarske potrese, traži nove životne prostore na zapadu.

The ideas about the transition from the Neolithic into the Eneolithic can roughly be divided into two groups. One group is comprised of authors who support the traditional view of the period, and who see it as a result of the migrations of new ethnic groups. The second group sees the process of Eneolithization as the local, internal, and individual development of Late Neolithic communities (Bánffy 1990-1991: 23). The changes brought on by the Eneolithic can be connected to certain social changes caused by an increase in the number of cattle, the exchange of animal proteins, the application of crop rotation in agriculture, or changes in the climate. The populations abandoned large tell settlements and moved to small, dispersed ones. Such a change in settlement patterns is also visible in northeastern Croatia.

In a larger portion of northern Croatia, the Early Eneolithic began around 4500, and did not introduce major changes. Late Neolithic communities, such as the Sopot culture and its regional variants, continued their relatively peaceful traditional life in eastern Slavonia, western Slavonia and northeastern Croatia. However, the growing populations, the stronger development of trade and communication with the neighboring territories, the accumulation of riches, and the first development of metallurgy, gradually started to change the traditional Neolithic society, which was also affected by significant movements of populations from steppes north of the Black Sea and eastern Europe, which were instigated by climate change that also caused demographic and economic uproars, all in search of new living areas in the west.

U kronologiji neolitika i eneolitika za područje sjeverne Hrvatske već je odavno uočeno da nedostaje pojava koja bi se mogla okarakterizirati kao rani eneolitik, odnosno nije bilo vidljivo neko prijelazno razdoblje između kasnoga neolitika i eneolitika. Dugo se smatralo da eneolitik istočne Hrvatske čine badenska, kostolačka i vučedolska kultura, dok se u središnjim i sjeverozapadnim dijelovima eneolitik iskazuje kroz lasinjsku, retzgajarsku i kasnu vučedolsku kulturu, odnosno njezin regionalni tip C. No, kako je već odavno utvrđeno da i badenska i kostolačka i vučedolska kultura pripadaju kasnome eneolitiku, postavilo se pitanje što je zapravo rani i srednji eneolitik. Pokazalo se da to razdoblje zauzimaju lasinjska i retzgajarska kultura, no opet je ostalo otvoreno pitanje ranoga eneolitika. Z. Marković je u svojoj monografiji 1994. predložio nešto drukčiju podjelu eneolitika u sjevernoj Hrvatskoj od one uobičajene (zapravo Dimitrijevićeve). On također eneolitičko razdoblje dijeli na tri dijela, ali rani eneolitik sagledava kroz daljnje trajanje sopotske kulture (tzv. Sopot IV) u istočnoj i srednjoj Slavoniji te horizont Seče u srednjoj i sjeverozapadnoj Hrvatskoj (Marković 1994: 28). Horizont Seče je već ranije definirao kao kulturu Seče, kronološki je smjestivši na prijelaz Vinče D2 u Vinču D3, odnosno Sopot III/IV (Marković 1985). U materijalnoj ostavštini uočio je mnoge dodirne točke s klasičnom sopotskom kulturom, ali i postojanje znatnih razlika koje nisu dopuštale da se nova pojava potpuno uklopi u postojeću sliku istočnoslavonske sopotske kulture. S druge strane jasno su bila vidljiva neka obilježja kasnih lenđelskih kultura, osobito njihovih neslikanih inačica, poznatih na području zapadne Mađarske, Moravske i jugozapadne Slovačke. Uz to neka su obilježja podsjećala na keramografiju lasinjske kulture. Otkriće novih lokaliteta po cijeloj sjevernoj Hrvatskoj kao i radiokarbonski datumi s nekih od njih naveli su Z. Markovića da svoju kronologiju ranoga eneolitika donekle modificira, mada u općem smislu ostaje ista (Marković 2012) pa je pojam kulture Seče opravdano zamijenio tipom Seče sopotske kulture. Dakle, rani eneolitik u sjevernoj Hrvatskoj obilježuju regionalne inačice kasnoneolitičke zajednice sopotske kulture koje nastavljaju svoj tradicionalni život i početkom eneolitika paralelno s nekim novim eneolitičkim zajednicama. To potvrđuju i apsolutni datumi dobiveni radiokarbonskim metodama.

Prema trenutnom stanju istraživanja tip Seče sopotske kulture izdvojen je na Slavči u Novoj Gra-

Slika / Figure 1. Mala posuda s lokaliteta Koprivnički Bregi-Seče / A small vessel from the site of Koprivnički Bregi-Seče (foto / photo: I. Krajcar).

It was noticed long ago that the chronology of the Neolithic and the Eneolithic of northern Croatia was missing an occurrence that could be characterized as the Early Eneolithic, i.e. there was no visible transitional period between the late Neolithic and the Early Eneolithic. For a long time, it was thought that the Eneolithic of eastern Croatia was marked by the Baden, Kostolac and Vučedol cultures, and that of central and northwestern parts were marked by the Lasinja, Retz-Gajary and the late Vučedol culture, i.e. its regional type – C. However, as it was already established that the Baden, Kostolac and Vučedol cultures belonged to the Late Eneolithic, the question arose of what the Early and Middle Eneolithic were. It then became clear that the period was marked by the Lasinja and Retz-Gajary cultures, but the question of the Early Eneolithic remained unanswered. In his 1994 monograph, Z. Marković suggested a different division of Eneolithic in northern Croatia that the usual one (made by Dimitrijević). He also divided the Eneolithic into three parts, but studied the Early Eneolithic as a prolonged duration of the Sopot culture (so called Sopot IV) in eastern and central Slavonia, as well as the Seče phase in central and northwestern Croatia (Marković 1994: 28). He had previously defined the Seče phase as the Seče culture, chronologically placing it to the Vinča D2 to Vinča D3, i.e. the Sopot III to IV transition (Marković 1985). He saw numerous points of contact with the classical Sopot culture in the material remains, but also the existence of significant differences that did not allow the new occurrence to completely fit into the picture of the Sopot culture in eastern Slavonia. On the other hand, some characteristics of the late Lengyel cultures were clearly visible, especially the non-painted variants, known from western Hungary, Moravia and southwestern Slovakia.

Slika / Figure 2. Vrč s lokaliteta Sopot / A jug from the site of Sopot (foto / photo: I. Krajcar).

diški (Mihaljević 2012) i Pepelani (Minichreiter 1990), potom na križevačkom području na lokalitetu Grabrovec-Zvonarica, gdje su u donjem sloju otkriveni nalazi Seče-tipa, a u gornjem lasinjske kulture (Marković & Homen 1990). Na lokalitetu Karane u blizini Križevaca, također su prisutni elementi Seče-tipa i lasinjske kulture (Marković 2012: 61), kao i na lokalitetu Letičani-Bukvik (Dimitrijević 1961: sl. 26-29; Marković 1985: 8-9, sl. 6). Površinski nalazi ove kulture uočeni su u blizini Virovitice na nalazištima Rezovac, Orošac-Dvor, Brana i Pepelana (Minichreiter 1986: 83; 1990: 27-29). Opravdanost uvrštavanja spomenutih lokaliteta u rani eneolitik te izdvajanje eneolitičke faze sopotske kulture potvrđuju i noviji radiokarbonski datumi sa Sopota 4340-4040 pr. Kr., 4320-4040, 4250-4040 pr. Kr., 4250-4030 pr. Kr., 4230-3940 pr. Kr. (Obelić et al. 2004: 252). Ova prijelazna faza prema eneolitičkom horizontu, uočena je na Sopotu u najmlađim objektima koji se sastoje od kanala i rupa za stupove (Krznarić Škrivanko & Balen 2006; Krznarić Škrivanko 2011: 213; 2015: 379, 380, sl. 18-19).

Slični datumi potječu i s lokaliteta Nova Gradiška-Slavča 4250-3990 pr. Kr. (Mihaljević 2012; 2014: 83) te nalazišta Osijek-Filipovcia/Hermanov vinograd 4230-3810 pr. Kr. i jedan s nalazišta Otok-Mandekov vinograd 4330-4040 pr. Kr. (Obelić et. al. 2004: 252, 253), a povezani su uz keramičke nalaze stupnja Sopot IV. Taj je stupanj definirao Z. Marković uočivši u keramičkom materijalu s istočnoslavonskih lokaliteta određene sličnosti s tipom Seče, ali i razlike u odnosu na stupanj III klasične sopotske kulture (Marković 1994: 28, 85). Sopotu IV pripisao je i nalaze s područja Đakovštine, a to su Drenje i Mrzović kod Đakova (Marković 1994: 85; 2012: 14). Grubu keramiku karakteriziraju ručke koje spajaju obod i rame posude, oker do svijetlo-crvene boje, a u fak-

Additionally, some characteristics resembled the pottery production of the Lasinja culture. The discovery of new sites all across northern Croatia, as well as radiocarbon dates from some of them, urged Z. Marković to somewhat modify his chronology of the Early Eneolithic, although it generally stayed the same (Marković 2012), so he justifiably replaced the term 'the Seče culture' with 'the Seče type of the Sopot culture'. Therefore, the early Eneolithic in northern Croatia is marked by regional variants of the Late Neolithic communities of the Sopot culture, who continued their traditional way of life at the beginning of the Eneolithic parallel with some new Eneolithic communities. This was confirmed by absolute dates obtained through the application of the radiocarbon method.

According to the current state of research, the Seče type of the Sopot culture was defined at Slavča in Nova Gradiška (Mihaljević 2012) and at Pepelana (Minichreiter 1990), then in the territory of Križevci, at the site of Grabrovec-Zvonarica, which yielded finds of the Seče type in the lower, and those of the Lasinja culture in the upper layers (Marković & Homen 1990). The site of Karane near Križevci also yielded elements of the Seče type and the Lasinja culture (Marković 2012: 61), as did the site of Letičani-Bukvik (Dimitrijević 1961: sl.26-29; Marković 1985: 8-9, sl. 6). Surface finds of this culture were recorded near Virovitica, at the sites of Rezovac, Orošac-Dvor, Brana, and Pepelana (Minichreiter 1986: 83; 1990: 27-29). The justified inclusion of these sites into the Early Eneolithic and the defining of an Eneolithic phase of the Sopot culture have been confirmed by the latest radiocarbon dates obtained at Sopot: 4340-4040 BC, 4320-4040 BC, 4250-4040 BC, 4250-4030 BC, 4230-3940 BC (Obelić et al. 2004: 252). This transitional phase towards the Eneolithic was noticed in the youngest structures at Sopot, composed of canals and post holes (Krznarić Škrivanko & Balen 2006; Krznarić Škrivanko 2011: 213; 2015: 379, 380, Fig. 18-19).

Similar dates were obtained at Nova Gradiška-Slavča, 4250-3990 BC (Mihaljević 2012; 2014: 83), Osijek-Filipovcia/Hermanov Vinograd, 4230-3810 BC, and Otok-Mandekov Vinograd, 4330-4040 BC (Obelić et. al. 2004: 252, 253), and can be connected to ceramic finds of the Sopot IV phase. This phase was defined by Z. Marković, who noticed similarities with the Seče type in the material from sites in eastern Slavonia, as well as differences in relation to phase III of the classical Sopot culture (Marković 1994: 28, 85). He ascribed other finds to the Sopot IV phase,

turi ima primjese pijeska i usitnjenog kamena. Od oblika izdvojeni su lonci i lončići s otiscima prsta u traci ili stijenci posude. Fina keramika je ponekad glačana i sa sjajem, boja joj je siva, crna, a rijetko crvena, a ponekada je vidljiv trag slikanja crvenom bojom. Karakteristični oblici su konične zdjele na cilindrično-zvonastoj nozi s rupom, kuglaste svijetlosive zdjele s plitkim vertikalnim kaneliranjem te različite bikonične zdjele. Karakterisitčne su i blago jezičaste aplikacije na prijelomu te zaravnjeni obodi zdjela (Marković 1994: 85). Finu keramiku iz SJ 091 nalazišta Slavča-Nova Gradiška (Mihaljević 2012) obilježuje boja koja varira od crne do crvenosmeđe i crvene, od oblika zaobljene zdjele, bikonične zdjele, bikonične zdjele s ručkom od oboda do prijeloma, bute ili dublje zdjele sa šiljastom kljunastom ručkom, kupe na nozi zvonoliko-cilindričnog tipa. Ukrašavanje fine keramike je rijetko, a javlja se žljebljenje horizontalnih linija u nizu ili samostalno te plastične aplikacije na trbuhu. Najkarakterističniji su ukras udubljene jamice na ručki i trbuhu zdjele s ručkom. Gruba keramika u fakturi ima primjese pijeska i kamena, a boja varira od oker, smeđe, sive do sivocrne i crne (Marković 2012: 62).

Ranoeneolitički horizont potvrđen je i na nalazištu Gomolava (Gomolava IIa, Brukner 1980-1981: 20-25; Petrović 1986: 23) te Gradini na Bosutu (Tasić 1985: 1-2). Na potonjem, u sloju Bosut I uočen je vrlo debeo sloj kasnoneolitičke lenđelske kulture, bogat keramičkim nalazima koji su bili pomiješani s nalazima lasinjske, vatinske i kulture Boleraz. Stoga N. Tasić smatra ovaj lokalitet dobrim primjerom kontakata na relaciji Sopot-Lengyel-Vinča u vrijeme ranoga eneolitika na području Slavonije i istočnoga Srijema, te naglašava kako iza ovog horizonta odmah slijedi sloj lasinjske kulture, bez značajnog prekida. E. Banffy također naglašava kontituitet Lengyel-Balaton-Lasinja na području južne Transdanubije. Postojanje faze finalnog Sopota pretpostavio je i B. Brukner te ga vremenski izjednačio s Vinčom D i kulturom Tiszapolgar (Brukner 1980-1981). Kraj stupnja III sopotske kulture smješta se u 4600/4500. pr. Kr., i prema kronologiji Borić 2009. paralelan je s Vinčom D (Borić 2009: 234). U tom slučaju datume koji se pojavljuju između 4500. i 4300. možemo smatrati datumima ranoga eneolitika, odnosno Sopota IV (Z. Marković), paralelnog s Lengyelom III i fazom Seče sopotske kulture. J. Balen se slaže da je potpuno opravdano klasičnu sopotsku kulturu (stupnjevi I-III prema S. Dimitrijeviću) datirati najkasnije do oko 4500. pr.

including those from the Đakovo region - Drenje and Mrzović near Đakovo (Marković 1994: 85; 2012: 14). Coarse pottery is characterized by handles that connect the rim and the shoulder, varies in color from ochre to light red, and has a lot of inclusions of sand and crushed rock. Characteristic forms include jugs and small jugs with finger imprints in a ribbon or on the vessel surface. Fine ware is sometimes polished and has a sheen, varies in color from gray, black and, occasionally, red, and sometimes has traces of red paint. Characteristic forms include conical bowls on a cylindrical/bell-like foot with a hole, spherical light gray bowls with vertical flutes, and different biconical bowls. Slightly tongue-like applications on the transition of the vessel body and straightened vessel rims are also characteristic (Marković 1994: 85). Fine ware, from SU 091, discovered at Slavča-Nova Gradiška (Mihaljević 2012) is characterized by variation in color from black to reddish-brown and red, rounded bowls, biconical bowls, biconical bowls with a handle that connects the rim and the transition of the vessel body, "bute" or deeper bowls with a pointy beak-shaped handle, and vessels on a cylindrical/bell-like foot. Decorations rarely appear on fine ware, but include gauged individual or stacked horizontal lines and plastic applications at the body. The most common decorations include sunken holes on the handle and the bodies of vessels with handles. Coarse pottery contains inclusions of sand and rocks, varies in color from ochre and gray to gray-black and black (Marković 2012: 62).

An Early Eneolithic phase was also confirmed at Gomolava (Gomolava IIa, Brukner 1980-1981: 20-25; Petrović 1986: 23) and Gradina na Bosutu (Tasić 1985: 1-2). At the latter site, the Bosut I layer yielded a thick layer of the Late Eneolithic Lengyel culture that contained pottery finds, mixed with those of the Lasinja, Vatin and Boleraz cultures. Therefore, N. Tasić sees this site as a good example of the Sopot-Lengyel-Vinča contacts during the Early Eneolithic in Slavonia and eastern Syrmia, and emphasizes that this phase was immediately followed by a layer of the Lasinja culture, without significant interruption. E. Bánffy also emphasizes the Lengyel-Balaton-Lasinja continuity in southern Transdanubia. The existence of the final Sopot phase was also suggested by B. Brukner, who dated it to the same time as Vinča D and the Tiszapolgar culture (Brukner 1980-1981). The end of phase IIIof the Sopot culture is dated to 4600/4500 BC and is, according to the chronology of Borić from 2009, parallel to Vinča D (Borić 2009: 234). In that case, the dates that appear

Kr. i da prije lasinjske kulture svakako treba uzeti u obzir postojanje eneolitičke faze sopotske kulture, kako je to obrazložio Z. Marković (Balen et. al. 2009: 35).

between 4500 and 4300 can be ascribed to the Early Eneolithic, i.e. Sopot IV (Z. Marković), which is parallel to Lengyel III and the Seče phase of the Sopot culture. J. Balen agrees that it is justifiable to date the classical Sopot culture (phases I-III according to S. Dimitrijević) to 4500 BC at the latest, and that Lasinja culture might have indeed been preceded by an Eneolithic phase of the Sopot culture, as explained by Z. Marković (Balen et. al. 2009: 35).

Literatura / Bibliography

Balen, J., Bilić, T., Bunčić, M., Drnić, I., Solter, A. 2009, Rezultati zaštitinih istraživanja na lokalitetu Ivandvor-šuma Gaj, *Vjesnik Arheološkog muzeja u Zagrebu*, 3. s., XLII, 23-72.

Bánffy, E. 1990-1991, Continuity od Discontinuity? Some Questiones on the Transition from Neolithic to the Copper Age in the Carpatian Basin, *Antaeus* 19-20, 23-32.

Borić, D. 2009, Absolute Dating of Metallurgical Innovations in the Vinča Culture of the Balkans, *Universitätsfforsungen zur prähistorichen archäologie* 169, Bonn, 191-245.

Brukner, B. 1980-1981, Zum problem der Auflösung der Fruhäneolitschen Kulturen in Südostpannonien. *Archaeologica Iugoslavica* XXI-XXII, 16-26.

Dimitrijević, S. 1961, Problem neolita i eneolita u sjeverozapadnoj Jugoslaviji, *Opuscula archaeologica* V, Zagreb.

Krznarić Škrivanko, M. 2011, Radiokarbonski datumi uzoraka sa Sopota, in: M. Dizdar (ed.), Panonski prapovijesni osviti – Zbornik radova posvećen Korneliji Minichreiter uz 65. obljetnicu života, Zagreb, 209-225.

Krznarić Škrivanko, M. 2015, Rezultati Dimitrijevićevih istraživanja Sopota u svjetlu novih istraživanja, *Opuscula Archaeologica* 37-38/2013-2014, Zagreb, 371-395.

Krznarić Škrivanko, M. & Balen, J. 2006, Osma, deveta i deseta sezona sustavnog istraživanja gradine Sopot (godina 2003., 2004., 2005.), *Obavijesti Hrvatskog arheološkog društva* XXXVIII/1, 51-60.

Marković, Z. 1985, Problem ranog eneolita u sjeverozapadnoj Hrvatskoj, *Vjesnik Arheološkog muzeja u Zagrebu* 3. ser. 18, 1-34, T. 1-11.

Marković, Z. 1994, *Sjeverna Hrvatska od neolita do brončanog doba, Problem kontinuiteta stanovništva i kultura sjeverne Hrvatske od ranog neolita do brončanog doba*, Muzej grada Koprivnice, Koprivnica.

Marković, Z. 2012, Novija razmatranja o nekim aspektima sopotske kulture u sjevernoj Hrvatskoj, *Prilozi Instituta za arheologiju u Zagrebu* 29, Zagreb, 57-69.

Marković, Z. & Homen, Z. 1990, Nekoliko novijih momenata u istraživanju neolita i eneolita u sjevernoj Hrvatskoj, *Poročilo o raziskovanju paleolita, neolita in eneolita v Sloveniji* 18, Ljubljana, 61-82.

Mihaljević, M. 2012, *Sopotska kultura u zapadnoj Slavoniji s posebnim osvrtom na nalazište Slavča-Nova Gradiška*, Doktorska disertacija, Sveučilište u Zagrebu.

Mihaljević, M. 2014, Slavča-Nova Gradiška, in: J. Balen, T. Hršak, R. Šošić Klindžić (eds.), *Darovi zemlje - neolitik između Save, Drave i Dunava*, katalog izložbe, Zagreb, 82-84.

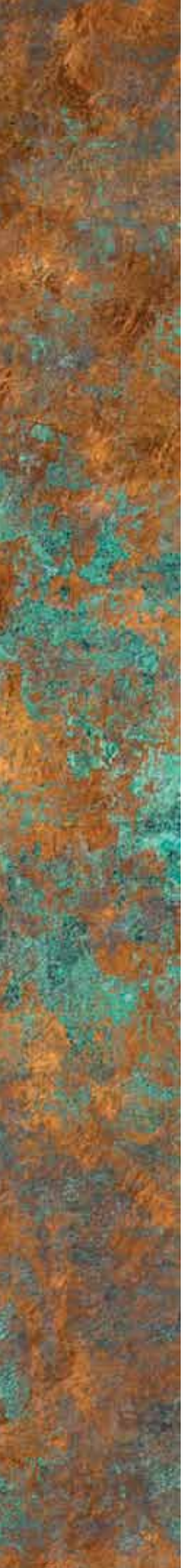
Minichreiter, K. 1986, Pregled arheoloških nalaza na području općine Virovitica, *Virovitički zbornik 1234-1984*, Virovitica, 81-98.

Minichreiter, K. 1990, Prvi rezultati arheoloških istraživanja u Pepelanama, *Arheološka istraživanja u Podravini i kalničko-bilogorskoj regiji, Znanstveni skup Koprivnica 1986, Izdanja Hrvatskog arheološkog društva* 14, Zagreb, 19-38.

Obelić, B., Krznarić Škrivanko, M., Marijan, B., Krajcar Bronić, I. 2004, Radiocarbon dating of Sopot Culture sites (Late Neolithic) in Eastern Croatia, *Radiocarbon* Vol 46., Nr. 1, 245-258.

Petrović, J. 1986, Srednji i pozni eneolit, in: *Gomolava od praistorije do srednjeg veka*, katalog izložbe, Novi Sad, 23-30.

Tasić, N. 1985, O hronološkom odnosu eneolitskih kultura u jugoslovenskom Podunavlju, *Starinar* XXXVI, Beograd, 1-11.



Lasinjska kultura

The Lasinja culture

Lea Čataj

Hrvatski restauratorski zavod
Croatian Conservation Institute
Zagreb
lcataj@h-r-z.hr

Lasinjska je kultura zauzimala prostor zapadnog dijela Panonske nizine, s približno Dunavom kao granicom na sjeveru i istoku te obroncima Dinarida i Alpa na jugu i zapadu. U okvirima današnjih državnih granica zauzimala je kontinentalnu Hrvatsku, sjevernu Bosnu, kontinentalnu Sloveniju, jugoistočnu Austriju te zapadnu Mađarsku, dok je njezina prisutnost u vojvođanskom dijelu Srijema još upitna (Dimitrijević 1979: 139-142, karta 3; Simon 1990: 54-55; Marković 1994: karta 9; Tasić 1995: 125; Ruttkay 1996; Marijanović 2003, karta II; Balen 2010: sl. 5; Velušček 2011: 229-231). U novije je vrijeme njezina južna granica rasprostiranja u Hrvatskoj pomaknuta do Otočca, gdje je zabilježena prilikom arheoloških istraživanja Staroga grada (Kolak 2015).

Kulturu je imenovao S. Dimitrijević, prema nalazištu Lasinja na Kupi, a kronološki ju je smjestio u čitavo razdoblje eneolitika (Dimitrijević 1961: 22-89). Srodni su nalazi s područja Austrije označeni kao Pölshals-Strappelkogel tip kasne badenske kulture (Pittioni 1954: 208). Proučavajući slične nalaze s prostora Slovenije i sjeverozapadne Hrvatske, J. Korošec zaključuje kako se radi o kulturi kasnoga neolitika i prijelaznoga razdoblja, koju imenuje alpskim facijesom lenđelske kulture, čime jasno naglašava utjecaje pod kojima se ona razvila te smatra da joj ne pripadaju nalazi s prostora Hrvatske (Korošec 1958; 1960; 1962; 1965). Važnu ulogu lenđelske, odnosno sopotske kulture u genezi lasinjske uočio je i S. Dimitrijević, ali isto tako i snažne utjecaje badenske te nešto manje vučedolske i hvarske kulture (Dimitrijević 1979: 137-181). Drugi su autori vidjeli jadranske utjecaje u lasinjskom materijalu (Bregant 1974; Batović 1975; Marković 1986: 22), ali i elemente istovremenih susjednih

The Lasinja culture occupied the area of the western part of the Pannonian Plain. The Danube was the approximate border in the north and the east, and the slopes of the Dinaric Alps and the Alps in the south and west. In the sense of today's defined country borders, this includes continental Croatia, northern Bosnia, continental Slovenia, southeastern Austria, and western Hungary. The culture's presence in the part of Syrmia in Vojvodina is still questionable (Dimitrijević 1979: 139-142, map 3; Simon 1990: 54-55; Marković 1994: map 9; Tasić 1995: 125; Ruttkay 1996; Marijanović 2002: map II; Balen 2010: fig. 5; Velušček 2011: 229-231). In recent times, its southern border in Croatia was moved to Otočac, where the culture was recorded during the archaeological excavations of the Stari grad position (Kolak 2015).

The culture was defined by S. Dimitrijević based on the site of Lasinja on the Kupa River, and the author chronologically dated it to the entire Eneolithic period (Dimitrijević 1961: 22-89). Similar finds from Austria were defined as the Pölshals-Strappelkogel type of the late Baden culture (Pittioni 1954: 208). By studying similar finds from Slovenia and northwestern Croatia, J. Korošec concluded that the culture belonged to the Late Neolithic and the transitional period. He called it the Alpine facies of the Lengyel culture, thereby clearly emphasizing the influences that affected its development, and claiming that the finds from Croatia should not be ascribed to it (Korošec 1958; 1960; 1962; 1965). The important role of the Lengyel, that is, the Sopot culture, in the genesis of the Lasinja culture was also noted by S. Dimitrijević, who saw the strong influences of the Baden, and, to a lesser extent, of the Vučedol and Hvar cultures (Dimitrijević 1979: 137-181). Other au-

kultura poput Bodrogkeresztúr i Salcuța (Dimitrijević 1961: 52; 1979: 174-176; Marković 1983: 255). Jedan od predloženih naziva za ovu kulturnu pojavu je i Kanzianiberg-Drulovka-Lasinja (Pahič 1975: 23).

Na prostoru Mađarske lasinjska je kultura prvotno bila prepoznata kao najstariji dio kompleksa Balaton, u čijoj je tvorbi najznačajniju ulogu odigrala vinčanska, a potom i sopotsko-lenđelska kultura (Kalicz 1973). Danas je poznata kao zasebna kultura Balaton-Lasinja (Kalicz 1995: 37). Proučavajući srodne nalaze s područja Austrije, E. Ruttkay svrstava ih u grupu Bisamberg-Oberpullendorf srednjoeuropskog epilenđelskog horizonta, koju vidi kao tipološku poveznicu između moravske grupe Jordanow/Jordansmühl i lasinjske kulture u Hrvatskoj (Ruttkay 1985: 34). Smatra da se lasinjska kultura javlja u nekoliko lokalnih grupa, a osim navedene pripadale bi joj i Balaton-Lasinja te Kanzianiberg-Lasinja (Ruttkay 1996). Sličnog je razmišljanja i Z. Marković, koji drži da se lasinjska kultura javlja u nekoliko regionalnih tipova, od kojih bi na prostoru Hrvatske bili rasprostranjeni tipovi Koška u istočnoj Hrvatskoj, Beketinec u sjeverozapadnoj Hrvatskoj i sjevernoj Bosni te Čakovac ili Josipdol u okolici Ogulina (Marković 1994: 92-94).

Prema podjeli eneolitika u kontinentalnoj Hrvatskoj, lasinjska kultura smješta se u početak srednjega eneolitika, a danas već brojni radiokarbonski datumi u rasponu su između 4350. i 3900. g. pr. Kr. (Balen 2008: sl. 3; 2010: tablica 3; 2016: 64; 2018: 67; Čataj 2016: fig. 2). Velik broj radiokarbonskih datuma lasinjske kulture s prostora Slovenije u istom je vremenskom rasponu (Guštin 2005: sl. 2, sl. 3; Žižek 2006; Strmičnik Gulič 2006; Plestenjak 2010: 156; Kavur 2011; Tomaž 2012: 277). Datumi iz Beketinaca, dobiveni iz zagrebačkog laboratorija nešto su mlađi te iskaču iz predloženog okvira (Minichreiter & Marković 2013: 22). Apsolutni kalibrirani datumi grupe Kanzianiberg-Lasinja s prostora Austrije padaju u razdoblje između 4240. i 3950. g. pr. Kr. (Ruttkay 1996). Iako je u zapadnoj Mađarskoj istraženo mnogo nalazišta kulture Balaton-Lasinja, zasad je poznato tek nekoliko radiokarbonskih datuma, koji su u rasponu od 4300. do 3900. g. pr. Kr. (Horváth 2010: 53; Oross et al. 2010: Abb. 12).

Na prostoru istočne Hrvatske lasinjska kultura slijedi završnu fazu sopotske kulture (Sopot IV), a u sjeverozapadnoj Hrvatskoj njezin tip Seče. U Gorskoj Hrvatskoj, Sloveniji, Austriji i Mađarskoj ona se javlja nakon završnog stupnja lenđelske kulture, a u sjevernoj Bosni nakon stupnja Vinča

thors recognized Adriatic influences in the material of the Lasinja culture (Bregant 1974; Batović 1975; Marković 1986: 22), as well as elements of contemporaneous neighboring cultures such as Bodrogkeresztúr and Salcuța (Dimitrijević 1961: 52; 1979: 174-176; Marković 1983: 255). One of the suggested names for this culture is Kanzianiberg-Drulovka-Lasinja (Pahič 1975: 23).

In Hungary, the Lasinja culture was originally seen as the oldest part of the Balaton complex that developed under strong influences of the Vinča, and later the Sopot-Lengyel culture (Kalicz 1973). Today it is known as a separate culture called Balaton-Lasinja (Kalicz 1995: 37). By studying similar finds from Austria, E. Ruttkay ascribed them to the Bisamberg-Oberpullendorf group of the epi-Lengyel phase in central Europe, which was seen as a typological link between the Moravian Jordanow/Jordansmühl group and the Lasinja culture in Croatia (Ruttkay 1985: 34). It is believed that the Lasinja culture appeared in several local groups, including, other than the listed, the Balaton-Lasinja and the Kanzianiberg-Lasinja groups (Ruttkay 1996). Z. Marković is of a similar opinion, and feels that the Lasinja culture appeared in several regional types that, in Croatia, include the Koška type in eastern Croatia, Beketinec in northwestern Croatia and northern Bosnia, and Čakovac or Josipdol in the vicinity of Ogulin (Marković 1994: 92-94).

According to the division of the Eneolithic in continental Croatia, the Lasinja culture is dated to the beginning of the Middle Eneolithic, and, today, the increasing number of radiocarbon dates fall in the range between 4350 and 3900 BC (Balen 2008: fig. 3; 2010: table 3; 2016: 64; 2018: 67; Čataj 2016: fig. 2). A large number of radiocarbon dates of the Lasinja culture from Slovenia fall into the same time span (Guštin 2005: fig. 2, fig. 3; Žižek 2006; Strmičnik Gulič 2006; Plestenjak 2010: 156; Kavur 2011; Tomaž 2012: 277). The dates from Beketinci, obtained from the laboratory in Zagreb, are somewhat younger and deviate from the suggested timeframe (Minichreiter & Marković 2013: 22). The calibrated absolute dates of the Kanzianiberg-Lasinja group in Austria fall to the period between 4240 and 3950 BC (Rutkay 1996). Even though many sites of the Balaton-Lasinja culture were excavated in western Hungary, so far only several radiocarbon dates have been published that fall into the range between 4300 and 3900 BC (Horváth 2010: 53; Oross et al. 2010: Abb. 12).

D3 (Raczky 1974: 209; Dimitrijević 1979: 347-349; Marković 1986: 20-22; Težak-Gregl 2005; Balen 2018: 67). Lasinjskoj su kulturi istovremene susjedne kulture i grupe: Ludanice u zapadnoj Slovačkoj i sjevernoj Transdanubiji, Bisamberg-Oberpullendorf u Donjoj Austriji i Gradišću, Münchshöffen u Donjoj Bavarskoj, Bodrogkeresztúr u istočnoj Mađarskoj, Bubanj-Hum-Salcuța u Srbiji (Kalicz 1995: Abb. 1, Abb. 2). Nakon ili krajem lasinjske javlja se kultura Retz-Gajary, odnosno kultura keramike s brazdastim urezivanjem (Kalicz 1995: 47, Abb. 2; Marković 1989: 46; Velušček 2004: 250-261).

S. Dimitrijević podijelio je lasinjsku kulturu na stupnjeve I, IIa, IIb i III (Dimitrijević 1979: 146). Z. Marković prvotno je podijelio kulturu na stupnjeve A i B, prema kojoj bi se stupanj A izjednačio s Dimitrijevićevim stupnjevima I i IIa, a stupanj B sa stupnjevima IIb i III (Marković 1977). Kasnije se priklonio Dimitrijevićevoj podjeli na tri stupnja, ali nije smatrao potrebnim dodatno dijeliti drugi stupanj (Marković 1983: 253).

Iako se periodizacija prema S. Dimitrijeviću (1979: 146) još uvijek koristi u stručnoj literaturi, već je prije nekog vremena postalo jasno da je potrebno pomaknuti lasinjsku kulturu iz odavno zadanih tipo-kronoloških okvira (Balen 2010; Balen & Drnić 2014: 50-54). Nalazi iz Ajdovske jame poslužili su Dimitrijeviću za stupnjevanje lasinjske kulture te je tri horizonta datirao u stupnjeve I, IIa i IIb (Dimitrijević 1979: 144-147). Revizija nalaza te radiokarbonski datumi pokazali su da se samo drugi od tri horizonta može vezati uz lasinjsku kulturu (Budja 1983: 81; Velušček 2004: 243-245; Tomaž & Velušček 2005; Balen 2010: 35). Problematičnom se pokazala i stratigrafija Gornje Tuzle, čiji je stratum I Dimitrijević pripisao stupnju IIa, a stratum II stupnju I (Dimitrijević 1979: 146). Kako je već ranije uočeno, u horizontima su zamijećeni nalazi mlađih kultura, koji upućuju na poremećenu stratigrafiju (Benac 1980: 16; Budja 1983; Marković 1994; Balen 2010: 35-36). Radiokarbonski datumi pokazali su da je lasinjska kultura u Požeškoj kotlini bila prisutna i prije njezine završne faze (Balen 2010: 35, tab. 3), u koju je nalazišta s tog prostora datirao Dimitrijević (1979: 145). Brojni su i primjeri ukrašavanja keramičkih nalaza, koje je S. Dimitrijević datirao u određeni stupanj lasinjske kulture, a ne potvrđuje ih apsolutna kronologija, primjerice mrežasti, ljestvičasti i krivolinijski ukrasi te velike jezičaste aplikacije, koje je Dimitrijević pripisao kasnoj fazi lasinjske kulture, a na nekim su nalazištima pronađeni u zatvorenim cjelinama radiokarbonski dati-

In eastern Croatia, the Lasinja culture appeared right after the final phase of the Sopot culture (Sopot IV), and, in northwestern Croatia its Seče type. In mountainous parts of Croatia, Slovenia, Austria and Hungary, it appeared after the final phase of the Lengyel culture, and in northern Bosnia after the Vinča D3 phase (Raczky 1974: 209; Dimitrijević 1979: 347-349; Marković 1986: 20-22; Težak-Gregl 2005). The Lasinja culture is contemporaneous with the following neighboring cultures and groups: Ludanice in western Slovakia and northern Transdanubia, Bisamberg-Oberpullendorf in Lower Austria and Burgenland, Münchshöffen in Lower Bavaria, Bodrogkeresztúr in eastern Hungary, Bubanj-Hum-Salcuț a in Serbia (Kalicz 1995: Abb. 1, Abb. 2). The Retz-Gajary, i.e. the culture of pottery with furrowed incisions, appeared after, or at the end of the Lasinja culture (Kalicz 1995: 47, Abb. 2; Marković 1989: 46; Velušček 2004: 250-261).

S. Dimitrijević divided the Lasinja culture into phases I, IIa, IIb and III (Dimitrijević 1979: 146). Z. Marković initially divided the culture into phases A and B, whereby phase A was the same as Dimitrijević's phases I and IIa, and phase B the same as phases IIb and III (Marković 1977). He later adopted Dimitrijević's tripartite division, but saw no need to further divide the second phase (Marković 1983: 253).

Although S. Dimitrijević's division (1979: 146) is still used in expert publications, it eventually became clear that the Lasinja culture should be moved from the previously defined typological and cultural frameworks (Balen 2010; Balen & Drnić 2014: 50-54). Dimitrijević used the finds from Ajdovska jama to make a division of the Lasinja culture into three stages dated to phases I, IIa and IIb (Dimitrijević 1979: 144-147). A reevaluation of the finds and radiocarbon dates revealed that only the second out of the three stages can be connected with the Lasinja culture (Budja 1983: 81; Velušček 2004: 243-245; Tomaž & Velušček 2005; Balen 2010: 35). The stratigraphy of Gornja Tuzla is also problematic, seeing as Dimitrijević had ascribed stratum I to phase IIa, and stratum II to phase I (Dimitrijević 1979: 146). As previously noted, these strata yielded finds of younger cultures, suggesting that the stratigraphy was disrupted (Benac 1980: 16; Budja 1983; Marković 1994; Balen 2010: 35-36). Radiocarbon dates have shown that the Lasinja culture was present in the Požega Valley before its final phase (Balen 2010: 35, tab. 3), to which Dimitrijević had dated the sites from the region (1979: 145). There are also numerous exam-

ranima u sam početak lasinjske kulture (Dimitrijević 1979: 158; Balen 2010: 34; Plestnjak 2010: 35-38, G27).

Istraživanja velikog broja nalazišta lasinjske kulture, posebice unatrag dvadesetak godina, rasvijetlila su neke njezine dotad ne potpuno jasne aspekte, poput načina stanovanja ili apsolutne kronologije. Ipak, problem njezine unutarnje periodizacije još uvijek nije razriješen.

ples of decorated pottery that Dimitrijević had ascribed to certain phases of the Lasinja culture, but that are not confirmed by absolute chronology. For example, decorations in the shape of nets, ladders or wavy lines, as well as large tongue-like applications, which Dimitrijević had ascribed to the late phase of the Lasinja culture, were discovered in closed contexts at some sites, and were radiocarbon dated to the very beginning of the Lasinja culture (Dimitrijević 1979: 158; Balen 2010: 34; Plestnjak 2010: 35-38, G27).

The excavations conducted on a large number of sites of the Lasinja culture, especially in the last twenty or so years, have shed new light on some of its previously vague aspects, such as the way of life and absolute chronology. However, the problem of its inner periodization remains unsolved.

Naselja i stanovanje

Lasinjska su naselja najčešće smještena na manjim brežuljcima ili gredama, blizu potoka ili rijeka, na nadmorskoj visini do 250 m. U gorskim ili planinskim dijelovima Hrvatske često su gradinskog tipa, na prirodnoj uzvisini iznad rijeke. Lasinjski su nalazi pronađeni i u nekoliko špilja, koje su korištene kao privremena skloništa, izuzev Ajdovske jame, koja je služila u grobnom ritualu i kultu (Dimitrijević 1979: 147; Horvat 1989; Marković 1994: 39; Virág 2003: 393; Balen 2010: 27).

Lasinjska su naselja otvorenog tipa i u pravilu jednoslojna, iako su se neka vjerojatno pomicala i horizontalno, što bi mogle potvrditi serije radiokarbonskih datuma. Uglavnom su to bili zaseoci ili farme međusobno udaljeni 1-2 km povezani u grupacije te se pretpostavlja da se radi o obiteljskim zajednicama. Naselja su bila raširena na velikoj površini. Sastojala su se od nekoliko nadzemnih objekata međusobno udaljenih 30 do 80 m, popratnih jama različite namjene, bunara, peći i sl. Zamijećeno je grupiranje po nekoliko kuća i jama zajedno, kao i podjela nalazišta na radni i stambeni dio. Kako pokazuju dosadašnja istraživanja, istovremeno je korišteno maksimalno 4-5 stambenih objekata (Virág 1990: 74; 2003: 386; Kalafatić 2009: 21-22; Oross et al. 2010: 388, Abb. 1; Minichreiter & Marković 2013: 34; Hornok & Kiss 2017: 239-241; Hulina, *u tisku*). Jedino zasad poznato naselje tipa tela jest Pepelana kod Virovitice, s tri prepoznata horizonta ove kulture (Minichreiter 1990; Minichreiter & Marković 2009).

Settlements and habitation

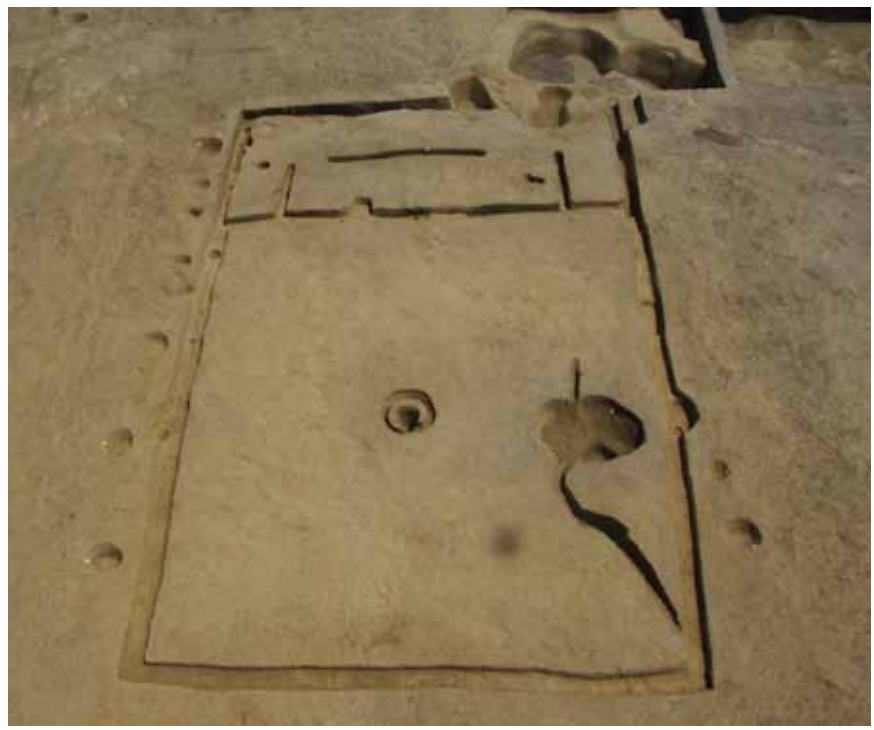
Settlements of the Lasinja culture are most often situated on smaller hills or elevated positions in the vicinity of streams or rivers, at an altitude of up to 250 m. In hilly and mountainous parts of Croatia, these are often hillforts situated on natural elevations above rivers. Finds of the Lasinja culture have also been discovered in caves that were used as temporary shelters, with the exception of Ajdovska jama, which was used for burials and cult-related activities (Dimitrijević 1979: 147; Horvat 1989; Marković 1994: 39; Virág 2003: 393; Balen 2010: 27).

Settlements of the Lasinja culture are of the open type and generally have a single layer, although some of them probably made horizontal shifts, as could potentially be indicated by radiocarbon dates. These were mostly hamlets or farms that were 1-2 km apart and were clustered into groups, so it was assumed that they were inhabited by familial communities. The settlements spread over large areas and were comprised of several above-ground structures that were 30 to 80 m apart, as well as of accompanying pits used for different purposes, wells, kilns and the like. The tendency to group several houses and pits together was noted, as was the division of sites into working and residential areas. As shown by research conducted so far, a maximum of 4-5 residential structures were used at the same time (Virág 1990: 74; 2003, 386; Kalafatić 2009: 21-22; Oross et al. 2010: 388, Abb. 1; Minichreiter & Marković 2013: 34; Hornok & Kiss 2017: 239-241; Hulina, in print). The only currently

Iako se za pripadnike lasinjske kulture dugi niz godina smatralo da daju prednost životu u jamsko-zemuničkim objektima, danas je posve jasno da su gradili nadzemne objekte. Lasinjske su kuće imale zidove građene od nosivih stupova i pruća oblijepljenih glinom/blatom. Na prostoru Transdanubije i Slavonije gotovo su u pravilu građene s temeljnim jarcima širokim oko 25-50 cm i dubokim čak do 50 cm, na dnu kojih su bile jame od stupova. S obzirom na dublje ukopane temelje nekih od kuća pretpostavlja se da su imale dva kata. U središnjoj Hrvatskoj i Sloveniji te na nekoliko nalazišta u Transdanubiji kuće nisu imale temeljne rovove već samo nosive stupove. Njihova je orijentacija ovisila o prevladavajućem smjeru vjetra i topografskim okolnostima, čemu u prilog govori jednaka orijentacija kuća iz različitih razdoblja na pojedinim nalazištima. Najčešće su bile orijentirane sjeverozapad-jugoistok ili zapad-istok, s ulazom na kraćoj strani kuće (Dimitrijević 1979: 148-150; Virág 2003; Kalafatić 2009; Balen 2010: 28; Oross et al. 2010: 379-389; Minichreiter & Marković 2013: 52-71; Hulina, u tisku).

known tell settlement is the one at Pepelane near Virovitica, were three phases of this culture have been identified (Minichreiter 1990; Minichreiter & Marković 2009).

Although it was, for many years, thought that the members of the Lasinja culture preferred to live in dugout pit-dwellings, today it is completely clear that they used above-ground structures. Houses of the Lasinja culture had walls comprised of supportive posts and wattle covered with clay/mud. In Transdanubia and Slavonia, they almost always had ditches with post holes at the base. Seeing as some of the houses had deeper foundations, it was suggested that they had two floors. In central Croatia and Slovenia, as well as on several sites in Transdanubia, the houses did not have ditches, but only supporting pillars. Their orientation depended on the prevailing direction of the wind and other topographic features, as attested to by the same orientation of houses from different periods at certain sites. Most often they were laid out in a northwest-southeast or a west-east direction, with the entrance on the shorter side of the house (Dimitrijević 1979: 148-150; Virág 2003; Kalafatić 2009; Balen 2010: 28; Oross et al. 2010: 379-389; Minichreiter & Marković 2013: 52-71; Hulina, in print).



Slika / Figure 1. Ostaci nadzemnog objekta lasinjske kulture, Tomašanci-Palača / The remains of an above-ground structure of the Lasinja culture, Tomašanci-Palača (prema / after: Balen 2016: fig. 7).

Lasinjske su kuće najčešće bile pravokutnog tlocrta dimenzija 7-12 x 13-23 m, s unutarnjom podjelom na dvije prostorije te ponekad i nosivim stupovima u sredini koji su nosili krov na dvije vode. Nešto se rjeđe javljaju kuće s jednom ili tri prostorije. Uz kuće može biti nadograđeno kružno dvorište s ogradom. Kuće kvadratnog oblika imale su stranice dimenzija 7-11 m, jednu prostoriju i krov na dvije ili četiri vode (Dimitrijević 1979: 148-150; Virág 2003; Kalafatić 2009; Balen 2010: 28; Oross et al. 2010).

Na prostoru Hrvatske najveća istražena lasinjska naselja s nadzemnim kućama i popratnim objektima su nalazišta Beketinci-Bentež (Minichreiter & Marković 2013: 52-71), Čepinski Martinci-Dubrava (Kalafatić 2009), Donji Miholjac-Mlaka (Nodilo 2012) i Donji Miholjac-Đanovci (Tkalčec 2016). Na nalazištima Varaždin-Brezje (Tomičić 1968; Madiraca & Čimin 2009; Bekić 2010), Poljana Križevačka I (Dizdar 2013; Hulina, *u tisku*), Poljana Križevačka II (Ložnjak Dizdar 2012; Hulina, *u tisku*) i Velika Gorica-Šepkovčica (Bugar 2009) istražena je velika površina, a nadzemni objekti prepoznati su po nizovima nosivih stupova.

U Mađarskoj su najveća istražena lasinjska naselja s nadzemnim objektima Győr-Szabadrétdomb (Virág & Figler 2007: 352-354, fig. 2. 1, 5-11), Magyaregres-Macskalyuk (Hornok & Kiss 2017: fig. 1) te Balatonszárszó-Kis-erdei-dűlő (Oross et al. 2010).

Velik je broj lasinjskih nalazišta na kojima nisu pronađeni nadzemni objekti. S obzirom na horizontalnu raširenost kao osnovnu karakteristiku lasinjskih naselja te činjenicu da niti jedno od njih nije istraženo u cijelosti, barem za dio njih može se pretpostaviti da je postojanje isključivo jamskih objekata rezultat stanja istraženosti (Balen 2010: 29; 2018: 65). Dio nalazišta vjerojatno je bio kratkotrajnog ili sezonskog karaktera te se sastojao od manjeg broja ukopanih objekata (Straub 2005; Tokai 2007).

Zahvaljujući u prvome redu zaštitnim arheološkim istraživanjima, broj lasinjskih nalazišta povećava se iz godine u godinu. Na prostoru Hrvatske tako je 1979. g. zabilježeno tek 29 nalazišta (Dimitrijević 1979: karta 3) dok ih je danas poznato gotovo 200, iako su se arheološka istraživanja odvijala na njih manje od sto (Marković 1994: karta 9; Registar 1997; Okroša Rožić 2004: karta 2; Balen 2010: 41-44, sl. 5; Jakovljević 2012).

Houses of the Lasinja culture were most commonly rectangular, measuring 7-12x13-23 m, their interior was divided into two rooms, and some of them had posts in the middle that supported the gable roof. Houses with one or three rooms are somewhat less common. The houses can be accompanied by a circular yard with a fence. Square houses measured 7-11 m at the sides, had one room, and a gable or a cross gabled roof (Dimitrijević 1979: 148-150; Virág 2003; Kalafatić 2009; Balen 2010: 28; Oross et al. 2010).

In Croatia, the largest excavated settlements of the Lasinja culture with above-ground houses and accompanying structures include Beketinci-Bentež (Minichreiter & Marković 2013: 52-71), Čepinski Martinci-Dubrava (Kalafatić 2009), Donji Miholjac-Mlaka (Nodilo 2012), and Donji Miholjac-Đanovci (Tkalčec 2016). The large areas excavated at the sites of Varaždin-Brezje (Tomičić 1968; Madiraca & Čimin 2009; Bekić 2010), Poljana Križevačka I (Dizdar 2013; Hulina, in print), Poljana Križevačka II (Ložnjak Dizdar 2012; Hulina, in print), and Velika Gorica-Šepkovčica (Bugar 2009) yielded above-ground structures that were defined based on the remains of supporting pillars.

In Hungary, the largest excavated settlements of the Lasinja culture with above-ground structures include Győr-Szabadrétdomb (Virág & Figler 2007: 352-354, fig. 2. 1, 5-11), Magyaregres-Macskalyuk (Hornok & Kiss 2017: fig. 1), and Balatonszárszó-Kis-erdei-dűlő (Oross et al. 2010).

A large number of sites of the Lasinja culture did not yield above-ground structures. Considering the fact that a horizontal spread is the basic characteristic of settlements of the Lasinja culture, and the fact that none of them have been fully excavated, it can be assumed that recording exclusively dugout structures, on at least some of them, is the result of the state of research (Balen 2010: 29; 2018: 65). Some of the sites were probably of short-term or seasonal character and consisted of a smaller number of dugout structures (Straub 2005; Tokai 2007).

Primarily with the help of rescue archaeological excavations, the number of sites of the Lasinja culture keeps growing with each year. In Croatia, there were only 29 recorded sites in 1979 (Dimitrijević 1979: map 3), while today there are over 200. However, less than a hundred of them have been excavated (Marković 1994: map 9; Registar 1997; Okroša Rožić 2004: map 2; Balen 2010: 41-44, fig. 5; Jakovljević 2012).

Pogrebni ritual

Iako je poznat velik broj lasinjskih nalazišta, pogrebni ritual ove kulture još nije posve jasan. Poznato je tek nekoliko ukopa, koji pokazuju neujednačenost u načinu pokopavanja.

Najiscrpnije nam podatke o grobnom ritualu daju nalazi iz Ajdovske jame u Sloveniji, u kojoj je pronađeno šest skupina pokojnika, ukupno 31 individua: 7 muškaraca, 8 žena i 16 djece. Pokojnici su u špilji bili izloženi, a ne pokopani, a tijela su im nakon određenog vremena bila premještena na drugo mjesto. Ponekad je oko kostiju postavljeno kamenje kao oznaka groba, a osobne su stvari (nakit, keramika, oružje, oruđe) položene uz tijela. Ostaci keramike, životinjskih kostiju i pougljenjenih zrna žita, pronađeni zajedno s ostacima pokojnika govore da se u trenutku polaganja pokojnika ili poslije tog događaja prilagala hrana. Ukopi su vezani uz horizont 2b, nakon čega je uslijedilo razdoblje štovanje pokojnika, koji se veže uz horizont 2c (Horvat 1989; Budja 1990; Bonsall et al. 2007). Prema radiokarbonskim datumima, polaganje umrlih započelo je najvjerojatnije u drugoj polovici 44. st. pr. Kr. i trajalo maksimalno 120 godina, dok je štovanje pokojnika moglo trajati i do 545 godina (Horvat 1989; Sraka 2016: 120-136).

S prostora Hrvatske zasigurno je najpoznatiji masovni ukop iz Potočana kraj Požege, gdje je 2007. g. otkrivena jama s velikom količinom ljudskih kostiju i nekoliko ulomaka keramike. Radiokarbonska analiza triju ulomaka kostiju datira ga između 4258. i 3978. g. pr. Kr. (Potrebica & Balen 2008: 18; Balen 2010: 31, tablica 3). Bioarheološka analiza skeletnih ostataka pokazala je da se radi o minimalno 41 osobi različitih dobnih i spolnih skupina. Na 13 lubanja vidljive su perimortalne traume nastale različitim oružjem, što može upućivati na više počinitelja. Pokojnici su ubijeni i odloženi u jamu u isto vrijeme (Janković et al. 2017). Masovni su ukopi poznati s prostora Mađarske, ali ne radi se o žrtvama masakra kao u Potočanima, već se kao uzrok smrti navodi epidemija (Balatonőszöd: Horváth et al. 2003) ili žrtvovanje (Keszthely-Fenékpuszta: Zoffmann 2005).

U Jakšiću kod Požege slučajno su pronađeni kosturni ostaci jedne ili više osoba te pet posuda. Jedna od do danas sačuvanih kostiju datirana je u razdoblje od sredine 43. do sredine 41. st. pr. Kr. (Balen 2018:68). U okolici nisu pronađeni tragovi naselja ili drugih grobova (Marković 1985: 159; 1994, 44, T. 22. 1-5; Balen 2010: 30, tab. 3; 2018: 68). U lasinjskom

Burial rites

Regardless of the large number of recorded sites of the Lasinja culture, the burial rites are still not completely recognized. Only a small number of burials have been discovered, and they indicate different burial rites.

The most thorough data on burial rites was obtained from Ajdovska jama in Slovenia, a site that yielded six groups of burials, i.e. a total of 31 individuals: 7 men, 8 women, and 16 children. In the cave, the bodies of the deceased were exposed, not buried, and were moved to a different place after a certain period of time. Sometimes stones were placed next to the bones to mark the grave, and personal belongings (jewelry, pottery, weapons, and tools) were placed next to the bodies. Remains of pottery, animal bones and charred wheat grains that were discovered with the deceased indicate that food was placed next to the bodies when they were laid to rest, or after. These burials were ascribed to phase 2b that was followed by a period of honoring the dead, ascribed to phase 2c (Horvat 1989; Budja 1990; Bonsall et al. 2007). According to radiocarbon dates, the burials probably started in the second half of the 44th century BC, and lasted for a maximum of 120 years, while the honoring of the dead might have lasted up to 545 years (Horvat 1989; Sraka 2016: 120-136).

The most famous find from Croatia is definitely the mass grave from Potočani near Požega, where, in 2007, a pit was discovered that contained a large number of human bones and several pottery fragments. Radiocarbon dates obtained from three bone samples date this tomb to the time between 4258 and 3978 BC (Potrebica & Balen 2008: 18; Balen 2010, 31, table 3). The bioarchaeological analysis of the skeletal remains revealed that the grave contained at least 41 people of different age and sex. A total of 13 skulls displayed perimortem traumas made by different weapons, which could point to several perpetrators. The deceased were killed and placed into the pit at the same time (Janković et al. 2017). Mass graves were also recorded in Hungary, but they, unlike the one from Potočani, did not include victims of a massacre, but people who are thought to have died from an epidemic (Balatonőszöd: Horváth et al. 2003) or who were sacrificed (Keszthely-Fenékpuszta: Zoffmann 2005).

The skeletal remains of one or more people, and five vessels, were accidentally discovered in Jakšić near Požega. One of the preserved bones was dated

sloju u Ozlju pronađen je dio donje čeljusti djeteta starog 4-5 goodina (Rajić 2003). Ukoliko se radi o ostacima ukopa, ono je bilo unutar naselja.

Najveći nam je broj ukopa poznat iz Transdanubije, veoma različitog karaktera. Kosturni su zgrčeni ukopi pronađeni na pet nalazišta, unutar naselja ili izvan njegova konteksta (Németh 1994: 241-244; Somogyi 2000; Honti et al. 2002: 35; Regenye 2006: 18-19). Paljevinski su ukopi poznati sa četiri nalazišta, također unutar naselja ili izvan njega (Horváth et al. 2003: 270; Gabor 2004: 98; Barna & Kreiter 2006: 56-57).

to between the middle of the 43rd and the middle of the 41st cent. BC (Balen 2018: 68). No traces of settlements or other graves have been discovered in the vicinity (Marković 1985: 159; 1994: 44, Pl. 22. 1-5; Balen 2010: 30, tab. 3). At Ozalj, the layer of the Lasinja culture yielded a part of the lower jaw of a child between the ages of 4 and 5 (Rajić 2003). If these are the remains of a burial, it was situated within a settlement.

Slika / Figure 2. Masovna grobnica u Potočanima kod Požege / Mass grave from Potočani near Požega (prema / after: Janković et al. 2017).

Unutar grupe Bisamberg-Oberpullendorf poznati su i paljevinski i kosturni ukopi (Hahnel 1990; Probst 1999: 438), dok grupa Ludanice prakticira samo kosturne ukope (Pavúk & Batora 1995: 112-115). Kosturni su ukopi karakteristični i za sopotsku, vinčansku i lenđelsku kulturu, koje prethode lasinjskoj, a u sklopu lenđelske kulture u južnoj se Transdanubiji javljaju i paljevinski ukopi (Zalai-Gaál 2001; Balen & Čataj 2014: 67-69; Borić 2015).

Pokopavanje životinja unutar naselja uobičajeno je za razdoblje eneolitika, a može svjedočiti ritualnom žrtvovanju ili odbacivanju uginulih životinja. U lasinjskoj kulturi, sudeći po dosadašnjim istraživanjima, ova praksa nije bila osobito česta. Ukopi psa na prostoru Hrvatske pronađeni su jedino u Pajtenici (Balen 2010: 32-33) te na nalazištima Lébény-Kaszás-domb u Mađarskoj i Bernhardstahl u Donjoj Austriji (Németh 1994: 242, Abb. 3).

The largest number of known burials was recorded in Transdanubia, and they display very different characteristics. Burials that included crouched skeletons were discovered at five sites, within or outside the contexts of settlements (Németh 1994: 241-244; Somogyi 2000; Honti et al. 2002: 35; Regenye 2006: 18-19). Incineration graves were found at four sites, also inside and outside settlements (Horváth et al. 2003: 270; Gabor 2004, 98; Barna & Kreiter 2006: 56-57).

The Bisamberg-Oberpullendorf group yielded incineration and skeletal burials (Hahnel 1990; Probst 1999: 438), while the Ludanice group only practiced skeletal burials (Pavúk & Batora 1995: 112-115). Skeletal burials are also characteristic of the Sopot, Vinča and Lengyel cultures that preceded the Lasinja culture. In southern Transdanubia, the Lengyel culture is also characterized by incineration burials (Zalai-Gaál 2001; Balen & Čataj 2014: 67-69; Borić 2015).

Burying animals within settlements was common during the Eneolithic, and can be indicative of ritual sacrificing or discarding dead animals. In the Lasinja culture, judging by the research conducted so far, this practice was not particularly common. In Croatia, dog burials were only discovered at Pajtenica (Balen 2010: 32-33). In Hungary, they were discovered at Lébény-Kaszás-domb and, in Lower Austria, at Bernhardstahl (Németh 1994: 242, Abb. 3).

Materijalna kultura

Keramički nalazi

Gruba keramika lasinjske kulture sive je ili narančaste do oker boje, s dosta primjesa usitnjenog kamena i pijeska, čiji se udio smanjuje kod prijelazne keramike. Površina je tek ovlaš obrađena ili zaglađena. Fina je keramika uglavnom tamnijih tonova, u sastavu ima manju količinu pijeska, a površina je često fino uglačana. Tipovi posuda zastupljeni u lasinjskoj kulturi su lonci, vrčevi, posude s izljevom, zdjele, šalice, čaše, posude na nozi i tave. Od posebnih se oblika javljaju poklopci, žlice, bočice i pintadere (Dimitrijević 1979: 151-162; Balen 2010: 33-36).

Lonci mogu imati bikonično ili zaobljeno tijelo. Kod bikoničnih lonaca rame posude obično je izvedeno konkavno ili konveksno, dok je trbuh uglavnom konkavan. Prijelaz ramena u vrat posude može biti blag ili izražen, kada je vrat često cilin-

Material culture

Ceramic finds

Coarse pottery of the Lasinja culture is gray or orange to ochre in color, and has a lot of inclusion of small rocks and sand. The ratio of inclusions is reduced in transitional pottery. The surface is only slightly processed or polished. Fine ware is mostly darker, contains only a small amount of sand, and commonly has a nicely polished surface. Vessel forms of the Lasinja culture include pots, jugs, vessels with a spout, bowls, cups, glasses, vessels on a foot and pans. Special forms include lids, spoons, bottles and stamps (Dimitrijević 1979: 151-162; Balen 2010: 33-36).

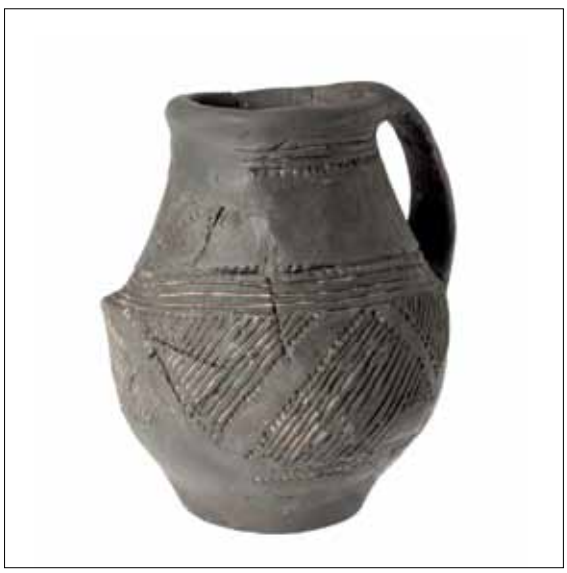
Pots can have a biconical or rounded body. On biconical pots, the shoulder is commonly concave or convex, while the body is mostly concave. The transition from the shoulder into the neck can be minor or accentuated, whereby the neck is commonly cy-

dričnog oblika. Javljaju se i bikonični lonci niskog ramena, slični zdjelama, koji ponekad imaju ručku postavljenu odmah iznad prijeloma. Karakteristični su i bikonični lonci uglatog ramena, koje nosi bogati ukras. Lonci zaobljena tijela mogu imati blagu s-profilaciju ili imati naglašenije izdvojen vrat od ramena. Ponekad imaju horizontalne, vertikalne ili kljunaste ručke ili pak ušuce uz ili ispod oboda. Lonci grube fakture najčešće su ukrašeni plastičnim aplikacijama i tehnikom utiskivanja, dok oni fine fakture uglavnom nose mehanički izvedene ukrase, ponekad ispunjene inkrustacijom (Dimitrijević 1979: sl. 5. 6, 10-12, T. XVIII. 4, 8, T. XIX. 3-4, 8-10, T. XXI. 4-5; Balen 2010: T. 6, T. 7, T. 8. 1, T. 10. 3; Minichreiter & Marković 2013: T. 1. 1, 3, 5, T. 2. 1, 3, 5, T. 3, T. 12 id).

Vrčevi s jednom ručkom tipični su predstavnici lasinjske kulture i često nose ukras. U pravilu su bikoničnog oblika s konkavno izvedenim trbuhom i najčešće konveksnim ramenom te cilindričnim vratom. Kao i kod lonaca, javljaju se oblici uglato izvedenog ramena, koje nosi ukras i prelazi u konkavan vrat, a predstavlja tipičan oblik za ovu kulturu (Dimitrijević 1979: sl. 5. 13, 19, T. XIX. 5, T. XXI. 2, 3; Okroša Rožić 2004: sl. 7C1, 7C2; Balen 2010: T. 4. 1, t. 5. 1; Minichreiter & Marković 2013: T. 15).

Zdjele se često javljaju na lasinjskim nalazištima te kao i lonci, mogu imati bikonično ili zaobljeno tijelo, a jednostavne konične zdjele također su uo-

Slika / Figure 3. Vrč s lokaliteta Vlatkovac / A jug from the site of Vlatkovac (foto / photo: I. Krajcar).



lindrical. There are also biconical pots with a short shoulder that resemble bowls, and they sometimes have a handle placed right above the transition of the body. Biconical pots with an angular shoulder and rich decorations are also a characteristic form. Pots with a rounded body can have a slight S-profile or a neck that is more pronounced than the shoulder. They sometimes have horizontal, vertical or beaked handles, or perforated lugs along or under the rim. Coarse pots mostly have mechanically made decorations, sometimes filled with incrustation (Dimitrijević 1979: fig. 5. 6, 10-12, Pl. XVIII. 4, 8, Pl. XIX. 3-4, 8-10, Pl. XXI. 4-5; Balen 2010: Pl. 6, Pl. 7, Pl. 8. 1, Pl. 10. 3; Minichreiter & Marković 2013: Pl. 1. 1, 3, 5, Pl. 2. 1, 3, 5, Pl. 3, Pl. 12, etc.).

Jugs with a single handle are a typical representative find of the Lasinja culture, and are often decorated. They are generally biconical with a concave body and, most often, a convex shoulder and a cylindrical neck. Just like with pots, some jugs have an angular shoulder, supported by decorations, that transitions into a concave neck – a typical form ascribed to this culture (Dimitrijević 1979: fig. 5. 13, 19, Pl. XIX. 5, Pl. XXI. 2, 3; Okroša Rožić 2004: fig. 7C1, 7C2; Balen 2010: Pl. 4. 1, t. 5. 1; Minichreiter & Marković 2013: Pl. 15).

Bowls are a common find at sites of the Lasinja culture and, just like pots, can have a biconical or rounded body. Simple conical bowls are also common. Biconical bowls appear in several variants with different combinations of concave, convex or conical bodies and shoulders. They can have a handle that connects the transition and the rim, and which can, sometimes, go over the rim. Coarse bowls most often have tongue-like or plastic applications on the transition of the body, or mechanically made decorations that also appear on fine biconical bowls. The latter often have small plastic applications on the transition of the body. Rounded bowls can be semispherical and spherical, and can have mechanically made decorations or plastic applications. Rounded bowls can also have a handle that is placed under the rim. Simple conical bowls are a common find as well. Bowls with a short rounded body and a cylindrical or concave neck are rare. The most typical bowl of the Lasinja culture has a biconical shape, a short shoulder and a concave body with a tongue-like application on the transition of the body (Dimitrijević 1979: fig. 5. 1-2, 7-9, 15-17, Pl. XVIII. 9; Okroša Rožić 2004: fig. 7A; Balen 2010: Pl. 2, Pl. 3. 6-7, Pl. 9. 1, 4).

bičajen inventar. Bikonične se zdjele javljaju u više varijanti s različitim kombinacijama konkavno, konveksno ili konično izvedena trbuha i ramena. Mogu imati ručku koja spaja prijelom i obod, koji ponekad i prelazi. Zdjele grube fakture najčešće nose jezičastu ili plastičnu aplikaciju na prijelomu ili mehanički izveden ukras, koji se javlja i na bikoničnim zdjelama fine fakture. Potonje često nose male plastične aplikacije na prijelomu. Zaobljene zdjele mogu biti polukuglaste i kuglaste te nositi mehanički izveden ukras ili plastične aplikacije. Zaobljene zdjele također mogu imati ručku koja je postavljena ispod oboda. Uobičajen su nalaz i jednostavne konične zdjele. Zdjele niskog zaobljenog tijela i cilindričnog ili konkavnog vrata rijetko se javljaju. Za lasinjsku je kulturu među zdjelama najtipičnija ona bikoničnog oblika kratkog ramena i konkavnog trbuha s jezičastom aplikacijom na prijelomu (Dimitrijević 1979: sl. 5. 1-2, 7-9, 15-17, T. XVIII. 9; Okroša Rožić 2004: sl. 7A; Balen 2010: T. 2, T. 3. 6-7, T. 9. 1, 4).

Vjedra s izljevom uglavnom su jednostavnog koničnog ili bikoničnog oblika. Mogu imati cilindričan izljev, koji izlazi iz tijela posude, otvoren izljev koji prolazi kroz vrat/rame posude ili jednostavno oblikovan izljev na rubu usta (Dimitrijević 1979: sl. 5. 21; Okroša Rožić 2004: sl. 7F1; Balen et al. 2017: T. 4. 4; Čataj, *u tisku*).

Jedan od karakterističnih oblika lasinjske kulture svakako je i posuda na nozi. U najvećem broju slučajeva, na arheološkim nalazištima ne pronalazimo takve cjelovite posude i veoma ih je teško spojiti naknadnim pregledavanjem materijala. Stoga se različiti podtipovi uglavnom baziraju na obliku noge, najčešće visoke, koja može biti cilindrična ili konkavna te se manje ili više širiti prema stajaćoj plohi. Zastupljene su i zaobljene noge zadebljane u gornjem dijelu te konkavnog tijela, koje se izrazito širi prema stajaćoj plohi. Kratke noge ne javljaju se često na lasinjskim posudama, a mogu biti cilindrične, stožaste ili konveksne (Dimitrijević 1979: sl. 5. 4, 5, 20, T. XVIII. 1, 5, T. XIX. 1, T. XX. 3, 6, T. XXI. 1; Balen 2010: T. 10. 1).

Šalice su uglavnom bikonične ili s-profilirane, a imaju trakastu ručku, koja spaja obod, koji ponekad nadvisuje, s prijelomom posude. Često su ukrašene mehanički izvedenim ukrasom (Balen 1998: T. 3: 2; 2010: 34, T. 4.2; Okroša Rožić 2004: T. 12; Čataj, *u tisku*).

Čaše se ne javljaju osobito često na lasinjskim nalazištima. Fine su fakture te imaju prilično tanke

Buckets with a spout mostly have a simple conical or biconical shape. They can have a cylindrical spout that stems from the vessel body, an open spout that passes through the neck/shoulder, or a simply-shaped spout at the very rim of the vessel (Dimitrijević 1979: fig. 5. 21; Okroša Rožić 2004: fig. 7F1; Balen *et al* 2017: Pl. 4. 4; Čataj, in print).

One of the most characteristic forms of the Lasinja culture is certainly a vessel on a foot. In the majority of cases, such complete vessels are not found at archaeological sites, and are very difficult to reconstruct during subsequent processing. Hence, the different subtypes are mostly based on the shape of the foot that is, most often, tall, can be cylindrical or concave, and more or less widens towards the base. There are some rounded ones with a thicker upper part and a concave body that significantly widens towards the base. Short ones do not appear often on vessels of the Lasinja culture, but can be cylindrical, conical or convex (Dimitrijević 1979: fig. 5. 4, 5, 20, Pl. XVIII. 1, 5, Pl. XIX. 1, Pl. XX. 3, 6, Pl. XXI. 1; Balen 2010: Pl. 10. 1).

Cups are mostly biconical or have an S-profile, as well as a ribbon-like handle that connects, and sometimes goes over, the rim and the transition on the body. They are often decorated with mechanically made motifs (Balen 1998: Pl. 3: 2; 2010: 34, Pl. 4.2; Okroša Rožić 2004: Pl. 12; Čataj, in print).

Slika / Figure 4. Zdjela na nozi s lokaliteta Jakšić-Čaire / A bowl on a foot from the site of Jakšić-Čaire (foto / photo: I. Krajcar).

Slika / Figure 5. Keramičke žlice s tuljcem za nasad s lokaliteta Tomašanci-Palača / Ceramic spoons with a cylindrical protrusion for hafting from the site of Tomašanci-Palača (foto / photo: I. Krajcar).

stijenke i lagano izvučen rub. Mogu nositi mehanički izveden ukras na rubu usta (Balen 2010: T. 5. 2; Čataj, *u tisku*).

Plitke tave velika promjera nedavno su izdvojen oblik lasinjske kulture, a kako je zasad poznato, javljaju se na slavonskim nalazištima (Balen 2010: 34, T. 10. 2; Minichreiter & Marković 2013: T. 16-17).

Poklopci su uglavnom jednostavnog diskoidnog oblika, s ručkom/drškom postavljenom na gornjoj strani ili bez nje, grube fakture. Rjeđe se javljaju poklopci fine fakture, ukrašeni urezivanjem i inkrustacijom (Homen 1990: sl. 4. 6; Bekić 2006: T. 2. 6).

Žlice se javljaju na gotovo svakom nalazištu lasinjske kulture, imaju veći ili manji zaobljeni recipijent te cilindrični tuljac za nasad drška (Dimitrijević 1961: T. VIII. 51, T. XVIII. 149-150; 1979a: T. XVIII. 6; Marković 1994: T. 24. 7-8; Okroša Rožić 2004: sl. 7J2; Minichreiter & Marković 2013: T. 18).

Bočice su manjih dimenzija, bikoničnog tijela, s ušicama postavljenim na prijelomu, koje su vjerojatno služile za vješanje. Često su ukrašene ubodima, urezima i inkrustacijom. Analiza zemlje iz zapune jedne od njih, upućuje na moguća eterična ulja, iako se to nije moglo sa sigurnošću dokazati. Dosad nisu pronađene na prostoru istočne Hrvatske (Homen 1985; Težak-Gregl 2007).

Glasses are not a particularly frequent find at site of the Lasinja culture. They have a fine surface and quite thin walls, as well as a slightly outward-facing rim. They can have mechanically made decorations at the rim (Balen 2010: Pl. 5. 2; Čataj, in print).

Shallow pans that have a large diameter were recently defined as a form of the Lasinja culture, and they appear on sites in Slavonia (Balen 2010: 34, Pl. 10. 2; Minichreiter & Marković 2013: Pl. 16-17).

Lids are coarse and mostly have a simple discoid shape as well as, in some cases, a handle/protrusion on the upper side. Fine lids appear less frequently, and are decorated by incising and incrustation (Homen 1990: fig. 4. 6; Bekić 2006: Pl. 2. 6).

Spoons were discovered at almost all sites of the Lasinja culture. They have a larger or smaller rounded recipient and a cylindrical protrusion for hafting (Dimitrijević 1961: Pl. VIII. 51, Pl. XVIII. 149-150; 1979a, Pl. XVIII. 6; Marković 1994: Pl. 24. 7-8; Okroša Rožić 2004: fig. 7J2; Minichreiter & Marković 2013: Pl. 18).

Bottles are smaller, have a biconical body and suspension loops at the transition of the body that were probably used to hang the vessel. They are often decorated by stabbing, incising and incrustation. The analysis of soil from one bottle indicates the possible use of essential oils, although the finds

Plastično ukrašavanje u znaku je raščlanjenih rebara, dugmetastih ili jezičastih aplikacija te nosolikih držaka ispod oboda. Najčešće se javlja na keramici grube fakture, koja rjeđe nosi mehanički izvedene ukrase. Jezičaste aplikacije javljaju se i na zdjelama fine fakture, kada njihov oblik prati liniju ramena posude. Mehaničko ukrašavanje, poput urezivanja (pravilno urezivanje i žlijebljenje) i ubadanja, javlja se uglavnom na posudama fine fakture, iako je prisutno i na onima grube fakture. Nosilac ukrasa najčešće je središnji ili gornji dio posude ili njezina noga, a rjeđe trbuh, dno ili unutrašnja strana posude. Od motiva koji su najzastupljeniji u lasinjskoj kulturi možemo spomenuti nizove paralelnih vertikalnih, horizontalnih ili kosih linija, te paralelne urezane linije koje tvore A-, V-, cik-cak ili motiv jelove grančice, girlande u nekoliko paralelnih koncentričnih polukrugova, metličasto urezivanje, motiv bodljikave žice, mrežasti te ljestvičasti ukras i sl. Kao najtipičniji lasinjski ukras javljaju se paralelne urezane linije obrubljene nizom uboda. Ubadanje se javlja i samostalno, ispod ruba ili na prijelomu posude, gdje možemo naći i ukras izveden otiskivanjem alatke. Urezani su motivi često ispunjeni bijelom inkrustacijom, koja je dobivena drobljenjem paljenog jelenovog roga apliciranog u ureze impregnirane organskom smolom. Posude mogu nositi i crveni premaz na vanjskoj površini (Dimitrijević 1961; 1979: 151-160, sl. 5; Homen 1990; Marković 1994: T. 20 – T. 24; Balen 2010: 33-36; Kos et al. 2013; Marković & Minichreiter 2013: T. 1-18). Iako se ukras izveden brazdastim urezivanjem ili urezan motiv spirale ispunjene urezima vežu uglavnom uz kasniju kulturu Retz-Gajary, oni se javljaju već u lasinjskoj kulturi (Artner et al. 2011; Velušček 2011: 222-223, sl. 5. 11; Čataj, u tisku).

Mnoge tehnike i motivi, kojima su ukrašene lasinjske posude, poput urezanih paralelnih linija vodoravno postavljenih ispod ruba i jelove grančice, otiskivanja uz rub ili na samom rubu, otiskivanja alatkom na prijelomu, dvostrukog reda uboda ispod ruba ili pak slikanja crvenom bojom mogu se pratiti u krugu lenđelske kulture, a isti je slučaj i s nekim oblicima posuda poput bikoničnih zdjela, konkavno oblikovanog trbuha, lonaca s ušicom uz rub ili onih zaobljena tijela, zdjela na šupljim nogama i žlica (Košturik 1972; Budja 1992: sl. 4; Homen 1990; Težak-Gregl 1994; 2005; Tomaž 1999: T. MV1-MV36; Guštin 2005). Bikonične i zaobljene zdjele, zdjele na nozi, kao i ukrašavanje otiskivanjem uz rub ili na samom rubu posude te malim jezičastim aplikacijama na prijelomu predstavljaju

were not conclusive. So far no bottles have been discovered in eastern Croatia (Homen 1985; Težak-Gregl 2007).

Plastic decorations include branched ribs or tongue-like applications and nozzles under the rim. They mostly appear on coarse ware that less often has mechanically made decorations. Tongue-like applications also appear on fine bowls, when their shape follows the line of the vessel shoulder. Mechanical decorations, such as incising (regular incising and gauging) and stabbing, mostly appears on fine ware, although they can also be found on coarse ware. The decorations are most often placed on the central or upper parts of vessels or on the foot, and less often on the body, base or the inside of the vessel. The most common motifs used in the Lasinja culture include series of parallel vertical, horizontal or slanted lines, as well as parallel incised lines in the shape of the letters A and V, zigzag lines or fir twig motifs, garlands in several parallel concentric semicircles, combed incisions, and motifs of barbed wire, nets and ladders, and so on. The most typical decoration of the Lasinja culture consists of parallel incised lines bordered by a line of stabs. Stabbing also appears by itself, under the rim or on the transition of the body, just like the decorations made by impressing certain tools. Incised motifs are often filled with white incrustation, obtained by grinding burnt deer antler and applied into the incisions that were previously impregnated by organic resin. Vessels can also have a red slip on the outside surface (Dimitrijević 1961; 1979: 151-160, fig. 5; Homen 1990; Marković 1994: Pl. 20-Pl. 24; Balen 2010: 33-36; Kos et al. 2013; Marković & Minichreiter 2013: Pl. 1-18). Although decorations made by furrowed incisions, as well as incised spiral motifs filled with smaller incisions, are often connected with the later Retz-Gajary, they were already used during the Lasinja culture (Artner et al. 2011; Velušček 2011: 222-223, fig. 5. 11; Čataj, in print).

Many techniques and motifs that were used to decorate vessels of the Lasinja culture, such as parallel horizontal lines under the rim and fir twig motifs, impressing along the rim, or painting a red slip, can be traced back to the Lengyel culture, and the same can be said of some vessel forms, such as biconical bowls with concave bodies, pots with a suspension loop near the rim or ones with a rounded body, bowls on a hollow foot, and spoons (Košturik 1972; Budja 1992: fig. 4; Homen 1990; Težak-Gregl 1994; 2005; Tomaž 1999: Pl. MV1-MV 36; Guštin 2005). Biconical and rounded bowls, bowls on a foot, as

poveznicu sa sopotskom kulturom, a konkavno je oblikovanje trbuha te zaobljene i bikonične zdjele, zdjele na nozi i nosoliki drški prisutno u vinčanskoj kulturi (Dimitrijević 1968; 1979; Marković 1994: T. 19a. 6). Iako se u oblikovanju i ukrašavanju keramike lasinjske kulture jasno uočava tradicija njezinih prethodnica, novi elementi koje ona donosi, poput lonaca i vrčeva uglatog ramena ili veoma čestog motiva paralelnih urezanih linija obrubljenih nizom uboda, daju joj pomalo drukčije i samo njoj svojstveno ruho.

well as impressed decorations placed along or on the rim, and small tongue-like applications at the transition of the body, point to a connection with the Sopot culture, while concave vessel bodies, rounded and biconical bowls, vessels on a foot, and nuzzled protrusions point to the Vinča culture (Dimitrijević 1968; 1979; Marković 1994: Pl. 19a. 6). Although the forms and decorations of pottery of the Lasinja culture clearly show the traditions of its predecessors, the new elements it introduced, such as pots and jugs with an angular shoulder, or the very common motif of incised parallel lines bordered with a line of stabs, give it a somewhat different and individual identity.

Slika / Figure 6. Figurica s lokaliteta Vidovci-Rosulje / A figurine from the site of Vidovci-Rosulje (foto / photo: I. Krajcar).

Osim standardne keramičke proizvodnje, na lasinjskim se nalazištima povremeno nalazi i antropomorfna plastika. Mali broj dosad pronađenih primjeraka potječe s prostora Slavonije i sjeveroistočne Slovenije, a radi se o dva poznata tipa figura: jednostavnoj plosnatoj statueti pravokutno oblikovane glave i naglašenih grudi te valjkastoj statueti pojednostavljena tijela (Dimitrijević 1976: T. 1. 1, 4; Težak-Gregl 1984: 27-28, T. 8. 2-3; Bondár 2006: 122, fig. 2; Kerman 2014: 10-11). Treći tip figura pronađen je samo izvan Hrvatske, na nalazištima Szombathely (Mađarska) i Kögelberg (Austrija), a pripada tipu s bolje razrađenim prikazom glave i dugim vratom. Njihova pripadnost lasinjskoj kulturi nije posve sigurna (Bondár 2006: 122, fig. 3).

Apart from the standard ceramic production, sites of the Lasinja culture also occasionally yield anthropomorphic figurines. The small number of examples discovered so far originates from Slavonia and northeastern Slovenia, and includes two famous idols: a simple flat statuette with a rectangular head and emphasized bosom, and a cylindrical statuette with a simplified body (Dimitrijević 1976: Pl. 1. 1, 4; Težak-Gregl 1984: 27-28, Pl. 8. 2-3; Bondár 2006: 122, fig. 2; Kerman 2014: 10-11). The third type of figurine was discovered only outside Croatia, at the sites of Szombathely (Hungary) and Kögelberg (Austria), and can be ascribed to the type with a better-developed portrayal of the head and a long neck. It is not completely clear whether they should be attributed to the Lasinja culture (Bondár 2006: 122, fig. 3).

Kameni nalazi

Kamene izrađevine čest su nalaz na lokalitetima lasinjske kulture, no mali je broj nalazišta s kojih je napravljena njihova tipološko-tehnološka analiza. Kod lomljenih kamenih izrađevina najzastupljenije su tehnološke kategorije odbojci i sječiva. Dosta su zastupljene i jezgre, koje zajedno s visokim udjelom krhotina pokazuju djelomičnu proizvodnu aktivnost *in situ*. Prisutan je mali broj izrađevina s okorinom te se njezino uklanjanje, kao i priprema jezgre vjerojatno odvijalo na mjestu prikupljanja sirovine. Prema tipološkoj analizi najzastupljeniji su komadi s obradom i grebala. U sjeverozapadnoj Hrvatskoj karakterističan su poluproizvod odbojci, a u istočnoj Hrvatskoj sječiva/pločice. Sirovina za lomljene izrađevine nabavljala se u okolici, iz obližnjih gora, korita rijeka ili sekundarnih aluvijalnih nanosa (Šošić & Karavanić 2004; Komšo 2006; Balen 2010: 36-37; Špoljar 2011; Šošić Klindžić 2013; Balen et al. 2017; Barbir 2017).

Najpoznatiji nalaz lomljene litičke građe je ostava u posudi s 48 obrađenih i neobrađenih izrađevina pronađena u Vinkovcima, od kojih su tri izrađene od opsidijana (Balen 2010: 36).

Stone finds

Stone artifacts are a common find on sites of the Lasinja culture. However, typological and technological analyses have only been conducted on material from a small number of sites. When it comes to chipped stone artifacts, the most frequent technological categories include flakes and blades. Cores are also quite frequent and, along with the high ratio of chunks, they suggest that production was partially conducted *in situ*. A small number of artifacts have traces of cortex, meaning that its removal, as well as core preparation, probably took place at the source of raw material. Typological analyses have shown that pieces with retouch and endscrapers are the most common. The most frequent semi-products in northwestern Croatia are flakes, while, in eastern Croatia, these include blades/bladelets. The raw material used for making chipped stone artifacts was obtained in the vicinity of the sites, from nearby mountains, riverbeds or alluvial deposits (Šošić & Karavanić 2004; Komšo 2006; Balen 2010: 36-37; Špoljar 2011; Šošić Klindžić 2013; Balen et al. 2017; Barbir 2017).

Slika / Figure 7. Glačane i abrazivne kamene alatke s lokaliteta Tomašanci-Palača / Polished and abrasive stone tools from the site of Tomašanci-Palača (foto / photo: I. Krajcar).

Velik broj glačanih kamenih izrađevina pronađen je bez arheološkog konteksta te se može datirati od neolitika do brončanoga doba (Registar 1997; Težak-Gregl 2001: 15-16). Među tipovima glačanih izrađevina u kontekstu lasinjske kulture prepoznate su sjekire, tesle, dlijeta, klinovi i čekići. Posebno su česte sjekire trapezastog oblika (Težak-Gregl 2001: 15; Balen et al. 2017: 12).

Kamene izrađevine s abrazivnim svojstvima, poput glačalica, rastirača, brusova i žrvnjeva učestali su nalaz na lasinjskim nalazištima. Među sirovinom korištenom za izradu glačanog i abrazivnog oruđa najzastupljeniji je pješčenjak (Balen et al. 2017: 12; Barbir 2017: 62-64).

The most famous chipped stone assemblage is the hoard discovered in Vinkovci that included a vessel with 48 processed and unprocessed artifacts, three of which were made of obsidian (Balen 2010: 36).

Numerous polished stone tools were discovered outside archaeological contexts and can be dated to the period between the Neolithic and the Bronze Age (Registar 1997; Težak-Gregl 2001: 15-16). In contexts ascribed to the Lasinja culture, the following types have been recorded: axes, adzes, chisels, wedges and hammers. Trapezoidal axes are particularly common (Težak-Gregl 2001: 15; Balen et al. 2017: 12).

Stone artifacts with abrasive properties, such as polishers, handstones, whetstones and grindstones, are common finds at sites of the Lasinja culture. Sandstone is the most commonly used raw material for the production of polished and abrasive stone tools (Balen et al. 2017: 12; Barbir 2017: 62-64).

Metalni nalazi

Na prostoru Hrvatske metalni nalazi na lasinjskim nalazištima predstavljaju iznimku. Uglavnom se radi o iglama, šilima, dlijetima ili sječivima sjekira (Balen 2010: 37-38, T. 8. 2, 5; 2016: fig. 6). Na prostoru Mađarske i Slovenije velik je broj bakrenih sjekira pronađenih bez konteksta, koje se prema analogijama s nalazima suvremene joj kulture Bodrogkeresztúr, vežu uz lasinjsku kulturu (Patay 1984: 24-46; Virág 1986: Fig. 1a-c, Fig. 3a-c Velušček & Greiff 1998: 39; Somogyi 2002: 339). Bakrene križne sjekire pronađene su na prostoru Hrvatske u Čepinu, Franjinu dvoru kod Koloďvara, Gabošu, Gorjanima, Jarmini, Klakaru, Kršincima, Laslovu, Osijeku, Požegi, Vinkovcima. Kako se radi o pojedinačnim nalazima, osim primjeraka iz Vinkovaca, za koje se pretpostavlja da su dio ostave, određivanje njihove kulturne pripadnosti je otežano (Brunšmid 1902: 52-56; Balen 2010: 38-39).

U naselju lasinjske kulture Magyaregres -Macskalyuk, tijekom zaštitnih istraživanja 2016/2017. g. pronađena je ostava s 970 predmeta unutar keramičkog lonca. U posudi se nalazilo najviše bakrenih predmeta: 19 spiralnih svitaka, tri spiralne narukvice, dva naočalasta privjeska, 681 mali cilindrični privjesak te 265 cilindričnih ili plosnatih privjesaka od kamena, mramora i školjke (Hornok & Kiss 2017). Ovi nalazi svakako upućuju na to da bi se i slučajni nalazi zlatnih diskova tipa Stollhof-

Metal finds

In Croatia, metal finds are an exception at sites of the Lasinja culture. They mostly include needles, awls, chisels or axe blades (Balen 2010: 37-38, Pl. 8. 2, 5; 2016: fig. 6). In Hungary and Slovenia, many copper axes were found out of context, but were, based on analogies with the finds of the contemporary Bodrogkeresztúr, ascribed to the Lasinja culture (Patay 1984: 24-46; Virág 1986: Fig. 1a-c, Fig. 3a-c; Velušček & Greiff 1998: 39; Somogyi 2002: 339). Copper cross-shaped axes were discovered at the following sites in Croatia: Čepin, Franjin dvor near Koloďvar, Gaboš, Gorjani, Jarmina, Klakar, Kršinci, Laslovo, Osijek, Požega, and Vinkovci. Their cultural attribution is made difficult by the fact that they are individual finds, apart from the finds from Vinkovci that are assumed to have been part of a hoard (Brunšmid 1902: 52-56; Balen 2010: 38-39).

The 2016/2017 rescue archaeological excavations conducted at the Lasinja culture settlement at Magyaregres-Macskalyuk revealed a hoard of 970 items discovered in a ceramic pot. The pot mostly contained copper finds: 19 spiral coils, three spiral bracelets, two spectacle pendants, 681 small cylindrical pendants, and 265 cylindrical or flat pendants made of stone, marble and shell (Hornok & Kiss 2017). These finds definitely point to the fact that chance finds of golden discs of the Stollhof-Csáford type, with three conical protrusions, a multitude of

Slika / Figure 8. Bakreni nalazi lasinjske kulture s lokaliteta Pajtenica kod Đakovačkih Selaca / Copper finds of the Lasinja culture from the site of Pajtenica near Đakovački Selci (prema / after: Balen 2016: fig. 6).

Csáford s tri konična ispupčenja, višestrukim nizom iskucanih točkica po rubu i rupicama za vješanje, mogli pripisati lasinjskoj kulturi. Ponekad su deponirani zajedno s naočalastim ili spiralnim privjescima, a pronađeni su i u ostavi iz Tenje. Zlatni se diskovi tipa Stollhof-Csáford relativno datiraju između 4000. i 3600. g. pr. Kr. te se pripisuju ili lasinjskoj ili kulturi Retz-Gajary (Angeli 1967; Makkay 1976: 286-290; Marković 1994: 57; Balen 2016: 62). Jedan bakreni primjerak ovog tipa diska pronađen je prilikom istraživanja lasinjskog naselja Zalavár-Basasziget (Virág 1986: 14, Fig. 4. 1. a-b, Fig. 5. a-b).

punctuated dots on the edge and holes for hanging, could be ascribed to the Lasinja culture. In some cases, they were deposited alongside spectacle or spiral pendants, and some were discovered in the Tenje hoard. Finds of gold discs of the Stollhof-Csáford are relatively dated to between 4000 and 3600 BC, and are ascribed to either the Lasinja or the Retz-Gajary cultures (Angeli 1967; Makkay 1976: 286-290; Marković 1994: 57; Balen 2016: 62). One copper disc of this type was discovered in the excavations of the Lasinja settlement at Zalavár-Basasziget (Virág 1986: 14, Fig. 4. 1. a-b, Fig. 5. a-b).

Privreda

O privredi arheoloških populacija najbolje nam podatke daju arheobotaničke, arheozoološke te analize organskih ostataka na posudama, kao i analize kamenih izrađevina.

Arheobotaničkim su analizama na nekoliko lasinjskih nalazišta u Hrvatskoj pronađeni tragovi žitarica poput jednozrne pšenice (*triticum monococcum*) i dvozrnog pira (*triticum turgidum* ssp. *dicoccum*) te ječma (*hordeum vulgare* ssp. *vulgare*), koje svjedoče o zemljoradničkoj komponenti ove eneolitičke populacije. Dokaz obrade žitarica svakako su i žrvnjevi te lomljena litika sa sjajem srpa, pronađeni na brojnim nalazištima lasinjske

Economy

The best information about the economy of archaeological population can be obtained through archaeobotanical, archaeological and analyses of organic residue on vessels, as well as analyses of stone artifacts.

Archaeobotanical analyses of remains from several sites of the Lasinja culture have revealed traces of cereals, such as einkorn (*triticum monococcum*), emmer spelt (*triticum turgidum* ssp. *dicoccum*) and barley (*hordeum vulgare* ssp. *vulgare*), that attest to the agricultural component of this Eneolithic population. Further evidence for cereal processing certainly includes grindstones and chipped stone

kulture. Od voća dominira drijenak (*cornus mas*) te šumska mjehurica (*physalis alkekengi*). Šljiva (*prunus cf. spinosa*) se rijetko nalazi, kao i mahunarke, uljarice te divlje biljke i korov (Đukić 2014; Balen et al. 2017: 24-26; Reed 2017: 1750-1753, T. 1 - T. 4).

Analiza organskih ostataka na keramici iz Ajdovske jame pokazala je miješanu biljnu i životinjsku privredu, koja je posvjedočena i analizom kolagena iz ljudskih kostiju. Pronađeno je meso i mliječni proizvodi preživača, a na jednom primjerku i svinjska mast (vjerojatno od divljeg vepra). Analiza stabilnih izotopa kosturnih ostataka pokazala je da je njihova prehrana bila bazirana na domaćim i divljim biljojedima i C3 biljkama (Bonsal et al. 2007; Šoberl et al. 2014: 163).

Na temelju malog broja pronađenih životinjskih kostiju u naselju Zalavár-Basasziget pretpostavlja se da su se životinje trančirale van naselja ili na njegovim rubnim područjima te da se stoka nije primarno čuvala zbog mesa (Virág 2003: 385).

U privredi lasinjske populacije važnu su ulogu imale i zemljoradnja i stočarstvo. Iako su zamjetne promjene u načinu organizacije naselja u odnosu na neolitik, one su mnogo manje kada govorimo o pribavljanju i uzgoju hrane. Iako se radi o eneolitičkoj populaciji, lasinjska kultura svjedoči o postupnom prijelazu iz neolitičkog u eneolitički način života promijenjene društvene strukture, koji nastupa u kasnom eneolitiku.

tools with sickle sheen, both of which have been discovered at numerous sites of the Lasinja culture. Fruit remains are dominated by Cornelian Cherry (*cornus mas*) and Chinese lantern (*physalis alkekengi*). Plum (*prunus cf. spinosa*) is rarely found, as are pulses, oil plants and wild plants and weeds (Đukić 2014; Balen et al. 2017: 24-26; Reed 2017: 1750-1753, Pl. 1 - Pl. 4).

The analysis of organic residue found on pottery from Ajdovska jama indicates that a mixed agricultural and cattle-breeding economy was present, which is further attested to by the analysis of collagen from human bones. The results indicate the presence of meat and dairy products, and one sample yielded traces of pork lard (probably from wild boar). The analysis of stable isotopes conducted on skeletal remains revealed that the diet was based on cultivated and wild herbivores and C3 plants (Bonsal et al. 2007; Šoberl et al. 2014: 163).

Based on the small number of animal bones discovered at the Zalavár-Basasziget settlement, it was assumed that animals were butchered outside, or on the periphery of the settlement, and that cattle was not primarily bred for meat (Virág 2003: 385).

Both agriculture and animal husbandry played important roles in the economy of the Lasinja population. Despite the fact that significant changes in settlement organization can be noted in comparisons with the Neolithic, the changes in the procurement and cultivation of food are significantly smaller. Although it was an Eneolithic population, the Lasinja culture reveals a gradual transition from the Neolithic into the Eneolithic way of life marked by a different social structure that was recorded in the Late Eneolithic.

Literatura / Bibliography

Angeli, W. 1967, Der Depotfund von Stollhof, *Annales Naturhistorisches Museum Wien* 70, 491-496.

Artner, W., Brandl, M., Christandl, G., Gutjahr, C., Obereder, J., Postl, W., Trausner M. 2011, Die kupferzeitliche Höhensiedlung auf der „Kanzel" bei Graz, Steimark, *Fundberichte aus Österreich* 50, 43-66.

Balen, J. 1997-1998, Nalazište lasinjske kulture u Dubrancu, *Vjesnik Arheološkog muzeja Zagreb, 3.s.,* XXX-XXXI, 13-31.

Balen, J. 2008, Apsolutni datumi sa zaštitnih istraživanja na prostoru Slavonije kao prilog poznavanju kronologije srednjeg eneolitika, *Vjesnik Arheološkog muzeja u Zagrebu* XLI, 17-35.

Balen, J. 2010, *Eneolitičke kulture na prostoru istočne Hrvatske,* Doktorska disertacija, Sveučilište u Zagrebu.

Balen, J. 2016, The Development of Eneolithic Cultures Between the Sava and the Drava Rivers, in: D. Davison, V. Gaffney, P. Miracle & J. Sofaer (eds), *Croatia at the Crossroads*, Arheopress, Oxford, 59-73.

Balen, J. 2018, Eneolitičke kulture na prostoru istočne Hrvatske, *Arheologija na Dunavu, Izdanja Hrvatskog arheološkog društva* 31/2017, 65-74.

Balen, J. & Čataj, L. 2014, Sopotska kultura, in: J. Balen, T. Hršak & R. Šošić Klindžić (eds), *Darovi zemlje, neolitik između Save, Drave i Dunava,* Arheološki muzej u Zagrebu, Muzej Slavonije, Filozofski fakultet Sveučilišta u Zagrebu, Zagreb, Osijek, 59-73.

Balen, J. & Drnić, I. 2014, Arheološka istraživanja na lokalitetu Barbarsko – novi prilog poznavanju srednjeg eneolitika na prostoru sjeverne Hrvatske, *Vjesnik arheološkog muzeja u Zagrebu* XLVII, 39-76.

Balen, J., Đukić, A., Špoljar, D. 2017, Jurjevac-Stara Vodenica – nalazište lasinjske kulture, *Vjesnik arheološkog muzeja u Zagrebu* L, 7-50.

Barbir, A. 2017, Litička analiza eneolitičkih kamenih izrađevina s lokaliteta Crkvišće-Bukovlje, *Vjesnik arheološkog muzeja u Zagrebu* L, 51-70.

Barna, J. P. & Kreiter, E. 2006, Középső rézkori települések Zalaegerszeg-Andráshida, Gébárti-tó (II.) lelőhelyen: Előzetes közlemény. Middle Copper Age settlements at Zalaegerszeg-Andráshida, Gébárti tó (II): preliminary results, *Zalai Múzeum* 15, 47-78.

Batović, Š. 1975, Odnos Jadranskog primorja prema području jugoistočnih Alpa u neolitu i eneolitu, *Arheološki vestnik* XXIV/1973, 62-127.

Bekić, L. 2006, Stara Ves kod Nedelišća, in: L. Bekić (ed.), *Zaštitna arheologija u okolici Varaždina*, Ministarstvo kulture RH, Hrvatski restauratorski zavod, Zagreb, 203-251.

Bekić, L. 2010, Brezje IV i V (rbr. 104), *Hrvatski arheološki godišnjak* 6/2009, 191-192.

Benac, A. 1980, Eneolitsko doba u Bosni i Hercegovini (neka nova razmatranja), *Glasnik Zemaljskog muzeja Bosne i Hercegovine u Sarajevu* XXXIV (1979), 15-26.

Bondár, M. 2006, Kultúraváltások a rézkori emberábrázolások tükrében (Dunántúl) (Cultural changes in the light of human representations during the Copper Age (Transdanubia)), *Zalai múzeum* 16, 107-130.

Bonsall, C., Horvat, M., McSweeney, K., Masson, M., Higham, T. F. G., Pickard, C., Cook, G. T. 2007, Chronological and dietary aspects of the human burials from Ajdovska jama, Slovenia, *Radiocarbon* 49/2, 727-740.

Borić, D. 2015, The End of the Vinča World: Modelling the Neolithic to Copper Age Transition and the Notion of Archaeological Culture, in: S. Hansen, P. Raczky, A. Anders & A. Reingruber (eds.), *Neolithic and Copper Age between the Carpathians and the Aegean Sea. Chronologies and Technologies from 6th to 4th Millennium BC*, *Archäologie in Euroasien* 31, Bonn, 177-237.

Bregant, T. 1974, Element jadransko-mediteranske kulturne skupine v alpskom faciesu lengyelske kulture, *Situla* 14-15, 35-43.

Brunšmid, J. 1902, Nahođaji bakrenoga doba iz Hrvatske i Slavonije i susjednih zemalja, *Vjesnik Arheološkog muzeja u Zagrebu* 6 (1), 32-67.

Budja, M. 1983, Tri desetletja razvoja teorij o poznem neolitu in eneolitu severozahodne Jugoslavije, *Poročilo o raziskovanju paleolita, neolita in eneolita v Sloveniji* XI, 73-83.

Budja, M. 1990, Ajdovska jama pri Nemški vasi, *Arheološki pregled* 29/1988, 40-43.

Budja, M. 1992, Pečatniki v slovenskih neolitskih naselbinskih kontekstov, *Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji* 20, 95-109.

Bugar, A. 2009, Šepkovčica 1 (rbr. 114), *Hrvatski arheološki godišnjak* 5/2008, 269-273.

Čataj, L. 2016, Lasinja, Retz-Gajary and Boleráz? Radiocarbon dates and the sequence of Copper Age Cultures in Central Croatia, in: J. Kovárnik (ed.), *Centenary of Jaroslav Palliardi´s Neolithic and Aeneolithic Relative Chronology (1914-2014)*, Philosophical Faculty, University of Hradec Králové, Hradec Králové-Ústí nad Orlicí, 181-192.

Čataj, L. *u tisku*, Crkvišće-Bukovlje, višeslojno eneolitičko naselje: prilog poznavanju lasinjske kulture, *Arheološka istraživanja Bjelovarsko-bilogorske žu-*

panije i okolnih krajeva, Izdanja Hrvatskog arheološkog društva.

Dimitrijević, S. 1961, Problem neolita i eneolita u sjeverozapadnoj Jugoslaviji, *Opuscula archaeologica* V.

Dimitrijević, S. 1968, *Sopotsko-lenđelska kultura*, Arheološke monografije I, Filozofski fakultet Sveučilišta u Zagrebu, Arheološki institut, Zagreb.

Dimitrijević, S. 1976, Idoloplastika u lasinjskoj kulturi, *Godišnjak Centra za balkanološka ispitivanja* XIII, 59-81.

Dimitrijević, S. 1979, Lasinjska kultura, in: A. Benac (ed.), *Prapovijest jugoslovenskih zemalja III*, „Svjetlost", OOUR Izdavačka djelatnost, Akademija nauka i umjetnosti Bosne i Hercegovine, Sarajevo, 137-181.

Dizdar, M. 2013, Poljana Križevačka 1 (AN 4), *Hrvatski arheološki godišnjak* 9/2012, 236-240.

Đukić, A. 2014, Biljni ostaci s četiri novoistraživana lokaliteta Đakovštine, *Vjesnik arheološkog muzeja u Zagrebu* XLVII, 7-37.

Gabor I. 2004, *Outline of the prehistoric settlement of Szombathely*, Headquarter of the Museums in Vas County, Szombathely.

Guštin, M. 2005, Savska skupina Lengyelske kulture, in: M. Guštin (ed.), *Prvi poljodjelci,* Annales Meditarranea, Univerza na Primorskem, znanstvenoraziskovalno središče Koper, Inštitut za dediščinu Sredozemlja, Koper, 7-22.

Hahnel, B. 1990, Ein Epilengyel-Brandgrab aus Stillfried in Niederösterreich, *Fundberichte aus Österreich* 29, 9-11.

Homen, Z. 1985, Prilog proučavanju lasinjskih keramičkih bočica. *Muzejski vjesnik* 8, 44-46.

Homen, Z. 1990, Lokaliteti lasinjske kulture na križevačkom području, *Arheološka istraživanja u Podravini i Kalničko-bilogorskoj regiji, Izdanja Hrvatskog arheološkog društva* 14/1989, 51-68.

Honti, Sz., Belényesy, K., Gallina, Zs., Kiss, V., Kulcsár, G., Marton, T., Nagy, A., Németh, P. G., Oross, K., Sebők, K., Somogyi, K. 2002, A tervezett M7-es autópálya Somogy megyei szakaszán 2000-2001-ben végzett megelőző régészeti feltárások. Előzetes jelentés II. Rescue Excavations in 2000-2001 on the Planned Route of the M7 Motorway in Somogy County. Preliminary Report II, *Somogyi Múzeumok Közleményei* XV, 3-36.

Hornok, P. & Kiss, P. 2017, A Balaton-Lasinja-Kultúra települése és kincslelete Magyaregresen, *Archaeologiai Értesítő* 142, 239-253.

Horvat, M. 1989, *Ajdovska jama pri Nemški vasi*, Znanstveni inštitut Filozofske fakultete, Ljubljana.

Horváth, T. 2010, Megfigyeléseh a középső és későrézkori kultúrák fazekasaruin Balatonőszödtemetői dülő lelőhelyen. *Archeometriai Műhely* 2010/1, 51-82.

Horváth, L. A. & Simon, K. H. 2003, *Das Neolithikum und die Kupferzeit in Südwesttransdanubien*, Inventaria Praehistorica Hungariae 8, Magyar Nemzeti Múzeum, Budapest.

Hulina, M. u tisku, Poljana Križevačka 1 i 2, *Arheološka istraživanja Bjelovarsko-bilogorske županije i okolnih krajeva, Izdanja Hrvatskog arheološkog društva*.

Jakovljević, G. 2012, *Registar arheoloških nalaza i nalazišta Bjelovarsko-bilogorske županije,* Gradski muzej Bjelovar, Bjelovar.

Janković, I., Balen, J., Ahern, J. C. M., Premužić, Z., Čavka, M., Potrebica, H., Novak, M. 2017, Prehistoric massacre revealed. Perimortem cranial trauma from Potočani, Croatia, *Antropologischer Anzeiger* 74/2, 131-141.

Kalafatić, H. 2009, Čepinski Martinci-Dubrava (COKP Čepin) (rbr. 6), *Hrvatski arheološki godišnjak* 5/2008, 26-28.

Kalicz, N. 1973, Über die chronologische Stellung der Balaton-Gruppe in Ungarn, in: B. Chropovský (ed.), *Symposium über die Entstehung und Chronologie der Badener Kultur*. Slovenska Akadémia Vied, Archeologický Ustav, Bratislava, 131-165.

Kalicz, N. 1995, Die Balaton-Lasinja Kultur in der Kupferzeit Südost- und Mitteleuropas, in: T. Kovács (ed.), *Neuere Daten zur Siedlungsgeschichte und Chronologie der Kupferzeit des Karpatenbeckens*, Inventaria Praehistorica Hungariae VII, 37-50.

Kalicz, N. 2001, Die Protoboleráz – Phase an der Grenze von zwei Epochen, in: P. Roman & S. Diamandi (eds), *Cernavodă III – Boleráz,* Studia Danubiana, Series Symposia II, Internationale Beratungskommission für die Förderung der Indo-Europäischen und Thrakischen Forschung, Bucureşti, 385-435.

Kavur, B. 2011, Absolutne datacije, in: I. Tušek, B. Kavur, *Ivankovci (Ivánkóc) pri Lendavi*, Arheologija na avtocestah Slovenije, Zavod za varstvo kulturne dediščine Slovenije, Ljubljana, 124-127.

Kerman, B. 2014, *Moć gline. Figuralna plastika in drugi kultni predmeti iz bakrene dobe v Prekmurju,* Pomurski muzej, Murska Sobota.

Kolak, T. 2015, *Otočac – Stari grad 2015*. Prethodno izvješće, Muzej Like, Gospić.

Komšo, D. 2006, Blizna kod Jakupovca (Varaždin) – višeslojno naselje. Kameni nalazi, in: L. Bekić (ed.), *Zaštitna arheologija u okolici Varaždina – Arheološka istraživanja na autocesti Zagreb-Goričan*, Mini-

starstvo kulture RH, Hrvatski restauratorski zavod, Zagreb, 99-108, 133-175.

Korošec, J. 1958, Eine neue Kulturgruppe des späten Neolithikums in Nordwestjugoslawien, *Acta Archaeologica Academiae Scientiarum Hungaricae* IX/1-4, 83-93.

Korošec, J. 1960, Drulovka, *Zbornik Filozofske fakultete* III/4, Ljubljana.

Korošec, J. 1962, Nekaj neolitskih in eneolitskih problemov v okolici Križevcev na Hrvatskem, *Zbornik Filozofske fakultete* IV/1, Ljubljana, 5-54.

Korošec, J. 1965, Neo- in eneolitski elementi na Ptujskem gadu, *Poročilo o raziskovanju neolita in eneolita v Sloveniji* II, 5-71.

Kos, K., Posilović, H., Durman, A. 2013, Prapovijesne inkrustacije u Podunavlju, *Obavijesti Hrvatskog arheološkog* društva XLV, 17-24.

Koštuřík, P. 1972, *Die Lengyel-Kultur in Mähren*, Studie archeologického Ústavu Československé Akademie věd v Brně 6, Prag.

Ložnjak Dizdar, D. 2012, Zaštitna istraživanja nalazišta AN 5 Poljana Križevačka 2 na trasi autoceste A12 Sv. Helena – GP Gola, *Annales Instituti archaeologici* VIII, 63-68.

Madiraca, V. & Čimin, R. 2009, Brezje 1 (rbr. 80), *Hrvatski arheološki godišnjak* 5/2008, 197-198.

Makkay, J. 1976, Problems concerning Copper Age Chronology in the Carpathian Basin. Copper Age gold discs in Central and South-East Europe, *Acta Archaeologica Hungarica* 28, 251-300.

Marijanović B. 2003, *Eneolitik i eneolitičke kulture u Bosni i Hercegovini*, Sveučilište u Mostaru, Pedagoški fakultet, Odsjek za arheologiju i povijest umjetnosti, Mostar.

Marković, Z. 1977, Problem eneolita u našičkoj regiji, *Arheološki vestnik* 27/1976, 42-59.

Marković, Z. 1983, Prilog poznavanju razvijene i kasne lasinjske kulture u sjeverozapadnoj Hrvatskoj, *Podravski zbornik* 83, 251-262

Marković, Z. 1985, Problem ranog eneolita u sjeverozapadnoj Hrvatskoj, *Vjesnik arheološkog muzeja u Zagrebu*, 3. S., XVIII, 1-34.

Marković, Z. 1986, Neki problemi geneze i razvoja lasinjske kulture, *Arheološka istraživanja na karlovačkom i sisačkom području*, *Izdanja Hrvatskog arheološkog društva* 10 (1985), 19-28.

Marković, Z. 1989, Novi prilozi poznavanju neolitika i eneolitika sjeverne Hrvatske. *Poročilo o raziskovanju paleolita, neolita in eneolita v Sloveniji* XVII, 61-81.

Marković, Z. 1994, *Sjeverna Hrvatska od neolita do brončanog doba*, Muzej grada Koprivnice, Koprivnica.

Minichreiter, K. 1990, Prvi rezultati arheoloških istraživanja u Pepelanama godine 1985, *Arheološka istraživanja u Podravini i Kalničko-bilogorskoj regiji. Izdanja Hrvatskog arheološkog društva* 14/1989, 19-38.

Minichreiter, K. & Marković, Z. 2009, Prapovijesno i ranosrednjovjekovno naselje Bentež kod Beketinaca, *Prilozi Instituta za arheologiju u Zagrebu* 26, 21–44.

Minichreiter, K. & Marković, Z. 2013, *Beketinci-Bentež. Naselja iz eneolitika, ranoga i kasnoga srednjega vijeka*, Institut za arheologiju, Zagreb.

Németh, G. T. 1994, Vorbericht über spätneolitische und frühkupferzeitliche Siedlungsspuren bei Lébény (Westungarn), *Jósa András Múzeum Évkönyve* 36, 241-261.

Nodilo, H. 2012, Donji Miholjac-Mlaka (trafostanica) (rbr. 4), *Hrvatski arheološki godišnjak* 8/2011, 12-15.

Okroša Rožić, L. 2004, *Lokaliteti lasinjske kulture i problem njezina podrijetla na križevačkom području*, Magistarski rad, Sveučilište u Zagrebu.

Oross, K., Marton, T., Whittle, A., Hedges, R. E. M., Cramo, L. J. E. 2010, Die Siedlung der Balaton-Lasinja-Kultur in Balatonszárszó-Kis-erdei-dűlő, in: J. Šutekova, P. Pavúk, P. Kalábková & B. Kovár (eds), *Panta Rhei: Studies in Chronology and Cultural Development of South-Eastern and Central Europe in Earlier Prehistory presented to Juraj Pavúk on the Occasion of his 75th Birthday*, Studia Archaeologica et Medievalia XI, Facultas Philosophica, Universitatis Comenianae Bratislavensis, Bratislava, Olomona, 379-405.

Pahič, S. 1975, Najstarejše seliščne najdbe v severovzhodni Sloveniji, *Arheološki vestnik* XXIV/1973, 12-30.

Patay, P. 1984, *Kupferzeitliche Meissel, Beile und Äxte in Ungarn*, Prähistorische Bronzefunde IX/15, Beck, München.

Pittioni, R., *Urgeschichte des österreichisches Raum*, Franz Deuticke, Wien, 1954.

Plestnjak, A. 2010, *Gorice pri Turnišću*, Arheologija na avtocestah Slovenije, Zavod za varstvo kulturne dediščine Slovenije, Ljubljana.

Potrebica, H. & Balen, J. 2008, Rekognosciranje južnih obronaka Papuka (zona Velika – Stražeman), *Hrvatski arheološki godišnjak* 4/2007, 116-119.

Probst, E. 1999, Beginn der Kupferverbreitung. Die Bisamberg-Oberpullendorf-Gruppe, in: E. Probst

(ed.), *Deutschland in der Steinzeit*, Orbis Verlag, München, 437-438.

Raczky, P. 1974, A lengyeli kultúra legkésöbbi szakaszának leletei a Dunántúlon, *Archaeologia Értesitő* 101/2, Budapest, 185-210.

Raczky, P. 1995, New data on the absolute chronology of the Copper Age in the Carpathian Basin, *Inventaria Praehistorica Hungariae* VII, 51-60.

Rajić, P. 2003, Ozalj 2002. – nalaz dijela donje čeljusti djeteta, *Glas* 1, godina II, 27.

Reed, K. 2017, Agricultural change in Copper Age Croatia (ca. 4500-2500 cal B. C.)?, *Archaeological and Anthropological Sciences* 9 (8), 1745-1765.

Regenye, J. 2006, Temetkezések Veszprém, Jutasi út lelőhelyen (Lengyeli kultúra, Balaton-Lasinja kultúra), *A Veszprém megyei múzeumok közleményei* 24, 7-35.

Registar arheoloških nalaza i nalazišta sjeverozapadne Hrvatske (drugo dopunjeno izdanje), Bjelovar 1997.

Ruttkay, E. 1985, *Das Neolithikum in Niederösterreich*, Österreichische Arbeitsgemeinschaft für Ur- und Frühgeschichte, Wien.

Ruttkay, E.1996, Zur Chronologie der Kanzianiberg-Lasinja-Gruppe, *Archäologie Österreichs* 7/2, 43-48.

Simon, K. H. 1990, Der Stand und die Aufgaben der Neolithikum und Kupferzeitforschung im Komitat Zala, *Zalai Múzeum* 2, 47-60.

Somogyi, K. 2000, Előzetes jelentés a Kaposvár - 61-es út elkerülő szakasz 1. számú lelőhelyén végzett feltárásról. Preliminary report of the excavation of Site No. 1 situated on the encircling section of Road 61 around Kaposvár, *Somogyi Múzeumok Közleményei* XIV, 245-249.

Somogyi, K. 2002, Neuere Daten zur Hochkupferzeitlichen Kupferindustrie im Komität Somogy (Südwestungarn), *Antaeus* 25, 337-353.

Sraka, M. 2016, *Prazgodovinske kronologije in kulturna zaporedja*, Doktorska disertacija, Univerza v Ljubljani.

Straub, P. 2006, Middle Copper Age settlement at Sormás, *Archaeological Investigations in Hungary* 2005, 5-32.

Strmčnik Gulič, M. 2006, Malečnik – arheološko najdišče, in: A. Tomaž, (ed), *Od Sopota do Lengyela*, Annales Meditarranea, Univerza na Primorskem, znanstveno-raziskovalno središče Koper, Inštitut za dediščinu Sredozemlja, Koper, 195-202.

Šoberl, L., Horvat, M., Žibrat Gašparić, A., Sraka, M., Evershed, R., Budja, M. 2014, Neolithic and Eneolithic activities inferred from organic residue analysis of pottery from Mala Triglavca, Moverna vas and Ajdovska jama, Slovenia, *Documenta Praehistorica* XLI, 149-179.

Šošić Klindžić, R. 2013, Kameni artefakti, in: K. Minichreiter & Z. Marković (eds), *Beketinci, Bentež, naselje iz eneolitika, ranoga i kasnoga srednjeg vijeka*, Zagreb, 128-139.

Šošić, R. & Karavanić, I. 2004, Cijepani litički materijal s prapovijesnog nalazišta Slavča, Nova Gradiška, *Vjesnik Arheološkog muzeja u Zagrebu*, Zagreb, 3. s., XXXVII, 17-41.

Špoljar, D. 2011, *Cijepani litički materijal s prapovijesnog nalazišta Tomašanci-Palača*, Diplomski rad, Sveučilište u Zagrebu, Filozofski fakultet u Zagrebu.

Tasić, N. 1995, *Eneolithic cultures of central and west Balkans*, Posebna izdanja, Balkanološki institut, Srpska akademija nauka i umetnosti, Belgrade.

Težak-Gregl, T. 1984, Neolitička i eneolitička antropomorfna plastika iz fundusa Arheološkog muzeja u Zagrebu, *Vjesnik Arheološkog muzeja u Zagrebu* XVI-XVII/1983-1984, 15-48.

Težak Gregl, T. 1994, Prapovijesno nalazište Ozalj-Stari grad. *Opuscula archaeologica* 17/1993, 165-181.

Težak Gregl, T. 2001, Glačane kamene rukotvorine neolitičkog i eneolitičkog razdoblja u Hrvatskoj, *Opuscula archaeologica* 25, 7-27.

Težak Gregl, T., Ozalj-Stari grad, neolitička naseobina, in: M. Guštin, (ed.), *Prvi poljodjelci: savska skupina lengyelske kulture*, Annales Meditarranea, Univerza na Primorskem, znanstveno-raziskovalno središče Koper, Inštitut za dediščinu Sredozemlja, Koper, 2005, 155-162.

Težak Gregl, T. 2007, Ponovo o lasinjskoj bočici iz Vrlovke, *Prilozi instituta za arheologiju u Zagrebu* 24, 35-40.

Tkalčec, T. 2016, Prapovijesna, rimska i srednjovjekovna naselja na lokalitetu Donji Miholjac-Đanovci – zaštitna arheološka istraživanja u 2015. godini, *Annales Instituti Archaeologici* XII, 46-58.

Tokai, Z. M. 2007, A Balaton-Lasinja kultúra lelőhelyei Eszteregnye és Rigyác határában, *Zalai Múzeum* 16, 7-24.

Tomaž, A. 1999, *Časovna in prostorska strukturiranost neolitskega lončarstva: Bela Krajina, Ljubljansko barje, Dinarski Kras*, Magistarsko delo, Filozofska fakulteta, Univerza v Ljubljani, Ljubljana.

Tomaž, A. 2012, *Turnišče*, Arheologija na avtocestah Slovenije, Zavod za varstvo kulturne dediščine Slovenije, Ljubljana.

Tomaž, A. & Velušček A. 2005, Resnikov prekop na Ljubljanskem barju 1962 in 2002, in: M. Guštin (ed.), *Prvi poljodjelci: savska skupina lengyelske kulture*, Annales Meditarranea, Univerza na Primorskem,

znanstveno-raziskovalno središče Koper, Inštitut za dediščinu Sredozemlja, Koper, 87-100.

Tomičić, Ž. 1968, Brezje kraj Varaždina – prahistorijsko i ranosrednjevjekovno nalazište, *Arheološki pregled* 10, 237-238.

Velušček, A. 2004, *Hočevarica – eneolitsko koliščena Ljubljanskem barju (Hočevarica- an eneolithic pile dwellingin the Ljubljansko barje),* Opera Instituti Archaeologici Sloveniae 8, Institut za arheologijo ZRC SAZU, Založba ZRC, Ljubljana.

Velušček, A. 2011, *Spaha*, Opera Instituti Archaeologici Sloveniae 22, Institut za arheologijo ZRC SAZU, Založba ZRC, Ljubljana.

Velušček, A. & Greif T. 1998, Talilnik in livarski kalup z Maharskega prekopa na Ljubljanskem barju, *Arheološki vestnik* 49, 31–53.

Virág, Zs. M. 1986, Javarézkori leletek Zalavár-Basaszigetről (Middle Copper Age finds from Zalavár-Basasziget), *Archaeologiai Értesitő* 113, 3-14.

Virág, Zs. M. 1990, Vorbericht über die Ergebnisse der Freilegung der kupferzeitlichen Siedlung von Zalavár-Basasziget (Angaben zur Siedlungsstruktur und Wirtschaft der Balaton-Lasinja(l.)Kultur), *Zalai Múzeum* 2, 71-79.

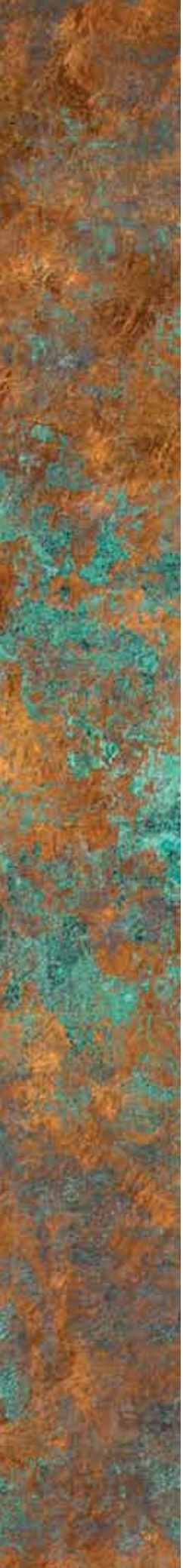
Virág, Zs. M. 2003, Settlement historical research in Transdanubia in the first half of the Middle Copper Age, in: E. Jerem & P. Raczky (eds), *Morgenrot der Kulturen. Frühe Etappen der Menschheitsgeschichte in Mittel- und Südosteuropa,* Festschrift für Nándor Kalicz zum 75. Geburtstag, Archaeolingua 15, Budapest, 375-400.

Virág, Zs. M., Figler A. 2007, Data on the settlement history of the Late Lengyel period of Transdanubia on the basis of two sites from Kisalföld (Small Hungarian Plain) (A preliminary evaluation of the sites Győr-Szabadrétdomb and Mosonszentmiklós-Pálmajor), in: J. K. Kozlowski. & P. Raczky (eds), *The Lengyel, Polgár and related cultures in the Middle/ Late Neolithic in Central Europe*, Polska Akademia Umiejętności, Kraków, 345-364.

Zalai-Gaál, I. 2001, Die Brandbestatung im Spätneolithikum Transdanubiens, in: Z. Fodor (ed.), *Sites and Stones: Lengyel Culture in Western Hungary and beyond*, Directorate of the Veszprem County Museums, Veszprém, 37-45.

Zoffmann, Zs. 2005, Embertani leletek a rézkori Balaton-Lasinja kultúra Keszthely-Fenékpuszta lelőhelyen feltárt gödreiből, *Zalai Múzeum* 14, 53-60.

Žižek, I. 2006, Bakrenodobna naselbina Hardek, in: A. Tomaž, (ed.), *Od Sopota do Lengyela: prispevki o kamenodobnih in bakrenodobnih kulturah med Savo in Donavo*, Annales Meditarranea, Univerza na Primorskem, znanstveno-raziskovalno središče Koper, Inštitut za dediščinu Sredozemlja, Koper, 129-140.



Kultura Retz-Gajary

The Retz-Gajary culture

Lea Čataj

Hrvatski restauratorski zavod
Croatian Conservation Institute
Zagreb
lcataj@h-r-z.hr

Kultura Retz-Gajary, izvan hrvatskih granica poznatija kao kultura keramike s brazdastim urezivanjem, zauzimala je velik prostor rubnih dijelova Karpatske kotline. U okvirima današnjih državnih granica, obuhvaćala je Austriju, kontinentalnu Sloveniju, sjevernu Hrvatsku, istočnu Češku, krajnji južni dio Poljske, jugozapadnu Slovačku, Mađarsku te zapadni dio Rumunjske (Dimitrijević 1979: 346; Ruttkay 1997: 166; Balen 2010: 46).

Keramika ovog specifičnog načina ukrašavanja iz Mondseea u Austriji još je krajem 19. st. označena kao sojenička keramika (*Pfahlbaukeramik*). Pripisani su joj nalazi iz Ljubljanskog barja (Much 1893: 271-272; fig. 102; Hoerns 1898: 266-268, 296-306, fig. 94-95), a uočena je i srodnost s nalazima iz Erdelja (Wosinsky 1904: 75-77). Uskoro kultura postaje poznata upravo po načinu ukrašavanja – brazdastom urezivanju, kao *Furchenstichkeramik* (Schroller 1933). Iako je ovaj termin danas u širokoj upotrebi, u drugoj polovici 20. st. uvedeno je nekoliko naziva za njezine regionalne tipove, primjerice Retz (Pittioni 1954: 181-182, sl. 119) i Gajary (Novotný 1958), koji su združeni u termin kultura Retz-Gajary (Dimitrijević 1967: 6-8, T. III, IV). Za nalaze kulture keramike s brazdastim urezivanjem na prostoru Slovačke predložen je pojam „miješana grupa“ (Točik 1961: 343). Pripisana su joj i nalazišta južne Donje Austrije i sjevernog Gradišća te je predloženo da se tipovi Gajary i Bajč sjedine u tip ili grupu miješane keramike s brazdastim urezivanjem unutar koje se mogu razlikovati kao stilovi ili facijesi (Ruttkay 1997; 2006). Nalazi ove kulture s prostora Hrvatske i Slovenije prvotno su objavljeni kao lasinjski (Dimitrijević 1961: 22-59, T. V - VI).

The Retz-Gajary culture, more commonly called the culture with furrowed incisions outside of Croatian borders, occupied the large area of the periphery of the Carpathian Basin. Within today's state borders, it encompassed Austria, continental Slovenia, northern Croatia, the eastern parts of the Czech Republic, the southernmost part of Poland, southwestern Slovakia, Hungary, and western Romania (Dimitrijević 1979: 346; Ruttkay 1997, 166; Balen 2010: 46).

Pottery decorated in this specific way from Mondsee in Austria was defined as stilt-house pottery (ger. *Pfahlbaukeramik*) already in the late 19th century. Finds from Ljubljansko Barje were ascribed to it (Much 1983: 271-272; fig. 102; Hoerns 1898: 266-268, 296-306, fig. 94-95), and similarities with finds from Erdelj were also noted (Wosinsky 1904: 75-77). The culture soon became famous precisely for its decorative mode - furrowed incisions, or, in German - *Furchenstichkeramik* (Schroller 1933). Although this term is widely used today, in the second half of the 20th cent., several terms were introduced to denote its regional variants, for example Retz (Pittioni 1954: 181-182, fig. 119) and Gajary (Novotny 1958), which was later combined to forge the term 'the Retz-Gajary' culture (Dimitrijević 1967: 6-8, Pl. III, IV). In Slovakia, finds ascribed to the culture with furrowed incisions were denoted by the term "mixed group" (Točik 1961: 343). Sites from southern Lower Austria and northern Burgenland were also ascribed to it, and it was proposed that the Gajary and Bajč be joined into the type of mixed pottery group with furrowed incisions that could then be divided into styles or facies (Ruttkay 1997; 2006). Finds of this culture from Croatia and Slovenia were originally published as belonging to the Lasinja culture (Dimitrijević 1961: 22-59, Pl. V - VI).

S. Dimitrijević razlikuje nekoliko tipova ove kulture: Retz u Donjoj Austriji, Waltrahöhle-Křepice u istočnoj Štajerskoj i Moravskoj, Mondsee u Gornjoj Austriji, Gajary i Bajč u jugozapadnoj Slovačkoj, južnoj Donjoj Austriji i sjevernoj Transdanubiji, transilvanijski tip u istoimenoj rumunjskoj regiji, Jevišovice u Slovačkoj, Višnjica u sjeverozapadnoj Hrvatskoj, jugozapadnoj Mađarskoj i kontinentalnoj Sloveniji te Kevderc–Hrnjevac u međuriječju Drave i Save, od srednje Slavonije do slovenskih Alpa, kao i u Transdanubiji i najjužnijem dijelu jugozapadne Slovačke (Dimitrijević 1980).

N. Kalicz uvodi pojam grupe Balaton s tri horizonta, od kojih bi II i III bili vezani uz keramiku s brazdastim urezivanjem (Kalicz 1973). Kako se pokazalo da se radi o tri različite kulture, imenuje ih Balaton–Lasinja, kultura keramike s brazdastim urezivanjem i horizont Protoboleráz (Kalicz 1995: 37). Potonjem je horizontu, koji opisuje kao jedinstven u istočnoj i zapadnoj Mađarskoj, jugozapadnoj Slovačkoj i sjevernoj Hrvatskoj, pripisao i nalazišta tipa Kevderc–Hrnjevac prema S. Dimitrijeviću (Kalicz 2001). Iako su neki autori (Horváth & Simon 2003: 136-138) prihvatili potonji naziv kao novu kulturnu pojavu ipak postoje određene sumnje u kulturnu atribuciju pojedinih nalazišta i opravdanost ovog termina (Bondár 2005: 280-281). S obzirom na stanje istraživanja, velik broj nalazišta i regionalnih razlika unutar pojedinih grupa, danas su podijeljena i mišljenja je li kultura Retz-Gajary jedinstvena pojava (Horváth 1994).

Najčešće se smatra da kultura Retz-Gajary potječe iz srednje Europe, posebice Moravske i Donje Austrije (Dimitrijević 1980: 73; Horváth & Simon 2003: 132) te da se razvila iz lokalne lenđelske osnove, ali i one kultura Bodrogkeresztúr i Hunyadihalom (Točik 1961; Kalicz 1995; Ruttkay 1997), iako postoji i mišljenje da se radi o kulturi jugoistočnog porijekla (Podborský 1989: 57).

Počeci kulture Retz-Gajary vežu se uz grupe Ludanice u Slovačkoj i Jordanów u srednjoj Europi te kulturu Baalberg u Moravskoj i Austriji (Točik 1961: 343; Podborský 1989: 59; Ruttkay 1997: 174-175). Na prostoru Hrvatske ova se kultura javlja nakon lasinjske, a prije badenske (Kalicz 1995: 47, Abb. 2). S. Dimitrijević je pretpostavio njezino dugo trajanje i sinkronizirao je s kulturama Tiszapolgár i Bodrogkeresztúr, predklasičnim i klasičnim Badenom, kostolačkom i vučedolskom kulturom (Dimitrijević 1980: 60, Beilage 2). Sloj Jevišovice B, koji Dimitrijević smatra istovremenim s kulturom

S. Dimitrijević differentiated between several types of this culture: Retz in Lower Austria, Waltrahöhle-Křepice in eastern Styria and Moravia, Mondsee in Upper Austria, Gajary and Bajč in southwestern Slovakia, southern Lower Austria and northern Transdanubia, the Transylvanian type in the designated Romanian region, Jevišovice in Slovakia, Višnjica in northwestern Croatia, southwestern Hungary and continental Slovenia up to the Slovenian Alps, and Kevderc-Hrnjevac in the Drava and Sava interfluve, from central Slavonia to the Slovenian Alps, as well as in Transdanubia and the southernmost part of southwestern Slovakia (Dimitrijević 1980).

N. Kalicz introduced the term 'the Balaton group' with three phases, wherein phases II and III were connected with pottery with furrowed incisions (Kalicz 1973). It later turned out that these were three different cultures that he named Balaton-Lasinja, a culture with pottery with furrowed incisions, and the Protoboleráz phase (Kalicz 1995: 37). The latter phase, which he described as a unique occurrence in eastern and western Hungary, southwestern Slovakia and northern Croatia, also included sites of the Kevderc-Hrnjevac type, as defined by S. Dimitrijević (Kalicz 2001). Although some authors (Horváth & Simon 2003: 136-138) accepted the latter term as a new cultural occurrence, there are certain doubts about the cultural attribution of certain sites and the suitability of this term (Bondár 2005: 280-281). Considering the state of research, a large number of sites and regional differences within certain groups, opinions still differ when it comes to whether the Retz-Gajary culture is a single occurrence (Horváth 1994).

It is most often thought that the Retz-Gajary culture originated in central Europe, especially Moravia and Lower Austria (Dimitrijević 1980: 73; Horváth & Simon 2003: 132), and that it developed from the local Lengyel basis, as well as from the Bodrogkeresztúr and Hunyadihalom cultures (Točik 1961; Kalicz 1995; Ruttkay 1997), although some authors think that it originated from the southeast (Podborský 1989: 57).

The beginnings of the Retz-Gajary culture are connected to the Ludanice group in Slovakia and Jordanów in central Europe, as well as the Baalberg culture in Moravia and Austria (Točik 1961: 343; Podborský 1989: 59; Ruttkay 1997: 174-175). On Croatian territory, this culture appeared right after the Lasinja, and right before the Baden culture (Kalicz 1995: 47, Abb.2). S. Dimitrijević assumed that it lasted for

Retz–Gajary ipak je nešto mlađi i pripada klasičnoj badenskoj kulturi (Némejcová-Pavúková 1964: 242–243). Novija arheološka istraživanja u sjevernoj Hrvatskoj, Sloveniji i Austriji, potpomognuta radiokarbonskim datumima, dala su prednost lasinjskoj kulturi pred onom s brazdastim urezivanjem, iako postoji nekoliko lokaliteta na kojima se javljaju istovremeno (Velušček 2004: 250-261). K. Minichreiter (1990) i Z. Marković (1989: 46) smatraju da je recgajarska kultura počela krajem lasinjske te da je postojao period istovremenog trajanja obiju kultura.

Kulturu keramike s brazdastim urezivanjem L. A. Horváth i K. H. Simon (2003: 135-136) dijele u dva horizonta. Stariji je prisutan na prostoru Moravske, Austrije i sjeverozapadne Slovačke i paralelan je s kulturama Jordansmühl, Ludanice, Bisamberg-Oberpullendorf, Baalberg A2, Lasinja i Bodrogkeresztúr. Mlađi dio ove kulture širi se na Transdanubiju, Štajersku, Hrvatsku, Sloveniju, odnosno na nekadašnji prostor kultura Balaton–Lasinja i Ludanice te zapadni dio velike mađarske ravnice, a vremenski se poklapa s kulturama Baalberg B, Hunyadihalom i Lažnany.

Na prostoru srednjega Podunavlja V. Podborský (1989: 60) prepoznao je tri horizonta keramike tipa Bajč–Retz–Křepice. A. Točik (1961: 343-344) u Slovačkoj razlikuje dva horizonta kulture keramike s brazdastim urezivanjem: u stariji ulaze nalazi iz miješane i grupe Retz, dok bi mlađi bili nalazi iz Mondseea i Erdelja. Na prostoru Moravske A. Medunová-Benešová (1986: 6) kulturu je podijelila u dvije podfaze. S. Dimitrijević (1980: 59-60) smatra da je tip Višnjica paralelan sa stupnjevima IIa i IIb lasinjske kulture, a Kevderc–Hrnjevac s Lasinjom III.

Kalibrirani radiokarbonski datumi iz sjeverne Hrvatske smještaju kulturu Retz–Gajary u razdoblje između 3950/3900. i 3600/3500. g. pr. Kr. (Balen 2008: 20; Čataj 2009: tablica 1; Balen 2010: tab. 4; 2016: 64-65; 2018: 68; Balen & Drnić 2014: 42). Njezin kraj podudarao bi se s početkom faze Boleráz badenske kulture, a nije isključeno da postoji vremenski period paralelnog trajanja ovih dviju kultura (Balen 2008: 20; Velušček 2004: 260-262). E. Ruttkay (2006: 294-296) smješta miješanu grupu u razdoblje između 4000. i 3700. g. pr. Kr. Prema kalibriranim radiokarbonskim datumima, kultura keramike s brazdastim urezivanjem u Transdanubiji datira se između 3850. i 3600/3500. g. pr. Kr. (Raczky 1995: Fig.1), a unutar tog vremena uklapaju se i nalazišta u Slo-

a long time, and synchronized it with the Tiszapolgár and Bodrogkeresztúr cultures, the pre-classical and classical Baden culture, and the Kostolac and Vučedol cultures (Dimitrijević 1980: 60, Beilage 2). The Jevišovice B layer, assumed by Dimitrijević to be contemporaneous with the Retz-Gajary culture, is somewhat younger and is ascribed to the classical Baden culture (Némejcová-Pavúková 1964: 242-243). More recent archaeological research from Croatia, Slovenia and Austria, along with radiocarbon dates, gives advantage to the Lasinja culture, and not the one with furrowed incisions, although there are some sites where the two appear simultaneously (Velušček 2004: 250-261). K. Minichreiter (1990) and Z. Marković (1989: 46) think that the Retz-Gajary culture appeared at the end of the Lasinja culture, and that the two cultures existed simultaneously for a certain period of time.

The culture with furrowed incisions was divided into two phases by L. A. Horváth and K. H. Simon (2003: 135-136). The older one was present in Moravia, Austria and northwestern Slovakia, and was contemporaneous with the Jordansmühl, Ludanice, Bisamberg-Oberpullendorf, Baalberg A2, Lasinja and Bodrogkeresztúr cultures. The younger phase spread to Transdanubia, Styria, Croatia and Slovenia, i.e. the former area occupied by the Balaton-Lasinja and Ludanice cultures, and the western part of the Great Hungarian Plain, and was contemporaneous with the Baalberg B, Hunyadihalom and Lažnany cultures.

In central Transdanubia, V. Podborský (1989: 60) recognized three phases of the Bajč-Retz-Křepice type pottery. In Slovakia, A. Točik (1961: 343-344) recognized two phases of the culture with furrowed incisions: the older included finds from the mixed and Retz groups, while the younger included finds from Mondsee and Erdelj. In Moravia, A. Medunová-Benešová (1986: 6) divided the culture into two sub-phases. S. Dimitrijević (1980: 59-60) though that the Višnjica type was parallel with the IIa and IIb phases of the Lasinja culture, and Kevderc-Hrnjevac with the Lasinja III phase.

The calibrated radiocarbon dates from northern Croatia place the Retz-Gajary culture in the period between 3950/3900 and 3600/3500 BC (Balen 2008: 20; Čataj 2009: table 1; Balen 2010: Pl. 4; 2016: 64-65; 2018: 68; Balen & Drnić 2014: 42). Its end coincides with the beginning of the Boleráz phase of the Baden culture, and the possibility that these cultures existed contemporaneously for a while

veniji (Velušček 2004: 295; 2011, Tab. 5. 3; Hüls 2009). U apsolutno-kronološkom smislu Protoboleráz i Boleráz horizonti ne mogu se odvojiti jer ih dobiveni datumi smještaju u isti vremenski period: Protoboleráz je datiran između 3750. i 3300. g. pr. Kr., a Boleráz između 3700. i 3350.g. pr. Kr. (Wild et al. 2001: 1062, Table 2). Četiri radiokarbonska datuma s nalazišta Abony 49, koje je pripisano horizontu Protoboleráz, u rasponu su između 3800. i 3500. g. pr. Kr., a u arheološkom su materijalu vidljivi elementi kultura Retz-Gajary, Bodrogkeresztúr i Balaton-Lasinja (Rajna 2011).

Naselja i stanovanje

Pojednostavljeno shvaćanje pojedine kulture često je rezultat njezine slabe istraženosti. Slično kao i lasinjsku populaciju, pripadnike recgajarske kulture smatralo se nomadima i stočarima, koji obitavaju u špiljama i jamskim objektima te sojeničkim naseljima. Smatralo se da upravo zbog stočarstva kao primarne djelatnosti nastanjuju više predjele, ali i da nemaju samostalna naselja, već da žive na prostoru drugih kultura, poput lasinjske u kontinentalnoj Hrvatskoj (Dimitrijević 1979: 351-358; Podborský 1989: 58). Nedostatak nalaza kulture keramike s brazdastim urezivanjem u mađarskoj ravnici, prije svega u Potisju, objašnjavao se nedostatkom većih uzvisina i postojanjem stočarskih populacija kultura Tiszapolgár i Bodrogkeresztúr (Dimitrijević 1980: 23).

Naselja recgajarske kulture smještena u nizinama, poput lokaliteta Bajč u Slovačkoj, Pécsbagota–Cseralja u Transdanubiji i Retz u Austriji sastojala su se od jama različitih veličina i oblika postavljenih bez nekog plana, a među njima je prepoznato nekoliko stambenih jama (Dimitrijević 1980: 52–53). Od visinskih je naselja možda najpoznatije Brno–Líšeň u Moravskoj (Medunová-Benešová 1964).

Razdoblju hrnjevačkog tipa kulture Retz–Gajary na prostoru Hrvatske pripada visinsko naselje Hrnjevac te nizinska naselja Drljanovac na platou omeđenom dvama potocima te Satnica i Grabrovac kod Đakova (Dimitrijević 1980: 44–45, 52;

cannot be excluded (Balen 2008: 20; Velušček 2004: 260-262). E. Ruttkay (2006: 294-296) dated the mixed group to the period between 4000 and 3700 BC. In Transdanubia, radiocarbon dates place the culture with furrowed incisions to the period between 3850 and 3600/3500 BC (Raczky 1995: Fig.1), and sites in Slovenia fall within the same timeframe (Velušček 2004: 295; 2011, Pl. 5. 3; Hüls 2009). In the sense of absolute chronology, the Protoboleráz and Boleráz phases cannot be separated, because obtained dates place them to the same time period: Protoboleráz was dated to between 3750 and 3300 BC, and Boleráz to between 3700 and 3350 BC (Wild et al. 2001: 1062, table 2). Four radiocarbon dates from the Abony 49 site, ascribed to the Protoboleráz phase, fall to between 3800 and 3500 BC, and the archaeological material displays elements of the Retz-Gajary, Bodrogkeresztúr and Balaton-Lasinja cultures (Rajna 2011).

Settlements and habitation

A simplified understanding of a certain culture is often the result of the poor state of research. Similar to the Lasinja population, the inhabitants of the Retz-Gajary culture were often seen as nomads and cattle-breeders that lived in caves, pit structures and stilt-houses. This view was based precisely on the fact that animal husbandry was seen as the primary activity, which caused people to live on higher elevations, or not to build independent settlements, but to live on the territory of other cultures, such as the Lasinja culture in continental Croatia (Dimitrijević 1979: 351-358; Podborský 1989: 58). The lack of finds of the culture with furrowed incisions in the Hungarian Plain, primarily in the Tisza valley, was explained through the lack of elevated ground, and the existence of the Tiszapolgár and Bodrogkeresztúr animal breeding cultures (Dimitrijević 1980: 23).

Settlements of the Retz-Gajary culture were situated in valleys, such as Bajč in Slovakia, Pécsbagota-Cseralja in Transdanubia and Retz in Austria, and were made up of differently shaped and sized pits without a regulated layout, along with some defined residential pits (Dimitrijević 1980: 52-53). Brno-Líšeň in Moravia is probably the most known site situated on an elevated position (Medunová-Bešenová 1964).

In Croatia, the elevated settlement at Hrnjevac and lowland settlement at Drljanovac, situated on a

Durman 1982; Marković 2002: 31). U istraživanjima vezanim uz infrastrukturne radove, otkrivena su retzgajarska naselja na lokalitetima Tomašanci-Zdenci (Wiewegh & Revald-Radolić 2007: 8), Tomašanci-Palača (Balen 2008: 22, sl. 5), Ivandvor–Đakovo (Leleković 2008), Josipovac Punitovački-Veliko polje I (Čataj 2009), Čepinski Martinci-Dubrava (Kalafatić 2009), Barbarsko (Balen & Drnić 2014).

Noviji podaci s arheoloških lokaliteta promijenili su sliku o ovoj kulturi i govore u prilog i njezinom sjedilačkom, a ne samo polunomadskom ili nomadskom karakteru (Marković 1994: 100; Horváth & Simon 2003: 132; Velušček 2004: 232). Na mađarskim su nalazištima pronađene djelomično ukopane kuće koje su interpretirane kao zadružne ili kultne građevine (Keszthely–Fenékpuszta I), odnosno kao radni prostori ili objekti za stanovanje (Pécsbagota–Cseralja) (Horváth & Simon 2003: 136). Na lokalitetu Mezőkeresztes u Mađarskoj, otkrivene su nadzemne građevine pripisane horizontu Protoboleráz, duge 15–20 m, sa stupovima promjera 30–40 cm, kakve se često javljaju u kulturi Hunyadihalom (Kalicz 2001: 386–387). Na nalazištu Čataj u Slovačkoj otkriven je nadzemni objekt dimenzija 27,5 x 9,5-10 m. Građen je s temeljnim rovovima u kojima su vidljive jame od stupova, koje su se nalazile i u unutrašnjosti dijeleći je na dvije prostorije (Pavúk 2001). Ostaci nadzemne konstrukcije pronađeni su i na nalazištu Bučany u Slovačkoj (Horváth & Simon 2003: 128).

Dva nadzemna objekta dimenzija 18 x 6 m i 12 x 6 m, čiji se tlocrt nazire po rasporedu jama od stupova, pronađena su na nalazištu Josipovac Punitovački-Veliko polje I. Naselje se smjestilo na povišenoj gredi, a premašivalo je površinu od 3 ha. Njime dominiraju dvije radne zemunice na zapadnom i istočnom rubu. Uz zapadnu se zemunicu nalazio i obor za stoku te nekoliko ognjišta. Jedan od nadzemnih objekata pronađen je oko 45 m južno od nje. Drugi nadzemni objekt udaljen je oko 110 m istočno, a nešto južnije od njega druga je velika zemunica, u kojoj su pronađeni tragovi tkalačkog stana. Ukopi jama unutar naselja su raštrkani i grupirani oko dva nadzemna objekta (Čataj 2009).

Slično je organizirano i naselje na Kalinovnjeku kod Turčišča u Sloveniji, gdje je pronađen jedan nadzemni objekt oko kojeg je grupirano nekoliko ukopanih objekata, koji su raštrkani i na ostatku iskopane površine (Kerman 2013: 38-40).

plateau bordered by two streams, Satnica and Grabrovac near Đakovo, can all be ascribed to the Hrnjevac type of the Retz-Gajary culture (Dimitrijević 1980: 44-45, 52; Durman 1982; Marković 2002: 31). The excavations conducted following infrastructural works revealed settlements of the Retz-Gajary culture at Tomašanci-Zdenci (Wiewegh & Revald-Radolić 2007: 8), Tomašanci-Palača (Balen 2008: 22, sl. 5), Ivandvor-Đakovo (Leleković 2008), Josipovac Punitovački-Veliko polje I (Čataj 2009), Čepinski Martinci-Dubrava (Kalafatić 2009), and Barbarsko (Balen & Drnić 2014).

More recent data from archaeological sites changed the understanding of this culture, and speaks in favor of its sedentary, and not exclusively semi-nomadic or nomadic character (Marković 1994: 100; Horváth & Simon 2003: 132; Velušček 2004: 232). Hungarian sites yielded partially dugout houses that have been interpreted as conjoined or cult-related buildings (Keszthely-Fenékpuszta I), or as working areas or residential structures (Pécsbagota-Cseralja) (Horváth & Simon 2003: 136). The site of Mezőkeresztes in Hungary yielded above-ground buildings ascribed to the Protoboleráz phase that were 15-20 m long and had posts measuring 30-40 cm in the diameter, the likes of which commonly appear in the Hunyadihalom culture (Kalicz 2001: 386-387). The site of Čataj in Slovakia yielded an above-ground structure measuring 27.5 x 9.5-10 m. It was constructed with underlying trenches with clearly visible post holes, and the interior was divided into two parts by additional post holes (Pavúk 2001). The remains of an above-ground construction were also discovered at Bučany in Slovakia (Horváth & Simon 2003: 128).

Two above-ground structures, measuring 18x6 and 12x6 m, whose layout was visible due to the distribution of post holes, were discovered at Josipovac Punitovački-Veliko polje I. The settlement was situated on an elevated position, and covered an area of over 3 ha. It was dominated by two working dugout structures situated at the western and eastern edges. A cattle pen and several hearths were discovered next to the western pit. One of the above-ground structures was discovered about 45 m to the south of this pit. The second above-ground structure was about 110 m to the east, and somewhat to the south of it was the other large dugout structure that yielded the remains of a loom. The pits were scattered around the settlement, and grouped around the two above-ground structures (Čataj 2009).

U Ivandvoru je otkriven dio naselja kojim dominira zemunica površine 280 m², a jame različitih dimenzija i oblika sporadično su raspršene na površini od oko 2 ha, dok tragovi nadzemnih objekata nisu uočeni (Leleković 2008: 12). Slična je situacija zamijećena i na nalazištu Čeminac-Vakanjac, gdje je pronađeno nekoliko grupacija većih i manjih jama, bez nadzemnih objekata (Kalafatić & Hulina 2016: 29-34).

Dosad istražena naselja svojom organizacijom, odnosno raspršenim jamama, često grupiranim oko većih zemunica ili nadzemnih objekata, podsjećaju na lasinjska naselja te svjedoče o sličnom načinu života ovih dviju kultura.

The settlement at Kalinovnjek near Turčišče in Slovenia was arranged in a similar way, and it also yielded an above-ground structure with several surrounding pits that were also scattered around the rest of the excavated area (Kerman 2013: 38-40).

Ivandvor yielded a part of a settlement that was dominated by a 280 m² pit, while other pits of different sizes and shapes were sporadically scattered on an area of about 2 ha. No traces of above-ground structures were discovered (Leleković 2008: 12). A similar situation was noted at the Čeminac-Vakanjac site that yielded several groups of larger and smaller pits with no above-ground structures (Kalafatić & Hulina 2016: 29-34).

Due to their organization, i.e. the scattered pits that are often grouped around larger dugout or above-ground structures, the settlements that have been excavated so far are reminiscent of Lasinja culture settlements and, as such, attest to the similar ways of life employed by these two cultures.

Pogrebni ritual

Pogrebni običaji kulture Retz–Gajary malo su poznati jer je zasad otkriveno tek nekoliko ukopa, a koristila se i inhumacija i incineracija (Dimitrijević 1980: 352–353; Horváth & Simon 2003: 128, 136). Na lokalitetu Bajč u Slovačkoj otkriven je skeletni zgrčeni ukop (Točik 1961: 332, obr. 8). Paljevinski su ukopi poznati u nešto većoj mjeri, primjerice na nalazištima Komjatice i Gajáry u Slovačkoj (Horváth & Simon 2003: 128) te Neszmély, Nadap i Szerenc u Mađarskoj (Bánffy 1991: 228). Na nalazištu Čeminac-Vakanjac u jednoj je od jama unutar naselja pronađena ljudska lubanja i nekoliko ljudskih kostiju (Kalafatić & Hulina 2016: 32).

Za sada je jedina nekropola kulture Retz–Gajary s objavljenim cjelokupnim materijalom i analiziranim skeletnim ostacima ona sa slovenskog nalazišta Pod kotom – jug kod Kroga. Nekropola je istražena u cijelosti, a sastojala se od 179 žarnih grobova bez vidljivih ukopa. Spaljeni ostaci pokojnika bili su položeni u urne, dijelom uništene strojnom obradom zemlje, u koje su prilagane i životinjske kosti, najčešće one ovce ili koze, nešto rjeđe goveda. Među spaljenim je ostacima bilo 60 djece, 43 ženske i 36 muških osoba, dok ih je 40 neopredijeljeno. Pretpostavlja se da su lomače za muškarce i žene bile različite (Hüls 2009; Šavel 2009: 59-113; Šlaus 2009).

Burial rites

Little is known about the burial rites of the Retz-Gajary because only a small number of burials have been discovered so far, and both inhumation and incineration have been recorded (Dimitrijević 1980: 352-353; Horváth & Simon 2003: 128, 136). The site of Bajč in Slovakia yielded a skeletal grave in which the body was in a crouching position (Točik 1961: 332, obr. 8). Somewhat more is known about incineration burials, such as those from Komjatice and Gajáry in Slovakia (Horváth & Simon 2003: 128), and Neszmély, Nadap and Szerenc in Hungary (Bánffy 1991: 228). One of the pits from the settlement at Čeminac-Vakanjac yielded a human skull and several human bones (Kalafatić & Hulina 2016: 32).

So far the only necropolis of the Retz-Gajary culture with fully published material and analyzed skeletal remains is the one at Pod kotom-jug near Krog in Slovenia. The necropolis was fully excavated, and contained 179 incineration graves without visible burials. The deceased were placed in urns that were partially destroyed by agricultural activities, and grave goods included animal bones, most often of sheep or goats, and, to a lesser extent, of cattle. The incinerated finds included the remains of 60 children, 43 women and 36 men, while 40 were indeterminable. It is assumed that the bonfires were different for men and women (Hüls 2009; Šavel 2009: 59-113; Šlaus 2009).

Materijalna kultura

Keramički nalazi

Keramika recgajarske kulture uglavnom je tamnijih sivih i smeđih tonova, iako se javlja i narančasta te crna keramika. Kao primjese u keramici grube fakture prisutni su kalcit, kremen, a ponekad i grog te rjeđe organski materijal. Površina grube keramike često je samo ovlaš zaglađena ili ogrubljena barbotinom, dok kod fine keramike ona može biti i uglačana. Od oblika su prepoznati lonci, vrčevi, zdjele, šalice, čaše i pladnjevi. Od posebnih se oblika javljaju žlice, pintadere i figurice (Dimitrijević 1980: Beilage 1; Marković 1994: 98-99; Velušček 2004: 185; Čataj 2009: 35; Balen 2010: 52).

Lonci se javljaju u nekoliko jednostavnih oblika te često imaju dvije ručke na ramenu ili pak tunelaste ili trakaste ručke ispod oboda. Uglavnom su zaobljena tijela, kada mogu biti lagane s-profilacije i širokog otvora, stožastog vrata i uskog otvora, niskog trbuha i cilindričnoga vrata ili posve jednostavna izdužena oblika, ponekad s niskim vratom ili lagano izvučenim rubom usta. Bikonični se lonci javljaju rjeđe, visokog su koničnog ili konveksnog trbuha te konkavnog ramena. Rijetko se javljaju i lonci gotovo cilindričnog trbuha, uvučenog ramena te kratkog vrata. Ukoliko nose ukras, radi se o raščlanjenim plastičnim trakama (jednostrukim i dvostrukim) ili otiskivanjem na rubu usta te različitim aplikacijama kružnog ili ovalnog presjeka, koje također mogu biti ukrašene utiskivanjem ili se javiti u paru (Dimitrijević 1980: T. 4. 1, T. 5, T. 9. 5-9, T. 10. 1, T. 19. 8, 11, T. 20. 7-8; Marković 1994: 98-99; Velušček 2004: 186-195; Čataj 2009: 39-41, T. 1. 1, T. 5. 2, T. 9. 1, T. 10. 3, T. 17 – T. 23, T. 28. 3, T. 30, T. 37 – T. 38, T. 39. 1, T. 40. 2; Šavel 2009: sl. 53).

Vrčevi su uglavnom niskog zaobljenog trbuha, s trakastom ručkom koja može prelaziti obod ili biti postavljena ispod njega. Mogu imati stožasti vrat i uzak otvor, dugi cilindričan vrat i izvučen rub usta ili kratak cilindričan vrat. Javljaju se i vrčevi visoko postavljenog zaobljenog trbuha ili lagano bikonični vrčevi niskog konkavnog vrata. Ovaj tip posuda često nosi bogat ukras izveden duborezom, rovašenjem, brazdastim urezivanjem i/ili ubadanjem (Dimitrijević 1980: T. 12. 2, T. 13. 1, T. 14. 1, T. 15. 3, T. 17. 17-18, T. 18. 5, 9, T. 20. 1, 3, 6; Horváth & Simon 2003: Abb. 29. 2, Abb. 32. 5; Čataj 2009: 38-39, T. 4. 3, T. 6. 1, T. 35, T. 36. 1; Šavel 2009: sl. 54; Kerman 2013: 42).

Material culture

Ceramic finds

Pottery of the Retz-Gajary culture is mostly dark gray to brown, although some orange and black pottery was also recorded. Inclusions in course pottery include calcite, flint, sometimes grog, and, less often, organic material. The surface of coarse pottery is often only lightly polished or made even coarser by using the barbotine technique, while fine ware is sometimes finely polished. Pottery forms include pots, jugs, bowls, cups, glasses and platters. Special forms include spoons, stamps and idols (Dimitrijević 1980: Beilage 1: Marković 1994: 98-99; Velušček 2004: 185; Čataj 2009: 35; Balen 2010: 52).

Pots appear in several simple shapes and often have two handles on the shoulder or narrow or ribbon-like handles beneath the rim. They mostly have rounded bodies, and can have a slight S-profile and a wide rim, a conical neck and a narrow rim, a lowered body and a cylindrical neck, or a simply elongated shape, sometimes with a short neck or a slightly outward-facing rim. Biconical pots do not appear as often, and have a conical or convex body and a concave shoulder. Pots with an almost cylindrical body, an inverted shoulder and a short neck rarely appear. If decorated, the motifs appear in broken down plastic ribbons (single or double), or impressing on the rim, as well as different circular or oval applications that can be additionally decorated by impressing or can appear in pair (Dimitrijević 1980: Pl. 4. 1, Pl. 5, Pl. 9. 5-9, Pl. 10. 1, Pl. 19. 8, 11, Pl. 20. 7-8; Marković 1994: 98-99; Velušček 2004: 186-195; Čataj 2009: 39-41, Pl. 1. 1, Pl. 5. 2, Pl. 9. 1, Pl. 10. 3, Pl. 17 - Pl. 23, Pl. 28. 3, Pl. 30, Pl. 37 - Pl. 38, Pl. 39. 1, Pl. 40. 2; Šavel 2009: fig. 53).

Jugs mostly have a short rounded body with a ribbon-like handle that can go over the rim or be below it. They can have a conical neck and a narrow rim, a long cylindrical neck and an outward-facing rim, or a short conical neck. Jugs with an elevated rounded body, or slightly biconical jugs with a short concave neck also appear. This type of vessel is often richly decorated by deep incising, gauging, furrowed incisions and/or stabbing (Dimitrijević 1980: Pl. 12. 2, Pl. 13. 1, Pl. 14. 1, Pl. 15. 3, Pl. 17. 17-18, Pl. 18. 5, 9, Pl. 20. 1, 3, 6; Horváth & Simon 2003: Abb. 29. 2, Abb. 32. 5; Čataj 2009: 38-39, Pl. 4. 3, Pl. 6. 1, Pl. 35, Pl. 36. 1; Šavel 2009: fig. 54; Kerman 2013: 42).

Slika / Figure 1. Vrč s lokaliteta Čepinski Martinci-Dubrava / A jug from the site of Čepinski Martinci-Dubrava (foto / photo: I. Krajcar).

Zdjele su veoma čest tip posuda recgajarske kulture, a uglavnom su zaobljenog tijela, iako se učestalo javljaju i bikonične, a potom i konične zdjele. Zaobljene zdjele raznoliko su oblikovane, a tipične su one visokog trbuha i veoma kratkog cilindričnog ili koničnog vrata. Njima su slične i zdjele nešto niže postavljenog trbuha i stožastog vrata. Bikonične zdjele najčešće imaju koničan trbuh i konkavno rame te više ili manje razgrnut obod. Učestale su i jednostavne kuglaste ili polukuglaste zdjele. Konične zdjele mogu imati konkavno dno i izvučen rub usta. Zdjele mogu nositi kružne ili ovalne plastične aplikacije, ponekad ukrašene otiskivanjem, male ušice na najširem dijelu posude, ručke ispod oboda ili ukrase izvedene duborezom, rovašenjem, ubadanjem, brazdastim urezivanjem ili urezivanjem (Dimitrijević 1980: T. 2. 1, 4, T. 4. 3, T. 6. 5, T. 7. 1-7, 12, T. 9. 3, T. 10. 8, T. 11. 8, T. 12. 1, 4, 6, 7, T. 13. 4, T. 15. 1, 3-5, T. 16. 19, 26, T. 18. 10-12; Horváth & Simon 2003: 128-129, Abb. 29. 10-12, Abb. 30. 1-7; Velušček 2004: 196-202; Čataj 2009: 36-37, T. 1. 4, T. 2, T. 3. 2-4, T. 7, T. 8. 1, T. 10. 1, T. 11 – T. 12, T. 13. 2-3, T. 14 – T. 15, T. 28. 2, T. 29. 4, T. 32. 2, 4,T. 33 – T. 34, T. 39. 2-3; Kerman 2013: 40-42).

Šalice se javljaju često, a imaju zaobljeno tijelo, visoko ili nisko postavljen trbuh, ponekad lagano izvučen rub usta te trakastu ručku koja se uzdiže nad njim. Često su bogato ukrašene rovašenjem i duborezom (Dimitrijević 1980: T. 2. 5-6, T. 3. 7, 11, T. 6. 1-2, T. 11. 1-4, T. 12. 3, 5, T. 14. 6, T. 15. 1-2, 4-7, 9-11, T. 16. 18, 20-22, 24-25, T. 17. 5, 10, T. 18. 1-3, T. 19. 1-6; Čataj 2009: 39, T. 13. 1, T. 16. 2, T. 28. 1, T. 29. 3; Kerman 2013: 41).

Bowls are a very common type of vessel in the Retz-Gajary culture, and mostly have a rounded body, although biconical forms also frequently appear, followed by conical bowls. Rounded bowls appear in different shapes, and the most typical ones have an elevated body and a very short cylindrical or conical neck. Similar bowls have a slightly lowered body and a conical neck. Biconical bowls most often have a conical body, a concave shoulder and a more or less outward-facing rim. Simple spherical and spherical bowls also frequently appear. Conical bowls can have a concave base and an outward-facing rim. Bowls can be decorated with round or oval applications, sometimes further decorated by impressing, small narrow handles on the widest part of the body, handles below the rim, or decorations made by deep incising, gauging, stabbing, furrowed incisions or incising (Dimitrijević 1980: Pl. 2. 1, 4, Pl. 4. 3, Pl. 6. 5, Pl. 7. 1-7, 12, Pl. 9. 3, Pl. 10. 8, Pl. 11. 8, Pl. 12. 1, 4, 6, 7, Pl. 13. 4, Pl. 15. 1, 3-5, Pl. 16. 19, 26, Pl. 18. 10-12; Horváth & Simon 2003: 128-129, Abb. 29. 10-12, Abb. 30. 1-7; Velušček 2004: 196-202; Čataj 2009: 36-37, Pl. 1. 4, Pl. 2, Pl. 3. 2-4, Pl. 7, Pl. 8. 1, Pl. 10. 1, Pl. 11 - Pl. 12, Pl. 13. 2-3, Pl. 14 - Pl. 15, Pl. 28. 2, Pl. 29. 4, Pl. 32. 2, 4,Pl. 33 - Pl. 34, Pl. 39. 2-3; Kerman 2013: 40-42).

Cups appear very often, and have a rounded body, an elevated or lowered widest part, sometimes a slightly outward-facing rim and a ribbon-like handle that goes over it. Cups are often decorated by gauging and deep incising (Dimitrijević 1980: Pl. 2. 5-6, Pl. 3. 7, 11, Pl. 6. 1-2, Pl. 11. 1-4, Pl. 12. 3, 5, Pl. 14. 6, Pl. 15. 1-2, 4-7, 9-11, Pl. 16. 18, 20-22, 24-25, Pl. 17. 5, 10, Pl. 18. 1-3, Pl. 19. 1-6; Čataj 2009: 39, Pl. 13. 1, Pl. 16. 2, Pl. 28. 1, Pl. 29. 3; Kerman 2013: 41).

Slika / Figure 2. Zdjela s lokaliteta Kaptol-Čemernica / A bowl from the site of Kaptol-Čemernica (foto / photo: I. Krajcar).

Čaše se rijetko javljaju na recgajarskim nalazištima i ne nose ukras. Imaju izduženo tijelo jednostavnog oblika, a mogu imati debele ili tanke stijenke, kada imaju i lagano izvučen rub usta (Čataj 2009: 30, T. 3. 1, T. 8. 2, T. 10. 2).

Pladnjevi su zamijećeni samo na jednom nalazištu u Hrvatskoj. Četvrtastog su oblika s niskim tijelom i rubom ukrašenim otiskivanjem prsta (Čataj 2009: 41, T. 5. 1, T. 26. 1).

Za razliku od lasinjske kulture, njezina sljedbenica nije poznata po velikoj količini žlica. One se javljaju na velikom broju nalazišta, ali u malom broju te uglavnom imaju puni držak (Velušček 2004: 203; Čataj 2009: 41, T. 31. 3; Šavel 2009: sl. 54).

Glasses rarely appear on sites of the Retz-Gajary culture, and are not decorated. They have a simple elongated body, and can have thick or thin walls, in which case they have a slightly outward-facing rim (Čataj 2009: 30, Pl. 3. 1, Pl. 8. 2, Pl. 10. 2).

Platters were only found at one Croatian site. They are square and have a short body, and a rim decorated by finger impressing (Čataj 2009: 41, Pl. 5. 1, Pl. 26. 1).

Unlike the Lasinja culture, its follower is not known for its large quantity of spoons. They appear on a large number of sites, but in small numbers, and mostly have a full handle (Velušček 2004: 203; Čataj 2009: 41, Pl. 31. 3; Šavel 2009: fig. 54).

Slika / Figure 3. Šalica s lokaliteta Tomašanci-Palača / A cup from the site of Tomašanci-Palača (foto / photo: I. Krajcar).

Plastični se ukrasi javljaju na loncima i zdjelama. Radi se o jednostrukim ili dvostrukim raščlanjenim trakama te o ovalnim, elipsoidnim ili polukružnim aplikacijama, koje opet mogu biti ukrašene otiskivanjem. Ponekad su tom tehnikom ukrašeni i rubovi usta posuda (Dimitrijević 1980: T. 9. 3, 9; Velušček 2004: 209-2011; Čataj 2009: 44, T. 1. 1, T. T. 5. 1, T. 17. 1-2, T. 18, T. 19. 1, 3, T. 21, T. 22. 1, T. 28. 3, T. 30. 2T. 32. 2, T. 39; Šavel 2009: sl. 55; Balen 2010: 52; Kerman 2013: 44).

Kultura Retz-Gajary najpoznatija je po brazdastom urezivanju, koje ipak nije dominantan način ukrašavanja ove kulture. Iako je upravo njegova prisutnost ili odsutnost poslužila S. Dimitrijeviću za odvajanje dvaju tipova prisutnih u Hrvatskoj, novijim je istraživanjima ustanovljeno da je ono bilo korišteno i unutar tipa Kevderc-Hrnjevac. Posude su najčešće ukrašene motivima paralelnih cik-cak, vodoravnih ili kosih linija, šrafiranih trokuta, spirale, šahovnice ili zvijezde, koji su izvedeni rovašenjem i duborezom, a nešto rjeđe običnim urezivanjem te ubadanjem (Dimitrijević 1980: T. 2, T. 3. 1-10, T. 4 – T. 8, T. 11, T. 12. 1-5, T. 13, T. 14. 1-4, 6, T. 15 -T. 20; Velušček 2004: 206-209; Čataj 2009: 44-46, T. 6. 1-4, T. 8. 3-4, T. 14. 1, T. 15. 2-3, T. 25. 1-7, T. 28. 2, T. 29. 2, T. 33. 4, T. 34. 3, 5; Balen 2010: 51-52; Šavel 2009, sl. 55; Kerman 2013: 42).

Većina oblika posuda i načina ukrašavanja kulture Retz-Gajary prisutna je u kulturama koje joj prethode. Bikonične zdjele, vrčevi, trakaste ručke koje prelaze obod i pintadere odjek su lenđelske i epilenđelske tradicije te su poslužile kao dokaz autohtonom porijeklu kulture Retz-Gajary (Točik 1961; Ruttkay 2006). Ogrubljivanje posuda barbotinom i ukrašavanje ruba usta otiskivanjem vrha prsta interpretira se kao utjecaj kultura Lažňany i Hunyadihalom (Ruttkay 2006: 286), a plastična traka postavljena uz rub posude kao utjecaj kulture ljevkastih pehara (Ruttkay 1988: 232). Vodeći oblik šalice ili zdjele zaobljena tijela i kratkog cilindričnog vrata javljaju se u kulturama Hunyadihalom i Salcuța (Bognár-Kutzián 1969: Abb. 5. 1ab, Abb. 6. 2ab, 3ab; Horváth 2001: 462). Lonci s trakastim ili tunelastim ručkama ispod oboda karakteristični su za kulturu Bodrogkeresztúr (Patay 1978: 49, 54-55).

Osim standardne keramičke proizvodnje, na nalazištima kulture Retz-Gajary prilično se često javljaju pintadere i antropomorfna plastika.

Pintadere mogu imati kvadratnu, pravokutnu, ovalnu, kružnu ili križnu bazu te cilindričan, koničan ili stožast držak, koji je ponekad perforiran. Motivi se najčešće sastoje od valovitih ili cik-cak linija. Če-

Plastic decorations appear on pots and bowls, ad include single or double ribbons, as well as oval, elliptical or semicircular applications, that can be further decorated by impressing. The same technique is sometimes used to decorate vessel rims (Dimitrijević 1980: Pl. 9. 3, 9; Velušček 2004: 209-2011; Čataj 2009: 44, Pl. 1. 1, Pl. 5. 1, Pl. 17. 1-2, Pl. 18, Pl. 19. 1, 3, Pl. 21, Pl. 22. 1, Pl. 28. 3, Pl. 30. 2, Pl. 32. 2, Pl. 39; Šavel 2009: fig. 55; Balen 2010: 52; Kerman 2013: 44).

The Retz-Gajary culture is most known for furrowed incisions, which is not the predominant decorative style. Although it was precisely the presence or absence of it that urged S. Dimitrijević to establish two types present in Croatia, recent excavations revealed that it was also used in the Kevderc-Hrnjevac type. Vessels are most often decorated by parallel zigzag lines, horizontal or slanted lines, hatched triangles, spirals, checkerboard motifs or stars, and the decorations are made by deep incising, and, somewhat less often, by regular incising and stabbing (Dimitrijević 1980: Pl. 2, Pl. 3. 1-10, Pl. 4 - Pl. 8, Pl. 11, Pl. 12. 1-5, Pl. 13, Pl. 14. 1-4, 6, Pl. 15 - Pl. 20; Velušček 2004: 206-209; Čataj 2009: 44-46, Pl. 6. 1-4, Pl. 8. 3-4, Pl. 14. 1, Pl. 15. 2-3, Pl. 25. 1-7, Pl. 28. 2, Pl. 29. 2, Pl. 33. 4, Pl. 34. 3, 5; Balen 2010: 51-52; Šavel 2009: fig. 55; Kerman 2013: 42).

Most vessel forms and decorative styles of the Retz-Gajary culture also appear in preceding cultures. Biconical bowls, jugs, ribbon-like handles that go over the rim, and stamps are a reflection of the Lengyel and epi-Lengyel traditions, and were used to support the idea of an autochthonous origin of the Retz-Gajary culture (Točik 1961; Ruttkay 2006). Making vessel coarser by applying the barbotine technique and decorating vessel rims by finger imprinting is interpreted as an influence from the Lažňany and Hunyadihalom cultures (Ruttkay 2006: 286), whereas plastic ribbons placed near the vessel rim are seen as an influence from the Funnel Beaker culture (Ruttkay 1988: 232). The dominant form of cup or bowl with a rounded body and a short cylindrical neck appears in the Hunyadihalom and Salcuța cultures (Bognár-Kutzián 1969: Abb. 5. 1ab, Abb. 6. 2ab, 3ab; Horváth 2001: 462). Pots with ribbon-like or narrow handles below the rim are characteristic of the Bodrogkeresztúr culture (Patay 1978: 49, 54-55).

Apart from standard pottery production, sites of the Retz-Gajary culture quite often yield stamps and anthropomorphic figurines.

Stamps can have a square, rectangular, oval, round or cross-shaped base, and a cylindrical, conical or

sto se javljaju na nalazištima kulture Retz-Gajary, a njihova se funkcija, značenje i uporaba različito interpretiraju. Danas je najzastupljenije mišljenje da su se koristile za otiskivanje na razgradivim materijalima poput kože ili tekstila (Dimitrijević 1980: T. 17. 11; Durman 1982: T. 2. 3; Dular 2001: t. 3. 9, 11; Skeats 2007; Marijanović 2008; Čataj 2009: 42-43, T. 6. 3-4; Vuković Biruš 2009).

Antropomorfna plastika, odnosno stilizirane ženske figure plosnatog su tijela s naglašenom stražnjicom, a često su bogato ukrašeni urezivanjem, duborezom ili brazdastim urezivanjem. S prostora Hrvatske poznate su figurice iz Ivandvora i Vindije. Javljaju se na nekoliko nalazišta u Sloveniji, Austriji, Slovačkoj i Mađarskoj (Bondár 2006: 122-123, fig. 4 – fig. 6; Havasi 2006; Leleković 2008, 12; Kerman 2014).

pivoted handle that is sometimes perforated. The motifs most often consist of wavy or zigzag lines. Stamps are a common find on sites of the Retz-Gajary culture, and their function, meaning and use are differently interpreted. Today, the prevailing opinion is that they were used to impress decorations on perishable materials such as leather or textile (Dimitrijević 1980: Pl. 17. 11; Durman 1982: Pl. 2. 3; Dular 2001: Pl. 3. 9, 11; Skeats 2007; Marijanović 2008; Čataj 2009: 42-43, Pl. 6. 3-4; Vuković Biruš 2009).

Anthropomorphic figurines, i.e. stylized female figures, have a flat body with an accentuated behind, and are often richly decorated by incisions, deep incisions or furrowed incisions. In Croatia, figurines were discovered at Ivandvor and Vindija. They were also found at several sites in Slovenia, Austria, Slovakia and Hungary (Bondár 2006: 122-123, fig. 4-fig. 6; Havasi 2006; Leleković 2008: 12; Kerman 2014).

Kameni nalazi

Analize kamenih izrađevina s hrvatskih nalazišta kulture Retz-Gajary još su uvijek malobrojne. Kao sirovina najčešće su korišteni rožnjak, radiolarit, radiolarijski rožnjak i silicificirani vapnenci. Prema tehnološkoj analizi lomljenih kamenih izrađevina najzastupljenija su sječiva, pločice, odbojci, krhotine i jezgre. Iako jezgre i krhotine te manji broj komada s okorinom svjedoče o proizvodnji, ona se većinom odvijala izvan naselja. Među tipovima oruđa dominiraju grebala, zarupci i komadi s obradom, a javljaju se dubila, svrdla i udupci. Učestale su alatke i segmenti srpa, koji svjedoče poljoprivrednoj djelatnosti (Komšo 2009; Rep 2016).

Stone finds

There are still only few analyses of stone tools from Croatian sites of the Retz-Gajary culture. The most commonly used raw materials include chert, radiolarite, radiolarian cherts and silicified limestone. According to the technological analysis of chipped stone, the most common tools include blades, bladelets, flakes, chunks and cores. Even though cores and chunks, as well as a small number of pieces with cortex indicate production within, it mostly took place outside of settlements. Tools types most commonly include endscrapers, truncations and pieces with retouch, but burins, perforators and notches also appear. Sickle segments are also a common tool that attests to agricultural activities (Komšo 2009; Rep 2016).

Slika / Figure 4. Kameni žrvanj i rastirač s lokaliteta Kamanje kod Vrlovke / A stone grindstone and sandstone from the site of Kamanje near Vrlovka (foto / photo: I. Krajcar).

Metalni nalazi

O metalurškoj djelatnosti kulture Retz-Gajary svjedoče kalupi pronađeni u Hočevarici i Gradecu kod Mirne te posude za taljenje bakra iz Notranjih Gorica i Josipovca Punitovačkog (Velušček 2004: 51-52, 301, T. 4. 1. 8: 11, sl. 5. 3. 2: 8; Velušček 2008: 37; Čataj 2009: 47-48, sl. 37-40, T. 36. 3), koje su poznate i s nekoliko mađarskih nalazišta (Horváth & Simon 2003: 131, Abb. 32. 11).

Nalazi bakrenih predmeta veoma su rijetki, a s prostora Hrvatske poznat je ulomak bakrene igle/šila s nalazišta Čeminac-Vakanjac (Kalafatić & Hulina 2016: 32, sl. 11). Na nekropoli Pod kotom-jug u jednom je grobu pronađen dio bakrene pločice (Šavel 2009: 118, G166a). Već spomenute križne sjekire i diskove tipa Stollhof-Csáford (vidi poglavlje o lasinjskoj kulturi) neki autori pripisuju kulturi Retz-Gajary (Pavelčik 1979: 336-337, Abb. 10; Bóna 1987: 81; Marković 1994: 57).

Privreda

Arheobotaničke analize s nekoliko nalazišta kulture Retz-Gajary otkrile su ostatke jednozrnog (*triticum monococcum*) i dvozrnog pira (*triticum turgudum*) i ječma (*hordeum vulgare*), koji zajedno s nalazima žrvnjeva i segmenata srpa svjedoče o poljoprivredi, odnosno obradi žitarica. Nalazi drijena (*cornus max*) potvrđuju i skupljanje divljih plodova (Čataj 2009: 46; Jeraj et al. 2009; Komšo 2009, Balen 2010: 53-54; Reed 2017: Tab. 2, Tab. 3).

Malobrojne arheozoološke analize pokazuju najveću zastupljenost kostiju goveda, svinja i malih preživača. Velik postotak kostiju mladih životinja s Hočevarice upućuje na zaključak da su one uzgajane u prvome redu zbog hrane. Nešto manji udio kostiju divljih životinja svjedoči o lovu (Toškan & Dirjec 2004; Trbojević Vukičević 2009).

Arheološkim je istraživanjima, potpomognutim brojnim prirodoslovnim analizama, ustanovljeno kako kultura Retz-Gajary, poput lasinjske, baštini neolitički način života te je više ne možemo pojednostavljeno sagledavati kao polunomadsku populaciju koja je svoju privredu temeljila na stočarstvu. U načinu organizacije naselja i keramografiji uočena je velika sličnost s njezinim prethodnicama, koja svjedoči o lokalnom srednjoeuropskom razvoju ove kulture.

Metal finds

The metallurgical activities of the Retz-Gajary culture are attested to by finds of molds discovered at Hočevarica and Gradec near Mirna, as well as vessels used in copper melting from Notranje Gorice and Josipovac Punitovački (Velušček 2004: 51-52, 301, Pl. 4. 1. 8: 11, fig. 5. 3. 2: 8; Velušček 2008: 37; Čataj 2009: 47-48, fig. 37-40, Pl. 36. 3), the likes of which were also found at several Hungarian sites (Horváth & Simon 2003: 131, Abb. 32. 11).

Finds of copper objects are extremely rare, and the territory of Croatia yielded a fragment of a copper needle/awl from Čeminac-Vakanjac (Kalafatić & Hulina 2016: 32, fig. 11). One grave at the Pod kotom-jug necropolis yielded a fragment of a copper tile (Šavel 2009: 118, G166a). The aforementioned cross axes and disks of the Stollhof-Csáford type (see chapter on the Lasinja culture) are ascribed to the Retz-Gajary culture by some authors (Pavelčik 1979: 336-337, Abb. 10; Bóna 1987: 81; Marković 1994: 57).

Economy

Archaeobotanical analyses conducted on material several sites of the Retz-Gajary culture revealed the remains of einkorn (*triticum monococcum*) and emmer spelt (*triticum turgudum*), as well as barley (*hordeum vulgare*) that, along with discovered grindstones and sickle segments, indicate agricultural activities, i.e. the cereal processing. Finds of Cornelian Cherry (*cornus max*) also confirm foraging of wild fruits (Čataj 2009: 46; Jeraj et al. 2009; Komšo 2009, Balen 2010: 53-54; Reed 2017: Pl. 2, Pl. 3).

The small number of zooarchaeological analyses revealed the highest frequency of cattle bones, followed by pigs and small ruminants. The large percentage of bones of juvenile animals from Hočevarica points to the conclusion that they were primarily grown for food. The somewhat lesser amount of bones of wild species indicates hunting activities (Toškan & Dirjec 2004; Trbojević Vukičević 2009).

Archaeological research, aided by numerous analyses from the sphere of natural sciences, revealed that the Retz-Gajary, just like the Lasinja culture, continued the Neolithic way of life, and can no longer be simply viewed as a semi-nomadic population that based its economy on animal husbandry. Settlement organization and pottery production revealed great similarities to its predecessors, a fact that attests to a local development of this culture in central Europe.

Literatura / Bibliography

Balen, J. 2008, Apsolutni datumi sa zaštitnih istraživanja na prostoru Slavonije kao prilog poznavanju kronologije srednjeg eneolitika, *Vjesnik Arheološkog muzeja u Zagrebu* XLI, 17-35.

Balen, J. 2010, *Eneolitičke kulture na prostoru istočne Hrvatske,* Doktorska disertacija, Sveučilište u Zagrebu.

Balen, J. 2016, The Development of Eneolithic Cultures Between the Sava and the Drava Rivers, in: D. Davison, V. Gaffney, P. Miracle, J. Sofaer (eds), *Croatia at the Crossroads*, Arheopress, Oxford, 59-73.

Balen, J. 2018, Eneolitičke kulture na prostoru istočne Hrvatske, *Arheologija na Dunavu, Izdanja Hrvatskog arheološkog društva* 31/2017, 65-74.

Balen, J. & Drnić, I. 2014, Arheološka istraživanja na lokalitetu Barbarsko – novi prilog poznavanju srednjeg eneolitika na prostoru sjeverne Hrvatske, *Vjesnik arheološkog muzeja u Zagrebu* XLVII, 39-76.

Bánffy, E. 1990-1991, Cult and Archaeological Context in Central and South – Eastern Europe in the Neolithic and the Calcolithic, *Antaeus* 19–20, 183-249.

Bognár-Kutzián, I. 1969, Probleme der mittleren Kupferzeit im Karpatenbecken, *Študijné Zvesti* 17, 31-60.

Boná, I. 1987, Javarézkori aranyleleteinkről. Fejezetek a magyar ősrégészet múltszázadi-századeleji történetéből. Über Goldfunde aus Hochkupferzeit, *A Veszprém Megyei Múzeumok Közleményei* 18/1986, 21-81.

Bondár, M. 2005, The Copper Age Settlement at Zalabaksa, *Antaeus* 28, 271-283.

Bondár, M. 2006, Kultúraváltások a rézkori emberábrázolások tükrében (Dunántúl) (Cultural changes in the light of human representations during the Copper Age (Transdanubia), *Zalai múzeum* 16, 107-130.

Čataj, L. 2009, Retz-Gajary kultura, in: L. Čataj (ed.), *Josipovac Punitovački – Veliko Polje I, zaštitna arheološka istraživanja na trasi autoceste A5. Eneolitičko, brončanodobno i srednjovjekovno naselje*, Hrvatski restauratorski zavod, Zagreb, 23-103.

Čataj, L. 2016, Lasinja, Retz-Gajary and Boleráz? Radiocarbon dates and the sequence of Copper Age Cultures in Central Croatia, in: J. Kovárnik (ed.), *Centenary of Jaroslav Palliardi´s Neolithic and Aeneolithic Relative Chronology (1914-2014)*, Philosophical Faculty, University of Hradec Králové, Hradec Králové-Ústí nad Orlicí, 181-192.

Dimitrijević, S. 1967, Die Ljubljana – Kultur. Problem des Substrats, der Genese und der regionalen Typologie, *Archaeologica Iugoslavica* 8, 1-26.

Dimitrijević, S. 1979, Retz-Gajary kultura, in: A. Benac (ed.), *Praistorija jugoslavenskih zemalja III*, „Svjetlost", OOUR Izdavačka djelatnost, Akademija nauka i umjetnosti Bosne i Hercegovine, Sarajevo, 343-366.

Dimitrijević, S. 1980, Zur Frage der Retz-Gajary-Kultur in Nordjugoslawien und ihrer Stellung im pannonischen Raum, *Bericht der römisch – germanischen Kommission* 61, 15-91.

Dular, J. 2001, Neolitska in eneolitska višinska naselja v osrednji Sloveniji, *Arheološki vestnik* 52, 89-106.

Durman, A. 1982, Prilog stratificiranju Kevderc-Hrnjevec tipa retzgajarske kulture, *Opuscula Archaeologica* 7, 37-46

Havasi, B. 2006, A bagodi idol, *Zalai Múzeum* 15, 93-105.

Hoernes, M. 1898, *Urgeschichte der bildenden Kunst in Europa*, Holzhausen, Wien.

Horváth, L. A. 1994, Beiträge zur Chronologie der mittleren Kupferzeit in der Grossen Ungarischen Tiefebene, *Acta archaeologica Academiae Scientiarum Hungaricae* 46, 73-105.

Horváth, L. A. 2001, Die relativchronologische Position des Protoboleráz – Horizontes aufgrund seiner südlichen Komponenten, in: P. Roman & S. Diamandi (eds), *Cernavodă III – Boleráz, Studia Danubiana, Series Symposia II,* Internationale Beratungskommission für die Förderung der Indo-Europäischen und Thrakischen Forschung, Bucureşti, 459-515.

Horváth, L. A. & Simon, K. H. 2003, *Das Neolithikum und die Kupferzeit in Südwesttransdanubien***,** Inventaria Praehistorica Hungariae 8, Magyar Nemzeti Múzeum, Budapest.

Hüls, M. 2009, Results of radiocarbon dating of samples KIA 21324 and KIA 21325, in: I. Šavel (ed.), *Pod Kotom – jug pri Krogu* I/II, Arheologija na avtocestah Slovenije, Zavod za varstvo kulturne dediščine Slovenije, Ljubljana, 138-139.

Jeraj, M., Velušček, A., Jacomet, S. 2009, The diet of Eneolithic (Copper Age, Fourth millennium cal B.C.) pile dwellers and the early formation of the cultural landscape south of the Alps: a case study from Slovenia), *Vegetation History and Archaeobotany* 18, 75-89.

Kalafatić, H. 2009, Čepinski Martinci-Dubrava (COKP Čepin) (rbr. 6), *Hrvatski arheološki godišnjak* 5/2008, 26-28.

Kalafatić, H. & Hulina, M. 2016, Zaštitno arheološko istraživanje lokaliteta AN7B Čeminac-Vakanjac na dionici autoceste A5 Beli Manastir – Osijek 2014. i 2015. godine, *Annales Instituti Archaeologici* XII, 29-35.

Kalicz, N. 1973, Über die chronologische Stellung der Balaton-Gruppe in Ungarn, in: B. Chropovský (ed.), *Symposium über die Entstehung und Chronologie der Badener Kultur*. Slovenska Akadémia Vied, Archeologický Ustav, Bratislava, 131-165.

Kalicz, N. 1995, Die Balaton-Lasinja Kultur in der Kupferzeit Südost- und Mitteleuropas, in: T. Kovács (ed.), *Neuere Daten zur Siedlungsgeschichte und Chronologie der Kupferzeit des Karpatenbeckens*, *Inventaria Praehistorica Hungariae* VII, 37-50.

Kalicz, N. 2001, Die Protoboleráz – Phase an der Grenze von zwei Epochen, in: P. Roman & S. Diamandi (eds), *Cernavodă III – Boleráz,* Studia Danubiana, Series Symposia II, Internationale Beratungskommission für die Förderung der Indo-Europäischen und Thrakischen Forschung, Bucureşti, 385-435.

Kerman, B. 2013, *Kalinovnjek pri Turnišću*, Arheologija na avtocestah Slovenije, Zavod za varstvo kulturne dediščine Slovenije, Ljubljana.

Kerman, B. 2014, *Moć gline. Figuralna plastika in drugi kultni predmeti iz bakrene dobe v Prekmurju,* Pomurski muzej, Murska Sobota.

Komšo, D. 2009, Analiza kamenih izrađevina, in: L. Čataj (ed.), *Josipovac Punitovački – Veliko Polje I, zaštitna arheološka istraživanja na trasi autoceste A5. Eneolitičko, brončanodobno i srednjovjekovno naselje*, Hrvatski restauratorski zavod, Zagreb, 2009, 265-280.

Leleković, T. 2008, Đakovo-Ivandvor (rbr 3), *Hrvatski arheološki godišnjak* 4/2007, 12-15.

Marijanović, B. 2008, Pintadera iz Ravlića pećine, *Archaeologia Adriatica* II/1, 141-149.

Marković, Z. 1989, Novi prilozi poznavanju neolitika i eneolitika sjeverne Hrvatske. *Poročilo o raziskovanju paleolita, neolita in eneolita v Sloveniji* XVII, 61-81.

Marković, Z. 1994, *Sjeverna Hrvatska od neolita do brončanog doba*, Muzej grada Koprivnice, Koprivnica.

Marković, Z. 2002, Grabrovac kod Đakova i početak brončanog doba u sjevernoj Hrvatskoj, *Prilozi instituta za arheologiju u Zagrebu* 19, 31-46.

Medunová-Benešová, A. 1964, Eneolitické výšinné sídliště Staré Zámky v Brně-Líšni. Die Äneolitische Höhensiedlung Staré Zámky in Brno-Líšeň, *Památky Archeologické* LV-1, 91-155.

Medunová-Benešová, A. 1986, *Křepice, Bez. Znojmo. Äneolitische Höhensiedlung „Hradisko". Katalog der Funde,* Fontes Archaeologiae Moravicae XIX, Archeologický ústav Československé akademie ved, Brno.

Minichreiter, K. 1990, Prvi rezultati arheoloških istraživanja u Pepelanama godine 1985, *Arheološka istraživanja u Podravini i Kalničko-bilogorskoj regiji. Izdanja Hrvatskog arheološkog društva* 14/1989, 19-38.

Much, M. 1893, *Die Kupferzeit in Europa und ihr Verhältnis zur Kultur der Indogermanen*, Jena, H. Costenoble, Wien.

Němejcová-Pavúková, V. 1964, Sídlisko bolerázskeho typu v Nitrianskom Hrádku. (Siedlung der Boleráz – Gruppe in Nitriansky Hrádok), *Slovenská Archeológia* XII-1, 163-268.

Novotný, B. 1958, *Slovensko v mladšej dobe kamenej*, Slovenská akadémia vied, Bratislava.

Patay, P. 1978, *Das kupferzeitliche Gräberfeld von Tiszavalk-Kenderföld*, Akadémiai Kiadó, Budapest.

Pavelčik, J. 1979, Depot měděných šperků z Hlinska u Lipníku n./Beč. Hortfund des Kupferschmucks aus Hlinsko bei Lipník a. d. Bečva, *Památky archaeologické* 70, 319-339.

Pavúk, J. 2001, Hausgrundriss und Furchenstichkeramik der Gruppe Bajč – Retz in der Slowakei, in: P. Roman & S. Diamandi (eds), *Cernavodă III – Boleráz,* Studia Danubiana, Series Symposia II, Internationale Beratungskommission für die Förderung der Indo-Europäischen und Thrakischen Forschung, Bucureşti, 563-578.

Pittioni, R. 1954, *Urgeschichte des österreichisches Raum*, Franz Deuticke, Wien.

Podborský, V. 1989, Die Chronologie und kulturelle Verbindungen zur Zeit der Kulturen Spätlengyel – Bajč – Retz – Křepice - früheste TRB im Mitteldonaugebiet, *Praehistorica* XV, 55-60.

Rajna, A. 2011, Az abony 49. Lelőhely 1 protoboleráz-kori leleteiés interpretációs lehetőségei, *Studia Comitatensia* 31, 96-124.

Reed, K. 2017, Agricultural change in Copper Age Croatia (ca. 4500-2500 cal B. C.)?, *Archaeological and Anthropological Sciences* 9 (8), 1745-1765.

Rep, L., *Analiza eneolitičkog litičkog skupa nalaza s lokaliteta Ivandvor*, Diplomski rad, Sveučilište u Zagrebu, Filozofski fakultet u Zagrebu 2016.

Ruttkay, E. 1988, Zur Problematik der Furchenstichkeramik des östlichen Alpenvorlandes: Beitrag zum Scheibenhenkelhorizont, *Slovenská Archaeologia* 36, 225-240.

Ruttkay, E. 1997, Zur jungneolithischen Furchenstichkeramik im östlichen Mitteleuropa. Die Fazies Gajary, in: C. Becker, M-L. Dunkelmann, C. Metzner-Nebelsick, H. Peter-Röcher, M. Roeder, B. Terzan (eds), *Chronos*: *Beiträge zur prähistorischen Archäologie zwischen Nord- und Südosteuropa. Festschrift für Bernard Hänsel*, Internationale Archäologie – Studia honoraria 1, VML, Rahden, 165-180.

Ruttkay, E. 2006, Eine Siedlungsgrube mit jungneolitische inkrustierter Keramikaus Puch-Scheibenfeld, SG und VB Hollabrunn, Niederösterreich – Neue Beiträge zur Furchenstichkeramikund zum Scheibenhenkel, *Annales Naturhistorisches Museums Wien* 107 A, 267-304.

Schroller, H. 1933, *Die Stein- und Kupferzeit Siebenbürgens,* Vorgeschichtlische Forschungen 8, W. de Gruyter & Co, Berlin.

Skeates, R. 2007, Neolithic stamps: Cultural Patterns, Processes and Potencies, *Cambridge Archaeological Journal 17:2*, 183-198.

Šavel, I. 2009, *Pod Kotom – jug pri Krogu*. Arheologija na avtocestah Slovenije, Zavod za varstvo kulturne dediščine Slovenije, Ljubljana.

Šlaus, M. 2009, Rezultati antropološke analize spaljenog ljudskog osteološkog materijala, in: I. Šavel (ed.), *Pod Kotom – jug pri Krogu* I/II, Arheologija na avtocestah Slovenije, Zavod za varstvo kulturne dediščine Slovenije, Ljubljana, 113-137.

Točik, A. 1961, Keramika zdobená brázdeným vpichom na juhozápadnom Slovensku. (Die Furchenstichkeramik in der Südwestslowekei), *Památky Archeologické* LII/-2, 321-344.

Toškan, B. & Dirjec, J. 2004, Hočevarica – analiza ostankov makrofavne, in: A. Velušček, (ed.), *Hočevarica – eneolitsko koliščena Ljubljanskem barju (Hočevarica- an eneolithic pile dwellingin the Ljubljansko barje),* Opera Instituti Archaeologici Sloveniae 8, Institut za arheologijo ZRC SAZU, Založba ZRC, Ljubljana, 76-132.

Trbojević Vukičević, T. 2009, Govedo – osnova stočarstva na lokalitetu Josipovac Punitovački-Veliko polje I, in: Čataj L. (ed.), *Josipovac Punitovački – Veliko Polje I, zaštitna arheološka istraživanja na trasi autoceste A5. Eneolitičko, brončanodobno i srednjovjekovno naselje*, Hrvatski restauratorski zavod, Zagreb, 2009, 281-285.

Velušček, A. 2004, *Hočevarica – eneolitsko koliščena Ljubljanskem barju (Hočevarica- an eneolithic pile dwellingin the Ljubljansko barje),* Opera Instituti Archaeologici Sloveniae 8, Institut za arheologijo ZRC SAZU, Založba ZRC, Ljubljana.

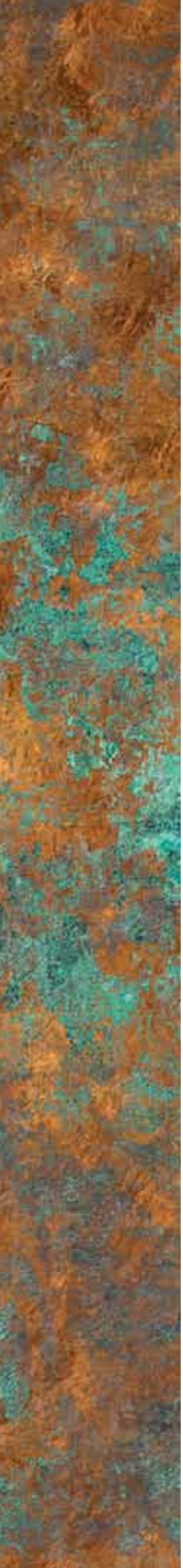
Velušček, A. 2008, Doneski k raziskovanju metalurške dejavnosti na Ljubljanskem barju, *Prilozi Instituta za arheologiju* 25, 2008, 33-46

Vuković Biruš M. 2009, Arheološki eksperiment: čemu su služile pintadere iz Josipovca?, in: L. Čataj (ed.), *Josipovac Punitovački – Veliko Polje I, zaštitna arheološka istraživanja na trasi autoceste A5. Eneolitičko, brončanodobno i srednjovjekovno naselje*, Hrvatski restauratorski zavod, Zagreb, 253-256.

Wiewegh, Z. & Revald-Radolić, V. 2007, Autocesta V-c, dionica Osijek-Đakovo, *Hrvatski arheološki godišnjak* 3/2006, 7-9.

Wild E. M., Stadler P., Bondár M., Draxler S., Friesinger H., Kutschera W., Priller A., Rom W., Ruttkay E., Steier P. 2001, New Chronological Frame of the Young Neolithic Baden Culture in Central Europe (4th millennium BC). *Radiocarbon* 43-2B, 1057-1064.

Wosinsky, M. 1904, *Die inkrustierte Keramik der Stein- und Bronzezeit*, A. Asher &Co., Berlin, 1904.



Badenska kultura

The Baden culture

Jacqueline Balen

Arheološki muzej u Zagrebu
Archeological museum in Zagreb
jbalen@amz.hr

Badenska kultura vrlo je raširena kulturna pojava po panonsko-podunavskom području; obuhvaća prostor Austrije, Moravske, Češke, južne Slovačke, dijela južne Poljske, Mađarske, Vojvodine i sjeverne Srbije i sjeveroistočnu Hrvatsku.

Opći položaj badenske kulture odredio je Milojčić 1949. godine na osnovi stratigrafije Vinče, Bapske i Sarvaša, po čemu je kultura determinirana kao nasljednica vinčanske kulture, odnosno kao prva eneolitička kultura. Određeni zaokret postignut je šezdesetih godina 20. st. kada su J. Banner i I. Bognar-Kutzián izveli tezu o proritetu tiszapolgarske i bodrogkeresztúrske kulture nad badenskom (1961). Iako je ovo stajalište uglavnom odmah podržano u europskim znanstvenim krugovima, mišljenje S. Dimitrijevića i dalje je bilo da badenska kultura predstavlja ranoeneolitičku pojavu te da je ona glavni nositelj kulturne smjene kamenoga u bakreno doba (Dimitrijević 1979: 188-191), što je neko vrijeme podržavao i Z. Marković (1977: 48). Danas možemo zaključiti da badenskom kulturom ne počinje razdoblje eneolitika u ovim prostorima, iako je njezinim dolaskom došlo do korjenitih promjena u društvenoj organizaciji kao i u gospodarskoj orijentaciji.

Značajni rezultati u istraživanju badenske kulture u posljednje su vrijeme postignuti na prostoru Mađarske i Češke, dok u odnosu na njih, rezultati temeljeni na istraživanju badenskih nalazišta i na izučavanju badenske kulture nisu na prostoru

The Baden culture is a widespread cultural occurrence that spans across the entire Pannonia-Danube territory, including the area of Austria, Moravia, the Czech Republic, southern Slovakia, parts of southern Poland, Hungary, Vojvodina and northern Serbia, and northeastern Croatia.

The general position of the Baden culture was defined by Milojčić in 1949 based on the stratigraphy of Vinča, Bapska and Sarvaš. The culture was defined as the successor of the Vinča culture, i.e. as the first Eneolithic culture. Certain changes occurred during the 1960s, when J. Banner and I. Bognar-Kutzián proposed that the Tiszapolgár and Bordrogkeresztúr cultures were antecedents of the Baden culture (1961). Although this viewpoint was mostly supported in European scientific circles, S. Dimitrijević still thought that the Baden culture was an Early Eneolithic occurrence and that it was the main representative of the transition from the Stone into the Copper Age (Dimitrijević 1979: 188-191), a hypothesis that was, for a while, also supported by Z. Marković (1977: 48). Today, it can be concluded that the Baden culture did not mark the start of the Eneolithic in these regions, although its emergence introduced radical changes in both social organization and economic orientation.

Lately, significant results in the research of the Baden culture have been obtained in Hungary and the Czech Republic. On the other hand, results based on excavations and research into the Baden

Hrvatske adekvatno brojni i značajni u odnosu na broj poznatih nalazišta te kulture (Marković 1994: 222, karta 12), što uvelike utječe i na nemogućnost stvaranja opće slike o toj kulturnoj pojavi.

Širi pak interes za problematiku badenske kulture nalazi se u radovima S. Dimitrijevića. Njegov rad u *Arheološkim radovima i raspravama* (Dimitrijević 1962) prvi je pokušaj da se badenski materijal s prostora Hrvatske (iako je obrađena građa i iz Vojvodine) klasificira i izvrši periodizacija. N. Tasić također se uvelike dotakao problema badenske kulture s hrvatskih nalazišta (1967). Iako u osnovi sa značajnim nedostacima djelo R. R.Schmidta (1945) važno je kao prvi pokušaj da se materijal s prostora Hrvatske prikupi i sagleda u okviru samostalne kulture.

Za prostor Hrvatske još uvijek je u literaturi uobičajeno mišljenje da je ona periferna pojava kratkog trajanja, bez obzira na veliki broj nalazišta na kojima je ustanovljena (Marković 1994: 104), iako je u posljednjih tridesetak godina prisutan sve veći broj radova u kojima se obrađuje badenski materijal; poglavito s nalazišta Vučedol (Težak-Gregl 1985; 1987; 1988), a dosta pažnje posvećeno je i metalurškoj produkciji te kulture (Durman 2000). Zasad jedini cjelovito prikazan i obrađen materijal je onaj s nalazišta Josipovac Punitovački – Veliko polje I (Čataj 2009).

culture in Croatia are not especially numerous and significant in relation to the number of known sites ascribed to this culture (Marković 1994: 222, map 12), a fact that makes it almost impossible to create a general overview of this cultural occurrence.

A wider interest into the problems surrounding the Baden culture is seen in the works of S. Dimitrijević. His paper, published in *Arheološki radovi i rasprave* (Dimitrijević 1962), was the first attempt at classifying material of the Baden culture from the territory of Croatia (although the paper also includes material from Vojvodina), and to create a periodization. N. Tasić also tackled the issue of the Baden culture from Croatian sites (1967). Although it included many fundamental deficiencies, R. R. Schmidt's work (1945) is important because it was the first attempt at collecting material from Croatia, and studying it as a separate culture.

Expert publications are still permeated by the opinion that the Baden culture was a peripheral and short occurrence on Croatian territory, regardless of the large number of sites ascribed to it (Marković 1994: 104). However, in the last thirty years or so, the number of publications discussing material of the Baden culture has been increasing, especially from the site of Vučedol (Težak-Gregl 1985; 1987; 1988). A lot of attention was also given to the metallurgy of this culture (Durman 2000). So far, the only completely presented and studied material is the one excavated at the site of Josipovac Punitovački-Veliko polje I (Čataj 2009).

Problem porijekla i periodizacije

Nekoliko je stavova o porijeklu badenske kulture, od nordijskog, autohtonog, jugoistočnog ili istočnostepskog (Dimitrijević 1979: 224-229).

Nordijsko porijeklo zastupali su O. Menghin, R. Pittioni i R. R. Schmidt s tim da je Schmidt ušao u direktnu proturječnost jer je u istoj objavi iznio i ideju o autohtonom podrijetlu badenske kulture i to upravo na osnovi nalaza iz Bapske i Sarvaša, gdje u sloju II vidi protobadensku kulturu (Schmidt 1945: 129). Tezu o autohtonom porijeklu neki autori (npr. V. Nemejcová-Pavúková, I. Torma, M. Garašanin) zastupali su upravo na osnovi grupe Boleraz u kojoj vide sličnosti s vinčanskom, sopotskom, kasnom lengyelskom, lasinjskom i kulturom Ludanice. Neki autori su na osnovi grupe Boleraz porijeklo kulture vukli iz istočne pontske oblasti (Tasić 1982-1983). Tezu o jugoistočnom, odnosno

The problem of origin and periodization

There are several opinions on the origins of the Baden culture, including Nordic, autochthonous, southeastern and that from the eastern steppes (Dimitrijević 1979: 224-229).

Nordic origin was supported by O. Menghin, R. Pittioni and R. R. Schmidt, whereby Schmidt contradicted himself by proposing, in the same publication, the idea of an autochthonous origin of the Baden culture, based precisely on the finds from Bapska and Sarvaša, sites where he saw the proto-Baden culture in layer II (Schmidt 1945: 129). Some authors (e.g. V. Nemejcová-Pavúková, I. Torma, M. Garašanin) supported the autochthonous origin hypothesis based on the Boleraz group that displayed similarities to the Vinča, Sopot, late Lengyel, Lasinja and Ludanice cultures. Based on the Boleraz group, some authors thought that the culture origi-

anatolskom porijeklu badenske kulture prvi je iznio V. Milojčić (1959), a dalje ju je temeljito i argumentirano obrazložio N. Kalicz (1963). S. Dimitrijević i I. Torma iznijeli su mišljenje da se ta teza ne smije zanemariti, ali da je važeća samo za klasičnu fazu badenske kulture. Naime, prema S. Dimitrijeviću badenska je kultura (odnosno Boleraz) nastala u južnim dijelovima Balkana na periferiji kasne vinčanske kulture, dok je važan doprinos anatolskih utjecaja u oblikovanju njezine klasične fizionomije (Dimitrijević 1979: 227-229). Istočnu, stepsku komponentu također možemo vidjeti, ona je naime potvrđena antropološkim podacima te načinom pokopavanja (Težak-Gregl 1985).

Prvi pokušaj periodizacije badenske kulture napravljen je pedesetih godina prošloga stoljeća: Foltiny i Ohrenberger (1952) na osnovi nalaza Neusiedel am See razlučili su dva horizonta badenske kulture, stariji i mlađi. Pittioni (1954) je toj podjeli, odnosno ranoj i srednjoj fazi, još dodao i kasnu fazu, odnosno tip Ossarn. Korak dalje učinio je J. Neustupny (1959) podijelivši badensku kulturu na pet stupnjeva: A – Boleraz, B – Fonyod, C – Uny, D – Ossarn, E – Bošaca.

Dimitrijevićeva podjela badenske kulture u osnovi se nadovezuje na onu Neustupny-a uz određene korekcije, napravljene najviše na osnovi stratigrafije lokaliteta Vučedol. On je badensku kulturu podijelio na tri stupnja: A – rana ili pretklasična faza, B – rana klasična faza i C – kasna klasična faza (Dimitrijević 1979: 194-195).

Za prostor središnje Europe prihvaćena je periodizacija V. Němejcove-Pavúkove kojom se u osnovi badenska kultura dijeli na Baden – Boleraz i na klasični Baden (Němejcová-Pavúková 1981; 1991; Wild et al. 2001: 1058).

Glavni problem i kod periodizacije i kod pitanja porijekla badenske kulture predstavlja njezina rana, osnivačka faza: naime, grupa Boleraz smatrana je kao razvojna faza u razvoju badenske kulture, kao protobadenski horizont, kao samostalna kulturna grupa ili kao dio kulturnog kompleksa Cernavoda III. Ovo posljednje se tumači istim ili sličnim formama posuda, istom ornamentikom i naposljetku složenim procesom pomicanja indoeuropskog stanovništva od istoka prema zapadu i njihova prodora u Panonsku nizinu. U sklopu tih pokreta dolazi i do pomicanja Salcutza IV i formiranja nekih novih kratkotrajnih kultura kao što je Hunyadi-Vajska.

nated from eastern Pontus (Tasić 1982-1983). The hypothesis about a southeastern, i.e. Anatolian, origin of the Baden culture was originally proposed by V. Milojčić (1959), and was further coherently explained by N. Kalicz (1963). S. Dimitrijević and I. Torma were of the opinion that the hypothesis could not be neglected, but that it was only valid for the classical phase of the Baden culture. Namely, according to S. Dimitrijević, the Baden culture (i.e. Boleraz) formed in the southern parts of the Balkans, on the periphery of the late Vinča culture, with important influences from Anatolia that affected the formation of its classical physiognomy (Dimitrijević 1979: 227-229). The eastern, steppe-related, component is also visible, seeing as it was confirmed by anthropological data and burial rites (Težak-Gregl 1985).

The first periodization of the Baden culture was made during the 1950s: based on finds from Neusiedel am See, Foltiny and Ohrenberger (1952) proposed two phases of the Baden culture, the older and the younger. Pittioni (1954) added a late phase, the Ossarn type, to this division into the early and the middle phase. A step further was made by J. Neustupny (1959), who divided the Baden culture into five phases: A-Boleraz, B-Fonyod, C-Uny, D-Ossarn, E-Bošaca.

Dimitrijević's division of the Baden culture is fundamentally linked to the one made by Neustupny, with certain corrections, based mostly on the stratigraphy of Vučedol. He divided the Baden culture into three phases: A-early or pre-classical phase, B-early classical phase, and C-late classical phase (Dimitrijević 1979: 194-195).

In central Europe, V. Němejcova-Pavúková's periodization is generally accepted, wherein the Baden culture is divided into the Baden-Boleraz and the classical Baden (Němejcová-Pavúková 1981; 1991; Wild et al. 2001: 1058).

The main problem of the periodization and the origin of the Baden culture is its early, founding phase: namely, the Boleraz group was seen as a phase in the development of the Baden culture, as a proto-Baden phase, as an independent cultural group, and as part of the Cernavoda III cultural complex. The latter is explained based on same, or similar, forms of vessels, uniform ornamentation and, finally, the complex process of Indo-European migrations from east to west and their entry into the Pannonian plain. During these migrations, the Salcutza IV also shifted, and some new and short-lasting cultures, such as Hunyadi-Vajska, were formed.

Apsolutno datiranje

Serija apsolutnih datuma na lokalitetima u središnjoj Europi potvrdila je da se ne može izdvojiti protoboleraz faza koju je uveo N. Kalicz (2001) jer se datumi s lokaliteta pripisanih toj fazi u potpunosti podudaraju s onima grupe Boleraz, koji pokrivaju razdoblje između 3630. i 3360. god. pr Kr. (Horváth et al. 2008: 452; Wild et al. 2001: 1062). Slični datumi dobiveni su i za Cernavoda I, po čemu bi se negirao paralelizam između Boleraz i horizonta Cernavoda III, odnosno pokazuje se da je Boleraz stariji od horizonta Cernavoda III (Wild et al. 2001: 1062-1063). Također datumi su pokazali da su Sitagroi IV, Cernavoda III i Ezero XIII-VII paralelni s klasičnom fazom badenske kulture, a ne kako se isprva mislilo s grupom Boleraz (Wild et al. 2001; Stadler et al. 2001). Navedeni prioritet Boleraza, kao i sličnost u keramičkim oblicima i ukrašavanju posuđa između Boleraza i Cernavoda III vode neke autore do zaključka da je grupa Boleraz nastala na prostoru Donje Austrije, Moravske, Slovačke, zapadne Mađarske i onda se proširila prema jugoistoku (Wild et al. 2001; Stadler et al. 2001: 544), što je uostalom već nagovijestio i Maran (1998).

Prosječno trajanje klasične badenske kulture na prostoru jugoistočne Europe procjenjuje se oko 3360.-2995. god. pr. Kr., dok se kasni (IV) stupanj datira do cca 2800. god. pr. Kr. (Bankoff & Winter 1990: 188, T. 3; Forenbaher 1993: 246; Horváth et al. 2008: 453-454; Horvath 2012: table 7; Rajković, Balen 2016: 60–62).

Apsolutni datumi dobiveni za badensku kulturu na području sjeverne Hrvatske potječu s nekoliko nalazišta. S položaja vinograd Streim na Vučedolu iz istraživanja vođenih od 1984. do 1990. godine (sonde V-84 i V-85) potječu četiri badenska datuma napravljena na ugljenu, a jedan na kosti, u rasponu od 3350. do 2900. god. pr. Kr. (Horvatinčić et al. 1990: 247, T. 2) čime se potvrđuje da je naselje Vučedol bilo naseljeno u klasičnoj fazi badenske kulture.

Istraživanjima istoga položaja, vođenima nakon 2000. godine (sonda V-87) dobiveno je 7 apsolutnih datuma, sve iz ukopanih objekata (jama). Šest datuma smješteno je od 3370. do 3100. god. pr. Kr., dok je jedan datum nešto stariji, odnosno uklapa se u datume dobivene za grupu Boleraz na prostoru središnje Europe (3490. - 3470. god. pr. Kr.) (Balen 2010: tabla 5; Balen 2016: 65-66; Balen 2018: 68, bilj. 53).

Absolute datation

A series of absolute dates from sites in central Europe confirmed that the proto-Boleraz phase, introduced by N. Kalicz (2001), cannot be confirmed, because dates obtained from sites ascribed to that phase completely overlap with those of the Boleraz group, dated to between 3630 and 3360 BC (Horváth et al. 2008: 452; Wild et al. 2001: 1062). Similar dates were also obtained from Cernavoda I, thereby negating the parallel existence of Boleraz and Cernavoda III phases, i.e. showing that Boleraz is older than the Cernavoda III phase (Wild et al. 2001: 1062-1063). Additionally, dates have shown that Sitagroi IV, Cernavoda III and Ezero XIII-VII are parallel to the classical phase of the Baden culture, and not, as was originally thought, to the Boleraz group (Wild et al. 2001; Stadler et al. 2001). The listed anteriority of Boleraz, as well as similarities in pottery forms and decorations between Boleraz and Cernavoda III, made some authors conclude that the Boleraz group developed in Lower Austria, Moravia, Slovakia and western Hungary, and then spread towards the southeast (Wild et al. 2001; Stadler et al. 2001: 544), as had been suggested by Maran (1998).

The average datation of the classical Baden culture in southeastern Europe is estimated to be between about 3360 and 2995 BC, while the late (IV) phase is dated to app. 2800 BC (Bankoff & Winter 1990: 188, Pl. 3; Forenbaher 1993: 246; Horváth et al. 2008: 453-454; Horváth 2012: table 7; Rajković, Balen 2016: 60-62).

Absolute dates of the Baden culture in northern Croatia were obtained from several sites. The Vinograd Streim position at Vučedol, excavated between 1984 and 1990 (trenches V-84 and V-85), yielded four dates of the Baden culture from charcoal, and one from bone. The dates range from 3350 to 2900 BC (Horvatinčić et al. 1990: 247, Pl. 2), and confirm that the settlement at Vučedol was inhabited during the classical phase of the Baden culture.

Excavations conducted at the same position after 2000 (trench V-87) yielded 7 absolute dates, all from dugout structures (pits). Six dates fall to the range between 3370 and 3100 BC, while one is somewhat older, i.e. it fits overlaps with dates of the Boleraz group in central Europe (3490-3470 BC) (Balen 2010: table 5; Balen 2016: 65-66; Balen 2018: 68, note 53).

The stratigraphy of Vučedol shows that the tell was inhabited during at least two phases. Specifically, a layer of the Baden culture was defined above the

Stratigrafija Vučedola i pokazuje najmanje dvije faze naseljavanja tela – naime, iznad ukopanih objekata u zdravici, ustanovljen je sloj badenske kulture. Iznad njega je tanki sloj u kojemu se nalazi miješani materijal badenske i kostolačke kulture (svojevrsni sloj nivelacije), zatim kostolačke te na kraju vučedolske kulture.

S nalazišta Josipovac – Gravinjak napravljena je serija od 15 apsolutnih datuma u rasponu od 3630. do 2870. god. pr. Kr. što se u potpunosti poklapa s dobivenim badenskim datumima s prostora srednje Europe (Balen 2010: tabla 5). Analizom građe i njihovom usporedbom s dobivenim datumima može se zaključiti da je naselje u Josipovcu trajalo tijekom grupe Boleraz i klasične badenske kulture. Materijalu iz ukopanih objekata koji su nešto više datirani (oko 3500. god. pr. Kr.) možemo naći analogije u oblicima i načinu ukrašavanja Boleraz grupe. Zanimljivi su datumi iz dva objekta u Josipovcu koji pokazuju dosta kasne datume, odnosno od cca 3000. do 2870. god. pr. Kr.. po čemu bismo mogli zaključiti da se na tom prostoru badenska kultura zadržala nešto duže, odnosno i u svojoj kasnijoj fazi. Tome potvrdu imamo i na nalazištima oko Belog Manastira, kao i Donjeg Miholjca (Nodilo 2012: 14). Naime, još je S. Dimitrijević, na osnovi keramičke građe naselje na položaju Ciglana u Belom Manastiru pripisao stupnju C ili kasnoj klasičnoj badenskoj fazi (Dimitrijević 1979: 216). To nam potvrđuje i dobiveni datum sa zaštitnih arheoloških istraživanja na položaju Šumarina-Benga, 2895-2705. god. pr. Kr. (Beta-439010: 4220±30 BP). Mišljenja smo da bi obližnje naselje na položaju Popova zemlja u Belom Manastiru također moglo pripadati navedenom razdoblju. S tog je naime nalazišta dobiven jedan AMS datum, 4176±28 BP; analiziran je ukop mlađeg muškarca (grob 17), koji je međutim pripisan vučedolskoj kulturi (Janković & Novak 2018). Determinacija ukopa kao vučedolskog napravljena je isključivo na temelju datuma, jer je u grobu pronađena atipična keramika, koja se ne može sa sigurnošću atribuirati vučedolskoj kulturi. Kako s tog nalazišta prema keramičkom repertoaru imamo prisutnu samo kasnu fazu vučedolske kulture, datum bi mogao pripadati kasnoj badenskoj kulturi, za što imamo analogije na obližnjem nalazištu Šumarina-Benga. Svakako, tek će nam detaljna obrada građe moći u potpunosti rasvijetliti to pitanje.

S nalazišta Štrosmajerovac kod Đakova potječu dva apsolutna datuma, a kreću se u rasponu od 3258. do 3097. god. pr. Kr., a slični datumi dobiveni

structures dug into the sterile layer and, above it, there was a thin layer with mixed material of the Baden and Kostolac cultures (a type of levelling), followed by the Kostolac and Vučedol cultures.

The site of Josipovac-Gravinjak yielded a series of 15 absolute dates, ranging from 3630 to 2870 BC, and completely overlapping with dates of the Baden culture in central Europe (Balen 2010: table 5). The analysis of material and comparisons to obtained dates lead to the conclusion that the settlement at Josipovac existed during both the Boleraz group and the classical phase of the Baden culture. The material from dugout structures with higher datations (around 3500 BC) is analogous to forms and decorations of the Boleraz group. Two, quite late, dates from dugout structures at Josipovac, app. 3000 to 2870 BC, are interesting because they indicate that the Baden culture was present in the area for a long time, i.e. in its late phase as well. This is additionally confirmed by sites around Beli Manastir and Donji Miholjac (Nodilo 2012: 14). Namely, S. Dimitrijević had, based on pottery, ascribed the settlement at the Ciglana position in Beli Manastir to the C, or the late classical phase of the Baden culture (Dimitrijević 1979: 216). This was confirmed by dates obtained from rescue excavations of the Šumarina-Benga position, which range from 2895 to 2705 BC (Beta-439010: 4220±30 BP). The author feels that the nearby settlement at the Popova zemlja position in Beli Manastir could also be ascribed to the same period. A single date was obtained from an analyzed grave of a young man (grave 17), 4176±28 BP, which was ascribed to the Vučedol culture (Janković & Novak 2018) based exclusively on the listed date. The grave yielded atypical pottery that could not be definitively ascribed to the Vučedol culture. Seeing as the rest of the pottery assemblage from the site indicates the presence of the Vučedol culture in its late phase, the date could be connected to the late Baden culture, as indicated by analogies at the nearby site of Šumarina-Benga. Naturally, only a detailed analysis of the material will help shed light on the issue.

The site of Štrosmajerovac near Đakovo yielded two absolute dates, ranging from 3258 to 3097 BC. Similar dates were obtained at the nearby site of Grabrovac (Rajković & Balen 2016: 61).

Based on the dates (app. 3300-3200 BC), other sites around Đakovo: Kaznica and Palača near Tomašanci (Balen 2010: table 5), can be ascribed to the classical phase of the Baden culture.

su i s obližnjeg nalazišta Grabrovac (Rajković & Balen 2016: 61).

Razdoblju klasične faze badenske kulture prema dobivenim datumima (cca 3300.-3200. god. pr. Kr.) pripadala bi i ostala nalazišta u okolici Đakova: Kaznica i Palača kod Tomašanaca (Balen 2010: tablica 5).

Rano badensko – Boleraz naselje prema datumima (3640. – 3340. god. pr. Kr.) bilo je i u Velikom polju I (Čataj 2009), a vjerojatno i u Starim Mikanovcima (Miloglav 2016: 104, tablica 1), te sudeći po keramičkoj produkciji i u Velimirovcu – položaj Arenda 1 (Jurković 2012: 49) Za nalazište Štrosmajerovac – Pustara mišljenja smo da bi moglo biti naseljeno tijekom rane (Boleraz) i klasične badenske kulture jer dio materijala pokazuju dosta analogija s drugim nalazima grupe Boleraz (Hršak & Bojčić 2008), dok apsolutni datum pripada klasičnoj badenskoj kulturi. Slično se može zaključiti i za nalazište Grabrovac kod Đakova (Hršak 2010: 22).

Na prostoru SZ Hrvatske na nekoliko je nalazišta potvrđeno postojanje naselja koja bismo također mogli pripisati grupi Boleraz: Gornji Pustakovac, Barbarsko, Crkvišće i Turčišće (Bekić 2006: 186, T.1:1,4; Balen & Drnić 2014: 48; Čataj 2016: str. 182, fig. 4; Balen 2018: 69) ili kao u Sloveniji, jednoj kulturnoj grupi nastaloj na lokalnoj tradiciji s prisutnim boleraskim utjecajima (Velušček 2009: str. 28–34).

Naselja

Iako danas možemo govoriti o velikom broju badenskih lokaliteta, pogotovo na prostoru istočne Hrvatske, činjenica je, da su, kao što je uglavnom problem i s ostalim eneolitičkim kulturama, tek na malom broju provedena istraživanja koja nam mogu reći nešto o organizaciji naselja badenske kulture.

Nosioci badenske kulture pretežno su naseljavali riječne terase ili izdanke brežuljaka. I na prostoru Hrvatske vidimo tako da su sva naselja u blizini velikih rijeka, Dunava, Save i Drave. A. Durman smatra da je Vučedol najvažnije i najznačajnije naselje badenske kulture i ishodište u smjeru zapada, odnosno prema Slavonskom Brodu te dalje prema Bosni, odnosno srednjobosanskim rudištima iz kojih se badenska kultura opskrbljivala rudom (Durman 2000: 100). Srednjobosanski rudonosni bazen je, naime, bogat sinjavcima nužnim za proizvodnju arsenske bronce.

As indicated by dates (3640-3340 BC), an early Baden-Boleraz settlement existed at Veliko polje I (Čataj 2009), and probably also at Stari Mikanovci (Miloglav 2016: 104, table 1). Based on pottery production, there might also have been one at Velimirovac – the Arenda 1 position (Jurković 2012: 49). The author feels that the settlement at Štrosmajerovac-Pustara might have been inhabited during the early (Boleraz) and the classical phase of the Baden culture, because some of the material is analogous to other finds of the Boleraz group (Hršak & Bojčić 2008), while the absolute date falls into the range of the classical Baden culture. A similar conclusion can be made about the site of Grabrovac near Đakovo (Hršak 2010: 22).

In NW Croatia, several sites yielded remains of settlements that could also be ascribed to the Boleraz group: Gornji Pustakovac, Barbarsko, Crkvišće and Turčišće (Bekić 2006: 186, Pl. 1:1, 4; Balen & Drnić 2014: 48; Čataj 2016: 182, fig. 4; Balen 2018: 69), or, like in Slovenia, to a single cultural group that developed on local traditions with Boleraz influences (Velušček 2009: 28-34).

Settlements

Despite the fact that it is, today, possible to speak of a large number of sites of the Baden culture, especially in eastern Croatia, the fact remains that, as is the case with most Eneolithic cultures, only a small number of them have been excavated in a way that could give information on the settlement organization of the Baden culture.

Populations of the Baden culture mostly inhabited river terraces or hillslopes. On Croatian territory, it is also visible that all settlements are in the vicinity of large rivers, the Danube, the Sava, and the Drava. A. Durman thinks that Vučedol is the most important and most significant settlement of the Baden culture, and the point from which it spread westwards, i.e. towards Slavonski Brod and further into Bosnia or, more precisely, the mining sites of central Bosnia where the Baden culture obtained ore (Durman 2000: 100). The ore-rich basin in central Bosnia is rich in sulfide ore that is necessary for the production of arsenic bronze.

Po nekim tumačenjima badenska kultura proteže se samo oko i uz rijeku Dunav, a nalazi badenske kulture koji se nalaze na udaljenim lokalitetima, odnosno izvan glavnog distribucijskog prostora vjerojatno se nalaze u sklopu neke druge, lokalne kulture kamo su dospjeli trgovinom ili razmjenom (Horváth et al. 2008: 456).

Iako je poznat dosta veliki broj badenskih nalazišta na prostoru Slavonije tek je na malom broju badenskh naselja ustanovljeno postojanje čvrstih nadzemnih objekata. Građeni su u tradicionalnoj maniri za razdoblje kamenoga i bakrenoga doba: nabijeni zemljani pod, zidna konstrukcija od kolja i pruća koja je zatim oblijepljena ilovačom te krov od trske ili slame. Većina naselja su kratkotrajna s vrlo tankim kulturnim slojem, izuzev stratigrafije Vučedola, Sarvaša i Bapske.

R.R. Schmidt navodi postojanje nadzemnih kuća u badenskom sloju na Sarvašu i Vučedolu. Međutim moramo naglasiti, iako je u literaturi već dosta o tome raspravljano, da za Schmidtovih istraživanja na Vučedolu i Sarvašu kostolačka kultura nije bila izdvojena kao zasebna kulturna pojava, nego su kostolački nalazi pripisani starijoj, badenskoj kulturi. Tako na oba lokaliteta imamo po dva badenska sloja, a vjerojatnije je da je jedan, onaj gornji, zapravo kostolački (Rajković & Balen 2016: 62).

Revizijom građe s vučedolskoga Gradca potvrđeno je postojanje jakoga kostolačkog sloja, što se potvrđuje i daljnjim istraživanjima na vučedolskom kompleksu, jednako kao i pripadnost apsidnih kuća kostolačkoj kulturi (Tasić 1979: 249; Nikolić 2000: 42-43; Balen 2002: 44). Ipak, situacija na Sarvašu nije posve jasna; slojevi su uleknuti, a i dokumentacija je manjkava. Primjer Vučedola, gdje je unutar badenskog sloja tijekom novijih istraživanja položaja vinograd Streim potvrđeno postojanje nadzemnih objekata, upozorava da se ipak ne smije posve isključiti postojanje nadzemnih objekata u sklopu badenske kulture niti na Sarvašu.

Istraživanja na Vučedolu pokazuju da je riječ o jednom dugotrajnijem badenskom naselju: najstarija faza je ukopana u zdravicu, a zatim slijedi bogati sloj debljine i do 60 cm (Težak-Gregl 1985: 24). Uglavnom je riječ o ukopanim jamskim objektima od kojih možemo razlikovati duboke, pravilne jame koje se šire prema dnu, koje su najvjerojatnije isprva imale funkciju spremišta te su potom služile i kao otpadne, te plitke jame nepravilnija oblika koje su vjerojatno bile radne. Naime, u nekima je pronađena velika količina lomljevine (jezgre, sječiva, od-

According to some interpretations, the Baden culture spread only around and along the Danube, and finds of the Baden culture that were discovered outside of the main distribution area were probably part of some other, local, culture that obtained it through trade or exchange (Horváth et al. 2008: 456).

Even though a large number of sites of the Baden culture is known from Slavonia, the existence of firm above-ground structures was confirmed only at some. These were built in the traditional Stone and Copper Age way: earthen floors, wall constructions made of wattle that was then covered in clay, and a roof made of reed or hay. Most settlements were used for a short period of time and contained very thin cultural layers, with the exception of the stratigraphy of Vučedol, Sarvaš, and Bapska.

R. R. Schmidt recorded the existence of above-ground structures in the Baden layer at both Sarvaš and Vučedol. However, it is important to note that, although it has been widely discussed in publications, during Schmidt's excavations of Vučedol and Sarvaš, the Kostolac culture was not yet seen as a separate cultural occurrence, and the material was ascribed to the older Baden culture, which is why two layers of the Baden culture were defined at both sites. However, it seems more likely that one of them, the upper one, should actually be ascribed to the Kostolac culture (Rajković & Balen 2016: 62).

A revision of material from the Gradac position at Vučedol confirmed the existence of a strong layer of the Kostolac culture, which was confirmed by subsequent excavations of the Vučedol complex. Apsidal houses were also attributed to the Kostolac culture (Tasić 1979: 249; Nikolić 2000: 42-43; Balen 2002: 44). However, the situation at Sarvaš is not completely clear; the layers were sunken, and the documentation incomplete. The example of Vučedol, where the Baden layer at the Vinograd Streim position, excavated in more recent times, confirmed the existence of above-ground structures, suggests that above-ground structures might have existed in the context of the Baden culture at Sarvaš as well.

The excavations of Vučedol indicate the existence of a long-term settlement of the Baden culture: the oldest phase is dug into the sterile layer, and was followed by a rich 60-cm-thick layer (Težak-Gregl 1985: 24). The finds mostly include dugout pit structures that can be divided into deep, regular pits that widen towards the bottom, and which probably origi-

Slika / Figure 1. Kupolasta peć s taracom od keramike, Vučedol - vinograd Streim, sonda V/87, istraživanja 2005. godine / A dome-shaped kiln with pottery at the base, Vučedol-Vinograd Streim, trench V/87, the 2005 excavations (foto / photo: J. Balen).

bojci, krhotine) zbog čega i mislimo da je u njima bio obrađivan kamen. Dio većih, nepravilnih jama, neki autori tumače i kao stambene (Durman 1984: 36). Nepravilni naboji žuta prapora kao i zapečeni naboji podnica najvjerojatnije su od nadzemnih objekata, međutim njihov točan oblik teško je definirati jer su uglavom ispresijecane jamama (Durman & Balen 2005: 30; Balen 2004: 66; Balen 2006: 44). Na otvorenom, uz stambene objekte pronalažena su i ognjišta i kupolaste peći s taracom od keramike koje se nalaze u jamama (Durman 1984: 36; Durman 1987: 35; Balen 2006: 44), za što imamo analogije na brojnim badenskim lokalitetima (Endrődi-Gyulai 1998/2000: fig. 21; Endrődi 2004: 14, sl. 8; Čataj 2009: 120).

Tragovi nadzemnih objekata spominju se i u Aljmašu – položaj Podunavlje (Šimić 2001: 73; 2006: 7). Nažalost , za nalaze triju kupolastih peći nije sasvim sigurno pripadaju li eneolitičkom stratumu (Šimić 2001: 73-74).

Tragovi nadzemnih objekata ustanovljeni su na nalazištu Donji Miholjac – Panjik, gdje su istraženi dijelovi stambenog i radnog dijela naselja badenske kulture (Ložnjak Dizdar et al. 2016).

Kao naselje s pronađenim isključivo jamskim objektima navodi se ono na položaju Grabrovac kod Đakova (Pavlović 1984), na položaju Štrosmajerovac kod Đakova (Hršak & Bojčić 2008), na položaju Gravinjak kod Josipovca (Mihelić 2008), Veliko polje I kod Josipovca Punitovačkog (Čataj 2009),

nally functioned as storage, and later as waste pits, and shallow irregular pits that were probably used as working areas. To be exact, some of them yielded large amounts of chipped stone (cores, blades, flakes, chunks), suggesting that they were used to process stone. Some larger irregular pits have been interpreted by some authors as habitational structures (Durman 1984: 36). The irregular compacted yellow loess and burnt house floors were most likely parts of above-ground structures, but their exact shape is difficult to determine because they were mostly cut by other pits (Durman & Balen 2005: 30; Balen 2004: 66; Balen 2006: 44). Hearths and dome-shaped kilns with pottery fragments at their base have been discovered in pits in the open, next to habitational structures (Durman 1984: 36; Durman 1987: 35; Balen 2006: 44), a situation that is analogous to that found at numerous sites of the Baden culture (Endrődi-Gyulai 1998/2000: fig. 21; Endrődi 2004: 14, fig. 8; Čataj 2009: 120).

Traces of above-ground structures are also mentioned at Aljmaš – the Podunavlje position (Šimić 2001: 73; 2006: 7). Unfortunately, it is not completely clear if the three dome-shaped kilns can be connected with the Eneolithic layer (Šimić 2001: 73-74).

Traces of above-ground structures were established at Donji Miholjac-Panjik, where a working and a habitational part of a settlement of the Baden culture were discovered (Ložnjak Dizdar et al. 2016).

Opatovac – Šanac (Ložnjak Dizdar et al. 2014; Ložnjak Dizdar & Dizdar 2015), Donji Miholjac-Đanovci (Tkalčec 2016: 52), Donji Miholjac-Mlaka (Nodilo 2012: 13-14), Donji Miholjac-Čovci (Vodička 2011), Gornji Slatnik-Grabrovac (Bakić-Stojsavljević 2010), Velika Londžica–Malo Polje (Paskojević 2010), Ruščica-Glogove-Praulje i Ruščica-Praulje (Bednjanec 2012a; 2012b; Mihaljević et al. 2018), Saloš kod Donje Vrbe (Lozuk 2006), Vidovci-Rosulje (Mihaljević 2010). Rubni dijelovi badenskih naselja s isključivo plitkim, okruglim jamama, ustanovljeni su i u Palači kod Tomašanaca i Čepinskim Martincima (Kalafatić 2009).

Prilikom objave istraživanja badenskog naselja u Belom Manastiru K. Vinski Gasparini veće, nepravilne ukopane objekte pripisala je jamama iz kojih se vadila glina, a ne, kao što je to uobičajeno, stambenim zemunicama (Vinski – Gasparini 1956: 13-17). Priklonila se tu mišljenju Pareta koji je upozorio na činjenicu da su u naseljima s nadzemnim objektima popratna pojava jame nepravilna oblika i raznih dimenzija, katkad s rupama od stupova. Smatra da se iz tih jama vadila ilovača kojom su se gradili i popravljali nadzemni objekti te također i keramika. Tragove kolaca tumači kao ogradu postavljenu iz sigurnosnih razloga. Etnografskim paralelama također je ustanovljeno da su velike nepravilne jame korištene za vađenje ilovače i za bacanje otpadaka, kruškolike vertikalne jame s uskim otvorom služile su kao spremišta žitarica, dok jame pravilnijeg tlocrta (ovalnog ili pravokutnog), s relativno ravnom podnicom, služe kao spremišta za razne usjeve. Ukopane nastambe – zemunice pravilnog su pravokutnog oblika te ukopane u zemlju cca 0,70 m.

Svakako zanimljiv nalaz nadzemnih objekata (sojenica) pronađen je na nalazištu Balatonőszöd-Temető dűlő (Horváth et al. 2007). Naime, uz obalu jezera, dakle na plavnom prostoru, ustanovljene su nadzemne kuće čiji su temelji postavljeni u ukopanim jamama dosta nepravilna oblika. Zasad, takvi nadzemni objekti nisu identificirani na hrvatskim nalazištima, makar ne smijemo isključiti moguće postojanje sličnih konstrukcija u nizinskom plavnom području Slavonije jer su neka od novootkrivenih badenskih naselja upravo smještena na takvom prostoru, primjerice Palača kod Tomašanaca.

Nažalost, o organizaciji naselja možemo govoriti samo kod nekoliko naselja. U Salošu su na istraženoj površini od 1650 m^2 otkrivena 34 jamska objek-

Only dugout structures have been recorded at the sites of Grabrovac near Đakovo (Pavlović 1984), the Štrosmajerovac position near Đakovo (Hršak & Bojčić 2008), the Gravinjak position near Josipovac (Mihelić 2008), Veliko polje I near Josipovac Punitovački (Čataj 2009), Opatovac-Šanac (Ložnjak Dizdar et al. 2014; Ložnjak Dizdar & Dizdar 2015), Donji Miholjac-Đanovci (Tkalčec 2016: 52), Donji Miholjac-Mlaka (Nodilo 2012: 13-14), Donji Miholjac-Čovci (Vodička 2011), Gornji Slatnik-Grabrovac (Bakić-Stojsavljević 2010), Velika Londžica-Malo Polje (Paskojević 2010), Ruščica-Glogove-Praulje and Ruščica-Praulje (Bednjanec 2012a; 2012b; Mihaljević et al. 2018), Saloš near Donja Vrba (Lozuk 2006), and Vidovci-Rosulje (Mihaljević 2010). The periphery of a settlement of the Baden culture, with shallow round pits, was defined at Palača near Tomašanaci and at Čepinski Martinci (Kalafatić 2009).

When publishing the result of excavations conducted at the Baden settlement in Beli Manastir, K. Vinski Gasparini defined all larger irregular dugout structures as clay beds and not, as is customary, pit dwellings (Vinski-Gasparini 1956: 13-17). She agreed with Paret who warned that pits of irregular shape and varying size, sometimes with post holes, often appear in settlements with above-ground structures. The author thought these pits were used to extract clay that was then used to build and repair above-ground structures and to make pottery. Post holes are interpreted as the remains of fences that were built for safety reasons. Ethnographic parallels also helped establish that large irregular pits were used to extract clay and deposit waste, that pear-shaped vertical pits with narrow openings were used to store grains, and that pits with a regular layout (oval or rectangular), with a relatively small floor, were used to store different crops. Dugout dwellings – pit-houses, had a rectangular layout and were about 0.7 m deep.

An interesting find of above-ground structures (stilt houses) was discovered at Balatonőszöd-Temető dűlő (Horváth et al. 2007). Namely, the lake shore, i.e. frequently flooded land, yielded above-ground houses with foundations in dugout pits of irregular shape. So far, such above-ground structures have not been identified on Croatian sites, although it is possible that similar constructions existed in lowland, frequently flooded areas of Slavonia, seeing as some of the newly-discovered sites of the Baden culture are situated precisely in such areas, e.g. Palača near Tomašanci.

ta, determinirana kao stambeni, radni, spremišta i otpadne jame. Izdvojene su tri cjeline unutar naselja: stambena, metalurška i dio za uzgoj stoke. Stambene zemunice ukopane su u zemlju, imaju do 4 prostorije i veličine su od 6 m² do 20 m². Ognjišta su pronalažena i u zemunicama i u vanjskim prostorima (Lozuk 2006: 228-229). Pronađeno je pet peći od čega tri za lijevanje metala. Uz to je bio radni, zemunički prostor, vjerojatno ljevača, što se vidi po kalupima i posudama za lijevanje pronađenim u zemunici. A. Durman smatra da je rudača ugrubo prebirana na rudištima dok je preciznije odvajanje obavljeno u naselju (Durman 2000).

Da se metalurška djelatnost odvijala u sklopu naselja pokazuju nam i lokaliteti Okukalj kod Gornje Bebrine, Štrosmajerovac kod Đakova, a također nam to potvrđuju rezultati zaštitnih istraživanja unutar Luke Slavonski Brod na nalazištima Ruščica-Glogove-Praulje i Ruščica-Praulje, koja su, čini se, tvorila jedinstveno naselje (Bednjanec 2012a; 2012b; Mihaljević et al. 2018).

U sklopu badenskih naselja pronalaženi su i grobovi, ljudski i životinjski, i rijetki primjerci kultnih mjesta. Najbolji primjer tome imamo iz Mađarske gdje je istraženo naselje na površini od 76000 m² u Balatonőszödu (Horváth 2004). U sklopu naselja pronađeno je čak 49 ljudskih ukopa te je definirano posebno sveto mjesto gdje su se najvjerojatnije odvijale kultne i religijske svetkovine.

Pokapanje

U Karpatskoj kotlini je u vrijeme razvijenog eneolitika pa tako i u okvirima badenske kulture uobičajeno pokapanje pokojnika izvan naselja u posebnim grobljima. Međutim, na prostoru Hrvatske još uvijek ne možemo govoriti o izdvojenim grobljima izvan naselja nego su pronalaženi sporadični grobovi unutar naselja. Iako je za badensku kulturu uobičajen biritualan način pokapanja – u grupi Boleraz karakteristično je paljevinsko pokapanje, dok je u klasičnoj fazi češća inhumacija - na prostoru Hrvatske pronalaženi su dosad samo skeletni ukopi. Razlog tome možda možemo tražiti u činjenici da svi paljevinski ukopi na prostoru Mađarske nisu ukopani u jamu nego su grobovi polagani u ili na humus te su zatim obloženi kamenjem (Dimitri-

Unfortunately, settlement organization can only be discussed based on a few settlements. In Saloš, an excavated area of 1650 m² yielded 34 pit structures that were defined as habitational and working areas, storage and waste pits. Three units were established within the settlement: habitational, metallurgical and one for keeping cattle. Pit-dwellings were dug into the ground, had 4 rooms and measured between 6 m² and 20 m². Hearths were discovered both in pit-dwellings and outside areas (Lozuk 2006: 228-229). Five kilns, three of them for casting metal, were discovered. A dugout area, probably used by a castor, was also discovered, as suggested by accompanying finds of molds and vessels used in casting. A. Durman thinks that ore was roughly screened at the source, and that a more detailed selection was made in the settlement (Durman 2000).

Metallurgical activities took place within the settlement, as indicated by finds from Okukalj near Gornja Bebrina and Štrosmajerovac near Đakovo, as well as the results of rescue excavations of Luka in Slavonski Brod – the sites of Ruščica-Glogove-Praulje and Ruščica-Praulje, which, as it seems, comprised a single settlement (Bednjanec 2012a; 2012b; Mihaljević et al. 2018).

Settlements of the Baden culture also yielded graves, human and animal, as well as rare examples of cult-related areas. The best example can be found in Hungary, where a 76000 m² settlement was excavated at Balatonőszöd (Horváth 2004). The settlement yielded a total of 49 human burials and a specially defined holy place that was, most likely, used during cult-related and religious events.

Burials

During the developed Eneolithic of the Carpathian basin, including the Baden culture, burying the dead outside settlements in special graveyards was a common practice. However, in Croatia, it is still impossible to speak of separate graveyards outside settlements, because only sporadic burials have been discovered within settlements. Although biritual burials are common in the Baden culture, the Boleraz group is characterized by incineration burials, while inhumation is more common in the classical phase – the territory of Croatia has so far yielded only skeletal burials. The reason behind this might be the fact that all incineration burials in Hungary were not buried in pits, but were placed either onto or into the surface layer and covered

jević 1979: 202), što znači da su vrlo lako mogli biti uništeni obradom zemlje.

Tijekom istraživanja 1984. god. na Vučedolu – vinograd Streim u dvije su jame pronađeni ukopi pripadnika badenske kulture (Težak-Gregl 1985). Jedan je ukop odrasle osobe, položene na prsa, orijentacije I-Z s prilozima bakrenog bodeža i kremenog noža. Grob je zasut slojem drobljenog kućnog lijepa. Drugi ukop je dječji, orijentacije S-J, položen na leđa, ali sa zgrčenim nogama, bez grobnih priloga. Autorica zasipavanje groba lijepom dovodi u vezu s posipavanjem grobova okerom, što je kao i polaganje pokojnika na leđa s podignutim nogama obilježje stepskih kultura, odnosno kulture grobova u jami.

S Vučedola (sonda V-87, sezona 2004) potječe i nalaz parcijalnog ukopa ljudske lubanje. Sličan nalaz, ali u sklopu zemunice u kojoj su ustanovljeni tragovi zgure i ognjište, zabilježen je i u Okuklju (Petrović & Belić 1971: 12).

S. Dimitrijević badenskoj kulturi pripisuje i dva groba s vučedolskog Gradca od kojih je Schmidt jedan pripisao badenskoj, a drugi vučedolskoj kulturi (Schmidt 1945: 41-47; Dimitrijević 1979: 202-203); dvojni grob ženskog para i dječju grobnicu u kojoj su bila pokopana tri novorođenčeta, dijete od 6 mjeseci i dijete od 6 godina.

Badenski ukop također imamo posvjedočen i na lokalitetu Josipovac – Gravinjak (Mihelić 2008; Nikotović et al. 2012) kao i na nalazištu Donji Miholjac-Mlaka (Nodilo 2012: 14). U Gravinjaku se radi o ukopu u zgrčenom položaju na lijevome boku, na relativnoj dubini od 50 cm od površine ukopa jame. Prekriven je pokrovom koji se najvećim dijelom sastoji od lijepa i zemlje, uz nekoliko fragmenata keramike. Dobiveni datum je 3490. – 3470. god. pr. Kr. (Beta 241675).

Na lokalitetu Retfala u Osijeku 1987. godine rovom je presječen kostur djeteta u zgrčenom položaju na lijevom boku. Prekriven je bio slojem riječnih školjki uz keramičke nalaze. Kako je riječ o neukrašenoj keramici grube fakture, ne može se sa sigurnošću reći radi li se o badenskom ili kostolačkom ukopu s obzirom da su u slojevima posvjedočeni nalazi obje spomenute kulture (Šimić 1998: 235).

Već smo naveli problem ukopa s položaja Popova zemlja u Belom Manastiru, za koji smo mišljenja da možda, ipak pripada kasnoj badenskoj kulturi, što uostalom sugeriraju i rezultati istraživanja s drugih naselja u neposrednoj blizini, a ne ranoj

with stones (Dimitrijević 1979: 202), meaning that they can be easily destroyed by agriculture.

The 1984 excavations of Vučedol-Vinograd Streim revealed two that contained burials of the Baden culture (Težak-Gregl 1985). One belonged to an adult, who was on his chest; it spread from E to W, and contained a copper dagger and a flint knife. The grave was covered by a layer of crushed daub. The second grave belonged to a child, who was on its back with contracted legs; it spread from N to S, and contained no grave goods. The author connected the crushed daub to the practice of covering graves with ochre that is, just like burying the deceased on their back with raised legs, a characteristic of steppe-related cultures, i.e. the culture of pit graves.

Vučedol (trench V-87, season 2004) yielded a partial burial of a human skull. A similar find, discovered within a pit-dwelling that also contained traces of slag and a hearth, was recorded at Okukalj (Petrović & Belić 1971: 12).

S. Dimitrijević ascribed two graves from the Gradac position at Vučedol to the Baden culture, and which had Schmidt divided and ascribed one to the Baden, and the other to the Vučedol culture (Schmidt 1945: 41-47; Dimitrijević 1979: 202-203). This was a double burial of a married couple and a children's tomb that included the remains of three newborns, a 6-month-old and a 6-year-old.

Burials of the Baden culture were also discovered at Josipovac-Gravinjak (Mihelić 2008; Nikotović et al. 2012) and Donji Miholjac-Mlaka (Nodilo 2012: 14). At Gravinjak, the deceased was in a crouched position on his left side, at a relative depth of 50 cm in relation to the top of the pit. The grave was covered by a shroud mostly composed of daub and soil, as well as a few pottery fragments. It was dated to between 3490 and 3470 BC (Beta 241675).

In 1987, a trench cut through the skeleton of a child who was crouching on its left side at the site of Retfala in Osijek. The skeleton was covered with a layer of river shells and ceramic finds. Seeing as the pottery was coarse and undecorated, it is not clear whether this is a grave of the Baden or the Kostolac culture, because material ascribed to both cultures was found in the surrounding layers (Šimić 1998: 235).

The problem of the burial from the Popova zemlja position in Beli Manastir was already mentioned, and the author is of the opinion that it might be

vučedolskoj kulturi, jer je na nalazištu prisutan isključivo keramički materijal koji možemo pripisati kasnoj vučedolskoj kulturi.

Životinjski ukopi česti su u badenskoj kulturi – i samostalni ukopi životinja i njihovo pokapanje zajedno s ljudima (Dimitrijević 1979: 204-205). Na prostoru Mađarske ustanovljeni su ukopi životinja (najčešće goveda) na čak 23 nalazišta (Endrődi 2003: 410), dok su na prostoru Hrvatske dosad posvjedočena dva ukopa goveda u Aljmašu (Šimić 2001: 73; Šimić 2006: 7), jedan na položaju Retfala u Osijeku (Šimić 2005), jedan na Josipovcu (Mihelić 2008), tri ukopa goveda, od čega jedan dvojni, u naselju na položaju Ruščica-Glogove-Praulje (Mihaljević et al. 2018: 18,19) te ukop goveda i svinje na Vučedolu (Jurišić 1990: 22-23).

ascribed to the late Baden culture, as suggested by the results of excavations from other settlements in the vicinity, and not to the early Vučedol culture, seeing as the site only yielded material that can be attributed to the late Vučedol culture.

Animal burials are common in the Baden culture – both individual animal burials and mixed burials of animals and humans (Dimitrijević 1979: 204-205). In Hungary, animal burials (most often cattle) were recorded at 23 sites (Endrődi 2003: 410), while Croatian territory has, so far, yielded two cattle burials at Aljmaš (Šimić 2001: 73; Šimić 2006: 7), one at the Retfala position in Osijek (Šimić 2005), one at Josipovac (Mihelić 2008), three, one of them double, at the Ruščica-Glogove-Praulje position (Mihaljević et al. 2018: 18,19), and the burial of a bovid and a pig at Vučedol (Jurišić 1990: 22-23).

Materijalna ostavština

Kao i na ostalim pretpovijesnim, tako i na badenskim nalazištima keramička produkcija čini najveći postotak ukupnog broja nalaza. Visok, gotovo metalni sjaj crno glačane površine posuđa, vrčevi i šalice kuglastog ili lukovičastog trbuha s visokim cilindričnim vratom i visokom ručkom koja nadvisuje rub posude, često ukrašeni kaneliranjem (Sl. 2), kao i plosnate stilizirane figure bez glave (koja je vjerojatno naknadno oblikovana od drta ili nekog organskog materijala) odlika su ove kulturne pojave na čitavom prostoru njezina rasprostiranja.

Material heritage

Just like at other prehistoric sites, pottery production makes up the largest percentage of the total assemblage at sites of the Baden culture. The characteristics of this cultural occurrence on the entire area it occupied include the high, almost metallic sheen of the black polished surface of vessels, jugs and cups with a rounded or bulbous body with cylindrical necks and tall handles that go over the rim, which are often decorated by fluting (Fig. 2), as well as flat stylized figurines without a head (which was probably additionally made out of wood or some organic material).

Slika / Figure 2. Različiti tipovi šalica s nalazišta Beli Manastir-Ciglana i Popova zemlja / Different types of cups from the sites of Beli Manastir-Ciglana and Popova zemlja (foto / photo: I. Krajcar).

Slika / Figure 3. Posuda izduljenog, vretenastog oblika s lokaliteta Osijek-Retfala / An elongated spindle-like vessel from the site of Osijek-Retfala (foto / photo: I. Krajcar).

Karakterističan je i nalaz posuda izduljenog vretenastog oblika, tzv. *Fischbutte* (Sl. 3), zatim zdjela S-profilirana tijela ili zaobljenih zdjela s ravnim ili uvučenim rubom. Ukras na tipu zaobljenih zdjela često je postavljen pod samim rubom, a na S-profiliranim zdjelama ukras je najčešće na trbuhu, odnosno donjem dijelu posude. Obično je izveden karakterističnim žigosanim ubodima i urezivanjem. Zdjele često imaju ušice na najširem dijelu posude. Lonci su grube fakture s izvučenim vratom i zaobljenim tijelom, ponekad s trakastim ručkama na trbuhu. Ukrašeni su rijetko – žigosanim ili urezanim ukrasom ili barbotinom.

Sasvim različit od klasičnog badenskog keramografskog opusa je onaj grupe Boleraz (Sl. 4). Za njega su karakteristične grube, velike posude, širokog ili suženog otvora, redovito vrlo malog promjera dna, bikonične zdjele s gornjim dijelom izvijenim prema van, lonci S-profiliranog tijela, vrčevi kuglastog tijela i kratkog vrata s ručkom. Keramika je uglavnom grube fakture, s velikim postotkom pijeska u sastavu. Ukras je izveden u vidu plastičnih traka sa zarezima ili otiscima u 1-4 reda ispod ruba, ponekad su kombinirane okomite i vodoravne vrpce, zatim kaneliranjem - široke facete ili glačani žljebovi postavljeni su okomito ili koso u unutrašnjosti zdjela ili na ručkama, urezane, okomito postavljene, široke cik-cak vrpce koje prekrivaju cijelu površinu posude i duboko urezani koncentrični krugovi (na zdjelama i poklopcima).

Za kasnije faze badenske kulture karakteristične su dvodijelne posude, odnosno posude s unutar-

Other typical forms include vessels with an elongated spindle-shaped neck – the, so called, *Fischbutte* (Fig. 3), as well as S-profiled bowls or rounded bowls with a straight or inward-facing rim. Decorations often appear right under the rim on rounded bowls, and on the vessel body or the lower part of S-profiled bowls, and are usually composed of characteristic stamped stabs and incisions. Bowls often have small loops on the widest part. Pots are coarse, have an inverted rim and a rounded body, and, sometimes, ribbon-like handles on the body. They are rarely decorated with stamped or incised motifs and barbotine.

The pottery repertoire of the Boleraz group is completely different from the one of the classical Baden culture (Fig. 4). It is characterized by coarse, large vessels with a wide or narrowed rim and a very narrow base, biconical bowls with an outward-facing neck, S-profiled pots, and jugs with a rounded body, a short neck and a handle. Pottery is mostly coarse and contains a lot of sand. Decorations include plastic ribbons with additional incisions or imprints that appear in 1-4 lines under the rime, occasionally a combination of vertical and horizontal ribbons, fluting – vertical or slanted wide facets or polished gauges on the inside of the vessel, incised vertical zigzag ribbons that cover the entire vessel, and deeply incised concentric circles (on bowls and lids).

The later phases of the Baden culture are characterized by bipartite vessels, i.e. vessels with inner dividers. In that context, a find from Luka Brod (Fig. 5) is interesting, because it poses the question of a longer duration of the Baden culture on a wider territory of Croatia, and not only in the Baranja region.

Unfortunately, other than vessels, very few everyday utilitarian finds from Croatian sites have been published. S. Dimitrijević listed that stone tool production resembled the usual, and that bone finds could be divided into awls and finds made out of deer antlers (Dimitrijević 1979: 219-220). Pits that contained pottery of the Baden culture at Vučedol also yielded ceramic spoons with protrusions for holding, as well as round objects with a funnel-like opening at the center, i.e. models of wheels.

The younger settlement of the Boleraz group at Veliko polje also yielded conical and flat spindles (Čataj 2009: 117).

In the context of the Baden culture, cult-related objects include ceramic models of wagons (mostly discovered in graves), flat stylized figurines with-

njom pregradom, pa je upravo i zanimljiv nalaz takve posude na poziciji Luka Brod (Sl. 5), čime bi se možda otvorilo pitanje dužeg trajanja badenske kulture na širem prostoru sjeverne Hrvatske, a ne isključivo na prostoru Baranje.

O svakodnevnim uporabnim predmetima, osim posuđa, nažalost s hrvatskih nalazišta imamo jako malo objavljenih podataka. S. Dimitrijević navodi da je litička produkcija standardna, a da se koštani predmeti dijele na šila i na predmete načinjene od jelenjih rogova (Dimitrijević 1979: 219-220). S Vučedola u jamama s badenskom keramikom pronalažene su i keramičke žlice s nastavkom za držanje, a čest je i nalaz okruglih keramičkih predmeta sa središnjim cjevastim produžetkom otvora, odnosno modela kotača.

Iz mlađeg, naselja grupe Boleraz u Velikom polju potječu i nalazi pršljenaka koničnog i plosnatog presjeka (Čataj 2009: 117).

Kao kultni predmeti u okviru badenske kulture navode se modeli kola (uglavnom pronalaženi u grobovima), plosnate stilizirane figure bez glave (pronalažene u naseljima), antropomorfne posude, odnosno posude sa stiliziranim prikazima ruku te nalazi kamenih stela – stupova kvadratična oblika od vapnenca koji su visoki 240 cm, a teški oko 600 kg (Endrődi 2003: 410; Endrődi 2004: 27-34). Na prostoru Hrvatske zasad su nam poznate samo četiri figure akefalnog tipa: dvije iz Vučedola (Težak-Gregl 1988) te po jedna iz Aljmaša (Šimić 2001: 73) i Belog Manastira – položaj Popova zemlja (Sl. 6) (Los 2016). Zajedno s figurama na Vučedolu su pronađeni i dijelovi modela kola (Težak-Gregl 1988: 13). S Vučedola potječu još dva tipa figura: plosnate, s urezima ispunjenim ubodima (Schmidt 1945: T.29:1) te valjkastog oblika, grube izrade i s motivom urezane prekrižene vrpce na prsima (Težak-Gregl 1988: 13, bilj. 13). Ulomak figurice trapezastog oblika, grube izrade i bez ukrasa pronađen je u Velikom polju (Čataj 2009: 118-119), a također je jedna figurica pronađena u Grabrovcu kod Đakova (Hršak 2010: 22).

Tip posuda sa stiliziranim rukama kakve su česte na prostoru Mađarske, a pronađene su i u susjednoj Vojvodini, na Gomolavi (Petrović & Jovanović 2002: 72-74), s nalazišta na prostoru Hrvatske nisu poznate. Zanimljiv je jedino nalaz posude pronađene na položaju vinograd Streim na Vučedolu koja svojim izgledom neodoljivo podsjeća na antropomorfne, viseće posude, jedino što umjesto stiliziranih ruku ima dvije velike lažne ručke čvrsto

Slika / Figure 4. Lonac s lokaliteta Đakovo-Štrosmajerovac-Pustara / A pot from the site of Đakovo-Štrosmajerovac-Pustara (foto / photo: I. Krajcar).

out a head (discovered in settlements), anthropomorphic vessels, i.e. vessels with stylized depictions of hands, and finds of tombstones – square limestone pillars that are 240 cm tall and weigh about 600 kg (Endrődi 2003: 410; Endrődi 2004: 27-34). Only four figurines without a head have been discovered in Croatia: two at Vučedol (Težak-Gregl 1988), and one each at Aljmaš (Šimić 2001: 73) and Beli Manastir – the Popova zemlja position (Fig. 6) (Los 2016). Parts of a model depicting a wagon were found at Vučedol in addition to the figurines (Težak-Gregl 1988: 13), and the site also yielded another two types of figurines: flat ones with incisions filled with stabs (Schmidt 1945: Pl. 29:1), and cylindrical ones that were roughly made and have the motif of intersecting ribbons at the bust (Težak-Gregl 1988: 13, note 13). A fragment of a coarse, trapezoidal and undecorated figurine was discovered at Veliko polje (Čataj 2009: 118-119), and an additional figurine was found at Grabrovac near Đakovo (Hršak 2010: 22).

The type of vessel with stylized hands that often appears in Hungary, and was also found at Gomolava in the neighboring Vojvodina (Petrović & Jovanović 2002: 72-74), is, so far, missing from Croatian sites. A noteworthy find is a vessel discovered at the Vinograd Streim position at Vučedol, and which is irresistibly similar to anthropomorphic hanging vessels. However, instead of arms, it has two large false handles that are firmly connected to the amphora body. The holes on the transition of the neck and body suggest that the vessel was probably hung (Težak-Gregl 1998: 125, fig. 46). The author ascribed

Slika / Figure 5. Posuda s unutarnjom pregradom s lokaliteta Ruščica-Glogove-Praulje / A Vessel with an inner divided from the site of Ruščica-Glogove-Praulje (foto / photo: I. Krajcar).

Slika / Figure 6. Ulomak keramičke figure s nalazišta Popova zemlja / A fragment of a ceramic figurine from the site of Popova zemlja (prema / after: Los 2016).

sraštene s tijelom amfore. Rupice na spoju vrata i trbuha sugeriraju da se vjerojatno posuda vješala (Težak-Gregl 1998: 125, sl. 46). Autorica posudu pripisuje kasnoj badenskoj kulturi, ali ima i tumačenja da je ona vučedolske provenijencije (Durman 1991: 152) iako slični primjerci nisu dosad pronalaženi u okviru vučedolske kulture.

Iako se isprva smatralo da je badenska kultura jedna od najsiromašnijih panonskih kultura u odnosu na metalne proizvode (Dimitrijević 1979: 220), nalazi jednodijelnih kalupa, posuda za lijevanje te plosnatih sjekira iz naselja Saloš u Donjoj Vrbi sasvim su promijenili sliku o badenskoj metalurgiji (Sl. 7). Osim plosnatih sjekira kakve nalazimo u Sotinu, Oroliku, Boboti, Kutjevu, Sarvašu (Durman 2000: 91-92; Durman 2006: kat. br. 9-18; Ložnjak Dizdar & this vessel to the late Baden, but some interpretations ascribe it to the Vučedol culture (Durman 1991: 152), despite the fact that no similar objects were discovered in the context of the Vučedol culture.

Although it was at first thought that the Baden culture was one of the poorest Pannonian cultures when it came to metal finds (Dimitrijević 1979: 220), the discovery of one-piece molds, vessels used in casting and flat axes from the settlement at Saloš in Donja Vrba have completely changed the view of Baden metallurgy (Fig. 7). Other than flat axes, which have been discovered in Sotin, Orolik, Bobota, Kutjevo, and Sarvaš (Durman 2000: 91-92; Durman 2006: cat. no. 9-18; Ložnjak Dizdar & Dizdar 2015: fig. 3), Vučedol and Sarvaš also yielded awls

Slika / Figure 7. Glineni jednodijelni kalupi za lijevanje bakrenih plosnatih sjekira s nalazišta Saloš u Donjoj Vrbi i Đakovo-Štrosmajerovac-Pustara / A clay one-piece mold for casting flat copper axes from the site of Saloš in Donja Vrba and Đakovo-Štrosmajerovac-Pustara (foto / photo: I. Krajcar).

Dizdar 2015: sl. 3), poznata su i šila te mali trijangularni bodeži iz Vučedola i Sarvaša (Težak-Gregl 1987; Balen 2005: 56, kat. br. 229). Posude i kalupi za lijevanje osim u Salošu pronađeni su i u Okuklju u Gornjoj Bebrini (Petrović & Belić 1971:12), te na lokalitetima Ruščica-Glogove-Praulje i Ruščica-Praulje (Bednjanec 2012a; 2012b; Mihaljević et al. 2018). Mišljenja smo da bi primjerak iz Velikog polja mogao biti kalup, a ne, kao što je objavljeno, posuda za lijevanje (Čataj 2009: 121, T.7:1).

Privreda

U badensko je vrijeme stočarstvo bilo najvažnija gospodarska grana. Goveda su korištena za prehranu, ali ne smijemo isključiti ni njihovu namjenu za rad jer je upravo badenska populacija ta koja je u Europu uvela zaprežna kola na 4 kotača kakve vidimo i na modelima kola.

Dok je za neolitik tipična strategija miješanog gospodarstva, veliki broj kostiju odraslih ženki u eneolitiku pokazatelj je strategije povećanja stada, a time i mesa za prehranu i mlijeka za izradu mliječnih proizvoda (Craig 2002: 99).

Kemijske analize na keramičkom materijalu grupe Boleraz pokazale su na nekoliko tipova posuđa (bikonična zdjela izvijena vrata, vrč s jednom ručkom i amfora/lonac sužena otvora s dvije ručke) da su korišteni u proizvodnji ili čuvanju mlijeka što potvrđuje Sherattovu tezu o jedinstvenoj poljoprivredno-stočarskoj ekonomiji kasnoga eneolitika utemeljenoj na iskorištavanju sekundarnih životinjskih proizvoda (Craig et al. 2003).

S badenskom se kulturom u Europi najviše povezuje i pojava alkoholnih pića jer su u naseljima i grobovima te kulture često pronalaženi setovi vrčeva i šalica. Keramički setovi za piće iz badenske kulture nalikuju cijelom kompleksu sličnih, ali metalnih, posuda za piće s prostora Anatolije i Egeide (Sheratt 1997: 178, 380-382; Milićević Bradač 1999-2000: 67). S obzirom na kontekst pronađenih setova u sklopu badenske kulture moramo razlikovati one za osobnu uporabu (par šalica) te one korištene u određenim događanjima u kojima sudjeluje čitava zajednica ili povlaštena grupa unutar zajednice (Spasić 2010: 82-94). Njihova prisutnost u grobovima kao prilog pokojniku ili, što je zanimljivije, zasebno ukopavanje setova za piće daje nam naslutiti važnost koja im se pridavala. Pojava setova za piće pada u vrijeme naglih socijalnih, kulturoloških i ekonomskih promjena koje su za-

and small triangular daggers (Težak-Gregl 1987; Balen 2005: 56, cat. no. 229). Other than in Saloš, casting vessels and molds were also found at Okukalj in Gornja Bebrina (Petrović & Belić 1971:12), as well as at the sites of Ruščica-Glogove-Praulje and Ruščica-Praulje (Bednjanec 2012a; 2012b; Mihaljević et al. 2018). The author is of the opinion that the find from Veliko polje could be a mold and not, as reported, a casting vessel (Čataj 2009: 121, Pl. 7:1).

Economy

During the Baden culture, animal husbandry was the most important branch of economy. Cattle was used in the diet, but it might have also been used for work, because it was precisely the Baden populations who introduced wagons on four wheels into Europe, exactly like those represented on models.

While a mixed economy is typical of the Neolithic, the large number of remains of grown female animals in the Eneolithic indicates the strategy of increasing a herd, thereby also the amount of meat in the diet and the amount of milk available for making dairy products (Craig 2002: 99).

Chemical analyses of pottery of the Boleraz group revealed traces of producing or storing milk in several vessel types (biconical bowls with an inverted neck, jugs with one handle, and amphoras/pots with a narrow opening and two handles), thereby confirming Sheratt's hypothesis of a single agricultural and livestock economy of the Late Eneolithic that was based on the use of secondary animal products (Craig et al. 2003).

In Europe, the Baden culture is most often connected to the appearance of alcoholic drinks, because settlements and graves ascribed to this culture yielded sets composed of jugs and cups. Ceramic drinking sets of the Baden culture resemble a whole line of similar, but metal, drinking vessels from Anatolia and the Aegean (Sheratt 1997: 178, 380-382; Milićević Bradač 1999-2000: 67). Considering the context of the recovered sets of the Baden culture, it is necessary to differentiate between those for personal use (a pair of cups), and those used at certain events that included the entire community or a privileged group within the community (Spasić 2010: 82-94). Their presence in graves as grave goods or, even more interestingly, the separate burials of drinking sets, reveal the value that was ascribed to them. The appearance of drinking sets happened

desile ovaj dio Europe pojavom badenske kulture. Napredak metalurgije, upotreba kola i pojava konja povlače sa sobom i izdvajanje društvene elite (Sheratt 1997: 385-388).

Analiza ostataka faune badenskog sloja na Vučedolu pokazuje da su najčešće kosti bovida, druge po učestalosti su kosti svinja, a tek treće malih preživača (ovce i koze) (Jurišić 1988: 18-25; Kužir 2002). Uzgajanje stoke sitna zuba imalo je perifernu ulogu što možemo vidjeti i na analizi faune s badenskih lokaliteta u Mađarskoj na kojima je također ustanovljeno da je karakteristika ekonomije držanje goveda, iako su prisutne i ovce, koze i svinje (Endrődi 2004: 15).

Konkretne dokaze sekundarne upotrebe životinja nažalost nemamo, osim nekih tragova na kostima goveda koji sugeriraju da su korištena za vuču (Trbojević Vukičević 2006). Također, na materijalu iz Vučedola vidljiva je dominacija kostiju ženskih primjeraka nad muškima, što, kao što smo već naglasili, sugerira strategiju povećanja stada radi mesa i mliječnih proizvoda, kao i veći broj jedinki srednje životne dobi što bi nam također sugeriralo da goveda nisu korištena isključivo radi mesa.

Miješano poljodjelsko-stočarsko gospodarstvo potvrđuje i veliki broj žitarica ustanovljenih na badenskim nalazištima u Mađarskoj: pšenica, ječam, leća, grašak. Dosta nalaza žirova hrasta pokazuje i njihovo korištenje u prehrani (Endrődi & Gyulai 1998/2000: 29-33; Gyulai 2004: 21-24)

Na primjeru lokaliteta Vučedol vidi se da su u prehrani znatnu ulogu imale i ribe: u prvome redu šarani, zatim som i štuka te su u većem broju zastupljeni školjkaši (Paunović & Lajtner 1995).

Istraživanja nekoliko nalazišta u blizini Slavonskoga Broda potvrdila su da su nosioci badenske kulture bili izvrsni metalurzi te da su koristili sulfidni bakar (arsensku broncu) za izradu oruđa i oružja (bodeži, noževi, plosnate sjekire).

at a time of sudden social, cultural and economic changes that were happening in this part of Europe when the Baden culture was forming. Advances in metallurgy, the use of wagons and the introduction of horses resulted in the emergence of social elites (Sheratt 1997: 385-388).

Analyses of faunal remains from the Baden layer at Vučedol show that bovids are dominant, followed by pigs, and small ruminants (sheep and goats (Jurišić 1988: 18-25; Kužir 2002). The breeding of small animals had a peripheral role, as can be seen from the analysis of fauna from sites of the Baden culture in Hungary, which also show that the main characteristic of the economy was cattle breeding, although sheep, goats and pigs were recorded (Endrődi 2004: 15).

Clear evidence of the secondary use of animals is, unfortunately, lacking, other than some traces on cattle bones that suggest the animals were used for hauling (Trbojević Vukičević 2006). Similarly, the material from Vučedol reveals a prevalence of female over male animals, which, as noted above, suggests the strategy of increasing the herd in order to obtain meat and dairy products. It also revealed a large number of older animals, suggesting that cattle were not only kept for procuring meat.

The mixed economy based on agriculture and animal husbandry is also attested to by the large number of grains discovered at sites of the Baden culture in Hungary: wheat, barley, lentils, and peas. Numerous finds of acorns suggest that they too were used in the diet (Endrődi & Gyulai 1998/2000: 29-33; Gyulai 2004: 21-24)

The example of Vučedol shows that fish also played an important role in the diet: primarily carp, followed by catfish and pike, as well as numerous shellfish (Paunović & Lajtner 1995).

Excavations of several sites near Slavonski Brod confirmed that the carriers of the Baden culture were excellent metallurgists and that they used sulfide copper (arsenic bronze) to produce tools and weapons (daggers, knives, flat axes).

Literatura / Bibliography

Bakić-Stojsavljević, M. 2010, Gornji Slatnik-Grabrovac, *Hrvatski arheološki godišnjak* 6/2009, 78-79.

Balen, J. 2002, Topografija nalazišta kostolačke kulture u sjevernoj Hrvatskoj, *Vjesnik Arheološkog muzeja u Zagrebu* 3.s. XXXV, Zagreb, 35-52.

Balen, J. 2004, Izvještaj s četvrte sezone sustavnog arheološkog iskopavanja tela Vučedol, *Obavijesti Hrvatskog arheološkog društva* XXXVI/3, Zagreb, 63-67.

Balen, J. 2005, *Sarvaš – neolitičko i eneolitičko naselje,* Musei Archaeologici Zagrebiensis Catalogi et Monographiae Vol. II, Zagreb.

Balen, J. 2006, Vučedol – vinograd Streim, *Hrvatski arheološki godišnjak* 2/2005, Zagreb, 43-45.

Balen, J. 2010, *Eneolitičke kulture na prostoru istočne Hrvatske*, Doktorska disertacija, Sveučilište u Zagrebu.

Balen, J. 2016, The Development of Eneolithic Cultures Between the Sava and the Drava Rivers, in: D. Davison, V. Gaffney, P. Miracle & J. Sofaer (eds), *Croatia at the Crossroads*, Arheopress, Oxford, 59-73.

Balen, J. 2018, Eneolitičke kulture na prostoru istočne Hrvatske, *Arheologija na Dunavu, Izdanja Hrvatskog arheološkog društva* 31/2017, 65-74.

Balen, J. & Drnić, I. 2014, Arheološka istraživanja na lokalitetu Barbarsko – novi prilog poznavanju srednjeg eneolitika na prostoru sjeverne Hrvatske, *Vjesnik arheološkog muzeja u Zagrebu* XLVII, 39-76.

Bankoff, H. A. & Winter, F. A. 1990, The Later Aeneolithic in Southeastern Europe, *American Journal of Archaeology* 94, 175-191.

Banner, J. & Bognár-Kutzián, I. 1961, Beitrage zur Chronologie der Kupferzeit des Karpatenbeckens, *Acta Archaeologica Academiae Scientiarum Hungaricae* XIII/1-4, Budapest, 1-32.

Bednjanec, L. 2012a, Slavonski Brod – luka (lokalitet Ruščica – Glogove – Praulje, *Hrvatski arheološki godišnjak* 8/2011, 126-130.

Bednjanec, L. 2012b, Slavonski Brod – luka (lok. Ruščica –Praulje), *Hrvatski arheološki godišnjak* 8/2011, 130-132.

Bekić, L. 2006, *Zaštitna arheologija u okolici Varaždina - Arheološka istraživanja na autocesti Zagreb-Goričan i njezinim prilaznim cestama,* Zagreb, Hrvatski restaurarski zavod.

Craig O. E. 2002, The development of dairying in Europe: potential evidence from food residues on ceramics, *Documenta Praehistorica* XXIX, Ljubljana, 97-108.

Craig O. E., Chapman, J., Figler, A., Patay, P., Taylor, G., Collins, M. 2003, Milk Jugs and other myths of the Copper age of Central Europe, *European Journal of Archaeology* 6/3, 251-265.

Čataj 2009, Badenska kultura, in: L. Čataj (ed.), *Josipovac Punitovački – Veliko Polje I, zaštitna arheološka istraživanja na trasi autoceste A5. Eneolitičko, brončanodobno i srednjovjekovno naselje*, Zagreb, Hrvatski restauratorski zavod, 105-139.

Čataj, L. 2016, Lasinja, Retz-Gajary and Boleráz? Radiocarbon dates and the sequence of Copper Age Cultures in Central Croatia, in: J. Kovárnik (ed.), *Centenary of Jaroslav Palliardi´s Neolithic and Aeneolithic Relative Chronology (1914-2014)*, Philosophical Faculty, University of Hradec Králové, Hradec Králové-Ústí nad Orlicí, 181-192.

Dimitrijević, S 1962, Prilog stupnjevanju badenske kulture u sjevernoj Jugoslaviji. *Arheološki radovi i rasprave* II, Zagreb, 239-261.

Dimitrijević, S 1968, *Sopotsko-lenđelska kultura*, Zagreb.

Dimitrijević, S. 1979, Badenska kultura, in: A. Benac (ed.), *Prapovijest jugoslovenskih zemalja III*, „Svjetlost", OOUR Izdavačka djelatnost, Akademija nauka i umjetnosti Bosne i Hercegovine, Sarajevo, 183-234.

Durman, A. 1984, Vučedol 1984 – novi početak sustavnih istraživanja, *Obavijesti Hrvatskog arheološkog društva* 3, Zagreb, 34-38.

Durman, A. 1987, "Vinograd Streim" - četvrta sezona na Vučedolu, *Obavijesti Hrvatskog arheološkog društva* 3, Zagreb, 34-36.

Durman, A. 1991, *Metal u prethistorijskom društvu jugoistočne Evrope*, Doktorska dizertacija, Sveučilište u Zagrebu, Zagreb.

Durman, A. 2000, Počeci metalurgije na brodskom području, *Zbornik radova sa znanstvenog skupa o Slavonskom Brodu u povodu 750. obljetnice prvoga pisanog spomena imena Brod*, Slavonski Brod, 91-102.

Durman, A. 2006, *Simbol boga i kralja - prvi europski vladari,* Katalog izložbe, Zagreb.

Durman, A. & Balen, J. 2005, Vučedol – vinograd Streim, *Hrvatski arheološki godišnjak* 1/2004, Zagreb, 30-33.

Endrődi A. 2003, Ein neues spätkupferzeitliches Idolbruchstück aus Budapest. Gedanken über die Erscheinungen des religiösen Lebens, in: E. Jerem & P. Raczky (eds.), *Morgenrot der Kulturen, Frühe Etappen der Menschheitsgeschichte in Mittel- und Südosteuropa, Festschrift für Nándor Kalicz zum 75. Geburtstag*, Archaeolingua, Budapest, 401-414.

Endrődi A. 2004, *Everyday life and spirituality at the end of the Copper Age – 5000 years old remains of the Baden Culture in Budapest*, Budapest.

Endrődi A. & Gyulai F. 1998/2000, Hearths and other finds of the Late Copper Age Baden Culture at Budapest-Csepel Island (Gynaecomorphic vessels, archaeobotanical remains), *Archaeologiai Értesítő* 125, 9-44.

Foltiny, S. & Ohrenberger, A. 1952, Neue Funde aus dem Bezirk neusiedel am See, *Archaeologia Austriaca* IX, Wien.

Forenbaher, S. 1993, Radicarbon dates and absolute chronology of of the central European Early Bronze Age, *Antiquity*, vol. 67, No 255, 218-220, 235-256.

Gyulai F. 2004, Plants of the Baden culture, in: A. Endrődi (ed.), *Everyday life and spirituality at the end of the Copper Age – 5000 years old remains of the Baden Culture in Budapest*, Budapest, 21-26.

Horváth, T., Gherdán, K., Herbich, K., Vasáros, Zs. 2007, Häuser der Badener Kultur am Fundort Balatonőszöd Temetői dűlő, Archaologische Untersuchungen. *Acta Archaeologica Academiae Scientiarum Hungaricae* LVIII/1, Budapest, 43-105.

Horváth, T., Svingor, S. E., Molnár, M. 2008, New radiocarbon dates for the baden culture, *Radicarbon* 50/3, 447-458.

Horváth, T. 2004, A new human representation from the Baden culture: a mask from Balatonőszöd, *Acta Archaeologica Academiae Scientiarum Hungaricae* LV/3-4, Budapest, 179-237.

Horvath, T. 2012, *Networks and Netwars: new perspectives on the Late Copper Age and Early Bronze Age. Typo-chronological relationships of the Boleraz/ Baden/Kostolac finds at the site of Balatonőszod–Temetői dűlő, Hungary*, British Archaeological Reports International Series 2427, Oxford.

Horvatinčić, N., Obelić, B., Srdoč, D., Durman, A., Benko, L., Sliepčević, A. 1990, Radiocarbon and TL Dating of the Eneolithic Site Vučedol in East Croatia, Yugoslavia, *PACT* 29, 243-250.

Hršak, T. & Bojčić, Z. 2008, Štrosmajerovac – Pustara. *Hrvatski arheološki godišnjak* 4/2007, Zagreb, 41-43.

Hršak, T. 2010, Grabrovac-Ciglana, *Hrvatski arheološki godišnjak* 6/2009, Zagreb, 21-23.

Janković, I. & Novak, M. 2018, Bioarheologija bakrenodobnih populacija na tlu kontinentalne Hrvatske, in: J. Balen, I. Miloglav & D. Rajković (eds.), P*ovratak u prošlost – Bakreno doba u sjevernoj Hrvatskoj*, Zagreb, 211-223.

Jurišić, M. 1988, *Lov i stočarstvo vučedolskog kulturnog kompleksa u sjevernim dijelovima Jugoslavije,* Magistarski rad, Zagreb, 1988.

Jurišić, M. 1990, Ukopi životinja na Vučedolu, *Opuscula archaeologica* 14, Zagreb, 17-31.

Jurković, T. 2012, Velimirovac-Arenda 1, *Hrvatski arheološki godišnjak* 8/2011, 46-49.

Kalafatić, H., 2009, Zaštitna istraživanja lokaliteta Čepinski Martinci – Dubrava na trasi autoceste Beli Manastir – Osijek – Svilaj 2007. i 2008, *Annales Instituti archaeologici* 5, Zagreb, 20-26.

Kalicz, N. 1963, *Die Péceler (Badener) Kultur und Anatolien*, Studia archaeologica II, Budapest.

Kalicz, N. 2001, Die Protoboleráz-Phase an der Grenze von zwei Epochen. in: P. Roman & S. Diamandi (eds.), *Studia Danubiana. Series Symposia II. Symposium Cernavoda III – Boleráz*, Bucureşti, 385-435.

Kužir, S. 2002, *Arheozoološko istraživanje kostiju i zubiju životinja badenske kulture s lokaliteta Vučedol,* Magistarski rad, Veterinarski fakultet, Zagreb.

Los, Dž. 2016, Lokalitet AN2 Beli Manastir-Popova zemlja, izložba Tekuća arheološka istraživanja, Arheološki muzej u Zagrebu.

Lozuk, J. 2006, Saloš kraj Donje Vrbe, in: A. Durman (ed.), *Stotinu hrvatskih arheoloških nalazišta,* Leksikografski zavod Miroslav Krleža, Zagreb 2006, 228-229.

Ložnjak Dizdar D., Hutinec M., Dizdar M. 2014, Terenski pregled područja između Sotina i Opatovca, *Annales Instituti Archaeologici* X, Zagreb, 159-163.

Ložnjak Dizdar D. & Dizdar M. 2015, Sotin i Opatovac, probna arheološka istraživanja višeslojnih nalazišta 2014. godine, *Annales Instituti Archaeologici* XI, Zagreb, 9-13.

Ložnjak Dizdar, D., Dizdar M., Tonc A. 2016, Donji Miholjac – Panjik – zaštitno istraživanje naselja sopotske i badenske kulture u Podravini, *Annales Instituti Archaeologici* XII, Zagreb, 59-62.

Maran, J. 1998, Die Badener Kultur und der ägäisch-anatolische Bereich, *Germania* 76/2, 497-525.

Marković, Z. 1977, Problem eneolita u našičkoj regiji, *Arheološki vesnik* 27/1976, Ljubljana, 42-59.

Marković, Z. 1994, *Sjeverna Hrvatska od neolita do brončanog doba,* Koprivnica.

Mihaljević, M. 2010, Vidovci-Rosulje, *Hrvatski arheološki godišnjak* 6/2009, 116-117.

Mihaljević, M., Podunavac, D., Matković Vrban, M. 2018, Zaštitna arheološka istraživanja Ruščica Glogove Praulje, Nova Gradiška, katalog izložbe

Mihelić, S. 2008, Josipovac – Gravinjak. *Hrvatski arheološki godišnjak* 4/2007, Zagreb, 15-17.

Milićević Bradač, M. 1999-2000, BRÓMOS OU BRÓMIOS – Bromo, a ne Bromije (Anth. Pal. 9. 368), *Opuscula archaeologica* 23-24, Zagreb, 65-76.

Milojčić, V. 1949, *Chronologie der jungen Steinzeit Mittel- und Sudeuropas*, Berlin.

Milojčić, V. 1959, Zur Chronologie der jüngeren Stein- und Bronzezeit Südost- und Mitteleuropas, *Germania* 37/1-4.

Miloglav, I. 2016, *Keramika u arheologiji – lončarstvo vučedolske kulture na vinkovačkom području*, Acta Musei Cibalensis 7, Gradski muzej Vinkovci, Filozofski fakultet Sveučilišta u Zagrebu, Vinkovci-Zagreb.

Němejcová-Pavúková, V. 1981, Náčrt periodizácie badenskej kultúry a jej chronologickýchodnej Európe, *Slovenská Archeológia* XXIX/2, Bratislava, 261-296.

Němejcová-Pavúková, V. 1991, Typologische Fragen der relativen und absoluten chronologie der Badener Kultur, *Slovenská Archeológia* XXXIX/1-2, Bratislava, 59-90.

Neustupný, E. 1959, Zur Entstehung der Kultur mit kanneliert Keramik, *Slovenská Archeológia* VII/2, Bratislava, 260-284.

Nikitović, D., Janković, I., Mihelić, S. 2012, Juvenile elbow dislocation from the prehistoric site of Josipovac - Gravinjak, Croatia, *International Journal of Paleopathology* 2, 36-41.

Nikolić, D. 2000, *Kostolačka kultura na teritoriju Srbije,* Beograd.

Nodilo, H. 2012, Donji Miholjac-Mlaka, *Hrvatski arheološki godišnjak* 8/2011, 12-15.

Paskojević, K. 2011, Velika Londžica – Malo Polje, *Hrvatski arheološki godišnjak* 7/2010, 65-67

Paunović, M. & Lajtner, I. 1995, Bedeutung der Mollusken- und Fischfauna in der Ökologie und Ökonomie der Äneolitischen siedlung Vučedol (NO Kroatien), *Opuscula archaeologica* 19, Zagreb, 33-38.

Pavlović, I. 1984, Rezultati arheoloških iskopavanja na lokalitetu Grabrovac u god. 1980, *Arheološka istraživanja u istočnoj Slavoniji i Baranji*, *Izdanja Hrvatskog arheološkog društva* 9/1981, Zagreb, 53-61.

Petrović, K. & Belić, B. B. 1971, Praistorijske kulture na području brodskog posavlja, *Materijali* VII, Beograd, 9-20.

Petrović, J. & Jovanović, B. 2002, *Gomolava – naselja kasnog eneolita*, Novi Sad – Beograd.

Pittioni, R. 1954, *Urgeschichte des österreichisches Raum,* Wien.

Rajković, D. & Balen, J. 2016, *Sarvaš – Neolitičko i eneolitičko naselje II*, Muzej Slavonije, Arheološki muzej u Zagrebu, Osijek.

Schmidt, R. R. 1945, *Die Burg Vučedol*, Zagreb.

Sheratt, A. 1997, *Economy and society in Prehistoric Europe*, Edinburgh.

Spasić, M. 2010, *Prva zdravica*, Muzej grada Beograda.

Stadler, P., Draxler, S., Friesinger, H., Kutschera, W., Priller, A., Rom, W., Steirer, P., Wild, E.M. 2001, Absolute Chronology for Early Civilisations in Austria and Central Europe using 14C Dating with Accelerator Mass Spectrometry with special Results for the Absolute Chronology of the Baden Culture, in: P. Roman & S. Diamandi (eds.), *Studia Danubiana. Series Symposia II. Symposium Cernavoda III – Boleráz*, Bucureşti, 541-562.

Šimić, J. 1998, Istraživanje lokaliteta Retfala u Osijeku, kasnobrončano doba istočne Slavonije, *Izdanja Hrvatskog arheološkog društva* 19, Zagreb, 235-242.

Šimić, J. 2001, Aljmaš – Podunavlje, zaštitno istraživanje višeslojnog prapovijesnog nalazišta, *Obavijesti Hrvatskog arheološkog društva* 3, Zagreb, 70-75.

Šimić, J. 2005, Retfala, *Hrvatski arheološki godišnjak* 1/2004, Zagreb, 11-12.

Šimić, J. 2006, Aljmaš – Podunavlje, *Hrvatski arheološki godišnjak* 2/2005, Zagreb, 7-8.

Tasić, N. 1967, *Badenski i vučedolski kulturni kompleks u Jugoslaviji*, Beograd – Novi Sad.

Tasić, N. 1979, Kostolačka kultura, in: A. Benac (ed.), *Prapovijest jugoslovenskih zemalja III*, „Svjetlost", OOUR Izdavačka djelatnost, Akademija nauka i umjetnosti Bosne i Hercegovine, Sarajevo, 235-266.

Tasić, N. 1982-1983, Das probleme der sukzessiven migration wahrend des aneolithikums im Karpaten-Donautal-Balkan-Gebiet, *Archaeologia Iugoslavica* XXII-XXIII, Beograd, 15-20.

Težak-Gregl, T. 1985, Dva nova groba badenske kulture s Vučedola, *Opuscula archaeologica* 10, Zagreb, 23-39.

Težak-Gregl, T. 1986, Vučedol kod Vukovara – eneolitsko naselje, *Arheološki pregled* 26/1985, Ljubljana, 57-59.

Težak-Gregl, T. 1987, Prilog poznavanju metalne produkcije badenske kulture, *Opuscula archaeologica* 11-12, Zagreb, 73-81.

Težak-Gregl, T. 1988, O problemu idoloplastike u badenskoj kulturi, *Opuscula archaeologica* 13, Zagreb, 11-21.

Težak-Gregl, T. 1998, Neolitik i eneolitik, in M. Mirić (ed.), *Prapovijest*, Zagreb, 56-157.

Tkalčec, T. 2016. Prapovijesna, rimska i srednjovjekovna naselja na lokalitetu Donji Miholjac – Đanovci – zaštitna arheološka istraživanja u 2015. godini, *Annales Instituti Archaeologici* XII, Zagreb, 46-58.

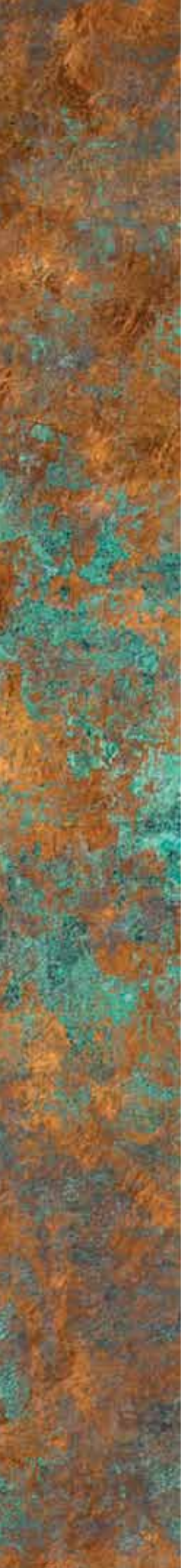
Trbojević Vukičević, T. 2006, *Arheozoološko i tafonomsko istraživanje eneolitičkog goveda Vučedola,* Doktorska disertacija, Sveučilište u Zagrebu.

Velušček, A. 2009, *Koliščarska naselbina Stare Gmajne in njen čas, Ljubljansko barje v 2. polovici 4. tisočletja pr. Kr.,* Opera Instituti Archaeologici Sloveniae 16, Ljubljana.

Vinski – Gasparini, K. 1956, Iskapanje prethistorijskog naselja u Belom Manastiru, *Osječki zbornik* V, Osijek, 5-36.

Vodička, K. 2011, Donji Miholjac-Čovci, *Hrvatski arheološki godišnjak* 7/2010, 15-16

Wild, E.M., Stadler, P., Bondar, M., Draxler, S., Friesinger, H., Kutschera, W., Priller, A., Rom, W., Ruttkay, E., Steier, P. 2001, New Chronological Frame for the Young Neolithic Baden Culture in Central Europe (4th millennium BC), *Radiocarbon*, 43, 1057-1064.



Kostolačka kultura u kontinentalnoj Hrvatskoj

The Kostolac culture in continental Croatia

Ana Đukić

Arheološki muzej u Zagrebu
Archaeological Museum in Zagreb
adukic@amz.hr

Kostolačka kultura eneolitička je pojava datirana u kraj 4. i 3 tisućljeće prije Krista, a nazvana je prema eponimnom lokalitetu Kostolac u Republici Srbiji. Kao zasebna kulturna pojava definirana je 1953. godine (Milojčić 1953), a prije toga je, na temelju ukrasa koji se pojavljuju na keramičkim predmetima, često povezivana s badenskom, vučedolskom i kulturom Coțofeni (Balen 2010: 85). Kao što je slučaj i s mnogim drugim eneolitičkim kulturama, i kostolačka je definirana prema oblicima i načinima ukrašavanja keramičkih posuda, što se u prvome redu odnosi na brazdasto urezivanje i ubadanje, često ispunjeno bijelom inkrustacijom.

Od trenutka pojavljivanja pa sve do svojih završnih faza, kostolačka je kultura bila rasprostranjena na širem prostoru. U početnim fazama bila je prisutna na prostoru istočne Slavonije, Srijema, sjeverne Bosne, središnje Srbije i Pomoravlja, a zatim se proširila na područje Karpatske kotline, srednjega Balkana i rumunjskoga Podunavlja, odnosno na današnji prostor istočne Hrvatske, središnje i istočne Srbije, sjeverne Bosne, Rumunjske, Mađarske i dijelove Slovačke (Balen 2010: 85). Tijekom vremena definirano je i nekoliko regionalnih tipova gdje se kultura javlja ili kao samostalna, ili pak kao pojava u okviru drugih kulturnih skupina (Rumunjska, Slovačka) – slavonsko-srijemska regija, područje Banata i Bačke, istočna Srbija, središnja Srbija, sjeverna Bosna, srednji tok Tise i područje dunavskog koljena u Mađarskoj te nalazišta na području Slovačke i Rumunjske (Tasić 1979: 237-242; Balen 2010: 85).

The Kostolac culture is a Copper Age phenomenon dated to the end of the 4th and the 3rd millennium BC, named after the eponymous site of Kostolac in the Republic of Serbia. It was defined as a separate culture in 1953 (Milojčić 1953), and was, previously, often connected with the Baden, Vučedol and Coțofeni cultures based on the decorations of ceramic finds (Balen 2010: 85). As is the case with many other Eneolithic cultures, the Kostolac culture was defined based on the forms and decorations of ceramic vessels, primarily furrowed incisions and stabbing, often filled with white incrustation.

From the moment it appeared, until its final stages, the Kostolac culture occupied a large area. In its initial phases, it included eastern Slavonia, Syrmia, northern Bosnia, central Serbia and the Pomoravlje region, and then spread to the Carpathian Basin, the central Balkans and the Romanian regions around the Danube, i.e. today's territory of eastern Croatia, central and eastern Serbia, northern Bosnia, Romania, Hungary, and parts of Slovakia (Balen 2010: 85). Over time, several regional types of the culture were defined, wherein the culture appears in isolation, or within the context of other cultural groups (Romania, Slovakia) – the Slavonia-Syrmia region, the area of Banat and Bačka, eastern Serbia, central Serbia, northern Bosnia, the central flow of the Tisza River, and the area around the Danube bend in Hungary, as well as sites in Slovakia and Romania (Tasić 1979: 237-242; Balen 2010: 85).

Porijeklo, stupnjevanje i kronologija kostolačke kulture

Porijeklom kostolačke kulture bavili su se mnogi autori, a većina ih se slaže oko toga da je nastala djelovanjem badenske kulture na autohtonu neolitičku osnovu na prostoru istočne Slavonije i Srijema (Dimitrijević 1979: 230; Durman 1988: 13) te da je samostalno egzistirala do formiranja vučedolske kulture kojoj je poslužila kao temelj za razvoj ornamentalnog stila (Balen 2010: 87-89).

Porijeklo kostolačke kulture od samoga je izdvajanja problematično. U prvim pokušajima definiranja i stupnjevanja, neki su autori nastojali dokazati da se radi isključivo o razvojnoj fazi badenske kulture i importiranom materijalu unutar vučedolske kulture, kao i to da bi badensku kulturu trebalo dijeliti na stupnjeve Baden-Pecel i Baden-Kostolac (Garašanin 1959: 37-45; 1959a: 23-27; 1973; Dimitrijević 1956: 35, 36; 1962: 246, 250-251; Jovanović 1963: 19-24; 1966: 1-11; Balen 2010: 87). Veći pomak učinjen je nakon objave rezultata istraživanja provedenih na lokalitetu Pivnica kod Odžaka (Benac 1962) gdje je otkriveno prvo samostalno naselje kostolačke kulture, kao i rezultata sustavnih istraživanja provedenih na Gomolavi gdje su prvi put ustanovljeni stratigrafski odnosi između badenske, kostolačke i vučedolske kulture (Tasić 1965; 1967; 1984) kojima su se kasnije bavili mnogi autori (Milojčić 1953; Benac 1962; Tasić 1965, 1966, 1970, 1979; Jovanović 1966; Dimitrijević 1977-1978; Brukner 1979; Roman 1980; Bondár 1984; Stapelfeldt 1997; Nikolić 2000; Balen 2002; 2010; 2011). Nažalost, s obzirom na činjenicu da potpune objave iskopanog materijala s rastućeg broja istraženih kostolačkih lokaliteta i dalje uglavnom izostaju, najopširniji pregled kulture potječe iz 1979. godine (Tasić 1979), a u novije je vrijeme dopunjen s nekoliko publikacija i povremenih izložbi.[1]

Relativno-kronološki položaj kostolačke kulture na mnogim je nalazištima utvrđen u odnosu na kulturne pojave koje su joj prethodile, ili pak one koje su se pojavile nakon nje. Na prostoru istočne Slavonije, kostolačka je kultura definirana s obzirom na badensku i vučedolsku kulturu na lokalitetima Vučedol i Sarvaš (Tasić 1979: 242, 243), s tim da je njezino postojanje na oba lokali-

1 Opsežnije publikacije uključuju Balen 2002, 2010 i 2011, a ostale objaveodnose se na kratke izvještaje o istraživanjima objavljene u *Hrvatskom arheološkom godišnjaku* te na izložbeni projekt Arheološkog muzeja u Zagrebu (*Tekuća arheološka istraživanja u Republici Hrvatskoj*) u sklopu kojeg su predstavljeni rezultati zaštitnih istraživanja provedenih tijekom 2014. i 2015. godine na baranjskom dijelu autoceste A5.

Origins, phases and the chronology of the Kostolac culture

The origins of the Kostolac culture have been discussed by many authors, and most agree that it developed under the influences of the Baden culture on autochthonous Neolithic populations in eastern Slavonia and Syrmia (Dimitrijević 1979: 230; Durman 1988: 13), and that it existed independently until the formation of the Vučedol culture that used it as the base for the development of its ornamental style (Balen 2010: 87-89).

The origin of the Kostolac culture has been problematic since the culture was defined. In the first attempts to define and divide it, some authors wanted to prove that it was exclusively a developmental phase of the Baden culture and imported material within the Vučedol culture, and stated that the Baden culture should be divided into the Baden-Pecel and Baden-Kostolac phases (Garašanin 1959: 37-45; 1959a: 23-27; 1973; Dimitrijević 1956: 35, 36; 1962: 246, 250-251; Jovanović 1963: 19-24; 1966: 1-11; Balen 2010: 87). A larger shift was made after the results of excavations conducted at Pivnica near Odžak were published (Benac 1962), thereby revealing the first isolated settlement of the Kostolac culture. Another shift was made after the publication of the results of systematic excavations conducted at Gomolava, where, for the first time, the stratigraphic relations between the Baden, Kostolac and Vučedol cultures were defined (Tasić 1965; 1967; 1984), and which were later discussed by many authors (Milojčić 1953; Benac 1962; Tasić 1965, 1966, 1970, 1979; Jovanović 1966; Dimitrijević 1977-1978; Brukner 1979; Roman 1980; Bondár 1984; Stapelfeldt 1997; Nikolić 2000; Balen 2002; 2010; 2011). Unfortunately, seeing as complete publications of material discovered at the increasing number of excavated sites of the Kostolac culture are still lacking, the most extensive overview of the culture was published in 1979 (Tasić 1979), which was, in recent years, expanded by several publications and temporary exhibitions.[1]

The relative chronological position of the Kostolac culture has, at many sites, been defined in relation to other cultural occurrences that preceded, or followed, it. In eastern Slavonia, the Kostolac culture

1 The more extensive publications include Balen 2002, 2010 and 2011, and the rest include short excavation reports from the *Croatian Archaeological Yearbook*, and the exhibition project of the Archaeological Museum in Zagreb (*Current archaeological excavations in the Republic of Croatia*) which includes the results of rescue excavations conducted in 2014 and 2015 at the part of the A5 motorway in Baranja.

teta naknadno utvrđeno, bilo revizijom i novijim istraživanjima (u slučaju Vučedola; Schmidt 1945; Dimitrijević 1966:22-23; Durman 1984; 1982; Durman & Balen 2005: 30-33; Balen 2010: 106; Durman & Hutinec 2011: 97-100; Hutinec 2011: 95; 2012: 93), ili pak isključivo revizijom materijala koji se čuva u muzejima u Osijeku i Zagrebu (u slučaju Sarvaša; Balen 2011; Rajković & Balen 2016). Rezultati novijih istraživanja pokazuju da je kostolačka kultura, kao što su neki autori ranije sugerirali (Nikolić 2000: 78-79; Horváth 2012: 64), istovremena klasičnoj badenskoj kulturi (Balen 2011; Horváth & Balen 2012; Rajković & Balen 2016: 68) te da djelomično traje paralelno s vučedolskom kulturom (Brukner 1979: 8-13; Balen 2010: 88; 2016a: 68; 2018: 69).

Apsolutna kronologija

Dobiveni apsolutni datumi za kostolačku kulturu kreću se u rasponu od 3300. do 2700. god. prije Krista (Balen 2011: tab. 6). Ipak, kao i u slučaju relativne kronologije, i ova je datacija problematična jer neki autori navode da je zbog dva važna "koljena" u kalibracijskoj krivulji (razdoblja između 3300. i 3100. te između 2900. i 2600. god. pr. Kr.) moguće očekivati kraće trajanje kostolačke kulture, (u vremenu između 3000./2900. i 2800./2700. god. pr. Kr.; Bankoff & Winter 1990: 186, 189, T.2; Forenbaher 1993: 246, 247: Bojadžijev 1992: 397; Balen 2010; 2011: 158; Rajković & Balen 2016: 68).

Dobiveni apsolutni datumi kostolačke kulture u istočnoj Hrvatskoj potječu s tri lokaliteta: Vučedol-vinograd Streim (sonde V-85 i V-87), Đakovo-Franjevac te Kaznica-Rutak (Balen 2011).

Kalibrirani datum iz sonde V-85 s Vučedola kreće se u rasponu od 3300. do 2900., a onaj iz sonde V-87 u rasponu od 3100. do 2880. god. pr. Kr. (Balen 2011: tab. 6). S nalazišta Đakovo-Franjevac datumi se kreću u rasponu od cca 3340. do 2830. god. pr. Kr. (Balen 2011: tab. 6; Horváth & Balen 2012: 18; Rajković & Balen 2016: 69), a s nalazišta Kaznica-Rutak potječe jedan datum koji se kreće se u rasponu od 3031. do 2910. god. pr. Kr. (Balen 2010: 89; 2011: tab. 6; Rajković & Balen 2016: 69). Iz susjednih područja valja spomenuti datume iz Gomolave koji se kreću u rasponu od oko 3108. do 2877. god. pr. Kr. (Petrović & Jovanović 2002: 298; Balen 2010: 89; 2011: 159),

was defined in relation to the Baden and Vučedol cultures at Vučedol and Sarvaš (Tasić 1979: 242, 243), noting that its presence on both sites was established subsequently, either through material reevaluation, or new excavations (in the case of Vučedol; Schmidt 1945; Dimitrijević 1966: 22-23; Durman 1984; 1982; Durman & Balen 2005: 30-33; Balen 2010: 106; Durman & Hutinec 2011: 97-100; Hutinec 2011: 95; 2012: 93), or exclusively through the reevaluation of material that is kept in museums in Osijek and Zagreb (in the case of Sarvaš; Balen 2011; Rajković & Balen 2016). The results of recent excavations show that the Kostolac culture is, as previously suggested by some authors (Nikolić 2000: 78-79; Horváth 2012: 64), contemporaneous with the classic Baden culture (Balen 2011; Horváth & Balen 2012; Rajković & Balen 2016: 68) and that it partially lasted parallel with the Vučedol culture (Brukner 1979: 8-13; Balen 2010: 88; 2016a: 68; 2018: 69).

Absolute chronology

The dates obtained for the Kostolac culture fall in the range between 3300 and 2700 BC (Balen 2011: tab. 6). However, just like in the case of relative chronology, this datation is problematic because some authors suggest that it is possible to expect a somewhat shorter duration of the Kostolac culture (the period between 3000/2900 and 2800/2700 BC) due to the two "bends" in the calibration curve (periods between 3300 and 3100, and between 2900 and 2600 BC; Bankoff & Winter 1990: 186, 189, Pl. 2; Forenbaher 1993: 246, 247: Bojadžijev 1992: 397; Balen 2010; 2011: 158; Rajković & Balen 2016: 68).

The obtained absolute dates of the Kostolac culture in eastern Croatia come from three sites: Vučedol-vinograd Streim (trenches V-85 and V-87), Đakovo-Franjevac, and Kaznica-Rutak (Balen 2011).

The calibrated date from trench V-85 at Vučedol falls into the range between 3300 and 2900, and the one from trench V-87 between 3100 and 2880 BC (Balen 2011: tab. 6). The dates from Đakovo-Franjevac fall into the range between approximately 3340 and 2830 BC (Balen 2011: tab. 6; Horváth & Balen 2012: 18; Rajković & Balen 2016: 69), and the date obtained from Kaznica-Rutak falls between 3031 and 2910 BC (Balen 2010: 89; 2011: tab. 6; Rajković & Balen 2016: 69). Noteworthy dates from the neighboring areas include those from Gomolava that fall into the range between about 3108 and 2877 BC (Petrović & Jovanović 2002: 298; Balen 2010: 89; 2011: 159), the

zatim datum iz Rudne glave u rasponu od 2910. do 2880. god. pr. Kr. i datum iz Belovoda od 3130. do 2920. god. pr. Kr. (Borić 2009: 198; Balen 2010: 89; 2011: 159), kao i nešto više datume s Pivnice koji se kreću u rasponu od 3356. do 2857. god. pr. Kr. (Petrović & Jovanović 2002: 298; Balen 2010: 89; 2011: 159).

Radiokarbonski datumi prikazani u Balen 2011 (tab. 6), važni su iz nekoliko razloga:

1. datacija iz 1979. godine, koja je kostolačku kulturu smjestila u vrijeme između 2400. i 2200. godine prije nove ere (Tasić 1979: 266), znatno je pomaknuta u vrijeme između 3300. i 2700. god. pr. Kr. (Balen 2010; 2011: 158; Rajković & Balen 2016: 68),

2. datumi s Vučedola potvrđuju istovremenost klasične badenske i kostolačke kulture između 3300./3200. i 3000./2900. god. pr, Kr. (Nikolić 2000: 78, 79; Balen 2010: 91),

3. datumi s lokaliteta Đakovo-Franjevac pokazuju da je rana faza kostolačke kulture, suprotno dosadašnjem mišljenju (Nikolić 2000: 78-79), prisutna i na prostoru južno Dunava (Balen 2010: 91; 2011),

4. datumi pokazuju djelomično vremensko preklapanje kostolačke i vučedolske kulture, za koju se datumi kreću od cca 3000. god. prije Krista (Balen 2010: 91; 2011).

Nalazišta

Popisi nalazišta kostolačke kulture objavljivani su u nekoliko navrata, a valja istaknuti prvi popis koji je uključio dva nalazišta s prostora Republike Hrvatske (Vučedol i Sarvaš; Milojčić 1953: 157, sl. 2; Balen 2010: 103), zatim nešto kasniji popis koji je uključio i lokalitet Samatovci (Benac 1962: 31, sl. 5; Balen 2010: 103), kao i popis 34 nalazišta (Balen 2002; Balen 2010) te posljednji objavljeni popis čak 55 položaja na kojima je pronađena keramika pripisana kostolačkoj kulturi (Balen 2010). Od 55 prethodno registriranih položaja, istraživanja su vođena na njih 14, od toga na devet položaja (tri na Vučedolu) s vertikalnom stratigrafijom. Na tri istraživana položaja otkriveni su pojedinačni nalazi kostolačke keramike u sklopu badenskih naselja (Balen 2010: 103-106).

Posljednji popis uključuje sljedeća nalazišta: Aljmaš-Podunavlje (Šimić 2006; 2011; Balen 2010: 103), Ašikovci-Vražjak (Dimitrijević 1966: 23; Balen 2010: 103), Bobota (Balen 2002: 37; 2010: 103), Bogdanovci (Balen 2002: 37; 2010: 103), Bogdanovci-Voćnjak

date from Rudna glava, between 2910 and 2880 BC, the date from Belovode, between 3130 and 2920 BC (Borić 2009: 198; Balen 2010: 89; 2011: 159), and the somewhat higher dates from Pivnica that fall into the range between 3356 and 2857 BC (Petrović & Jovanović 2002: 298; Balen 2010: 89; 2011: 159).

The radiocarbon dates collected in Balen 2011 (tab. 6) are important for several reasons:

1. The 1979 datation, which placed the Kostolac culture to the period between 2400 and 2200 BC (Tasić 1979: 266), was significantly shifted to the period between 3300 and 2700 BC (Balen 2010; 2011: 158; Rajković & Balen 2016: 68),

2. The dates from Vučedol confirm the contemporaneous existence of the classic phase of the Baden and the Kostolac culture in the period between 3300/3200 and 3000/2900 BC (Nikolić 2000: 78, 79; Balen 2010: 91),

3. The dates from Đakovo-Franjevac show that the early phase of the Kostolac culture, contrary to previous opinions (Nikolić 2000: 78-79), was also present on territories south of the Sava and the Danube rivers (Balen 2010: 91; 2011),

4. The dates indicate a partial temporal overlap of the Kostolac and Vučedol cultures that was dated to about 3000 BC (Balen 2010: 91; 2011).

Sites

Lists of sites of the Kostolac culture have been published on several occasions, and several of them should be noted: the first one, which included two sites from the territory of Croatia (Vučedol and Sarvaš; Milojčić 1953: 157, fig. 2; Balen 2010: 103), the somewhat later one, which also included the site of Samatovci (Benac 1962: 31, fig. 5; Balen 2010: 103), the list of 34 sites (Balen 2002; Balen 2010), and the latest published one that included a total of 55 positions that yielded pottery of the Kostolac culture (Balen 2010). Out of the 55 previously recorded positions, excavations were conducted at 14, nine of which revealed a vertical stratigraphy (three at Vučedol). Three excavated positions yielded individual finds of Kostolac pottery within settlements of the Baden culture (Balen 2010: 103-106).

The last list includes the following sites: Aljmaš-Podunavlje (Šimić 2006; 2011; Balen 2010: 103), Ašikovci-Vražjak (Dimitrijević 1966: 23; Balen 2010: 103), Bobota (Balen 2002: 37; 2010: 103), Bogdanovci (Balen 2002: 37; 2010: 103), Bogdanovci-Voćnjak (Hu-

(Hutinec & Bunčić 2006: 25, 26; Balen 2010: 103), Branjin Vrh-Okrugla međa 1 (Ložnjak Dizdar 2008: 8; Balen 2010: 103), Cerić-Plandište (Dimitrijević 1979: 136, 138; Iskra-Janošić 2005: 22; Balen 2010: 103), Dalj-Ciglana (Balen 2002: 37; 2010: 103), Dalj-Lisova skela (Bulat 1975: 22; Šimić 1983: 32; Balen 2010: 103), Dalj-Savulja (Bulat 1973: 34; Balen 2010: 103), Donja Bebrina-Paljevine (Salajić 1993: 91; Balen 2010: 103), Donja Vrba-Saloš (Minichreiter 1991: 183, 184, sl. 8; Lozuk 1995; Balen 2010: 104), Đakovo-Grabrovac (Pavlović 1984; Balen 2010: 104), Đakovo-Franjevac (Wiewegh & Revald-Radolić 2007: 9; Balen 2008; 2010: 104; 2011), Erdut-Veliki Varod (Balen 2002: 38; 2010: 104), Erdut–Panića skela (Bulat 1975: 20; Balen 2010: 104), Gornja Bebrina-Okukalj (Dimitrijević 1971: 149, sl. 1: 2; Balen 2010: 104), Ilok-Tvrđava (Tomičić et al. 2008; Balen 2010: 104), Ilok-Božino brdo (Ložnjak Dizdar et al. 2004: 46; Balen 2010: 104; Botić 2018: 37), Jaruge-Gođevo Berava (Balen 2010: 104), Kaznica-Rutak (Hršak & Pavlović 2007: 17; Balen 2010: 104; Hršak 2014: 47), Klisa-Ekonomija (Bulat & Bojčić 1980: 198; Balen 2010: 104), Kozarac-Ciglana (Balen 2002: 39; Balen 2010: 104), Kršinci-Okruglica (Marković 1984: 22; Balen 2010: 104; Marković & Botić 2017: 135), Lovas-Gradac (Kalvarija) (Dimitrijević 1962: T.III: 32; Balen 2010: 104), Nova Gradiška-Slavča (Skelac 1997: 220-223; Vrdoljak & Mihaljević 1999: T.3, T.4; Mihaljević 2000: T.1; 2004: 29; 2005: 39-40; 2006:54; 2007: 76; 2008: 94-95; 2009: 126-127; 2010: 88-89; 2011: 120-121; 2012: 115; 2013: 126-127; 2014: 82; 2014a: 97, 98; Balen 2010: 105), Orolik-Vinogradi (Balen 2002: 40; 2010: 105), Osijek-Retfala (Šimić 1995: 23-26; 2005: 12; Balen 2010: 105), Petrijevci-Verušed (Filipec et al. 2009: 47; Balen 2010: 105), Petrovci-Brođanka (Marković 1994; Balen 2010: 105), Potočani-Mali Grad (Potrebica & Balen 2003: 52-53; 2008: 116-118; Balen 2010: 105), Razbojište-Široko jutro (Marković 1975: 170; Balen 2010: 105; Marković & Botić 2017: 135), Rokovci (Balen 2002: 40; 2010: 105), Samatovci-Pusta (Drechsler-Bižić 1956: T. II: 12, 13; Balen 2010: 105), Sarvaš-Gradac (Schmidt 1945: 127-131; Balen 2005; 2010: 105; Rajković 2014: 79; Rajković & Balen 2016), Stari Jankovci-Gatina (Rapan Papeša 2007: 47; Balen 2010: 105), Sotin – nepoznati položaj (Balen 2002: 41; 2010: 105), Sotin-Fancage (Dizdar et al. 2009: 122; Balen 2010: 105), Sotin-Srednje polje (Dizdar et al. 2009: 124; Balen 2010: 105; Ilkić 2011: 224; Botić 2018: 34), Šarengrad – nepoznati položaj (Balen 2002: 41; 2010: 105), Šarengrad-Ađinac (Ložnjak Dizdar et al. 2004: 46; Balen 2010: 105; Botić 2018: 36), Šarengrad-Bišket (Ložnjak Dizdar et al. 2004: 46; Balen 2010: 105; Botić 2018: 36), Šarengrad-tinec & Bunčić 2006: 25, 26; Balen 2010: 103), Branjin Vrh-Okrugla međa 1 (Ložnjak Dizdar 2008: 8; Balen 2010: 103), Cerić-Plandište (Dimitrijević 1979: 136, 138; Iskra-Janošić 2005: 22; Balen 2010: 103), Dalj-Ciglana (Balen 2002: 37; 2010: 103), Dalj-Lisova skela (Bulat 1975: 22; Šimić 1983: 32; Balen 2010: 103), Dalj-Savulja (Bulat 1973: 34; Balen 2010: 103), Donja Bebrina-Paljevine (Salajić 1993: 91; Balen 2010: 103), Donja Vrba-Saloš (Minichreiter 1991: 183, 184, fig. 8; Lozuk 1995; Balen 2010: 104), Đakovo-Grabrovac (Pavlović 1984; Balen 2010: 104), Đakovo-Franjevac (Wiewegh & Revald-Radolić 2007: 9; Balen 2008; 2010: 104; 2011), Erdut-Veliki Varod (Balen 2002: 38; 2010: 104), Erdut–Panića skela (Bulat 1975: 20; Balen 2010: 104), Gornja Bebrina-Okukalj (Dimitrijević 1971: 149, fig. 1: 2; Balen 2010: 104), Ilok-Tvrđava (Tomičić et al. 2008; Balen 2010: 104), Ilok-Božino brdo (Ložnjak Dizdar et al. 2004: 46; Balen 2010: 104; Botić 2018: 37), Jaruge-Gođevo Berava (Balen 2010: 104), Kaznica-Rutak (Hršak & Pavlović 2007: 17; Balen 2010: 104; Hršak 2014: 47), Klisa-Ekonomija (Bulat & Bojčić 1980: 198; Balen 2010: 104), Kozarac-Ciglana (Balen 2002: 39; Balen 2010: 104), Kršinci-Okruglica (Marković 1984: 22; Balen 2010: 104; Marković & Botić 2017: 135), Lovas-Gradac (Kalvarija) (Dimitrijević 1962: Pl. III: 32; Balen 2010: 104), Nova Gradiška-Slavča (Skelac 1997: 220-223; Vrdoljak & Mihaljević 1999: Pl. 3, Pl. 4; Mihaljević 2000: Pl.1; 2004: 29; 2005: 39-40; 2006:54; 2007: 76; 2008: 94-95; 2009: 126-127; 2010: 88-89; 2011: 120-121; 2012: 115; 2013: 126-127; 2014: 82; 2014a: 97, 98; Balen 2010: 105), Orolik-Vinogradi (Balen 2002: 40; 2010: 105), Osijek-Retfala (Šimić 1995: 23-26; 2005: 12; Balen 2010: 105), Petrijevci-Verušed (Filipec et al. 2009a: 47; Balen 2010: 105), Petrovci-Brođanka (Marković 1994; Balen 2010: 105), Potočani-Mali Grad (Potrebica & Balen 2003: 52-53; 2008: 116-118; Balen 2010: 105), Razbojište-Široko jutro (Marković 1975: 170; Balen 2010: 105; Marković & Botić 2017: 135), Rokovci (Balen 2002: 40; 2010: 105), Samatovci-Pusta (Drechsler-Bižić 1956: Pl. II: 12, 13; Balen 2010: 105), Sarvaš-Gradac (Schmidt 1945: 127-131; Balen 2005; 2010: 105; Rajković 2014: 79; Rajković & Balen 2016), Stari Jankovci-Gatina (Rapan Papeša 2007: 47; Balen 2010: 105), Sotin – unknown position (Balen 2002: 41; 2010: 105), Sotin-Fancage (Dizdar et al. 2009: 122; Balen 2010: 105), Sotin-Srednje polje (Dizdar et al. 2009: 124; Balen 2010: 105; Ilkić 2011: 224; Botić 2018: 34), Šarengrad – unknown position (Balen 2002: 41; 2010: 105), Šarengrad-Ađinac (Ložnjak Dizdar et al. 2004: 46; Balen 2010: 105; Botić 2018: 36), Šarengrad-Bišket (Ložnjak Dizdar et al. 2004: 46; Balen 2010: 105; Botić 2018: 36), Šarengrad-Gradac (Ložnjak Dizdar et al. 2004: 46; Balen 2010: 105; Botić

Gradac (Ložnjak Dizdar et al. 2004: 46; Balen 2010: 105; Botić 2018: 36), Šarengrad-Kuruzeb (Ložnjak Dizdar et al. 2004: 46; Balen 2010: 105; Botić 2018: 36), Šarengrad-Luketinec zapad (Ložnjak Dizdar et al. 2004: 46; Balen 2010: 105; Botić 2018: 36), Šarengrad-Renovo (Ložnjak Dizdar et al. 2004: 47; Balen 2010: 105; Botić 2018: 36), Tovarnik – nepoznati položaj (Balen 2002: 41; 2010: 105), Vinkovci-Marica (Dimitrijević 1979: 138, T.2: 15; Balen 2010: 106), Vinkovci-Ervenica (Krznarić Škrivanko 1999: 22; 2006: 35-36; 2007: 61-62; 2008: 81-84; 2014: 80; Balen 2010: 106; Dizdar 2012: 91), Vukovar-Budžak (Dorn 1976: 13-14; Balen 2010: 106), Vukovar-Lijeva bara (Balen-Letunić 1996; Balen 2010: 106), Vučedol-Gradac (Schmidt 1945; Balen 2010; Hutinec 2011: 95), Vučedol-vingrad Streim (Durman 1984; Durman & Balen 2005: 30-33; Balen 2010: 106; Durman & Hutinec 2011: 97-100; Hutinec 2012: 93), Vučedol-kukuruzište Streim (Dimitrijević 1966:22-23; Durman 1982; Balen 2010: 106) i Zvizdan-Lovačka kuća (Marijan 2002; Balen 2010: 106).

Novi položaji kostolačke kulture definirani su revizijom materijala iz starih istraživanja s lokaliteta Beli Manastir-Ciglana (Balen 2016). U novije vrijeme, terenskim su pregledima i istraživanjima otkriveni tragovi naselja kostolačke kulture na sljedećim položajima: Osijek-Filipovica-Hermanov vinograd (Hršak & Los 2014: 39), Orlinjak u općini Bogdanovci (Hutinec 2008: 58; Hutinec 2009: 110-115), Josipovac-Verušed (Filipec et al. 2009: 30-33), Kešinci-Požarike (Balen 2010a: 14), Krušćik (Mihaljević 2010a: 107), Vidovci-Rosulje (Mihaljević 2010b: 116, 117), Vučedol-vila Streim (Hutinec 2011a: 97), Ruščica-Glogove-Praulje (Bednjanec 2012: 126-128), Beravci-Brišće-Gradina (Los 2013: 83-84), Gudinci-Jelas (Los 2013a: 99-101), Plandište u jugoistočnom dijelu Sotina (Ilkić 2011: 224), Novi Čeminac-Jauhov salaš (Balen et al. 2015; Balen et al. 2016; Đukić 2016), Novi Bolman-Grablje (Nodilo 2016), Osijek-Frigis 1 (Tresić Pavičić 2014: 23-25), Sotin Trojstvo (Ložnjak Dizdar et al. 2014: 159-163), Sotin Jakobovac zapad (Ložnjak Dizdar et al. 2014: 159-163), Sotin Dunavska ulica-M. Gupca (Ložnjak Dizdar et al. 2014: 159-163), Sotin Zmajevac istok (Ložnjak Dizdar et al. 2014: 159-163), Sotin Trstenik (Ložnjak Dizdar et al. 2014: 159-163), Opatovac Sokolovac istok (Ložnjak Dizdar et al. 2014: 159-163), Opatovac Šanac jug (Ložnjak Dizdar et al. 2014: 159-163.; Ložnjak Dizdar & Dizdar 2015: 12), Opatovac Šanac istok (Ložnjak Dizdar et al. 2014: 159-163.; Ložnjak Dizdar & Dizdar 2015: 12), Sotin Srednje polje Vašarište (Ložnjak Dizdar & Dizdar 2015a: 14), Vukojevci-Antolovo Brdo/Zmajevac (Marković & Botić 2018: 36), Šarengrad-Kuruzeb (Ložnjak Dizdar et al. 2004: 46; Balen 2010: 105; Botić 2018: 36), Šarengrad-Luketinec zapad (Ložnjak Dizdar et al. 2004: 46; Balen 2010: 105; Botić 2018: 36), Šarengrad-Renovo (Ložnjak Dizdar et al. 2004: 47; Balen 2010: 105; Botić 2018: 36), Tovarnik – unknown position (Balen 2002: 41; 2010: 105), Vinkovci-Marica (Dimitrijević 1979: 138, Pl. 2: 15; Balen 2010: 106), Vinkovci-Ervenica (Krznarić Škrivanko 1999: 22; 2006: 35-36; 2007: 61-62; 2008: 81-84; 2014: 80; Balen 2010: 106; Dizdar 2012: 91), Vukovar-Budžak (Dorn 1976: 13-14; Balen 2010: 106), Vukovar-Lijeva bara (Balen-Letunić 1996; Balen 2010: 106), Vučedol-Gradac (Schmidt 1945; Balen 2010; Hutinec 2011: 95), Vučedol-vingrad Streim (Durman 1984; Durman & Balen 2005: 30-33; Balen 2010: 106; Durman & Hutinec 2011: 97-100; Hutinec 2012: 93), Vučedol-kukuruzište Streim (Dimitrijević 1966:22-23; Durman 1982; Balen 2010: 106) i Zvizdan-Lovačka kuća (Marijan 2002; Balen 2010: 106).

New positions of the Kostolac culture were defined through a reevaluation of material from old excavations conducted at Beli Manastir-Ciglana (Balen 2016). In recent years, field surveys and excavations yielded traces of settlements of the Kostolac culture at the following positions: Osijek-Filipovica-Hermanov vinograd (Hršak & Los 2014: 39), Orlinjak in the Bogdanovci Municipality (Hutinec 2008: 58; Hutinec 2009: 110-115), Josipovac-Verušed (Filipec et al. 2009: 30-33), Kešinci-Požarike (Balen 2010a: 14), Krušćik (Mihaljević 2010a: 107), Vidovci-Rosulje (Mihaljević 2010b: 116, 117), Vučedol-vila Streim (Hutinec 2011a: 97), Ruščica-Glogove-Praulje (Bednjanec 2012: 126-128), Beravci-Brišće-Gradina (Los 2013: 83-84), Gudinci-Jelas (Los 2013a: 99-101), Plandište in the southeastern part of Sotin (Ilkić 2011: 224), Novi Čeminac-Jauhov salaš (Balen et al. 2015; Balen et al. 2016; Đukić 2016), Novi Bolman-Grablje (Nodilo 2016), Osijek-Frigis 1 (Tresić Pavičić 2014: 23-25), Sotin Trojstvo (Ložnjak Dizdar et al. 2014: 159-163), Sotin Jakobovac zapad (Ložnjak Dizdar et al. 2014: 159-163), Sotin Dunavska ulica-M. Gupca (Ložnjak Dizdar et al. 2014: 159-163), Sotin Zmajevac istok (Ložnjak Dizdar et al. 2014: 159-163), Sotin Trstenik (Ložnjak Dizdar et al. 2014: 159-163), Opatovac Sokolovac istok (Ložnjak Dizdar et al. 2014: 159-163), Opatovac Šanac jug (Ložnjak Dizdar et al. 2014: 159-163.; Ložnjak Dizdar & Dizdar 2015: 12), Opatovac Šanac istok (Ložnjak Dizdar et al. 2014: 159-163.; Ložnjak Dizdar & Dizdar 2015: 12),), Sotin Srednje polje Vašarište (Ložnjak Dizdar & Dizdar 2015a: 14), Vukojevci-Antolovo Brdo/Zmajevac (Marković & Botić 2017: 135), Sotin-zapad (Botić 2018: 34), Ilok-Štimovac (Dizdar & Ložnjak Dizdar

2017: 135), Sotin-zapad (Botić 2018: 34), Ilok-Štimovac (Dizdar & Ložnjak Dizdar 2009: 118, 119; Botić 2018: 36), Kuševac (Pavlović, Bojčić 1981; Pavlović 1984: 54; Šimić 1995a: 14, 15.) i Štrbinci (Marković 1982: 97; Šimić 1995a: 14, 15).

U novije vrijeme pronađeno je još arheoloških nalaza i struktura kostolačke kulture na otprije poznatim položajima Vučedol-Gradac (Hutinec 2011: 95), Vučedol-vinograd Streim (Durman & Hutinec 2011: 97-100; Hutinec 2012: 93), Vinkovci-Ervenica (Dizdar 2012: 91) i Sotin-Srednje polje (Ilkić 2011: 224), a revizijom materijala iz starih istraživanja s lokaliteta Sarvaš-Gradac izdvojeno je još kostolačkog materijala (Rajković 2014: 79; Rajković & Balen 2016).

Novim istraživanjima i terenskim pregledima ukupan broj kostolačkih nalazišta u Hrvatskoj povećan je s prethodno poznatih 55 na njih 85.

Naselja i stanovanje

S područja Hrvatske poznat je velik broj lokaliteta kostolačke kulture. Međutim, sustavna su istraživanja vođena tek na nekima , uključujući nekoliko položaja na Vučedolu, Sarvaš, Vukovar-Lijevu baru i Slavču kod Nove Gradiške. U zaštitnim istraživanjima na trasi autoceste Beli Manastir-Osijek-Svilaj također je istraženo nekoliko kostolačkih naselja koja, nažalost, većim dijelom nisu u potpunosti objavljena.[2]

Od samih početka proučavanja kostolačke kulture uočena je zajednička značajka naselja, a to je želja da ih se na neki način zaštiti, bilo samim pozicioniranjem ili dodatnim utvrđivanjem (Tasić 1979: 247; Balen 2010: 9). Sva poznata naselja na prostoru Hrvatske podignuta su uz veće ili manje vodotokove koji su zadovoljavali osnovne uvjete za život (Balen 2002: 35; 2010: 91; 2011; Balen & Rajković 2016; Đukić 2014: 30), a njihova gustoća pokazuje da se vjerojatno radilo o nizu manjih satelitskih naselja koja su gravitirala većim središtima poput onih u Sarvašu i Vučedolu (Balen 2010: 91). Sarvaš i Vučedol već u svojoj ranoj fazi zaposjeda vučedolska kultura, što sugerira da su glavna "središta" kostolačke kulture najvjerojatnije bila naselja na nešto udaljenijim lokalitetima na Gomolavi i Vinči, a sa spomenuta četiri tela kostolačka je kultura, barem u jednoj fazi svoga postojanja, imala kontrolu nad širokim prostorom međurječja Drave, Dunava i Save (Durman 1995: 153-158; Balen 2010: 91, 92).

2 Izuzev nalazišta Đakovo-Franjevac (Balen 2011).

2009: 118, 119; Botić 2018: 36), Kuševac (Pavlović, Bojčić 1981; Pavlović 1984: 54; Šimić 1995a: 14, 15.), and Štrbinci (Marković 1982: 97; Šimić 1995a: 14, 15).

Additional finds and structures of the Kostolac culture have recently been discovered at previously known positions of Vučedol-Gradac (Hutinec 2011: 95), Vučedol-vinograd Streim (Durman & Hutinec 2011: 97-100; Hutinec 2012: 93), Vinkovci-Ervenica (Dizdar 2012: 91), and Sotin-Srednje polje (Ilkić 2011: 224). A reevaluation of material from old excavations from Sarvaš-Gradac also yielded additional material ascribed to the Kostolac culture (Rajković 2014: 79; Rajković & Balen 2016).

New excavations and field surveys increased the number of Kostolac sites in Croatia from the previously recorded 55 to 85.

Settlements and habitation

The territory of Croatia yielded a large number of sites of the Kostolac culture. However, systematic excavations have only been conducted on a small number of them, including several positions at Vučedol, Sarvaš, Vukovar-Lijeva bara and Slavča near Nova Gradiška. The rescue excavations conducted on the Beli Manastir-Osijek-Svilaj motorway also revealed several settlement of the Kostolac culture that have, unfortunately, not been published. [2]

From their very beginnings, settlements of the Kostolac culture displayed a common characteristic – a desire to somehow protect the settlement, either by the choice of position, or by additional fortification (Tasić 1979: 247; Balen 2010: 9). All known sites in Croatia are situated near larger or smaller sources of water that provided basic living conditions (Balen 2002: 35; 2010: 91; 2011; Balen & Rajković 2016; Đukić 2014: 30), and their density indicates there was probably a whole series of small satellite settlements that gravitated towards larger centers, such as those at Sarvaš and Vučedol (Balen 2010: 91). Sarvaš and Vučedol were already inhabited during the early phase of the Vučedol culture, which suggests that the main "centers" of the Kostolac culture were, most probably, at the more distant sites of Gomolava and Vinča. The Kostolac culture could, at least during one phase of its existence, control the vast area of the Drava, Danube and Sava interfluve from the four mentioned tell settlements (Durman 1995: 153-158; Balen 2010: 91, 92).

2 Apart from the site of Đakovo-Franjevac (Balen 2011).

Zahvaljujući istraživanjima nekih od većih lokaliteta kao što su Gomolava i Vučedol, moguće je utvrditi kako je kostolačka kultura gradila solidne nadzemne objekte pravokutnog oblika, a zabilježeno je i stanovanje u zemunicama i poluzemunicama (Tasić 1979: 249; Petrović & Jovanović 2002; Nikolić 2000: 40-44; Rajković & Balen 2016: 69). S obzirom na činjenicu da najveći dio materijala s telova kostolačke kulture u Hrvatskoj (Vučedol i Sarvaš) nije odmah izdvojen već je pripisan badenskoj kulturi (Schmidt 1945), tek je revizijom dokumentacije dobiven ograničeni uvid u stratigrafiju (Dimitrijević 1962: 253; 1968: 26-27; Tasić 1970: 26-28; 1979: 243; Balen 2010: 92) koji sugerira da nadzemne apsidalne objekte na položaju Vučedol-Gradac treba pripisati kostolačkoj kulturi (Tasić 1979: 249; Nikolić 2000: 42-43, Balen 2002; 2010: 92). Samostalni kostolački horizont izdvojen je na lokalitetu Vučedol-vinograd Streim, u sloju debljine oko 80 cm koji je bio ispunjen garom i pepelom, komadićima kućnog lijepa i velikim brojem nalaza keramike, riječnih školjki i litike (Balen 2010: 92). Na tom je položaju, unatoč mlađim građevinskim djelatnostima koje su uništile kostolačke strukture, ustanovljen intenzivan život, a nalazi ukazuju na postojanje barem dva građevinska horizonta u sondi V-87 (Balen 2005a; 2010: 93). Prema dosad poznatim podacima, ponuđene su dvije hipoteze o izgledu spomenutog kostolačkog naselja:

a) unutar kostolačkog naselja pojedina su domaćinstva zauzimala puno veću površinu od onih vučedolske kulture, koja su u prosjeku zauzimala manje od 100 m^2 (Forenbaher 1995: 22, 23; Balen 2005a: 34, 35; 2010: 93),

b) kostolačko je naselje bilo više orijentirano prema središnjem dijelu platoa, za razliku od vučedolskoga koje je težilo njegovim rubnim dijelovima (Balen 2010: 93).

Kostolački sloj na Sarvašu nije definiran tijekom prvih arheoloških istraživanja, ali je kasnije ustanovljeno da bi mlađi badenski građevinski sloj (na dubini od 4 do 3,20 m), koji je tom prilikom definiran, u stvari mogao biti pripisan kostolačkoj kulturi (Balen 2005; 2010: 93; Rajković & Balen 2016). U prilog postojanju takvog sloja svjedoče i nalazi prikupljeni prije 1942. godine (Hoffiler 1938: T. 9; Balen 2010: 93; Rajković & Balen 2016), kao i nalazi apsidalnih kuća kakve su na Vučedolu pripisane kostolačkom horizontu naseljavanja (Tasić 1979: 249; Nikolić 2000: 42-43, Balen 2002; 2005a; 2010: 92, 93).

Thanks to the excavations of some of the larger sites like Gomolava and Vučedol, it was possible to establish that the Kostolac culture constructed firm above-ground structures of rectangular shape, but that it also kept using dugout and semi-dugout dwellings (Tasić 1979: 249; Petrović & Jovanović 2002; Nikolić 2000: 40-44; Rajković & Balen 2016: 69). Considering the fact that most of the material from tells of the Kostolac culture in Croatia (Vučedol and Sarvaš) was not immediately recognized, but was ascribed to the Baden culture (Schmidt 1945), only the reevaluation of the documentation provided a limited view of site stratigraphy (Dimitrijević 1962: 253; 1968: 26-27; Tasić 1970: 26-28; 1979: 243; Balen 2010: 92), which suggests that the above-ground apsidal structures from Vučedol-Gradac should be ascribed to the Kostolac culture (Tasić 1979: 249; Nikolić 2000: 42-43, Balen 2002; 2010: 92). An isolated phase of the Kostolac culture was defined at Vučedol-vinograd Streim, in a layer that was about 80 cm thick and full of soot and ash, pieces of daub, and numerous finds of pottery, river shells and knapped stone artifacts (Balen 2010: 92). This position, despite the younger phases of constructions that destroyed Kostolac structures, revealed traces of intense habitation, and the finds point to the existence of at least two phases of construction in trench V-87 (Balen 2005a; 2010: 93). Based on the data available so far, two hypotheses were developed about the organization of the Kostolac settlement:

a) Within the Kostolac settlement, individual households covered a significantly larger area than those of the Vučedol culture that took up less than 100 m2 on average (Forenbaher 1995: 22, 23; Balen 2005a: 34, 35; 2010: 93),

b) The Kostolac settlement was orientated more towards the central part of the plateau, unlike the Vučedol one that gravitated towards its peripheral parts (Balen 2010: 93).

The Kostolac layer at Sarvaš was not defined during the first archaeological excavations, but it was later established that the younger phase of the Baden culture (at the depth of 4 to 3.20 m), which had been recorded at the time, could, in fact, be ascribed to the Kostolac culture (Balen 2005; 2010: 93; Rajković & Balen 2016). The existence of such a layer is also attested to by finds discovered prior to 1942 (Hoffiler 1938: Pl. 9; Balen 2010: 93; Rajković & Balen 2016), as well as by finds of apsidal houses the likes of which were ascribed to the Kostolac phase of habitation at Vučedol (Tasić 1979: 249; Nikolić 2000: 42-43, Balen 2002; 2005a; 2010: 92, 93).

Na većini lokaliteta pripisanih kostolačkoj kulturi otkrivene su strukture iz kojih je moguće iščitati isključivo horizontalnu stratigrafiju naselja, a kao jedno od najznačajnijih valja izdvojiti Slavču kod Nove Gradiške gdje se već godinama provode sustavna arheološka istraživanja (Skelac 1997: 220-223; Vrdoljak & Mihaljević 1999: T.3, T.4; Mihaljević 2000: T.1; 2004: 29; 2005: 39-40; 2006:54; 2007: 76; 2008: 94-95; 2009: 126-127; 2010: 88-89; 2011: 120-121; 2012: 115; 2013: 126-127; 2014: 82). Ondje je, između ostalog, 1997. godine pronađena jama 1, nepravilnog trolisnog oblika, koja je sadržavala veću količinu kućnog lijepa s tragovima pruća, vjerojatno od zidne konstrukcije koja nije očuvana (Skelac 1997: 220; Balen 2010: 94). U slučaju ostalih nalazišta kostolačke kulture, uglavnom se radi o sporadičnim nalazima. Primjerice, na lokalitetu Vukovar-Lijeva bara pronađeni su ostaci ognjišta s grijalicama koji bi mogli pripadati kostolačkoj kulturi (Demo 1996: 29-31, sl. 15; Balen 2010: 93, 94).

U novijim istraživanjima na trasi autoceste Beli Manastir-Osijek-Svilaj otkrivena su tri položaja na prostoru Đakovštine (Đakovo-Franjevac; Wiewegh & Revald-Radolić 2007: 9; Balen 2008; Balen 2010: 104; 2011; Kaznica-Rutak; Hršak & Pavlović 2007: 17; Balen 2010: 104; Hršak 2014: 47; i Petrijevci-Verušed; Filipec et al. 2009a: 47; Balen 2010: 105) te dva položaja u Baranji (Novi Čeminac-Jauhov salaš; Balen et al. 2015; Balen et al. 2016; Đukić 2016; i Novi Bolman-Grablje; Nodilo 2016).

Najveće istraživano i u potpunosti objavljeno naselje definirano je na lokalitetu Đakovo-Franjevac (Balen 2011), stoga ono predstavlja najbolji poznati primjer za proučavanje arhitekture i organizacije naselja kostolačke kulture. Naselje na Franjevcu zauzimalo je površinu od 36,000 m^2, a od arheoloških struktura kostolačke kulture definirani su uglavnom višećelijski objekti ovalnog ili izduženog oblika, zatim plitke okrugle ili ovalne jame (primarno spremišta, sekundarno otpadne jame), dugački i uski kanali te stupovi koji su mogli služiti za pridržavanje nadzemnih konstrukcija (nadstrešnica?) ili su bili dijelovi ograda oko kuća ili prostora namijenjenih za čuvanje stoke (Balen 2008; 2010: 94; 2011). Posebno su zanimljivi nalazi većih ukopanih prostora (zemunica?) nepravilna ovalnog oblika s više izdvojenih manjih prostora (primjerice, SJ 160/161, Sl. 1) čija je namjena nejasna zbog izostanka rupa od stupova koje bi upućivale na postojanje nadzemnih konstrukcija te činjenice da je u obje strukture ustanovljen veliki broj jamskih prostora nejednake dubine i veličine što, uz ljudske i životinjske ukope pronađene uz SJ

Most sites ascribed to the Kostolac culture yielded structures that only allow for the reconstruction of horizontal settlement stratigraphy, and one of the most important ones is Slavča near Nova Gradiška that has been systematically excavated for years (Skelac 1997: 220-223; Vrdoljak & Mihaljević 1999: Pl. 3, Pl. 4; Mihaljević 2000: Pl. 1; 2004: 29; 2005: 39-40; 2006:54; 2007: 76; 2008: 94-95; 2009: 126-127; 2010: 88-89; 2011: 120-121; 2012: 115; 2013: 126-127; 2014: 82). In 1997, the site, among other things, yielded pit 1, of an irregular trefoil shape, which contained a larger amount of daub with traces of wattle, probably parts of a wall that was not preserved (Skelac 1997: 220; Balen 2010: 94). In the case of other sites of the Kostolac culture, mostly sporadic finds have been discovered. For example, the site of Vukovar-Lijeva bara yielded traces of a hearth with heaters that could be ascribed to the Kostolac culture (Demo 1996: 29-31, fig. 15; Balen 2010: 93, 94).

The recent excavations conducted on the Beli Manastir-Osijek-Svilaj motorway revealed three positions in the area of Đakovo (Đakovo-Franjevac; Wiewegh & Revald-Radolić 2007: 9; Balen 2008; Balen 2010: 104; 2011; Kaznica-Rutak; Hršak & Pavlović 2007: 17; Balen 2010: 104; Hršak 2014: 47; and Petrijevci-Verušed; Filipec et al. 2009: 47; Balen 2010: 105), as well as two sites in the Baranja region (Novi Čeminac-Jauhov salaš; Balen et al. 2015; Balen et al. 2016; Đukić 2016; and Novi Bolman-Grablje; Nodilo 2016).

The largest, and fully published, settlement was discovered at the site of Đakovo-Franjevac (Balen 2011). Hence, it is the best known example that can be used to study the architecture and settlement organization of the Kostolac culture. The settlement at Franjevac spread over an area of 36,000 m2, and the archaeological structures ascribed to the Kostolac culture mostly include multicellular oval or elongated structures, shallow round or oval pits (initially storage, later waste pits), long narrow canals and post holes that could have supported above-ground structures (canopies?) or were parts of fences surrounding houses or areas where cattle was kept (Balen 2008; 2010: 94; 2011). Finds of larger dugout areas (pit-dwellings?) of irregular oval shape with several isolated smaller areas are especially interesting (for example, SU 160/161, Fig. 1). Their function is unclear due to the lack of post holes that would indicate the existence of above-ground constructions, and due to the fact that both structures contained large numbers of dugout areas of uneven depth and size that, along with human and animal burials from SU 160/161,

160/161, u potpunosti poništava mogućnost njihova korištenja u stambene svrhe (Balen 2010: 94; 2011). Izuzev ovih velikih struktura zanimljivi su i nalazi dugačkih uskih kanala koji vjerojatno predstavljaju ostatke samostojećih drvenih ograda koje su mogle služiti za štavljenje životinjske kože, što ukazuje da je južni dio naselja na lokalitetu Đakovo-Franjevac mogao biti korišten kao svojevrsni radionički centar za provođenje specijalizirane djelatnosti (Balen 2011: 86-87).

Pogrebni običaji

Na prostoru Republike Hrvatske dosad je pronađen samo mali broj grobova koji se sa sigurnošću mogu pripisati nosiocima kostolačke kulture. Radi se o paljevinskom ukopu u loncu koji je poklopljen zdjelom iz Iloka (Tomičić et al. 2008: 12; Balen 2010: 98) te inhumacijskim grobovima na lokalitetima Đakovo-Franjevac (Balen 2010; 2011; Janković & Rajić Šikanjić 2011: 136-145) i Kaznica Rutak (Balen 2010: 98; 2011: 162) te Osijek (Šimić 1998: 235), Sarvaš (Tasić 1979: 250) i Vučedol (Tasić 1979: 250; Durman 1987: 24; 1987a: 35), gdje zbog konteksta nije jasno radi li se o badenskim ili kostolačkim grobovima (Balen 2010: 95; 2011; Horváth & Balen 2012: 16). Biritualnost ukopa je, prema nekim autorima, povezana s društvenim promjenama i razvojem metalurgije (Jovanović 1976: 140; Balen 2010: 96), a prisutna je i na širem prostoru rasprostiranja kulture (Nikolić 2000: 45-47; Balen 2010: 95), kako pokazuju pojedinačni skeletni grobovi unutar naselja na Gomolavi (Tasić 1979: 250-251; Balen 2010: 95), paljevinski grobovi na nalazištima Silajet kod Bijeljine i Padina u Gornjem Đerdapu (Jovanović 1976: 132-133; Balen 2010: 95), kao i dvojni način ukopa ustanovljen u grupi Coțofeni u Rumunjskoj (Dumitrescu 1960; Balen 2010: 95).

Kao i u slučaju organizacije naselja i arhitekture, i o grobnim ritualima kostolačke kulture, najviše podataka pruža lokalitet Đakovo-Franjevac, gdje je pronađeno nekoliko grobova, ukopanih u tri jame:

1) u cilindričnoj jami, koja je vjerojatno izvorno služila za odlaganje otpada, ukopan je muškarac starosti između 20 i 35 godina koji je položen na bok u ispruženom položaju, u smjeru istok-zapad, a uz njega su pokopane i dvije svinje. Ljudski ostaci datirani su u vrijeme između 2890. i 2830. god. pr. Kr. (Beta 241651; Balen 2011: tab. 6);

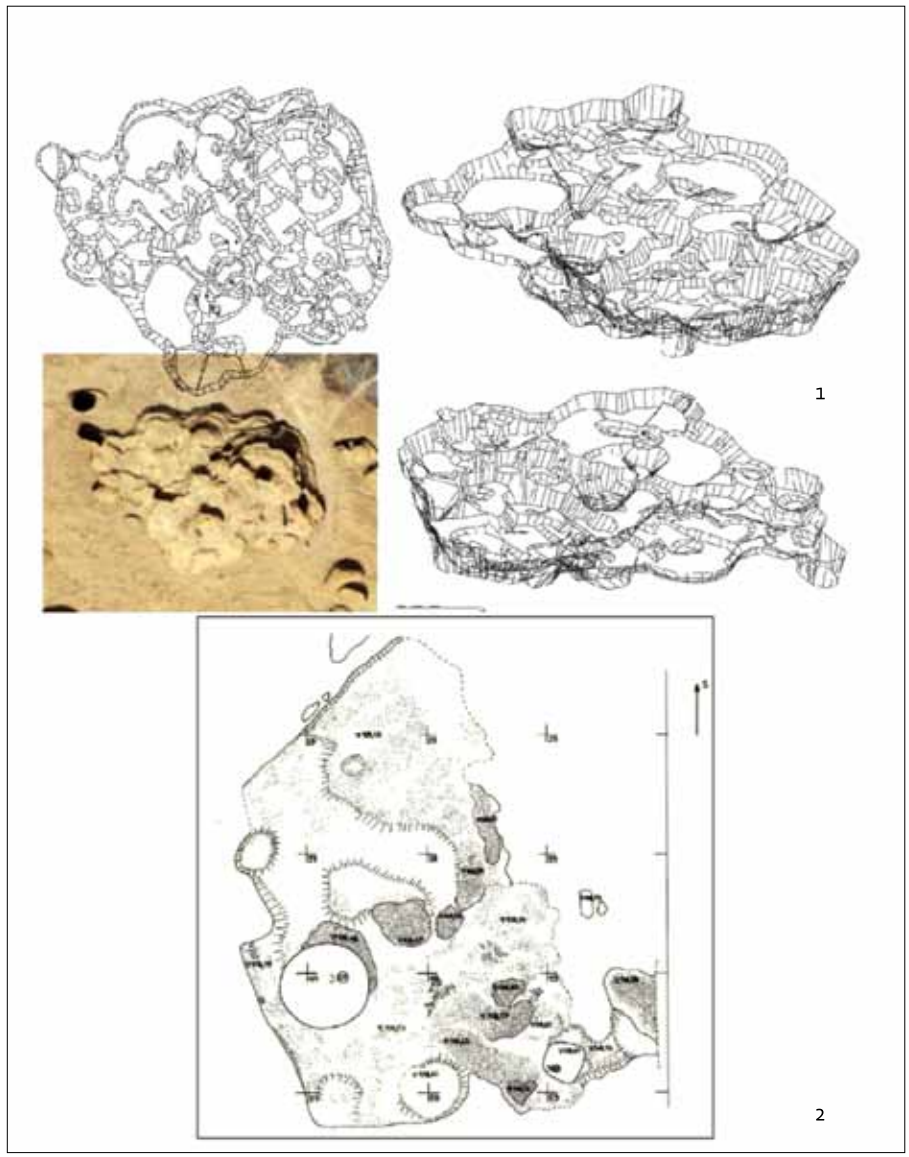
completely negate the possibility that these were used as residential areas (Balen 2010: 94; 2011). In addition to these large structures, interesting finds include long narrow canals that can probably be interpreted as the remains of detached fences which could have been used in hide processing, thereby indicating that the southern part of the settlement at Đakovo-Franjevac might have been used as a kind of workshop center for specialized activities (Balen 2011: 86-87).

Burial rites

So far, the territory of Croatia has yielded only a small number of burials that can definitively be ascribed to the Kostolac culture, including the incineration grave that was discovered in a pot covered by a bowl from Ilok (Tomičić et al. 2008: 12; Balen 2010: 98), and the inhumation graves from the sites of Đakovo-Franjevac (Balen 2010; 2011; Janković & Rajić Šikanjić 2011: 136-145), and Kaznica Rutak (Balen 2010: 98; 2011: 162), as well as those from Osijek (Šimić 1998: 235), Šarvaš (Tasić 1979: 250) and Vučedol (Tasić 1979: 250; Durman 1987: 24; 1987a: 35). In the case of the latter, it is, due to the lack of context, not clear if the graves should be ascribed to the Baden or the Kostolac culture (Balen 2010: 95; 2011; Horváth & Balen 2012: 16). The dual nature of burials is, according to some authors, connected to social change and the development of metallurgy (Jovanović 1976: 140; Balen 2010: 96). It has been recorded on the wider area occupied by the culture (Nikolić 2000: 45-47; Balen 2010: 95), as indicated by individual skeletal burials found within the settlement at Gomolava (Tasić 1979: 250-251; Balen 2010: 95), incineration graves from the sites of Silajet near Bijeljina and Padina in the Upper Đerdap region (Jovanović 1976: 132-133; Balen 2010: 95), as well as by the dualistic burial rites recorded in the Coțofeni group in Romania (Dumitrescu 1960; Balen 2010: 95).

Just like in the case of settlement organization and architecture, the burials rites of the Kostolac culture can also be studied in detail based on finds from Đakovo-Franjevac, where several graves were discovered in three pits:

1) A cylindrical pit, which was probably primarily used as a waste pit, contained the burial of a man between the ages of 20 and 35, who was laid on his side in an east-west direction, and who was found alongside two pig burials. The human remains were



Slika / Figure 1. Usporedni prikaz ukopane višećelijaste strukture i nadzemnog objekta kostolačke kulture
/ A comparative view of dugout multicellular structure and an aboveground house of the Kostolac culture
1. Đakovo-Franjevac, SJ 160/161 / Đakovo-Franjevac, SU 160/161 (prema / after: Balen 2011: 37);
2. Vučedol-vinograd Streim, objekt 24 / Vučedol-Vinograd Streim, structure 24 (prema / after: Balen 2005a: sl. / fig. 2).

2) u dva odvojena jamska prostora iste zemunice pronađeni su parcijalni ukopi, kalota djeteta starosti između 5 i 10 godina, apsolutno datirana u vrijeme između 3090. i 3050. god. pr. Kr. (Beta 233118; Balen 2011. tab.) te lubanja žene starosti između 35 i 50 godina, apsolutno datirana u vrijeme između 2900. i 2840. god. pr. Kr. (Beta 241652; Balen 2011. tab.);

3) sekundarni ukop triju lubanja također je pronađen u jami, a jedna od lubanja datirana je u vrijeme između 2900. i 2840. god. pr. Kr. (Beta 241653; Balen 2010: 96, 97; 2011. tab. 6; Janković & Rajić Šikanjić 2011: 136-145).

dated to the period between 2890 and 2830 BC (Beta 241651; Balen 2011: tab. 6);

2) Two separate dugout areas from the same large pit contained partial burials, the skullcap of a child, aged between 5 and 10, dated to the period between 3090 and 3050 BC (Beta 233118; Balen 2011: tab. 6), and the skull of a woman, aged between 35 and 50, dated to the period between 2900 and 2840 BC (Beta 241652; Balen 2011: tab. 6);

3) Secondary burials of three skulls were also discovered in a pit, and one of the skulls was dated to the period between 2900 and 2840 BC (Beta 241653; Balen 2010: 96, 97; 2011: tab. 6; Janković & Rajić Šikanjić 2011: 136-145).

Kao što je vidljivo iz prvog navedenog primjera s lokaliteta Đakovo-Franjevac, izuzev ljudskih ukopa, u naseljima kostolačke kulture česti su i ukopi životinja, bilo samostalno ili pak uz ljudske ostatke. Na Vučedolu su tako ustanovljeni ostaci psa, dva teleta te ovce ili koze (Jurišić 1990: 21, 23-24; Balen 2010: 98; 2011).

Materijalna kultura

Keramički nalazi

Keramički predmeti predstavljaju najbrojniju skupinu pokretnih arheoloških nalaza na svim zabilježenim lokalitetima kostolačke kulture, a najbrojniju skupinu među njima predstavljaju ulomci keramičkog posuđa koji su poslužili kao temelj za definiranje same kulture. Kao glavno obilježje ističe se bogat dekorativni stil upotpunjen bijelom inkrustacijom te motivi koji su izvedeni brazdastim urezivanjem, urezivanjem, kraćim zarezivanjem, ubadanjem te žigosanjem (korištenjem tupih alatki ovalnog, kružnog, pravokutnog i/ili potkovastog presjeka), a koji su grupirani u horizontalne i vertikalne zone i polja (Balen 2010: 98; 2011; Rajković & Balen 2016).

S obzirom na činjenice da gotovo nijedno nalazište kostolačke kulture na prostoru Hrvatske nije sustavno istraživano te da se najčešće radi o slučajnima nalazima ili nalazima iz starih istraživanja, do danas ne postoji usuglašena i dobro razvijena tipološka i kronološka razrada faza kostolačke kulture. Najčešći problemi s kojim se istraživači susreću jest miješanje arheoloških slojeva na samom terenu ili pak materijal koji je iskopan prije nego što je kultura definirana kao samostalna pojava. U velikom se broju slučajeva radi o miješanom materijalu badenske i kostolačke kulture na istom lokalitetu (Balen 2010: 100). Takva je situacija zabilježena na lokalitetima Osijek-Retfala (Šimić 1998: 236), Donja Vrba (Minichreiter 1991: 183-184; Lozuk 2000: 34) i Gornja Bebrina (Dimitrijević 1971: 149, sl. 1:1-2) kod Slavonskog Broda, Grabrovac kod Đakova (Pavlović & Bojčić 1981: 28; Pavlović 1984: 54, sl. 3:1-3), Aljmaš (Šimić 2001: 74), na jednom dijelu lokaliteta Vučedol-vinograd Streim (Težak-Gregl 1985: 29; 1986: 59) te u Kuševcu kod Đakova (Šimić 1995a: 14, 15).

As shown by the first example from Đakovo-Franjevac, in addition to human burials, settlements of the Kostolac culture also often contain animal burials, either individual or placed alongside human remains. Vučedol yielded the remains of a dog, two calves and a sheep or a goat (Jurišić 1990: 21, 23-24; Balen 2010: 98; 2011).

Material culture

Ceramic finds

Ceramic finds are the most numerous group of movable archaeological finds on all recorded sites of the Kostolac culture, and the most frequent among them are fragments of ceramic vessels that served as the base for defining the entire culture. Its main features are the rich decorative style filled with white incrustation, and motifs made by furrowed incising, incising, stabbing and stamping (by using blunt tools of an oval, round, rectangular and/or cross-sections in the shape of a horseshoe), and which are grouped in horizontal and vertical zones and fields (Balen 2010: 98; 2011; Rajković & Balen 2016).

Considering the fact that no site of the Kostolac culture in Croatia has been systematically excavated, and that chance finds and finds from old excavations are the most common, there is, to this day, no unified and well-developed typological and chronological division of the phases of the Kostolac culture. The most common problems encountered by researches pertain to the fact that archaeological layers at the sites are mixed, and that the studied material originates from excavations that took place before the culture was defined as a separate occurrence. In a large number of cases, material of the Baden and Kostolac cultures appears at the same site (Balen 2010: 100). Such cases were recorded at Osijek-Retfala (Šimić 1998: 236), Donja Vrba (Minichreiter 1991: 183-184; Lozuk 2000: 34) and Gornja Bebrina (Dimitrijević 1971: 149, fig. 1:1-2) near Slavonski Brod, Grabrovac near Đakovo (Pavlović & Bojčić 1981, 28; Pavlović 1984: 54, fig. 3:1-3), Aljmaš (Šimić 2001: 74), one part of Vučedol-vinograd Streim (Težak-Gregl 1985: 29; 1986: 59), and in Kuševac near Đakovo (Šimić 1995a: 14, 15).

Osim miješanja slojeva, i ukras na keramičkim posudama predstavlja svojevrstan izazov u određivanju kulturne pripadnosti materijala. Primjerice, na zdjelama iz Sarvaša, Bogdanovaca, Grabrovca, Cerića te Vukovara-Lijeve bare (Balen 2002a: Sarvaš, T. 4: 3; Bogdanovci, T. 9: 1; Grabrovac, T. 9: 2, 4; Cerić, T. 7: 1-4; T. 8: 3.; Vukovar-Lijeva Bara, T. 1: 2-7, T. 2: 5, T. 3: 4, 5; 2010: 99) ukras je sličan onome badenske kulture, ali je izveden žigosanjem i/ili ubadanjem, a ne dubokim urezivanjem (Balen 2010: 100), što sugerira da se radi o ranoj fazi kulture kada su jaki badenski utjecaji. Suprotno tomu, materijal s nalazišta Slavča i Ašikovci te dio materijala iz Dalja i Cerića pripisani su kasnoj fazi kulture jer je ukras pozicioniran unutar trake oko najšireg dijela posude, a učestalo se pojavljuju bikonične zdjele i šalice (terine) te žigosane kružnice (minirozete) kakve su karakteristične za keramografiju vučedolske kulture (Stapelfeldt 1997; Balen 2010: 99, 100). U skladu s predloženim stupnjevanjem kulture s obzirom na badenske i vučedolske utjecaje, revizijom materijala s lokaliteta Sarvaš zaključeno je da je kostolački horizont na Sarvašu prisutan od svojih ranijih faza, kada je vidljiva povezanost s badenskom kulturom, preko klasične faze te kasnih stupnjeva koje karakterizira povezanost s vučedolskim načinom ukrašavanja predmeta (Rajković & Balen 2016: 71). S druge pak strane, analize keramičkog materijala s lokaliteta Đakovo-Franjevac i Gomolava pokazuju da se niti tipologija oblika keramičkih posuda, niti način ukrašavanja zapravo nisu mijenjali kroz duže razdoblje (Petrović 1984: 33-34; 1986: 24; Balen 2010: 100; 2011), odnosno da nisu dovoljno kronološki osjetljivi da bi se isključivo na temelju njih moglo odrediti pojedine stupnjeve kulture.

U novije vrijeme na eneolitičkoj su keramici provođene analize sastava inkrustacije koje mogu pomoći pri kronološkoj diferencijaciji kultura. Naime, rezultati analiza pokazuju da postoje jasne kronološke i prostorne razlike u odabiru primarnih materijala korištenih za inkrustiranje posuda - u kostolačkoj kulturi tako se koriste kalcit, vapnenac i namjerno drobljeni kvarc, dok se u vučedolskoj javljaju aragonit i ponekad kvarc (Sofaer & Roberts 2016: 479-496). Ovim je analizama utvrđeno da, u kontekstu kostolačke kulture, inkrustacija nije umetana prije, već nakon pečenja posuda, ali da je kalcit korišten u njezinu sastavu mogao prethodno biti termički obrađivan (Sofaer & Roberts 2016: 479-496), što pak ukazuje na potrebu za podrobnim planiranjem i provedbom procesa ukrašava-

Apart from mixed layers, the decorations on ceramic vessels pose a specific challenge in the cultural attribution of excavated material. For example, bowls from Sarvaš, Bogdanovci, Grabrovac, Cerić and Vukovar-Lijeva bara (Balen 2002a: Sarvaš, Pl. 4: 3; Bogdanovci, Pl. 9: 1; Grabrovac, Pl. 9: 2, 4; Cerić, Pl. 7: 1-4; Pl. 8: 3; Vukovar-Lijeva Bara, Pl. 1: 2-7, Pl. 2: 5, Pl. 3: 4, 5; 2010: 99) have decorations similar to those of the Baden culture, but which were made by stamping and/or stabbing, and not deep incising (Balen 2010: 100), suggesting that the sites should be dated to the early phase of the culture when Baden influenced were strong. Contrary to that, the material from Slavča and Ašikovci, and some material from Dalj and Cerić, was ascribed to the late phase of the culture because the decorations are placed within a band that surrounds the widest part of the vessel, and frequent vessel forms include biconical bowls and cups (the terina type) decorated by stamped circles (mini rosettes) that are characteristic of the pottery production of the Vučedol culture (Stapelfeldt 1997; Balen 2010: 99, 100). In accordance with the proposed classification of the culture with respect to the Baden and Vučedol cultures, the reevaluation of material from Sarvaš revealed that the Kostolac culture was present at the site from its earlier phases, as indicated by similarities with the Baden culture, during its classic phase, and during its late phase that is characterized by similarities to the decorative style of the Vučedol culture (Rajković & Balen 2016: 71). On the other hand, however, analyses of pottery material from Đakovo-Franjevac and Gomolava show that neither the typology of ceramic objects, nor the mode of decorating, changed over a longer period of time (Petrović 1984: 33-34; 1986: 24; Balen 2010: 100; 2011), meaning that they are not chronologically definitive enough to be used as the sole basis for determining individual phases of the culture.

In recent years, analyses of incrustation composition have been conducted on Eneolithic pottery that can help with the chronological differentiation of cultures. Namely, the result of the analyses show that there are clear chronological and spatial differences in the choice of primary materials used in the production of incrustation - the Kostolac culture used calcite, limestone and intentionally crushed quartz, while the Vučedol culture used aragonite and occasionally quartz (Sofaer & Roberts 2016: 479-496). These analyses helped establish that, in the context of the Kostolac culture, incrustation was not inserted before, but after the

nja posuda koji nije uključivao samo umjetničko osmišljavanje motiva, već i konkretna tehnološka znanja i vještine. Slična situacija zabilježena je i analizama materijala s neolitičkog nalazišta Vors u Mađarskoj (Gherdán et al. 2005: 103-108).

Prema namjeni posuda obično se izdvajaju posude za kuhanje (termičku obradu sadržaja), posude za skladištenje hrane ili tekućine te posude za serviranje/konzumaciju hrane (Miloglav 2014: 205), a tipološkim analizama materijala s hrvatskih nalazišta ustanovljeni su sljedeći tipovi (Balen 2010: 98-100):

1. zdjele (posude za serviranje/konzumaciju hrane; Nalazi potječu s lokaliteta Đakovo-Franjevac; Balen 2010: kalotaste zdjele, zdjele izvučena vrata: T. 24: 1-5; T. 26: 1-3; T. 28: 1; T. 29: 2-3; izdužene, ovalne zdjele zaobljena tijela, blago uvučena ruba i ravna dna: T. 28: 3; blago bikonične zdjele s trakastom ručkom na prijelomu: T. 30: 4; Balen 2011):

a) kalotaste zdjele,
b) zdjele izvučena vrata,
c) izdužene, ovalne zdjele zaobljena tijela, blago uvučena ruba i ravna dna,
d) blago bikonične zdjele s trakastom ručkom na prijelomu;

2. izdužene posude (njem. Fischbutte; nalazi potječu s lokaliteta Vukovar-Lijeva bara, Cerić, Osijek i Đakovo-Franjevac (Balen 2002a: 155; 2010: 99; 2011);

3. lonci (posude za kuhanje i skladištenje hrane; Balen 2010: T. 30: 1):

a) zaobljeni lonci,
b) lonci S-profilacije,
c) posude s uskim otvorom i dvije ručke na trbuhu (amfore);

4. šalice (posude za serviranje/konzumaciju hrane; Balen 2010: T. 28: 2):

a) konične šalice,
b) šalice konkavnog tijela s ručkom koja nadvisuje rub.

Od svakodnevnih uporabnih predmeta u kontekstima kostolačke kulture pronađeni su različiti tipovi keramičkih pršljenova, kalemovi, veći utezi kružnog ili piramidalnog oblika koji su često nalaženi kraj ognjišta (Marković 1994: 105, T. 31: 11; Skelac 1997: T. 4: 1, 9) te žlice s nastavkom za držanje (Balen 2010: 100).

vessel was fired, but that the calcite used in its production could have previously been thermally processed (Sofaer & Roberts 2016: 479-496), suggesting that there was a need for thorough planning and executing the process of decorating vessels, which required not only the artistic skill to develop the motifs, but also precise technological knowledge and skills. A similar situation was recorded through analyses of material from the Neolithic site of Vors in Hungary (Gherdán et al. 2005: 103-108).

When it comes to function, vessels are usually divided into those for cooking (thermal processing of the content), vessels used for storing solids or liquids, and vessels used for serving/consuming food (Miloglav 2014: 205). The typological analyses of material from Croatian sites revealed the following types (Balen 2010: 98-100):

1. bowls (vessels used for serving/consuming food; Finds from Đakovo-Franjevac; Balen 2010: calotte-shaped bowls, bowls with an outward-facing rim: Pl. 24: 1-5; Pl. 26: 1-3; Pl. 28: 1; Pl. 29: 2-3; elongated, oval bowls with a rounded body, a slightly inverted rim and a straight base: Pl. 28: 3; slightly biconical bowls with a ribbon-like handle on the transition of the body: Pl. 30: 4; Balen 2011):

a) calotte-shaped bowls,
b) bowls with an outward-facing rim,
c) elongated, oval bowls with a rounded body, a slightly inverted rim and a straight base,
d) slightly biconical bowls with a ribbon-like handle on the transition of the body;

2. elongated vessels (Ger. Fischbutte; finds from Vukovar-Lijeva bara, Cerić, Osijek and Đakovo-Franjevac (Balen 2002a: 155; 2010: 99; 2011);

3. pots (vessels for cooking and storing food; Balen 2010: Pl. 30: 1):
a) rounded pots,
b) pots with an S-profile,
c) vessels with a narrow opening and two handles on the body (amphorae);

4. cups (vessels used for serving/consuming food; Balen 2010: Pl. 28: 2):
a) conical cups,
b) cups with a concave body and a handle that goes above the rim.

Everyday finds of profane character from sites of the Kostolac culture include different types of ceramic whorls, spools, larger round or pyramidal weights that often appear next to hearths (Marković 1994: 105, Pl. 31: 11; Skelac 1997: Pl. 4: 1, 9), and spoons with protrusions for hafting (Balen 2010: 100).

Slika / Figure. 2. Posude kostolačke kulture s nalazišta Đakovo-Franjevac / Vessels of the Kostolac culture from the site of Đakovo-Franjevac (foto / photo: I. Krajcar).

Predmeti kultne namjene

Predmeta čija funkcija bi mogla biti kultnog ili religioznog karaktera u kontekstima kostolačke kulture nema mnogo, ali valja istaknuti idol iz Vukovara (Dorn 1976: 13-14) te ulomke sedlastih žrtvenika iz Cerića (Dimitrijević 1979: T.2:11), Dalja (Balen 2002a: 155), Franjevca (Balen 2011: T.30:3) i novoistraženog lokaliteta Novi Čeminac-Jauhov salaš (Sl. 3) (Balen et al. 2015; Balen et al. 2016; Đukić 2016), a koji ukazuju na moguće postojanje kulta plodnosti i štovanje rogatih životinja (Balen 2010: 101). Raritet predstavlja i nalaz četvrtaste posude s ušicama za ovjes te ulomak posude s likom oranta izvedenim brazdastim urezivanjem s lokaliteta Đakovo-Franjevac (Balen 2010: posuda, T. 29: 1; orant, T.30:2).

Stilski i geografski najbliža paralela ovom nalazu je prikaz na eneolitičkoj četvrtastoj posudi s nalazišta Szelevény u Mađarskoj (Balen 2011: 97; Horváth & Balen 2012: 10). Neki autori smatraju da se na spomenutom ulomku iz Franjevca nalaze prikazi dvaju likova čiji se, dinamično prikazani, položaji tijela mogu interpretirati kao plesni pokreti, što pak otvara mogućnosti mnogo složenijih razmatranja i interpretacija takvih pretpovijesnih antropomorfnih prikaza (Turčin 2018).

Cult-related finds

Finds whose function could be cult-related or religious are not frequently discovered in the contexts of the Kostolac culture, but some are noteworthy – a figurine from Vukovar (Dorn 1976: 13-14) and fragments of saddle-like altars from Cerić (Dimitrijević 1979: Pl. 2:11), Dalj (Balen 2002a: 155), Franjevac (Balen 2011: Pl. 30:3) and the newly-excavated site of Novi Čeminac-Jauhov salaš (Fig. 3) (Balen et al. 2015; Balen et al. 2016; Đukić 2016), and which indicate the possible existence of a fertility cult and the worship of horned animals (Balen 2010: 101). More unique finds include a square vessel with small tubular handles for hanging, and a fragment of a vessel depicting an orant made by furrowed incising from Đakovo-Franjevac (Balen 2010: vessel, Pl. 29: 1; orant, Pl. 30:2).

The stylistic and geographically closest analogy for this find is an Eneolithic square vessel from Szelevény in Hungary (Balen 2011: 97; Horváth & Balen 2012: 10). Some authors feel that the fragment from Franjevac contains a depiction of two characters, whose dynamic positions of the body could be interpreted as dance moves. This creates a possibility to study and interpret such prehistoric anthropomorphic depictions in a significantly more complex way (Turčin 2018).

Slika / Figure 3 Sedlasti keramički žrtvenik s lokaliteta Novi Čeminac-Jauhov salaš / A saddle-like ceramic altar from the site of Novi Čeminac-Jauhov salaš (foto / photo: I. Krajcar).

Osim predmeta, i neke strukture na lokalitetu Đakovo-Franjevac ukazuju na moguće ritualne funkcije, primjerice uz ukopanu strukturu SJ 160/161 (Sl. 1) pronađen je ukop čovjeka s dvije životinje, a u samoj zemunici, u dva odvojena jamska prostora, i dva ukopa lubanja (Balen 2008; 2010: 94; 2011).

Kameni nalazi

Lomljene kamene alatke predstavljaju čest nalaz na kostolačkim lokalitetima, a detaljnije analize napravljene su na materijalu s položaja Vučedol-vinograd Streim (Balen et al. 2015: sl. 1, 14; Balen 2005a: 33; 2010: 93), Đakovo-Franjevac (Bunčić 2011) i Slavča kod Nove Gradiške (Šošić & Karavanić 2004).

U kostolačkom sloju na lokalitetu Vučedol-vinograd Streim, a u blizini dvaju nadzemnih objekata, pronađene su dvije veće nakupine kamenih jezgri za izradu sječiva, od kojih neke jesu, a neke nisu obrađivane lomljenjem (Balen 2005a: 33; 2010: 93). Samim svojim položajem, ovi skupovi nalaza ukazuju na moguću obradu sirovine unutar jednog domaćinstva, a činjenica da je pronađen i velik broj oblutaka sugerira da nije korišten kamen iz primarnog ležišta te da se možda radi o skupljanju sirovine na jednom mjestu za daljnju obradu ili transport (Balen 2005a: 33; 2010: 93 102). Za nalaze s lokaliteta Slavča, koji uključuju jezgre, sječiva, šila/dubila, grebala i strugala (Skelac 1999: 15: Vrdoljak & Mihaljević 1999: 46, T.4: 2-6; Balen 2010:

Other than objects, some structures from Đakovo-Franjevac also indicate a possible religious function. For example, a human and double animal burial was discovered next to the dugout structure SU 160/161 (Fig. 1), and the pit itself also yielded two skulls that were discovered in two separate parts of the structure (Balen 2008; 2010: 94; 2011).

Stone finds

Chipped stone tools are a frequent find at sites of the Kostolac culture, and more detailed analyses were conducted on material from Vučedol-vinograd Streim (Balen et al. 2015: fig. 1, 14; Balen 2005a: 33; 2010: 93), Đakovo-Franjevac (Bunčić 2011) and Slavča near Nova Gradiška (Šošić & Karavanić 2004).

The Kostolac layer at Vučedol-vinograd Streim, in the vicinity of two above-ground structures, yielded two larger concentrations of cores for blade production, some of which were, and some of which were not processed by knapping (Balen 2005a: 33; 2010: 93). By their position, these assemblages suggest that raw material could have been processed within a single household, and the fact that a large number of pebbles was recorded suggests that the used stone was not obtained from primary sources, and was possibly collected in one place for future processing or transport (Balen 2005a: 33; 2010: 93 102). The Neolithic and Eneolithic material from Slavča (Skelac 1999: 15: Vrdoljak & Mihaljević 1999: 46, Pl. 4: 2-6; Balen 2010: 100) was comparatively analyzed, and the results show that Eneolithic blades were made outside the settlement or were obtained through trade (Šošić & Karavanić 2004: 37-38). The material fits into the model which states that easily available raw materials were used (regardless of quality) during the Late Neolithic and the Early Eneolithic of Transdanubia, and that a wider range of raw materials from the broader region was used during the Middle and the Late Neolithic (Kaczanowska & Kozlowski 1997; Šošić & Karavanić 2004: 38). The material from Đakovo-Franjevac also fits into the described model, and an emphasis should be put on the distinct sickle gloss on chipped stone tools, which is created through the cutting of plants, and which was recorded on a total of 161 blades, i.e. blade fragments (Bunčić 2011; Đukić 2014: 32).

100), napravljena je komparativna analiza neolitičkog i eneolitičkog materijala, a rezultati pokazuju da su u eneolitiku sječiva izrađivana izvan naselja ili da su pribavljana trgovinom (Šošić & Karavanić 2004: 37-38). Sam materijal uklapa se u model prema kojem se, na prostoru Transdanubije, tijekom kasnog neolitika i ranog eneolitika koriste lako dostupne lokalne sirovine (bez obzira na kvalitetu), dok u srednjem i kasnom eneolitiku ponovno dolazi do iskorištavanja raznolikijih sirovina iz šire regije (Kaczanowska & Kozlowski 1997; Šošić & Karavanić 2004: 38). Materijal s lokaliteta Đakovo-Franjevac također se uklapa u navedeni model, a kao posebnu zanimljivost valja istaknuti karakterističan sjaj srpa na lomljenim litičkim oruđima koji nastaje sječom biljaka, a koji je ustanovljen na čak 161 sječivu, odnosno njihovim ulomcima (Bunčić 2011; Đukić 2014: 32).

Glačane kamene alatke javljaju se u znatno manjem broju od lomljenih i onih s abrazivnom površinom, a najčešće se radi o sjekirama s rupom za nasad drška koje su, kako pokazuju analize, za vrijeme svojeg upotrebnog perioda više puta preoblikovane i ponovno korištene (Balen 2010: 100; 2011).

Među kamenim alatkama s abrazivnom površinom najčešće se javljaju žrvnjevi i rastirači, a nešto rjeđe brusovi (Balen 2011; Đukić 2014: 32).

Metalni nalazi

Iako se radi o bakrenodobnoj pojavi, metalni nalazi kostolačke kulture nisu mnogobrojni. U prvoj većoj sintezi iz 1979. godine navode se nalazi dvaju bakrenih šila s Gomolave te dvije cijele i nekoliko fragmentiranih igala iz Pivnice (Tasić 1979: 257-258). U novijim istraživanjima na prostoru istočne Hrvatske, na lokalitetu Đakovo-Franjevac pronađeno je šest bakrenih predmeta - tri šila, dva moguća ulomka šila i jedan mogući ulomak bodeža (Balen 2010: 100). Spomenuta šila su četvrtastog presjeka s kratkim trnom, a očuvani ulomak bodeža ima očuvanu zaobljenu prikovnu pločicu s tri zakovice (Balen 2011: 121).

Osim metalnih predmeta, posebno valja istaknuti i nalaz četvrtastog keramičkog kalupa za lijevanje metalnih dlijeta s lokaliteta Osijek-Frigis 1 koji je pronađen na dnu jame, ispod veće količine ulomaka velikih keramičkih posuda koji su bili horizontalno poslagani u dva reda kao neka vrsta obloge (Tresić Pavičić 2014: 24).

Polished stone tools are nowhere near as frequent as knapped and abrasive ones, and most often include axes with holes for hafting that were, as indicated by analyses, reshaped and reused several times during their period of use (Balen 2010: 100; 2011).

Stone tools with an abrasive surface most often include grindstones and handstones, and, seldom, whetstones (Balen 2011; Đukić 2014: 32).

Metal finds

Although it is a Copper Age occurrence, metal finds of the Kostolac culture are rare. The first large synthesis, published in 1979, listed two copper awls from Gomolava, as well as two complete and several fragmented needles from Pivnica (Tasić 1979: 257-258). The recent excavations from eastern Croatia, i.e. the site of Đakovo-Franjevac, yielded six copper finds – three awls, two possible awl fragments and one possible fragment of a dagger (Balen 2010: 100). The awls have a square cross-section and a short tang, and the preserved dagger fragment has a round hilt-attachment plate and three rivets (Balen 2011: 121).

Other than metal finds, it is important to mention the find of a square ceramic mold for casting awls from Osijek-Frigis 1, which was discovered at the bottom of a pit under a large amount of pottery fragments that were horizontally arranged in two rows as a sort of lining (Tresić Pavičić 2014: 24).

Slika / Figure 4. Keramički kalup, Osijek-Frigis / Ceramic mold, Osijek-Frigis (foto / photo: I. Krajcar).

Koštani nalazi

Koštane alatke nisu česta vrsta nalaza na kostolačkim lokalitetima, moguće zbog toga što ih je često moguće definirati tek podrobnom analizom životinjskog osteološkog materijala. Na lokalitetu Đakovo-Franjevac očuvano je osam koštanih spatula, šila i ulomaka alatki te nekolicina alatki izrađenih od jelenjih rogova (Hincak & Mihelić 2011: 135). Koštana šila najčešći su tip nalaza (Balen 2010: 100), a jedno je pronađeno i na lokalitetu Novi Čeminac-Jauhov salaš (Balen et al. 2015: 14).

Privreda[3]

Privredu kostolačke kulture moguće je prilično jasno rekonstruirati analizom životinjskih osteoloških te arheobotaničkih ostataka pronađenih u različitim strukturama.

Osteološke analize provedene na materijalu s prostora Republike Hrvatske pokazuju da se prehrana kostolačke populacije na položaju Vinograd-Streim temeljila na uzgajanim životinjama (goveda, ovce/koze, svinje), te u manjoj mjeri, na divljim životinjama (jelen, srna) i pticama (Miščin 1986; Jurišić 1988: 20; Malez 1995: 28, tab. 1; Balen 2005a; 2010: 101), ali da su korištene i slatkovodne ribe (šaran, som, štuka) i školjke (Paunović & Lajtner 1995: 34, sl.1; Balen 2010: 101). Slična situacija zabilježena je i na lokalitetu Gomolava gdje su ustanovljeni ostaci goveda, ovaca, koza i svinja (Tasić 1979: 260; Blažić 1986: 42; Balen 2010: 101) te jelena, divlje svinje i srne (Blažić 1986: 42; Balen 2010: 101).

Arheobotaničke analize provedene su na manjem broju kostolačkih lokaliteta. Na lokalitetu Đakovo-Franjevac ustanovljeni su ostaci jednozrne pšenice (*T.monococcum),* graška *(Pisum sativum),* kukavičice (*Lathyrus sativus)* i divljih vrsta poput ovsika (*Bromus*)*,* bazge *(Sambucus sp.)* i drijena (*Cornus mas)*, a koji se uklapaju u standardnu sliku eneolitičke ekonomije srednje i jugoistočne Europe (Balen 2010; 2011; Đukić 2014: 30, 31). Slična je situacija zabilježena i na Gomolavi, gdje je ustanovljeno korištenje dvozrne pšenice, ječma i, nešto rjeđe, prosa, mahuna i leće (van Zeist 1979: 16, T.1; Jovanović 2004: 108-109; Balen 2010: 102).

Biljke su, osim u ljudskoj i životinjskoj prehrani, mogle biti korištene i u druge svrhe. U tom je kontekstu posebno zanimljiv nalaz drijena (*Cornus mas*) koji predstavlja izuzetno otpornu, ali savit-

3 Više o eneolitičkoj privredi vidi u Reed, ovo izdanje.

Bone finds

Bone tools are not a frequent kind of find on sites of the Kostolac culture, possibly because it is often possible to define them only through a more detailed analysis of animal osseous material. The site of Đakovo-Franjevac yielded eight spatulas, awls and tool fragments, and several tools made of deer antlers (Hincak & Mihelić 2011: 135). Bone awls are the most common type of find (Balen 2010: 100), and one was also discovered at Novi Čeminac-Jauhov salaš (Balen et al. 2015: 14).

Economy[3]

The economy of the Kostolac culture can be quite clearly reconstructed through the analysis of animal osseous and archaeobotanical remains discovered in different structures.

Analyses of osseous material conducted on material from Croatia show that the diet of the Kostolac population at Vinograd-Streim was based on cultivated (cattle, sheep/goats, pigs) and, to a lesser extent, wild animals (deer, roe), birds (Miščin 1986; Jurišić 1988: 20; Malez 1995: 28, tab. 1; Balen 2005a; 2010: 101), as well as fresh water fish (carp, catfish, pike) and shells (Paunović & Lajtner 1995: 34, fig. 1; Balen 2010: 101). A similar situation was also recorded at Gomolava, which yielded the remains of cattle, sheep, goats and pigs (Tasić 1979: 260; Blažić 1986: 42; Balen 2010: 101), as well as deer, wild board and roe (Blažić 1986: 42; Balen 2010: 101).

Archaeobotanical analyses were conducted on a smaller number of sites of the Kostolac culture. The site of Đakovo-Franjevac yielded remains of einkorn (*Pl. monococcum),* peas *(Pisum sativum),* grass peas (*Lathyrus sativus)*, and wild species like brome grasses (*Bromus*)*,* elder *(Sambucus sp.)* and Cornelian Cherry (*Cornus mas)*, all of which fit into the known picture of Eneolithic economy of central and southeastern Europe (Balen 2010; 2011; Đukić 2014: 30, 31). A similar situation was recorded at Gomolava, which yielded traces of emmer, barley and, in smaller quantities, millet, green beans and lentils (van Zeist 1979: 16, Pl. 1; Jovanović 2004: 108-109; Balen 2010: 102).

Apart from in the diet of people and animals, plants could also have been used for other purposes. In that sense, the discovery of Cornelian Cherry (*Cornus mas*) is especially interesting because the plant

3 For more on Eneolithic economy, see Reed, this publication.

ljivu i izdržljivu sirovinu za izradu držaka za razne vrste alata. U Ljubljanskom Barju pronađena je eneolitička glačana kamena sjekira-čekić s rupom za nasad, a, zahvaljujući izuzetno velikoj vlazi, očuvan je i ulomak drška, izrađen upravo od drveta drijena (Tolar et al. 2008: 49-56).

Zanimljive spoznaje o privredi kostolačkih populacija dobivene su kemijskim analizama stijenki posuda. Primjerice, analizom posude iz Franjevca ustanovljeni su ostaci pčelinjeg voska (do kojeg je, kako se pretpostavlja, populacija dolazila sakupljanjem iz prirode; eng. *honey hunting*; Needham & Evans 1987: 26-27; Bogaard et al. 2005: 505; Balen 2010: 102), dok su u maloj posudici s ušicom za ovjes ustanovljeni tragovi ulja ili masnoće biljnog ili životinjskog porijekla (Balen 2010: 99).

Na temelju dosad provedenih analiza biljnih i životinjskih ostataka, čini se da su se eneolitičke populacije na prostoru Hrvatske u jednakoj mjeri bavile poljoprivredom i stočarstvom (Giblin 2009; Giblin et al. 2013; Hoekman-Sites & Giblin 2012; Reed 2017: 1762), što sugerira da se odnos između zemljoradnje i stočarstva nije znatno promijenio uslijed društveno-ekonomskih i klimatskih promjena koje su se tada odvijale, iako su vjerojatno postojale diferencijacije između lokaliteta (Reed 2017: 1762).

is a very resilient, but also a very bendy and durable raw material used in the production of hafts for different types of tools. Ljubljansko Barje yielded an Eneolithic polished stone axe-hammer with a hole for hafting and, due to the extremely humid conditions, a fragment of the haft, made precisely from the wood of Cornelian Cherry (Tolar et al. 2008: 49-56).

The chemical analyses of vessel walls also provided interesting insight into the economy of the Kostolac populations. For example, the analysis of a vessel from Franjevac revealed traces of beeswax (which the population might have gathered from nature, i.e. *honey hunting*; Needham & Evans 1987: 26-27; Bogaard et al. 2005: 505; Balen 2010: 102), and an analysis of a small vessel with tubular handles yielded traces of oil or fat of plant or animal origin (Balen 2010: 99).

Based on the analyses of plant and animal remains that have been conducted so far, it seems that the Eneolithic populations from the territory of Croatia equally engaged in agriculture and animal husbandry (Giblin 2009; Giblin et al. 2013, Hoekman-Sites & Giblin 2012; Reed 2017: 1762), which suggests that the relation between agriculture and cattle-breeding had not significantly changed due to the social, economic and climate changes of the period, although there might have been variations between certain sites (Reed 2017: 1762).

Literatura / Bibliography

Balen, J. 2002, Topografija nalazišta kostolačke kulture u sjevernoj Hrvatskoj, *Vjesnik Arheološkog muzeja u Zagrebu* 3.s. XXXV, Zagreb, 35-52.

Balen, J. 2002a, Die Kostolac-Kultur in Kroatien, *Thraco-Dacica* XXIII, 1-2, Bucuresti, 153-170.

Balen, J. 2005, *Sarvaš – neolitičko i eneolitičko naselje,* Musei Archaeologici Zagrebiensis Catalogi et Monographiae Vol. II, Zagreb.

Balen, J. 2005a, Kostolački horizont na Vučedolu, *Opuscula archaeologica* 29, Zagreb, 25-38.

Balen, J. 2008, *Rezultati zaštitnih istraživanja na trasi autoceste Beli Manastir-Osijek-Svilaj,* katalog izložbe, Arheološki muzej u Zagrebu, Zagreb.

Balen, J. 2010, *Eneolitičke kulture na prostoru istočne Hrvatske*, doktorska disertacija, Sveučilište u Zagrebu.

Balen, J. 2010a, Đakovačko područje (zona Kuševac-Viškovci-Vučevci i Kešinci), *Hrvatski arheološki godišnjak* 6/2009, Zagreb, 13-15.

Balen, J. 2011, *Đakovo-Franjevac – kasnobakrenodobno naselje*, Musei Archaeologici Zagrebiensis Catalogi et Monographiae Vol. VII, Zagreb.

Balen, J. 2016, Beli Manastir-Ciglana, izložba *Tekuća arheološka istraživanja u Republici Hrvatskoj*, Zagreb.

Balen, J. 2016a, The Development of Eneolithic Cultures Between the Sava and the Drava Rivers, in: D. Davison, V. Gaffney, P. Miracle & J. Sofaer (eds), *Croatia at the Crossroads*, Arheopress, Oxford, 59-73.

Balen, J. 2018, Eneolitičke kulture na prostoru istočne Hrvatske", *Izdanja Hrvastkog arheološkog društva* sv. 31, Zagreb, 65-74.

Balen, J., Đukić, A., Ivanković, A, Mađerić, M. 2015, Položaj Jauhov salaš u Novom Čemincu", *Godišnjak ogranka Matice Hrvatske u Belom Manastiru* sv. 12, Beli Manastir,12-25.

Balen, J., Đukić, A., Boras, J. 2016, *Baština Baranje u Arheološkom muzeju u Zagrebu*, izložba, Zagreb.

Balen-Letunić, D. 1996, *Muzeopis... 1846-1996*, Arheološki muzej u Zagrebu, Zagreb.

Bankoff, H. A. & Winter, F. A. 1990, The Later Aeneolithic in Southeastern Europe, *American Journal of Archaeology* 94, 175-191.

Bednjanec, L. 2012, Slavonski Brod-luka (lokalitet Rušćica-Glogove-Praulje), *Hrvatski arheološki godišnjak* 8/2011), Zagreb, 126-128.

Benac, A. 1962, Pivnica kod Odžaka i neki problemi kostolačke kulture, *Glasnik zemaljskog muzeja Bosne i Hercegovine u Sarajevu* n.s. XVII, Sarajevo, 21-40.

Blažić, S. 1986, Domaće i divlje životinje Gomolave, in: *Gomolava od praistorije do srednjeg veka*, katalog izložbe, Novi Sad, 42-43.

Bojadžijev, J. 1992, Probleme der Radiokohlenstaffdatierung der Kulturen des Spätänneolithikums und der Frühbronzezeit, *Studia Praehistorica* 11-12, Sofia, 389-406.

Bogaard, A., Jones, G., Charles, M. 2005, The impact of crop processing on the reconstruction of crop sowing time and cultivation intensity from archaeobotanical weed evidence, *Vegetation History and Archaeobotany* 14, Berlin, 505-509.

Bondár, M. 1984, Neuere Funde der Kostolac- und der spätbedenen Kultur in Ungarn, *Acta Archaeologica Academiae Scientiarum Hungaricae* XXXVI, Budapest, 59-84.

Borić, D. 2009, Absolute Dating of Metallurgical Innovations in the Vinča Culture of the Balkans, *Universitäts Forsungen zur prähistorischen Archäologie* 169, Bonn, 191-245.

Botić, K. 2018, Neolitička nalazišta desne obale Dunava između Vukovara i Iloka. Prikaz pokretne građe prikupljene terenskim pregledima 2003., 2008.-2009. godine, *Izdanja Hrvatskog arheološkog društva* s.v. 31, Zagreb, 33-56.

Brukner, B. 1979, Zur Chronologie der Kostolac-Gruppe, *Archaeologica Iugoslavica* XIX (1978), 8-13.

Bulat, M. 1973, Novo eneolitsko nalazište kod Dalja, *Glasnik slavonskih muzeja* 23, 34-35.

Bulat, M. 1975, Daljska planina, *Glasnik slavonskih muzeja* 28, 17-22.

Bulat, M. & Bojčić, Z. 1980, Rekognosciranja arheološkog odjela Muzeja Slavonije u Osijeku u 1979. godini, *Arheološki pregled* 21, 198-200.

Bunčić, M. 2011, Cijepane kamene izrađevine, in: J. Balen (ed.), *Đakovo-Franjevac: kasno bakrenodobno naselje*, Musei Archaeologici Zagrebiensis Catalogi et Monographiae Vol. VII, Zagreb, 108-120.

Demo, Ž. 1996, *Vukovar Lijeva bara, k*atalog izložbe, Zagreb.

Dimitrijević, S. 1956, Prilog daljem poznavanju vučedolske kulture, *Opuscula archaeologica* 1, Zagreb, 5-56.

Dimitrijević, S. 1962, Prilog stupnjevanju badenske kulture u sjevernoj Jugoslaviji, *Arheološki radovi i rasprave* II, Zagreb, 239-261.

Dimitrijević, S. 1966, *Arheološka iskopavanja na području vinkovačkog muzeja, rezultati 1957.-1965.*, Vinkovci.

Dimitrijević, S. 1968, *Sopotsko-lenđelska kultura*, Zagreb.

Dimitrijević, S. 1971, Zu einigen Fragen des Spätneolithikums und Frühäneolithikums in Nordjugoslawien, *Actes du VIIIe Congrés International des Sciences Prehistoriques et Protohistoriques* I, Beograd, 141-172.

Dimitrijević, S. 1977-1978, Zurfrage der Genese und der Gliederung der Vučedoler Kultur in dem Zwischenstromlande Donau-Drau-Sawe, *Vjesnik Arheološkog muzeja u Zagrebu* X-XI, 1-96.

Dimitrijević, S. 1979, Badenska kultura, in: A. Benac (ed.), *Praistorija jugoslavenskih zemalja* III, Sarajevo, 183-234.

Dizdar, M. 2012, Vinkovci – zaobilaznica grada (trasa D-2); *Hrvatski arheološki godišnjak* 8/2011, Zagreb, 90-92.

Dizdar, M. & Ložnjak Dizdar, D. 2009, Terenski pregledi općina Ilok, Lovas i Tovarnik u 2008. godini, *Annales Instituti Archaeologici* V, Zagreb, 117-121.

Dizdar, M., Ložnjak Dizdar D., Ilkić, M., Hutinec, M., Leleković, T. 2009, Sotin, terenski pregled 2008. godine, *Annales Instituti archaeologici* V, Zagreb, 122-124.

Dorn, A. 1976, Karasovićev vinograd, Vučedol, Vukovar – višeslojno praistorijsko nalazište, *Arheološki pregled* 7, Beograd, 50-52.

Drechsler-Bižić, R. 1956, Samatovci – neolitsko naselje kod Osijeka, *Zbornik Matice srpske – serija društvenih nauka* 12, Novi Sad, 17-38.

Dumitrescu , V.1960, La plus anciennetombe à incinérationtrouvée sur le territoire de la R. P. Roumanie et autresdécouvertesapparentées de la même region, *Dacia* IV, Bucurest, 69-88.

Durman, A. 1982, Novi elementi u stratigrafiji lokaliteta Vučedol, *Glasnik slavonskih muzeja* 46, 2-6.

Durman, A. 1984, Vučedol 1984 – novi početak sustavnih istraživanja, *Obavijesti Hrvatskog arheološkog društva* 3, Zagreb, 34-38.

Durman, A. 1987, Vučedol 86 – treća sezona sustavnih istraživanja na lokalitetu "Vinograd Streim", *Obavijesti Hrvatskog arheološkog društva* 2, Zagreb, 24-25.

Durman, A. 1987a, „Vinograd Streim" – četvrta sezona na Vučedolu, *Obavijesti Hrvatskog arheološkog društva* 3, Zagreb, 34-36.

Durman, A. 1988, Vučedolska kultura, in: *Vučedol, treće tisućljeće p.n.e.*, katalog izložbe, Zagreb, 13-20.

Durman, A. 1995, Psihologija naseljavanja telova, *Histria Antiqua* 1, Pula, 153-158.

Durman, A. & Balen, J. 2005, Vučedol-vinograd Streim, *Hrvatski arheološki godišnjak* 1/2004, Zagreb, 30-34.

Durman, A. & Hutinec, M. 2011, Vučedol-vinograd Streim, *Hrvatski arheološki godišnjak* 7/2010, Zagreb, 97-100.

Đukić, A. 2014, Biljni ostaci s četiri novoistraživna lokaliteta Đakovštine, *Vjesnik Arheološkog muzeja u Zagrebu* XLVII, 7-37.

Đukić, A. 2016, AN10A Novi Čeminac-Jauhov salaš, izložba *Tekuća arheološka istraživanja u Republici Hrvatskoj*, Arheološki muzej u Zagrebu.

Filipec, K., Šiša Vivek, M., Roksandić, D. 2009, Josipovac-Verušed, *Hrvatski arheološki godišnjak* 5/2008, Zagreb 30-33.

Filipec, K., Roksandić, D., Šiša Vivek, M., Karneluti, M. 2009a, *Arheološke slike iz Slavonije: arheološka istraživanja na trasi autoceste Beli Manastir-Osijek-Svilaj,* Zbirka Odsjeka za arheologiju, knjižica 1, Zagreb.

Forenbaher, S. 1993, Radicarbon dates and absolute chronology of of the central European Early Bronze Age, *Antiquity*, vol. 67, No 255, 218-220, 235-256.

Forenbaher, S. 1995, Vučedol: graditeljstvo i veličina vučedolske faze naselja, *Opuscula archaeologica* 19, Zagreb, 17-25.

Garašanin, M. 1959, Neolitikum und Bronzezeit in Serbien und Makedonien, 39. *Bericht der römisch-germanischen Kommission* 1958, Mainz am Rhein, 1-130.

Garašanin, M. 1959a, Period prelaza iz neolita u metalno doba u Vojvodini i severnoj Srbiji, *Starinar,* n.s. IX-X/1958-1959, Beograd, 19-36.

Garašanin, M. 1973, Badenska grupa i badensko-kostolačka varijanta, u: *Praistorija na tlu SR Srbije*, Beograd, 226-235.

Gherdán, K., Biró, K. T., Szakmány, Gy., Tóth, M., Sólymos, K. G., Analysis of incrusted pottery from Vors, southwest Hungary. Understanding people through their pottery/*proceedings of the 7th European Meeting on Ancient Ceramics* (EMAC'03), Lisabon, 103-108.

Giblin, J. I. 2009, Strontium isotope analysis of Neolithic and Copper Age populations on the Great Hungarian Plain, *Journal of Archaeological Sciences* 36 (2), 491-497.

Giblin, J. I., Knudson, K. J., Bereczki, Z., Pálfi, G., Pap, I. 2013, Strontium isotope analysis and human mobility during the Neolithic and Copper Age: a case study from the Great Hungarian Plain, *Journal of Archaeological Sciences* 40, 227-239.

Hincak, Z. & Mihelić, D. 2011, Osteološka analiza ži-

votinjskih ostataka, in: J. Balen (ed.), *Đakovo-Franjevac: kasno bakrenodobno naselje*, Musei Archaeologici Zagrebiensis Catalogi et Monographiae Vol. VII, Zagreb, 128-135.

Hoekeman-Sites, H. A. & Giblin, J. I. 2012, Prehistoric animal use on the Great Hungarian Plain: a synthesis of isotope and residue analyses from the Neolithic and Copper Age, *Journal of Anthropology and Archaeology* 31, 515-527.

Hoffiller, V. 1938, *Corpus Vasorum Antiquorum*, fasc. II., Beograd.

Horváth, T. 2012, Networks and Netwars: new perspectives on the Late Copper Age and Early Bronze Age. Typo-chronological relationships of the Boleraz/Bbaden/Kostolac finds at the site of Balatonőszöd-Temetői dűlő, Hungary, *British Archaeological Reports, International Series* 2427, Oxford.

Horváth, T. & Balen, J. 2012, The cultural attribution and dating of the cult vessel from Szelevény-Vadas, *Opuscula Archaeologica* 36, Zagreb, 7-25.

Horvatinčić, N., Obelić, B., Srdoč, D., Durman, A., Benko, L., Sliepčević, A. 1990, Radiocarbon and TL Dating of the Eneolithic Site Vučedol in East Croatia, Yugoslavia, *PACT* 29, 243-250.

Hršak, T. & Pavlović, I. 2007, Kaznica – Rutak, *Hrvatski arheološki godišnjak* 3/2006, Zagreb, 16-18.

Hršak, T. 2014, Selci Đakovački-Kaznica-Rutak, katalog izložbe *Darovi zemlje - neolitik između Save, Drave i Dunava* – drugi dio, kataloške jedinice, Arheološki muzej u Zagrebu, 47-49.

Hršak, T. & Los, Dž. 2014, Osijek-Filipovica-Hermanov vinograd, katalog izložbe *Darovi zemlje - neolitik između Save, Drave i Dunava* – drugi dio, kataloške jedinice, Arheološki muzej u Zagrebu, 38-40.

Hutinec, M. 2008, Kanal Dunav-Sava (op. Vukovar, Trpinja, Bogdanovci), *Hrvatski arheološki godišnjak* 4/2007, Zagreb, 56-58.

Hutinec, M. 2009, Vučedolsko područje – zapadni dio, *Hrvatski arheološki godišnjak* 5/2008, Zagreb, 110-115.

Hutinec, M. 2011, Vučedol-Gradac, *Hrvatski arheološki godišnjak* 7/2010, Zagreb, 95-96.

Hutinec, M. 2011a, Vučedol-vila Streim, *Hrvatski arheološki godišnjak* 7/2010, Zagreb, 96-97.

Hutinec, M. 2012, Vučedol-vinograd Streim, *Hrvatski arheološki godišnjak* 8/2011, Zagreb, 92-95.

Hutinec, M. & Bunčić, M. 2006, Bogdanovci-Voćnjak, *Hrvatski arheološki godišnjak* 2/2005, Zagreb, 25-26.

Ilkić, M. 2011, Arheološka topografija prapovijesnih naselja u Sotinu, *Histria Antiqua* 20, 223-234.

Iskra-Janošić, I. 2005, Istočna obilaznica Vinkovaca – Kamenica, Cerić, Silos, Trbušanci, *Hrvatski arheološki godišnjak* 1/2004, Zagreb, 21-22.

Janković, I. & Rajić Šikanjić, P. 2011, Analiza ljudskog kosturnog materijala, in: J. Balen (ed.), *Đakovo-Franjevac: kasno bakrenodobno naselje*, Musei Archaeologici Zagrebiensis Catalogi et Monographiae Vol. VII, Zagreb, 136-145.

Jovanović, B. 1963, Les groupes de civilisation de l`age des métaux à Vinča, *Archaeologica Iugoslavica* IV, Beograd, 19-24.

Jovanović, B. 1966, Badensko-kostolačka grupa i hronologija eneolita u Jugoslaviji, *Starinar* n. s. XV-XVI (1964-1965), Beograd, 1-11.

Jovanović, B. 1976, Obredi sahranjivanja u kostolačkoj grupi, *Godišnjak centra za balkanološka ispitivanja* XIII, Sarajevo, 131-141.

Jovanović, M. 2004, Žitarice u praistoriji u Podunavlju i na balkanskom poluostrvu, *Rad muzeja Vojvodine* 46, Novi Sad, 101-127.

Jurišić, M. 1988, *Lov i stočarstvo vučedolskog kulturnog kompleksa u sjevernim dijelovima Jugoslavije*. Magistarski rad, Sveučilište u Zagrebu.

Jurišić, M. 1990, Ukopi životinja na Vučedolu, *Opuscula archaeologica* 14, Zagreb, 17-31.

Kaczanowska, M. & Kozlowski, J. K. 1997, Neolithic vs. Eneolithic lithic raw material procurement, technology and exchange in Eastern Europe, in: M. Lazi (ed.), *Zbornik Dragoslava Srejovića*, Centar za arheološka istraživanja filozofskog fakulteta, Beograd, 223-233.

Krznarić Škrivanko, M. 1999, Bakreno i rano brončano doba, in: *Vinkovci u svijetu arheologije*, katalog izložbe, Vinkovci, 21-29.

Krznarić-Škrivanko, M. 2006, Vinkovci-Ulica Stjepana Radića 19, *Hrvatski arheološki godišnjak* 2/2005, Zagreb, 35-36.

Krznarić-Škrivanko, M. 2007, Vinkovci-Ulica Matije Gupca 99, *Hrvatski arheološki godišnjak* 3/2006, Zagreb, 61-62.

Krznarić-Škrivanko, M. 2008, Vinkovci-Ulica Matije Gupca 14 i 20, *Hrvatski arheološki godišnjak* 4/2007, Zagreb, 81-84.

Krznarić-Škrivanko, M. 2014, Vinkovci-*Tell* Tržnica-Ulica P. Miškine 10, *Hrvatski arheološki godišnjak* 10/2013, Zagreb, 79-81.

Los, Dž. 2013, Beravci-Brišće-Gradina, *Hrvatski arheološki godišnjak* 9/2012, Zagreb, 83-84.

Los, Dž. 2013a, Gudinci-Jelas, *Hrvatski arheološki godišnjak* 9/2012, Zagreb, 99-101.

Lozuk, J. 1995, A problem of the Baden Group me-

tallurgy at the site of Saloš-Donja Vrba near Slavonski Brod, *Bor*, 55-58.

Lozuk, J. 2000, O kontinuitetu naseljavanja brodskog područja, *Zbornik radova sa znanstvenog skupa o Slavonskom Brodu u povodu 750. obljetnice prvog pisanog spomena imena Broda*, Slavonski Brod, 33-57.

Ložnjak Dizdar, D. 2008, Beli Manastir – zapadna zaobilaznica, *Hrvatski arheološki godišnjak* 4/2007, Zagreb, 7-9.

Ložnjak Dizdar, D. & Dizdar, M. 2015, Sotin i Opatovac, probna arheološka istraživanja višeslojnih nalazišta 2014. godine, *Annales Instituti Archaeologici* XI/2015, Zagreb, 9-13.

Ložnjak Dizdar, D. & Dizdar, M. 2015a, Sotin, arheološka istraživanja stariježeljeznog groblja u Podunavlju 2014. godine, *Annales Instituti Archaeologici* XI/2015, Zagreb, 14-17.

Ložnjak Dizdar, D., Dizdar, M., Šiljeg, B. 2004, Rezultati terenskog pregleda grada Iloka godine 2003., *Obavijesti Hrvatskog arheološkog društva* XXXVI, br. 1, 45-50.

Ložnjak Dizdar, D., Hutinec, M., Dizdar, M. 2014, Terenski pregled područja između Sotina i Opatovca, *Annales Instituti Archaeologici* X/2014, Zagreb, 159-163.

Marijan, B. 2002, Jedan nalaz vučedolske kulture iz županjske Posavine, *Osječki zbornik 26*, Osijek, 9-26.

Malez, V. 1995, The findings of the bird remains of the Vučedol site, *Opuscula archaeologica* 19, 27-32, Zagreb.

Marković, Z. 1975, Našice – novi prethistorijski i srednjovjekovni lokaliteti u g. 1975, *Arheološki pregled* 17, Beograd, 169-170.

Marković, Z. 1982, Prilog poznavanju prethistorijskih nalazišta u Đakovštini, *Zbornik Muzeja Đakovštine* 2, Đakovo, 93-103.

Marković, Z. 1984, Neka pitanja neolitika, eneolitika i brončanog doba našičkog kraja i Đakovštine, *Arheološka istraživanja u istočnoj Slavoniji i Baranji*, Zagreb, 13-29.

Marković, Z. 1994, *Sjeverna Hrvatska od neolita do brončanog doba*, Koprivnica.

Marković, Z. & Botić, K. 2017, Rezultati terenskog pregleda općina Našice i Podgorač 2016. godine, *Annales Instituti Archaeologici* XIII/2017, Zagreb, 133-140.

Mihaljević, M. 2000, Istraživanje nalazišta Slavča (Nova Gradiška, 1999), *Obavijesti Hrvatskog arheološkog društva* 1, Zagreb, 63-71.

Mihaljević, M. 2004, Istraživanje nalazišta Slavča-Nova Gradiška (2000.-2003.), *Obavijesti Hrvatskog arheološkog društva* 3, Zagreb, 26-32.

Mihaljević, M. 2005, Slavča, *Hrvatski arheološki godišnjak* 1/2004, Zagreb, 39-41.

Mihaljević, M. 2006, Slavča, *Hrvatski arheološki godišnjak* 2/2005, Zagreb, 53-54.

Mihaljević, M. 2007, Slavča, *Hrvatski arheološki godišnjak* 3/2006, Zagreb, 75-76.

Mihaljević, M. 2008, Slavča, *Hrvatski arheološki godišnjak* 4/2007, Zagreb, 94-95

Mihaljević, M. 2009, Slavča, *Hrvatski arheološki godišnjak* 5/2008, Zagreb, 126-127.

Mihaljević, M. 2010, Slavča, *Hrvatski arheološki godišnjak* 6/2009, Zagreb, 88-89.

Mihaljević, M. 2010a, Krušćik, *Hrvatski arheološki godišnjak* 6/2009, Zagreb, 107.

Mihaljević, M. 2010b, Vidovci-Rosulje, *Hrvatski arheološki godišnjak* 6/2009, Zagreb, 116-117.

Mihaljević, M. 2011, Slavča, *Hrvatski arheološki godišnjak* 7/2010, Zagreb, 120-121

Mihaljević, M. 2012, Slavča, *Hrvatski arheološki godišnjak* 8/2011, Zagreb, 115.

Mihaljević, M. 2013, Slavča, *Hrvatski arheološki godišnjak* 9/2012, Zagreb, 126-127.

Mihaljević, M. 2014, Slavča-Nova Gradiška, katalog izložbe *Darovi zemlje - neolitik između Save, Drave i Dunava* – drugi dio, kataloške jedinice, Arheološki muzej u Zagrebu, 82-84.

Mihaljević, M. 2014a, Slavča, *Hrvatski arheološki godišnjak* 10/2013, Zagreb, 97-98.

Miloglav, I. 2014, Od gline do predmeta – keramika u neolitiku, in: J. Balen, T. Hršak, R. Šošić Klindžić (eds.), *Darovi zemlje: neolitik između Save, Drave i Dunava*, katalog izložbe, Zagreb, 193-207.

Milojčić, V. 1953, Funde der Kostolacer Kultur in der Sammlung des Vorgeschichtlichen Seminars in Marburg/Lahn, *Prähistorische Zeitschrift* XXXIV/V (1949/1950), 151-158.

Minichreiter, K. 1991, Arheološka istraživanja na dijelu autoceste Slavonski Brod – Lipovac, *Godišnjak zaštite spomenika culture Hrvatske*, 17, Zagreb, 179-192.

Miščin, V. 1986, *Učestalost arheoloških nalaza u otpadnim jamama eneolitičkog lokaliteta Vučedol (Kampanja 85)*. Diplomski rad, Sveučilište u Zagrebu.

Needham, S. & Evans, J. 1987, Honey and dripping: neolithic food residues from Runnymede Bridge, *Oxford journal of archaeology* 6 (1), 21-28.

Nikolić, D. 2000, *Kostolačka kultura na teritoriju Srbije*, Centar za arheološka istraživanja, knjiga 19, Beograd.

Nodilo, H. 2016, Novi Bolman-Grablje, izložba *Tekuća arheološka istraživanja u Republici Hrvatskoj*, Zagreb.

Paunović, M. & Lajtner, I. 1995, Bedeutung der Mollusken- und Fischfauna in der Ökologie und Ökonomie der Äneolitischen Siedlung Vučedol (NO Kroatien), *Opuscula archaeologica* 19, Zagreb, 33-38.

Pavlović, I. 1984, Rezultati arheoloških iskopavanja na lokalitetu Grabrovac u god. 1980, *Arheološka istraživanja u istočnoj Slavoniji i Baranji*, Zagreb, 53-61.

Pavlović, I. & Bojčić, Z. 1981, Ciglana "Grabrovac", Đakovo – prethistorijsko naselje, *Arheološki pregled* 22, Beograd, 27-28.

Petrović, J. 1984, *Gomolava,* Novi Sad.

Petrović, J. 1986, Srednji i pozni eneolit, in: *Gomolava od praistorije do srednjeg veka*, katalog izložbe, Novi Sad, 23-30.

Petrović, J. & Jovanović, B. 2002, *Gomolava – naselja kasnog eneolita*. Novi Sad – Beograd.

Potrebica, H. & Balen, J. 2003, Potočani, Mali grad – naselje kostolačke culture, *Obavijesti Hrvatskog arheološkog društva* 1, Zagreb, 51-54.

Potrebica, H. & Balen, J. 2008, Zona Velika-Stražeman, *Hrvatski arheološki godišnjak* 4/2007, Zagreb, 116-119.

Rajković, D. 2014, Sarvaš-Gradac, katalog izložbe *Darovi zemlje - neolitik između Save, Drave i Dunava* – drugi dio, kataloške jedinice, Arheološki muzej u Zagrebu, 79-81.

Rajković, D. & Balen, J. 2016, *Sarvaš – neolitičko i eneolitičko naselje II*, Osijek.

Rapan Papeša, A. 2007, Stari Jankovci-Gatina, *Hrvatsko arheološko društvo* 3 (2006), Zagreb, 47.

Reed, K. 2017, Agricultural change in Copper Age Croatia (ca. 4500-2500 cal BB.C.)?, *Archaeological and Anthropological Sciences* 9 (2017), Springer, 1745-1765.

Roman, P. 1980, Der "Kostolacer-Kultur"-Begriff nach 35 Jahren, *Praehistorische Zeitschrift* 55/2, Berlin, 220-227.

Salajić, S. 1993, Zbirka arheologa amatera Vjekoslava Dukića, *Arheološka istraživanja u Slavonskom Brodu i Brodskom Posavlju*, Zagreb, 89-93.

Schmidt, R. R. 1945, *Die Burg Vučedol,* Zagreb.

Šimić, J. 1983, Terenska istraživanja arheološkog odjela Muzeja Slavonije tijekom godine 1982. i 1983., *Obavijesti Hrvatskog arheološkog društva* 3, Zagreb, 30-32.

Šimić, J. 1995, Osijek, Retfala – istraživanje pretpovijesnog nalazišta, *Obavijesti Hrvatskog arheološkog društva* 1, Zagreb, 23-26.

Šimić, J. 1995a, Prapovijest Đakovštine, *Diacovensia* 1, Đakovo, 11-27.

Šimić, J. 1998, Istraživanje lokaliteta Retfala u Osijeku, kasno brončano doba istočne Slavonije, *Izdanja Hrvatskog arheološkog društva* 19, Zagreb, 235-242.

Šimić, J. 2001, Aljmaš-Podunavlje, zaštitno istraživanje višeslojnog prapovijesnog nalazišta, *Obavijesti Hrvatskog arheološkog društva* 3, Zagreb, 70-75.

Šimić, J. 2005, Retfala, *Hrvatski arheološki godišnjak* 1/2004, Zagreb, 11-12.

Šimić, J. 2006, Aljmaš-Podunavlje, *Hrvatski arheološki godišnjak* 2/2005, Zagreb, 7-8.

Skelac, G. 1997, Prapovijesno nalazište Slavča, *Opuscula arhaeologica* 21, Zagreb, 217-233.

Skelac, G. 1999, *Prapovijesno nalazište Slavča s posebnim osvrtom na kostolačke nalaze.* Diplomski rad, Sveučilište u Zagrebu.

Sofaer, J. & Roberts, S. 2016, Technical innovation and practice in Eneolithic and Bronz Age encrusted ceramics in the Carpathian Basin, Middle and Lower Danube, *Archaeologische Korrespondenzblatt* 46, 479-496.

Šošić, R. & Karavanić, I. 2004, Cijepani litički materijal s prapovijesnog nalazišta Slavča, Nova Gradiška, *Vjesnik Arheološkog muzeja u Zagrebu* XXXVII, Zagreb, 7-41.

Stapelfeldt, T. 1997, Zum Kostolacer Zierstil, *Chronos, Beiträge zur prähistorischen Archäologie zwischen Nord- und Südosteuropa, Festschrift für Bernhard Hänsel, Internationale Archäologie, Studiahonoria* 1, Marburg, 157-163.

Tasić, N. 1965, Poznoeneolitski, bronzanodobni i sloj starijeg gvozdenog doba na Gomolavi, iskopavanja 1965-1966, *Rad vojvođanskih muzeja* 14, Novi Sad, 177-228.

Tasić, N. 1966, Apparition et évolution du groupe-culturel de Kostolac en Yougoslavie, *Archaeologica Iugoslavica* VII, Beograd, 19-29.

Tasić, N. 1967, *Badenski i vučedolski kulturni kompleks u Jugoslaviji*, Beograd-Novi Sad.

Tasić, N. 1970, Genetische Probleme der Gruppen Baden, Kostolac und Vučedol im Jugoslawischen Donaugebiet und Zentralbalkan, *Balcanica* I, Beograd, 23-42.

Tasić, N. 1979, Kostolačka kultura, *Praistorija jugoslavenskih zemalja* III (ur. A. Benac), Sarajevo, 235-266.

Tasić, N. 1984, Sremsko-slavonska regija kao nosilac evolucije na relaciji Baden-Kostolac-Vučedol, *Izdanja Hrvatskog arheološkog društva* 9, Zagreb, 31-36.

Težak-Gregl, T. 1985, Dva nova groba badenske kulture s Vučedola, *Opuscula archaeologica* 10, Zagreb, 23-39.

Tolar, T., Čufar, K., Velušček, A. 2008, Leseno toporišče kladivaste sekire s kolišča Stare gmajne na Ljubljanskem barju, *Arheološki vestnik* 59, 49-56.

Tomičić, Ž., Minichreiter, K., Jelinčić K., Turkalj, K., Mahović, G., Botić, K., Dizdar, M., Kalafatić, H., Kovačević, S., Marković, Z. 2008, Ilok – Dvor knezova iločkih, crkva Sv. Petra apostola, kula 8 i bedemi – rezultati zaštitnih arheoloških istraživanja 2007., *Annales Instituti archaeologici* IV, Zagreb, 7-22.

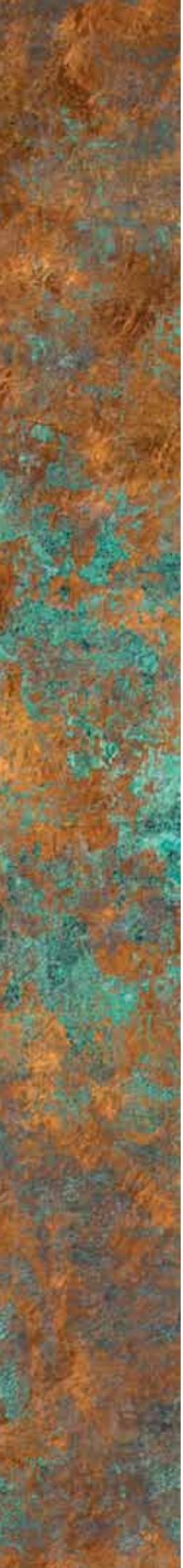
Tresić Pavičić, D. 2014, Osijek-Frigis 1 (AN 2), *Hrvatski arheološki godišnjak* 10/2013, Zagreb, 23-25.

Turčin, I. 2018, Motiv plesa na pretpovijesnoj keramici iz istočne Hrvatske, *Vjesnik Arheološkog muzeja u Zagrebu* 51, Zagreb, u pripremi.

van Zeist, W. 1979, Ugljenisani biljni ostaci na višeslojnom nalazištu Gomolava, *Rad vojvođanskih muzeja* 23-24 (1974-1978), Novi Sad, 5-18.

Vrdoljak, S. & Mihaljević, M. 1999, Istraživanje nalazišta Slavča (Nova Gradiška, 1998.), *Obavijesti Hrvatskog arheološkog društva* 1, Zagreb, 34-48.

Wiewegh, Z. & Revald-Radolić, V. 2007, Autocesta V-c, dionica Osijek-Đakovo, *Hrvatski arheološki godišnjak* 3/2006, Zagreb, 7-9.



Vučedolska kultura

The Vučedol culture

Ina Miloglav

Odsjek za arheologiju
Filozofski fakultet Sveučilišta u Zagrebu
Department of Archaeology,
Faculty of Humanities and Social Sciences
of the University of Zagreb
imiloglav@ffzg.hr

Povijest nastanka i imena

Kraj bakrenoga doba obilježila je vučedolska kultura, jedna od najzanimljivijih i najintrigantnijih pretpovijesnih kultura koja svojim obilježjima vrlo jasno odražava stil i duh vremena u kojemu je nastala i razvijala se. Društvena i ekonomska previranja na samome kraju bakrenoga doba, vrlo se jasno mogu prepoznati u njezinu prepoznatljivom keramografskom repertoaru koji uključuje organiziranu proizvodnju i pojavu specijaliziranih lončara, razvijenoj metalurškoj djelatnosti, načinu organizacije naselja i počecima društvenog raslojavanja te duhovnom životu.

Vučedolska kultura svoje ishodište ima u slavonsko-srijemskom prostoru iz kojeg se u kasnijem razdoblju širila po europskom tlu. Njezin nastanak u slavonsko-srijemskom prostoru potaknuo je migraciju i potiskivanje kasne kostolačke kulture. Ova jedinstvena kulturna pojava na samome kraju bakrenoga doba zanimljiva je iz više aspekata. U njoj se mogu vidjeti relikti prošlosti i tragovi budućnosti. U istoj mjeri je primala utjecaje i inovacije sa strane i prihvaćala neke stare tradicije koje je prilagođavala duhu vremena u kojemu je nastala. U njezinu se keramografskom repertoaru mogu jasno vidjeti utjecaji kostolačke i badenske kulture, a posredno preko njih sopotske i vinčanske kulture. Prihvaćajući utjecaje svojih prethodnika, vučedolska kultura će jednako tako ostaviti traga u mnogim kulturama ranoga brončanog doba s kojima je dolazila u kontakt. To je vrijeme kada se njezina homogenost raspada na niz regionalnih varijanti na širokom geografskom prostoru (Miloglav 2012).

History of origin and name

The end of the Copper Age was marked by the Vučedol culture, one of the most interesting and intriguing prehistoric cultures the characteristics of which clearly reflect the style and spirit of the period in which it appeared and developed. The social and economic changes that occurred at the very end of the Copper Age can unmistakably be recognized in the culture's characteristic repertoire of pottery that includes well-organized production and the emergence of specialized potters, in the developed metallurgical activities, in settlement organizations, and in the beginnings of social stratification and spiritual life.

The Vučedol culture originated from the territory of Slavonia and Syrmia and later spread all over Europe. Its emergence in Slavonia and Syrmia sparked the migration and suppression of the late Kostolac Culture. This unique cultural occurrence from the very end of the Copper Age is fascinating for several reasons. Within it, it is possible to see relics of the past, as well as traces of the future. It accepted influences and innovations from outside and incorporated some older traditions that it adjusted to the spirit of the time in which it emerged. Its repertoire of pottery clearly displays influences from the Kostolac and Baden cultures and, through them, indirectly also those from the Sopot and Vinča cultures. By accepting the influences of its predecessors, the Vučedol culture would leave an equally strong mark in numerous cultures of the Early Bronze Age that it interacted with during a period when its homogeneity shattered into numerous regional variants on a wide geographical area (Miloglav 2012).

Prvi podaci o vučedolskoj kulturi europskoj znanosti postaju poznati 1875. godine kada je Karl Deschman objavio istraživanja sojeničkog naselja na Ljubljanskom barju (Deschman 1875). Međutim, dugo je trebalo da se ova kultura prihvati kao izdvojena pojava te postane prepoznatljiva po imenu eponimnog lokaliteta Vučedol kraj Vukovara. Nalaze s Ljubljanskog barja, kao i prve nalaze s Vučedola, Sarvaša i Erduta objavio je Moritz Hoernes u publikaciji *Urgeschichte der bildenden Kunst in Europa* (1898. i 1915.god.) nazivajući ovu kulturnu pojavu istočnoalpskom sojeničkom keramikom (Hoernes & Menghin 1925: 339 – 343). Gordon Childe predlaže naziv slavonska kultura (1929), a tek će Oswald Menghin 1931. godine u literaturu uvesti naziv vučedolska kultura (Menghin 1931). Djelo Viktora Hoffillera *Corpus vasorum antiquorum I* iz 1933. god. (Hoffiller 1933) u kojem objavljuje veliku količinu vučedolskog materijala označit će konačnu potvrdu eponimnog lokaliteta Vučedola kao pojma jednog stila i kulture. Međutim, tek s pojavom opsežne sinteze o vučedolskoj kulturi Richarda Rudolfa Schmidta *Die Burg Vučedol* (1945) uslijedit će konačna afirmacija naziva i pojma vučedolske kulture. Arheološka istraživanja na ovom eponimnom lokalitetu započela su još davne 1897. godine manjim pokusnim iskopavanjem na položaju Gradac, koje je proveo Josip Brunšmid, tadašnji ravnatelj Arheološkog muzeja u Zagrebu (Schmidt 1945). Međutim, prva prava arheološka iskopavanja ostat će zapamćena i zabilježena tek s pojavom njemačkog arheologa R. R. Schmidta, koji je 1938. godine započeo istraživanja na Vučedolu, a četiri godine kasnije i na Sarvašu. Period poslije 2. svjetskog rata obilježila su istraživanja vučedolskih lokaliteta u Bosni: pećine Hrustovače (Mandić 1940; Korošec 1946; Benac 1948) i lokaliteta Zecovi kod Prijedora (Benac 1956). Ovo je vrijeme obilježio i početak dugogodišnjih iskopavanja na Gomolavi u Hrtkovcima, još jednom značajnom arheološkom lokalitetu, čija su istraživanja započela 1953. godine (Rašajski 1954). Ovaj će višeslojni lokalitet postati predstavnik klasičnog perioda u Vojvodini (Petrović & Jovanović 2002: 305-374). Manja istraživanja na Vučedolu na položajima Kukuruziše Streim, Vinograd Streim i Vinograd Karasović nastavljaju se 60-ih godina prošloga stoljeća (Dorn 1965; Dimitrijević 1977/78: 3-4; 1979: 271).

In European science, the first data on the Vučedol culture appeared in 1875, when Karl Deschman published the results of the excavations conducted at a settlement with stilt houses from Ljubljansko barje (Deschman 1875). However, it took a long time for this culture to be accepted as a separate occurrence and for it to become recognizable by the name of its eponymous site of Vučedol near Vukovar. The finds from Ljubljansko barje, just like the first finds from Vučedol, Sarvaš and Erdut, were published by Moritz Hoernes in the *Urgeschichte der bildenden Kunst in Europa* (1898 and 1915), where the cultural group was referred to as eastern Alpine stilt house pottery (Hoernes & Menghin 1925: 339 – 343). Gordon Childe suggested the term Slavonian culture (1929), and only in 1931 did Oswald Menghin introduce the name Vučedol culture (Menghin 1931). Viktor Hoffiller's paper, *Corpus vasorum antiquorum I*, published in 1933 (Hoffiller 1933), wherein he published a large amount of material of the Vučedol culture, would mark the final confirmation of the eponymous site of Vučedol as the term that denotes a single style and culture. Nevertheless, the final affirmation of the name and term of the Vučedol culture would only occur after the extensive synthesis of the Vučedol culture, written by Richard Rudolf Schmidt, *Die Burg Vučedol* (1945). The archaeological excavations of the eponymous site started back in 1897 when small test trenches were made at the Gradac position by Josip Brunšmid, the then director of the Archaeological Museum in Zagreb (Schmidt 1945). However, the first real archaeological excavations would be conducted and recorded through the work of the German archaeologist R. R. Schmidt, who started the excavations at Vučedol in 1938, and later at Sarvaš. The period after WWII was marked by excavations of sites of the Vučedol culture in Bosnia: the Hrustovača cave (Mandić 1940; Korošec 1946; Benac 1948) and the site of Zecovi near Prijedor (Benac 1956). This period was also marked by the start of year-long excavations of Gomolava in Hrtkovci, another significant archaeological site that was excavated from 1953 (Rašajski 1954). This multi-layered site would prove to be a representative of the classical period in Vojvodina (Petrović & Jovanović 2002: 305-374). Smaller excavations at the Kukuruziše Streim, Vinograd Streim and Vinograd Karasović positions at Vučedol were continued in the 1960s (Dorn 1965; Dimitrijević 1977/78: 3-4; 1979: 271).

Za iskopavanja vučedolskih lokaliteta u Hrvatskoj najznačajnija je 1977./78. godina, kada se provode velika zaštitna iskopavanja na položaju Hotela „Slavonija“ u Vinkovcima (Dimitrijević 1979: 267-341). Iskopavanja na ovom lokalitetu, koji je u stručnoj literaturi poznat kao tel „Tržnica“, poslužit će S. Dimitrijeviću za periodizaciju i klasifikaciju vučedolske kulture, a koja se održala do današnjih dana (Dimitrijević 1956: 418-419; 1966: 24-28; 1979: 267-343). Prilikom urbanizacije Vinkovaca u drugoj polovici 70-ih godina te zaštitnim arheološkim istraživanjima, koja se na području grada intenzivno provode u posljednjih 50-ak godina, otkriveno je oko 12000 m² površine vučedolskog naselja, koje se rasprostiralo na dva povišena platoa s lijeve i desne strane potoka Ervenice, dok je s južne strane ovo veliko vučedolsko naselje bilo omeđeno Bosutom (Gale 2002; Miloglav 2007; 2012; 2012a; 2016).

Novija istraživanja eponimnog lokaliteta Vučedol obilježena su sustavnim iskopavanjem položaja Vinograd-Streim od 1981.-1990. godine (Durman 1982; 1984a; 1985; 1987; 1987a; Težak-Gregl 1986; Durman & Forenbaher 1989), nastavkom istraživanja nakon Domovinskog rata od 2001.–2011. godine (Durman et al. 2003; Balen 2004; Durman & Balen 2005; Balen 2006; 2007; 2008; 2009; Durman & Hutinec 2011; Hutinec 2012) te istraživanjem položaja Kukuruzište Streim od 2012. do danas (Durman et al. 2013; 2014).

Mnogi su arheolozi godinama raspravljali o pitanjima koja su vezana za porijeklo, rasprostranjenost, razloge širenja, materijalnu kulturu te gospodarsku situaciju koja je uvjetovala uspon i pad društvene hijerarhije (za pregled vidi: Miloglav 2012), međutim s obzirom na količinu znanstvenih objava i sustavno istraženih lokaliteta možemo reći da i danas vrlo malo poznajemo sve aspekte ove iznimne pretpovijesne kulture.

Još jedan, nikako manje zanemariv problem jest nedostatak objavljenog materijala. koji je zasigurno najbolji pokazatelj slike vučedolskog društva i promjena koje su se događale potkraj trećega tisućljeća pr. Kr. Iako je vučedolska kultura najprepoznatljivija i najintrigantnija pretpovijesna kultura na našim prostorima, još uvijek je nedovoljno istražena i publicirana. Kasnom fazom vučedolske kulture, koja uključuje i obradu keramičkog materijala, najviše se bavio Z. Marković (Marković 1981; 2002; 2002a). Određeni kultni i pogrebni aspekti ove kulture obrađeni su u nekoliko radova i pu-

The year 1977/78 is the most significant in the research of Vučedol culture sites in Croatia when extensive rescue excavations of the Hotel “Slavonija” position were undertaken in Vinkovci (Dimitrijević 1979: 267-341). The excavations of this site, also known in expert publications as the “Tržnica” tell, would be used by S. Dimitrijević to create a periodization and classification of the Vučedol culture that remains in use to this day (Dimitrijević 1956: 418-419; 1966: 24-28; 1979: 267-343). During the urbanization of Vinkovci in the second half of the 1970s, and the rescue archaeological excavations that have been conducted in the city during the last 50 years, an area of over 12000 m² of a Vučedol settlement has been uncovered, spanning over two elevated plateaus on the left and right side of the Ervenica stream. This large settlement of the Vučedol culture was bordered by the Bosut River in the south (Gale 2002; Miloglav 2007; 2012; 2012a; 2016).

More recent research conducted at the eponymous site of Vučedol is marked by the systematic excavations that took place between 1981 and 1990 at the Vinograd-Streim position (Durman 1982; 1984a; 1985; 1987; 1987a; Težak-Gregl 1986; Durman & Forenbaher 1989), the continued excavations following the War of Independence between 2001 and 2011 (Durman et al. 2003; Balen 2004; Durman & Balen 2005; Balen 2006; 2007; 2008; 2009; Durman & Hutinec 2011; Hutinec 2012), and the excavations conducted at the Kukuruzište Streim position that have been going on since 2012 (Durman et al. 2013; 2014).

For years, numerous archaeologists have been discussing the issues of the origin, distribution, the reasons behind the diffusion, the material culture and the economic situation that influenced the rise and fall of social hierarchy (for an overview, see: Miloglav 2012). However, considering the amount of scientific publications and systematically researched sites, it can still be said that little is known about all aspects of this exceptional prehistoric culture.

Another problem that must not be neglected is the lack of published material - certainly the best indicator of the Vučedol society and the changes that took place at the end of the third millennium BC. Although the Vučedol culture is the most recognizable and most intriguing prehistoric culture on our territory, it is still insufficiently researched and published. The late phase of the Vučedol culture was mostly studied by Z. Marković, who also con-

blikacija, te većih i manjih izložbi (Durman 1988; 2000; 2006; Hoti 1989; 1991; 1993). Nekoliko je novijih publikacija koje donose objavu starih nalaza iz muzejskih fundusa, poput Sarvaša (Balen 2005; Rajković & Balen 2016), objavu materijala sa zaštitnih istraživanja na Ervenici u Vinkovcima i Damića gradini u Starim Mikanovcima (Miloglav 2016) ili sintezu rezultata višegodišnjih sustavnih istraživanja poput Vele Spile (Čečuk & Radić 2005) i Gudnje (Marijanović 2005). Posljednja dva lokaliteta predstavljaju već prelazak u rano brončano doba na Jadranskoj obali, odnosno nalaze koji pripadaju ljubljanskoj kulturi.

Vučedolska naselja

Najranija faza vučedolske kulture ujedno je i najmanje poznat i arheološki dokumentiran period. Lokaliteti koji pripadaju najranijoj, pretklasičnoj fazi vučedolskog naseljavanja slavonsko-srijemskog prostora obuhvaćaju prostor od istočne periferije Požeške kotline do Zemuna. Apsolutni datumi dobiveni s položaja Vinograd Streim na Vučedolu koji se kreću između 3080.-2450. g. pr. Kr. (Horvatinčić et al. 1990; Benkö et al. 1989; Balen 2010) potvrđuju ranu fazu naseljavanja i na eponimnom lokalitetu Vučedol na kojemu tragove života možemo pratiti do kraja egzistencije ove kulturne pojave. Svi evidentirani lokaliteti ovoga najranijeg razdoblja pokazuju opće karakteristike naseljavanja vučedolske populacije, koja uglavnom bira već naseljene i zaposjednute položaje. Naselja su većinom smještena na povišenim prapornim terasama uz rijeke, a već u ovoj najranijoj fazi vidljiv je obrambeni karakter vučedolskih naselja, odnosno utvrđivanje naselja jarcima i palisadama.

Kulminacija vučedolskog dekorativnog stila obilježila je sljedeću fazu vučedolskog života (ranoklasični stupanj B-1 prema podjeli S. Dimitrijevića). Vrlo širok i osebujan repertoar oblika i ukrasa u klasičnoj fazi njezinog razvoja, dovest će ovu kulturu na sam vrh umjetničkog stvaranja s vrlo prepoznatljivim stilskim pečatom. Lokaliteti koji predstavljaju ovu razvojnu fazu postat će sinonimi za vučedolsku kulturu. Najizrazitiji predstavnik svakako je eponimni lokalitet Vučedol sa svoja 4 položaja: Gradac, Vinograd Streim, Kukuruzište-Streim i Karasovićev vinograd, zatim stariji vučedolski horizont na Sarvašu i Gomolavi, te lokalite-

ducted analyses of ceramic finds (Marković 1981; 2002; 2002a). Certain cult-related and funerary aspects of this culture have been studied in several publications and several larger and smaller exhibitions (Durman 1988; 2000; 2006; Hoti 1989; 1991; 1993). There are some more recent publications that include old finds from the collections of different museums, such as Sarvaš (Balen 2005; Rajković & Balen 2016), the material from rescue excavations at Ervenica in Vinkovci and Damića gradina in Stari Mikanovci (Miloglav 2016), or a synthesis of several years of research, such as Vela Spila (Čečuk & Radić 2005) and Gudnja (Marijanović 2005). The last two sites represent the transition into the Bronze Age on the Adriatic coast, i.e. finds that can be ascribed to the Ljubljana culture.

Settlements of the Vučedol culture

The earliest phase of the Vučedol culture is also the least archaeologically known and documented period. The sites that belong to the earliest, pre-classical phase of the Vučedol culture in Slavonia and Syrmia include the territory between the eastern periphery of the Požega Valley and Zemun. Absolute dates obtained at the Vinograd Streim position at Vučedol, ranging between 3080 and 2450 BC (Horvatinčić et al. 1990; Benkö et al. 1989; Balen 2010), also confirm that the eponymous site of Vučedol was settled in the early phase of this cultural occurrence, and life there can be traced all the way to the end of its existence. All of the recorded sites from this earliest period show general characteristics of being settled by the Vučedol population that mostly selected previously inhabited and taken positions. Settlements are mostly located on elevated loess terraces near rivers, and, already in the earliest phase, it is possible to discern the defensive character of Vučedol settlements, i.e. fortifications made up of ditches and palisades.

The culmination of the Vučedol decorative style marked the next phase of the Vučedol way of life (early classical phase, B-1, according to the division of S. Dimitrijević). The very wide and distinctive repertoire of forms and decorations in the classical phase of its development would take this culture to the very top of artistic creation with very recognizable stylistic features. The sites from this developmental phase would become synonymous with the Vučedol culture. The most outstanding representative is certainly the eponymous site of Vučedol and its 4 positions: Gradac, Vinograd

ti Borinci, Vođinci, Erdut. Novijim istraživanjima potvrđena su još dva lokaliteta koja pripadaju istom vremenu, Lovačka kuća u blizini Zvizdana u županjskoj Posavini, gdje je pronađen vučedolski materijal iz klasične i kasne faze (Marijan 2002) te lokalitet Verušed pored Osijeka. Potonji je otkriven prilikom velikih zaštitnih iskopavanja na trasi autoceste kroz Slavoniju (koridor Vc), smješten na gredi koja se pruža od istoka prema zapadu JZ od sela Josipovac (Filipec 2009: 39-41).

Sljedeća razvojna faza vučedolske kulture (kasnoklasični B-2 stupanj prema podjeli S. Dimitrijevića) izlazi iz poznatog slavonsko-srijemskog prostora rasprostiranja te se širi u smjeru sjevera prema mađarskoj Baranji, na istok u rumunjski Banat (Dimitrijević 1979: 292; Ecsedy 1980), te prema SZ Hrvatskoj (Marković 1981; 2002a). Širenje prema sjeveru, istoku i zapadu u kasnijem će razdoblju poprimiti još veće geografske razmjere i postat će samo uvertira za veći migracijski val vučedolske populacije iz matičnog područja.

Lokaliteti koji čine reprezentativne primjere ove faze su mlađi horizont na Sarvašu i Gomolavi, te jedan od najpoznatijih lokaliteta ove faze, tel „Tržnica“ u centru Vinkovaca koji je poslužio S. Dimitrijeviću za klasifikaciju ovoga stupnja (Dimitrijević 1979). Vinkovačko područje bilo je naseljeno kroz cijelo klasično razdoblje vučedolske kulture, što je potvrđeno zaštitnim arheološkim istraživanjima ili slučajnim nalazima. Novija zaštitna arheološka istraživanja na području grada izdvojila su Ervenicu kao još jedan vučedolski položaj koji je bio dio velikog vučedolskog naselja sa središtem na mjestu današnjeg hotela Slavonija, a koje je dijelio nekadašnji utok potoka Ervenice u Bosut (Krznarić Škrivanko 1994; Gale 2002; Miloglav 2007; 2012a). Ovom razdoblju pripada i naselje na Damića gradini u Starim Mikanovcima (Miloglav 2012a; 2016), te Prisunjači kraj Vođinaca, smješteno na pola puta od Vinkovaca do Mikanovaca (Miloglav 2012a). Gradinski lokalitet visok oko 20 m nalazi se na prirodno povišenom ovalnom platou koji je nekada bio omeđen šumom i potokom (Dimitrijević 1979: 282). Omeđen šumom, te smješten na najvišoj koti od Đakova do Vukovara, ovaj položaj bio je zasigurno vrlo važno strateško mjesto. Kontinuiranim obrađivanjem zemljišta i gradnjom vikendica lokalitet se sustavno uništava s obzirom na to da se tijekom obilaska terena na površini mogu naći veći komadi gorenog kućnog lijepa kao posljedica izoravanja kuća, te dijelovi cijelih utega, keramičkih posuda ili kamenog oruđa (Miloglav 2012a: 79, T. 4).

Streim, Kukuruzište Streim and Karasović Vineyard, followed by the older Vučedol phase at Sarvaš and Gomolava, as well as the sites of Borinci, Vođinci, and Erdut. Recent excavations revealed another two sites that can be dated to the same period – Lovačka kuća near Zvizdan in the Sava River valley near Županja, which yielded material ascribed to the classical and late phase of the Vučedol culture (Marijan 2002), and Verušed near Osijek. The latter was discovered during the large rescue excavations at the motorway leading through Slavonia (corridor Vc) and is situated on an elevated position that spans from east to west, southwest of the Josipovac village (Filipec 2009: 39-41).

The next phase in the development of the Vučedol culture (the late classical phase, B-2, according to the division of S. Dimitrijević) spreads out of the known area of Slavonia and Syrmia northwards to the Hungarian Baranja region, eastwards to the Romanian Banat region (Dimitrijević 1979: 292; Ecsedy 1980), and towards NW Croatia (Marković 1981; 2002a). In the following period, the spread towards the north, east and west would become even more encompassing and would become the overture for the larger wave of migration of the Vučedol culture out of its native territory.

Representative examples from this phase can be found in the younger layers of Sarvaš and Gomolava, as well as on one of the most known sites from this phase, the “Tržnica” tell in the center of Vinkovci, used by S. Dimitrijević to make a classification of this phase (Dimitrijević 1979). The area of Vinkovci was settled throughout the entire classical period of the Vučedol culture, as attested to by rescue archaeological excavations and chance finds. Recently conducted rescue archaeological excavations in the city helped define Ervenica as another position used by the Vučedol population as a large settlement with a center at the location of today’s “Slavonija” hotel, which once divided today’s confluence of the Ervenica stream into the Bosut River (Krznarić Škrivanko 1994; Gale 2002; Miloglav 2007; 2012a). The settlement at Damića gradina in Stari Mikanovci also belongs to this phase (Miloglav 2012a; 2016), as does the one at Prisunjača near Vođinci, situated half way between Vinkovci and Mikanovci (Miloglav 2012a). This hillfort site is about 20m tall and is on a naturally elevated oval plateau that was once surrounded by a forest and a stream (Dimitrijević 1979: 282). Surrounded by a forest, and situated on the highest point between Đakovo and Vukovar, this position must have been

Geofizička istraživanja provedena 2017. godine na površini od 7.500 m² pokazala su ostatke pretpovijesnih kuća i jama te dijelove obrambenog jarka (Miloglav & Mušič 2017).

Područje vukovarske praporne zaravni te zapadni obronci Fruške gore koji završavaju na Dunavu, pružali su idealne uvjete za naseljavanje, stoga i ne čudi veći broj zabilježenih vučedolskih položaja (Marković 1993; Bunčić 2007; Ložnjak Dizdar et al. 2004; Dizdar & Ložnjak Dizdar 2009; Ložnjak Dizdar & Hutinec 2014). Prije svega tu je geološka podloga (prapor) koja omogućuje plodnu obradivu zemlju za bavljenje zemljoradnjom. Visoka desna obala Dunava štitila je naselja od poplava, za razliku od lijeve bačke obale koja je niža i k tome sklonija poplavama pa ne čudi što na tom području nisu zabilježena vučedolska naselja. Praporna zaravan iznad Dunava ispresijecana je usjecima ili „surducima", a smještaj uz njih omogućio je stanovnicima silaženje i spuštanje do rijeke, kao glavnog komunikacijskog pravca i, ne manje važnog, egzistencijalnog izvora (Miloglav 2012). U zapadnoj Slavoniji i sjeverozapadnoj Hrvatskoj češće se izabiru istaknuti i zaštićeni položaji na kojima se oblikuju gradinska naselja kao što su naselja na Slavči kraj Nove Gradiške (Skelac 1997; Mihaljević 2005; 2006; 2007; 2008; 2012; 2013; 2014) jedno od rijetkih naselja koje se sustavno istražuje, zatim, Marić-gradine u Mikleuškoj kod Kutine (Marković 1981; 2002a; Balen 2017) te Osječenice kod Dvora na Uni (Durman 1991; Težak-Gregl 2017: 153).

Zanimljivo je da tijekom velikih zaštitnih istraživanja koja su se odvijala posljednje desetljeće na velikom području Hrvatske nije zabilježen značajan broj novih vučedolskih lokaliteta, za razliku od ostalih pretpovijesnih kultura bakrenoga doba. Terenski pregledi i zaštitna istraživanja pokazala su da je vučedolska kultura koncentrirana na prostoru između Đakova, Osijeka, Vinkovaca, Vukovara i Županje. Na prostoru Baranje ističu se samo tri nova lokaliteta, Suza-Derjan otkriven prilikom terenskog pregleda 2013. god. na trasi Kneževi Vinogradi-Zmajevac (Ložnjak Dizdar & Dizdar 2014), lokalitet Novi Bolman-Grablje otkriven 2014. prilikom zaštitnih istraživanja na trasi autoceste Beli Manastir-Osijek-Svilaj (Đuričić 2015) te vrlo zanimljiv lokalitet Popova zemlja na kojemu su provedena zaštitna arheološka istraživanja 2014./2015. godine (Los 2017; Janković & Novak 2018). Kasna vučedolska kultura zabilježena je na lokalitetu Viškovci-Gradina kraj Đakova (Balen 2013; 2014) potvrđena i apsolutnim datumima od 2574-2465. pr.

a very important strategic point. Due to ongoing agricultural works and construction, this site is being systematically destroyed, seeing as, during a walk in the field, it is possible to find large pieces of burnt daub that are the result of plowing out houses, as well as entire weights, ceramic vessels and stone tools (Miloglav 2012a: 79, Pl. 4). Geophysical measurements taken in 2017 on an area of 7.500 m² revealed the remains of prehistoric houses and pits, as well as parts of a moat (Miloglav & Mušič 2017).

The area of the Vukovar loess plateau and the west slopes of the Fruška gora Mountain, which end at the Danube, provided ideal conditions for settlement, and it is, therefore, not surprising that there is a larger number of recorded sites of the Vučedol culture in the area (Marković 1993; Bunčić 2007; Ložnjak Dizdar et al. 2004; Dizdar & Ložnjak Dizdar 2009; Ložnjak Dizdar & Hutinec 2014). Primarily, the geological surface (loess) provides fertile soil suitable for agriculture. The elevated right bank of the Danube protected the settlements from floods, unlike the left bank in the Bačka region that is lower and, therefore, more susceptible to flooding. For that reason, it is not surprising that there are no recorded settlements of the Vučedol culture in that area. The loess plain above the Danube is covered by notches and furrows, and settling around them allowed the inhabitants to come down to the river – the main communication path and, equally important, the existential water source (Miloglav 2012). In western Slavonia and northwestern Croatia, protruding and protected positions were most often selected, and hillfort settlements were formed, such as the one at Slavča near Nova Gradiška (Skelac 1997; Mihaljević 2005; 2006; 2007; 2008; 2012; 2013; 2014), one of the rare settlements that is being systematically researched, Marić gradina in Mikleuška near Kutina (Marković 1981; 2002a; Balen 2017), or Osječenica near Dvor na Uni (Durman 1991; Težak-Gregl 2017: 153).

It is interesting to note that, during the large rescue excavations that have been taking place during the last decade across a large portion of Croatia, there has been no significant rise in the number of new sites of the Vučedol culture, unlike with other prehistoric Copper Age cultures. Field surveys and rescue excavations have shown that the Vučedol culture was concentrated on the area between Đakovo, Osijek, Vinkovci, Vukovar and Županja. Only three new sites stand out in the Baranja region: Suza-Derjan, discovered during a field survey in 2013 on the

Kr. (Balen 2016). Na zapadu su tragovi naseljavanja u vrijeme kasne vučedolske kulture potvrđeni na lokalitetima Brekinjova kosa kraj Gline (Madiraca 2012: 297-299) te na platou ispred špilje Vrlovke kraj Ozlja (Hulina & Lapić 2018).

Vrijeme jedinstvene vučedolske kulture završava pred sam kraj bakrenoga doba, a matično područje njezina nastanka polako gubi svoje značenje i otvara prostor za egzistenciju novim kulturama koje će naseljavati ovo područje početkom ranoga brončanog doba. Veliki vučedolski migracijski val krenuo je na sve četiri strane svijeta, gubeći tako kulturno i društveno jedinstvo, a stvarajući pritom nove regionalne centre. Ti će centri biti samo blijeda reminiscencija vučedolske kulture kakva je bila u vrijeme svojega najjačeg uspona. Specifičnost vučedolske kulture nije samo u bogato ukrašenom keramičkom inventaru, već u vrlo naprednoj društvenoj organizaciji koja im je omogućila kvalitetan život što je, između ostalog, i jedan od razloga njihova odlaska i naseljavanja nekih drugih krajeva.

Organizacija naselja i društvena hijerarhija

Već pregledom topografskih karakteristika nekih najvažnijih vučedolskih lokaliteta vrlo se jasno može zaključiti da je vučedolska populacija slijedila određena pravila pri podizanju svojih naselja. Jedan od sigurno bitnih faktora pri odabiru mjesta za naseljavanje bili su prirodno povišeni istaknuti položaji, smješteni u blizini riječnih tokova ili manjih potoka. Takvi su položaji vrlo logičan odabir, značajan u strateškom i komunikacijskom pogledu, a utvrđivanje podignutih naselja ovisilo je u prvome redu o prirodnoj konfiguraciji terena i izgledu krajolika. Veliki broj utvrđenih naselja ukazuje na potrebu vučedolske populacije za mirnijim i trajnijim životom na jednom mjestu te iskorištavanje već ranije zaposjednutih i napuštenih položaja koji se lako mogu utvrditi. Uglavnom su naseljavali one položaje koje su prije njih nastanjivali nositelji starčevačke, sopotske, badenske i

Kneževi Vinogradi-Zmajevac road (Ložnjak Dizdar & Dizdar 2014), Novi Bolman-Grablje, discovered in the rescue excavations on the Beli Manastir-Osijek-Svilaj motorway in 2014 (Đuričić 2015), and the very interesting site of Popova zemlja, discovered in rescue excavations in 2014/2015 (Los 2017; Janković & Novak 2018). The late Vučedol culture was recorded at the Viškovci-Gradina site near Đakovo (Balen 2013; 2014), and was dated to between 2574 and 2465 BC (Balen 2016). In the west, traces of settlement from the late phase of the Vučedol culture have been confirmed at the sites of Brekinjova kosa near Glina (Madiraca 2012: 297-299) and on the plateau in front of the Vrlovka cave near Ozalj (Hulina & Lapić 2018).

The unique Vučedol culture started to disappear at the very end of the Copper Age, and its main territory slowly lost its meaning and created a space for new cultures to exist, ones that would inhabit the area at the beginning of the Early Bronze Age. The large migration wave of the Vučedol culture spread to all four corners of the world, whereby the population lost its cultural and social unity but created new regional centers that would be only weakly reminiscent of the Vučedol culture when in its prime. The specificity of the Vučedol culture does not only lie in the richly decorated assemblage of pottery, but also in the advanced social organization that allowed these people to live a high-quality life that, among other things, became one of the reasons they left and settled other territories.

Settlement organization and social hierarchy

Already an overview of the topographic characteristics of some of the most important sites of the Vučedol culture clearly shows that the Vučedol population followed certain rules when constructing its settlements. One of the factors that were definitely important when selecting a place to settle was the natural elevation of a certain position, and its position in the vicinity of river flows or smaller streams. Such positions were a very logical choice; significant in the sense of strategy and communication, and fortifying settlements primarily depended on the natural configuration of the terrain and the landscape. A large number of fortified settlements points to the need of the Vučedol population for a peaceful and long-lasting life at the same location, and to using previously inhabited and abandoned positions that could be easily

kostolačke kulture (Vučedol, Vinkovci, Sarvaš, Gomolava, Borinci, Damića gradina). Podizanje naselja na visokim prapornim gredama uz Dunav osim što je štitilo naselje od poplava, štitilo ga je i od neprijatelja jer je strma dunavska obala bila prirodna zaštita pa je utvrđivanje naselja jarcima i palisadama iziskivalo manje posla. Činjenica je da je desna obala Dunava bila gusto naseljena vučedolskim naseljima, a da ih na lijevoj obali nema. Međutim, isto tako stoji činjenica da je lijeva dunavska obala niska i plavna i da stoga nije bila idealno mjesto za podizanje naselja. Možda je naseljavanje na desnoj, povišenoj, dunavskoj obali bilo kombinacija topografskih i strateških karakteristika. Topografske odrednice imale su veliku ulogu kroz sva prapovijesna razdoblja, kad su se naselja jednostavno prilagođavala krajoliku u ekonomskom i naseobinskom smislu. Strateška komponenta postala je bitan faktor tek u vrijeme kasnoga bakrenog doba kada se ta ista naselja dodatno utvrđuju jarcima i palisadama, očito iz potrebe za većom zaštitom naselja u novonastalim nesigurnim vremenima (Miloglav 2012).

Utvrđena naselja i stalan boravak na jednom mjestu ukazuju na zemljoradničku privredu, što vučedolsku privredu bitno ne razlikuje od one kakvu su poznavali nositelji badenske i kostolačke kulture. Potreba za boravkom na istom mjestu i vezivanje za isto područje, način je života koji se može pratiti još od kasnoga neolitika, kada se naselja grupiraju u mala sela, odnosno zaseoke. Trajnost boravka na jednome mjestu možda je najbolje arheološki dokumentirana obnavljanjem kućnih osnova i postojanjem nekoliko stambenih horizonata na istom naselju, kao što je slučaj s Vučedolom (Dimitrijević 1979: 283; Forenbaher 1995: 20), Vinkovcima, Sarvašom, Damića gradinom i Borincima (Dimitrijević 1979: 283; Iskra-Janošić 1984; Miloglav 2016; Rajković & Balen 2016). Obnavljanje kućnih osnova na istom mjestu uobičajena je pojava i na klasičnim telovima Bliskoga istoka i JI Europe od najranijih vremena, i obično se tumači kao potreba neolitičkih i eneolitičkih domaćinstava da uspostave simbolički kontinuitet u odnosu na neko domaćinstvo iz prošlosti (Whittle 1996; Stevanović 1997; Tringham 2000; Tripković 2009).

S druge strane stočarstvo, kao opći privredni trend na panonskom tlu, bilo je još jedan način privređivanja koji, za razliku od zemljoradnje, omogućuje stvaranje rezervi za razmjenu i veću mobilnost. Stoka je pojačala moć obitelji i omogućila gomilanje dobara te porast populacije. Životinje su postale izvor bogatstva, ne samo zbog svojih primarnih

fortified. They mostly settled at positions that were previously occupied by the Starčevo, Sopot, Baden and Kostolac cultures (Vučedol, Vinkovci, Sarvaš, Gomolava, Borinci, Damića gradina). Constructing settlements on elevated loess elevations along the Danube protected them from floods, as well as enemies because the steep Danube coast provided natural protection, so fortifying settlements with ditches and palisades required less work. It is a fact that the right bank of the Danube was densely populated by the Vučedol population, and that there are no settlements on the left bank. However, it is also a fact that the left bank of the Danube is low and frequently flooded so that it was not an ideal place for the construction of settlements. Perhaps settling on the right, elevated, bank of the Danube was the result of a combination of topographic and strategic characteristics. Topographic features played an important role throughout all prehistoric periods when settlements were simply adjusted to the landscape both economically and settlement-wise. The strategic component became an important factor only during the Late Copper Age when the same settlements were additionally fortified by ditches and palisades; obviously due to the need to additionally protect the settlement in newly-created and uncertain times (Miloglav 2012).

Fortifying settlements and permanently staying at the same place point to an agriculture-based economy, making the Vučedol economy similar to those of the Baden and Kostolac cultures. The need to stay at one place and connect to one area is a way of life that can be traced back from the Late Neolithic when settlements were grouped into small villages, i.e. hamlets. The permanency of staying in one place is perhaps best archaeologically documented through the renewal of houses, and the existence of several phases of occupation at a single settlement, as is the case at Vučedol (Dimitrijević 1979: 283; Forenbaher 1995: 20), Vinkovci, Sarvaš, Damića gradina, and Borinci (Dimitrijević 1979: 283; Iskra-Janošić 1984; Miloglav 2016; Rajković & Balen 2016). From the earliest times, rebuilding houses at the same place was a usual occurrence at classic tells in the Middle East and SE Europe, and is usually interpreted as a need of Neolithic and Eneolithic households to establish a symbolic continuity in relation to a certain household from the past (Whittle 1996; Stevanović 1997; Tringham 2000; Tripković 2009).

On the other hand, animal husbandry, as a general economic trend on Pannonian soil, was another one of the ways that, unlike agriculture, allow for

karakteristika koje su stanovništvu omogućavale kvalitetnu ishranu, već i zbog sekundarnih proizvoda poput mlijeka i mliječnih proizvoda, vune za tekstilne izrađevine i vuče. Najveći napredak bio je zamjena životinje za ljudski rad, odnosno upotreba stoke za vuču i obradu zemlje. Time se dobilo više obradive zemlje koju je jedno domaćinstvo moglo obraditi. Važnost stoke u svakodnevnom životu uvjetovala je mogućnost povećanog prosperiteta u domaćinstvima i stvaranje zaliha (Miloglav 2012). Vrlo je vjerojatno da se korijeni društvene nejednakosti javljaju već u kasnom neolitiku, dok će jasnija i izrazitija diferencijacija društva kulminirati nakon 4. tisućljeća. Tako gomilanje stoke i rast populacije postaju bitni čimbenici za razumijevanje društvenih promjena u kasnoj europskoj pretpovijesti (Sheratt 1997: 29; Bogucki 2004: 314). Upoznavanje s bakrom i proizvodnjom bakrenih predmeta bitno će utjecati na dodatno raslojavanje društva i izdvajanje povlaštenog sloja stanovništva. Iako je bakar poznat još od vremena neolitika, tek će u eneolitiku, koji opravdano nosi naziv bakreno doba, dobiti na svom značenju i masovnoj upotrebi.

Izgled vučedolskog naselja djelomično nam je poznat samo s lokaliteta Vučedol i to s položaja Vinograd Streim i Kukuruzište Streim. Vučedolsko stanovništvo gradi četvrtaste nadzemne kuće s podom od nabijene ilovače, koje su ponekad obnavljane i po nekoliko puta vjerojatno zbog učestalih požara. Razlog tome je mogao biti u vrlo gustom rasteru naselja gdje su kuće bile zbijene na vrlo maloj udaljenosti od 0,5-1,00 m (Durman 1988; Forenbaher 1995). Zidovi kuća su zaobljeni, što je logična posljedica gradnje s pomoću kolaca i isprepletenog šiblja koje je potom bilo oblijepljeno ilovačom. Podaci za krovnu konstrukciju izostaju, međutim vrlo je vjerojatno da se radi o laganoj drvenoj konstrukciji koja je nosila slamnati pokrov (Forenbaher 1994; 1995). Unutrašnjost kuća sastojala se od jedne ili vrlo često dvije do tri pregrađene prostorije (Durman 1988; Forenbaher 1995; Balen 2010; Durman et al. 2014) čiji središnji dio zauzima kružno ognjište (Durman 1988; Forenbaher 1995: sl.7; Težak-Gregl 1998; Balen 2008; 2010), dok se u većim kućama mogu naći čak dva ognjišta (Forenbaher 1995; Durman et al. 2014). (Sl. 1).

Prostorija s ognjištem predstavljala je centralni dio kuće u kojem se pripremala hrana i gdje su se odvijali ostali kućanski poslovi, a koja je bila prostor za druženje, zajedničko blagovanje i okupljanje svih ukućana. Kao dio infrastrukture jednog domaćinstva, uz kuće su se nalazile jame koje su

the creation of reserves intended for trade and larger mobility. Cattle increased a family's power and allowed for the accumulation of goods and an increase in population. Animals became a source of wealth, not only due to their primary characteristics that provided the population with a high-quality diet, but also due to secondary produce such as milk and dairy, wool used in textile production, and towing. The largest advancement was achieved when animals replaced humans, i.e. when cattle were used to tow heavy loads and work the land. This provided a single household with a larger area of land that could be used. The importance of cattle in everyday life conditioned the possibility of a household to prosper and create supplies (Miloglav 2012). It is very likely that the roots of social inequality appeared already during the Late Neolithic, while a clearer and more pronounced social differentiation would culminate during the 4th millennium. That is how cattle breeding and population growth became important factors for the understanding of social change in late European prehistory (Sheratt 1997: 29; Bogucki 2004: 314). The discovery of copper and copper find production would significantly influence additional social stratification and the separation of a privileged class among the population. Although copper was known since the Neolithic, only during the Eneolithic, rightfully called the Copper Age, would it gain significance and become massively used.

The overall appearance of a settlement of the Vučedol culture is partially known only from the site of Vučedol, from the Vinograd Streim and Kukuruzište Streim positions. The Vučedol population constructed square above-ground houses with floors of packed soil that were sometimes rebuilt several times, probably due to frequent fires. The reason for this could have been the dense layout of the settlements where houses were clumped together and were about between 0.5 and 1 m apart (Durman 1988; Forenbaher 1995). The walls of the houses were rounded, which is a logical consequence of building with posts and intertwined wattle that was then covered with clay. There is no data available about roof constructions, but it is very likely that these were light wooden constructions that supported a straw cover (Forenbaher 1994; 1995). The interior of the houses included one, or, very often, two to three rooms (Durman 1988; Forenbaher 1995; Balen 2010; Durman et al. 2014) with a round hearth in the center (Durman 1988; Forenbaher 1995: sl.7; Težak-Gregl 1998; Balen 2008; 2010), while larger houses had two hearths (Forenbaher 1995; Durman et al. 2014). (Fig. 1)

Slika / Figure 1. Ostaci vučedolske kuće s ognjištem u sredini i trijemom ispred ulaza u kuću, Vučedol-Vinograd Streim, sonda V/04, istraživanja 2008. godine / The remains of a house of the Vučedol culture with a central hearth and a porch in front of the house entrance, Vučedol-Vinograd Streim, trench V/04, the 2008 excavations (foto / photo: I. Miloglav).

služile kao spremišta za hranu, dok u sekundarnoj ulozi preuzimaju funkciju otpadnih jama u koje su se odlagali ostaci od životinjskih kostiju, polomljenih keramičkih posuda, i kamenih alatki, viškovi građevinskog materijala poput kućnog lijepa, pepela iz ognjišta i sl. (Durman 1988; Forenbaher 1994; Težak Gregl 1998; Balen 2010). Jame za skladištenje hrane ponekad su se nalazile i u samoj kući (Durman 1988). S obzirom na to da su kuće u naselju bile gusto zbijene, veća odlagališta otpada smještena su uz rub naselja što je potvrđeno velikom količinom životinjskih kostiju, pepela i kućnog lijepa (Balen 2009; Durman & Hutinec 2011). Obrasci za odlaganje otpada u naselju vrlo su dragocjen izvor podataka o društvenoj, demografskoj ili ekonomskoj organizaciji naselja, a posebno su mjerljivi etnoarheološkim istraživanjima (Schiffer 1976; Hayden & Cannon 1983; Arnold 1990; Schiffer 1996; Stanton et al. 2008). Etnoarheološka istraživanja tako razlikuju: uobičajen manji otpad (većinom organskog porijekla) iz kuća koji se uklanjao na prostor ispred kuće; jame koje se nalaze u blizini kuća i sastavni su dio jednog domaćinstva u koji

The room with the hearth was the central part of the house and was used for food preparation and other household chores. It was also the place where household members socialized, ate and mingled. As part of the infrastructure, each house had pits alongside it that were used as food storage, and secondarily, as waste pits used to deposit the remains of animal bones, broken ceramic vessels and stone tools, surplus building material such as daub, ashes from the hearth, etc. (Durman 1988; Forenbaher 1994; Težak Gregl 1998; Balen 2010). Food storage pits were sometimes situated within the house (Durman 1988). Seeing as the houses were closely grouped together in settlements, larger waste fills were situated along the edge of settlements, as attested to by large amounts of animal bones, ashes and daub (Balen 2009; Durman & Hutinec 2011). Patterns of depositing waste in a settlement are a very precious source of information about the social, demographic or economic organization of a settlement, and are especially suitable for ethnoarchaeological research (Schiffer 1976; Hayden & Cannon 1983; Arnold 1990; Schiffer 1996; Stanton et al. 2008).

se bacao veći otpad od ostataka hrane ili razbijenog posuđa te ostalih izrađevina od kosti, kamena ili drva te pepela s ognjišta; te veća odlagališta uz sam rub naselja (Hayden & Cannon 1983). Jame s većom koncentracijom jednog materijala ili proizvoda svjedoče o intenzivnoj aktivnosti određenog zanimanja koja se odvijala u naselju.

Ispred ulaza u kuću vrlo često se nalazio trijem (Durman & Hutinec 2011; Durman et al. 2014), ili pregradni zidić smješten točno nasuprot ulazu u kuću čija je namijena mogla biti zaštita od vjetra (Balen 2008; 2010) (Sl. 1). Na podu kuća mogao se naći tipičan inventar jednog kućanstva, od keramičkih posuda za kuhanje i skladištenje namirnica, keramičkih kuka za vješanje posuda iznad vatre, utega i pršljenaka, brusova, rastirača, žrvnjeva do malih kućnih glinenih žrtvenika što ukazuje na individualno prakticiranje vjerskih rituala (Težak-Gregl 1998). Zanimljiv nalaz svakako predstavlja keramički model čizmice, također pronađen na podu jedne od kuća (Balen 2008: 86; 2008a: 37). Po dvije rupice na bočnim dijelovima modela, uz sam rub, sugeriraju da je predmet visio negdje u prostoru kuće (Sl. 2). U unutrašnjosti kuća vrlo često se nalazila i veća posuda za skladištenje hrane ili tekućine ukopana u pod kuće (Forenbaher 1995).

Ethnoarchaeological research differentiates between: common small waste (mostly organic) from houses that was deposited in front of the house; pits situated near the houses that are an integral part of a household, used do deposit waste such as leftover food, broken ceramic vessels and other artifacts made of bone, stone or wood, as well as ashes from the hearth; and larger waste fills situated along the very edge of the settlement (Hayden & Cannon 1983). Pits with concentrations of one kind of material or artifact attest to intensive activities pertaining to a certain profession that took place within the settlement.

There was often a porch in front of the house entrance (Durman & Hutinec 2011; Durman et al. 2014), or a small wall right opposite the house entrance that might have served as wind protection (Balen 2008; 2010). The house floors were full of typical household inventory, including ceramic vessels used to cook and store food, ceramic hooks for hanging vessels above an open fire, weights and whorls, whetstones, handstones, grindstones, and small house clay altars that point to an individualized practice of religious rituals (Težak-Gregl 1998). A ceramic model of a boot is certainly an interesting find, also discovered on a house floor (Balen 2008: 86; 2008a: 37). Pairs of small holes on the lateral parts of the model, right along the rim, suggest that this artifact was hung somewhere in the house interior (Fig. 2). The houses also commonly had a larger vessel, used for storing food or liquid, buried into the house floor (Forenbaher 1995).

Slika / Figure 2. Nalaz keramičke čizmice *in situ* na podu kuće, Vučedol-Vinograd Streim / A ceramic boot found *in situ* on a house floor, Vučedol-Vinograd Streim (prema / after: Balen 2008: 86).

Ekonomska strategija vučedolske populacije koja je uključivala zemljoradnju, stočarstvo, lov i metalurgiju imala je za posljedicu društveno raslojavanje pri čemu se jedan bogatiji sloj zajednice uzdignuo nad ostalima. Dokazi društvene hijerarhije vrlo dobro se mogu pratiti na eponimnom lokalitetu Vučedol koji svojom veličinom i prostornom organizacijom odskače od ostalih naselja svoga vremena. Nekoliko je ključnih faktora koji dokazuju početak društvenog raslojavanja i izdvajanje Vučedola kao centralnog i najvažnijeg naselja gospodarskog i društvenog života ovoga razdoblja:

a) Vučedol je najveće naselje svoga vremena što je potvrđeno dosadašnjim brojem otkrivenih kuća i pripadajuće infrastrukture koja čini jedno domaćinstvo (jame za zalihe/otpadne jame u blizini kuća) b) centralni dio naselja, kao najistaknutije mjesto u naselju predstavlja Gradac, gdje je oko i unutar objekta koji je znatno veći od običnih kuća u naselju, utvrđena metalurška djelatnost. Ona je bila visoko specijalizirana, podrazumijevala je kontrolu nad sirovinom i proizvodima te je u velikoj mjeri utjecala na društvenu organizaciju i duhovni život c) sahranjivanje povlaštenog sloja u zajednici potvrđeno je također na Gradcu gdje nalazimo „grobnicu bračnog para“ s velikom količinom priloga, koja je dokaz izdvajanja istaknutih pojedinaca. Specifična građevina vjerojatno je bila rezidencija osobe koja je bila nositelj nekog oblika moći, društvene ili vjerske d) osim u grobovima, luksuzno posuđe, izrađeno od vještih i zasigurno specijaliziranih lončara, nalazimo u svim dijelovima naselja. Takve posude sigurno su posebno naručivane od strane istaknutih pojedinaca u naselju. Dokazi organizirane keramičke proizvodnje i specijaliziranog lončarskog zanata potvrđeni su na lokalitetima na Ervenici u Vinkovcima i Damića gradini u Starim Mikanovcima, stoga je moguće pretpostaviti da je zasigurno postojala i na Vučedolu, centru društvenog i gospodarskog života u to vrijeme (Schmidt 1945; Durman 1988; 2000; Forenbaher 1994; 1995; Miloglav 2012b; 2016; 2018; Težak-Gregl 2017).

Premda se u vučedolskom društvu mogu pratiti naznake društvene nejednakosti, ona je još uvijek u začetku, stoga je vjerojatno da nije postojala kontrola nad svim segmentima ekonomskog i društvenog života. Metalurgija je igrala veliku ulogu u vučedolskom društvu te su metal kao dragocjenu sirovinu vjerojatno kontrolirali istaknutiji pojedinci, za razliku od gline koja je lako dostupna i prilično „jeftina“ sirovina. Keramička proizvod-

The economic strategy of the Vučedol population included agriculture, animal husbandry, hunting and metallurgy. It caused social stratification wherein a richer class rose above the rest of the community. Evidence of social hierarchy can be well traced at the eponymous site of Vučedol that is both larger and has a more complex spatial organization than the other settlements from its period. Several key factors prove the beginning of social stratification and the separation of Vučedol as the central and most important settlement in the economic and social life of the period: a) Vučedol is the largest settlement of its time, as attested to by the number of houses and accompanying infrastructure that makes up a single household (storage pits/waste pits in the vicinity of the house); b) The central, and most prominent, part of the settlement is Gradac, where metallurgical activities have been recorded within and around a structure that is significantly larger than regular houses. These activities were highly specialized, included controlling raw materials and products, and also had a significant impact on social organization and spiritual life; c) The privileged class in the community was also buried at Gradac, where the “tomb of the married couple” was discovered, along with a large number of grave goods that prove that prominent individuals were separated. The specific building was probably the residence of the person that held some form of power, social or religious; d) Other than in graves, luxurious goods, made by skilled and certainly specialized potters, were discovered in all parts of the settlement. Evidence of organized pottery production and craft specialization was confirmed at the sites of Ervenica in Vinkovci and Damića gradina in Stari Mikanovci, so it possible to assume that it must have existed at Vučedol, the center of social and economic life of the time (Schmidt 1945; Durman 1988; 2000; Forenbaher 1994; 1995; Miloglav 2012b; 2016; 2018; Težak-Gregl 2017).

Although certain social inequalities can be seen in the Vučedol society, they were still in their infancy, so it seems likely that not all segments of economic and social life were being controlled. Metallurgy played a large role in Vučedol society and metal was, as a precious raw material, probably controlled by prominent individuals, unlike clay that is an easily available and pretty “cheap” raw material. Pottery was produced within the settlement by specialized potters, but it is difficult to imagine that these products and raw materials were being controlled. It is, nevertheless, possible that richer

nja odvijala se unutar naselja od strane specijaliziranih lončara, međutim teško je zamisliti da je postojala kontrola nad ovim proizvodima i sirovinom. Ovdje treba ostaviti otvorenu mogućnost da su bogatije obitelji/pojedinci naručivali određene proizvode posebne namjene (luksuzne predmete), što je i potvrđeno na arheološkom materijalu. Pojava predmeta posebne namjene, odnosno posuda koje se oblikom, dimenzijama i ukrasom izdvajaju od uobičajenog keramičkog inventara za svakodnevnu potrebu potvrđena je na gotovo svim lokalitetima vučedolske kulture. Ove posude radili su izrazito vješti lončari pa nije isključena mogućnost postojanja posebne kategorije lončara specijaliziranih za izradu posebne vrste posuda od velikog društvenog ili religijskog značenja za zajednicu ili pojedinca (Vuković & Miloglav 2018). Takve posude mogle su poslužiti za posebne vjerske obrede, zajednička blagovanja ili pak za isticanje društvenog statusa i moći. Ova razlika najuočljivija je upravo na lokalitetu Vučedol, koji pokazuje vidljivije tragove društvene diferencijacije i pojavu velikog broja luksuznih predmeta, međutim trebalo bi napraviti analize, istraživanja i testiranja na samom keramičkom materijalu kako bi se dobili relevantni podaci za znanstvene interpretacije (Miloglav 2012b, 2016). U ekonomskom terminu specijalizacija zanata javlja se u društvima koja imaju određeni stupanj kompleksnosti (Forenbaher 1999) što bi svoju potvrdu nedvojbeno imalo unutar razvijenoga vučedolskog društva. Ona je vidljiva kako u metalurškoj zanatskoj specijalizaciji tako i u lončarskoj. Kada govorimo o složenim društvenim odnosima u pretpovijesti oni se ne mogu gledati samo u okvirima jednog aspekta, već na osnovi cijelog niza arheoloških podataka, kao što su organizacija naselja, pokopavanje ili organizirana proizvodnja. U tom smislu organizirana keramička proizvodnja dokaz je složenih društvenih odnosa, a zanati poput lončara i metalurga igrali su veliku ulogu u novonastaloj slojevitoj mreži društvenih odnosa (Vuković & Miloglav 2018). Također, stilske analize na keramičkom materijalu iz drugih perioda sugeriraju da kompleksni dekorativni dizajn može biti jedan od dobrih pokazatelja složenije društvene stratifikacije (Pollock 1983; Hodder 2007), a upravo je takav jedinstven i složen umjetnički stil karakterističan za vučedolske posude.

families/individuals ordered specific products for special purposes (luxury items), as archaeological material clearly shows. The presence of artifacts of special function, i.e. vessels that stand apart from the usual everyday ceramic inventory due to their shape, dimensions and decorations, has been recorded on almost all sites of the Vučedol culture. These vessels were made by exceptionally skilled craftsmen, so it is possible that there was a special category of potters who specialized in making vessels that were seen by the community or an individual as having a lot of social or religious meaning (Vuković & Miloglav 2018). Such vessels could have been used in special religious rituals, communal feasting, or to point out social status and power. This difference is most visible precisely at Vučedol, which revealed traces of social differentiation and the emergence of a large number of luxury items. However, analyses, research and testing should be done on the pottery in order to obtain relevant data for scientific interpretation (Miloglav 2012b, 2016). In the sense of economy, craft specialization appears in societies that show a certain level of complexity (Forenbaher 1999), something that was undoubtedly confirmed within the developed Vučedol society. It is visible in both metallurgical and pottery-related practices. When it comes to more complex social relations in prehistory, they cannot be studied within the scope of one aspect but based on an entire series of archaeological data, such as settlement organization, burials or organized production. In that sense, organized pottery production proves complex social relations, and craftsmen such as potters and metallurgists played an important role in the newly-created and multi-layered network of social relations (Vuković & Miloglav 2018). Also, stylistic analyses on other assemblages from different periods suggests that complex decorative designs can be one of the good indicators of a more complex social stratification (Pollock 1983; Hodder 2007), and it is precisely such a unique and complex artistic style characteristic of the Vučedol vessels.

Gospodarstvo

Razdoblje bakrenoga doba ne znači samo poznavanje i upotrebu bakra kao nove sirovine, već novi način života. U gospodarskom smislu to je značilo prevlast stočarstva nad poljoprivredom koje brže stvara viškove i omogućuje intenzivniju razmjenu, trgovinu i mobilnost, a time i stjecanje zaliha.

Stupanj kultiviranosti zemljišta za sada je moguće, barem dijelom, rekonstruirati na osnovi podataka dobivenih arheobotaničkom analizom s dva lokaliteta: Vučedola i Ervenice u Vinkovcima (položaj M. Gupca 14). Rezultati provedene analize s lokaliteta na Ervenici pokazali su veću zastupljenost samoniklih biljnih vrsta (77,40%) u odnosu na kultivirane biljke, posebno žitarice (18,98%). Od žitarica najzastupljenija je pšenica i to dvozrna pšenica (*Triticum dicoccum*), potom jednozrna pšenica (*Triticum monococcum*), prava pšenica (*Triticum spelta*) i meka/tvrda pšenica (*Triticum aestivum/durum*). Nakon pšenice najzastupljeniji je šestoredni ječam (*Hordeum vulgare*) i ječam s golim zrnom (*Hordeum vulgare var. nudum*). Raž (*Secale cereale*), je zabilježena samo s jednim, a obično proso (*Panicum miliaceum*) s dva primjerka. Pšenična pljeva je rijetka, a sjemenke lana (*Linum usitatissimum*) zastupljene su u većem broju nego na ostalim nalazištima istoga razdoblja (Miloglav 2016; Reed 2016). Žitarice pronađene na Ervenici i Vučedolu uobičajena su slika zemljoradničke privrede bakrenoga doba srednje i jugoistočne Europe, što pokazuju i rezultati arheobotaničke analize na lokalitetima s tog područja (van Zeist 1974.-78; Bankoţ & Winter 1990; Jovanović 2004; Gyulai 2010). Prehrana na bazi žitarica uvela je velike promjene u svakodnevnoj ishrani, s obzirom na njihovu kalorijsku vrijednost. Žitarice općenito imaju veliku nutritivnu vrijednost, bogate su ugljikohidratima, a pšenica u svom sastavu ima još proteina i glutena. Jednozrna i dvozrna pšenica, zajedno s ječmom činile su glavnu osnovu poljoprivrednih kultura koje su se uzgajale u pretpovijesno vrijeme. Usjev jednozrne pšenice bio je slabiji, ali se uspio održati i proširiti jer podnosi siromašno tlo. Dvozrna pšenica davala je bolji usjev i kvalitetniji kruh. Ječam je žitarica koja dobro uspijeva i na siromašnijoj zemlji. Osim za kruh i kaše, ječam se još od neolitika koristio i za proizvodnju piva te kao hrana za domaće životinje. Ova je žitarica vrlo zahvalna zbog svoje otpornosti na različite temperature, kratku sezonu rasta i veliku mogućnost prilagodbe (Gyulai 2010: 42).

Economy

The Copper Age does not only include the knowledge about and use of copper as a new raw material but a new way of life. Economically, this includes the dominance of animal husbandry over agriculture. It was now possible to create a surplus, allowing for more intensive exchange, trade and mobility, thereby also the acquisition of supplies.

The degree of cultivating a piece of land can, so far, be partially reconstructed based on data obtained by archaeobotanical analyses from two sites: Vučedol and Ervenica in Vinkovci (the M. Gupca 14 position). The results of the conducted analysis from the site of Ervenica reveal a dominance of wild plant species (77.40%) over cultivated plants, especially grains (18.98%). The most common grain is wheat (*Triticum dicoccum*), followed by emmer (*Triticum monococcum*), spelt (*Triticum spelta*) and naked wheat (*Triticum aestivum/durum*). Barley is the next most common grain (*Hordeum vulgare*), followed by naked barley (*Hordeum vulgare var. nudum*). Only one piece of rye (*Secale cereale*), and two pieces of millet (*Panicum miliaceum*) were recorded. Wheat chaff rarely appears, and flax seeds (*Linum usitatissimum*) are more frequent than at other sites from the same period (Miloglav 2016; Reed 2016). The grains discovered at Ervenica and Vučedol reveal the standard image of the agriculture-based Copper Age economy of central and southeastern Europe, as attested to by the results of archaeobotanical analyses from sites in the area (van Zeist 1974.-78; Bankoff & Winter 1990; Jovanović 2004; Gyulai 2010). Due to its calorific value, a grain-based diet introduced great changes into the everyday diet. Generally, grains have a large nutritional value, are rich in carbohydrates and also contain protein and gluten. Emmer and einkorn, along with barley, made up the basis of agricultural produce that was grown during prehistory. Einkorn is a weaker crop, but it managed to spread and stay in use because it can grow on poor soil. Emmer is a more resilient crop and could be turned into high-quality bread. Barley is a grain that can also be grown on poor soil. Other than bread and porridge, barley was also used to make beer and feed animals ever since the Neolithic. This grain is very suitable to grow because it is resilient to different temperatures, has a short growing season, and can adapt to different environments (Gyulai 2010: 42).

Wild trees gave tasty and vitamin-rich fruits that were collected from the nearby forests, and the remains include those of Cornelian Cherry (*Cornus*

Od divljih voćaka, čiji su se ukusni i vitaminima bogati plodovi sakupljali u obližnjim šumama, prisutan je drijenak (*Cornus mas*), bazga (*Sambucus sp.*) i zimska trešnja (*Physalis alkekengi*). Neki od divljih plodova mogli su se koristiti i u ljekovite svhe. U uzorcima je prisutan i dosta velik broj samoniklog bilja i korova, uključujući veliku koncentraciju korova ovsika (*Bromus* sp.), bijele lobode (*Chenopodium album*), trave (*Gramineae*), žitnog korova/kukolja (*Agrostemma githago*) te jedan uzorak cvijeta ljubice (*Viola* sp.) (Miloglav 2016: 126, tablica 23). Dominacija korova/divljih vrsta mogla bi sugerirati da su tadašnji stanovnici u većoj mjeri bili orijentirani na stočarstvo, odnosno da su više zemlje ostavljali slobodnom za ispašu. Velika količina samoniklog bilja i korova mogla bi ukazivati i na mogućnost da žitarice nisu bile očišćene, a te bi vrste ujedno bile i pokazatelj biljne vegetacije koja raste na obližnjim livadama, vrtovima i u okolici samog naselja. Ovaj podatak svakako je vrlo vrijedna informacija o pretpovijesnom okolišu, odnosno vegetaciji i iskoristivosti obližnjih livada i pašnjaka.

Arheobotanička analiza s lokaliteta Vučedol pak pokazuje dominaciju jednozrne pšenice, ječma pa tek onda dvozrne pšenice. Isto tako pokazuje veći udio žitarica (91%) nad samoniklim biljkama i korovima (7%) (Reed 2012). Ista je situacija zabilježena i na ostalim naseljima iz srednjega/kasnoga bakrenog doba (Đakovo-Franjevac, Tomašanci-Palača, Slavča, Čepinski Martinci-Dubrava) (Reed 2016). Na Ervenici imamo posve drukčiju sliku, odnosno dominaciju divljih trava/korova u odnosu na žitarice. Razlog tomu može biti u drukčijim ekonomskim prioritetima ili predispozicijama i iskoristivosti krajolika. To bi moglo sugerirati da su se stanovnici Ervenice u manjoj mjeri bavili poljodjelstvom te da su više bili orijentirani na stočarstvo, odnosno da su više zemlje ostavljali slobodnom za ispašu. Međutim, treba naglasiti da ovakav omjer žitarica i korova na Ervenici ne mora nužno pružati konkretne zaključke o njihovoj ekonomiji. Naime, arheobotanički uzorak trebao bi biti veći, prikupljen s više vučedolskih položaja na Ervenici i iz različitih vrsta odlagališta (iz jama, kuća, okolice kuća) (Miloglav 2016: 128-129).

Nalazi životinjskih kostiju u sklopu naselja predstavljaju interakciju čovjeka i životinje, uglavnom su produkt konzumacije hrane, ali isto tako mogu biti i dio ritualnih radnji, dok njihovi ostaci mogu biti sekundarno iskorišteni za izradu oruđa, oružja ili ukrasnih i svakodnevnih predmeta. Dokazi

mas), elder (*Sambucus sp.*) and Chinese lantern (*Physalis alkekengi*). Some of the wild fruits could have been used medicinally. The samples include a large portion of weeds, including a large concentration of chess grasses (*Bromus* sp.), fat hen (*Chenopodium album*), grasses (*Gramineae*), common corn-cockle (*Agrostemma githago*), and one sample of a violet flower (*Viola* sp.) (Miloglav 2016: 126, table 23). The domination of weeds/wild species could suggest that the inhabitants were largely orientated towards animal husbandry, i.e. that more land was left for pasture. A large amount of wild plants and weeds could also point to the possibility that grains were not cleaned, and that wild species could be the indicators of vegetation that grew on nearby meadows, gardens, and the area around the settlement. This data certainly provide valuable information about the prehistoric landscape, i.e. the vegetation and the utilization of nearby meadows and pasture grounds.

The archaeobotanical analysis from Vučedol, however, revealed a dominance of einkorn, followed by barley and, only then, emmer. It also displayed a greater ratio of grains (91%) in comparison to wild species and weeds (7%) (Reed 2012). The same situation was recorded at other Middle/Late Copper Age settlements (Đakovo-Franjevac, Tomašanci-Palača, Slavča, Čepinski Martinci-Dubrava) (Reed 2016). Ervenica provided a completely different image, i.e. the domination of wild species/weeds over grains. The reason for this could be different economic priorities or predispositions and the usability of the landscape. It could suggest that the inhabitants of Ervenica were more engaged in animal husbandry than agriculture, i.e. that they left more land for pasture. However, it should be pointed out that such a ratio of grains to weeds at Ervenica does not necessarily provide complete conclusions about their economy. Namely, the archaeobotanical sample should be larger, collected from more positions of the Vučedol culture at Ervenica, and from different kinds of deposits (pits, houses, areas around houses (Miloglav 2016: 128-129).

Finds of animal bones within settlements reflect the interaction of man and animals, are most often the result of food consumption, but can also be parts of ritualistic activities, while animal remains can be secondarily used to produce tools, weapons or decorative and everyday artifacts. Evidence of food consumption and discarding the remains into pits within (Hutinec 2012), or in special waste fills at the edge of settlements (Balen 2009) is especially

konzumacije hrane te njihovo odbacivanje u jame u naselju (Hutinec 2012) ili na posebna odlagališta na rubu naselja (Balen 2009) posebno su vidljivi na samom lokalitetu Vučedol. Analiza životinjskih kostiju s Vučedola i Ervenice u Vinkovcima pokazala je veću zastupljenost domaćih nad divljim životinjama, što odgovara gospodarstvu bakrenoga doba, odnosno dominaciji stočarstva nad lovom. Rezultati osteološke analize s lokaliteta na Ervenici (položaj M. Gupca 14) pokazali su veću zastupljenost domaćih (67,49%) nad divljim životinjama (32,51%) (Miloglav 2012; 2012a; 2016), baš kao i na lokalitetu Vučedol gdje je zastupljenost domaćih životinja (78,20%) daleko veća od divljih (21,80%) (Jurišić 1988).

Od domaćih životinja na Ervenici najviše se uzgajalo domaće govedo (*Bos taurus* L.) (6524%), koje tijekom bakrenoga doba postaje osnova stočarstva. Uz domaće, prisutno je i divlje govedo (*Bos primigenius* L.) (12,66%) čija je zastupljenost krajem bakrenoga doba polako u opadanju. Druga važna domaća životinja je svinja (*Sus domesticus* L.) (25%), dok je koza, odnosno ovca na zadnjem mjestu (4,88%). Od divljih životinja najviše se lovio jelen (*Cervus elaphus* L.) (69,62%), potom divlje govedo i srna (*Capreolus capreolus* L.) (8,86%) (Miloglav (2016: 131-132). Iako je u svim razdobljima jelen lovljen u prvome redu radi mesa, poznato je da je njegova koža najvjerojatnije korištena za izradu odjeće, crijeva za šivanje, a kosti i rogovi za izradu ratarskih i kućanskih alata (Trbojević Vukičević et al. 2006). Nalazi keramičkih utega za vertikalne tkalačke stanove, pršljenaka za vretena te kalemovi svjedoče o intenzivnoj tkalačkoj djelatnosti, a njihovi ostaci vrlo često se nalaze *in situ* na podovima kuća na lokalitetu Vučedol (Hutinec 2011; Durman et al. 2014). Odjeća se osim od vune izrađivala i od materijala biljnog porijekla, poput lana i konoplje, te kože, posebno jelenske jer je ona mekana i pogodna za krojenje i šivanje. Obuća se mogla raditi od tvrđe kože, poput one goveđe ili svinjske. Tekstil je vjerojatno bio i obojen živim bojama koje su se dobivale od raznih biljaka (Milićević 1984: 15). Konačne izrađevine ne nalazimo u arheološkom kontekstu jer propadaju u zemlji zbog njihova organskog porijekla, međutim prikazi odjeće na keramičkim figuricama te modeli keramičkih cipela mogu nam posvjedočiti o njihovu izgledu. Možda najljepši primjer predstavlja keramička figura iz Vinkovaca koja prikazuje odjeću koja se sastoji od nabrane suknje i prekriženih naramenica koje ne

visible at Vučedol. The analyses of animal bones from Vučedol and Ervenica in Vinkovci revealed the dominance of domesticated over wild animals, a fact that fits into the Copper Age economy, i.e. the domination of animal husbandry over hunting. The results of osteological analyses from the site of Ervenica (the M. Gupca 14 position) revealed the prevalence of domesticated (67.49%) over wild animals (32.51%) (Miloglav 2012; 2012a; 2016), just like at Vučedol where domesticated animals (78.20%) appear far more frequently than wild ones (21.80%) (Jurišić 1988).

The most common domesticated animal found at Ervenica is cattle (*Bos taurus* L.) (65.24%), and it became the basis of animal husbandry during the Copper Age. Along with domesticated cattle, aurochs were also recorded (*Bos primigenius* L.) (12.66%) but became less and less represented towards the end of the Copper Age. The second most important domestic animal is the pig (*Sus domesticus* L.) (25%), while goats, i.e. sheep, fall to the last place (4.88%). Deer (*Cervus elaphus* L.) was the most hunted wild animal (69.62%), followed by the aurochs and doe (*Capreolus capreolus* L.) (8.86%) (Miloglav 2016: 131-132). Even though deer were hunted primarily for their meat in all periods, it is known that their hide was most likely used to make clothes, their intestine for sewing, and their bones and antlers for the production of agricultural and household tools (Trbojević Vukičević et al. 2006). Finds of ceramic weights used on vertical looms, spindle whorls and spools attest to intensive weaving activities, and their remains are often found *in situ* on house floors at Vučedol (Hutinec 2011; Durman et al. 2014). Other than wool, clothes were made from plant materials, such as flax and hemp, as well as from hide, especially deer hide because it is soft and suitable for tailoring and sewing. Shoes could have been made of stronger hide, like that of cattle or pigs. Textile was probably also painted in bright colors obtained from different plants (Milićević 1984: 15). The final artifacts cannot be discovered in archaeological contexts because they decompose in soil due to their organic nature. However, depictions of clothing on ceramic figurines and ceramic models of shoes can attest to their appearance. Perhaps the most compelling example is a ceramic figurine from Vinkovci that shows a pleated skirt and crossed shoulder straps that do not cover the bust, a find that could be the representation of a female deity or priestess in ritualistic clothing. What makes the figurine especially interesting are the

pokrivaju grudi, te možda predstavlja lik ženskog božanstva ili svećenice u odjeći za obred. Ono što figuricu čini dodatno zanimljivom su motivi križa na rukama koji možda predstavljaju običaj tetoviranja ili skarificiranja (pravljenjem ožiljaka na tijelu), a značili bi pripadnost plemenu ili društvenom sloju. Isti motiv prisutan je na bedrima još jedne figure iz Vinkovaca. Motiv križa, koji je vrlo čest u vučedolskoj kulturi, predstavljao bi želju za sretnim životom i zdravljem pojedinca (Milićević 1984).

Veća količina motika od jelenjih parožaka s rupom za nasad drška, koje su se koristile za obradu zemlje mogu se naći na svakom vučedolskom lokalitetu. Osim za hranu govedo se koristilo i za obradu zemlje. Iskorištavanje životinja pri obradi zemlje i upotreba kola za vuču donijeli su mnoge promjene u organizaciji rada. Povećala se produktivnost i ekonomičnost u obradi zemlje, što je značilo obradu i iskorištavanje većih obradivih površina te one zemlje koja je do tada bila teško obradiva. Upotreba kola za vuču u svakodnevnom životu poslužila je za obradu zemlje i transportiranje uroda, a isto tako intenzivirala razmjenu dobara i omogućila veću mobilnost. Promjene koje je donijela ovakva ekonomska transformacija odrazile su se i na naseobinske karakteristike, koje će postati prepoznatljive kroz cijelo 4. i 3. tisućljeće. Tragove na kostima goveda koji bi mogli sugerirati da su se koristila za vuču nalazimo na analiziranim osteološkim ostacima badenskog sloja na Vučedolu (Trbojević Vukičević 2006). Utezi u obliku kotača vrlo čest su inventar domaćinstava, kako badenske tako i vučedolske kulture (Sl. 3).

cross motifs depicted on its arms, and which might represent the custom of tattooing or scarification (making scars on the body), and which would denote the affiliation with a certain tribe or social layer. The same motif is present on the thighs of another figurine from Vinkovci. The cross, a common motif in the Vučedol culture, could represent an individual's desire to live a happy and healthy life (Milićević 1984).

Large amounts of hoes with a hole for hafting, made of deer antler and used in agriculture, are a common find at every site of the Vučedol culture. Other than for food, cattle were also used in agriculture. Using animals to work the land and tow wagons brought many changes in the organization of labor. Productivity increased along with the profitability of agriculture, which included the processing of larger areas, and land that was difficult to process. Using wagons in everyday life made it possible to process the land and transport goods, and, at the same time, it intensified the exchange of goods and allowed for greater mobility. The changes that were introduced by such an economic transformation also reflected on settlement characteristics that would become recognizable throughout the entire 4th and 3rd millennia BC. Traces discovered on bones of cattle, possibly suggesting the animals were used for hauling, can be seen on analyzed osteological remains from the layer of the Baden culture at Vučedol (Trbojević Vukičević 2006). Wheel-shaped weights are common inventory within the households of both the Baden and the Vučedol culture.

Fishing must have, along with agriculture and animal husbandry, played an important role in riverside settlements, and large amounts of fish scales point to the fact that fish was processed by drying and salting, just like today (Fig. 3).

Slika / Figure 3. Utezi u obliku kotača s lokaliteta Popova zemlja / Wheel-shaped weights from the site of Popova zemlja (prema / after: Los 2016).

Ribolov je, uz zemljoradnju i stočarstvo, na naseljima uz rijeke sigurno imao veliku ulogu, a velike količine ribljih krljušti upućuju na preradu ribe sušenjem i soljenjem, baš kao i danas.

Potvrdu ribolovne aktivnosti nalazimo na lokalitetu Vučedol gdje je pronađena velika količina riječnih puževa i ribljih ljusaka (Sl. 4), a analizom je potvrđeno da se radi o šaranu, somu i štuki (Jurišić 1988: 26). Analizom faune s položaja Vinograd-Streim uočeno je da su za vrijeme badenske i kostolačke kulture u većoj mjeri zastupljeni školjkaši, dok u vučedolskoj kulturi dominiraju puževi. Uzrok ove promjene nije poznat, ali je sigurno da su ribe, školjkaši i puževi imali veliku ulogu u prehrani bakrenodobnih kultura uz dunavsku obalu (Paunović & Lajtner 1995) o čemu, između ostalog, svjedoče i velike količine pronađenih utega za ribarske mreže te koštanih harpuna. Osim u prehrani, školjke su se koristile i za izradu bijele inkrustacije (paste) na keramičkim posudama (Kos et al. 2013; Miloglav 2016: 143). Ovaj dio vučedolskog gospodarstva pokazuje da je blizina rijeka i riječnih tokova oduvijek bila prirodan i dosta logičan izbor za podizanje naselja, kako bi se osigurala egzistencija i omogućila komunikacija.

Confirmations of fishing activities can be found at Vučedol, a site that yielded large amounts of freshwater snails and fish scales (Fig. 4) that analyses have ascribed to carp, catfish and pike (Jurišić 1988: 26). The analysis of fauna from the Vinograd-Streim position revealed that shellfish were predominant during the Baden and Kostolac cultures, while snails prevailed during the Vučedol culture. The reason behind this change is unknown, but it is known that fish, shellfish and snails had a great part in the diet of Copper Age cultures along the coast of the Danube (Paunović & Lajtner 1995) as attested to, among other things, by the large amounts of recovered weights for fishing nets and bone harpoons. Other than in the diet, shellfish were also used to make white incrustation (paste) for ceramic vessels (Kos et al. 2013; Miloglav 2016: 143). This part of the Vučedol economy shows that the proximity of rivers and water flows has always been a natural and quite logical choice of locatio n for constructing a settlement in order to ensure the existence and allow for communication.

Slika / Figure 4. Ostaci ribljih ljusaka na dnu posude, Vučedol-Vinograd Streim, sonda V/87, istraživanja 2005 / The remains of fish scales at the bottom of a vessel, Vučedol-Vinograd Streim, trench V/87, the 2005 excavations (foto / photo: M. Burić).

Pogrebni običaji

Formiranje čvršće povezanih patrijarhalnih rodovskih i plemenskih zajednica u društvenom će pogledu prerasti neolitički način života (Težak-Gregl 1998: 111). Gomilanje stoke i metalurških proizvoda omogućili su stjecanje veće količine zaliha, a populacijski rast vjerojatno je bio uvjetovan boljim načinom života. Društvena hijerarhija najbolje se očituje u sahranjivanju pokojnika i u određenim pokazateljima unutar koncepcije stanovanja i organizacije naselja (Miloglav 2016: 147).

O društvenom raslojavanju i pokapanju vladajućeg sloja pojedinaca svjedoči poznata „grobnica bračnog para" s položaja Gradac na Vučedolu ispred pročelja tzv. Megarona II. Skeletni ukop muškarca i žene u zgrčenom položaju s velikom količinom priloga otkopan je davne 1938. godine (Schmidt 1945: 41-47). Položaj na Gradcu najbolje ilustrira društveno raslojavanje unutar vučedolskog društva, što je prepoznao još S. Dimitrijević nazivajući ga akropolom koja odražava privilegirani položaj unutar naseobinskog kompleksa (Dimitrijević 1979: 332). Klasičnoj vučedolskoj kulturi pripadaju i dva paljevinska groba pod tumulima, a to su Velika humka u Batajnici i Humka u Vojki (Dimitrijević 1979: 285-286). Oba tumula nose obilježje tzv. kneževskih tumula koji će svoj vrhunac dostići kneževskim grobom u Maloj Grudi, koji je možda najbolji primjer dovršavanja modela rodovskog principata (Dimitrijević 1979: 333). Slučajni nalaz para srebrnih sjekira iz Starih Jankovaca također svjedoči o iskazivanju statusne moći vlasnika te sugerira da je i na tom mjestu možda postojao sličan monumentalni ukop društveno povlaštene osobe (Balen & Mihelić 2003; Težak-Gregl 2017: 161-162).

Pokapanje pokojnika na groblju izvan naselja dosad nije utvrđeno ni na jednom vučedolskom lokalitetu, a malobrojni skeletni ukopi nađeni su u naseljima. Zanimljiv i vjerojatno ritualni ukop predstavlja jama na položaju Vinograd Streim u kojoj su bili sahranjeni muškarac i sedam žena, od kojih je jedna dijete. U jami dubokoj 4 m pokojnici su bili zatrpani debelom naslagom ugljena. Ono što je neobično za ovaj skupni ukop jest to da su svi pokojnici, osim djeteta, bili obilježeni udubljenim ožiljcima koji nisu bili uzrok njihove smrti već su vjerojatno predstavljali ritual inicijacije tj. uvođenja u svijet odraslih (Durman 1988; 2000).

Burial rites

The formation of more closely related patriarchal familial and tribal communities would, in a social sense, surpass the Neolithic way of life (Težak-Gregl 1998: 111). The accumulation of cattle and metallurgical products allowed for the collection of more supplies, and the population growth was probably conditioned by a better way of life. The social hierarchy can be best seen through burial rites and certain indicators within the concept of habitation and settlement organization (Miloglav 2016: 147).

Social stratification in the sense of burying members of the ruling elite is attested to by the famous "tomb of the married couple" from the Gradac position at Vučedol, discovered in front of the, so-called, Megaron II. The skeletal burial of a man and woman in contracted positions that contained a large number of grave goods was discovered back in 1938 (Schmidt 1945: 41-47). The Gradac position at Vučedol is the best reflection of the social stratification that occurred within the Vučedol society, as acknowledged by S. Dimitrijević who called it an acropolis that reflected the privileged position within the habitational complex (Dimitrijević 1979: 332). Two incineration burials under tumuli can also be ascribed to the classical Vučedol culture – Velika humka in Batajnica, and Humka in Vojka (Dimitrijević 1979: 285-286). Both tumuli have the marks of the, so-called, princely graves that would reach their peak with the princely grave in Mala Gruda, which is perhaps the best example of the completion of the tribal principate model (Dimitrijević 1979: 333). The chance find of a pair of silver axes from Stari Jankovci also attests to expressing the status and power of the owner and suggests that that place possibly also contained a similar monumental burial of a distinguished individual (Balen & Mihelić 2003; Težak-Gregl 2017: 161-162).

Burying the deceased at graveyards outside settlements has so far not been recorded on sites of the Vučedol culture, seeing as the few skeletal burials were discovered within settlements. A pit from the Vinograd Streim position is an interesting and probably ritualistic burial. It contained the remains of a man and seven women, one still a child. The pit was 4 m deep, and the deceased were covered by a thick layer of ash. The unusual thing about this group burial is the fact that all of the deceased, apart from the child, were marked by concave scars that were not the cause of their deaths, but were probably made during an initiation ritual, i.e. entering the world of adults (Durman 1988; 2000).

Nekoliko skeletnih ukopa, bez vidljive rake, u vučedolskom sloju otkriveno je na položaju Vinograd Streim na Vučedolu. Oko kostura nalazila se veća količina razbacanih životinjskih kostiju, a ispod kostura pronađena je vučedolska keramika te jedan metalni nalaz. Dva su kostura orijentacije JZ-SI, jedan je gotovo sasvim očuvan s ostacima svinjske glave na mjestu gdje bi trebala biti lubanja, dok su od drugog kostura ostale sačuvane samo kosti donjih ekstremiteta i zdjelica (Sl. 5). Datum dobiven iz kosti jedne individue je 2900-2840 g. pr. Kr. Druga dva kostura nalazila su se sjevernije, orijentacije JI-SZ, također djelomično sačuvana (Balen 2007: 64).

Several skeletal burials, without a visible grave, were discovered in the layer of the Vučedol culture at the Vinograd Streim position at Vučedol. The skeletons were surrounded by a large amount of scattered animal bones, pottery of the Vučedol culture and one metal find, all discovered beneath the skeletons. Two skeletons faced SW-NE. One was almost completely preserved and had the remains of a pig's head in place of the skull, while only the lower extremities and the pelvis of the other skeleton were preserved (Fig. 5). A date obtained from the bone of one individual is 2900-2840 BC. Another two skeletons were situated more to the north, faced SE-NW and were also partially preserved (Balen 2007: 64).

Slika / Figure 5. Kosturni ukopi bez rake, Vučedol-Vinograd Streim / Skeletal burials without a visible grave, Vučedol-Vinograd Streim (prema / after: Balen 2007: 64).

U sklopu nadzora zemljanih radova 2011. prilikom gradnje vodospremnika na padinama koje se spuštaju s platoa Vinograda Streim prema novoizgrađenim objektima Arheološkog parka Vučedol, pronađeni su kosturni dislocirani i fragmentirani ostaci osam pokojnika, bez konteksta. Torza su bila ispreplетena na vrlo malom prostoru (1,00 x 2,00 m), a među njima je pronađena vučedolska keramika i kameni žrvanj (Hutinec 2012).

Novijim zaštitnim istraživanjima na položaju Osijek – Ciglana i Zeleno polje otkriven je skeletni ukop ženske osobe starosti 50 godina u zgrčenom položaju koja prema dobivenom 14C datumu između 2681. i 2475. pr. Kr. odgovara kasnoklasičnoj fazi vučedolske kulture. S obzirom na to da prilikom istraživanja nije pronađen niti jedan objekt koji bi pripadao vučedolskoj kulturi za sada nam ostaje samo podatak radiokarbonskog datuma s mogućnošću postojanja naselja u blizini (Krmpotić et al. 2016).

Na nalazištu AN2 Beli Manastir-Popova zemlja u sklopu naselja pronađena su dva groba vučedolske kulture. Zgrčeni skeletni ukop muškarca, starosne dobi između 25-30 godina pronađen je u jami većih dimenzija i datiran 14C metodom u razdoblje 2884-2666 g. pr. Kr. Kostur je bio položen na trbuh sa savinutim nogama na lijevu stranu, glavom prema jugu, a pored njega pronađena je manja količina keramike. Prema rezultatima analize drevne DNA koja je rezultirala uspješnom izolacijom genoma kuge muškarac iz ovoga groba dosad je najraniji dokumentirani slučaj ove bolesti u Europi. Drugi grob pripada starijem muškarcu starosne dobi između 50-60 godina uz kojeg je nađena posuda vučedolske kulture (Los 2017; Matheison et al. 2018; Janković & Novak 2018).

Zanimljivo je da u grobovima vučedolske kulture kao prilog ne nalazimo nakit, oružje ili oruđe. Izuzetak predstavlja nalaz dvojnog groba na položaju vinograd Streim iz 1990. god. gdje je kao prilog u grobu položen veći broj lomljenog kamenog materijala te komad zlatnog lima (Hoti 1993: 183-184).

Životinjski ukopi inače nisu strani u razdoblju bakrenoga doba pa tako ni u vučedolskoj kulturi, a gotovo svi su nađeni u jamama. Ritualni ukopi životinja dokaz su duhovnog života i društvenog uređenja određene zajednice. Samostalni životinjski ukopi poznati su s položaja Vinograd-Streim na Vučedolu (Jurišić 1990: 22) te s položaja Gradac gdje je nađen ukop jelena ispod megarona ljevača bakra (Schmidt 1945: 28). Ukop goveda i laneta

In 2011, when the earth was being moved during the construction of a water reservoir on the slopes that descend from the plateau of Vinograd Streim towards the newly constructed buildings of the Vučedol archaeological park, dislocated and fragmented skeletal remains of eight individuals were discovered out of context. Their torsos were intertwined on a very small area (1x2 m) and had some pottery of the Vučedol culture and a stone grindstone among them (Hutinec 2012).

Recent excavations of the Osijek-Ciglana and Zeleno polje position yielded the skeletal burial of a female in a contracted position who was about 50 years old. A 14C date, ranging between 2681 and 2475 BC, coincides with the late classical phase of the Vučedol culture. Seeing as no structures ascribed to the Vučedol culture were discovered in the excavations, so far only the radiocarbon date indicates that there might have been a settlement in the vicinity (Krmpotić et al. 2016).

The settlement discovered at the site of AN2 Beli Manastir-Popova zemlja yielded two graves of the Vučedol culture. The contracted skeletal burial of a man, aged between 25 and 30, was discovered in a larger pit and was dated by the radiocarbon method to 2884-2666 BC. The deceased was placed on its stomach with legs bent to the left and the head facing south, with some pottery fragments next to it. Based on ancient DNA analyses, resulting in a successful extraction of the genome of the plague, the man from this grave is the earliest documented case of this disease in Europe. The second grave contained an older man, aged between 50 and 60, and a vessel of the Vučedol culture (Los 2017; Matheison et al. 2018; Janković & Novak 2018).

It is interesting to note that graves of the Vučedol culture do not contain grave goods in the sense of jewelry, weapons or tools. An exception is a double burial at the Vinograd Streim position, discovered in 1990, that contained a large number of chipped stone tools and a piece of a golden sheet (Hoti 1993: 183-184).

Animal burials are generally not an uncommon occurrence in the Copper Age period, and the same can be said in the context of the Vučedol culture. Most of them were discovered in pits. Ritualistic animal burials attest to the spiritual life and social organization of a certain community. Individual animal burials have been discovered at the Vinograd Streim position at Vučedol (Jurišić 1990: 22), and at the Gradac position, where a deer burial

pronađen na Damića gradini apsolutno je datiran, prema kosti goveda, u razdoblje od 2630.-2470. g. pr. Kr. (Miloglav 2012). Samostalni životinjski ukopi u jamama mogu se interpretirati kao dio animalističkog kulta, dok oni koji se nalaze uz ljudski kostur govore o vjeri u zagrobni život. Isto tako po njima je vidljiva diferencijacija društva, gdje bogatiji sloj zajednice može sebi dopustiti gubitak hrane na taj način (Jurišić 1990).

Metalurška djelatnost

Metalurška djelatnost, iako poznata iz ranijih razdoblja, svoj će puni procvat dosegnuti upravo u vrijeme vučedolske kulture kada možemo govoriti o organiziranoj i specijaliziranoj djelatnosti. Ona je osim metalurškog zanata uključivala i specijalizaciju ostalih zanimanja koja sudjeluju u ovom procesu, od rudara, drvosječa i tesara, ljevača i kovača do trgovaca koji dobavljaju sirovinu i prodaju gotove proizvode (Težak-Gregl 2017: 141). Proizvodnja bakrenih predmeta imala je posebno mjesto u društvenom i ekonomskom smislu o čemu, između ostalog, svjedoče ostaci metalurških peći, kalupa i pripadajućeg alata pronađeni na mnogobrojnim vučedolskim lokalitetima. Metaluršku djelatnost u vučedolsko vrijeme obilježit će pojava dvodijelnih kalupa, što je značilo da se jednim prototipom moglo napraviti više kalupa istovremeno. To će dovesti do serijske proizvodnje dvodijelnih kalupa, odnosno serijske proizvodnje bakrenih predmeta (Durman 1983: 23-31). Velika količina bakrenih sjekira i kalupa koji su pronađeni u ostavama ili kao pojedinačni nalazi (Vinkovci, Vučedol, Sarvaš, Borinci, Brekinska), kao i mjesta metalurške djelatnosti u naseljima svjedoče o velikoj ulozi metalurgije u vučedolskoj kulturi. Tipovi oruđa i oružja koji se javljaju u vučedolskoj kulturi uglavnom predstavljaju tipičan inventar koji se pojavljuje u bakrenodobnim kulturama i prije vučedolske: bodeži, plosnate sjekire, šila i dlijeta. Samostalnost u razvoju vučedolske metalurške aktivnosti pokazat će se u izradi lepezastih plosnatih sjekira i sjekira s cilindričnim usadnikom za držak koje su produkt tehnike lijevanja u dvodijelnim kalupima. Ostava kalupa u „Jami ljevača bakra“ s lokaliteta tel „Tržnica“ sadržavala je, uz još nekoliko različitih kalupa, četiri dvostruka kalupa za lijevanje bakrenih sjekira s cilindričnim usadnikom za držak (Durman 1984), a još dva dvostruka kalupa pronađena su u istom naselju, na položaju u Ul. M. Gupca 4 na Ervenici (Gale 2002: 57, T. 5: 5).

was defined under the Copper Smelter's Megaron (Schmidt 1945: 28). The burial of a bovid and a fawn from Damića gradina was, based on a bovid bone, dated to the period between 2630 and 2470 BC (Miloglav 2012). Individual animal burials in pits can be interpreted as parts of an animalistic cult, while those discovered alongside human skeletons attest to the belief in the afterlife. Additionally, they show social differentiation, wherein the rich social class can afford to waste food in such a way (Jurišić 1990).

Metallurgical activities

Metallurgy, although known from previous periods, flourished precisely at the time of the Vučedol culture, when it is possible to speak of organized and specialized activities. Apart from the metallurgical craft, it included the specialization of other vocations involved in the process, including miners, lumberjacks and carpenters, smelters and blacksmiths, as well as traders who procured raw materials and sold finished products (Težak-Gregl 2017: 141). The production of copper objects was important in the social and economic sense, as attested to, among other things, by the remains of metallurgical kilns, molds and other related tools discovered at numerous sites of the Vučedol culture. During the times of the Vučedol culture, metallurgy was characterized by the use of bipartite molds, meaning that a single prototype could be used to produce several molds at the same time. This led to the serial production of bipartite molds, i.e. the serial production of copper objects (Durman 1983: 23-31). A large amount of copper axes and molds that were discovered in hoards or as individual finds (Vinkovci, Vučedol, Sarvaš, Borinci, Brekinska), as well as the places where metallurgy was practiced within settlements, attest to the important role metallurgy had in the Vučedol culture. The types of weapons and tools that appear during the Copper Age before the Vučedol culture include: daggers, flat axes, awls and chisels. The independence of Vučedol metallurgy became apparent through the production of flat fan-shaped axes and axes with a cylindrical shaft for hafting, produced by casting in bipartite molds. The hoard of molds, discovered in the "Copper Castor's Pit" from the "Tržnica" tell, in addition to several different molds, also contained four bipartite molds for casting copper axes with a cylindrical shaft for hafting (Durman 1984). Another two bipartite molds were discovered in the same settlement, at the Ul. M. Gupca 4 position in Ervenica (Gale 2002: 57, Pl. 5: 5).

Kao posljedica snažnog uzleta metalurške djelatnosti na našim se prostorima prvi put susrećemo s pojavom metalurških ostava, koje će postati vrlo uobičajena praksa u brončanom dobu, a koje sadrže predmete koji su bili zakopani (skriveni) u jednom trenutku, možda zbog neke opasnosti ili nesigurnosti. Vrlo često se pripisuju putujućim majstorima ljevačima. One nam možda najbolje svjedoče o samostalnom razvoju vučedolske metalurgije i serijske proizvodnje oruđa ili oružja, što je bilo moguće zahvaljujući korištenju sulfidnih ruda. Jedna od najvećih ostava je ona u mjestu Brekinska kod Pakraca koja je sadržavala 50-ak sjekira s cjevastim usadnikom za držak (Brunšmid 1902: 41; Durman 1983: 39) te ostava iz Borinaca u kojoj je bilo pohranjeno 40 komada sjekira lepezastog oblika (Dimitrijević 1979a: 139-140, T. 4: 1-3; Durman 1983: 67) (Sl. 6).

Zanimljivo je da su se proizvodili uglavnom utilitarni predmeti poput oruđa ili oružja jer tragovi nakita ili drugih ukrasnih predmeta zasad nisu pronađeni. Nagli porast populacije i povećana potreba za metalom, odnosno ležištima bakrene rude, uvjetovali su potkraj klasičnog stupnja odlazak iz matičnog slavonsko-srijemskog područja i osvajanje novih područja (Durman 1988; Težak-Gregl 1998: 149), a time označili i njezin kraj.

As a result of the strong rise in metallurgy, the first metallurgical hoards appeared on our territories. These would become a very common practice in the Bronze Age, and contained finds that were buried (hidden) at one point, possibly due to some threat or insecurity. These hoards are perhaps the best evidence of the independent development of Vučedol metallurgy and the serial production of tools or weapons, a fact made possible by the use of sulfide ore. One of the biggest hoards was discovered at Brekinjska near Pakrac, and it contained about 50 axes with a cylindrical shaft for hafting (Brunšmid 1902: 41; Durman 1983: 39). The hoard from Borinci contained 40 flat fan-shaped axes (Dimitrijević 1979a: 139-140, Pl. 4: 1-3; Durman 1983: 67) (Fig. 6).

It is interesting to note that mostly utilitarian objects were cast, such as weapons or tools, because traces of jewelry or other decorative objects have so far not been discovered. At the end of the classical phase, the sudden growth of the population and the increased need for metal, i.e. sources of copper ore, caused the population to depart from the originating area of Slavonia and Syrmia and to conquer new territories (Durman 1988; Težak-Gregl 1998: 149), thereby marking the end of the culture.

Slika / Figure 6. Bakrene lepezaste sjekire iz ostave u Borincima / Copper fan-shaped axes from the Borinci hoard (foto / photo: I. Krajcar).

Keramička proizvodnja

Oblici, tehnike ukrašavanja i motivi koji se javljaju u vučedolskoj kulturi već su dobro poznati u kulturama koje joj prethode, od kasne vinčanske, sopotske, retz-gayarske, badenske do kostolačke. Tako geometrijski motivi poput rombova, rozeta, trokuta, pravokutnika ili šahovnica izvedeni tehnikama urezivanja, brazdastog urezivanja, rovašenja ili ubadanja na bikoničnim i S-profiliranim zdjelama i loncima, zdjelama na čepastim nogama ili sedlastim žrtvenicima ne predstavljaju novitet u keramografskoj tradiciji. Ono što vučedolski keramografski repertoar izdvaja od kultura koje joj prethode jest što je već sve dobro poznate elemente spojila i izgradila u jedan osebujan i vrlo prepoznatljiv vlastiti stil (Težak-Gregl 1998: 140). Ukrašavanje je postalo vučedolski *brand*, segment po kojem je ova kultura prepoznatljiva i za što nas veže prva asocijacija kad se spomene vučedolska kultura (Miloglav 2016: 120). Široka paleta keramičkih proizvoda svjedoči o vrlo raznolikim svakodnevnim aktivnostima, duhovnom životu i pogrebnim običajima te hijerarhijskim odnosima u zajednici (Sl. 7).

Pottery production

The forms, decorative techniques and motifs used in the Vučedol culture were known from the cultures that came before it, including the late Vinča, Sopot, Retz-Gajary, Baden and Kostolac cultures. Geometrical motifs such as rhombs, rosettes, triangles, rectangles or chess-boards were made by incising, furrowing, notching or puncturing on biconical or S-profiled bowls and pots, bowls on a cork-like foot or saddle-like altars, and they were not a novelty in the pottery making tradition. What separates the Vučedol ceramic repertoire from the preceding cultures is the fact that it combined all previously known elements and created a single, unique, and highly recognizable, style (Težak-Gregl 1998: 140). Decorations became the Vučedol *brand*, the segment that made this culture recognizable, and what is also the first thing that comes to mind when the Vučedol culture is mentioned (Miloglav 2016: 120). The wide palette of ceramic products attests to the diversity of everyday activities, spiritual life and burial rites, and the hierarchic relations in the community (Fig. 7).

Slika / Figure 7. Ulomci keramičkih posuda s lokaliteta Popova zemlja / Fragments of ceramic vessels from the site of Popova zemlja (prema / after: Los 2016).

Društvene i ekonomske promjene koje se vrlo dobro mogu pratiti u okvirima vučedolske kulture, tako su se odrazile i na keramičku proizvodnju. U tom kontekstu zanimanje lončara izdvaja se kao prepoznata zanatska djelatnost, koja pred lončare stavlja visoke standarde. Keramička proizvodnja ovisila je o potrebama zajednice i lončari su se prilagođavali njezinim zahtjevima ujedno poštivajući tradicijsko nasljeđe. U tom smislu je proizvodnja određenog tipa posude bila manje ili više intenzivna (Miloglav 2016: 161). Organizacija proizvodnje trebala je zadovoljiti svakodnevne potrebe stanovništva, a isto tako osigurati dio keramičkih proizvoda za razmjenu i trgovinu. Ova razmjena mogla se odnositi na keramički proizvod kao predmet trgovine, a isto tako u sekundarnom kontekstu kao proizvod koji je korišten za transport žitarica prilikom razmjene dobara. Nadalje, keramička proizvodnja trebala je zadovoljiti sve slojeve društva, od onih povlaštenih i bogatijih pojedinaca/obitelji i naručivanja luksuznih posuda, do onih manjih i siromašnijih domaćinstava čija potražnja nije išla dalje od zadovoljavanja godišnjih i sezonskih potreba za keramičkim proizvodom. Postojanje organizirane keramičke proizvodnje, potvrđeno je na lokalitetima na Ervenici i Damića gradini kao i pojava specijaliziranih lončara koji se izdvajaju svojim vještinama i sposobnostima te izrađuju posude na razini domaćinstva Povećana keramička proizvodnja, koja je vidljiva u gotovo svim vučedolskim naseljima tako postaje odraz novonastalih društveno-ekonomskih promjena, a uključivala bi i podjelu rada u svakodnevnim aktivnostima (Miloglav 2007; 2012; 2012b; 2013; 2016; Vuković & Miloglav 2018).

Općenito gledajući posude su po svojoj funkciji mogle poslužiti za kuhanje, serviranje i konzumaciju hrane koja ne zahtijeva termičku obradu, skladištenje te transport. Različiti načini pripravljanja hrane termičkom obradom, kao što su kuhanje, prženje, pirjanje ili pečenje zahtijevaju korištenje različitih oblika posude te adekvatnu obradu površine. Isto tako, posude za skladištenje i transport koristile su se dugoročno ili kratkoročno, u njima su se skladištile suhe i tekuće namirnice pa je ovisno o namjeni i funkciji ovisio i njihov oblik, receptura smjese te obrada površine (Miloglav 2016; Vuković 2017). Ovisno o budućoj namjeni lončari su pribjegavali različitim tehnološkim izborima kako bi dobili recepturu smjese koja je dovoljno kvalitetna za pretpostavljenu funkciju posude. Receptura lončarske smjese kojom se regulira proces

The social and economic changes that can be tracked within the framework of the Vučedol culture also reflected in their pottery production. In that sense, pottery making stood out as a recognizable craft, setting very high standards to the potters. Pottery production depended on the needs of the community, and potters adjusted to the demands while still respecting traditional heritage. In that sense, the production of a certain type of vessel was more or less intense (Miloglav 2016: 161). The organization of production had to fulfil the community's everyday needs, and also ensure that some ceramic products were available for exchange and trade. This trade could refer to the ceramic product as a trading good, but also, in a secondary context, as a good that was used to transport grains during the exchange of goods. Furthermore, pottery production had to please all social classes, from the privileged to the smaller and poorer households that did not demand anything more than that their yearly and seasonal needs for ceramic products be fulfilled. The existence of organized pottery production was confirmed at the sites of Ervenica and Damića gradina, as was the presence of specialized potters who stood out due to their skills and abilities, and who made vessels at the household level. The increased pottery production, recorded in almost all settlements of the Vučedol culture, became a reflection of newly-created social and economic changes, and also included the division of labor in everyday activities (Miloglav 2007; 2012, 2012b; 2013; 2016; Vuković & Miloglav 2018).

Generally speaking, based on their function, vessels could be used to cook, serve and consume food that did not require thermal processing, and to store or transport it. Different methods of preparing food by thermal processing, such as cooking, frying, sautéing or baking, required different forms of vessels and adequate surface processing. Additionally, vessels used for storage and transport were in use long- or short-term, and were used to store dry or liquid ingredients, so their shape, the composition of the clay paste and surface processing varied depending on their function (Miloglav 2016; Vuković 2017). Depending on the future function, potters made different technological choices in order to obtain a clay paste that was of good enough quality for the assumed function of the vessel. The composition of the clay paste, used to regulate the process of vessel production, was the potter's choice, and the result of his knowledge, skill and experience, a series of social and economic norms, as

izrade posude predstavlja tehnološki izbor lončara, a rezultat je njegova znanja, vještine i iskustva, niza društvenih i ekonomskih normi te ideoloških i tradicijskih praksi (Silar & Tite 2000). Tako izrada posude zahtjeva od lončara ili skupine lončara koji sudjeluju u procesu izrade keramičkih posuda, cijeli niz tehnoloških izbora koji uključuje odabir sirovine (gline) i primjesa, vrstu alata, tehniku izrade i obrade površine te mjesta i načina pečenja. Svaki lončar ima utjecaj na konačan izgled posude i pritom ima nekoliko opcija na raspolaganju kada izrađuje keramičku posudu, a koje svjesno ili nesvjesno odabire iz nekog određenog razloga. U lancu operacija receptura lončarske smjese, obrada površine te oblik imaju ključnu ulogu kod definiranja uporabne komponente posude. U arheološkoj metodologiji tu je još i kontekst nalaza kojim definiramo mjesto njezina posljednjeg odlaganja (Miloglav 2016: 161).

Najbrojniju kategoriju posuda za svakodnevnu uporabu čine lonci za kuhanje. S obzirom na funkciju ove su posude za lončara bile najveći tehnološki izazov jer je trebalo osigurati otpornost na termalni stres, nepropusnost i čvrstoću. Ove je karakteristike lončar postigao dodavanjem određenih primjesa u glinenu smjesu, odabirom prikladnog oblika i obradom površine (Sl. 8).

Velika količina keramičkih kuka za vješanje na gotovo svim vučedolskim lokalitetima svjedoči o tome da ove posude nisu bile u direktnom kontaktu s vatrom već su bile obješene iznad ognjišta.

well as ideological and traditional practices (Silar & Tite 2000). In that sense, the production of a vessel required the potter, or group of potters, to make an entire series of technological choices pertaining to raw materials (clay) and inclusions, tool types, production techniques and surface treatment, as well as the location and firing method. Each potter affected the final appearance of a vessel, and had several choices at their disposal during the production process, and which they, consciously or unconsciously, made for a certain reason. In the operational chain, the composition of the clay paste, surface treatment and vessel form had the key role in defining the future use of the vessel. In archaeological methodology, it is also necessary to include the context of the find that defines the final place of its deposition (Miloglav 2016: 161).

The most numerous category of vessels used in everyday life includes cooking pots. Considering their function, these vessels posed the greatest technological challenge to the potters, because they had to be resistant to thermal stress, impermeable and firm. The potters achieved these characteristics by adding certain inclusions into the clay paste, by choosing the appropriate form and surface treatment (Fig. 8). A large amount of ceramic hooks used for hanging, discovered at almost all sites of the Vučedol culture, attest to the fact that these vessels were not in direct contact with fire, but were hung above hearths.

Slika / Figure 8. Posuda za kuhanje, Damića gradina / A cooking vessel, Damića gradina (prema / after: Miloglav 2016: 74).

Slika / Figure 9. Mala posuda s lokaliteta Ervenica u Vinkovcima (M. Gupca 8a) / A small vessel from the site of Ervenica in Vinkovci (M. Gupca 8a) (foto / photo: I. Krajcar).

Slika / Figure 10. Zdjela s lokaliteta Ervenica u Vinkovcima (M. Gupca 14) / A bowl from the site of Ervenica in Vinkovci (M. Gupca 14) (prema / after: Miloglav 2016: 156).

Najzanimljiviji tehnološki izbor vučedolskih lončara predstavlja premazivanje posuda pčelinjim voskom s unutrašnje i vanjske strane što pojačava efekt nepropusnosti. Ovaj vrlo zanimljiv tehnološki izbor lončari su primjenjivali isključivo na zdjelama koje nisu služile za kuhanje već su se koristile za konzumaciju i serviranje hrane i pripravu namirnica koje nisu zahtijevale termičku obradu (Miloglav 2016: 135-142). Upotreba voska zabilježena je na posudama iz različitih razdoblja, a analize pokazuju da se koristio kao sredstvo za začepljivanje pora na keramičkoj posudi kako bi se postigla

The most interesting technological choice of Vučedol potters was to coat the inside and outside surfaces of vessels with beeswax, thereby increasing their impermeability. The potters practiced this interesting technological choice exclusively on bowls that were not used for cooking, but for consuming and serving food and the preparation of ingredients that did not require thermal processing (Miloglav 2016: 135-142). The use of beeswax was recorded on vessels from different periods, and analyses show that it was used to fill the pores on ceramic vessels in order to achieve impermeability

Slika / Figure 11. Vrč s lokaliteta Mikleuška / A jug from the site of Mikleuška (foto / photo: I. Krajcar).

vodootpornost (Charters et al. 1997; Regert et al. 2001; Ogrinc et al. 2014). Provedeni eksperimenti i analize pokazali su da ovaj korak u lancu operacija izrade posuda nije bio vremenski zahtijevan. Vosak se topi na niskim temperaturama od 60-65°C i dodaje se na posudu nakon pečenja, dok je još vruća. Na taj se način vosak otapa i ulazi u stijenke porozne keramike te blokira pore. Stvaranje takvog vodootpornog filtera, osim što onemogućuje istjecanje tekućine iz posude, daje posudi i dodatni sjaj (Heron et al. 1994).

Zdjele koje su služile za svakodnevno konzumiranje i serviranje hrane ili pripravu namirnica koje ne zahtijevaju termičku obradu (npr. različite vrste kaša) druga su najbrojnija kategorija posuda. Od ostalog keramičkog inventara koje se svakodnevno koristilo u domaćinstvu za pripravu ili konzumaciju hrane izdvajaju se čaše i vrčevi za ispijanje i točenje tekućine (vode, mlijeka, alkohola), plitke posude za prženje hrane, cjedila za pripravu sira, poklopci, dvodijelne i trodijelne boce, keramičke žlice te kuke za vješanje posuda iznad vatre. Utezi za tkalačke stanove i ribarske mreže, pršljenci za vretena, kalemovi, kalupi za izradu bakrenih sjekira te antropomorfne i zoomorfne figurice također čine bogat izbor keramičkih proizvoda u vučedolskim naseljima (Sl. 9-11).

Pečenje keramičkih posuda odvijalo se na otvorenom ognjištu ili jami, a niti jedna keramička peć zasad nije potvrđena u vučedolskim naseljima. Za razliku od pečenja u pećima koje pripada prostorno ograničenim aktivnostima, pečenje na otvorenom je fleksibilna aktivnost koja omogućuje lončaru da premjesti mjesto pečenja posuda, na što su uglavnom i primorani kako bi poboljšali uvjete pečenja (Arnold 1990). Odabir mjesta ovisi o nizu okolnosti koje su uvjetovane prostornim (organizacija naselja, gust raspored kuća) i vremenskim karakteristikama (različiti smjerovi vjetra), a manje tehnološkim (Arnold 1990: 928). Stoga razlozi odabira načina pečenja prije svega ovise o okolišnom i društvenom kontekstu, različitom stupnju društvene organizacije i podjele rada, a ne o tehnološkim dostignućima. O vještini i znanju vučedolskih lončara svjedoči i činjenica da su redukcijsku atmosferu, koja je karakteristična za vučedolske posude, postizali u jamama, za što je potrebno više goriva, radnih sati, znanja i iskustva.

(Charters et al. 1997; Regert et al. 2001; Ogrinc et al. 2014). Experiments and analyses have shown that this step in the operational chain of vessel production wasn't time-consuming. Wax melts at low temperatures of 60-65°C and is put onto the vessel after firing when it is still hot. That way, the wax melts and enters the walls of the porous pottery and blocks the pores. Creating such a waterproof filter disables liquids from pouring out of the vessel, and also gives the vessel an additional sheen (Heron et al. 1994).

Bowls that were used every day to consume or serve food, or to prepare ingredients that do not require thermal processing (e.g. different kinds of porridge), are the second most numerous category of vessels. Other ceramic inventory that was used in the household daily to prepare or consume food includes glasses and jugs for drinking and pouring liquid (water, milk, alcohol), shallow vessels for frying food, strainers for cheese making, lids, bipartite and tripartite bottles, ceramic spoons and hooks used to hang vessels above a fire. Weights for looms and fishing nets, spindle whorls, spools, molds for making copper axes and anthropomorphic and zoomorphic figurines also make up a rich selection of ceramic products in settlements of the Vučedol culture (Fig. 9-11).

The firing of ceramic vessels took place over an open fire or in a pit, and so far no pottery kilns have been found in settlements of the Vučedol culture. Unlike firing in kilns that is spatially limited, firing over an open fire is a flexible activity that allows the potter to change the place of vessel production, what they were most often forced to do in order to enhance the firing conditions (Arnold 1990). The selection of space depended on a series of circumstances that were conditioned more by spatial (settlement organization, dense distribution of houses) and weather (different directions of the wind), than technological characteristics (Arnold 1990: 928). That is why the choice of the firing method primarily depended on the landscape and social context, the different degree of social organization and division of labor, and not technological achievements. The knowledge and skill of the Vučedol potters is attested to by the fact that firing in a reduction atmosphere, characteristic of Vučedol vessels, was achieved in pits, something that required a lot more fuel, working hours, knowledge and experience.

Recikliranje i sekundarna upotreba posuda vrlo je uobičajena u današnjim tradicijskim zajednicama isto kao što je bila u pretpovijesnim društvima (Hally 1983; Hayden & Cannon 1983; Skibo 2013). Nakon što posuda odradi svoju primarnu funkciju, može se upotrijebiti za neku drugu svrhu kako bi se maksimalno iskoristio njezin životni vijek. Npr. kada posuda za kuhanje postane vodopropusna ona se može iskoristiti za skladištenje suhih namirnica. Povezivanje polomljenih keramičkih ulomaka organskim materijalom na mjestima lomova (trakama kože ili biljnim nitima) vrlo je karakteristično za sve kulture bakrenoga doba. Ovaj koncept sekundarne upotrebe posebno je karakterističan za vučedolsku kulturu gdje je zamijećen daleko najveći broj popravaka posuda na ovaj način. Tako „slijepljena" posuda mogla je poslužiti nekoj drugoj svrsi (skladištenju ili posluživanju suhih namirnica) čime joj se produžavao životni vijek (Kudelić et al. 2017). Popravci posuda, međutim ne ukazuju samo na sekundarnu upotrebu i ekonomsku potrebu za određenim proizvodom već su pokazatelj društveno-ideoloških značenja koje je posuda imala za pojedinca i/ili zajednicu, što je još jedan segment koji ukazuje na kompleksnu društvenu organizaciju vučedolskog društva (Miloglav 2018a).

Recycling and secondary use of vessels are very common in today's traditional communities, just like they were in prehistoric societies (Hally 1983; Hayden & Cannon 1983; Skibo 2013). After the vessel serves its original function, it can be used for some other purpose in order to fully use its potential. For example, when a cooking vessel becomes porous, it can be used to store dry ingredients. Tying together broken pieces of pottery fragments with organic materials (ribbons of leather or plant fibers) at the points of breakage is very characteristic of all Copper Age cultures. This concept of secondary use became especially characteristic of the Vučedol culture that displays the largest number of vessels that were mended in this fashion. A vessel that was "glued together" in this way could have been used for something else (storing or serving dry ingredients), thereby prolonging its use (Kudelić et al. 2017). The mending of vessels does not, however, point only to secondary use and the economic need for a certain product, but is also an indicator of social and ideological meanings that the vessel had for an individual and/or a community, which is another segment that points to the complex social organization of the Vučedol society (Miloglav 2018a).

Literatura / Bibliography

Arnold, P. J. III 1990, The Organization of Refuse Disposal and Ceramic Production within Contemporary Mexican Houselots, *American Anthropologist* 92(4), 915-932.

Balen, J. 2004, Izvještaj s četvrte sezone sustavnog arheološkog iskopavanja tela Vučedol, *Obavijesti Hrvatskog arheološkog društva* XXXVI/3, Zagreb, 63-67.

Balen, J. 2005, *Sarvaš – neolitičko i eneolitičko naselje,* Musei Archaeologici Zagrebiensis Catalogi et Monographiae Vol. II, Zagreb.

Balen J. 2006, Vučedol – Vinograd Streim, *Hrvatski arheološki godišnjak* 2/2005, Zagreb, 43-45.

Balen J. 2007, Vučedol – Vinograd Streim, *Hrvatski arheološki godišnjak* 3/2006, Zagreb, 63-64.

Balen J. 2008, Vučedol – Vinograd Streim, *Hrvatski arheološki godišnjak* 4/2007, Zagreb, 85-87.

Balen, J. 2008a, *Vučedol, mit koji traje*. Katalog izložbe, Muzej na Makedonija, Arheološki muzej u Zagrebu, Skopje.

Balen J. 2009, Vučedol – Vinograd Streim, *Hrvatski arheološki godišnjak* 5/2008, Zagreb, 107-110.

Balen, J. 2010, *Eneolitičke kulture na prostoru istočne Hrvatske*, Doktorska disertacija, Sveučilište u Zagrebu.

Balen, J. 2013, Viškovci-Gradina, *Hrvatski arheološki godišnjak* 9/2012, Zagreb, 37-38.

Balen, J. 2014, Viškovci-Gradina, *Hrvatski arheološki godišnjak* 10/2013, Zagreb, 51-53.

Balen, J. 2016, Viškovci-Gradina, Hrvatski arheološki godišnjak 12/2015, Zagreb, *u tisku*.

Balen, J. 2017, Izvješće o zaštitnim arheološkim istraživanjima gradine Marić, MKRH.

Balen, J. & Mihelić, S. 2003, Par srebrnih sjekira iz Starih Jankovaca, *Opuscula Archaeologica* 27, Zagreb, 85-96.

Bankoff, H. A. & Winter, F. A. 1990, The Later Aeneolithic in Southeastern Europe, *American Journal of Archaeology* 94, 175-191.

Benac, A. 1948, Završna istraživanja u pećini Hrustovači, *Glasnik Zemaljskog muzeja u Sarajevu* n.n. III, Sarajevo, 3-42.

Benac, A. 1956, Prehistorijska gradina Zecovi kod Prijedora, *Glasnik Zemaljskog muzeja u Sarajevu* n.s, Sarajevo, 147-166.

Benkö, L., Horváth, F., Horvatinčić, N. & Obelić, B. 1989, Radiocarbon and Thermoluminescence Dating of Prehistoric Sites in Hungary and Yugoslavia, *Radiocarbon* 31(3), 992-1002.

Bogucki, P. 2004, Introduction: Consequence of Agriculture, 5000-2000 B.C, in: P. Bogucki & P. J. Crabtree (eds.), *Ancient Europe 8000 B.C-1000 A.D.: Encyclopedia of the Barbarian World vol. I*, 313-316.

Brunšmid, J. 1902, Nahođaji bakrenog doba iz Hrvatske i Slavonije i susjednih zemalja, *Vjesnik Arheološkog muzeja u Zagrebu* Vol. 6, Sv. 1, 32-67.

Bunčić, M. 2007, Topografija pretpovijesnih nalazišta u Vukovaru i okolici, *Vjesnik Arheološkog Muzeja u Zagrebu* 3.s. XL, Zagreb, 35-71.

Charters, S., Evershed, R. P., Quye, A., Blinkhorn, P. W. & Reeves, V. 1997, Simulation Experiments for Determining the Use of Ancient Pottery Vessels: the Behaviour of Epicuticular Leaf Wax During Boiling of a Leafy Vegetable, *Journal of Archaeological Science* 24, 1-7.

Childe, V. G. 1929, *The Danube in Prehistory*, Oxford.

Čečuk, B. & Radić, D. 2005, *Vela Spila – višeslojno pretpovijesno nalazište Vela Luka- otok Korčula*, Vela Luka.

Deschman, K. 1875, Die Pfahlbautenfunde auf dem Laibacher Moore, *Verhandlungen der KuK. Geologischen Reichsanstalt*, Wien.

Dimitrijević, S. 1956, Vučedolska nalazišta na području grada Vinkovaca, *Arheološki Vestnik* VII/4, Ljubljana, 408-438.

Dimitrijević, S. 1966, Arheološka iskopavanja na području vinkovačkog muzeja, rezultati 1957.-1965, *Acta Musei Cibalensis* 1, Vinkovci.

Dimitrijević, S. 1977/78, Zur frage der genese und der gliederung der Vučedoler kultur in dem zwischenstromlande Donau -Drau-Sawe, *Vjesnik Arheološkog Muzeja u Zagrebu* 3.ser, sv. X-XI, Zagreb, 1-96.

Dimitrijević, S. 1979, Vučedolska kultura i vučedolski kulturni kompleks, in: A. Benac (ed.), *Praistorija jugoslavenskih zemalja III*, Sarajevo, 267-343.

Dimitrijević, S. 1979a, Arheološka topografija i izbor nalaza s vinkovačkog tla, in: *Corolla memoriae Iosepho Brunšmid dicata, Izdanja Hrvatskog arheološkog društva* 4, Vinkovci, 133-201.

Dizdar, M. & Ložnjak Dizdar, D. 2009, Terenski pregled područja općine Ilok, Lovas i Tovarnik u 2008.g, *Annales Instituti Archaeologici* V, Zagreb, 117-121.

Dorn, A. 1965, Karasovićev vinograd, Vučedol, Vukovar – višeslojno praistorijsko nalazište, *Arheološki pregled* 7, 50-52.

Durman, A. 1982, Novi elementi u stratigrafiji lokaliteta Vučedol, *Glasnik slavonskih muzeja* XVII, br. 46, Osijek, 2-6.

Durman, A. 1983, Metalurgija vučedolskog kulturnog kompleksa, *Opuscula Archaeologica* 8, Zagreb, 1-87.

Durman, A. 1984, Ostava kalupa vučedolskog ljevača bakra iz Vinkovaca, Arheološka istraživanja u istočnoj Slavoniji i Baranji, *Izdanja Hrvatskog arheološkog društva* 9, Zagreb, 37-52.

Durman, A. 1984a, Vučedol 1984. – novi početak sustavnih istraživanja, *Obavijesti Hrvatskog arheološkog društva* 3, Zagreb, 34-38.

Durman, A. 1985, Vučedol '85 – nastavak sustavnih istraživanja na lokalitetu „Vinograd Streim", *Obavijesti Hrvatskog arheološkog društva* 3, Zagreb, 32-33.

Durman, A. 1987, Vučedol '86 – treća sezona sustavnih istraživanja na lokalitetu „Vinograd Streim", *Obavijesti Hrvatskog arheološkog društva* 2, Zagreb, 24-25.

Durman, A. 1987a, Vinograd Streim" – četvrta sezona na Vučedolu, *Obavijesti Hrvatskog arheološkog društva* 3, Zagreb, 34-36.

Durman,, A. 1988, Vučedolska kultura, in: *Vučedol treće tisućljeće p.n.e.,* Katalog izložbe, Zagreb, 13-20.

Durman, A. 1988a, Metal u vučedolskom kulturnom kompleksu, in: *Vučedol treće tisućljeće p.n.e.,* Katalog izložbe, Zagreb, 32-38.

Durman, A. 1991, Dvor na Uni. Od prijeslavenskog doba do naših dana, *Zbornik naučnih i publicističkih radova,* Knjiga I, Dvor na Uni, 89-94.

Durman, A. 2000. *Vučedolski Orion i najstariji europski kalendar*, Katalog izložbe, Zagreb.

Durman, A. 2006, *Simbol boga i kralja – prvi europski vladari*, Katalog izložbe, Zagreb.

Durman, A. & Forenbaher, S. 1989, Šesta sezona projekta „Vučedol 1984-1990.“, *Obavijesti Hrvatskog arheološkog društva* 3, Zagreb, 33-35.

Durman, A. & Balen, J. 2005, Vučedol – vinograd Streim, *Hrvatski arheološki godišnjak* 1/2004, Zagreb, 30-33.

Durman, A., Balen, J. & Hutinec, M. 2003, Nastavak sustavnih istraživanja na lokalitetu Vučedol – vinograd Streim, *Obavijesti Hrvatskog arheološkog društva* XXXV/1, Zagreb, 46-50.

Durman, A. & Hutinec, M. 2011, Vučedol – Vinograd Streim, *Hrvatski arheološki godišnjak* 7/2010, Zagreb, 97-99.

Durman, A. Hutinec, M. & Roksandić, D. 2013, Vučedol – Kukuruzište Streim, *Hrvatski arheološki godišnjak* 9/2012, Zagreb, 78-80

Durman, A. Hutinec, M. & Roksandić, D. 2014, Kukuruzište Streim *Hrvatski arheološki godišnjak* 10/2013, Zagreb, 88-91.

Đuričić, S. 2015. Preliminarno izvješće o istraživanjima na lokalitetu AN 4 Novi Bolman – Grablje, MKRH.

Ecsedy, I. 1980, Bronzkori leletek lánycsókról, *Janus Pannonius Múzeum Évkönyve* 24 (1979), Pecs, 95-112.

Filipec, K. 2009, *Arheološke slike Slavonije – arheološka istraživanja na trasi autoceste Beli Manastir – Osijek – Svilaj*, Zagreb.

Forenbaher, S. 1994, The Late Copper Age Architecture at Vučedol, Croatia, *Journal of Field Archaeology* 21, 307-323.

Forenbaher, S. 1995, Vučedol: graditeljstvo i veličina vučedolske faze naselja, *Opuscula Archaeologica* 19, Zagreb, 17-25.

Forenbaher, S. 1999, *Production and Exchange of Bifacial Flaked Stone Artifacts during the Portuguese Chalcolithic*, BAR International Series 756, Archaeopress, Oxford.

Gale, I. 2002, Vučedolsko naselje na Ervenici u Vinkovcima, *Vjesnik Arheološkog Muzeja u Zagrebu* 3.s., XXXV, Zagreb, 53-67.

Gyulai, F. 2010, *Archaeobotany in Hungary: Seed, Fruit, Food and Beverage Remains in the Carpathian Basin from the Neolithic to the Late Middle Ages*, Archaeolingua, Budapest.

Hally, D. J. 1983, Te Interpretive Potential of Pottery from Domestic Contexts, *Midcontinental Journal of Archaeology* 8 (2), 163-196.

Hayden, B. & Cannon, A. 1983, Where the Garbage Goes: Refuse Disposal in the Maya Highlands, *Journal of Anthropological Archaeology* 2, 117-163.

Heron, C., Nemcek, N., Bonfeld, K. M., Dixon, D. & Ottawax, B. S. 1994, The Chemistry of Neolithic Beeswax, *Naturwissenschaften* 81, 266-269.

Hodder, I., 2007, Sequences in structural change in the Dutch Neolithic, in: I. Hodder (ed.), *Symbolic and Structural Archaeology*, Cambridge University Press, Cambridge, 162-177.

Hoernes, M. & Menghin, O. 1925, *Urgeschichte der bildenden Kunst in Europa*, Wien, 3. izdanje.

Hoffiller, V. 1933, *Corpus Vasorum Antiquorum*, Fasc. I, Paris.

Horvatinčić, N., Obelić, B., Srdoč, D., Durman, A., Benkö, L. & Sliepčević, A. 1990, Radiocarbon and TL dating of the Eneolithic site Vučedol in East Croatia, Yugoslavia, *PACT* 29, *Second International Symposium 14C and Archaeology*, 243-250.

Hoti, M. 1989, Novi nalazi konsekrativnih rogova na Vučedolu, *Opuscula Archaeologica* 14, Zagreb, 33-42.

Hoti, M. 1991, Jedna posuda vučedolske kulture s posebnim obzirom na cjevaste vaze, *Opuscula Archaeologica* 15, Zagreb, 25-45.

Hoti, M. 1993, Vučedol-Streimov vinograd: magijski ritual i dvojni grob vučedolske kulture, *Opuscula Archaeologica* 17, Zagreb, 183-203.

Hulina, M. & Lapić, J. 2018, Kamanje, in: J. Balen, I. Miloglav & D. Rajković (eds.), *Povratak u prošlost - Bakreno doba u sjevernoj Hrvatskoj II*, pregled lokaliteta i materijala, Zagreb.

Hutinec, M. 2012, Vučedol – Vinograd Streim, sjeverna padina, *Hrvatski arheološki godišnjak* 8/2011, Zagreb, 95.

Hutinec, M. 2012, Vučedol – Vinograd Streim, *Hrvatski arheološki godišnjak* 8/2011, Zagreb, 92-94.

Iskra-Janošić, I. 1984, Arheološka istraživanja na području općine Vinkovci, *Izdanja Hrvatskog arheološkog društva* 9, Zagreb, 143-152.

Janković, I. & Novak, M. 2018, Bioarheologija bakrenodobnih populacija na tlu kontinentalne Hrvatske, in: J. Balen, I. Miloglav & D. Rajković (eds.), P*ovratak u prošlost – Bakreno doba u sjevernoj Hrvatskoj*, Zagreb, 211-223.

Jovanović, M. 2004, Žitarice u praistoriji u Podunavlju i na Balkanskom poluostrvu, *Rad muzeja Vojvodine* 46, Novi sad, 101-127.

Jurišić, M. 1988, Prehrana u vučedolskoj kulturi, in: *Vučedol treće tisućljeće p.n.e.*, Zagreb, 24-26.

Jurišić, M. 1990, Ukopi životinja na Vučedolu, *Opuscula Archaeologica* 14, Zagreb, 17-31.

Korošec, J. 1946, Pećina Hrustovača, novi lokalitet slavonske kulture, *Glasnik državnog muzeja u Sarajevu* n.s., sv. 1, Sarajevo, 7-38.

Kos, K., Posilović, H. & Durman, A. 2013, Prapovijesne inkrustacije u Podunavlju, *Obavijesti hrvatskog arheološkog društva* 45, Zagreb, 17-24.

Krmpotić, M., Čataj, L., Rajić Šikanjić, P. & Premužić, Z. 2016, Grobovi iz kasnoga bakrenog i ranoga brončanog doba s nalazišta Osijek – Ciglana i Zeleno polje, VAMZ, 3.s., XLIX, Zagreb, 59-94.

Krznarić Škrivanko, M. 1994, Ervenica – zaštitno iskopavanje, *Obavijesti Hrvatskog arheološkog društva* 26/3, Zagreb, 38-39.

Kudelić, A., Miloglav, I. & Balen, J. Recikliraj, ideje iz prošlosti – složena priroda recikliranja, in: I. Miloglav, A. Kudelić & J. Balen (eds.), *Recikliraj, ideje iz prošlosti*, Arheološki muzej u Zagrebu, Filozofski fakultet Sveučilišta u Zagrebu, Institut za arheologiju, Zagreb, 7-32.

Ložnjak Dizdar, D. & Dizdar, M. 2014, Cesta Kneževi Vinogradi-Zmajevac (rekonstrukcija D-212), *Hrvatski arheološki godišnjak* 10/2013, Zagreb, 13-15.

Ložnjak Dizdar, D. & Hutinec, M. 2014, Sotin, *Hrvatski arheološki godišnjak* 10/2013, Zagreb, 64-66.

Ložnjak Dizdar, D., Dizdar, M. & Šiljeg, B. 2004, Rezultati terenskog pregleda područja grada Iloka godine 2003., *Obavijesti hrvatskog arheološkog društva* 34/1, Zagreb, 45-50.

Los, Dž. 2016, Lokalitet AN2 Beli Manastir-Popova zemlja, izložba Tekuća arheološka istraživanja, Arheološki muzej u Zagrebu.

Los, Dž. 2017, Izvještaj o arheološkom istraživanju na trasi autoceste A15 Beli Manastir-Osijek-Svilaj, dionica Beli Manastri-Osijek, na lokalitetu AN2 Beli Manastir-Popova zemlja, MKRH.

Madiraca, V. 2012, Brekinjova kosa – kamenolom bojna (općina Glina), *Hrvatski arheološki godišnjak* 8/2011, Zagreb, 297-299.

Mandić, M. 1940, Prethodni izvještaj o započetom iskapanju u Hrustovačkoj pećini kod Bos. Vrpolja, *Glasnik zemaljskog muzeja Kraljevine Jugoslavije*, God. LI -1939, Sarajevo, 65-71.

Marijan, B. 2002, Jedan nalaz vučedolske kulture iz županjske Posavine, *Osječki zbornik* 26, Osijek, 9-26.

Marijanović, B. 2005, *Gudnja - višeslojno prapovijesno nalazište*, Dubrovnik.

Marković, Z. 1981, Vučedolska kultura u sjeverozapadnoj Hrvatskoj, *Arheološki Vestnik* 32, Ljubljana, 219-290.

Marković, Z. 1993, Neolitička, eneolitička i ranobrončanodobna naselja u sjevernoj Hrvatskoj, *Izdanja Hrvatskog arheološkog društva* 16, Zagreb, 113-125.

Marković, Z. 2002, Grabrovac kod Đakova i početak brončanog doba u sjevernoj Hrvatskoj, *Prilozi Instituta za arheologiju u Zagrebu* 19, Zagreb, 31-46.

Marković, Z. 2002a, Ranobrončanodobna faza vučedolske kulture u zapadnoj Bosni i sjevernoj Hrvatskoj, *Godišnjak centra za balkanološka ispitivanja*, Knjiga 30, Sarajevo.

Mathieson, I. et al. 2018, The genomic history of Southeastern Europe, *Nature* 555 (7695), 197-203.

Mihaljević, M. 2005, Slavča, *Hrvatski arheološki godišnjak* 1/2004, Zagreb, 39-41.

Mihaljević, M. 2006, Slavča, *Hrvatski arheološki godišnjak* 2/2005, Zagreb, 53-54.

Mihaljević, M. 2007, Slavča, *Hrvatski arheološki godišnjak* 3/2006, Zagreb, 75-76.

Mihaljević, M. 2008, Slavča, *Hrvatski arheološki godišnjak* 4/2007, Zagreb, 94-95.

Mihaljević, M. 2012, Slavča, *Hrvatski arheološki godišnjak* 8/2011, Zagreb, 115.

Mihaljević, M. 2013, Slavča, *Hrvatski arheološki godišnjak* 9/2012, Zagreb, 126-127.

Mihaljević, M. 2014, Slavča, *Hrvatski arheološki godišnjak* 10/2013, Zagreb, 97.

Milićević, M. 1984, Rekonstrukcija ženske odjeće u eneolitiku međuriječja Dunava, Drave i Save, *Opuscula Archaeologica* 9, Zagreb, 1-22.

Miloglav, I. 2007, Ervenica - dio naselja vučedolske kulture, *Opuscula Archaeologica* 31, 27-48.

Miloglav, I. 2012, *Kasna vučedolska kultura u Bosutskoj nizini na temelju keramičkih nalaza,* Doktorska disertacija, Sveučilište u Zagrebu.

Miloglav, I. 2012a, Topografja nalazišta vučedolske kulture na vinkovačkom području, *Acta Musei Cibalensis* 5, 69-93.

Miloglav, I. 2012b, Organizacija proizvodnje, standardizacija keramičkih proizvoda i specijalizacija zanata unutar vučedolskog društva, *Opuscula Archaeologica* 36, 27-54.

Miloglav, I. 2013, A model of ceramic production, specialization and standardization of ceramic assemblages on the basis of two sites of the Vučedol culture in eastern Croatia, *Anthropologie. International Journal of Human Diversity and Evolution* 51(2), Brno, 195-211.

Miloglav, I. 2016, *Keramika u arheologiji – lončarstvo vučedolske kulture na vinkovačkom području*, Acta Musei Cibalensis 7, Gradski muzej Vinkovci, Filozofski fakultet Sveučilišta u Zagrebu, Vinkovci-Zagreb.

Miloglav, I. & Mušič, B. 2017, Izvješće geofizičkih istraživanja s lokaliteta Prisunjača, MKRH.

Miloglav, I. 2018, Drills and holes - Pottery mending as evidence of the social meaning of an object, *Ab-*

stract book of the 24th European Association of Archaeologists Annual Meeting, Barcelona, 387.

Ogrinc, N., Budja, M., Potočnik, D., Žibrat Gašparič, A. & Mlekuž, D. 2014, Lipids, pots and food processing at Hočevarica, Ljubljansko barje, Slovenia, *Documenta Praehistorica* 41, 181-194.

Petrović, J. & Jovanović, B. 2002, *Gomolava – naselja kasnog eneolitika*, Novi Sad – Beograd.

Pollock, S. 1983, Style and Information: An Analysis of Susiana Ceramics, *Journal of Anthropological Archaeology* 2, 354–390.

Rajković, D. & Balen, J. 2016, *Sarvaš – Neolitičko i eneolitičko naselje II*, Muzej Slavonije, Arheološki muzej u Zagrebu, Osijek.

Rašajski, R. 1954, Gomolava kod Hrtkovaca – rezultati probnih istraživanja, *Rad vojvođanskih Muzeja*, Novi Sad, 187-219.

Reed, K. 2012, *Farmers in Transition. The archaeobotanical analysis of the Carpathian Basin from the Late Neolithic to the Late Bronze Age (5000-900 BC)*, Doktorska disertacija, University of Leicester.

Reed, K. 2016, Agricultural change in Copper Age Croatia (ca. 4500–2500 cal B.C)?, *Archaeological and Anthropological Sciences*, 1-21.

Regert, M., Colinart, S., Degrand, L. & Decavallas, O. 2001, Chemical alteration and use of beeswax through time: Accelerated ageing tests and analysis of archaeological samples from various enviromental context, *Archaeometry* 43(4), 549-569.

Schiffer, M. 1976, *Behavioral Archaeology,* Academic Press, New York.

Schiffer, M. B. 1996, *Formation Processes of the Archaeological Record*, University of Utah Press, Salt Lake City.

Schmidt, R. R. 1945, *Die Burg Vučedol*, Zagreb.

Sheratt, A. 1997, *Economy and Society in Prehistoric Europe*, Edinburgh.

Sillar, B. & Tite, M. S. 2000, The Challenge of „Technological choice" for Material Science Approaches in Archaeology, *Archaeometry* 42(1), 2-20.

Skelac, G. 1997, Prapovijesno nalazište Slavča, *Opuscula Archaeologica* 21, Zagreb, 217-235.

Skibo, J. M. 2013, *Understanding Pottery Function* (Manuals in Archaeological Method, Teory and Technique), Springer, New York.

Stanton, T. W., Brown, M. K. & Pagliaro, J. B. 2008, Garbage of the Gods? Squatters, Refuse Disposal, and Termination Rituals among the Ancient Maya, *Latin American Antiquity* 19(3), 227-247.

Stevanović, M. 1997, The Age of Clay: The Social Dynamics of House Destruction, *Journal of Anthropological Archaeology* 16, 334-395.

Težak-Gregl, T. 1986, Vučedol kod Vukovara – eneolitsko naselje, *Arheološki pregled* 26, Ljubljana, 57-59.

Težak-Gregl, T. 1998, Neolitik i eneolitik, in: M. Mirić (ed.), *Prapovijest*, Zagreb, 59-157.

Težak-Gregl, T. 2017, *Hrvatske zemlje od starijega kamenog do bakrenog doba,* Leykam international, Zagreb.

Trbojević Vukičević, T. 2006, *Arheozoološko i tafonomsko istraživanje eneolitičkog goveda Vučedola*, Doktorska disertacija, Sveučilište u Zagrebu.

Trbojević Vukičević, T., Tušek, T., Babić, K. & Gjurčević Kantura, V. 2006, Archaeozoological research on red deer (Cervus elaphus L.) from Croatian archaeological sites, *Veterinarski arhiv* 76, Zagreb, 221-228.

Tringham, R. 2000, The continuous house. A view from the deep past, in: R. A. Joyce & S. D. Gilespie (eds.), *Beyond Kinship. Social and Material Reproduction in House Societies*, Philadelphia, 115-134.

Tripković, B. 2009, *Domaćinstvo i zajednica u kasnom neolitu centralnog Balkana,* Doktorska disertacija, Univerzitet u Beogradu.

van Zeist, W. 1974-1978, Ugljenisani biljni ostaci na višeslojnom nalazištu Gomolava, *Rad vojvođanskih Muzeja* 23-24, Novi Sad, 5-18.

Vuković, J. 2017, *Studije keramike. Teorija i metodologija u analizama grnčarije u arheologiji*, Zavod za udžbenike, Beograd.

Vuković, J. & Miloglav, I. 2018, Part-time Labor and Household Production: Emergence of Specialized Potters in the Late Neolithic Vinča (Serbia) and Late Eneolithic Vučedol (Croatia) Societies, in: I. Miloglav & J. Vuković (eds.), *Artisans Rule. Product Standardization and Craft Specialization in Prehistoric Society*, Cambridge Scholars Publishing, Cambridge, 120-136.

Slika / Figure 1. Opsidijan – luksuzna sirovina korištena u pretpovijesti
/ Obsidian-a luxurious raw material used in prehistory (foto / photo: A. Barbir)

Bakrenodobna kamena građa u kontinentalnoj Hrvatskoj

Copper age stone finds from continental Croatia

Antonela Barbir

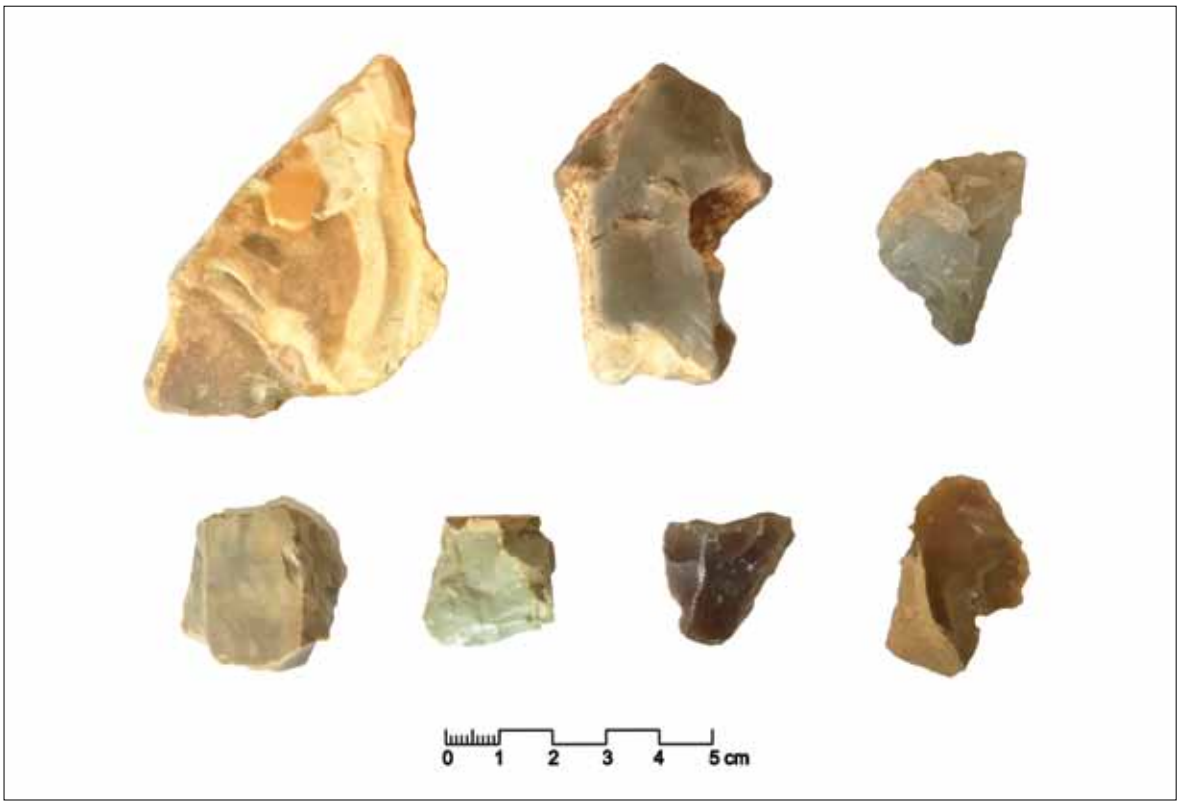
Institut za arheologiju
Institute of Archaeology
Zagreb
abarbir@iarh.hr

Uvod

Iako je temeljno obilježje bakrenoga doba ili eneolitika pojava metala, u prvome redu zlata i bakra, društvo se i dalje bavi zemljoradnjom, stočarstvom i lovom, a za svoje svakodnevne aktivnosti koristi se i kamenim oruđem. U posljednje vrijeme promjena razmišljanja znanstvenika o važnosti litičkih analiza materijala iz bakrenoga doba rezultira porastom objava takve vrste materijalne ostavštine. Iako širom upotrebom metala u proizvodnji oruđa i oružja metalni predmeti polako zamjenjuju one kamene, podaci koje mogu pružiti tipološka, tehnološka i sirovinska analiza kamene građe uvelike govore o životu i aktivnostima na lokalitetu te mobilnosti zajednice preko čega se mogu detektirati trgovinske veze i robne razmjene (Inizan et al. 1992). Prema M. Kaczanowskoj i J. Kozlowskom (1997) korištenje sirovinskog materijala potpuno se lokalizira na prostoru Transdanubije tijekom kasnoga neolitka i ranoga eneolitika, što upućuje na to da se koriste lako dostupne sirovine bez obzira na kvalitetu. Tijekom srednjega i kasnoga eneolitika dolazi do širenja mreže razmjene sirovina iz čitave regije. U usporedbi s neolitikom, eneolitički kameni sirovinski materijal pokazuje veću raznolikost (Šošić & Karavanić 2009).

Introduction

Even though the basic characteristic of the Copper Age, or the Eneolithic, is the appearance of metal, primarily gold and copper, the society continued to engage in agriculture, animal husbandry and hunting, and used stone tools in everyday activities. In recent years, scientists have changed their opinions on the importance of lithic analyses conducted on Copper Age material, which resulted in an increase of publications focusing on that kind of material remains. Although the widespread use of metals in tool and weapon production encouraged the replacement of stone tools by metal ones, the data obtained by typological, technological and raw material analyses of stone finds greatly increases knowledge on the life and activities at a given site, as well as a populations mobility, and can help detect routes of trade and exchange (Inizan et al. 1992). According to M. Kaczanowska and J. Kozlowski (1997), the use of raw materials in Transdanubia was completely localized during the Late Neolithic and Early Eneolithic, which suggests that easily accessible raw materials were used regardless of their quality. During the Middle and the Late Eneolithic, the network of raw material exchange from all regions was widely spread. In comparison to the Neolithic, Eneolithic raw material displays greater diversity (Šošić & Karavanić 2009).



Slika / Figure 2. Različiti varijeteti rožnjaka – najčešće sirovine za izradu oruđa / Different varieties of chert-the most common raw material used for tool production (foto / photo: A. Barbir)

U kontinentalnoj Hrvatskoj poznajemo više bakrenodobnih lokaliteta s kojih je objavljena kamena građa. Od svih eneolitičkih kultura, najzastupljenije su objave litičkog materijala lasinjske kulture koje uključuju nalaze s lokaliteta Blizna (Komšo 2006b), Tomašanci – Palača (Špoljar 2011), Pajtenica – Velike livade (Tykot & Balen 2010), Beketinci – Bentež (Šošić Klindžić 2013), Jurjevac – Stara Vodenica (Balen et al. 2017), Golinci – Selište (Čataj & Janeš 2013), Ivandvor (Rep 2016), Pustakovec (Komšo 2006d), Dubranec (Balen 1998), Vinkovci – Hotel (Dimitrijević 1979; Marković 1994) i Crkvišće – Bukovlje (Barbir 2017). Na lokalitetu Kuševac – Topolina (Barbir & Šprem 2018) pronađeni su nalazi i lasinjske i kulture Retz-Gajary, dok su kameni nalazi kulture Retz-Gajary otkriveni na lokalitetu Josipovac Punitovački – Veliko Polje I (Komšo 2009) i Ivandvor (Rep 2016). Lasinjskoj i kostolačkoj kulturi mogu se pripisati nalazi s lokaliteta Slavča (Šošić & Karavanić 2004), a kostolačkoj oni s lokalteta Đakovo – Franjevac (Bunčić 2011). Lokaliteti koji se ne mogu pripisati određenoj eneolitičkoj kulturi, a sadrže kamene nalaze su Gromače (Komšo 2006a), Brezje (Komšo 2006c) i Čanjevo (Komšo 2008).

Stone finds from several Copper Age sites in continental Croatia have been published. Out of all Copper Age cultures, most numerous lithic material publications focus on the Lasinja culture, including finds from Blizna (Komšo 2006b), Tomašanci-Palača (Špoljar 2011), Pajtenica-Velike livade (Tykot & Balen 2010), Beketinci-Bentež (Šošić Klindžić 2013), Jurjevac-Stara Vodenica (Balen et al. 2017), Golinci-Selište (Čataj & Janeš 2013), Ivandvor (Rep 2016), Pustakovec (Komšo 2006d), Dubranac (Balen 1998), Vinkovci-Hotel (Dimitrijević 1979; Marković 1994), and Crkvišće-Bukovlje (Barbir 2017). The site of Kuševac-Topolina (Barbir & Šprem 2018) yielded finds of the Lasinja and Retz-Gajary cultures, and additional stone finds of the Retz-Gajary culture were discovered at Josipovac Punitovački-Veliko Polje I (Komšo 2009) and Ivandvor (Rep 2016). Finds from Slavča (Šošić & Karavanić 2004) can be ascribed to the Lasinja and Kostolac cultures, and those from Đakovo-Franjevac (Bunčić 2011) to the Kostolac culture. The sites that yielded stone finds which cannot be ascribed to a certain Eneolithic culture include Gromače (Komšo 2006a), Brezje (Komšo 2006c) and Čanjevo (Komšo 2008).

Pregled kamene građe po bakrenodobnim kulturama

Lasinjska kultura

Najviše lasinjskih lokaliteta s objavljenom kamenom građom nalazi se na prostoru istočne Hrvatske. Lokalitet Tomašanci – Palača nalazi se na Đakovačkom ravnjaku, a objavljeno je 380 komada lomljene kamene građe (Špoljar 2011). Sirovinski materijal za izradu kamenog oruđa dolazi iz bliže okolice naselja, iako je jedna rukotvorina izrađena od opsidijana koji nije lokalnog podrijetla. Dio kamenog oruđa izrađivali su u naselju, no veći dio izrađivan je izvan naselja ili su do njih došli na drugi način (Špoljar 2011). Sječiva su najzastupljeniji tip izrađevina. Često su neobrađena, s vidljivim ogrebotinama i sjajem srpa, što je poseban sjaj na rubu sječiva koji nastaje rezanjem biljaka, odnosno otpuštanjem biljnih ulja prilikom rezanja. Osim neobrađenih sječiva, većina oruđa izrađena je upravo na ovom tehnološkom proizvodu. Najbrojnija oruđa su komadi s obradom koji su mogli biti korišteni za čitav niz aktivnosti, poput poljodjelstva, stočarstva, lova i dr. (Špoljar 2011). Lokalitet Pajtenica – Velike livade zanimljiv je zbog rukotvorine izrađene od opsidijana, čija je petrografska analiza pokazala karpatsko podrijetlo sirovine (Tykot & Balen 2010). Osim tog nalaza, zabilježena je lomljena kamena građa, te brusevi i žrvnjevi od granita, pegmatita i škriljevca (Balen 2006). Analiza kamene građe s lokaliteta Beketinci-Bentež u istočnoj Hrvatskoj pokazuje da to naselje ima djelomično proizvodni karakter, a većinu izrađevina čine odbojci i sječiva (Šošić Klindžić 2013). Zanimljivo je da su jezgre pronađene na ovome lokalitetu služile isključivo za proizvodnju sječiva. Veliki postotak kamene građe s nalazišta pripada oruđima, od kojih su najbrojniji tipovi komadi s obradom, zarupci i grebala, a prisutni su i lunarni segmenti i projektili (Šošić Klindžić 2013). Na lokalitetu Jurjevac-Stara Vodenica pronađena je lomljena, glačana i abrazivna kamena građa (Balen et al. 2017). Od 44 lomljene izrađevine, najzastupljenije su pločice i sječiva. Jezgre su uglavnom malih dimenzija, što može biti posljedica maksimalnog iskorištavanja, namjerne izrade sječiva i pločica malih dimenzija te malih dimenzija dostupne sirovine (Balen et al. 2017). Dio izrađevina proizveden je na lokalitetu, dok su ostale vjerojatno izrađene na mjestu prikupljanja sirovine, odnosno u blizini samoga naselja. Oruđe koje je najčešće zastuplje-

An overview of stone finds in Copper age cultures

The Lasinja culture

Most sites of the Lasinja culture with published stone material are situated in eastern Croatia. The site of Tomašanci-Palača is situated in the Đakovo plain, and 380 pieces of chipped stone have been published (Špoljar 2011). The raw material used to produce stone tools originated from the vicinity of the settlement, although one find is made of obsidian that is not of local origin. Some of the stone tools were produced in the settlement, but a larger portion was made somewhere else, or was acquired in some other way (Špoljar 2011). Blades are the most common type of find. They are often not retouched and have visible traces of chipping and sickle gloss – a special kind of gloss on the edges of blades that is created by intensive plant cutting, seeing as plant oils are released when cut. Other than unretouched blades, most tools were made precisely on this technological product. The most numerous tools include pieces with retouch that could have been used in a series of activities, such as agriculture, animal husbandry, hunting, etc. (Špoljar 2011). The site of Pajtenica-Velike livade is interesting due to a tool made out of obsidian that was, through petrographic analysis, proven to be of Carpathian origin (Tykot & Balen 2010). In addition to this find, chipped stone tools, whetstones and grindstones made of granite, pegmatite and slate were also recorded (Balen 2006). The analysis of stone finds from Beketinci-Bentež in eastern Croatia suggests that the settlement was partially used for production, and the most common finds include flakes and blades (Šošić Klindžić 2013). It is interesting to note that the cores from this site were exclusively used for blade production. Tools make up a large percentage of stone finds from the site, and the most frequent include pieces with retouch, truncations and endscrapers, as well as some lunar segments and projectiles (Šošić Klindžić 2013). The site of Jurjevac-Stara Vodenica yielded chipped, polished and abrasive stone finds (Balen et al. 2017). Out of the 44 chipped finds, bladelets and blades are the most frequent. Cores are generally small in size, which could be a result of maximal use, the intentional production of small blades and bladelets, or the small size of available raw materials (Balen et al. 2017). Some of the finds were probably produced at the site, while others were probably produced

no je kombinirano, a često je riječ o kombinacijama udubak i komad s obradom, udubak i grebalo, grebalo, nazubak i komad s obradom te primjerice perforator, udubak i komad s obradom na jednom rubu (Balen et al. 2017). Većina oruđa izrađena je na sječivu. Sirovinska analiza pokazala je da su se na ovom lokalitetu najčešće koristili rožnjaci / radiolariti, a rijetko kvarc, kvarcit iz jezerskih naslaga i opsidijan. Sjaj srpa i ogrebotine koji svjedoče o rezanju bilja zabilježeni su na nekoliko izrađevina. Na nekoliko izrađevina vidljivi su tragovi gorenja, najvjerojatnije nastali slučajnim izlaganjem vatri (Balen et al. 2017). U Vinkovcima je na položaju Hotel 1977. godine pronađen vrč u kojem je bilo 48 lomljenih izrađevina i oruđa, među kojima se ističe jedan projektil i zarupci, te tri izrađevine izrađene od opsidijana (Dimitrijević 1979; Marković 1994; Šošić Klindžić 2011).

Na području središnje Hrvatske izdvajaju se dva lokaliteta, Dubranec i Crkvišće – Bukovlje. Dubranec je lasinjski lokalitet s bogatom, no samo preliminarno objavljenom kamenom građom (Balen 1998). Uglavnom je riječ o rožnjačkim jezgrama i ulomcima te odbojcima izrađenim od rožnjaka. Pronađeno je i jedno široko plosnato oruđe od škriljevca čija je površina djelomično oštećena utjecajem atmosferilija (Balen 1998). Na lasinjskom lokalitetu Crkvišće – Bukovlje pronađeno je 265 komada lomljenoga kamenog oruđa te 79 nalaza glačanoga i abrazivnoga kamenog oruđa (Barbir 2017). Među lomljenom kamenom građom najviše je odbojaka, krhotina i sječiva. Jezgara je malo, ali pokazuju proizvodnju oruđa na samom lokalitetu. Od oruđa su najzastupljeniji komadi s obradom, zatim grebala te svrdla (Sl. 3.). Od glačanog oruđa pronađene su sjekire, tesle, dlijeta, klinovi i čekići, dok su oruđa grube ili abrazivne površine rastirači, brusovi, glačalice i žrvnjevi (Barbir 2017). Dokaze za poljodjelsku aktivnost nalazimo u sječivima koja imaju sjaj srpa. Prisutnost žrvnjeva i rastirača (Sl. 4.) također svjedoči o mljevenju biljnih proizvoda, sjemenki, orašastih plodova i dr. (Barbir 2017). U sjeverozapadnoj Hrvatskoj smješten je lokalitet Blizna na kojem je pronađena lomljena i glačana kamena građa (Komšo 2006b). Sirovina za izradu lomljenoga kamenog oruđa pribavljana je lokalno, na obalama obližnjih rijeka gdje je vjerojatno rađena primarna redukcija okorine. Na lokalitet je sirovina donesena kao pripremljene jezgre i poluizrađevine. Najviše je odbojaka, a sječiva su nešto rjeđa (Komšo 2006b). Pronađena je i jedna cijela plosnata jezičasta sjekira, što je tip koji je prisutan

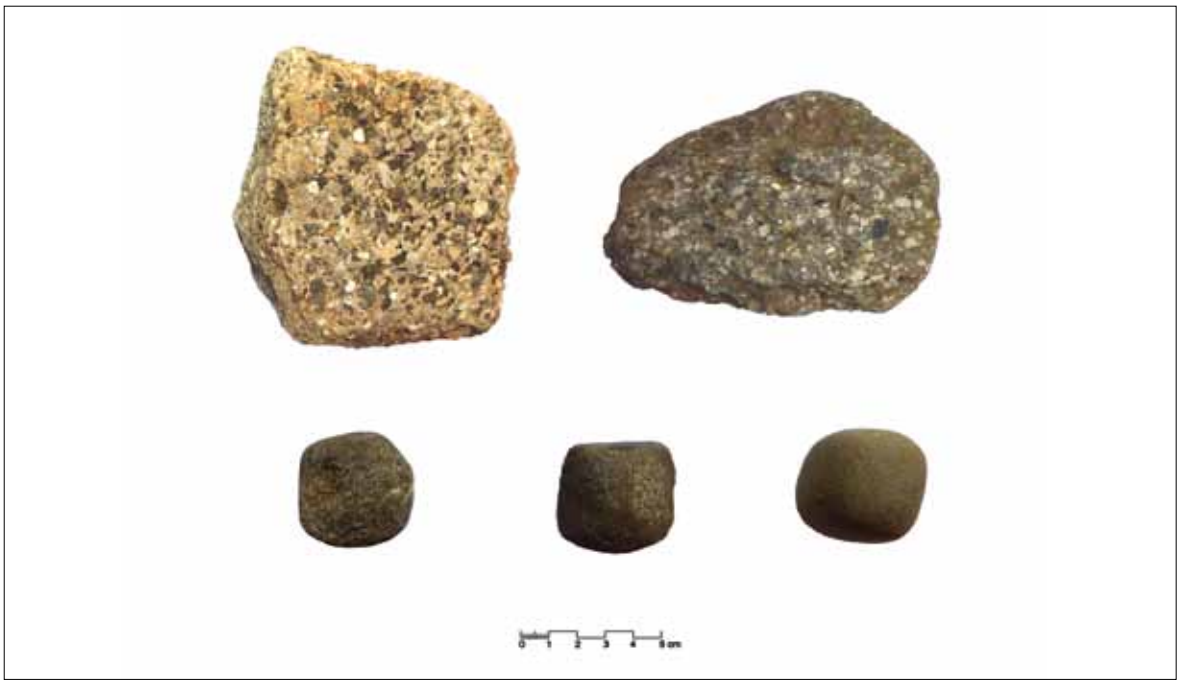
at the place where raw material was procured, i.e. in the vicinity of the settlement. The most frequent tool type is combined, often a combination of a notch and a piece with retouch, a notch and an endscraper, an endscraper, denticulate and a piece with retouch and, for example, a perforator, notch and a piece with retouch on one edge (Balen et al. 2017). Most tools were made on blades. The raw material analysis has revealed that cherts/radiolarites were most commonly used, and that quartz, quartzite from lake deposits, and obsidian were seldom used. Sickle gloss and chipping that attest to plant cutting were recorded on several finds. Several finds display traces of burning, most probably from accidental exposure to fire (Balen et al. 2017). In 1977, the Hotel position in Vinkovci yielded a jug with 48 chipped artifacts and tools, including one projectile and truncations, as well as three artifacts made of obsidian (Dimitrijević 1979; Marković 1994; Šošić Klindžić 2011).

Two sites from central Croatia stand out: Dubranec and Crkvišće-Bukovlje. Dubranac is a Lasinja culture site with numerous, but only preliminarily published finds (Balen 1998). It mostly consists of chert cores and core fragments, and chert flakes. One flat wide tool made of slate was also discovered, and its surface was partially damaged by weather conditions (Balen 1998). The Lasinja culture site of Crkvišće-Bukovlje yielded 265 pieces of chipped, and 79 polished and abrasive stone tools (Barbir 2017). Flakes, chunks and blades dominate the chipped stone assemblage. There are few cores, but they suggest that tool production took place at the site. The most common tools are pieces with retouch, followed by endscrapers and perforators (Fig. 3.). Polished tools include axes, adzes, chisels, wedges and hammers, and tools with a coarse abrasive surface include handstones, whetstones, polishers and grindstones (Barbir 2017). Evidence of agricultural activities includes sickle sheen recorded on some blades. The presence of grindstones and handstones (Fig. 4.) also attests to the grinding of plant produce, seeds, nuts and the like (Barbir 2017). The site of Blizna is situated in northwestern Croatia, and it too yielded chipped and polished stone material (Komšo 2006b). The raw material used to produce chipped stone tools was obtained locally, on the shores of nearby rivers where the primary processing of cortex probably took place. The raw material was brought to the site in the shape of prepared cores and semi-finished products. Flakes are the most frequent, and blades appear less often

Slika / Figure 3. Oruđe s lokaliteta Crkvišće-Bukovlje / Tools from Crkvišće-Bukovlje (foto / photo: A. Barbir)

na lokalitetima od neolitika do brončanoga doba (Komšo 2006b). Na istom području smješteno je i nalazište Pustakovec, na kojem je prikupljeno šest kamenih izrađevina od kojih su tri od lomljenog kamena, a tri glačane sjekire (Komšo 2006d). Od glačane kamene građe pronađena je plosnata trapezasta sjekira, mala plosnata trapezasta sjekra, te ulomak baze glačane plosnate sjekire (Komšo 2006d). Od lomljenih kamenih nalaza pronađen je jedan odbojak, prizmatično sječivo i ulomak jezgre. Sirovinski materijal lomljenih kamenih izrađevina potječe iz sekundarnih aluvijalnih nanosa, dopremljenih iz primarnih, vjerojatno različitih ležišta djelovanjem rijeka i nataloženih na obalama. Korištene su različite tehnike proizvodnje: tehnologija prizmatičnih sječiva i *ad hoc* tehnologija dobivanja odbojaka (Komšo 2006d). Na lokalitetu Selinci-Golište u Podravini prilikom istraživanja jame pronađeno je 15 komada lomljene kamene građe (Čataj & Janeš 2013). Najzastupljenija su sječiva na kojima su izrađena dva grebala, komad s obradom na jednom i na dva ruba. Na odbojcima su izrađena dva grebala, a na odbojčićima tri (Čataj & Janeš 2013). U litičkom skupu prisutne su i dvije pločice od kojih je na jednoj izrađen nazubak. Pronađena je i jedna jezgra za dobivanje sječiva i odbojaka. Iako je riječ o malom skupu nalaza, može se pretpostaviti aktivnost izrade oruđa na samom lokalitetu (Čataj & Janeš 2013).

(Komšo 2006b). One complete tongue-shaped axe was discovered – a type that is present on sites dated to the period from the Neolithic to the Bronze Age (Komšo 2006b). The site of Pustakovec is situated in the same area, and it yielded six stone artifacts – three chipped ones and three polished axes (Komšo 2006d). Polished stone tools include a flat trapezoidal axe, a small flat trapezoidal axe, and a fragment of the base of a flat axe (Komšo 2006d). Chipped stone finds include one flake, a prismatic blade, and a core fragment. The raw material used to make chipped stone artifacts originates from secondary alluvial deposits to where it was carried by the rivers from primary, probably different, sources, only to be deposited at the riverbanks. Different production techniques were used: the technology of prismatic blades, and the *ad hoc* technology of flake production (Komšo 2006d). The excavations of a pit at the site of Selinci-Golište in the Drava River valley yielded 15 pieces of chipped stone material (Čataj & Janeš 2013). Blades are the most common type, and were used to produce two endscrapers, a piece with retouch on one, and a piece with retouch on two edges. Flakes were used to produce two endscrapers, and small flakes to produce three (Čataj & Janeš 2013). The assemblage also includes two bladelets, one of which was used to make a denticulate. One core for flakes and blades was also found. Although this is a small assemblage, it can be assumed that tool manufacturing activities took place at the site (Čataj & Janeš 2013).



Slika / Figure 4. Ulomci žrvnjeva i rastirači s lokaliteta Crkvišće-Bukovlje / Grindstone fragments and handstones from Crkvišće-Bukovlje (foto / photo: A. Barbir)

Kultura Retz-Gajary

Ova srednjoeneolitička kultura ima objavljenu kamenu građu s tri lokaliteta. Kamene izrađevine s lokaliteta Josipovac Punitovački – Veliko Polje I dolaze iz dvije stratigrafske jedinice (Komšo 2009). U jednom slučaju (SJ 194) riječ je o velikoj radnostambenoj zemunici s velikim brojem vatrišta i rupa od kolaca, a analizom radioaktivnog ugljika smještena je u razdoblje između 3790. i 3650. g. pr. Kr. (Komšo 2009). Prikupljeno je 63 lomljenih i jedna glačana izrađevina, dva riječna oblutka i dva kamena. Visoka je zastupljenost oruđa, posebno segmenta srpa. Stratigrafska jedinica 239 zemunica je nepravilnog oblika za koju se pretpostavlja da je radni prostor. U ovom prostoru prikupljeno je 39 kamenih izrađevina – 37 je rožnjaka, jedan ulomak riječnog oblutka i jedan kamen (Komšo 2009). Kamene izrađevine pokazuju sličnost s onima iz SJ 194 zbog sječiva koja su prevladavajuća tehnološka kategorija, rijetke okorine, malog broja oruđa i jezgara. Korištena je kvalitetna sirovina dobrih osobina lomljenja. Za ovaj lokalitet može se zaključiti kako je tehnologija proizvodnje kamenih izrađevina stavila naglasak na produkciju sječiva, uglavnom pravilnih i prizmatičnih (Komšo 2009). Niska učestalost okorine pokazuje da je primarna redukcija uglavnom obavljana izvan

The Retz-Gajary culture

Stone finds from three sites of this Middle Eneolithic culture have been published. The stone finds from Josipovac Punitovački-Veliko Polje I were found in two stratigraphic units (Komšo 2009). One of them (SU 194) was a large working and residential pit-house that had many hearths and post holes, and radiocarbon analyses dated it to the period between 3790 and 3650 BC (Komšo 2009). A total of 63 chipped and one polished stone artifact was found, as were two pebbles and two rocks. Tool frequency is high, especially that of sickle segments. Stratigraphic unit 239 is a pit-dwelling of irregular shape that was interpreted as a working area. It yielded 39 stone artifacts - 37 pieces of chert, one fragment of a river pebble, and one rock (Komšo 2009). The stone artifacts are similar to those from SU 194 because blades are the dominant technological category, cortex rarely appears, and the number of tools and cores is small. The used raw material is of high-quality and has good chipping properties. It can be said that the technology of stone artifact production at this site put an emphasis on the production of blades that are mostly regularly-shaped and prismatic (Komšo 2009). The low frequency of cortex suggests that primary reduction was mostly conducted outside the settlement. The several re-

nalazišta. Nekoliko nađenih odbojaka prekrivenih u potpunosti okorinom, loše i osrednje kvalitete, pokazuju kako je bar dio primarne redukcije obavljan unutar nalazišta, na što bi upućivale i prikupljene jezgre, odbojčići od popravka i pomlađivanja platforme i prebačeno sječivo (Komšo 2009). Oba prostora imaju najviše oruđa koje se povezuje uz rezanje materijala biljnog porijekla, uz pretpostavku da je funkcija ova dva prostora bila vezana uz poljodjelstvo, odnosno uz izradu, popravak ili korištenje oruđa za poljodjelstvo (Komšo 2009). Osim lomljenih izrađevina, pronađeno je nekoliko ulomaka pješčenjaka koji mogu ukazivati na oštrenje metalnih predmeta i na obradu koštanog oruđa. Pronađeno je i jedno glačano oruđe čija funkcija zasad nije poznata (Komšo 2009). Na lokalitetu Ivandvor u blizini Đakova prikupljene su 474 lomljene kamene izrađevine (Rep 2016). Najviše je sječiva/pločica i odbojaka. Pronađeno je i 26 jezgara, uglavnom za izradu sječiva, dok ih je samo 4 iskorišteno za odbojke (Rep 2016). Prema promjeni orijentacije odbijanja mogu se pretpostaviti pokušaji maksimalnog iskorištavanja sirovine. Stanovnici ovoga naselja dio su oruđa izrađivali unutar same zemunice. Odbojci su iskorištavani pretežno za izradu grebala, dok je najveći dio sječiva obrađen u trapeze i zarupke (Rep 2016). Na sječivima je zabilježen i sjaj srpa. Najčešće korištena sirovina za izradu oruđa su rožnjaci i radiolariti koji ne dolaze iz neposredne blizine lokaliteta, što upućuje na postojanje sustava trgovine i povezanost zajednice s udaljenijim krajevima. Tome u prilog ide i nalaz opsidijana (Rep 2016). Kuševac – Topolina drugi je lokalitet na kojem je pronađena kamena građa koja se može povezati s retz-gajarskom i lasinjskom kulturom (Barbir & Šprem 2018). Ukupno je pronađen 231 kameni nalaz. Tehnološka analiza pokazala je da je dio oruđa proizveden *in situ*, čemu u prilog ide visok postotak jezgara (Sl. 5.), odbojaka i sječiva s okorinom te krhotina (Barbir & Šprem 2018). Male dimenzije jezgara, odbojaka od dotjerivanja plohe i sa stranom jezgre upućuju na štedljivo iskorištavanje sirovina. Sirovinski materijal prikupljan je u okolnim pritocima Drave i aluvijalnim nanosima. Rezultati tipološke analize pokazuju da su oruđa bila jednako izrađivana na sječivima i odbojcima (Barbir & Šprem 2018, u tisku). Na izraženu lovnu komponentu može ukazivati prisutnost projektila, koji su u vrijeme eneolitika zastupljeni na širem prostoru jugoistočne Europe. Može se zaključiti da je većina oruđa rađena na samom lokalitetu, čemu u prilog ide nešto veći postotak jezgara s okorinom, iako ne treba isklju-

covered flakes of poor and mediocre quality that were fully covered with cortex suggest that at least a portion of primary reduction was carried out in the settlement, as is additionally suggested by recovered cores, small flakes from core preparation and an overshot blade (Komšo 2009). Most tools recovered from these two areas can be connected to the cutting of plant material, thereby indicating that the function of these structures was connected to agriculture, i.e. the production, reparation or using agricultural tools (Komšo 2009). In addition to chipped artifacts, several fragments of sandstone were also discovered that can point to the sharpening of metal objects and the processing of bone tools. One polished tool was also found, but its function is still unknown (Komšo 2009). The site of Ivandvor near Đakovo yielded 474 chipped stone artifacts (Rep 2016). Blades/bladelets and flakes are the most common. A total of 26 cores were found, most of which were used to produce blades, while only 4 were used for flakes (Rep 2016). Based on the change of chipping orientation, it is possible to detect an attempt to maximally exploit the raw material. The inhabitants of this settlement produced some tools within the dugout structure itself. Flakes were mostly used to make endscrapers, and most blades were processed into trapezes and truncations (Rep 2016). Sickle gloss was documented on blades. The most frequently used raw materials for tool production include cherts and radiolarites that do not originate from the immediate vicinity of the site, indicating the existence of a trading system, and connections between this community and more distant areas. A find of obsidian speaks in favor of this hypothesis (Rep 2016). Kuševac-Topolina is another site that yielded stone material that can be ascribed to the Retz-Gajary and Lasinja cultures (Barbir & Šprem 2018), and it yielded a total of 231 stone finds. The technological analysis revealed that some of the tools were produced *in situ*, as attested to by the large percentage of cores (Fig. 5.), flakes and blades with cortex, and chunks (Barbir & Šprem 2018). The small dimensions of cores and flakes, as well as the surface processing of cores, suggest that raw materials were used sparingly. The raw material was collected in the nearby tributaries of the Drava River and alluvial deposits. The results of the typological analysis show that tools were equally made from blades and flakes (Barbir & Šprem 2018). The presence of projectiles, which were spread cross southeastern Europe during the Eneolithic, points to a pronounced emphasis on hunting. It can be concluded that most tools were

čiti ni mogućnost donošenja pripremljene jezgre, poluproizvoda ili alatke na sam lokalitet (Barbir & Šprem 2018). Lokaliteti kulture Retz-Gajary imaju određene sličnosti u korištenju kamene građe. Koristi se uglavnom kvalitetan rožnjak, a pronađeno je i nekoliko izrađevina i oruđa od opsidijana koje svjedoče o mobilnosti ovih populacija (Komšo 2009).

produced at the site, as suggested by a somewhat larger percentage of cores with cortex, although it is not possible to exclude the possibility that prepared cores, semi-finished products, or tools, were also brought to the site (Barbir & Šprem 2018). Sites of the Retz-Gajary culture display certain similarities in the use of stone material. High-quality chert was the most common material, but several obsidian tools were also recovered, thereby indicating the mobility of these populations (Komšo 2009).

Slika / Figure 5. Jezgre s lokaliteta Kuševac – Topolina / Cores from Kuševac-Topolina (foto / photo: A. Barbir)

Kostolačka kultura

Na kostolačkom lokalitetu Đakovo – Franjevac litička građa, ukupno 938 komad, nalazila se u zapunama jama. Najviše je pronađenih sječiva i oruđa na sječivima (Bunčić 2011). Među oruđem prevladavaju zarubljena sječiva i komadi s obradom na jednom rubu. Znakova lokalne proizvodnje je manje, no razlog nije u nedostatku sirovine jer je ona dobavljana iz bliže okolice kao neobrađena sirovina, o čemu svjedoči veći broj jezgara s okorinom (Bunčić 2011). Visok je postotak fragmentiranih sječiva, kao i onih bez okorine. Za ovaj lokalitet može se zaključiti kako se većina proizvodnje obavljala izvan naselja. Stanovnici ovoga naselja bili su vješti u izradi oruđa o čemu svjedoče jezgre, ali i održavanje oruđa (Bunčić 2011). Značajan

The Kostolac culture

All of the lithic material from the Kostolac culture site of Đakovo-Franjevac, a total of 938 finds, was discovered in pit fills. Blades and tools on blades are the most common (Bunčić 2011). Tools mostly include truncated blades and pieces with retouch on one edge. There are fewer traces of local production, but not due to lack of raw material, seeing as it was procured from the vicinity in an unprocessed state, as attested to by the large number of cores with cortex (Bunčić 2011). Fragmented blades, as well as those without cortex, make up a high percentage of finds. It can be established that the largest portion of production was, in the case of this site, carried out somewhere outside the settlement. The inhabitants of this settlement were

je i sjaj srpa na velikom broju sječiva s ovoga lokaliteta što govori o njihovoj čestoj upotrebi, odnosno korištenju kao dijelova srpa u poljodjelskim poslovima (Bunčić 2011). Drugo kostolačko naselje s kojeg je analizirana litička građa je Slavča, no problem predstavlja činjenica da je na istom nalazištu prisutna i lasinjska kultura te u analizi ove kulture nisu tretirane zasebno (Šošić & Karavanić 2004). Ukupno je analizirano 257 litičkih komada iz razdoblja eneolitika, te 834 komada iz pomiješanih slojeva (Šošić & Karavanić 2004). Na nalazištu je najčešće zastupljena proizvodnja odbojaka, dok za proizvodnju sječiva nema dokaza, već su sječiva izrađivana na drugoj lokaciji ili pribavljana trgovinom i razmjenom. Korištena je raznovrsna sirovina, odnosno rožnjak u više varijanti (Šošić & Karavanić 2004). U kostolačkom horizontu s lokaliteta Vučedol također je pronađena lomljena kamena građa (Balen 2005). U jami 60 pronađene su velike količine lomljene kamene građe i faunalnih nalaza, kao i keramike karakteristične za kostolačku kulturu. Skup kamenih nalaza, ukupno 57 komada, sastojao se od tipoloških i tehnoloških tipova koji bi upućivali na izradu sječiva i odbojaka, popravak oruđa i izradu oruđa na lokalitetu (Balen 2005). Sirovina je bila dostupna na obližnjim obalama rijeke. Na lokalitetu su na dva mjesta pronađene nakupine jezgara, posložene jedna na drugu, u radijusu od oko pola metra. Jezgre su služile za izradu sječiva, a dio je neobrađen. Ove dvije zalihe jezgara možda su služile kao sirovina, a možda su pripremljene za transport (Balen 2005).

Na području sjeverozapadne Hrvatske tri su lokaliteta čiji se kulturni nalazi ne mogu pripisati niti jednoj pojedinačnoj kulturi, već samo širem pojmu bakrenoga doba. To su Gromače, Brezje i Čanjevo. Na lokalitetu Gromače pronađeno je vrlo malo kamene građe, ukupno 23 kamene izrađevine (Komšo 2006a). Od oruđa lomljene kamene građe pronađeno je jedno grebalo, sječivo s obrađenim rubom, iskrzani komadić i zarubljeni odbojak. Uočena je velika učestalost izrađevina s rubovima oštećenim korištenjem, dok su na jednom komadu vidljivi tragovi gorenja (Komšo 2006a). Izrađevine s rubovima oštećenim korištenjem brojnije su od oruđa. Težište tehnologije izrade je na korištenju jednostavnog oruđa i izrađevina koje se ne čuvaju, već se nakon upotrebe odbacuju. Prikupljeni materijal manjih je dimenzija, a sirovina je vjerojatno dopremljena iz sekundarnih riječnih nanosa u blizini lokaliteta (Komšo 2006a). Nalazi su uglavnom prikupljeni izvan konteksta, te je teško steći pravi

skilled toolmakers, as shown by both cores and tool maintenance (Bunčić 2011). The sickle gloss that was recorded on a large number of blades from this site suggests the frequent usage of tools, i.e. using them as sickle segments in agricultural activities (Bunčić 2011). The second analyzed lithic assemblage was discovered at the Kostolac site of Slavča. However, the fact that the Lasinja culture was also recorded at the site presents a problem, and the finds from the two cultures were not separated in the analysis (Šošić & Karavanić 2004). A total of 257 lithic finds dated to the Eneolithic were analyzed, as were 834 pieces from mixed contexts (Šošić & Karavanić 2004). Flakes are the most common category produced at the site, while there is no evidence of blade production, meaning that they were made somewhere else, or were obtained through trade and exchange. Different raw materials were used, i.e. several variants of chert (Šošić & Karavanić 2004). The Kostolac layers from Vučedol also yielded chipped stone material (Balen 2005). Pit 60 yielded large amounts of chipped stone material and faunal remains, as well as pottery characteristic of the Kostolac culture. The lithic assemblage, a total of 57 pieces, included typological and technological types that could point to blade and flake production, tool maintenance, and tool production at the site (Balen 2005). The raw material was available on the nearby riverbanks. Clusters of cores, placed one on top of another in a 50 cm radius, were found at two locations at the site. Some cores were used to make blades, and some were unprocessed. These two depots of cores might have been used as storage for raw materials, or storage of goods for future transport (Balen 2005).

The territory of northwestern Croatia yielded three sites with finds that cannot be ascribed to a specific culture, but only to the broader context of the Copper Age. These are Gromače, Brezje and Čanjevo. The site of Gromače yielded very little stone finds, a total of 23 lithic artifacts (Komšo 2006a). Chipped stone tools include one endscraper, a blade with retouch on one edge, a chipped piece and a truncated blade. A large frequency of tools with traces of use on the edges was recorded, and one finds displayed traces of burning (Komšo 2006a). The artifacts with traces of use on the edges are more numerous than tools. The brunt of production technology was using simple tools and artifacts that were not kept, but discarded after use. The recovered finds are small, and the raw material was probably obtained from secondary river deposits in the vicinity of the

uvid u korištenje kamene građe na ovom lokalitetu. Slična je situacija i na Brezju, lokalitetu u blizini Varaždina, na kojem je izvan arheološkog konteksta prikupljeno 18 kamenih izrađevina od kojih su dvije glačane sjekire, dva ulomka kamena s tragovima glačanja te 14 komada lomljene kamene građe (Komšo 2006c). Obje glačane izrađevine ubrajaju se u tip plosnatih jezičastih sjekira. Lomljena kamena građa sastoji se od osam odbojaka, jednog prizmatičnog sječiva, dva ulomka jezgre i 3 lomljevine (Komšo 2006c). Kamena građa i korištene tehnologije kao i načini dobavljanja sirovine vrlo su slični Pustakovcu (Komšo 2006d). Na Čanjevu, lokalitetu u blizini Varaždina, pronađeno je 211 izrađevina od lomljenog kamena koje se mogu pripisati bakrenom dobu (Komšo 2008). Najzastupljenije su krhotine i odbojci. Od oruđa su prisutna grebala, jedno kombinirano grebalo/dubilo, strugalo, izrađevine s jednostavnom obradom na rubovima, dubila, udupci, svrdlo te iskrzani komadi (Komšo 2008). Sirovina korištena za izrađevine je rožnjak malih i srednjih dimenzija. Pretpostavlja se kako je sirovina skupljana lokalno, u primarnim ležištima na Kalničkom gorju. Korištene su jednostavne strategije lomljenja u svrhu dobivanja odbojaka (Komšo 2008). Većina nalaza prikupljena je izvan konteksta, kao slučajan nalaz te se ne može vidjeti prava slika kamene industrije ovih nalazišta.

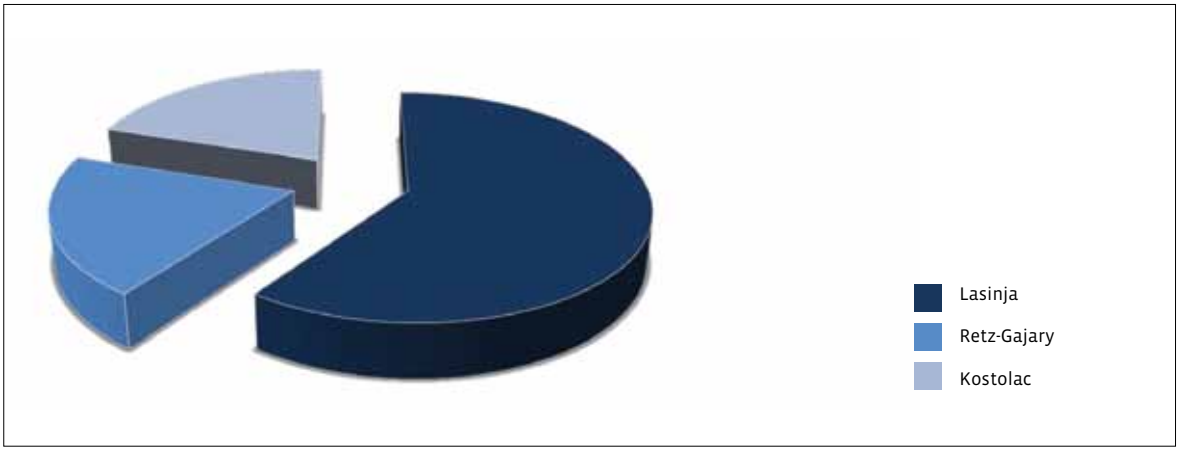
site (Komšo 2006a). The finds were mostly collected out of context, and it is difficult to gain a true insight into the use of stone material at this site. A similar situation was also recorded at Brezje, a site near Varaždin, where 18 stone finds were discovered out of context, including two polished axes, two fragments of stone with traces of polishing, and 14 pieces of chipped stone (Komšo 2006c). Both polished axes belong to the flat tongue-shaped axe type. The chipped stone material includes eight flakes, one prismatic blade, two core fragments and three chunks (Komšo 2006c). The stone assemblage, the applied technologies, and modes of raw material procurement, are very similar to those recorded at Pustakovec (Komšo 2006d). Čanjevo, a site near Varaždin, yielded 211 chipped stone finds that can be dated to the Copper Age (Komšo 2008). Chunks and flakes are the most numerous. Tools include endscrapers, a combined endscraper/burin, a sidescraper, artifacts with a simple retouch on the edges, burins, notches, a perforator, and notched pieces (Komšo 2008). Small and medium-sized chert was used as the raw material. It is assumed that the raw material was collected locally, in the primary deposits at the Kalnik hills. Simple chipping techniques were used to produce flakes (Komšo 2008). Most finds were discovered out of context as chance finds, so the true picture of the stone industry of these sites cannot be reconstructed.

Rasprava i zaključak

Iako stanje istraživanja i objavljenost bakrenodobne kamene građe bilježi pozitivan rast, uzoraka za usporedbu još je malo. Kamene izrađevine često su obrađene selektivno ili samo spomenute u objavama. Sukladno tome, naša saznanja o promjenama u pribavljanju, proizvodnji i korištenju kamenih izrađevina i oruđa zasad su nedostatna za šire zaključke. Opsežnije provedene analize pojedinih lokaliteta, primjerice Slavče (Šošić & Karavanić 2004) pokazale su jasnu razliku u eksploataciji sirovinskog materijala, odnosno širi spektar sirovina u eneolitiku. Međutim, ako usporedimo navedene lokalitete koji se mogu pripisati lasinjskoj, retz-gajarskoj i kostolačkoj kulturi, razlike su gotovo nepostojeće. Najviši postotak objavljene kamene građe pripada lasinjskoj kulturi, dok su kostolačka i retz-gajarska gotovo identične.

Discussion and conclusion

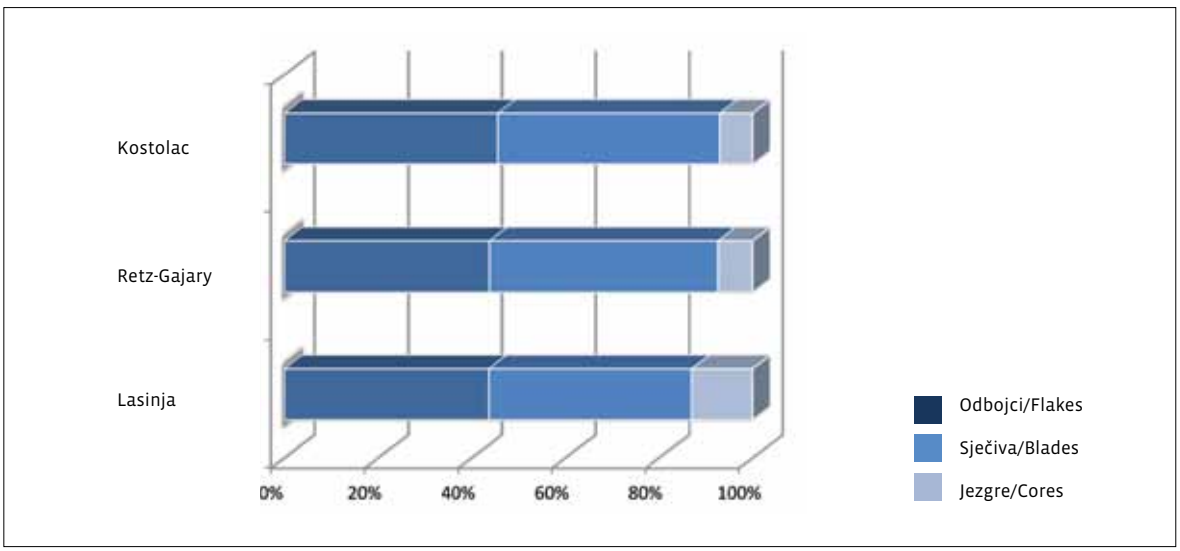
Even though the state of research and publications of Copper Age stone material are generally increasing, there are still few comparable samples. Stone tools are often selectively analyzed or only briefly mentioned in publications. Accordingly, our knowledge on the changes in the modes of stone object and tool procurement, production, and use, is insufficient to allow for broader conclusions. The extensive analyses of certain sites, such as Slavča (Šošić & Karavanić 2004), revealed a clear difference in the modes of raw materials exploitation, i.e. that a wider spectrum of raw materials was used in the Eneolithic. However, if we compare the listed sites that can be ascribed to the Lasinja, Retz-Gajary and Kostolac culture, the differences are practically nonexistent. The largest percentage of published stone material is ascribed to the Lasinja culture, and the amount of published material of the Kostolac and Retz-Gajary cultures is almost identical.



Graf / Graph 1. Zastupljenost kamene građe u bakrenodobnim kulturama / The frequency of stone finds in Copper Age cultures.

Usporedba zastupljenosti osnovnih tehnoloških tipova za lomljenu kamenu građu, odbojke, sječiva i jezgre, pokazala je zanimljive rezultate. Naime, sve navedene osnovne tehnološke kategorije gotovo su podjednako zastupljene u ovim kulturama, Također, odbojci i sječiva u pojedinoj su kulturi gotovo izjednačeni, dok je jezgara, očekivano, manje (graf 2).

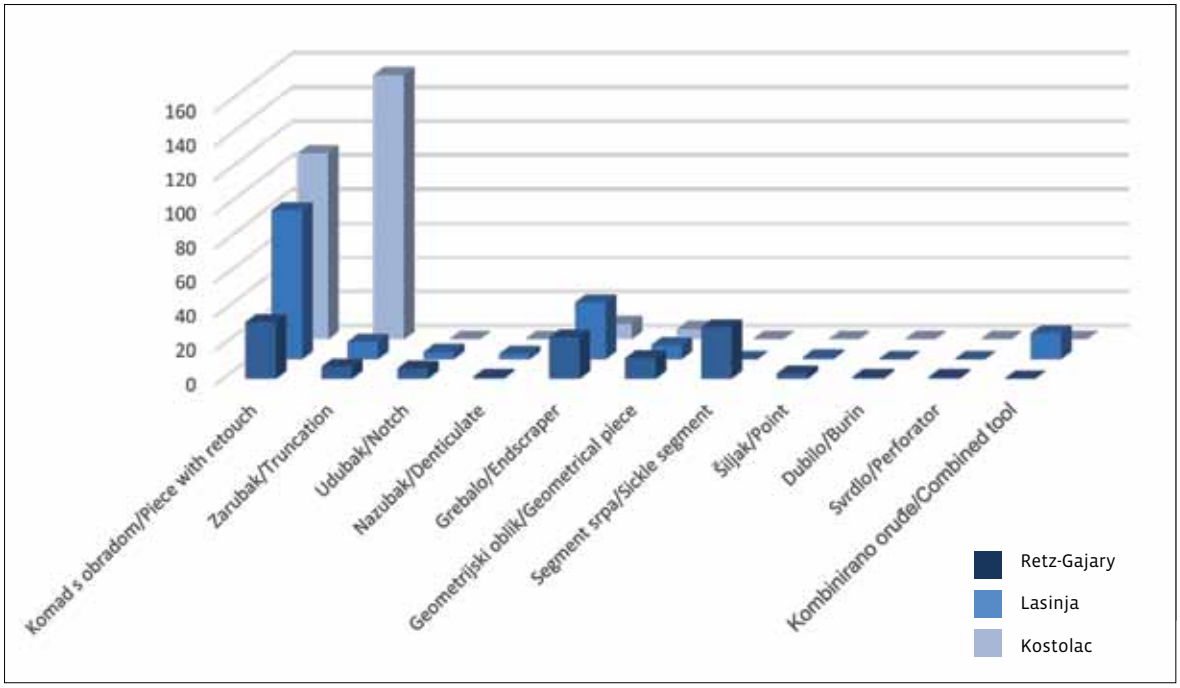
A comparison of the frequency of main technological types used to produce chipped stone finds, flakes, blades and cores, produced interesting results. Namely, all of the listed basic technological categories are almost equally represented in all of these cultures. Additionally, flakes and blades appear almost in equal amounts in individual cultures, while there are, as expected, less cores (graph 2).



Graf / Graph 2. Zastupljenost tehnoloških kategorija po bakrenodobnim kulturama / The frequency of main technological categories in Copper Age cultures

Usporedba oruđa s navedenih lokaliteta (graf 3) pokazala je da su glavni tipovi oruđa prisutni u lasinjskoj, kostolačkoj i retzgajarskoj kulturi gotovo izjednačeni. U svim kulturama najčešći su komadi s obradom i zarupci, dok je u kulturi Retz-Gajary nešto veća zastupljenost grebala, segmenta srpa i geometrijskih oblika, a u lasinjskoj kulturi češća su grebala i kombinirana oruđa.

A comparison of tools from the listed sites (graph 3) showed that the main tool types ascribed to the Lasinja, Kostolac and Retz-Gajary culture are almost equal. Pieces with retouch and truncations are the most common in all cultures, while more endscrapers, sickle fragments and geometrical forms were noted in the Retz-Gajary, and more endscrapers and combined tools in the Lasinja culture.



Graf / Graph 3. Zastupljenost oruđa prema bakrenodobnim kulturama / The frequency of tools in Copper Age cultures

Iako su uočljive male razlike u vrsti korištenog oruđa, treba imati na umu relativno malen broj lokaliteta s potpuno objavljenom kamenom građom, kao i selektivne načine prikupljanja takve građe u prošlosti. S porastom komparativnog uzorka bit će moguće postaviti i definirati pitanja o sličnostima i razlikama između pojedinih kultura, odnosno unutar njih u proizvodnji kamene industrije.

Although small differences can be seen in the types of tools that were used, it should be noted that a relatively small number of publications includes a complete analysis of stone tools, and that such material was selectively collected in the past. An increase of the comparative sample will make it possible to pose and define questions about the similarities and differences between specific cultures, or within a single one, when it comes to the production of stone industry.

Literatura / Bibliography

Andrefsky, W. 1998, *Lithics – Macroscopic approaches to analysis,* Cambridge Manuals in Arcaeology, Cambridge University Press, Cambridge.

Antonović, D. 2003, *Neolitska industrija glačanog kamena u Srbiji*, Arheološki institut, Beograd, 2003.

Barbir, A. & Šprem, K. 2018, Lomljeni litički materijal s lokaliteta Kuševac-Topolina, *Arheologija na Dunavu, Izdanja Hrvatskog arheološkog društva* 31/2017, 75-79.

Barbir, A. 2017, Litička analiza eneolitičkih kamenih izrađevina s lokaliteta Crkvišće – Bukovlje, *Vjesnik Arheološkog muzeja u Zagrebu* 3.s. 50, 51 – 70.

Balen, J., Đukić, A., Špoljar, D. 2017, Jurjevac-Stara Vodenica – nalazište lasinjske kulture, *Vjesnik arheološkog muzeja u Zagrebu* 3.s. 50, 7-50.

Balen, J. 1998, Nalazište lasinjske kulture u Dubrancu, *Vjesnik Arheološkog muzeja u Zagrebu* 3.s. 30-31, 13-32.

Balen, J. 2005, Kostolački horizont na Vučedolu, *Opuscula archaeologica* 29, 25-38.

Balen, J. 2006, Pajtenica, *Hrvatski arheološki godišnjak* 3/2006, 27-29.

Bunčić, M. 2011, Cijepane kamene izrađevine, in: J. Balen (ed.), *Đakovo – Franjevac. Kasno bakrenodob-*

no naselje, Katalozi i monografije Arheološkog muzeja u Zagrebu sv. 7, Zagreb, 108 – 120.

Čataj, L. & Janeš, A. 2013, Golinci – Selište. Naselje iz prapovijesti i srednjeg vijeka, in: J. Višnjić (ed.), *Nove arheološke spoznaje o donjoj Podravini. Zaštitna arheološka istraživanja na magistralnom plinovodu Slobodnica – Donji Miholjac*, Zagreb, Hrvatski restauratorski zavod, 165 – 225.

Dimitrijević, S. 1979, O nekim kontroverznim pitanjima u kronologiji eneolita južnih područja Karpatske kotline (U povodu lasinjsko salkucanskog horizonta u Vinkovcima), *Osječki zbornik 17*, 35-78.

Inizan, M-L., Roche, H., Tixier, J. 1992, *Technology of Knapped Stone*, CREP, Meudon.

Kaczanowska, M. & Kozlowski, J.K. 1997, Neolithic vs Eneolithic lithic raw material procurement, technologyand exchange in Eastern Europe, in: M. Lazić (ed.), *Zbornik Dragoslava Srejovića*, Centar za arheološka istraživanja filozofskog fakulteta, Beograd, 223-233.

Komšo, D. 2006a, Varaždinske Toplice – Gromače 2, Kameni nalazi, in: L. Bekić (ed.), *Zaštitna arheologija u okolici Varaždina. Arheološka istraživanja na autocesti Zagreb - Goričan*, Zagreb, 23-27.

Komšo, D. 2006b, Jakopovec – Blizna, Kameni nalazi, in: L. Bekić (ed.), *Zaštitna arheologija u okolici Varaždina. Arheološka istraživanja na autocesti Zagreb - Goričan*, Zagreb, 99-108.

Komšo, D. 2006c, Brezje, Kameni nalazi, in: L. Bekić (ed.), *Zaštitna arheologija u okolici Varaždina. Arheološka istraživanja na autocesti Zagreb - Goričan*, Zagreb, 291-293.

Komšo, D. 2006d, Pustakovec, Kameni nalazi, in: L. Bekić (ed.), *Zaštitna arheologija u okolici Varaždina. Arheološka istraživanja na autocesti Zagreb - Goričan*, Zagreb, 186.

Komšo, D. 2008, Kamene izrađevine s utvrde Čanjevo, in: L. Bekić (ed.), *Utvrda Čanjevo – istraživanja 2003-2007,* Visoko, Općina Visoko, Hrvatski restauratorski zavod, 97-105.

Komšo, D. 2009, Analiza kamenih izrađevina, in: L. Čataj (ed.), *Josipovac Punitovački – Veliko Polje I, zaštitna arheološka istraživanja na trasi autoceste A5. Eneolitičko, brončanodobno i srednjovjekovno naselje*, Zagreb, Hrvatski restauratorski zavod, 265-280.

Marković, Z. 1994, *Sjeverna Hrvatska od neolita do brončanog doba. Problem kontinuiteta stanovništva i kultura sjeverne Hrvatske od ranog neolita do početka brončanog doba*, Koprivnica.

Petersen, W. 1975, A Demographer's View of Prehistoric Demography, *Current Anthropology Vol. 16, No. 2*. The University of Chicago Press on behalf of Wenner-Gren Foundation for Anthropological Research, Chicago, 227-245.

Rep, L. 2016, *Analiza eneolitičkog litičkog skupa nalaza s lokaliteta Ivandvor*, Diplomski rad, Sveučilište u Zagrebu.

Schick, K. & Toth, N. 1994, *Making Silent Stones Speak*, New York, Simon&Schuster.

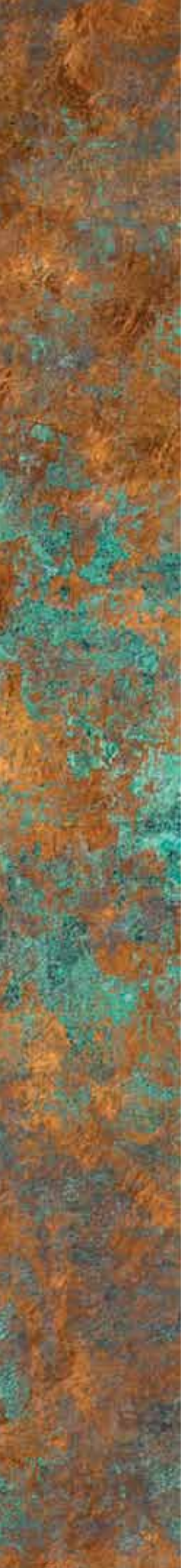
Šošić Klindžić, R. 2013, Kameni artefakti, in: K. Minichreiter & Z. Marković (eds.), *Beketinci Bentež. Naselja iz eneolitika, ranoga i kasnoga srednjega vijeka,* Institut za arheologiju, 128 – 140.

Šošić, R. & Karavanić, I. 2004, Cijepani litički materijal sa prapovijesnog nalazišta Slavča, Nova Gradiška, *Vjesnik Arheološkog muzeja u Zagrebu 3.s.* 36, 17-40.

Špoljar, D. 2011, *Cijepani litički materijal s prapovijesnog nalazišta Tomašanci – Palača*, Diplomski rad, Sveučilište u Zagrebu.

Težak-Gregl, T. 2001, The Lengyel Culture in Croatia, in: Z. Fodor (ed.), *Sites and stones: Lengyel culture in Western Hungary and beyond. A review of the current research*, Veszprem, 71-79.

Tykot, R. H. & Balen, J. 2010, Prehistoric Obsidian Trade Between Central Europe and Croatia, *16th Annual Meeting of the European Association of Archaeologists*, Hague, Poster.



Koštana industrija eneolitičkoga perioda u jugoistočnoj Europi

Bone industry in the Eneolithic period in the South-East Europe

Selena Vitezović

Arheološki institut, Beograd
Institute of Archaeology, Belgrade
s.vitezovic@ai.ac.rs

Uvod

Koštane sirovine u širem smislu obuhvaćaju sve tvrde sirovine životinjskog porijekla (*animal hard tissue*), točnije, tu pripadaju kosti, rogovi cervida, zubi, uključujući i bjelokost, ljušture mekušaca pa čak i ljuske jaja, oklop kornjača i materijali kertinastog sastava, kao što su rogovi bovida (cf. Averbouh 2000: 187; Christensen 2004).

Koštane sirovine imale su veliko značenje tijekom cijele prapovijesti, još od donjega paleolitika (cf. Schibler 2007). Mada se njihova uloga donekle mijenja tijekom vremena, a naročito uvođenjem novih sirovina i s razvojem metalurgije, one su i u mlađoj prapovijesti široko korištene za izradu raznovrsnih predmeta – kako svakodnevnog oruđa, oružja, tako i ukrasnih i neutilitarnih predmeta.

Nažalost, koštana industrija eneolitičkoga perioda slabo je proučena, osobito u jugoistočnoj Europi. Poseban problem za analize jest stanje zbirki s iskopavanja sprovedenih u 19. i u prvoj polovici 20. stoljeća, tijekom kojih faunalni nalazi nisu pažljivo prikupljani, već samo odabrani, cijeli i/ili atraktivni predmeti. Pored toga, prisutan je problem vezan za nepotpune podatke o kontekstu i stratigrafiji, osobito kod višeslojnih lokaliteta.

Introduction

Osseous raw materials in wide sense include all the hard animal tissue, more precisely, bones, cervid antlers, teeth, including ivory, mollusc shells, and even shells of eggs, tortoise shells and keratinous materials, such as bovid horns (cf. Averbouh 2000: 187; Christensen 2004).

Bone raw materials were very important throughout the entire prehistory, since the Lower Palaeolithic (cf. Schibler 2007). Although their role changed over time, especially with the introduction of the new raw materials and the development of the metallurgy, they were still used in the later prehistoric times for production of a variety of objects – everyday tools and weapons, as well as decorative and non-utilitarian items.

Unfortunately, the bone industry in the Eneolithic is not sufficiently explored, in particular in the South-East Europe. A considerable obstacle for analyses is the state of the assemblages originating from excavations carried out in the 19th and the first half of the 20th century, when the faunal remains were not carefully recovered, but only selected, complete and/or attractive objects. Furthermore, there is a problem of incomplete information regarding the context and the stratigraphy, especially when it concerns multi-layered sites.

U ovom radu bit će dan pregled raspoloživih podataka o koštanim industrijama tijekom eneolitičkog perioda u različitim kulturama koje su naseljavale prostor jugoistočne Europe, točnije, područje južnoga Karpatskog bazena i zapadnog, centralnog i istočnog Balkana – u badenskoj, kostolačkoj, Cernavoda i vučedolskoj kulturi, i u okvirima kulturnog kompleksa Bubanj-Sălcuța-Krivodol.

Kulture Baden i Baden-Boleráz

Koštani artefakti badenske kulture i njezinih lokalnih varijacija poznati su nam s više lokaliteta u Mađarskoj.

Na višeslojnom lokalitetu Kaposújlak-Várdomb u jugozapadnoj Mađarskoj pronađena je razmjerno bogata zbirka koštanih predmeta, od čega oko 35 pripada slojevima kulture Pécel-Baden (Gál 2011). Uglavnom su korištene kosti ovce i koze, osobito metapodijalne kosti i tibije, dok je šest predmeta izrađeno od rogova jelena. Tipološki repertoar dosta je ograničen, prevladavaju artefakti sa šiljatim radnim dijelom (23 primjerka) – masivni, srednji i fini šiljci, od čega jedan s perforacijom na baznom dijelu. Dosta su neobična i dva predmeta izrađena od rijetko korištenih sirovina – jedan šiljak od fibule divlje svinje i jedan izrađen od tibije zeca (Gál 2011: 139-140). Još treba spomenuti dva masivna predmeta, sjekire ili tesle od većih segmenata roga jelena. Jedan, fragmentirani predmet, izrađen je od segmenta stabla i ima kružnu perforaciju na baznom dijelu. Drugi predmet izrađen je od baze i segmenta stabla, ima dosta naglašeno modificiranu bazu i ima razmjerno veliku perforaciju gotovo pravokutnog oblika (Gál 2011: sl. 6).

Na lokalitetu Balatonőszöd-Temetői-Dűlő pronađeno je oko 120 artefakata, od čega 26 pripada Boleráz, a veći dio, gotovo 100, badenskoj kulturi (Gál 2014).

U horizontu Boleráz prevladavaju fini i srednji šiljci; najbrojniji podtip su šila od po dužni cijepanih tibija i metapodijalnih kostiju sitnih preživača bez epifize na bazi. Ulne su također korištene, nađen je jedan fini šiljak od ulne psa i jedan dvojni šiljak od ulne krupnog preživača. Razmjerno su brojna i dlijeta, izrađivana od rebara, ulni i drugih kostiju. Neobičan je predmet izrađen od iliuma psa forme spatule, nepoznate funkcije. Od zuba svinje izrađen je jedan strugač i jedan privjesak, s perforacijom promjera od svega 2 mm na vrhu, kao i

In this paper will be offered an overview of the available data on the bone industries in the Eneolithic among the diverse cultures that inhabited the area of the South-East Europe, more specifically, the region of the south Carpathian basin and the western, central and eastern Balkans – within Baden, Kostolac, Cernavoda and Vučedol culture, as well as within the cultural complex Bubanj-Sălcuța-Krivodol.

Baden and Baden-Boleráz cultures

Bone artefacts of the Baden culture and its local variants are known from several sites in Hungary.

On the multi-layered site of Kaposújlak-Várdomb in the south-west Hungary was discovered relatively rich assemblage of osseous artefacts, out of which about 35 objects belongs to the layers of the Pécel-Baden culture (Gál 2011). Mainly sheep and goat bones were used, especially metapodial bones and tibiae, while six objects were made from red deer antlers. The typological repertoire is rather limited; pointed tools (23 specimen) – large, medium and fine points, one of them with perforation at the basal part. There are two unusual items, made from rarely used skeletal elements – one point from wild pig fibula and one point from hare tibia (Gál 2011: 139-140). Also two massive objects should be mentioned, axes or adzes made from large segments of red deer antlers. One of them, fragmented, was made from beam segment and had circular perforation at the basal part. The other object was made from the segments of the base and beam, it has heavily modified basal part and relatively large rectangular perforation (Gál 2011: fig. 6).

On the site of Balatonőszöd-Temetői-Dűlő approximately 120 artefacts were recovered, out of which 26 belongs to the Boleráz, and the majority, almost 100 objects, to the Badn culture (Gál 2014).

Within Boleráz horizon fine and medium points predominate; the most common subtype are awls made from longitudinally split tibiae and metapodial bones from small ruminants without the epiphysis at the base. Ulnae were used as well, one fine point made from dog ulna was found and one double point from large ruminant ulna. Relatively frequent are chisels, made from ribs, ulnae and other bones. There was also one unusual item made from dog ilium, spatula-shaped, of unknown function. Pig teeth were used to manufacture one scraper and one pendant, with the diameter of the

Slika / Figure 1. Šiljci i dlijeta od ulni, Gravinjak-Josipovac, badenska kultura. Points and chisels made from ulnae, Gravinjak-Josipovac, Baden culture (foto / photo: K. Miculinić).

nekoliko predmeta nejasne namjene. Rogovi nisu česti; ukupno dvije fragmentirane alatke su od roga jelena. Jedna je izrađena od baze i stabla odbačenog roga, druga od segmenta stabla, i obje su prelomljene na perforaciji.

U badenskom horizontu također su fini i srednji šiljci najzastupljeniji; najbrojnija varijanta jesu šila od tibija i metapodijalnih kostiju sitnih preživača, neki s očuvanom epifizom na baznom dijelu (oko 30 primjeraka). Ulne su također korištene za finije šiljke, uglavnom od ovce/koze, ali je prisutna i jedna ulna praseta. Među masivnim šiljcima treba spomenuti jedan od ulne govečeta i jedan od metapodijalne kosti jelena s očuvanom epifizom na baznom dijelu. Dlijeta su također razmjerno brojna (16 primjeraka), pretežno od rebara i segmenata dugih kostiju. Osim toga, nađena su i dva retušera, kao i jedan projektil. Od kanina svinje izrađeno je nekoliko predmeta, ali njihova namjena nije jasna.

Rogovi su nešto brojniji nego u horizontu Boleráz; ukupno četrnaest predmeta, svi od jelenjeg roga, osim jednog *ad hoc* dlijeta od roga srndaća. U pitanju su tesle i sjekire s kružnim perforacijama za drveni držak. Također je nekoliko dvojnih šiljaka izrađeno od segmenta roga, moguće korištenih kao projektili.

perforation of only 2 mm, as well as few items of unknown purpose. Antlers are not common; total of two fragmented axes made from red deer antler were found. One was made from the basal part of the shed antler, the other from beam segment, and both were broken on the perforation.

Within the Baden horizon also fine and medium points prevail; the most common variant are awls made from tibiae and metapodial bones of small ruminants, some with epiphysis preserved at the base (approximately 30 specimens). Ulnae were also used for fine points, mainly from sheep/goats, but also one pig ulna was noted. Among the heavy points should be mentioned one made from cattle ulna and one made from red deer metapodial bone, with the epiphysis preserved at the base. Chisels are also relatively frequent (16 specimen), usually made from ribs and long bone segments. Also two retouching tools were recovered, and one projectile points. Boar tusks were also used for production of several artefacts, but their function is unknown.

Antlers are slightly more common than within Boleráz horizon; total of fourteen objects were found, all from red deer, except for one *ad hoc* chisel made from roe deer antler. These were axes and adzes with circular perforations for a wooden handle. Also several double points were made from antler segments, probably used as projectile points.

Slika / Figure 2. 1) projektil, 2) strugač od rebra, 3) sjekira ili tesla od roga jelena, Gravinjak-Josipovac, badenska kultura. / 1) projectile point, 2) scraper made from rib, 3) axe or adze made from red deer antler, Gravinjak-Josipovac, Baden culture (foto / photo: S. Vitezović).

S lokaliteta Boleráz kulture Győr-Szabadrét-Domb u jugozapadnoj Mađarskoj potječe zbirka od oko 120 predmeta (Choyke 2014). Uglavnom su korištene kosti; u manjoj mjeri su prisutni rogovi jelena i kanini svinje. Tipološki, prisutna su šila od metapodijalnih kostiju sitnih preživača, šila od rebara, masivniji probojci od dugih kostiju, spatule, klinovi, dlijeta od različitih dugih kostiju, osobito ulni i drugih dugih kostiju. Prisutno je i oružje – fino oblikovane koštane strelice, zatim dvostruki šiljci izrađivani uglavnom od dugih kostiju krupnih preživača, korišteni kao vrhovi za projektile, kao i jedan konusni harpun od paroška roga (Choyke 2014: fig. 9, fig. 13, fig. 18).

Rogovi jelena korišteni su za izradu masivnijeg alata; od bolje očuvanih primjeraka treba spomenuti sjekiru/teslu od baze i stabla odbačenog roga sa četvrtastom perforacijom i sjekiru ili sjekiru-čekić također od odbačenog roga, dosta modificiranog baznog dijela i također s perforacijom četvrtaste forme (Choyke 2014: fig. 19).

Od kanina svinje, i to kako domaće, tako i divlje, izrađivani su strugači S-forme. Još je interesantna pojava mandibula korištenih u izradi kožnih remenova *thong stretcher / thong smoother*), čak 10 primjeraka je pronađeno. Ukrasi su rijetki; nađen je jedan privjesak od kanina svinje i deset perfo-

From Boleráz site of Győr-Szabadrét-Domb in the south-western Hungary originates an assemblage of 120 objects (Choyke 2014). Mainly bones were used; red deer antlers and boar tusks were used to a lesser extent. Typologically are represented awls from small ruminant metapodial bones, awls made from ribs, heavy points from long bones, spatulae, wedges, chisels from diverse bone segments, especially from ulnae and other long bones. Also weapons were present – finely made bone arrowheads, double points from large ruminant long bones, used as projectile points, as well as one toggle shaped harpoon made from antler tip (Choyke 2014: fig. 9, fig. 13, fig. 18).

Red deer antlers were used for massive tools; among the better preserved artefacts should be mentioned one axe/adze from the basal and beam segment of a shed antler with rectangular perforation, and one axe or hammer-axe from shed antler, with heavily modified basal part and also with rectangular perforation (Choyke 2014: fig. 19).

Both wild and domestic pig canines were used for production of S-shaped scrapers. Also is interesting the occurrence of the mandibles used for production of leather thongs, so-called *thong stretchers or thong smoothers*; total of 10 items were discovered. Decorative objects are rare; one pendant

riranih zuba od domaćeg psa i od lisice. Otpaci od proizvodnje također su konstatirani, što pokazuje da su predmeti izrađivani unutar naselja (Choyke 2014).

Koštana industrija badenske kulture u Slavoniji poznata nam je s lokaliteta Gravinjak kod Josipovca (Miculinić & Vitezović 2017). Tijekom 2007. godine sprovedena su zaštitna arheološka istraživanja na ovom lokalitetu, prilikom izgradnje autoceste Beli Manastir-Osijek-Svilaj. Otkriveni su ostaci jednoslojnog naselja – otpadne i druge jame, ukopani stambeni objekti; a nađen je i jedan dječji grob (Mihelić 2008: 15-17; Miculinić & Vitezović 2017; Miculinić & Vitezović, u pripremi).

Analiza faunalnih ostataka pokazala je dosta visok udio divljih životinja, oko 60% (ukoliko se ne uračunaju ostaci jednog goveda koje je cijelo pohranjeno). Od divljih vrsta, najzastupljeniji je jelen, potom srndać, a prisutni su i divlja svinja i divlje govedo. Među domaćim životinjama najzastupljeniji su svinja i govedo, dok su ovce i koze prisutne u manjoj mjeri. Pažljivim pregledom faunalnih ostataka izdvojeno je gotovo stotinu artefakata, mada su neki dosta fragmentirani i loše očuvanih površina zbog izloženosti eroziji i drugim tafonomskim utjecajima. Od sirovina, uglavnom su zastupljene različite kosti goveda, ovce/koze i jelena – metapodijalne, ulne i druge duge kosti, ali su prisutne i plosnate kosti – rebra, skapule i pelvisi. Manji broj predmeta izrađen je od segmenata roga jelena i od kanina svinje.

Tipološki repertoar uključuje različite zašiljene alatke – šila od po dužini cijepanih dugih kostiju, dok su od ulne goveda izrađivani masivniji probojci. Od ulni su izrađena i manja dlijeta s dosta naglašenim tragovima upotrebe (Sl. 1). Glačalice i strugači izrađivani su od po dužini cijepanih dugih kostiju, kao i od segmenata rebara, na kojima se jasno vidi naglašena istrošenost na distalnom dijelu (Sl. 2/2). Svi ovi predmeti korišteni su na mekim organskim materijalima – za obradu kože, krzna i biljnih vlakana (cf. Peltier 1986; Legrand 2007).

Dosta su neuobičajeni segmenti skapula i pelvisa s tragovima uporabe, za koje zasad ne postoje poznate paralele s drugih eneolitičkih nalazišta. Uglavnom se radi o nepravilnim urezima i linijama i moguće je da su korišteni kao neka vrsta radne površine, odnosno podmetača ili podloge.

made from pig canine was found, as well as ten perforated teeth from domestic dog and from fox. Production waste was recovered as well, showing that these objects were produced within the settlement (Choyke 2014).

Bone industry of the Baden culture in Slavonia is known from the site of Gravinjak near Josipovac (Miculinić & Vitezović 2017). During 2007 rescue archaeological excavations were carried out on this site, during the construction of the motorway Beli Manastir-Osijek-Svilaj. The remains of single-layered settlement were discovered – rubbish and other pits, dug-out dwellings; and also one child grave was discovered (Mihelić 2008: 15-17; Miculinić & Vitezović 2017; Miculinić & Vitezović, in prep.).

The analysis of the faunal remains showed relatively high ratio of wild animals, approximately 60% (if we do not count in the remains of a complete cattle skeleton). From wild species, the most frequent was red deer, followed by roe deer, and also wild pig and aurochs were present. Among the domestic species, pigs and cattle were the most common, while sheep and goats were present to a lesser extent. Careful examination of the faunal remains enabled to single out almost one hundred of artefacts, although some of them are heavily fragmented and badly preserved, with eroded surfaces. The most common raw material were different bones from cattle, sheep/goats and red deer – metapodial, ulnae and other long bones, but also flat bones – ribs, scapulae, pelvis. A small number of items was produced from red deer antler segments or from boar tusks.

The typological repertoire includes diverse pointed tools – awls from longitudinally split long bones and heavy points from cattle ulnae. Ulnae were also used to produce smaller chisels, usually heavily worn from use (Fig. 1.). Burnishers and scrapers were made from longitudinally split long bones and from rib segments, and also their distal ends display intensive traces of use (Fig. 2/2). All these tools were used on soft organic materials – for processing leathers, hides and plant fibres (cf. Peltier 1986; Legrand 2007).

Quite unusual is the occurrence of the segments from scapula and pelvic bones with traces of use, for which there are no parallels from other Eneolithic sites. The use wear consists mainly from irregular lines and incisions, and it is possible that these objects were used as some sort of a working surface – as a supporter or an anvil.

Posebno još treba spomenuti jedan gotovo potpuno očuvani projektil, izrađen od duge kosti krupnog preživača (Sl. 2/1). Predmet ima pun, kružni presjek, na distalnom dijelu ima masivni šiljak, dok je sama baza oštećena, i na tijelu predmeta se raspoznaju fine linije od struganja kremenom alatkom. Tipološki i tehnološki, srodan je projektilima pronađenima na lokalitetu Gyõr-Szabadrét-Domb.

Od alatki izrađenih od roga jelena, dvije bolje očuvane mogu se izdvojiti. Jedna je dlijeto od paroška roga, gdje je prirodni vrh roga dotjeran u sječicu, fino uglačan i istrošen upotrebom, moguće za obradbu drveta. Drugi predmet je masivnija alatka za sječenje, sjekira ili tesla (Sl. 2/3). Izrađen je od segmenta stabla roga. Distalni dio je dobiven tako što je rog ukoso isječen i struganjem i glačanjem formirana ravna, oštra radna ivica. Bazni dio nije očuvan. Perforacije nisu postojale ili nisu očuvane.

Od kanina svinje izrađen je jedan nož, od segmenta nepravilnog pravokutnog oblika. Radna ivica korištena za sječenje naglašeno je istrošena. Osim toga, nađeno je i nekoliko otpadaka od proizvodnje, kao što je segment metapodijalne kosti sa započetim longitudinalnim žlijebom, stvorenim kremenim sječivom, ili komad roga s tragovima rezanja. Ovi otpaci svjedoče da su koštane alatke proizvođene unutar naselja.

Još se među badenskim koštanim nalazima mogu spomenuti malobrojni nalazi s lokaliteta Jabuka-Tri Humke kod Pančeva u Banatu. Na ovom nalazištu konstatirani su ostaci badenskog i kostolačkog naselja, dosta uništeni kasnijim korištenjem ovog mjesta prije svega za sahranjivanje (humak kulture grobova u jami, sarmatsko i srednjovjekovno groblje) (Uzelac 2002). Među ostacima badenskog naselja otkriveno je i nekoliko koštanih predmeta: tri koštana dlijeta ili spatule-dlijeta i jedna masivna sjekira ili sjekira-čekić od odbačenog roga jelena s kružnom perforacijom u baznom dijelu (Uzelac 2002: t. 47/5-8).

Kulturni kompleks Bubanj-Sălcuța-Krivodol

Koštana industrija kompleksa Bubanj-Sălcuța-Krivodol poznata je s eponimnog lokaliteta Bubanj–Novo Selo, u današnjem predgrađu grada Niša. Obimna istraživanja provedena su u više navrata tijekom 20. stoljeća i otkriven je višeslojni lokalitet s ostacima naselja iz perioda ranoga neolitika

Also should be mentioned one almost completely preserved projectile point. It was made from long bone of a large ruminant (Fig. 2/1). It has full circular cross-section, on its distal end is massive point, while the basal part is fragmented. On the body of the object are visible traces of scraping with a chipped stone tool. Typologically and technologically, it is similar to the projectile points discovered at the site of Gyõr-Szabadrét-Domb.

Among the red deer antler tools, two better preserved can be outlined. The first one is a chisel made from tine, where the natural tine tip is modified into a cutting tool, finely polished and worn from use, probably used in wood working. The other object is massive cutting tool, axe or adze (Fig. 2/3). It was made from beam segment. The distal end is obtained by oblique cutting and by scraping and burnishing is formed straight, sharp cutting edge. The basal part is not preserved. The perforations did not exist or were not preserved.

From pig canine one knife was made, from a segment of irregular rectangular shape. The working edge used for cutting is heavily worn. Besides, several pieces of manufacture debris were recovered, such as one metapodial bone with unfinished longitudinal groove, or antler piece with traces of cutting. This manufacturing waste shows that the bone tools were produced within the settlement.

Among the bone artefacts of the Baden culture we can also mention few finds from the site of Jabuka-Tri Humke near Pančevo in Banat. At this site were noted the remains of the Baden and Kostolac culture settlements, heavily destroyed by later use of this location, mainly for burials (tumulus of the Yamnaya culture, necropoles from Sarmatian and Middle Age periods) (Uzelac 2002). Among the remains of the Baden culture settlement few bone artefacts were found: three chisels or spatula-chisels made of bone, and one heavy duty tool, axe or hammer-axe made from shed red deer antler, with circular perforation at the base (Uzelac 2002: t. 47/5-8).

Bubanj-Sălcuța-Krivodol cultural complex

The bone industry of the cultural complex Bubanj-Sălcuța-Krivodol is known from the eponymous site of Bubanj–Novo Selo, today suburb of the city of Niš. Extensive excavations were carried out in several campaigns during the 20th century and multi-layered site was discovered, with the remains

Slika / Figure 3. Različite šiljate alatke, Bubanj-Novo Selo, kulturni kompleks Bubanj-Sălcuța-Krivodol / Diverse pointed tools, Bubanj-Novo Selo, cultural complex Bubanj-Sălcuța-Krivodol (foto / photo: S. Vitezović).

(starčevačka kultura), više eneolitičkih kultura i brončanoga doba, kao i nekropola iz kasnoga srednjeg vijeka (Bulatović & Milanović 2012; Bulatović et al. 2014, sa referencama). Prikupljena arheološka građa poslužila je za definiranje prapovijesnih kultura u regiji, osobito za definiranje eneolitičke kulture Bubanj-Hum I i brončanodobne kulture Bubanj III (Гарашанин 1973). Izgradnjom željeznice i autoceste, lokalitet je gotovo u potpunosti uništen te su u periodu od 2009. do 2014. godine provedena revizijska istraživanja na malom preostalom dijelu lokaliteta (Bulatović & Milanović 2012; Bulatović *et al.* 2014).

Ovim istraživanjima prikupljeni su bogati faunalni ostaci i njihovim pažljivim pregledom izdvojeno je više od 200 koštanih artefakata (Vitezović, in press). Većina predmeta potječe iz slojeva kulture Bubanj-Hum I, dok manji dio pripada horizontima Kostolac-Coțofeni i Cernavoda III (v. dolje u tekstu). Osim toga, tijekom ranijih istraživanja skupljena je manja količina reprezentativnih koštanih predmeta, uglavnom masivnih artefakata od roga.

of settlements from the Early Neolithic (Starčevo culture), several Eneolithic cultures and the Bronze Age, and also necropolis from late Middle Ages (Гарашанин 1973; Bulatović & Milanović 2012; Bulatović *et al*. 2014, and references therein). The collected archaeological material was the basis for the defining the prehistoric cultures in the region, in particular for defining the Eneolithic culture Bubanj-Hum I and the Bronze Age culture Bubanj III (Гарашанин 1973). The construction of the railway and motorway destroyed almost completely the site, therefore, in the period between 2008 and 2014 revision archaeological excavations were carried out on the small remaining portion of the site (Bulatović & Milanović 2012; Bulatović et al. 2014).

During these researches also rich faunal remains were recovered and their careful examination enabled to single out over 200 osseous artefacts (Vitezović, in press). Majority of these items originates from the layers of the Bubanj-Hum I culture, while smaller portion may be attributed to the horizons of the Kostolac-Coțofeni and Cernavoda III cultures (see further down in the text). Besides these, during earlier excavations a smaller quantity of the most attractive bone items was collected, mainly large objects made from antlers.

Od koštanih sirovina zastupljenih u naselju ranoga eneolitika na Bubnju prisutni su kosti, rogovi cervida, zubi i ljušture mekušaca. U zbirci prikupljenoj tijekom istraživanja 2008-2014 prevladavaju kosti: duge kosti, rebra i rijetko drugi skeletni elementi, uglavnom od domaćih životinja, i to od ovce/koze i goveda, dok se ostale vrste sreću rijetko. Rogovi su razmjerno rijetki i isključivo od jelena, međutim, o važnosti rogova kao sirovine svjedoče nalazi s istraživanja provedenih tijekom 20. stoljeća. Štoviše, ova razlika možda pokazuje da su se drukčije aktivnosti odvijale u onome dijelu naselja gdje su rogovi više nalaženi. Osim toga, prisutni su malobrojni kanini svinje (od čega je najmanje jedan sigurno od divlje svinje). Nađen je svega jedan predmet od importirane morske školjke *Spondylus*.

Grupa zašiljenih predmeta obuhvaća šila, odnosno srednje jake šiljke, igle ili fine zašiljene alatke i probojce ili masivne šiljke (Sl. 3). Šila su najbrojniji tip. Najčešće se izrađuju od metapodijalnih kostiju ovce/koze. Kosti su po dužini cijepane duž žlijeba koji je urezan kremenim sječivom ili dlijetom, a finalno glačanje i poliranje vršeno je abrazivnim kamenim alatom. Neki primjerci imaju epifizu očuvanu na bazi. Uglavnom imaju intenzivnu ispoliranost i istrošenost od uporabe, što pokazuje da su korišteni uglavnom na mekim, organskim materijalima (cf. Peltier 1986; Maigrot 2003; Christidou & Legrand 2005; Legrand 2007).

U grupu alata za sječenje pripada nekoliko predmeta izrađenih od kanina svinje, koji su korišteni kao neka vrsta noževa. Slabo su očuvani; s obzirom na to da su ovi zubi dosta krti, predmeti se često nalaze fragmentirani. Obično su izrađeni od raskoljenih segmenata zuba, manje-više u obliku polumjeseca, i imaju intenzivne tragove uporabe u vidu istrošenih, iskrzanih radnih ivica. Ovoj grupe pripada i jedna fragmentirana alatka od segmenta roga jelena, najvjerojatnije sjekira ili tesla, nađena tijekom istraživanja 2008-14. S ranijih istraživanja potječe nekoliko sjekira, tesli i dlijeta od segmenata rogova, često sa kružnom perforacijom na baznom dijelu.

Od alata za glačanje pronađeno je nekoliko spatula i strugača, uglavnom izrađenih od rebara. Rebra su obično cijepana po dužini pa se alatka izrađuje od jedne koštane pločice, obično manje-više pravokutnog oblika. Na njima su vidljivi i intenzivni tragovi uporabe od kontakta mekim organskim materijalima: istrošene površine, sjaj, ispoliranost

Raw materials used in the Early Eneolithic layers on Bubanj were bones, red deer antlers, teeth and mollusc shells. Within the assemblage collected during the excavations 2008-2014 bones prevail: long bones, ribs and rarely other skeletal elements, mainly from domestic animals, from sheep/goats and cattle, rarely from other species. Antlers are not frequent and only those from red deer were used, however, the importance of antler as raw material is visible in the material collected during the excavations in the 20th century. In fact, this difference perhaps points that different activities were carried out in the parts of the settlement where antlers were more frequently found. Besides these raw materials, there are also few boar tusks (at least one is certainly from wild pig). Just one object made from imported mollusc Spondylus was discovered.

The group of pointed tools includes medium points - awls, fine points – needles and heavy points (Fig. 3). Awls are the most frequent type. The most common are those made from metapodial bones of sheep/goats. Bones were longitudinally split along the groove prepared with the chipped stone burin or blade, and the final burnishing and polishing was done by abrasive stone tools. Some examples have the epiphysis preserved at the base. They usually display heavy polish and worn surfaces from use, suggesting they were used on soft, organic materials (cf. Peltier 1986; Maigrot 2003; Christidou & Legrand 2005; Legrand 2007).

Several artefacts made from boar tusks can be attributed to the group of cutting tools; they were used as some sort of knives. They are not well preserved; these teeth are brittle and the objects are often fragmented. Usually they were produced from split tusks, they have more-less crescent shape, and their edges are worn. Among the cutting tools also belongs one fragmented tool made from red deer antler, most likely axe or adze, discovered during the excavation campaigns in 2008-14. Previous excavations yielded several axes, adzes and chisels from antler segments, often with a circular perforation on the basal part.

The group of burnishing tools encompass several spatulae and scrapers, made mainly from ribs. Ribs were usually longitudinally split, so the tools were produced from one bone plate of the rib, more-less rectangular in shape. Intensive traces of use are visible on them, result from contact with soft organic materials: worn surfaces, polish, shine and sometimes irregular striations from use (cf. Peltier 1986;

Slika / Figure 4. Modificirani astragali, Bubanj-Novo Selo, kulturni kompleks Bubanj-Sălcuța-Krivodol / Modified astragals, Bubanj-Novo Selo, cultural complex Bubanj-Sălcuța-Krivodol (foto / photo: S. Vitezović).

i ponegdje nepravilne strije od uporabe (cf. Peltier 1986; Maigrot 2003; Christidou & Legrand 2005; Legrand 2007).

Pronađeno je i nekoliko modificiranih astragala s tragovima upotrebljavanja, od jelena, ovce i svinje (Sl. 4). Njihove lateralne stranice u potpunosti su ostrugane nekim abrazivnim sredstvom, a još se mogu uočiti intenzivna ispoliranost, sjaj i guste strije. Njihova namjena, međutim, nije jasna. Eksperimenti na sličnim predmetima koji su pronađeni na nekoliko brončanodobnih lokaliteta u Mađarskoj, pokazuju da su vjerojatno korišteni u radu s glinom (Meier 2013). Tragovi upotrebe na našim primjercima, osobito intenzivna ispoliranost i sjaj, pokazuju da je vjerojatnije da su korišteni u kontaktu s organskim materijalima, kao što su kože ili biljna vlakna (Peltier 1986; Maigrot 2003; Christidou & Legrand 2005; Legrand 2007). Da bi se ustanovila njihova funkcija i način korištenja, potrebna su daljnja eksperimentalna istraživanja.

Modificirani astragali, vjerojatno različitih namjena, sreću se u brojnim prapovijesnim kulturama u Europi; između ostalog, u kasno neolitičkoj vinčanskoj kulturi (Vitezović 2007), kao i u eneolitičkim kulturama u Rumunjskoj (e.g., Kogălniceanu *et al.* 2014) i Bugarskoj (e.g., Zidarov 2005), u brončanom dobu Mađarske (Meier 2013) i tako dalje.

Otkrivena su samo dva ukrasna predmeta su. Jedno je fragmentirana narukvica od morske školjke *Spondylus*. Ovakve su narukvice dosta česte na brojnim neolitičkim i eneolitičkim lokalitetima u Europi (cf. Borrello & Micheli 2004; Séfériadès 2010, sa referencama). Drugi artefakt je fragmentirana igla od segmenta duge kosti. Na baznom dijelu

Maigrot 2003; Christidou & Legrand 2005; Legrand 2007).

Several modified astragals with traces of use were found, from red deer, sheep and pig (Fig. 4). Their lateral surfaces were completely scraped by some abrasive tool, and also intensive polish, shine and dense striations are visible. Their purpose, however, is not clear. Experiments with similar items discovered on several Bronze Age sites in Hungary showed that they were most likely used in processing clay (Meier 2013). The traces of use on our examples, however, especially the intensive polish and shine, show they were most likely used in contact with organic materials, such as leathers or plant fibres (Peltier 1986; Maigrot 2003; Christidou & Legrand 2005; Legrand 2007). In order to establish their function and the mode of use, further experimental researches are needed.

Modified astragals, probably od different functions, can be encountered among the numerous prehistoric cultures in Europe; among others, in the Late Neolithic Vinča culture (Vitezović 2007), among Eneolithic cultures in Romania (e.g., Kogălniceanu *et al.* 2014) and Bulgaria (e.g., Zidarov 2005), in the Bronze Age in Hungary (Meier 2013), and so on.

Only two decorative items were discovered. One is fragmented bracelet from the marine Spondylus shell. Similar bracelets are encountered in numerous Neolithic and Eneolithic sites across Europe (cf. Borrello & Micheli 2004; Séfériadès 2010, and references therein). The other artefact is fragmented pin made from long bone segment,. It has rounded head at the basal part, with perforation, and thin, slender mesial part. The distal portion is fragment-

ima kružnu glavu s perforacijom i tanko tijelo u mezijalnom dijelu. Distalni dio nedostaje. Cijeli predmet je fino ispoliran. Sama perforacija je naglašeno deformirana intenzivnim korištenjem, a površine su također pokrivene sjajem od manipulacije i upotrebe (cf. Newcomer 1974; d'Errico 1993).

Još jedan značajan lokalitet bubanjske kulture je Lazareva ili Zlotska pećina kod Zlota, 20 km udaljena od Bora. U periodu između 1963. i 1969. godine istražena je jedna veća galerija, s bogatim ostacima iz eneolitika i željeznoga doba. Radi se o specifičnom lokalitetu koji je korišten vjerojatno samo povremeno, odnosno sezonski. Pretpostavka istraživača je da je to bio metalurški centar, zbog bogatih nalaza bakarnih predmeta, ali i tragova same rude i šljake (Tasić 1995: 172-173).

U okviru horizonta Bubanj-Sălcuța-Krivodol pronađena je razmjerno bogata zbirka koštanih predmeta i to pretežno rogova jelena (Vitezović, u pripremi). Svi segmenti rogova su korišteni – baze, stabla i parošci. Prisutnost većeg broja segmenata s očuvanom bazom pokazuje da se radi o odbačenim rogovima pa se može pretpostaviti da je veći dio ili čak cjelokupna količina sirovine planski prikupljana. Tipološki repertoar nije jako raznovrstan i pretežno se radi o sjekirama, teslama, dlijetima i klinovima. Veliki broj predmeta ima perforaciju na bazi, za uglavljivanje drvenog drška. Sam način izrade je jednostavan, ali dosta standardiziran – obično su čeoni parošci uklonjeni sa stabla kombiniranom *cut-and-break* tehnikom, a radna ivica je dobivana kosim sječenjem. Vanjske površine nisu dodatno dotjerivane, već se raspoznaju prirodne neravnine rogova. Korteks roga obično je stanjivan struganjem prije nego što se napravi perforacija; sama perforacije najčešće je kružnog oblika i obično promjera cca 2 cm. Namjena ovih predmeta vjerojatno je vezana za obradu drva. Moguće je da je to bila jedna od aktivnosti grupa koje su nastanjivale pećinu, ali i da su velike količine drva pribavljane zarad metalurških aktivnosti.

S preostalih bubanjskih nalazišta koštani artefakti su malobrojni ili se uopće ne spominju u izvještajima, odnosno, može se pretpostaviti da se na faunalne ostatke slabo obraćala pažnja i da su samo odabrani koštani predmeti prikupljani. Može se još samo spomenuti jedna dobro očuvana masivna sjekira s ovalnom perforacijom na baznom dijelu koja potječe s lokaliteta Hisar kod Suve Reke na Kosovu (Тасић 1998: 494, kat. 98).

ed. The entire object is finely polished. The perforation is heavily deformed from intensive use, and the most of the preserved surfaces are also covered by polish and shine from manipulation and use (cf. Newcomer 1974; d'Errico 1993).

Another important site of the Bubanj culture is the site of Lazareva or Zlotska cave near Zlot, 20 km from the town of Bor. In the period between 1963 and 1969 one larger room, with rich remains from the Eneolithic and Iron Age. This site had specific character, it was probably used only occasionally, or seasonally. The excavators offered the hypothesis that it was a metallurgical centre, because of rich finds of copper objects, but also because of traces of copper ore and slag (Tasić 1995: 172-173).

Within the horizon of the Bubanj-Sălcuța-Krivodol cultural complex relatively rich assemblage of osseous artefacts was discovered, mainly consisting of red deer antlers (Vitezović, in prep.). All antler segments were used – basal parts, beams and tines. The presence of large quantities of the segments with preserved base show that these were shed antlers; and we may assume that the raw material was mainly or even exclusively obtained by planned collecting. The typological repertoire is not very diverse and includes axes, adzes, chisels and wedges. Many of these objects have the perforation on the base, for the wooden handle. The manufacturing procedure was rather simple, but highly standardized – usually brow tines were removed by combined cut-and-break technique, and the working edge was obtained by oblique cutting. Outer surfaces were not additionally modified, and the naturally rough surface of the antler is still visible. The cortex was usually thinned by scraping before the perforation was executed; perforation itself was generally circular in shape and usually its diameter was cca 2 cm. These objects were most likely used in wood-working activities. It is possible that this was one of the activities practiced by groups that inhabited the cave, but perhaps the large quantities of wood were also needed for metallurgical activities.

Bone artefacts from remaining Bubanj culture sites are very few or they are not mentioned at all in the reports, meaning that we may assume that the attention was not paid to the faunal remains and that only selected bone objects were collected. We may only mention one well preserved massive axe with oval perforation on the basal part found at the site of Hisar near Suva Reka on Kosovo (Тасић 1998: 494, kat. 98).

Koštane figure

Posebno interesantna novina eneolitičkog perioda u koštanoj industriji jest pojava antropomorfnih figura. Dok su u neolitičkom periodu u jugoistočnoj Europi figure bile gotovo isključivo od gline, s rijetkim primjercima od kamena, sada se javlja nekoliko tipova figura izrađivanih od kostiju.

Tipološku klasifikaciju koštanih figura predložilo je više autora, s manjim varijacijama (cf. Петков 1950: 25–26, sa referencama). Mogu se izdvojiti tri osnovna tipa (Sl. 5, 6): 1) shematizovane figure lučnog presjeka s dodatkom, koje se još nazivaju i violinskim, obično nešto većih dimenzija, 2) plosnate figure srednjih dimenzija i 3) figure od kratkih kostiju gdje je prirodni oblik minimalno modificiran i uglavnom ograničen na dodavanje perforacija i struganje površina (cf. Todorova & Vajsov 2001; Andreescu 2002: 55–67, Manolakakis & Averbouh 2004; Averbouh & Zidarov 2014). Plosnate figure uglavnom čine tri dijela – glava, koja može biti trokutasta, ovalna ili heksagonalna; torzo, obično ukrašen; i noge, koje mogu biti samo shematizirane, spojene ili razdvojene i veoma pažljivo izrađene (cf. Петков 1950; Comşa 1979; Andreescu 2002: 55–67). Ponekad, ove figure imaju elemente od drugih materijala, osobito bakra (Todorova & Vajsov 2001), ali i kamena, kao što je serpentinit (Георгиева 2014).

Plosnate antropomorfne figure čest su nalaz u današnjoj Bugarskoj i Rumunjskoj, u eneolitičkim kulturnim kompleksima Bubanj-Salcuța-Krivodol i Kodjadermen-Gumelnița-Karanovo VI. Štoviše, smatraju se kulturno-kronološki osjetljivim tipom za halkolit istočnoga Balkana ("index fossils", "fossiles directeurs") (cf. Георгиева 2014: 225; Averbouh & Zidarov 2014: 183). Ove se figure javljaju od faze Gumelnița A1, dosta su uobičajene tijekom faza A2 i B1, i čini se da su nešto češće u ranijim fazama kulturnoga kompleksa Bubanj-Salcuța-Krivodol (cf. Berciu 1961, fig. 157/2; Георгиева 2012: 244–245; cf. i Comşa 1976; Andreescu 2002: 55–67). Dosad su otkrivene na više od 80 lokaliteta u istočnoj Rumnjskoj i Bugarskoj (cf. Andreescu 2002; Comşa 1979; Петков 1950; cf. i Averbouh & Zidarov 2014, sa referencama). Iscrpnoj listi koju su priredili A. Averbouh i P. Zidarov (2014) mogu se još dodati lokaliteti kao što su Kozareva Mogila (Козарева Могила) (Георгиева 2014) u Bugarskoj i Cuptoare u Banatu u Rumunjskoj (Radu 2002: Pl. 100/4).

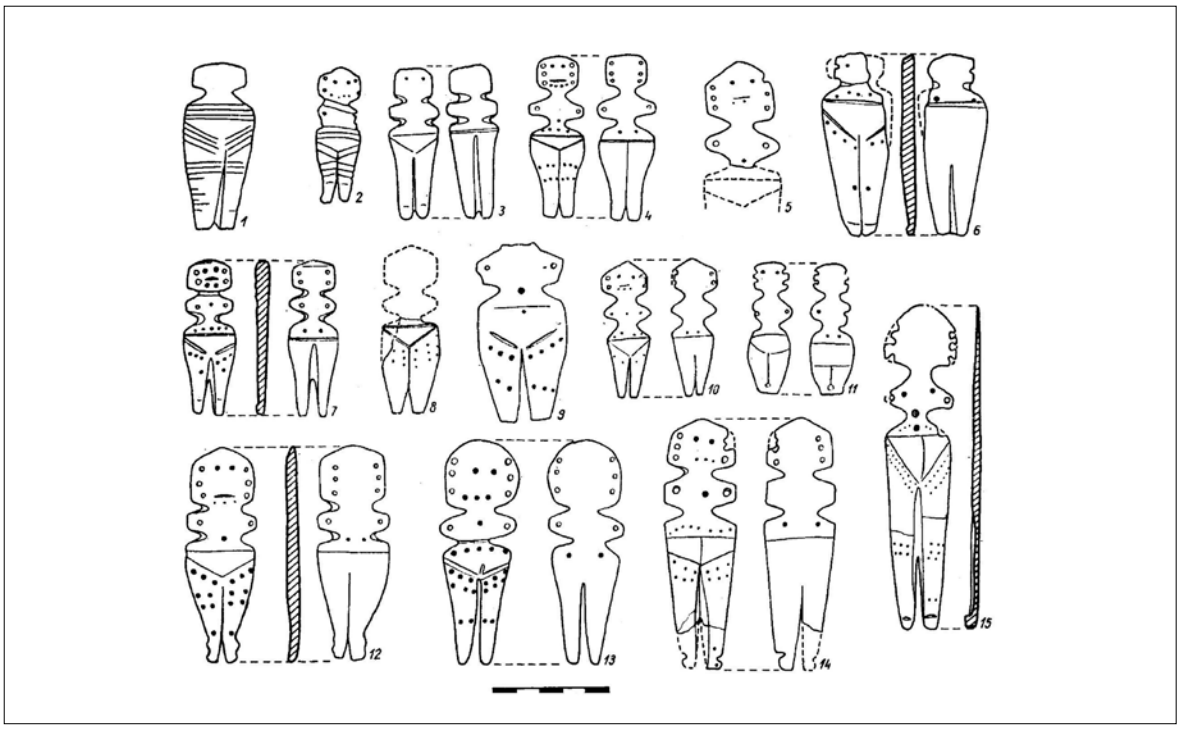
Tijekom istraživanja 2008.-2014. na lokalitetu Bubanj pronađen je i jedan fragment plosnate antro-

Bone figurines

Particularly interesting innovation of the Eneolithic period within the bone industry is the appearance of the anthropomorphic figurines. While in the Neolithic period in the South-East Europe figurines were made almost exclusively from clay, with rare examples made of stone, now we have several types of figurines manufactured from bones.

Typological classification of the bone figurines was offered by several authors, with minor variations (cf. Петков 1950: 25–26, and references therein). Three main types may be outlined (Fig. 5, 6): 1) schematized vaulted figurines with appendices, also called violin-shaped, usually of considerable dimensions, 2) medium-sized flat figurines, and 3) figurines made from short bones by minimal alterations to their natural shape, mainly limited to perforations and grinding of surfaces (cf. Todorova & Vajsov 2001; Andreescu 2002: 55–67, Manolakakis & Averbouh 2004, Averbouh & Zidarov 2014). Flat figurines usually have three-partite division – head, that may be triangular, oval or hexagonal, torso, usually decorated, and legs, that may be only schematized, joint or very elaborated and separated (cf. Петков 1950; Comşa 1979; Andreescu 2002: 55–67). Sometimes, these figurines had elements made from other material, in particular copper (Todorova & Vajsov 2001), but also from stones, such as serpentinite (Георгиева 2014).

Flat anthropomorphic figurines are commonly found in present-day Bulgaria and Romania, within the Eneolithic cultural complexes of Bubanj-Salcuța-Krivodol and Kodjadermen-Gumelnița-Karanovo VI. Furthermore, they are considered to be culturally-chronologically sensitive type for the Chalcolithic of the eastern Balkans ("index fossils", "fossiles directeurs") (cf. Георгиева 2014: 225; Averbouh & Zidarov 2014: 183). These figurines appear in since the phase Gumelnița A1, they are quite frequent during the phases A2 and B1, and it seems they are more commonly found in the earlier phases of the cultural complex of Bubanj-Salcuța-Krivodol (cf. Berciu 1961, fig. 157/2; Георгиева 2012: 244–245; cf. and Comşa 1976; Andreescu 2002: 55–67). Until today, figurines were discovered at over 80 sites in eastern Romania and Bulgaria (cf. Andreescu 2002; Comşa 1979; Петков 1950; cf. and Averbouh & Zidarov 2014, and references therein). To the extensive list provided by A. Averbouh and P. Zidarov (2014) we may also add sites such as Kozareva Mogila (Козарева Могила) (Георгиева 2014) u Bulgaria and Cuptoare in Banat in Romania (Radu 2002: Pl. 100/4).



Slika / Figure 5. Koštane figurine iz Rumunjske / Bone figurines from Romania (prema / after: Comşa 1979).

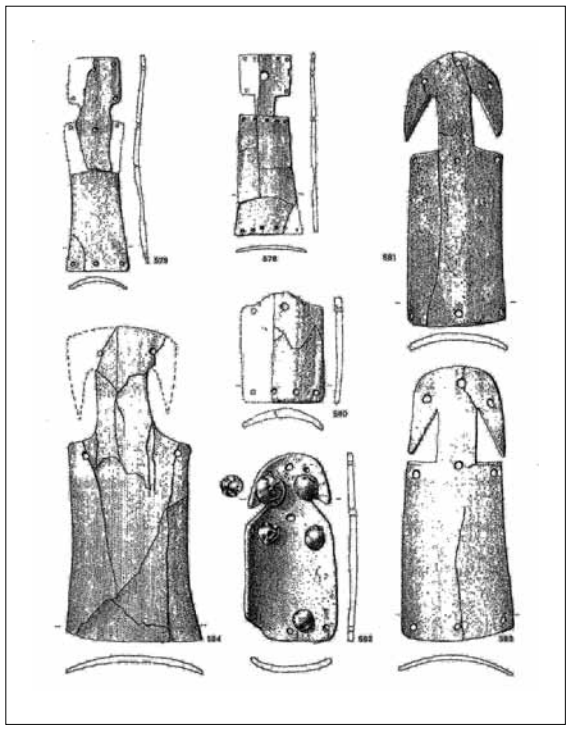
pomorfne figure (Vitezović & Bulatović 2015). Ovo je prvi i zasad jedini nalaz ove vrste s teritorija Srbije, i istovremeno najzapadniji ovakav nalaz, koji samim tim pokazuje nešto drukčiju sliku o distribuciji ovih figura nego što se ranije smatralo. Od figure je očuvan samo torzo, dok glava i noge nedostaju. Izrađena je od segmenta duge kosti (humerusa ili tibije) srednje krupne životinje. Ukras na njoj se sastoji od tri horizontalna žlijeba, ispod kojih su dva dijagonalna ureza koji formiraju ukras u obliku latiničnog slova V, i ispod toga se nalaze po tri mala kružna udubljenja sa svake strane. Površina figure dosta je istrošena, i upotrebom i postdepozicijskim procesima. Izrađena je sječenjem i glačanjem, urezi su izvedeni kremenom alatkom, a kružni ornamenti svrdlom.

Također je interesantan nalaz s lokaliteta Hotnica (Хотница) u Bugarskoj (Ангелов 1961), gdje je otkriveno nekoliko figura u različitim stupnjevima obrade u okviru jednog objekta. Radi se vjerojatno o radionici ili radioničkom mjestu.

Nalazi plosnatih figura u prvome su redu u okvirima naselja; na lokalitetu Pietrele u Rumunjskoj sve su figure otkrivene unutar kuća; nijedna nije nađena na otvorenom prostoru (Hansen 2011: 120). Jedini nalazi iz grobova potječu s nekropole u Varni, na

During the excavations in 2008-2014 on the site of Bubanj one fragment of a flat anthropomorphic figurine was discovered (Vitezović & Bulatović 2015). This is the first and for the moment the only such find from the territory of Serbia, and at the same moment the westernmost such find, thus showing somewhat different picture of the distribution than previously thought. Only torso of the figurine is preserved, while the head and legs are missing. It was made from a segment of a long bone (humerus or tibia) of middle-sized animal. Its decoration consists three horizontal grooves, below them are two diagonal incisions, forming the ornament in the shape of the Latin letter V and below it are placed three small circular impression on each side. The surface of the figurine is heavily worn, both from use and post depositional processes. It was made by cutting and burnishing; the grooves and incisions were made by chipped stone tool and the circular ornaments with a bow-drill.

Also interesting is the find from the site of Hotnica (Хотница) in Bulgaria (Ангелов 1961), where several figurines different stages of manufacture were discovered within one dwelling. This was some most likely workshop or working place.



Slika / Figure 6. Koštane figurine iz Varne, Bugarska / Bone figurines from Varna, Bulgaria (prema / after: Todorova & Vajsov 2001).

obali Crnoga mora. Tu su u većem broju grobova nađene sasvim nove figure, bez tragova manipulacije i korištenja, ukupno 28 primjeraka različitih podtipova (Manolakakis & Averbouh 2004).

Sve ove figure karakterizira strogi izbor sirovina, ujednačena morfologija i dekoracija (Averbouh & Zidarov 2014: 183). Prema analitičkom okviru kontinuiteta proizvodnje koji je predložila A. Choyke (1997), figure pripadaju klasi predmeta koji su visoko vrednovani, i u koje je uložen veliki trud, vrijeme i vještina, što im je dalo ili pojačalo prestižni status (cf. Vitezović & Bulatović 2015). Nastanak i intenzivna proizvodnja ovih figura još je jedan od pokazatelja porasta proizvodnje prestižnih, cijenjenih predmeta (cf. Manolakakis & Averbouh 2004). Simboličko značenje i prestižni karakter figura vidi se, osim u velikom ulaganju vremena, truda i vještine u izradu, i u tome što su na nekropoli u Varni nađene potpuno nove, nekorištene figure, očito pripremljene upravo u funeralne svrhe. Neki autori također smatraju ove figure "ideološkom inovacijom" ranoga eneolitka (Hansen 2011).

Moguće je da su neke, ako ne i većina ovih figura nošene kao dodatak na odjeći, sudeći po tragovima intenzivnog korištenja koji su uočeni na većini, pa i na figuri s Bubnja (Тодорова 1980; Averbouh & Zidarov 2014: 191; Vitezović & Bulatović 2015).

Flat figurines are mainly found within the settlements; at the site of Pietrele in Romania all the figurines were discovered within houses; not a single one was found on an open area (Hansen 2011: 120). The only finds from graves come from the necropolis in Varna, on the Black sea coast. Here numerous graves contained brand new figurines, without any traces of use or manipulation, total of 28 specimen of different figurine subtypes (Manolakakis and Averbouh 2004: 159).

All these figurines are characterized by the strict choice of raw materials, uniform morphology and decorations (Averbouh & Zidarov 2014: 183). After the conceptual framework of manufacturing continuum, designed by A. Choyke (1997), figurines belong to the class of highly valued objects, with large labour, time and skill investment, that gave and/or increased their prestigious status. (cf. Vitezović & Bulatović 2015). The occurrence and the intensive production of these figurines is another mark of the increased production of prestigious, valued items (cf. Manolakakis & Averbouh 2004). The symbolical importance and prestigious character of the figurines is visible, among other, in the high time, labour and skill investment, but also in the fact that on the necropolis in Varna were found brand new, unused figurines, obviously prepared precisely for the funerary purposes. Some authors even consider them as "ideological innovation" of the Early Eneolithic (Hansen 2011).

It is possible that some, if not majority of these figurines were worn attached clothes, judging by the traces of intensive use, visible on most of them, including the figurine from Bubanj (Тодорова 1980; Averbouh & Zidarov 2014: 191; Vitezović & Bulatović 2015).

Kulture Kostolac i Kostolac-Coțofeni

Nešto podataka o koštanim industrijama u kostolačkoj kulturi imamo s lokaliteta Bubanj kod Niša (v. gore), gdje se javlja lokalna varijanta Kostolac-Coțofeni (Vitezović, in press).

U koštanoj industriji otkrivenoj tijekom istraživanja 2008.-2014. najzastupljenije su kosti, slijede rogovi jelena, dok ljušture školjki nisu otkrivene. Grupa zašiljenih predmeta obuhvaća uglavnom srednje i masivne šiljke. Srednji šiljci, odnosno šila uglavnom su izrađivani od dugih kostiju sitnijih preživača, kao što su metapodijalne kosti ovce/koze. Na ovim se šilima mogu uočaiti ispoliranost i istrošenost od upotrebe, što pokazuje da su korišteni uglavnom na mekim, organskim materijalima. Nađen je i manji broj masivnih probojaca.

U grupu alatki za sječenje pripadaju dva masivnija predmeta od roga jelena. Jedno je gotovo cijela sjekira ili tesla, izrađena od baze i segmenta stabla otpalog roga, s perforacijom u baznom dijelu, promjera 1,2 cm (Sl. 7). Radna ivica je dobivena kosim zasijecanjem stabla roga i samo je djelomično očuvana. Drugi predmet je dosta fragmentiran, ali se može pretpostaviti da je morfološki i funkcionalno bio dosta sličan prvom.

Grupa alata za glačanje obuhvaća različite spatule, strugače i spatule-dlijeta, od različitih kostiju. Većina spatula i strugača izrađena je od minimalno modificiranih rebara, dok se po pažljivoj izradi

Culture Kostolac and Kostolac-Coțofeni

Some information about the bone industries within the Kostolac culture we have from the site of Bubanj near Niš (see above), where the local variant of Kostolac-Coțofeni was present (Vitezović, in press).

Within the bone industry recovered during the excavations in 2008-2014 the most common raw material were bones, followed by red deer antlers, while mollusc shells were not found. The group of pointed tools encompasses mainly medium and heavy points. Medium points, i.e., awls were usually manufactured from long bones of small ruminants, such as metapodial bones of sheep/goats. On these awls are visible polish and worn surfaces from use, showing they were mainly used on soft, organic materials. Also a small number of heavy points was discovered.

In the group of cutting tools fall two massive objects from red deer antler. One is almost completely preserved axe or adze, made from base and beam segment of a shed antler, with a perforation in the basal part, diameter 1,2 cm (Fig. 7). Working edge is obtained by oblique cutting of the beam and is only partially preserved. The other objects is heavily fragmented, but we may assume that it was morphologically and functionally very similar to the first one.

The group of burnishing tools includes diverse spatulae, scrapers and spatula-chisels, made from different bones. Majority of spatulae is made from

Slika / Figure 7. Sjekira ili tesla od roga jelena, Bubanj-Novo Selo, kultura Kostolac-Coțofeni / Axe or adze from red deer antler, Bubanj-Novo Selo, culture Kostolac-Coțofeni (foto / photo: S. Vitezović).

Slika / Figure 8. Koštane drške, Bubanj-Novo-Selo, kultura Kostolac-Coțofeni / Bone handles, Bubanj-Novo Selo, culture Kostolac-Coțofeni (foto / photo: S. Vitezović).

posebno izdvaja spatula-dlijeto od gotovo cijele tibije ovce/koze. Tragovi uporabe i na ovim predmetima pokazuju da su korišteni uglavnom na mekim, organskim materijalima, vjerojatno najviše za obradu kože (Peltier 1986; Maigrot 2003; Christidou & Legrand 2005; Legrand 2007). Osim toga nađene su dvije mandibule s tragovima korištenja, čija je namjena bila za izradu remenja i drugih predmeta od kože (*thong stretcher / thong smoother*).

Posebno interesantnu grupu predmeta čini nekoliko držaka (Sl. 8). Svi su izrađeni od gotovo cijelih metapodijalnih kostiju ovce/koze. Modificirani su jednostavnim uklanjanjem distalne epifize, a na nekim predmetima se mogu raspoznati i tragovi kako je presječena ivica uglačana abrazivnim kamenim alatom, moguće pješčenjakom. Prirodna šupljina duge kosti iskorištena je za usađivanje nekog drugog predmeta, oštrog i tankog. Tragovi upotrebe sastoje se od ispoliranosti, sjaja i strija bez pravilnog rasporeda, koji su trag manipuliranja i kontakta s materijalom koji je usađeni predmet obrađivao (cf. Barge-Mahieu 1990; d'Errico 1993). Slični tragovi upotrebe uočeni su i na finim, cilindričnim šupljim predmetima, kakvi su otkriveni u eneolitiku Francuske, i koji su identificirani kao drški nakon što je otkriveno nekoliko primjeraka s još uvijek uglavljenom alatkom (Barge-Mahieu 1990).

minimally modified ribs, while one spatula-chisel from almost complete sheep/goat tibia stands out by its careful manufacture. Use wear traces on these objects also show they were predominantly used on soft, organic materials, probably mainly for leather processing (Peltier 1986; Maigrot 2003; Christidou & Legrand 2005; Legrand 2007). Apart from these, also two mandibles with traces of use were discovered, used in the process of making thongs and other leather items (*thong stretcher / thong smoother).*

Particularly interesting group of artefacts are several handles (Fig. 8). They were all made from almost complete metapodial bones of sheep/goats. They were modified by removing the distal epiphysis, and on some of them on the cut edge are visible traces of burnishing with abrasive stone, possibly sandstone. The natural cavity of the long bone was used for inserting another object, pointed and slender. Traces of use consist of polish, shine and irregular striations, which are traces of manipulation and contact with the material that was worked by the inserted tool (cf. Barge-Mahieu 1990; d'Errico 1993). Similar traces of use were noted on fine, cylindrical hollow objects, discovered in the Eneolithic in France, which were identified as handles after the discovery of several specimens with still inserted tool (Barge-Mahieu 1990).

Promjer otvora držaka s Bubnja je prilično malen obično oko 6-8 mm, i najizvjesnija je pretpostavka da su bili namijenjeni bakrenim iglama i šilima, mada su nalazi bakrenih predmeta na Bubnju izuzetno rijetki. Slične drški, točnije minimalno modificirani segmenti dijafiza dugih kostiju sitnih preživača, s još uvijek uglavljenom bakrenom alatkom poznati su s većeg broja lokaliteta u Europi. Kao jedan od primjera može se spomenuti Azmaška Mogila (Азмашка Могила) u istočnoj Bugarskoj (Калчев 2005: 13).

S drugih kostolačkih lokaliteta koštani predmeti su gotovo potpuno nepoznati. Može se još samo spomenuti jedan držak od duge kosti (vjerojatno metapodijalna kost ovce/koze) s još uvijek uglavljenim bakrenim šilom, koja je otkrivena na lokalitetu Hisar kod Suve Reke na Kosovu i najvjerojatnije pripada kostolačkom horizontu (Тасић 1998: 500, kat. 108).

The diameter of the opening of the handles from Bubanj is quite small, usually about 6-8 mm, and the most plausible hypothesis is that they were intended for copper needles and awls, although copper finds were extremely rare on Bubanj. Similar handles, namely, minimally modified segments of diapyhses of small ruminant long bones, with a copper tool still embedded inside, are known from numerous sites in Europe. As one of the examples we may outline the site of Azmashka Mogila (Азмашка Могила) in eastern Bulgaria (Калчев 2005: 13).

From other Kostolac culture sites bone artefacts are almost completely unknown. We may mention here only one handle made from long bone segment (probably metapodial bone of sheep/goat) with still inserted copper awl, discovered at the site of Hisar near Suva Reka on Kosovo, which most likely belongs to the Kostolac horizon (Тасић 1998: 500, kat. 108).

Cernavoda kultura

Koštana artefakta Cernavoda I kulture poznata su nam s lokaliteta Săveni-La Movile u Rumunjskoj, gdje je prikupljena manja zbirka od 50 artefakata (Cernea *et al.* 2014). Uglavnom su korišteni rogovi. Svega 14 predmeta izrađeno je od kostiju; većinom su zastupljeni različiti šiljci od dugih kostiju. Osim toga, tri različite duge kosti krupnih preživača (metakarpus, metatarzus i radius) iskorištene su kao neka vrsta čekića. Nađena je i jedna alatka za preradu remenja od kože (*thong stretcher / thong smoother*) od mandibule. Od rogova su izrađivana dlijeta i sjekire; jedan fragmentirani artefakt od baze odbačenog roga i stabla s perforacijom moguće je služio kao sjekira-čekić. Ostaci od proizvodnje razmjerno su brojni, jedan polufabrikat i 18 komada koji predstavljaju otpadak.

Nađena su i dva ukrasna predmeta; privjesak od dijafize duge kosti krupnije životinje i duguljasta cilindrična perla od metapodijalne kosti od životinje vrste *Canis/ Vulpes / Lupus.* Privjesak je ovalne forme i ima dvije perforacije u gornjem dijelu; jedna je prelomljena i moguće da je druga i izrađena nakon loma prve. Ovaj je predmet najvjerojatnije imitacija takozvanih Gumelnița idola, zlatnih privjesaka kakvi su nađeni na lokalitetu Sultana-Malu Roşu (Cernea et al. 2014: fig. 7).

Cernavoda culture

Bone artefacts of the Cernavoda I culture were are available from the site of Săveni-La Movile in Romania, where a smaller assemblage of 50 artefacts was collected (Cernea *et al*. 2014). The predominant raw material were antlers. Only 14 objects were made from bones; mainly diverse points from long bone segments. Also, three different bones from large ruminant (metacarpus, metatarsus and radius) were used as some sort of hammer. One tool made from mandible was found, used in leather working (thong stretcher / thong smoother). Antlers were used to produce chisels and axes; one fragmented tool made from the basal part of the shed antler probably used as a hammer-axe. Manufacture debris is relatively frequent, and include one semi-finished item and 18 pieces representing waste.

Two decorative items were discovered; pendant from diaphysis of a long bone from large mammal and one cylindrical bead made from metapodial bone of the animal from species Canis/ Vulpes / Lepus. The pendant has oval shape and two perforations in the upper part; one is broken and it is possible that the second was made after the first one was broken. This objects is most likely imitating the so-called Gumelnița idols, golden pendants found at the site of Sultana-Malu Roşu (Cernea et al. 2014: fig. 7).

Slika / Figure 9. Ukrasi od Unio školjki, Bubanj-Novo Selo, kultura Cernavoda III / Decorations from Unio shells, Bubanj-Novo Selo, culture Cernavoda III (foto / photo: S. Vitezović).

S lokaliteta Bubanj tijekom istraživanja 2008-2014 manji broj koštanih predmeta otkriven je u okviru horizonta Cernavoda III kulture. Osnovna sirovina su kosti; rogovi nisu otkriveni, ali je pronađeno i nekoliko artefakata izdrađenih od ljuštura riječnih školjki *Unio sp*.

Najzastupljenija su šila od dugih kostiju sitnih preživača, uglavnom metapodijalnih kostiju ovce/koze. Kosti su cijepane po dužini, dotjerivane glačanjem, i predmeti često imaju očuvanu epifizu na bazi. Tragovi uporabe, uglačanost, ispoliranost i sjaj, pokazuju da su korištena na mekim, organskim materijalima – za obradu kože i/ili biljnih vlakana (Peltier 1986; Maigrot 2003; Christidou &Legrand 2005; Legrand 2007). Nekoliko fragmentiranih predmeta od dugih kostiju predstavljaju probojce.

Od alatki za sječenje nađeno je nekoliko artefakata izrađenih od kanina svinje, koji su korišteni kao neka vrsta noževa. U grupi alata za glačanje javljaju se spatule i strugači, izrađivani uglavnom od rebara, i to kako cijepanih po dužini (predmeti od jedne koštane pločice), tako i cijelih (od segmenata rebara pune debljine). Većinom pokazuju vrlo visok intenzitet istrošenosti od upotrebe, od kontakta s mekim, organskim materijalima, te se može pretpostaviti da su najviše korišteni za obradu kože (Peltier 1986; Maigrot 2003).

Modificirani astragali javljaju se i u horizontima Cernavoda. Tragovi korištenja uglavnom su smješteni na condylusima. Jedan astragal ovce/koze ima nedovršenu perforaciju. Za njih možemo pret-

A small number of bone objects was discovered at the site of Bubanj during the excavations in 2008-2014 within the horizon of Cernavoda III culture. The main raw material were bones; antlers were not noted, but several artefacts made from river Unio sp. shells were discovered.

The most common are awls made from long bones of small ruminants, mainly metapodial bones of sheep/goat. Bones were longitudinally split, finished by burnishing, and these objects often have preserved epiphysis on the base. Use wear traces, smooth surfaces, polish and shine, show these items were used on soft, organic materials – for processing leather and/or plant fibres (Peltier 1986; Maigrot 2003; Christidou & Legrand 2005; Legrand 2007). Several fragmented tools made from long bones were probably heavy points .

Cutting tools include several items made from boar tusks, used as some sort of knife. The group of burnishing tools include spatulae and scrapers, made mainly from ribs, both split (objects produced on one bone plate), and unsplit (from segments which preserved the full thickness of the bone). They display very intensive use wear, result of the contact with soft, organic materials, and we may assume they were used in leather working (Peltier 1986; Maigrot 2003).

Modified astragals also occur within the Cernavoda horizon. The traces of use on them are mainly located on the condyli. One sheep/goat astragal has unfinished perforation. We may assume that these items had similar function as those from the Early

postaviti sličnu funkciju kao i za one iz ranoga eneolitika – da su korišteni u obradi mekih organskih materijala, kao što su kože i biljna vlakna, ali su potrebna daljnja istraživanja za preciznije definiranje njihove namjene.

Nađeno je i nekoliko ukrasnih predmeta od riječnih školjki *Unio* (Sl. 9). Pronađeno je nekoliko cijelih valvi sa perforacijama, ali i nekoliko nedovršenih primjeraka – cijele valve s tragovima abrazije i nedovršenim perforacijama. Ovi su ukrasi vjerojatno bili dio ogrlice, ili našiveni na odjeću. Zanimljivo je da su školjke *Unio* znatno češće korištene u odnosu na neolitički period, i sreću se i na drugim eneolitičkim lokalitetima u jugoistočno Europi. Na lokalitetu kulture Gumelnița tell Hârşova u Rumunjskoj, na primjer, nađena je veća količina cijelih perforiranih valvi, finih perli izrađenih od ove školjke, kao i nedovršeni primjerci (Mărgărit 2008).

Eneolithic layers – they were most likely used in processing soft, organic materials, such as leathers and plant fibres; however, further studies are needed for more precise definition of their purpose.

Several decorative items from river Unio shells were discovered (Fig. 9). Several complete valves with perforations were found, but also several unfinished pieces – complete valves with traces of abrasion and unfinished perforations. These decorations were probably part of the necklace or were attached to the clothes. It is interesting to note that Unio shells are now more common than in the Neolithic period, and they are encountered on other Eneolithic sites in the south-east Europe. On the site of Gumelnița culture Hârşova tell in Romania, for example, a large quantity of complete perforated valves was found, along with fine beads from this shell and several unfinished pieces (Mărgărit 2008).

Vučedolska kultura

Mada vučedolska kultura ima dugu tradiciju proučavanja i istražen je veliki broj lokaliteta na velikoj površini, koštana industrija ostala je zanemarena pored ostalih spektakularnih nalaza i nije detaljno analizirana. Poseban problem predstavlja nepotpuna dokumentacija o stratigrafiji nekoliko velikih vučedolskih tell-naselja, s kojih potječe izuzetno veliki broj koštanih predmeta, kao što su sam Vučedol, Sarvaš-Gradac, ili Zók.

Istraživanjima koja su provedena na eponimnom lokalitetu Vučedol u prvoj polovici 20. stoljeća prikupljena je velika količina koštanih predmeta koji se danas čuvaju u Arheološkom muzeju u Zagrebu (Krištofić 2017). U zbirci se nalaze uglavnom masivne alatke od roga, sjekire, tesle, dlijeta, kombinirani perkuteri, kao i otpaci od proizvodnje. Kosti su slabije zastupljene; korištene su uglavnom za igle, šila i različite predmete za glačanje.

S lokaliteta Sarvaš-Gradac u Arheološkom muzeju u Osijeku danas se čuva veća količina predmeta (oko stotinjak) od koštanih sirovina, uglavnom od rogova jelena (Vitezović, u pripremi). Radi se o raznim segmentima – baznim, dijelovima stabla i parošcima. Veći broj rogova s očuvanom bazom pokazuje da se do sirovine dolazilo prije svega prikupljanjem odbačenih rogova, vjerojatno sustavnim i planiranim, ali je manja količina nabavljena i lovom.

Vučedol culture

Although Vučedol culture has long tradition of research and numerous sites on extensive area were investigated, the bone industry remained unnoticed next to the other spectacular finds and was never analysed in detail. In particular, the problem poses the incomplete documentation regarding stratigraphy regarding several large Vučedol tell-settlements, from which extraordinary large number of bone artefacts was uncovered, such as the eponymous site of Vučedol, site of Sarvaš-Gradac, or Zók.

The researches carried out on the eponymous site of Vučedol in the first half of the 20th century a large quantity of bone objects was collected, today stored at the Archaeological museum in Zagreb (Krištofić 2017). The assemblage consists of mainly massive antler tools, axes, adzes, chisels, combined percussion tools, as well as manufacture debris. Bones were less common; used mainly for needles, awls and diverse burnishing tools.

From the site of Sarvaš-Gradac in the Archaeological museum in Osijek today is stored a larger amount of objects (about one hundred) from osseous raw materials, mainly from red deer antlers (Vitezović, in prep.). Diverse segments are present – bases, beams and tines. Large amount of antlers with preserved base show that the raw material was obtained predominantly by collecting the shed antlers, probably in a systematic and planned way, but a smaller quantities were obtained by hunting.

Slika / Figure 10. Konusni harpuni od roga, Sarvaš-Gradac, vučedolska kultura / Toggle harpoons from antler, Sarvaš-Gradac, Vučedol culture (foto / photo: S. Vitezović).

Tipološki, obuhvaćaju uglavnom masivne alatke za udaranje i sječenje – čekiće, kombinirane perkutere, sjekire, tesle, dlijeta. Često imaju kružnu (rijetko četvrtastu) perforaciju za drveni držak. Među fino izrađenim predmetima osobito se izdvajaju tri cijela, dobro očuvana konusna harpuna (Sl. 10). Izrađeni su od manjih parožaka rogova; bazni dijelovi su ukoso isječeni, na mezijalnom dijelu imaju manju perforaciju, dok su sami vrhovi prirodni vršci parožaka dodatno dotjerani struganjem i sječenjem da budu oštriji. Također se u zbirci nalazi i jedan polufabrikat za konusne harpune.

Osim toga, u Muzeju se danas čuva i određena količina otpadaka od proizvodnje – različiti segmenti roga (bazni dijelovi, stabla, parošci) s tragovima cijepanja, piljenja, započetih perforacija, i drugo (Sl. 11).

Posebno je interesantan lokalitet Zók kod Pečuha u Mađarskoj. Na ovom su lokalitetu provedena istraživanja velikog obujma 1920. godine, i prikupljena je izuzetno velika količina materijala, danas u Narodnom muzeju u Beogradu (Mitrović & Vitezović 2017). Između ostalog, tu pripada više od 200 koštanih predmeta koji se mogu opredijeliti u kasno-vučedolski i vinkovački horizont (Mitrović & Vitezović, u pripremi).

Typologically, they encompass mainly massive percussion and cutting tools – hammers, combined percussion tools, axes, adzes, chisels. They often have circular (rarely rectangular) perforation for a wooden handle. Among the finely manufactured items especially stand out three complete, well preserved toggle harpoons (Fig. 10). They were made from smaller tines; their basal parts were obliquely cut, on the mesial part have smaller perforation, while the tips were natural tips of the tine, additionally modified by scraping and burnishing to be sharper. Also in this assemblage is encountered one semi-finished toggle harpoon.

Furthermore, in the Museum is today stored a certain amount of the manufacture debris – different segments of antlers (basal parts, beams, tines) with traces of cutting, sawing, unfinished perforations, etc. (Fig. 11).

Particularly interesting is the site of Zók near Pécs in Hungary. On this site large scale excavation were carried out in 1920, and a very large quantity of the material was collected, today stored in the National museum in Belgrade (Mitrović & Vitezović 2017). Among others, there is over 200 bone objects that can be attributed to the Late-Vučedol or Vinkovci culture horizon (Mitrović & Vitezović, in prep.).

Slika / Figure 11. Otpadak ili polufabrikat od roga, Sarvaš-Gradac, vučedolska kultura / Manufacture debris or semifinished item from antler, Sarvaš-Gradac, Vučedol culture (foto / photo: S. Vitezović).

Slika / Figure 12. Sjekire i čekići-sjekire od roga, Zók, vučedolska kultura / Axes and hammer-axes from antler, Zók, Vučedol culture (foto / photo: S. Vitezović).

Slično kao i na Sarvašu, pa i na samom Vučedolu, primjetna je izuzetno velika količina rogova. Radi se uglavnom o rogovima jelena, s rijetkim primjercima rogova srndaća, i zastupljeni su svi segmenti – bazni dijelovi, stabla, parošci. Veliki dio predstavljaju odbačeni rogovi, ali i ovdje je prisutna manja količina rogova od ubijenih životinja. Tipološki repertoar obuhvaća masivne alatke za sječenje i perkutere – sjekire, tesle, dlijeta, klinove, kombinare sjekire-čekiće, obične čekiće, manje perkutere i drugo (Sl. 12). Znatna je količina i otpada od proizvodnje – bazni dijelovi, segmenti stabla i parošci s tragovima rezanja, piljenja, započetim perforacijama, i drugo. Ovako velika količina svakako ukazuje na vrlo intenzivnu proizvodnju. Posebno značajna odlika industrije roga i sa Sarvaša i sa Zóka jesu tragovi obrade metalnim alatom (cf. Christidou 2008).

Predmeti od kostiju obuhvaćaju jednostavne oblike srednjih, finih i masivnih šiljaka od različitih dugih kostiju (uglavnom metapodijalnih, tibija i rebara) sitnih i krupnih preživača, kao i spatule i strugače od rebara i dlijeta od cijepanih dugih kostiju.

Kanini svinje, i domaće i divlje, dosta su korišteni za izradu predmeta. Dio njih predstavljaju razne oblike strugača, međutim, dosta su loše očuvani i za veliki dio nije moguće rekonstuirati prvotni izgled i namjenu.

Još se među predmetima od roga osobito izdvaja nekoliko konusnih harpuna, vrlo fine izrade. Konusni harpuni od rogova mogu se smatrati karakte-

The situation is similar as in Sarvaš and Vučedol – the amount of antlers is very high. These were mainly red deer antlers, with rare examples of roe deer, and all the segments are present – basal parts, beams, tines. Majority of them are shed antlers, but here as well a certain smaller amount of antlers comes from killed animals. Typological repertoire includes massive cutting and percussion tools – axes, adzes, chisels, wedges, combined hammer-axes, simple hammers, small percussion tools, and other (Fig. 12). The amount of manufacture waste is considerable – basal parts, beam segments and tines with traces of cutting, sawing, unfinished perforations, etc. Such large quantities certainly point to the very intensive production. One particularly important characteristic of the antler industry from both Sarvaš and Zók are traces of manufacture made by metal tools (cf. Christidou 2008).

Artefacts made from bones include simple forms of medium, fine and heavy points made from different bones (mainly metapodial bones, tibiae and ribs) from small and large ruminants, as well as spatulae and scrapers made from ribs and chisels from longitudinally split long bones.

Boar tusks, both from wild and domestic pigs, were also relatively frequently used. Majority of these objects were different forms of scrapers, however, they are also fragmented and for most of them it is not possible to reconstruct neither original shape nor the purpose.

Among the artefacts made from antlers also should be outlined toggle harpoons, very nicely made. Tog-

rističnim za kasni eneolitik i brončano doba Karpatskoga bazena. Primjerci iz vučedolske kulture svi su jako pažljivo izrađeni, primjetna je kako vještina majstora koji ih je izradio, tako i veliko ulaganje vremena i truda, što pokazuje da se radi o cijenjenim predmetima. Izrađeni su od samog vrha paroška roga jelena, imaju bazu ukoso odrezanu, perforaciju smještenu u mezijalnom dijelu i masivan, oštar šiljak. Vjerojatno su korišteni u ribolovu, moguće za neku posebnu vrstu koja obitava u velikim rijekama u Panoniji, ili se radi o specifičnoj tehnici ribolova.

gle harpoons can be considered as characteristic for the Eneolithic period and the Bronze Age in the Carpathian basin. The examples from the Vučedol culture are all very finely made; both the skill of the craftsperson who made them is visible and the investment of time and labour, suggesting that these were valued objects. They were produced from the very tip of the antler tine; their base is obliquely cut, they have the perforation in the mesial part and massive, but sharp point. They were probably used in fishing, perhaps for a particular species that lives in large rivers in the Pannonian plain, or this was for some specific fishing technique.

Diskusija i zaključak

Tijekom eneolitika, koštane sirovine i dalje predstavljaju jednu od osnovnih sirovina za izradu raznovrsnih predmeta – od svakodnevnih alata, oružja, do ukrasnih i neutilitarnih predmeta.

S jedne strane, i dalje su prisutne neke tehnološke i tipološke odlike preuzete iz neolitičkog perioda, naročito tijekom ranoga i srednjega eneolitika. S druge strane, uočavaju se i znatne promjene.

Javljaju se novi tipovi predmeta, od kojih su neki povezani s novom sirovinom – bakrom. Naime, sad se od dugih kostiju sitnih preživača izrađuju drški za fine i tanke bakrene predmete, šila i igle. Takvi su nam drški poznati iz slojeva Kostolac-Coțofeni lokaliteta Bubanj, gdje se izrađuju isključivo od metapodijalnih kostiju ovce/koze. Nalaz s lokaliteta Hisar–Suva Reka vjerojatno također pripada kostolačkim slojevima. Na eneolitičkim lokalitetima u Bugarskoj nešto raznovrsnije sirovine se koriste za drške, mada opet prevladavaju metapodijalne kosti i tibije ovce/koze. Posebno su interesantni primjerci gdje je očuvana bakrena alatka unutar drška, kao što je primjerak s Azmaške mogile (Калчев 2005).

Krupna promjena uočava se i među ukrasnim i neutilitarnim predmetima. Dok je tijekom neolitika u cijeloj jugoistočnoj Europi glina bila osnovna sirovina za izradu antropomorfnih i zoomorfnih figura i drugih predmeta kojima se pretpostavlja ritualna svrha, s rijetkim primjercima od kamena, sada se javljaju i figure od kostiju. To pokazuje da se kulturni odnos prema sirovinama promijenio (cf. Vitezović & Bulatović 2015).

Discussion and conclusion

During the Eneolithic, osseous raw materials still represent one of the basic raw materials for production of diverse objects – from everyday tools, weapons, up to decorative and non-utilitarian items.

From one side, some of the technological and typological traits from the Neolithic period are still present, in particular during the early and middle Eneolithic. On the other side, also considerable changes may be noted.

New types of objects now occur, some of them related with the new raw material – copper. Namely, now are produced handles from long bones of small ruminants for fine and slender copper objects, needles and awls. Such handles were found within the Kostolac-Coțofeni layers of the site of Bubanj, where they were made exclusively from metapodial bones of sheep/goat. The find from the site of Hisar–Suva Reka probably also belongs to the Kostolac culture layers. On the Eneolithic sites in Bulgaria somewhat more diverse raw materials are used, but still the metapodial bones and tibiae of sheep/goats prevail. Particularly interesting are examples where the copper tool is still preserved within the handle, such as the example from Azmashka mogila (Калчев 2005).

An important change may be observed among the decorative and non-utilitarian objects. While in the Neolithic period in the entire south-eastern Europe clay was the main raw material for production of anthropomorphic and zoomorphic figurines and other objects for which the ritual purpose is assumed, with rare examples made of stones, now we have figurines made from bones. This shows that the cultural attitude towards raw materials changed (cf. Vitezović & Bulatović 2015).

Nakit od importiranih morskih školjki, osobito *Spondylus* i *Glycymeris,* karakterističan je za neolitičku Europu (cf. Séfériadès 2010). Količina ovih predmeta sada donekle opada, ali se uočava da se javlja lokalna zamjena – nakit od riječnih školjki *Unio*. Radionica za izradu ukrasa od školjki *Unio* otkrivena je u kasno eneolitičkom horizontu Cernavoda III na lokalitetu Bubanj, a školjke *Unio* kao ukras dosta su dobro zastupljene i na eneolitičkom lokalitetima u Rumunjskoj, kao što je tell Hărşova (Mărgărit 2008).

Tehnologija izrade postupno se mijenja. Dok u badenskoj kulturi još uvijek imamo sigurne tragove obrade kremenim alatom, već se u vučedolskoj kulturi uočava korištenje metalnog alata za obradu rogova.

Osim toga, sama proizvodnja sve je više standardizirana i češće se u arheološkom zapisu prepoznaju radionička mjesta ili radionice, što dalje pokazuje da je proizvodnja intenzivirana, više standardizirana i moguće već djelomično specijalizirana. Radionica ili radioničko mjesto za izradu koštanih figura otkriveno je na lokalitetu Hotnica u Bugarskoj (Ангелов 1961). Mjesta za preradu rogova identificirana su na nekoliko lokaliteta kulture Gumelnița, kao što su Borduşani-Popină (Mărgărit *et al.* 2009), ili tell Hărşova (Mărgărit & Popovici 2012), gdje je otkrivena bogata i raznovrsna industrija roga i otpaci od proizvodnje te polufabrikati u različitim stupnjevima obrade.

Industrija roga naročito cvjeta tijekom vučedolske kulture; izrađuje se velika količina predmeta, uključujući i masivne alate poput čekića, kombiniranih perkutera, sjekira, tesli, ali i oružja, kao što su konusni harpuni, koji su zahtijevali posebnu vještinu i uloženi trud i vrijeme u izradu. Radionice ili radionička mjesta, moguće već specijalizirana, postojala su u okvirima naselja na Sarvašu i na Zóku.

* * *

Koštana industrija u eneolitiku nastavlja da živi, mijenja se i razvija; prilagođava se novim potrebama, novim tehnološkim rješenjima i novim sirovinama. Osobito je značajno što se i u koštanoj industriji oslikavaju neke karakteristike društava eneolitičkog razdoblja – intenzivirana proizvodnja, povećana standardizacija i djelomična specijalizacija, ali i pojava novih prestižnih predmeta.

Jewellery from imported marine shells, in particular *Spondylus* and *Glycymeris*, is characteristic for the entire Neolithic Europe (cf. Séfériadès 2010). The quantity of these objects is somewhat in decline, but we may observe that the local replacement now occurs – jewellery from river *Unio* shells. Workshop for making the decorative objects from *Unio* shells is discovered in the Late Eneolithic horizon of the Cernavoda III culture on the site of Bubanj, and *Unio* shells as decoration are widespread on the Eneolithic sites in Romania, such as Hărşova tell (Mărgărit 2008).

The technology of production changes gradually. While in the Baden culture we still have certain traces of working with chipped stone tools, already in Vučedol culture we may note the use of metal tools for manufacturing antler objects.

Furthermore, the production itself is more and more standardised and more often in the archaeological record we can recognise working places or workshops, which further shows that the production is intensified, more standardised and probably already partially specialised. The workshop or working place for production of bone figurines is discovered at the site of Hotnica in Bulgaria (Ангелов 1961). Places for working antlers are identified on several sites of the Gumelnița culture, such as Borduşani-Popină (Mărgărit et al. 2009), or Hărşova tell (Mărgărit & Popovici 2012), where rich and diverse antler industry is discovered, along with manufacture debris and semi-finished items in different stages of production.

The antler industry particularly flourished in the Vučedol culture; a large amount of artefacts are being produced, including massive tools such as hammers, combined percussion tools, axes, adzes, but also weapons, such as toggle harpoons, which demanded particular skill and investment of time and labour into the production process. Workshops or working places, perhaps already specialised, existed in the settlements of Sarvaš and Zók.

* * *

The bone industry in the Eneolithic continues to live, it changes and develops; it adjusts to the new needs, new technological solutions and new raw materials. Especially important is that even in the bone industry are reflected some of the main traits of the Eneolithic period – intensified production, increased standardisation and partial specialisation, and also the appearance of new prestigious objects.

Zahvale

Zahvaljujem s kolegama na povjerenom materijalu koji je ovdje analiziran, kao i na pomoći u radu: Kazimiru Miculiniću, Sanjinu Miheliću, Jacquelini Balen, Vedrani Krištofić, Dragani Rajković, Tomislavu Hršaku, Aleksandru Bulatoviću i Igoru Jovanoviću.

Acknowledgements

I would like to thank to the colleagues who entrusted me with the material analysed here and for the help they provided during work: Kazimir Miculinić, Sanjin Mihelić, Jacqueline Balen, Vedrana Krištofić, Dragana Rajković, Tomislav Hršak, Aleksandar Bulatović and Igor Jovanović.

English translation: Selena Vitezović

Literatura / Bibliography

Andreescu, R. R. 2002, *Plastica antropomorfă Gumelniţeană*, Muzeul Naţional de istorie a României, Bucureşti.

Ангелов, Н. 1961, Работилница за плоски костени идоли в селищната могила при с. Хотница, Търновско, Археология III (2), 34-38.

Averbouh, A. 2000, *Technologie de la matière osseuse travaillée et implications palethnologiques,* Thèse de doctorat, Université de Paris I, Paris.

Averbouh, A. & Zidarov, P. 2014, The production of bone figurines in the Balkan Chalcolithic and the use of debitage by extraction, in: M. Mărgarit, G. Le Dosseur & A. Averbouh (eds.), *An overview of the exploitation of hard animal materials during the Neolithic and Chalcolithic*, Editura Cetatea de Scaun, Târgovişte, 183-200.

Barge-Mahieu. H. 1990, Les outils en os emmanchés de l'habitat chalcolithique des Barres (Eyguières, Bouches–du–Rhône) et les tubes en os du Midi de la France", *Bulletin de la Société préhistorique française* 87/3, 86-92.

Berciu, D. 1961, *Contribuţii la problemele neoliticului in Rominia in lumina noilor cercetâri,* Editura Academiei Republicii Populare Romîne, Bucureşti.

Borrello, M. & Micheli, R. 2004, Spondylus gaederopus, gioiello dell'Europa preistorica, *Preistoria Alpina* suppl. 1, vol. 40, 71-82.

Bulatović, A. & Milanović. D. 2012, Preliminarni rezultati arheoloških iskopavanja na lokalitetu Bubanj u Novom Selu u 2011. godini, in: V. Bikić, , S. Golubović i D. Antonović (eds.), *Arheologija u Srbiji, projekti Arheološkog instituta u 2011. godini,* Arheološki institut, Beograd, 22-25.

Bulatović, A., Milanović, D. & Vitezović, S. 2014, Preliminarni rezultati istraživanja lokaliteta Bubanj u 2013. godini, in: D. Antonović (ed.), *Arheologija u Srbiji. Projekti Arheološkog instituta u 2013. godini,* Arheološki institut, Beograd, 22-25.

Cernea, C., Vlad, F. & Coman, R. 2014, Primary analyses of the hard animal material industry of the Cernavoda I culture (Săveni-*La Movile* Site, Ialomiţa county, Romania), in: M. Mărgarit, G. Le Dosseur & A. Averbouh (eds.), *An overview of the exploitation of hard animal materials during the Neolithic and Chalcolithic,* Editura Cetatea de Scaun, Târgovişte, 275-293.

Choyke, A. M. 1997, The bone tool manufacturing continuum*, Anthropozoologica* 25-26, 65-72.

Choyke, A. M. 2014, Continuity and discontinuity at Gyõr-Szabadrét-Domb: bone tools from a Chalcolithic settlement in northwest Hungary, in: M. Mărgarit, G. Le Dosseur & A. Averbouh (eds.), *An overview of the exploitation of hard animal materials during the Neolithic and Chalcolithic,* Editura Cetatea de Scaun, Târgovişte, 295-328.

Christensen, M. 2004, Fiches caractères morphologiques, histologiques et mécaniques des matières dures d´origine animale, in: D. Ramseyer (ed.), *Matières et techniques. Fiches de la Commission de nomenclature sur l'industrie de l'os préhistorique. Cahier XI,* CNRS, Paris, 17-27.

Christidou, R. 2008, The use of metal tools in the production of bone artifacts at two Bronze Age sites of the southwestern Balkans: a preliminary assessment, in: L. Longo & N. Skakun (eds.), *"Prehistoric technology" 40 years later: functional studies and the Russian legacy, Proceedings of the international congress, 20-23 April 2005 Verona*, British Archaeological Reports, International Series 1783, Oxford, 253-264.

Christidou, R. & Legrand, A. 2005, Hide working and bone tools: experimentation design and applicati-

ons, in: H. Luik, A. M. Choyke, C. Batey & L. Lõugas (eds.), *From Hooves to Horns, from Mollusc to Mammoth – Manufacture and Use of Bone Artefacts from Prehistoric Times to the Present. Proceedings of the 4th Meeting of the ICAZ Worked Bone Research Group at Tallinn, 26th–31st of August 2003,* Muinasaja teadus 15, Tallinn, 385-396.

Comşa, E. 1976, Date despre un tip de figurină neolitică de os, *Studii şi cercetari de istorie veche* 27 (4), 557-564.

Comşa, E. 1979, Les figurines en os appartenant à la phase moyenne de la culture Gumelniţa, *Dacia* (n. s.) XXIII, 69-78.

d'Errico, F. 1993, Identification des traces de manipulation, suspension, polissage sur l'art mobilier en os, bois de cervidés, ivoire, in: P. C. Anderson, S. Beyries, M. Otte & H. Plisson (eds.), *Traces et fonctions: les gestes retrouvés,* vols 1-2, Centre de Recherches Archéologiques du CNRS, Études er Recherches Archéologiques de l'Université de Liège (ERAUL 50), Liège, 177-188.

Gál, E. 2011, Prehistoric antler- and bone tools from Kaposujlak-Vardomb (South-Western Hungary) with special regard to the Early Bronze Age implements, in: J. Baron & B. Kufel-Diakowska (eds.), *Written in Bones. Studies on technological and social contexts of past faunal skeletal remains*, Uniwersytet Wrocławski, Instytut Archeologii, Wroclaw, 137-164.

Gál, E. 2014, Bone, antler and tusk tools, in: T. Horváth (ed.), *The Prehistoric Settlement at Balatonöszöd-Temetöi-dülö: The Middle Copper Age, Late Copper Age and Early Bronze Age Occupation*, Archaeolingua, Varia archaeologica Hungarica, Budapest, 327-332.

Гарашанин, М. 1973, *Праисторија на тлу СР Србије*, Српска књижевна задруга, Београд.

Георгиева П., 2014, Костени антропоморфни фигурки от Козарева могила, in: В. Петрова, С. Танева & К. Бояджиев (eds.), *In memoriam Lilyana Pernicheva-Perets*, Годишник на националния археологически музей 12, София, 225-232.

Hansen, S. 2011, Figurines in Pietrele: Copper Age Ideology, *Documenta Praehistorica* XXXVIII, 117-129.

Kogălniceanu, R., Ilie, A., Mărgărit, M., Simalcsik, A. & Dumitraşcu V. 2014, A hoard of astragals discovered in the Copper Age settlement at Iepureşti, Giurgiu County, Romania, *Documenta Praehistorica* XLI, 283-304.

Krištofić, V. 2017, Koštana industrija s nalazišta Vučedol iz zbirke Arheološkog Muzeja u Zagrebu, Stručni rad, Arheološki muzej, Zagreb.

Legrand, A. 2007, *Fabrication et utilisation de l'outillage en matières osseuses du Néolithique de Chypre: Khirokitia et Cap Andreas-Kastros*, Archaeopress, BAR International series S1678, Oxford.

Maigrot, Y. 2003, *Etude technologique et fonctionnellede l'outillage en matières dures animalesLa station 4 de Chalain (Néolithique final, Jura, France)*, Thèse de doctorat, Université de Paris I, Paris.

Manolakakis, L. & Averbouh, A. 2004, Grandes lames et grandes statuettes, marqueurs de l'activité funéraire dans le Chalcolithique de Bulgarie, in : *XXVe Congrès Préhistorique de France, Nanterre 24–26 novembre 2000 – Approches fonctionnelles en Préhistoire*, Société préhistorique française, Nannterre, 155-165.

Mărgărit, M. 2008, Les perles en valves de Unio dans l'habitat énéolithique de Harşova-tell (department de Constanţa), *Annales d'Université „Valahia" Târgovişte. Section d'Archéologie et d'Histoire* X, 73-77.

Mărgărit, M., Popovici, D. N. & Vlad, F. 2009, L'exploitation du bois dans l'habitat énéolithique de Borduşani-Popină (dép. de Ialomiţa), *Annales d'Université „Valahia" Târgovişte. Section d'Archéologie et d'Histoire* XI/I, 53-67.

Mărgărit, M. & Popovici, D. N. 2012, Another facet of man – Red deer relationship in prehistory: Antler exploitation at the Eneolithic settlement at Hârsova-tell (Constanta County, Romania), *Documenta praehistorica* XXXIX, 397-416.

Meier, J. 2013, More than fun and games? An experimental study of worked bone astragali from two Middle Bronze Age Hungarian sites, in: A. Choyke & S. O'Connor (eds.), *From these bare bones: raw materials and the study of worked osseous objects*, Oxbow books, Oxford, 166-173.

Miculinić, K. & Vitezović, S. 2017, Faunal remains and the bone industry from the Late Eneolithic site Josipovac – Gravinjak, eastern Croatia, *At the Gates of the Balkans – Prehistoric communities of the Baranya/Baranja region and the adjacent areas. International round-table conference*, 23-24 February 20147, Pécs, 32.

Mihelić, S. 2008, Lokalitet: Josipovac – Gravinjak, *Hrvatski arheološki godišnjak,* 4/2007, https://www.min-kulture.hr/userdocsimages/HAG_2007_27_1_2010_mala.pdf

Mitrović, J. & Vitezović, S. 2017, Zók revisited: Excavations of D. Karapandžić at Zók in 1920. *Yearbook Of Joanus Pannonius Museum/ Jahrbuch des Janus-Pannonius-Museums/ A Janus Pannonius Múzeum Évkönyve* 54, 179-190.

Newcomer, M. 1974, Study and replication of bone tools from Ksar Akil (Lebanon), *World Archaeology* 6/2, 138-153.

Peltier, A. 1986, Étude expérimentale des surfaces osseuses façonnées et utilisées, *Bulletin de la Société Préhistorique Française* 83/1, 5-7.

Петков, Н. 1950, Класификация на плоските костни идоли в Балкано-дунавската област, *Годишник на народния музей Пловдив* II, 25-37.

Poplin, F. 2004, Fiche éléments de nomenclature anatomique relative aux matières dures d'origines animale, in: D. Ramseyer (ed.), *Matières et techniques. Fiches de la Commission de nomenclature sur l'industrie de l'os préhistorique*, Cahier XI, CNRS, Paris, 11-15.

Radu, A. 2002, *Cultura Sălcuța în Banat*, Editura Banatica, Reșița.

Schibler, J. 2007, Knochen, Zahn, Geweih und Horn: Werkstoffe der prähistorischen und historischen Epochen, *Nova Acta Leopoldina Neue Folge* 94, 45-63.

Séfériadès, M. L. 2010, Spondylus and long-distance trade in prehistoric Europe, in: D. Anthony (ed.), *The Lost World of Old Europe: The Danube Valley 5000-3500BC. Lost world of europe The Danube Valley 5000-3500BC*, The Institute for the study of the Ancient World & Princeton University Press, New York, Princeton & Oxford, 178-190.

Tasić, N. 1995, *Eneolithic cultures of central and west Balkans,* Beograd: Draganić.

Тасић, Н. 1998, *Хисар код Суве Реке. Вишеслојно насеље, in: Археолошко благо Косова и Метохије од неолита до раног средњег века*, Каталог, Галерија Српске академије наука и уметности, Београд, 492-501.

Тодорова, Х. 1980, Классификация и числовой код пластики неолита, энеолита и ранней бронзовой эпохи Болгарии, *Studia praehistorica* 3, 43-64.

Todorova. H. & Vajsov, I. 2001, Der kupferzeitliche Schmuck Bulgariens. Prähistoriche Bronzefunde 20 (6), Franz Steiner Verlag Wiesbaden GmbH, Stuttgarrt.

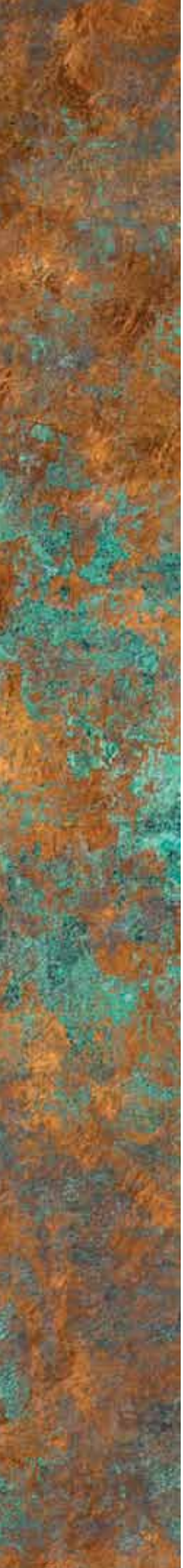
Uzelac, J. 2002, *Eneolit južnog Banata*, Gradski muzej Vršac, Vršac.

Vitezović, S. 2007, *Koštana industrija u neolitu srednjeg Pomoravlja*, Magistarska teza / Mphil thesis, Univerzitet u Beogradu, Beograd.

Vitezović, S. & Bulatović, A. 2015, The first find of an early Eneolithic flat bone figurine in the Central Balkans, *Zbornik Narodnog muzeja* XXII-1, 31-44.

Vitezović, S. & Mitrović, J. 2016, Antler technology in the Bronze Age: The case study of Zók, in: *11th Meeting of the Worked Bone Research Group of the ICAZ*, Programme and abstracts, Iaşi, Romania, 23-28. May 2016, Iaşi, 38-39.

Zidarov. P. 2005, Bone artefacts, *Acta Archaeologica* 76 (1), Acta Archaeologica Supplementa 6, Lîga, Copper Age strategies in Bulgaria, 124-131, 185-187.



Eneolitski rudnici bakra na Balkanu

Eneolithic copper mines in the Balkans

Dragana Antonović

Arheološki institut, Beograd
Institute of Archaeology
d.antonovic@ai.ac.rs

Balkan je tokom neolita bila gusto naseljena teritorija, možda upravo zbog velikog bogatstva u sirovinama. Cela ova oblast obiluje vodom zbog razgranate hidrološke mreže, plodnim zemljištem za zemljoradnju, šumama sa kvalitetnim drvetom, a naročito rudnim bogatstvom i ležištima kvalitetnog kamena. Verovatno da su prvi balkanski metalurzi odlično poznavali geološko bogatstvo svoje teritorije i da su znali gde treba tražiti rudu bakra za proizvodnju metala. Nema sumnje da je eksploatacija minerala i stena korišćenih u proizvodnji kamenog oruđa često vršena u neposrednoj blizini ležišta bakarne rude što je predstavljalo dobru osnovu za nastanak prve metalurgije. Da je malahit već bio poznat kao sirovina svedoče nalazi ovog minerala na više ranoneolitskih nalazišta u jugoistočnoj Evropi (Antonović 2014: 18). Zapravo, malahit i azurit su bili dobro poznati već u mezolitu Balkana kao kamen za izradu ukrasnih predmeta. Perle i privesci, kao i amorfni grumenovi od malahita i azurita otkriveni su u mezolitskom Vlascu i u ranoneolitskim slojevima Lepenskog Vira (Borić 2012: 94).

During the Neolithic, the Balkans were a densely populated territory, perhaps precisely due to their abundance of raw materials. The entire region is rich in water due to a branched-out hydrological network, has fertile agricultural land, forests with high-quality wood, and is especially rich in ore and high-quality stone deposits. The first Balkan metallurgists were probably well-acquainted with the geological richness of their territory and knew where to look for copper ore used in metal production. Undoubtedly, the exploitation of minerals and rocks used in stone tool production was often conducted in the immediate vicinity of copper ore deposits, which was an excellent basis for the creation of true metallurgy. Malachite was already a known raw material, as attested to by finds of this mineral on many Early Neolithic sites in southeastern Europe (Antonović 2014: 18). In fact, malachite and azurite were already well-known during the Mesolithic of the Balkans, and were used to produce decorative objects. Beads and pendants, as well as amorphous chunks of malachite and azurite, were discovered at the Mesolithic site of Vlasac, and in the Early Neolithic layers of Lepenski Vir (Borić 2012: 94).

Istraživanja početaka metalurgije na Balkanu rađena poslednjih godina pokazala su da je prva metalurgija u Evropi nastala upravo na Balkanu (Radivojević et al. 2010: 2779). Još uvek je veliko pitanje odakle je donošena ruda za topljenje, mada neki bakarni predmeti iz doba nastarije metalurgije daju nagoveštaje o mogućim izvorištima rude (Gale et al. 2003; Pernicka et al. 1993; Pernicka et al. 1997; Radivojević et al. 2010: 2781, 2784 Fig. 10). Ono što je poznato je to da su najstariji rudnici bakra na Balkanu istovremeni sa najstarijim predmetima od bakra, koji svedoče o već razvijenoj tehnici rudne eksploatacije. Takođe je pitanje dokle u prošlost sežu počeci rudarenja na ovoj teritoriji, ali može se pretpostaviti da je visok nivo tehnološkog znanja u okviru neolitskih kultura na tlu Balkana sasvim sigurno imao presudnu ulogu u nastanku metalurgije i sa njom tesno povezanim rudarstvom. Međutim, praistorijski kamenolomi i rudnici nemetala do sada nisu otkriveni na Balkanu pa je sasvim moguće da ovakav način pribavljanja kvalitetne sirovine za kameno oruđe nije ni postojao na Balkanu.

Research on the beginnings of metallurgy in the Balkans, conducted over the recent years, has shown that the first metallurgy in Europe appeared precisely in the Balkans (Radivojević et al. 2010: 2779). The big question remains of where the ore for melting was obtained, even though some copper finds from the period of the earliest metallurgy give hints on the possible origins of the ore (Gale et al. 2003; Pernicka et al. 1993; Pernicka et al. 1997; Radivojević et al. 2010: 2781, 2784 Fig. 10). It is well-known that the oldest copper mines in the Balkans were contemporaneous with the oldest copper finds, which indicate the existence of developed mining techniques. It is also a question of how far into the past do the beginnings of mining in this territory go, and whether it can be assumed that the high level of technological knowledge, within the frame of Neolithic cultures in the Balkans, played a crucial part in the appearance of metallurgy and mining. However, prehistoric quarries and nonmetal mines have not yet been discovered in the Balkans, so it is very likely that this type of raw material procurement for stone tool production did not exist in the Balkans.

Ležišta bakarne rude na Balkanu

Istočni i centralni Balkan su posebno bogati ležištima bakarne rude (Sl. 1), pa zato i ne čudi rana pojava metalurgije upravo na tim prostorima. Na teritoriji Balkana se nalazi osam metalogenetskih zona sa više polja bakarnog orudnjenja u svakoj od njih (Bogdanov 1982; Gale et al. 2003: 123, Fig. 10.1, 153–154; Janković 1967). Na istočnom Balkanu to su: 1. Rodopska zona u južnoj Bugarskoj sa rudnim oblastima Osogovo-Ozgraden, Zapadni Rodopi i Istočni Rodopi; 2. Srednjogoska zona u srednjoj Bugarskoj sa rudnim oblastima Sofija, Panađurski, Jambol, Burgas i Strandža; 3. Kraištidna zona u zapadnoj Bugarskoj (ova oblast je značajna po ležištima zlata); 4. Balkanska zona sa ležištima Čiprovci, Sedmočislenici, Granipa, Luprene i Salah-Krasimir; 5. Mezijska zona u kojoj je značajna rudna oblast Varna. Sve ove zone nastavljaju se ka centralnom i zapadnom Balkanu gde postoje tri osnovne metalogenetske zone: 1. Karpato-balkanska u istočnoj Srbiji koja se na istoku nastavlja na Srednjogorsku i Balkansku zonu (ovoj zoni pripada i rudnik vinčanske kulture Rudna Glava); 2. Srpsko-Makedonska koja se proteže od centralnog Balkana duž Velike Morave i Vardara do Egejskog

Copper deposits in the Balkans

The eastern and central Balkans are exceptionally rich in copper ore deposits (Fig. 1), so it is not surprising that early metallurgy appeared precisely in these regions. There are eight metallogenetic zones on Balkan territory, each of which includes several copper ore deposits (Bogdanov 1982; Gale et al. 2003: 123, Fig. 10.1, 153–154; Janković 1967). In the eastern Balkans, these include: 1. The Rhodope zone in southern Bulgaria with the mining areas of Osogovo-Ozgraden, western Rodopi and eastern Rodopi; 2. The Srednogorie zone in central Bulgaria with the mining areas of Sofia, Panagyurishte, Jambol, Burgas and Strandzha; 3. The Kraishtide zone in western Bulgaria (this region is significant due to gold deposits); 4. The Balkan zone with mines at Chiprovtsi, Sedmochislenitsi, Granipa, Luprene and Salah-Krashimir; 5. The Moesian zone with the important mining area of Varna. All of these zones spread out towards the central and western Balkans where three basic metallogenetic zones are recorded: 1. The Carpathian-Balkan zone in eastern Serbia that is connected with the Srednegorie and Balkan zones in the east (this zone includes the mine of the Vinča culture at Rudna Glava); 2. The Ser-

mora; 3. Dinarska koja se proteže kroz jugozapadnu Srbiju, Crnu Goru, Bosnu i Hercegovinu, Hrvatsku i Sloveniju. Rudne zone u Karpato-balkanskoj provinciji (metalogenetske zone Bor, Banat – Ridanj – Krepoljin i Poreč – Stara Planina) spadaju u neka od najbogatijih rudišta u svetu, pa se i danas intezivno eksploatišu. Nije naodmet napomenuti da se u ovoj provinciji nalaze bogata ležišta zlata, ali nema podataka o njihovoj eksploataciji tokom praistorije. U Srpsko-makedonskoj provinciji se nalaze dva arheometalurški najznačajnija rudišta bakra - polimetalično ležište na Rudniku u centralnoj Srbiji, sa eneolitskim rudnikom na Malom Šturcu, i Lece, c. 40 km južno od Pločnika. U Lecu je tokom rimskog perioda eksploatisano zlato. U blizini ovog rudnika su početkom XX veka nađene sekirečekići tipa Pločnik (Antonović 2014: 64), na osnovu čega se pretpostavlja da je rudnik bio aktivan već u doba eneolita. U Dinarskoj provinciji nalazi se, kao izolovana pojava bakarne rude, Jarmovac, praistorijski rudnik eksploatisan od vremena vinčanske kulture. U ovoj provinciji postoje značajna ležišta u srednjoj Bosni, Mračaj i Maškara, zapadno od Sarajeva, u kojima glavno orudnjenje predstavlja tetraedrit.

Male pojave bakarne rude postoje i na krajnjem zapadu Balkanskog poluostrva. U Hrvatskoj to su Trgovska gora kod Dvora na Uni, Samobor kod Zagreba, Zagrebačka gora i Tršće kod Rijeke, a u Sloveniji u okolini grada Škofja Loka i kod mesta Blagovica. Tamo je ruda bakra eksploatisana tek od 15. veka i tragovi praistorijskog rudarenja do sada nisu detektovani (Simić 1951: 99–101, 102–107). Ipak, može se pretpostaviti da su sva ta rudišta bila poznata i tokom praistorije, ali da su tragovi tog ranog rudarenja uništeni tokom eksploatacije rude u kasnijim epohama.

Praistorijski rudnici bakra na Balkanu

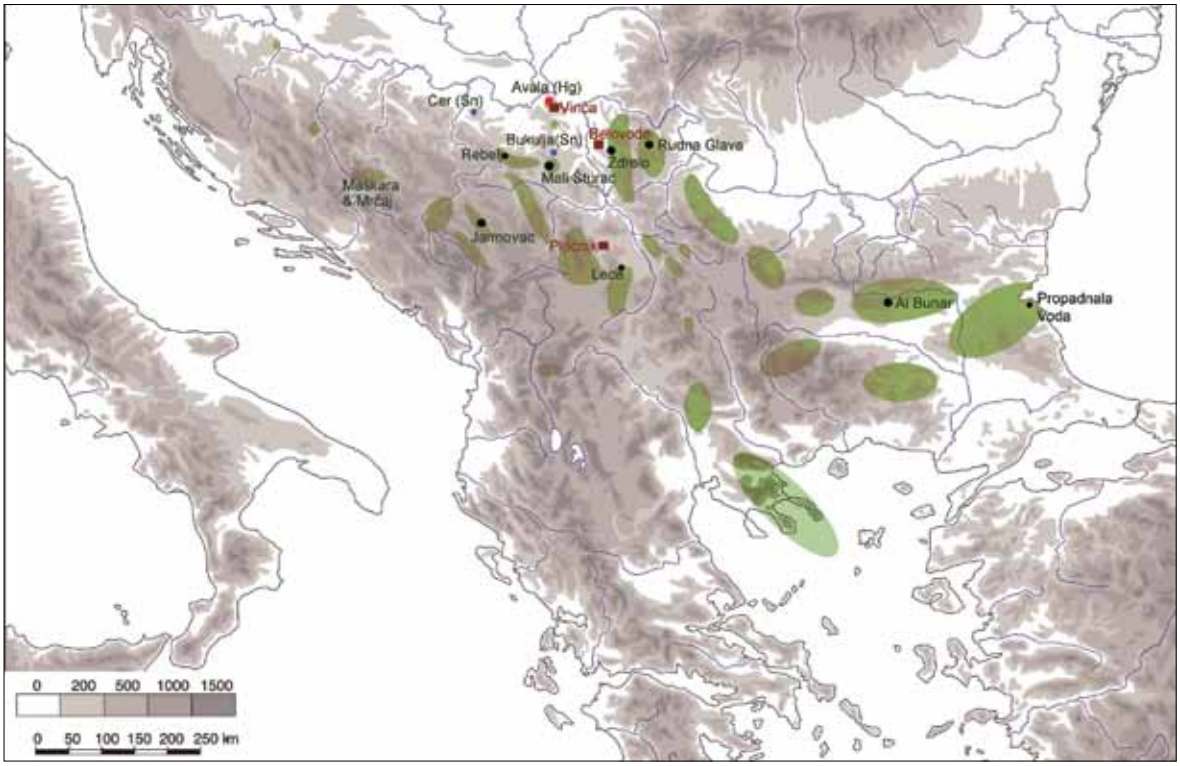
Početkom sedamdesetih godina XX veka Evgenij Černyh je sproveo bugarsko-sovjetski projekat istraživanja eneolitskog rudarenja u Bugarskoj. U okviru tog projekta zabeleženo je 103 sigurnih i potencijalnih starih rudnika: 33 nije imalo nikakve tragove stare rudarske eksploatacije, šest je imalo neke naznake starog rudarenja koje bi trebalo proveriti, a 65 ih je bilo eksploatisano u prošlosti

bian-Macedonian zone that spans from the central Balkans along Velika Morava and Vardar to the Aegean Sea; 3. The Dardanian zone that spans throughout southwestern Serbia, Montenegro, Bosnia and Herzegovina, Croatia and Slovenia. The mining areas in the Carpathian-Balkan province (the metallogenetic zones of Bor, Banat-Ridanj-Krepoljin and Poreč-Stara Planina) are among the richest mining areas in the world, and are being exploited to the present day. It does not hurt to mention that this province includes rich gold deposits, but there is no data about them being exploited in prehistory. The Serbian-Macedonian province includes two, from the perspective of archaeometallurgy, most important copper deposits – the polymetallic deposit at Rudnik in central Serbia, with the Eneolithic mine at Mali Šturc, and Lece, c. 40 km south of Pločnik. Lece was used for gold mining during Roman times. At the beginning of the 20th century, several axe-hammers of the Pločnik type were discovered near this mine (Antonović 2014: 64), based on which it was assumed that the mine was already active during the Eneolithic. The Dardanian province includes, as an isolated occurrence of copper ore, Jarmovac, a prehistoric mine used from the time of the Vinča culture. This province includes significant deposits in Bosnia, Mračaj and Maškara, west of Sarajevo, where tetrahedrite is the main ore.

Small occurrences of copper ore also exist in the westernmost parts of the Balkan Peninsula. In Croatia, these include Trgovska gora near Dvor, Samobor near Zagreb, Zagrebačka Gora and Tršće near Rijeka, and, in Slovenia, the area around the city of Škofja Loka and the village of Blagovica. There, copper ore was exploited from the 15th century, and traces of prehistoric mining have not yet been discovered (Simić 1951: 99–101, 102–107). However, it can be assumed that all of these mining zones were known in prehistory, but that traces of such early mining were destroyed when the ore was exploited in later periods.

Prehistoric copper mines in the Balkans

At the beginning of the 1970, Evgenij Černyh conducted a Bulgarian-Soviet project that focused on Eneolithic mining in Bulgaria. Within the scope of that project, 103 confirmed and potential ancient mines were recorded: 33 did not display any traces of mining, six showed some signs of ancient mining that should be reevaluated, and 65 were exploited in the past, from the Eneolithic until the 20th centu-



Slika / Figure 1. Zone s bakarnim orudnjenjem, eneolitski lokaliteti, istraženi i potencijalni eneolitski rudnici na Balkanu / Zones with copper ore mineralization, Eneolithic sites, researched and potential Eneolithic copper mines in the Balkans: ■ eneolitski lokaliteti / copper age sites ● istraženi praistorijski rudnici / explored prehistoric mines • potencijalni praistorijski rudnici / potential prehistoric mines

od eneolita do XVII veka. Samo nekoliko rudnika, osim Ai Bunara, je imalo neke znake, ali ne i jasne arheološke dokaze da su bili eksploatisani tokom eneolita (Черньх 1978: 18). Kao eneolitski rudnici, pored Ai Bunara, označeni su Kristjene i Timijanka. U Kristjene, kod Stare Zagore, nađeno je rudno okno koje po svom obliku liči na tipične eneolitske rudarske radove (Черньх 1978: 42–43, sl. 23), ali nisu otkriveni arheološki nalazi koji bi to potvrdili. I u Timijanka su otkriveni rudarski radovi tipični za eneolit, kao i jedan grob iz bronzanog doba, pa je na osnovu svega toga, ali i zbog blizine ovog rudnika Ai Bunaru, zaključeno da je i na tom mestu u eneolitu eksploatisana ruda bakra (Черньх 1978: 43–44).

Rekognosciranjem rozenskog rudnog polja obavljenim od 2013. do 2015. godine obuhvaćeno je više starih rudarskih radova, poznatih od ranije – Medni rid, Propadnala voda (Sl. 2), Čiplaka, Alepu, Alefo Tumba – ali nigde nisu otkriveni pouzdano datovani eneolitski tragovi rudarenja u tom kraju (Kunze et al. 2018). Međutim, u obližnjim praistorijskim naseljima Budžak kod Sozopola i Akladi Čeiri, u slojevima sa kasnoneolitskim i ranoeneolitskim materijalom (5400 – 4900 BC) otkriveno je dosta kory. Only several mines, other than Ai Bunar, revealed some traces, but not clear archeological evidence, of being used during the Eneolithic (Черньх 1978: 18). Kristjene and Timijanka were, along with Ai Bunar, defined as Eneolithic mines. Kristjene, near Stara Zagora, yielded a mining shaft that resembles typical Eneolithic mining activities (Черньх 1978: 42–43 fig. 23), but no archeological finds that could confirm this hypothesis were recovered. Timijanka also yielded a typical Eneolithic layout, as well as a Bronze Age grave, so it was, based on these finds and the fact that this mine is close to Ai Bunar, concluded that copper ore was also exploited at this location during Eneolithic (Черньх 1978: 43–44).

The field survey of the Rosen Ore Field, conducted in the period between 2013 and 2015, encompassed several mining zones, including the previously known medni rid, Propadnala voda (Fig. 2), Chiplaka, Alepu and Alefo Tumba, but no definitive traces of Eneolithic mining activities were discovered in the area (Kunze et al. 2018). However, the layers that contained Late Neolithic and Early Eneolithic material (5400-4900 BC) at the nearby prehistoric settlements of Budžak near Sozopol and Akladi Čeiri yielded many copper ore fragments, malachite

mada rude bakra, nakita od malahita i poneki metalni predmet na osnovu čega je pretpostavljena eneolitska eksploatacija rude na okolnim rudištima (Leshtakov 2010; Kunze et al. 2018).

Ai Bunar

Najstariji i najbolje istraženi eneolitski rudnik bakra u Bugarskoj je za sada samo Ai Bunar, otkriven 1971. godine (Черньх 1978: 56). Nalazi se 8 km severozapadno od Stare Zagore u centralnoj Bugarskoj. To je polimetalično ležište hidrotermalnog tipa, sa olovom, cinkom i bakrom kao osnovnom mineralizacijom. Na više mesta karbonatna ruda bakra (malahit i azurit) izbija na površinu što je i dovelo do veoma rane rudarske eksploatacije na ovom mestu. Orudnjenje koje seže do 25 – 30 m u dubinu se pojavljuje u žilama širokim od 0,5 m do 5 m, a na mestima gde se one sastaju debljina dosеže do 10 – 15 m .

Istraženo je 11 rudarskih okana, neka od njih sa više ulaza. Njihova dužina se kreće od 10 do 111 m, širina od 2 do 10 m, a u dubinu idu do 20 m. Eneolitska keramika Karanovo VI – Gumelnița kulture otkrivena je u oknima 1, 2, 3 i 4. Okno 3 je dalo najviše arheoloških nalaza (Sl. 3). Pored eneolitske keramike tu je nađeno i 15 rudarskih alatki od roga (Черньх 1978: 58, 61, 62, 64, 67).

jewelry and some metal finds, so it was proposed that Eneolithic mining took place in the nearby ore fields (Leshtakov 2010; Kunze et al. 2018).

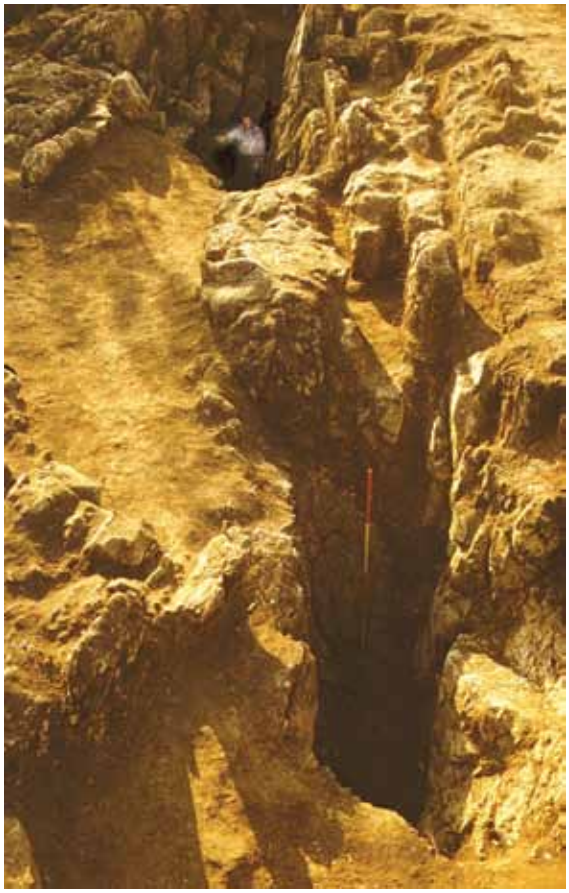
Ai Bunar

The oldest and most researched Eneolithic copper mine in Bulgaria is Ai Bunar, discovered in 1971 (Черньх 1978: 56). It is situated 8 km northwest of Stara Zagora in central Bulgaria. It is a polymetallic hydrothermal deposit, where lead, zinc and copper make up the basic mineralization. The carbonate minerals of copper (malachite and azurite) appear on the surface at several places, which was what caused the very early exploitation at this location. The ore deposit, that is 25-30 m deep, appears in lodes that are 0.5-5 m thick, and which reach a thickness of 10-15 m at the points of intersection.

A total of 11 mining shaft were researched, some of them at several entrances. Their length varies from 10 to 111m, their width from 2 to 10m, and they can go up to 20m in depth. Eneolithic pottery of the Karanovo VI Gumelnița culture was discovered in shafts 1, 2, 3 and 4. Shaft 3 yielded the most archaeological finds (Fig. 3). Apart from Eneolithic pottery, it also yielded 15 mining tools made of antlers (Черньх 1978: 58, 61, 62, 64, 67).

Slika / Figure 2. Propadnala Voda, rudno polje Rozen / Propadnala Voda, the Rosen Ore Field (foto dobijena ljubaznošću / photo obtained by courtesy of P. Leshtakov).

Slika / Figure 3. Ai Bunar, Okno 3 / Ai Bunar, Shaft 3 (foto dobijen ljubaznošću / photo obtained by courtesy of E. Černih).



Slika / Figure 4. Ai Bunar, Okno 4 / Ai Bunar, Shaft 4 (foto dobijen ljubaznošću / photo obtained by courtesy of from E. Černih).

Rudne žile u Ai Bunaru se pružaju horizontalno po površini i vertikalno u dubinu kao uske žile. Nakon vađenja rude i njihovog iscrpljivanja ostali su nepravilni kanali (Sl. 4) koji se danas smatraju rudarskim oknima iako po izgledu i obliku znatno odudaraju od okana koja nastaju u organizovanoj rudnoj eksploataciji što odlikuje rudarstvo iz kasnijih perioda.

Nalazi keramike Karanovo VI – Gumelnica grupe u oknima Ai Bunara sigurno datuje ovaj rudnik u kraj ranog halkolita. Ipak ruda iz Ai Bunara otkrivena na nekim okolnim lokalitetima (Stara Zagora Bolnica, Bereketska Mogila) u slojevima sa keramikom Karanovo V – Marica III grupe, pa čak i u ranijim slojevima sa Marica II keramikom, potvrđuje da je eksploatacija bakarne rude u Ai Bunaru počela već na kraju neolita i početkom ranog halkolita (oko 5100 BC; Gale et al. 2003: 161), a to znači paralelno sa radom Rudne Glave koja je bila eksploatisana u isto vreme.

The lodes of ore at Ai Bunar spread horizontally on the surface, and narrow down vertically. The extraction of the ore and the emptying of the lodes left irregularly-shaped canals (Fig. 4) that are now thought to be mining shafts, even though their layout and shape differ significantly from shafts made through organized mining which is a feature of mining activities from later periods.

The find of Karanovo VI-Gumelnica group pottery in the shafts at Ai Bunar definitively date this mine to the end of the Early Eneolithic. However, ores from Ai Bunar that were discovered at some sites in the vicinity (Stara Zagora Bolnica, Bereketska mogila), in layers that contained pottery of the Karanovo V-Marica III group, and even earlier layers with Marica II pottery, proves that the exploitation of copper ore at Ai Bunar began already at the end of the Neolithic and the beginning of Early Eneolithic (around 5100 BC; Gale et al. 2003: 161), i.e. that it was contemporaneous with the activities conducted at Rudna Glava.

Rudna Glava

Tokom kasnog neolita i ranog eneolita bakarna ruda se na centralnom Balkanu verovatno iskopavala na više mesta, ali je Rudna Glava za sada jedini potpuno potvrđeni i sistematski istražen ranoeneolitski rudnik vinčanske kulture (Sl. 5). Nalazi se 20 km jugoistočno od Majdanpeka, savremenog rudnika bakra koji je možda takođe bio eksploatisan tokom praistorije, sudeći na osnovu analize izotopa olova rađenih pre 30 godina (Pernicka et al. 1993).

Na Rudnoj Glavi je, od rimskih vremena do savremenog doba, vršena eksploatacija rude gvožđa koja predstavlja primarno orudnjenje na ovom rudištu, dok je karbonatna ruda bakra (malahit i azurit) sekundarna pojava.

Rudna Glava je istraživana od 1968. do 1987. godine (Jovanović 1982; Antonović 2014: 8). Tom prilikom je istraženo 8 pristupnih platformi, svaka sa više rudnih kanala tako da je skupa istraženo 30 kanala/okana. Zapravo ne može da se govori o oknima u pravom smislu već o kanalima koji su nastali kao rezultat iskopavanja rudnih žila (Sl. 6-7). Rudnik je bio otkriven tokom raščišćavanja terena i pripremanja lokacije za otvaranje savremenog rudnika gvožđa. Nekoliko praistorijskih okana je tada presečeno po dužini (Sl. 8) čime su bili otkriveni oblik i dimenzije starih rudarskih radova (Јовановић 1972: 5, T II/2, TIV/1).

Rudna Glava

During the Late Neolithic and Early Eneolithic, copper ore was probably exploited at several places in the central Balkans, but Rudna Glava is, so far, the only confirmed and systematically excavated Early Eneolithic mine of the Vinča culture (Fig. 5). It is situated 20 km southeast of Majdanpek, a modern-day copper mine that might have, based on isotope analyses that were conducted 30 years ago, also been used during prehistory, (Pernicka et al. 1993).

From Roman to modern times, Rudna Glava was used for extracting iron, which is the main ore at this shoot, while carbonate copper ore (malachite and azurite) are a secondary feature.

Rudna Glava was excavated from 1968 to 1987 (Jovanović 1982; Antonović 2014: 8). At the time, 8 access platforms were excavated, and each had several mining canals, meaning that a total of 30 canals/shafts were researched. These cannot be defined as proper shafts, but rather as canals that were created as a result of mining lodes (Fig. 6-7). The mine was discovered when the area was being cleared and prepared for the construction of a modern-day iron mine. Several prehistoric shafts were then bisected lengthwise (Fig. 8), thereby revealing the shape and dimensions of ancient mining shafts (Јовановић 1972: 5, T II/2, TIV/1).

Slika / Figure 5. Rudna Glava, pogled sa zapada / Rudna Glava, a view from the west (foto / photo: B. Jovanović, dokumentacija AI, Beograd / documentation of the IA, Belgrade).

Prosečna dubina kanala, odnosno okana, bila je 8 m, ali su neka bila i do 15 m duboka (Jovanović 1982: 4–16). Eksploatacija rude je počinjala od horizontalne platforme – mesta gde je ruda izlazila na površinu i gde se na površini spajalo nekoliko rudnih žila.

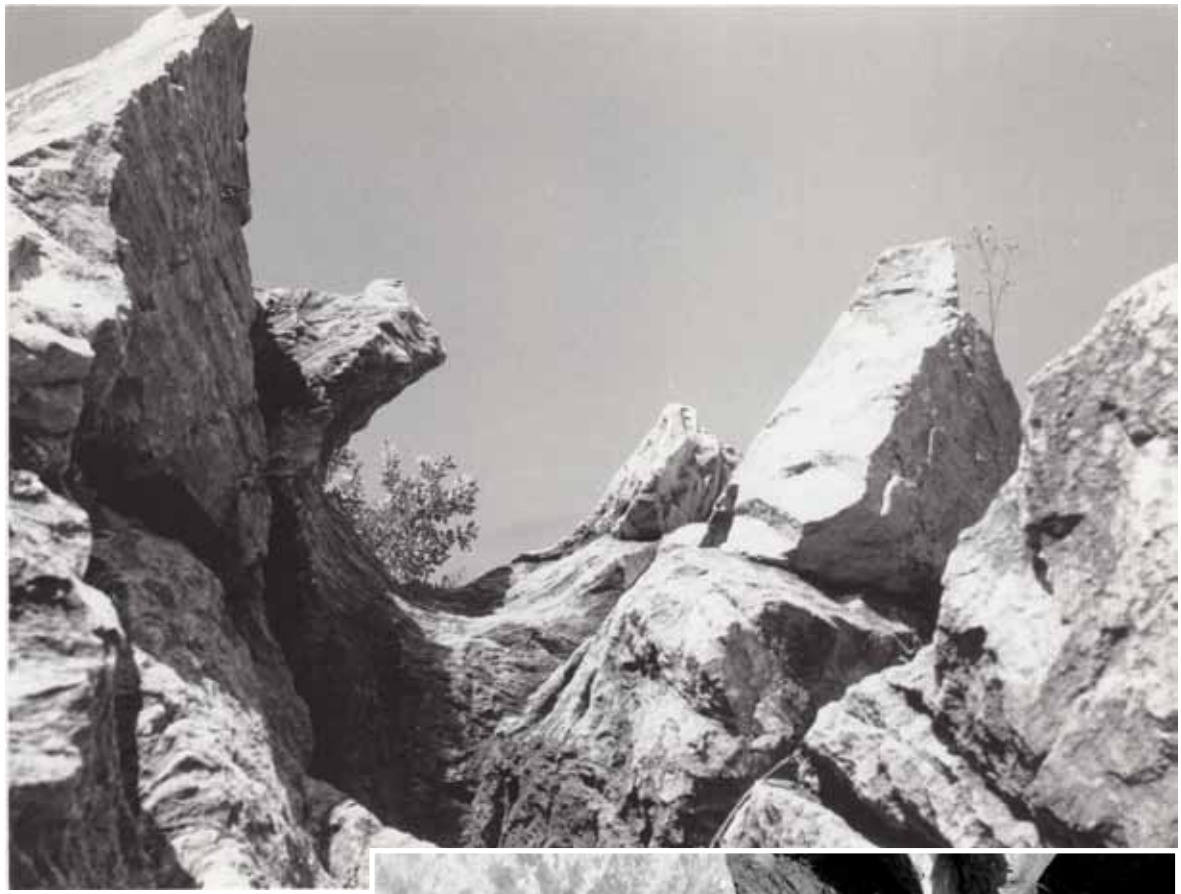
Tokom iskopavanja otkriven je veliki broj kamenih i koštanih rudarskih alatki i keramike vinčanske kulture koji su prikupljeni ispred i u ispunama rudarskih okana. Neke alatke su bile ostavljene na dnu rudarskih okana, ali najveći broj ih je bio verovatno upotrebljavan van okana radi površinske eksploatacije rude. Keramika je bila otkrivena na nekoliko mesta, a najviše u okviru pet ostava otkrivenih na pristupnim platformama okana 2 i 6 (Sl. 9). Keramika zastupljena na Rudnoj Glavi pripada mlađim fazama vinčanske kulture (Gradačka faza – Vinča Pločnik I) (Jovanović 1982: 91–96). Prema apsolutnim datumima Rudna Glava je bila eksploatisana tokom cele vinčanske kulture od 5400 do 4650 BC (Borić 2009: 205 f).

The average depth of the canals, i.e. shafts, was 8 m, but some were up to 15 m deep (Jovanović 1982: 4–16). The extraction of ore started at the access platform – the place where the ore was visible on the surface, and where several lodes intersected.

The excavations of the area around, as well as inside, the mining shafts revealed a large number of stone and bone mining tools and pottery of the Vinča culture. Some tools were left at the bottom of the shafts, but most were probably used outside, for the extraction of surface ore. Pottery was found at several places, and most of it was part of the five hoards that were discovered on the access platforms of shafts 2 and 6 (Fig. 9). The pottery from Rudna Glava belongs to the earlier phases of the Vinča culture (the Gradac phase -Vinča Pločnik I) (Jovanović 1982: 91–96). Based on radiocarbon dates, Rudna Glava was in use for the entire duration of the Vinča culture, from 5400 to 4650 BC (Borić 2009: 205 f).

Slika / Figure 6. Rudna Glava, Okno 2f / Rudna Glava, Shaft 2f (foto / photo: B. Jovanović, dokumentacija AI, Beograd / documentation of the IA, Belgrade).

Slika / Figure 7. Rudna Glava, Okno 2d / Rudna Glava, Shaft 2d (foto / photo: B. Jovanović, dokumentacija AI, Beograd / documentation of the IA, Belgrade).



Slika / Figure 8. Rudna Glava, Okno 6 / Rudna Glava, Shaft 6 (foto / photo: B. Jovanović, dokumentacija AI, Beograd / documentation of the IA, Belgrade).

Slika / Figure 9. Rudna Glava, Ostava 2 / Rudna Glava, Hoard 2 (foto / photo: B. Jovanović, dokumentacija AI, Beograd / documentation of the IA, Belgrade).

Jarmovac

Jarmovac je jedinstven kompleks ranog rudarstva smešten u jugozapadnoj Srbiji, na južnoj periferiji Priboja. Poznat je kao praistorijski rudnik još od tridesetih godina 20. veka na osnovu sumarnih opisa dva stara rudarska okna i nalaza kamenog rudarskog čekića sa žlebom ispred jednog od njih (Davis 1937). Rudarski kompleks Jarmovac je 5 km duga zona orudnjenja.

Iskopavanja su započeta 2003. godine (Дерикоњић 2005; Derikonjić et. al. 2011). Izvode se na dva lokaliteta, Majdan i Curak, kao i na obližnjem lokalitetu Kaluđersko Polje van rudne oblasti. Na ovom poslednjem je pronađeno naselje kasne faze vinčanske kulture. Iako još uvek nije otkrivena direktna veza tog vinčanskog naselja i rudnika na Jarmovcu, pretpostavlja se da je ovo vinčansko naselje u tesnoj vezi sa rudarenjem na obližnjim lokalitetima Majdan i Curak i određuje datum početka rudarske aktivnosti u Jarmovcu u sredinu petog milenijuma pre nove ere (Derikonjić et al. 2011).

Na lokalitetu Majdan otkriveni su vertikalno okno, horizontalno okno i pristupna platforma, što je, sve skupa, navelo istraživače da prepoznaju bar dve faze rudarenja. Položaj horizontalnog okna i

Jarmovac

Jarmovac is a unique mining complex situated on the southern periphery of Priboj in southwestern Serbia. It has been known as a prehistoric ever since the 1930 based on the scarce descriptions of two old mining shafts and a mining hammer with a gauge that was discovered in front of one of them (Davis 1937). The Jarmovac mining complex includes a 5 km-long mining zone.

Excavations at the sites of Majdan and Curak, as well as at the nearby site of Kaluđersko Polje that is outside the mining zone began in 2003 (Дерикоњић 2005; Derikonjić et. al. 2011). The latter yielded a settlement dated to the late phase of the Vinča culture. Even though no direct link between this settlement of the Vinča culture and the mine at Jarmovac was found, it was assumed that this settlement of the Vinča culture was closely related to the mining activities that took place at the nearby sites of Majdan and Curak, and that it dates the beginning of mining activities at Jarmovac into the middle of the fifth millennium BC (Derikonjić et al. 2011).

The site of Majdan yielded a vertical shaft, a horizontal shaft, and an access platform which led the researchers to differentiate between at least two

Slika / Figure 10. Jarmovac, Majdan, horizontalno okno / Jarmovac, Majdan, horizontal shaft (foto / photo: J. Pendić, ljubaznošću / by courtesy of S. Derikonjić, Zavičajni muzej Priboj / Homeland Museum, Priboj).

Slika / Figure 11. Jarmovac, Curak, otvoreni kop, pogled sa jugoistoka / Jarmovac, Curak, open pit, a view from the southeast (foto / photo: Jugoslav Pendić, ljubaznošću / with courtesy by S. Derikonjić, Zavičajni muzej Priboj / Homeland Museum, Priboj).

prisustvo drvenih greda u njemu stavljaju to okno u mlađu, drugu fazu eksploatacije na Majdanu, koja je i dalje bila zasnovana na praćenju bogatih malahitnih žila (Sl. 10). Vertikalno okno predstavlja početnu rudarsku fazu, ali i ono je nastalo tek posle ranog eneolita sudeći na osnovu četvorougaonog oblika rudnog kanala i ostacima drvene potpore otkrivene na dubini od 6 m. Do sada nije nađen arheološki materijal koji bi obezbedio dokaz o hronološkoj pripadnosti ovog okna na Majdanu.

Nalazište Curak se nalazi na padini c. 50 m udaljenoj od Majdana. Na njemu su otkrivena dva vertikalna okna koja su pratila žilu bogatu malahitom i magnetitom i površinski kop ispred njih (Sl. 11). Na ovom mestu su nađene 42 kamene alatke koje sve potiču sa otvorenog kopa. Identifikovana su dva tipa alatki: veliki kameni batovi sa žlebom i mali žrvnjevi za usitanjavanje rude.

Na lokalitetu Curak se prilikom iskopavanja nailazilo na rasute fragmente vinčanske keramike,[1] hronološki opredeljujuć ovaj lokalitet. Pored toga blizina vinčanskog naselja na lokalitetu Kaluđersko polje, 300 m udaljenom od starih rudarskih radova, dodatno sugeriše kulturnu pripadnost ovog rudnika.

1 Usmeno saopštenje Save Derikonjića, Zavičajni muzej Priboj.

phases of mining activities. The position of the horizontal shaft, and the presence of wooden pillars within it, date this shaft into the younger, i.e. the second phase of exploitation at Majdan, which was still based on following the rich lodes (Fig. 10). The vertical shaft presents the initial phase of mining, but it was also created only after the Early Neolithic, as suggested by the quadratic shape of the mining canal and the remains of a wooden support system that was discovered at the depth of 6 m. So far no archaeological material was discovered that could be used to chronologically define this shaft at Majdan.

The site of Curak is situated on a slope, about 50 m from Majdan. It yielded two vertical shafts that followed the rich lode of malachite and magnetite, and an open cast mine that was in front of it (Fig. 11). The open mine yielded 42 stone tools, including two types of tools: large stone hammers with gauges and small grindstones used to grind the ore.

The excavations of Curak revealed sporadic finds of pottery ascribed to the Vinča culture,[1] thereby dating this site. Additionally, the proximity of a Vinča culture settlement at the site of Kaluđersko polje, 300 m away from the old mine, also speaks in favor of the suggested cultural attribution of this site.

1 Personal communication of Savo Derikonjić from the Homeland Museum Priboj.

Mali Šturac

Eneolitski rudnik na Malom Šturcu je otkriven 1980. godine (Јовановић 1988). Ovaj rudnik se nalazi na lokalitetu Prljuša koji je smešten na jugozapadnoj padini Malog Šturca, najnižeg vrha planine Rudnik u centralnoj Srbiji. Rudna zona površine 2,5 ha ima elipsoidni oblik i pruža se pravcem jugozapad – severoistok (Sl. 12).

Prva arheološka istraživanja obavljena su 1981. godine kada su otkriveni ulazi u dva okna (Okno 1 i 2). Istraživanja su nastavljena 1987. godine i tada je otkriveno još nekoliko okana (Okna 3, 4, 5 i 6). Više su istraženi samo Okno 5 i Okno 6 kod kojih su otkriveni ulazi u same rudne kanale. Iskopavanje Okna 6 je nastavljeno 2013–2014. godine i tada je otkrivena prostrana plitka rudna jama, a paralelno s njim je istražena površinska eksploatacija rude u zoni okna 4 veličine c. 90 m^2. Sakupljeni su brojni rudarski kameni batovi, dve potpuno fragmentovane alatke od jelenjeg roga i nekoliko atipičnih fragmenta eneolitske keramike.

Istraživanja na Prljuši su nastavljena 2011. godine (Antonović & Vukadinović 2012). Geofizičko ispitivanje donjeg dela padine ukazalo je na veći broj rudnih pojava i potencijalnih starih rudarskih radova pokrivenih slojem sipara i komadima raspadnutih stena iz gornjih slojeva lokaliteta debljine 2 – 10 m (Antonović et al. 2012).

Mali Šturac

The Eneolithic mine at Mali Šturac was discovered in 1980 (Јовановић 1988). This mine is situated at the Prljuša site on the southwestern side of Mali Šturac, the lowest top of the Rudnik Mountain in central Serbia. The mining area of 2.5 ha is elliptical in shape and spreads in a southwest-northeast direction (Fig. 12).

The first archaeological excavations were conducted in 1981, and yielded entrances to two shafts (Shafts 1 and 2). The research continued in 1987, when several other shafts were discovered (Shafts 3, 4, 5 and 6). Detailed research was carried out only on Shaft 5 and Shaft 6, revealing the entrances of the mining canals. The excavations of Shaft 6 resumed in 2013-2014, and yielded a wide shallow mining pit. At the same time, an area of c. 90 m2 was excavated around Shaft 4, where traces of surface exploitation were recorded. Numerous mining hammers, two completely fragmented antler tools, and several atypical Eneolithic pottery fragments were found.

The excavations of Prljuša continued in 2011 (Antonović & Vukadinović 2012). Geophysical research of the lower part of the slope points to a large number of mining traces and traces of potential ancient mining activities, covered by a 2-10 m thick layer of debris and pieces of rocks that slid from the upper layers (Antonović et al. 2012).

Slika / Figure 12. Mali Šturac, pogled odozgo / Mali Šturac, a view from above (dokumentacija AI, Beograd / documentation of the IA, Belgrade).

Slika / Figure 13. Mali Šturac, okno Objekat 1 / Mali Šturac, Shaft Object 1 (foto / photo: V. Dimić, dokumentacija AI, Beograd / documentation of the IA, Belgrade).

Rekognosciranjem samog lokaliteta 2011. i 2012. godine otkriveno je najmanje 13 grupa starih rudarskih radova u gornjem delu lokaliteta. Neka od ovih okana imaju impozantne dimenzije što dokazuje da je Prljuša pre početka rudne eksploatacije bila naročito bogata rudom koja je izbijala na površinu u obliku moćnih žila. Nakon eksploatacije rude ostajale su prostrane galerije čije su se tavanice vremenom obrušile i zatrpale ostatke praistorijskih okana (Sl. 13). Istraživanje jednog od ovih okana, smeštenog na najvišoj koti lokaliteta, započeto je 2014. godine i prvo je u čijim je slojevima otkrivena hronološki jasno definisana kasnoeneolitska keramika Bubanj-Hum kulture (Sl. 14). Ovaj nalaz iz najviših delova lokaliteta ukazuje da je na Prljuši eksploatacija karbonatne rude bakra trajala do kraja eneolita.

Tokom istraživanja od 2011. godine iskopavanjima je prikupljeno oko 400 batova, dok je na površini registrovano čak preko 600 ovih kamenih rudarskih alatki. Kameni batovi se pojavljuju u raznim oblicima i veličinama (Антоновић 2013; Bogosavljević 1995), teški od 100g do čak 20 kg. Pretpostavlja se da su manji batovi imali drvenu držalju i bili korišćeni kao ručni alat, dok su oni veći bili okačeni o drveni stativ i tako korišćeni za razbijanje tvrdih stena u kojima se ruda nalazila (Dimić 2017).

A field survey of the site, conducted in 2011 and 2012, yielded at least 13 groups of traces of ancient mining activities at the higher part of the site. Some of these shafts are impressively large, proving that Prljuša had, before the beginning of mining exploitation, been especially rich in ore that was visible on the surface in the shape of mighty lodes. After the ore was extracted, spacious galleries were created that subsequently caved in and buried the remains of prehistoric shafts (Fig. 13). The excavation of one of these shafts, situated on the highest point of the site, began in 2014, and was the first to yield a chronologically clearly defined Eneolithic pottery of the Bubanj-Hum culture (Fig. 14). This find, from the highest parts of the site, suggests that the exploitation of carbonate ore at Prljuša lasted until the end of the Eneolithic.

The excavations conducted in 2012 yielded around 400 hammers, with over 600 additional tools of this type that were recorded on the surface. Stone hammers appear in different forms and sizes (Антоновић 2013; Bogosavljević 1995), and weigh from 100 g up to even 20 kg. It is assumed that smaller hammers had a wooden handle and were used as hand tools, while larger ones were hanged on from wooden frames and were used for crushing the hard rocks that contained the ore (Dimić 2017).

Ždrelo

Rekognosciranje okoline Belovoda, vinčanskog naselja kod Petrovca na Mlavi u istočnoj Srbiji na kome su zabeleženi najraniji tragovi metalurgije u Evropi, dovelo je do otkrića starih rudarskih radova blizu sela Ždrelo (Šljivar et al. 2006: 254). Za ovo mesto karakteristična je crvena boja površinskih geoloških slojeva gde bogate žile malahita i azurita izlaze na površinu.

Ždrelo

A field survey of Belovode, a settlement of the Vinča culture near Petrovac na Mlavi in estern Serbia, where the earliest traces of metallurgy in Europe have been recorded, led to the discovery of ancient mining activities near the Ždrelo village (Šljivar et al. 2006: 254). This area is characterized by red surface geological layers where the rich lodes of malachite and azurite are visible on the surface.

Slika / Figure 14. Mali Šturac, keramički sud iz okna Objekat 1 / Mali Šturac, ceramic vessel from the shaft Object 1 (foto / photo: V. Dimić, dokumentacija AI, Beograd / documentation of the IA, Belgrade).

Izuzetno strma padina na kojoj je smešten ovaj lokalitet je ispresecana paralelnim vertikalnim jarugama koje se pružaju od rečice Reškovice u podnožju padine do samog vrha brda, ogranka planine Vukan (Sl. 15). Pretpostavlja se da je kopanjem jaruga na površini praćena mineralizacija malahita i azurita kako bi se otkrila mesta gde je ruda izbijala na površinu i odakle je počinjalo formiranje rudnog okna kojim se rudna žila pratila u dubinu.

Iskopavano je samo jedno okna 2006. godine, ali tom prilikom je otkriven samo ulaz u okno. Dokazi praistorijskog rudarenja nisu otkriveni, a pravilan oblik ulaza u okno ostavlja mogućnost da je okno nastalo u nekom kasnijem praistorijskom dobu (bronzano ili gvozdeno doba).

The exceptionally steep slope, where this site is situated, is crisscrossed with parallel vertical ditches that go from the Reškovica River at the foot, up to the very top of the hill – an offshoot of the Vukan Mountain (Fig. 15). It is assumed that the ditches were dug following the malachite and azurite mineralization, in order to reveal the places where the ore was visible on the surface, and where mining shafts were formed in order to follow the lodes vertically.

Only one shaft was excavated in 2006, and only the entrance was unearthed. No traces of prehistoric mining were discovered, and the regular shape of the shaft entrance suggests that the shaft was created at some later period of prehistory (Bronze or Iron Age).

Ostali eneolitski rudnici na centralnom Balkanu

Kao i na istočnom Balkanu tako i na centralnom Balkanu ima puno mesta na kojima su nađeni neki, ali ne i dovoljno pouzdani dokazi praistorijskog rudarsva. Oko savremenog rudnika bakra Rebelj u severozapadnoj Srbiji postoje ostaci starih rado-

Other Eneolithic copper mines in the central Balkans

Just like the eastern Balkans, the central Balkans also yielded numerous places where some, but not reliable-enough, evidence of prehistoric mining has been discovered. The area around the contemporary copper mine of Rebelj in northwestern Serbia yield-

va koji po obliku mogu biti eneolitski (Simić 1951: 172), uz koje je nađen i jedan kameni rudarskih bat sa žlebom.[2]

Sudeći na osnovu analiza izotopa olova, ruda iz Majdanpeka, savremenog rudnika bakra u istočnoj Srbiji, bila je korišćena za izradu bakarnog oruđa tokom eneolita i ranog bronzanog doba (Pernicka et al. 1993: 38; Radivojević 2007: 19). U Majdanpeku je na više mesta, još početkom 20. veka, nađeno nekolika desetina kamenih batova (Simić 1951: 252), tipičnih praistorijskih rudarskih alatki koje su se koristile do kraja bronzanog doba.

Na Avali, planini blizu Beograda i samo nekoliko kilometara udaljenoj od neolitskog naselja u Vinči, nalazi se mali rudnik bakra nepoznate hronološke pripadnosti. Po izgledu samog rudnika – pinga i deponija usitnjenog kamena pomešanog sa malahitom – može da se pretpostavi da je ekploatacija bakarane rude na ovom mestu rađena u praistoriji.

2 Usmeno saopštenje, Borislav Jovanović, Srpska akademija nauka i umetnosti.

ed traces of ancient mining activities that could, based on their shape, be ascribed to the Eneolithic (Simić 1951, 172), and which were accompanied by a stone hammer with a gauge.[2]

Based on the analyses of iron lead isotopes, the ores from Majdanpek, a contemporary copper mine in eastern Serbia, were used in copper tool production during the Eneolithic and the Early Bronze Age (Pernicka et al. 1993: 38; Radivojević 2007: 19). At the beginning of the 20th century, several locations at Majdanpek yielded several tens of stone hammers (Simić 1951: 252), typical prehistoric mining tools that were used until the end of the Bronze Age.

A small copper mine of unknown age is situated on Avala, a mountain close to Belgrade, and only several kilometers away from the Neolithic settlement at Vinča. The shape of the mine – a landfill of crushed rocks mixed with malachite – suggests that copper ore exploitation took place here during prehistory.

2 Personal communication, Borislav Jovanovć, Serbian Academy of Sciences and Arts.

Slika / Figure 15. Ždrelo, pogled na lokalitet / Ždrelo, a view of the site (foto / photo: D. Šljivar).

Rudišta u srednjoj Bosni, Mračaj i Maškara, sa tetraedritom kao glavnim orudnjenjem, eksploatišu se još od praistorije za šta postoje indirektni dokazi. U srednjem veku tu su bili vađeni zlato, srebro i živa što je potrajalo do danas. U Mračaju su nađeni fragmenti bronzanodobne i gvozdenodobne keramike kao i kameni rudarski batovi sa žlebom kao sigurna potvrda praistorijske eksploatacije rude (Simić 1951: 128). Moguće da je eksploatacija ovih rudišta započela već tokom eneolita, ali za to ne postoje pouzdani arheološki dokazi. Zanimljliv je zaključak vezan za prsten izrađen od kalajne bronze otkriven u sloju vinčanske kulture na Gomolavi za koji je, nakon analiza, pretpostavljeno da je bio izrađen od rude tetraedrita (Radivojević et al. 2013: 1032 Abb. 1B, 1035). Veza Gomolave i oko 250 km udaljenih rudišta u srednjoj Bosni nije dokazana dosadašnjim istraživanjima, ali nije nemoguće da su i ona korišćena za nabavljanje rude u primitivnoj metalurgiji. Ipak treba imati u vidu da su analize izotopa olova u najstarijim bakarnim artefaktima iz Austrije, Slovačke, Nemačke i Mađarske pokazale da je za njihovu izradu korišćena ruda iz Srbije i Bugarske (Niederschlag et al. 2003; Höppner et al. 2005; Schriener 2007; Siklósi et al. 2017). Pretpostavlja se da su, paralelno sa njima, u manjoj meri korišćeni za sada nepoznati izvori bakarne rude u Slovačkoj i Mađarskoj (Siklóski et al. 2015; Siklósi et al. 2017: 71), a analizama je potvrđeno da je u Austriji eksploatacija lokalne rude počela tek u ranom bronzanom dobu (Höppner et al. 2005). Isto može da se pretpostavi i za zapadni Balkan, da je ruda za najstarije bakarno oruđe donošena sa istoka poluostrva, a da su lokalna rudište počela da se eksploatišu tek kasnije, najranije od bronzanog doba, što pokazuju nalazi iz okoline Mračaja i Maškara u Bosni.

Tokom eneolita eksploatisane su i druge rude. Šuplja stena na Avali kod Beograda je praistorijski rudnik rude žive cinabarita za koji su znali i stanovnici neolitskog naselja u Vinči. Grumenovi cinabarita su bili nalaženi u svim slojevima tog nalazišta (Васић 1932: 5). Postoji mišljenje da su stanovnici naselja u Vinči proizvodili živu, što je pre svega zaključeno na osnovu oblika peći (Durman 1988). Na osnovu nedavnih analiza cinabarita sa Avale, materijala i peći iz Vinče i Pločnika ustanovljeno je da u pećima na Vinči nema tragova prerade cinabarita. Ovaj mineral je u Vinči bio retko korišćen kao pigment i pažljivo je čuvan u posudama u sprašenom stanju (Mioč et al. 2004). Cinabarit je bio korišćen kao boja za figurine na Pločniku, ali nije poznato da li je korišćena ruda sa Avale (Gajić-

Ore fields in central Bosnia, Mračaj and Maškara, where tetrahedrite is the main ore, were exploited since prehistory, as suggested by indirect evidence. During the Middle Ages, these mines were used to extract gold, silver and mercury, as is the case to this day. Mračaj yielded fragments of Bronze and Iron Age pottery, as well as stone mining hammers with gauges, thereby confirming prehistoric ore exploitation (Simić 1951: 128). It is possible that the exploitation of these mining areas began during the Eneolithic, but there is no reliable archaeological data to support such a hypothesis. The analysis of a ring made of tin bronze, discovered in a layer of the Vinča culture at Gomolava, revealed that the find was probably made of tetrahedrite ore (Radivojević et al. 2013: 1032 Abb. 1B, 1035). The link between Gomolava and the ore fields in central Bosnia, which are about 250 km away, has not yet been confirmed, but it is possible that these sites were also used to obtain ore in primitive metallurgy. However, it should be noted that lead isotope analyses of the oldest copper artifacts from Austria, Slovakia, Germany and Hungary, show that the items were made of purified ore from Serbia and Bulgaria (Niederschlag et al. 2003; Höppner et al. 2005; Schriener 2007; Siklósi et al. 2017). It is assumed that, parallel with them, less known sources of copper ore in Slovakia and Hungary were used as well (Siklóski et al. 2015; Siklósi et al. 2017: 71), and analyses confirmed that ore exploitation in Austria began in the Early Bronze Age (Höppner et al. 2005). The same can be assumed for the western Balkans, meaning that ores used to produce the oldest copper tools were brought from the east of the peninsula, and that the exploitation of local mining zones began later, starting from the, at the earliest, Bronze Age, as attested to by finds from the area around Mračaj and Maškara in Bosnia.

Other ores were also exploited during the Eneolithic. Šuplja stena on the Avala Mountain near Belgrade is a prehistoric cinnabar mercury mine that was known to the inhabitants of the Neolithic settlement at Vinča. Lumps of cinnabar were discovered in all layers at the site (Васић 1932: 5). Based on the shape of kilns, some authors think that the inhabitants of Vinča produced mercury (Durman 1988). Based on recent analyses of cinnabar from Avala, and material and kilns from Vinča and Pločnik, it was established that the kilns at Vinča showed no traces of cinnabar processing. This mineral was rarely used at Vinča as a pigment, and was carefully stored in powder form in vessels (Mioč et al. 2004). At Pločnik, cinnabar was used as a dye for figurines, but it is not known whether the ore from Avala was

Kvašev et al. 2012: 1032). Arheološka iskopavanja ovog rudnika su bila sprovedena početkom tridesetih godina prošlog veka kada je otkriveno da je rudnik bio korišćen od strane nosilaca kasnoeneolitske kostolačke kulture (Milojčić 1943).

Na padinama planina Bukulja u centralnoj Srbiji i Cer u severozapadnoj Srbiji postoje aluvijalni nanosi kaseterita, i to su jedina lako dostupna ležišta rude kalaja u jugoistočnoj Evropi (Janković et al. 2003: 53). Zbog toga se pretpostavlja da su ona mogla biti eksploatisana tokom praistorije (Durman 1997), ali za to za sada ne postoje arheološki dokazi.

Novim istraživanjima starog rudarstva na Ceru do sada nisu otkrivena mesta eksploatacije kasiterita kao ni tragovi praistorijske prerade ove rude (Bankoff et al. 2011). Ipak, geohemijska analiza uzoraka kasiterita iz nekoliko potoka na Ceru i rekognosciranje cele oblasti otkrila su brojna kasnobronzana naselja na rečnim terasama upravo oko potoka sa visokom koncentracijom kasiterita pa se pretpostavlja njihova veza sa mogućom eksploatacijom kalajne rude (Huska et al. 2014). Na osnovu proučavanja izotopskog sastava kalaja u bronzanom oruđu sa Balkana utvrđeno je da je ruda sa Cera bila korišćena samo južno od Dunava, dok su oblasti severno od njega koristile rudu iz drugih rudnika, najverovatnije iz rudnika Erzgebirge u centralnoj Evropi na granica Nemačke i Češke (Powell et al. 2018: 149).

Svakako je najzanimljiviji nalaz lima iz neolitskog naselja u Pločniku izrađenog od kalajne bronze sa čak 11,7 % kalaja i visokim sadržajem olova, nikla i gvožđa u svom sastavu (Radivojević et al. 2013: 1035). Nalaz potiče iz sloja datovanog u 4650 p.n.e. Metalografska analiza ukazuje na namernu proizvodnju i poznavanje karakteristika ovakvog novostvorenog metala. Analiza sastava ga povezuje sa topljenjem kompleksne bakarno-kalajne rude (halkopirit sa stanitom i tertraedritom), pa se isključuje mogućnost da je bronza nastala korišćenjem kasiterita (Radivojević et. al. 2013: 1037), a time i moguća rana eksploatacija ove rude iz aluvijalnih nanosa na Ceru i Bukulji.

Zlato se pojavilo vrlo brzo posle bakra, sredinom petog milenijuma pre nove ere. Nalazi zlatnih artefakata na nekropoli u Varni u istočnoj Bugarskoj su za sada najstariji predmeti od ovog metala u ljudskoj istoriji (Ангелов 1959; Иванов 1978; Dimitrov & Stoychev 2018). Dugo se postavljalo pitanje odakle potiče ruda od koje su ti predmeti bili napravljeni. Tek je u novije vreme, početkom 21. veka, utvrđe-

used (Gajić-Kvašev et al. 2012: 1032). Archaeological excavations of this mine that were conducted at the beginning of the 1930s revealed that this mine was used by the people of the Late Eneolithic Kostolac culture (Milojčić 1943).

The slopes of the mountains Bukulja, in central Serbia, and Cer in northwestern Serbia, include alluvial deposits of cassiterite, and are the only such, easily-available, sources of tin in southeastern Europe (Janković et al. 2003: 53). That is why it was assumed they could have been used during prehistory (Durman 1997), even though there is no archaeological evidence.

Recent explorations of ancient mining at Cer have, so far, yielded no places where cassiterite was exploited, nor any traces of prehistoric processing of that ore (Bankoff et al. 2011). However, the geochemical analysis of cassiterite from several streams on Cer, and a field survey of the entire area, revealed numerous Late Bronze Age settlements on the riverbanks, precisely around the streams that had a large concentration of cassiterite, so it was assumed that they were linked to the exploitation of tin ore (Huska et al. 2014). The study of the isotope composition of tin found in bronze tools from the Balkans established that the ore from Cer was used only south of the Danube, while ores from other mines, most likely from Erzgebirge in central Europe, on the border of Germany and the Czech Republic, were used north of the Danube (Powell et al. 2018: 149).

The most interesting find is certainly the metal plate from the Neolithic settlement at Pločnik that was made from tin bronze that contained 11.7% of tin and a large percentage of lead, nickel and iron (Radivojević et al. 2013: 1035). The find was discovered in a layer dated to 4650 BC. A metallographic analysis points to an intentional production and knowledge of the characteristics of this newly-created metal. The composition analysis connects it to the melting of a complex copper-tin ore (chalcopyrite with stannite and tetrahedrite), thereby excluding the possibility that the bronze was created by purifying cassiterite (Radivojević et. al. 2013: 1037), and suggesting that an early exploitation of this ore from the alluvial deposits at Cer and Bukulja was possible.

Gold appeared soon after copper, at the middle of the fifth millennium BC. The gold finds from the Varna necropolis in eastern Bulgaria are, so far, the earliest objects made of this metal in human history (Ангелов 1959; Иванов 1978; Dimitrov & Stoychev 2018). For a long time the origin of the ore used for

no da ruda potiče iz nekoliko različitih ležišta i svi se nalaze na teritoriji Bugarske – u oblasti planine Strandža kod Burgasa, te u gornjem toku reke Strume i nekih od njenih pritoka (Dimitrov & Stoychev 2018: 46). Reč je o zlatu iz aluvijalnih nanosa iz kojih se ruda dobijala ispiranjem. Bogata aluvijalna ležišta zlata postoje i u istočnoj Srbiji, ali za sada nemamo nikakvih indicija o njihovoj eksploataciji tokom praistorije, a posebno eneolita, već samo pretpostavku da su rudari tog doba verovatno prepoznali njihovo bogatsvo.

Poreklo rude u primitivnoj metalurgiji

Radi razrešenja pitanja porekla rude od koje se dobijao bakar za izradu eneolitskog i bronzanodobnog oruđa sa teritorije Balkana, urađene su brojne analize metala i uzoraka rude (Черньх 1978: 14; Gale et al. 2003; Pernicka et al. 1993; Pernicka et al. 1997). Sa nalazišta u Srbiji ispitan je uzorak od 90 eneolitskih i bronzanodobnih bakarnih predmeta, uzorci malahita iz dva kasnovinčanska naselja, ruda iz Rudne Glave i više rudišta u istočnoj, centralnoj i južnoj Srbiji (Majdanpek, Blagojev kamen, Lipa, Aljin Do, Crnajka, Biljevina, Trnjane, Bor, Velika Brestovica, Rudnik, Lajkovača, Čadinje, Šatorica (Pernicka et al. 1993: 25–29; Radivojević 2007: 98 f). U Bugarskoj je urađen znatno veći broj analiza. U okviru bugarsko-sovjetskog projekta sedamdesetih godina prošlog veka izvršene su hemijske analize elemenata u tragovima na uzorku od 1244 eneolitskih i bronzanodobnih predmeta od bakra i bronze sa 250 različitih nalazišta (Черньх 1978: 14), koje ukazuju na korišćenje rude iz različitih ležišta. Analize izotopa olova urađene su na c. 400 predmeta i uzoraka rude sa brojnih rudišta u Bugarskoj (Pernicka et al. 1997: 83 Abb. 14, 91 Tab. 1; Gale et al. 2003: 157–168).

Na osnovu svih pomenutih analiza primećeno je da je u ranoj metalurgiji na Balkanu korišćen veći broj ležišta, ponekad vrlo udaljenih od oblasti iz koje potiču metalni predmeti. Na lokalitetima oko Ai Bunara konstatovana je ruda iz najmanje četiri rudnika iz bliže okoline, pa se pretpostavlja da je tokom srednjeg halkolita, pored Ai Bunara, postojalo još nekoliko rudnika u toj rudnoj oblasti (Gale et al. 2003: 161). Ista praksa je primećena i na Belovodama gde je korišćena ruda iz Ždrela u blizini Belovoda, Majdanpeka i nepoznatog rudnika iz oblasti oko Rudne Glave, Crnajke, Biljevine i Velike Brestovice, ali ne i ruda iz same Rudne Glave (Radivojević 2007: 98-116; Radivojević et al. 2010: 2781,

their production was unknown. It was, only recently, at the beginning of the 21st century, established that the ore originates from several different areas of Bulgaria – the region of the Strandzha Mountain near Burgas, and the upper part of the Struma River and some of its tributaries (Dimitrov & Stoychev 2018: 46). The gold was obtained by flushing alluvial deposits. The rich alluvial gold deposits also exist in eastern Serbia, but there are still no indications that they were being exploited during prehistory, but only assumptions about the miners from the past knowing about their richness.

The origin of ore in primitive metallurgy

Numerous analyses of metals and ore samples were made in order to answer the question of the origin of ores used to obtain copper for the production of Eneolithic and Bronze Age tools in the Balkans, (Черньх 1978: 14; Gale et al. 2003; Pernicka et al. 1993; Pernicka et al. 1997). A total of 90 Eneolithic and Bronze Age tools from Serbia were analyzed, as were malachite samples from two settlements of the late Vinča culture and ores from Rudna Glava and several mines from eastern, central and south Serbia (Majdanpek, Blagojev kamen, Lipa, Aljin Do, Crnajka, Biljevina, Trnjane, Bor, Velika Brestovica, Rudnik, Lajkovača, Čadinje, Šatorica; Pernicka et al. 1993: 25-29; Radivojević 2007: 98 f). A far greater number of analyses were conducted in Bulgaria. The Bulgarian-Soviet project from the 1970s included chemical analyses of trace elements on a sample of 1244 Eneolithic and Bronze Age copper and bronze finds from 250 different sites (Черньх 1978: 14), and the results suggest the use of ore from different mining zones. The analyses of lead isotopes were conducted on c. 400 finds and ore samples from numerous deposits in Bulgaria (Pernicka et al. 1997: 83 Abb. 14, 91 Tab. 1; Gale et al. 2003: 157-168).

All of the listed analyses have shown that a larger number of ore deposits were used in the early metallurgy of the Balkans, which were sometimes very far from the regions where the finds were discovered. The sites around Ai Bunar yielded ores from at least four mines in the vicinity, so it was assumed that, during the middle Eneolithic, several other mines existed in this mining area apart from Ai Bunar (Gale et al. 2003: 161). The same practice was recorded at Belovode that yielded ore from Ždrelo in the vicinity of Belovode, Majdanpek and an unknown mine from the area around Rudna Glava, Crnajka, Biljevina and Velika Brestovica, but not ores from Rudna Glava itself (Radivojević 2007: 98-116; Radivojević et al. 2010:

2784 Fig. 10). Kao mnogo verovatniji izvor rude u tom periodu ističe se Majdanpek, čija je ruda korišćena i na teritoriji zapadne Bugarske. Pretpostavlja se da je na mestu današnjeg rudnika postojao ranoeneolitski rudnik većih razmera koji ili nije otkriven do sada ili je uništen kasnijim rudarskim radovima (Pernicka et al. 1993; Pernicka et al. 1997: 146), što je mnogo verovatnije.

Iako nije bila praksa da se ruda sa istočnog Balkana koristi za proizvodnju metala na centralnom Balkanu i obrnuto, veza ove dve oblasti u korišćenju rude iz istih ležišta dokazana je na materijalu iz Pločnika i nekropole u Varni. Naime, osam predmeta iz Pločnika i 16 iz nekropole uVarni su bili izrađeni od metala dobijenog iz iste rude, iskopane u za sada neidentifikovanom rudniku čije je izotopsko polje vrlo blisko onom sa poljem Ai Bunara (Gale et al. 2003: 165, Fig. 10.13). Takođe je sasvim moguće da je ruda iz ležišta Varli Briag bila upotrebljena za izradu jedne alatke iz Pločnika, ali i za izradu kasnoeneolitskih alatki iz Srbije (krstasta sekira iz Stojačka, HDM 1401 i dleto iz Jelašnice, HDM 1421; Gale et al. 2003: 165, Fig. 10.14, Fig. 10.16).

Ruda od koje je bio dobijen metal od koga su bili izrađeni bakarni predmeti iz Varne dolazila je iz bugarskih ležišta, pa čak i iz turskog dela Trakije, ali ne i iz Ai Bunara, Majdanpeka, Rudnika i Rudne Glave. Bakar iz Varne je bio izrađen od rude iz Varli Briag, Diebeli Rit, Sokolec, Plakalnica, Vozdol, Vinica-Lakatnik, Meden Rid, Osikota, kao i od rude iz nekog rudnika sa izotopskim poljem bliskim Ai Bunaru, (Gale et al. 2003: 166, Abb. 10.15).

Bakarni predmeti iz Dolnoslova, njih 52 koji su bili podvrgnuti analizi izotopa olova nisu bili izrađeni od rude iz Rudne Glave, Bora, Majdanpeka, Lesova i Sedmočislenici, ali su neki od njih bili izrađeni od rude iz rudnika Varli Briag, Ai Bunar i iz oblasti Rudnika u centralnoj Srbiji (Gale et al. 2003: 166). Isto tako 11 objekata iz Pločnika pokazuju slaganje sa nalazima iz Dolnoslova, pa se pretpostavlja da su i oni bili izrađeni od rude iz pomenuta tri rudna ležišta (Gale et al. 2003: 167). Jedna grupa predmeta pokazuje slaganje sa rudama iz grčkog dela Trakije (Kirki ležište u grčkom delu Rodopskog masiva, 25 km severno od Aleksandrupolisa i rudne zone Panađurski (Gale et al. 2003: 167–168, Fig. 10.19).

Ispitivanje bakarnih predmeta iz nekropola Durankulak i Varna I pokazala su da je veliki procenat predmeta bio izrađen od metala dobijenog od rude iz rosenskog rudnog polja (Dimitrov 2007; Leshtakov 2010: 175).

2781, 2784 Fig. 10). A more likely source of ores from that period is Majdanpek, which also provided ore that was used in western Bulgaria. It is assumed that there was a larger Early Eneolithic mine at the location of today's mine, but that it was either not discovered, or was destroyed by subsequent mining activities (Pernicka et al. 1993; Pernicka et al. 1997: 146), which seems more likely.

Although it was not common to use ores from the eastern Balkans in the production of the central Balkans, and vice versa, the links between these two regions, in the sense of using ores from the same mines, is attested to by the material from Pločnik and the Varna necropolis. Namely, eight finds from Pločnik and 16 from the Varna necropolis were made of metal obtained from the same ore that came from an, so far, unidentified mine that had an isotopic field very similar to that of Ai Bunar (Gale et al. 2003: 165, Fig. 10.13). It is also possible that the ore from Varli Briag was used for the production of one tool from Pločnik, but also in the production of Late Eneolithic tools from Serbia (the axe-adze from Stojačak, HDm 1401 and the chisel from Jelašnica, HDm 1421; Gale et al. 2003: 165, Fig. 10.14, Fig. 10.16).

The ore used to obtain metal from which the Varna copper finds were made originated from Bulgarian ore fields, even those in the Turkish part of Thrace, but not from Ai Bunar, Majdanpek, Rudnik and Rudna Glava. The copper from Varna was made of ore from Varli Briag, Diebeli Rit, Sokolec, Placalnitsa, Vozdol, Vienietsa-Lakatnik, meden Rid, and Osikota, as well as of ore from a mine that had an isotopic field similar to that of Ai Bunar, (Gale et al. 2003: 166, Abb. 10.15).

The lead isotope analyses conducted on 52 copper find from Dolnoslov revealed that they were not made of ores from Rudna Glava, Bor, Majdanpek, Lesovo and Sedmochislenitsi, and that some of them were made of ore from the mines of Varli Briag, Ai Bunar and those in the Rudnik region in central Serbia (Gale et al. 2003: 166). Also, 11 finds from Pločnik are similar to the finds from Dolnoslov, so it is assumed that they too were made from ores from the three aforementioned mines (Gale et al. 2003: 167). One group of finds displays similarities to ores from the Greek part of Thrace, (the Kirki ore field in the Greek part of the Rhodope zone, 25 km north of Alexandroupoli and the Panagyurishte ore field (Gale et al. 2003: 167–168, Fig. 10.19).

The analyses of finds from the Durankulak and Varna I necropolises revealed that a large percentage of

Nisu svi rudnici i rudna ležišta podjednako korišćeni tokom eneolita i bronzanog doba. Intenzivna eksploatacija Rudne Glave tokom kasnog neolita i ranog eneolita (5400–4650 p.n.e; Borić 2009: 205), jasno vidljiva na samom lokalitetu, nije dokazana analizama metala sa Balkana,[3] za razliku od Majdanpeka gde nije otkriven rudnik, ali zato postoje dokazi da je ruda odatle bila korišćena u dužem vremenskom periodu. Tokom eneolita Ai Bunar i Medni Rid su snabdevali istočnu Bugarsku, a Majdanpek zapadnu Bugarsku i Srbiju. Ruda iz Mednog Rida nije prodrla dublje u kopno Bugarske, ali se pretpostavlja da je proširena na Kukuteni i Tripolje kulture na severu. Dok je Ai Bunar bio više korišćen tokom ranog i srednjeg eneolita, Majdanpek je postao intezivno eksploatisan rudnik tek tokom finalnog eneolita (Pernicka et al. 1997: 145).

Zaključak

Dosadašnja istraživanja starog rudarstva bakra na Balkanu pokazuju da je ono bilo dobro razvijena aktivnost već od kraja neolita. Dva dobro istražena ranoeneolitska rudnika, Rudna Glava i Ai Bunar, zatim dokazi o korišćenju rude iz većeg broja različitih ležišta i brojni masivni bakarni predmeti otkriveni na centralnom i istočnom Balkanu jasni su dokaz razvijenog rudarstva i metalurgije bakra čiji se počeci stavljaju u sam početak V milenijuma pre nove ere (5000 p.n.e.).

Način eksploatacije rude u najstarijim rudnicima bakra je dobro poznat zahvaljujući istraživanjima na Rudnoj Glavi i Ai Bunaru, ali još nije poznato kako su funkcionisale zajednice prvih rudara. Do sada nije otkriveno nijedno rudarsko naselje u blizini nekog od istraživanih najstarijih rudnika bakra. Izuzetak predstavlja Jarmovac gde je vinčansko naselje bilo smešteno u neposrednoj blizini rudnika, samo 300 m od rudne zone, ali njegova veza sa rudnikom za sada nije poznata, pre svega zato što su iskopavanja tog nalazišta na samom početku. U okolini Ai Bunara otkriveno je više ranoeneolitskih naselja na kojima je nalažena ruda iz Ai Bunara. Nalazi keramike na ovom rudniku,

3 Prirodna radioaktivna kontaminacija rude sa Rudne Glave smatra se jednim od glavnih uzroka negativnih rezultata po pitanju njenog prisustva u bakarnim artefaktima iz Srbije (Jovanović 1993).

finds was made of metals obtained from ores from the Rhodope zone (Dimitrov 2007; Leshtakov 2010: 175).

Not all mines and ore deposits were equally used during the Eneolithic and the Bronze Age. The intensive exploitation of Rudna Glava during the Late Neolithic and Early Eneolithic (5400-4650 BP; Borić 2009: 205), which is clearly visible only at the very site, was not proved by the analyses of metal from the Balkans,[3] unlike at Majdanpek where no mines were discovered, but there is evidence of using locally available ore over a longer period. During the Eneolithic, Ai Bunar and Medni Rid provided ores for eastern Bulgaria, and Majdanpek for western Bulgaria and Serbia. The ore from Medni Rid was not used deeper in Bulgarian territory, but is assumed to have spread to the Cucuteni and Tripolye cultures in the north. While Ai Bunar was more commonly used during the Early and Middle Eneolithic, Majdanpek was more intensively exploited only during the Final Eneolithic (Pernicka et al. 1997: 145).

Conclusion

The research of ancient copper mining in the Balkans conducted thus far shows that this was a well-developed activity already at the end of the Neolithic. Two well-researched Early Eneolithic mines, Rudna Glava and Ai Bunar, as well as evidence of using ore from different areas and the numerous copper artefacts discovered in the central and eastern Balkans, clearly show that copper mining and metallurgy were well-developed and that such activities started at the very beginning of the 5th millennium BC (5000 BC).

The modes of ore exploitation in the earliest copper mines are well-known due to the excavations conducted at Rudna Glava and Ai Bunar, but how the first mining communities functioned is still to be determined. So far no mining settlements have been discovered in the proximity of the excavated copper mines. The only exception is Jarmovac, where a settlement of the Vinča culture was registered only 300 m from the mining zone. However, seeing as the excavations of the settlement have only just begun, there are no clear links between it and the mine. The area around Ai Bunar yielded several Early Eneolithic settlements that contained ore from Ai

3 The natural radioactive contamination of ore from Rudna Glava is considered to be one of themain causes of negative results when it comes to its presence in the copper artifacts from Serbia (Jovanović 1993).

kao i na Rudnoj Glavi ukazuju na duži boravak ljudi na njima. Može se pretpostaviti da su na samim rudnicima postojali sezonski kampovi u kojima su bili smešteni rudari, ali do sada nigde nisu otkriveni bilo kakvi ostaci stambenih objekata ili tragovi stanovanja kao što su peći i ognjišta.

Dosadašnje analize metalnih predmeta i uzoraka rude iz ležišta nagovestile su da je cirkulacija iskopane rude i metala bila znatno razgranatija nego što se ranije pretpostavljalo. Ruda bakra je na Balkanu eksploatisana na znatno više mesta nego što je danas poznato na osnovu istraživanja starog rudarstva. Iako je ruda cirkulisala na većem prostoru od istočnog Balkana do centralne Evrope, za proizvodnju metala nije korišćena ruda iz susednih vanbalkanskih teritorija kao što su Kipar, Anadolija, Bliski i Srednji istoka, kako se ranije pretpostavljalo (Gale et al. 2003: 168).

Najstariju metalurgiju u Evropi, nastalu na Balkanu, pratilo je razvijeno rudarstvo bakra otkriveno na više mesta u Srbiji i Bugarskoj. Najverovatnije da dobavljanje i širenje rude nije išlo iz jednog usamljenog centra i da je već početkom ranog eneolita na Balkanu postojalo više centara u kojima se vršila eksploatacija rude. Već krajem eneolita na ovoj teritoriji sasvim sigurno postoji veći broj rudnika koji su snabdevali rudom brojne metalurške radionice i intenzivnu proizvodnju metalnih predmeta koju neki autori nazivaju "metalnim bumom" kasnog eneolita (Pernicka et al. 1997: 146). To dokazuje i rudnik na Malom Šturcu na kome su potvrđena okna iz kasnog eneolita. Na celom rudištu otkriven je impozantni broj kamenih batova (do sada c. 1000 alatki) koji ukazuju na veoma živu rudarsku aktivnost na tom mestu.

Kroz istraživanja rudnika Ai Bunar i Rudna Glava, ali u novije vreme i Jarmovac i Mali Šturac, upoznat je način eksploatacije rude u eneolitu. Ipak mnogo je više otvorenih pitanja koja se odnose na sve aktivnosti koje dolaze posle vađenja rude iz ležišta - distribucija rude do metalurških centara i njena prerada. Odgovor na sva ova pitanja zahteva još mnoga nova istraživanja ranog rudarstva i metalurgije Balkana zbog čega je ova tema jedna od nainteresantijih u izučavanju praistorije Balkana.

Bunar. The finds of pottery from this mine, just like at Rudna Glava, suggest that it was occupied for a longer period of time. It can be assumed that there were seasonal camps around the mines, which were occupied by miners, but, so far, there have been no recorded traces of residential structures or habitation, such as kilns or hearths.

The analyses of metal finds and samples of ore from mining zones that have been conducted thus far show that the circulation of the exploited ores and metals was significantly more widespread than was previously thought. In the Balkans, copper ore was exploited at a significantly larger number of places than is assumed based on research of ancient mining. Although the ore circulated on the larger territory from the eastern Balkans to central Europe, ores from neighboring regions outside the Balkans, such as Cyprus, Anatolia, and the Middle East, were not, as previously assumed, used in metal production (Gale et al. 2003: 168).

The earliest metallurgy in Europe, which developed in the Balkans, was accompanied by well-developed copper mining, as was shown at several locations in Serbia and Bulgaria. It seems most likely that the procurement and circulation of ores did not originate from a single centre, and that there were several centers of ore exploitation in the Balkans already at the beginning of the Early Eneolithic. By the end of the Eneolithic, there was definitely an even larger number of mines on this territory that provided ore to numerous metallurgical workshops for the intensive production of metal objects that some authors call the "metallurgical boom" of the Late Eneolithic (Pernicka et al. 1997: 146). This is attested to by the mine at Mali Šturac, which yielded shafts from the Late Eneolithic. The entire mining area yielded an impressive number of stone hammers (c. 1000 tools so far) that point to very dynamic mining activities at that location.

The excavations of the Ai Bunar and Rudna Glava mines, as well as the more recent ones conducted at Jarmovac and Mali Šturac, revealed the modes of Eneolithic ore exploitation. However, there are still more unanswered questions regarding all activities that follow ore extraction from the deposit – the distribution of ore to metallurgical centers and its processing. The answers to all of these questions require more new researches into early mining and metallurgy of the Balkans, making this topic one of the most interesting in the study of Balkan prehistory.

Literatura / Bibliography

Ангелов, Н. 1959, Златното съкровище от Хотница, *Археология*, 1, 1/2, 38-46.

Антоновић, Д. 2013, Камено оруђе са Малог Штурца: истраживање 2011. и 2012. године, *Зборник Народног Музеја* 21, 61–76.

Antonović, D. 2014, *Kupferzeitliche Äxte und Beile in Serbien*, Prähistorische Bronzefunde Abt. IX Bd. 27, Mainz, Akademie der Wissenschaften und der Literatur; Stuttgart, Franz Steiner.

Antonović. D. & Vukadinović, M. 2012, Eneolithic Mine Prljuša – Mali Šturac: Archaeological and Geophysical Investigations, *Старинар НС* XLII, 95–106.

Antonović, D., Vukadinović, M., Cicović, A. 2012, Praistorijski rudnik na lokalitetu Prljuša, Mali Šturac, istraživanje 2012. godine, in: D. Antonović, S. Golubović, V. Bikić (eds.), *Arheologija u Srbiji: projekti Arheološkog instituta u 2012. godini*, Beograd, Arheološki institut, 28–31.

Bankoff, H. A, Mitrović, S., Arsić, R., Boger, B., Filipović, V., Huska, A., Powell, W. 2011, Tin sources and settlement in the Bronze Age of south-eastern Europe: A pilot study from western Serbia, *Antiquity* 85, 327.

Bogdanov, B. 1982, Bulgaria, in: F. W. Dunning, W. Mykura, D. Slater (eds.), *Mineral deposits of Europe*, Volume 2, Southeast Europe, London, Mineralogical Society-Institution of Mining and Metallurgy, 215–232.

Bogosavljević, V. 1995, Mining Hammerstones of Prljuša – Mali Šturac Site, in: B. Jovanović (ed.), *Ancient Mining and Metallurgy in Southeast Europe*, International Symposium Donji Milanovac, May 20–25, 1990, Belgrade, Archaeological Institute; Bor, Museum of Mining and Metallurgy, 37–44.

Borić, D. 2009, Absolute Dating of Metallurgical Innovations in the Vinča Culture of the Balkans, in: T. L. Kienlin, B. W. Roberts (eds.), *Metals and Societies: Studies in Honour of Barbara S. Ottaway* (Universitätsforschungen zur prähistorischen Archäologie 169), Bonn, Verlag Dr. Rudolf Habelt GMBH, 191–245.

Borić, D. 2012, Social organization and contacts with neighbors, in: B. Mihailović (ed.), *Lepenski Vir: Guide*, Belgrade, National Museum, 87–95.

Черньх, Е. Н. 1978, *Горное дело и металлургия в древнейшей Болгарии*, София, Болгарская академия наук.

Davis, O. 1937, Prehistoric copper-mine at Jarmovac near Priboj na Limu, *Glasnik Zemaljskog muzeja* Sarajevo 49, 1–3.

Дерикоњић, С. 2005, Археометалуршки и рударски центар Јармовац код Прибоја на Лиму: прелиминарни извештај о археолошким ископавањима у 2003. и 2004. Години, *Гласник Друштва конзерверватора Србије* 29, 33–36.

Derikonjić, S., Radivojević, M., Pernicka, E., Rehren, Th. 2011, The Vinča Culture Mining Complex in Jarmovac, Southwest Serbia, in: A. Hauptmann, D. Modarressi-Tehrani, M. Prange (eds.), *International Conference „Archaeometallurgy in Europe III"*, 29th June – 1st July 2011, Bochum, Metalla, Sonderh. 4, 39.

Dimić, V. 2017, The (Re)construction and usage of mining hammerstones from copper mining site of Prljuša – Mali Šturac: experimental archaeology, in I. Miloglav (ed.*), MetArh - 05th International scientific conference Methodology & Archaeometry, Zagreb, 30th November – 1st December 2017*, Zagreb, Croatian Archaeological Society, 30–40.

Dimitrov, K. 2007, *Mednata metalurgija po Zapadnija brjag na Černo more (sredata na V - načaloto na IV hol. pr. Hr.),* Ph. D. Thesis, Sofija 2007.

Dimitrov, K. & Stoychev, R. 2018, The East Balkan Region as a Source of Precious and Non-ferrous Metals from Prehistory to the Roman Period, in: S. Alexandrov, Y. Dimitrova, H. Popov, B. Horejs, K. Chukalev (eds.), *Gold & bronze: metals, technologies and interregional contacts in the Eastern Balkans during the Bronze Age*, Sofia, National Archaeological Institute with Museum, Bulgarian Academy of Sciences, 43–57.

Durman, A. 1988, Industrija cinabarita u Vinči, *Opuscula Archaeologica* 13, 1–9.

Durman, A. 1997, Tin in Southeastern Europe?, *Opuscula Archaeologica* 21, 7–14.

Gale, N. H, Stos-Gale, Ž., Raduncheva, A., Panayotov, I., Ivanov, I., Lilov, P., Todorov, T. 2003, Early metallurgy in Bulgaria, in: P. Craddock, J. Lang (eds.), Mining and metal production through the ages, London, British Museum, 122–173.

Gajić-Kvašev, M., Marić Stojanović, M., Šmit, Ž., Kantarelou, V., Germanos Karydas, A., Šljivar, D., Milovanović, D., Andrić, V. 2012, New evidence for the use of cinnabar as a colouring pigment in the Vinča culture, *Journal of Archaeological Science* 39, 1025–1033.

Höppner, B., Bartelheim, M., Huijsmans, M., Krauss, R., Martinek, K.-P., Pernicka, E., Schwab, R. 2005, Prehistoric copper production in the Inn valley (Austria), and the earliest copper in Central Europe, *Archaeometry* 47/2, 293–315.

Huska, A., Powell, W., Mitrović, S., Bankoff, H. A., Bulatović, A., Filipović, V., Boger, R. 2014, Placer tin ores from Mt. Cer, West Serbia, and their potential exploitation during the Bronze Age, *Geoarchaeology* 29, 477-493.

Иванов, И. 1978, Раннохалколитни гробове до град Варна, *Известия на народния музей – Варна*, XIV/XXIX, 81-93.

Janković, S. 1967, *Metalogenetske epohe i rudonosna područja Jugoslavije*, Beograd, Rudarsko-geološki fakultet i Rudarski institute.

Јовановић, Б. 1972, Технологија рударства у раном енеолиту Централног Балкана. *Старинар НС* XXIII, 1–14.

Jovanović, B. 1982, *Rudna Glava, najstarije rudarstvo bakra na centralnom Balkanu*, Bor, Muzej rudarstva i metalurgije; Beograd, Arheološki institut.

Јовановић, Б. 1988, Прљуша – Мали Штурац. Праисторијски рудник бакра и горског кристала на Руднику, *Зборник радова Народног музеја* 18, 5–12.

Jovanović, B. 1993, Archaeological comment to E. Pernicka's et al. "Eneolithic and Early Bronze Age copper artefacts from the Balkalns and their relation to Serbian copper ores", *Praehistorische Zeitschrift* 68-1, 55–57.

Kunze, R., Abele, J., Leshtakov, P., Dimitrov, K., Krauß, R., Rödel, T. 2018, Archaeometallurgical prospections in the highlands of Medni Rid, southeastern Bulgaria: preliminary report on fieldwork 2013–2015 with a focus upon remote sensing methods by means of LiDAR, *Journal of Archaeological Science: Reports* 19, 596–617.

Leshtakov, P. 2010, Archaeometallurgical evidences for exploitation of copper deposits from the Medni Rid Ridge in the fifth millennium BC, *Bulgarian Geological Society, National Conference with international participation "Geosciences 2010"*, Sofia, BulgarianGeological Society, 175–176.

Milojčić, V. 1943, Das vorgeschichtliche Bergwerk „Šuplja Stena" am Avalaberg bei Belgrade (Serbien), *Wiener Prahistorische Zeitschrift* 30, 41–54.

Mioč, U. B., Colomban, Ph., Sagon, G., Stojanović, M., Rosić, A. 2004 Ochre decor and cinnabar residues in Neolithic pottery from Vinča, Serbia, *Journal of Raman Spectroscopy* 35 (10), 843–846.

Niederschlag, E., Pernicka, E., Seifert, Th., Bartelheim, M. 2003, The determination of lead isotope ratios by multiple collector ICP-MS: a case study of Early Bronze Age artefacts and their possible relation with ore deposits of the Erzgebirge, *Archaeometry* 45/1, 61–100.

Pernicka, E., Begemann, F., Schmitt-Strecker, S., Wagner, G. A. 1993, Eneolithic and Early Bronze Age Copper Artefacts from the Balkans and their Relation to Serbian Copper Ores, *Prähistorische Zeitschrift* 68-1, 1–57.

Pernicka, E., Begemann, F., Schmitt-Strecker, S., Todorova, H., Kuleff, I. 1997, Prehistoric copper in Bulgaria, *Eurasia Antiquia: Zeitschrift für Archäologie Eurasiens* 3, 41–180.

Powell, W., Bankoff, A., Mason, A., Mathur, R., Bulatović, A., Filipović, V. 2018, Tin sources and regional trade in the Bronze Age of Southeast Europe: evidence from tin isotopes, in: S. Alexandrov, Y. Dimitrova, H. Popov, B. Horejs, K. Chukalev (eds.), *Gold & bronze: metals, technologies and interregional contacts in the Eastern Balkans during the Bronze Age*, Sofia, National Archaeological Institute with Museum, Bulgarian Academy of Sciences, 141–149.

Radivojević, M. 2007, *Evidence for Early Copper smelting in Belovode, a Vinča culture site in Eastern Serbia*, Unpublished MSc Thesis, London UCL Institute of Archaeology.

Radivojević, M., Rehren, Th., Pernicka, E., Šljivar, D., Brauns, M., Borić, D. 2010, On the origins of extractive metallurgy: new evidence from Europe, *Journal of Archaeologica Science* 37, 2775–2787.

Radivojević, M., Rehren, Th., Kuzmanović-Cvetković, J., Jovanović, M., Northover, P. 2013, Tainted ores and the rise of tin bronzes in Eurasia, c. 6400 years ago, *Antiquity* 87, 1030–1045.

Schreiner, M. 2007, Erzlagerstätten im Hrontal, Slowakei. Genese und prähistorische Nutzung, *Forschungen zur Archäometrie und Altertumswissenschaft* 3, Rahden/Westf.

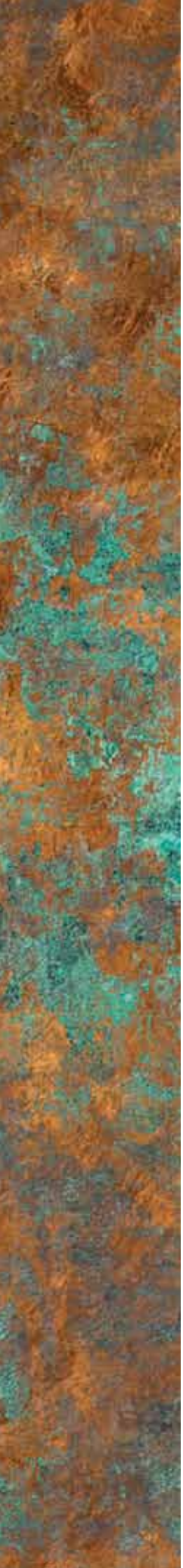
Siklósi, Zs., Prange, M., Kalicz, N., Raczky, P. 2015, New data on the provenance of early copper finds from the Great Hungarian Plain, in: S. Hansen, P. Raczky, A. Anders, A. Reingruber (eds.), *Neolithic and Copper Age between the Carpathians and the Aegean Sea. Chronologies and technologies from the 6th to the 4th millennium BC*, International Workshop Budapest 2012, Archäologie in Eurasien 31, 57–92.

Siklósi, Zs., Virag, Zs. M., Mozgai, Vi., Bajnóczi, B. 2017, The spread of the products and technology of metallurgy in the Carpathian Basin between 5000 and 3000 BC – current questions, *Dissertationes Archaeologicae ex Instituto Archaeologico Universitatis de Rolando Eötvös nominatae* Ser. 3, No. 5, 67–82.

Simić, V. 1951, *Istoriski razvoj našeg rudarstva*, Beograd, Izdavačko-štamparsko preduzeće Saveta za energetiku i ekstraktivnu industriju.

Šljivar, D., Kuzmanović-Cvetković, J., Jacanović, D. 2006, Belovode – Pločnik: new contributions regarding the copper metallurgy in the Vinča culture, in: N. Tasić, C. Grozdanov (eds.), *Homage to Milutin Garašanin, Beograd, Serbian Academy of Sciences and Arts*, 251–266.

Васић, М. М. 1932. *Преисториска Винча* I, Београд, Државна штампарија.



Bioarheologija bakrenodobnih populacija na tlu kontinentalne Hrvatske

Bioarchaeology of Copper Age populations in continental Croatia

Ivor Janković
Mario Novak

Institut za antropologiju
Institute for Anthropological Research
Zagreb
ivor.jankovic@inantro.hr
mario.novak@inantro.hr

Uvod

Bioarheološke analize su tijekom posljednja dva desetljeća postale standardnim dijelom znanstvenih analiza arheoloških nalazišta na prostoru Hrvatske. Nažalost, raniji istraživači, posebice sve do pred kraj osamdesetih godina prošloga stoljeća, ljudske su kosturne ostatke u najboljem slučaju skupili i pohranili u depoe te u većini slučajeva nedostaju podaci o cjelinama, kontekstu nalaza i dr., što danas znatno otežava mogućnost znanstvenih analiza. Tek su u rijetkim slučajevima na materijalu provedene antropološke analize nalaza (za detaljniji pregled bioarheoloških istraživanja na području Hrvatske vidi Rajić Šikanjić 2005.). Nadalje, bioarheolozi ponekad u terenskim dnevnicima, ili objavama istraživanja nalaze podatke u kojima se spominju i koštani ostaci, da bi nakon toga ustanovili da su oni tijekom godina netragom nestali. Srećom, stav suvremenih arheologa prema antropološkoj građi danas je drugačiji i pokazuje svijest o tome da nam ljudski ostaci (kao i ostale vrste biološke i druge građe iz arheološkog konteksta) mogu pružiti vrijedne podatke u interpretaciji minulih događaja, načina života, socijalne strukture, odnosa u zajednici, zdravstvenog stanja i dr. Nadalje, sve su češće i analize koje osim standardnih bioarheoloških metoda i tehnika, koriste i suvremena pomagala, metode i tehnike drugih znanosti – poput radiologije, kemijskih i genetičkih/genomičkih analiza i dr. Sve to je rezultiralo mnogim novim spoznajama i novim uvidima u prošlost.

Introduction

During the last two decades, bioarchaeological analyses have become an integral part of scientific analyses conducted at archaeological sites in Croatia. Unfortunately, previous researchers, especially until the very end of the 1980s, had, in the best-case scenario, collected human remains and stored them in depots. In most cases, there is little data on units, the context of the find, etc., which makes the finds difficult to scientifically analyze. Anthropological analyses of material were conducted in only a few cases (for a more detailed overview of bioarchaeological research in Croatia, see Rajić Šikanjić 2005). Furthermore, bioarchaeologists are sometimes able to find data on skeletal remains in field journals or publications, only to realize that they have been misplaced or lost over the years. Luckily, the attitude of contemporary archaeologists about anthropological material has changed, and awareness exists about the fact that human remains (as well as other kinds of biological and various materials from an archaeological context) can provide valuable information for the interpretation of past events, ways of life, social structures, relations within communities, health conditions, and so on. Additionally, there has been an increase in analyses that, other than the standard bioarchaeological methods and techniques, also include modern tools, methods and techniques from other sciences – such as radiology, chemical and genetic/genome analyses, etc., all of which resulted in numerous new findings and insights into past events.

Što se tiče antropoloških nalaza bakrenoga doba s prostora kontinentalne Hrvatske, dosad su objavljene analize kosturnih nalaza s eponimnog nalazišta vučedolske kulture (Teschler-Nicola & Berner 1994; Šlaus 2002; Hincak et al. 2007; 2013), te ukopa s lokaliteta Nama u Vinkovcima koji pripada istoj kulturi (Hincak et al. 2007), ukop djeteta s lokaliteta Josipovac-Gravinjak (Nikitović et al. 2012), ljudskih kosturnih nalaza s lokaliteta Franjevac kod Đakova (Janković & Rajić Šikanjić 2011), Beli Manastir – Popova zemlja (Andrades Valtueña et al. 2017, Mathieson et al. 2018) te dijela kosturnih nalaza iz masovnog ukopa s nalazišta Potočani (Janković et al. 2017; Novak et al., u tisku).

Bioarheološke analize bakrenodobnih nalaza kontinentalne Hrvatske

Masovna grobnica lasinjske kulture u selu Potočani kraj Požege otkrivena je slučajno 2007. godine tijekom pripremnih radova za izgradnju garaže. Manja jama (promjera 2x2 m i očuvanih 1 m dubine) sadržavala je brojne ljudske kosturne ostatke. Kosturi su bili pobacani bez organizacije, no položaj pojedinih koštanih elemenata ukazuje na to da su u jamu deponirani najvjerojanije dok su tijela bila čitava. Ostaci kulturne građe bili su vrlo rijetki (pronađeno je samo nekoliko fragmentata keramike lasinjske kulture). Rezultati datiranja metodom radioaktivnog ugljika provedeni su na uzorku tri ljudske kosti, i to iz različitih dijelova (horizonata) jame. Sva tri rezultata ukazuju na vrijeme srednjega bakrenog doba, odnosno lasinjske kulture, oko 4100 godina pr. Kr. (Beta 233122: 5240 ± 40 ^{14}C BP;

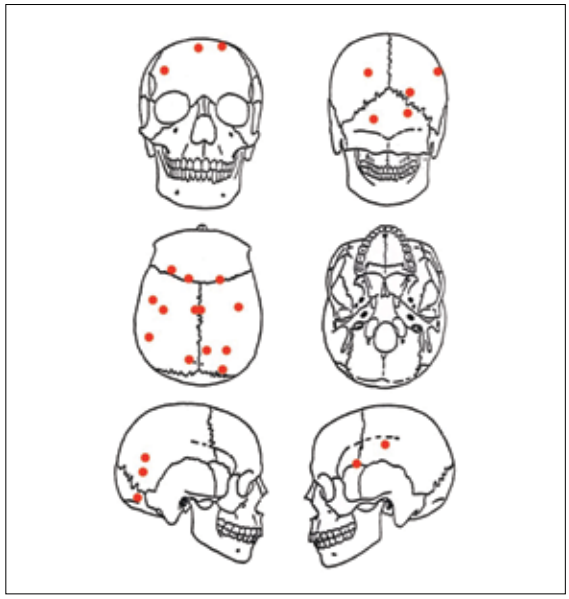
On the question of anthropological analyses of Copper Age finds from continental Croatia, so far the following has been published: analyses of skeletal remains from the eponymous site of the Vučedol culture (Teschler-Nicola & Berner 1994; Šlaus 2002; Hincak et al. 2007; 2013), burials from the Nama site in Vinkovci that belongs to the same culture (Hincak et al. 2007), a child burial from Josipovac-Gravinjak (Nikitović et al. 2012), human skeletal remains from Franjevac near Đakovo (Janković & Rajić Šikanjić 2011), Beli Manastir-Popova zemlja (Andrades Valtueña et al. 2017; Mathieson et al. 2018), as well as some skeletal finds from the mass grave from Potočani (Janković et al. 2017; Novak et al., in print).

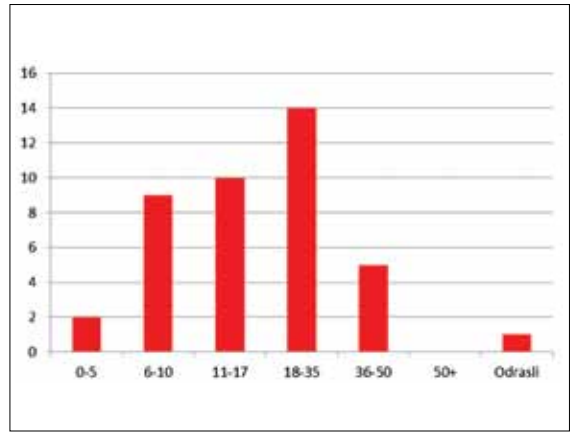
Bioarchaeological analyses of Copper Age finds from continental Croatia

The mass grave of the Lasinja culture in the Potočani village near Požega was discovered by chance in 2007, during the preparation works for the construction of a garage. A smaller pit (2x2 m in diameter, 1 m in depth) contained numerous human skeletal remains. The skeletons were randomly scattered, but the position of some skeletal elements suggested that they were probably deposited into the pit while the bodies were whole. The remains of material culture were sparse (only several fragments of pottery of the Lasinja culture were found). Radioactive carbon dating was done on three samples of human bones from three different layers of the pit. All three dates point to the Middle Copper Age period, i.e. the time of the Las-

Slika / Figure 1. Lubanja 1 iz Potočana s tragovima penetrirajućih ozljeda / Skull 1 from Potočani with traces of penetrating trauma (foto / photo: I. Janković).

Slika / Figure 2. Lubanja 5 iz Potočana s tragovima ozljede nastale udarcem tupim predmetom / Skull 5 from Potočani with traces of blunt force trauma (foto / photo: M. Novak).





Slika / Figure 4. Dobna distribucija uzorka iz Potočana / The age distribution of the sample from Potočani.

Slika / Figure 3. Distribucija ozljeda na lubanjama iz Potočana / The distribution of traumas on the skulls from Potočani. (crtež / drawing: M. Novak).

Beta 233123: 5310 ± 40 ^{14}C BP; UCIAMS 140250: 5325 ± 20 ^{14}C BP, Janković et al. 2017).

Analize koštanih ostataka provedene su na Institutu za antropologiju u Zagrebu. Budući da se ne radi o uobičajenom ukopu, već masovnoj grobnici, prvi izazov bio je ustanoviti broj osoba. Analize pokazuju da je na nalazištu prisutna najmanje 41 osoba. Zastupljene su sve dobne skupine, od djeteta starog otprilike 2 godine u trenutku smrti, do odrasle osobe stare oko 50 godina.

Spolna i dobna struktura odgovara manjoj zajednici (21 dijete mlađe od 18 godina, osam odraslih žena i 11 muškaraca te jedna odrasla osoba čiji se spol nije mogao sa sigurnošću utvrditi).

Najzanimljivija činjenica jest da se radi ne samo o masovnoj grobnici, već da je u slučaju Potočana moguće govoriti o egzekuciji manje zajednice. Naime, na 13 lubanja uočene su ozljede nastale u trenutku smrti, a brojnost ozljeda (ukupno 27 ozljeda nanesenih različitim predmetima), kao i položaj te spolna i dobna pripadnost žrtava svjedoči o nepotrebnom divljaštvu. Perimortalne traume prisutne su na lubanjama dva mala djeteta, četiri adolescenta, dvije mlađe žene, tri mlađa i dva muškarca srednje dobi.

Detaljni rezultati analiza četiriju lubanja iz Potočana (Janković et al. 2017), kao i preliminarni rezultati analiza ostatka uzorka (Novak et al., u tisku) pokazuju određene obrasce. Različiti tipovi ozljeda (posjekotine, ubodne i penetrirajuće

inja culture, about 4100 BC (Beta 233122: 5240 ± 40 ^{14}C BP; Beta 233123: 5310 ± 40 ^{14}C BP; UCIAMS 140250: 5325 ± 20 ^{14}C BP, Janković et al. 2017).

The analyses of skeletal remains were conducted at the Institute for Anthropological Research in Zagreb. Seeing as this was not a usual burial, but a mass grave, the first challenge was to establish the number of individuals. The analysis showed that there were at least 41 individuals at the site. All age groups were recorded, from a child who was about 2 years old at the time of death, to an adult who was about 50 years old

The age and sex distribution matches that of a smaller community (21 children younger than 18, eight adult women and 11 men, and one adult whose sex could not be established with certainty).

The most interesting fact is that, not only is this a mass grave, but that it is, in the case of Potočani, possible to discuss the execution of a smaller community. Namely, 13 skulls exhibit perimortem trauma, and the amount of traumas (a total of 27 injuries made by different objects), as well as the position, sex and age of the individuals, attest to the use of unnecessary violence. Perimortem traumas are present on the skulls of two infants, four adolescents, two younger women, three younger and two middle-aged men.

The detailed results of the analysis of four skulls from Potočani (Janković et al. 2017), as well as the preliminary results of analyses conducted on the

rane, ozljede nastale udarcima tupim predmetom) uglavnom su koncentrirane na stražnjim i gornjim dijelovima lubanje ili sa strane. Lokacija ozljeda, kao i činjenica da na kosturima tijela nisu uočene tzv. obrambene ozljede (tipične ozljede koje nastaju u sukobu i pokušaju da se zaštite vitalni dijelovi tijela i glave) sugeriraju da su ljudi iz Potočana bili pogubljeni. Niti populacijska struktura uzorka ne odgovara onoj koju bismo očekivali u oružanim sukobima jer su prisutna brojna djeca i ženske osobe. Na temelju rezultata analiza, terenske dokumentacije i datacije uzorka, najvjerojatnije je da je masovna grobnica iz Potočana rezultat jednog događaja kad su nepoznati počinitelji pogubili manju prapovijesnu zajednicu.

Osim perimortalnih ozljeda, na dijelu uzorka moguće je bilo ustanoviti i antemortalne ozljede, odnosno one nastale i zaliječene za života. Patološke promjene (poput hipoplazije zubne cakline, prisutnosti *cribra orbitalia* te makroporoznosti na području oko slušnog otvora) svjedoče o teškom životu i ishrani u kojoj je nedostajalo vitamina C te stresu tijekom djetinjstva. Na lubanji jednog djeteta uočena je i patološka promjena koja ukazuje na upalu moždane ovojnice. O prehrani osoba iz masovne grobnice u Potočanima detaljnije podatke pružit će analize stabilnih izotopa koje su u tijeku, a preliminarni rezultati govore u prilog tome da je prehrana populacije iz Potočana bila većim dijelom temeljena na proteinima životinjskog podrijetla. Nadalje, u suradnji s kolegama iz nekoliko stranih institucija provode se i analize drevne DNA koje će pružiti vrijedne podatke za daljnje analize srodnosti, populacijske pripadnosti i dr.

Lokalitet Gravinjak smješten je oko 4 km od slavonskog naselja Josipovac. Istraživanja tijekom 2007. godine potvrdila su postojanje naselja bakrenodobne badenske kulture, a rezultati radiometrijskih mjerenja (metodom radioaktivnog ugljika) smještaju naselje u razdoblje između 3500 i 2780 g. pr. Kr. Tijekom istraživanja, pod jednom od kuća (SJ 322) pronađen je kosturni ukop djeteta. Kostur je pronađen u zgrčenom položaju, na lijevoj strani, orijentiran u smjeru sjever-jug (Nikitović et al. 2012). Ovakav način ukopavanja i ranije je zamijećen u naseljima badenske kulture (Čataj 2009.). Rezultati određivanja starosti provedeni su direktno na kosturu (Beta 241675, 3490-3470 cal BC, Nikitović et al. 2012) i odgovaraju ranije spomenutim datumima za badensko naselje. Bioarheološke analize kostura provedene na Institutu za antropologiju u Zagrebu pokazale su zanimljive rezultate (Nirest of the sample (Novak et al., in print) display certain patterns. Different types of injuries (cuts, stabbing and penetrating wounds, blunt force trauma) are mostly concentrated in the back and on the upper parts of the skull, or on the side. The location of the injuries, and the fact that no, so called, defensive injuries (typical injuries obtained during physical fights and in attempts to protect the vital parts of the body and head) were found of the rest of the skeletons, suggests that the people from Potočani were executed. The population structure of the sample does not match what would be expected in armed conflicts because of the large number of children and women. Based on the results of the analyses, field documentation and sample datation, it seems most likely that the mass grave from Potočani is the result of a single event during which an entire smaller prehistoric community was executed by unknown perpetrators.

Apart from perimortem trauma, it was possible to establish antemortem trauma on a part of the sample, i.e. injuries that were obtained and healed while the person was alive. Pathological changes (such as dental enamel hypoplasia, the presence of *cribra orbitalia*, and macroporosity around the ear canal), attest to the harsh living conditions, a diet that did not include enough vitamin C, and stress during childhood. The skull of one child displayed pathological changes that indicate meningitis. More data on the dietary habits of individuals from the mass grave at Potočani will be provided by stable isotope analyses that are currently in progress. The preliminary results show that the diet of the population from Potočani was mostly based on animal proteins. Furthermore, ancient DNA analyses are being conducted in cooperation with colleagues from several foreign institutions, and they will definitely produce valuable data for further analyses of kinship, population affiliation, and so on.

The site of Gravinjak is situated about 4 km from the Slavonian village of Josipovac. The 2007 excavations confirmed the presence of a Copper Age settlement of the Baden culture, and the results of radiometric analyses (radiocarbon method) date the settlement to the period between 3500 and 2780 BC. During the excavations, a skeletal burial of a child was discovered under one of the houses (SU 322). The skeleton was in a crouched position on its left side, and its orientation was north-south (Nikitović et al. 2012). This kind of burial was previously recorded in settlements of the Baden culture (Čataj 2009). Radiocarbon dating was conducted directly on the

Slika / Figure. Terenska fotografija ukopa djeteta s lokaliteta Gravinjak / Field photograph of the child burial from Gravinjak (prema / after: Nikitović et al. 2012).

Slika / Figure 6. Lakatna i palčana kost djeteta s lokaliteta Gravinjak / The ulna and radius of the child from Gravinjak (foto / photo: I. Janković).

kitović et al. 2012). Analize starosti provedene na temelju rasta i razvoja zuba ukazuju na to da je dijete umrlo u dobi između 7,5 i 8,5 godina, iako su analize kosturnih ostataka sugerirale nešto mlađu dob (između 4,5 i 6 godina starosti) (za detaljnije rezultate vidi Nikitović et al. 2012). Ovaj nerazmjer između rezultata analiza dentalne i kosturne dobi najvjerojatnije je rezultat stresa koje je dijete doživjelo tijekom odrastanja, što je potkrijepljeno tragovima hipoplazije na prednjim zubima. Da je dijete imalo težak život pokazuju i rezultati paleopatološke analize kostura. Zamijećene su patološke promjene na laktu desne ruke (Sl. 6). nastale kao rezultat dislokacije koja nije bila liječena te je onemogućila normalan raspon pokreta.

Nalazište Franjevac otkriveno je tijekom zaštitnih istraživanja na trasi autoceste Beli Manastir-Osijek-Svilaj, dionica Osijek-Đakovo. Lokalitet je smješten jugoistočno od Satnice Đakovačke, a istraživanja su provedena 2007. godine, na ukupnoj površini od 36 000 m^2 (Balen 2011). Na temelju arheoloških nalaza, kao i rezultata datiranja metodom radioaktivnog ugljika, naselje je moguće pripisati kasnom bakrenom dobu, odnosno kostolačkoj kulturi (Balen 2011). Uz brojne nalaze kulturne ostavštine (keramika, kamene alatke, bakreni predmeti

skeleton (Beta 241675, 3490-3470 cal BC, Nikitović et al. 2012), and matches the aforementioned dates obtained from the settlement of the Baden culture. The bioarchaeological analyses of the skeleton, conducted at the Institute for Anthropological Research in Zagreb, gave interesting results (Nikitović et al. 2012). Age analyses were conducted based on tooth growth and development, and suggest that the child died at the age of between 7.5 and 8.5, although the analyses of skeletal remains suggested a somewhat younger age (between 4.5 and 6 years; for more detailed results, see Nikitović et al. 2012). This misbalance between the results of dental and skeletal age analyses is probably due to the stress the child had suffered as it grew, as was additionally confirmed by traces of hypoplasia on the front teeth. The results of paleopathological analysis of the skeleton also show that the child had a difficult life. The right elbow displayed pathological changes (Fig. 6) that resulted from a dislocation which was left untreated and disabled normal movement.

The site of Franjevac was discovered during the rescue excavations on the Beli Manastir-Osijek-Svilaj motorway, on the part between Osijek and Đakovo. The site is situated southeast of Satnica Đakovačka, and an area of 36 000 m^2 was excavated in 2007

i dr.) pronađeni su i ostaci životinjskih i ljudskih kostiju, kao i biljni ostaci (za rezultate analiza pojedinih vrsta nalaza vidi Balen 2011).

Detaljni rezultati analiza ljudskih kosturnih ostataka iz Franjevca objavljeni su u Janković i Rajić-Šikanjić (2011). Kosturni ostaci pronađeni su u jamama, a u uzorku je prisutno šest osoba, tri odrasle i tri osobe mlađe od deset godina starosti (Tab. 1). Zanimljivo je spomenuti da su u jami SJ 266 pronađeni kranijalni i postkranijalni ostaci, dok su u druge dvije jame (SJ 161 i SJ 306) pronađeni samo kranijalni ostaci. Određivanje starosti metodom radioaktivnog ugljika provedeno je direktno na uzorku ljudskih kosturnih ostataka (SJ 306, Beta 241653, 4210±40 BP, SJ 266, Beta 241651, 4190±40 BP, vidi Balen 2011). Zanimljiv je podatak da je unutar jame SJ 266, osim ljudskih kosturnih ostataka, pronađen i ukop dvije svinje (Balen 2011; Pasarić 2012).

(Balen 2011). Based on archaeological finds and the results of radiocarbon dating, the settlement was ascribed to the Late Copper Age, i.e. the Kostolac culture (Balen 2011). Along with numerous remains of material culture (pottery, stone tools, copper finds, etc.), the site also yielded animal and human skeletal, as well as plant remains (for the result of analyses of specific kinds of finds, see Balen 2011).

The detailed results of the analyses of human skeletal remains from Franjevac were published in Janković and Rajić-Šikanjić (2011). The skeletal remains were discovered in pits, and the sample includes six individuals, three adults and three children under the age of ten (Tab. 1). It is interesting to note that pit SU 266 yielded cranial and postcranial remains, while two other pits (SU 161 and SU 306) only yielded cranial remains. Radiocarbon dating was conducted directly on human skeletal remains (SU 306, Beta 241653, 4210±40 BP, SU 266, Beta 241651, 4190±40 BP; see Balen 2011). It is interesting to note that pit SU 266, other than human skeletal remains, also yielded the burial of two pigs (Balen 2011; Pasarić 2012).

JAMA/PIT	SPOL/SEX	DOB/AGE
SJ/SU 266	Muški/male	20-35
SJ/SU 161	Ženski/female	35-50
SJ/SU 161	Nije određen/not defined	5-10
SJ/SU 306 (lubanja/skull 1)	Nije određen/not defined	5-10
SJ/SU 306 (lubanja/skull 2)	Muški/male	odrasla osoba/adult
SJ/SU 306 (lubanja/skull 3)	Nije određen/not defined	0-5

Tablica / Table 1. Demografski podaci za ljudske kosturne ostatke s lokaliteta Franjevac / Demographic data for the human skeletal remains from Franjevac (prema / after: Janković & Rajić-Šikanjić 2011).

Što se tiče uočenih patoloških promjena na kostima, na sve tri lubanje koje su imale očuvane očnice zamijećena je *cribra orbitalia*. Nadalje, na dugim kostima osobe iz SJ 266 uočen je periostitis, odnosno upalni proces vanjskog sloja kosti. Ova patologija vrlo je česta u arheološkom uzorku i uglavnom je rezultat infekcije. Znanstveni rad na ljudskim kosturnim ostacima ovoga nalazišta nije završen.

Regarding pathological changes on bones, all three skulls that had preserved orbits displayed *cribra orbitalia*. Furthermore, the bones of the individual from SU 266 revealed periostitis, i.e. an inflammation of the outer layer of the bone. This pathology often occurs in archaeological samples and is mostly the result of an infection. The scientific analyses of human skeletal remains from this site are still in

Slika / Figure 7. Lubanja ženske osobe iz SJ 161 nalazišta Franjevac / The skull of a female from SU 161 at Franjevac (foto / photo: P. Rajić Šikanjić).

Slika / Figure 8. Kosturni ostaci muške osobe iz SJ 266 nalazišta Franjevac / The skeletal remains of a male from SU 266 at Franjevac (foto / photo: P. Rajić Šikanjić).

U tijeku su analize drevne DNA te stabilnih izotopa (dušika i ugljika) koje će pružiti mogućnosti za uvid u mnoge nove parametre, poput srodstva, populacijske pripadnosti, osobnih genetičkih odlika te prehrane.

Vučedol je eponimno i vjerojatno najpoznatije nalazište bakrenoga doba na prostoru Hrvatske. Na samom lokalitetu, smještenom na rubnim dijelovima današnjeg grada Vukovara, pronađeni su slojevi i kulture koji svjedoče o postojanju naselja u različitim razdobljima prapovijesti. Samim time pronađeni su i ukopi iz različitih razdoblja, no ovdje ćemo se osvrnuti samo na one iz razdoblja bakrenoga doba, odnosno vučedolske kulture. U prvome redu to su kosturni ukopi 13 osoba označeni kao Vukovar - Vučedol otkriveni prilikom istraživanja 1984. i 1985. godine (Teschler-Nicola & Berner 1994; Durman 2000; Hincak et al. 2007) (Tab. 2). Zanimljivo je da je osam kostura, pronađenih na dnu jame (jama 6, grob 3) (Durman 2000), kao i ostatke u grobu 3/112 koji je najvjerojatnije moguće pripisati nešto ranijem razdoblju bakrenoga doba, odnosno badenskoj kulturi (Šlaus 2002). Durman i Obelić (1989) donose nekoliko rezultata radiometrijske datacije uzoraka s Vučedola, uključujući i jedan iz jame 6 (Pit 6/85, Z-1637, 4322±100 BP nekal.), no kako se ne radi o datiranju provedenom na ljudskim kosturnim ostacima, u budućnosti bi trebalo razmisliti o takvoj vrsti datacije ljudskog koštanog materijala vučedolske kulture, što bi pružilo čvršće temelje za usporedbu i kronologiju bakrenodobnih ukopa na prostoru Hrvatske. Uz ostatke iz spomenute jame, istoj kulturi Hincak i suradnici (2007) pripisuju i ostatke 6 osoba s Vučedola, kao i ukop žene pronađen na lokalitetu Vinkovci-Hotel.

Antropološke analize koje su proveli M. Teschler-Nicola i M. Šlaus (Teschler-Nicola & Berner 1994; Šlaus 2002) pružaju uvid u najčešće patologije stanovnika Vučedola. Općenito govoreći, kosturni ostaci vučedolskih stanovnika pokazuju relativno dobro zdravlje. Učestalost patoloških promjena (npr. *cribra orbitalia*, karijes, tragovi infekcija, zaliječene frakture, osteoartritis i sl.) ne odskače od uobičajene u drugih populacija. Jedna od najzanimljivijih pojava uočenih na ukupno šest ženskih i jednoj muškoj lubanji jesu neobična udubljenja (lezije) (Teschler-Nicola & Berner 1994; Durman 2000; Hincak et al. 2007). Na lubanji muškarca iz groba 3/4 udubljenje je prisutno na čeonoj kosti, što je slučaj i kod lubanje žene iz groba 3/2. Kod svih ostalih lubanja (grob 2, grob 3/1, 3/3, 3/5 i 3/8, sve pripadaju ženskim osobama) osim udubljenja

progress. Ancient DNA and stable isotope analyses (nitrogen and carbon) are ongoing, and they will allow for the study of new parameters, such as kinship ties, population affiliation, personal genetic traits and dietary habits.

Vučedol is the eponymous, and probably the most famous Copper Age site in Croatia. The site itself, situated on the periphery of today's city of Vukovar, yielded layers and cultures that attest to the existence of settlements from different periods of prehistory. As such, it also yielded burials from different periods. However, this paper will only refer to those dated to the Copper Age, i.e. the Vučedol culture. Primarily, this includes the skeletal burial of 13 individuals that were marked as Vukovar-Vučedol when discovered in the 1984 and 1985 excavations (Teschler-Nicola & Berner 1994; Durman 2000; Hincak et al. 2007; Tab. 2). It is interesting to note that eight skeletons, that were discovered at the bottom of a pit (pit 6, grave 3) (Durman 2000), as well as the remains from grave 3/112 can probably be ascribed to a somewhat earlier period of the Copper Age, that is, to the Baden culture (Šlaus 2002). Durman and Obelić (1989) published several results of radiometric datations of samples from Vučedol, including one from pit 6 (pit 6/85, Z-1637, 4322±100 BP non cal.). However, seeing as the dates were not obtained from human skeletons, such a datation of human skeletal remains of the Vučedol culture should be conducted in the future in order to lay the foundations for comparisons and the chronology of Copper Age groups on Croatian territory. Along with the remains from the aforementioned pit, Hincak et al. (2007) analyzed the remains of six individuals from Vučedol, and the burial of a woman from the Vinkovci-Hotel site, also attributed to the Vučedol culture.

The anthropological analyses conducted by M. Teschler-Nicola and M. Šlaus (Teschler-Nicola & Berner 1994; Šlaus 2002) give insight into the most common pathologies of the inhabitants of Vučedol. Generally speaking, the skeletal remains of the Vučedol population indicate relatively good health. The frequency of pathological changes (e.g. *cribra orbitalia*, caries, traces of infections, healed fractures, osteoarthritis, and the like) does not deviate from what is common in other populations. One of the most interesting features recorded on a total of six female and one male skull includes unusual indents (lesions; Teschler-Nicola & Berner 1994; Durman 2000; Hincak et al. 2007). The indent on the skull of the man from grave 3/4 is on the frontal bone, as is

GROB/GRAVE	SPOL/SEX	DOB/AGE
1	Muški/male	40-45
2	Ženski/female (?)	17-20
1/1 (sjeverni ukop/ northern burial)	Muški/male (?)	15-17
1/1 (sjeverni ukop/ northern burial)	Nije određen/not defined	7-8
1/2 (južni ukop/ southern burial)	Ženski/female	20-25
3/1	Ženski/female	20-25
3/2	Ženski/female	25-30
3/3	Ženski/female	25-30
3/4	Muški/male	40-45
3/5	Ženski/female	45-55
3/6	Ženski/female	35-40
3/7	Nije određen/not defined	Oko/about 9
3/8	Ženski/female	20-21
2*	Ženski/female	25-29
4 (jama/pit 26)	Ženski/female	20-24
5 (jama/pit 83)	Ženski/female (?)	12±6 mjeseci/months
3 (jama/pit 9, osoba/ person A)	Muški/male (?)	9-10
3 (jama/pit 9, osoba B)	Ženski/female	17-19
Lubanja/skull Q	Muški/male	+60
2 (jama/pit 10)	Ženski/female	45-50

Tablica / Table 2. Demografski podaci za ljudske kosturne ostatke s lokaliteta Vučedol i Vinkovci-Hotel* / Demographic data for the human skeletal remains from Vučedol and Vinkovci-Hotel* (prema / after: Teschler-Nicola & Berner 1994; Hincak et al. 2007).

na čeonoj kosti prisutno je i udubljenje na središnjem šavu tjemenih kostiju (Teschler-Nicola & Berner 1994). Prema Durmanu (Durman 2000), ova udubljenja rezultat su kultne prakse (inicijacije) kod koje je na glave iniciranih lijevan rastopljen bakar. Ova hipoteza svakako zaslužuje pažnju te bi detaljnije analize mogle pružiti uvid u etiologiju ovog zanimljivog fenomena.

Na lokalitetu Beli Manastir-Popova zemlja, osim ukopa starčevačke i sopotske kulture, pronađena su i dva groba vučedolske kulture. Grob 17 pripada mlađem muškarcu (25-30 godina starosti) (Sl. 9) te grob 15 u kojem je pronađen kostur starijeg muškarca (50-60 godina starosti). Mlađi muškarac je za života pretrpio ozljedu desne tjemene kosti, a osim ove traume na kosturu je vidljiva i zaliječena *cribra orbitalia* kao i zaliječena upala koštane ovojnice na desnoj natkoljenici i potkoljenici. Na kosturu starijega muškarca također su vidljivi tragovi upale koštane ovojnice na desnoj bedrenoj kosti kao i kostima potkoljenice, a poodmakla

also the case on the female skull from grave 3/2. On all the other skulls (grave 2, grave 3/1, 3/3, 3/5 and 3/8, all female) beside the indents on the frontal bone, there were indents on the central suture of the parietal bones (Teschler-Nicola & Berner 1994). According to Durman (2000), these indents are the result of a cult-related practice (initiation), during which melted copper was poured onto the head of the initiate. This hypothesis is certainly interesting, and future analyses could provide insight into the etiology of this phenomenon.

The site of Beli Manastir-Popova zemlja, in addition to burials of the Starčevo and Sopot cultures, also yielded two graves of the Vučedol culture. Grave 17 contained the remains of a younger man (25-30 years of age; Fig. 9), and grave 15 included the remains of an older man (50-60 years of age). In his life, the younger man suffered an injury to the right parietal bone, and the skeleton also revealed traces of healed *cribra orbitalia*, and a healed inflammation of the right femur and tibia. The skeleton of the old-

Slika / Figure 9: Grob 17 s nalazišta Beli Manastir-Popova Zemlja / Grave 17 from Beli Manastir-Popova Zemlja site (foto / photo: Dž. Los).

dob rezultirala je i pojavom osteoartritisa dijela kralježnice. Kostur iz groba 17 direktno je datiran metodom radioaktivnog ugljika, a dobiveni rezultat od 4176±28 godina prije sadašnjosti odgovara razdoblju vučedolske kuture. Uz kostur iz groba 15 pronađena je posuda vučedolske kulture. Vjerojatno najzanimljiviji podatak vezan uz kosturne ostatke iz Popove zemlje vezan je uz rezultate analize drevne DNA koja je rezultirala uspješnom izolacijom genoma kuge (*Yersinia pestis*) (Andrades Valtueña et al. 2017). Time je muškarac iz groba 17 nalazišta Popova zemlja postao do sada najraniji dokumentirani slučaj ove bolesti u Europi.

U novije vrijeme razvoj metodologije i tehnika analiza drevne DNA (aDNA) rezultira i brojnim novim analizama arheoloških uzoraka. Uz rezultate spomenute analize grobova iz Belog Manastira, isti uzorci, uz mnoge druge s područja sjeveroistočne Europe (uključujući i dva uzorka iz Vučedola, grob 1/1 i grob 3/6) pružili su vrijedne podatke o genetičkoj strukturi, populacijskom širenju kao i kulturnim aspektima, poput širenja zemljoradnje (Mathieson et al. 2018).

er man also revealed traces of right femur, tibia and fibula and, in addition, the man's age resulted in the occurence of osteoarthritis on a part of the spine. The skeleton from grave 17 was directly dated by the radiocarbon method, and the result, 4176±28 BP, fits into the time span of the Vučedol culture. A vessel of the Vučedol culture was discovered along with the skeleton in grave 15. Probably the most interesting thing about the skeletal remains from Popova zemlja includes the results of ancient DNA (aDNA) analysis, through which it was possible to successfully extract the genome of plague (*Yersinia pestis*) (Andrades Valtuena et al. 2017). Thus, the man from grave 17 from Popova zemlja is, up to now, the oldest recorded case of this disease in Europe.

In recent times, the development of methodology and techniques applied in ancient DNA (aDNA) analyses has resulted in numerous new analyses of archaeological samples. The aforementioned results results of grave analyses from Beli Manastir, as well as many others from southeastern Europe (including two samples from Vučedol, grave 1/1 and grave 3/6) have provided valuable data about the genetic structure, population expansion, as well as cultural aspects, such as the spread of agriculture (Mathieson et al. 2018).

Zaključak

Porast svijesti o važnosti analiza ljudskog kosturnog materijala iz arheološkog konteksta posljednjih desetljeća rezultirao je porastom broja znanstvenih analiza. Nadalje, tehnološka dostignuća i interdisciplinarni pristup problematici rezultirao je, osim standardnim bioarheološkim analizama, i drugim vrstama uvida u prošlost (primjerice analize stabilnih izotopa i analize drevne DNA). Iako bioarheološke i druge vrste analiza polako postaju uvriježen standard u arheologiji (kako u svijetu tako i u Hrvatskoj), bioarheolozi se susreću s brojnim problemima. Jedan od najvećih je nedostatak podataka (bilo samih kosturnih nalaza koji ili nisu bili skupljani ili su skupljani selektivno ili su nakon iskopavanja zagubljeni, ili podataka o kontekstu nalaza koji su, pogotovo u slučaju ranijih istraživanja, vrlo oskudni ili sasvim nedostaju). Nadalje, ukoliko su i provedene znanstvene analize kosturnih ostataka s hrvatskih arheoloških nalazišta, uglavnom se radi o standardnim biantropološkim

Conclusion

The increased awareness on the importance of analyzing human skeletal remains from archaeological contexts has, in the last decades, resulted in an increase of scientific analyses. Furthermore, the technological advances and interdisciplinary approaches to the problem have resulted in, apart from standard bioarchaeological analyses, other kinds of insight into the past (for example, stable isotope analyses and analyses of ancient DNA). Even though bioarchaeological and other kinds of analyses are slowly becoming a standard in archaeology (both in the world, and in Croatia), bioarchaeologists encounter numerous problems. One of the greatest shortcomings is lack of data (be it of the skeletal remains that were not collected, were collected selectively, were lost after the excavations, or the data about the context of discovery, especially in the case of older excavations, being sparse or nonexistent). Furthermore, in cases where scientific analyses had been conducted on skeletal remains

analizama, a tek u rijetkim slučajevima i analizama poput spomenutih studija stabilnih izotopa i drevne DNA. U svjetlu ubrzanog razvoja arheološke znanosti (kako u tehničkom, tehnološkom, tako i u teoretskom smislu), nužno je problematici vezanoj uz antropološku građu iz arheološkog konteksta pristupiti multi- i interdisciplinarno. Pouzdana kronološka slika i rezultati direktne datacije ljudskoga kosturnog materijala, standardne, ali i novije vrste bioarheoloških analiza, upotrebe suvremenih tehničkih i tehnoloških pristupa (poput radiografskih metoda, kemijskih i molekularnih analiza i dr.) te spomenuti multi- i interdisciplinarni pristup rezultirat će puno detaljnijim uvidom u biološke, ali i sociokulturne aspekte života (i smrti) minulih populacija.

Ovo istraživanje financirano je i provedeno u sklopu znanstvenoistraživačkog projekta HRZZ IP-2016-06-1450 (PASTLIVES).

from Croatian archaeological sites, they mostly included the standard bioarchaeological analyses, and only seldom analyses such as studies of stable isotopes and ancient DNA. In the light of the rapid development of the archaeological science (in both a technical, technological, and theoretical sense), it is necessary to approach the problems of anthropological material from archaeological contexts through multi- and interdisciplinary perspectives. A reliable chronological framework and the results of direct radiocarbon datation of human skeletal remains, the standard, as well as newer kinds of bioarchaeological analyses, the application of modern technical and technological approaches (such as radiographic methods, chemical and molecular analyses, etc.), and the mentioned multi- and interdisciplinary approaches, will result in a far more detailed insight into the biological, but also the social and cultural aspects of life (and death) of past populations.

This study was financed and conducted as a part of the research project HRZZ IP-2016-06-1450 (PASTLIVES).

Literatura / Bibliography

Andrades Valtueña, A., Mittnik, A., Key, F. M., Haak, W., Allmäe, R., Belinskij, A., Daubaras, M., Feldman, M., Jankaussas, R., Janković, I., Massy, K., Novak, M., Pfrengle, S., Reinhold, S., Šlaus, M., Spyrou, Am.A., Szécsényi-Nagy, A., Tõrv, M., Hansen, S., Bos, K.I., Stockhammer, P.W., Herbig, A., Krause, J. 2017, The Stone Age Plague and its Persistence in Eurasia, *Current Biology* 27, 1-9.

Balen, J. 2011, *Đakovo-Franjevac. Kasnobakrenodobno naselje,* Katalozi i monografije Arheološkog muzeja u Zagrebu sv. 7, Zagreb, Arheološki muzej u Zagrebu.

Čataj, L. 2009, Badenska kultura, in: L. Čataj (ed.), *Josipovac Punitovački – Veliko polje. Eneolitičko, brončanodobno i srednjevjekovno naselje. Zaštitna arheološka istraživanja na trasi autoceste A5,* Zagreb, Hrvatski restauratorski Zavod.

Durman, A. & Obelić, B. 1989, Radiocarbon dating of the Vučedol complex., *Radiocarbon* 31 (3),1003-1009.

Durman, A. 2000, *Vučedolski Orion i najstariji europski kalendar*, Zagreb. Arheološki muzej u Zagrebu.

Hincak, Z., Cavalli, F., Durman, A. 2013, The cranial analysis of eight skulls from collective grave of the early Bronze Age Vučedol site (East Slavonia, Croatia), *Collegium Antropologicum* 37 (1), 229-237.

Hincak, Z., Drmić-Hofman, I., Mihelić, D. 2007, Anthropological analysis of neolithic and Early Bronze Age skeletons – a classical and molecular approach (East Slavonia, Croatia), *Collegium Antropologicum* 31 (4), 1135-1141.

Janković, I., Balen, J., Ahern, J. C. M., Premužić, Z., Čavka, M., Potrebica, H., Novak, M. 2017, Prehistoric Massacre Revealed. Perimortem Cranial Trauma from Potočani, Croatia, *Anthropologischer Anzeiger* 74 (2), 131–141.

Janković, I. & Rajić Šikanjić, P. 2011, Analiza ljudskog kosturnog materijala, in: J. Balen (ed.) *Đakovo - Franjevac. Kasnobakrenodobno naselje*, Katalozi i monografije Arheološkog muzeja u Zagrebu sv. 7, Zagreb, Arheološki muzej u Zagrebu, 136-145.

Mathieson, I. et al. 2018, The genomic history of Southeastern Europe. *Nature* 555 (7695), 197-203.

Nikitović, D., Janković, I., Mihelić, S. 2012, Juvenile elbow dislocation from the prehistoric site of Josipovac - Gravinjak, Croatia, *International Journal of Paleopathology* 2, 36-41.

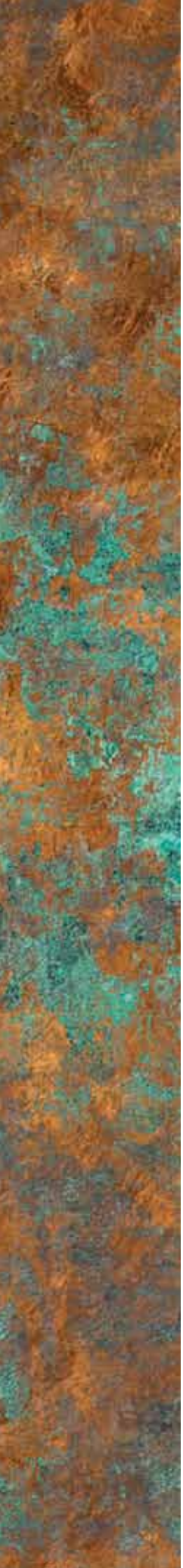
Novak, M., Janković, I., Čavka, M., Ahern, J.C.M., Premužić, Z., Potrebica, H., Balen, J. *u tisku*, Ukopi lasinjske kulture na području Hrvatske s posebnim osvrtom na nalaz iz Potočana, Arheološka istraživanja Bjelovarsko-bilogorske županije i okolnih krajeva, Izdanja Hrvatskog arheološkog društva 32.

Pasarić, M. 2012, *Životinjski ritualni ukopi i idoloplastika u prapovijesti kontinentalne Hrvatske*, doktorska disertacija, Sveučilište u Zagrebu.

Rajić Šikanjić, P. 2005, Bioarchaeological research in Croatia, *Collegium Antropologicum* 29 (2), 763-768.

Šlaus, M. 2002, *The bioarchaeology of continental Croatia*, BAR International Series, Oxford, Archaeopress.

Teschler-Nicola, M. & Berner, M.E. 1994, Zur Anthropologie der eneolitischen Funde aus Vučedol, in: *Die Neandertaler und die Anfänge Europas*, Eisenstadt, Burgenlandisches Landesmuseum.



Ukopi životinja u eneolitičkim naseljima kontinentalne Hrvatske

Animal burials in Eneolithic settlements of continental Croatia

Maja Pasarić

Institut za etnologiju i folkloristiku
Institute of Ethnology and Folklore Research
Zagreb
maja@ief.hr

Prisutnost životinja u pogrebnom ritusu jednako kao i prikazi životinja u umjetničkom izrazu pojedinih prapovijesnih populacija mogu pružiti različite informacije o duhovnom životu zajednica, njihovom gospodarskom i društvenom uređenju te odnosu ljudi i životinja. Ponekad je u pogrebnim praksama životinjama pripisana ključna uloga te putem njih ne doznajemo isključivo o ljudskim zajednicama i mjestu životinja u njihovom svjetonazoru, nego detaljno sagledavanje arheološkog konteksta pruža saznanja i o životinjama samima, odnosno o njihovim biografijama kako ih naziva Morris[1] (2011; 2018).

Proteklih desetljeća uslijed velikih zaštitnih arheoloških istraživanja na području kontinentalne Hrvatske došlo je do otkrića niza životinjskih ukopa koji kronološki pripadaju razdoblju eneolitika, tj. lasinjskoj, badenskoj, kostolačkoj i vučedolskoj kulturi. Ti nalazi, zajedno s nekolicinom u arheološkoj literaturi od ranije poznatih ukopa, pozivaju na ponovno razmatranje teme. Eneolitičke ukope životinja možemo podijeliti na ukope koji sadrže cjelovite ili gotovo cjelovite kosture jedne ili više životinja, ukope koji sadrže djelomično sačuvane kosture jedne ili više životinja i mješovite ukope koji sadrže cjelovite i djelomično sačuvane kosture više individua i/ili vrsta životinja, a također bilježimo i zajedničke ukope životinja i ljudi (Pasarić 2012). Većina eneolitičkih ukopa životinja

1 Prema Jamesu Morrisu (2011; 2018) biografski pristup podrazumijeva detaljno sagledavanje tafonomskih podataka te razmatranje cjelokupnoga životnoga ciklusa pojedinog ukopa, tj. različitih trenutaka u životu i smrti pojedine životinje.

The presence of animals in burials, as well as the depictions of animals in the artistic expression of certain prehistoric communities, can provide different information on the spiritual lives of the communities and their economic and social organization, as well as the relation between man and animals. Animals are sometimes ascribed the key role in burial practices, which not only can provide information about human communities and the place that the animals held in their world-view, but a detailed studies of an archaeological context can also provide insight into the animals themselves or their biographies, as described by Morris (2011; 2018).[1]

Due to the extensive rescue archaeological excavations in continental Croatia over the last decades, a series of animal burials was discovered and ascribed to the Eneolithic Lasinja, Baden, Kostolac and Vučedol cultures. These finds, along with a few previously published burials, call for a review of the topic. Eneolithic animal burials can be divided into burials that contain complete or almost complete skeletons of one or several animals, burials that contain partial skeletons of one or more animals, mixed burials with several specimens and/or kinds of animals, as well as combined burials of animals and humans (Pasarić 2012). Most Eneolithic animal burials in continental Croatia were discovered in pits within settlements. The settlement is the area where the intensive interaction between man and

1 According to James Morris (2011; 2018), the biographical approach includes a detailed study of all taphonomic data and taking the entire life cycle of a specific burial into consideration, i.e. the different moments in the life and death of a specific animal.

na tlu kontinentalne Hrvatske pronađena je u jamama unutar naselja. Naselje je prostor u kojem se odvijala interakcija čovjeka sa životinjama te su se stvarale i mijenjale dinamike njihova odnosa. Dijeljenje svakodnevnoga života u naseljima utječe i na stvaranje zajedničkih životnih ritmova ljudi i životinja te razvoj međusobnoga odnosa povjerenja, kako je to na primjeru jedne južnoskandinavske stočarske brončanodobne populacije istaknula Armstrong Oma (2010). Životinje su, neminovno, bile i hrana, a njihovi ostaci upotrebljeni kao sirovina za izradu različitih predmeta ili pak odbačeni. Kako pokazuju ukopi životinja, pojedine životinje mogle su biti i dijelom ritualnih aktivnosti, možda i ritualno ubijene ili žrtvovane, te u konačnici pokopane.

Ritualni kod

Ritual, jednako kao i religija, tema je koja je tijekom povijesti antropološku i arheološku struku poticala na mnogobrojne rasprave, često i zastupanje oprečnih stavova pa čak i na sugestije za potpunim odbacivanjem ovoga pojma (Bell 1992; Brück 1999; Groot 2008; Morris 2011). Do danas ne postoji suglasnost oko jedinstvene definicije rituala, nego su one znatno uvjetovane različitim prostornim i vremenskim odrednicama. Kako to ističu Livarda i Madgwick (2018), bez obzira na definiciju rituala, ritualne aktivnosti možemo sagledati kao prakse putem kojih neka zajednica izražava sve ono što joj je važno – vjerovanja, bihevioralne i moralne stavove. Opširan, te do danas relevantan antropološki doprinos istraživanjima rituala donosi Bell (1992). Strukturirano ponašanje prema pravilima kao što su formalnost, repetitivnost, performativnost i sakralni simbolizam (tj. odnos prema nadnaravnom ili nekoj "naddruštvenoj" vrijednosti) neke su od prepoznatljivih karakteristika ritualnih aktivnosti (Bell 1992). U praktičnom smislu rituali se izvode kako bi uredili, popravili ili transformirali određenu situaciju (Bell 1992).

Kada je riječ o ukopima životinja u arheološkoj literaturi se najčešće susreće pretpostavka da ukopani osteološki ostaci svjedoče o žrtvovanim životinjama (Durman 1988; Jurišić 1990; Hoti 1993; Horváth 2012; Morris 2011). Žrtvovanje prepoznajemo kao posebnu vrstu rituala u kojem životinje ili ljudi budu ubijeni, predmeti i hrana uništeni, a njihovo tijelo ili suština ponuđeni bogovima (Groot 2008). Dok razlozi za žrtvovanje mogu biti brojni, konkretan kontekst žrtvovanja ne mora uvijek biti očit u arheološkom materijalu (Russell & Düring

animal took place, and the place where the meanings ascribed to animals emerged and transformed. Sharing everyday life in settlements also affected the development of mutual life rhythms of people and animals, and the development of a mutual trust, as shown by Armstrong Oma (2010) on an example from one southern Scandinavian farming Bronze Age population. Animals could have been eaten, and their remains either used as raw material for the production of different objects, or simply discarded. As shown by animal burials, they could also have had a significant ritualistic role, and could have been ritually slaughtered, sacrificed, and buried.

Ritual code

Ritual, just like religion, is a topic that have sparked many discussions throughout the history of anthropology and archaeology, often leading to opposing attitudes and even suggesting that the term be completely renounced (Bell 1992; Brück 1999; Groot 2008; Morris 2011). Up to this day there is still no consensus about a single definition of ritual, and the definitions are significantly influenced by different spatial and temporal determinants. As pointed out by Livarda and Madgwick (2018), regardless of the definition of ritual, ritualistic activities can be seen as practices that were used by a certain community to express what it felt was important – beliefs, behavioral and moral attitudes. An extensive, and still relevant, anthropological contribution to the research of rituals was made by Bell (1992). Structured behavior in accordance with rules such as formality, repetitiveness, performance and sacral symbolism /i.e. the relation with a higher or "above-societal" value) are some of the recognizable characteristics of ritualistic activities (Bell 1992). In a practical sense, rituals are performed in order to establish, repair or transform a certain situation (Bell 1992).

When it comes to animal burials, archaeological publications most often suggest that the buried osteological remains attest to sacrificed animals (Durman 1988; Jurišić 1990; Hoti 1993; Morris 2011; Horváth 2012). Sacrificing is a special kind of ritual wherein animals or people are killed, objects and food destroyed, and their bodies or essence is offered to the gods (Groot 2008). While the reasons for sacrificing can be numerous, the context of a sacrifice must not always be evident in the archaeo-

2006) budući da on svjedoči isključivo o materijalnim ostacima ljudskog djelovanja. O žrtvovanju govore povijesni, etnografski i antropološki izvori bilježeni diljem svijeta te je ta praksa sastavni dio gotovo svake religije. Na primjer, žrtvene aktivnosti grčke i rimske religije dobro su poznate, a srodne prakse prepoznat ćemo i u judeo-kršćanskoj i muslimanskoj tradiciji (Burkert 1983; Hoti 1993; Janićijević 1986). Neki autori postupke žrtvovanja prepoznaju već kod paleolitičkih lovaca dok ih drugi povezuju isključivo s usmrćivanjem domaćih životinja u agrarnim ili stočarskim društvima (Burkert 1983; Smith 1987). Velika ovisnost stočara o svojim stadima stvara potrebu za održavanjem ravnoteže u reciprocitetu uzimanja i davanja životne sile te je i upravljanje stadima moglo biti bazirano na njenom recipročnom tijeku i ideji da ispravno žrtvovanje stvara više životinja (Mlekuž 2007). Ta nas pretpostavka navodi nas da određene rituale shvatimo i kao ekonomski vrlo važne (Groot 2008). Odnosno, na žrtvovanje životinje koja kasnije nije korištena za hranu možemo gledati manje kao gubitak mesa za zajednicu, a više kao način kojim će se osigurati plodnost životinja te blagostanje zajednice.

U predmodernim društvima u kojima je religija sastavni dio svakodnevnog života malo je vjerojatno da je ljudsko ponašanje uvjetovano strogo razdvojenim ekonomskim i simboličnim impulsima stoga je i materijalne ostatke ritualnih aktivnosti moguće pronaći u naseljima gdje su rituali usko povezani s tamošnjim svakodnevnim životom. Bradley (2003) napominje da je u prapovijesti ponekad teško razdvojiti praktične i ritualne aktivnosti što postaje razvidno i kod eneolitičkih ukopa životinja iz kontinentalne Hrvatske. Na primjer, ostaci životinja kao i predmeti mogu biti položeni u zemlju na strukturiran, formalan i repetativan način, ali ostaju sastavnim dijelom svakodnevnog života u naselju time što su položeni u jame koje su se nekada koristile za spremišta ili se pak životinje nalaze u jamama koje kasnije služe za odlaganje otpada. Prema nekim mišljenjima upravo je usmjerenost na strukturiranost i "pravila" koja mogu biti vidljiva u arheološkom materijalu prvenstveno važna kod razmatranja ritualnih aktivnosti u arheologiji (Groot 2008). Dok kod eneolitičkih ukopa životinja možemo zamijetiti određene repetitivne obrasce i "pravila" poput lokacije ukopa, položaja tijela životinje i drugih, interpretacije ukopa odnosno razumijevanje aktivnosti ili razloga koji dovode do njihove pojave za sada ostaju na razini pretpostavki.

logical material (Russell & Düring 2006), seeing as it testifies exclusively about the material remains of human activities. Sacrificing is discussed in historical, ethnographical and anthropological sources from all over the world, and this practice is an integral part of almost every religion. For example, the sacrificial activities of Greek and Roman religions are well known, and similar practices can also be seen throughout the history of the Judeo-Christian and Muslim traditions (Burkert 1983; Janićijević 1986; Hoti 1993). Some authors recognize sacrificial behavior in the context of Paleolithic hunters, while others connect them exclusively with the slaughtering of domesticated animals in agrarian or pastoral societies (Burkert 1983; Smith 1987). The great dependency of cattle-breeders on their herds creates a need for preserving balance in the reciprocity of taking and giving life force. Managing herds could have been based on the reciprocal flow of the life force, and the idea that righteous sacrifices created more animals (Mlekuž 2007). The latter suggests that certain rituals should be seen as economically important (Groot 2008), meaning that the sacrificing of animals that were then not used for food can be seen as less of a loss of meat for the community, and more as a means to ensure animal fertility and the community's well-being.

In pre-modern societies, when religion was a constituent part of everyday life, it is unlikely that human behavior was governed by strictly divided economic and symbolic aspects, making it possible to detect material traces of ritualistic activities within settlements where the rituals were closely connected to everyday life. Bradley (2003) points out that, when studying prehistory, it is sometimes difficult to separate practical and ritualistic activities, as is also clear when dealing with Eneolithic animal burials in continental Croatia. For example, animal remains and items can be buried in a structured, formalized and repetitive manner, but they remain a constituent of everyday life in a settlement by being laid into pits that had previously been used for storage, or animals could have been placed into pits that were later used for depositing waste. According to some opinions, precisely the focus on structure, and "rules" that can be seen in the archaeological material, are of the utmost importance when studying ritualistic activities in archaeology (Groot 2008). While Eneolithic animal burials display certain repetitive patterns and "rules", such as burial location, body position and others, the interpretations of burials, i.e. understanding the activities or reasons that lead to their creation are, so far, still only speculative.

Ukopi životinja kao prostorne i vremenske odrednice života u naselju

Lokacije ukopa životinja u eneolitičkim naseljima kontinentalne Hrvatske upućuju na njihovu povezanost s određenim stambenim prostorima i naseobinskim objektima. Premda ni jedan od ukopa životinja nije pronađen u temeljima ili rovovima kuća nije isključena mogućnost da nisu bili povezani s njihovim životnim ciklusima. Prema podjeli koju za žrtvene prinose kućama donosi Gerritsen (2003) prvoj kategoriji pripadaju oni prinosi do kojih je došlo tijekom ili neposredno nakon gradnje kuće. Takozvane žrtve temeljice, nalaze se najčešće u bazama stupova, u rovovima zidova ili blizu ulaza u kuću. Drugu kategoriju čine prinosi dani tijekom života u kući ili za njenog napuštanja (Gerritsen 2003). Prema etnografskim izvorima prinošenje životinjskih žrtvi za vrijeme gradnje kuće ili nakon njezina završetka imalo je višestruku apotropejsku funkciju. Njima se željelo zaštititi buduće stanare, kući osigurati čvrstoću i stabilnost te umiriti duhove prirode uznemirene za vrijeme gradnje (Schneeweis 2005). Takve vrste prinosa bilježene su u etnografskim izvorima sa naših prostora sve do prve polovice 20. stoljeća.

Istraživanja na Vučedolu provedena 80-ih godina prošlog stoljeća zabilježila su ostatke psa u podu kuće vučedolske kulture (Jurišić 1990). Premda nisu poznate sve okolnosti tog nalaza, riječ je o lokaciji koja bi eventualno mogla sugerirati gradbenu žrtvu. Primjer žrtvovanja psa prilikom gradnje kuće ili naselja možda je najočitiji na nalazištu Berettyóújfalu-Herpály u susjednoj Mađarskoj (Herpály kultura) gdje je osam pasa bilo poredano na dnu jame uz zid kuće (Zalai-Gaál 1994) ili na nalazištu Vedrovice-Za dvorem u Češkoj (lengyelska kultura) gdje je kompletan kostur psa bio pokopan u rupi od stupa (Humplová & Ondruš 1999). U blizini naseobinskog objekta, odnosno uz dio kuće s podnicom, pronađena je i jama sa cjelovitim kosturom goveda, SJ 15/16 na nalazištu Aljmaš-Podunavlje (Šimić 2007).

Parcijalan ukop divljeg goveda (*Bos primigenius*) iz Koprivničke Rijeke-Rudine zabilježen je u jami koja se osim po brojnima ulomcima keramičkih posuda isticala svojim centralnim položajem u naselju (Marković 1981). Štoviše, jama se nalazila uz jedini nadzemni objekt na nalazištu za koji se pretpostavlja da pripada rodovskom starješini (Marković 1981). Slična je i lokacija poznatog ukopa jelena s vučedolskog Gradca povezanog s

Animal burials as spatial and temporal determinants of life in a settlement

The locations of animal burials in Eneolithic settlements of continental Croatia suggest that they were connected with certain living areas and settlement structures. Although none of the burials were found within the foundations or trenches of houses, it is still possible that they were connected to their life cycles. According to Gerritsen's (2003) division of sacrificial offerings for houses, the first category includes those that occurred during or right after the house was built. The, so called, "foundation sacrifice", is most often found at the bases of post holes, in wall ditches or near the house entrance. Another category includes sacrifices made during the occupancy of the house, or at the time the house was abandoned (Gerritsen 2003). Based on ethnographic sources, making sacrifices during house construction, or its finalization, had a multifold apotropaic function. They were aimed at protecting the future inhabitants, ensure the house would be firm and stable, and to appease the spirits of nature that were disturbed during construction works (Schneeweis 2005). Such sacrifices were recorded in ethnographic sources from our territory until the first half of the 20th century.

The excavations conducted during the 1980s at Vučedol yielded the remains of a dog under the floor of a house ascribed to the Vučedol culture (Jurišić 1990). Even though not all of the circumstances of the find are known, the location is interesting, and could suggest a sacrifice related to construction. Examples of sacrificing dogs during house or settlement construction is perhaps most obvious at the site of Berettyóújfalu-Herpály in the neighboring Hungary (the Herpály culture), where eight dogs were lined up at the bottom of a pit next to a house wall (Zalai-Gaál 1994), or at the site of Vedrovice-Za dvorem in the Czech Republic (the Lengyel culture), where a complete dog skeleton was discovered in a post hole (Humplová and Ondruš 1999). The site of Aljmaš-Podunavlje yielded a pit with the complete skeleton of a bovid, SU 15716, near a residential structure, i.e. along a house with a floor (Šimić 2007).

A partial skeleton of a wild bovid (*Bos primigenius*) from Koprivnička Rijeka-Rudina was found in a pit that stood out due to the numerous fragments of pottery vessels, and its central position within the settlement (Marković 1981). Furthermore, the pit was placed next to the only above-ground structure discovered at the site that is thought to have

Slika / Figure 1. Cjelovit kostur goveda s nogama podvučenim pod tijelo, Aljmaš-Podunavlje / Complete bovine skeleton, Aljmaš-Podunavlje. Limbs of the animal were contracted towards the body (prema / after: Šimić 2007).

istaknutim nadzemnim objektom vučedolske kulture poznatog kao megaron I ili „megaron ljevača bakra" (Schmidt 1945). U posljednja dva primjera riječ je o nalazima vučedolske kulture gdje ukope snažnih, rogatih divljih životinja zbog njihovih lokacija možemo povezati s prostorima ekonomske, religijske i/ili političke moći na nalazištima.

Osim uz nastambe, ukope životinja nalazimo i u graničnim objektima na naselju tj. u perifernom arealu jama, možda s namjerom da označe granice naselja kao sigurnog i poznatog prostora. Takav je slučaj na nalazištu Josipovac-Gravinjak,[2] gdje je jama s ostacima goveda bila smještena na rubu naselja, tj. na krajnjem istočnom dijelu (Mihelić 2008); jama s kosturom svinje pronađena je na rubu naselja Koprivnička Rijeka-Rudina (Marković 1981) ali i na Vučedolu gdje su svi ukopi životinja otkriveni tijekom arheoloških iskapanja od 1984. do 1989. godine pronađeni na krajnjoj periferiji naselja za razliku od ljudskih grobova koji se javljaju na cijeloj istraživanoj površini (Jurišić 1990). U nekim slučajevima možemo uočiti i grupaciju ukopa na pojedinim mjestima unutar naselja koja su mogla biti smatrana povoljnijim lokacijama od nekih drugih za izvođenje ritualnih aktivnosti ili ritualna ukapanja životinja. Takva situacija je zabilježena na nalazištu lasinjske kulture Selci Đakovački-Pajtenica. Cjeloviti kosturi dva psa pronađeni su u jami lasinjske kulture SJ 78/79, a ispod njih nalazi-

2 Analizu životinjskih koštanih ostataka s nalazišta Josipovac-Gravinjak, Selci Đakovački-Pajtenica, Đakovo-Franjevac, Osijek-Retfala i Aljmaš-Podunavlje proveli su Tajana Trbojević Vukičević, Zdravka Hincak, Damir Mihelić i Kazimir Miculinić.

belonged to the clan elder (Marković 1981). A similar location was noted for a deer burial at the Gradac position at Vučedol that is connected with the notable above-ground structure known as megaron, or the "Copper Smelter's Megaron" (Schmidt 1945). The last two examples are ascribed to the Vučedol culture, and their positions make it possible to connect the burials of strong, horned wild animals with areas of economic, religious and /or political power recorded at the sites.

Apart from next to dwellings, animal burials are also found at the edges of settlements or the peripheral area of pits, perhaps with the intent to serve as border markers of a settlement that was a safe and known space. Such a case was recorded at Josipovac-Gravinjak,[2] where a pit with bovine remains was located at the edge of the settlement, i.e. at the easternmost edge (Mihelić 2008). A pit containing a skeleton of a pig was discovered at the edge of the Koprivnička Rijeka-Rudina site (Marković 1981), but also at Vučedol where all animal burials discovered in the campaigns conducted between 1984 and 1989 were located at the periphery of the settlement, unlike human burials that were recorded all over the excavated area (Jurišić 1990). In some cases, it is possible to discern a group of burials at certain locations within a settlement that could have been seen as more suitable for ritual-related activities or the ritual burial of animals than other places. Such

2 The analyses of animal bone remains from the sites of Josipovac-Gravinjak, Selci Đakovački-Pajtenica, Đakovo-Franjevac, Osijek-Retfala and Aljmaš-Podunavlje were conducted by Tajana Trbojević Vukičević, Zdravka Hincak, Damir Mihelić and Kazimir Miculinić.

Slika / Figure 2. Jama s ostacima većeg broja životinja, Selci Đakovački-Pajtenica / Pit containing remains of a large number of animals, Selci Đakovački-Pajtenica (prema / after: Balen 2007a).

li su se ostatci većeg broja životinja SJ 158 (Balen 2007a.). Riječ je o ostacima šest pasa i dva mala preživača: ovce/koze i ovce/koze/srne. Premda nije točno određeno radi li se o ovci, kozi ili srni temeljem dentalnih ostataka dob tog malog preživača procijenjena je na do tri mjeseca starosti (Pasarić 2012). Bilo da je riječ o ovci/kozi ili srni ove se životinje uglavnom rađaju krajem zime, početkom proljeća. Podatak da je riječ o mladoj životinji staroj svega tri mjeseca upućuje na vjerojatnost da je ukop nastao u proljetnom razdoblju, a s obzirom na fragmentiranost pojedinih životinjskih ostaka možda je riječ i o ostacima tada provedenih gozbi (Pasarić 2012).

Pojedini ukopi povezani su i sa životnima etapama stanovnika naselja. Zajedničkim ukopima ljudi i životinja pogrebnim je ritusom obilježen obostran kraj životnih ciklusa. Ostaci životinja ukopanih sa čovjekom najčešće se tumače kao grobni prilozi pokojnika kojima se želi ukazati na njegov društveni status ili zanimanje tijekom života, a ovisno o vrsti životinje i predodžbama o njenim ktonskim karakteristikama cijelim se životinjama pripisivala i uloga psihopompa. Tijekom Schmidtovih istraživanja na vučedolskom Gradcu 1938. godine otkriven je dvostruki grob vučedolske kulture u kojem su bili sahranjeni žena i muškarac zajedno s bogatim i raznovrsnim prilozima (Schmidt 1945). Iz navoda istraživača zaključuje se kako su se u grobu nalazili ostaci različitih životinja, većina njih najvjerojatnije u svojstvu priloga u hrani: „Sve su te posude nekada bile pune hrane, a osim toga dobili su pokojnici u grob za hranu još i čitavo janje.

a case was recorded at Selci Đakovački-Pajtenica, a site of the Lasinja culture. Complete skeletons of two dogs were discovered in a pit of the Lasinja culture, with the remains of a large number of animals underneath them SU 158 (Balen 2007a). The finds included the remains of six dogs and two small ruminants: sheep/goat and sheep/goat/doe. Although it was, based on dental remains, impossible to definitively determine if the animal was a sheep, goat or doe, the animal was up to three months old (Pasarić 2012). Whether it was a sheep/goat or doe, these animals are usually born at the end of winter or the beginning of spring. The fact that the animal was only three months old points to the probability that the burial was made during the spring season. Additionally, considering the fragmentation of certain animal remains, it is possible that these are the remains of a feast (Pasarić 2012).

Certain burials are connected to the life stages of the inhabitants of settlements. In combined human and animal burials, the burial rites were used to mark the mutual end of their life cycles. The remains of animals burned alongside humans are most often interpreted as grave goods that portrayed the deceased social status or profession, as well as, depending on the kind of animal and ideas about their chthonic characteristics, entire animals were also seen as having the role of psychopomps. During Schmidt's 1938 excavations of Gradac at Vučedol, a double burial of the Vučedol culture was discovered with the remains of a woman and a man with numerous luxurious grave goods (Schmidt 1945). The excavator's notes suggest that the grave

Slika / Figure 3. Zajednički ukop čovjeka i svinje, Đakovo-Franjevac / Human buried together with a pig, Đakovo-Franjevac (prema / after: Balen 2007b).

A nalazimo ovdje još i ostatke goveda, jelena, svinje. Svog gospodara slijedio je u grob i njegov pas" (Schmidt 1945: 178). Zanimljiva je činjenica da je glava pokojnice bila prekrivena tipičnom vučedolskom terinom dok je muškarac rukama prekrio lice (Schmidt 1945). Prema navodima Schmidta i pas je bio prekiriven velikim fragmentima keramike. Premda točni podaci o položaju psa u grobu danas nažalost nisu poznati ovo posljednje upućuje nas na mogućnost da je pas u pogrebnom ritusu tretiran na isti način kao i ljudski pokojnici.

Iako su mogući različiti religijski razlozi zbog kojih se nakon smrti čovjeka u nekim zajednicama smatra prigodnim žrtvovati određenu životinju, npr. psa ili svinju (van Gennep 1977), jednako tako je moguće da je pokopana životinja čovjeku bila važna i kao ljubimac i/ili da su čovjek i životinja i tijekom života ostvarivali blizak odnos koji se nije temeljio isključivo na materijalno-upotrebnim i/ili simboličkim vrijednostima. O tome možda svjedoči i zajednički ukop svinja sa čovjekom na nalazištu kostolačke kulture Đakovo-Franjevac (Balen 2007b) gdje je jedna životinja bila položena točno iznad glave čovjeka. Zanimljiva je činjenica da se druga svinja nalazila uz suprotan rub jame u sasvim drugačijem položaju. Svi ekstremiteti ove životinje bili su pažljivo privučeni zajedno ispred tijela, možda na taj način zavezani i prije njene smrti.

contained the remains of different animals, most of which were probably placed in the grave as food: "All of the vessels were once full of food, and the deceased also received an entire lamb to eat. There were also the remains of bovids, deer, and pigs, and the master was also accompanied to the grave by his dog" (Schmidt 1945, 178). It is interesting to note that the head of the deceased woman was covered by a terina-type vessel typical of the Vučedol culture, while the man's head was covered by his own hands (Schmidt 1945). According to Schmidt, the dog was covered by large pottery fragments. Although the exact data on the position of the dog within the grave are, unfortunately, unknown, the latter comment suggests that the dog was treated in the same way as the humans in the burial ritual.

Although there are different religious reasons for sacrificing an animal when a human dies, e.g. a dog or a pig, in certain communities (van Gennep 1977), it is also possible that the buried animal was important to the human as a pet and/or that the human and the animal had developed a close relationship during their lives that was not only based on the material/necessity and/or symbolic values. This is possibly attested to by the find of a burial with two pigs and man from Đakovo-Franjevac, a site of the Kostolac culture (Balen 2007b), where an animal was placed directly above the man's head. It is interesting to note that the other animal was placed along the opposite edge of the pit in a completely different position. All of the animal's extremities were carefully pulled together in front of the body and were possibly even tied in that position before the animal died.

Tri krave, dva psa i svinja

Pojedini ukopi poput ovog iz Đakova pružaju nam više podataka o okolnostima nalaza te važne informacije o životinjama samima, ali i o ljudskim postupcima tijekom života životinja ili nakon njihove smrti. Položaj tijela, bioarheološki i paleopatološki podaci, odnos s drugim nalazima, stupanj sačuvanosti i cjelovitosti koštanih ostataka neki su od ključnih elemenata u razmatranju svakog pojedinačnog ukopa. Govedo je najzastupljenija životinjska vrsta u eneolitičkim ukopima na području kontinentalne Hrvatske te nalaze njihovih cjelovitih ili djelomično sačuvanih kostura pripisujemo badenskoj, kostolačkoj i vučedolskoj kulturi (Pasarić 2012). Zanimljive podatke pružaju ukopi goveda na nalazištima badenske kulture Aljmaš-Podunavlje i Osijek-Retfala. Ukop goveda u badenskoj jami SJ 15/16 na nalazištu Aljmaš-Podunavlje izdvaja se po iznimno dobroj sačuvanosti koštanih ostataka i položaju tijela u kojem se životinja nalazila - prednje i stražnje noge bile su sakupljene zajedno i podvučene pod tijelo (Šimić 2007). Vidljiv je i neobičan položaj vratne kralježnice i glave koja je bila naslonjena na prsište jedinke. Na istom nalazištu i badenska jama SJ 59/60 sadržavala je cjelovit i dobro sačuvan kostur goveda (Šimić 2001). Životinja je ležala na desnom boku s vratnom kralježnicom, odnosno glavom savijenom prema dolje uz rub jame. Prednje noge bile su savijene prema tijelu dok su stražnje bile u opruženom položaju. Unutar jame, na njenoj sjevernoj strani, nalazila se i svojevrsna niša u kojoj je pronađena glava goveda s rogovima, položena okomito, oslanjala se na gornju čeljust. U istoj jami pronađen je i cjelovit kostur malog mesojeda, najvjerojatnije psa, starog do dva mjeseca (Pasarić & Trbojević-Vukičević 2016). Stražnje noge životinje bile su savinute i postavljene jedna preko druge, dok su prednje noge bile privučene na prsa; ispod donje čeljusti bio je položen oblutak nešto veći od glave životinje (Šimić 2001). Cjelovit i dobro očuvan kostur goveda otkriven je i u badenskoj jami na nalazištu Osijek-Retfala (Šimić 2005). Ovdje je životinja ležala na desnom boku s glavom na jugu i leđima na zapadu; stražnje noge bile su potpuno opružene, a prednje tek lagano savijene i primaknute bliže tijelu. Glava goveda bila je također okrenuta prema tijelu.

U sva tri slučaja riječ je o jedinkama domaćeg goveda ženskoga spola koje su doživjele otprilike dvije godine starosti (Pasarić & Trbojević-Vukičević 2016). Na njihovim osteološkim ostacima nisu uočene patološke promjene koje bi se mogle pove-

Three cows, two dogs, and a pig

Certain burials, like the one from Đakovo, provide additional data on the circumstances of the finds and on the animals themselves, as well as on the way humans treated the animals before and after they died. The position of the body, bioarchaeological and paleopathological data, relations to other finds, the degree of preservation and the completeness of osteological remains are some of the key elements for the study of each individual burial. Bovids are the most common animal species in Eneolithic burials of continental Croatia, and their complete or partial skeletons were found in the context of the Baden, Kostolac and Vučedol cultures (Pasarić 2012). Interesting data was obtained from bovid burials of the Baden culture from the sites of Aljmaš-Podunavlje and Osijek-Retfala. The burial found in a pit of the Baden culture, SU 15/16, at Aljmaš-Podunavlje stands out due to the excellent preservation of bones and the position of the bovid body – the front and hind legs of the animal were huddled together and pulled under the body (Šimić 2007). The unusual position of the animal's cervical spine and its head, which was leaning on its body, was also visible. A pit of the Baden culture, SU 59/60, from the same site yielded a complete and well-preserved bovid skeleton (Šimić 2001). The animal was placed on its right side with the cervical spine, i.e. the head, bent downwards, facing the edge of the pit. The front legs were bent towards the body, while the hind legs were stretched out. The northern side of the pit had a sort of a niche that yielded the remains of a bovid head with horns, placed vertically, leaning on the upper jaw. The same pit also contained a complete skeleton of a small carnivore, most likely a dog, up to two months old (Pasarić & Trbojević-Vukičević 2016). The animal's hind legs were bent and crossed one over the other, while the front legs were pulled towards the chest; a pebble, somewhat bigger than the animal's head, was placed under the lower jaw (Šimić 2001). A complete and well-preserved bovid skeleton was also discovered in a pit of the Baden culture at Osijek-Retfala (Šimić 2005). In this case, the animal was placed on its right side with its head facing south, and its back west; the hind legs were fully relaxed, and the front were only slightly bent and moved closer to the body. The head of the bovid was also turned towards the body.

In all three cases, the domesticated bovids were female and were about two years of age (Pasarić & Trbojević-Vukičević 2016). Their osteological remains did not reveal pathological changes that

Slika / Figure 4. Cjelovit kostur goveda, Osijek-Retfala / Complete bovine skeleton, Osijek-Retfala (prema / after: Šimić 2005).

zati s traumama ili bolestima te možemo zaključiti da su životinje za svoga života bile zdrave, a vrlo vjerojatno i dobro zbrinute. Cjelovitost i sačuvanost njihovih koštanih ostataka te položaji u kojima su se nalazile ukazuju na činjenicu da su ove jedinke bile namjerno položene, a ne odbačene u jamu te da su bile ukopane odmah nakon smrti. Ističe se položaj životinje iz Aljmaša, jama SJ 15/16 gdje su njeni ekstremiteti bili pažljivo sakupljeni zajedno i podvučeni pod tijelo što ukazuje na namjerno izazvan položaj. Sakupljeni ekstremiteti mogu upućivati i na rezanje ligamenata nakon smrti kako bi životinja stala u jamu, međutim lezije uzrokovane rezanjem ligamenata nakon što je nastupio *rigor mortis* (vidi: Cencetti et al. 2006) na koštanom materijalu nedostaju (Pasarić & Trbojević-Vukičević 2016.), što sugerira da su ekstremiteti životinje mogli biti zavezani zajedno prije smrti kako je to već pretpostavila i Šimić (2007). Ta bi nas činjenica dalje bi nas upućivala i na pretpostavku da je životinja bila zavezana prije nego je namjerno usmrćena.

Štoviše, u sva tri razmatrana slučaja osteološkom analizom ustanovljena je rotacija prva dva vratna kralješka suprotno od njihovoga uobičajenog položaja što može svjedočiti o namjernoj manipulaciji glavom i vratnom kralježnicom nakon smrti životinje, a možda i o načinu njenog usmrćivanja (Pasarić & Trbojević-Vukičević 2016). Međutim, u potpunosti se ne mogu isključiti ni drugi tafonomski procesi, odnosno vanjski čimbenici nakon polaganja životinje u jamu. No, pretpostavka da su

could be connected to traumas or illnesses, so it can be concluded that the animals were healthy and, most likely, well taken care of. The completeness and preservation of their bones, as well as the positions of their bodies, point to the fact that they had been intentionally placed and buried, and not discarded in the pit right after their deaths. The position of the body of the animal from Aljmaš, pit SU 15/16, stands out, because the extremities were carefully clumped together and pulled under the body, indicating an intentionally induced position. The connected extremities could also point to the cutting of ligaments after death in order to make the animal fit into the pit, but there are no visible lesions caused by the cutting of ligaments after the onset of *rigor mortis* (see Cencetti *et al*. 2006) on the osseous finds (Pasarić & Trbojević-Vukičević 2016), suggesting that the animal's extremities might have been tied together before death, as was already suggested by Šimić (2007). This fact would lead to the assumption that the animal had been tied prior to being intentionally killed.

Furthermore, in all three cases, the analysis of osteological remains revealed a rotation in the first two cervical vertebrae that is opposite to their natural position, a fact that suggest an intentional manipulation of the head and the cervical spine after the animal's death, or, possibly, indicating the manner it was killed (Pasarić & Trbojević-Vukičević 2016). However, other taphonomical processes, i.e. outside factors after the animal was placed into the pit, cannot be fully excluded. Nonetheless, the assump-

Slika / Figure 5. Ukop dva psa, Selci Đakovački-Pajtenica / Two dog burial, Selci Đakovački-Pajtenica (foto / photo: I. Drnić).

krave iz Aljmaša i Osijeka bile namjereno usmrćene ne bi bila neobična s obzirom na to da dokaze o usmrćivanju goveda nalazimo na lokalitetima badenske kulture sa susjednih područja. Na primjer, usmrćivanje goveda lomljenjem kralježnice zabilježeno je na mađarskom nalazištu Budimpešta-Káposztásmegyer/Farkaserdő, a poznati su i drugi načini na koje su goveda mogla biti ubijena (Horváth 2012). O tome izravno svjedoče i kameni šiljci pronađeni na prsima goveda u Parchatki i Złoti, poljskim nalazištima kulture kuglastih amfora (Gabałówna 1958). Na tragu takvih dokaza možda možemo smatrati i da je oblutak položen ispod čeljusti vrlo mladog psa pronađenog ispod krave u Aljmašu, SJ 59/60 povezan s uzrokom smrti životinje. Naime, jedini dio vrlo fragilnog, ali ipak dobro sačuvanog kostura te životinje koji ukazuje na fragmentaciju je lijevi dio čeone kosti. Nažalost, stupanj fragmentiranosti ovoga dijela lubanje onemogućuje uočavanje potencijalnih fraktura (Pasarić & Trbojević-Vukičević 2016). Ipak, kamen pronađen ispod glave toga psa vrlo vjerojatno nije slučajnost.

Nakon ukopa goveda tijekom eneolitika na prostoru kontinentalne Hrvatske najbrojniji su ukopi pasa. (Pasarić 2012). Prema zooarheološkim istraživanjima tijekom eneolitika u srednjoj Europi prevladavala je gracilnija pasmina slična špicu (*Canis familiaris palustris*), a to je također i pasmina koja se najčešće javlja u prapovijesnim ukopima

tion that the cows from Aljmaš and Osijek were intentionally killed is not unusual, considering that evidence of killing cattle can be found on sites of the Baden culture from neighboring territories. For example, the killing of cattle by breaking their spine was recorded on the Hungarian site of Budapest-Káposztásmegyer/Farkaserdő. Other ways of killing cattle are also known (Horváth 2012), as directly indicated by stone points discovered on the bodies of cattle at Parchatka and Złota, Polish sites of the globular amphora culture (Gabałówna 1958). Due to these kinds of evidence, it can be assumed that the pebble, found under the jaw of the very young dog found under the cow at Aljmaš, SU 59/60, is connected to the cause of the animal's death. Namely, the only part of the very fragile, but still well-preserved, skeleton of this animal that shows fragmentation is the left part of its forehead bone. Unfortunately, the degree of fragmentation of this part of the skull disables the definition of potential fractures (Pasarić & Trbojević-Vukičević 2016). However, the rock discovered under the dog's head is probably not a coincidence.

Following bovids, the dog is the second most common animal species found in Eneolithic burials in continental Croatia (Pasarić 2012). Based on zooarchaeological analyses, a more gracile breed (*Canis familiaris palustris*), similar to a spitz, was the most common during the Eneolithic in central Europe, and it is also the most common breed that appears

(Horváth 2010). Ostaci dva psa pronađeni su u jami lasinjske kulture SJ 78/79 na nalazištu Selci Đakovački-Pajtenica (Balen 2007a). Nalazi cjelovitih ili gotovo cjelovitih kostura mogu upućivati na životinje koje su umrle prirodnom smrću, zbog bolesti ili nesretnim događajem te su jednostavno bile odbačene. U ovom slučaju vidljivo je da su psi bili pažljivo položeni u jamu točno jedan ispod drugoga čime je očuvan integritet tijela obje pokopane životinje, njihovi se ostaci dodiruju ali se međusobno ne prekrivaju. U oba slučaja riječ je mladim psima. Premda je moguće da su dva psa podjednake dobi uginula u isto vrijeme i zatim pokopana, ne možemo isključiti ni mogućnost da njihova istovremena smrt nije slučajnost.

Tijekom eneolitika na području kontinentalne Hrvatske nalazimo i ukope svinja. Ukopi svinja zabilježeni su u badenskoj, kostolačkoj i vučedolskoj kulturi (Pasarić 2012). U jami kostolačke kulture SJ 43/44 na nalazištu Đakovo-Franjevac pronađen je cjelovit kostur svinje (Balen 2007b). Osim po cjelovitosti kostura, nalaz se izdvaja i po namjerno izazvanom položaju tijela životinje. Prednji i stražnji ekstremiteti životinje bili su u potpunosti podvučeni pod tijelo dok je glava životinje usmjerena od tijela. U istoj jami jugoistočno od cjelovitog kostura svinje nalazilo se nekoliko dijelova tijela malog preživača. Moguće je da je riječ o hrani za gozbu ili zagrobni život koja je također položena u jamu uz žrtvovanu životinju, što je već zabilježeno i na drugim eneolitičkim nalazištima, npr. Balatonőszöd u Mađarskoj (Horváth 2010), ili je riječ o grobnom prilogu namjenjenom upravo ovoj, pažljivo ukopanoj, životinji.

Zaključak

Većina do danas poznatih eneolitičkih ukopa životinja na tlu kontinentalne Hrvatske pronađena je u naseljima. Smješteni su u blizini naseobinskih objekata ili u perifernom arealu jama te upravo te prostorne odrednice ukazuju na njihovu povezanost sa životnim ciklusima pojedinih domaćinstava i/ili ritualim aktivnostima koje su bile od značaja za cijelo naselje. Na primjer, lokacijom pojedinog ukopa mogao se označiti granični prostor naselja, njegov središnji dio ili mjesto pogodno za ritualne aktivnosti, a u pojedinim slučajevima detaljni zooarheološki podaci ukazuju nam i na moguća razdoblja u godini kada je do njih i došlo. U većini ukopa prisutne su domaće životinje, a zanimljivo

in prehistoric burials (Horváth 2010). Remains of two dogs were discovered in a pit of the Lasinja culture, SU 78/79, at Selci Đakovački-Pajtenica (Balen 2007a). Finds of complete or almost complete skeletons can indicate that the animals died of natural causes, due to illness or accidents, and that they were simply discarded. In this case, it is visible that the dogs were carefully placed within the pit, one under the other, thereby preserving the integrity of the bodies of both buried animals, with their remains touching, but not overlapping. In both cases, the dogs were young. Although it is possible that two dogs of about the same age died at the same time and were then buried, the possibility that their parallel deaths were not an accident cannot be excluded.

Eneolithic pig burials have been recorded as well and attributed to the Baden, Kostolac, Vučedol cultures (Pasarić 2012). A pit of the Kostolac culture, SU 43/44 at Đakovo-Franjevac yielded a complete pig skeleton (Balen 2007b). Other than its completeness, it stands out due to the intentionally induced position of the animal's body. The front and hind limbs of the animal were placed completely under the body, and the head was facing away from the body. Several body parts of a juvenile small ruminant were discovered in the same pit, southeast of the complete pig skeleton. It is possible that this was food for a feast or the afterlife, which was placed in the pit alongside the sacrificed animal, as was recorded at other Eneolithic sites, e.g. Balatonőszöd in Hungary (Horváth 2010) or that this was a grave good intended precisely for this, carefully buried, animal.

Conclusion

Most of the known Eneolithic animal burials from continental Croatia have been discovered in settlements. They are situated in the vicinity of dwellings, or at the peripheral parts of pits, and these spatial determinants suggest that they were connected to the life cycles of specific households and/or the ritualistic activities that were important for the entire settlement. For example, the location of a certain burial could have marked the borders of the settlement, its central part or a place that was suitable for ritualistic activities. In certain examples, detailed zooarchaeological data indicate the possible season of the year when the burial happened. Most burials include the remains of domestic ani-

je da su u dva slučaja divlje životinje poput jelena i divljeg goveda pronađene uz istaknute naseobinske objekte u naselju. No, na životinje ne moramo gledati isključivo kao na identifikacijsku oznaku pojedinog prostora, određene društvene skupine ili statusa pokojnika kako je to dosada uglavnom bilo uvriježeno. Zajednički ukopi životinja sa čovjekom mogu ukazivati i na emotivne razloge toga čina, odnosno na blizak odnos životinje i čovjeka tijekom njihova života što se u pojedinim slučajevima može manifestirati u načinu na koji su oboje bili položeni u zemlju i/ili tretirani u pogrebnom ritusu. U ovome radu nešto detaljnije sagledala se tek nekolicina poznatih eneolitičkih ukopa životinja s prostora kontinentalne Hrvatske. Ukopi krava, pasa i svinje iz Aljmaša, Osijeka, Đakova i Selca Đakovačkih upućuju na dobro očuvane, cjelovite koštane ostatke namjereno ukopanih životinja nedugo nakon njihove smrti te na manipulaciju dijelovima njihova tijela, odnosno glavama i ekstremitetima. Važno je istaknuti kako kod razmatranih životinja nisu uočene nikakve patološke promjene te je riječ životinjama koje su tijekom života bile zdrave i zbrinute. U pojedinim slučajevima vidljivo je i da su vrlo pažljivo i brižno bile položene u jame. Premda ni u jednom od razmatranih slučajeva nemamo neosporive dokaze da je riječ o namjerno usmrćenim životinjama, za to postoje određene indicije te bi tada trebali pretpostaviti da su bile žrtvovane ili na neki drugi način ritualno ubijene. Ako pretpostavimo da su ove životinje tijekom svog života dijelile prostore istih naselja s ljudima, u tome slučaju naselja evidentno prepoznajemo kao mjesta interakcija čovjeka sa životinjama te smjenu u dinamikama njihova odnosa.

mals, but it is interesting to note that the two cases of wild species burials, deer and wild bovid, were recorded next to pronounced structures in the settlement. However, animals must not be seen exclusively as an identity mark of a certain space, a certain social group or status of the deceased as has been customary so far. The combined burials of animals and humans can also indicate emotional behavior, i.e. the close relationship between the animal and the human during their life, which can sometimes be manifested through the way both were laid into the ground and/or treated in the burial rites. This paper takes a closer look only at several known Eneolithic animal burials from continental Croatia. The burials of cows, dogs and a pig from Aljmaš, Osijek, Đakovo and Selci Đakovački have revealed well-preserved, complete skeletal remains which suggest that the animals were intentionally buried very soon after death, as well as that their bodies, i.e. heads and extremities, were manipulated. It is important to note that the studied animals did not reveal any pathological changes and that these animals were healthy and well off during their lives. In some cases it is possible to see that they were laid into the pits with a lot of care and effort. Although none of the studied examples revealed undeniable evidence that the animals were intentionally killed, there are some indications that make it possible to assume that they had been sacrificed or ritualistically murdered in some other way. If it is assumed that these animals shared their living area with humans, then settlements can clearly be seen as places where man interacted with animals and where the dynamics of their interrelations changed.

Literatura / Bibliography

Armstrong Oma, K. 2015, Between trust and domination: social contracts between humans and animals, *World Archaeology* 42 (2), 175-187.

Balen, J. 2007a, Izvješće o arheološkim istraživanjima nalazišta Pajtenica, Zagreb, Arheološki muzej u Zagrebu.

Balen, J. 2007b, Izvješće o arheološkim istraživanjima nalazišta Đakovo-Franjevac, Zagreb, Arheološki muzej u Zagrebu.

Bell, C. 1992, *Ritual theory, ritual practice,* Oxford University Press, Oxford.

Bradley, R. 2003, A life less ordinary: the ritualization of the domestic sphere in later prehistoric Europe, *Cambridge Archaeological Journal* 13, 5-23.

Brück, J. 1999, Ritual and rationality: some problems of interpretation in European archaeology, *European Journal of Archaeology* 2, 313-344.

Burkert, W. 1983, *Homo Necans. The anthropology of ancient Greek sacrificial ritual and myth. Berkeley*, University of California Press.

Cencetti, S., Mazza, P., Chilleri, F. & Cozzini, F. 2006, Madonna del Piano (Sesto Fiorentino, Florence, central Italy) ox and dog: A case of intentional Iron Age inhumation, *Geobios* 39, 328-336.

Durman, A. 1988, Vučedolska kultura, in: A. Durman (ed.), *Vučedol, treće tisućljeće p. n. e.,* Katalog izložbe, Muzejsko-galerijski centar, Zagreb, 13-20.

Gabałówna, L. 1958, Pochówki bydlęce kultury amforkulistych ze stanowiska 4 w Brześciu Kujawskim w świetle podobnych znalezisk kultur środkowoeuropejskich. Prace i materiały Muzeum archeologicznego i etnograficznego w Łodzi, *Seria archeologiczna* 3, 63-108.

Gerritsen, F. 2003, *Local identities. Landscape and community in the late prehistoric Meuse-Demer-Scheldt region*, Amsterdam University Press, Amsterdam.

Groot, M. 2008, *Animals in ritual and economy in a Roman frontier community. Excavations in Tiel-Passewaaij*, Amsterdam University Press, Amsterdam.

Horváth, T. 2010, Transcendent phenomena in the Late Copper Age Boleráz/Baden settlement uncovered at Balatonőszöd-Temetői dűlő: human and animal 'depositions'. http://www.jungsteinsite.unikiel.de/2010_horvath/ 2010_Horvath_low.pdf.

Horváth, T. 2012, Animal deposits in the Late Copper Age settlement of Balatonőszöd-Temetői dűlő, in: A. Pluskowski (ed.), *The ritual killing and burial of animals. European perspectives,* Oxbow Books, Oxford, 115-136.

Hoti, M. 1993, *Prethistorijski korijeni nekih aspekata grčke religije,* Doktorska disertacija, Sveučilište u Zagrebu.

Humplová, A. & Ondruš, V. 1999, Vedrovice, okr. Znojmo, in: V. Podborský (ed.), *Praveká sociokultovní architektura na Morave,* Ústav archeologie a muzeologie Filozofické fakulty Masarykovy univerzity v Brně, Brno, 167-219.

Janićijević, B. 1986, *U znaku Moloha: antropološki ogled o žrtvovanju*, Vajat, Beograd.

Jurišić, M. 1990, Ukopi životinja na Vučedolu, *Opuscula archaeologica* 14, 17-31.

Livarda, A. & Madgwick, R. 2018, Ritual and religion: bioarchaeological perspectives, in: A. Livarda, R. Madgwick, S. Riera Mora (eds.), *The bioarchaeology of ritual and religion*, Oxbow Books, Oxford, Philadelphia, 1-13.

Marković, Z. 1980, Osobine stanovništva života vučedolskog stanovništva naselja Rudina I, *Podravski zbornik* 6, 331-338.

Mihelić, S. 2008, Josipovac-Gravinjak, *Hrvatski arheološki godišnjak* 4/2007, Zagreb, 15-17.

Milićević Bradač, M. 2002, Of deer, antlers, and shamans, in: M. Milićević Bradač (ed.), *Znakovi i riječi. Zbornik projekta "Protohistorija i antika hrvatskog povijesnog prostora",* Hrvatska sveučilišna naklada, Zagreb, 7-41.

Mlekuž, D. 2007, 'Sheep are your mother'- rhyta and the interspecies politics in the Neolithic of the eastern Adriatic, *Documenta Praehistorica* 34, 267-278.

Morris, J. T. 2011, *Investigating animal burials: ritual, mundane and beyond,* Archaeopress, BAR British Series 535, Oxford.

Morris, J. T. 2018, Animal biographies in the Iron Age of Wessex: Winnall Down, UK. Revisited in: A. Livarda, R. Madgwick & S. Riera Mora (eds.), *The bioarchaeology of ritual and religion,* Oxbow Books, Oxford, Philadelphia, 115-128.

Pasarić, M. 2012, *Životinjski ritualni ukopi i idoloplastika u prapovijesti kontinentalne Hrvatske*, Doktorska disertacija, Sveučilište u Zagrebu.

Pasarić, M. & Trbojević Vukičević, T. 2016, Eneolithic cattle burials from Aljmaš-Podunavlje and Osijek-Retfala, Croatia, *International Journal of Osteoarchaeology* 26 (5), 842-852.

Russell, N. & Düring, B. S. 2006, Worthy is the lamb: a double burial at Neolithic Çatalhöyük (Turkey), *Paléorient* 32, 73-84.

Schmidt, R. R. 1945, *Die Burg Vučedol,* Hrvatski državni arheološki muzej, Zagreb.

Schneeweis, E. 2005, *Vjerovanja i običaji Srba i Hrvata*, Golden marketing-Tehnička knjiga, Zagreb.

Smith, J. Z. 1987, The Domestication of sacrifice, in: R. G. Hamerton-Kelly (ed.), *Violent origins*, Stanford University Press, Stanford, 191-206.

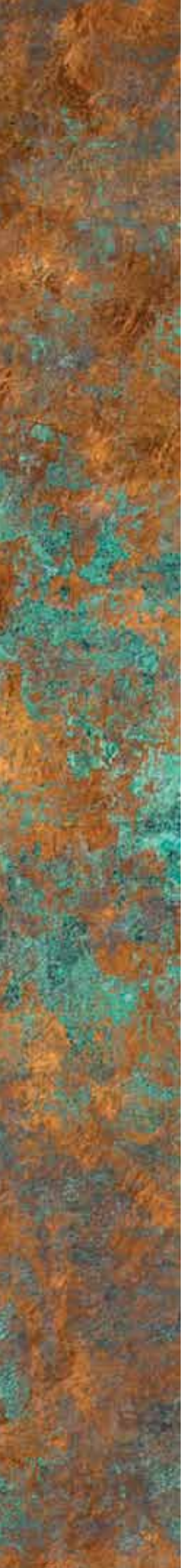
Šimić, J. 2001, Aljmaš-Podunavlje, zaštitno istraživanje višeslojnog prapovijesnog nalazišta, *Obavijesti Hrvatskog arheološkog društva* 3/2001, 70-75.

Šimić, J. 2005, Retfala, *Hrvatski arheološki godišnjak* 1, Zagreb, 11-12.

Šimić, J. 2007- Aljmaš-Podunavlje, zaštitno istraživanje godine 2005, *Obavijesti Hrvatskog arheološkog društva* 1/2007, 36-43.

van Gennep, A. 1977, *Rites of passage*, Routledge and Kegan Paul, London.

Zalai-Gaál, I. 1994, Betrachtungen uber die kultische Bedeutung des Hundes im mitteleuropaischen Neolithikum, Acta *Archaeologica Academiae Scientiarum Hungaricae* 46, 33-59.



Razvoj poljoprivrede u eneolitiku: arheobotanički ostaci

The development of farming in the Eneolithic: the archaeobotanical remains

Kelly Reed

Oxford Martin School
University of Oxford
kellyreed@hotmail.co.uk

Biljke su potrebne u svim društvima, bilo kao hrana, lijek, zaklon, odjeća, gorivo ili krmna hrana za životinje, a u pretpovijesnim su društvima svakako morale biti značajna komponenta strategije preživljavanja. Način na koji su ova društva iskorištavala i upravljala svojim prirodnim okolišem, koje usjeve su uzgajala i čime su trgovala, mogao se mijenjati s obzirom na vrijeme i različite krajolike, a u skladu sa specifičnim potrebama. Pomoću arheobotanike, koja se bavi proučavanjem biljnih ostataka (prvenstveno makro fosila poput zrna, sjemenki, ljuski orašastih plodova i sjemenki voća) pronađenih u arheološkim iskopavanjima, moguće je rekonstruirati te prošle zemljoradničke sustave, ekonomije, okoliše i ljudske aktivnosti.

Arheobotaničke analize u Hrvatskoj nisu rutinski dio arheoloških istraživanja, djelomično zbog manjka školovanih arheobotaničara te ograničenih spoznaja o toj disciplini i njezinim potencijalnim doprinosima. Tijekom dvadesetog stoljeća objavljeni su pretpovijesni arheobotanički ostaci sa samo devet lokaliteta (Gnirs 1925; Hopf 1964; Karg & Müller 1990; Chapman et al. 1996), ali od tada se povećala količina uzorkovanja, što je po prvi puta pružilo podatke o ljudskom gospodarenju biljem na nizu arheoloških lokaliteta diljem Hrvatske iz različitih razdoblja. U ovom radu bit će predstavljeni trenutno dostupni arheobotanički dokazi iz kontinentalne Hrvatske, uključujući raspon kultiviranih usjeva koji su mogli biti uzgajani tijekom eneolitika, kao i usporedbe s teorijama o razvitku eneolitičkih strategija preživljavanja na proučavanom području.

All societies need plants for food, medicine, shelter, clothing, fuel, and fodder for their domestic animals and would have constituted a major component of subsistence strategies in prehistory societies. How these societies used and managed their natural environment, what crops they grew and what they traded would have differed through time and space depending on their specific requirements. Archaeobotany, which examines plant remains (primarily macro-fossils such as grains, seeds, nutshells, and fruit stones) recovered from archaeological excavations, can be used to reconstruct these past agricultural systems, economies, environments and human activities.

In Croatia archaeobotanical analyses is not routinely undertaken as part of archaeological research, due in part to the lack of trained archaeobotanists and a limited awareness of the discipline and its potential contribution. During the 20th century only nine sites have published evidence of prehistoric archaeobotanical remains (Gnirs 1925; Hopf 1964; Karg & Müller 1990; Chapman et al. 1996), but since then there has been a greater increase in sampling, providing for the first time important information about past human plant economies from a range of archaeological sites and periods across Croatia. This chapter presents current archaeobotanical evidence from continental Croatia exploring the range of domestic crops that may have been cultivated during the Eneolithic and how they compare to prevailing theories on the development of Eneoltihic subsistence strategies in the region.

Arheobotanička istraživanja u Hrvatskoj

Biljni materijal na arheološkim nalazištima u Hrvatskoj najčešće je očuvan zbog procesa karbonizacije i gorenja, iako su zabilježeni i drugi oblici očuvanja, uključujući mineralizaciju i očuvanje zbog velike količine vode. Karbonizacija se događa kada je biljni materijal, namjerno ili slučajno, izložen toplini tijekom aktivnosti poput kuhanja, spaljivanja otpada ili korištenja biljnog goriva (Van der Veen 2007). Neizbježno, većina skupova nalaza stvarana je niz aktivnosti, što ih čini sekundarnim izvorom podataka (Hubbard & Clapham 1992). Dakle, prikupljeni biljni ostaci samo su dio nekoć postojeće cjeline koja je došla u kontakt s vatrom te preživjela spaljivanje, odlaganje i ponovno prikupljanje.

Archaeobotanical research in Croatia

The most common form by which plant material is preserved on archaeological sites in Croatia is through carbonisation or charring, although other forms of preservation can also be found including mineralisation and waterlogging. Carbonisation occurs when the plant material is exposed to heat either accidentally or deliberately, through activities such as cooking, burning rubbish or using plants for fuel (Van der Veen 2007). Inevitably, most assemblages are built up during a series of activities and as such are usually secondary in nature (Hubbard & Clapham 1992). Therefore the plant remains recovered are only a fraction of the once living community that come into contact with fire, survive charring, deposition and recovery.

Rani i srednji eneolitik

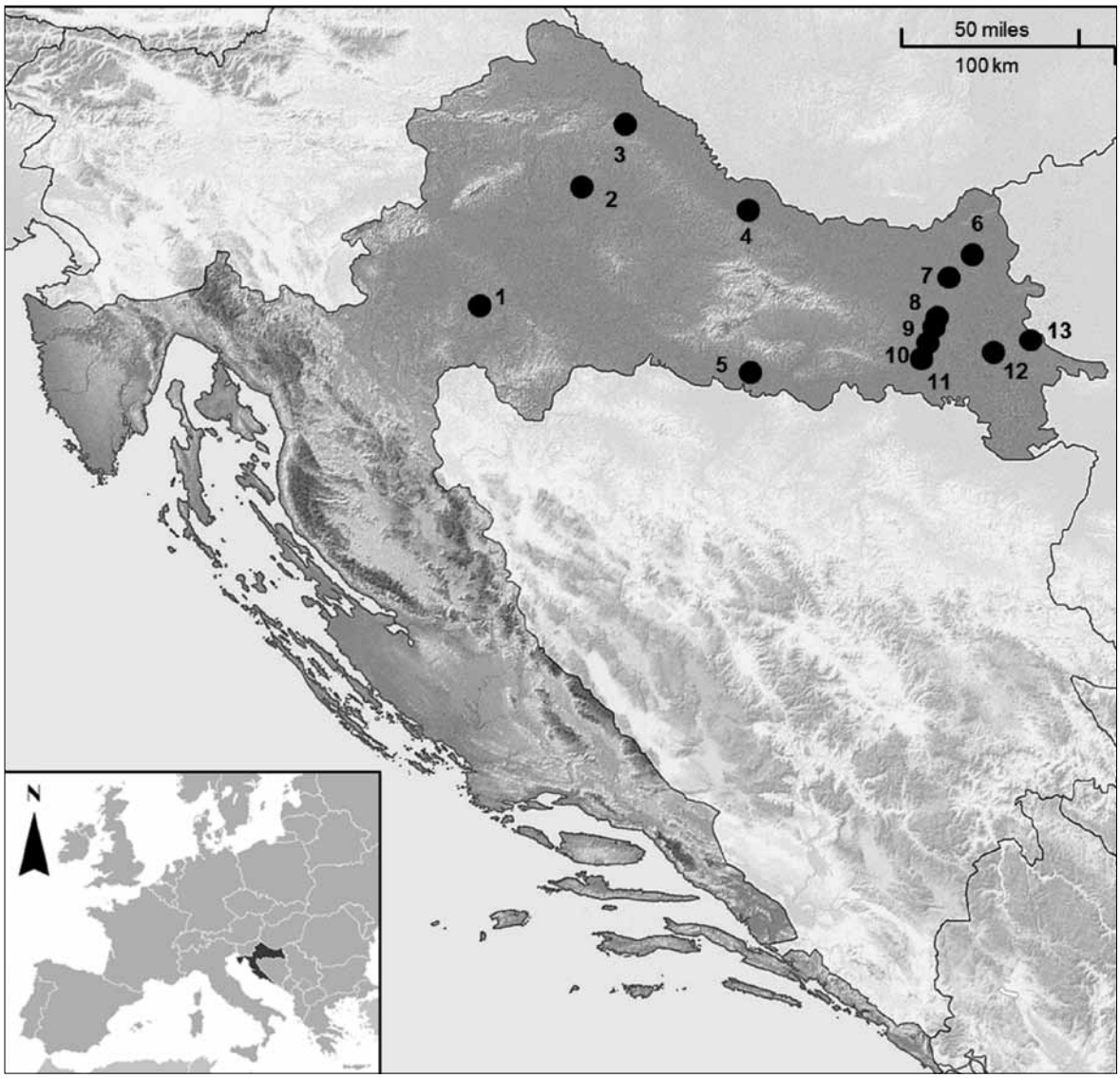
Arheobotanički ostaci pronađeni su na jedanaest rano/srednje eneolitičkih naselja u kontinentalnoj Hrvatskoj, a radi se o sljedećim lokalitetima: sopotsko/lasinjsko naselje Slavča, lasinjska naselja na lokalitetima Čepinski Martinci-Dubrava, Jurjevac-Stara Vodenica, Lasinja, Pajtenica-Velike Livade, Tomašanci-Palača, lasinjsko/retzgajarsko nalazište Barbarsko, retzgajarska naselja na lokalitetima Čeminac-Vakanjac i Tomašanci-Palača, i u retzgajarskim/boleraz slojevima na lokalitetu Virovitica-Batelije (Sl. 1). Ovi lokaliteti obuhvaćaju dva tipa: ravna ili horizontalna naselja s tek nekoliko slojeva naseljavanja, i telove na kojima je zabilježeno više faza ponovne izgradnje na relativno maloj površini. Na naselju tel tipa u Slavči uzorci su uzimani tijekom nekoliko sezona istraživanja, dok su na ostalim ravnim naseljima uzimani tijekom zaštitnih istraživanja financiranih od strane Ministarstva Kulture Republike Hrvatske. Uzorci su, stoga, u najvećoj mjeri uzimani iz ukopanih struktura, osim na lokalitetu tel tipa u Slavči i lokalitetu Čeminac-Vakanjac gdje su uzorci prikupljani iz naseobinskih slojeva, jaraka i jama. Osim u naseljima, uzorci su prikupljeni i iz velike jame lasinjske kulture s lokaliteta Potočani u kojoj su pronađeni posmrtni ostaci 50 individua.

Ukupno su prikupljena 74 uzorka biljnih makro ostataka iz slojeva datiranih u rani/srednji eneolitik. Ukupna gustoća bila je izuzetno mala, s manje od 1 sjemenke po litri zemlje (Reed 2016), zbog čega je izdvojeno tek 191 zrno žitarica, što pak izuzetno otežava identifikaciju preferiranih usjeva

Early and Middle Eneolithic

Eleven early/middle Eneolithic settlements located in continental Croatia have been sampled for archaeobotanical remains. These include the Sopot/Lasinja site of Slavča, the Lasinja settlements discovered at Čepinski Martinci-Dubrava, Jurjevac-Stara Vodenica, Lasinja, Pajtenica-Velike Livade, Tomašanci-Palača, the Lasinja/Retz-gajary site of Barbarsko, the Retz-gajary settlements at Čeminac-Vakanjac and Tomašanci-Palača, and the Retz-gajary/Boleraz levels at Virovitica-Batelije (Fig. 1). These sites represent two types of sites; flat, or horizontal, settlements, which have only a few layers of occupation, and tell sites, which have multiple episodes of rebuilding within a relatively concentrated area. The tell site Slavča was sampled over a number of field seasons while the remaining flat settlements were sampled as part of rescue excavations commissioned by the Croatian Ministry of Culture. Samples were therefore collected predominantly from pit features, except at the tell site of Slavča and the sites of Čeminac-Vakanjac where samples were collected from occupation levels, ditches and pit features. In addition to the settlements, samples were also taken from Potočani a large Lasinja culture burial pit filled with 50 individuals.

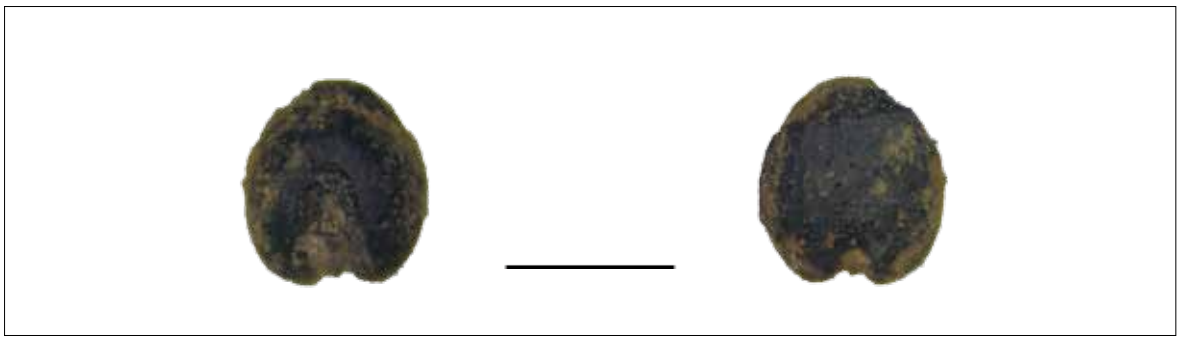
A total of 74 samples contained plant macro-remains from levels dated to the early/middle Eneolithic. Overall density was particularly low at less than 1 seed per litre of soil (Reed 2016). This resulted in only 191 cereal grains being recovered, which makes identification of crop preferences particular-



Slika / Figure 1. Položaj lokaliteta s kojih potječu arheobotanički ostaci obrađeni u tekstu / Location of the sites with archaeobotanical remains referred to in the text: (1) Lasinja; (2) Barbarsko; (3) Potočani; (4) Virovitica-Batelije; (5) Slavča; (6) Čeminac-Vakanjac; (7) Čepinski Martinci-Dubrava; (8) Pajtenica-Velike Livade; (9) Jurjevac-Stara Vodenica; (10) Tomašanci-Palača; (11) Đakovo-Franjevac; (12) Vinkovci, 14 Matije Gupca; (13) Vučedol

(Sl. 3). Među malim brojem ostataka, u uzorcima se najčešće pojavljuje sjeme jednozrne pšenice (*Triticum monococcum*), dvozrne pšenice (*Triticum dicoccum*) i ječma (*Hordeum vulgare*) (Sl. 4). Broj svinutih sjemenki ječma s lokaliteta Čepinski Martinci-Dubrava, Potočani i Barbarsko ukazuje na prisutnost šesteroredne varijante. U Slavči je zabilježeno samo jedno zrno gole pšenice (*Triticum aestivum/durum/turgidum*), dok se ostaci sjemena prosa (*Panicum milliaceum/Setaria italica*) samo sporadično pojavljuju u uzorcima. Uz ostatke zrna žitarica, na mnogim su lokalitetima zabilježeni i ostaci pljeve ili mekinja dvozrne i jednozrne pšenice te jedan ostatak stapke ječma, pronađen na

ly difficult (Fig. 3). From the small number of grains einkorn (*Triticum monococcum*), emmer (*Triticum dicoccum*) and barley grain (*Hordeum vulgare*) are most frequently identified in the samples (Fig. 4). A number of twisted barley grains seen at Čepinski Martinci-Dubrava, Potočani and Barbarsko indicate the presence of the six-row variety. Only one naked wheat grain (*Triticum aestivum/durum/turgidum*) was identified at Slavča, while a number of millet (*Panicum milliaceum/Setaria italica*) grains were recovered sporadically in the samples. In addition to the cereal grains, remains of emmer and einkorn cereal husk or chaff were recovered from many of the sites along with one barley rachis identified



Slika / Figure 2. Karbonizirani klipasti muhar (*Setaria italica*) iz uzorka 11, Lasinja (mjerilo = 1mm) / Carbonised foxtail millet (*Setaria italica*), from sample 11, Lasinja (scale = 1mm).

lokalitetu Slavča. Zbog slabe očuvanosti, pšenična pljeva (*Triticum sp.*) prevladava u uzorcima s lokaliteta Slavča (530 ovojnica zrna), Tomašanci-Palača (60 ovojnica zrna) i Čeminac-Vakanjac (282 ovojnica zrna). Osim toga, slaba očuvanost rezultirala je time da je očuvan samo jedan uzorak velike neidentificirane mahunarke s lokaliteta Potočani i Čepinski Martinci-Dubrava te dvije moguće sjemenke lana (*Linum cf. usitatissimum*) s lokaliteta Čeminac-Vakanjac.

Identificirani su i ostaci divljih plodova, uključujući drijen (*Cornus mas*), pronađen u malim količinama na lokalitetima Jurjevac-Stara Vodenica, Tomašanci-Palača i Čeminac-Vakanjac. Po manje od tri ploda ljoskavca (*Physalis alkekengi*) pronađena su na lokalitetima Tomašanci-Palača i Lasinja, a jedno sjeme iz porodice kupina (*Rubus* sp.) pronađeno je na lokalitetu Lasinja. Osim toga, na lokalitetu Jurjevac-Stara Vodenica pronađen je mogući ostatak koštice trnjine (*Prunus* cf. *spinosa*), a u reztgajarskim slojevima na lokalitetu Tomašanci-Palača i dva ostatka ljuske lješnjaka (*Corylus* sp.). Divlje vrste i korov nisu čest nalaz s ovih lokaliteta. Najveći broj sjemenki divljih vrsta/korova, njih 32, pronađen je na lokalitetu Čeminac-Vakanjac, a radi se o 13 različitih divljih vrsta, uključujući trave (npr. *Bromus* sp.), dvornikovke (*Polygonum aviculare*), ivanjsko cvijeće (*Galium aparine*) i abdovinu (*Sambucus ebulus*).

at Slavča. Due to poor preservation wheat chaff (*Triticum* sp.) dominates the samples at Slavča (530 glume bases), Tomašanci-Palača (60 glume bases) and Čeminac-Vakanjac (282 glume bases). Additionally, poor preservation resulted in only one large unidentified pulse from Potočani and Čepinski Martinci-Dubrava and two possible flax seeds (*Linum* cf. *usitatissimum*) from Čeminac-Vakanjac being identified.

Wild fruits were also identified, including cornelian cherry (*Cornus mas*), which was found in small quantities at Jurjevac-Stara Vodenica, Tomašanci-Palača and Čeminac-Vakanjac. Less than three seeds of chinese lantern (*Physalis alkekengi*) were found at Tomašanci-Palača and Lasinja, and one seed from the blackberry family (*Rubus sp.*) was identified from Lasinja. In addition, one possible sloe stone (*Prunus* cf. *spinosa*) was recovered from Jurjevac-Stara Vodenica and two fragments of hazelnut shell (*Corylus* sp.) were recovered from Retzgajary culture levels at Tomašanci-Palača. Wild plant and weed species were not commonly identified from the sites. Čeminac-Vakanjac had the highest number of wild/weedy plants at 32 seeds, representing 13 different weed species including grasses (e.g. *Bromus* sp.), knotgrass (*Polygonum aviculare*), bedstraw (*Galium aparine*) and dwarf elder (*Sambucus ebulus*).

Kasni eneolitik

Arheobotanički ostaci prikupljeni su sa šest srednje/kasno eneolitičkih lokaliteta u kontinentalnoj Hrvatskoj, uključujući badensko naselje na lokalitetu Čepinski Martinci-Dubrava, badenske i kostolačke slojeve na lokalitetu Tomašanci-Pala-

Late Eneolithic

Six middle/late Eneolithic settlements located in continental Croatia have been sampled for archaeobotanical remains. These include the Baden settlement of Čepinski Martinci-Dubrava, the Baden/Kostolac culture levels at Tomašanci-Palača and at

ča i telu Vučedol, kostolačko naselje na lokalitetu Đakovo-Franjevac, kostolačke i vučedolske slojeve na telu u Slavči te na lokalitetu vučedolske kulture u Vinkovcima, Ulica Matije Gupca 14 (Sl. 1). Uzorci su većinom prikupljani iz jamskih struktura, osim na telovima Slavča i Vučedol gdje u prikupljani iz kuća, jaraka i jama. Uzorci sa Slavče i Vučedola prikupljani su kroz više sezona, dok su oni iz preostalih horizontalnih naselja prikupljeni tijekom zaštitnih istraživanja.

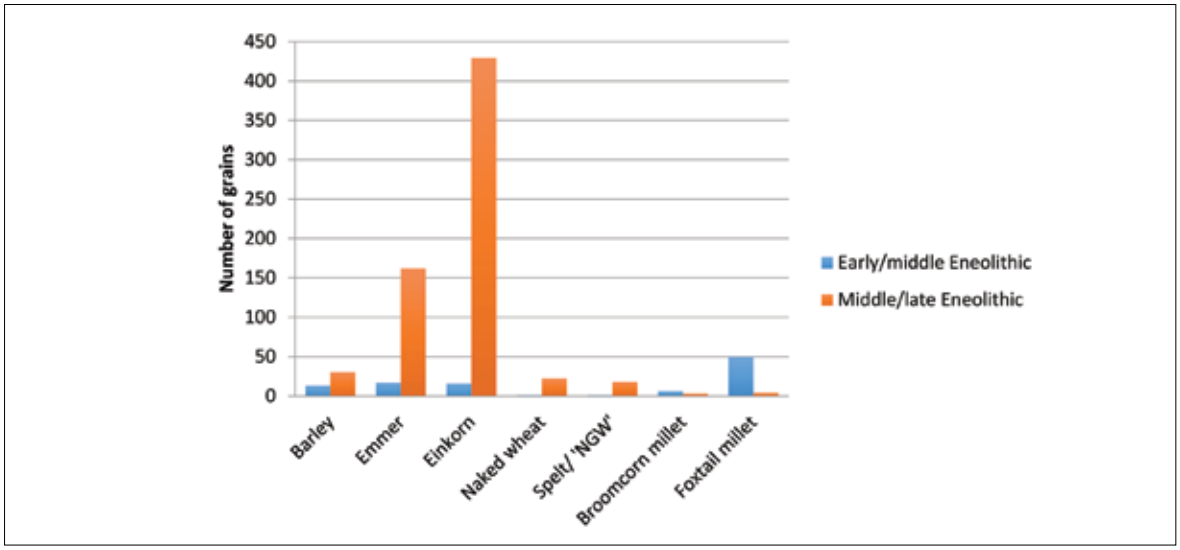
Ostaci zrna i pljeve žitarica prevladavaju u svim uzorcima izuzev onih s lokaliteta Vinkovci/Matije Gupca 14, gdje 77% skupa nalaza sačinjavaju ostaci divljih vrsta i korova. Među žitaricama prevladavaju ostaci jednozrne pšenice (Sl. 3), iako je tomu većinski tako zbog velikog broja nalaza s Vučedola, gdje jednozrna pšenica sačinjava 70% identificiranih ostataka žitarica. Male količine zrna dvorne pšenice zabilježene su na lokalitetima Đakovo-Franjevac i Slavča, dok na položaju Vinkovci/Matije Gupca 14 dvozrna pšenica prevladava sa 125 identificiranih zrna. Ječam se ne pojavljuje u velikim količinama, a najveći broj ostataka, njih 16, pronađen je na položaju Vinkovci/Matije Gupca 14. Na lokalitetima Vinkovci/Matije Gupca 14 i Vučedol definiran je i određen broj mogućih ostataka pira ili „novog tipa" pšenice s ovojnicom koji je identificiran na temelju tupog vrha i izostanka dorzalnog grebena (Jones et al. 2000; Kohler-Schneider 2003). Ipak, s obzirom na morfološke sličnosti, slabo stanje očuvanosti i činjenicu da nisu pronađeni identificirani ostaci pljeve, ovim ostacima nije bilo moguće odrediti vrstu. Mali broj ostataka gole pšenice (*Triticum aestivum/durum/turgidum*) pronađen je na lokalitetima Đakovo-Franjevac, Vinkovci/Matije Gupca 14 i Vučedol, a jedan ostatak stapke gole pšenice definiran je na Vučedolu. Osim zrna žitarica, pronađeni su i ostaci pljeve dvozrne i jednozrne pšenice, kao i velik broj, njih 699, ostataka pljeve pšenice s ovojnicom (*Triticum sp.*), pronađen na lokalitetu Slavča. Ipak, niti na jednom od lokaliteta iz ovog razdoblja nisu pronađeni ostaci stapke ječma.

Mahunarke i uljarice češći su nalaz iz ovog razdoblja. Primjerice, na lokalitetu Đakovo-Franjevac pronađeni su ostaci sjemena sjetvene kukavičice (Lathyrus sativus), leće (*Lens culinaris*) i graška (*Pisum sativum*), a na lokalitetu Vinkovci/Matije Gupca 14, definirano je 47 sjemenki lana. Među ostacima plodova prevladava ljoskavac koji je, u manjim količinama, zabilježen na sva četiri lokaliteta, kao i drijen koji je zabilježen na tri lokaliteta. Osim

the tell site of Vučedol, the Kostolac settlement at Đakovo-Franjevac, the Kostolac/Vučedol levels at the tell site of Slavča and the Vučedol culture site discovered at Vinkovci, 14 Matije Gupca (Fig. 1). Samples were collected predominantly from pit features, except at the tell sites of Slavća and Vučedol where samples were collected from house, ditch and pit features. The tell sites Slavča and Vučedol were sampled over a number of field seasons while the remaining flat settlements were sampled as part of rescue excavations.

Cereal grain and chaff dominate the assemblages of all but Vinkovci/Matije Gupca 14, where 77% of the assemblage is wild plant and weed species. Of the cereals, einkorn grains dominate the assemblage (Fig. 3), although this is largely due to the large number recovered from Vučedol, where 70% of the identified cereal grains were einkorn. Small quantities of emmer grains are recorded at Đakovo-Franjevac and Slavča, while at Vinkovci/Matije Gupca 14 emmer dominates the assemblage with 125 identified grains. Overall, barley is not found in high quantities with the highest number of grains, 16, being found at Vinkovci/Matije Gupca 14. At Vinkovci/Matije Gupca 14 and Vučedol, a number of possible spelt or 'new type' glume wheat grains where identified based on their blunt apex and lack of a dorsal ridge (Jones et al. 2000; Kohler-Schneider 2003). However, due to similarities in morphology, their poor state of preservation and the fact that no identified glume bases were recovered restricted their identification to species. A small number of naked wheat grains (*Triticum aestivum/durum/turgidum*) were also recovered from Đakovo-Franjevac, Vinkovci/Matije Gupca 14 and Vučedol and one naked wheat rachis from Vučedol. In addition to the cereal grains, remains of the emmer and einkorn cereal chaff were recovered, along with a large number of 699 glume wheat glume bases (*Triticum* sp.) being identified at Slavča. However, no barley rachis is seen for this period at any of the sites.

Pulses and oil plants were more commonly found during this period. For example, at Đakovo-Franjevac seeds of grass pea (*Lathyrus sativus*), lentil (*Lens culinaris*) and pea (*Pisum sativum*) were recovered, while at Vinkovci/Matije Gupca 14, 47 flax seeds were identified. The fruit remains were dominated by chinese lantern, which were recovered in small numbers from all four sites, as well as cornelian cherry which was identified at three of the sites. A couple of blackberry (*Rubus fruticosus*) seeds are also found at Đakovo-Franjevac and Slavča. Com-



Slika / Figure 3. Broj zrna svake žitarice po razdoblju / Number of grains recovered for each cereal per period.

toga, na lokalitetima Đakovo-Franjevac i Slavča pronađeno je nekoliko ostataka sjemenki kupine (*Rubus fruticosus*). U usporedbi s ranijim eneolitikom, divlje vrste i korovi prisutni su u većim količinama na svim lokalitetima izuzev Slavče, gdje je samo 4% uzoraka sadržavalo divlje vrste i korove. Osobito visoka frekvencija divljih/invazivnih vrsta zabilježena je na lokalitetu Vinkovci/Matije Gupca 14, zbog toga što je ondje utvrđeno više od 1,000 vrsta trava (*Bromus sp., Phleum sp.*, itd.) i sjeme divlje/bijele lobode (*Chenopodium sp./Chenopodium album*).

pared to the earlier Eneolithic wild plant and weed species are present in higher quantities at all the sites except Slavča, where only 4% of the assemblage contained wild plant and weed species. In particular, Vinkovci/Matije Gupca 14 has a high percentage of wild/weedy species due to the recovery of over 1,000 grass species (*Bromus* sp., *Phleum* sp. etc.) and seeds of goosefoot/fat hen (*Chenopodium* sp./*Chenopodium album*).

Rekonstrukcija praksi uzgajanja usjeva

Teško je pokušati odrediti je li vrsta usjeva identificirana na nekom lokalitetu zaista bila kultivirana. Primjerice, Van der Veen i Fieller (1982) su izračunali da bi uzorak trebao sadržavati najmanje 384 sjemenki, s time da bi jedna vrsta trebala sačinjavati 50% uzorka kako bi se dobila vjerojatnost od 95% za određivanje udjela svake vrste prisutne u uzorku. Osim toga, uzorci s manje od 50 ili 100 sjemenki često se isključuju iz analiza obrade usjeva i ratarstva (Bogaard 2004; Van der Veen 1992). Stoga, male koncentracije žitarica u arheobotaničkim uzorcima interpretirane su kao 'trave' ili kontaminanti, dok su veće koncentracije smatrane dokazima za uzgajanje 'usjeva'. Tek mali broj uzoraka s prostora Hrvatske sadržavao je više od 100 sjemenki, a samo dva uzorka s Vučedola i položaja Vinkovci/Matije Gupca 14 sadržavala su više od 384 sjemenke. Sklonost uzorkovanja jama u skupu nalaza iz

Reconstructing crop husbandry practices

Trying to determine whether a crop species recovered from a site is evidence of that crop being cultivated can be difficult. For example, Van der Veen and Fieller (1982) calculated that one sample needed at least 384 seeds, with one taxon making up 50% of the assemblage, to ensure a 95% chance of estimating the contribution of each taxon to that sample. In addition, samples with fewer than 50 or 100 seeds are often excluded from crop processing and husbandry analyses (Bogaard 2004; Van der Veen 1992). Consequently, low concentrations of cereals in archaeobotanical samples have been interpreted as 'weeds' or contaminants, whereas higher concentrations have been suggested as evidence of a 'crop plant'. For the samples examined within Croatia, only a small number contain over 100 seeds and only two samples from Vučedol and Vinkovci/Matije Gupca 14 have over 384 seeds. The bias to-

Hrvatske, kao i mala gustoća sjemena, također mogu sugerirati da mnogi od uzorka predstavljaju sporu akumulaciju sekundarnog ili tercijarnog odlaganja koje je slabo povezano s izvornim kontekstom. Dakle, kako bi se odredilo je li izgledno da je određena vrsta uzgajana kao usjev tijekom eneolitika kontinentalne Hrvatske, potrebno je općenitije sagledati skupni uzorak svih lokaliteta, kao i širu regiju u istom razdoblju.

wards sampling pits in the Croatian assemblage, as well as the low seed density, may also suggest that many of the remains represent the slow accumulation of secondary or tertiary deposits, which have little association with the context. Therefore, we must look more generally at the patterns of the sites together, as well as in the wider region at the time, to determine whether it is likely that a certain species was grown as a crop during the Eneolithic in continental Croatia.

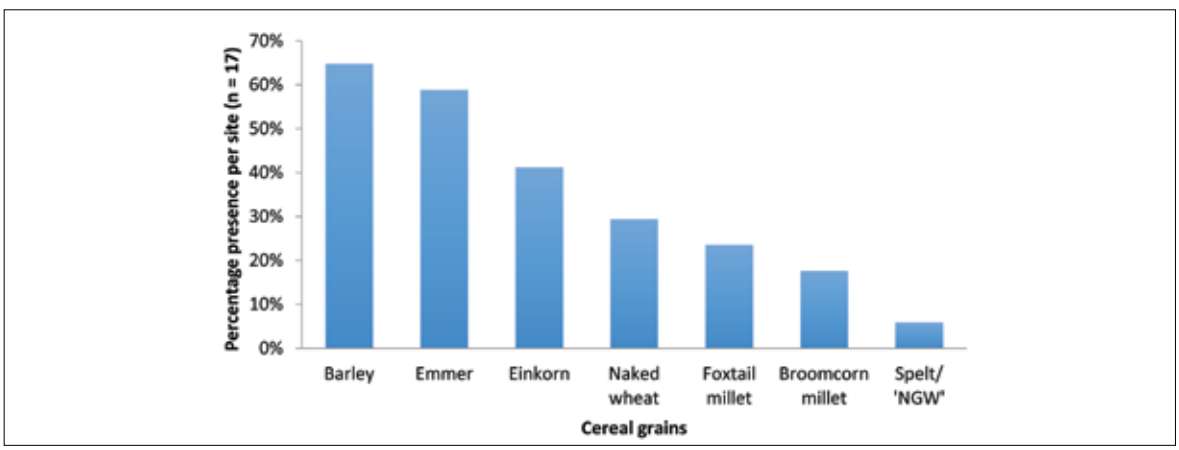
Ječam, dvozrna i jednozrna pšenica

Najčešće identificirane žitarice sa 17 proučavanih lokaliteta su šesteroredni ječam, jednozrna i dvozrna pšenica (Sl. 4). Dvozrna i jednozrna pšenica ujedno sačinjavaju i najveći broj sjemenki izdvojenih iz uzoraka, osobito s lokaliteta datiranih u srednji/kasni eneolitik (Sl. 3). Primjerice, velik broj sjemenki jednozrne pšenice s Vučedola većinom potječe s podova kuća te iz nekoliko uzoraka uzetih iz spaljenog zida, što sugerira da je ovaj usjev namjerno uzgajan na lokalitetu. Ipak, frekvencija ječma na pojedinom lokalitetu visoka je u usporedbi s drugim vrstama žitarica, što sugerira da je to bila jedna od čestih žitarica na lokalitetima (Sl. 4). Ovaj uzorak primijećen je diljem jugoistočne i središnje Europe gdje su dvozrna i jednozrna pšenica te šesteroredni ječam najčešći identificirani usjevi od neolitika do kasnog brončanog doba (Reed 2013). S obzirom na trenutne dokaze, teško je odrediti je li neki od ovih usjeva bio uzgajan učestalije od drugih.

Barley, Emmer and Einkorn

The most commonly recovered cereals from the 17 study sites are 6-row barley, emmer and einkorn (Fig. 4). Emmer and einkorn also have the highest number of grains recovered, especially from the middle/late Eneolithic sites (Fig. 3). For example, the large numbers of einkorn grains recovered from Vučedol are mainly from house floors and a couple of samples from a burnt wall suggesting that this crop was purposefully grown at the site. Nevertheless, the frequency of barley per site is high compared to the other cereal species also suggesting that it was a common cereal at the sites (Fig 4). This pattern is seen throughout southeast and central Europe where emmer, einkorn and 6-row barley are the most common crops found from the Neolithic to the late Bronze Age (Reed 2013). Whether there is a preference of one crop over another at the sites is difficult to determine from the current evidence.

Slika / Figure 4. Postotak udjela zrna žitarica po eneolitičkom lokalitetu / The percentage presence of cereal grains per site for the Eneoltihic.



Novi tip pšenice s ovojnicom, pir i gola pšenica

'Novi tip' pšenice s ovojnicom (eng. 'New type' glume wheat - NGW) prvi put su identificirali Jones et al. (2000) na neolitičkom lokalitetu u Grčkoj, a odonda se taj tip sve češće prepoznaje na lokalitetima diljem jugoistočne Europe. Sve veći broj nalaza sugerira da je ova biljka u tom razdoblju bila uzgajana na širokom prostoru, moguće u kombinaciji s jednozrnom pšenicom, vjerojatno kao zimski usjev, ali da je izgubila na važnosti tijekom brončanog i željeznog doba. U ranoeneolitičkim slojevima sa Slavče identificirano je samo pet ostataka NGW-a, a morfološke sličnosti između ostataka pira i NGW-a te izostanak pljeve na Vučedolu i Vinkovcima/Matije Gupca 14 znatno otežavaju identifikaciju ostataka NGW-a. Posljedično, ograničena količina dokaza moguće ukazuje na to da ovaj usjev nije redovito uzgajan, dok izostanak jasno odredivih ostataka pira sugerira da ta biljka nije uzgajana u proučavanom razdoblju.

Pronađeno je samo jedno ranoeneolitičko zrno gole pšenice *(Triticum durum/aestivum/turgidum*), a ista se tek sporadično javljaju na lokalitetima datiranima u mlađa razdoblja. Gola pšenica se također sporadično pojavljuje diljem jugoistočne i središnje Europe, ali čini se da je do brončanog doba ona u Italiji postala glavni usjev (Mercuri et al. 2006). Ipak, na temelju ostataka s eneolitičkih lokaliteta u Hrvatskoj, čini se neizglednim da je gola pšenica učestalo uzgajana.

New type glume wheat, Spelt and Naked wheat

'New type' glume wheat (NGW) was first identified by Jones et al. (2000) at a Neolithic site in Greece and since then has been identified more regularly at sites across Southeast Europe. The growing body of evidence suggests that it was widely cultivated at this time perhaps in mixed stands with einkorn, probably as a winter crop, but declined in importance during the Bronze and Iron Ages. Only five NGW glume bases were recovered from the early Eneolithic levels at Slavča, while similarities in the morphology of spelt and NGW grains and the lack of chaff remains at Vučedol and Vinkovci/Matije Gupca 14 make the identification of NGW tenuous during the later Eneolithic. Subsequently, the limited evidence may suggest that the crop was not regularly cultivated, while the absence of a clear spelt wheat identification would suggest this crop was not grown during this period.

Naked wheat (*Triticum durum/aestivum/turgidum*) is only found as one grain during the early Eneolithic and only sporadically seen at the later sites. Naked wheat is also found sporadically across southeast and central Europe, but by the Bronze Age in Northern Italy it is suggested to be a primary crop (Mercuri et al. 2006). However, for the Eneolithic sites in Croatia it is unlikely that the remains are representative of naked wheat being commonly grown as a crop.

Proso

Rasprave o tome kada i gdje su proso (*Panicum miliaceum*) i klipasti muhar (*Setaria italica*) prvi puta postali usjevi u Europi i dalje traju (npr. Jones 2004; Zohary et al. 2012: 71). Arheobotanički nalazi općenito pokazuju da se kvantiteta i frekvencija prosa i klipastog muhara znatno povećavaju diljem Europe do željeznog doba. Ista situacija zabilježena je u Hrvatskoj, gdje je u nedavnim iskopavanjima u Sisku pronađen stariježeljeznodobni lonac prepun sjemenki prosa (Reed & Drnić 2016). Čistoća ovih ostataka, i činjenica da su pronađeni u loncu, ukazuju na pohranjivanje hrane za potrebe čovjeka. Analiza stabilnih izotopa ugljika i dušika pronađenih u ljudskim kostima iskopanima na brončano i željeznodobnim lokalitetima u Hrvatskoj također pokazuje da je proso korišteno do željeznog doba (Lightfoot et al. 2015). Proso se u susjednim regijama također rijetko pojavljuje prije kasnog brončanog doba (Kroll 1998; van Zeist 2001/2002;

Millet

When and where broomcorn (*Panicum miliaceum*) and foxtail (*Setaria italica*) millet first became established in Europe as a crop is still debated (e.g. Jones 2004; Zohary *et al*. 2012: 71). Generally, the archaeobotanical evidence indicates that the quantity and frequency of foxtail and broomcorn millet increases significantly across Europe by the Iron Age. This is also supported in Croatia where recent excavations at Sisak revealed an early Iron Age pot filled with foxtail millet grains (Reed and Drnić 2016). The purity of the remains and their recovery within a pot suggest the storage of a crop for human consumption. The examination of carbon and nitrogen stable isotopes of human bones excavated from Bronze and Iron Age sites within Croatia also indicate millet consumption by the Iron Age (Lightfoot et al. 2015). In neighbouring regions millet is also rarely seen until the late Bronze Age (Kroll 1998; van Zeist 2001/2002; Filipović 2011; Medović 2011; 2012).

Filipović 2011; Medović 2011; 2012). U eneolitičkim kontekstima, proso i klipasti muhar pronađeni su u po samo nekoliko primjeraka (Sl. 2), stoga se čini neizglednim da je proso uzgajano u Hrvatskoj tijekom eneolitika.

Mahunarke i uljarice

Mahunarke su važan usjev u većini zemljoradničkih sustava, jer njihovo uzgajanje pomaže održavanju ili povećanju količine dušika u tlu te predstavljaju važan izvor bjelančevina u ljudskoj i životinjskoj prehrani. Za razliku od žitarica, mahunarke nisu čest nalaz na eneolitičkim lokalitetima. Mahunarke su identificirane samo na kasnoeneolitičkim lokalitetima Đakovo-Franjevac i Vučedol, i to u malim količinama. Najčešće identificirana vrsta je grašak (*Pisum sativum*), a slijede dva ostatka leće (*Lens culinaris*) i jedan sjetvene kukavičice (*Lathyrus sativus*). Grašak i leća mogu rasti u hladnijoj klimi i imaju relativno kratko vrijeme rasta. Sjetvenu kukavičicu mogu jesti i ljudi i životinje, a radi se o izdržljivoj mahunarki otpornoj na sušu, veliku vlagu, niske temperature i tlo slabe kvalitete (Gill 1991). Ipak, sjetvena kukavičica sadrži mnogo neurotoksina koji, ako ih se konzumira u velikim količinama, mogu dovesti do neurolatirizma (paraliza donjih ekstremiteta; Spencer & Schaumburg 1983). Ljudi u Etiopiji kratkim namakanjem uklanjaju ovojnicu sjetvene kukavičice jer se u njoj, kao i kod ostalih mahunarki, nalazi najviše toksičnih tvari (Butler et al. 1999). Ljudi u Španjolskoj namaču sjetvenu kukavičicu prije kuhanja variva, ili pak melju sjemenke u brašno od kojeg se potom kuha kaša (Peña-Chocarro & Zapata-Peña 1999). Sudeći prema tome što ih se u jugoistočnoj Europi od neolitika do brončanog doba pronalazi u kontekstima vezanim uz pohranjivanje, ali i ponovno korištenje hrane (npr. Valamoti et al. 2011), vrlo je izgledno da su mahunarke bile svakodnevni sastojak korišten u hrvatskom eneolitiku.

Lan (*Linum usitatissimum*) je uljarica, a ujedno i vlaknasta biljka koja uspijeva na propusnom tlu, ali je posebno osjetljiva na sušu (Casa et al. 1999). Sjemenke lana učestalo su identificirane na kasnoeneolitičkim lokalitetima, osobito na položaju Vinkovci/Matije Gupca 14, gdje je pronađeno 47 sjemenki lana. Očuvanje uljarica kroz proces karbonizacije ipak je osobito problematično, budući da sjemenke često izgore zbog visoke koncentracije ulja u sastavu, stoga neki autori predlažu da se uzgajanje lana na određenom lokalitetu ili regi-

Within the Eneolithic assemblage the recovery of both broomcorn and foxtail millet is limited to only a few grains (Fig. 2), so it is unlikely that millet was cultivated during the Eneolitic in Croatia.

Pulses and Oil plants

Pulses represent an important crop in most agricultural systems as they help maintain or increase nitrogen in the soil as well as provide an important source of protein for both humans and animals. In contrast to the cereals, pulses are not commonly recovered from the Eneolithic sites. Only the late Eneolithic sites of Đakovo-Franjevac and Vučedol have pulses identified and again only in small numbers. The most commonly identified is pea (*Pisum sativum*), followed by two lentils (*Lens culinaris*) and one grass pea (*Lathyrus sativus*). Peas and lentil are both cool-weather crops and have relatively short growing seasons. Grass pea is consumed by both humans and animals and is a hardy pulse that is resistant to drought, waterlogging, low temperatures and poor quality soil (Gill 1991). However, grass pea is high in neurotoxins, which if consumed in high numbers can lead to neurolathyrism (paralysis of the lower limbs) (Spencer & Schaumburg 1983). In Ethiopia, testae of grass pea are removed, as this is where most of the toxic substances of pulses are concentrated, by briefly soaking (Butler et al. 1999). In Spain, grass pea is soaked prior to cooking in stews or the seeds are ground into flour and cooked as gruel (Peña-Chocarro & Zapata-Peña 1999). Judging from their common occurrence both among storage and refuse contexts in southeast Europe from the Neolithic to the Bronze Age (e.g. Valamoti et al. 2011) it is very likely that pulses were regular ingredients of daily meals in Eneolithic Croatia.

Flax (*Linum usitatissimum*) is both an oil and fibre crop that grows best on well drained soils, but is particularly susceptible to droughts (Casa et al. 1999). From the Eneolithic sites flax seeds are commonly identified at the later sites, especially at Vinkovci/Matije Gupca 14, where 47 flax seeds were identified. The preservation of oil plants through carbonisation is, however, particularly problematic as the seeds tend to burn away due to their high oil content. Thus, some have suggested that flax cultivation can be inferred for a site/region even when a few flax seeds are found present in an archaeobotanical assemblage (Kroll 1993). Furthermore, processing of the plant might have taken place outside

ji može dokazati čak i kada se u arheobotaničkom skupu nalaza pronađe tek nekoliko sjemenki (Kroll 1993). Nadalje, obrada biljke mogla se odvijati izvan naselja, osobito ako su stapke korištene za dobivanje vlakana, što bi značilo da su u naselja stizala već obrađena vlakna ili očišćene sjemenke koje su ondje pohranjivane i dodatno obrađivane (Valamoti 2011). Na temelju malog broja pronađenih sjemenki moguće je, dakle, predložiti da je lan tijekom eneolitika u Hrvatskoj uzgajan kao uljarica ili pak kao sirovina za dobivanje vlakana.

Obrada usjeva

Pronalazak dijelova ovojnice zrna pšenice može pomoći pri identifikaciji mogućih strategija preživljavanja u naseljima. Primjerice, istraživači su, od sedamdesetih godina do danas, odredili da se izglednijim čini da su karbonizirani biljni ostaci posljedica proizvodnje hrane ili obrade usjeva, a ne konzumiranja hrane, i da stoga ukazuju na obradu usjeva i pritom korištene metode (Knörzer 1971; Dennell 1972; 1974; Hillman 1984; Jones 1984). Otada su razvijeni prediktivni modeli kojima je moguće identificirati kojem bi stupanju obrade usjeva određeni arheobotanički ostaci mogli pripadati. Model se temelji na pretpostavci da svaki stupanj rezultira uzorkom koji ima različiti karakteristični omjer žitarica, pljeve i korova (Hillman 1984; Jones 1984; Van der Veen 1992; Van der Veen & Jones 2006). Svaki stupanj rezultira dvama skupovima nalaza: usjevni proizvod, koji se dalje obrađuje kroz ostale stupnjeve te usjevni nusproizvod ili otpad, koji se uklanja prije sljedećeg stupnja. Pojednostavljeno, stupnjevi obrade žitarica bez ovojnice (npr. gola pšenica i ječam) su sljedeći (prema Hillman 1984; Van der Veen 1992; (Sl. 5):

• Žetva: sabiranje zrelog usjeva s polja, moguće čupanjem ili rezanjem;

• Vršidba: odvajanje zrna od pljeve, moguće udaranjem štapom ili korištenjem stoke za gaženje;

• Ispuhivanje: odvajanje sitne pljeve i korova od zrna, moguće pomoću vjetra ili košare;

• Grubo prosijavanje: odvajanje većih tvari poput komada korova, neovršenog klasja i sjena;

• Fino prosijavanje: odvajanje malih sjemenki korova od zrna korištenjem sita s gustom mrežicom.

Pšenice s ovojnicom (npr. jednozrna, dvozrna i 'novi tip' pšenice s ovojnicom) pak zahtijevaju daljnje stupnjeve obrade kako bi se zrno odvojilo od uske ovojnice. Primjerice, fazu sušenja zrna ti-

the settlement, especially if stems were processed for fibre extraction, resulting in only processed fibre or processed clean seed being brought to the site, stored and further processed (Valamoti 2011). It may therefore be possible to suggest from the few seeds found that flax was grown either as an oil or fibre crop during the Eneolithic in Croatia.

Crop processing

The recovery of wheat glume bases can help identify possible subsistence activities at the settlements. For example, since the 1970s researchers have determined that carbonised plant remains are more likely to result from food production and crop processing, rather than from food consumption and therefore provide a record of the crop husbandry and processing methods employed (Knörzer 1971; Dennell 1972; 1974; Hillman 1984; Jones 1984). Since then, predictive models have been created to identify which stage of the crop processing sequence an archaeobotanical assemblage may represent. This is based on the assumption that each stage produces a characteristically different ratio of cereal, chaff and weeds within the sample (Hillman 1984; Jones 1984; Van der Veen 1992; Van der Veen & Jones 2006). Each stage produces two assemblages: a crop product, which continues through each stage, and a crop by-product or residue, which is removed from the remaining processes. Simplified, the stages for processing free-threshing cereals (e.g. naked wheat and barley) are as follows (after Hillman 1984; Van der Veen 1992) (Fig. 5):

• Harvesting: to gather the mature crop from the field, possibly by uprooting or cutting;

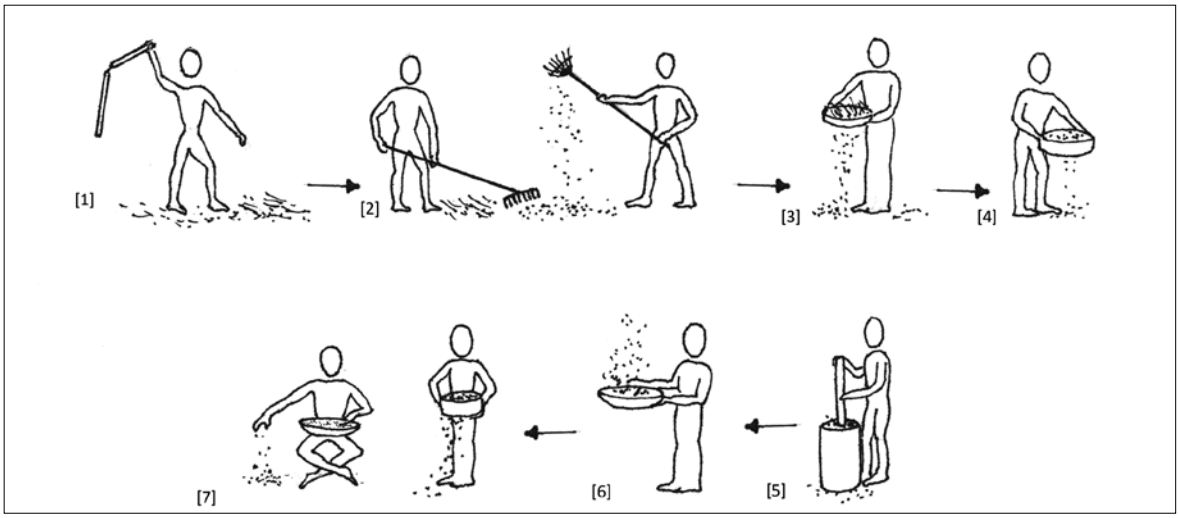
• Threshing: to release the grain from the chaff, possibly by beating with a stick or trampling by cattle;

• Winnowing: to remove the light chaff and weeds from the grain possibly by wind or basket;

• Coarse sieving: to remove larger items such as weed heads, un-threshed ears and straw;

• Fine sieving: to remove the small weed seeds from the grain with narrower meshed sieves.

Glume wheats (e.g. einkorn, emmer and 'new type' glume wheat) on the other hand require further processing stages to release the grain from the tight glumes. For example, a parching stage to dry



Slika / Figure 5. Obrada usjeva: 1. vršidba, 2. pročešljavanje i ispuhivanje, 3. grubo prosijavanje, 4. fino prosijavanje, 5. udaranje (uklanjanje ovojnice s pšenice s ovojnicom), 6. ispuhivanje, 7. grubo i fino prosijavanje i ručno probiranje / Crop processing activities: 1. Threshing, 2. Raking and Winnowing, 3. Coarse sieving, 4. Fine sieving, 5. Pounding (dehusking glume wheats), 6. Winnowing, 7. Coarse and fine sieving and hand-picking (crtež/drawing: M. Galić, prema/after: Stevens 2003).

jekom koje ovojnica postane krhka i spremna za udaranje te drugu fazu prosijavanja (prema Hillman 1984; Van der Veen 1992).

Pojednostavljeno, ovaj model sugerira da uzorak s visokim udjelom zrna žitarica i malo ostalih tvari, koji je posljedica jedne epizode spaljivanja i odlaganja, predstavlja kraj procesa obrade usjeva kada je zrno spremno za upotrebu. Suprotno tomu, uzorak s visokim udjelom ostataka ovojnica, koji je također posljedica jedne epizode spaljivanja i odlaganja, vjerojatno predstavlja otpad od obrade usjeva (stupnja u kojem se pljeva odvaja od zrna).

S eneolitičkih lokaliteta izdvojeno je samo pet vrsta zrna i pljeve žitarica: ječam, jednozrna pšenica, dvozrna pšenica, 'novi tip' pšenice s ovojnicom i gola pšenica. Od ovih pet, u uzorcima kvantitetom i frekvencijom prevladavaju dvozrna i jednozrna pšenica. Pregledom proučavanih lokaliteta, čini se izglednim da su mnogi od uzoraka s malom gustoćom biljnih ostataka deponirani kao posljedica različitih epizoda spaljivanja. Ipak, moguće je da velika gustoća ostataka ovojnica od takvih vrsta pšenica utvrđena na lokalitetu Slavča dokazuje postojanje otpada od obrade usjeva. Neki autori predlažu da se dnevna obrada pohranjene pšenice s ovojnicom odvijala u kućanstvu te da je zatim otpad (pljeva žitarica) odbacivan u vatru gdje je karboniziran (cf. Hillman 1984; Gregg 1989; Meurers-Balke & Lüning 1992; Bogaard 2004: 68; Kreuz 2012). Otpad iz ovih vatrišta naknadno je mogao biti odložen izvan kuća u jamama ili jarcima oko naselja. Pronalazak jednog komada stapke ječ-

the grain and render the glumes brittle ready for pounding, a 2nd winnowing stage, followed by a 2nd sieving stage (after Hillman 1984; Van der Veen 1992).

Simply, this model suggests that a sample with high numbers of cereal grains and not much else, which resulted from one burning and depositional event, would represent the end of the crop processing stages where the grain is ready for consumption. On the other hand, a sample with a high number of glume bases, also resulting from one burning and depositional event, probably represents crop processing waste (i.e. where the chaff is removed from the grain).

Only five types of cereal grain and chaff were identified from the Eneolithic sites: barley, emmer, einkorn, 'new type' glume wheat and naked wheat. Of these five, emmer and einkorn dominate the samples both in the quantity and the frequency. Examining the study sites, it is likely that many of the samples with low densities of plant remains were deposited as a result of different charring events. However, the high density of glume wheat glume bases seen at Slavča may suggest evidence of crop processing waste. Some suggest that the daily processing of stored glume wheats occurred within the household, where the waste (cereal chaff) was then swept into fires and carbonised (cf. Hillman 1984; Gregg 1989; Meurers-Balke & Lüning 1992; Bogaard 2004: 68; Kreuz 2012). The waste from these fires could have then been deposited outside the houses in pits or ditches around the settlement. The recov-

ma u Slavči također bi mogao ukazivati na to da je ječam uglavnom obrađivan izvan naselja, ili da je bio tek sporadično uzgajan na lokalitetu. Ipak, ostaci stapki žitarica krhkiji su od ostataka ovojnica i moguće je da naprosto nisu izdržali proces karbonizacije, što je dovelo do njihove premale zastupljenosti u uzorcima s lokaliteta (cf. Dennell 1976; Hillman 1981; Boardman & Jones 1990).

Prosa poput vrsta *Panicum* i *Setaria* prolaze slične stupnjeve obrade kao i pšenice s ovojnicom, zbog toga što je i njih potrebno vršiti (Harvey & Fuller 2005). Etnografska opažanja iz Španjolske pokazala su da jedna metoda obrade vrste *Panicum* zahtijeva zagrijavanje zrna, bilo na suncu ili u pećnici, a što olakšava uklanjanje ljuske korištenjem mužara (Moreno-Larrazabal et al. 2015). Zabilježeno je da je četirima ženama bilo potrebno 40 minuta da bi očistile 1 kg prosa pomoću mužara. Na eneolitičkim lokalitetima nije pronađena prosena pljeva, što sugerira da tijekom tog razdoblja proso nije obrađivano na prostoru Hrvatske. Međutim, prosena pljeva rijetko izdrži proces karbonizacije, zbog čega njezin izostanak može biti posljedica stupnja očuvanosti uzorka.

Jones (1984) i Butler (1992; Butler et al. 1999) također su proučavali mahunarke s etnološkog aspekta, osobito grahorice, graške, leću i sjetvenu kukavičica. Njihove studije pokazuju da se vrste *Vicia* i *Lathyrus* mogu obrađivati na sličan način kao žitarice bez ovojnice, ali da je proces vršidbe složeniji, budući da mnoge mahune ne puknu tijekom prve vršidbe, već njihova obrada zahtijeva više faza (Butler et al. 1999). Iz razdoblja eneolitika ne postoje dokazi o obradi mahunarki, što može biti posljedica mnogobrojnih razloga, uključujući obrađivanje mahunarki izvan naselja, čime njihovo dospijevanje u vatru i očuvanje u arheološkom kontekstu bilo onemogućeno.

Drugi izvori hrane

Teško je procijeniti ulogu divljih vrsta biljaka u pretpovijesnim zemljoradničkim zajednicama, ali izgledno je da su one imale važnu ulogu u eneolitičkoj prehrani. Povrh toga, divlje biljke mogle doprinositi i drugim aspektima ljudskog života. Primjerice, mogle su biti korištene kao građevinski materijal, lijekovi, boje, gorivo, krmna hrana, ili pak u različitim zanatima ili ritualima. Razlika između jestivih i nejestivih divljih vrsta u arheobotaničkim ostacima daleko je od jednostavne te se

ery of only one barley rachis at Slavča may also suggest that barley was mainly processed away from the settlement, or was only a minor crop at the site. However, cereal rachis is more fragile than glume bases and may simply have not survived the carbonisation process, resulting in its underrepresentation at the sites (cf. Dennell 1976; Hillman 1981; Boardman & Jones 1990).

Millets, such as *Panicum,* and *Setaria,* share similar processing stages with glume wheats, as millets also require dehusking (Harvey & Fuller 2005). Ethnographic observations in Spain have shown that one method of processing *Panicum* involves the warming of grains, either in the sun or in an oven, to help remove the hull when pounded in mortars (Moreno-Larrazabal et al. 2015). They observed that to dehusk 1 kg of broomcorn millet in a mortar it took approximately four women 40 minutes. No millet chaff was recovered from the Eneolithic sites suggesting that they were not processing millet during this period in Croatia. However, millet chaff is less likely to survive the carbonisation process and so its absence could also be a result of preservation.

Pulses, in particular vetches, peas, lentils and grass peas, have also been examined ethnographically by Jones (1984) and Butler (1992; Butler et al. 1999). These studies showed that *Vicia* and *Lathyrus* can be treated similarly to free-threshing cereals, but that there is a spectrum of threshability, as many pods do not shatter during the first threshing requiring further threshing (Butler et al. 1999). Evidence of pulse processing waste is not evident during the Eneolithic, however this may be due to a number of reasons including the processing of the pulses away from the settlements and the lack of opportunity of the remains to come into contact with fire and preserve in the archaeological record.

Other sources of food

It is difficult to assess the role of wild plants in prehistoric farming communities, but it is likely that they played an important role in the Eneolithic diet. Moreover, wild plants would have also contributed to other aspects of human life, being used as building materials, medicines, dyes, fuel, animal fodder, crafts or rituals. The distinction between edible and non-edible wild taxa in archaeobotanical samples is far from straightforward and is often based on those that are 'obviously gathered', due to the high

često temelji na onim vrstama koje su „očito sakupljane“, bilo zbog toga što su mnogobrojne među ostacima (Jacomet 2009), što su pronađene u kontekstima povezanim uz pohranu hrane, ili su naprosto jestive. Nadalje, divlja biljna hrana tipično je nedovoljno zastupljena među nagorenim ostacima zbog slabe očuvanosti. Primjerice, listovi salate neće se sačuvati ako dođu u kontakt s vatrom.

Plodovi

Na proučavanim eneolitičkim lokalitetima pronađen je određen broj drugih jestivih vrsta koji ukazuje na kontinuirano iskorištavanje neposrednog okoliša. Prikupljanje drijena (*Cornus mas*), iako u malim količinama, zabilježeno je na gotovo 50% nalazišta. Drijen se sakuplja u kasno ljeto i ranu jesen te je prepun vitamina C. Ljoskavac (*Physalis alkekengi*) je također definiran među uzorcima, iako češće u onim iz kasnog eneolitika. Slično kao i drijen, ljoskavac je bogati izvor vitamina C i ima dugu povijest upotrebe u ljekovite svrhe. Drugi, iako manje česti, plodovi koji su mogli biti uključeni u prehranu su kupine (*Rubus fruticosus*), lješnjak (*Corylus sp.*) i trnjina (*Prunus cf. spinosa*).

Divlje vrste

Druge moguće jestive vrste uključuju bijelu lobodu (*Chenopodium album*), čiji su listovi, sjeme i cvijet jestivi, zatim listove koprive (*Urtica* sp.) i mentu (*Mentha* sp.). Ipak, mnoge od definiranih vrsta često rastu uz usjeve kao korov. Primjerice, na nalazištima neolitičke kulturne skupine s trakastom keramikom, uz uzgajane se usjeve učestalu i sljedeće divlje vrste: *Bromus secalinus, Chenopodium album, Galium aparine, Galium Spurium*, i *Polygonum convolvulus* (Kruez & Schäfer 2011). Određeni broj ovih vrsta pojavljuje se i na eneolitičkim lokaltetima, zbog čega se izglednijim čini to da su te divlje vrste zapravo korovi koji su sačuvani zbog načina obrade žitarica, a ne da su namjerno prikupljani kao samonikli izvori hrane.

density of remains (Jacomet 2009), are within contexts associated with storage, or are simply edible. Furthermore, wild plant foods will also be typically under-represented in charred samples due to preservation. For example, salad leaves are not likely to preserve if they come into contact with fire.

Fruits

At the Eneolithic sites a number of other edible species were recovered that indicate the continued exploitation of the local environment. The collection of cornelian cherry (*Cornus mas*) is seen at nearly 50% of the sites, although in small numbers. Cornelian cherries are harvested in the late summer and early autumn and are high in vitamin C. Chinese lantern (*Physalis alkekengi*) is also identified from the samples, although more commonly from the later Eneolithic sites. Similarly chinese lantern is a rich source of vitamin C and has a long history of medicinal uses. Other less common fruits which could have been eaten include blackberry (*Rubus fruticosus*) hazelnut (*Corylus* sp.) and sloe (*Prunus* cf. *spinosa*).

Wild species

Other possible edible species could have included fat hen (*Chenopodium album*), whose leaves, seeds and flowers are all edible, as well as the leaves of nettles (*Urtica* sp.) and mint (*Mentha* sp.). However, many of the species recovered are also commonly found as weeds in cultivated crops. For example, at Neolithic Bandkeramik sites weed species found regularly in samples associated with manured crops include, *Bromus secalinus, Chenopodium album, Galium aparine, Galium Spurium*, and *Polygonum convolvulus* (Kruez & Schäfer 2011). A number of these species are also found at the Eneolithic sites making it likely that many of the wild species are in fact weeds from the crop processing waste rather than collected wild foods.

Zaključak

Čini se da se uzgajanje žitarica tijekom eneolitika u kontinentalnoj Hrvatskoj temeljilo na ječmu te dvozrnoj i jednozrnoj pšenici. Sporadični nalazi drugih vrsta žitarica, poput gole pšenice i prosa, mogli bi sugerirati da te biljke nisu često uzgajane u tom razdoblju te da su potencijalno rasle kao korov uz glavne usjeve žitarica. Velik broj ostataka pljeve pronađene na mnogim nalazištima ukazuje na to da se prerada žitarica s ovojnicom – dvozrne i jednozrne pšenice, odvijala u naselju, moguće u više pojedinačnih navrata. Takva praksa utjecala bi na potrebe za radom unutar naselja, s obzirom na to da pohranjivanje relativno nečistih usjeva (npr. djelomično vršenog klasja) zahtijeva manje rada ljeti, ali rutinska „dnevna obrada" zahtijeva više vremena. S obzirom na izneseno, predloženo je da ljudi koji pohranjuju neobrađene ili djelomično obrađene usjeve mogu provesti žetvu i, moguće, preliminarno vršidbu unutar jednog kućanstva (Fuller & Stevens 2009), iako su potrebna nova istraživanja koja bi potvrdila je li tako nešto bilo moguće u eneolitičkim naseljima.

Uz žitarice, izgledno je da su i mahunarke redovito uzgajane kao usjevi na lokalitetima, ali zbog ograničene količine nalaza s područja Hrvatske nije jasno koje su to mahunarke mogle biti. Ipak, one su važne za održavanje kvalitete tla, kao stočna hrana i dodatan izvor bjelančevina i amino kiselina u ljudskoj prehrani te su, vrlo vjerojatno, bile dijelom eneolitičkog sustava poljoprivrede. Još jedan od usjeva koji su vjerojatno bili uzgajani je lan, koji je mogao biti korišten za dobivanje ulja, ali i vlakana. Kao dopuna prehrani temeljenoj na žitaricama i važan izvor vitamina C, također su sakupljani i divlji plodovi poput drijena, ljoskavca i kupine.

Conclusion

During the Eneolithic in continental Croatia cereal production seems to have been based around the growing of barley, emmer and einkorn. The sporadic finds of other cereals, such as naked wheat and millet, would suggest that they are not commonly grown during this period and may even be weeds within the main cereal crops. The large number of chaff remains found at many of the sites indicate that crop processing of the glume wheats emmer and einkorn occurred within the settlement, possibly piecemeal. This would have an impact on the labour requirements within a settlement as the storage of relatively unclean crops (e.g. partially threshed ears) will have a less intensive demand on labour in the summer, but routine 'daily processing' will consume more time. It has therefore been suggested that those storing crops with little to no processing will be able to perform harvesting and perhaps preliminary threshing and raking within just the nuclear household (Fuller & Stevens 2009), although further research is needed to confirm whether this could have been possible at the Eneolithic settlements.

In addition to the cereals, pulses were also likely to have been regularly grown as crops at the sites. The limited evidence within the Croatian assemblage makes it unclear what pulses may have been regularly grown, however, they are important for soil health, for animal feed and also an additional source of protein and amino acids in the human diet and were likely part of the Eneolithic farming regime. Another crop that was likely grown was flax which could have been used as both an oil and fibre crop. To supplement the crop based diet, and provide an important source of vitamin C, wild fruits would have also been collected including cornelian cherry, chinese lantern and blackberries.

Literatura / Bibliography

Boardman, S. & Jones, G. 1990, Experiments on the effects of charring on cereal plant components, *Journal of Archaeological Science* 17(1), 1-11.

Bogaard, A. 2004, *Neolithic Farming in Central Europe: An Archaeobotanical Study of Crop Husbandry Practices*, Routledge, London.

Butler, A. 1992, Pulse agronomy: traditional systems and implications for early cultivation, in: P. C. Anderson (ed.), *Préhistoire de l'Agriculture: Nouvelles Approches Expérimentales et Ethnographiques*, Monographie du CRA 6. Paris, Éditions du CNRS, 67-78.

Butler, A. Tesfay, Z. D'Andrea, C., Lyons, D. 1999, The ethnobotany of Lathyrus sativus L. in the highlands of Ethiopia, in: M. Van der Veen (ed.), *The Exploitation of Plant Resources in Ancient Africa,* New York, Kluwer/Plenum, 123-136.

Casa, R. Russell, G. Lo Cascio, B., Rossini, F. 1999, Environmental effects on linseed (*Linum usitatissimum* L.) yield and growth of flax at different stand densities, *European Journal of Agronomy* 11(3–4), 267-278.

Chapman, J. Shiel, R., Batović, Š. 1996, *The Changing Face of Dalmatia*, Leicester, Leicester University Press.

Dennell, R. W. 1972, The interpretation of plant remains: Bulgaria, in: E. S. Higgs (ed.), *Papers in Economic Prehistory*, Cambridge, Cambridge University Press, 149-159.

Dennell, R. W. 1974, Botanical evidence for prehistoric crop processing activities*, Journal of Archaeological Science* 1(3), 275-284.

Dennell, R. W. 1976, The economic importance of plant resources represented on archaeological sites, *Journal of Archaeological Science* 3, 229-247.

Filipović, D. 2011, Beška-Kalakača: Arheobotaničke analize, in: M. Jevtić (ed.), *Čuvari žita u praistoriji. Studija o žitnim jama sa Kalakače kod Beške*, Vršac-Beograd, Gradski Muzej Vršac-Filozofski Fakultet Beograd, 84–94.

Fuller, D. & Stevens, C. 2009, Agriculture and the development of complex societies: An archaeobotanical agenda, in: A. Fairbairn and E. Weiss (eds.), *From Foragers to Farmers: Papers in Honour of Gordon C. Hillman*, Oxford, Oxbow Books, 37-57.

Gill, G. 1991, *Seasonality and Agriculture in the Developing World: A Problem of the Poor and the Powerless*, Cambridge, Cambridge University Press.

Gnirs, A. 1925, *Istria Praeromana*, Germany, Karsbad.

Gregg, S. 1989, Paleo-ethnobotany of the Bandkeramik phases, in: C. Kind (ed.), *Ulm-Eggingen: Die Ausgrabungen 1982 bis 1985 in der bandkeramischen Siedlung und der mittelalterlichen Wüstung,* Forschungen und Berichte zur Vor- und Frühgeschichte in Baden-Württemberg 34, Stuttgart, Konrad Theiss Verlag, 367-399.

Harvey, E. L. & Fuller, D. 2005, Investigating crop processing using phytolith analysis: The example of rice and millets, *Journal of Archaeological Science* 32(5), 739-752.

Hillman, G. 1981, Reconstructing crop husbandry practices from charred remains of crops, in: R. Mercer (ed.), *Farming Practices in British Prehistory*, Edinburgh, Edinburgh University Press, 123-162.

Hillman, G. 1984, Interpretation of archaeological plant remains: the application of ethnographic models from Turkey, in: W. Van Zeist and W. A. Casparie (eds.), *Plants and Ancient Man: Studies in Palaeoethnobotany*, Rotterdam, Balkema, 1-41.

Hopf, M. 1964, Untersuchung der Getreidereste im Hüttenlehm aus Danilo/ Investigation of cereal residues in daub from Danilo, in: J. Korošec (ed.), *Danilo in Danilska Kultura*, Ljubljana, Univerzitetna založba, 107-108.

Hubbard, R.N.L.B. & Clapham, A. 1992, Quantifying macroscopic plant remains, *Review of Palaeobotany and Palynology* 73 (1-4), 117-132.

Jacomet, S. 2009, Plant economy and village life in Neolithic lake dwellings at the time of the Alpine Iceman, *Vegetation History and Archaeobotany* 18, 47-59.

Jones, G. 1984, Interpretation of archaeological plant remains: ethnographic models from Greece, in: W. Van Zeist and W. A. Casparie (eds.), *Plants and Ancient Man: Studies in Palaeoethnobotany*, Rotterdam, Balkema, 43-61.

Jones, G., Valamoti, S., Charles, M. 2000, Early crop diversity: a "new" glume wheat from northern Greece, *Vegetation History and Archaeobotany* 9(3), 133-146.

Jones, M.K. 2004, Between fertile crescents: minor grain crops and agricultural origins, in: M.K. Jones (ed.), *Traces of Ancestry: Studies in Honour of Colin Renfrew*, Cambridge, McDonald Institute for Archaeological Research, 127–35.

Karg, S. & Müller, J. 1990, Neolithische Getreidefunde aus Pokrovnik, Dalmatien, *Archäologisches Korrespondenzblatt* 20, 373-386.

Knörzer, K. H. 1971, Urgeschichtliche unkräuter im Rheinland ein beitrag zur entstehungsgeschichte der segetal gesellschaften, *Vegetatio* 23(1-2), 89-111.

Kohler-Schneider, M. 2003, Contents of a storage pit from Late Bronze Age Stillfried, Austria: another record of the "new" glume wheat, *Vegetation History and Archaeobotany* 12(2), 105-111.

Kreuz A. 2012, Die Vertreibung aus dem Paradies? Archäobiologische Ergebnisse zum Frühneolithikum im westlichen Mitteleuropa, *Bericht der Römisch-Germanischen Kommission* 91, 23-196.

Kreuz, A. & Schäfer, E. 2011, Weed finds as indicators for the cultivation regime of the early Neolithic Bandkeramik culture?, *Vegetation History and Archaeobotany* 20(5), 333-348.

Kroll, H.J. 1993, Kulturpflanzen von Kalapodi, *Archäol Anz* 2, 161–182.

Kroll, H.J. 1998, Die Kultur- und Naturland- schaften des Titeler Plateaus im Spiegel der metall- zeitlichen Pflanzenreste von Feudvar – Biljni svet Teitelskog platoa u bronzanum i gvozdenom dobu – Palaeobotanička analiza biljnih ostataka praistorijskog naselja Feudvar, in: B. Hänsel & P. Medović (eds.), *Feudvar 1. Das Plateau von Titel und die Šajkaška*, Prähistorische Archäologie in Südosteuropa 13, Kiel, Verlag Oetker&Voges, 305–17.

Lightfoot, E., Šlaus, M., Rajić Šikanjić, P., O'Connell, T.C. 2015, Metals and millets: Bronze and Iron Age diet in inland and coastal Croatia seen through stable isotope analysis, *Archaeological and Anthropological Sciences* 7(3), 375-386.

Medović, A. 2011, Biljna privreda Gradine na Bosutu (ili Savi?) u starijem gvozdenom dobu, in: P. Medović and I. Medović (eds.), *Gradina na Bosutu: Naselje starijeg gvozdenog doba*, Novi Sad, Pokrajinski zavod za zaštitu spomenika kulture, 329–355.

Medović, A. 2012, Late Bronze Age plant economy at the Early Iron Age hill fort settlement Hisar, *Rad Muzeja Vojvodine* 54, 105–18.

Mercuri, A. M. Accorsi, C. A. Mazzanti, M. B. Bosi, G. Cardarelli, A. Labate, D. Marchesini, M., Grandi, G. T. 2006, Economy and environment of Bronze Age settlements – Terramaras – on the Po Plain (Northern Italy): first results from the archaeobotanical research at the Terramara di Montale, *Vegetation History and Archaeobotany* 16(1), 43-60.

Meurers-Balke, J. & Lüning, J. 1992, Some aspects and experiments concerning the processing of glume wheats, in: P.C. Anderson (ed.), *Prehistoire de l'Agriculture: Nouvelles Approches Experimentales et Ethnographiques*, Paris, Éditions du CNRS, Monographie du CRA 6, 341–62.

Moreno-Larrazabal, A. Teira-Brión, A. Sopelana-Salcedo, I. Arranz-otaegui, A., Zapata, L. 2015, Ethnobotany of millet cultivation in the north of the Iberian Peninsula, *Vegetation History and Archaeobotany* 24(4), 541-554.

Peña-Chocarro, L. & Zapata-Peña, L. 1999, History and traditional cultivation of Lathyrus sativus L. and Lathyrus cicera L. in the Iberian Peninsula, *Vegetation History and Archaeobotany* 8, 49–52.

Reed, K. 2013, Farmers in Transition: *The Archaeobotanical Analysis of the Carpathian Basin from the Late Neolithic to the Late Bronze Age (5000–900 BC),* Unpublished Ph.D. thesis, School of Archaeology and Ancient History, University of Leicester.

Reed, K. 2016, Agricultural change in Copper Age Croatia (ca. 4500 – 2500 cal B.C)?, *Archaeological and Anthropological Science* [Online April 2016].

Reed, K. & Drnić, I. 2016, Iron Age diet at Sisak, Croatia: archaeobotanical evidence of foxtail millet (Setaria italica [L.] P. Beauv.), *Oxford Journal of Archaeology* 35(4), 359-368.

Spencerm, P.S. & Schaumburg, H.H. 1983, Lathyrism: a neurotoxic disease, *Neurobehavioral Toxicology and Teratology* 5, 625–629.

Stevens, C. J. 2003, An investigation of agricultural consumption and production models for prehistorc and Roman Britain, *Environmental Archaeology* 8, 61-76.

Valamoti, S. M. 2011, Flax in Neolithic and Bronze Age Greece: archaeobotanical evidence, *Vegetation History and Archaeobotany* 20(6), 549-560.

Valamoti, S. M., Moniaki, A., Karathanou, A. 2011, An investigation of processing and consumption of pulses among prehistoric societies: Archaeobotanical, experimental and ethnographic evidence from Greece, *Vegetation History and Archaeobotany* 20(5), 381-396.

Van der Veen, M. 1992, *Crop Husbandry Regimes: An Archaeobotanical Study of Farming in northern England 1000 BC - AD 500*, Sheffield: J.R. Collis Publications.

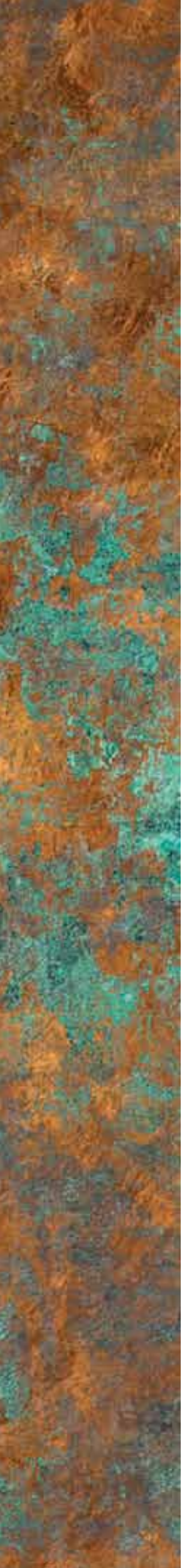
Van der Veen, M. 2007, Formation processes of desiccated and carbonized plant remains: The identification of routine practice, *Journal of Archaeological Science* 34(6), 968-990.

Van der Veen, M. & Fieller, N. 1982, Sampling seeds, *Journal of Archaeological Science* 9(3), 287-298.

Van der Veen, M. & Jones, G. 2006, A re-analysis of agricultural production and consumption: Implications for understanding the British Iron Age, *Vegetation History and Archaeobotany* 15(3), 217-228.

Van Zeist, W. 2001/2002, Plant husbandry and vegetation of Tell Gomolava, Vojvodina, Yugoslavia, *Palaeohistoria* 43/44, 87–115.

Zohary, D., Hopf, M., Weiss, E. 2012, *Domestication of Plants in the Old World: The Origin and Spread of Domesticated Plants in South-west Asia, Europe, and the Mediterranean Basin*, Oxford, Oxford University Press.



Eneolitička proizvodnja tekstila

Eneolithic textile production

Ana Grabundžija

Freie Universität Berlin
Excellence Cluster TOPOI
ana.grabundzija@fu-berlin.de

Tijekom eneolitičkog razdoblja na području jugoistočne i srednje Europe došlo je do nekoliko važnih ekonomskih pomaka. Između ostalog, počeli su se koristiti sekundarni proizvodi životinjskog porijekla, kako je prvobitno predložio Andrew Sherratt (1981, 1983), i čemu su naknadno posvećene mnoge arheološke rasprave (Evershead et al. 2002; Craig 2002; Craig et al. 2002; Greenfield 2005; 2010; Vigne & Helmer 2007; Halstead & Isaakidou 2011). Sličan je razvoj razmatran i u kontekstu arheološkog proučavanja tekstila koje je usmjereno na rano korištenje vune (Good 1999; 2007; Becker et al. 2003; Rahmstorf 2005; Rast-Eicher 2005; 2013; 2014; Shishlina et al. 2003). Ipak, mnogi problemi vezani uz to interesno područje, poput nedostataka očuvanih tekstila i činjenice da većina neizravnih nalaza nije analizirana i objavljena, razlog su zašto su teme vezane uz tekstilnu proizvodnju i promjene tehnologije izrade tekstila ostale neobrađene. Posljedično, pitanja izvora sirovinskih materijala, koji su usko vezani uz promjene trendova u strategijama preživljavanja tijekom eneolitika, kao i njihova specijalizacija za tekstilnu proizvodnju, ostaju neistražena.

Neki od glavnih ciljeva arheologije tekstila uključuju proučavanje pojave novih strategija proizvodnje vlakana (McCorriston 1997; Rast-Eicher 2005; Kimbrough 2006; Grabundžija & Schoch, u tisku) i objašnjavanje, kako kulturoloških, tako i klimatskih čimbenika koji su utjecali na razvoje u tehnologiji predenja i tkanja (Nosch 2014; Andersson 2011, 2012, 2014; Barber 1991; Gleba 2008; McCorriston 1997). U najnovijim istraživanjima koja se bave širenjem inovacija primjenjuju se matematički modeli (Djurdjevac Conrad et al. 2018) te pristupi temeljeni na upotrebi agentnih sistema

Several important economic advances were introduced and spread across the area of South East and Central Europe during the Eneolithic period. Among them, the use of secondary animal products, which was originally proposed by Andrew Sherratt (1981, 1983) and later extensively discussed in diverse archaeological studies (Evershead et al. 2002; Craig 2002; Craig et al. 2002; Greenfield 2005; 2010; Vigne & Helmer 2007; Halstead & Isaakidou 2011). Similar developments have also been considered within the context of textile archaeological research that focuses on early wool exploitation (Good 1999; 2007; Becker et al. 2003; Rahmstorf 2005; Rast-Eicher 2005; 2013; 2014; Shishlina et al. 2003). However, many issues related to the particular research area, such as the lack of actual textiles and the fact that much of the indirect evidence remains unanalyzed and unpublished, has left the subject of textile production and its changing technology unexamined. Consequently, the issue of raw fibre material resources, which closely relates to the changing trends in the subsistence economies of the Eneolithic period, and their specialization for textile production, is poorly understood.

Some of the main objectives in textile archaeology include investigating the appearance of new fibre production strategies (McCorriston 1997; Rast-Eicher 2005; Kimbrough 2006; Grabundžija & Schoch, in press) and explaining both cultural and environmental factors that influenced developments in spinning and weaving technology (Nosch 2014; Andersson 2011, 2012, 2014; Barber 1991; Gleba 2008; McCorriston 1997). In the most recent research, a mathematical modeling of the spreading of innovations (Djurdjevac Conrad et al. 2018) and agent based approaches to information transfer (Park

za prijenos informacija (Park et al., u postupku recenzije) kako bi se odredili prostorni i vremenski aspekti proučavanih tehnoloških trendova.

Složenost proučavanja razmjera proizvodnje novih izvora vlakana uglavnom se oslanja na *proxy* indikatore i integraciju različitih istraživačkih polja. Inkorporiranje modela klimatskih promjena (Grabundžija & Russo 2016) i istraživanje razvoja vegetacije (Schumacher et al. 2015; 2016) od ključne su važnosti za određivanje okolišnih faktora koji su mogli utjecati na uzorke iskorištavanja različitih sirovinskih materijala. Kao što je vidljivo iz uzorka eneolitičkih tekstilnih alatki diljem jugoistočne i središnje Europe, glavni se klimatski trendovi preklapaju s promjenama u morfologiji pršljenova za predenje (Grabundžija & Russo 2016). Čini se da su oba skupa podataka usklađena sa zabilježenim tendencijama u strategijama preživljavanja (Hoekman-Sites & Giblin 2012; Gyucha & Duffy 2013). Tekstilni zanati među najstarijim su tehnologijama, a znatna količina tekstilnih proizvoda bila je neophodna u svakodnevnom životu. Proizvodnja je ovisila o dostupnosti sirovina, stoga je uvođenje novih vrsta vlakana moglo biti od ključne važnosti za ekonomiju tijekom proučavanog razdoblja.

Alatke za proizvodnju tekstila ovise o nekoliko faktora, kao što su primijenjene tehnike, korišteni materijali i željeni krajnji proizvodi. Većinu njih moguće je sagledati kroz analizu morfoloških karakteristika tekstilnih alatki, a koje su, dokazano, osjetljive na kulturnu atribuciju (Grabundžija 2018).

Izravni i neizravni dokazi

Najstarija dosad poznata vunena tkanina datirana je u vrijeme između 3700. i 3200. god. kal. pr. Kr. (Shishlina et al. 2003), a pronađena je na sjevernom Kavkazu u središnjoj Aziji i pripisana kulturi Majkop. Osim toga, na predenom platnu s lokaliteta Lagozza di Besnate u gradu Varese pronađeno je nekoliko pojedinačnih vunenih niti (Bazzanella et al. 2003: 184) datiranih u kasni neolitik (Baioni 2003: 183), otprilike u vrijeme između 3800. i 2800. god. kal. pr. Kr. (Skeates 1994: 222-223), a oba nalaza sugeriraju da je u europskim kontekstima moguće očekivati prvu pojavu vune jednako rano kao i na Bliskom Istoku. Činjenicu da je vuna prepoznata u 4. tisućljeću pr. Kr. (Good 1999; Shishlina et al. 2003) treba uzeti kao referentnu točku za buduća istraživanja, odnosno kao *terminus ante quem* za pojavu vunastih ovaca (Becker et al. 2016: 113).

et al., in review) are being applied for determining spatio-temporal aspects of the investigated technological trends.

The complexity of investigating the expanse of new fibre material production relies mainly on proxy indicators and the integration of different research fields. Incorporation of climate change modeling (Grabundžija & Russo 2016) and investigation of vegetation developments (Schumacher et al. 2015; 2016) is considered crucial for determining possible environmental factors that might have influenced different raw material exploitation patterns. As observed on the Eneolithic textile tool samples across South East and Central Europe, the main climate trends are shown to be concurrent with changes in spindle whorl morphology (Grabundžija & Russo 2016). Both sets of data appear to be in accord with the outlined tendencies in subsistence strategies (Hoekman-Sites & Giblin 2012; Gyucha & Duffy 2013). Textile crafting is one of the oldest technologies and the variety of its products was indispensable in everyday life. It relied on raw material availability, so the introduction of new fibre options might have had a fundamental impact on ancient economies during this period.

Textile tools depend on several factors, such as applied techniques, used materials and desired end products. Most of them can be investigated through the analysis of morphological traits of textile tools, which have proven to be culture sensitive (Grabundžija 2018).

Direct and Indirect Evidence

So far, the oldest woolen textile, dated between 3700-3200 cal. BC (Shishlina et al. 2003), which was found at North Caucasus in Central Asia is attributed to the Majkop culture. Additionally, a few stray wool fibres on a twined cloth from Lagozza di Besnate, Varese (Bazzanella et al. 2003: 184) that was dated to the recent Neolithic (Baioni 2003: 183), roughly between 3800-2800 cal. BC (Skeates 1994: 222–223), propose that first wool can be expected in European contexts just as early as in the Near East. The fact that wool has been identified in the 4th millennium BC (Good 1999; Shishlina et al. 2003) should be taken as a reference point for further investigation, marking a *terminus ante quem* for the appearance of woolly sheep (Becker et al. 2016: 113).

Due to the rareness of direct evidence, a great deal of research in the frame of textile archaeology re-

Zbog rijetke pojave izravnih dokaza, a s ciljem proučavanja vlakana znatan dio istraživanja u okvirima arheologije tekstila odnosi se na različite izvore podataka. Studije tekstilnih vlakana koje se bave pretpovijesnom proizvodnjom na Bliskom Istoku dodatne podatke mogu crpiti iz pisanih izvora, uključujući i prijeko potrebne podatke o ranim izvorima sirovina. Preciznije, proizvodnja vune spominje se već u 3. tisućljeću pr. Kr. u zapisima na klinastom pismu (Völling 2012), a u nekima se od njih čak opisuju tehnike korištene u proizvodnji tekstila (Waetzoldt 1972; 2007; 2010; 2013; Steinkeller 1980). O detaljima tekstilne proizvodnje, prvenstveno predenju, tkanju i bojenju, već je raspravljano u nekoliko studija koje se bave tekstovima s lokaliteta Ur III (Andersson Strand & Cybulska 2012; Firth & Nosch 2012; Firth 2013). Nažalost, takav pristup nije moguće primijeniti u kontekstu pretpovijesne Europe, gdje se studije tekstila oslanjaju na sporadične konkretne ostatke i analizu znatno brojnijih tekstilnih alatki.

Ostaci tekstila

Očuvanje tekstila u arheološkim kontekstima uglavnom ovisi o uvjetima tla i mikrobima. Izuzetno se rijetko pojavljuju u pretpovijesnim slojevima, što je ujedno i glavni razlog zbog kojeg arheolozi često zaborave i previde njihovo postojanje. PH vrijednosti tla različito utječu na očuvanje vlakana životinjskog i biljnog porijekla. Neutralna tla (pH=7) pogoduju životinjskim vlaknima koja se većinski sastoje od bjelančevina, što znači da se raspadaju u alkalnim uvjetima, za razliku od biljnih vlakana, koja se, zbog svog celuloznog sastava, raspadaju u kiselom, a ostaju bolje očuvana u alkalnom okruženju (Cybulska & Maik 2007).

Očuvanje obje vrste vlakana, biljnih i životinjskih, u istom kontekstu je neuobičajena pojava, iako je moguća pod posebnim okolnostima kada su aktivnosti mikroba smanjene zbog suše (Good 1999), smrzavanja (Winiger 1995) ili visoke koncentracije soli (Bichler et al. 2005).

Tkanine se obično kratko koriste, što znači da su pogodne za radiokarbonsko datiranje, osobito nakon što je razvijena metoda masene spektrometrije akceleratorom (AMS) koja je omogućila datiranje manjih uzoraka. U skladu s tim, u sklopu nekolicine projekata je provedeno sustavno radiokarbonsko datiranje arheoloških tekstila, čime je uspostavljen čvrsti kronološki okvir za važne tekstilne zbirke i, što je još važnije, na temelju čega

sorts to different sources of information for the purpose of investigating fibre materials. Textile fibre studies that focus on the prehistoric Near Eastern productions are able to derive additional data from written sources, which include indispensable information on the early raw materials. Specifically, wool production is mentioned already in the late 3rd millennium BC cuneiform scripts (Völling 2012), some of which are even describing employed textile production techniques (Waetzoldt 1972; 2007; 2010; 2013; Steinkeller 1980). Specifics of textile production, in particular spinning, weaving and dyeing, are addressed in several studies based on Ur III texts (Andersson Strand & Cybulska 2012; Firth & Nosch 2012; Firth,2013). Unfortunately, this kind of approach is not possible in the context of prehistoric Europe, where textile studies rely on scarce actual remains and the analysis of more numerous textile tools.

Textile Remains

Preservation of textiles in archaeological contexts mainly depends on soil conditions and microbial activity. Their appearance in prehistoric deposits is exceptionally rare, which is the main reason why their overall presence often tends to be forgotten and overlooked by archaeologists. The soil's pH-value influences the conservation of animal and vegetal fibres differently. Neutral soils (pH=7) favour animal fibres that are protein-based, which causes them to decay in alkaline conditions, while vegetal fibres dissolve in acidic milieu and are better preserved in alkaline environment, mainly due to their cellulose composition (Cybulska & Maik 2007).

The preservation of both types of fibres, vegetal and animal, in the same context is extraordinary, whereas it occurs in special circumstances of reduced microbial activity due to desiccation (Good 1999), permafrost (Winiger 1995) or high salt concentration (Bichler et al. 2005).

Textiles usually have a relatively short period of use, which makes them suitable for radiocarbon dating, especially after the development of accelerator mass spectrometry (AMS) that enabled dating of smaller samples. Accordingly, several projects have carried out systematic radiocarbon dating of archaeological textiles, which established a solid chronological framework for important textile collections, and more importantly, resulted in an on-

je Rheinische Friedrich-Wilhelms-Universität u Bonnu osnovao elektroničku bazu podataka datiranih tekstila (http://textile-dates.info).

Glavna analiza vlakana uključuje njihovo prepoznavanje, mjerenje i procjenu kvalitete, dok se dodatne izmjere mogu koristiti pri određivanju načina njihove obrade, primjerice za utvrđivanje jesu li vlakna prethodno namakana, te da li su spajana uplitanjem ili predenjem (Leuzinger & Rast-Eicher 2011). Sastav vunenih vlakana može ukazivati na vrstu ovce od koje potječe sirovina (i.e. primitivne dlakave ovce ili razvijenije vrste), na to je li vuna trgana ili čupana, je li odvajana i čak je li češljana. Ovaj se proces izvodi kombiniranjem svjetlosnog i skenirajućeg elektronskog mikroskopa (SEM) koji se koriste za proučavanje pigmentacije i strukture, te za inspekciju ljuski i srži vlakana, kao i za utvrđivanje prisutnosti bojila, iako se, u slučaju da nije moguće uzeti uzorke, kao zamjena može koristiti digitalni video mikroskop, npr. *Optilia Flexia* (Gleba 2012).

Na području jugoistočne i središnje Europe pronađeno je samo nekoliko ostataka tekstila, a većina ih je otkrivena u močvarama Ljubljanskog barja. Nažalost, količina dostupnih podataka o ovim uzorcima izuzetno je mala.

Komadići niti i užadi iz Dežmanovih istraživanja čuvaju se u Nacionalnom muzeju u Ljubljani. Druge niti i užad, kao i sitni komadići tkanog tekstila, čuvaju se u Blatnoj Brezovici. Kemijske analize su pokazale da su nalazi izrađeni od lana ili konoplje (Greif 1997: 41). Ipak, za razliku od lana (*Linum usitatissimum*), korištenje konoplje (*Cannabis sativa*) za proizvodnju tekstila iz razdoblja prije željeznog doba u Europi nije dovoljno poznato (Barber 1991: 15). Solidna količina nalaza iz Ljubljanskog barja, većina kojih, nažalost, nije u potpunosti objavljena, uključuje različite tekstilne proizvode (predivo, užad i tkana platna). Svi su ovi nalazi, prema dostupnim podacima, biljnog porijekla, iako za većinu njih nisu poznati tehnološki parametri poput debljine i smjera predenja niti, tehnika tkanja i slično.

Arheobotanički podaci iz močvara (Greif 1997: 29, Sl. 4, 5) potvrđuju prisustvo nekoliko divljih i kultiviranih vrsta koje su mogle biti korištene u proizvodnji tekstila, prostirki i košara, uključujući rogoz (*Typha angustfollia*) i lipu (*Tilia sp.*). Lan je tek nedavno uvršten na popis zbog korištenja prikladne arheobotaničke metode uzorkovanja i proučavanja (Tolar & Velušček 2009). Prisutnost lana zabilježena je na lokalitetu Stare Gmajne, jednom

line database of dated textiles established by the Rheinische Friedrich-Wilhelms-Universität in Bonn (http://textile-dates.info).

The main fibre analysis includes the identification of fibres, measurement and assessment of fibre quality, while further measurements of fibres can be used for determining how they were processed, e.g. whether the plant fibres were retted or not, or whether they have been spliced or spun (Leuzinger & Rast-Eicher 2011). The composition of wool fibres can indicate the type of sheep they derive from (i.e. primitive hairy sheep or more developed ones), whether the wool was shorn or plucked, if it had been sorted or even if it had been combed. This is done by a combination of light microscopy and scanning electron microscopes (SEM), used for investigating pigmentation, scales, fibre surface, medulla and indications of dye, although if it is not possible to take samples, a digital video microscope, i. e. *Optilia Flexia* may be used as an alternative (Gleba 2012).

Only a few textile remains have been found within the scope of South East and southern Central Europe. The great majority of them were recovered at Ljubljansko Barje moors, however, the existing data on these particular examples are very scarce.

Pieces of threads and cord from Dežman's excavations are kept in the National museum in Ljubljana. Other threads and cords, as well as tiny pieces of woven textiles are found at Blatna Brezovica. According to chemical analyses, they are made of either flax or hemp (Greif 1997: 41). But, in contrast to the use of flax (*Linum usitatissimum*), the textile use of hemp (*Cannabis sativa*) in Europe is so far not sufficiently attested prior to the Iron Age (Barber 1991: 15). The fair amount of evidence from Ljubljansko barje, most of which is unfortunately insufficiently published, includes textile products of different character (yarn, cords and woven fabrics). These are all, according to the available data, of plant origin, although, for most of the finds nothing is known about technological parameters, like thickness and spin direction of the thread, weaving techniques, etc.

Archaeobotanical data from the moors (Greif 1997: 29, Fig. 4, 5) attested the presence of a few wild and cultivated species that might have been used for textile, mat and basketry products, including marshy grass (*Typha angustfollia*) and lime-tree (*Tilia sp.*). Flax was only recently added to the list, due to the use of an appropriate archaeobotanical method of sampling and examination (Tolar & Velušček 2009).

od močvarnih nalazišta gdje je pronađeno i predivo pripremljeno za tkanje ili izradu užeta (Pajagič-Bregar et al. 2009: 310). Provedena analiza vlakana temeljena je na slikama dobivenim SEM-om, a rezultati sugeriraju da je ova visoko-kvalitetna pređa, datirana u kraj 4. tisućljeća pr. Kr., vjerojatno ispredena od vlakana dobivenih iz plodova i stabljika biljaka iz porodice trava (*Poaceae*) (Pajagič-Bregar et al. 2009: 318).

Još jedan važan dokaz iz regije jest tehnološki potpuna tkanina pronađena u brončanodobnom grobnom humku na lokalitetu Pustopolje u Bosni i Hercegovini, datirana u sredinu 2. tisućljeća pr. Kr. (Marić Baković & Car 2014: 42). Vuneni plašt iz Pustopolja na Kupresu sada se sastoji od gotovo 600 ulomaka, a, s obzirom na to da su očuvana sva četiri ruba, bilo je moguće odrediti njegovu izvornu veličinu, oblik i, najvažnije, način na koji je izrađen (Hoffmann 1964). Srećom, sam nalaz još je organski, što znači da se sastoji od vune i nije mineraliziran, čime su omogućene znanstvene analize vlakana i bojila. Sama tkanina jednostavno je istkana vuna, očuvana s početnim i završnim krajevima, kao i bočnim rubovima (Bender Jørgensen & Grömer, 2012: Sl. 4). Dokazano je da je plašt kvalitetno napravljen; ujednačenost vune i tkanine pokazuju da su brončanodobni proizvođači s prostora Balkana bili vješti majstori sposobni proizvesti kvalitetnu tkaninu, vjerojatno korištenjem ručnog, visećeg vretena i tkalačkog stana s nategnutom osnovom (Bender Jørgensen & Grömer 2012: 52). Tehnološka analiza strukture tekstila omogućila je identifikaciju početnog ruba: "*vrsta poprečnog ruba kakvu se obično povezuje s korištenjem tkalačkog stana s nategnutom osnovom*" (Bender Jørgensen & Grömer 2012: 61).

Dr. Antoinette Rast-Eicher provela je analizu vlakana na uzorcima iz Pustopolja korištenjem svjetlosnog i SEM mikroskopa te je, na temelju kombinacije vrlo finih i vrlo grubih vlakana, ustanovila da je korištena '"tipična" neodvajana brončanodobna vuna (Bender Jørgensen & Grömer 2012: 56).

Analogije za tekstil iz Pustopolja mogu se naći među brončanodobnim vunenim nalazima iz rudnika bakra i soli na lokalitetima Mitterberg i Hallstatt koji su datirani u vrijeme između 1600. i 1200. god. pr. Kr. (Grömer 2006). Ovi nalazi ukazuju na „potpuno razvijenu kulturu korištenja vune i, iako su jednostavne vunene tkanine izrađivane od samo jednog prediva, dokazuju pojavu određene novine - boje (Bender Jørgensen & Grömer 2012: 50).

The presence of flax was recorded at Stare Gmajne, one of the moor sites that also yielded a preserved example of a spun yarn, wound into a ball and prepared for weaving, or rope making (Pajagič-Bregar et al. 2009: 310). The performed fibre analysis was based on the SEM images, results of which suggest that this high-quality yarn, dated to the end of the 4th millennium BC was most probably spun from fibres found in fruits and stems of plants belonging to the family of grasses (*Poaceae*) (Pajagič-Bregar et al. 2009: 318).

Another important piece of evidence from the region is a technically complete textile, found in a Bronze Age burial mound at Pustopolje in Bosnia-Herzegovina, dated to the middle of the 2nd millennium BC (Marić Baković & Car 2014: 42). The woolen cape from Pustopolje, Kupres now consists of almost 600 fragments, but as all four edges are preserved it was possible to establish its original size and design, and most importantly, how it was made (Hoffmann 1964). Fortunately, the find itself is still organic, meaning it consists of wool rather than being mineralized, which enabled the scientific analyses of fibres and dyestuffs. The textile itself is a wool tabby- complete with starting and finishing borders as well as salvages (Bender Jørgensen & Grömer 2012: Fig. 4). It is proven to be well made; the evenness of yarns and fabric shows that Bronze Age manufacturers from the Balkans were skilled craftsmen, able to produce high-quality fabric, most likely using drop spindles and the warp-weighted loom (Bender Jørgensen & Grömer 2012: 52). Technical analysis of the textile structure made it possible to identify the starting border, "*a type of transverse border that is usually associated with the warp-weighted loom*" (Bender Jørgensen & Grömer 2012: 61).

Samples of the Pustopolje textile have been subjected to fibre analysis by Dr. Antoinette Rast-Eicher, who used the Light microscopy and SEM to determine that, based on a combination of very fine and very coarse fibres (kemp), a 'typical' unsorted Bronze Age wool was used (Bender Jørgensen & Grömer 2012: 56).

Analogies for the textile recovered at Pustopolje can be found among Bronze Age woolen finds from the copper and salt mines at Mitterberg and Hallstatt, both dated between 1600 and 1200 BC (Grömer 2006). These finds suggest "*a fully developed wool textile culture*", and even though the woolen tabbies are made of single yarn and are coarser than the Early Bronze Age linens, they offer a particular novelty- color (Bender Jørgensen & Grömer 2012: 50).

Alatke za proizvodnju tekstila

Za razliku od konkretnih ostataka tekstila, alatke za njegovu proizvodnju čest su nalaz u pretpovijesnim kontekstima jugoistočne i srednje Europe. Posebno je to slučaj s pršljenovima koji postaju brojniji tijekom razdoblja eneolitika (Sl. 1). Knjiga Elizabeth Barber, "Prehistoric Textiles" (Barber 1991), znatno je promijenila shvaćanje tekstila u arheologiji jer je ukazala na postojanje alatki i potencijal da se kroz njih osvrne na pitanja sirovinskih materijala, tehnika i krajnjih proizvoda.

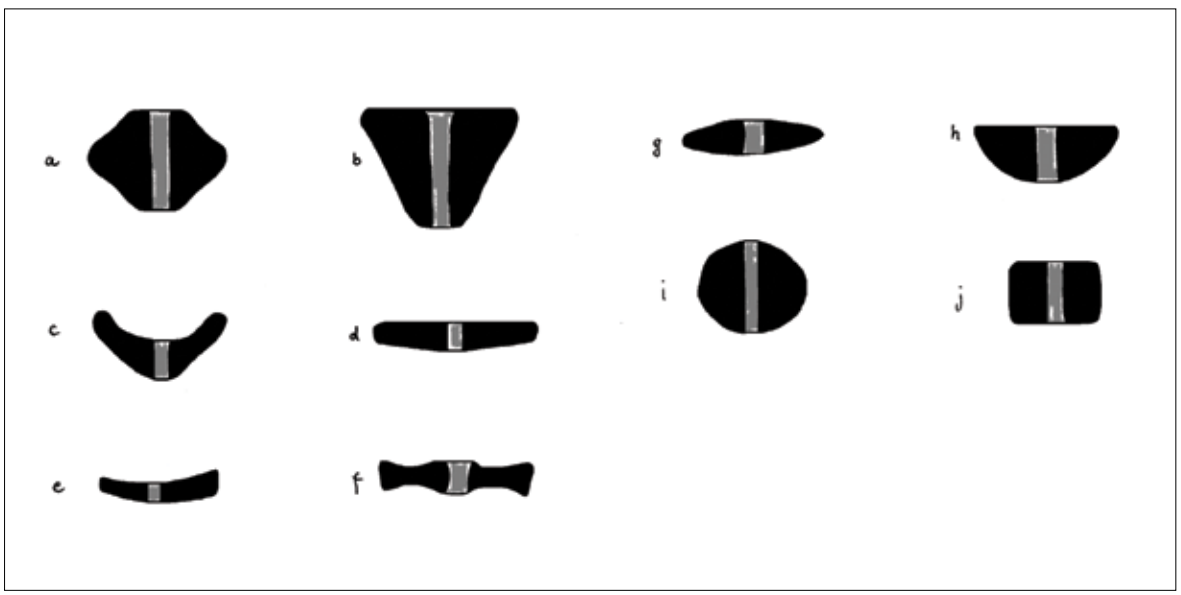
Tijekom prošlog desetljeća tekstilne su se alatke našle u središtu studija kojima se nastoji objasniti tehnološki razvoj povezan sa specijalizacijom zanata (Andersson Strand 2011), povećanjem proizvodnje (McCorriston 1997) i uvođenjem novih sirovina (Kimbrough 2006). Kako bi se rasvijetlila izvorna upotreba i funkcija tekstilnih alatki s obzirom na različita vlakna, studije tekstila često se služe kombinacijom dvaju metoda. Prva se odnosi na tehnološku analizu tekstilnih alatki (i.e. Belanova-Štolcova & Gromer 2010), a druga, koja je nadopunjava, se temelji na rezultatima eksperimentalne arheologije (Andersson Strand 2010) koji pružaju analogije potrebne za određivanje parametara funkcionalnosti alatki.

Textile Tools

Unlike actual textile remains, textile tools are well represented in the prehistoric contexts across South East and Central Europe. This especially holds true for spindle whorls, which become numerous during the course of the Eneolithic period (Fig. 1). Elizabeth Barber's book "Prehistoric Textiles" (Barber 1991), immensely changed the perception of textiles in archaeology, since it raised the awareness of tools and their potential for addressing issues of raw fibre materials, techniques and final products.

During the past decade textile tools have become the main focus of studies explaining technological developments connected to craft specialization (Andersson Strand 2011), intensified production (McCorriston 1997) and introduction of new raw materials (Kimbrough 2006). In order to elucidate the original use and function of textile tools in connection to different fibres, textile studies often combine two main methods. The first includes a technical analysis of textile tools (i.e. Belanová-Štolcová & Grömer 2010) and the second, which complements it, is based on the results of experimental archaeology (Andersson Strand 2010) that provides analogies necessary for a determining tool's functional parameters.

Slika / Figure 1. Najčešći tipovi eneolitičkih pršljenova: (a) bikonični, (b) konični, (c) konkavni konični, (d) diskoidni, (e) različiti oblici ulomaka keramike, (f) diskoidni u obliku kotača, (g) lećasti, (h) konveksni, (i) okrugli i (j) cilindrični / Most common Eneolithic spindle whorl types: (a) biconical, (b) conical, (c) concave conical, (d) discoid, (e) various forms of ceramic fragments, (f) wheel-like discoid, (g) lenticular, (h) convex, (i) spherical and (j) cylindrical (crtež / drawing: A. Grabundžija).



Izuzev pionirskih studija tekstilnih tradicija u Rumunjskoj (Mazăre 2014) i Bugarskoj (Petrova 2011), koje su u obzir uzele samo arheološke nalaze iz ograničenih zemljopisnih cjelina, dijagnostički nalazi sa širokog prostora jugoistočne i srednje Europe tek su odnedavno postali predmetom sustavnih istraživanja (Grabundžija & Schoch, u tisku). Iako je Mazareina studija (2014) tekstilnih alatki iz Transilvanije obuhvatila dugo razdoblje između otprilike 6000. i 3500. god. pr. Kr., u njoj eneolitička proizvodnja tekstila nije dovoljno istražena i obuhvaćena. Nažalost, 'prijelazna' stoljeća druge polovice 4. i prve polovice 3. tisućljeća pr. Kr., koja nisu zahvaćena spomenutom studijom, najzanimljivije su razdoblje za proučavanje iskorištavanja novih izvora vlakana. Prvo, zbog onoga što Sherratt predlaže u svom SPR modelu (Sherratt 1981; 1983) po pitanju izvora životinjskih vlakana, i, drugo, zbog onoga što o uzgoju lana govore nove studije botaničkih ostataka (Brombacher & Jacomet 1997; Jacomet 2009; Herbig & Maier 2011; Harris 2014).

S druge strane, studija koju je Petrova (2011) provela na tekstilnim alatkama iz Bugarske uglavnom se bavi kasnijim kontekstima i primarno se osvrće na uzorke alatki iz brončanog i željeznog doba. Takav pristup ni u ovom slučaju nije omogućio detaljnije proučavanje velikih napredaka u strategijama pribavljanja vlakana kakve bi se moglo očekivati u razdoblju eneolitika. Uzgredno, nedostatak oba navedena istraživanja jest to što je zbog usmjerenosti na pojedinačna razdoblja i ograničene prostore ostalo malo mjesta za usporedbe rezultata na međuregionalnoj razini.

Ipak, napravljena je još jedna studija tekstilnih alatki koja je uključila znatan broj eneolitičkih nalazišta u Poljskoj (Chmielewski 2009), i koja može poslužiti kao referenca za tehnološke promjene uočene na uzorku alatki iz jugoistočne i srednje Europe (Grabundžija & Russo 2016; Grabundžija & Schoch, u tisku). Chmielewskijevo opsežno istraživanje proizvodnje tekstila uključilo je ne samo tehnološke aspekte predenja i tkanja, već i zooarheološke i arheobotaničke podatke važne za istraživanje tekstilnih vlakana. Nadalje, njegova i Gardyńskijeva funkcionalna analiza pršljenova temeljena na izračunima momenta inercije (Chmielewski & Gardyński 2010) znatno je doprinijela metodologiji istraživanja rotacijskih svojstava alatki i njihovoj povezanosti s korištenjem različitih vrsta sirovih vlakana.

Apart from pioneering studies on textile traditions in Romania (Mazăre 2014) and Bulgaria (Petrova 2011), which only took into consideration archaeological evidence from confined geographical sections, diagnostic objects from a large area of South East and southern Central Europe have been only recently systematically studied (Grabundžija & Schoch, in press). Although Mazăre's study (2014) of textile tools from the Transylvanian region covered a large period between ca. 6000 and 3500 BC, it left the Late Eneolithic textile production underinvestigated and unaddressed. Unfortunately, the 'transitional' centuries of the second half of the 4th and the first half of the 3rd millennium BC, which are not covered by the particular study, are the most interesting for the research of the new fibre material practice. Firstly, in regard to animal fibre resources, as it is proposed by Sherratt's SPR model (Sherratt 1981; 1983), and secondly, in regard to flax fibre cultivation, as it is indicated by the recent studies on botanical evidence (Brombacher & Jacomet 1997; Jacomet 2009; Herbig & Maier 2011; Harris 2014).

On the other hand, Petrova's study (2011) of textile-tools from Bulgaria covers mainly later contexts, focusing more precisely on Bronze and Iron Age tool samples. This again did not allow a more detailed study of the major advancements in the fibre material procurement strategies that are expected for the Eneolithic period. Incidentally, the drawback of both bodies of research is that while focusing on separate periods and confined areas, they left little room for cross-regional comparison of the results.

However, another case study of textile tools, which incorporates a fair number of Eneolithic sites in Poland (Chmielewski 2009), offers a reference for technological changes observed on the Eneolithic tool sample from South East and southern Central Europe (Grabundžija & Russo 2016; Grabundžija & Schoch, in press). Chmielewski's extensive research on textile production covers not only spinning and weaving aspects of the technology but also incorporates zooarchaeological and archaeobotanical data relevant for the textile fibre research. Furthermore, his and Gardyński's functional analysis of spindle whorls, based on the moment of inertia calculations (Chmielewski & Gardyński 2010), made a valuable methodological asset to the investigation of a tools' rotational properties and their possible correlation to different raw fibre materials.

Glavna prepreka u istraživanju pretpovijesnih tehnologija tekstila, a posebice razvoja u proizvodnji i obradi vlakana, je nedostatak objavljenih podataka. Alatke koje i jesu objavljene obično nisu prezentirane u potpunosti, kao cjeloviti skup nalaza, ili pak nedostaju najvažniji podaci poput veličine i težine. Takve je nalaze stoga moguće samo tipološki uspoređivati, jer manjak podataka onemogućava provođenje funkcionalne analize.

Na spomenutim sojeničarskim lokalitetima iz Ljubljanskog barja, na kojima je pronađeno nekoliko komada tkanine, također je otkrivena i velika količina tekstilnih alatki, uglavnom pršljenova. Nažalost, dosad nije objavljena niti jedna sustavna studija o proizvodnji tekstila. Neki od nalaza se ipak spominju, primjerice dio uzorka iz Maharskog Prekopa (Bregant 1974a; 1974b; 1975), lokaliteta istovremenog kompleksu Baden-Boleráz (Parzinger 1984) koji je apsolutno datiran u vrijeme između otprilike 3500. i 3300. god. pr. Krista. Tipologija ovog uzorka istovjetna je tipologiji pršljenova pripisanih kulturnoj skupini Baden-Boleráz (Ruttkay 1995: 145-160), iako se mogu povući jake paralele i s alatkama s lokaliteta kulture Horgen, Arbon-Bleiche 3 u istočnoj Švicarskoj (Leuzinger 2002: Sl. 2). Ovaj je lokalitet apsolutno datiran u vrijeme između 3384. i 3370. god. kal. pr. Kr., što ga čini gotovo istovremenim Maharskom Prekopu (de Capitani & Leuzinger 2001: 721). Utemeljenost usporedbe ova dva skupa nalaza potvrđena je jakim utjecajima kompleksa Baden-Boleráz (de Capitani & Leuzinger 2001: 723). Svi tipovi pršljenova iz Maharskog Prekopa imaju analogije u uzorku s lokaliteta Arbon-Bleiche 3. Ipak, ova se dva uzorka znatno razlikuju u veličini pršljenova. Pršljenovi iz Maharskog Prekopa znatno su veći od primjera s lokaliteta Arbon-Bleiche 3. Još je na jednom lokalitetu iz Ljubljanskog barja, Blatna Brezovica (Korošec 1963), pronađen uzorak pršljenova koji se mogu smatrati otprilike istovremenima onima iz skupa nalaza s lokaliteta Maharski Prekop (Greif 1997: Tab. 1). Na lokalitetu su pronađeni konkretni ostaci tekstila koji su i dalje neobjavljeni, iako je izbor velikih bikoničnih i koničnih pršljenova (kao i ulomak jajolikog utega za tkalački stan s uzdužno probušenom rupom) spomenut u literaturi (Korošec 1963: 17, 18, 20).

Uzorci alatki koji sadrže velike i teške bikonične te konične pršljenove zabilježeni su i u kontekstima kasnog eneolitika diljem kontinentalne Hrvatske: Slavča-Nova Gradiška, Štrosmajerovac, Đakovo-Franjevac, Čepinski Martinci-Dubrava, i Tomašan-

The main setback in investigating prehistoric textile technologies and, in particular, developments in fibre production and processing is the lack of published data. Those tools that do get published are often not reported in their complete assemblages or are lacking the most important data, which include size and weight information. This makes them eligible for typological comparisons but does not provide the needed information for performing a functional analysis.

The already mentioned Ljubljansko Barje piledwelling sites, which yielded several pieces of textile, also produced a large amount of textile tools, mainly spindle whorls. Unfortunately, no systematic study of textile production has been published so far. Some of the finds have been reported, among them a part of the sample from Maharski Prekop (Bregant 1974a; 1974b; 1975), a site synchronized with the Baden-Boleráz complex (Parzinger 1984), and dated in absolute terms to the period between ca. 3500-3300 BC. The particular sample typologically corresponds to the spindle whorl sets of the Baden-Boleráz cultural group (Ruttkay 1995: 145–160), although strong parallels can be also made with the tools from Horgen site Arbon-Bleiche 3 in east Switzerland (Leuzinger 2002: Fig. 2). This site is absolutely dated between 3384 and 3370 cal. BC, which makes it roughly contemporary to Maharski Prekop (de Capitani & Leuzinger 2001: 721). The basis for comparison of the two tool sets is supported by the pronounced Baden-Boleráz influence (de Capitani & Leuzinger 2001: 723). All types of whorls from Maharski Prekop reveal parallels in Arbon-Bleiche 3 sample. Although, these two samples obviously differ in the size of the whorls. Spindle whorls from Maharski Prekop appear significantly larger than the examples belonging to the Arbon-Bleiche 3 sample. Another Ljubljansko Barje site, Blatna Brezovica (Korošec 1963), also yielded a spindle whorl sample that could be considered roughly contemporary to the Maharski Prekop assemblage (Greif 1997: Tab. 1). The site produced some actual textile remains that remain unpublished, although a selection of large biconical and conical spindle whorls (including a fragment of an ovoid longitudinally pierced loom weight) was reported in the literature (Korošec 1963: 17, 18, 20).

Comparable spindle whorl samples containing large and heavy biconical and conical spindle whorl types are recorded at several Late Eneolithic contexts across continental Croatia: Slavča-Nova Gradiška, Štrosmajerovac, Đakovo-Franjevac, Čepinski Mar-

Slika / Figure 2. Bikonični pršljenovi, Đakovo-Štrosmajerovac-Pustara / Biconical spindle whorls, Đakovo-Štrosmajerovac-Pustara (foto / photo; I. Krajcar).

Slika / Figure.3. Konični pršljenovi, Jaruge-Gođevo-Berava / Conical spindle whorls, Jaruge-Gođevo-Berava (foto / photo: I. Krajcar).

ci-Palača, (Grabundžija 2016). Radi se o primjercima koji su tipično vrlo velikih dimenzija i ukazuju na češći odabir viših tipova alatki (alatke većeg omjera visine i promjera), što se može smatrati glavnim tehnološkim standardom koji se razvio tijekom kasnog 4./ranog 3. tisućljeća pr. Kr. (Sl. 2-3).

Jedan od najvećih skupova nalaza pršljenova u široj regiji prikupljen je na lokalitetu Ig-Ljubljansko barje. Spomenute alatke potječu iz Dežmanovih istraživanja (Dežmnanova kolišča) koja su provedena krajem 19. stoljeća, a objavljene su bez zabilježenih težina (Korošec & Korošec 1969). Nažalost, i kronološka i kulturološka atribucija ovih nalaza je upitna. Prema autorima (Korošec & Korošec 1969), čini se izglednijim da zbirka potječe iz više od jednog naselja, a uspostavljeno je da se alatke može otprilike datirati u razdoblje od samog kraja eneolitika (vučedolska kultura) do ranog brončanog doba (kultura Somogyvár-Vinkovci/Ljubljana).

Tipološke (bikonični i visoki konični pršljenovi) i morfološke (veliki i teški pršljenovi) analogije za uzorak s lokaliteta Ig moguće je pronaći u rijetkim objavama pršljenova iz kasnog eneolitika s lokaliteta Vučedol-Gradac (Schmidt 1945: Sl. 48) i Sarvaš (Balen 2005: T. 58, 73, 74) u istočnoj Hrvatskoj, ili pak Gomolava u Srbiji (Petrović & Jovanović 2002: 221, 279, 319, 321). Određeni uzorci predstavljaju samo manji dio otkrivenih nalaza koje tek treba detaljno proučiti i dokumentirati.

tinci-Dubrava, Tomašanci-Palača, (Grabundžija 2016). These examples are typically very large in size and display a preference for (tools with greater height/diameter ratio) that can be considered as the main technological standard which developed during the late 4th/early 3rd millennium BC (Fig. 2-3)

One of the biggest sets of spindle whorls in the wider region was recovered at Ig – Ljubljansko barje. The tools in question originate from Dežman's excavations (Dežmanova kolišča) that were carried out at the end of the 19th century and were published without weight values (Korošec & Korošec 1969). Unfortunately, both chronological and cultural attribution of these tools remains uncertain. According to the authors (Korošec & Korošec 1969) it is more than likely that the collection belongs to more than one settlement and it can be established that the tools are roughly dated to the period from the very end of the Eneolithic (Vučedol culture) till the Early Bronze Age (Somogyvár-Vinkovci /Ljubljana culture).

Typological (biconical and high conical spindle whorls) and morphological (large and heavy spindle whorls) analogies for the Ig sample can be traced among rare published examples of Late Eneolithic spindle whorls from Vučedol-Gradac (Schmidt 1945: Taf. 48) and Sarvaš (Balen 2005: T. 58, 73, 74) in eastern Croatia, or Gomolava in Serbia (Petrović & Jovanović 2002: 221, 279, 319, 321). Particular samples represent only a small portion of the tools recovered, which remain to be studied and recorded in detail.

Istraživanje tekstilne tehnologije

Razvoju izvora tekstilnih vlakana moguće je pristupiti kroz proučavanje indikatora tehnoloških promjena, a koje se, kako je predloženo, može prepoznati kroz prilagodbu alatki na svojstva određene sirovine.

Kao što je Kimbrough predložila funkcionalne kategorije za analizu mezopotamskih pršljenova datiranih u 4. tisućljeće pr. Kr. (2006: 135-6), tako je nekoliko autora, primjerice Rast-Eicher (2005: 127) te Chmielewski i Gardyński (2010: 878), povezalo očite promjene u morfologiji pršljenova 4. tisućljeća pr. Kr. s ranim korištenjem vune u Europi.

Početne faze proizvodnje tekstila koje se odnose na obradu vlakana izuzetno su važne pri proučavanju trendova nabavljanja sirovina. Najbrojnije i standardizirane alatke koje omogućavaju dijakronički pristup takvim ciljevima upravo su pršljenovi, zbog toga što oni, u određenoj mjeri, sadrže potencijal za otkrivanje promjena u preferencijama pri odabiru vlakana (Bohnsack 1981; Crewe 1998) i svojstvima krajnjih proizvoda (Grömer 2005).

Glavne odrednice protokola dokumentiranja tekstilnih alatki se, više ili manje, temelje na istom metodološkom modelu kojeg je izradio Centar za istraživanje tekstila u Kopenhagenu. Svaku alatku karakteriziraju: tipološke odrednice, stanje očuvanosti, sirovina, ukras, kvaliteta izrade, tragovi korištenja, dimenzije i težina.

Osim pršljenova, bilježi se i analizira neizravne dokaze tehnologije tkanja. Utezi za tkalački stan često su jedini izvor podataka za proučavanje promjena u tradiciji tkanja. Eksperimentalnu metodu moguće je primijeniti kao dodatan dio analize alatki. Cilj takvih pokusa često je proučiti alternativne izbore alatki i njihovu prilagodljivost (Rahmstorf 2005; Mårtensson et al. 2007b; Pavúk 2012) u nastojanju da se objasni izostanak konvencionalnih tipova alatki u proučavanim kontekstima (Grabundžija et al. 2016).

Investigating Textile Technology

Developments in textile fibre resources can be approached through indications of technological change. These are proposed to be recognizable as tool adaptation to the particular raw material properties.

Just like Kimbrough established functional categories for the analysis of Mesopotamian spindle whorls dated to the 4th millennium BC (2006: 135–6), several authors, i.e. Rast-Eicher (2005: 127) and Chmielewski and Gardyński (2010: 878) connected obvious changes in the morphology of the 4th millennium BC spindle whorls with the early wool use in Europe.

Onset stages of textile production which relate to fibre processing are especially important for the investigation of trends in the raw material procurement. The most numerous and standardized tools that allow a diachronic approach to such objectives are spindle whorls. To a certain degree, they hold the potential for revealing changes in both the fibre material preferences (Bohnsack 1981; Crewe 1998) and the final product properties (Grömer 2005).

Main guidelines for textile tool recording protocol are more or less based on the same methodological model established by the Centre of the Textile Research in Copenhagen. Each tool is characterized by: typological assignment, preservation status, raw material, decoration, production quality, use wear, dimensions and weight

Besides spindle whorls, indirect evidence of weaving technology is also being recorded and analyzed. Loom weights are often the only source of information for addressing changes in the weaving traditions. An experimental method can be applied as a remote part of the tool analysis. These tests often aim to explore alternative tool options and their versatility (Rahmstorf 2005; Mårtensson et al. 2007b; Pavúk 2012) with an attempt to explain the absence of conventional tools in the investigated contexts (Grabundžija et al. 2016).

Tehnologija predenja: glavni funkcionalni parametri

Napravljena je studija slučaja na pršljenovima s lokaliteta Josipovac Punitovački-Veliko polje I i Đakovo-Franjevac u istočnoj Hrvatskoj. Skupovi pršljenova pripisanih retzgajarskoj kulturi srednjeg te kostolačkoj kulturi kasnog eneolitika analizira-

Spinning Technology: Main Functional Parameters

A spindle whorl case study was performed for Josipovac Punitovački – Veliko polje I and Đakovo – Franjevac sites in eastern Croatia. Spindle whorl assemblages associated with the Middle Eneolithic Retz-Gajary and the Late Eneolithic Kostolac cultur-

ni su s ciljem proučavanja tehnoloških napredaka u proizvodnji vlakana i njihov odnos sa značajnim kulturnim, društvenim i ekonomskim promjenama koje su se odvijale tijekom 4. i ranog 3. tisućljeća pr. Krista. Osnovna prostorna distribucija aktivnosti predenja i daljnje usporedbe na razini lokaliteta primijenjene su kako bi se ustanovile glavne odlike razvoja zanata, poput specijalizacije i organizacije, i to na lokalnoj razini. Prostorni kontekst tekstilnih alatki doveo je u pitanje proizvodnju tekstila na razini domaćinstva, te su njihova brojnost i koncentracija povezane s intenziviranjem zanatskih aktivnosti. Može se ustvrditi da je kroz promjene u tekstilnoj tehnologiji i razvoj zanatske proizvodnje, već od 4. tisućljeća pr. Kr. moguće pratiti povezanost društvenih strujanja s nastankom novog modela upravljanja sirovinama.

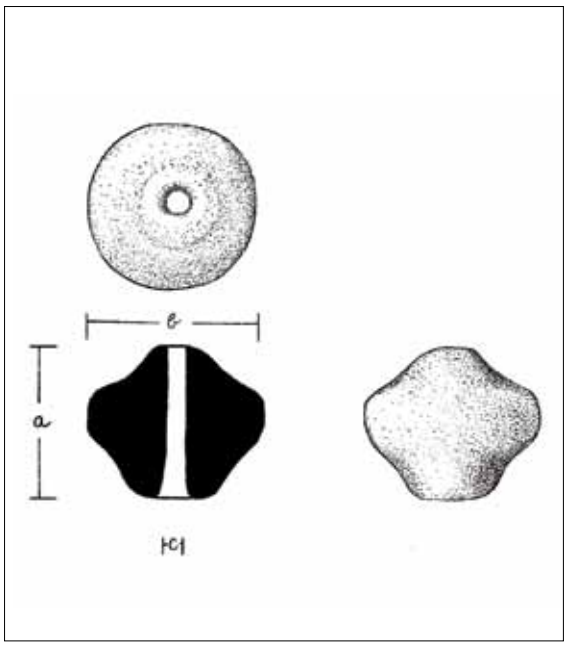
Ako se analizira dovoljno veliki uzorak tekstilnih alatki, moguće je primijeniti nekoliko statističkih metoda. Razlike u osnovnim svojstvima alatki moguće je statistički analizirati na različitim razinama asocijacije. Preciznije, moguće je utvrditi razmjer do kojeg funkcionalna i stilistička svojstva alatke ovise o kontekstu deponiranja i kulturno-povijesnoj atribuciji (Grabundžija, u tisku; Grabundžija et al., u postupku recenzije). Ovo se izravno odnosi na antropološka pitanja o tome zašto se u društvima na velikom zemljopisnom prostoru u određeno vrijeme javljaju sličnosti u materijalnoj kulturi. Već je Boas (1889; 1940) smatrao difuziju i migraciju primarnim metodama širenja materijalne kulture i uzrokom njezinih homogenih svojstava. Znatno kasnije, Steward je u svom višelinijskom evolucijskom modelu (1955) predložio promjene iznutra. Njegov model predlaže da su različite populacije, neovisno jedne od drugih, razvile paralelne značajke bez potrebe za difuzijom i migracijom. Analiza tehnoloških specifikacija nastoji ispitati načine na koje je uključivanje inovacija u proizvodnji tekstila utjecalo na lokalne populacije. *'Tekstil nije samo binarni sustav predenih, uvijanih ili uplitanih vlakana, već, prvo i osnovno, rezultat složenih interakcija između sirovina, tehnologije i društva'* (Andersson et al. 2010: 150).

Tijekom postupka uzorkovanja i obrade, posebna se pozornost obraća na morfološke karakteristike pršljenova (Sl. 4). U istom se polju istraživanja ove značajke smatraju ključnima za određivanje učinkovitosti alatke pri obradi sirovine s različitim svojstvima vlakana (Grömer 2005; Chmielewski & Gardyński 2010). I oblik i veličina pršljena određuju njegova rotacijska svojstva, što pak utječe na mo-

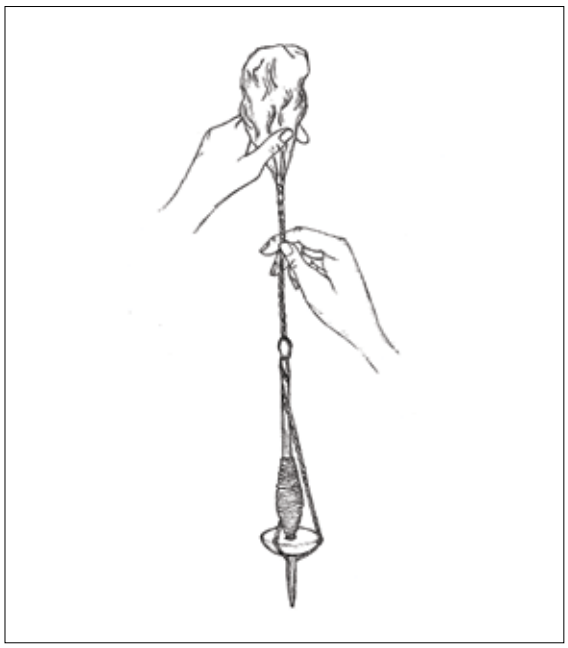
al-historical contexts were analyzed in order to investigate technological developments in fibre production and their connection to the significant cultural, social and economic changes that occurred during the 4th and early 3rd millennium BC. Basic spatial analysis of spinning activities and further inter-site comparisons were applied to access the main craft developments, such as specialization and organization, on a local scale. Textile tools' spatial contexts brought to question the household extent of textile production and their frequencies and concentration was associated with the early craft intensification. It might be argued that a close relationship between changes and developments in craft production, new raw material management and social flux are traceable already to the 4th millennium BC.

If given a big enough textile tool sample, an application of several statistical methods is possible. The differences in the main tool properties can be statistically analyzed on different levels of association. More precisely, it is possible to establish the extent to which a tool's functional and stylistic properties depend on its deposition context and cultural-historical attribution (Grabundžija, in press; Grabundžija et al., in review). This directly addresses anthropological questions regarding why societies over very large geographic regions at certain times exhibit similarities in their material culture. Already Boas (1889; 1940), considered diffusion and migration as the primary methods by which material cultures spread and displayed homogeneous traits. Much later, Steward in his multilinear evolution model (1955) proposed a change from within. Whereas, different populations independently developed parallel features, without the necessity of diffusion or migration. The analysis of technological specifications examines how local populations were affected by incorporating innovation into their textile productions. '*A textile is not simply a binary system of spun, twisted or spliced fibres, but, first and foremost, a result of complex interactions between resources, technology and society*' (Andersson et al. 2010: 150).

During the sampling and post-recording process, morphological traits of spindle whorls are given special attention (Fig. 4). In the respective field of research, these precise characteristics are held responsible for determining a tool's performance with raw materials of different fibre traits (Grömer 2005; Chmielewski & Gardyński 2010). Both the whorl's shape and its size determine its rotation-



Slika / Figure 4. Tri glavne bilježene metričke vrijednosti pršljenova: (a) visina pršljena, (b) promjer pršljena, (c) promjer rupe / Three main metric values recorded for spindle whorls: (a) height of the whorl, (b) diameter of the whorl, (c) perforation diameter (crtež / drawing: A. Grabundžija).



Slika / Figure 5. Predenje vlakana u nit pomoću ručnog, visećeg vretena. / Spinning fibres into thread with a bottom whorl drop spindle (crtež / drawing: A. Grabundžija).

ment inercije koji je ključan u procesu predenja (Sl. 5). Iako težina pršljena više utječe na tenziju, odnosno snagu koja vuče vlakna tijekom procesa predenja, njegova visina i promjer više utječu na brzinu rotacije. Posljedično, što je veća rotacija, to je predivo čvršće namotano (Andersson 2003: 25). Promjer i položaj perforacije također su svojstva koja u znatnoj mjeri utječu na okretanje pršljena, s tim da položaj utječe i na stabilnost pršljena pri rotaciji (Crewe 1998: 12). Perforacija u nekoj mjeri ukazuje i na tip vretena na kojoj je pršljen korišten, pa treba razmotriti i njezine dimenzije i svojstva, budući da su ista također utjecala na proces predenje (Gleba 2008: 3). Težina pršljena igra glavnu ulogu, prvenstveno zbog toga što je se može povezati i s korištenom sirovinom i sa svojstvima predene niti (Andersson 2003: 25). Smatra se da su duža, teža i grublja vlakna, poput onih biljnog porijekla, češće predena uz pomoć težih pršljenova, dok su lakša i kraća vlakna, poput onih životinjskog porijekla, predena uz pomoć lakših pršljenova (Barber 1991: 25; Gleba 2008: 103-106). Osim toga, ako se razmotre opća svojstva predene niti, onda teže i deblje pređe zahtijevaju korištenje težih, dok one lakše i tanje zahtijevaju korištenje lakših pršljenova (Ryder 1983; Costin 1993).

al properties, influencing the moment of inertia, which is crucial for the spinning process (Fig. 5). Although the weight has more influence on tension, namely the strength that pulls the fibres during the spinning process, the height and diameter have a greater impact on the speed of the rotation. Consequently, the higher the rotation the more tightly the yarn is spun (Andersson 2003: 25). Perforation diameter and position are another two properties that effect a whorl's rotation on a significant level, later also being accountable for a spindle whorl's stability while it rotates (Crewe 1998: 12). Perforation is to some extent indicative of a spindle on which a whorl was used, therefore its dimensions and properties have to be considered, since they too influenced the spinning (Gleba 2008: 3). The weight of the whorl is given the central role, mainly because it can be connected with both the raw material and the spun thread properties (Andersson 2003: 25). Longer, heavier and coarser fibres, like those of plant origin, are more often considered to be spun with heavier weights, while shorter and lighter fibres, such as animal ones are brought to connection with lighter whorls (Barber 1991: 25; Gleba 2008: 103–106). Additionally, if general properties of the spun thread are considered, then heavier and thicker yarns necessitate heavy whorls, while lighter and thinner yarns call for light whorls (Ryder 1983; Costin 1993).

Spomenute standarde treba uzeti s oprezom jer na sam proces predenja utječe mnogo združenih čimbenika. Izuzev spomenute težine, veličine i oblika pršljena, ne smije se u potpunosti zanemariti dodatne elemente, kao što su količina niti akumulirane na preslici (Barber 1994: 37), položaj pršljena na vretenu (Barber 1991: 66; Breniquet 2008: 110-112), odabir tehnike predenja (Mazăre 2014: 21) i, naposljetku, individualna vještina i preference predioca/prelje (Kania 2015).

Eksperimentalnim su istraživanjima utvrđene glavne morfološke specifikacije koje određuju učinkovitost alatke s obzirom na različite vrste sirovina (Verhecken 2010). Smatra se da rezultati pokusnog predenja imaju značajan analitički potencijal za proučavanje strategija u proizvodnji vlakana, barem na razini određivanja da li su iste bile utemeljene na kultivaciji biljaka ili životinja. To je moguće prvenstveno zbog značajnih razlika u očekivanoj snazi i dužini dvaju glavnih kultiviranih vlakana u europskoj pretpovijesti: lana i vune.

The standards mentioned above ought to be taken with caution, since the actual spinning process is influenced by many combined factors. Besides the already mentioned weight, size, and shape of a whorl, additional traits such as the accumulated thread on a spindle (Barber 1994: 37), the whorl's position on it (Barber 1991: 66; Breniquet 2008: 110–112), the spinning technique used (Mazăre 2014: 21) and finally the spinner's skill and preference (Kania 2015) should be considered as well.

Experimental research established the main morphological specifications accountable for the tool's performance with different types of raw material (Verhecken 2010). The results of spinning experiments are held to have a significant analytical potential for investigating fibre production strategies, at least on the level of determining whether the staple has been based on plant or animal cultivates. This is due to a significant difference in the expected tensile strength and length of the main two cultivated fibre resources used in the European prehistory: fibre flax and wool.

Tehnologija tkanja: zagonetka utega za tkalački stan

Na temelju opće definicije onoga što sačinjava tkano platno, Andersson Strand dala je kratku i preciznu definiciju tehnologije tkanja koja obuhvaća sve tipove tehnika i tkalačkih stanova koji su mogli biti korišten tijekom pretpovijesti: '*Platno nastaje tkanjem dvaju sustava niti. Jedan od tih sustava, osnova, pada paralelno s bočnom stranom tkalačkog stana i nategnuta je tijekom cijelog procesa tkanja. Drugi sustav, potka, provlači se pod pravim kutem u odnosu na osnovu i naizmjenično prolazi preko i ispod njezinih niti*' (Andersson Strand 2012: 34).

Povećana proizvodnja niti, koja se obično očituje kroz veću frekvenciju pršljenova, postavlja pitanje o tkalačkim stanovima i tehnologiji tkanja, bilo da su korišteni za proizvodnju platna ili tapiserija.

Metode natezanja niti osnove razlikuju se među kulturama i razdobljima, a smatra se da je za tkanje u pretpovijesti korišteno nekoliko tipova tkalačkih stanova. Horizontalni podni tkalački stan smatra se jednim od najstarijih tipova tkalačkih stanova, iako je najraniji prikaz , s lokaliteta Badari u Egiptu, datiran u kasni neolitik (Broudy 1979: 38; Barber 1991: 83). Još jedan od ranih tipova je

Weaving Technology: Loom weight Puzzle

Based on the general definition of what constitutes a woven fabric, Andersson Strand gives a short and precise explanation of the weaving technology that covers all types of techniques and looms that might have been used during prehistory: '*A fabric is created by weaving together two thread systems. One of these systems, the warp, runs parallel to the side of the loom and is kept stretched during weaving. The other system, the weft, lies at right angles to the warp and runs alternately over and under the warp threads*' (Andersson Strand 2012: 34).

The intensified production of threads, which is generally attested by a higher frequency of spindle whorls raises a question of the loom and weaving technology, whether it was to produce cloth or for tapestry making.

Methods of stretching the warp threads vary among different cultures and time periods, and several types of looms are proposed to have been used for weaving in the prehistoric times. The horizontal ground loom is considered to be one of the oldest loom types, even though the earliest depiction is dated to the Late Neolithic and comes from Badari, Egypt (Broudy 1979: 38; Barber 1991: 83). Another

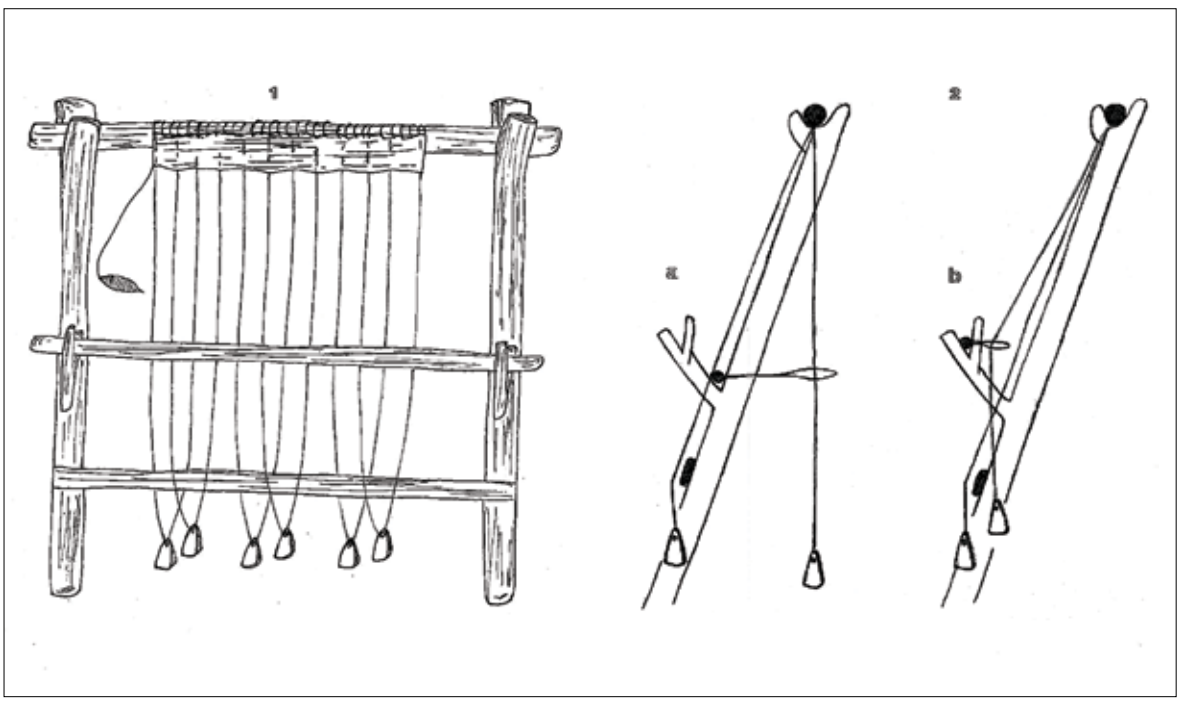
tkalački stan s osnovom nategnutom utezima, koji je smatran karakterističnim tkalačkim stanom pretpovijesne Europe (Hoffman 1964) i čije je korištenje pretpostavljeno u kontekstu kulture Körös u ranom neolitiku Mađarske, već u 7. ili ranom 6. tisućljeću pr. Kr. (Barber 1991: 93-94). Naposljetku, smatra se da se dvogredni tkalački stan, pretpostavljenog porijekla iz Sirije ili Palestine, razvio uvođenjem vune jer je bio pogodan za izradu šarenih tkanih tapiserija (Broudy 1979: 44; Barber 1991: 113).

Nažalost, tkalački stanovi sami po sebi nisu očuvani, budući da su bili izrađeni od propadljivih organskih materijala. Osim prikaza (Barber 1991: 83-116, 295; Wright 2013: 406) i tekstova (Maekawa 1980; Waetzoldt 1987) koji pružaju nenadomjestive podatke o pretpovijesnim tehnologijama tkanja, a koji izostaju iz europskog konteksta, čest dokaz njihovog korištenja su utezi za tkalački stan. Iako poprilično diskriminativno, oni ukazuju isključivo na upotrebu tkalačkih stanova s nategnutom osnovom (Sl. 6). U iznimnim slučajevima i druge tekstilne alatke, odnosno neizravni indikatori tkanja poput lađica ili češljeva, također ostaju sačuvani u pretpovijesnim kontekstima (Bazzanella et al. 2003; Kapeller 2003: 229).

early type is the warp-weighted loom, which is considered the characteristic loom of prehistoric Europe (Hoffman 1964) and is proposed to have been used in the Early Neolithic Körös culture of Hungary, already in the late 7th, or early 6th millennium BC (Barber 1991: 93–94). Finally, the two-beam loom, or tubular loom, which is proposed to have originated in Syria or Palestine, is considered to have been developed during the introduction of wool, due to its convenience for colorful tapestry weaving (Broudy 1979: 44; Barber 1991: 113).

Unfortunately, looms themselves haven't been preserved, since they were made of perishable, organic materials. Besides depictions (Barber 1991: 83-116, 295; Wright 2013: 406) and texts (Maekawa 1980; Waetzoldt 1987) that provide indispensable information about the prehistoric weaving technologies, both of which are lacking in European contexts, other common evidence for their use are loom weights. Although quite discriminatively, these are only indicative of the warp-weighted type of loom (Fig. 6). Exceptionally, other textile tools, like weaving swords or weaving combs, also get preserved in prehistoric contexts (Bazzanella et al. 2003; Kapeller 2003: 229) as an indirect indication of weaving.

Slika / Figure 6. Tkanje na tkalačkom stanu s nategnutom osnovom s prednje strane (1). Prirodna osnova (a) i umjetna osnova (b) označene su na bočnom prikazu (2) / Weaving on a warp-weighted loom from frontal perspective (1). Natural shed (a) and artificial shed (b) are denoted in the side perspective (2) (crtež / drawing: A. Grabundžija).



Slika / Figure 7. Uteg, Kamanje kod Vrlovke / Loom weight, Kamanje by Vrlovka (foto / photo: I. Krajcar).

Tkalački stan s osnovom nategnutom utezima možda je korišten i na lokalitetu Çatal Höyük, zbog čega se i Anatoliju i srednju Europe može smatrati izvorištima te vrste tehnologije (Barber 1991: 254), koja se mogla proširiti Europom iz bilo kojeg od ta dva centra. Na Bliskom Istoku i Egiptu su, pak, prevladavali podni tkalački stanovi.

Pronalaženje utega za tkalački stan *in situ* česta je pojava u neolitičkim kontekstima diljem Europe (Barber 1991: 91-100), a Barber čak opisuje tkanje na tkalačkim stanovima s nategnutom osnovom kao *'središnju kulturološku aktivnost'* tijekom tog razdoblja (Barber 1991: 97). S tim na umu, njihov izostanak u kontekstima kasnog eneolitika postavlja važna pitanja o promjeni tehnologije.

Iako rijetki, utezi iz kasnog eneolitika značajno su drugačiji od ranijih uobičajenih utega s perforacijom na gornjem dijelu, primjerice koničnih, diskoidnih ili eliptičnih tipova (Sl. 7), jer su najčešće cilindričnog ili jajolikog oblika koji je uzdužno perforiran (Grabundžija 2016).

Utezi za tkalački stan obično su izrađivani od pečene gline, iako valja spomenuti utege iz srednjeg eneolitika iz proučavane regije, prvenstveno one lasinjske kulture, a koji su uglavnom loše pečeni (niske temperature/oksidacijsko pečenje gline).

Izostanak utega za tkalački stan u pojedinim regijama i razdobljima, primjerice u slojevima V i rani VI u Troji (Pavúk 2012: 126), arheolozima je zagonetan. Isto tako, pretpostavlja se da je prekid u korištenju utega tijekom cijelog brončanog doba Egeide posljedica mogućeg uvođenja nove tehnologije tkanja (Nosch 2014: 6-7). Ipak, izuzev promjene u tipu korištenih tkalačkih stanova, postoji još nekoliko prihvatljivih objašnjenja za izostanak konvencionalnih utega za tkalački stan u arheološkim

A warp-weighted loom might have also been utilized at Çatal Höyük, thus, both Anatolia and Central Europe may be considered as possible origins of this particular technology (Barber 1991: 254). It could have spread throughout Europe from either of these two centers, while the ground loom prevailed in the Near and Middle East, as well as Egypt.

Findings of in situ loom weights are a common occurrence in Neolithic contexts across Europe (Barber 1991: 91–100) and Barber even describes weaving with a warp-weighted loom as a '*central cultural activity*' during the period (Barber 1991: 97). With this in mind, their disappearance in Late Eneolithic contexts raises an important question of technological change.

Exceptionally rare, Late Eneolithic weights largely differ from earlier, more conventional upper-perforated, for example conical, discoid or elliptical types (Fig. 7), since they have a cylindrical or ovoid shape and are usually lengthwise-perforated (Grabundžija 2016).

Typically, loom weights are made of fired clay, although it is worth mentioning that Middle Eneolithic loom weights from the region, specifically Lasinja examples are generally very poorly fired (low temperature/oxidation firing of clay).

The disappearance of loom weights in specific areas and periods, for example in Troy V and Early VI (Pavúk 2012: 126) puzzles textile archaeologist. Likewise, in the case of their interrupted use throughout the Bronze Age in the Aegean, it has been proposed that a new type of loom or weaving technology might have been introduced (Nosch 2014: 6–7). Nonetheless, there are several plausible explanations for the absence of conventional loom weights in archaeological contexts, besides the

kontekstima. Prvo, utezi za tkalački stan mogu izostati iz arheološkog konteksta ukoliko su bili izrađivani od propadljivih materijala. Osim toga, prema nekim autorima, za postizanje potrebne napetosti za niti osnove mogli su biti korišteni nekonvencionalni oblici poput kalemova (Rahmstorf 2005: 156; Mårtensson et al. 2007b: 15; Pavúk 2012: 123-124). Kao što je prethodno spomenuto, ova su pitanja prepoznavanja tekstilnih alatki, koje su često višenamjenskog karaktera, predmet eksperimentalne arheologije (Grabundžija et al. 2016).

Postoje čvrsti argumenti koji govore u prilog povezanosti korištenja sve tri vrste tkalačkih stanova i upotrebe vunenih niti. Zbog činjenice da je njime moguće brže tkati nego na vertikalnom (Hoffmann 1964: 130-131, 225, 258), horizontalni tip tkalačkog stana uklapa se u scenarij povećane proizvodnje kakav je predložen u slučaju mezopotamskih tekstilnih industrija koje su se razvile i prosperirale na iskorištavanju vunenih vlakana (McCorriston 1997; Kimbrough 2006).

S druge pak strane, vunu je prilično lako bojiti, osobito u usporedbi s lanom, a baš je ta karakteristika mogla potaknuti tkanje tapiserija za čiju je proizvodnju najprikladniji dvogredni tkalački stan (Broudy 1979: 44; Barber 1991: 113).

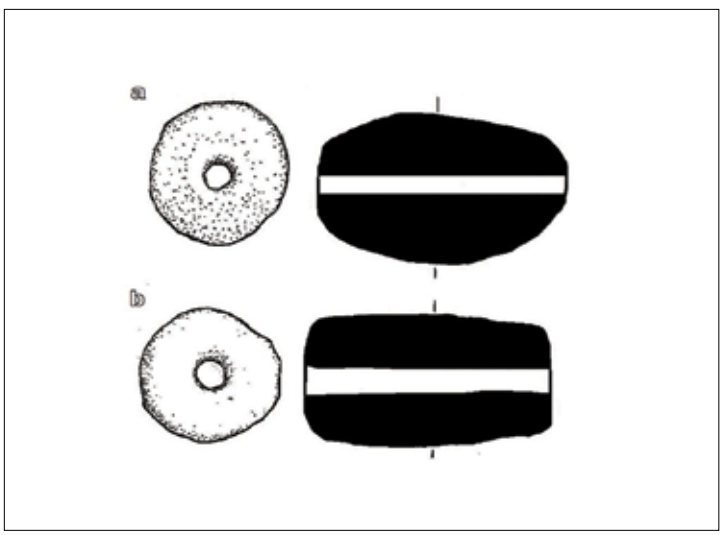
Naposljetku, mnogobrojni rezultati eksperimentalnog tkanja na tkalačkim stanovima s osnovom nategnutom utezima (Mårtensson et al. 2005-2006; 2007a; 2007b; Schierer 2005) i njihovo korištenje u proizvodnji vunenog platna u modernim vremenima (Hoffmann 1964) povezuju baš taj tip s proizvodnjom vunenog platna.

change of the utilized loom type. First and foremost, loom weights could be lacking in archaeological contexts due to the perishable materials used for their production. Additionally, according to some authors, more unconventional forms such as spools might have also been applied for providing the necessary tension for warp threads (Rahmstorf 2005: 156; Mårtensson et al. 2007b: 15; Pavúk 2012: 123-124). This particular issue of recognizing textile tools, which often have a multifunctional character is, as has already been mentioned, addressed in experimental research (Grabundžija et al. 2016).

It is possible to find sustainable arguments which would connect the use of all three types of looms with woolen threads. Due to the fact that it can be operated much faster than the vertical loom (Hoffmann 1964: 130–131, 225, 258), the horizontal type fits the intensified production scenario, which is the proposed method for the Mesopotamian textile industries that developed and strived on wool fibre exploitation (McCorriston 1997; Kimbrough 2006).

On the other hand, wool is quite easy to dye, especially in comparison to flax, and this particular characteristic could have promoted tapestry weaving, for which the two-beam loom is considered to be the most convenient type (Broudy 1979: 44; Barber 1991: 113).

Finally, numerous results of weaving experiments on the warp-weighted loom (Mårtensson et al. 2005–2006; 2007a; 2007b; Schierer 2005) and its use for producing woolen fabrics in modern times (Hoffmann 1964) connect this particular type that utilizes loom weights with woolen fabrics as well.



Slika / Figure 8. Dvije glavne varijante tipova utega za tkalački stan s uzdužno probušenom rupom iz kasnog eneolitika: jajoliki tip (a) i cilindrični tip (b) / Two main variations of a Late Eneolithic loom weight type with a longitudinal perforation: ovoid type (a) and cylindrical type (b) (crtež / drawing: A. Grabundžija).

Kada bi se istraživanje proizvodnje tekstila oslanjalo isključivo na neizravne dokaze tkanja, tada bi se, diljem jugoistočne i srednje Europe, kasni eneolitik mogao smatrati razdobljem velikih prilagodbi. Ustaljeno i dobro razvijeno korištenje tkalačkog stana s nategnutom osnovom tijekom neolitičkog razdoblja, u drugoj polovici 4. tisućljeća pr. Kr. naizgled je izblijedjelo ili čak nestalo. Ipak, u srednjem brončanom dobu tkalački stan s osnovom nategnutom utezima opet postaje najčešće korišteni tip (Sofaer et al. 2013: 480), što jasno ukazuje na točku u vremenu kada su novi aspekti proizvodnje tekstila već široko rašireni i potpuno ujednačeni na tehnološkoj razini. Na ovakav zaključak ukazuju složenije tehnike tkanja, bojanja i, ponajviše, predenja, budući da su, kako pokazuju konkretni ostaci tekstila (Grömer et al. 2013), različite pređe glavna varijabla brončanodobnog tekstila u Europi (Sofaer et al. 2013: 479).

Jedno od glavnih obilježja zabilježenih skupova nalaza tekstilnih alatki kasnog eneolitika na području Hrvatske je rijetko pronalaženje utega za tkalački stan (Grabundžija 2016), ali još je zanimljivije to što je slična pojava zabilježena i u kompleksima kasnog 4. i 3. tisućljeća pr. Kr. u susjednim regijama gdje se većina, iako rijetkih, nalaza utega može pripisati masivnim i izduženim tipovima (s uzdužno probušenom rupom, sl. 8). Paralele za oblik i veličinu utega zabilježene su na lokalitetima Gomolava (Petrović & Jovanović 2002: 126, 211) i Sitagroi 4 (Renfrew et al. 1986: Pl. XXXIV) te u naseljima u Bugarskoj koja su datirana u proto- i rano brončano doba (Petrova 2011).

If the research on changes in textile production would solely depend on indirect evidence for weaving, all across the South East and southern Central Europe region, Late Eneolithic could be considered as the period of major adjustments. Established and developed use of the warp-weighted loom during the Neolithic period, simply seems to diminish or even disappear in the second half of the 4th millennium BC. Nonetheless, warp-weighted loom becomes the most commonly used type again by the Middle Bronze Age (Sofaer et al. 2013: 480), which is clearly the point in time when new aspects of textile production are already widely spread and completely consolidated on the technological level. This is suggested by more elaborate techniques of weaving, dyeing and, most of all spinning, since different yarn types are the main variable of the European Bronze age textiles (Sofaer et al. 2013: 479), as evinced by the actual textiles remains (Grömer et al. 2013).

One of the main features of the recorded Late Eneolithic textile tool assemblages from Croatia is the rarity of loom weights (Grabundžija 2016), but it is even more interesting that a similar observation can be made for complexes of the late 4th and subsequent 3rd millennium BC in the neighboring regions, where all the rare loom weight finds almost exclusively belong to the same massive and elongated (lengthwise perforated) types (Fig. 8). Parallels in shape and size are known from Gomolava (Petrović & Jovanović 2002: 126, 211), Sitagroi 4 (Renfrew et al. 1986: Pl. XXXIV), and from Proto-Bronze and EBA settlements in Bulgaria (Petrova 2011).

Primjena analize alatki u praćenju inovacije

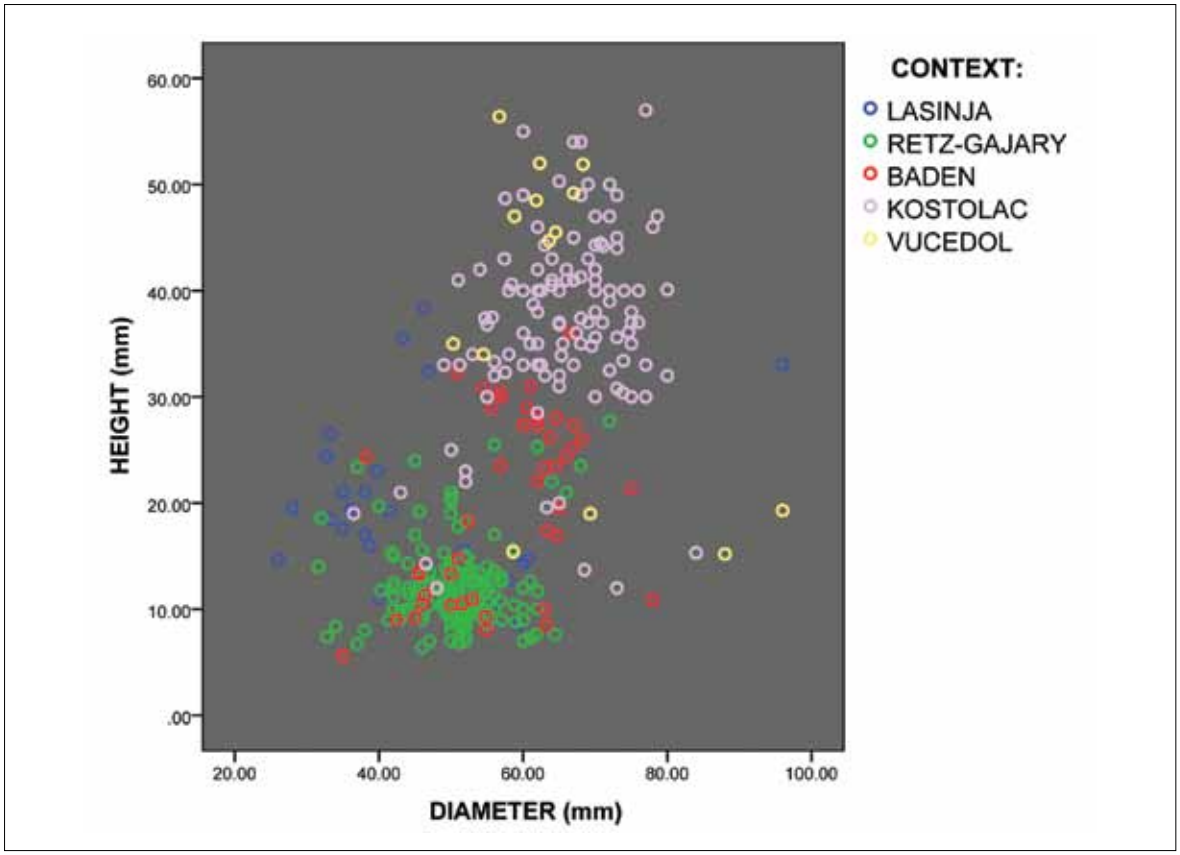
Iako izostanak i nestanak određenih kategorija i tipova alatki ne ukazuje nužno na izostanak aktivnosti ili prakse, ovakvim se promjenama u arheološkim kontekstima mogu pripisati određene tehnološke implikacije. Izuzetno je važno ovakva pitanja sagledavati u širem zemljopisnom kontekstu, jer to može omogućiti procjenu i razmjera i važnosti određene tehnološke prilagodbe.

Nedavno provedenom studijom pršljenova iz jugoistočne i srednje Europe utvrđeno je da se varijabilnost veličine/težine alatki znatno povećala tijekom 4. tisućljeća pr. Kr. (Grabundžija & Schoch, u tisku). Određeni trend u povećanju visine pršlje-

Applying Tool Analysis for Tracking Innovation

Even though the absence and disappearance of certain categories and types of tools does not necessarily indicate a lack of activity or practice, these changes in the archaeological record can be regarded as having specific technological implications. It is of great importance to observe these particular issues in an enlarged geographical context, as it can enable an estimation of both the reach and the significance of the particular technological adjustment.

A recent study of spindle whorls from South East and southern Central Europe established that during the 4th millennium BC tool size/weight variabili-



Slika / Figure. 9. Distribucija vrijednosti promjera i visina pršljenova obzirom na kulturno-povijesni kontekst / Spindle whorl diameter and height value distribution regarding culture-historical context_N379.

nova započeo je već u srednjem te je nastavljen i u kasnom eneolitiku, kada je postao izraženiji zbog dominacije bikoničnih i visokih koničnih oblika (Grabundžija & Russo 2016). Na različitim dijelovima Balkanskog poluotoka, osobito na prostoru takozvanog "Post-Cernavoda III Boleráz fenomena" (Govedarica 2001; Jevtić 2001; Köninger et al. 2001), primijećene su slične promjene: u kostolačkoj i vučedolskoj kulturi središnjeg Balkana, u kulturama Coțofeni i Ezero na istočnom Balkanu, kao i u kulturama ranog brončanog doba u sjevernoj Grčkoj. Neki od objavljenih primjera potječu iz ranobrončanodobnih slojeva humka Ezero u jugoistočnoj Bugarskoj (Georgiev et al. 1979: 388-90, T. 224), s višeslojnih lokaliteta u sjevernoj Grčkoj, kao što je Sitagroi u ravnici Drame (Elster 2004: 231-33), i iz Tesalije (Christmann 1996: 305). Ovi veliki bikonični i konični oblici često se pojavljuju i u uzorku pršljenova iz sjeverne Hrvatske (Sl. 9).

ty developed significantly (Grabundžija & Schoch, in press). A particular trend in the increase of spindle whorl height was already initiated during the Middle Eneolithic period and continues into the Late Eneolithic, when it becomes more pronounced, due to the dominance of biconical and high conical forms (Grabundžija & Russo 2016). In different parts of the Balkan Peninsula, especially in the area of the so called "Post-Cernavoda III Boleráz Phenomenon" (Govedarica 2001; Jevtić 2001; Köninger et al. 2001), similar changes can be observed as well: in Kostolac and Vučedol cultures in the Central Balkans, Coțofeni and Ezero cultures in the Eastern Balkans, similar to Early Bronze Age cultures in North Greece. Some of the published examples come from Early Bronze Age layer at Ezero mound in South East Bulgaria (Georgiev et al. 1979: 388-90, T. 224), multilayer settlements in the northern Greece, like Sitagroi in the plain of Drama (Elster 2004: 231-33) and Thessaly (Christmann 1996: 305). These large size biconical and conical forms are well presented in the north Croatian spindle whorl sample (Fig. 9).

Istovjetan tipološki razvoj zabilježen je i u drugim regijama Europe: može ga se pratiti kroz velike i teške primjerke pripisane kulturi Jevišovice u Moravskoj i Donjoj Austriji, a jedan je od primjera skup nalaza pršljenova pripisanih kulturi Chamer u Gornjoj Austriji i južnoj Njemačkoj (Grömer 2005: 109).

Važno je primijetiti da ovaj specifičan tipološki trend nije bio ograničen na lokalnu razinu. Upravo suprotno, čini se da je bio univerzalan, odnosno da je bio rasprostranjen na širokom postoru te da je bio otprilike istovremen.

Ovaj trend moglo bi se objasniti optimizacijom i prilagodbom alatki. Ako je tomu tako, to bi ukazivalo na značajne i široko rasprostranjene inovacije poput uvođenja nove sirovine. Chmielewski kao objašnjenje za bikonizaciju alatki s poljskih lokaliteta predlaže isto (Chmielewski 2009; Chmielewski & Gardyński 2010).

Važno je istaknuti činjenicu da je do kraja eneolitika ovaj trend, koji je započeo naglašenom morfološkom varijabilnošću pršljenova, doveo do jasne prevlasti visokih tipova drastično većih dimenzija i težine. Tipovi pršljenova kasnog 5. i ranog 4. tisućljeća pr. Kr. s prostora jugoistočne i srednje Europe počeli su postupno, ali drastično, mijenjati oblik (Sl. 10). Spljošteni, zaravnjeni diskoidni i lećasti tipovi, kakvih ima u retzgajarskim (Čeminac-Vakanjac, Cugovec-Barbarsko, Ivandvor, Jagodnjak-Na-

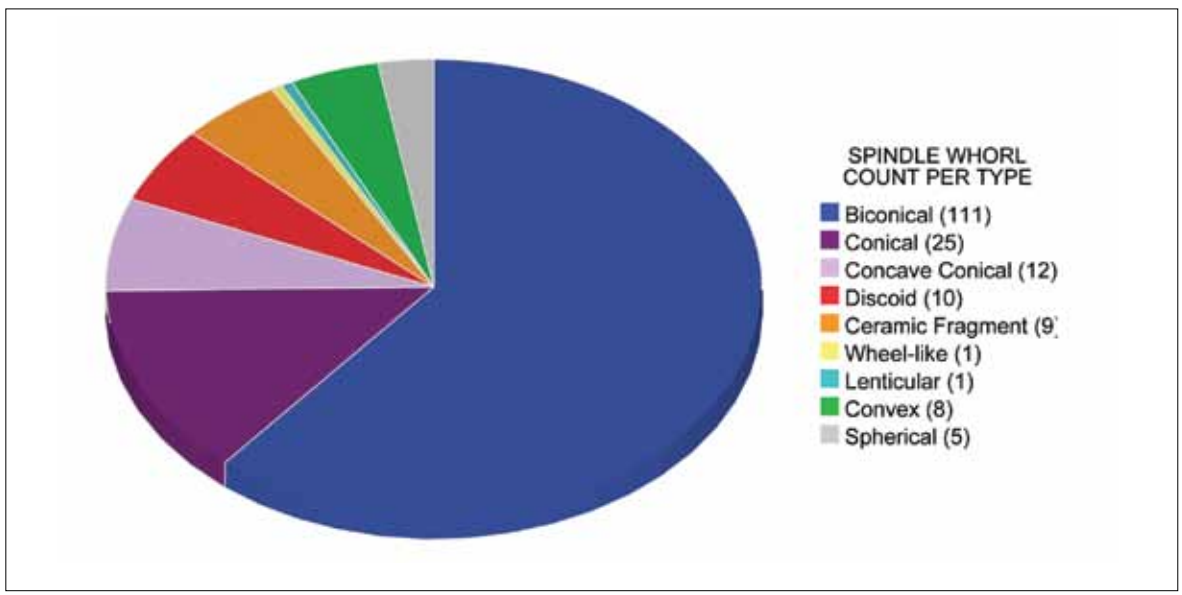
A corresponding typological development is observed in other European regions as well: it can be traced in large and heavy examples attributed to the Jevišovice Cuture in Moravia and Lower Austria, one example being spindle whorl sets attributed to the Chamer Culture in Upper Austria and Southern Germany (Grömer 2005: 109).

It is important to observe that this particular typological trend was not confined locally. On the contrary it appears to have been universal, meaning both spatially widely spread and roughly simultaneous.

This specific trend might be explainable through the optimization and adaptation of tools. If that is the case, this could imply a significant and wide spread innovation, such as the introduction of new raw materials. Chmielewski also proposes this as an argument for explaining the biconization of the tools observed at Polish sites (Chmielewski 2009; Chmielewski & Gardyński 2010).

It has to be pointed out that by the end of the Eneolithic period, a trend that started as a pronounced morphological variability of spindle whorls resulted in a clear dominance of high types with a drastically increased size and weight. Late 5th and early 4th millennium BC spindle whorl types from the territory of South East and southern Central Europe, gradually, but drastically started to change form (Fig. 10). Flat, planate discoid and lenticular types,

Slika / Figure 10. Tipološka varijabilnost kasno eneolitičkih pršljenova / Typological variability of Late Eneolithic spindle whorls_ N 182.



puštene njive, Josipovac Punitovački-Veliko polje I) i lasinjskim (Čepinski Martinci-Dubrava, Pajtenica-Velike livade, Tomašanci-Palača) kontekstima sjeverne Hrvatske, polako su se počeli mijenjati u više tipove (Grabundžija & Russo 2016).

Slično uvođenje prvih niskih koničnih i konveksnih oblika moguće je pratiti i u najudaljenijim područjima: od Rachmani (Christmann 1996: 305-306, Sl. 162) i Krivodol-Salcuța-Bubanj (Bonev & Alexandrov 1996: Sl. 42) konteksta u jugoistočnoj Europi, pa sve do nešto kasnijih Chassey, Cortaillod (Odone 1998: Sl. 21) ili Pfyn/Horgen (Leuzinger 2002: 148-150, Sl. 2) konteksta u sjeverozapadnoj Europi.

Povećanje visine pršljenova bilo je popraćeno povećanjem sveukupnih dimenzija i težine, što je tijekom kasnog eneolitika dovelo do veće varijabilnosti svih morfoloških parametara (Grabundžija & Russo 2016). Ovakav spori razvoj rezultirao je dominacijom teških i velikih bikoničnih i koničnih pršljenova koji su zatim, u 3. tisućljeću pr. Kr., postali normativ.

Kako bi se moglo istražiti do koje mjere ove tehnološke promjene odražavaju prilagodbu na promjene uvjeta u okolišu te kako bi se moglo raspravljati o njihovom društveno-ekonomskom utjecaju na eneolitičke zajednice, nužno je inkorporirati okolišni pristup. Primjećenu razvojnu shemu ranih tekstilnih industrija nije moguće u potpunosti shvatiti bez uključivanja rezultata istraživanja klime i geografije.

Integracija disciplina i istraživanje strategija pribavljanja sirovina

Pršljenovi s nalazišta u sjevernoj Hrvatskoj jasno preslikavaju navedene tehnološke promjene. Kako bi se moglo bolje razumjeti uzroke ovih promjena, potrebno je zasebno proučiti utjecaj klime (Grabundžija & Russo 2016) i „kulture“ (Grabundžija, u tisku) na uočene trendove. U sferi društva i ekonomije, moguće izravne posljedice moguće je proučavati kroz razvoj u specijalizaciji zanata i promjeni strukture društva (Grabundžija et al., u postupku recenzije). Izuzev promjena u društveno-ekonomskoj sferi, očekuje se da je, do određene mjere, predloženo povećanje proizvodnje vlakana utjecalo i na promjene u holocenskom okolišu (Schumacher et al. 2015). Za one dijelove Europe

which can be seen in Retz-Gajary (Čeminac – Vakanjac, Cugovec – Barbarsko, Ivandvor, Jagodnjak – Napuštene njive, Josipovac Punitovački – Veliko polje I) and Lasinja (Čepinski Martinci – Dubrava, Pajtenica – Velike livade, Tomašanci – Palača) contexts in northern Croatia, started to slowly transform into higher types (Grabundžija & Russo 2016).

We can track a similar introduction of the first low conical and convex forms in the most remote areas: from Rachmani (Christmann 1996: 305-306, Taf. 162) and Krivodol-Salcuța-Bubanj (Bonev & Alexandrov 1996: Fig. 42) contexts in the south-east to the later Chassey, Cortaillod (Odone 1998: Fig. 21) or Pfyn/Horgen contexts (Leuzinger 2002: 148-150, Fig. 2) in the north-west of Europe.

The increase in the spindle whorl height that was accompanied by the increase in the overall size and weight as well, eventually leads to the higher variability of all the morphological parameters during the Late Eneolithic period (Grabundžija & Russo 2016). This slow development results in the dominance of heavy and large biconical and conical spindle whorls that eventually came to represent the 3rd millennium norm.

In order to investigate the extent to which these technological changes reflect an adaptation to the altering environmental conditions and to further discuss their socio-economic impact on the Eneolithic communities, an environmental approach has to be incorporated. The observed development patterns in early textile industries cannot be fully understood without incorporating climate and geographic research.

Integration of Disciplines and the Investigation of Raw Material Procurement Strategies

Spindle whorls from the North Croatian sites clearly reflect the outlined technological changes. In order to better understand the causality of these advances, the influence of climate (Grabundžija & Russo 2016) and “culture” (Grabundžija, in press) on the observed trends was separately examined. Within the socio-cultural sphere, possible direct consequences are addressed through developments in craft specialization and altering social structures (Grabundžija et al., in review). Besides the transformation of the socio-cultural sphere of the human environment, it is expected that, to a certain extent, the proposed fibre production intensification also affected the Holocene landscape

gdje šumski pokrov nije bio ograničen klimatskim uvjetima (suhe i subarktičke zone, obale zapadne Europe izložene vjetru), moguće je pretpostaviti da je uzgajanje ovaca postalo važno tek nakon što je antropogenim djelovanjem uklonjena izvorna šumska vegetacija. Dakle, kako bi se pratio razvoj vunaste ovce u Europi, potrebno je uključiti istraživanja pradavnih okoliša (Becker et al. 2016: 103). Rezultati studije promjena u okolišu povezanih sa stočarstvom tijekom srednjeg holocena (Schumacher et al. 2016a; 2016b) daju dodatne dokaze za rano korištenje vune te podupiru tezu da je ono moglo započeti tijekom 4. tisućljeća pr. Krista. Iako je početak povećanja stočarskih aktivnosti moguće pratiti u tragovima iz okoliša, Schumacherova analiza (2015; 2016a; 2016b) sugerira da početak korištenja sekundarnih proizvoda životinjskog porijekla nije uzrokovao značajne promjene u jugoistočnoj i srednjoj Europi, već da su okoliši bili dovoljno otporni da izdrže pritiske rane ispaše. Diljem jugoistočne i srednje Europe, u razdoblju neolitika vidljiv je mali utjecaj stočarstva, dok se tragovi povećanih stočarskih aktivnosti pojavljuju u kasnijem, eneolitičkom razdoblju. Ti bi se tragovi, kako predlaže Schumacher (Schumacher et al. 2016b), mogli preklapati s dokazima koji govore u prilog ranom transhumantnom stočarstvu na središnjem Balkanu (Arnold & Greenfield 2006). Osim toga, akumulacija sedimenta povezanog s ljudskim aktivnostima na padinama Bükkalja datirana je u vrijeme oko 4800. god. kal. pr. Kr. (Schumacher et al. 2016a) i može je se povezati s povećanjem pokazatelja stočarskih aktivnosti na obližnjim lokalitetima (Magyari et al. 2010; 2012).

Iako bi uvođenje vune predstavljalo sasvim novi element u prethodnim strategijama pribavljanja vlakana, a koje su se uglavnom temeljile na biljnim vlaknima (Cybulska & Maik 2007: 186), ne postoje pokazatelji koji sugeriraju da je to dovelo do snižavanja vrijednosti biljnih vlakana. Upravo suprotno, rezultati analize pršljenova (Grabundžija & Russo 2016; Grabundžija & Schoch, u tisku) ukazuju na njihovu rastuću važnost na prijelazu u 4. tisućljeće pr. Kr., što bi moglo biti povezano s povećanjem proizvodnje lanenih vlakana. Kultivacija tekstilnih biljaka smatra se prirodnom posljedicom spontanog smanjenja biljnih sirovina zbog vrste ekonomije specifične za razdoblje eneolitika (Mazăre 2014: 33). U kontekstu pritiska klimatskih promjena i dinamičnih kulturoloških utjecaja koji su prelazili planine (Alpe, Karpate i Balkan) te se spuštali u Panonsku nizinu, eneolitičke su tekstil-

change (Schumacher et al 2015). In those parts of Europe in which forest cover was not restricted by climatic factors (arid and sub-arctic zones, wind exposed coastal fringes of western Europe), sheep husbandry can be expected to have gained importance only in the course of an increased anthropogenic opening of the primeval forest vegetation. Therefore, to follow the track of the woolly sheep in Europe it is necessary to include research on ancient landscapes (Becker et al. 2016: 103). The results of the study on the mid-Holocene herding-related landscape change (Schumacher et al. 2016a; 2016b) provide additional arguments for the early wool use, supporting the idea that it might have started during the 4th millennium BC. Schumacher's analysis (2015; 2016a; 2016b) suggests that the emerging use of secondary animal products did not cause large-scale landscape disturbances in South East and Central Europe, whereas landscapes seem to have been resilient enough to withstand early grazing pressure, although the initial intensification of herding activities can be traced in environmental records. During the Neolithic period, low herding impact was indicated throughout the South East and Central Europe study area, whereas intensified herding is noticed for the succeeding Eneolithic period and could be, as proposed by Schumacher (Schumacher et al. 2016b), in accordance with the evidence of early transhumant pastoralism in the central Balkans (Arnold & Greenfield 2006). Additionally, the sediment accumulation related to human activity in the Bükkalja foothill area is evident around 4800 cal BP (Schumacher et al. 2016a) and it can be synchronized with the increased herding indication at nearby sites (Magyari et al. 2010; 2012).

Even though the appearance of wool would have introduced a completely new element into the earlier fibre procurement strategies, which were mainly based on plant resources (Cybulska & Maik 2007: 186), there are no indications that would suggest this had led to plant fibre materials becoming an inferior good. On the contrary, the results of the spindle whorl analysis (Grabundžija & Russo 2016; Grabundžija & Schoch, in press) propose their growing importance at the turn of the 4th millennium BC, which could be considered relating to the intensification of flax fibre cultivation. Cultivation of textile plants is assumed to be a natural consequence of the spontaneous vegetation resource depletion due to the type of economy specific to the Eneolithic period (Mazăre 2014: 33). In the context of climate change pressure and dynamic cultural in-

ne tradicije očito prolazile kroz tehnološke prilagodbe koje je moguće objasniti kroz dva različita trenda u korištenju sirovina, što pak neizravno sugerira uzgoj i životinjskih i biljnih vlakana.

Biljna vlakna nisu korištena samo u proizvodnji tkanog tekstila, već i za užad, konopce i mreže (Good 2007: 182). Poteškoće oko uzgajanja tekstilnih biljaka, posebice lana, kao i težak i dugotrajan proces izvlačenja vlakana (McCorriston 1997: 522-523), vjerojatno su dodatno povećavala njihovu važnost i vrijednost (Mazăre 2014: 33).

Inovativni element upotrebe vune znatno bi promijenio sve faze eneolitičke proizvodnje tekstila i njezino bi uvođenje drastično smanjilo količinu vremena i rada potrebnih za proizvodnju i obradu vlakana. Osim toga, zbog svojih termoizolacijskih svojstava, vodootpornosti i mogućnosti bojenja, vuna je također mogla znatno utjecati na standard krajnjih proizvoda.

Najnovija istraživanja govore u prilog tome da je vuna u proučavanoj regiji najvjerojatnije uvedena i korištena već tijekom eneolitika (Djurdjevac Conrad et al. 2018; Park et al., u postupku recenzije), kao što je prvotno predložio Sherratt u svom SPR modelu (1981; 1983). Kritike Sherrattove hipoteze uglavnom su ispitivale mogućnost međusobnog povezivanja i istovremenosti (Chapman 1982) različitih načina korištenja životinja. Dakle, i sam je Sherratt jako naglašavao složenost lokalnih prilagodbi sekundarnih proizvoda, ukazujući time na važnost društvene simbolike i prestiža povezanog s određenim inovacijama u stočarstvu (Sherratt 1986). Moguće je neizravno povezati ciljani uzgoj lana s naprecima u poljoprivredi do kojih je došlo uvođenjem pluga, što sačinjava još jedan element Sherrattovog „paketa". U svakom slučaju, postaje sve jasnije da su izvori tekstilnih vlakana, kako životinjskog, tako i biljnog porijekla, imali sve veću ulogu u oblikovanju eneolitičkih ekonomija i da su zbog toga njihov uzgoj i obrada sudjelovali, a moguće i poticali, raslojavanje društva.

Kako bi se moglo u potpunosti razumjeti snagu određenih okidača koji su promicali korištenje različitih sirovina u različitim kontekstima, potrebna su nova istraživanja. Većina studija koje se bave tekstilnim vlaknima fokusirana je na određen tip sirovine, što ograničava uvid u sveukupne faktore koji su mogli uvjetovati dinamiku iskorištavanja pojedinog izvora vlakana unutar šireg spektra mogućnosti i prilika za odabir. Proučavanje odnosa između različitih izvora vlakana i načina njihovog

fluences which were crossing the mountains (Alps, Carpathians and the Balkans) and percolating into the Pannonian Plain, the Eneolithic textile traditions apparently experienced technological adjustments, explainable through two distinct trends in the raw material use, which indirectly propose the cultivation of both animal and plant fibres.

Vegetal fibres have not only been used in the production of woven textiles, but also resourced for cordage, ropes and nets (Good 2007: 182). The difficulties involved in growing textile plants, and flax in particular, as well as the laborious and time-consuming process of extracting fibres (McCorriston 1997: 522-523) most probably further magnified their importance and increased their value (Mazăre 2014: 33).

The innovative element of wool would have fundamentally affected and changed all stages of the Eneolithic textile production. Its appearance would have drastically decreased the time-labour investment in fibre production and processing. Additionally, it might have fundamentally influenced the final product standards, due to its thermo-isolation, water-proof and dying properties.

The most recent research supports that wool was most likely introduced and exploited in the region already during the course of the Eneolithic period (Djurdjevac Conrad et al. 2018; Park et al., in review), as initially outlined by Sherratt in his SPR model (1981; 1983). Criticism around Sherratt's hypothesis mainly questioned the interconnectivity and simultaneousness (Chapman 1982) of different forms of animal exploitation. Therefore, Sherratt himself has increasingly stressed the intricacy of local adaptions of secondary products, pointing to the importance of social symbolism and prestige related to the particular innovations in the animal husbandry (Sherratt 1986). It is possible that the more focused flax cultivation could be indirectly connected to the advancements in farming, due to the plough agriculture, which is yet another element from Sherratt's 'package'. In any case, it is more and more evident that textile fibre materials, both of animal and plant origin, played a significant role in the formation of Eneolithic economies and as such their cultivation and processing participated and possibly even stimulated social stratification.

In order to really understand the potency of particular triggers which promoted different raw materials in different contexts, further research is necessary. Most of the studies on textile fibres

iskorištavanja moglo bi dati konkretnije odgovore na pitanja kulturološki uvjetovanih odabira, kao i uvjetovanosti okolišem.

Do 3. tisućljeća pr. Kr., oba osnovna materijala (vuna i lan) su već vjerojatno bila široko rasprostranjena, kako u smislu uzgoja i korištenja, tako i trgovine diljem cijele jugoistočne i srednje Europe. Prijelaz iz kasnog eneolitika u rano brončano doba karakteriziraju znakovite društveno-ekonomske promjene koje omogućavaju detaljnije proučavanje specijalizacije, upravljanja sirovinama i trgovine koji su usko povezani s praksama uzgajanja vlakana.

focus on one particular raw material, which restricts addressing specific factors that might have conditioned the dynamics of their use within the wider fibre repertoires and selection opportunities. Further focus on the relationship between different fibre resources and modes of their exploitation could provide more concrete answers to questions on cultural choices and environmental conditioning.

By the 3rd millennium BC both staple materials (wool and fibre flax) were most probably very widely spread in terms of cultivation, use and quite possibly trade across the entire South East and Central Europe. Transition from the Late Eneolithic to the Early Bronze Age period is characterized by profound socio-economic changes, which enable a more detailed study of developments in specialization, resource management and trade that were closely connected to fibre cultivation practices.

English translation: Ana Grabundžija

Literatura / Bibliography

Andersson, E. B. 2003, Tools for Textile Production from Birka and Hedeby, *Birka Studies, vol 8*, Stockholm, Riksantikvarieainbetet.

Andersson Strand, E. B. 2010, Experimental Textile Archaeology, in: E. Andersson Strand, M. Gleba, U. Mannering, C. Munkholt, M. Ringgaard (eds.), *North European Symposium for Archaeological Textiles X, Vol. 5*, Oxford, Oxbow Press, 1-3.

Andersson Strand, E. B. 2011, The organization of textile production in Birka and Hedeby, in: S. Sigmundsson (ed.), *Viking Settlements and Viking Society, Papers from the Proceedings of the Sixteenth Viking congressand Reykholt, 16th -23rd August 2009*, Reykjavik, University of Iceland Press, 1-17.

Andersson Strand, E. B. 2012, The textile chaîne opératoire: Using a multidisciplinary approach to textile archaeology with a focus on the Ancient Near East, *Paléorient* vol. 38, n°1-2, 21-40.

Anderson Strand, E. B. 2014, Sheep, Wool and Textile Production. An Interdisciplinary Approach to the Compexity of Wool Working, in: C. Breniquet & C. Michel (eds.), *Wool Economy in the Ancient Near East and the Aegean. From the Beginnings of Sheep Husbandry to Institutional Textile Industry*, Oxford & Philadelphia, Oxbow Books, 41-51.

Andersson Strand, E. B. & Cybulska, M. 2012, Visualising Ancient Textiles – How to Make a Textiles Visible on the Basis of an Interpretation of an Ur III Text, in: M.-L. Nosch, H. Koefold, E. Andersson Strand (eds), *Textile Production and Consumption in the Ancient Near East, Archaeology, Epigraphy and Iconography*, Ancient Textiles 12, Oxford and Oakville, Oxbow, 113-127.

Andersson Strand, E. B., Frei, k. M., Gleba, M., Mannering, U., Nosch, M. L., Irene Skals, I. 2013, Old Textiles – New Possibilities, *European Journal of Archaeology* 13(2), 149-173.

Arnold, E. R. & Greenfield, H. J. 2006, *The origins of transhumant pastoralism in temperate southeastern Europe: a zooarchaeological perspective from the central Balkans, Volume 1538*, Oxford, British Archaeological Reports Ltd.

Baioni, M. 2003, Lagozza di Besnate, in: M. Bazzanella, A. Mayr, L. Moser, A. Rast-Eicher (eds.), *Textiles: intrecci e tessuti dalla preistoria europea,* Trento, Provincia Autonoma di Trento, Sevizio Beni Culturali, Uffido Beni Archeologici, 183.

Balen, J. 2005, *Sarvaš – Neolithic and Eneolithic Settlement*, Musei Archaeologici Zagrabiensis Catalogi et Monographiae Vol II, Zagreb, Arheološki muzej u Zagrebu.

Barber, E. J. W. 1991, *Prehistoric textiles: the development of cloth in the Neolithic and Bronze Ages with special reference to the Aegean,* Princeton, Princeton University Press.

Barber, E. W. 1994, *Women´s Work: The First 20 000 years - Women, Cloth and Society in Early Times,* New York, W W Norton & Co Inc.

Bazzanella, M., Mayr, A., Moser, L., Rast-Eicher, A. 2003, Schede [Catalogue], in: M. Bazzanella, A. Mayr, L. Moser, A. Rast-Eicher (eds.), *Textiles: intrecci e tessuti dalla preistoria europea*, Trento, Provincia Autonoma di Trento, Sevizio Beni Culturali, Uffido Beni Archeologici, 133-289.

Becker, C., Benecke, N., Grabundžija, A., Küchelmann, H. C., Pollock, S., Schier, W., Schoch, C., Schrakamp, I., Schütt, B., Schumacher, M. 2016, The Textile Revolution. Research into the Origin and Spread of Wool Production between the Near East and Central Europe, in: G. Graßhoff & M. Meyer (eds.), *eTopoi Journal for Ancient Studies – Special Volume* 6: *Topoi Research Papers*, 102-145.

Belanová-Štolcová, T. & Grömer, K. 2010, Loomweights, spindles and textiles—textile production in Central Europe from the Bronze Age to the Iron Age, in: E. Andersson Strand, M. Gleba, U. Mannering, C. Munkholt, M. Ringgaard (eds.), *North European symposium for archaeological textiles X,* Oxford, Oxbow Books, 9-20.

Bender Jørgensen, L. & Grömer, K. 2012, Arheologija tekstila – Suvremena dostignuća i novije metode, The Archaeology of Textiles – Recent advances and new methods, *Portal* (3), 45-68.

Bichler, P., Grömer, K., Hofmann-de Keijzer, R., Kern, A., Reschreiter, H. (eds.) 2005, *Hallstatt Textiles. Technical Analysis, Scientific Investigation and Experiment on Iron Age Textiles*, BAR International Series 1351. Oxford, Archaeopress.

Boas, F. 1889, *The Aims of Ethnology*, New York, Hermann Bartsch.

Boas, F. 1940, *Race, Language, and Culture*, New York, The Macmillan Company.

Bohnsack, A. 1981, *Spinnen und Weben. Entwicklung von Technik und Arbeit im Textilgewerbe,* Reinbek, Rowohlt.

Bonev, A. & Alexandrov, G. 1996, *Bagachina Selishte ot Kusnata Kamenno-Medna Epoha i Trakiiski Kultov Tsentur (3-1 hil. pr. Hr.),* Montana, Polimona.

Bregant, T. 1974a, Kolišče ob Maharskem prekopu pri Igu – raziskovanja leta 1970, *Poročilo o raziskovanju neolita in eneolita v Sloveniji* III, 7-36.

Bregant, T. 1974b, Kolišče ob Maharskem prekopu pri Igu – raziskovanja leta 1972, *Poročilo o raziskovanju neolita in eneolita v Sloveniji* III, 39-68.

Bregant, T. 1975, Kolišče ob Maharskem prekopu pri Igu – raziskovanja 1973. in 1974. leta, *Poročilo o raziskovanju neolita i eneolita v Sloveniji* IV, 7-114.

Breniquet, C. 2008, *Essai sur le tissage en Mésopotamie, des premières communautés sédentaires au milieu du IIIe millénaire avant J.-C. Travaux de la Maison René-Ginouvès*, Paris, De Boccard.

Brombacher, C. & Jacomet, S. 1997, Ackerbau, Sammelwirtschaft und Umwelt: Ergebnisse archäobotanischer Untersuchungen, in: J. Schibler, H. Huüster-Plogmann, S. Jacomet, C. Brombacher, E. Gross-Klee, A. Rast-Eicher (eds.), *Ökonomie und Ökologie neolithischer und bronzezeitlicher Ufersiedlungen am Zürichsee. Ergebnisse der Ausgrabungen Mozartstrasse, Kanalisationssanierungen Seefeld, AKAD/Pressehaus und Mythenschloss in Zürich*, *Monographien der Kantonsarchäologie Zürich vol. 20,* 220-279.

Broudy, E. 1979, *The Book of Looms. A History of the Handloom from Ancient Times to the Present*, Hanover and London, University Press of New England.

Chapman, J. 1982, 'The Secondary Products Revolution' and the limitations of the Neolithic, *Bulletin of the Institute of Archaeology 19*, 107-22.

Chmielewski, T. 2009, *Po nitce do kłębka: o przędzalnictwie i tkactwie młodszej epoki kamienia w Europie Środkowej*, Warszawa, Semper.

Chmielewski, T. & Gardyński, L. 2010, New frames of archaeometrical description of spindle whorls: a case study of the late eneolithic spindle-whorls from the 1C site in Grödek, District of Hrubieszȩw, Poland, *Archaeometry 52*(5), 869-881.

Christmann, E. 1996, *Die Deutschen Ausgrabungen auf der Pevkakia-Magula in Thessalian II. Die frühe Bronzezeit*, Beiträge zur ur- und frühgeschichtlichen Archäologie des Mittelmeer-Kulturraumes (BAM 29), Bonn, Rudolf Habelt.

Costin, C. L. 1993, Textiles, Women and Political Economy in Late Prehispanic Peru, in: B. Isaac (ed.), *Research in Economic Anthropology*, Greenwich, JAI Press, 29-59.

Craig, O. 2002, The development of dairying in Europe: potential evidence from food residues on ceramics, *Documenta Praehistorica* XXIX, 97-107.

Craig, O. E., Chapman, J., Heron, C., Willis, L. H., Bartosiewicz, L., Taylor, G., Whittle, A., Collins, M. J. 2005, Did the first farmers of Central and Eastern Europe produce dairy foods?, *Antiquity 79*, 882-894.

Crewe, L. 1998, *Spindle Whorls, A study of form, function and decoration in prehistoric Bronze Age Cyprus,* Jonsered, Paul Aström Förlag.

Cybulska, M. & Maik, J. 2007, Archaeological Textiles- A Need for New Methods of Analysis and Reconstruction, *Fibres & Textiles in Eastern Europe* 15(5-6), 185-189.

De Capitani, A. & Leuzinger, U. 2001, Arbon-Bleiche 3. Eine jungsteinzeitliche Seeufersiedlung am schweizerischen Bodenseeufer aus dem fruhen 34 Jh. v. Chr, in: P. Roman & S. Diamandi (eds.), Cernavodă III - Boleráz. Ein vorgeschichtliches Phänomen zwischen dem Oberrhein und der Unteren Donau, Symposium Mangalia/Neptun (Bucureşti 18.-24. Oktober 1999), Bucureşti, Studia Danubiana, ser. Symp. 2, 721-728.

Djurdjevac Conrad, N., Furstenau, D., Grabundžija, A., Helfmann, L., Park, M., Schier, W., Schütt, B, Schütte, C., Weber, M., Wulkow, N., Zonker J. 2018, Mathematical Modeling of the Spreading of Innovations in the Ancient World, *eTopoi. Journal for Ancient Studies, Special Volume 7*, 1-32.

Elster, E. 2004, Tools of the Spinner, Weaver, and Mat Maker, in: E. Elster & C. Renfrew (eds.), Prehistoric Sitagroi: Excavations in Northeast Greece 1968-1970, Vol. 2: The Final Report, *Monumenta Archaeologica 20*, 229-251.

Evershead, R., Dudd, S. N., Copley, M. S., & Mukherjee, A. 2002, Identification of animal fats via compound specific d13C values of individual fatty acids: assessments of results for reference fats and lipid extracts of archaeological pottery vessels, *Documenta Praehistorica* XXIX, 73-96.

Firth, R. 2013, Considering the Finishing of Textiles based on Neo-Sumerian Inscriptions from Girsu, in: M.-L. Nosch, H. Koefold, E. AnderssonStrand (eds.), *Textile Production and Consumption in the Ancient Near East, Archaeology, Epigraphy and Iconography*, Ancient Textiles 12, Oxford and Oakville, Oxbow, 140-151.

Firth, R. & Marie-Louise, N. 2012, Spinning and Weaving Wool in Ur III Administrative Text, *Journal of Cuneiform Studies 64*, 67-84.

Georgiev, G. I., Merpert, N. Y., Katincarov, R., Dimitrov, D. 1979, *Ezero. Rannobronzovoto selishte,* Sofia, BAS.

Gleba, M. 2008, *Textile Production in Pre-Roman Italy*, Ancient Textiles Series, 4, Oxford, Oxbow Books.

Gleba, M. 2012, From textiles to sheep: investigating wool fibre developement in pre-Roman Italy using scanning electron microscopy (SEM), *Journal of Archaeological Science 39*, 3643-61.

Good, I. 1999, *The Ecology of Exchange: Textiles from Shahr-i Sokhta, Eastern Iran* (Doctoral disertation), Retrieved from ProQuest Dissertations and Theses, Ann Arbor, University of Pennsylvania.

Good, I. 2007, Invisible Exports in Aratta: Enmerkar and the Three Tasks, in: C. Gillis & M. L. Nosch (eds.), *Ancient Textiles. Production, Craft and Society*, Oxford, Oxbow Books (Ancient Textiles Series 1), 179-184.

Govedarica, B. 2001, Die Funde vom Typ Cernavodă III-Boleráz im ehemaligen Jugoslawien, in: P. Roman & S. Diamandi (eds.), Cernavodă III - Boleráz. Ein vorgeschichtliches Phänomen zwischen dem Oberrhein und der Unteren Donau, Symposium Mangalia/Neptun (Bucureşti 18.-24. Oktober 1999). Bucureşti,Studia Danubiana, ser. Symp. 2, 358-368.

Grabundžija, A. 2016, *Archaeological Evidence for Early Wool Processing in South East and Central Europe*, Doctoral dissertation, Berlin, Freie Universität.

Grabundžija, A. & Russo, E. 2016, Tools tell tales - climate trends changing threads in the prehistoric Pannonian Plain, *Documenta Praehistorica* 43, 301-326.

Grabundžija, A., Schoch C., Ulanowska, A. 2016, Bones for the loom. Weaving experiments with astragali weights, *Prilozi Instituta za arheologiju u Zagrebu* 33, 287-306.

Grabundžija, A., 2018, Two sides of a whorl. Unspinning meanings and functionality of eneolithic textile tools, in: M. Siennicka, L. Rahmstorf, A. Ulanowska (eds.), *First Textiles. The beginning of textile manufacture in Europe and Mediterranean*, Ancient Textile Series 32, Oxford & Philadelphia, Oxbow Books.

Grabundžija, A. & Schoch C., *in press*, Fibres to Fibres. Thread to Thread. Comparing Diachronic Changes in Large Spindle Whorl Samples, in: W. Schier & S. Pollock (eds.), *The Competition of Fibres. Textile Production in Western Asia and Europe (5000-2000 BC)*, Berlin, Studies of the Ancient World.

Grabundžija, A., Schlichterle, H, Leuzinger, H., Schier, W, Karg, S., *in review*, Neolithic surplus production of textiles? Spindle whorls from two Neolithic lake dwellings in the pre-Alpine area in comparison to contemporary tools from South-eastern Europe, *Antiquity*.

Greenfield, H. J. 2005, A Reconsideration of the Secondary Products Revolution in South-Eastern Europe. On the Origins and Use of Domestic Animals for Milk, Wool, and Traction in the Central Balkans, in: J. Mulville & A. K. Outram (eds.), *The Zooarchaeology of Fats, Oils, Milk and Dairying,* Proceedings of the 9th Conference of the International Council of Archaeozoology, Durham, August 2002, Oxford, Oxbow Books, 14-31.

Greenfield, H. J. 2010, The Secondary Products Revolution: the past, the present and the future, *World Archaeology 42*(1), 29-54.

Greif, T. 1997, Prazgodovinska kolišča na Ljubljanskem barju. Arheološka interpretacija in poskus rekonstrukcije načina življenja (The prehistoric pile dwellings in the Ljubljansko barje. An archaeological interpretation and attempted reconstruction of the way of life), *Arheo* 18.

Grömer, K. 2005, Efficiency and technique - experiments with original spindle whorls (Leistung und Technik – Experimente zum Spinnen mit Originalspinwirteln), in: P. Bichler, K. Grömer, R. Hofmann-de Keijzer, A. Kern, H. Reschreiter (eds.), *Hallstatt Textiles. Technical Analysis, Scientific Investigation and Experiment on Iron Age Textiles,* BAR International Series 1351, Oxford, Archaeopress, 107-116.

Grömer, K. 2006, Textilien der Bronzezeit in Mitteleuropa, *Archaeologia Austriaca* 90, 31-72.

Grömer, K., Rösel-Mautendorfer, H., Bender Jørgensen, L. 2013, Visions of Dress. Recreating Bronze Age Clothing from the Danube Region, *Textile Journal of Cloth and Culture* 11(3), 218-241.

Gyucha, A., Duffy, P. R., Parkinson, W. 2013, Prehistoric Human-Environmental Interactions on the Great Hungarian Plain, *Anthropologie,* LI/2, 158-168.

Halstead, P. & Isaakidou, V. 2011, Revolutionary secondary products: the development and significance of milking, animal-traction and wool-gathering in later prehistoric Europe and the Near East, in: T. Wilkinson, S. Sherratt, J. Bennet (eds.), *Interweaving Worlds: Systemic Interactions in Eurasia, 7th to 1st Millennia BC*, Oxford, Oxbow Books, 61-76.

Harris, S. 2014, Flax fibre: Innovation and Change in the Early Neolithic. A Technological and Material Perspective, Published in Textile Society of America 2014 Biennial Symposium Proceedings: *New Directions: Examining the Past, Creating the Future,* Los Angeles, California, September 10-14.

Herbig, C. & Maier, U. 2011, Flax for oil or fibre? Morphometric analysis of flax seeds and new aspects of flax cultivation in Late Neolithic wetland settlements in southwest Germany, *Vegetation History and Archaeobotany* 20(6), 527-533.

Hoekman-Sites, H. A. & Giblin, J. I. 2012, Prehistoric animal use on the Great Hungarian Plain: a synthesis of isotope and residue analyses from the Neolithic and Copper Age, *Journal of Anthropological Archaeology* 31(4), 515-527.

Hoffmann, M. 1964, *The warp-weighted loom: studies in the history and technology of an ancient implement*, Studia Norvegica, 14, Oslo, Universitetsforlaget.

Jacomet, S. 2009, Plant economies and village life in Neolithic lake dwellings at the time of the Alpine Iceman, *Vegetation History and Archaeobotany* 18, 47-59.

Jevtić, M. 2001, On the Stratigraphy of Cernavodă III-Boleráz Finds from the Djerdap Area, in: P. Roman & S. Diamandi (eds.), Cernavodă III - Boleráz. Ein vorgeschichtliches Phänomen zwischen dem Oberrhein und der Unteren Donau, Symposium Mangalia/Neptun (Bucureşti 18.-24. Oktober 1999), Bucureşti, Studia Danubiana, ser. Symp. 2, 330-341.

Kania, K. 2015, Soft yarns, hard facts? Evaluating the results of a large scale hand-spinning experiment, *Journal of Archaeological and Anthropological Sciences* 7, 113-130.

Kapeller, A. 2003, Sito: Wetzikon-Robenhausen, in: M. Bazzanell,A. Mayr, L. Moser, A. Rast-Eicher (eds.), *Textiles: intrecci e tessuti dalla preistoria europea,* Trento, Provincia Autonoma di Trento, Sevizio Beni Culturali, Uffido Beni Archeologici, 228-229.

Kimbrough, C. K. 2006, *Spindle Whorls, Ethnoarchaeology and the Study of Textile Production in Third Millennium BCE Northern Mesopotamia: A Methodological Approach*, Doctoral disesrtation, New York, New York University, Department of Anthropology.

Köninger, J., Kolb, M., Schlichtherle, H. 2001, Elemente von Boleráz und Baden in den Feuchtbodensiedlungen des südwestdeutschen Alpenvorlandes und ihre möglicheRolle im Transformationsprozess des lokalen Endneolithikums, in: P. Roman & S. Diamandi (eds.), *Cernavodă III - Boleráz. Ein vorgeschichtliches Phänomen zwischen dem Oberrhein und der Unteren Donau*, Symposium Mangalia/Neptun (Bucureşti 18.-24. Oktober 1999), Bucureşti, Studia Danubiana, ser. Symp. 2., 641-672.

Korošec, J. 1963, *Prazgodovinsko kolišče pri Blatni Brezovici*, Dela 14, Sekcija za arheologijo 10, Ljubljana, Slovenska akademija znanosti in umetnosti.

Korošec, P. & Korošec, J. 1969, *Najdbe s koliščarskih naselbin pri Igu na Ljubljanskem barju* / Fundgut der Pfahlbausiedlungen bei Ig am Laibacher Moor, Arheološki katalogi Slovenije 3, Ljubljana, Narodni muzej v Ljubljani.

Leuzinger, U. 2002, Textilherstellung, in: A. de Capitani, S. Deschler-Erb, U. Leuzinger et al. (eds.), *Die jungsteinzeitliche Seeufersiedlung Arbon-Bleiche 3*, Thurgau, Departement für Erziehung und Kultur des Kantons Thurgau, 115-134.

Leuzinger, U. & Rast-Eicher, A. 2011, Flax processing in the Neolithic and Bronze Age pile-dwelling settlements of eastern Switzerland, *Vegetation History and Archaeobotany* 20(6), 535-542.

Maekawa, K. 1980, Female weavers and their children in Lagash – pre-Sargonic and Ur III, *Acta Sumerologica* 2, 81-125.

Magyari, E. K., Chapman, J. C., Passmore, D. G., Allen, J. R. M., Huntley, J. P., Huntley, B. 2010, Holocene persistence of wooded steppe in the Great Hungarian Plain, *Journal of Biogeography* 37(5), 915-935.

Magyari, E. K., Chapman, J. C., Fairbairn, A. S., Francis, M., de Guzman, M. 2012, Neolithic human impact on the landscapes of North-East Hungary inferred from pollen and settlement records, *Vegetation History and Archaeobotany* 21(4-5), 279-302.

Marić Bakoviḱ, M. & Car, G. 2014, Conservationț restoration works and results of the latest analyses of the textile shroud from prehistoric earth tumulus no. 16, Pustopolje, Kupres/Konzervatorsko-restauratorski radovi i rezultati najnovijih analiza na tekstilnome plaštu iz prapovijesnoga zemljanog tumula br. 16, Pustopolje, Kupres, *Cleuna* 1, 30-47.

Mårtensson, L., Andersson, E., Nosch, M. L., Batzer, A. 2005-6, Technical Report, Experimental Archaeology Part 1*, Tools and Textiles – Texts and Contexts Research Programme*, Copenhagen, The Danish National Research Foundation's Centre for Textile Research (CTR) University of Copenhagen.

Mårtensson, L., Andersson, E., Nosch, M. L., Batzer, A. 2007a, Technical Report, Experimental Archaeology Part 3 – Loom weights*, Tools and Textiles – Texts and Contexts Research Programme*, Copenhagen, The Danish National Research Foundation's Centre for Textile Research (CTR) University of Copenhagen.

Mårtensson, L., Andersson, E., Nosch, M. L., Batzer, A. 2007b, Technical Report, Experimental Archaeology Part 4 – Spools*, Tools and Textiles – Texts and Contexts Research Programme*, Copenhagen, The Danish National Research Foundation's Centre for Textile Research (CTR) University of Copenhagen.

Mazăre, N. P. 2014, Investigating Neolithic and Copper Age Textile Production in Transylvania (Romania). Applied Methods and Results, in: M. Harlow, C. Michel, M. L. Nosch (eds.), *Prehistoric, Ancient Near Eastern and Aegean Textiles and Dress. An interdisciplinary anthology,* Ancient Textiles Series 18, Oxford and Philadelphia, Oxbow Books, 1-42.

McCorriston, J. 1997, The Fiber Revolution: Textile Intensification, Alienation, and Social Stratification in Ancient Mesopotamia, *Current Anthropology* 38(4), 517-549.

Nosch, M. L. 2014, The Aegean Wool Economies of the Bronze Age, *Textile Society of America Symposium Proceedings*, Paper 900.

Odone, S. 1998, La Lagozza di Besnate (VA): nuovi dati alla luce degli scavi Cornaggia Castiglioni, *Notizie archeologiche Bergomensi* 6, 7-71.

Pajagič-Bregar, G., Velušček, A., Tolar, T., Strlič, M., Bukošek, V., Kolar, J., Ravbar, I. 2009, Raziskave in konserviranje preje z Ljubljanskega barja / Analysis and conservation of the Ljubljansko barje yarn, in: A. Velušček (ed.), Koliščarska naselbina Stare gmajne in njen čas. Ljubljansko barje v 2. polovici 4. tisočletja pr. Kr. / Stare gmajne Pile-Dwelling Settlement and its era. The Ljubljansko barje in the 2nd half of the 4th millennium BC, *Opera Instituti Archaeologici Sloveniae* 16, 309-318.

Park, M., Djurdjevac Conrad, N., Grabundžija, A. Helfmann, L., Russo, E., Weber, M., Zonker, J., Schier, W., Schütte, C., Schütt, B., *in review*, Modeling the spread of the wool-bearing sheep from south-west Asia into Europe – an agent-based approach, *Journal of Archaeological Science*

Parzinger, H. 1984, Die Stellung der Ufferansiedlungen bei Ljubljana in äneolitischen und frühbronzezeitlichen Kultursystem der mittleren Donauländer, *Arheološki vestnik* 35, 13-75.

Pavúk, P. 2012, Of Spools and Discoid Loom-Weights: Aegean-Type Weaving at Troy Revisited, in: M. L. Nosch & R. Laffineur (eds.), KOSMOS. Jewellery, Adornment and Textiles in the Aegean Bronze Age, 13th International Aegean Conference held at the University of Copenhagen, 19-23 April 2010 (Leuven-Liège 2012), 121-130.

Petrova, V. N. 2011, *Textile Production in the Bronze and Early Iron Age in the North Balkan Region*, Doctoral dissertation, Sofia, Sofia University St. Kliment Ohridsi.

Petrović, J. & Jovanović, B. 2002, *Gomolava: naselja poznog eneolita*, Novi Sad, Beograd, Muzej Vojvodine, Arheološki institut.

Rahmstorf, L. 2005, Ethnicity and changes in weaving technology in Cyprus and the eastern Mediterranean in the 12 th century BC, in: V. Karageorghis, H. Matthäus, S. Rogge (eds.), Cyprus: Religion and Society from the Late Bronze Age to the End of the Archaic Period, *Proceedings of an International Symposium on Cypriote Archaeology*, Erlangen, 23-24 July 2004, Erlangen, Bibliopolis, 143-169.

Rast-Eicher, A. 2005, Best before Wool: the first textiles, in: P. Bichler, K. Grömer, R. Hofmann-de Keijzer, A. Kern, H. Reschreiter (eds.), *Hallstatt Textiles. Technical Analysis, Scientific Investigation and Experiment on Iron Age Textiles*, BAR International Series 1351, Oxford, Archaeopress, 117-131.

Rast-Eicher, A. & Bender Jørgensen, L. 2013, Sheep wool in Bronze Age and Iron Age Europe, *Journal of Archaeological Science* 40, 1224-41.

Rast-Eicher, A. 2014, Bronze and Iron Age Wools in Europe, in: C. Breniquet & C. Michel (eds.), *Wool Economy in the Ancient Near East and the Aegean. Ancient Textile Series vol. 17*, Oxford, Oxbow Books, 12-21.

Renfrew, C., Gimbutas, M., Elster, E. 1986, *Excavations at Sitagroi. A prehistoric village in north-east Greece, Volume I*, Monumenta Archaeologica 13, Los Angeles, UCLA Institute of Archaeology.

Ruttkay, E. 1995, Boleráz-Gruppe, in: E. Lenneis, C. Neugebauer-Maresch, E. Ruttkay (eds.), *Jungsteinzeit im Osten Österreich,* Wissenschaftliche Schriftenreihe Niederösterreich 102-105, St. Pülten, Wien, 145-160.

Ryder, M. L. 1983, *Sheep and Men,* London, Duckworth.

Schierer, I. 2005, Experiments with the warp-weighted loom of Gars-Thunau, Austria, in: P. Bichler, K. Grömer, R. Hofmann-de Keijzer, A. Kern, H. Reschreiter (eds.), *Hallstatt Textiles. Technical Analysis, Scientific Investigation and Experiment on Iron Age Textiles,* British Archaeological Reports International Series 1351, Oxford, Archaeopress, 101-105.

Schumacher, M., Schütt, B., Schier, W. 2015, Near Landscapes of the Textile Revolution, *Bridging the Gap – Integrated Approaches in Landscape Archaeology, eTopoi. Journal for Ancient Studies, Special Volume 4*, 162-187.

Schumacher, M., Schier, W., Schütt, B. 2016a, Mid-Holocene vegetation development and herding-related interferences in the Carpathian region, *Quaternary International*, doi:10.1016/j.quaint.2015.09.074

Schumacher, M., Dobos, A., Schier, W., Schütt, B. 2016b, *in review*, Holocene valley incision in the southern Bükk foreland: climate-human-environment interferences in northern Hungary, Quaternary International.

Schmidt, R. R. 1945, *Die Burg Vučedol*, Zagreb, Hrvatski Državni Arheološki Muzej.

Sherratt, A. 1981, Plough and pastoralism: aspects of the secondary products revolution, in: I. Hodder, G. Isaac, N. Hammond (eds.), *Pattern of the Past: Studies in honour of David Clarke*, Cambridge, Cambridge University Press, 261-305.

Sherratt, A. 1983, The Secondary Products Revolution of animals in the Old World, *World Archaeology* 15, 90-104.

Sherratt, A. 1986, Wool, Wheels and Ploughmarks: Local Developmentsor Outside Introductions in Neolithic Europe?, *Bulletin of Institute of Archaeology* 23, 1-15

Shishlina, N. I., Orfinskaya, O. V., Golikov, V. P. 2003, Bronze Age Textiles from North Caucasus: new evi-

dence of fourth millennium BC fibers and fabrics, *Oxford Journal of Archaeology* 22(4): 331-344.

Skeates, R. 1994, A radiocarbon date-list for prehistoric Italy (c. 46,400 BP - 2450 BP / 400 cal. BC), in: R. Skeates & R. Whitehouse (eds.), *Radiocarbon dating and Italian prehistory,* London, The British School at Rome, Accordia Research Centre, University of London, 147-288.

Sofaer, J., Jørgensen, L. B., Choyke, A. 2013, Craft production: ceramics, textiles and bone, in: A. Harding & H. Fokkens (eds.), *The Oxford Handbook of the European Bronze Age,* Oxford, Oxford University Press, 469-491.

Steinkeller, P. 1980, Matresses and Felt in Early Mesopotamia, *Oriens Antiquus* 19, 79-100.

Steward, J. 1955, *Theory of Culture Change: The Methodology of Multilinier Evolution*, Urbana, IL, University of Illinois Press.

Tolar, T. & Velušček, A. 2009, Discovery of flax (Linum usitatissimum) at Ljubljansko barje, Slovenia, *Histria Antiqua* 18, 187-194.

Verhecken, A. 2010, The moment of inertia: a parameter for the functional classification of worldwide spindle-whorls, in: E. Andersson Strand, M. Gleba, U. Mannering, C. Munkholt, M. Ringgaard (eds.), *North European symposium for archaeological textiles* X, Oxford and Oakville, Oxbow Books, 257-270.

Vigne, J. D. & Helmer, D. 2007, Was milk a "secondary product" in the old world Neolithization process? Its role in the domestication of cattle, sheep and goats, *Anthropozoologica* 42(2), 9-40.

Völling, E. 2012, Stoff. A. Philologisch, in: M. P. Streck (ed.), *Reallexikon der Assyriologie und Vorderasiatischen Archäologie Band* 13, Berlin and New York, De Gruyter, 193-194.

Waetzoldt, H. 1972, *Untersuchungen zur neusumerischen Textilindustrie*, Studi economici e technologici 1, Roma, Centro per la Antichità e la Storie dell'Arte del Vicino Oriente.

Waetzoldt, H. 1987, Compensation of Craft Workers and Officials in the Ur III Period, in: M. A. Powell (ed.), *Labor in the Ancient Near East*, American Oriental Series 68, New Haven, American Oriental Society, 117-141.

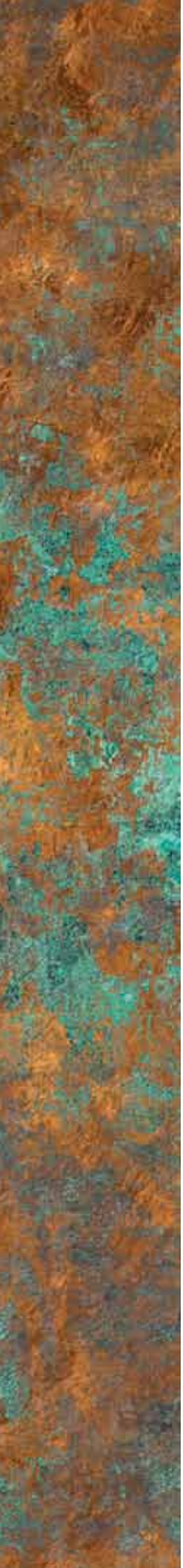
Waetzoldt, H. 2007, The Use of Wool for the Production of Strings, Ropes, Braided Mats and Similar Fabrics, in: C. Gillis & M.-L. Nosch (eds.), *Ancient Textiles. Production, Craft and Society*, Proceedings ofthe First International Conference on Ancient Textiles, held at Lund, Sweden, and Copenhagen,Denmark, on March 19 – 23, 2003. Ancient Textiles 1, Oxford, Oxbow Books, 112–121.

Waetzoldt, H. 2010, The Colours and Variety of Fabrics from Mesopotamia during the Ur III Period (2050 BC), ine C. Michel & M.-L. Nosch (eds.), *Textile Terminologies in the Ancient Near East andMediterranean from the Third to the First Millennia BC,* Ancient Textiles 8, Oxford, Oxbow Books, 201-210.

Waetzoldt, H. 2013, Textilien. A. Philologisch, in: M. P. Streck (ed.), *Reallexikon der Assyriologie und Vorderasiatischen Archäologie Band* 13, Berlin and New York, De Gruyter, 617–624.

Winiger, J. 1995, Die Bekleidung des Eismanns und die Anfänge der Weberei nördlich der Alpen, in: K. Spindler, E. Rastbichler-Zissernig, H. Wilfing, D. zur Nedden, H. Nothdurfter (eds.), *Der Mann im Eis. Neue Funde und Ergebnisse,* Wien, Springer Verlag, 119–187.

Wright, R. 2013, Sumerian and Akkadian Industries: Crafting Textiles, in: H. E. W. Crawford (ed.), *The Sumerian World,* New York and London, Routledge Press, 395-417.



Niti koje vežu elitu
Lociranje eneolitičkih tekstilnih zanata

Threads that bind the establishement
Housing eneolithic textile craft

Ana Grabundžija

Freie Universität Berlin
Excellence Cluster TOPOI
ana.grabundzija@fu-berlin.de

Uvod

Alatke i zanat

Tretiranje i obrada vlakana uvelike ovise o dostupnosti i prirodi izvora sirovine, kao i o željenim krajnjim proizvodima. Dakle, i početna i završna faza proizvodnje tekstila ocrtavaju se u dijelu procesa koji uključuje predenje. Posljedično, različiti načini eksploatacije vlaknastog materijala i njegovo pretvaranje u tekstilni proizvod mogu se promatrati kroz funkcionalni aspekt tekstilnih alatki, odnosno, preciznije, kroz pršljenove.

Pršljenovi su jednostavne alatke koje stvaraju napetost i rotaciju tijekom procesa predenja, dok se vretenom izvlači vlakna iz pripremljene sirovine i zavija ih se u uzicu ili nit. Pršljenovi su najbrojnija vrsta neizravnih dokaza za proizvodnju tekstila u eneolitičkim kontekstima, što doprinosi potencijalu za proučavanje tehnoloških trendova, osobito onih koji se odnose na dinamiku i promjene u obradi vlakana. Oni pružaju određene podatke o procesu predenja, a ujedno i o: prvo, svojstvima korištenih vlaknastih materijala (Grömer 2005; Verhecken 2010), i, drugo, tipu i kvaliteti proizvedene niti (Bohnsack 1981; Crewe 1998). Iako nisu ključni, pršljenovi su vrlo korisne alatke za proizvodnju niti (Barber 1991: 42) koje znatno ubrzavaju i poboljšavaju ovu, početnu, fazu u proizvodnji tekstila koja slijedi nakon pribavljanja i pripreme sirovih vlakana (Barber 1991: 51-53). Dok jedan pršljen označava proizvodnju jedne niti u pojedinom

Introduction

Tools for the Craft

Fibre treatment and processing greatly depend on the availability and the nature of raw material resources, as well as on the desired end products. Thus, both the initial and the final phase of textile production are reflected in the spinning part of the process. Consequently, different modes of both, the fibre material exploitation and its fabrication into textile produce, can be studied through the functional aspect of textile tools, more precisely, the spindle whorls.

Spindle whorls are simple tools that impart both tension and rotation during the process of spinning, in which the spinner draws out strands of raw material and twists them together into a cordage or thread. They are the most numerous among indirect evidence for manufacture of textiles in Eneolithic contexts. This contributes to their potential for studying technological trends, particularly those related to fibre processing dynamics and change. They provide specific information about the spinning process, while offering information on: first, the used fibre material traits (Grömer 2005; Verhecken 2010) and second, the type and quality of the produced thread (Bohnsack 1981; Crewe 1998). Even though not essential, spindle whorls are highly beneficial tools for thread production (Barber 1991: 42) that make this initial stage in textile manufacture, which fallows the acquisition and prepara-

trenutku i tijekom procesa predenja ga može koristiti samo jedna osoba (prelja/predioc), veći broj i koncentracija nalaza mogu vrlo jasno ocrtavati grupne aktivnosti. Posljedično, arheološke strukture s visokom koncentracijom pršljenova mogu se smatrati indikatorom intenzivnih aktivnosti predenja.

Prostorni element proizvodnog procesa uključen je u analizu kako bi se ispitala složenost organizacije eneolitičke proizvodnje tekstila. Cilj ovog rada bio je istražiti u kolikoj su mjeri strategije nabavljanja, obrade i tretiranja vlakana bile društveno sprovođene. Preciznije, pokušalo se posvetiti raspravi o tome postoji li dovoljno dokaza koji sugeriraju da su obrada vlakana i proizvodnja niti bile, osim na razini kućanstva, koordinirane i u sklopu većih, moguće i specijaliziranih skupina ljudi unutar eneolitičkih zajednica.

Novi teorijski pristup (Joyce & Gillespie 2000; Robin & Rothschild 2002) naglašava ulogu posredovanja u stvaranju, transformaciji i doživljaju prostora i mjesta. Dakle, dublje razumijevanje određenih prozvodnih aktivnosti, a osobito njihova prostorna organizacija, ključni su čimbenici za istraživanje društvenog aspekta proizvodnje. Većina analiziranih i dokumentiranih neizravnih dokaza za proizvodnju tekstila u neolitiku spada u skupinu nalaza utega za tkalačke stanove otkrivenih *in situ*, a koji se na proučavanom prostoru najčešće pojavljuju u kontekstu kuća (Selmeczi 1969; Barber 1991; Jovanović 2011). S obzirom na činjenicu da se u nekim ruralnim područjima do današnjih dana većina poslova vezanih uz tekstil odvija u kućanstvu, proizvodnja tekstila na razini domaćinstva smatrana je standardnim objašnjenjem koje, nehotimično, negira mogućnost rane specijalizacije tog zanata. Nadalje, za razliku od tkanja, koje zahtijeva određeni prostor, predenje je prilično mobilna aktivnost koja se odvijala u nizu prostornih konteksta i nije ničime bila ograničena na prostor domaćinstva. Dakle, namjerno odbacivanje pršljenova često se nije moralo odvijati paralelno s odbacivanjem drugih vrsta predmeta iz domaćinstva. Etnografske su studije pokazale da se predenje često odvija prilikom obavljanja drugih radnji (Crowfoot 1931: 37). Elizabeth Barber (Barber 1991: 69) čak je zabilježila: „Jedan od razloga zbog kojih kotač nije bio popularan u Grčkoj jest to što je najprikladnije vrijeme za predenje bilo tijekom putovanja od jednog do drugog sela, ili prilikom čuvanja stada. Čini se da je navika predenja tijekom hodanja, ili jahanja na magarcu, na sjevernom

tion of raw fibres, much faster and more proficient (Barber 1991: 51–53). While a single spindle whorl counts for the production of one thread at a time and can be used by an individual spinner during the rendering process, their increased number and concentration can be highly reflective of group activities. Thus, archaeological features with high spindle-whorl concentration can be considered as an indication of intensified spinning practice.

In order to investigate the possibility and the complexity of organization of Eneolithic textile productions, the spatial element of the manufacturing process was addressed. The aim of this study was to examine to which extent were the fibre material procurement, handling and treatment strategies socially structured. More precisely, an attempt has been made to discuss if the initial phase of textile production was managed on the household level or is there enough evidence to suggest that the fibre processing and thread fabrication practice was also coordinated within larger, possibly specialized groups, during the studied periods.

New theoretical approach (Joyce & Gillespie 2000; Robin & Rothschild 2002) stresses the role of agency in the creation, transformation and experience of space and place. Hence, a deeper understanding of the specific manufacturing activities and in particular their spatial organization are the key factors for investigating the social aspects of the production. The majority of analysed and reported indirect evidence for the Neolithic textile productions falls into the group of *in situ* evidences of loom-weights, most often recovered from the house contexts across the studied region (Selmeczi 1969; Barber 1991; Jovanović 2011). Considering the fact that in some rural areas a big portion of textile work is still, until today, performed at home, the household level of textile production is regarded as a standard that rather unintentionally discriminates the possibility for early craft specialization. Further, unlike weaving that requires an activity area, spinning is a rather mobile practice that was practiced in a wider range of spatial contexts and is not at all limited to the domestic sphere. Thus, an intentional discard of spindle whorls often might not occure with other classes of domestic refuse. Etnographic studies show that spinning is often done while performing other tasks (Crowfoot 1931: 37). Elizabeth Barber (Barber 1991: 69) even reports: "One reason the wheel has not been popular in Greece is that one of the most convenient times there for spinning is while travelling about- from one village to the

Mediteranu prilično stara.“ Imajući navedeno na umu, visoka frekvencija pršljenova u jednom arheološkom kontekstu ukazuje na značajnu razinu proizvodnje pređe (specijaliziranu, organiziranu, ili oboje), bez obzira na prirodu depozita (primarnu ili sekundarnu).

S obzirom na to da morfološke odlike alatki znatno utječu na njihovu funkcionalnost (Gromer 2005; Martensson et al. 2006; Verhecken 2010), tehnička analiza pršljenova predstavlja temelj za istraživanje korištenih tehnika, metoda i materijala, te konačnih proizvoda predenja. Ipak, do koje mjere morfologija alatki uvjetuje sam proces proizvodnje i dalje se propitkuje i istražuje kroz eksperimentalne studije (Laurito et al. 2014; Kania 2015).

Zanat i specijalizacija

Promatranje razina procesa proizvodnje tekstila kroz vremenske i prostorne kategorije omogućava definiranje uzoraka zanatske proizvodnje. Mnoge studije bile su usmjerene na pojmove obrtništva i specijalizacije kroz proučavanje njihove uvjetovanosti društvenom organizacijom (Clark 1995; Chapman 2003). Već je Vere Gordon Child predložio svezu između pojave specijalizacije zanata i razvoja društvenih struktura (Childe 1930, 1950, 1951, 1958).

Veliki dio arheološke teorije odnosi se na specijalizaciju u poodmaklom, potpuno razvijenom obliku unutar društvenog konteksta profiliranih hijerarhija (Chapman 1996; Gilman 1996), iako postoje i studije koje propitkuju pretpostavke o razini društvene složenosti koja je potrebna za njezino rano uspostavljanje (Perlès & Vitelli 2000; Souvatzi 2008).

Cathy Lynne Costin predložila je model koji pokazuje najviše potencijala za za proučavanje prostornog aspekta specijalizacije (Costin 1991). Ona je specijalizaciju zanata definirala kao: „diferencirani, regulirani, trajni i, moguće, institucionalizirani sustav proizvodnje ” (Costin 1991: 4), a predložila je i četiri kategorije za proučavanje njezine složenosti: *kontekst, koncentraciju, razmjer i intenzitet* (Costin 1991: 5-9). *Kontekst* se odnosi na političke i društveno-ekonomske uvjete proizvodnje, dok se *koncentracija* odnosi na njezinu prostornu organizaciju i distribuciju. *Razmjer* procjenjuje broj sudionika integriranih u proizvodni proces, do dok se

next, or while tending the flocks. The habit of spinning while walking, or riding a donkey, seems to be fairly old in the north Mediterranean”. With all of this in mind, a high frequency of spindle whorls in a single archaeological context is suggestive of a significant level of yarn production (specialized, organized, or both), regardless of the nature of the deposit (primary or secondary).

Technical analysis of spindle whorls enables the investigation of techniques, materials, methods and products, since the morphological traits of the tools greatly impact their functionality (Grömer 2005; Mårtensson et al. 2006; Verhecken 2010). Nevertheless, the level on which the morphology influences and conditions the spinning process continues to be questioned and investigated through experimental studies (Laurito et al. 2014; Kania 2015).

Craft for the Specialization

Observation of the stages of textile manufacturing process in time and space categories allows for the definition of patterns of craft production. Many studies addressed the concepts of craftsmanship and specialisation through examining their dependence on social organization (Clark 1995; Chapman 2003). Already Vere Gordon Child proposed the relationship between the emergence of craft specialization and the development of class structures (Childe 1930, 1950, 1951, 1958).

A big portion of archaeological theory deals with specialisation already in its developed form within the social context of profiled hierarchies (Chapman 1996; Gilman 1996), although there are studies which challenged the assumptions about the level of social complexity essential for its early establishment (Perlès & Vitelli 2000; Souvatzi 2008).

Cathy Lynne Costin proposed a model, which probably holds the greatest potential for addressing the subject of specialization on a spatial level of investigation (Costin 1991). She defined the craft specialization as a “differentiated, regularized, permanent, and perhaps institutionalized production system” (Costin 1991: 4) and suggested four categories for addressing its complexity: context, concentration, scale and intensity (Costin 1991: 5–9). *Context* focuses on the political and socio-economic conditions of the production, while *concentration* examines its spatial organisation and distribution. *Scale* category assesses the amount of people involved and integrated in the process and finally, *intensity* ad-

intenzitet odnosi na količinu uloženog i utrošenog vremena (Costin 1991: 11-16).

U kontekstu arheologije tekstila, problemom specijalizacije zanata s teorijskog aspekta bavila se Eva Andersson-Strand, koja razlikuje četiri razine specijalizacije: *proizvodnju u kućanstvu, industriji u kućanstvu, zavisnu specijaliziranu proizvodnju* i *radioničku proizvodnju za trgovinu* (Andersson 2003: 47, fig.1.). Njezin se model odnosi na isti problem kao i onaj Cathy Lynne Costin, a sugerira da su stupanj organizacije rada (*koncentracija*), njezina raširenost (*razmjer*) i razina angažiranosti pojedinaca (*intenzitet*) u društveno-ekonomskom kontekstu (*kontekst*) glavni parametri za stupnjevanje ili procjenu specijalizacije zanata u sklopu proizvodnje tekstila (Andersson Strand 2011: 3). Iako utemeljen na proizvodnji tekstila iz doba Vikinga, njezin model može se smatrati prikladnim za proučavanje promjena u pretpovijesti (Grömer 2016: 246-61).

dresses the amount of time spent and invested by individuals (Costin 1991: 11–16).

In the context of textile archaeology, the issue of craft specialization has been theoretically addressed by Eva Andersson-Strand, who distinguishes between four levels of specialisation: *household production*, *household industry*, *attached specialist production* and *workshop production for trade* (Andersson 2003: 47, fig.1.). Her model addresses the same issues as Cathy Lynne Costin's, suggesting that the degree of labour organisation (*concentration*), its spread (*scale*) and involvement (*intensity*) in the socio-economic context (*context*) are the main parameters for gradation or evaluation of craft specialisation within the frame of textile manufacture (Andersson Strand 2011: 3). Although established on the Viking age textile production, her model may be concerned as suitable for the study of prehistoric developments (Grömer 2016: 246–61).

Specijalizacija i složenost društva

U kontekstu proizvodnje tekstila, majstorstvo je neraskidivo povezano s nekoliko aspekata društvenog identiteta koji se ne odnose samo na status, već i na rod, dob i srodstvo (Dolfini 2013). Ipak, pri proučavanju nestratificiranih društava potrebno je prihvatiti pretpostavku da specijalizacija zanata nije nužno bila vezana uz složenost društvene strukture. U prilog tomu govore argumenti autorica Catherine Perlès i Karen Vitelli, koje smatraju da razine specijalizacije i društvene složenosti ne moraju nužno biti proporcionalne (Perlès & Vitelli 2000). Nadalje, Kenneth Sassaman kritizirao je pristranost modela koji se temelje na inkorporiranju i koncentriranju moći unutar političkih ekonomija, zbog toga što ne uzimaju u obzir nestratificirana društva, te time negiraju njihov potencijal za razvijanje specijaliziranih uloga u proizvodnji. (Sassaman 1998). John Cross predložio je novu definiciju specijalizacije koju bi se moglo implementirati pri proučavanju proizvodnje malih razmjera kakva se veže uz egalitarne zajednice (Cross 1993). Formiranje specijalizirane proizvodnje i njezina provedba mogle bi se, dakle, shvatiti kao kontinuum između *nezavisnih* (samostalnih i neustrojenih koji zadovoljavaju ekonomske potrebe društva) i *zavisnih* (unaprijeđenih i privrženih koji zadovoljavaju potrebe elita ili centraliziranih institucija) *specijalista* (Brumfiel & Earle 1987:5), dok bi se proces njihovog razvoja "trebalo proma-

Specialization for the Social Complexity

In the context of textile production craftmenship is inseparably intertwined with several facets of social identity besides status, including gender, age and kin (Dolfini 2013). Whereas, the presumption that craft specialization is not necessarily related to the developed social complexity needs to be addressed for the study of non-stratified societies. Supporting this issue, Catherine Perlès and Karen Vitelli argued that levels of specialization and social complexity do not have to be necessarily proportional (Perlès & Vitelli 2000). Furthermore, Kenneth Sassaman criticized the bias towards models built on incorporation and concentration of power within political economies, with unranked societies being left unaddressed and excluded from having potential for specialized production roles (Sassaman 1998), while John Cross suggested a redefinition of specialization, so it could be implemented in the research of low-level production expected for the egalitarian communities (Cross 1993). Formation of specialized production and its enactment could thus be conceptualized as a continuum between *independent* (self-reliant, unregimented and providing for the economic demands of the society) and *attached* (promoted from, dependent of and providing for elites or centralized institutions) *specialists* (Brumfiel & Earle 1987:5), while the process of its development "should be viewed as additive, rather than the replacement of one mode

trati kao pridodavanje novih segmenata načinu proizvodnje, a ne kao kao zamjenu jednog načina drugim“ (Costin 2001: 274). Predložena dinamika vrlo se dobro uklapa u kontekst proizvodnje tekstila kroz pretpovijest, povijest, pa i moderno doba, osobito u ruralnim područjima i za vrijeme kada je proces proizvodnje na razini domaćinstva bio široko rasprostranjen i postojao usporedno s drugim oblicima koji su se razvijali s vremenom (Grömer 2016: 248).

Istraživanja obrade vlakana i proizvodnje tekstila u Mezopotamiji (McCorriston 1997) i Anatoliji (Sagona & Zimansky 2009) iznjedrila su dokaze o postojanju specijaliziranih zanata već u kasnom 4. i 3. tisućljeću prije Krista. Studije mezopotamske proizvodnje tekstila, koja se temelji na proizvodnji vune, bave se detaljima vezanim uz organizaciju i centralizaciju rane industrije kroz promatranje odnosa društvenih tokova, razvoja proizvodnje i procesa urbanizacije. (McCorriston 1997). Veliki broj očuvanih organskih dokaza iz naselja u močvarnim područjima oko Alpa doveo je do razvitka sličnih argumenata o istovremenoj organiziranoj i specijaliziranoj proizvodnji lana u zapadnoj i središnjoj Europi. U dobro očuvanim slojevima na lokalitetima Arbon-Bleiche 3 i Pfyn-Breitenloo otkrivene su važne informacije o pripremi i obradi lana,a koje sugeriraju da su pojedina sela bila fokusirana na uzgoj lana i obradu vlakana. (Schlichtherle 2009). Prostorna distribucija alatki za proizvodnju tekstila unutar naselja ukazuje na organiziranu i specijaliziranu proizvodnju (Maier 2001; Lauzinger & Rast-Eicher 2011: 539-540), dok arheološki i botanički nalazi ukazuju na podjelu rada i razvoj određenih društveno-ekonomskih razlika zbog kojih dobra i ekonomski faktori, uključujući lan, nisu u jednakoj mjeri bili dostupni svim stanovnicima (Schlichtherle et al. 2010). Za istovremenu proizvodnju tekstila u jugoistočnoj i središnjoj Europi dosad nisu doneseni isti zaključci. S obzirom na zatvorenost Panonske nizine, koja se proteže od Karpata i jugoistočnih Alpi na sjeveru i zapadu do sjevernih padina planina središnjeg Balkana na jugu i rijeke Dunav na istoku, ovo je područje izvjesno bilo vrlo otvoreno trgovačkim i prometnim putovima. Očekivano, istovremeno je moglo biti otvoreno i utjecajima vezanim uz proizvodnju tekstila koji su stizali preko Alpa i Karpata, kao i onima koji su stizali balkanskim i dunavskim putovima.

Čini se izglednim da srednje, a osobito kasnoeneolitička društva na prostoru velike Panonske nizine razvijaju nove izvore vlakana i načine proizvodnje

by another” (Costin 2001: 274). Proposed dynamics resonates very well within the context of textile production, mainly while its household level persists wide spread, from prehistoric times through the entire history, into the modern era, especially in rural areas, in addition to other forms that developed through time (Grömer 2016: 248).

Research on fibre processing and textile production in Mesopotamia (McCorriston 1997) and Anatolia (Sagona & Zimansky 2009) revealed evidence for craft specialization already in the late 4th and 3rd millennium BC. In particular, the study of Mesopotamian wool based textile production addressed the details of organization and centralization of the early industry, through its relation to the processes of urbanization and social flux (McCorriston 1997). Due to the abundance of preserved organic evidence from the wetland settlements of the circum alpine region, arguments for organized and specialized flax production were made for the contemporary western central Europe. Well preserved layers at Arbon-Bleiche 3 and Pfyn-Breitenloo revealed valuable information on its preparation and handling, suggesting that certain villages were focused on flax growing and fibre processing (Schlichtherle 2009). The spatial distribution of the textile tools within settlements proposes organized and specialized textile work (Maier 2001, Lauzinger & Rast-Eicher 2011: 539–540), while archaeological and botanical evidence pointed to the division of labor and the development of certain socioeconomic differences, where goods and economic factors, including flax, were not available in the same extent to all inhabitants (Schlichtherle et al. 2010). So far, no similar conclusions were made about the contemporary textile productions across the South East and Central Europe. With its enclosed Pannonian Plain, stretching from the foothills of the Carpathian Mountains and the South East Alps in the North and West, to the northern slopes of the Central Balkan Mountains in the South and the Danube River in the East, this area was presumably highly exposed to trade and traffic routes. Expectantly, it could have been simultaneously opened to the production influences that were crossing the Alps and Carpathians, as to those arriving through the Balkan and Danube routes.

It is not unlikely that during the period of the striving wool economies in the Near Eastern and East Mediterranean centres and the developing fibre flax productions in the western Central Europe, Middle and especially Late Eneolithic societies oc-

dok bliskoistočna i istočnomediteranska društva uzgajaju vunu, a upotreba lana raste u zapadnoj i središnjoj Europi. Najveći broj arheoloških dokaza o eneolitičkoj privredi potječe s prostora današnje Mađarske, dok zoološke, a osobito arheobotaničke, studije nisu toliko sustavno provođene u Hrvatskoj i Srbiji (Reed 2016). Osim toga, zbog manjka očuvanih nalaza tekstila, alatke korištene u proizvodnji ostaju jedini izvor informacija za istraživanje prijelaza na organiziranu proizvodnju koja se posljedično usmjeravala na kultivirane izvore vlakana.

Porast proizvodnje mogao je biti izazvan različitim faktorima. Primjerice, na taj su proces mogli utjecati tehnološki napredak, dostupnost sirovina, potražnja ili razmjena. Sukladno tomu, proizvodnja unutar domaćinstva zamijenjena je proizvodnim sustavom koji stvara viškove.

Specijalizaciju se u arheologiji često indirektno definira kroz proučavanje stupnja standardizacije u tehnologiji (Blackman et al. 1993; Costin & Hagstrum 1995; Eerkens & Bettinger 2001; Roux 2003). Uobičajen pristup za proučavanje standardizirane proizvodnje uključuje uočavanje uniformnosti sirovina i procjenu varijabilnosti metričkih atributa proučavanih predmeta.

cupying the vast Pannonian Plain were adapting new fibre resources and developing new modes of manufacture as well. The biggest portion of the archaeological evidence for Eneolithic husbandry comes from the region of modern day Hungary, while zooarchaeological and especially archaeobotanical studies have been not as systematically conducted in Croatia and Serbia (Reed 2016). Additionally, limited by the absence of preserved textile finds, textile tools remain the main source of information for investigating the transition to organized productions that consequently intensified the focus on cultivated fibre material resources.

The intensification of production might have been caused by different factors. For an example technological advance, resource availability, product demands or trade might have all fuelled the process. Consequently, the domestic mode of production gives way to a production system that produces surpluses.

In archaeology, the specialisation is often diagnosed indirectly by studying the degree of standardisation in technology (Blackman et al. 1993; Costin & Hagstrum 1995; Eerkens & Bettinger 2001; Roux 2003). The most common approach is to study standardisation by looking for the uniformity of raw materials or the variation in metric attributes of the studied objects.

Analiza alatki

Lociranje organizirane proizvodnje

Karakter i sastav eneolitičkih društava u različitim je regijama vjerojatno varirao ovisno o lokalnim geografskim značajkama, dostupnosti resursa te društvenim i ekonomskim sklonostima populacija. Prijelaz iz razdoblja kasnog neolitika objašnjava se zamjenom velikih telova manjim i kratkotrajnijim naseljima te promjenom strategije preživljavanja u smislu prijelaza sa zemljoradnje na intenzivnije stočarstvo (Parkinson 2006: 186; Gyulai 2010). Ipak, do kraja novog razdoblja, obrasci naseljavanja iznova su se promijenili. U Mađarskoj, badenska je kultura razvila gustu mrežu visinskih i nizinskih, kao i velikih i malih naselja i špilja (Horváth & Virág 2003:127). Iznova su formirani telovi koji su vjerojatno funkcionirali kao društvena i ekonomska središta kojima su gravitirala manja satelitska naselja koja su bila raspršena oko rijeka i potoka (Durman 1995; Tasić 2003-2004). Moguće je da ove promjene ocrtavaju pojačanu razmjenu koja se

Tool Analysis

Locating Organized Production

Character and constitution of Eneolithic societies most likely varied regionally, depending on local geography, accessibility of resources and socioeconomic inclinations. The transition from the late Neolithic period has been explained through the replacement of large tell sites with smaller shorter-term settlements and a transformation of subsistence strategies from crop agriculture to more intensified animal husbandry (Parkinson 2006: 186; Gyulai 2010). However, by the end of the period, settlement patterns are once again altering. In Hungary, the Baden culture developed a dense network of both upland and lowland large and small settlements and caves (Horváth & Virág 2003:127). Once again, the large tell sites were being established that most likely acted as the socioeconomic centres for the smaller satellite settlements dispersed around rivers and streams (Durman 1995; Tasić 2003–2004). These changes possibly reflect the in-

dodatno objašnjava razvojem metalurških središta (Šljivar 2006; Jovanović 2009). U kontekstu pojačane trgovine i razvoja metalurgije intenzivirana proizvodnja čini se logičnom.

Istraživanje eneolitičke proizvodnje tekstila, s naglaskom na tehnologiju predenja, a koja je temelj ovog rada, oslanja se na opsežnu tehničku analizu tekstilnih alatki. Glavni cilj bio je proučiti ranu pojavu organizirane proizvodnje, s namjerom da se istraže sve mogućnosti pojave rane specijalizacije zanata među eneolitičkim zajednicama u Panonskoj nizini.

Temi je pristupljeno na dvije razine: prvo, kroz prostornu analizu distribucije alatki koje bi mogle upućivati na radioničke aktivnosti i napuštanje sfere proizvodnje u domaćinstvu te, drugo, kroz proučavanje standardizacije i funkcionalnosti radne opreme koje bi sugerirale upotrebu zajedničke sirovine ili ujednačenost tehnika i krajnjih proizvoda.

Proučavano razdoblje, počevši od srednjeg eneolitika (najranije alatke su pršljenovi lasinjske kulture), a završivši s ranim brončanim dobom (najmlađe alatke su pršljenovi kulture Somogyvár-Vinkovci), datirano je otprilike u vrijeme između sredine

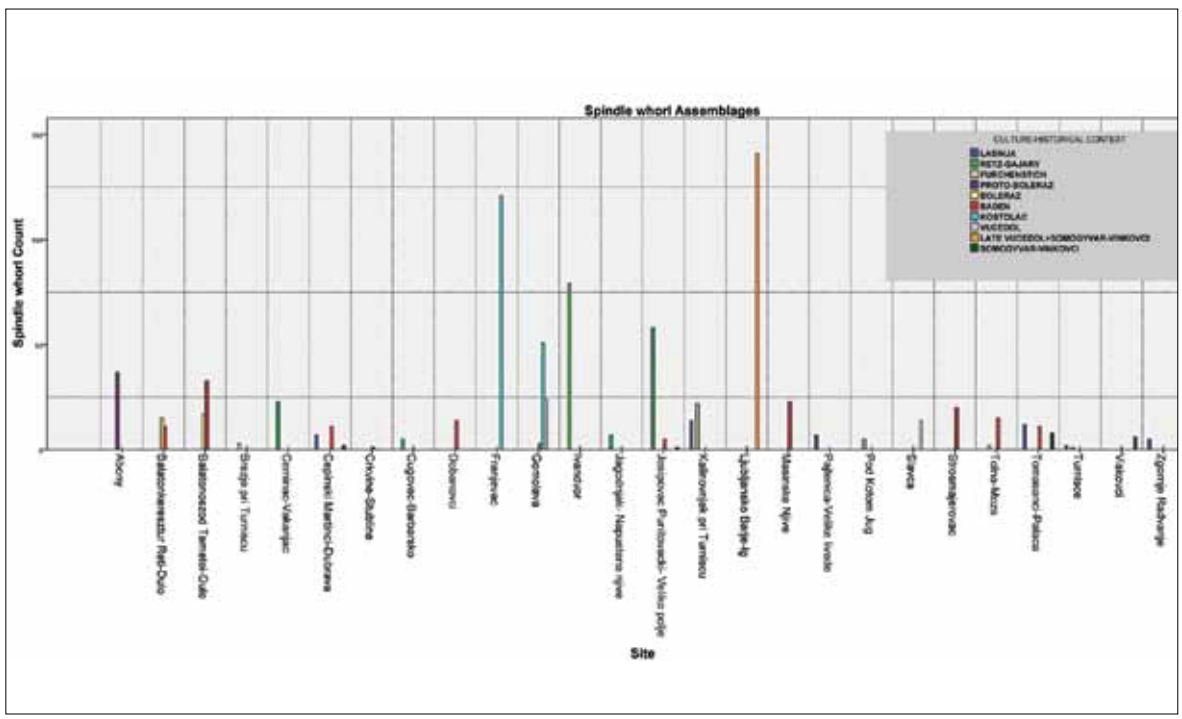
tensified exchange, further explained through the development of metallurgical centres (Šljivar 2006; Jovanović 2009). In the context of intensified trade and developing metallurgy, higher levels of production would be conceivable.

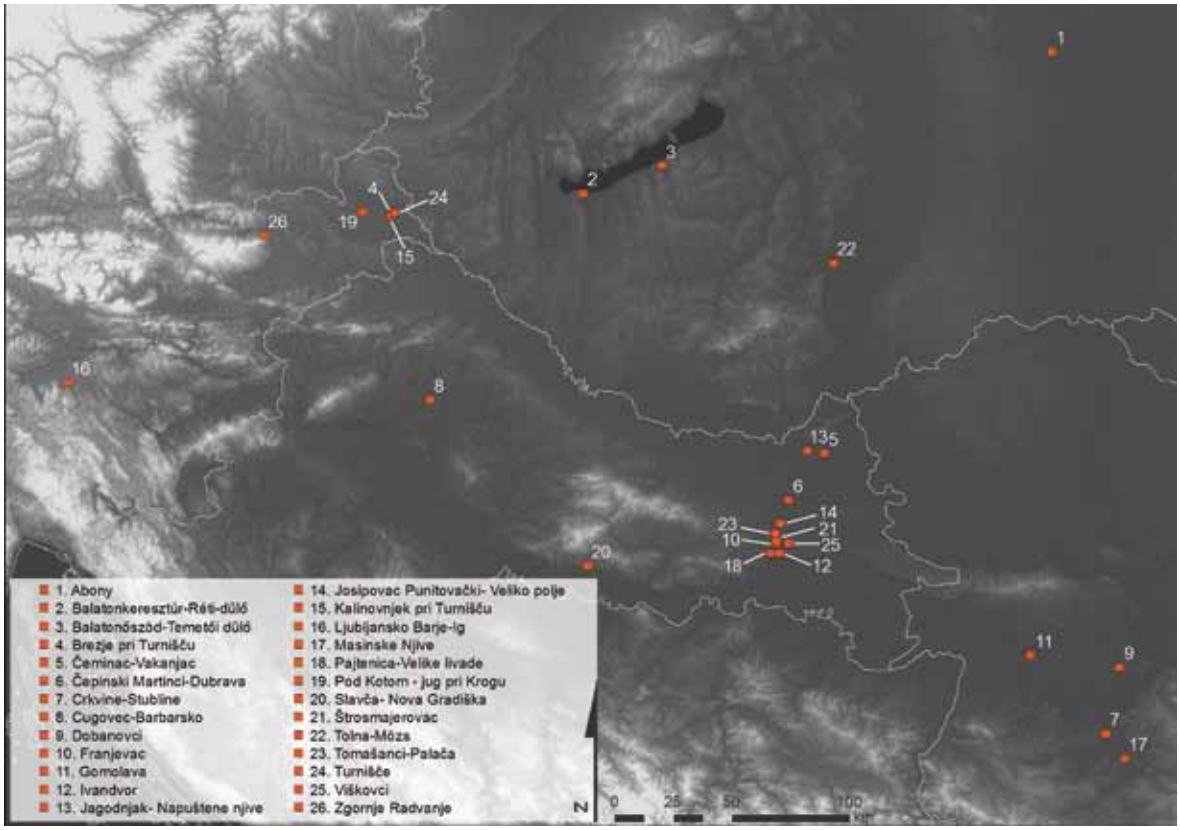
The research of the Eneolithic textile production with the emphasis on the spinning technology which represents the basis of this study, was performed through extensive technical analysis of textile tools. The main objective was to explore the early manifestation of organized production, with the aim to investigate any possibility for initial craft specialization among the Eneolithic communities of the Pannonian Plain region.

This subject was addressed on two levels: first, through the spatial distribution of tools that might indicate workshop activities and leaving of the domestic sphere of production, and second, through the inspection of standardization and functionality of the work equipment, that would propose communal fibre resources or uniformity of techniques and end products.

Studied period, beginning with the Middle Eneolithic (the earliest tools belonging to the Lasinja spindle whorl set) and ending with the Early Bronze

Slika / Figure 1. Skupovi nalaza pršljenova po lokalitetima s obzirom na kulturno-povijesnu atribuciju (N=836) / Spindle whorl assemblages with respect to their site distribution and culture-historical attribution (N=836).





Slika / Figure 2. Zemljopisni položaj lokaliteta s kojih potječu uzorci pršljenova / Geographical distribution of the sites represented in the spindle whorl sample.

5. i kraja 3. tisućljeća prije Krista.[1] Sve proučavane kulturno-povijesne skupine, izuzev protoboleráz grupe, u zadanom su uzorku zastupljene na dva ili više nalazišta (Sl. 1).

U skupini od 26 uzorkovanih lokaliteta (Sl. 2) s kojih potječe 836 pršljenova, na dva je ustanovljena značajna koncentracija alatki.[2] Oba nalazišta, Ivandvor i Franjevac kod Đakova, iskopavana su u zaštitnim istraživanjima na autocesti A5 koja je

Age (the latest tools belonging to the Somogyvár-Vinkovci spindle whorl set), falls roughly between the middle of the 5th and the end of the 3rd millennium BC[1]. All investigated culture-historical groups in the sample were represented on two or more sites, except for the Proto-Boleráz group (Fig. 1).

In the cluster of 26 sampled sites (Fig. 2) that yielded 836 spindle whorls, two settlements displayed a significant level of concentration of tools[2]. Both

1 Tijekom trogodišnjeg doktorskog istraživanja analizirano je 1152 pršljena koji su uneseni u bazu podataka alatki za proizvodnju tekstila. Studija je u početku obuhvaćala alatke s 34 arheološka lokaliteta, ali je konačna analiza provedena na ograničenom uzorku od 836 pršljenova: standard za uzorkovanje lokaliteta postavljen je na minimalno tri zabilježena pršljena s potpunim metričkim i kronološkim podacima. Skup nalaza pršljenova iz kasnog neolitika isključen je iz analize, prvenstveno zbog toga što baza podataka nije sadržavala pršljenove datirane u rani eneolitik, zbog čega nije bilo moguće temeljito istražiti kontinuitet ili promjene u organizaciji proizvodnje za ovu prijelaznu fazu.

2 Nije o svim pršljenovima postojala jednaka količina podataka stoga je za potrebe funkcionalne analize određen minimalni kriterij: pouzdano kronološko određenje, tipološko određenje i spomenuti standard izmjera. Nedostatak podataka o kontekstu pršljenova pronađenih na lokalitetu Ljubljansko Barje-Ig, a koji sačinjavaju veliki dio uzorka pripisanog ranom brončanom dobu, ne dopušta nikakvu podrobnu analizu prostorne distribucije, zbog čega je nemoguće donositi ikakve zaključke o dinamici i organizaciji zanata na prijelazu iz kasnog eneolitika u rano brončano doba, što je ograničilo analizu na razvojne procese tijekom srednjeg i kasno eneolitičkog perioda.

1 During a three-year doctoral research 1152 spindle whorls were recorded in the textile tools database. Initially, the study included tools from 34 archaeological sites, but consequently the final analysis was conducted on a restrained sample of 836 spindle whorls: the site sample standard was set at minimum three recorded spindle-whorls with the complete metric data and chronological placement. The Late Neolithic spindle whorl set was left out of the outlined analysis, mainly because Early Eneolithic spindle whorls were not at all recorded in the database. Thusly no continuity or change in manufacturing organization could be thoroughly investigated for the production of this transitional phase.

2 Not all spindle whorls provided equal amount of information and for the purpose of the functionality analysis a minimum criterion was applied: reliable chronological assignment, typological determination and the mentioned measurement standard. The lack of contextual data for the spindle whorls found at Ljubljansko Barje – Ig site, which account for the big portion of the Early Bronze Age sample unable any thorough spatial distribution examination. This left the conclusions regarding the dynamics of the craft organization during the Late Eneolithic to Early Bronze Age transitional period impossible, limiting the focus of the analysis on the developments that occurred in the Middle and Late Eneolithic.

dio europskog koridora C5, odnosno na trasi Osijek-Đakovo. Ostaci naselja is srednjeg eneolitika koje se, prema još neobjavljenim analizama podataka, može pripisati kulturno-povijesnoj grupi Retz-Gajary, zabilježeni su na lokalitetu Ivandvor (Leleković 2007), dok je kasnoeneolitičko naselje pripisano kostolačkoj kulturi definirano na lokalitetu Đakovo-Franjevac (Balen 2011). Područje na kojem su lokaliteti dio je đakovačko-vinkovačkog ravnjaka, odnosno povišenog terena koji se pruža jugoistočno od Satnice Đakovačke. Eneolitička naselja ovog tipa osnivana su uz vodene tokove na prirodno povišenim mjestima. Oba su lokaliteta jednoslojna s horizontalnom stratigrafijom, a na njima, djelomično zbog intenzivne zemljoradnje, nije bilo očuvanih kulturnih slojeva (Leleković 2007; Balen 2011).

Pršljenovi uključeni u niže predstavljenu analizu dokumentirani su bilježenjem četiriju glavnih metričkih vrijednosti pršljena (promjer pršljena, promjer rupe za nasad vretena, visina pršljena i težina pršljena), te računanjem omjera težine i promjera pršljena i visine i promjera pršljena.[3]

Lociranje prelja i predioca retzgajarske kulture

Naseljem retzgajarske kulture na Ivandvoru dominirala je velika višećelijska ukopana struktura, veličine otprilike 280 kvadratnih m (SJ 11861/11862) (Sl. 3), dok su na ostatku površine zabilježene manje strukture različitih oblika i veličina koje su bile raspršene na prostoru od 2 hektara. Ostaci nadzemnih konstrukcija ili nisu pronađeni, ili nisu prepoznati (Leleković 2007: 12-13).

Od 79 pršljenova pronađenih na lokalitetu koji su pripisani retzgajarskoj kulturi, njih 62 pronađena su u „glavnoj" jami, u kojoj je pronađena i velika količina grube keramike, lomljenog kamena i životinjskih kostiju čije analize nisu završene i objav-

3 Analizirani uzorak alatki uključuje 328 potpuno očuvanih pršljenova, 163 polovično očuvana pršljena, 223 djelomično očuvana pršljena te 122 manjih ulomaka pršljenova (manje od 10% sačuvano). Vrijednosti težine pršljenova iz uzorka bilježene su u četiri različite kategorije vjerojatnosti, ovisno o stanju očuvanosti predmeta. Težina cjelovitih predmeta dokumentirana je u kategoriji cjelovita težina, težina gotovo cjelovitih predmeta kojima nedostaje tek manji dio u kategoriji procijenjena težina, težina polovično očuvanih predmeta dokumentirana je u kategoriji izračunata težina (izračunata težina = udvostručena izmjerena težina) i, naposljetku, težina djelomično očuvanih predmeta zabilježena je u kategoriji rekonstruirana težina (rekonstruirana težina = gustoća x volumen). Varijable volumena i gustoće dobivene su iz virtualnih (trodimenzionalnih) modela koji su napravljeni na temelju djelomično očuvanih pršljenova.

sites, Ivandvor and Franjevac near Đakovo, were excavated as a part of salvage archaeological investigations on the A5 highway route of the European C5 Corridor, more precisely on its Osijek-Đakovo section. The remains of a Middle Eneolithic settlement, which, according to the still unpublished data analysis, is attributed to the Retz-Gajary culture-historical group, were recorded on Ivandvor (Leleković 2007), while the Late Eneolithic settlement associated with the Kostolac culture-historical group was ascertained on Đakovo – Franjevac (Balen 2011). The area of the two localities belongs to the Đakovo-Vinkovci Plateau, namely the elevation extending southeast of Satnica Đakovačka. Eneolithic settlements of this type were founded near watercourses and on natural elevations. Both sites consist of a single layer with horizontal stratigraphy and had no cultural layer preserved, partly due to the intensive agricultural activity (Leleković 2007; Balen 2011).

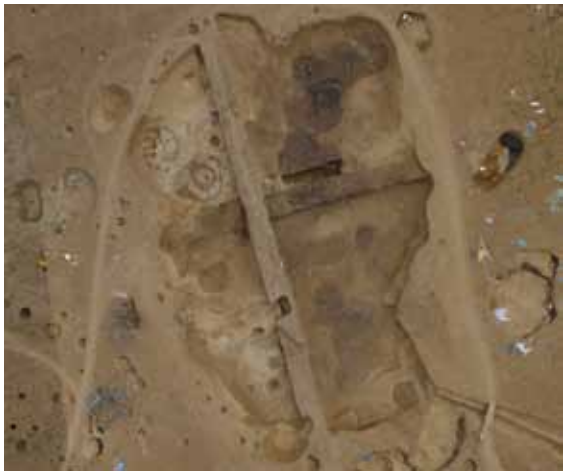
Spindle whorls used for the following analysis were recorded by taking four main measurements (whorl's diameter, its perforation diameter, height and weight) and calculating their weight/diameter and height/diameter ratios[3].

Housing Retz-Gajary Spinners

The Retz-Gajary settlement at Ivandvor was dominated by a large, multicellular, approximately 280 square meter big pit structure (SJ 11861/11862) (Fig. 3), while the rest of the smaller features of different shapes and sizes were sporadically scattered over an area of 2 hectares. The remains of the surface architecture were either not found, or were not recognized (Leleković 2007: 12–13).

Out of 79 spindle whorls excavated at the settlement and attributed to the Retz-Gajary culture, 62 were recovered from the 'main' pit structure that also yielded a large amount of coarse pottery, lithic material and animal bones that are still under anal-

3 Analysed tool sample includes 328 whorls which were completely preserved, 163 whorls preserved in half, 223 partially preserved whorls and 122 whorls that had small fragments (less than ten percent) missing. Weight values of the spindle whorls in the sample were documented in four different reliability categories, depending on their preservation status. Weights of complete samples was documented in the *complete weight* category, weights of almost complete samples with small fragments missing was documented in the *estimated weight* category (estimated weight ≈ weight if not complete), weights of samples preserved in half were documented in the *calculated weight* category (calculated weight= weight if not complete doubled) and finally weights of partially preserved samples were documented in the *reconstructed weight* category (reconstructed weight = density x volume). Volume and density variables were provided from virtual (three-dimensional) models created for the partially preserved spindle whorls.



Slika / Figure 3. Zračna fotografija velike strukture retzgajarske kulture (SJ 11861/11862) s lokaliteta Ivandvor / Aerial photo of the large Retz-Gajary structure (SJ 11861/11862) at Ivandvor (foto / photo: T. Leleković).

Slika / Figure 4. Pločasti pečat retzgajarske kulture s lokaliteta Ivandvor / Retz-Gajary tile stamp recovered at Ivandvor (foto / photo: T. Leleković).

ljene. Među važnijim nalazima iz tog konteksta svakako je bodež izrađen od tankog brončanog lima (dužine 12 cm) i plosnati keramički pečat, ili pintadera, koja je na obje strane ukrašena različitim simbolima (Sl. 4).

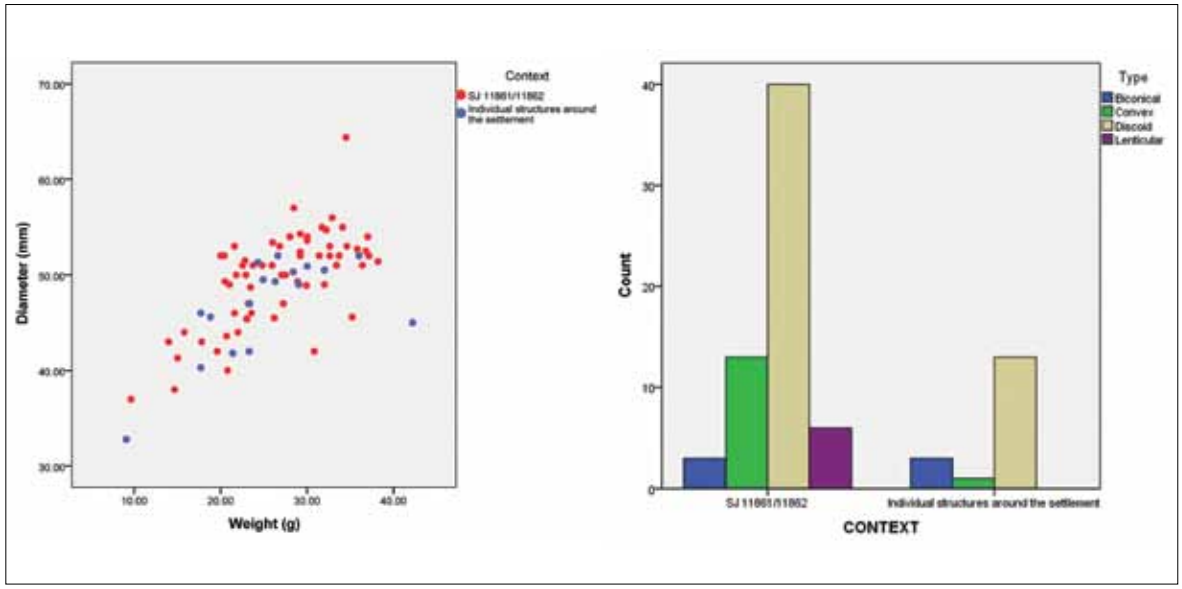
Preostalih 17 pršljenova s lokaliteta nalazilo se u 12 različitih struktura i s obzirom na njihov *in situ* kontekst, ne može ih se povezati s velikom grupom nalaza iz „glavne" strukture. Analiza alatki nije pokazala značajne razlike između glavne skupine pršljenova i onih koji su pronađeni u pojedinim strukturama drugdje u naselju.

Osnovne morfološke značajke koje ocrtavaju funkcionalna svojstva pršljena ne ukazuju na razlike u korištenim izvorima vlakana, niti debljinu dobivene niti, što sugerira da su se slični krajnji proizvodi mogli proizvoditi na različitim lokacijama unutar naselja. Distribucija vrijednosti težine i promjera alatki ne varira u odnosu na prostorni kontekst, zbog čega je tehnološki standard moguće sagledati samo na razini lokaliteta, a ne u odnosu na određenu lokaciju ili proizvodni prostor unutar naselja (Sl. 5). Štoviše, neznatna devijacija promatranih parametara (Sl. 6) sugerira naizgled specijaliziranu tehnologiju koja može ocrtavati korištenje prilično uskog spektra izvora vlakana. Prilično lagani pršljenovi, težine između 20 i 30 grama, prevladavaju u uzorku s Ivandvora (56%), iako ima i nešto lakših (10-20 g) te nešto težih (30-40 g) primjeraka. Skupina srednjeg promjera (40-50 mm i 50-60 mm) sačinjava većinu, odnosno 94% uzorka. Skupina male visine uvjerljivo je najbrojnija na lokalitetu, što je dodatno naglašeno zbog ograničene tipološ-

ysis and remain unpublished. Some of the more important findings allocated in the context include a dagger made of a thin bronze sheet (length 12 cm) and a ceramic tile stamp, or *pintadera*, decorated with different symbols on each side (Fig. 4).

The remaining 17 spindle whorls found at the site were distributed among 12 different structures and cannot be brought to connection with the large assemblage from the 'main' structure, at least as far as their *in situ* context is concerned. The tool analysis did not show a significant difference between the main spindle whorl set and the collection of spindle whorls discovered in individual structures around the settlement.

The main morphological traits, indicative of the spindle whorls' functional properties, do not propose distinction in either the fibre material that was used, nor in the thickness quality of the spun thread, thus suggesting similar end products may have been produced everywhere around the site. Distribution of the tools' weight and diameter values does not appear to vary depending on the spatial context, making the technological standard observable mainly on the site level, rather than conditioned by the specific location, or area of manufacture (Fig. 5). Nonetheless, low deviation of all the investigated parameters (Fig. 6) suggests a seemingly specialised technology that may be reflective of a rather narrow focus in terms of fibre resources. Relatively light whorls, ranging from 20 to 30 grams dominate in the Ivandvor sample (56 %), although slightly lighter (10-20 g) and slightly heavier (30-40 g) whorls are fairly represented as well. Middle di-



Slika / Figure 5. Omjer težine i promjera (lijevo) i distribucija tipova (desno) pršljenova iz pojedinačnih jamskih struktura s lokaliteta Ivandvor / Spindle whorls' weight-diameter (left) and type distributions (right) given for separate pit structures at Ivandvor.

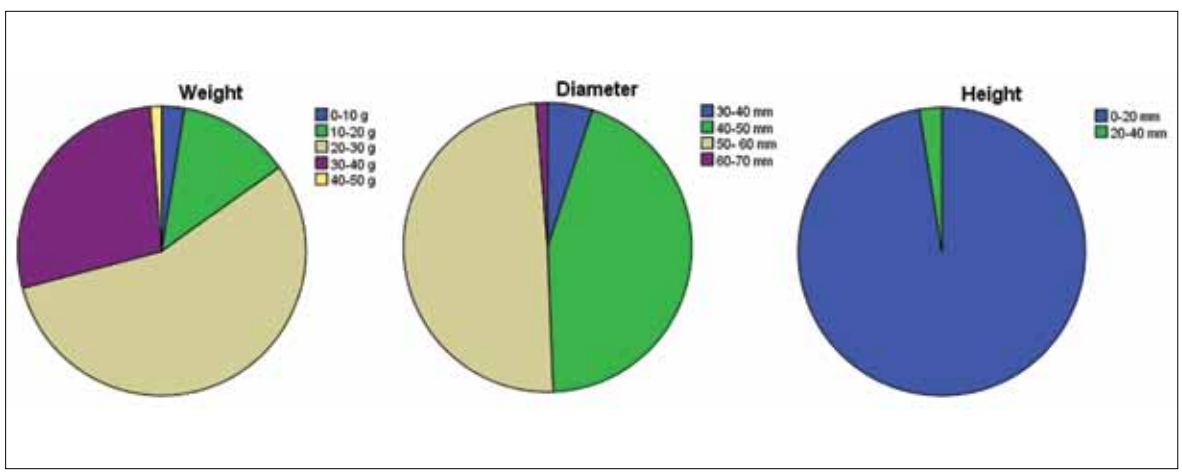
ke varijabilnosti u skupini pršljenova, a koja sadrži visoku frekvenciju diskoidnih primjeraka.

Jedine primjetne razlike između glavne skupine pršljenova i onih iz ostatka naselja vidljive su u distribuciji tipova (Sl. 5). Skupina nalaza iz velike ukopane strukture naizgled je tipološki raznolikija. Funkcionalno je nemoguće razlikovati lećaste i diskoidne pršljenove koji sačinjavaju većinu u obje skupine nalaza, ali zanimljivo je primijetiti da „glavni" skup nalaza iz najveće strukture sadrži prilično velik postotak pršljena lećastog tipa (7,6%) koji nije zabilježen drugdje na lokalitetu.

ameter classes (40-50 mm and 50-60 mm) represent the majority, making up for the 94 percent of the sample. Low height class is convincingly the main type represented at the site, which resonates further in the restricted typological variability within the spindle whorl set that revealed a very high frequency of discoid spindle whorls.

The only noticeable difference between the main spindle whorl set and the collection from the rest of the settlement can be observed in the distribution of the spindle whorl types (Fig. 5). The large assemblage recovered from the big pit structure appears typologically more diverse. Functionally

Slika / Figure 6. Frekvencija određene kategorije težine, promjera i visine pršljenova s lokaliteta Ivandvor / Frequency of the particular weight, diameter and height classes of spindle whorls at Ivandvor.



Slika / Figure 7. Velika jamska struktura retzgajarske kulture (SJ 194) s lokaliteta Josipovac Punitovački-Veliko polje I / Large Retz-Gajary pit structure (SJ 194) from Josipovac Punitovački – Veliko polje I site (prema / after: Čataj 2009: 34, Fig. 11.).

Sudeći prema velikoj količini lomljenog kamenog materijala, kako alatki tako i krhotina, s posebno velikim udjelom jezgri (›70 komada), lomljenih kamenih predmeta koji se ne mogu definirati kao alatke (Shott 1993), već kao mugući oblik pripremljene sirovine, „glavnu" ukopanu strukturu može se interpretirati kao zajednički radni prostor za obradu sirovina, a ne kao specijaliziranu radionicu za tekstil. Centralna pozicija te jame u naselju također se uklapa u ovaj scenarij, ako pretpostavimo da su najbitniji resursi mogli biti korišteni na razini zajednice. Centralizirana pozicija te jame u naselju također se uklapa u ovaj scenarij, ako pretpostavimo da su resursi korišteni na razini zajednice.

Iz spomenute velike ukopane strukture potječe 79% svih nalaza s lokaliteta (79 pršljenova) i 36% cijelog uzorka retzgajarske kulture (172 pršljena) zabilježenog u bazi podataka. Dakle, bez obzira na veličinu ovog, pretpostavljeno radnog prostora, koncentracija pršljenova ukazuje na prilično intenzivno i organizirano predenje. Ta činjenica postaje jasnija ako se primijeni model u kojem svaki pojedinac prede uz pomoć jedne alatke po pojedinom zadatku, što bi moglo sugerirati da je veća skupina prelja/predioca mogla koristiti prostor radionice.

Osim na Ivandvoru, uzorci pršljenova retzgajarske kulture zabilježeni su na lokalitetima Josipovac Punitovački-Veliko polje I (Čataj 2009), Cugovec-

the lenticular type cannot be separated from the discoid spindle whorls, which make the majority in both sets, but it is an interesting observation that the 'main' assemblage from the largest structure holds a relatively high percentage of the particular spindle whorl type (7.6 %) that hasn't been attested anywhere else on the site.

Judging by the vast amount of lithic material, tools and debitage, with particularly high frequency of cores (› 70 pieces), a non-tool category (Shott 1993) of chipped stone artefacts that might have only been used as sources of raw material, a joint work area for raw material processing, rather than a specialized textile workshop, presents a plausible interpretation for the 'main' pit structure. Its central position within the settlement also agrees with this scenario, if we consider the possibility that the most important resources were managed on a communal level.

The assemblage found in this large sunken structure at the site accounts for 79 percent of the entire settlement set (79 spindle whorls) and 36 percent of the entire Retz-Gajary sample (172 spindle whorls) recorded in the database. Thus, despite the size of this, presumably work-related space, the concentration of spindle whorls suggests a rather intensified and organized spinning activity. This becomes even more obvious if a tool per spinner scenario is applied, suggesting that a larger group of spinners may have been using the workshop area.

Slika / Figure 8. Replike retzgajarskih pečata pronađenih na lokalitetu Josipovac Punitovački-Veliko polje I i otisci kakve ostavljaju na lanenom platnu / Replicas of Retz-Gajary stamp seals found at Josipovac Punitovački-Veliko polje I and their impressions on a linen cloth (prema / after: Čataj 2009: 255, Fig. 6.).

Barbarsko (Balen & Drnić 2014), Jagodnjak-Napuštene njive i Čeminac-Vakanjac u istočnoj Hrvatskoj. Osim na Ivandvoru, samo je još na lokalitetu Josipovac Punitovački-Veliko polje I, također iskopavanom u zaštitnim istraživanjima na autocesti A5 na europskom koridoru C5, ustanovljena velika koncentracija pršljenova koja može sugerirati intenzivno korištenje prostora za predenje. I u ovom je slučaju najveći broj alatki pronađen u najvećoj ukopanoj strukturi na lokalitetu (19,5x12 m). Od 58 pronađenih pršljenova, ukupno njih 31 (53%) pronađen je u velikoj višećelijskoj ukopanoj strukturi (SJ 194) smještenoj na sasvim istočnom dijelu naselja (Sl. 7).[4] Osim velikog broja pršljenova, u ovom je kontekstu pronađeno i mnoštvo keramike (fine i grube fakture), životinjskih kostiju, lomljene litike i ulomaka lijepa. Samu strukturu autorica je interpretirala kao radni prostor (Čataj 2009: 34-35).

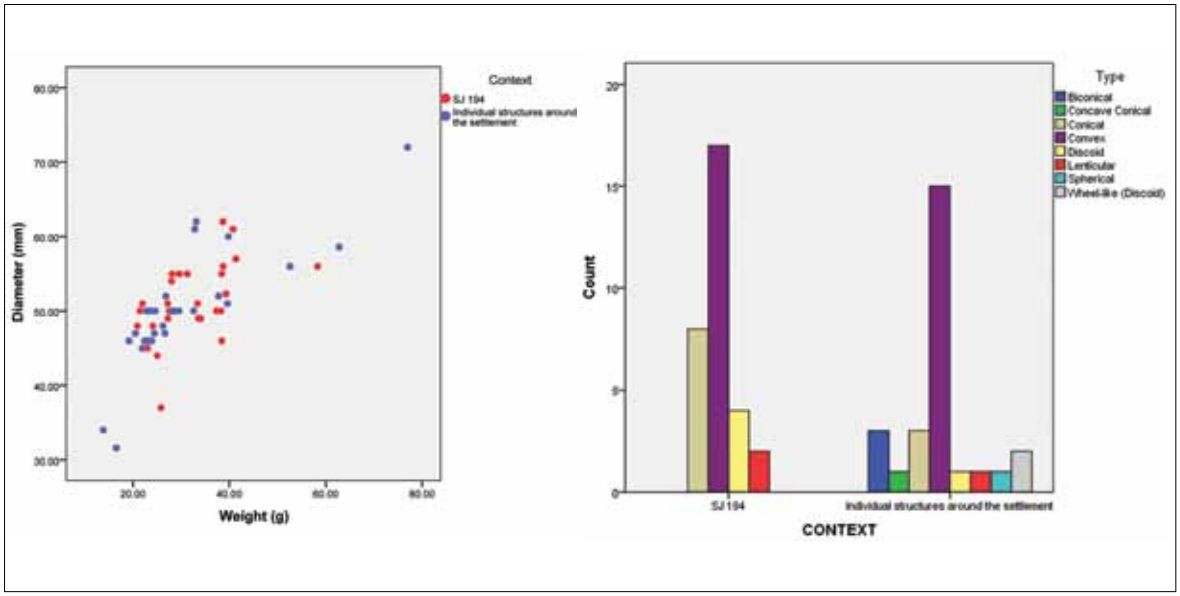
Već je i Lea Čataj (2009: 34) primijetila visoku frekvenciju pršljenova uz južni rub strukture, u blizini vatrišta, te interpretirala njihov *in situ* položaj kao oznaku dijela prostora u kojem se odvijala proizvodnja tekstila. Skupinu od 13 rupa od stupova i kolaca, koja je otkrivena u istom dijelu jame kao i pršljenovi, autorica smatra mogućim dokazima za postojanje strukture za tkanje (Čataj 2009: 34). Ako razmotrimo nekoliko mogućih načina tkanja (Barber 1991: 79-91), uključujući horizontalne varijante poput pojasnih i podnih tkalačkih stanova

4 SJ 194 je radiokarbonski datirana u vrijeme između 3790. i 3650. pr. Kr. (Čataj 2009: 50).

Besides at Ivandvor, spindle whorl samples attributed to the Retz-Gajary culture-historical group were recorded Josipovac Punitovački-Veliko polje I (Čataj 2009), Cugovec-Barbarsko (Balen and Drnić 2014), Jagodnjak-Napuštene njive and Čeminac-Vakanjac sites in eastern Croatia. Apart from Ivandvor, only at Josipovac Punitovački-Veliko polje I site, which was also excavated as a part of salvage archaeological investigations on the A5 highway route of the European C5 Corridor, a high concentration of spindle whorls that may propose an intensified use of space for spinning was attested. Here, again, the largest pit structure (19.5 x 12 meters) at the settlement yielded the highest number of tools. Out of 58 recovered spindle whorls, all together 31 (53 %) were found in a large multicellular sunken structure (SJ 194) located in the very eastern part of the settlement (Fig. 7)[4]. Besides the numerous spindle whorls, the context yielded a vast amount of ceramic finds (both fine and coarse ware), animal bones, lithic material and daub fragments. The structure itself was interpreted by the author as a working area space (Čataj 2009: 34–35).

Already Lea Čataj (2009: 34) notices a high concentration of spindle whorls located in the southern edge of the structure, close to the fireplace, and defines their *in situ* context as a textile production area within the working space. She refers to the group of 13 dowel and peg holes, discovered in the area

4 SJ 194 was C14 dated to the period between 3790 and 3650 BC (Čataj 2009: 50).



Slika / Figure 9. Omjer težine i promjera (lijevo) i distribucija tipova (desno) pršljenova iz pojedinačnih jamskih struktura s lokaliteta Josipovac Punitovački-Veliko polje I / Spindle whorls' weight-diameter (left) and type distributions (right) given for separate pit structures at Josipovac Punitovački-Veliko polje I.

pričvršćenih za tlo, ova situacija mogla bi predstavljati prihvatljivo objašnjenje za izostanak utega u dokumentiranim retzgajarskim kontekstima. Zanimljivo je spomenuti i dodatnih pet pršljenova iz male jamske strukture (3,5x3,5 m) sa sjevernog dijela iskopne površine (SJ 132), kao i dva pečata ili pintadere (Sl. 8).[5] Autorica je i taj prostor interpretirala kao radni, sugerirajući da je bio korišten za aktivnosti vezane uz proizvodnju tekstila (Čataj 2009: 33).

Slično distribuciji na Ivandvoru, analiza alatki ni u ovom slučaju nije otkrila razlike između „glavnog" skupa nalaza i pršljenova pronađenih u drugim strukturama u naselju. Glavne morfološke značajke koje ukazuju na funkcionalna svojstva alatki ne ukazuju na razlike u korištenim vlaknima ili kvaliteti debljine dobivene niti. S tim na umu, moguće je zamisliti da su konzistentni završni proizvodi bili proizvođeni unutar naselja. Distribucija težine i promjera pršljenova, kao i na Ivandvoru, ne varira s prostornim kontekstom. Iako pojedine lokacije pokazuju malo ili nimalo posebnosti s obzirom na promatrane parametre funkcionalnosti, veća koncentracija alatki iz glavnog proizvodnog prostora (SJ 194) pokazala je manju tipološku varijabilnost u usporedni s ostatkom pršljenova iz naselja (Sl.

5 SJ 132 je radiokarbonski datirana u vrijeme između 3950. i 3710. pr. Kr. (Čataj 2009: 50).

where spindle whorls were found, as a possible evidence of a weaving structure (Čataj 2009: 34). If we consider several weaving possibilities (Barber 1991: 79–91), including the use of horizontal variants, like the backstrap and the ground loom constructions, this could present a plausible explanation for the lack of loom weights in the documented Retz-Gajary context(s). Interestingly, another 5 spindle whorls were recorded in the smaller pit structure (3.5 x 3.5 meters) in the northern part of the investigated area (SJ 132), together with two stamp seals or *pintaderae* (Fig. 8)[5]. The author interpreted this feature as a work space as well, proposing it was used for textile related activities (Čataj 2009: 33).

Similar to the distribution at Ivandvor, the tool analysis did not show any difference between the 'main' assemblage and the set of spindle whorls found in different structures around the settlement. Again, the main morphological traits, indicative of tools' functional properties, do not suggest differences in fibre material use, or thickness quality of the spun thread. Having this in mind, it is conceivable that consistent end products were produced within the settlement. Distribution of the spindle whorls' weight and diameter values, again, like at Ivandvor, does not appear to vary depending on the spatial

5 SJ 132 was C14 dated to the period between 3950 and 3710 BC (Čataj 2009: 50).

9). Općenito niska devijacija svih promatranih metričkih vrijednosti sugerira prilično specijaliziranu proizvodnju koja je, moguće, odraz ograničenog izbora korištenih vlakana (Sl. 10). Glavni tehnološki standard, vidljiv isključivo na razini lokaliteta, sugerira da su ovdje, kao i na Ivandvoru, najčešće korišteni lakši pršljenovi. U uzorku prevladavaju pršljenovi težine od 20 do 30 g (53%), iako je uočena i znatna količina nešto težih primjeraka (30-40 g). Najčešći su oni srednjih vrijednosti promjera (40-50 mm i 50-60 mm) koji sačinjavaju 86% uzorka. Najzastupljeniji su primjerci nižeg razreda visine (<20 mm), iako to nije rezultiralo očekivanom dominacijom klasičnih spljoštenih tipova, poput diskoidnih i lećastih pršljenova. Suprotno tomu, i ono što je glavna razlika u odnosu na nalaze s Ivandvora, na ovom lokalitetu najčešće se javljaju konveksni i konični tipovi pršljenova (Sl. 9).

U usporedbi s drugim pršljenovima retzgajarske kulture, oni s lokaliteta Ivandvor i Josipovac Punitovački-Veliko polje I ne pokazuju značajna odstupanja koja bi ih izdvajala u tehnološkom smislu proizvodnje. Upravo suprotno, funkcionalna analiza alatki sugerira znatnu količinu dosljednosti koja može ukazivati na nepostojanje razlika u korištenim vlaknima, ali i na homogenost krajnjih proizvoda (Sl. 11).

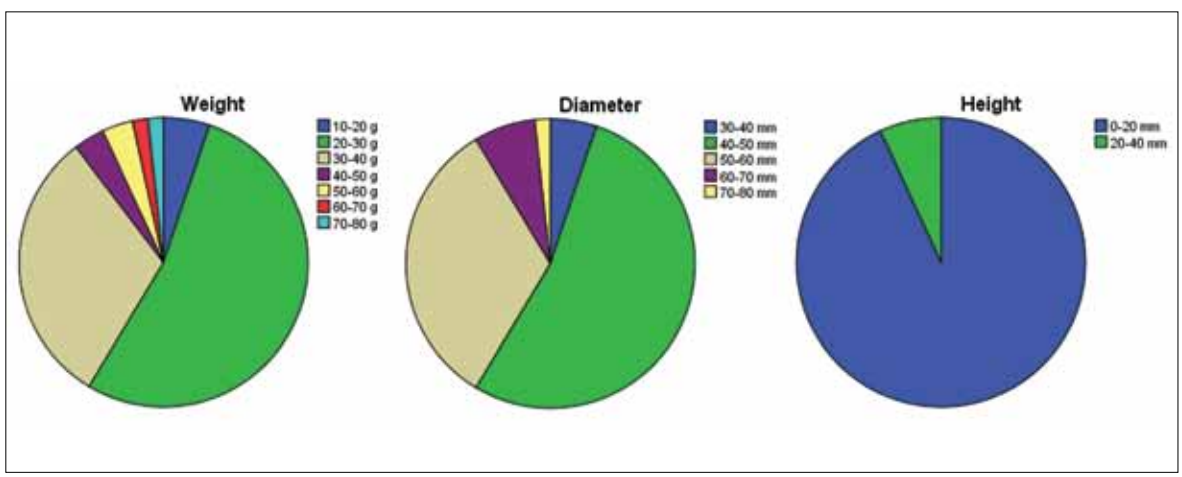
Uz povećanu frekvenciju pršljenova zabilježenu na oba lokaliteta, kada ih se promatra u kontekstu pojedinog nalazišta, njihovi tipološki profili ukazuju nekoliko stvari. Diskoidni pršljenovi, koji su naizgled najčešći tip u retzgajarskoj kulturi, prilično se rijetko javljaju na lokalitetu Josipovac Puni-

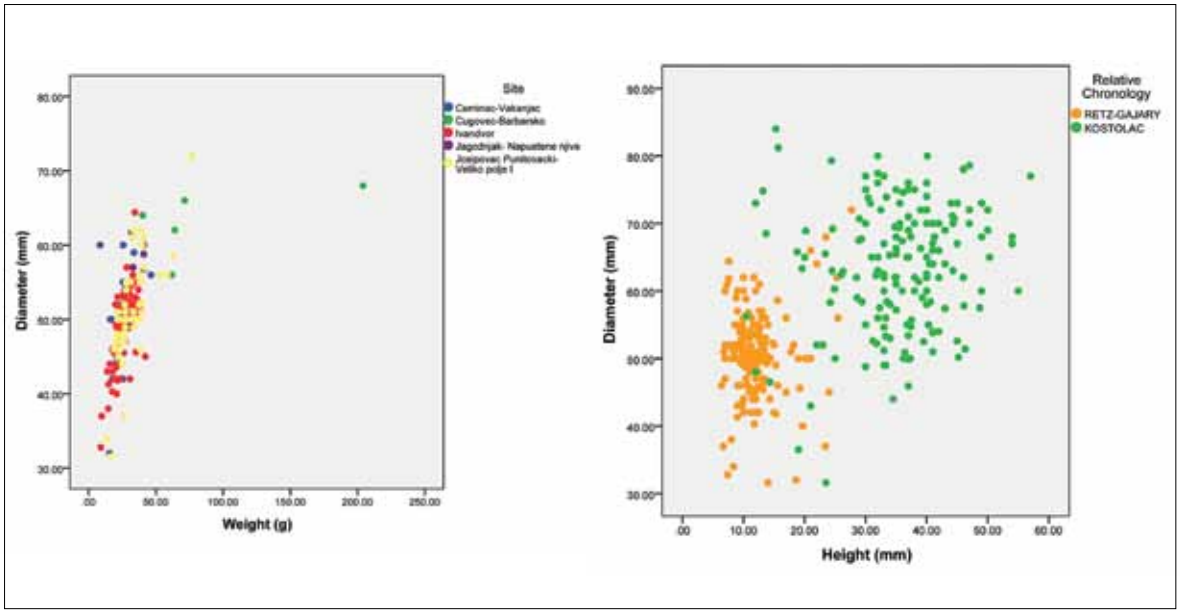
context. Although the specific locations, particularly the main area of the manufacture (SJ 194), display little to no peculiarity regarding the inspected functionality parameters, its higher tool concentration revealed a significantly lowered typological variability in comparison to the rest of the spindle whorl sample (Fig. 9).

The generally low deviation of all the considered metric values suggests a rather specialised production, possibly resonating limited fibre material options (Fig. 10). The main technological standard, observable only on the site level, suggests that here, again, like at Ivandvor, lighter spindle whorls were most commonly used. Spindle whorls ranging from 20 to 30 grams dominate in the sample (53 %), although slightly heavier (30-40 g) whorls are highly represented as well. Middle diameter classes (40-50 mm and 50-60 mm) are the most common, making up for the 86 percent of the sample. Low height class (< 20 mm) is the most represented at the site, although this is not reflected in the dominance of the typically flat types, like discoid and lenticular spindle whorls. On the contrary, and this is the main difference when compared to the Ivandvor set, the most frequent here is the convex and conical spindle whorl type (Fig. 9).

When compared to other Retz-Gajary spindle whorls, both the Ivandvor set and the set from Josipovac Punitovački-Veliko polje I are not revealing any significant deviation that would separate them in technological sense of production. On the contrary, functional analysis of the tools proposes a fair level of consistency, which may be further con-

Slika / Figure 10. Frekvencija određene kategorije težine, promjera i visine pršljenova s lokaliteta Josipovac Punitovački-Veliko polje I / Frequency of the particular weight, diameter and height classes of spindle whorls at Josipovac Punitovački-Veliko polje I.





Slika / Figure 11. Omjer težine i promjera (lijevo) i distribucija tipova (desno) pršljenova s lokaliteta retzgajarske kulture / Spindle whorls' weight-diameter (left) and type distributions (right) against sampled Retz-Gajary sites.

tovački-Veliko polje I, gdje prevladavaju konveksni pršljenovi, praćeni koničnima. Tip koničnih pršljenova, pak, u potpunosti izostaje u skupu nalaza s Ivandvora. Čini se da je bikonični tip, češći krajem 4. i tijekom 3. tisućljeća pr. Kr., korišten samo na ova dva lokaliteta, i nije zabilježen na preostala tri proučavana lokaliteta retzgajarske kulture. Cijeli skup nalaza pršljenova retzgajarske kulture karakterizira mala varijabilnost u visini (>80% nalaza je u kategoriji plosnatih predmeta čija visina ne prelazi 20 mm), kao i prilično standardizirana težina (>80% nalaza teži između 10 i 40 g) te maksimalna-vrijednost promjera (>80% nalaza varira od 40 do 60 mm).

Lociranje prelja i predioca kostolačke kulture

Naselje kostolačke kulture na lokalitetu Đakovo-Franjevac jedno je od najvećih dokumentiranih lokaliteta te kulture u Hrvatskoj, a rezultate istraživanja detaljno je objavila Jacqueline Balen, koja je i vodila zaštitna istraživanja na nalazištu. Zabilježeni nepokretni arheološki nalazi uključuju višećelijske strukture ovalnog i izduženog oblika, plitke kružne ili ovalne jame, duge uske jarke te rupe od stupova.

Slično Ivandvoru, na lokalitetu nisu prepoznati ostaci nadzemne arhitekture, iako lijep pronađen u zapunama određenih jama ukazuje na postojanje konkretnih nadzemnih konstrukcija. Budući sidered as an indication of both, the undifferentiated use of raw fibre materials and the homogeneity of end products (Fig. 11).

Along with the elevated frequency of spindle whorls attested at both sites, their typological profiles account for few peculiarities, when observed on an inter-site level. The discoid spindle whorl, which appears to be the most common Retz-Gajary type is fairly underrepresented at Josipovac Punitovački – Veliko polje I, where convex spindle whorls dominate and the conical type seems to be the second most common. The conical spindle whorl type, on the other hand, is completely missing in the Ivandvor set. The biconical type, more common for the later 4th and the succeeding 3rd millennium BC appears to be used only at these two settlements and has not been recorded at the other three investigated Retz-Gajary sites. The entire Retz-Gajary spindle-whorl sample is characterized by a low height value variability (› 80 % being in the flat tool class, not higher than 20 mm) and rather standardized weight (› 80 % ranging from 10 to 40 g) and maximum diameter values (› 80 % ranging from 40 to 60 mm).

Housing Kostolac Spinners

The Kostolac settlement at Đakovo – Franjevac is one of the largest documented sites of this culture in Croatia and the results of its investigation were published in great detail by Jacqueline Balen, who led the rescue excavations. Multicellular structures of oval and elongated shape; shallow circular, or

da u ukopanim strukturama na lokalitetu nisu *in situ* pronađeni ostaci peći ili ognjišta, kao ni popratnih stupova, autorica ove prostore interpretira kao radne, a ne stambene. Na Franjevcu je zabilježeno nekoliko vrsta dokaza koji podupiru ovakvu interpretaciju navedenih prostora. U tom smislu, interpretacija koju Jacqueline Balen nudi za istražene prostore pruža podatke o organizaciji aktivnosti na lokalitetu (Balen 2011: 86-88). Neke od struktura sadržavale su duboko ukopane manje jame, vjerojatno rupe od stupova koji su mogli nositi lakše nadzemne konstrukcije, a zbog čega je spomenute strukture moguće interpretirati kao radioničke prostore. Izduženi uski jarci smješteni u južnom dijelu istražene površine, mogli su biti dijelom samostojećih drvenih ograda korištenih u procesu štavljenja kože. Nepravilne jame ispunjene gotovo sterilnim sedimentom, u kojima nije bilo organskih sastavnica ni arheološkog materijala, vjerojatno su služile za miješanje gline, dok

Slika / Figure 12. Zračna fotografija lokaliteta Đakovo-Franjevac snimljena sa sjeverne strane. Žuta strelica pokazuje na južnu (SJ 160/161), a crvena na sjevernu (SJ 876/877) od dvaju velikih jamskih struktura u kojima je zabilježena velika koncentracija pršljenova / Aerial photo of the Đakovo-Franjevac site taken from the northern side. Yellow arrow is pointing to the southern (SJ 160/161) and the red arrow is pointing to the northern (SJ 876/877) of the two large pit structures with high concentration of spindle whorls (prema / after: Balen 2011: 12, Fig. 1. 1.).

oval pits; long, narrow trenches and postholes make up for the recovered immovable archaeological finds.

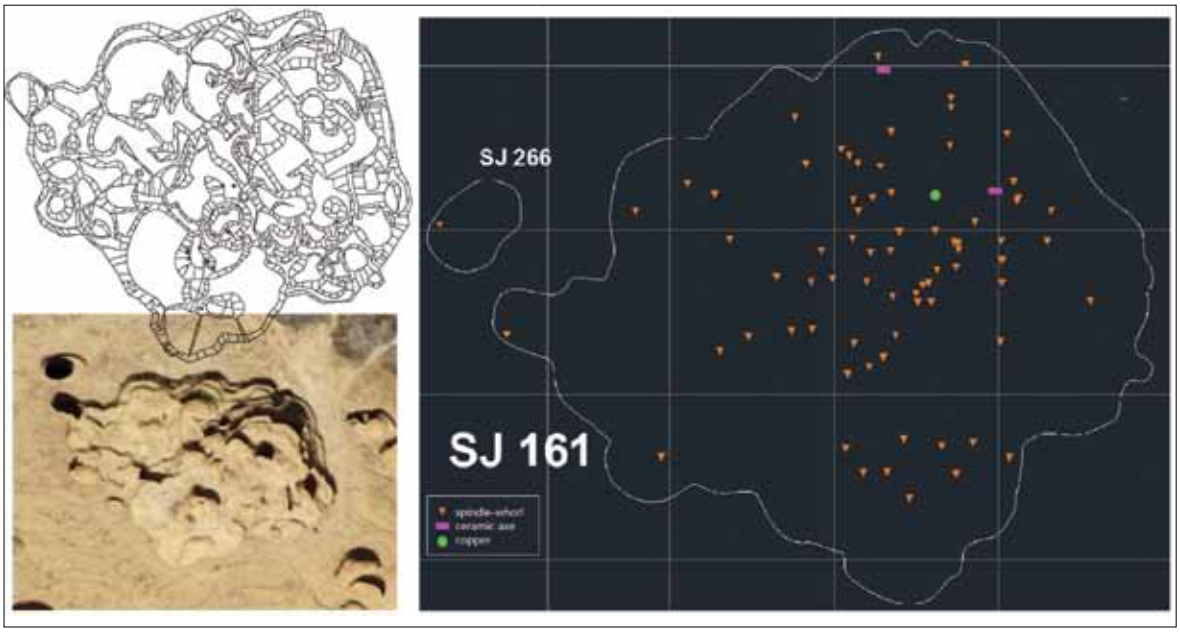
Similar to Ivandvor, no surface architecture was recognized with certainty at the site, although the recovery of daub in the fills of certain pits attests for the presence of solid above-ground structures. Since none of the sunken structures at the settlement contained *in situ* elements of ovens or hearts and no surrounding posts were traced, the author is closer to interpreting them as activity spaces, rather than ascribing them residential character. There are several different lines of evidence at Franjevac, which are in agreement with its work-related character. In this manner, Jacqueline Balen's interpretations of the investigated features inform about the organization of the activities at the site (Balen 2011: 86–88). Some structures were composed of deeply dug pits, most probably postholes, which could have supported light constructions, making these features interpretive as workshop spaces. Elongated narrow trenches, all located in the southern part of the investigated area may have been self-standing timber fences used in the process of tanning animal hides. Irregular pits that were filled with almost sterile sediment, lacking organic components and archaeological material, most likely served for mixing clay, while bell shaped pits that widen towards their dugout bottom, in which large concentrations of botanical remains were attested, were likely utilized for storage (Balen 2011: 86–88).

Interestingly, out of the 142 recorded features at Franjevac, which yielded Kostolac pottery, two structures (SJ 160/161 and SJ 876/877), the most dominating in size (20 x 17 meters), just like it was the case with Retz-Gajary sites, held the majority (62 %) of the recovered spindle whorls (Fig. 12).

Out of 121 spindle whorls excavated at the settlement and attributed to the Kostolac culture, 63 (more than 50 % of the entire Franjevac sample and 37 % of the entire Kostolac sample recorded in the database) were found in the southern large pit structure (SJ 160/161) that also yielded a substantial amount of other ceramic and lithic material (Fig. 13).

Other interesting findings allocated in the same context (SJ 160) include 8 polished stone tools, 5 grindstones, 3 small spools, 2 small ceramic axes, a small decorated ceramic tile and bone tools- spatulae and an awl (Balen 2011: 36–37, 135)[6]. This large sunken structure contained several pit features

6 SJ 160 (upper layer that yielded 56 spindle whorls) was C14 dated to the period between 3380 and 2880 BC (Balen 2011: 159).



Slika / Figure 13. Velika višećelijska ukopana struktura (SJ 160/161) s lokaliteta Đakovo-Franjevac. Lijevo: zračna fotografija i tehnički crtež (prema: Balen 2011: 37). Desno: tlocrt s prikazom prostorne distribucije nalaza preuzet iz objavljenog plana lokaliteta izrađenog u programu AutoCad (prema: Balen 2011) / Large multicellular sunken structure (SJ 160/161) from Đakovo-Franjevac. Left: aerial photo and the technical drawing (after: Balen 2011: 37). Right: plan with the spatial distribution of finds taken from the published AutoCad map of the site (after: Balen 2011).

su zvonolike jame, koje se šire prema dnu i koje su sadržavale velike koncentracije botaničkih ostataka, vjerojatno bile korištene za skladištenje (Balen 2011: 86-88). Zanimljivo, od 142 zabilježene strukture koje su na Franjevcu sadržavale kostolačku keramiku, dvije strukture (SJ 160/161 i SJ 876/877), najvećih dimenzija (20x17 m), kao što je bio slučaj i na retzgajarskim lokalitetima, sadržavale su većinu (62%) pronađenih pršljenova (Sl. 12).

Od 121 kostolačkog pršljena pronađenog na lokalitetu, 63 (više od 50% cijelog uzorka s Franjevca i 37% cijelog kostolačkog uzorka u bazi podataka) je pronađeno u velikoj ukopanoj strukturi (SJ 160/161), u kojoj je pronađena i znatna količina keramičkog i kamenog materijala (Sl. 13).

Iz istog konteksta (SJ 160) potječe još zanimljivih nalaza, uključujući osam glačanih kamenih alatki, pet žrvnjeva, tri mala kalema, dvije male keramičke sjekire, mala ukrašena keramička pločica i koštane alatke – spatule i šilo (Balen 2011: 36-37, 135).[6] Ova velika ukopana struktura sadržavala je nekoliko jamskih objekata različitih dubina i dimenzija, a autorica te činjenice uzima kao dodatni argument protiv moguće stambene funkcije objekta (Balen 2011: 87). Osim toga, Jacqueline Balen smatra da je

of uneven depth and dimensions, so the author interprets this fact as an extra argument against its possible residential function (Balen 2011: 87). In addition, Jacqueline Balen argues that the large structure from Franjevac might have been used for cult purposes: firstly, she suggests this on the account of the discovery of two buried skulls in the two separate smaller features within the pit itself (one belonging to a child and another to an adult female) and secondly, due to the position of another cylindrical feature next to it (SJ 265/266), which was initially probably used for storage, but secondarily served as a burial place (Balen 2011: 88). Interestingly, both the female skull burial pit from the large structure and the male burial pit next to it yielded a single spindle whorl, each. Female skull was found together with a fragment of a copper dagger (Balen 2011: 37), while a skeleton of an adult male was buried in the cylindrical pit together with two pigs (Balen 2011: 51).

Another 12 spindle whorls were recovered from the northern, of the two dominating structures (SJ 876/877) at Đakovo – Franjevac, which also contained several pit features of uneven depth and dimensions that lead the author's interpretation

6 SJ 160 (gornji sloj u kojem je pronađeno 56 pršljenova) je radiokarbonski datirana u vrijeme između 3380. i 2880. pr. Kr. (Balen 2011: 159).

velika struktura s Franjevca mogla biti korištena u kultne svrhe: prvo, autorica takvu funkciju pretpostavlja na temelju dvaju ukopanih lubanja koje su pronađene u dvije odvojene manje jame unutar strukture (jedna dječja i druga odrasle žene), i, drugo, zbog položaja dodatne cilindrične strukture koja je zabilježena pored ove (SJ 265/266), a koja je prvotno vjerojatno korištena za skladištenje, dok je sekundarno poslužila za ukop (Balen 2011: 88). Zanimljivo, i u ženskom grobu unutar jame, kao i u muškom iz jame pored, pronađen je po jedan pršljen. Uz lubanju žene pronađen je i ulomak bakrenog bodeža (Balen 2011: 37),dok je u cilindričnoj jami uz kostur muškarca otkriven i ukop dvije svinje (Balen 2011: 51).

Još je 12 pršljenova pronađeno u sjevernijoj od dvije najveće strukture (SJ 876/877) na lokalitetu Đakovo-Franjevac, koja je također bila sastavljena od nekoliko jama različitih dubina i dimenzija, što je autoricu navelo da niti ovu jamu ne interpretira kao stambenu. Izuzev pršljenova, u jami je pronađeno mnogo keramičkog i kamenog materijala. Neki od važnih nalaza iz ovog konteksta uključuju mali kalem i keramički žrtvenik (Balen 2011: 78).[7]

Preostalih 46 pršljenova kostolačke kulture s Franjevca pronađeno je u 18 različitih struktura širom lokaliteta i na temelju zabilježenog *in situ* konteksta, ne može ih se povezati s dva velika skupa nalaza.Veća koncentracija pršljenova (10) pronađena je u relativno velikoj jami (SJ 572/573) u kojoj je bila

7 SJ 876 je radiokarbonski datirana u vrijeme između 3100. i 2960. pr. Kr. (Balen 2011: 159).

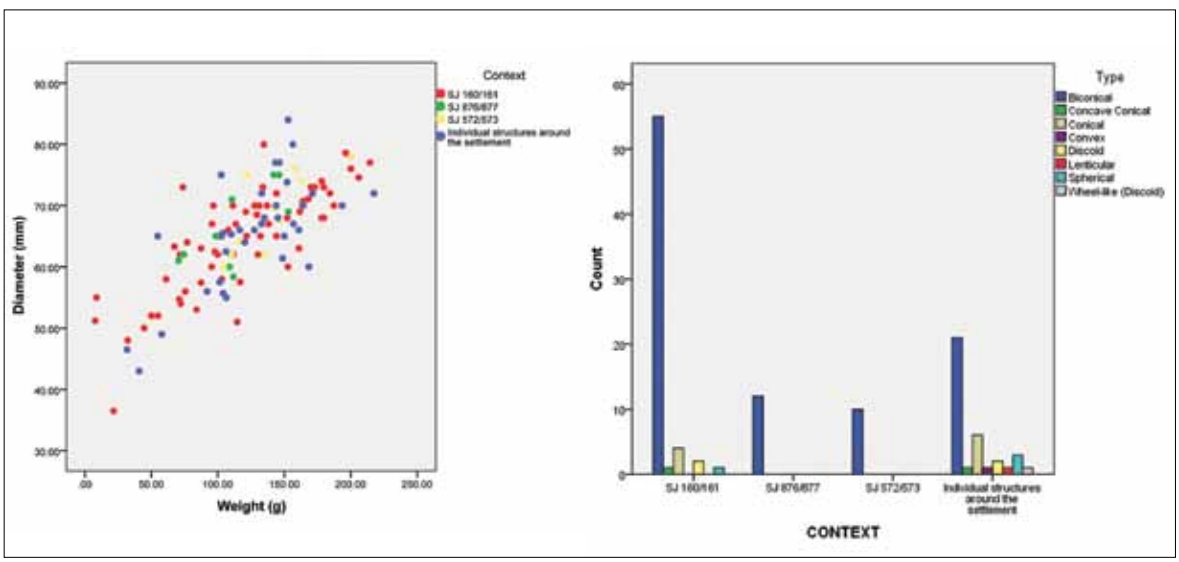
away from defining it as a living area. Besides the spindle whorls, the pit yielded a huge amount of ceramic and lithic material. Some of the more important findings allocated in the context include a small spool and a ceramic altar (Balen 2011: 78)[7].

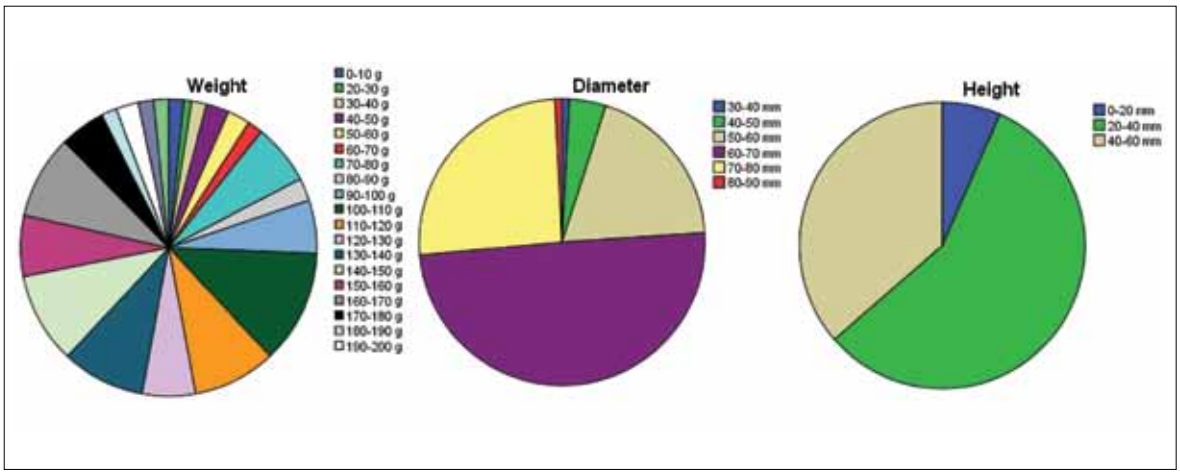
Remaining 46 Kostolac spindle whorls found at Franjevac were distributed among 18 different features and cannot be brought to the connection with the two large assemblages as far as their *in situ* context is concerned. Higher concentration of spindle whorls (10) was recovered in another relatively large pit (SJ 572/573) which also yielded a fair amount of ceramic material and a stone axe. Even though fireplaces were documented in this particular structure, Balen is still inclined to consider it as a working space rather than ascribing it residential character (Balen 2011: 67, 88).

The results of the tool analysis reveal some specifics among the three 'main' assemblages from the largeest pit structures. Although only minor differences were observed, which would functionally or typologically separate these sets from the rest of the spindle whorls recovered around the settlement, they are significant for the investigation of tool standardisation and thus potentially indicative of higher levels of specialisation attestable for the particular locations at the site.

7 SJ 876 was C14 dated to the period between 3100 and 2960 BC (Balen 2011: 159).

Slika / Figure 14. Omjer težine i promjera (lijevo) i distribucija tipova (desno) pršljenova iz pojedinačnih jamskih struktura s lokaliteta Đakovo-Franjevac / Spindle whorls' weight-diameter (left) and type distributions (right) given for separate pit structures at Đakovo-Franjevac.





Slika / Figure 15. Frekvencija određene kategorije težine, promjera i visine pršljenova s lokaliteta Đakovo-Franjevac / Frequency of the particular weight, diameter and height classes of spindle whorls at Đakovo-Franjevac.

i znatna količina keramike te kamena sjekira. Iako su u ovom dijelu strukture zabilježena ognjišta, Balen i ove strukture smatra radnim, a ne stambenih prostorima (Balen 2011: 67, 88).

Rezultati analize alatki otkrivaju neke osobitosti u tri „glavna" skupa nalaza iz najvećih jamskih struktura.Iako su među njima primijećene samo manje razlike koje bi ove skupove nalaza mogle funkcionalno i tipološki razlikovati od ostalih pršljenova sa nalazišta, dovoljno su značajne za istraživanje standardizacije alatki i stoga potencijalno ukazuju na višu razinu specijalizacije na određenim lokacijama na lokalitetu.

Usporedba morfoloških značajki prisutnih u trima skupovima nalaza ne ukazuje na znatne razlike u korištenim vlaknima ili kvaliteti krajnjih proizvoda, iako je među analiziranim pršljenovima uočena zanimljiva varijabilnost u pogledu veličine i tipa, a koja bi mogla ukazivati na eventualna ograničenja u pogledu funkcionalnosti alatki (Sl. 14). Najveće su razlike zabilježene između dvaju manjih skupova nalaza iz velikih struktura (SJ 876/877 i SJ 572/573). U oba skupa vidljiva je slaba zastupljenost manjih vrijednosti težina i promjera pršljenova, pošto su prisutne isključivo velike (>50 mm u promjeru) i teške (teže od 70 g) alatke.

Najveći skup nalaza iz južne ukopane strukture nije pokazao značajne razlike u distribuciji vrijednosti težina i promjera pršljenova u usporedbi s ostalim skupovima alatki koje su pronađene na različitim mjestima u naselju. Suprotno dvama manjim skupovima, u „glavnom" skupu nalaza pršljenova iz 'južne' strukture (SJ 160/161) zabilježena je

Morphological traits represented in the three assemblages, when compared, do not propose a major distinction in fibre material use, or different quality end products, although few interesting observations regarding the level of both size and type variability within the analysed sets of spindle whorls can be drawn, pointing to possible limitations regarding their functionality (Fig. 14). The biggest difference can be noticed in the case of two smaller assemblages coming from the two large structures (SJ 876/877 and SJ 572/573). They are both showing restriction in the distribution of smaller weight and diameter values, holding exclusively large (> 50 mm diameter classes) and heavy (heavier than 70 r g weight classes) tools.

The largest assemblage from the southern pit structure does not reveal much difference regarding the distribution of spindle whorls' weight and diameter values, when compared to the rest of the tool set recovered at different locations around the settlement. Opposite to the two smaller assemblages, a slightly higher frequency of smaller weight (10 % < 50 g) values can be detected for the 'main' spindle whorl set recovered from the 'southern' structure (SJ 160/161). Although there is no big difference observable in the distribution of higher values between the studied sets, since the massive tools appear to dominate in all of them, it should be mentioned that both the very large (> 80 % > 60 mm) and especially the very heavy tools (> 60 % > 100 g) are convincingly the most represented classes in the 'main' (SJ 160/161) assemblage.

The general tendency of all the considered metric values to cluster around the higher end of the

nešto viša frekvencija nalaza manje težine (10% <50 g). Iako u proučavanim skupovima nije uočena značajna razlika kod distribucije većih vrijednosti, s obzirom na to da masivnije alatke prevladavaju u svima, valja istaknuti da izuzetno velike (>80% je >60 mm), a osobito izuzetno teške (>60% je >100 g) alatke uvjerljivo sačinjavaju najveće razrede u „glavnom" skupu nalaza (SJ 160/161).

Opća tendencija grupiranja svih promatranih metričkih vrijednosti oko višeg kraja spektra ukazuje na prilično specijaliziranu proizvodnju koja, gotovo sigurno, odražava i ciljani odabir vlakana i korištenje određenih tehnika. Glavni tehnološki standard, gledano na razini lokaliteta, pokazuje da su najčešće korišteni teški, a posebno vrlo teški pršljenovi. Pršljenovi teži od 100 g prevladavaju u uzorku (>70%), iako su zabilježeni i nešto lakši primjerci (>20% je 40-100 g). Prevladavaju nalazi velikih promjera (>60 mm) koji sačinjavaju više od 70% uzorka, iako su prisutni (>20%) i oni umjerenih veličina, od 40 do 60 mm (Sl. 15). Ova prilično velika varijabilnost u težini pršljenova nije se odrazila kroz varijabilnost tipova. Bikonični pršljenovi uvjerljivo su glavni tip na Franjevcu (>80%), i jedini korišteni tip (100%) na dvije određene lokacije (SJ 876/877 i SJ 572/573), na kojima je već ustanovljena viša razina standardizacije alatki.

Unatoč ljudskim ukopima otkrivenim u južnoj strukturi (SJ 160/161), koji bi mogli objasniti kontekst kroz posebno odlaganje, u višim slojevima strukture nisu uočene indikacije sekundarnog depozita glavnog skupa nalaza pršljenova.

Najveća koncentracija pršljenova na Franjevcu, ako se uzme u obzir model po kojem svaki pojedinac za vrijeme predenja koristi po jedan pršljen, sugerira da je znatan broj prelja/predioca mogao koristiti „glavni" radionički prostor u južnoj jamskoj strukturi (SJ 160/161), što ujedno ukazuje na intenzivne, i, najizglednije, specijalizirane aktivnosti koje su se odvijale u naselju, i to upravo u središnjim i najvećim strukturama, barem na istraženoj površini.

Osim na lokalitetu Đakovo-Franjevac, pršljenovi kostolačke kulture pronađeni su na Gomolavi, lokalitetu tel tipa u Srbiji. Na Gomolavi, za razliku od Đakovo-Franjevca, njihova prostorna distribucija ukazuje na proizvodnju u domaćinstvu (Sl. 16). Sloj kostolačke kulture na lokalitetu izvrsno je očuvan, a arheološki nalazi koji dokazuju postojanje nadzemnih konstrukcija pružili su vrijedne podatke o naseljavanju: tri horizonta naseljavanja koji su

spectrum suggests a rather specialised production, almost certainly reflecting both the focused fibre material use and the particular technique practice. The main technological standard, when observed on the site level, suggests that heavy and especially very heavy spindle whorls were most commonly used. Whorls heavier than 100 grams dominate in the sample (> 70 %), although slightly lighter (40-100 g) whorls are represented as well (> 20 %). Larger diameters (> 60 mm) seem to prevail, making up for more than 70 percent of the sample, although moderate sizes, ranging from 40 to 60 mm appear to be represented (> 20 %) as well (Fig. 15). This relatively high weight value variability is not at all reflected in the deviation of types. A biconical whorl is convincingly the main type used at Franjevac (> 80 %), and the only type used (100 %) at the two specific locations (SJ 876/877 and SJ 572/573), which already displayed a higher level of tool standardisation.

Despite the human burials recovered in the southern structure (SJ 160/161), that may suggest a special deposition as a plausible explanation for the context, no indications for a secondary refuse of the main spindle whorl assemblage, found in the upper layers of the investigated feature, were attested.

The highest recorded concentration of spindle whorls at Franjevac, if a tool per spinner scenario is concerned, would suggest that a substantial number of spinners could have been using the 'main' workshop space in the southern pit structure (SJ 160/161). Thus, this large concentration of tools proposes that intensified and, most likely, specialized spinning practice took place at the settlement, precisely in its most central and largest structures, as far as the investigated area is concerned.

Besides at Đakovo – Franjevac, spindle whorls attributed to the Kostolac culture-historical group were recorded at Gomolava, a tell site in Serbia. At Gomolava, as opposed to Đakovo – Franjevac, their spatial distribution agrees with the household production (Fig. 16). Kostolac cultural layer was substantially preserved at the site and the archaeological evidence, attesting above ground constructions, provided some valuable information on housing: three habitation horizons comprised of houses and accompanying features revealed intensive occupancy, displaying parallel rows of buildings, overlapping of certain house plans, continuous architectural renovations, use of partition walls, use of in-house hearts and ovens and double-

Slika / Figure 16. Kuća 6 (IIIb1) s lokaliteta Gomolava – pršljenovi u kućnom lijepu / House 6 (IIIb1) at Gomolava – Spindle whorls in daub. (prema / after: Petrović & Jovanović 2002: 100).

sadržavali kuće i popratne strukture ukazuju na intenzivnu okupaciju, a vidljivi su paralelni redovi građevina, preklapanje planova nekih kuća, kontinuirano arhitektonsko obnavljanje, korištenje pregradnih zidova, vatrišta i peći unutar objekata te dvostruka krovišta na pravokutnim građevinama (Petrović & Jovanović 2002: 299).[8]

Pršljenovi iz kostolačkog sloja naseljavanja često su pronalaženi u kućama, jamama i popratnim prostorima na telu kroz sve tri faze naselja (Petrović & Jovanović 2002). Visoka frekvencija alatki koja je zabilježena na Gomolavi (51 pršljen) čini ovaj uzorak važnom referentnom točkom za usporedbe sa drugim lokalitetima, iako nije bilo moguće izdvojiti pojedinačne lokacije s većom koncentracijom alatki koje bi sugerirale da su se aktivnosti vezane uz predenje ikada odvijale na za to predodređenoj lokaciji.

Tehnološki standard na Gomolavi karakterizira najveća zastupljenost velikih (>40% je 50-60 mm) i teških (>75% je 40-100 g) pršljenova, za razliku od Franjevca gdje je zabilježena znatno viša frekvencija ekstremnih vrijednosti. I jako veliki (>60 mm) i jako teški (>100 g) pršljenovi, kakvi prevladavaju na Franjevcu, znatno se rjeđe pojavljuju u uzorku s Gomolave (Sl. 17).

8 C14 datumi s Gomolave padaju u raspon između 3038. i 2903. pr. Kr. te 3108 i 2877 pr. Kr. (Petrović & Jovanović 2002: 303), što znači da je faza naseljavanja tela istovremena naselju s lokaliteta Đakovo-Franjevac.

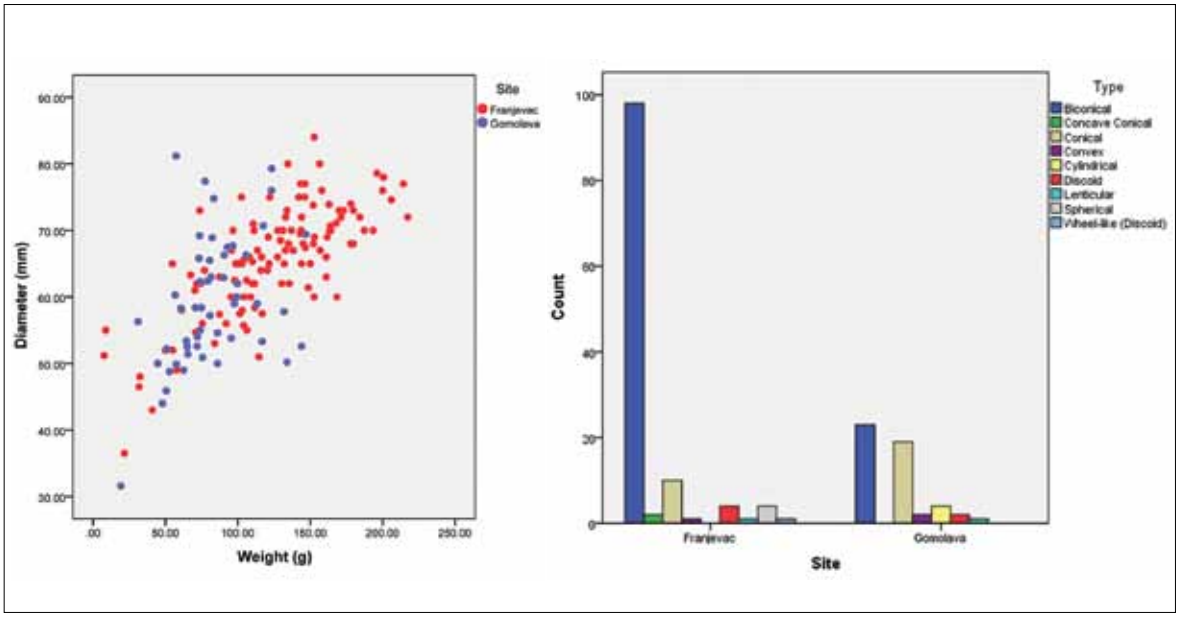
pitched roofing of rectangular buildings (Petrović and Jovanović 2002: 299)[8].

Spindle whorls from the Kostolac level of occupation at the tell were commonly found in houses, pits and their surrounding areas belonging to all three habitation horizons (Petrović & Jovanović 2002). A high frequency of tools recorded at Gomolava (51 spindle whorls) makes this sample a valuable point of reference for the inter-site comparison, although no specific location with a higher concentration of tools could be recognized, which would suggest that a designated area for spinning activities ever existed at the site.

The technological standard at Gomolava is characterized by the highest distribution of the large (> 40 % 50-60 mm) and heavy (> 75 % 40-100 g) spindle whorl classes. As oposed to the Franjevac sample, which revealed a much higher frequency of extreme values. Both, very large (> 60 mm) and very heavy (> 100 g) spindle whorls, which dominate at Franjevac are significantly less represented in the Gomolava sample (Fig. 17).

In terms of typological variability, the situation at Gomolava appears more dynamic. Although

8 C14 dates from Gomolava cover the span 3038-2903 BC and 3108-2877 BC (Petrović & Jovanović 2002: 303), making the Kostolac occupational phase at the tell contemporary to the Đakovo – Franjevac settlement.

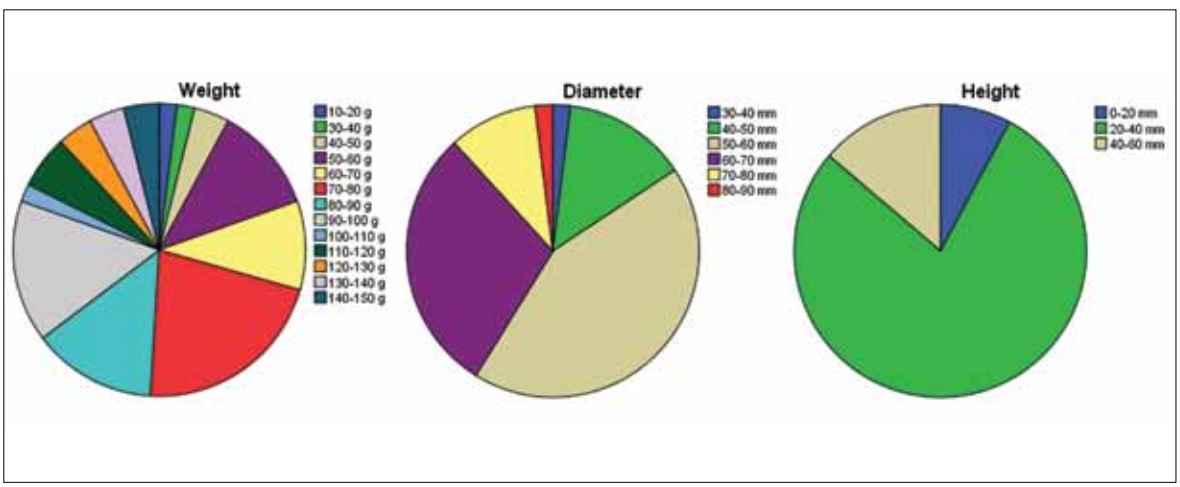


Slika / Figure 17. Omjer težine i promjera (lijevo) i distribucija tipova (desno) pršljenova s lokaliteta kostolačke kulture / Spindle whorls' weight-diameter (left) and type distributions (right) against sampled Kostolac sites.

U pogledu tipološke varijabilnosti, situacija na Gomolavi čini se dinamičnijom. Iako je u uzorku s Franjevca zabilježeno osam različitih tipova, zbog potpune prevlasti bikoničnih pršljenova taj se skup nalaza čini izrazito standardiziranim. S druge strane, na Gomolavi je zabilježeno šest različitih tipova pršljenova, a dva glavna tipa (>80%) prilično su jednakomjerno zastupljena (bikonični >45%, a zatim konični tip >35%).

the sample from Franjevac yielded eight different types, the absolute dominance of biconical spindle whorls makes this set appear as highly standardized. On the other hand, at Gomolava six different types of spindle whorls were recorded, but the two main types (> 80 %) seem to be more equally distributed within the sample (biconical > 45 %, followed by conical type > 35 %).

Slika / Figure 18. Frekvencija određene kategorije težine, promjera i visine pršljenova kostolačke kulture s lokaliteta Gomolava / Frequency of the particular weight, diameter and height classes of Kostolac spindle whorls at Gomolava.



Glavno ograničenje varijabilnosti u uzorku s Gomolave, za razliku od tehnološkog standarda kostolačke kulture, vidljivo je u distribuciji vrijednosti visine (Sl. 18). Ovdje uvjerljivo prevladavaju pršljenovi srednje visine (20-40 mm), što se znatno odražava na smanjenu varijabilnost vrijednosti težina (u usporedbi s distribucijom težina u uzorku s Franjevca). Osim toga, distribucija vrijednosti promjera na Gomolavi također pokazuje manju zastupljenost velikih alatki (60-70 mm i 70-80 mm).

In the Gomolava sample, the main variability restriction, in comparison to the Kostolac technological standard, can be observed in the height class distribution (Fig. 18). Here, the convincing dominance of the medium height class spindle whorls (20-40 mm), is substantially resonating the lowered deviation of the weight value (in comparison to the weight value distribution in the Franjevac sample). Additionaly, the diameter value distribution at Gomolava displays a decreased frequency of large tools (60-70 mm and 70-80 mm) as well.

Trendovi ili tradicije

Kako bi se istražili glavni čimbenici koji su mogli utjecati na tehnološki razvoj, rane faze te dinamiku procesa specijalizacije tijekom srednjeg i kasnog eneolitika, uspoređena su dva uzorka pripisana retzgajarskoj i kostolačkoj kulturno-povijesnoj skupini (Sl. 19).

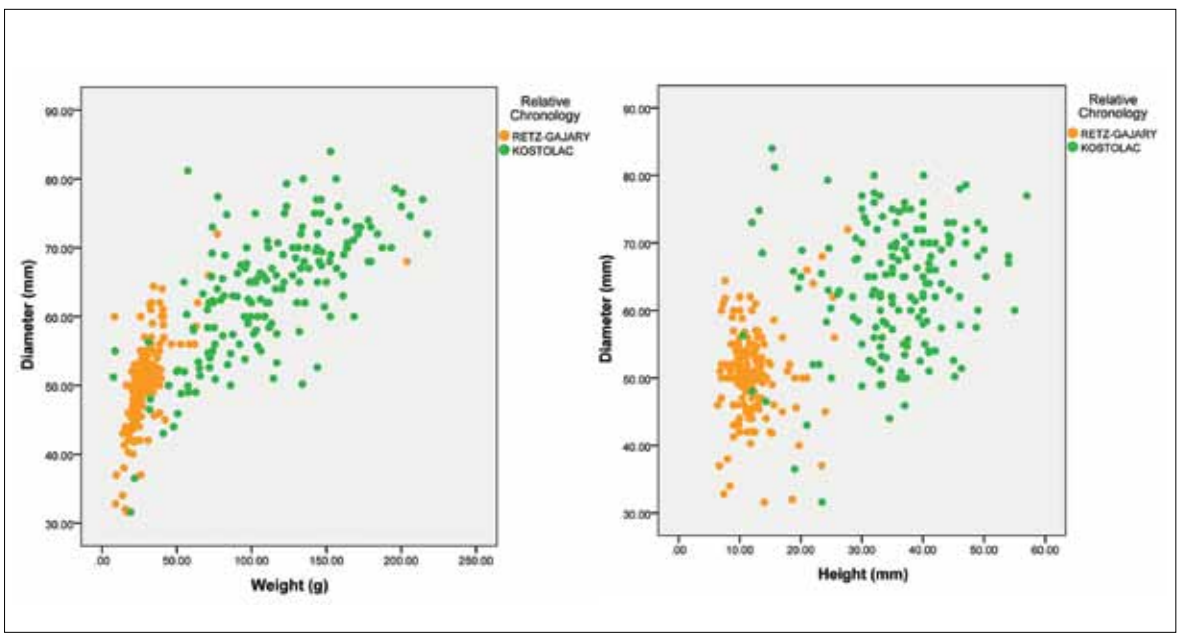
Zanimljivu posebnost u oba skupa nalaza kostolačke kulture čini distribucija vrijednosti težina pršljenova, odnosno očita smanjena zastupljenost lakših alatki (<30 g), unatoč njihovoj brojnosti i generalno visokoj varijabilnosti u vrijednosti težina primjećenoj u uzorcima. Ovaj razred težine pršljenova je, pak, uvjerljivo najučestaliji u proučavanim retzgajarskim skupovima nalaza.Kao što pokazuju

Trends or Traditions

In order to explore the main factors which might have influenced the technological developments, the early stages and the dynamics of the specialisation process during the Middle and Late Eneolithic, two samples belonging to Retz-Gajary and Kostolac culture-historical groups were compared (Fig. 19).

An interesting peculiarity regarding both of the investigated Kostolac assemblages is that their spindle whorl weight value distribution, or their spindle whorl weight class variability is highly restricted in the case of light tools weighing (<30 g), despite the high frequency of spindle whorls and the high weight value deviation apparent in the samples. This particular weight class of spindle whorls is, on

Slika / Figure 19. Distribucija omjera težina-promjer (a) i visina-promjer (b) za uzorke pršljenova retzgajarske i kostolačke kulture / Weight-diameter (a) and height-diameter (b) distributions given together for Retz-Gajary and Kostolac spindle whorl samples.



rezultati analiza, pršljenovi retzgajarske kulture grupiraju se oko nižeg kraja spektra vrijednosti varijable težine: u istraženim je skupovima nalaza ustanovljen samo mali postotak teških, i još neznatniji broj izuzetno teških alatki.

Ograničena zastupljenost pršljenova manje visine u kostolačkom uzorku također odražava prevladavanje, prvo, bikoničnog, i, zatim, koničnog tipa pršljena. Suprotno tomu, zanimljivo je primijetiti stabilne vrijednosti težine retzgajarskih pršljenova: tehnološki standard koji je jasno postignut kroz dominaciju nižih pršljenova i ograničenje maksimalne vrijednosti promjera (Sl. 20). U kostolačkim skupovima uvelike prevladavaju teški i vrlo teški pršljenovi. Kao što je spomenuto, vrlo teški pršljenovi posebno su zastupljeni na lokalitetu Đakovo-Franjevac, gdje su razredi vrlo velike težine pronađeni u dvije strukture koje pokazuju najveću lokaliziranu standardizaciju. Te, izuzetno velike, vrijednosti tipične su za kostolačke skupove nalaza i mogu se povezati sa značajno dugim (pretpostavljeno biljnim) vlaknima i/ili predenjem (Hochberg 1979: 21; Barber 1991: 52) teže i deblje pređe ili užadi (Vakirtzi 2014: 53). Izuzev uplitanjem (uvijanje dvaju ili više niti zajedno), visoku frekvenciju vrlo teških pršljenova moguće je objasniti korištenjem određene tehnike predenja.

Poznate su dvije tehnike predenja ručnim vretenom: uz pomoć visećeg vretena koje samostalno visi na niti, i uz pomoć poduprtog vretena koje je oslonjeno i okreće se na tlu ili u posudi. Pri predenju s oslonjenim vretenom gravitacija ne utječe na proces, zbog čega je parametar težine manje važan. Glavni nedostatak ove tehnike jest to što pojedinac mora stajati na istom mjestu, za razliku od korištenja visećeg vretena koje omogućava da se sjedi, stoji, hoda, jaše, itd. dok se prede. (Grömer 2005: 109). Lokalizirane koncentracije vrlo teških pršljenova pronadene u najvećim jamskim strukturama na lokalitetu Đakovo-Franjevac mogle bi ukazivati na odredenu logiku koja stoji iza „sedentarnog" karaktera korištenja oslonjenog vretena. Karina Grömer je u pokusima predenja dokazala kako je pomoću poduprtog vretena (oslonjene na tlu ili u posudi) s vrlo teškim pršljenom (iznad 100 g) moguće ispresti čak i fine niti promjera 0.3 mm, jer gravitacija ne utječe na proces, te ne dovodi do pucanja niti (Grömer 2005: 110).

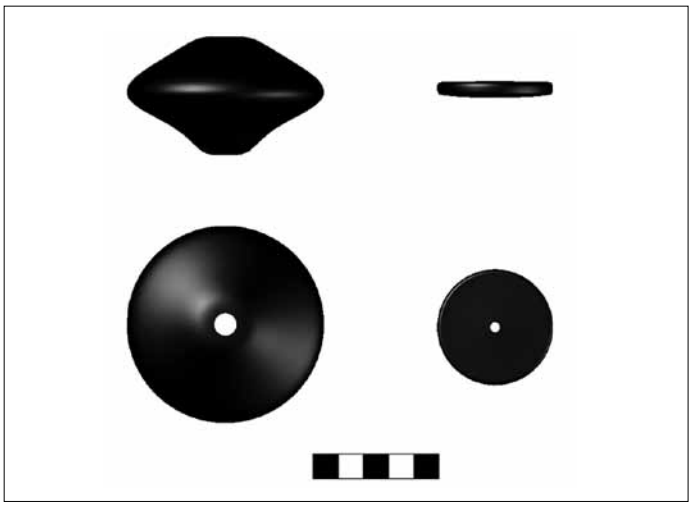
Razmotri li se odnos težine pršljena i tipa vlakna koje se prede korištenjem visećeg vretena, postaje jasno da bi za predenje tankih i kratkih vlakana

the other hand convincingly the most dominating one in the studied Retz-Gajary sets. As shown by the results of the analysis, Retz-Gajary whorls cluster in the lower spectrum of the weight variable distribution: only a low percentage of heavy and even lower percentage of very heavy tools appear in the investigated assemblages.

Restricted distribution of the low height class in Kostolac sample is also resonating a dominance of firstly, the biconical and secondly, the conical type of whorls. In contrast, it is interesting to observe the fixed weight values of the Retz-Gajary spindle whorls: a technological standard that is evidently established through the dominance of lower height classes of whorls and the restriction of the maximum diameter value (Fig. 20). Kostolac sets are greatly dominated by heavy and very heavy spindle whorls. As mentioned, very heavy whorls are particularly represented at Đakovo – Franjevac, where two structures that showed the highest localized standardization held mainly very heavy classes. These extremely high weight values, typical for Kostolac assemblages, may be brought to connection with substantially long (presumably plant) fibres and/or plying (Hochberg 1979: 21; Barber 1991: 52) heavier thick yarns or ropes (Vakirtzi 2014: 53). Besides plying (twisting two or more threads together) the use of a specific spinning technique could explain a high frequency of very heavy whorls.

Two different techniques of spinning with a hand spindle are known: using a drop spindle that hangs freely on the lengthening thread and using a supported spindle that turns on the ground or in a vessel. In supported spinning gravity does not influence the process, making the weight parameter less crucial. The main disadvantage is that the spinner has to stay in one place, in contrast to the use of drop spindle, which allows the spinner to sit, stand, walk, ride etc. (Grömer 2005: 109). Localized concentrations of very heavy whorls found in the largest pit structures at Đakovo – Franjevac may resonate a certain logic behind the 'sedentary' character of practicing the supported technique. Karina Grömer's spinning experiments proved that when spinning supported (on the ground or in a bowl) even fine threads of 0.3 mm diameter can be spun with heavy whorls (more than 100 g), while gravity does not affect the spinning process or break the thread. (Grömer 2005: 110).

If we consider the relationship between the weight of a whorl and the type of fibre being spun when



Slika / Figure 20. Veliki bikonični pršljen kostolačke kulture s lokaliteta Đakovo-Franjevac i diskoidni pršljen retzgajarske kulture s lokaliteta Ivandvor / A large Kostolac spindle whorl of a biconcal type from Đakovo-Franjevac and a Retz-Gajary spindle whorl of a discoid type found at Ivandvor (crtež / drawing: A. Grabundžija).

bilo prikladnije koristiti lakše pršljenove te da bi odabir težih pršljenova bio prikladniji za predenje debljih i dužih vlakna ili za uplitanje niti (Liu 1978: 99). U proučavanim skupovima nalaza, razlike između dominacije lakših pršljenova u retzgajarskoj i dominacije težih pršljenova u kostolačkoj kulturi ukazuju na znakovite prilagodbe u tehnologiji.

Michael Ryder (1968: 81) i Elizabeth Barber slažu se u tvrdnji da su pršljenovi težine oko 33 g prikladni za predenje dugih niti vune srednje težine (Barber 1991: 52). Osim toga, objavljeni rezultati tehnološke analize skupova nalaza datiranih u 4. i rano 3. tisućljeće pr. Kr. s lokaliteta Arslantepe u Turskoj (Laurito et al. 2014) govore u prilog navedenoj tezi. Zanimljivo, jedini koštani pršljen iz cijelog uzorka (836 pršljenova u bazi podataka) koji je pronađen na lokalitetu Josipovac Punitovački-Veliko polje I[9] vrlo je sličan (oblikom, načinom izrade te zabilježenim vrijednostima veličine i težine) spomenutim koštanim alatkama 4. tisućljeća s lokaliteta Arslantepe koje su, pretpostavlja se, korištene za predenju vune.

Valja spomenuti rezultate još jedne analize (Vakirtzi 2014) koja je provedena na brončanodobnim alatkama iz Tasosa u sjevernoj Egeidi, a koja također sugerira da je ovaj težinski razred pršljenova korišten za predenju vune. Nasuprot tomu, kako bi se moglo presti punu dužinu lanenih vlakana, najpogodnije je koristiti teške pršljenove, težine između 100 i 150 g (Gleba & Mannering 2012: 10).

9 Koštani pršljenovi izuzetno su rijetki u Panonskoj nizini tijekom ovog razdoblja, a ovaj nalaz prvotno je objavljen kao koštani privjesak (Čataj 2009: 31).

using a drop spindle, a light whorl would be suitable for spinning fine, short fibres and heavy whorls would be chosen for coarser and longer fibres or for plying (Liu 1978: 99). In the examined assemblages, the difference between the dominance of light weighted spindle whorls in the Retz-Gajary sets and the dominance of heavy weighted spindle whorls in the Kostolac sets, accounts for a significant technological adjustment.

Both Michael Ryder (1968: 81) and Elizabeth Barber argued that whorls around 33 grams are suitable for long staple medium-heavy wool (Barber 1991: 52). Additionally, reported results of the technological analysis on the 4th and early 3rd millennium BC assemblages from Arslantepe, Turkey (Laurito et al. 2014) support this conclusion. Interestingly, a single bone spindle whorl in the entire (836 spindle whorls in the database) sample, which was recovered at Josipovac Punitovački – Veliko polje[9] highly resembles (in shape, production, and recorded size and weight values) the mentioned 4th millennium bone tools from Arslantepe, suggested for spinning wool.

It should be mentioned that results of another analysis (Vakirtzi 2014), of the North Aegean Early Bronze Age tools from Thasos, also propose that this particular spindle whorl weight class was used for spinning wool. Quite the opposite, in order to spin a full-length flax, it is ideal to use a heavy whorl, weighing between 100 and 150 grams (Gleba & Mannering 2012: 10).

9 Bone spindle whorls are very rare in the Pannonian Plain during this period and the particular find was initially published as a bone pendant (Čataj 2009: 31).

Iako vještina pojedinca do određene mjere može biti važnija od težine alatke (Kania 2015), znakovitu razliku u vučnoj snazi između kratkih životinjskih i dugih biljnih vlakana trebalo bi se moći prepoznati, ako ne u distribuciji alatki umjerenih/srednjih vrijednosti, onda svakako kroz zastupljenost ekstremno različitih kategorija pršljenova. Prve su vunene tkanine izuzetno rijetke i javljaju se tek od 4. tisućljeća pr. Kr. (Shishlina et al. 2003; Rast-Eicher 2014). S druge strane, količina peludi lana u uzorcima iz priobalnih naselja na švicarskim jezerima sugerira intenzivnu proizvodnju lana na prijelazu tisućljeća, a koja postaje još jasnije vidljiva zahvaljujući konkretnim ostacima tekstila pronađenim na ovim, izuzetno dobro očuvanim, lokalitetima (De Capitani et al. 2002: 115-120).

Bilo da je ona vezana uz ciljano korištenje određenih izvora vlakana, ili pak da ovisi o primjeni određenih tehnika, u usporedbi uzoraka retzgajarske i kostolačke kulture može se govoriti o određenoj razini standardizacije alatki. S druge strane, ako uzmemo kvalitetu predene niti kao parametar za usporedbu ove dvije proizvodne tradicije, također možemo objasniti razlike između ciljanih krajnjih proizvoda.

S obzirom na to da je u proučavanom razdoblju dokazano korištenje životinja za vuču (Fabiš 2005; Johannsen 2005; Isaakidou 2006), uprezanje životinja, povećana zemljoradnja te mobilnost i transport mogli su utjecati na pojačano korištenje tehnike uplitanja niti (vjerojatno za izradu teških konopa i užadi), kao što sugerira masivnost alatki kostolačke kulture.

Keramički pečati predstavljaju posebnu kategoriju nalaza koje se može povezati sa standardizacijom. Mnogi autori predlažu da su ti predmeti korišteni u proizvodnji tekstila (Mellart 1967: 220; Makkay 1984: 91; Barber 1991: 175; Budja 2003: 119), dok se o njihovom simboličkom aspektu nagađa kroz prizmu razvoja indeksa društvenih odnosa između različitih naselja na razini regije (Prijatelj 2007: 252). Hodder ih interpretira kao osobne predmete (Hodder 2006: 231), prvenstveno na temelju dva pečata pronađena u grobovima iz slojeva IV i VI na lokalitetu Çatalhöyük.

Pitanja o osobnom identitetu i statusu, koja su objašnjiva kroz pojam osobnog vlasništva ili iznimne umješnosti individue, moguće je postaviti i za kontekst ljudskih ukopa iz velike strukture kostolačke kulture na lokalitetu Đakovo-Franjevac. Iako na analiziranim lokalitetima retzgajarske kulture

Although the influence of tool's weight can be to a certain degree surpassed by a spinner's skill (Kania 2015), the substantial difference in tensile strength between the short animal and long plant fibres should be distinguishable, if not in the distribution of the moderate spindle whorl types, then in the distribution of the extremely different tool categories. First woolen textiles are exceptionally rare and appear only from the 4th millennium BC (Shishlina et al. 2003; Rast-Eicher 2014). On the other hand, level of flax pollen in the samples taken from the lake-shore settlements in Switzerland indicated an intensive flax production at the turn of the millennia, even more obvious thanks to the actual textile-remains recovered at these exceptionally preserved sites (De Capitani et al. 2002. 115–120).

Whether being connected to the more focused use of certain fibre materials or dependent on the application of specific techniques, when compared, a certain level of tool standardization may be argued for the Retz-Gajary and Kostolac samples. In addition, if we would use the spun thread quality as a parameter for distinction it might explain how substantially different end products were aimed for by these two production traditions.

Since animal traction has been attested for the period (Fabiš 2005; Johannsen 2005; Isaakidou 2006), harnessing of animals, increased agriculture, mobility and transport may all have promoted the intensified plying technique (maybe for heavy cords and ropes), as suggested by the massiveness of the Kostolac tools.

Ceramic stamps are a perculiar category of finds that might be connected to the standardization. Many authors proposed their use in textile production (Mellart 1967: 220; Makkay 1984: 91; Barber 1991: 175; Budja 2003: 119), while their symbolic aspect has been hypothesised through the development of indexes for social relationships between various settlements at the regional level (Prijatelj 2007: 252). Hodder interprets them as personal items (Hodder 2006: 231), mainly on the account of the two stamps found in burials at Çatalhöyük in levels IV and VI.

Questions regarding personal identity and status, explainable whether through ownership or craftsmanship, may be raised also on the account of human burials from the large Kostolac structure at Đakovo – Franjevac. Although no human burials were found at the analysed Retz-Gajari settlements, a large Furhenstich cemetery from Slovenia (Pod Kotom-jug pri Krugu), where spindle whorls

nisu ustanovljeni ljudski ukopi, veliko groblje s keramikom ukrašenom brazdastim urezivanjem iz Slovenije (Pod Kotom-jug pri Krugu), gdje su pršljenovi zabilježeni u nekoliko grobova (Šavel 2009), dokazuje važnost obrade vlakana već u 4. tisućljeću pr. Krista. Zanimljivo je istaknuti da su zooarheološke analize ostataka faune s te nekropole pokazale da su ovce/koze najčešće prisutne životinje (66,7%) pronađene u ukopima (Šavel 2009: 137). Pretpostavka da bi to moglo ukazivati na rano korištenje ovčje vune za proizvodnju tekstila mogla bi objasniti dominaciju pršljenova male težine u retzgajarskom uzorku.

Izuzev činjenice da su središnji i najveći prostori uvijek bili korišteni za predenje, rijetki metalni nalazi, otkriveni u istim kontekstima s pršljenovima, mogli bi dodatno naglašavati važnost barem jednog aspekta obrade vlakana. Sherratt (Sherratt 1997; 2006) je povezao vuču i vunu s društvenom stratifikacijom, objašnjavajući ih kao simbole elite, iako bi brončane sjekire pronađene u grobnim humcima moravske kulture ljevkastih pehara (njem. Trichterbecherkultur, eng. Funnel Beaker Culture), pronađene zamotane u lanenu tkaninu, mogle sugerirati da nisu samo vunene tkanine bile vezane uz prestiž (Baldia et al. 2008: 264-265). Drugi oblici specijalizacije pojedinih naselja tijekom kasnog eneolitika zabilježeni su u Srbiji, gdje je na nizu lokaliteta utvrđeno ciljano vađenje bakrene rudače, dok je na drugima i dalje vidljivo kontinuirano bavljenje stočarstvom (Kapuran & Milošević 2013: 24-26). Ukoliko su proizvodnja/nabavljanje i obrada vlakana pratile sličan uzorak upravljanja izvorima sirovine, kakav povezujemo s gospodarenjem izvorima bakra i metalurgijom. Čini se izglednim da je i u proizvodnji tekstila donekle moguće zamisliti neki oblik rane organizacije, specijalizacije, centralizacije i kontrole proizvodnog procesa.

Izostanak razreda lakih pršljenova (<30 g) povezanih s korištenjem kraćih životinjskih vlakana, i na Đakovo-Franjevcu i na Gomolavi, a koji može odražavati opću usmjerenost na predenje (i uplitanje) dugih biljnih vlakana (i niti), ukazuje na razvijenu specijalizaciju u tom razdoblju. Ne samo rezultati analize pršljenova, već i rijetki konkretni dokazi iz regije (nalazi pređe iz Ljubljanskog barja u Sloveniji)[10] te botanički ostaci (Reed 2016; Tolar et al. 2016), govore u prilog ideji o intenziviranju korištenja biljnih vlakana krajem 4. tisućljeća pr.

10 Očuvana vlakna iz Ljubljanskog Barja izrađena su od divljih biljnih vlakana iz porodice trava (*Poaceae*) (Pajagič-Bregar et al. 2009) i vlakana lišća rogoza (*Typha angustifolia*) (Greif 1997: 41).

were recorded in several graves (Šavel 2009), attest the importance of fibre processing already in the 4th millennium BC. Interestingly, zooarchaeological analysis of the faunal remains from the cemetery revealed that the sheep/goats were the most commonly (66.7 %) found animals in the burials (Šavel 2009: 137). If we consider that this might point to the early use of sheep wool for textiles, it could explain the dominance of the low weight values of spindle whorls in the Retz-Gajary sample.

Besides the fact that always the most central and the biggest spaces were allocated for spinning activities, rare metal objects recovered in the same contexts together with spindle whorls may further emphasise the relevance of at least one aspect of the fibre processing practice. Sherratt (Sherratt 1997; 2006) connected both the traction and the wool with social-stratification, explaining them as symbols of the elites, but copper axes from the burial mounds of the Moravian Trichterbecherkultur-Boleráz (Trichterbecherkultur or Funnel Beaker Culture) sites that were wrapped in flax-textiles, may propose not only woollen fibres had a high value (Baldia et al. 2008: 264–265). Other forms of settlement specialisation during the late Eneolithic were documented in eastern Serbia, where a number of sites exhibit a focused copper ore extraction, while others present a continued focus on animal husbandry (Kapuran and Milošević 2013: 24–26). It is plausible that early organisation, specialization, centralization and control associated with copper resources and metal work might be, to some extent, traced in the textile manufacture as well, if the fiber production/procurement and processing followed a similar pattern of the raw material management.

The absence of the light class spindle whorls (< 30 g), connected to shorter animal fibres, both at Đakovo – Franjevac and Gomolava, which may be reflecting a general focus on spinning (and plying) long plant fibres (and filaments), suggests a developed specialisation for the period. Not only the results of the spindle whorl analysis, but also the rare actual evidence from the region (yarn finds from Ljubljansko barje in Slovenia)[10] and the botanical remains (Reed 2016; Tolar et al. 2016) support the idea of intensified plant fibre use at the end of the 4th millennium BC. Expanding the Kostolac spindle whorl sample should provide some arguments for the

10 Preserved fibres from Ljubljansko Barje were made of wild plant fibre belonging to the family of grasses (*Poaceae*) (Pajagič-Bregar et al. 2009) and leaf-fibres of lesser bulrush (*Typha angustifolia*) (Greif 1997: 41).

Krista. Proširivanje uzorka tekstilnih alatki kostolačke kulture trebalo bi rezultirati dodatnim argumentima za hipotezu o specijalizaciji pojedinih naselja, u slučaju kada bi na proširenom uzorku lokaliteta bile zabilježene više frekvencije lakših pršljenova. Ako se to ne ostvari, drugo objašnjenje za izostanak razreda lakših pršljenova moglo bi biti to da su prelje i predioci koristili drugačije tehnike predenja, s obzirom na činjenicu da bi korištenje oslonjenih vretena omogućilo obradu kraćih životinjskih vlakana i finijih niti. Naposljetku, najuži zaključak bio bi taj da je proizvodnja tekstila, ako ne u potpunosti, onda u znatnoj mjeri ovisila o izvorima dugih biljnih vlakana. To bi značilo da je, u kontekstu intenzivne i organizirane proizvodnje, fokus bio stavljan na uzgajanje određenih vlakana, pri čemu je lan najizgledniji kandidat.

Prema iznesenim rezultatima analize tekstilnih alatki čini se da nije bilo prijelaza na masovnu produkciju tijekom dva proučavana tisućljeća. Niti jedan od analiziranih lokaliteta iz Panonske nizine nije pružio dokaze koji bi govorili u prilog industrijalizacije procesa, barem ne na razini koja je postignuta u istovremenoj proizvodnji tekstila na Bliskom Istoku (McCorriston 1997; Sagona & Zimansky 2009). Ipak, indikacije za postojanje rane specijalizacije, barem na razini radionice, dovoljno su jake i sugeriraju da se prvu pojavu organizirane proizvodnje može pratiti od vremena retzgajarskih i kostolačkih društava (4. tisućljeće pr. Kr.).

Razvojni procesi na pojedinim lokalitetima nisu bili predmetom ove analize. Pretpostavljeno je da prostorni raspored alatki u određenim jamskim strukturama izravno ocrtava primarni kontekst njihovog korištenja i/ili odbacivanja. Takva pretpostavka do određene mjere negira razlike između sistemskog i arheološkog konteksta (Schiffer 1976; 1985). Ovaj se pristup smatra valjanim zbog toga što rezultati analiziranih skupova nalaza pokazuju značajnu razinu standardizacije. Nadalje, neobično visoka frekvencija alatki u pojedinim kontekstima, koje su mogle biti korištene u raznim situacijama, te stoga nisu ograničene na pojavljivanje isključivo u okviru naselja, sugerira da se uvjerljivo intenzivna proizvodnja odvijala u i oko određenih struktura, zbog čega analizirane skupove nalaza ne treba odbaciti kao dokaze organiziranih i specijaliziranih proizvodnji na proučavanim lokalitetima, čak ni u slučaju da se radi o sekundarno odbačenim predmetima.

settlement specialization hypothesis, in the case that higher frequencies of lighter spindle whorls would be recorded on other sites. If that does not appear to be the case, another explanation for the absence of the lighter classes of whorls would suggest that a different spinning technique was used by Kostolac spinners, since the supported spinning would allow the use of heavy spindle whorls even for shorter animal fibres and finer threads. Finally, the most restrictive conclusion would be that their textile production was highly, if not exclusively dependable on long plant fibre resources. This could mean, that in the context of intensified and organized production, emense focus was placed on a particular fibre cultivation, with flax plant being the main candidate.

The results of the presented textile tool analysis propose that there was no transition to the mass production during the two studied millennia. None of the investigated sites of the Pannonian Plain region displayed evidence for industrialization of the process, at least not on the level achieved by the contemporary textile productions in the Near East (McCorriston 1997; Sagona and Zimansky 2009). Nonetheless, indications for an early specialisation, possibly on the workshop level are convincing enough to argue that the first manifestations of organized productions are traceable all the way to the Retz-Gajary and Kostolac societies (4th millennium BC).

This analysis did not take into account formation processes. It is assumed that the spatial layout of tools in the particular pit structures directly reflects their primary context of use and/or deposition. Such an assumption neglects to some extent the difference between the systemic and archaeological contexts (Schiffer 1976; 1985). It is held to be a valid approach, given the fact it was demonstrated by the results of the analysis that the investigated assemblages revealed a significant level of standardisation. Further, an unusually high frequency of tools, which can be used in a wide range of situations and are not at all limited to the settlement context for that matter, is suggestive of convincingly intensified manufacture in or around the particular features. Thus, even in the case that the analysed assemblages represent a secondary refuse, they should not be disregarded as a valid evidence of organized and specialized productions at the investigated localities.

Kako bi se moglo baviti određenim elementima tehnološkog kontinuiteta i njegovog odnosa s glavnim kulturološkim, društvenim i ekonomskim promjenama, potrebno je napraviti detaljnu analizu proizvodnje tekstila vučedolske kulture. Takva bi analiza mogla pružiti vrijedne podatke o daljnjem razvoju procesa specijalizacije koji je, kako se čini, već započeo u društvima srednjeg te se nastavio razvijati u razdoblju kasnog eneolitika.

Zaključci

Izostanak pršljenova među arheološkim nalazima može se objasniti nekolicinom faktora kao što su slaba očuvanost, ručno uplitane niti te obrasci naselja. Osim toga, praktičnost korištenja slobodnog pršljena za viseće vreteno dopušta obavljanje više zadataka istovremeno (Levy & Gilead 2013: 38). Dakle, ručno predenje je aktivnost koja se često odvija izvan sfere domaćinstva. Ipak, visoka frekvencija očuvanih pršljenova u proučavanim kontekstima ukazuje na porast proizvodnje pređe, što prelazi razinu proizvodnje u domaćinstvu.

Neizravni dokazi za eneolitičku proizvodnju predstavljeni u ovom radu ukazuju na intenzivnije prakse predenja u zajednicama koje su nastanjivale Panonsku nizinu. Očite tehnološke promjene u proizvodnom procesu koje su se odvijale tijekom 4. tisućljeća pr. Kr. zahtijevaju novu i prilagođenu perspektivu. Prvo, pojavu novih izvora sirovina treba sagledavati u širem kontekstu. Proizvodnja tekstila jedna je od najstarijih ljudskih tehnologija, što znači da su vlakna morala biti glavni dio strategija preživljavanja, ekonomije, pa čak i trgovine. Korištenje i vune i vlakana novog tipa lana (prilagođenog za tekstil, a ne ishranu) objašnjava ključne inovacije koje ne samo da su promijenile tehnološke aspekte proizvodnje, već su utjecale i na njezinu društvenu i ekonomsku važnost. Niti u jednoj od proučavanih ukopanih struktura u kojima je pronađen velik broj alatki nisu ustanovljeni dokazi na temelju kojih bi ih se moglo okarakterizirati kao stambene strukture. Nadalje, na Ivandvoru i Đakovo-Franjevcu, dvaju od lokaliteta s najvećom ustanovljenom koncentracijom pršljenova, nisu utvrđene nikakve karakteristike stambenih prostora. Vrlo je izgledno da su tijekom razdoblja kada je uvođena nova sirovina/e neke zajednice razvile organizirane sustave proizvodnje i obrade istih. Ovi prvi izvori kultiviranih vlakana vjerojatno su utjecali na specijalizaciju zanata i organizaciju rada, tako da se neke aktivnosti više

In order to address the specific elements of the technological continuity and its connection with the major cultural, social and economic changes, a detailed analysis of the succeeding Vučedol textile production is necessary. It could provide valuable information on further developments of the specialization process that, as it appears, already started in the Middle Eneolithic and continues to shape its form in the Late Eneolithic period.

Conclusions

Spindle whorl deficiency in the archaeological record may be explained by several different factors, such as poor archaeological preservation, finger twined products and settlement patterns. Additionily, the practicality of the spindle whorl when used for drop-spinning allows multi-tasking (Levy & Gilead 2013: 38). Thus, hand spinning is an activity quite often dislocated from the domestic sphere. However, a high frequency of efficient spindle whorls from the investigated contexts suggests a degree of yarn production intensification, which exceeds the household level.

Indirect evidence for the Eneolithic production presented in this study reveal an intensified spinning practice among the communities inhabiting the Pannonian Plain region. Obvious technological changes that occurred in the manufacturing process during the 4th millennium BC call for a new and modified perspective. First of all, the appearance of new raw materials is something that should be observed in a wider context. The manufacture of textiles is one of the oldest human craft technologies, which makes fibres an elementary part of subsistence and economy, even trade. Both wool and fibre flax (a new type of plant, selected for its fibre instead of nutritional traits) account for a crucial innovation, which noth only changed the technological aspects of the production, but also impacted its social and economical importance. None of the investigated pit structures that yielded a high number of tools revealed any evidence that would characterize them as residential dwellings. Furthermore, both Ivandvor and Đakovo–Franjevac, two of the sites that showed the higest concentration of spindle whorls are lacking the residential characteristics whatsoever. It is highly possible that during the period of the new raw material(s) introduction some communities developed organized systems for their production and processing. These first cultivated fibre resources most probably in-

nisu odvijale u domaćinstvima, već u radionicama. Iako spekulativno, izgledno je da se upravljanje ovim sirovinama moglo konsolidirati na razini naselja, kao što je to bio slučaj s drugim sirovinama u tom razdoblju. Lokaliteti Ivandvor i Đakovo-Franjevac mogli bi biti jedni od lokaliteta koji su bili korišteni u te svrhe. Janet Levy i Isaac Gilead, koji su istraživali tekstilnu proizvodnju 5. tisućljeća pr. Kr. na južnom Levantu, predložili su model koji sugerira da su se lanena vlakna proizvodila u određenim zonama, odakle su bila distribuirana u naselja i područja sa manje pogodnim okolišnim uvjetima. (Levy & Gilead 2012: 137).

Veliki skupovi nalaza pršljenova zabilježeni na lokalitetima Ivandvor i Đakovo-Franjevac ukazuju na visoku razinu proizvodnje pređe. Čak i ako ih se promatra kao sekundarne depozite, uzevši u obzir izostanak struktura stambenog karaktera, te dokaze koji upućuju na druge specijalizirane aktivnosti na dvaju istraživanim lokalitetima, obrađene je tekstilne alatke moguće interpretirati kao pokazatelje razvijenog zanata.

Predložena organizacija dijela procesa proizvodnje tekstila koja se odnosi na predenje sugerira da je eneolitička proizvodnja tekstila sudjelovala u društveno-ekonomskom razvoju, iako je, zbog izostanka izravnih dokaza, odnosno očuvanih tekstila, niti i užadi, teško odrediti da li su na to više utjecale strategije nabavljanja vlakana, važnost krajnjih proizvoda, ili pak oboje. Kako bi se moglo bolje razlučiti regionalnu razinu spomenutih procesa specijalizacije i organizacije zanata, predloženi pristup trebalo bi dodatno ispitati na većem broju susjednih lokaliteta iz istog vremenskog okvira te iste kulturno-povijesne asocijacije. Izložena prostorna analiza, koja bi obuhvaćala veći broj lokaliteta, mogla bi pružiti više podataka o ekonomskim vezama i savezima između eneolitičkih kulturnih skupina. Predloženo je da društvena složenost nekog društva sasvim korelira s demografskim varijablama poput veličine populacije (Feinman & Neitzel 1984; Feinman 2011). Nažalost, društva srednjeg i kasnog eneolitika su, zbog svog načina života i udaljenosti između naselja, posebno zahtjevna pri provođenju ovakvih analiza.

Na trenutnoj razini istraživanja, rezultati funkcionalne analize sugeriraju da glavni tehnološki aspekti proizvodnje tekstila ispoljavaju visoku razinu ovisnosti o kulturi. Kako bi se otkrilo jesu li uzroci ove tehnološke podudarnosti bili dijelom integralnih ekonomija ili su pak bili povezani s

fluenced the craft specialisation and organization, both of which possibly influenced certain activities to leave the household and enter a workshop. It is highly speculative, but managing these resources might have been consolidated on an inter-settlement level, like it was the case with other raw materials at the time. Both Ivandvor and Đakovo – Franjevac might be among localities that served this function. Janet Levy and Isaac Gilead who investigated the 5th Millennium BC textile production in the Southern Levant proposed that flax fibers were produced in the particular zones and then distributed among settlements situated in the areas with unsuitable environmental conditions (Levy & Gilead 2012: 137).

Large assemblages of spindle whorls recorded in particular deposits at Ivandvor and Đakovo – Franjevac are suggestive of a significant level of yarn production. Even if they were to be seen as secondary deposits, considering the lack of residential structures and the evidence that is supporting other specialised activities at both of the investigated sites, these tool concentrations can be interpreted as an indication of a developed spinning craft.

Proposed organization of the spinning part of the fabrication process indicated that the Eneolithic textile productions participated in the socioeconomic transition of the period, although, due to the absence of direct evidence of the textile craft, more precisely, preserved textiles, thread and cordage, it is hard to determine whether this is connected to the fibre procurement strategies or to the final produce importance, or possibly both. In order to gain a higher resolution for the regional perspective of the outlined processes of craft specialization and organization, the proposed approach should be further tested against a greater number of neighbouring sites belonging to the same temporal frame and culture-historical attribution. Proposed spatial analysis, which would cover a greater number of sites could provide more information on economic interconnection and alliance within Eneolithic cultural groups. It is suggested that the organisational complexity of a society positively correlates with demographic variables such as population size (Feinman & Neitzel 1984; Feinman 2011). Unfortunatelly, Middle and Late Eneolithic societies, due to their way of life and the dispersity of their settlements, are particularly challenging for this type of analysis.

drugim aspektima stvaranja „kulturnog" identiteta, potrebne su daljnje analize na razini većeg broja lokaliteta.

Iako se potvrđene aktivnosti predenja izvan domaćinstva mogu smatrati dokazom intenzivne proizvodnje, ili čak specijalizacije zanata, čini se da to nije bila široko rasprostiranjena i ustaljena praksa tijekom eneolitičkog razdoblja. U Panonskoj nizini moglo je doći do razvoja elita, iako je u proučavanom razdoblju teško odrediti tragove političke centralizacije, institucionalizirane hijerarhije ili pak privilegiranog pristupa izvorima sirovina. Osim toga, dokazi zanatske proizvodnje znatno variraju od lokaliteta do lokaliteta, stoga je povećanje uzorka alatki korištenih u proizvodnji tekstila nužna stavka u proučavanju ovih pitanja.

Unatoč činjenici da dokazi za specijalizaciju i složenost društva znatno variraju među ovdje proučavanim pojedinačnim lokalitetima, moguće je ustanoviti neke trendove. Otkrivene koncentracije alatki sugeriraju da je proizvodnja tekstila u proučavanom razdoblju bila na granici specijalizacije. Tehnički izvještaj i rezultati analize alatki pokazali su da alatke, koje odražavaju tehnološki razvoj, imaju potencijal da prošire razumijevanje pojedinih društveno-ekonomskih čimbenika. Nadalje, dobiveni rezultati otkrili su određene trendove i razvoje u smislu standardizacije alatki. Naposlijetku, prostorna distribucija nalaza ukazuje na organizaciju rada i intenzitet uključenosti aktera. Izuzev parametara *koncentracije*, *razmjera* i *intenziteta*, definirani su i određeni pokazatelji *konteksta* specijalizacije zanata. Iako ih je teško pripisati *zavisnoj specijalizaciji*, rijetki metalni predmeti i ljudski ukopi koji su kontekstualno vezani uz skupove nalaza pršljenova ukazuju na važnost i ulogu proizvodnje tekstila koja je bila utkana u svakodnevni život retzgajarskih i kostolačkih zajednica.

At this point of the research the results of the functional analysis suggest that main technological aspect of the textile manufacturing tends to display a high level of cultural dependency. Further inter-site investigations are needed to reveal if the reasons for this technological concordance lie in the integral aspects of their economies or they are connected to other aspects of the 'cultural' identity amassment.

Although attested extra-domestic spinning may be accepted as evidence of intensified production, or even craft specialization, it does not appear to be a widespread and established practice during the Eneolithic period. Nascent elites may be developing in the Pannonian Plain, even though traces of political centralization, institutionalized hierarchy or privileged access to raw material resources are hard to determine for the investigated period. In addition, the evidence of craft production is highly variable both from site to site, so the enlargement of the textile tool sample is necessary for addressing this specific questions.

Despite the fact that the evidence for craft production and social complexity varies greatly between the separate sites included in this study, some trends are observable. Detected tool concentrations suggest that textile productions of the period bordered with specialization. The technical report and the results of the tool analysis outlined that textile tools, reflective of the technological developments, hold the potential for broadening our understanding of the advancement of particular socioeconomic factors. Furthermore, the obtained results revealed certain trends and developments regarding the tool standardization and, finally, the spatial distribution of the finds suggested, besides the organization of labour, also the intensity of investment. Besides *concentration*, *scale* and *intensity* parameters, some indications for the craft specialization *context* were also detected. Although it is difficult to assign them to the *attached specialization*, rare metal objects and human burials, which were contextually associated with the whorl assemblages, attest to the importance and the role of textile production in the fabric of everyday life for Retz-Gajary and Kostolac communities.

Zahvale

Najiskrenije zahvaljujem svima koji su mi pružili priliku da dokumentiram i analiziram alatke korištene u proizvodnji tekstila za potrebe ovoga rada. Posebno zahvaljujem Tini Lelekoviću na tome što mi je ustupio originalne fotografije. Također posebno zahvaljujem istraživačkoj mreži *TOPOI Excellence Cluster* koja je omogućila provođenje ovog istraživanja. Osim toga, voljela bih zahvaliti istraživačkoj skupini *TOPOI A4 - TEXTILE REVOLUTION*, čiji su članovi uložili mnogo truda u to da me, svojim savjetima, usmjeravaju tijekom istraživanja.

Acknowledgments

I would like to express my deepest appreciation to all those who provided me the possibility to record and analyse textile tools for this study. In particular I am grateful to Tino Leleković for his courtesy regarding supplementing original photographs. A special gratitude I give to the *TOPOI Excellence Cluster* for making this research possible. Additionally, I would also like to acknowledge the *TOPOI A4 - TEXTILE REVOLUTION* research group, whose members invested full effort in guiding my research.

English translation: Ana Grabundžija

Literatura / Bibliography

Andersson Strand E. B. 2015, Textile Production at Birka. Household Needs or Organised Workshops?, *Northern Archaeological Textiles: NESAT VII,* Textile Symposium in Edinburgh, 5th-7th May 1999, 44-50.

Andersson Strand E. B. 2011, The organization of textile production in Birka and Hedeby, in: S. Sigmundsson (ed.), *Viking Settlements and Viking Society, Papers from the Proceedings of the Sixteenth Viking congressand Reykholt, 16th-23rd August 2009*, Reykjavik, University of Iceland Press, 1-17.

Andersson E. 2003, Textile production in Scandinavia during the Viking Age, in: L. Bender Jørgensen, J. Banck-Burgess, A. Rast-Eicher (eds.), *Textilien aus Archäologie und Geschichte,* Festschrift für Klaus Tidow, Neumünster, 46-62.

Barber E. J. W. 1991, *Prehistoric textiles: the development of cloth in the Neolithic and Bronze Ages with special reference to the Aegean,* Princeton University Press, Princeton.

Balen J. 2011, *Đakovo-Franjevac: Late Eneolithic site*, Musei Archaeologici Zagrabiensis Catalogi et Monographiae Vol VII, Zagreb, Arheološki muzej u Zagrebu.

Balen J. & Drnić I. 2014, Archaeological excavations at Barbarsko - a new contribution to understanding of the Middle Copper Age in northern Croatia, *Vjesnik Arheološkog muzeja u Zagrebu* 47 n.s., 39-76.

Baldia M. O., Frink D. S., Boulanger M. T. 2008, The Earthen Long-Barrow of Džbán, Moravia, Czech Republic and its Implications for the Interaction between the Nordic Funnel Beaker and the Southern Baden Culture, in: M. Furholt, M. Szmyt, A. Zastawny (eds.), *The Baden Complex and the Outside World.* Proceedings of the 12th Annual Meeting of the EAA in Cracow 19-24th September, 2006, *Studien zur Archäologie in Ostmitteleuropa* 4, 263-289.

Bohnsack A. 1981, *Spinnen und Weben. Entwicklung von Technik und Arbeit im Textilgewerbe,* Rowohlt, Reinbek.

Blackman M. J., Stein G. J., Vandiver P. B. 1993, The Standardization Hypothesis and Ceramic Mass Production: Technological, Compositional, and Metric Indexes of Craft Specialization at Tell Leilan, Syria, *American Antiquity* 58, 60-80.

Brumfiel E. M. & Earle T. K. 1987, Specialization, Exchange, and Complex Societies: an Introduction, in: E. M. Brumfiel & T. K. Earle (eds.), *Specialization, Exchange, and Complex Societies*, Cambridge University Press, Cambridge, 1-9.

Budja M. 2003, Seals, Contracts and Tokens in the Balkans Early Neolithic: Where in the Puzzle, *Documenta Praehistorica* 30, 115-130.

Chapman R. 1996, Inventiveness and Ingenuity? Craft Specialization, Metallurgy, and the West Mediterranean Bronze Age, in: V. G. Childe & B. Wailes (eds.), *CraftSpecialization and Social Evolution: In Memory of V. Gordon Childe,* University of Pennsylvania Museum of Archaeology and Anthropology, Philadelphia, 73-83.

Chapman R. 2003, *Archaeologies of Complexity,* London, Routledge.

Childe V. G. 1930, *The Bronze Age,* New York, Macmillan.

Childe, V. G. 1950, The Urban Revolution, *The Town Planning Review* 21, 3-17.

Childe V. G. 1951, *Man Makes Himself,* New York, New American Library.

Childe, V. G. 1958, *The Prehistory of European Society,* Harmondsworth: Penguin.

Chmielewski T. & Gardyński L. 2010, New frames of archaeometrical description of spindle whorls: a case study of the late eneolithic spindle-whorls from the 1C site in Grödek, District of Hrubieszów, Poland, *Archaeometry* 52 (5), 869-881.

Clark J. E. 1995, Craft Specialization as an Archaeological Category, *Research in Economic Anthropology* 16, 267-294.

Costin C. L. 1991, Craft Specialization: Issue in Defining, Documenting, and Explaining the Organization of Production, in: M. B. Schiffer (ed.) *Archaeological Method and Theory*, University of Arizona Press, Tuscon, 1-56.

Costin C. L. 2001, Craft Production Systems, in: G. Feinman & T. D. Price (eds.), *Archaeology at the Millennium: A Sourcebook,* Kluwer Academic/Plenum Publishers, New York, 273-327.

Costin C. L. & Hagstrum M. B. 1995, Standardization, Labor Investment, Skill, and the Organization of Ceramic Production in Late Prehispanic Highland Peru, *American Antiquity* 60, 619-639.

Crewe L. 1998, *Spindle Whorls. A study of form, function and decoration in prehistoric Bronze Age Cyprus,* Paul Aström Förlag, Jonsered.

Cross J. R. 1993, Craft Specialization in Non-stratified Societies, *Research in Economic Anthropology* 14, 61-84.

Crowfoot G. M. 1931, *Methods of Hand Spinning in Egypt and the Sudan*, Bankfield Museum Notes, ser. 2, no. 12, Halifax.

Čataj L. 2009, *Josipovac Punitovački - Veliko Polje I. Eneolitičko, brončanodobno i srednjovjekovno naselje (Eneolithic, Bronze Age and Medieval Settlement),* Zagreb, Hrvatski Restauratorsi zavod.

De Capitani A., Deschler-Erb S., Leuzinger U., Marti-Grädel E., Schibler E. 2002, Die jungsteinzeitliche Siedlung Arbon-Bleiche 3. Funde, *Archäologie im Thurgau 11,* Frauenfeld.

Dolfini A. 2013, The Gendered House: Exploring Domestic Space in Later Italian Prehistory, *Journal of Mediterranean Archaeology* 26 (2), 131-157.

Durman A. 1995, Psihologija naseljavanja telova, *Histria Antiqua* 1, 153-158.

Eerkens J. W. & Bettinger R. L. 2001, Techniques for Assessing Standardization in Artifact Assemblages: Can We Scale Material Variability?, *American Antiquity* 66, 493-504.

Fabiš M. 2005, Pathological alteration of cattle skeletons, evidence for the draught exploitation of animals?,in: J. Davies, M. Fabiš, I. Mainland, M. Richards, R. Thomas (eds.), *Diet and Health in Past Animal Populations: Current Research and Future Directions*, Oxbow Books, Oxford, 58-62.

Feinman G. M. 2011, Size, Complexity, and Organizational Variation: A Comparative Approach, *Cross-Cultural Research* 45, 37-58.

Feinman G. M. & Neitzel J. 1984, Too Many Types: An Overview of Sedentary Prestate Societies in the Americas, in: M. B. Schiffer (ed.), *Advances in Archaeological Method and Theory Vol. 7,* Academic Press, New York, 39-102.

Gilman A. 1996, Craft Specialization in Late Prehistoric Mediterranean Europe, in: V. G. Childe & B. Wailes (eds.), *Craft Specialization and Social Evolution: In Memory of V. Gordon Childe,* University of Pennsylvania Museum of Archaeology and Anthropology, Philadelphia, 67-71.

Gleba M. & Mannering U. 2012, Introduction: Textile Preservation, Analysis and Technology, in: M. Gleba & U. Mannering (eds.), *Textiles and textile production in Europe from Prehistory to AD 400,* Oxbow Books, Oxford, 1-26.

Greif T. 1997, Prazgodovinska kolišča na Ljubljanskem barju. Arheološka interpretacija in poskus rekonstrukcije načina življenja (The prehistoric pile dwellings in the Ljubljansko barje. An archaeological interpretation and attempted reconstruction of the way of life), *Arheo* 18, Ljubljana.

Grömer K. 2005, Efficiency and technique - experiments with original spindle whorls (Leistung und Technik - Experimente zum Spinnen mit Originalspinwirteln), in: P. Bichler, K. Grömer, R. Hofmann-de Keijzer, A. Kern, H. Reschreiter (eds.), "Hallstatt Textiles", Technical Analysis, Scientific Investigation and Experiment on Iron Age Textiles, *BAR International Series* 1351, 107-116.

Grömer K. 2016, *The Art of Prehistoric Textile Making. The development of craft traditions and clothing in Central Europe,* Natural History Museum Vienna, Vienna.

Gyulai F. 2010, *Archaeobotany in Hungary: seed, fruit, food and beverage remains in the Carpathian Basin from the Neolithic to the Late Middle Ages*, Budapest, Archaeolingua.

Hochberg B. 1979, *Spin, Span, Spun: Fact and folklore for Spinners,* Santa Cruz, California: B. and B. Hochberg.

Hodder I. 2006, *The Leopard's Tale: Revealing the Mysteries of Çatalhöyük*, London: Thames and Hudson.

Horváth L. A. & Virág Z. M. 2003, History of the Copper Age, in: S. Visy (ed.), *Hungarian Archaeology at the Turn of the Millennium*, Ministry of National Cultural Heritage, Budapest, 125-127.

Isaakidou V. 2006, Ploughing with cows: Knossos and the 'secondary products revolution', in: D. Serjeantson & D. Field (eds.), *Animals in the Neolithic of Britain and Europe*, Oxbow Books, Oxford, 95-112.

Johannsen N. 2005, Palaeopathology and Neolithic cattle traction: methodological issues and archaeological perspectives, in: Davies, J., Fabis, M., Mainland, I., Richards, M., Thomas, R. (eds.), *Diet and Health in Past Animal Populations: Current Research and Future Directions*, Oxbow Books, Oxford, 39-51.

Joyce R. A. & Gillespie S. D. 2000, *Beyond Kinship: Social and Material Reproductionin House Societies,* Philadelphia, University of Pennsylvania Press.

Jovanović B. 2009, Beginning of the metal age in the Central Balkans according to the results of the archaeometallurgy, *Journal of Mining and Metallurgy* 45(2), 143-148.

Jovanović M. 2011, Masters of Clay and Wheat, From the Life of Prehistoric Farmers in the Danube Basin, in: M. Jovanović (ed.), *Masters of Clay and Wheat,* Muzej Vojvodine, Novi Sad, 13-57.

Kania K. 2015, Soft yarns, hard facts? Evaluating the results of a large scale hand-spinning experiment, *Journal of Archaeological and Anthropological Sciences* 7, 113-130.

Kapuran A. & Milošević S. 2013, Rockshelter Mokranjske stene- a new late prehistoric site in Eastern Serbia region, *Archaeologia Bulgarica* 17(2), 17-37.

Laurito R., Lemorini C., Perilli A. 2014, Making Textiles at Arslantepe, Turkey, in the 4th and 3rd Millennia BC. Archaeological Data and Experimental Archaeology, in: C. Breniquet & C. Michel (eds.), *Wool Economy in the Ancient Near East and the Aegean.*

Ancient Textile Series 17, Oxbow Books. Oxford, 151-168.

Leuzinger U. & Rast-Eicher A. 2011, Flax processing in the Neolithic and Bronze Age pile-dwelling settlements of eastern Switzerland, *Vegetation History and Archaeobotany* 20 (6), 535-542.

Levy J. & Gilead I. 2012, Spinning in the 5th millennium in the southern Levant: Aspects of the Textile Economy, *Paléorient* 38 (1), 129-141.

Levy J. and Gilead I. 2013, The Emergence of the Ghassulian Textile Industry in the Southern Levant Chalcolithic Period (c. 4500- 3900 BCE), in: M.-L. Nosch, H. Koefoed, E. Andersson Strand (eds.), *Textile Production and Consumpion in the Ancient Near East - Archaeology, Epigraphy, Iconography. Ancient Textile Series* 12, Oxbow Books, Oxford and Oakville, 26-44.

Leleković, T. 2007, Ivandvor, *Hrvatski arheološki godišnjak* 4, 12-15.

Liu R. K. 1978, Spindle whorls part I: some comments and speculations, *The Bead Journal* 3, 87-103.

Mårtensson L., Andersson E., Nosch M. L., Batzer A. 2006, *Technical report - Experimental archaeology - Part 1, 2005-2006*, Copenhagen, Centre for Textile Research.

On line: http://ctr.hum.ku.dk/tools/Technical_report_1_experimental_archaeology.pdf

Maier U. 2001, Archäobotanische Untersuchungen in der neolithischen Ufersiedlung Hornstaad-Hörnle IA am Bodensee, in: U. Maier & R. Vogt (eds.), *Siedlungsarchäologie im Alpenvorland VI. Botanische und pedologische Untersuchungen zur Ufersiedlung Hornstaad-Hörnle IA,* Forschungen und Berichte zur Vor-und Frühgeschichte in Baden-Württemberg 74, 9-384.

Makkay J. 1984, Early Stamp Seals in South-East Europe, Budapest, Akademiai Kiadö.

McCorriston J. 1997, Textile Intensification, Alienation, and Social Stratification in Ancient Mesopotamia, *Current Anthropology* 38(4), 517-549.

Mellaart J. 1967, Çatal Hüyük: A Neolithic Town in Anatolia, London, Thames and Hudson.

Pajagič-Bregar G., Velušček A., Tolar T., Strlič M., Bukošek V., Kolar J., Ravbar I. 2009, Raziskave in konserviranje preje z Ljubljanskega barja / Analysis and conservation of the Ljubljansko barje yarn, in A. Velušček (ed.), Koliščarska naselbina Stare gmajne in njen čas. Ljubljansko barje v 2. polovici 4. tisočletja pr. Kr. / Stare gmajne Pile-Dwelling Settlement and its era. The Ljubljansko barje in the 2nd half of the 4th millennium BC, *Opera Instituti Archaeologici Sloveniae* 16, 309-318.

Parkinson W. A. 2006, The social organization of Early Copper Age tribes on the Great Hungarian Plain, *BAR International Series* 1573, Oxford, Archaeopress.

Perlès C. & Vitelli K. 2000, Craft Specialization in the Neolithic of Greece, in: P. Halstead (ed.), *Neolithic Society in Greece,* Sheffield Academic Press, Sheffield, 96-107.

Petrović J. & Jovanović B. 2002, *Gomolava - naselja kasnog eneolit*a, Novi Sad - Beograd.

Prijatelj A. 2007, Digging the Neolithic Stamp-Seals of SE Europe from Archaeological Deposits, Texts and Mental Constructs, *Documenta Praehistorica* 34, 231-256.

Rast-Eicher A. 2014, Bronze and Iron Age Wools in Europe, in: C. Breniquet & C. Michel (eds.), *Wool Economy in the Ancient Near East and the Aegean, Ancient Textile Series vol. 17*, Oxbow Books, Oxford, 12-21.

Reed K. 2016, Agricultural change in Copper Age Croatia (ca. 4500-2500 cal B.C)?, *Archaeological and Anthropological Sciences,* SpringerLink DOI: 10.1007/s12520-016-0330-3

Robin C. & Rothschild N. 2002, Archaeological ethnographies: social dynamics of outdoor space, *Journal of Social Archaeology* 2, 159-72.

Roux V. 2003, Ceramic Standardization and Intensity of Production: Quantifying Degrees of Specialization, *American Antiquity* 68, 768-782.

Ryder M. L. 1968, The origin of spinning, *Textile History* 1 (1), 73-82.

Sagona A. & Zimansky P. 2009, *Ancient Turkey*, New York, Routledge.

Sassaman, K. E. 1998, Crafting Cultural Identity in Hunter-Gatherer Economies, in: P. Costin & R. P. Wright (eds.), *Craft andSocial Identity,* American Anthropological Association, Arlington, 93-107.

Schiffer M. B. 1976, *Behavioral Archeology*, Academic Press, New York.

Schiffer M. B. 1985, Is There a "Pompeii Premise" in Archaeology?, *Journal of Anthropological Research* 41, 18-41.

Schlichtherle H. 2009, Eine neue Siedlungskammer im westlichen Federseeriedund ihre Bedeutung für das Verständnisneolithischer Siedelsysteme, in: J. Biel, J. Heiligmann, D. Krausse (eds.), *Landesarchäologie. Festschrift für Dieter Planck zum 65. Geburtstag. Forschungen und Berichte zur Vor und Frühgeschichte in Baden-Württemberg 64*, Theiss. Stuttgart, 61-86.

Schlichtherle H., Bleicher N., Dufraisse A., Kieselbach P., Maier U., Schmidt E., Stephan E., Vogt R. 2010, Bad Buchau - Torwiesen II: Baustrukturen und Siedlungsabfälle als Indizien der Sozialstruktur und Wirtschaftsweise einer endneolithischen Siedlung am Federsee, in: E. Claßen T. Doppler & B. Ramminger (eds.), *Familie - Verwandtschaft - Sozialstrukturen: Sozialarchäologische Forschungen zu neolithischen Befunden. Fokus Jungsteinzeit*, Berichte der AG - Neolithikum 1. Kerpen – Loogh, 157-178.

Selmeczi L. 1969, Das Wohnhaus der Körös-Gruppe von Tiszajenő. Neuere Angaben zu den Haustypen des Frühneolithikums, *A Mora Ferenc Múzeum Évkönyve* 2, 17-22.

Shott M. J. 1993, *The Leavitt Site: A Parkhill Phase Paleo-Indian Occupation in Central Michigan, Memoirs No. 25,* Ann Arbor, Museum of Anthropology, University of Michigan.

Shishlina N. I., Orfinskaya O. V., Golikov V. P. 2003, Bronze Age Textiles from North Caucasus: new evidence of fourth millennium BC fibers and fabrics, *Oxford Journal of Archaeology* 22 (4), 331-344.

Souvatzi S. 2008, *A Social Archaeology of Households in Neolithic Greece: An Anthropological Approach,* Cambridge, Cambridge University Press.

Šavel I. 2009, *Pod Kotom - jug pri Krogu I/II*, Arheologija na avtocestah Slovenije, Ljubljana.

Sherratt A. G. 1997, *Economy and Society in Prehistoric Europe: Changing Perspectives,* Edinburgh, Edinburgh University Press.

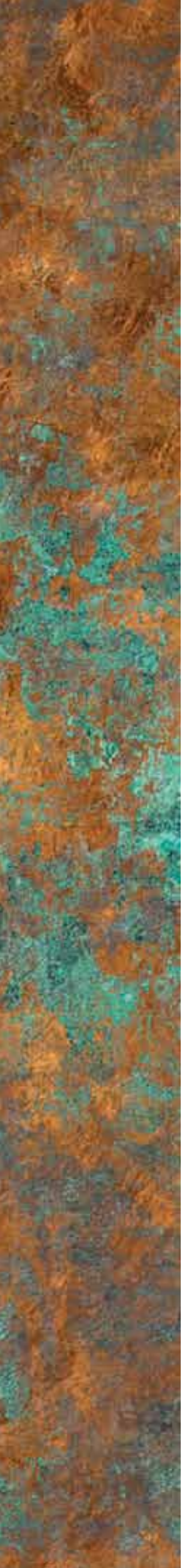
Šljivar D. 2006, The earliest copper metallurgy in the Central Balkans, *Association of Metallurgical Engineers of Serbia* 12, 93-104.

Tasić N. 2003-2004, Historical picture of development of Bronze Age cultures in Vojvodina, *Starinar* 53-54, 23-34.

Tolar T., Jacomet S. & Velušček A. 2016, Cereal chaff used as temper in loom-weights: new evidence from a Slovenian Eneolithic pile-dwelling site (ca. 3100 cal. BC), *Vegetation History and Archaeobotany* 25 (3), 291-301.

Vakirtzi S., Koukouli-Chrysanthaki C., Papadopoulos S. 2014, Spindle whorls from two prehistoric sites on Thassos, in: M. Harlow, C. Michel, M. L. Nosch (eds.), *Prehistoric, Ancient Near Eastern and Aegean Textiles and Dress. An interdisciplinary anthology,* Oxbow Books, Oxford and Philadelphia, 43-57.

Verhecken A. 2010, The moment of inertia: a parameter for the functional classification of worldwide spindle-whorls, in: E. Andersson Strand, M. Gleba, U. Mannering, C. Munkholt, M. Ringgaard (eds.), *North European symposium for archaeological textiles X,* Oxbow Books, Oxford and Oakville, 257-270.



Eksploatacija soli u eneolitiku

The exploitation of salt in the eneolithic

Ivana Pandžić

Muzej Republike Srpske
Museum of Republic of Srpska
Banja Luka
ivanapandzic@gmail.com

Natrijum hlorid (NaCl) poznatiji kao kuhinjska, morska, kamena, varena, vakumirana ili jednostavno sol, veoma je značajna za život. Odsustvo soli izaziva bitne poremećaje u fiziološkom funkcionisanju ljudskog i životinjskog organizma jer bez neophodnih minimalnih količina naši organizmi ne bi mogli opstati (Buljugić 1990: 6). Teško je reći od kada datira, ali se pretpostavlja da je upotreba soli nastupila još tokom kamenog doba, u periodu promjene ekonomije, prelaska sa lovačko - sakupljačke privrede na poljoprivredu i stočarstvo (domestifikaciju/ uzgoj životinja i žitarica i sedentarni način života) tadašnjeg stanovništva. Korištena je kao dodatak ishrani, kako čovjeka tako i životinja, upotrebljavala se za konzerviranje prehrambenih proizvoda, naročito ribe i mesa, zatim za štavljenje kože, prilikom izvođenja pojedinih rituala, a pogotovo kao lijek (i danas se ljekovitost solnih voda najviše koristi kod liječenja oboljenja reumatizma, išijasa, ženskih bolesti i dr., dok korištenje solnih rastvora u inhalatoru liječi probleme disajnih puteva). Vremenom je počelo i njeno korištenje kao sirovine ili pomoćne materije i u hemijskoj proizvodnji (Imamović 1990: 19; Buljugić 1990: 6). Drevni narodi ulagali su velike napore kako bi dobili sol, tako što su je sami proizvodili ili sticali putem trgovine: sol se smatra jednom od prvih roba kojima se trgovalo i vršila razmjena. Na osnovu količine proizvodnje soli, mogao bi se izvesti zaključak o stepenu razvijenosti stanovništva jednog područja ali i o razvijenosti trgovine te oblasti (Buljugić 1990: 6).

Sodium chloride (NaCl), better known as kitchen, sea, rock, welded, vacuumed, or, simply, salt, is very significant for life. The lack of salt causes serious disturbances in the physiological functioning of human and animal organisms, because our organisms could not survive without the necessary minimal requirements (Buljugić 1990: 6). It is difficult to date it precisely, but it is assumed that the use of salt started during the Stone Age, a period when the economy of the populations changed from hunting and gathering to agriculture and animal husbandry (domestication/growing animals and plants, followed by a sedentary way of life). It was used as a supplement in the diets of both man and animals, it was used to preserve produce, especially fish and meat, in tanning hide, in certain rituals, and especially as a medicine (even today, salt water is used in curing rheumatism, sciatica, female diseases and the like, and salt inhalators are used to cure respiratory problems). With time, it was also used as a raw material or auxiliary material in chemical production (Imamović 1990: 19; Buljugić 1990: 6). Ancient peoples worked very hard to obtain salt, either by producing it themselves or obtaining it through trade: salt is thought to be one of the first goods used in trade and exchange. Based on the level of salt production, it is possible to make conclusions about the degree of development of a population in a given area, but also on the level of trade in the area (Buljugić 1990: 6).

Istraživanja eksploatacije i konzumiranja soli veoma su različite u zavisanosti da li istražujemo prirodno, materijalno i nematerijalno nasljeđe, potragu za solju, tehnike eksploatacije i upotrebe alatki, tehnike dobijanja različitih proizvoda, transport, način ishrane ljudi i životinja, konzervaciju hrane. S druge strane, teme istraživanja uključuju i pokretljivost ljudi i životinja, eksploataciju divljači, simboličku upotrebu soli (mitologija, religija, kultovi i rituali, vjerovanja, sujeverja, magija i zavjeti), narodnu književnost (priče, razgovore i pregovore) i kulturnu literaturu, kontrolu solnih resursa, sukobe, strateške vrijednosti, geografske percepcije, profesije vezane za eksploataciju soli i njezinu upotrebu, ekonomske, pravne i administrativne propise, rječnik, toponimiju, kao i same potrošače (Alexianu 2015: 1). Iako ništa nije ostalo od samih proizvoda, arheološka realnost eksploatacije soli utvrđena je na terenu pomoću različitih vrsta dokaza koji informišu o primijenjenim tehnikama (slivovi, keramika ili akumulacije uglja), ili indirektno o uticaju na životnu sredinu, teritorijalnu organizaciju ili distribuciju robe. Sve informacije koje posjedujemo odnose se na tehnologiju korištenu za sakupljanje/dobijanje soli ili za mjesto na kojem se eksploatacija dešavala (Harding 2013: 111).

Sol se u prirodi javlja u obliku kamene soli ili impregnirana sa okolnim sedimentima ali i rastvorena u vodi (morskoj, slanim jezerima i izvorima), kao stepska sol (izmiješan pijesak sa solju nakon sušenja vode) ili u vulkanskom eruptivnom kamenju (Jovanović 1941: 127). Od praistorije, kamena sol, slana jezera i izvori slane vode bili su veliki izvori soli u unutrašnjosti kopna, dok se u priobalnim područjima sol dobijala iz morske vode. Veoma je bitna činjenica da danas imamo više podataka vezano za eksploataciju kontinentalnih nego morskih izvora soli tokom praistorije (Urem-Kotsou 2016: 128). Pretpostavlja se da je prvobitna sol sakupljana na obalama mora, slanih jezera i/ili slanih izvora tokom perioda maj - septembar (kada su najveće vrućine, a samim tim i najviši stepen isparavanja). Vremenom ljudi su naučili kako se sol može proizvesti, i to na tri načina: rudarenjem kamene soli, prirodnim isparavanjem slane vode u plitkim bazenima ili prisilnim isparavanjem koje se postiže zagrijavanjem slane vode na posebnim pećima, a kasnije i pomoću drvenih instalacija (korita i ograda). Pri tome slana voda koja se koristila mogla je biti morska, iz slanih izvora, a mogla se dobiti i ispiranjem iskopane kamene soli (Forenbaher 2013:

Research into the exploitation and use of salt greatly differs depending on what is studied – natural, material or immaterial heritage, the search for salt, exploitation techniques and tool usage, techniques used to obtain different products, transport, human and animal dietary habits, or food preservation. On the other hand, research topics also include the transit of people and animals, the exploitation of wild game, the symbolic use of salt (mythology, religion, beliefs, superstitions, magic and vows), folk literature (stories, conversations and prefaces) and cultural literature, the control of salt resources, its strategic value, the geographic perception, professions related to the exploitation of salt and its use, the economic, legal and administrative regulations, the vocabulary, toponymy, and the users themselves (Alexianu 2015: 1). Even though there are no remains of the products, the archaeological reality of salt exploitation was confirmed in the field with the help of different kinds of evidence that indicate specific techniques (confluences, pottery or coal accumulation), or indirectly attest to the marks salt left in a living area, on the organization of territory or the transfer of goods. All available information refers to the technology used to collect/obtain salt, or places of exploitation (Harding 2013: 111).

In nature, salt appears either as rock salt, or integrated with surrounding sediments, as well as melted in water (sea, salty lakes and springs), as steppe salt (sand mixed with salt after the water dries out), or in volcanic eruptive rocks (Jovanović 1941: 127). Since prehistory, rock salt, salty lakes and saltwater springs were big sources of salt on inland territories, while, on the coast, salt was obtained from sea water. It is very important to note that there is more available data on inland than coastal salt exploitation during prehistory (Urem-Kotsou 2016: 128). It is assumed that salt was originally collected on the coasts of seas, salty lakes and/or saltwater springs during the period between May and September (the greatest heats and the highest degree of evaporation). In time, people learned to produce salt in three ways: by mining rock salt, through the natural evaporation of salty water in shallow pools, or through forced evaporation that is achieved by heating salty water in special kilns, and, later, with the help of wooden installations (troughs and fences). In these processes, the salty water could have originated from the sea or saltwater springs, but could also be obtained by washing out mined rock salt (Forenbaher 2013: 179-194). In territories that are far from the sea or a saltwater spring, an impor-

179-194) Za područja udaljena od mora i bez izvora slanice, bitnu ulogu igrale su biljke koje sadrže određene količine natrijum hlorida. Sol je dobijana spaljivanjem biljaka i rastvaranjem njihovog pepela. Takve biljke se nalaze i u našim krajevima a najpoznatija i najčešća je rusmarin (*Rosmarinus officialis)*. Navedenu metodu koristili su Indijanci, a danas ju koriste pojedina plemena Papuanaca u Novoj Gvineji (Imamović 1990: 22).

Dok u Sredozemlju jaka insolacija i suhi vjetrovi omogućavaju prirodno isparavanje, sjevernije u Evropi proizvodnja soli nije moguća bez prisilnog isparavanja (Forenbaher 2013: 179-194). Pretpostavlja se da je prva „ekspolatacija" soli vršena tokom ljeta kada je sunčevom toplotom dolazilo do isparavanja/evaporacije brojnih solnih izvora i potoka, ostavljajući pri tome koru kristala soli na površini, nakon čega se sol sakupljala i koristila. Kako je sunce samo sredinom ljeta dovoljno toplo da proizvede razumnu količinu soli, bilo je neophodno da se nađu drugi metodi eksploatacije (Harding 2016: 213). Jedan od najranijih načina dobijanja soli, koji je arheološki dokumentovan u centralnoj i sjevernoj Evropi, bilo je isparavanje rastvorene kamene soli tehnikom briketaže, a koja uključuje iskuhavanje rastvora soli ili slanice u keramičkim posudama do tačke ključanja. Najranija briketaža prema dostupnim izvorima evidentirana je u centralnoj Evropi i potiče iz ranog neolita (sredina 5. milenijuma p.n.e.). Na zapadnom Sredozemlju najraniji dokazi proizvodnje soli datiraju iz perioda srednjeg neolita (kraj 5. milenijuma p.n.e.) ali se odnose na rudarstvo kamene soli, dok na istočnom Mediteranu dokazi eksploatacije i korištenja soli nose datum već iz ranog neolita u Anadoliji (7. milenijum p.n.e.) i bronzanog doba u Egeji. Očekuju se i pronalasci jasnih dokaza tehnika rane eksploatacije soli u području jezera Tuz Gölö u centralnoj Anadoliji, gdje se kristalisana sol nastala isparavanjem iz slanog jezera prikupljala sa površine. Prikupljanje morske soli iz prirodnih „solana" (npr. bazeni kamene soli pored mora) i slanih rastvora isparavanjem u posudama, jedini su konkretni dokazi eksploatacije i upotrebe soli u Egeju do sada. U jugoistočnoj Evropi najranija proizvodnja soli datira još od ranog neolita (kraj 7. milenijuma p.n.e.), a tehnike koje se korištene u ovoj ranoj proizvodnji soli još uvek nisu u potpunosti razjašnjene, ali ne uključuju briketažu (Weller 2002; Kopaka & Chaniotaki 2003; Weller & Dumitroaia 2005; Atalai & Hastorf 2006; Erdogu & Ozbasaran 2008; navedeno prema Urem-Kotsou 2016: 129).

tant role was played by plants that contain large amounts of sodium chloride. Salt was obtained by burning plants and searching through the ashes. Such plants grew on our territories, and the best known and common one is rosemary - *Rosmarinus officialis*. The described method was used by Indians, and is still used by Papua tribes in New Guinea (Imamović 1990: 22).

While the insolation and dry winds make natural evaporation possible in the Mediterranean, in more northern parts of Europe it is not possible to produce salt without forced evaporation (Forenbaher 2013: 179-194). It is assumed that the first "exploitation" of salt took place during the summer when the heat of the sun caused vaporization/evaporation of numerous saltwater springs and streams, leaving a crust of salt crystals on the surface that could then be collected and used. As the sun is only warm enough to produce a reasonable amount of salt in the middle of summer, it was necessary to find other methods of exploitation (Harding 2016: 213). One of the earliest archaeologically documented ways of obtaining salt, at least in central and northern Europe, is the evaporation of rock salt solutions by using the briquetage technique, which includes the heating of brine or saline water in ceramic vessels until it reaches boiling point. According to available sources, the earliest briquetage was recorded in the Early Neolithic (middle of the 5th millennium BC) of central Europe. In the western Mediterranean, the earliest evidence of salt production can be dated to the Middle Neolithic (end of the 5th millennium BC), but it refers to mining rock salt. In the eastern Mediterranean, evidence of salt exploitation and use can be dated to the Early Neolithic in Anatolia (7th millennium BC) and to the Bronze Age in the Aegean. It seems likely that clear evidence of early salt exploitation will emerge in the area of the Tuz Gölö Lake in central Anatolia, where crystalized salt, created by evaporation of lake water, was collected from the surface. The collecting of salt from natural "salt works" (e.g. pools of rock salt near the sea), and salty solutions through evaporating in vessels, are, so far, the only clear pieces of evidence of salt exploitation and use in the Aegean. In southeastern Europe, the earliest salt exploitation can be dated to the Early Neolithic (end of the 7th millennium BC), but the applied techniques are still not fully understood. However, it seems they did not involve briquetage (Weller 2002; Kopaka & Chaniotaki 2003; Weller & Dumitroaia 2005; Atalai & Hastorf 2006; Erdogu & Ozbasaran 2008; navedeno prema Urem-Kotsou 2016: 129).

Što se tiče samog načina procesa dobijanja soli briketažom, Forenbaher u svom radu (2013: 185-187) u opisu navodi dvije faze. U prvoj fazi proizvodnje, slana voda iz mora ili iz slanih izvora grijana je u širokim plitkim zemljanim posudama debelih zidova. Za ovaj postupak bila je potrebna velika količina goriva, drveta ili drvenog ugljena, a vatru je trebalo neprestano održavati i nadzirati kako posude ne bi popucale.[1] Dok je voda postepeno isparavala, iz zasićenih otopina obarali su se kristali soli i na dnu posude sakupljala se slana kaša. Za ovu fazu proizvodnje često se koristi izraz «prokuhavanje», iako se voda ne mora nužno zagrijavati do ključanja. Sličan postupak, pod nazivom «varenje», koristio se u tuzlanskoj solani sve do 1939. godine. Druga faza proizvodnje podrazumijevala je premještanje koncentrisanih otopina soli u glinene kalupe. U njima se slana kaša prosušivala na posebnoj vrsti peći, sve dok se ne bi formirali kompaktni tzv. kolačići soli. Ukoliko je sol bila prljava, dodavala se slatka voda te se postupak ponavljao, sve dok se nečistoće ne uklone. Glineni kalupi obično su ujednačenih oblika i dimenzija, naročito u proizvodnim središtima kasnijih perioda (npr. iz perioda željeznog doba). Napravljeni su za jednokratnu upotrebu jer ih treba razbiti prilikom vađenja tvrdog kolačića. To se može učiniti na mjestu proizvodnje, ali kalup je mogao poslužiti i kao ambalaža za transport. Kalupi su se proizvodili masovno, oblaganjem drvene matrice glinom, čime se osiguravala identičnost proizvedenih kolačića. Standardizovani kolačići soli ujednačene vrijednosti bili su idealni za razmjenu. Konstrukcija i način upotrebe peći za prosušivanje slane kaše dobro su poznati zahvaljujući sada već obilnijoj arheološkoj građi, etnografskim izvorima i eksperimentalnoj arheologiji.

Na ravnu, blago ukopanu površinu tla slažu se u pravilnim razmacima uspravni vretenasti podupirači napravljeni od pečene zemlje. Na svaki podupirač stavlja se po jedan zemljani kalup za prosušivanje slane kaše. Tlocrtne dimenzije etnografskih primjera takvih peći su oko 3 x 5 metara, a sastavljene su od stotinjak potpornih stubića i isto toliko kalupa. Zbog stabilnosti, potpornji i kalupi međusobno se povezuju mekim grudvicama sirove gline. Peć se nakon toga zatvara sa svih strana zidovima od gline i ulomaka polomljenog briketaža, s tim da je ostavljan otvor za loženje i provjetravanje. Kako

1 Prilikom pregleda materijala sa iskopavanja iz perioda 2007. – 2009. godine u Muzeju istočne Bosne u Tuzli, uočen je sistem ispucalosti koničnih fragmenata posuda na jednoj strani, po istom sistemu pucanja (IP).

When it comes to the sole process of obtaining salt through briquetage, in his paper, S. Forenbaher (2013: 185-187) describes two phases. During the first phase of production, salty water from the sea or saltwater springs was heated in wide shallow clay vessels with thick walls. This procedure required large amounts of fuel, wood or charcoal, and the fire needed to be continuously maintained and supervised so that the vessels would not break.[1] As the water gradually evaporated, the salt crystals fell to the bottom of the saturated solution, creating a salty mixture. This phase of production is often called “boiling”, although the water does not to reach boiling point. A similar process, called “brewing” was used in the salt works at Tuzla until 1939. The second phase of production included the transfer of saturated solutions into clay molds. In them, the salty mixture was dried on a special type of kiln until compact, so called, salt cakes, were formed. If the salt was impure, fresh water was added and the process was repeated until all of the impurities were removed. Clay molds were usually uniform in shape and size, especially in production centers from later periods (e.g. the Iron Age). They were made for single use because they had to be broken to extract the hard cake. This could be done at the place of production, but the mold could also be used as packaging for transport. The molds were mass produced by covering a wooden matrix with clay, thereby ensuring that the produced cakes were identical. Standardized salt cakes of uniform value were ideal for trade. The construction and the ways in which kilns were used to dry out the salty mixture are well known due to the quite abundant archaeological material, archaeological sources and experimental archaeology.

Upright spindly supports made out of fired clay were placed onto flattened and slightly dug out soil. A mold was then placed on each support to dry out the salty mixture. Ethnographic examples of such kilns show that the layout size of such kilns was 3x5 m, and that they were composed of about a hundred supports and the same number of molds. For stability, the supports and the molds were connected by small clumps of raw clay. After this, the kiln was closed off on all sides by walls made of clay and fragments of broken briquetage, with an exhaust hole for feeding the fire and letting in fresh air. As reported further on, the experiments and

1 During the analysis of material from the excavations conducted between 2007 and 2008 at the Museum of Eastern Bosnia in Tuzla, a system of cracks was registered on one side of conical pedestals, and it followed a uniform pattern (IP).

se dalje navodi, prema provedenim eksperimentima i etnografskim podacima, isušivanje slane kaše na laganoj vatri, pri temperaturi od oko 100°C, moglo je trajati između 12 i 24 sata. Nakon hlađenja, sol se vadila iz kalupa ili se odnosila u kalupima, pri čemu se peć rušila i rastavljala. Neoštećeni dijelovi briketaža (posebno potporni stubići) mogli su se ponovo upotrijebiti. Najprepoznatljiviji dio briketaže i jesu potporni stubići koji su, da bi bili korišteni u istoj peći, morali biti jednakih dimenzija, te su vjerovatno izrađivani unaprijed i serijski. Sastav gline trebalo je prilagoditi tek toliko da se ne raspuca na vatri. Budući da se radi o upotrebnim predmetima kratkog vijeka trajanja, nije ih trebalo ukrašavati. Naročito su karakteristični stubići kojima je jedan kraj zaravnjen ili konkavan te blago proširen, a drugi se račva u tri jednaka roščića. Trorogi završetak mogao je biti okrenut prema gore, ali i prema dole, što je vjerojatno zavisilo od podloge na koju su stubići postavljani. Njihova orijentacija može se odrediti prema tragovima pečenja jer je vrh stubića bio izložen oksidaciji znatno više nego baza (Forenbaher 2013: 179-194).

Za period paleolita nemamo nikakvih dokaza o interesovanju ljudi za sol osim lokacija staništa ili boravka ljudi a koji su u blizini izvora soli, kao i pretpostavku da su dovoljan unos soli ostvarivali prirodnim putem ishrane. Prvi opipljiv dokaz o konzumaciji soli iz rane praistorije datovan je kao mezolitski sa lokaliteta Provanse, gdje su nađeni ostaci drvene ograde koja je, pretpostavlja se, korištena za evaporaciju slanice.

Eksploatacija soli tokom neolita i eneolita u nekim slučajevima čini se posebno dinamičnom zbog značajnih količina keramičkih fragmenata nađenih oko određenih solnih izvora, ponekad povezanih sa strukturama sagorjevanja ili ostataka. Postojeći podaci o ekspolataciji soli su oskudni, a najraniji pouzdani dokazi dolaze sa nedavno iskopanog lokaliteta Poiana Slatinei u Lunci u Rumuniji, gdje keramika ranog neolita i radiokarbonski datumi ukazuju na eksploataciju solnih izvora od kraja 7. milenijuma prije nove ere. Ogromne količine pepela, uglja i spaljene zemlje bez dokaza o briketaži ukazuju na eksploataciju soli tehnikom koja obuhvata vatru bez keramike, ili barem bez tipičnih posuda za briketažu. Nakon ovog lokaliteta slijede Gornja Tuzla u Bosni i Hercegovini, Mala Poljska, Varna i Provadia-Solnitsata u Bugarskoj, Kataloniji (Harding 2013: 43-44, 50; Urem 2016: 130-133). Za Karpatski bazen još uvijek nema konkretnih podataka neolitske eksploatacije, dok

ethnographic data suggest that drying out the salty mixture at a temperature of about 100 100°C could have taken between 12 and 24 hours. After cooling, the salt was taken out, in or out of the molds, and the kiln was destroyed and disassembled. The undamaged parts of the briquetage (especially the supports) could have been reused. The most representative parts of briquetage are exactly the supports that had to be of the same size if they were used in the same kiln, and were probably made in advance and through serial production. The composition of the clay paste had to be adjusted only so that it does not fall apart in the fire. Seeing as supports were utilitarian objects, they did not have to be decorated. Supports that have one straight or concave end and another that widens into three horns are especially characteristic. The three-horned ends cold have faced up or down, which probably depended on the type of surface that was used as the base. Their orientation can be determined based on burning marks, because the top of the support was far more exposed to oxidation that the base (Forenbaher 2013: 179-194).

There is no evidence that Paleolithic people were interested in salt, other than traces of habitats that were close to sources of salt, as well as the assumption that they could get sufficient amounts of salt naturally through their diet. The first tangible evidence of salt consummation in early prehistory was discovered at the Mesolithic site of Provence, which yielded traces of a wooden fence that was, presumably, used for evaporating brine.

In some cases, dated to the Neolithic and Eneolithic, salt exploitation seems to have been especially dynamic, as indicated by significant amounts of pottery fragments discovered around saltwater springs, and which are sometimes connected with burnt structures or remains. The existing data on the exploitation of salt is sparse, and the earliest reliable evidence was discovered at the recently excavated site of Poiana Slatinei in Lunca, Romania, where early Neolithic pottery and radiocarbon dates suggest that saltwater springs were exploited since the end of the 7th millennium BC. The enormous amounts of ash, charcoal and burnt soil, with no traces of briquetage, suggest that salt was exploited by a technique that included fire and not pottery, or at least not the typical briquetage-related vessels. Other than there, evidence was also discovered at Gornja Tuzla in Bosnia and Herzegovina, Little Poland, Varna and Provadia-Solnitsata in Bulgaria, and Catalonia (Harding 2013: 43-44, 50; Urem

se za Transilvaniju svi neolitski lokaliteti vezuju za solne izvore (Harding 2013: 47). Podaci o prvoj rudarskoj eksploataciji soli vežu se za lokalitet Duzdaği, Azerbajdžan (Harding 2013: 49, 52). Posljednja otkrića koja su vezana za praistorijsku proizvodnju soli u Evropi uključuju lokalitete iz Austrije (Hallstatt, Dürrnberg blizu Halleina), Francuske (Seille vally u Lorraine), Španije (period kulture zvonastih pehara u Vilafáfili kod Zamore), Bugarske (neolitski i eneolitski lokalitet u Provadiji, Varna) i Rumunije (neolitski lokaliteti Moldavije i bronzanog doba Transilvanije), a istovremeno je obnovljen interes za ovu temu u Njemačkoj, Poljskoj, Italiji i Britaniji, kao i drugim dijelovima Francuske (uglavnom bronzanog i metalnog perioda) (Harding 2013: 11). Jedan od rijetkih nalaza stvarne soli dolazi iz bronzanog doba iz pećine Ourania na istočnom Kritu (Kopaka & Chaniotakis 2003) gdje je tokom iskopavanja otkriveno pola kilograma soli, i velikih i malih komada (uključujući i sol u prahu). Oko izvora soli Halle-a u Njemačkoj pronađeni su ostaci prvih glinenih kalupa lokalnog porijekla, otvorenog oblika sa brojnim primjesama od sirove gline ili od namotaja/kalema, sa otiscima prstiju ili biljaka, sa tragovina pletenog dijela (asure) na bazi, ivice i spoljni zidovi su nedovršeni, ali je unutrašnji dio uredno usaglašen. Fragmentacija je, međutim, značajna, zbog namjernog lomljena kako bi se izvadili solni kolači/kocke/dijelovi (Weller 2012: 189). Upotreba keramičkih kalupa praktično identičnih oblika i volumena od strane svake kulturne grupe potvrđuje posvećenost proizvodnji i pakovanju soli prema unaprijed definisanom obliku, u kompaktnom obliku i jednostavnom za transport. Proizvodnja nije bila usmjerena samo na proizvodnju soli, nego i na proizvodnju standardizovanog oblika i kvaliteta, veličine i težine. Na osnovu toga solni kolač postaje društveni predmet, identifikacioni marker proizvođača. U tom obliku kretaće se jednostavno, dijeliće se bez gubitka upotrebne vrijednosti i skladištiti dugi niz godina. U centralnoj i istočnoj Evropi, sredinom 5. milenijuma prije nove ere, razvijena je kristalizacija i oblikovanje soli u glinenim posudama (Weller 2012: 189).

Tokom bronzanog doba mogu se identifikovati četiri vrste produkcije soli u Evropi. Dvije od njih uključivale su isparavanje slane vode (slane ili morske vode), koristeći briketažu i primjenu toplote, ili putem insolacije, djelovanjem sunca, na slanu vodu u lagunama; jedna uključuje rudarstvo ili eksploataciju kamene soli; a posljednja uključuje mješavinu rudarstva i koncentrovanog rastvora

2016: 130-133). There is still no tangible evidence of Neolithic salt exploitation in the Carpathian basin, while all Neolithic sites in Transylvania are connected to saltwater springs (Harding 2013: 47). Data about the first mining of salt pertains to the site of Duzdaği, Azerbaijan (Harding 2013: 49, 52). The latest discoveries related to prehistoric salt production in Europe come from sites in Austria (Hallstatt, Dürrnberg near Hallein), France (Seille vally in Lorraine), Spain (the Bell beaker culture in Vilafáfila near Zamora), Bulgaria (Neolithic and Eneolithic site in Provadia, Varna), and Romania (Neolithic sites in Moldavia and Bronze Age sites in Transylvania). At the same time, this topic has again become interesting in Germany, Poland, Italy and Britain, as well as in other parts of France (mostly Bronze Age and metal periods) (Harding 2013: 11). One of the rare finds of real salt, dated to the Bronze Age, comes from the Ourania cave on eastern Crete (Kopaka & Chaniotakis 2003), where half a kilogram of salt was excavated, in large and small chunks (as well as powdered salt). Remains of the first molds were found around the Halle salt source in Germany. The molds were of local origin, had an open shape and numerous inclusions of raw clay or spools, as well as fingerprints or plant imprints, traces of weaving (mats) at the base. The edges and outer walls were not preserved, but the interior was neatly arranged. However, the fragmentation was great due to the intentional breaking of the molds in order to obtain the salt cakes/cubes/parts (Weller 2012: 189). The use of ceramic molds that were practically identical in shape and volume by different cultural groups confirms that salt was produced and packaged according to a predefined mode, in compact shape that is easy to transport. Production did not only focus on the production of salt, but also on standardized shape, quality, size and weight. Consequently, the salt cake became a social object, an identifying marker of the producer. In that way, it could be easily transported, divided without loss of value, and stored for many years. At the beginning of the 5th millennium BC in central and eastern Europe, salt crystallization and shaping it in ceramic vessels was developed (Weller 2012: 189).

It is possible to identify four kinds of salt production in Europe pertaining to the Bronze Age. Two of them included the vaporization of salty water (saltwater or sea water), using briquetage and the use of heat, either through insolation, the effect of the sun on salt water in lagoons; one includes mining or the exploitation of rock salt; and the last includes

soli koristeći „tehniku korita" (Harding 2013: 54). Za solne lagune razumno je pretpostaviti da su postojale u mnogim dijelovima Evrope, posebno oko Mediterana (Harding 2013: 66). Briketaža se obično smatra jednim od glavnih obilježja proizvodnje stare sorte soli još u neolitskim kontekstima, ali posebno tokom perioda od metalnog do rimskog doba. Iako je u nekim područjima poznat značajan niz oblika, i dalje se ne može tačno reći kako je funkcionisao cjelokupni proces isparavanje slanice i transport dobijenih soli kristala (Harding 2013: 54). U zavisnosti od toga koliko duboko u zemlju zalazi, tamo gdje je sol bila na površini, i nikakvo ili minimalno kopanje nije bilo potrebno, postupak se kategorizovao kao vađenje kamena; za razliku od toga, rudarstvo je obično uključivalo kopanje u zemlju. Što se tiče eksploatacije kamene soli u bronzanom dobu, vršeno je i rudarstvo i vađenje kamena, ali jedina lokacija sa nespornim dokazima o dubokom rudarstvu je Hallstatt na području Salzkammerguta u Austriji. Na drugim mjestima, naročito u Rumuniji, gdje se mnoge izloženosti kamene soli pojavljuju na ili blizu površine zemlje, vjerovatno je došlo do eksploatacije kamena čak i tamo gdje trenutno nemamo niti jedan trag. Gdje se kamena sol pojavljuje blizu površine, kao što je to slučaj sa područjem Becleana (Rumunija), iskopavanje je pokazalo da se kopanjem uklanjao najviši sloj soli eksploatacijom kamena ili rudnika, iako su to dopunjavali dodatni tehnološki procesi (Harding 2013: 61-62). Pretpostavlja se da su rudnici Halštata držali veliki ekonomski uticaj u bronzanom dobu i snabdijevali zapadni dio Karpatskog basena, dok je Vieliczka potencijalno snabdijevala sjeverni, Transilvanija istočni, a Tuzla južni dio (Harding 2013: 62). „Tehnika korita" poznata je tek posljednjih nekoliko godina, iako su objekti korišteni u ovoj vrsti proizvodnje soli prvi put pronađeni u ranom XIX vijeku. Istorija otkrića opisana je nekoliko puta, nedavno od strane Hardinga i Kavruka u kontekstu objavljivanja njihovog rada u karpatskoj zoni uglavnom u periodu 2005-2010 (Harding & Kavruk 2010; 2013; Harding 2011). Drvena korita (balvani slični kanuima ili drvenim sanducima, sa šupljinama ili rupama) pronađena su u današnjoj Ukrajini i na nekoliko mjesta u Transilvaniji. Korita su vrlo neobična jer su njihove baze perforirane sa redom rupa (Harding 2013: 63, slika 5.5), a na očuvanim primjercima, rupe su ispunjene drvenim klinovima ili štipaljkama. Perforacije su bile ispunjene uvijenom trakom ili drvenim iglama. Nijedno od pronađenih korita nije cijelo, tako da nije poznato koliko je otvora prvobitno bilo pri-

a mix of mining and the concentrated solution of salt by using the "trough technique" (Harding 2013: 54). It is reasonable to assume that salt lagoons existed in many parts of Europe, especially around the Mediterranean (Harding 2013: 66). Briquetage is usually considered to be one of the main markers of production of old sorts of salt since the Neolithic, but especially during the metal ages and the Roman period. Although a significant amount of forms was used in some areas, it is still impossible to say how the entire process of vaporizing brine and transporting the obtained salt crystals functioned (Harding 2013: 54). Depending on whether the salt was visible on the surface, it required either none, or only minimal digging, and the process was categorized as collecting rocks. Unlike that, mining usually required digging into the ground. When it comes to Bronze Age exploitation of rock salt, both mining and collecting were used, but the only location with undisputable evidence of deep mining is Hallstatt in the Salzkammergut territory in Austria. In other places, especially Romania, where much rock salt appears on or near the surface, rock exploitation probably took place even in places where there are currently no visible traces. In places where rock salt is visible on the surface, like the Beclean territory (Romania), excavations have shown that the highest layer of salt was removed by rock exploitation or mining, even though other technological processes were also used (Harding 2013: 61-62). It is assumed that the Hallstatt mines were economically very influential during the Bronze Age, and that they supplied the western part of the Carpathian basin, while Vieliczka potentially supplied the northern part, Transylvania the eastern, and Tuzla the southern part (Harding 2013: 62). The "trough technique" has only been known for a few years, even though structures used in this type of production were discovered in the early XIX century. The research history was described several times, recently by Harding and Kavruk in the context of their work in the Carpathian zone that mostly took place between 2005 and 2010 (Harding & Kavruk 2010; 2013; Harding 2011). Wooden troughs (logs similar to canoes or wooden crates, with cavities or holes) were discovered in today's Ukraine and at several places in Transylvania. Troughs are very unusual because they have a line of holes at the base (Harding 2013: 63, figure 5.5). On preserved examples, the holes were closed by wooden pegs or clamps. The perforations were filled with twisted ribbons or wooden pins. None of the troughs were completely preserved, so the number of holes on

sutno u podlozi, i da li su oba kraja korita zatvorena ili je jedan kraj ostao otvoren (Harding 2013: 63). Najkompletniji dokaz dolazi sa nedavnih iskopavanja u Baile Figi kod Becleana u Rumuniji, gdje su pronađene izuzetno dobro očuvane drvene instalacije koje potiču iz bronzanog doba, mada ni one nisu potpune: pronađena korita nađena su u blatu najvjerovatnije odbačena u stranu, te je nemoguće tačno znati kako su bila postavljena i korištena, ali svakako ukazuju na kompleksan sistem sofisticirane tehnike za ekstrakciju i eksploataciju izvora kamene soli (Cavruc & Harding 2012; Harding 2013: 62-63). Što se tiče funkcionisanja navedenih korita, pretpostavlja se da je tekućina (svježa voda) morala biti uvedene u korito i da je kapala kroz rupe na dnu, na kamenu sol koja se nalazila ispod, te formirala depresije i žlijebove koji su kasnije olakšavali odvajanje kamena. Druga teorija navodi da je slanica uvedena u korito kako bi se koncentrisala, da se kapi sakupljaju u posudi ispod ili da se stvore kristali koji se mogu sakupljati, na primjer na tekstilu koji se nalazi ispod. Praktični eksperimenti pokazali su da prva metoda funkcioniše prilično dobro (Buzea 2010, navedeno prema: Harding 2013: 64), barem što se tiče razbijanja kamene soli; drugi takođe funkcioniše, mada još uvek nije sprovedena potpuna i obimna rekonstrukcija (Harding, 2009, navedeno prema: Harding 2013: 64).

Na osnovu navedene četiri metode dobijanja soli, Harding je predložio podjelu praistorijske Evrope (2013: 89) na „produkcijske solne zone“ tako što je kao „zonu najpoznatiju i najrasprostranjeniju briketaže (ZB)“ definisao istočnu Francusku, Njemačku, zapadnu Britaniju i istočnu Poljsku. Druga zona je „zona solarne evaporacije (ZSE)“ koja obuhvata Mediteran, a treća zona je „zona korita (ZK)“ i obuhvata istočno-centralnu Evropu, Karpatski bazen i Transilvaniju, dok sve tri zone predstavljaju „presudnu primjenu multikulturalne tehnološke konvergencije. Dok je ZSE u velikoj mjeri rezultat uslova okoline, druge zone su kulturno uslovljene.” (Harding 2013: 90). Prilikom analiza procesa proizvodnje, ista je teorijski podjeljena na tri nivoa, a prema količini dobijene soli na domaću, industrijsku i „ritualnu“ sol. Pri navedenoj podjeli domaća proizvodnja se odvijala u blizini naselja, koristila je sasvim jednostavnu tehnologiju, obrada proizvoda je bila minimalna a proizvođene su relativno male količine soli, dovoljne za potrošnju domaćinstva. Sa druge strane, industrijska proizvodnja odvijala se bez obzira da li su veliki izvori soli bili dostupni ili ne, proizvo-

the original base is unknown, It is also unclear if both edges of the trough were closed off, or if one was left open (Harding 2013: 63). The most complete evidence originates from the recent excavations of Baile Figi near Beclean in Romania, which yielded exceptionally well-preserved, albeit incomplete, wooden installations dated to the Bronze Age: the discovered troughs were found in mud where they were, most likely, discarded, and it is impossible to precisely establish how they were set up and used, but they certainly do point to a complex system of sophisticated equipment used in extracting and exploiting sources of raw salt (Cavruc & Harding 2012; Harding 2013: 62-63). When it comes to the function of said troughs, it is assumed that liquid (fresh water) had to be placed in the trough, and that it dripped through the holes at the bottom onto rock salt that was under it, thereby forming depressions and gauges that made it easier to crush the rock. Another theory suggests that brine was placed into the trough in order to concentrate it, and that the drops were collected in a vessel placed below, or that it created crystals that could be collected on, for example, textile placed underneath. Practical experiments have shown that the first method functions quite well (Buzea 2010, listed according to: Harding 2013: 64), at least when it comes to crushing rock salt; the other one also works, although so far there have been no full and extensive reconstructions (Harding 2009, listed according to: Harding 2013: 64).

Based on the four listed methods of obtaining salt, Harding suggested a division of prehistoric Europe (2013: 89) into “salt production zones”. The best known, and widespread, is the “briquetage zone” (BZ) of eastern France, Germany, western Britain and eastern Poland. The second zone is the “solar evaporation zone” (SEZ) of the Mediterranean, and the third is the “trough zone” (TZ) of eastern and central Europe, the Carpathian Basin and Transylvania. All three zones together make up “a striking instance of cross-cultural technological convergence”. While SEZ is largely the result of the landscape, the other two are culturally conditioned (Harding 2013: 90). In the analysis, the production process was theoretically divided into three levels, depending on the amount of domestic, industrial and “ritualistic” salt. In the said division, local production took place near the settlement, and relied on completely simple technology. The products were minimally processed, and only small amounts of salt were made, sufficient for household use. On

dila je velike količine soli, predviđene uglavnom za razmjenu. Proizvodnja „ritualne“ ili „svete“ soli imala je za cilj proizvodnju soli vrlo visokog kvaliteta, koristeći specijalizovanu tehnologiju i puno prerade; proizvod je bio namjenjen specijalističkoj upotrebi, a proizvedena količina može biti prilično mala (Harding 2013: 92). U odsustvu jasnih indikacija kako je proces funkcionisao, pretpostavke su da je za većinu proizvodnje korištena briketaža do metalnog doba bila domaća po karakteru i mala po veličini. Proizvodnja briketažom od metalnog doba bila je s druge strane velikog obima i vjerovatno industrijske prirode. Rudarstvo u Hallstattu i Dürnbergu, kao i proizvodnja tehnikom korita, takođe su bile industrijske po veličini. Što se tiče „ritualne ili svete“ proizvodnje soli, do sada nije poznato koja bi arheološka manifestacija mogla biti povezana sa njom (Harding 2013: 92).

Prema svemu navedenom, ogromno povećanje aktivnosti proizvodnje soli u Evropi evidentirano je tokom metalnog doba (u poređenju sa prethodnim periodima), aktivnosti su se progresivno povećavale da je na nekim mjestima bila čak na industrijskom nivou. Pojedine lokacije su smatrane centrima trgovine soli (npr. Hallstatt, primorska Francuska, Droitwich i Cheshire u Engleskoj), što nameće pitanja o položaju soli u ekonomiji i stepenu do kojeg je stvarno služila kao „bijelo zlato”, ime koje joj se često dodeljuje (Harding, 2013: 85). I dalje su nepoznati podaci o načinu proizvodnje, ali i transportu iz proizvodnog područja u područje potrošača. Pojedini naučnici (Cavruc & Harding 2012) primijetili su da se najbogatiji materijalni dokazi društvene nejednakosti u tom periodu na Balkanu nalaze u oblastima bogatim solju, (npr. kulturni kompleks Precucuteni i Cucuteni u regionu Karpata kao i Varna kulturi sjeveroistočne Bugarske). Oni se odnose na prosperitet navedenih društava, na sistematsku eksploataciju soli za trgovinu i procjenjuje se da je eksploatacija izvora soli premašila potrebe domaćinstva već tokom početne faze naselja, implicirajući proizvodnju soli za trgovinu. (Urem Kotsou 2016: 132) Pretpostavlja se da se sol proizvodila u različitim oblicima, od blokova u obliku kocke i nepravilnih grudvi do isjeckane soli. Varijabilnost u obliku soli je povezana sa razlikama u dužini razmjene, od razmjene na dalekim lokacijama (kockasti blokovi) do iste na kraćim razdaljinama (isjeckana sol) (Cavruc & Harding 2012; Harding 2013: 62-63). Sol je prevožena morskom vodom, duž reka i (manje obično) preko zemlje; rekonstrukcija koja je predložena za sje-

the other hand, industrial production took place regardless of whether large sources of salt were available or not, it made large amounts of salt, mostly intended for trade. The production of “ritual” or “holy” salt aimed to produce high-quality salt by using specialized technology and a lot of processing; the product was intended for specialist use, and the obtained amount could be quite small (Harding: 2013: 92). In the absence of clear indicators of how the process worked, it is assumed that briquetage was used in most production until the metal ages, and that it was localized and small. Since the metal periods, briquetage salt production was, on the other hand, quite extensive and probably industrial in nature. Mining in Hallstatt and Dürnberg, as well as the trough technique, were also on an industrial level. It is not yet known which archaeological manifestation could be connected to “ritual or holy” salt production (Harding 2013: 92).

Based on everything listed above, a huge increase in the salt production of Europe occurred during the metal periods (in comparison to previous periods). Activities progressively increased and even reached industrial level at some places. Some locations were considered centers of salt trade (e.g. Hallstatt, coastal France, Droitwich and Cheshire in England), something that poses questions about the place salt had in the economy and the degree to which it really was used as “white gold” - a name that it is often given (Harding, 2013: 85). Data about the modes of production, as well as transport from the area of production to the area of use, is still unknown. Some scientists (Cavruc & Harding 2012; Dimitrov 2012) noticed that the best material evidence of social inequality from that period in the Balkans can be found in areas that are rich in salt (e.g. the Pre-Cucuteni and Cucuteni cultural complexes in the Carpathians, as well as the Varna culture in northeastern Bulgaria). These reflect the prosperity of the listed societies, the systematic exploitation of salt for trade, and it is estimated that the exploitation of salt sources surpassed the needs of the household already during the first phase of the settlement, thereby suggesting that salt was produced for trade (Urem Kotsou 2016: 132). It is assumed that salt was produced in different shapes, including cubical blocks, irregular clumps and powdered form. The variability in the shape of salt is connected to the differences in the extent of trade, from long-distance (cubical blocks) to short-distance trade (powdered salt) (Cavruc & Harding 2012; Harding, 2013: 62-63). Salt was transported by sea,

vernu Njemačku od strane Sprockhoff-a, i Cavruka i Hardinga za Rumuniju, sugerišu riječne puteve kao najvjerovatnije u praistoriji. Arheološki primjeri sugerišu da se kretanje soli može zapaziti kroz distribuciju keramičkih posuda za nošenje (Harding 2013: 96). Smatra se da jednom kada je eksploatacija regulisana, a naročito kada je skala proizvodnje porasla sa niskog nivoa, očigledno slučajnog, prerasla na nešto što uključuje značajan broj ljudi i značajnu količinu proizvedene soli, te stekla vrijednost i postala dobro.

Donedavno je bilo izuzetno ograničen broj dokaza o proizvodnji soli tokom praistorije kako u Evropi tako i na Balkanu. Iako postoje direktni dokazi o praistorijskoj proizvodnji soli u jugoistočnoj Evropi samo sa sjevernog Balkana, sol je takođe morala biti proizvođena na Jadranskoj i Egejskoj obali i mogla je biti barem povremeno razmjenjivana među susjedima za druga dobra kao što su morske školjke, ornamenti i kremen (Urem-Kotsou 2016: 130, 133). Pretpostavlja se da su još u ranoj praistoriji ljudi prepoznavali ekonomske potencijale određenih oblasti - kroz lično iskustvo, usmenu tradiciju prenošenu iz generacije u generaciju, od grupe do grupe povodom trgovinskih razmjena, zborova, sajmova, poklona, nevjesta, ceremonijalnih razmjena i sl., te da su se vraćali u oblasti bogate solju da sakupe sol nastalu isparavanjem na suncu u prirodnim uvalama duž obala (Montagnari-Kokelj 2007: 173). Stoga se pretpostavlja da je uloga soli, tj. sol kao element moći u funkcionisanju društava praistorije, vjerovatno mnogo veća nego što na osnovu postojećih materijalnih ostataka možemo danas da zaključimo.

rivers, and (less often) by land. Reconstructions, made for northern Germany by Sprockhoff, and by Cavruk and Harding for Romania, suggest that rivers were most likely used during prehistory. Archaeological examples suggest that the transfer of salt can be traced through the distribution of ceramic vessel used to carry it (Harding, 2013: 96). It is generally considered that salt got its value and became a trading good once exploitation was regulated, and especially when the scale of production rose from a small level, obviously from an unintentional level, to something that included a significant number of people and resulted in large quantities of produced salt.

Until recently, the number of evidence of prehistoric salt production in Europe and in the Balkans was extremely limited. Although there direct evidence of Neolithic salt production in southeastern Europe was only found in the northern Balkans, salt must have been produced on the Adriatic and Mediterranean coasts and could have, at least occasionally, been traded among neighbors for other goods such as sea shells, ornaments or flint (Urem-Kotsou 2016: 130, 133). It is assumed that people recognized the economic potential of certain regions in early prehistory – through personal experience, oral tradition transferred from generation to generation or from group to group during trading exchanges, meetings, fairs, gifts, brides, ceremonial exchanges and the like – and that people went back to salt-rich regions to collect salt made through vaporization in the sun in natural valleys along the coasts (Montagnari-Kokelj 2007: 173). That is why it is assumed that the role of salt, i.e. salt as an element of power in prehistoric societies, was probably a lot bigger than what can be concluded based on the existing material remains.

Literatura / Bibliography

Alexianu, M. 2015, Anthropology of Salt: a First Conceptual Approach, Salt Effect, *Second Arheoinvest Symposium: From the ethnoarchaeology to the anthropology of salt, 20-21 April 2012, "Al. I. Cuza" University of Iasi, Romania, 1-2*.

Buljugić, S. 1990, *Tuzlanske solane i solari*, Hronika, knjiga prva, Tuzla.

Buzea, D. 2010, Experimentul, Troaca, *Angustia* 14, 245-256.

Cavruc, V. & Harding, A. 2012, Prehistoric production and exchange of salt in the Carpathian-Danube Region, in: V. Nikolov & K. Bacvarov (eds), *Salz und Gold: die Rolle des Salzes im prähistorischen Europa / Salt and Gold: The Role of Salt in Prehistoric Europe*, Provadia & Veliko Tarnovo, 173-200.

Forenbaher, S. 2013, Pretpovijesni tragovi proizvodnje soli u podvelebitskom primorju, *Senjski zbornik* 40, 179-194.

Forenbaher, S., Kaiser, T., Miracle, P. T. 2013, Dating the eastern Adriatic Neolithic, *European Journal of Archaeology* 16, 589-609.

Harding, A. 2011, Evidence for salt production rediscovered in the Hungarian Central Mining Museum, *Antiquaries Journal* 91, 27-49.

Harding, A. & Kavruk, V. 2010, A prehistoric salt production site at Băile Figa, Romania, *Eurasia Antiqua* 16, 131-167.

Harding, A. & Kavruk, V. 2013, *Explorations in Salt Archaeology in the Carpathian Zone*, Budapest: Archaeolingua.

Harding, A. 2013, *Salt in Prehistoric Europe*, Sidestone Press, Leiden.

Harding, A. 2015, Salt exploitation in the later prehistory of the Carpahtian Basin, *Documenta Praehistorica* XLII, Ljubljana, 211-217.

Imamović, I. 1990, *Rudarstvo soli*, Univerzal Tuzla, Tuzla.

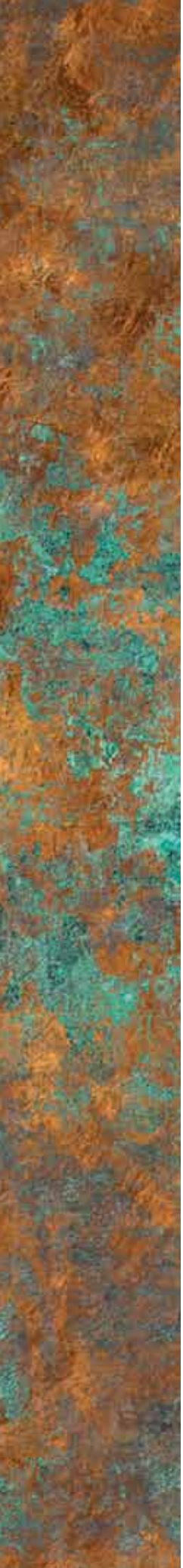
Jovanović, B. 1941, *Pojava soli u Bosni i njena proizvodnja*, Prosvjeta, Kalendar za 1941, 125-133.

Montagnari-Kokelj, M. 2007, Salt and the Trieste Karst (North – Eastern Italy) in Prehistory: some considarations, in: D. Monah, G. Dumitroaia, O. Weller, J. Chapman (eds.), *L'explotation du sel* à travers le temps, Piatra-Neamț, 161-189.

Urem-Kotsou, D. 2016, Salting the Roads: Connectivity in the Neolithic Balkans, Of Odysseys and Oddities: Scales and modes of interaction between prehistoric Aegean societies and their neighbours, *Sheffield Studies in Aegean Archaeology* 10, 122-143.

Weller, O. 2015, First salt making in Europe: an overview from Neolithic times, *Documenta Praehistorica* XLII, 185-196.

Weller, O. 2015a, First salt making in Europe: a global overview from Neolithic times, in: R. Brigand and O. Weller (eds.), *Archaeology of Salt, Approaching an invisible past*, Sidestone Press, 67-82.



Bakar u eneolitičkim kulturnim zajednicama Bosne i Hercegovine

Copper in eneolithic communities of Bosnia and Hercegovina

Andrijana Pravidur

Zemaljski muzej Bosne i Hercegovine
National Museum of Bosnia and Hercegovina
Sarajevo
andrijana.pravidur@gmail.com

Upotreba bakra i razvoj metalurgije na susjednim zemljopisnim područjima imao je odraz na današnje područje Bosne i Hercegovine kroz društvena kretanja i kontakte, a čiji je impuls između ostalog uvjetovan i potragom za rudnim sirovinama. Stoga se na području današnje Bosne i Hercegovine proces *metalizacije* razvija u okviru metalurške tradicije onih društvenih zajednica koje s vremenom zauzimaju i naseljavaju ovo područje. Prvi metalni (bakreni) predmeti koji su *cirkulirali* širim regionalnim područjem kroz razmjenu, trgovinu i društvena kretanja pronašli su se kao rijetki i slučajni nalazi i na području Bosne i Hercegovine. Oni najraniji svjedoče o samim početcima upotrebe i poznavanja metala te njegovu postupnom uvođenju u materijalnu kulturu prapovijesnih zajednica. Najranijem poznavanju ne samo metala već i metalnih izrađevina svjedoče nalazi iz srednje Bosne u obliku sitnih izrađevina – nakita (bakrenih perli), koji su svoje mjesto u okviru neolitičkih kulturnih zajednica na lokalitetima Obre I, Obre II i Butmir (Benac 1979: 371, 374) pronašli vjerojatno kao uvozni materijal posredovanjem razmjene i trgovine. Najranija zabilježena pojava upotrebe ili poznavanja bakra na području Bosne i Hercegovine potječe s lokaliteta Obre I u sloju s materijalom koji upućuje na ranu fazu u razvoju lokalne kakanjske kulture (Gimbutas 1974: 11; Sterud & Sterud 1974: 258) gdje fragment malahitne perle, zabilježen u kontekstu kuće pokazuje vrlo rano poznavanje metala ovoga područja iz sredine 6. milenija pr. Kr. (Gimbutas 1974: 22, 358). Sitni bakreni nalazi i fragmenti metala prepoznati su i zabilježeni i na lokalitetu Obre

The use of copper and the development of metallurgy in the neighboring geographical regions reflected on today's territory of Bosnia and Herzegovina through social movement and contacts that were, among other things, spurred by the search for sources of ore. Hence, in today's Bosnia and Herzegovina, the process of *metallization* developed within the framework of the metallurgical tradition of social communities that, in time, conquered and inhabited this area. The first metal (copper) finds that *circulated* in the wider region through exchange, trade and social movements were also recorded on the territory of Bosnia and Herzegovina as chance and individual finds. The earliest finds attest to the very beginnings of using and working with metal, and its gradual influx into the material culture of prehistoric communities. The earliest evidence of using not only metals, but also metal artifacts, in central Bosnia appears in the form of small artifacts – jewelry (copper beads) that found their place within the scope of Neolithic cultural communities at the sites Obre I, Obre II and Butmir (Benac 1979: 371, 374), probably as material imported through trade and exchange. The earliest recorded use of copper in Bosnia and Herzegovina originates from the site of Obre I, and was discovered in a layer that also contained material ascribed to the early phases of the local Kakanj culture (Gimbutas 1974: 11; Sterud & Sterud 1974: 258). The fragment of a malachite bead, recorded within a house, indicates a very early use of metal in this area, dated to the 6th millennium BC (Gimbutas 1974: 22, 358). At the same time, tiny copper finds

Slika / Figure 1. Ploča samorodnog bakra, Vareš, BiH / A plate of native copper, Vareš, B&H (prema / after: Operta 2009).

II, u slojevima kasne butmirske kulture na što je sporadično ukazao Benac (1971: 267). Većina bakrenih nalaza iz ovoga perioda rezultat je proizvodnje koja se temelji na tehnici hladnog kovanja, koja je duboko utemeljena u tradiciji neolitičke, odnosno litičke industrije pa je ova najranija bakrena proizvodnja rezultat jednostavnog modeliranja sitnih, odnosno ornamentalnih predmeta.

S vremenom kada metalurška aktivnost počinje poprimati sve veću važnost u ekonomskom i gospodarskom aspektu, a metalurške zajednice migriraju u potrazi za rudnom sirovinom, počela se razvijati aktivnija samostalna i lokalna proizvodnja šireg opsega o čemu svjedoče raznovrsni metalurški nalazi na našem području. Na području istočne Bosne koja u kulturnom smislu pripada istočnobosanskoj varijanti vinčanske kulture već se odvijala metalurška aktivnost koju vezujemo uz naselja Gornje i Donje Tuzle i to u mlađim, eneolitičkim fazama. U stratumima III i II koji pripadaju mlađim slojevima vinčanske kulture u Gornjoj Tuzli zabilježeni metalni i arheometalurški nalazi svjedoče o ranom razvoju i poznavanju metalurške aktivnosti na području Bosne i Hercegovine (Čović 1961; Glumac & Todd 1987; 1991: 11-12, sl. 4; Radivojević et al. 2010: 2778; Radivojević 2015; Radivojević & Rehren 2016; Radivojević & Grujić 2017). Ova dva stratuma u cjelokupnoj stratigrafiji lokaliteta, upućuju na vrlo bogat i raznovrstan kulturni materijal što je, kako se čini, rezultat snažnog ekonomskog razvoja naselja u ovom periodu, kada je naselje najvjerojatnije obuhvaćalo i najveću površinu te doživjelo svoj procvat (Čović 1961: 94). Nalazi s ovoga lokaliteta povezani su s procesima proizvodnje u okviru industrije bakra, a kompleksnost metalurške aktivnosti ogleda se u različitoj vrsti arheometalurškog materijala. Stoga se metalurška djelatnost područja istočne Bosne odvijala

and metal fragments were discovered and recorded at the Obre II site, in the layers of the late Butmir culture, as sporadically mentioned by Benac (1971: 267). Most copper finds from this period are the result of production, based on the technique of cold casting that was well-founded in the tradition of the Neolithic, i.e. stone industry, so that this earliest copper production was the result of the simple modeling of very small, ornamental, objects.

In time, as the metallurgical activities started to gain importance in an economic sense, and metallurgical communities migrated in search of raw ores, a more active, independent and local wider-range production started to develop, as attested to by various metallurgical finds from the region. In eastern Bosnia, which can, culturally, be ascribed to the eastern Bosnian variant of the Vinča culture, already entailed metallurgical activities that can be connected with the settlements at Gornja and Donja Tuzla in the younger, Eneolithic phases. Strata III and II at Gornja Tuzla, ascribed to the younger layers of the Vinča culture, yielded metal and archaeological metal finds that speak in favor of an early development and use of metallurgical activities in Bosnia and Herzegovina (Čović 1961; Glumac & Todd 1987; 1991: 11-12, fig. 4; Radivojević et al. 2010: 2778; Radivojević 2015; Radivojević & Rehren 2016; Radivojević & Grujić 2017). Out of the entire stratigraphy of the site, these two strata point to a very rich and diverse cultural material that, as it seems, resulted from a strong economic growth of the settlement in this period, when the settlement probably covered the largest area and was prosperous (Čović 1961: 94). The finds from this site are connected to the production processes of copper industry, and the complexity of metallurgical activities can be seen through the different kinds of archaeological material made of metal. Therefore, the metal-

u tradiciji vinčanske kulture, samostalno i na lokalnoj razini, u opsegu koji je zadovoljavao potrebe za bakrom i bakrenim izrađevinama u vremenu 4400 pr. Kr. (Radivojević & Rehren 2016).

U razmatranju prapovijesnog rudarstva i *talioničarstva* na području Bosne i Hercgeovine Vejsil Ćurčić prvi upućuje na značenje nalaza iz Donje Tuzle, posudice, mlađe faze vinčanske kulture, a na čijem su dnu pronađeni ostaci mineralne metalične mase, što je rezultat pokušaja topljenja komada olovnog sjajnika-galenita (Ćurčić 1908: 82, T. I: 15; Čović 1961: 98, T. X: 13-15, sl. 16; Benac 1964: 95, 133; Čović 1984). Izdvajanje male količine olovnog oksida i sumpora zbog nedovoljno dostatne temperature za potpuno topljenje metala, Ćurčić je protumačio kao eksperimentalni i najraniji pokušaj dobivanja olova (Ćurčić 1908: 84; 1930: 408). Ipak, nalazi bakrenog minerala malahita iz Donje Tuzle mogu sugerirati na još stariju upotrebu ruda i moguću metaluršku djelatnost u okviru starije faze vinčanske kulture na području Bosne i Hercegovine.

Sustavnija istraživanja *badenske kulture* rezultirala su i saznanjem da je ova kultura pored bakrenih nalaza poznavala i primjenjivala metaluršku, ljevačku djelatnost koja se koristila sulfidnom bakrenom rudom. Metalurški centri badenske kulture na području Brodskog Posavlja, Saloš u Donjoj Vrbi i Okukalj kod Donje Bebrine, na osnovi arheometa-

lurgical activities in eastern Bosnia occurred within the tradition of the Vinča culture, individually and locally, and to an extent that satisfied the needs for copper and copper artifacts around 4400 BC (Radivojević & Rehren 2016).

When studying prehistoric mining and *smelting* in Bosnia and Herzegovina, Vejsil Ćurčić was the first to pint out the significance of the finds from Donja Tuzla – small vessels of the Vinča culture with traces of mineral metallic mass at their base, created as a result of an attempt to melt a piece of a lead sulfide - galena (Ćurčić 1908: 82, Pl. I: 15; Čović 1961: 98, Pl. X: 13-15, fig. 16; Benac 1964: 95, 133; Čović 1984). Ćurčić described the extraction of a small amount of lead oxide and sulfur, due to temperatures that were insufficiently high to fully melt the metal, as an experimental, and the earliest attempt to obtain lead (Ćurčić 1908: 84; 1930: 408). However, the finds of the copper mineral malachite from Donja Tuzla indicate an even earlier use of ores, and possible metallurgical activities within the context of the older phase of the Vinča culture in Bosnia and Herzegovina.

The more systematic study of the *Baden culture* revealed that this culture, in addition to copper finds, also knew and used metallurgical, smelting, activities based on the use of sulfide copper ore. The archaeological material made of metal from the metallurgical centers of the Baden culture in the Brod-

Slika / Figure 2. Donja Tuzla, posuda s ostacima galenita, Zemaljski muzej BiH / Donja Tuzla, a vessel with traces of galena, National Museum of B&H.

Slika / Figure 3. Tetraedrit sa sideritom, Maškara, Gornji Vakuf, BiH / Tetrahedrite with siderite, Maškara, Gornji Vakuf, B&H (prema / after: Operta 2009).

lurškog materijala pokazuju vrlo razvijenu metalurgiju bakra koja je zbog potrebe za sulfidnim bakrenim mineralima najvjerojatnije bila i prostorno organizirana na širem zemljopisnom području (Lozuk 1995: 55; Durman 2000; 2006: 30). U tom smislu je područje Bosne i Hercegovine koje obiluje sulfidnom rudom vjerojatno bilo primarno i najbliže izvorište ovoga bakrenog minerala za potrebe badenske metalurgije na području Slavonije i šireg njezinog područja. Putovi koji su vodili do rudnih izvorišta na području Bosne, osobito riječne doline Vrbasa i Bosne, predstavljaju najznačajnije komunikacijske smjerove sa srednjobosanskim rudnim područjem o čemu svjedoče i pozicije badenskih lokaliteta na području Bosne i Hercegovine.

Tijekom probnih arheoloških iskopavanja 1958. i sustavnih 1960. godine na lokalitetu Pivnica kod Ožaka definirana je *kostolačka kultura* u okviru starijeg stratuma (Benac 1962: 22) gdje je u sondi 3 zabilježena i veća kostolačka kuća s dvije faze izgradnje. Iz starije faze kuće pored centralnog ognjišta zabilježena je jama (C) koja je služila kao ostava ili otpadna jama. Pored velike količine grube i fine keramike u jami je zabilježena i jedna bakrena *igla* (kako ju Benac definira) četvrtastog, u gornjem dijelu proširenog presjeka s trnom (Benac 1962: 24, 27, T. X: 11), a radi se o bakrenom šilu kakva su poznata i s drugih lokaliteta kostolačke kulture. Osim ovoga nalaza, tijekom iskopavanja 1960. godine zabilježeno je još jedno cjelovito i nekoliko ulomaka bakrenih šila istog tipa (Benac 1962: 27). Ovi nalazi s područja Bosne i Hercegovine mogu se usporediti s onima zabilježenim na kasnobakrenodobnom naselju Đakovo – Franjevac (Balen 2011: 121, kat. 1, 3, 5) te u kostolačkom naselju u Gomolavi (Petrović & Jovanović 2002: 281-284).

sko Posavlje region, Saloš in Donja Vrba and Okukalj near Donja Bebrina, point to a well-developed copper metallurgy that was, due to the need for sulfide copper minerals, most probably spatially organized over a wider geographical region (Lozuk 1995: 55; Durman 2000; 2006: 30). In that sense, the territory of Bosnia and Herzegovina, which is abundant in sulfide ore, was probably the primary and the closest source of this copper mineral used in the Baden culture metallurgy in Slavonia and the wider area. The routes that connected the sources of ore in Bosnia, especially in the Vrbas and Bosna River valleys, and the mining regions in central Bosnia, were the most significant communication paths, as attested to by the position of sites of the Baden culture in Bosnia and Herzegovina.

The 1958 test, and the 1960 systematic excavations of the Pivnica near Odžak site yielded finds of the *Kostolac culture* (Benac 1962: 22), when a larger house of the Kostolac culture with two phases of construction was found in trench 3. The older phase of the house yielded a pit (C), situated next to the central hearth, that was used as a pantry or a waste pit. In addition to the large amounts of coarse and fine pottery, the pit also yielded a copper *needle* (as defined by Benac) with a square cross-section on the upper part, and a shaft (Benac 1962: 24, 27, Pl. X: 11). However, it is a copper awl the likes of which have been discovered at other sites of the Kostolac culture. In addition to this find, the 1969 excavations yielded another complete and several fragmented copper awls of the same type (Benac 1962: 27). These finds from Bosnia and Herzegovina can be compared to those recorded at the Late Eneolithic site of Đakovo-Franjevac (Balen 2011: 121, cat. 1, 3, 5) and from the settlement of the Kostolac culture at Gomolava (Petrović & Jovanović 2002: 281-284).

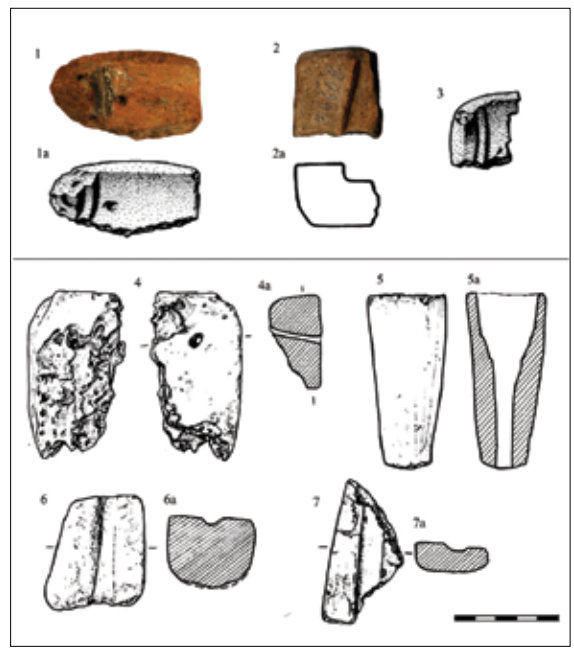
By far a more tangible record of metallurgical activities in Bosnia and Herzegovina can be seen in the material of the *Vučedol culture*. When this cultural community stabilized and produced finds that can definitively be described as metallurgical produce, four sites in Bosnia and Herzegovina (the Zecovi hillfort near Prijedor, Debelo Brdo near Sarajevo, the Alihodže hillfort in the Bila valley, Velika gradina in Varvara) reveal the development and degree of local copper metallurgy. Although the first finds of the Vučedol cultural group had been discovered already at the end of the 19th century at Debelo Brdo, only the more extensive excavations conducted after those at the Hrustovača cave in 1939 (Benac 1948; 1950; 1964: 136-147), would point

Daleko konkretnija dokumentiranost metalurške djelatnosti na tlu Bosne i Hercegovine dolazi s materijalnom ostavštinom nosilaca *vučedolske kulture*. Stabilizacijom ove kulturne zajednice te nalazima koji se sasvim pouzdano mogu odrediti u skupinu metalurških objekata, na četiri lokaliteta u Bosni i Hercegovini (Gradina Zecovi kod Prijedora, Debelo Brdo kod Sarajeva, Gradina Alihodže u dolini Bile, Velika gradina u Varvari) može se pratiti razvoj i stupanj domaće bakrene metalurške industrije. Premda su prvi nalazi vučedolske kulturne grupe otkriveni već krajem 19. stoljeća na Debelom Brdu, tek će nešto opsežnija istraživanja koja su uslijedila nakon iskopavanja pećine Hrustovača 1939. godine (Benac 1948; 1950; 1964: 136-147) potvrditi značenje ove kulturne skupine u okviru metalurške industrije eneolitičkog razdoblja Bosne i Hercegovine. Već poznavanje metalurške radionice na Vučedolu (Schmidt 1945: 206), i objavljivanje metalurškog pribora i bakrenih nalaza iz Ljubljanskog barja (Korošec & Korošec 1969: 20-21) značajnije su potaknuli izučavanje metalurške djelatnosti grupe što će se s vremenom odraziti i na područje ove kulture južno od Save. Od 70-tih godina 20. stoljeća polako će se neki stariji, dotad nedeterminirani nalazi revidirati i pouzdano opredijeliti skupini metalurških objekata, čime se povećava broj specifičnih metalurških artefakata pa im se i sasvim konkretno pronalazi mjesto i funkucija u fundusu arheološkog materijala (Čović 1976; Durman 1983; 1988; 2006; Žeravica 1993). Najznačajniji nalazi koji konkretno upućuju na metaluršku djelatnost pa i na moguće metalurške centre ove kulturne zajednice u Bosni i Hercegovini već su poznati i više puta interpretirani s gradina u Zecovima kod Prijedora, Debelog brda u Sarajevu, Alihodža kod Travnika i Velike gradine u Varvari. Premda dosadašnji poznati nalazi vezani uz metalurgiju vučedolske kulture na području Bosne i Hercegovine i nisu osobito brojni, tehnološke karakteristike metalurškog materijala, posebno kada je riječ o nalazima kalupa ili sopalja, sasvim jasno ukazuju na stupanj razvoja metalurgije bakra te domete bakrene industrije koja se odvijala u tradiciji vučedolske kulturne zajednice.

Najjužnije nalazište vučedolske kulture na području Bosne i Hercegovine poznato je na Debelom brdu u Sarajevu. Metalurški nalazi bili su poznati još s kraja 19. stoljeća i objavljeni u izvještajima F. Fiale (1894: 107-124, sl. 2, T. VIII: 9, 11, 12) koji konstatira da je na Debelom brdu *postojala raznovrsna i živa zanatska djelatnost i to ne samo u željezno*

to the significance of this cultural group when it came to the metallurgy of the Eneolithic period in Bosnia and Herzegovina. The previously discovered metallurgical workshop from Vučedol (Schmidt 1945: 206), and the publication of metallurgical equipment and copper finds from Ljubljansko barje (Korošec & Korošec 1969: 20-21), had a more significant impact on the study of the group's metallurgical activities that were, in due time, reflected on the territory occupied by this culture south of the Sava River. Starting from the 1970s, some older, but previously undetermined finds have been reevaluated and definitively ascribed to the group of metallurgical objects, thereby increasing the number of specific metallurgical artifacts that found their place and function in the archaeological material (Čović 1976; Durman 1983; 1988; 2006; Žeravica 1993). The most significant finds that definitively point to metallurgical activities, as well as to possible metallurgical centers of this cultural group in Bosnia and Herzegovina, are well-known, and were recorded at the following sites: the Zecovi hillfort near Prijedor, Debelo brdo in Sarajevo, Alihodža near Travnik, and Velika gradina in Varvara. Although the previously known finds related to the metallurgy of the Vučedol culture in Bosnia and Herzegovina are not numerous, the technological characteristics of the metallurgical material, especially in the case of

Slika / Figure 4. Nalazi kalupa i sopalja s lokaliteta Alihodže i Varvara, Zemaljski muzej BiH / Molds and nozzles of bellows from Alihodže and Varvara, National Museum of B&H (prema / after: Čović 1977; Žeravica 1993).



doba, već i ranije (Fiala 1894: 124-125). Iz ovog naseobinskog kompleksa potječe nešto veći, ali raznolikiji broj metalurškog pribora na osnovi kojega se može sagledati i nešto konkretnija slika o bakrenoj industriji koja se odvijala u okviru južnobosanskog tipa vučedolskog kulturnog kompleksa. Nalazi kalupa i metalurškog pribora – sopalja u naselju ukazuju na metaluršku djelatnost koja se očito odvijala kroz sve neophodne procese bakrene industrije, a koja podrazumijeva obradu rudne sirovine u naselju i ljevačku djelatnost do konačnog proizvoda. Ovakav istovjetni obrazac metalurške aktivnosti poznat je i s gradine Zecovi u Prijedoru. Posebno se to odnosi na nalaze keramičkih nastavaka za puhaljke – sopalje, koji su s dva primjerka zastupljeni i u naseobinskom lokalitetu Debelo brdo. Upravo specifičnost ovih nalaza omogućuje rekonstrukciju i stupanj metalurške aktivnosti, odnosno načina termalne obrade bakrene mineralne sirovine koja se i na Debelom brdu kao i na Zecovima odvijala u otvorenim ognjištima. Repertoar nalaza kalupa s Debeloga brda ukazuje i na raznoliku proizvodnju bakrenih predmeta, a najčešći su kalupi za sjekire s jednom oštricom i cilindričnim produžetkom za nasad drška (Fiala 1894: 118, sl. 12; Čović 1976: 109, T. II: 1-3; Durman 1983: 32; Žeravica 1993: 27, T. 8: 84-86) koje su i najčešći repertoar ostava.

Najveći broj bakrenih alatki s područja Bosne i Hercegovine u okviru vučedolskog kulturnog kompleksa pripada slučajnim ili pojedinačnim nalazima te nalazima iz ostava. Serijska proizvodnja i tehnika lijevanja u dvodijelne kalupe metalurška je inovacija koja se primjenjivala i na prostoru vučedolskoga kulturnog kompleksa s kojom započinje i izrada novog tipa oruđa - sjekira sa cilindričnim produžetkom za nasad drška i jednom oštricom, odnosno sjekire tipa Kozarac. Redovito se javljaju u ostavama ili kao pojedinačni, slučajni nalazi. Iz dosad poznatih ostava, sjekire ovoga tipa mogu se javljati zajedno, odnosno na području Bosne i Hercegovine isključivo s plosnatim lepezastim sjekirama – tipa Griča. Sjekire s jednom oštricom i cilindričnim produžetkom za nasad drška - tipa Kozarac (Žeravica 1993: 24-26) s područja Bosne i Hercegovine poznate su iz ostava: Kozarac kod Prijedora (Truhelka 1907), Griča kod Mrkonjić Grada (Truhelka 1906; Žeravica 1993: 22, 27), Vranovići i Lohinja kod Gračanice (Čović 1957; Durman 1983: 41; Žeravica 1993: 28). Nalazi ostava s većim brojem istovjetnih bakrenih predmeta, najčešće sjekira, mogu sugerirati na robu namijenjenu prodaji ili

molds or the nozzles of bellows, clearly point to the degree of development of copper metallurgy, and the achievements of the copper industry that took place within the tradition of the Vučedol cultural group. The southernmost site of the Vučedol culture in Bosnia and Herzegovina was recorded at Debelo brdo in Sarajevo. Metallurgical finds had been known from the end of the 19th century, and were published in F. Fiala's reports (1894: 107-124, fig. 2, Pl. VIII: 9, 11, 12), wherein he concluded that Debelo Brdo was a place where *a diverse and lively crafting activities were happening, and not only during the Iron Age, but also prior to it* (Fiala 1894: 124-125). This settlement complex yielded a larger, but more versatile, number of metallurgical equipment that can serve as the basis for the study of a more tangible image of copper industry that took place in the context of the southern Bosnian type of the Vučedol cultural complex. Finds of molds and metallurgical equipment, such as nozzles of bellows, suggest metallurgical activities that evidently covered all of the necessary processes of copper industry, including ore processing within the settlement, and smelting activities that led to the creation of the final product. The same pattern of metallurgical activities was also recorded at the Zecovi hillfort in Prijedor, especially when discussing the ceramic endings of bellows – nozzles, two of which were found at the settlement of Debelo brdo. Precisely the specificity of these finds allows for the reconstruction of the degree of metallurgical activities, i.e. the ways in which copper raw materials were thermally processed, noting that it took place in open hearths at both Debelo Brdo and Zecovi. The repertoire of mold from Debelo Brdo also reveals the versatile production of copper objects, and the most common molds were used to make axes with a single blade and a cylindrical protrusion for hafting (Fiala 1894: 118, fig. 12; Čović 1976: 109, Pl. II: 1-3; Durman 1983: 32; Žeravica 1993: 27, Pl. 8: 84-86), which are also the most common find in hoards.

Most copper tools from Bosnia and Herzegovina that can be ascribed to the Vučedol cultural complex are chance and individual finds, or were parts of hoards. Serial production and the technique of casting in bipartite molds are metallurgical innovations that were applied on the territory of the Vučedol cultural complex, and that also led to the production of a new type of tool – axes with a cylindrical protrusion for hafting and a single blade, i.e. the Kozarac type of axe. These are a common find in hoards, as well as a common individual, chance

Slika / Figure 5. Ostava Griča kod Mrkonjić grada / The Griča hoard near Mrkonjić grad (foto / photo: A. Šahbaz).

način prenošenja sirovina iz područja ležišta ruda u krajeve gdje ležišta nije bilo, a gdje je postojala potreba za bakrenim izrađevinama (Težak-Gregl 2006: 38). Tako se sve više pojava ovakvih tipova sjekira u ostavama može sagledati i u funkciji ingota ili poluproizvoda što je uvelike olakšavalo transport metalne sirovine do udaljenih radioničkih centara.

Poznavanje metalurške aktivnosti vučedolske kulture na području Bosne i Hercegovine odraz je dosad poznatog i analiziranog metalurškog materijala, koji je rezultat i tek djelomična slika stanja istraženosti ove kulture na našem području. Premda ne toliko brojni, ovi nalazi s područja Bosne i Hercegovine ipak pokazuju stupanj razvoja metalurške aktivnosti koja je bila u skladu s općom metalurškom slikom vučedolskoga kulturnog kompleksa. Potraga za novim rudnim izvorima pokrenula je migraciju ove kulture upravo radi održavanja metalurške tradicije koja je predstavljala jednu od važnijih grana ekonomske strukture. S druge strane tehnološki napredak u metalurgiji vučedolske kulture rezultirao je i potrebom za većom količnom metala što je zahtijevalo pronalazak i eksploataciju novih ležišta koja osiguravaju dovoljnu količinu rudne sirovine, s obzirom na to da je serijska proizvodnja ubrzala i kvantitativno povećala izradu identičnih bakrenih alatki. Ove novine koje je predvodila sve naprednija metalurška tehnologija u kasnoj su fazi vučedolske kulture rezultirale i pomicanjem metalurških i radioničkih središta bakrene industrije koja su se na području Bosne i Hercegovine koncentrirala uglavnom u blizini rudnih izvora i riječnih komunikacija.

find. Based on the hoards discovered so far, this type of axe can appear, that is, in Bosnia and Herzegovina, exclusively alongside flat trapezoidal axes of the Grič type. Axes with a single blade and a cylindrical protrusion for hafting – the Kozarac type (Žeravica 1993: 24-26) have been found in the following hoards in Bosnia and Herzegovina: Kozarac near Prijedor (Truhelka 1907), Grič near Mrkonjić Grad (Truhelka 1906; Žeravica 1993: 22, 27), Vranovići and Lohinja near Gračanica (Čović 1957; Durman 1983: 41; Žeravica 1993: 28). Hoards with a large number of the same kind of copper find, most often axes, can indicate goods that were prepared for trade, or the modes of transporting raw materials from the mines to places where there were no raw materials, and where copper artifacts were required (Težak-Gregl 2006: 38). Hence, the increasing emergence of these types of axes indicates that they could be interpreted as ingots or semi-products that would greatly alleviate the transport of metals to the distant workshop centers.

The knowledge on the metallurgical activities of the Vučedol culture in Bosnia and Herzegovina is a reflection of the published and analyzed metallurgical material, which is the result, and only a partial image, of the state of research conducted on this culture in the region. Although not numerous, the finds from Bosnia and Herzegovina indicate the developmental degree of metallurgical activities that were in line with the general metallurgical framework of the Vučedol cultural complex. Searching for new sources of ore sparked a migration of this culture precisely in order to preserve the metallurgical tradition that was one of the most important parts of their economic structure. On the other hand, the technological advances in the metallurgy of the Vučedol culture resulted in an increased need for metals, which, in turn, required the discovery and exploitation of new sources of raw materials that would provide sufficient amount of ore, especially because serial production sped up and increased the production of identical copper tools. During the late phase of the Vučedol culture, these novelties, led by the increasingly advanced metallurgical technology, resulted in a shift of metallurgical and workshop centers that were, in Bosnia and Herzegovina, mostly concentrated in the vicinity of ore sources and river communication routes.

Literatura / Bibliography

Balen J. 2011, *Đakovo-Franjevac, kasno bakrenodobno naselje/ Đakovo-Franjevac, Late eneolithic settlement*, Katalozi i Monografije 7, Arheološki muzej u Zagrebu, Zagreb.

Benac A. 1948, Završna istraživanja u pećini Hrustovači, *Glasnik Zemaljskog muzeja u Sarajevu* n.s. III, Sarajevo, 5-42.

Benac A. 1962, Pivnica kod Odžaka i neki problemi kostolačke kulture, *Glasnik Zemaljskog muzeja u Sarajevu,* n. s. A. XVII, Sarajevo, 21-40.

Benac A. 1964, *Studije o kamenom i bakrenom dobu u sjeverozapadnom Balkanu*, Veselin Masleša, Sarajevo.

Benac A. 1971, Sjeverozapadni Balkan na prelazu iz neolitskog u metalno doba, *Radovi Filozofskog fakulteta u Sarajevu* VI, Sarajevo (1970-1971), 265-272.

Benac A. 1979, Prelazna zona, in: A. Benac & M. Garašanin (eds.), *Praistorija Jugoslavenskih Zemalja II – Neolitsko doba*, Akademija nauka i umjetnosti Bosne i Hercegovine, Centar za balkanološka ispitivanja, Sarajevo, 363-470.

Čović B. 1957, Nekoliko manjih preistorijskih nalaza iz Bosne i Hercegovine, *Glasnik Zemaljskog muzeja u Sarajevu,* n. s. A. XII, Sarajevo, 241-255.

Čović B. 1961, Rezultati sondiranja na prehistorijskom naselju u Gornjoj Tuzli, *Glasnik Zemaljskog muzeja u Sarajevu* n. s. A. XV-XVI, Sarajevo (1960-1961), 79 139.

Čović B. 1976, Metalurška djelatnost vučedolske grupe u Bosni, *Godišnjak* XIII/ 11, Centar za balkanološka istraživanja, Sarajevo, 105-115.

Čović B., 1977, Velika gradina u Varvari - I dio (slojevi eneolita, ranog i srednjeg bronzanog doba), *Glasnik Zemaljskog muzeja Bosne i Hercegovine u Sarajevu* n. s. A. XXXII, Sarajevo (1978) , 5-173.

Čović B. 1984, Praistorijsko rudarstvo i metalurgija u Bosni i Hercegovini - stanje i problemi istraživanja / Das prähistorische Bergbauwesen und die Metalurgie in Bosnien und der Herzegowina, *Godišnjak* XXII/20, *Centar za balkanološka ispitivanja*, Akademija nauka i umjetnosti Bosne i Hercegovine, Sarajevo, 111-145.

Ćurčić V. 1908, Prilozi poznavanju prehistorijskog rudarstva i talioničarstva brončanog doba u Bosni i Hercegovini, *Glasnik Zemaljskog muzeja u Bosni i Hercegovini* XX/ 1, Sarajevo, 77-90.

Ćurčić V. 1930, Historija rudarstva i topioničarstva u Bosni i Hercegovini, *Rudarski i topioničarski Vesnik* 9, Beograd, 317-334.

Durman A. 1983, *Metalurgija vučedolskog kulturnog kompleksa*, *Opuscula Archaeologica* 8, Zagreb.

Durman A. 1988, Metal u vučedolskom kulturnom kompleksu / Metal in the Vučedol Cultural Complex, in: *Vučedol treće tisuljeće p.n.e/ Vučedol three thousand years b.c.*, Katalog izložbe, Muzejski prostor Zagreb, 32-39.

Durman A. 2000, Počeci metalurgije na Brodskom području, *Zbornik radova sa znanstvenog skupa o Slavonskom Brodu, Slavonski Brod u povodu 750. Obljetnice prvoga pisanog spomena imena Broda,* Slavonski Brod, 91-102.

Durman A. 2006, Simbol boga i kralja, in: *Simbol boga i kalja-prvi europski vladari / Symbol of God and King-the first European rulers*, Katalog izložbe, Galerija Klovićevi dvori Zagreb, 11-86.

Fiala F. 1894, Jedna prehistorička naseobina na Debelom Brdu kod Sarajeva, *Glasnik Zemaljskog muzeja u Bosni i Hercegovini* VI/ 1, Sarajevo, 107-140.

Gimbutas M. 1974, Chronology of Obre I and Obre II, *Wissenschaftliche Mitteilungen des Bosnisch-Herzegowinischen Landesmuseums* IV, Sarajevo, 15-35.

Glumax P. & Todd J. 1987, New Evidence for the use of Lead in Prehistoric South East Europe, *Archeomaterials* 2, 29-37.

Glumac P. & Todd J. 1991, Early Metallurgy in Southeast Europe: the Evidence for Production, in: P. Glumac (ed.), *Recent Trends in Archaeometallurgical Research, MASCA Research Papers in Science i Archaeology,* vol. 8, part I, Philadelphia, University of Pennsylvania, 8-19.

Korošec P. & Korošec J. 1969, *Najdbe s količarskih naselbin pri Igu na Ljubljanskom barju/ Fundgut der Pfahlbausiedlungen bei Ig am Laibacher Moor*, Arheološki katalogi Slovenije III, Ljubljana.

Lozuk J. 1995, A problem of the Baden group Metallurgy at the Site of Salos-Donja Vrba near Slavonski Brod, in: B. Jovanović (ed.), *Ancient mining and Metallurgy in Southeast Europe*, International Symposium, D. Milanovac 1990, Bor-Belgrade, 55-58.

Operta M. 2009, *Mineralogija*, knjiga I, Zenica.

Petrović J. & Jovanović B. 2002, *Gomolava – naselje kasnog eneolita,* Muzej Vojvodine-Arheološki Institut, Novi Sad-Beograd.

Radivojević, M., Rehren, T., Pernicka, E., Šljivar, D., Brauns, M., Borić, D. 2010, On the origins of extractive metallurgy: new evidence from Europe, *Journal of Archaeological Science* 37 (11), 2775-2787.

Radivojević M. 2015, Inventing Metallurgy in Western Eurasia: a Look through the Microscope Lens, *Cambridge Archaeological Journal* 25, 321-338.

Radivojević M. & Rehren T. 2016, Paint It Black: The Rise of Metallurgy in the Balkans, *Journal of Archaeological Method and Theory* 23 (1), 200-237.

Radivojević M. & Grujić J. 2017, Community structure of copper supply networks in the prehistoric Balkans: An independent evaluation of the archaeological record from the 7th to the 4th millennium BC, *Journal of Complex Networks*, 1-19.

Schmidt R. R. 1945, *Die Burg Vučedol*, Zagreb.

Sterud E. L. & Sterud A. K. 1974, A quantitative analyses of the material remains, *Wissenschaftliche Mitteilungen des Bosnisch-Herzegowinischen Landesmuseums IV*, Sarajevo, 155-355.

Težak-Gregl T. 2006, Eneolitik, in: S. Mihelić (ed.), *Trgovina i razmjena u pretpovijesti*, Arheološki muzej u Zagrebu, Zagreb, 33-37.

Truhelka Ć. 1906, Prehistorijski nalazi u Bosni i Hercegovini, *Glasnik Zemaljskog muzeja u Bosni i Hercegovini* XVIII/2, Sarajevo, 117-127.

Truhelka Ć. 1907, Prehistorijski nalazi u Bosni i Hercegovini, *Glasnik Zemaljskog muzeja u Bosni i Hercegovini* XIX/1, Sarajevo, 57-75.

Žeravica Z. 1993, *Äxte und Beile aus Dalmatien und anderen Teilen Kroatiens, Montenegro, Bosnien und Herzegovina*, Prähistorische Bronzefunde, IX/18, Stuttgart.


arheološki muzej u zagrebu
archaeological museum in zagreb
POVRATAK U PROŠLOST — BAKRENO DOBA U SJEVERNOJ HRVATSKOJ
BACK TO THE PAST — COPPER AGE IN NORTHERN CROATIA
triglav
izložba
exhibition
30-08 – 19-11-2018
arheološki muzej u zagrebu
archaeological museum in zagreb
amz

AUTORICE IZLOŽBE / AUTHORS OF THE EXHIBITION

Jacqueline Balen
Ina Miloglav
Dragana Rajković

OBLIKOVANJE I GRAFIČKA PRIPREMA IZLOŽBE
/ DESIGN AND GRAPHIC PREPARATION OF THE EXHIBITION

Srećko Škrinjarić

OBLIKOVANJE I GRAFIČKA PRIPREMA PLAKATA IZLOŽBE
/ DESIGN AND GRAPHIC PREPARATION OF EXHIBITION POSTER

Nedjeljko Špoljar, Sensus Design Factory

PREDMETE NA IZLOŽBI ODABRALI SU I USTUPILI
/ THE EXHIBITS WERE CHOSEN AND BORROWED BY

Arheološki muzej u Zagrebu / Archaeological museum in Zagreb (Jacqueline Balen, Ana Đukić)
Arheološki muzej Osijek / Archaeological museum Osijek (Tomislav Hršak, Dragana Rajković)
Geoarheo d.o.o. (Mateja Hulina, Jelena Lapić, Goran Skelac)
Gradski muzej Koprivnica / Museum of Koprivnica (Robert Čimin, Ivan Valent)
Gradski muzej Križevci / Križevci Municipal Museum (Lana Okroša Rožić)
Gradski muzej Nova Gradiška / Nova Gradiška Municipal Museum (Marija Mihaljević)
Gradski muzej Požega / City Museum Požega (Mirela Pavličić Hein)
Gradski muzej Vinkovci / City Museum Vinkovci (Maja Krznarić Škrivanko)
Gradski muzej Virovitica / City Museum Virovitica (Silvija Salajić)
Hrvatski restauratorski zavod / Croatian Conservation Institute (Lea Čataj)
Institut za arheologiju, Zagreb / Institute for archaeology, Zagreb (Hrvoje Kalafatić, Darija Ložnjak Dizdar, Zorko Marković, Tatjana Tkalčec)
Kaducej d.o.o. (Josip Burmaz, Dženi Los, Dinko Tresić Pavičić)
Muzej Brodskog posavlja / Brodsko Posavlje Museum (Josip Lozuk, Lidija Miklik-Lozuk)
Muzej Đakovštine / Museum of Đakovo Region (Jelena Boras)
Muzej grada Zagreba / Zagreb City Museum (Aleksandra Bugar, Boris Mašić)
Muzeji Hrvatskog zagorja - Muzej seljačkih buna / Museums of the Croatian Zagorje – Museum of Peasant Uprisings (Ivana Škiljan)
Muzej Međimurja Čakovec / Međimurje County Museum in Čakovec (Branka Marciuš)
Muzej Moslavine, Kutina / Moslavina Museum, Kutina (Antonio Džaja)
Muzej Radboa / Museum Radboa (Ivana Hazulin, uz pomoć Davora Špoljara)
Odjel za arheologiju, Sveučilište u Zadru / Department of Archaeology, University of Zadar (Filipa Jurković Pešić, Brunislav Marijanović)
Odsjek za arheologiju, Filozofski fakultet Sveučilišta u Zagrebu / Department of Archaeology, Faculty of Humanities and Social Sciences, University of Zagreb (Krešimir Filipec, Ina Miloglav, Hrvoje Potrebica)
Zavičajni muzej Našice / Našice Local History Museum (Jasna Jurković, Danimirka Podunavac)
Zbirka obitelji Zvijerac / Collection of Zvijerac family (Ivan Zvijerac)

TEHNIČKA IZVEDBA IZLOŽBE
/ TECHNICAL EXECUTION OF THE EXHIBITION

Vedran Mesarić
Ivan Troha
Robert Vazdar

POSTAV IZLOŽBE / SETTING UP THE EXHIBITION

Slađana Latinović

VIZUALIZACIJA NASELJA / SETTLEMENT VISUALIZATION

Jelena Boras
Marin Mađerić

IZRADA REKONSTRUKCIJA / RECONSTRUCTIONS

Vedran Mesarić

KONZERVATORSKO-RESTAURATORSKI RADOVI
/ CONSERVATION AND RESTORATION

Marina Gregl
Zrinka Znidarčić

EDUKATIVNI PROGRAM / EDUCATIONAL PROGRAM

Zorica Babić

FOTOGRAFIJE / PHOTOGRAPHS

Igor Krajcar
Nenad Milić

Realizaciju izložbenog projekta financijski su pomogli Grad Zagreb, Arheološki muzej u Zagrebu, Filozofski fakultet Sveučilišta u Zagrebu i Arheološki muzej Osijek / The realization of the exhibition project was financially supported by the City of Zagreb, Archaeological museum in Zagreb, Faculty of Humanities and Social Sciences, University of Zagreb and Archaeological Museum Osijek.

aeneus
mjeden, bakren

lithos
kamen

Glavna značajka bakrenoga doba ili eneolitika jest upotreba metala, upravo bakra i zlata, za izradbu nakita, oružja i orudja, iako je već u neolitiku čovjek ovladao novim tehnologijama, odnosno proizvodnjom metala, isprva se oslanjajući samo na površinske nalaze elementarnoga bakra.

The main feature of Copper Age or Eneolithic is the use of metals, copper and gold, for jewelry, weapons and tools, although in the Neolithic man already mastered new technologies or production of metal at the beginning using surface finds of elemental copper.

aeneus
brass, copper

lithos
stone

Archaeological Museum in Zagreb
Faculty of Humanities and Social Sciences of the University of Zagreb
Archaeological Museum Osijek

AMZ ISBN 978-953-8143-18-2
FFZG ISBN 978-953-175-749-2
AMO ISBN 978-953-7559-10-6

CIJENA: 150 kn