Papers in Honour of Rastko Vasić 80th Birthday

Зборник радова у част 80 г. живота Растка Васића

АРХЕОЛОШКИ ИНСТИТУТ

ЗБОРНИК РАДОВА У ЧАСТ 80 Г. ЖИВОТА РАСТКА ВАСИЋА

Уредници
Војислав Филиповић
Александар Булатовић
Александар Капуран

Београд
2019

INSTITUTE OF ARCHAEOLOGY

PAPERS IN HONOUR OF RASTKO VASIĆ 80th BIRTHDAY

Editors
Vojislav Filipović
Aleksandar Bulatović
Aleksandar Kapuran

Belgrade
2019

Published by
Institute of Archaeology, Belgrade

For publisher
Miomir Korać

Editors
Vojislav Filipović
Aleksandar Bulatović
Aleksandar Kapuran

Translation
Authors

Proof-reading
Caitlyn Breen

Design
Institute of Archaeology

Printed by
Sajnos d.o.o., Novi Sad

Printed in
250

ISBN 978-86-6439-048-4

CONTENTS

Foreword

Since 1990, after practically 30 years and the publication of the volume of the Starinar journal dedicated to the academician and professor Milutin Garašanin, the Institute of Archaeology in Belgrade publishes a volume dedicated to a doyen of both Serbian and European archaeology, Rasko Vasić. In contrast to university centers, where this kind of publications are usual, due to the position of individuals as professors and teachers (Festschrift, Homage...), the scientific researchers are usually neglected in that respect, which can be seen in the fact that this volume represents the first of a kind published by the Institute of Archaeology. Bearing in mind the significance and the influence of Vasić's work on ex-Yugoslav and prehistoric archaeology of Europe, as well as the fact that he spent his entire career at the Institute of Archaeology, we consider this volume as a humble act of our gratitude for everything our dear colleague Vasić did for archaeology and the Institute, on occasion of his 80th birthday.

Indeed, Rastko Vasić stands as a great of both Serbian and Yugoslav archaeology, distinctly appreciated and esteemed, which stands in opposition to his humble and unobtrusive nature. Vasić's scientific and artistic educations often intertwined in his papers dealing both with the protohistoric art and the particular problems of the Bronze and Iron Age in southeastern Europe. Years of work and scientific questions led him to various phenomena of our prehistoric archaeology, many of which he had himself defined, but from time to time he used to go back and discover the until then unobserved Iron Age art of the Central Balkans. Only a glimpse of his bibliography at the beginning of this volume reveals the archaeological phenomena he had defined and interpreted, and through his serious and responsible scientific work and afterwards authority introduced to archaeology. His first monographs (*Културне групе старијег гвозденог доба у Југославији* and *The Chronology of the Early Iron Age in Socialist Republic of Serbia*) were created on basis of his doctoral dissertation and more than a couple of decades since the publication represent often cited literature.

Увод

Након безмало 30 лета и *Старинара* посвећеног академику и професору Милутину Гарашанину из 1990. године, Археолошки институт у Београду објављује једну засебну публикацију посвећену доајену српске, али и европске археологије Растку Васићу. За разлику од универзитетских центара, где је овај тип публикација (Festschrift, Hommage...) уобичајен због позиције појединца као професора и учитеља, научни су радници обично занемарени у томе погледу, што се види и по томе да је ово прва таква засебна публикација наше куће. Но, имајући у виду значај Васићевих дела за бившу југословенску и праисторијску археологију Европе и утицај на њу, као и то што је цео свој радни век провео у Археолошком институту, сматрали смо да је овај зборник поводом 80 година живота један скромни чин наше захвалности за све што је драги колега Васић учинио за археологију и Институт.

Растко Васић доиста представља великана српске и југословенске археологије, изразито уваженог и цењеног, што је у неку руку у супротности са његовом скромном и ненаметљивом природом. Васићево научно, али и уметничко образовање често се сустицало у његовим првим радовима, када се бавио како уметничким протоисторијским темама, тако и конкретним проблемима гвозденог и бронзаног доба југоисточне Европе. Године рада и стручна питања одвела су га ка многим феноменима наше праисторијске археологије, од којих је неке и сам дефинисао, али се с времена на време враћао, а уједно и откривао до тада незапажену уметност гвозденог доба централног Балкана. Само и летимичан поглед на његову библиографију на почетку овог зборника говори о археолошким појавама које је Васић одредио и интерпретирао, а својим озбиљним и одговорним научним радом и доцнијим ауторитетом увео у домаћу археологију. Његове прве монографије (*Културне групе старијег гвозденог доба у Југославији* и *The Chronology of the Early Iron Age in Socialist Republic of Serbia*), настале на основама док-

A complete affirmation in Yugoslav archaeology for colleague Vasić was the invitation to write no less than 13 chapters for the 5th volume of the distinguished publication *Praistorija jugoslavenskih zemalja*, as one of the youngest authors, dealing with less familiar subjects or subjects with scarce background data, undetermined origin or undefined to a great extent. It can be said that even nowadays, after more than 30 years, Vasić's certain syntheses from the aforementioned publication, remain the postulates for the Iron Age of the Central Balkans. Another significant work of Rastko Vasić, although often not emphasized enough, is the fact that under the invitation of the academician Dragoslav Srejović, he participated in writing of 150 separate units in the unique domestic archaeological encyclopedia - *Arheološki leksikon – preistorija Evrope, Afrike i Bliskog Istoka, grčka, etrurska i rimska civilizacija*, a paper that Yugoslav and Serbian archaeology lacked for a number of decades. His international reputation was confirmed by five monographs published within the prestigious *Prähistorische Bronzefunde* edition. In parallel with that, through his advice and influence, as well as through his scientific renown, he aided younger colleagues to prepare the volumes for the same edition.

In that context, it is important to mention that defending boards for magister or doctoral thesis on the subject on Bronze and Iron Age could not be imagined without the presence of the colleague Vasić. On such occasions, not a single critique or a bad word could be heard from Vasić, but positive opinion and useful suggestions above all, so that the candidate could properly prepare the thesis for future publication. Rastko Vasić has been a member of the editorial board for the Starinar journal for more than 40 years, as well as for many other corpora and journals in the territory of southeastern Europe. As a member of editorial staff or as a reviewer of papers and monographs, he would always point out the qualities of the submitted material, and if the other members of editorial staff or reviewers decided to reject the material, his benevolent suggestions would help in publishing each useful paper after all, even in some other journal. Also, as a long-time director of scientific projects at the Institute of Archaeology, he would always do his best to help

торске дисертације, и даље су, неколико деценија након објављивања,цитирано штиво.

Потпуну афирмацију у југословенској археологији колега Васић доживео је када је позван да, као један од тада најмлађих аутора, напише чак 13 поглавља за том V чувене *Праисторије југославенских земаља*, и то на неке теме о којима се мало знало или у вези с којима су подаци били штури, нејасног порекла и добрим делом недефинисани. Може се рећи да и данас, након 30 и више година, поједине Васићеве синтезе из ове серије и даље остају једини постулати гвозденог доба централног Балкана. Још један значајан допринос овога типа, чини се, није довољно помињан у досадашњем његовом раду, а то је чињеница да је на позив академика Драгослава Срејовића учествовао у изради преко 150 засебних јединица у јединственој домаћој археолошкој енциклопедији – *Археолошки лексикон – преисторија Европе, Африке и Блиског истока, грчка, етрурска и римска цивилизација*, делу које је дуги низ деценија недостајало југословенској и српској археологији. Међународни углед потврдио је са пет монографија у престижној едицији *Prähistorische Bronzefunde*, док је паралелно саветима и својим утицајем, као и научним реномеом, помагао млађим колегама да припреме своје свеске за исту едицију.

У томе контексту, важно је поменути да се без колеге Васића није могла замислити комисија за одбрану магистарских или докторских дисертација на тему бронзаног или старијег гвозденог доба. Том приликом од њега се није могла чути покуда или лоша реч, већ надасве позитивно мишљење и корисне сугестије како би кандитат своје дело адекватно припремио за будуће објављивање. Преко 40 година члан је редакције Старинара, као и многих зборника и часописа на простору југоисточне Европе. Као чест члан редакција или рецензент радова и монографија, увек је истицао квалитете прилога, а уколико би се остатак редакције или други рецензенти одлучили да одбију аутора, он би сесвојим благонаклоним сугестијама трудио да сваки користан рад ипак буде објављен, па макар у неком другом часопису. Такође, као дугогодишњи руководилац научних пројеката у Археолошком институту,

young colleagues on each matter, never striking as a boss or a superior.

Plenty of details on the private and professional life of Rastko Vasić, both as an archaeologist and painter and literate, can be found in the continuation of this volume, which was one of the ideas of the editors. Therefore, about 60 pages are dedicated to his life and work, biography and a detailed bibliography, while the interview is illustrated with Vasić's numerous paintings, selected by the celebrant himself. Afterward, there is a collection of papers dedicated to the colleague Vasić, written in English, German, Russian and the ex-Yugoslav languages, assorted chronologically. Unfortunately, certain authors which were invited in agreement with the celebrant did not respond, primarily due to the poor health, so the editors once again point out that they regret the situation, although on the other hand, we are grateful and proud of the content of the volume, on 33 authors of the papers, and the editorial board comprised of prominent names of the word archaeology from nine different countries.

Through this volume, the editorial board and the Institute of Archaeology would like to heartily congratulate the jubilee to our colleague Vasić and to wish him many more years in archaeology.

Vojislav Filipović
Aleksandar Bulatović
Aleksandar Kapuran

трудио се да помогне млађим колегама по свим питањима, не постављајући се притом као шеф.

Многи детаљи о приватном и професионалном животу Растка Васића и као археолога, и као сликара и књижевника, могу се наћи у наставку овог зборника, што је била и једна од идеја приређивача. Стога је првих шездесетак страна посвећено његовом животу и раду, биографији и детаљној библиографији, док је интервју илустрован бројним Васићевим сликама, по избору самог слављеника. Након тога уприличени сурадови посвећени колеги Васићу, на енглеском, немачком, руском и језицима бивше Југославије, поређани по хронолошком реду. Нажалост, поједини аутори позвани у консултацијама са слављеником нису се одазвали позиву, поглавито због нарушеног здравственог стања, па уредници и овом приликом напомињу да жале због оваквог развоја ситуације. С друге стране, поносни смо на садржај зборника – како на 33 аутора прилога, тако и на редакцију, у којој су врхунска имена светске археологије из девет земаља.

Колеги Васићу уредници и Археолошки институт овим зборником од срца честитају јубилеј и желе још много година рада у археологији.

Војислав Филиповић
Александар Булатовић
Александар Капуран

In the National Museum in Belgrade, 2018 (by Aca Đorđević)
У Народном музеју, 2018. године (фото Аца Ђорђевић)

A warrior's journey? Some recent taxonomic, trace element and lead isotope analyses of Mediterranean later Bronze Age metalwork in the Central and West Balkans

Barry Molloy

Abstract: The question of mobility between the different geographic and cultural regions of the Balkans, Aegean and Central Mediterranean remains an issue of crucial importance for understanding the development of Bronze Age societies in each region. While mobility can take many forms, in this paper we are particularly concerned with the movement of personal objects as a means to explore personal mobility. To do this, the paper brings together typological, trace element and lead isotope analyses and the role of portable XRF in this process is explored. It is concluded that a multi-proxy analyses that includes typologies can offer valuable insights into the nature and directionality of mobility.

Key words: Balkan prehistory, Mediterranean prehistory, later Bronze Age, bronze artefacts, swords, personal mobility, lead isotopes analysis, trace element analysis, artefact typologies.

The possibility of migrations to the Aegean from or through the Balkans in the thirteenth to eleventh century BC has long been considered in relation to the destabilisation, collapse and reorganisation of the palaces of the Aegean Bronze Age (Bouzek 1985). As interest in migration moves in and out of vogue in archaeology (Anthony 1997; Bergerbrandt 2013; Chapman 1997; Dzięgielewski et al. 2010; Mac Sweeney 2016; Molloy 2016), this has stimulated a long standing interest in seeking evidence for connectivity between cultures in the Aegean world and societies in the Balkans and Central Europe (Bouzek 1994, 1985, Harding 2007, 1984). Metalwork has been a significant resource for analysing how Aegean societies might have related to those to the north and west (Harding 1984; Jung et al. 2011, 2008; Molloy, Doonan 2015). The displacement of metal artefacts, and potentially metal as a raw material, from one place to another can be considered a signature of mobility. This can take place through the exchange of objects, the movement of people bearing those objects as personal possessions, or the knowledge of how an object should look or be made that was known by or imparted to a craftsman. Warriors by the very nature of their occupation meet at, and cross, boundaries and so examining weaponry as their possessions may be a particularly relevant category of material for addressing mobility between regions (Kristiansen, Larsson 2007). This paper will consider some analytical ways for assessing this by building on traditional typological approaches. The analyses discussed in this paper are part of an ongoing program looking at the technology of later Bronze Age copper alloy artefacts from the Carpathian Basin, Balkan and the Aegean regions.

Metals and their origins

The complementarity of lead isotope and trace element analyses is increasingly advocated as a method for characterising 'fingerprints' in copper alloys, though there is disagreement as to how these fingerprints can be best translated into the movement of metals within social environments (Begemann et al. 2001; Jung et al. 2011; Ling et al. 2014, 2013; Northover 2009; Pernicka 2014). It is generally agreed, however, that they can be used with a high degree of certainty to rule out areas where artefacts do not come from. Using these same data to define specific points

of origin of objects or their metal content is contested (Budd 1995; Budd et al. 1993; Knapp 2000; Sayre et al. 1995). In this paper I consider both of these issues but further argue that on a case-by-case basis, it can be possible to suggest general regions of origin for objects when we are in a position to integrate the typology of the artefact also into analyses. While remaining an act of balancing probabilities, this at once strengthens the case for specific pieces while also dramatically restricts the field of candidates for analysis to those that "don't belong" in their find environment.

A second objection to 'provenancing' metals to sources is that it reduces the social biography of artefacts to markers of mobility based on metal content alone without seeking to understand the social mechanisms underlying their displacement from points of origin, apart from hazy references to presumed, but not independently substantiated, trade networks (Doonan, Day 2007: 5-8; Knapp 2000: 32-36). Focussing on the metal as a trade resource on the basis of its economic value but not addressing the highly varied social lives of artefacts can therefore be a problem that leads to generalisations that are fundamentally contestable while also undermining the distinct story of specific artefacts in their local and international contexts.

Analytical methods

Alloys and provisional study of trace elements was conducted with SEM-EDX (in collaboration with D. Dungworth) and lead isotopes using MC-ICP-MS (by V. Pashley and J. Evans at the British Geological Survey) followed standard methods. Further analyses of objects sampled is ongoing using Q and MC ICP-MS at University College Dublin in collaboration with Stephen Daly. A portable XRF (pXRF) was used for preliminary and final studies, and as the device is rarely used for this purpose, some brief comments must be made at this point.

A pXRF uses a miniaturised X-Ray tube and in archaeology it is typically used for analysing irregularly shaped objects in museums, resulting in compromises for both instrumental and method precision and accuracy. For analysing prehistoric bronzes, their complex surface chemistry typically means that the patina or even true metal at the surface will not represent accurately the composition of the original alloy (Constantinides et al. 2002; Giumlia-Mair 2005; Pernicka 1999). It is an imperfect instrument for analysing ancient metalwork and is not therefore a substitute for established laboratory methods for analysing prehistoric bronze artefacts when a choice is available. In archaeology it is increasingly problematic to conduct destructive analyses and the numbers and nature of artefacts that can be sampled are often restricted. The challenge may therefore be to see if a pXRF device can be used with due awareness of its limitations to generate data that could otherwise not be obtained. This does not constitute an excuse for 'bad science' but rather encourages us to explore the conditions through which pXRF data may be considered, on a case-by-case basis, usable for studying ancient metalwork.

With the portable XRF, we can observe two linked advantages – first, its use is not restricted by the analysis chamber of a lab XRF, which means it can analyse an object of any size, and second, it is possible to analyse awkward shaped objects from different angles and therefore choose suitable spots almost at will. While analysis of the patina on an archaeological object will give you the chemistry of the patina, not the alloy, it is often possible to find patches of exposed metal or even objects that have had the patina physically or chemically removed. Archaeological bronzes often have differential segregation of elements, notably but not exclusively lead, and so they are heterogeneous compounds. The ability to take multiple readings with a pXRF on a single object helps to mitigate the impact of this heterogeneity. For example, using EMPA, Northover (1988) analysed different samples from the same British swords and the results (for example from A10948, A24934 and Ontario AF9) demonstrate the concentrations of many elements can vary in different parts of a given object.

Where permission was in place for removing samples for laboratory analysis, the pXRF was used to guide this process. In situations where further sampling was not permissible, the

pXRF was used to obtain data that could otherwise not be obtained. By selecting areas of the object that had exposed (golden coloured) metal or very thin patinas in less ideal circumstances, it was possible to take readings that provided accurate assessments of tin content and a picture of the absence, low concentration or relative abundance of key trace elements. For some objects, it was also possible to cut metallographic samples and so to compare the results with those obtained using SEM-EDX, confirming the accuracy of pXRF for determining major alloying components using the methods described herein (Table 1). In most cases, it was possible to use the pXRF to define if trace elements were below 0.1% up to 1% or over 1%. While providing rather coarse data, as will be shown, this was sufficient to suggest areas where objects were unlikely to be from, particularly when combined with typological analysis.

Analysis	Find location	Sn	Ni	As	Sb	Pb
Surface pXRF	Lakavica	12.5	0.06	0.72	<LOD	0.93
Surface pXRF	Donje Luge	12.3	<LOD	<LOD	0.08	0.6
Surface pXRF	Sisak	8.8	<LOD	0.42	<LOD	0.17
Surface pXRF	Bingula Divos	5.8	0.37	1.12	0.66	1.04
Surface pXRF	Simanovci	<LOD	<LOD	0.93	<LOD	0.08
Surface pXRF	Zemun	10.9	<LOD	0.2	0.01	0.01
Surface pXRF	Hajdukovo	12	0.09	0.16	<LOD	0.57
Powder pXRF	Sisak	8.1	<LOD	0.41	<LOD	0.14
Powder pXRF	Simanovci	<LOD	<LOD	1.06	<LOD	<LOD
Powder pXRF	Hajdukovo	11.3	0.02	0.13	0.01	0.23
Metallographic SEM-EDS	Sisak	8.8	0.06	0.33	<LOD	0.01
Metallographic SEM-EDS	Bingula Divos	4.52	0.4	0.45	0.5	0.33
Metallographic SEM-EDS	Hajdukovo	11.5	<LOD	0.13	<LOD	0.8

Table 1 – Sn, Ni, As, Sb and Pb in swords from Donje Luge, Lakavica, Sisak, Hajdukovo, Bingula Divoš and Zemun and ingot from Šimanovci.

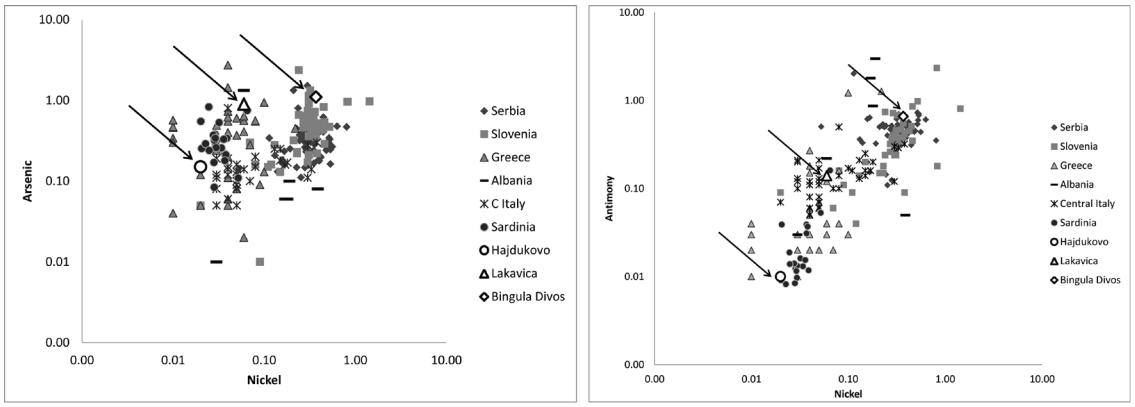

Figure 1a and b – Comparison of trace elements for swords from Lakavica, Hajdukovo and Bingula Divos and artefacts from Serbia (SEM-EDS), Slovenia (ICP-AES (Trampuž-Orel 1996)), Greece (AAS (Koui et al. 2006; Mangou, Ioannou 1999, 1998)), Albania (AAS (Koui et al. 2006), Central Italy (EDXRF (De Marinis et al. 2005)) and Sardinia (NAA (Begemann et al. 2001)). Swords from Sisak, Donje Luge and Zemun are not compared due to high detection limits for key elements, see Table 1.

Trace elements are compared to the predominant levels of those in artefacts in circulation in the region (Begemann et al. 2001; Jung et al. 2011; Trampuž-Orel 1996; Molloy pers. obs. for artefacts analysed on this project but not cited in this paper). When conducting trace element analyses, I used Ni, Sb and As (Figure 1a and b) because these elements remain present from ore to artefact in copper alloys (Pernicka 1999) and are the most indicative of different metal compositions. The analytic dangers of using trace elements alone to relate metals to sources or even zones of circulation has been clearly laid out by Pernicka (2014, 1999). I use this therefore in broad brush stroke discussions, reflecting Knapp's (2000: 35) position of distinguishing "between local and foreign materials, and/or to eliminate from consideration individual sources." The general picture would have Ni and Sb well above 0.1% in the Balkans and Carpathian basin while in southern Italy (and Sardinia) and the East Mediterranean, these elements are typically well below 0.1% (Jung et al. 2011; Liversage 1994; Northover 2009; Trampuž-Orel 1996; Jung et al. 2008;

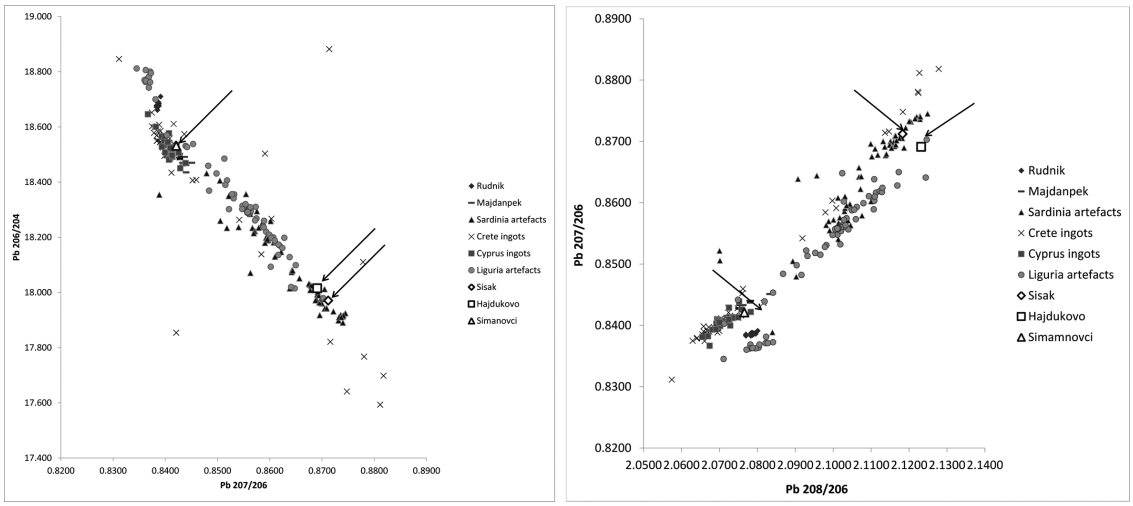

Figure 2 a and b – Comparison of lead isotope ratios of swords form Sisak and Hajdukovo and ingot from Šimanovci to artefacts and ingots from Sardinia, Liguria, Greece and Cyprus and ores and slags from Majdanpek and Rudnik.

Sample	code		Pb206/ Pb204	%2SE	Pb207/ Pb204	% 2SE	Pb208/ Pb204	% 2SE	Pb207/ Pb206	% 2SE	Pb208/ Pb206	% 2SE
Hajdukovo	P642	1	18.0152	0.011	15.6589	0.013	38.2527	0.016	0.8691	0.004	2.1232	0.0075
Sisak	P642	2	17.9703	0.011	15.6568	0.013	38.0713	0.015	0.8712	0.005	2.1183	0.0065
Simanovci	P642	3	18.5314	0.010	15.6074	0.014	38.4872	0.014	0.8421	0.005	2.0766	0.0064
±%2SD reproducibility of NBS981 standard			**0.014**		**0.016**		**0.02**		**0.006**		**0.006**	

Table 2 – Lead isotope analyses of swords from Sisak and Hajdukovo and ingot from Šimanovci.

Koui et al. 2006; Mangou, Ioannou 1999, 1998; Begemann et al. 2001; Lo Schiavo et al. 2009, 2005). In all of these regions, As is typically between 0.1% and 1%. Trace elements are thus used as broad indicators of metal types typical to this region and those typical to regions to the south or west, and this is augmented by typological distinction of objects and in some instances lead isotope analysis also (Figure 2a-b and Table 2), where practicable.

The material

Lakavica (Figure 3)

This is a sword of type Reutlingen (Harding 1995: 40) and can be dated to the 12th to 10th century BC. While the general form is found widely throughout Europe, the distinctive faux-midrib flanked by two small ridges is peculiar to central and northern Greece and Albania with outliers in FYRO Macedonia, Croatia and Bulgaria (Molloy 2016). It was possible to analyse this sword using the portable XRF alone. The absence of Sb and Ni represented in these analyses suggest that it is not made from the metal commonly in circulation to the north and would be typical for the bronze used in regions to the south (Jung et al. 2008; Koui et al. 2006; Mangou, Ioannou 1999). Combined with the form of the object, it can be suggested that this sword is not an import from the north but rather marks part of the boundary for types that were produced either locally or to the south in Greece.

Donje Luge (Figure 4)

This sword is broadly of Type Reutlingen and appears to be early in the sequence of grip-tongue swords (Bulatović et al. 2003). The patina had been completely removed from this sword.

Figure 3 – Sword from Lakavica.

Figure 4 – Sword from Donje Luge.

Figure 5 – Sword from Sisak.

It was only permitted to use pXRF for analysis. Ni and As were below the limits of detection and Sb was (just) above 0.1%. These levels of Sb and As would not be typical for metal circulating in the Balkans, Greece or Italy. However, the pXRF is not best suited to detecting such low concentrations, and so the balance of probability is that the metal did not come from the north but may be from unknown local sources or the south. The trace element analyses are therefore in conclusive without supporting analyses of lead isotope ratios and because the shape of the object is *sui generis*.

Sisak (Figure 5)

The sword from Sisak (Harding 1995: 49-50) is of the Statzling type and should be dated to the 12th to 11th century BC. The pXRF did not pick up traces of Ni or Sb and As was over 0.1%, confirmed also by SEM-EDX analysis of a sample, which makes it atypical for this region and would be more commensurate with one of the Mediterranean sources. A drilled sample was taken for lead isotope analyses and a solid sample was taken for metallographic analyses.

The sword falls within the lead isotope ratio (Table 2) range of artefacts in use in Sardinia and possibly Liguria in Italy (Begemann et al. 2001: 70-71; Lo Schiavo et al. 2005; OxaLID) and the trace element levels fit within this range also (Begemann et al. 2001: 60-61; Ling et. al. 2014). In terms of generic typology, the sword type occurs across Europe, however its greater

than average (for the type) length and narrow central spine almost forming a midrib and the sloping shoulders are reminiscent of the faux-midrib swords typical to Greece (Molloy 2016). Its proportions and blade geometry are not common to swords typical to the Balkans. Unfortunately, there are few sword finds from Sardinia or Liguria and no complete pieces that provide close comparanda (Lo Schiavo 2005; Peroni 1970). Whether this sword represents an import from Italy or a sword from Greece made from Italian metal remains unresolvable, though for the purpose of this paper its exogenous origin and probable transport from the south or west via the Adriatic are of relevance.

Bingula Divoš (Figure 6)

A sword fragment from Bingula Divoš on the River Sava (Harding 1995: 94) appears to have a cross-section with a faux-midrib similar to that of the sword from Lakavica described above and characteristic of the regions south of there. It is dated by associated finds to the 12th to 10th century BC. A similar fragment is known from the nearby site of Brodski Varoš (Harding 1995: 94). The fragment from Bingula-Divoš was analysed using pXRF on an area with thin patina. Allowing for enrichment of elements due to taphonomic processes, the sum value of Ni, Sb and As of over 2% is still high and would be consistent with this region and inconsistent with Mediterranean metals (Table 2). SEM-EDS analysis of a metallographic sample provided a sum value for these elements of nearly 1.5%, which confirms the general picture suggested by the pXRF. The only examples with these levels in Greece have been shown to be imports (Jung et al. 2008), and so lead isotope analyses were not undertaken at this point in the research. Nonetheless, if we are to consider the potential multi-directionality of mobility in the region, it is noteworthy that in western Greece a sword of this morphology was found to have been made of a metal type common to northern Italy and the Balkans (Stavropoulou Gatsi et al. 2012). Without suggesting a similar biography, this highlights the complexity of binding a source of metal and a final place of deposition of an object as a linear relationship.

Figure 6 – Sword from Bingula Divos.

Šimanovci (Figure 7)

Moving along the river Sava to the east, we will deviate briefly from swords. In the unpublished hoard from Simanovci an ingot fragment was recovered that appeared to be the corner of an ox-hide ingot, with the characteristic elongated protrusion.[1] This type of ingot is common to the Mediterranean region and finds in other parts of Europe are considered to be imports (Sabatini 2016). The lead isotope ratios (Table 2) from a sample taken from this overlap those of ingot finds from Cyprus and Crete, though they are also at the limit of the range for ores from Majdanpek in Serbia. There is good evidence to suggest that this latter area was mined in prehistory, though the precise dates are not clear (Pernicka et al. 1993: 43-49). For the Eneolithic to Early Bronze Age artefacts sampled from the area, however, As levels were typically quite similar to Ni and Sb, with each typically occurring below 0.1% (Pernicka et al. 1993: 34-36). A similar picture is evident in the geological samples from Majdanpek. Looking to the oxhide ingots from the Medi-

[1] 3D model of this ingot: https://skfb.ly/MnKI

terranean, arsenic is typically present in the region of 0.1-1% with Ni and Sb not exceeding 0.1% and most commonly occurring below 0.03% or being absent entirely (Kassianadou 2009; Lo Schiavo 2009). The low trace elements in East Mediterranean ingots are believed to be a result of the smelting of very pure ores and not a consequence of subsequent refining (Hauptman 2005: 505). In any eventuality, the analyses of ingots from the East Mediterranean uniformly have very low trace elements, even if the exact levels apparently vary from site to site (Kassianadou 2005; Hauptman et al. 2002).

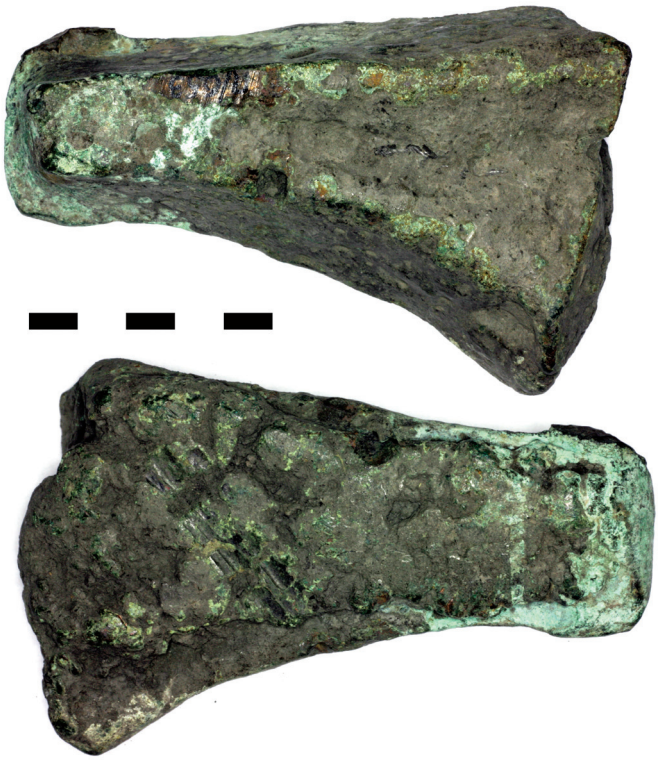

Figure 7 – Ingot from Simanovci.

This latter pattern best matches the fragment from Šimanovci with 1% As, while Ni and Sb occurred below the limit of detection with the pXRF and the SEM-EDS. The characteristic shape of the ingot fragment, along with its rectilinear profile further support the case for this being of East Mediterranean origin, most probably arriving via a Black Sea route, where such ingots are also known. One face of the ingot is also smooth which appears to be from it being poured into a mould, whereas the other 'back' side is very uneven, typical of the exposed upper surface in a one piece mould. There are marks on the ingot where it appears to have been struck with a bladed object (an axe?) in the process of fragmenting it. With the finds of four ingot fragments from Oberwilflingen in Germany that probably originate in the Mediterranean (Primas, Pernicka 1998) and newly discovered depictions of what appear to be oxhide ingots as far north as Sweden (Ling, Stos-Gale 2015), the chemistry and morphology of this find would be in good company.

Zemun (Figure 8)

Moving east again along the Sava and towards its confluence with the Danube, a sword was allegedly discovered in the 19th century (Harding 1995: 65). It is a typical East Mediterranean form that has been found as far afield as the Levant (Maxwell-Hislop 1946; Shalev 2004), and examples also come from northern and western Turkey. It is not easy to date, but its manufacture should fall somewhere between 1500 and 1100 BC.

This sword was sold to an English collector, though Harding (1995: 65-66) argues that either the seller or the buyer mixed it up with another in their keeping, so that the one we have today is not in fact the one originally from Zemun. It could nonetheless be argued that dealers and collectors alike would place a high value on swords, and the likelihood of such an unfamiliar type for the region being mistaken for one characteristic to the Balkans may be questionable in a collection of a handful of

Figure 8 – Sword from Zemun.

swords. In light of the other finds of Mediterranean origin, particularly the ingot at Šimanovci and those from Oberwilflingen, or indeed the east Balkan axe on the Uluburun shipwreck, materials presumably travelled between the Black Sea and the Danube, so the sword could conceivably be an ancient import brought by ancient voyagers who travelled along this same route. Whether we consider this to be an ancient import or a less likely modern mix-up, the pXRF analyses of two areas with clean metal exposed suggest a Ni and Sb occurring below the limits of detection and As at 0.2%. These data indicate that the metal used is not typical for the Balkans and so we can probably rule out that it was an ancient local copy of a Mediterranean sword.

Hajdukovo (Figure 9)

Moving to the north along the River Tisza, a sword from the southern part of the Great Hungarian plane in Serbia was studied (Harding 1995: 66; Cat. 219). This was in quite poor condition lacking components including the majority of the hilt and no bare metal was exposed. It was not possible to provide an exact typology for it due to the lack of hilt, though it is of the grip-tongue family of swords and is probably dated to the 13th to 11th century on the basis of blade shape, though a date down to the 9th century is possible (Harding 1995: 54).

The corrosion of the sword was not conducive to optimal use of the pXRF, though it was observed that very low levels of Nickel and Antimony were present. This sword was sampled using a 1mm drill. The trace element levels were measured again using the pXRF and SEM-EDS on the drilled sample, and the readings were similar (Table 1). The lead isotope ratios and trace elements for this artefact are close to those from Sardinia, although Pb208/206 plotted against Pb207/206 falls slightly outside this range and alongside some outlier artefacts from Liguria in northern Italy where Bronze Age mining may have taken place (Ling et al. 2014: 114). However this is still very close to the range of Sardinian artefacts and looking at Pb207/206 plotted against Pb206/204 it falls again within the range of Sardinian artefacts and farther from the Ligurian artefacts. There are not sufficient trace element data available on artefacts from Liguria to further compare trace elements, they would fit well within the range present in Sardinia and they do not fit well in the region where the sword was found. Without the hilt, it is difficult to say anything about the typology, but the use of one or two rivet holes in each shoulder is less common in Italy than three rivet holes in each shoulder (Peroni 1970). The presence of a low midrib on the sword is atypical for the Carpathian basin, and may find a loose parallel on models of swords from Sardinia (Lo Schiavo 2005). Pointing to a specific source for the object is therefore tenuous, but there is little to suggest it is local and more to suggest it, or the metal used to make it, came from non-east-Alpine sources in Italy.

Figure 9 – Sword from Hajdukovo.

Discussion

The social effects of imports into any particular local context can be variable, arising in part from the object and in part from its biography and that of the person that brought it. Using the material itself as the unifying characteristic to document and understand imports in the form of objects (as opposed to craft practices or craftspeople) is problematic because the social pathways through which different objects can travel can be very di-

verse dependent on the context and persons using them – e.g. a sickle (tool), a sword (weapon) or an ingot (resource). My choice to focus mainly on weaponry was informed by an expectation that these objects were used in activities that fundamentally required mobility in antiquity. Indeed, of all objects analysed during this study, those that appear to have been of atypical metal for the Balkans were ones that stood out on the basis of their form also. In two cases, the form appeared to be of foreign influence, but the metal used to make them apparently was not. In no case analysed thus far was the form typically local and the metal atypical.

Three artefacts of probable Mediterranean origin have been discussed on the basis of form, trace elements and lead isotopes. This latter method provides perhaps the least ambiguous component to the methods brought together here, but it is also the most destructive and expensive. The use of portable XRF as discussed in this paper is not a suitable replacement for laboratory methods, though it does provide an opportunity to refine the best candidates for sampling and in the specific region of this study, it provides results that may be indicative of where objects are *unlikely* to be from. The few artefacts discussed herein and samples currently under study inform us that Mediterranean metals could and did make their way into the Balkans. While finding more 'instances' of imports is likely through further compositional analyses, a significant issue must be the development of a framework of analyses that takes account of types and functions of artefacts. If we isolate the metal content as an object of study in itself for the purpose of provenancing, we risk homogenising the social environment in which materials and people moved to economic endeavours.

The combined use of trace elements and artefact morphology therefore provides a useful method in its own right for defining potential mobility (or lack thereof) of bronze artefacts (e.g. the swords from Lakavica and Bingula Divoš). Those artefacts that exemplify (e.g. the sword from Sisak) and confound this approach (e.g. the swords from Hajdukovo and Donje Luge) suggest the complexity of the role of lead isotope analyses in such research. The overall picture is of predominantly local metal being used to make weapons of local form, yet it is clear that journeys were made by people from this region or visitors to it that led to a handful of exogenous objects being used and deposited there. The overall picture is that warriors in different parts of this region were participants, at least on occasion, in activities that led them to journey to distant places.

Acknowledgements:
This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 655023 held at University College Dublin. I am grateful to all colleagues who made this research possible – too numerous to mention here – but Dragan Jovanović, Sanjin Mihelić, Aleksandra Papazovska, Agnes Szekeres, Predrag Lutovac, Andrew Shapland, Roger Doonan and Aidan O'Sullivan aided in analyses of these objects. And finally thank you Dr. Rastko Vasić for your advice and warm welcome to Serbia.

Bibliography

Anthony 1997 – D. Anthony, Prehistoric migration as social process, in: *Migrations and Invasions in Archaeological Explanation*, eds. J. Chapman, H. Hamerow, *British Archaeological Reports*, Oxford, 1997: 21–32.

Begemann *et al.* 2001 – F. Begemann, S. Schmitt-Strecker, E. Pernicka, Chemical Composition and Lead Isotopy of Copper and Bronze from Nuragic Sardinia. *Journal of European Archaeology* 4: 43–85.

Bergerbrandt 2013 – S. Bergerbrandt, Migration, innovation and meaning: Sword depositions on Lolland 1600-1100 BC, in, *Exchange Networks and Local Transformations*, eds. M.E. Alberti, S. Sabatini, Oxford, 2013: 146–155.

Bouzek 1985 – J. Bouzek, *The Aegean, Anatolia and Europe: cultural interrelations in the second millennium* B.C. Göteborg, Åström and Prague, 1985.

Bouzek 1994 – J. Bouzek, Late Bronze Age Greece and the Balkans: A Review of the Present Picture, *Annual of the British School at Athens* 89: 217–234.

Budd 1995 – P. Budd, Oxhide Ingots, Recycling and the Mediterranean Metals Trade, *Journal of Mediterranean Archaeology* 8: 1–32.

Budd, *et al.* 1993 – P. Budd, D. Gale, A. M. Pollard, Evaluating Lead Isotope data: Further observations. *Archaeometry* 35: 241–263.

Bulatović *et al.* 2003 –L. Bulatović, P. Lutovac, T. Lauko, B. Ravnik-Toman, M. Guštin, J. Tratnik, *Zlatno doba Crne Gore / The golden age of Montenegro*. Podgorica, 2003.

Chapman 1997 – J. Chapman, The impact of modern migrations and invasions on archaeological explanation, in: *Migrations and Invasions in Archaeological Explanation*, eds. J. Chapman, H. Hamerow, *British Archaeological Reports*, Oxford, 1997: 11–20.

Constantinides *et al.* 2002 – I. Constantinides, A. Adriaens, F. Adams, Surface characterization of artificial corrosion layers on copper alloy reference materials, *Applied Surface Science* 189: 90–101.

De Marinis *et al.* 2005 – G. De Marinis, A. Giumlia-Mair, M. Miccio, P. Pallechi, Tecnologie produttive nei siti dell'Etá del Bronzo di Moscosi di Cingoli e Cisterna di Tolentino, in: *Atti Della XXXVIII Riunione scientifica "Preistoria e Protostoria delle Marche" Portonovo*. Abbadia Di Fiastra. 1- 5 Ottobre 2003. Florence, 2005: 679–694.

Doonan, Day 2007 – R. Doonan, P, Day, Mixed origins and the origins of mixing: Alloys and Provenance in the Early Bronze Age Aegean, in: *Metallurgy in the Early Bronze Age Aegean*, eds. P. M. Day, R. C. P. Doonan, Oxford, 2007: 1–18.

Dzięgielewski *et al.* 2010 – K. Dzięgielewski, M. S. Przybyła, A. Gawlik, Reconsidering Migration in Bronze and Early Iron Age Europe: Bridging a Gap in European Mobility?, in: *Migration in Bronze and Early Iron Age Europe*, eds. K. Dzięgielewski, M. S. Przybyła, A. Gawlik, Kraków, 2010: 9–36.

Giumlia-Mair 2005 – A. Giumlia-Mair, On surface analysis and archaeometallurgy, *Nuclear Instruments and Methods in Physics Research* Section B: 35–43.

Harding 1984 – A. Harding, *The Mycenaeans and Europe*. London, 1984.

Harding 1995 – A. Harding, *Die Schwerter Im Ehemaligen Jugoslawien*, PBF IV/14, Stuttgart, 1995.

Harding 2007 – A. Harding, Interconnections between the Aegean and Continental Europe in the Bronze and Early Iron Ages: Moving beyond Scepticism, in: *Between the Aegean and Baltic Seas: Prehistory Across Borders*, eds. I. Galanaki, H. Tomas, Y. Galanakis, R. Laffineur, Liège, 2007: 47–56.

Hauptman, Maddin 2005 – A. Hauptman, R. Maddin, Die Kupferbarren von Uluburun, Teil I: Qualitätsmetall für den Weltmarkt?, in: *Das Schiff von Uluburun – Welthandel Vor 3000 Jahren*, eds. Ü. Yalcin, C. Pulak, R. Slotta, Deutsches Bergbau-Museum, Bochum, 2005: 141–147.

Hauptman *et al.* 2002 – A. Hauptman, R. Maddin, M. Prange, On the texture and composition of copper and tin ingots excavated from the shipwreck of Uluburun. *Bull. Am. Sch. Orient. Res*. 328: 1–30.

Jung *et al.* 2011 – R. Jung, M. Mehoefer, E. Pernicka, Metal Exchange in Italy from the Middle to the Final Bronze Age (14th–11th century B.C.E.), in: *Metallurgy: Understanding How, Learning Why: Studies in Honor of James D. Muhly*, eds. P. P. Betancourt, S. C. Ferrence, Philadelphia, 2011: 231–249.

Jung *et al.* 2008 – R. Jung, I. Moschos, M. Mehoefer, Fonevontas me ton idio tropo: Oi eirinekes epafes yia ton polemo metaxi dutikis Elladas kai Italias kata ti diapkeia ton opsimon Mukinaikon xronon, in: *Politismiki Allilogonimopoisi Notias Italia Kai Dutikis Elladas Mesa Apo Tin Istoria*, Patras, 2008: 85–107.

Kassianadou 2009 – V. Kassianadou, Oxhide ingots in Cyprus, in: *Oxhide Ingots in the Central Mediterranean*, eds. F. Lo Schiavo, J. Muhly, R. Maddin, A. Giumlia-Mair, Roma, 2009: 41–82.

Knapp 2000 – B. Knapp, Archaeology, science-based archaeology and the Mediterranean Bronze Age metals trade, *European Journal of Archaeology* 3: 31–56.
Kristiansen 2002 – K. Kristiansen, The tale of the sword – swords and swordfighters in Bronze Age Europe, *Oxford Journal of Archaeology* 21: 319–332.
Kristiansen, Larsson 2005 – K. Kristiansen, T. B. Larsson, *The Rise of Bronze Age Society: Travels, Transmissions and Transformations*. Cambridge, 2005.
Kristiansen, Larsson 2007 – K. Kristiansen, T. B. Larsson, Contacts and Travels during the 2nd Millennium BC: Warriors on the move, in: *Between the Aegean and Baltic Seas: Prehistory Across Borders*, eds. I. Galanaki, H. Tomas, Y. Galanakis, R. Laffineur, Liège, 2007: 25–32.
Koui *et al.* 2006 – M. Koui, P. Papandreopoulos, E. Andreopoulou-Mangou, L. Papazoglou-Manuoudaki, A. Priftaj-Vevecka, F. Stamati, Study of Bronze Age copper-based swords of Type Naue II and spearheads from Greece and Albania. *Mediterr. Archaeol. Archaeom*. 6: 5–22.
Ling *et al.* 2013 – J. Ling, E. Hjärthner-Holdar, L. Grandin, K. Billström, P. O. Persson, Moving metals or indigenous mining? Provenancing Scandinavian Bronze Age artefacts by lead isotopes and trace elements, *Journal of Archaeological Science* 40: 291–304.
Ling *et al.* 2014 – J. Ling, Z. Stos-Gale, L. Grandin, K. Billström, E. Hjärthner-Holdar, P. O. Persson, Moving metals II: provenancing Scandinavian Bronze Age artefacts by lead isotope and elemental analyses, *Journal of Archaeological Science* 41: 106–132.
Ling, Stros-Gale 2015 – J. Ling, Z. Stos-Gale, Representations of oxhide ingots in Scandinavian rock art: the sketchbook of a Bronze Age traveller? *Antiquity* 89: 191–209.
Liversage 1994 – D. Liversage, Interpreting composition patterns in ancient bronze: The Carpathian Basin, *Acta Archaeologica* 65: 57–134.
Lo Schiavo 2005 – F. Lo Schiavo, Bronze weapons, tools, figurines from nuragic Sardinia, in: *Archaeometallurgy in Sardinia from the Origins to the Beginning of the Early Iron Age*, eds. F. Lo Schiavo, A. Giumlia-Mair, U. Sanna, R. Varlera, Montagnac, 2005: 343–358.
Lo Schiavo 2009 – F. Lo Schiavo, Oxhide ingots in Nuragic Sardinia, in: *Oxhide Ingots in the Central Mediterranean*, eds. F. Lo Schiavo, J. Muhly, R. Maddin, A. Giumlia-Mair, Roma, 2009: 225–238.
Lo Schiavo *et al.* 2005 – F. Lo Schiavo, A. Giumlia-Mair, U. Sanna, R. Varlera, Archaeometallurgy in Sardinia from the origins to the beginning of the Early Iron Age. Editions Monique Mergoil, Montagnac.
Mac Sweeney 2016 – N. Mac Sweeney, Anatolian-Aegean interactions in the Early Iron Age: Migration, Mobility, and the Movement of People, in: *Of Odysseys and Oddities: Scales and Modes of Interaction between Prehistoric Aegean Societies and Their Neighbours*, ed. B. P. C. Molloy,Oxford, 2016.
Mangou, Ioannou 1998 – E. Mangou, P.V. Ioannou, On the Chemical Composition of Prehistoric Greek Copper-based Artefacts from Crete. *BSA* 93: 91–102.
Mangou, Ioannou 1999 – E. Mangou, P.V. Ioannou, On the chemical composition of prehistoric Greek copper-based artefacts from Mainland Greece. *Annu. Br. Sch. Athens* 94: 81–101.
Maxwell-Hislop 1946 – R. Maxwell-Hislop, Daggers and Swords in Western Asia: A Study from Prehistoric Times to 600 BC, *Iraq* 8: 1–65.
Molloy 2016 – B. P. C. Molloy, Introduction: Thinking of scales and modes of interaction in prehistory, in: *Of Odysseys and Oddities: Scales and Modes of Interaction between Prehistoric Aegean Societies and Their Neighbours*, ed. B. P.C. Molloy, Oxford, 2016.
Molloy, Doonan 2015 – B. P. C. Molloy, R. Doonan, A moving story: Some observations on the circulation of metal, metalworking and metal users in the thirteenth to eleventh century BC Balkan and Apennine peninsulas, in: *Mobility of Culture in Bronze Age Europe*, eds. P. Suchowska-Ducke, S. Reiter, H. Vandkilde, Proceedings of an International Conference and the Marie Curie ITN "Forging Identities" at Aarhus University June 2012, *British Archaeological Reports*, Oxford, 2015.
Northover 1988 – P. Northover, "The analysis and metallurgy of British Bronze Age swords" in *The swords of Britain,* eds. I. Colquhoun, C. Burgess, PBF IV/5, Munich, 1988: 130-147
Northover 2009 – P. Northover, Analysis and metallography of copper alloy metalwork, in: *Das Spätbronze- Und Früheisenzeitliche Gräberfeld von Bischofshofen-Pestfriedhof*, eds. A. Lippert, P. Stadler, Bonn, 2009: 351–384.
Pernicka 1999 – E. Pernicka, Trace Element Fingerprinting of Ancient Copper: A Guide to Technology or Provenance, in: *Metals in Antiquity*, eds. S. M. Young, P. Budd, A. M. Pollard, R. A. Ixer, *British Archaeological Reports*, Oxford, 1999: 163–171.

Pernicka 2014 – E. Pernicka, Provenance determination of archaeological metal objects, in: *Archaeometallurgy in Global Perspective – Methods and* Syntheses, eds. B. Roberts, C.Thornton, New York, 2014: 239–268.
Pernicka *et al*. 1993 – E. Pernicka, F. Begemann, S. Schmitt-Strecker, G.A. Wagner, Eneolithic and Early Bronze Age copper artefacts from the Balkans and their relation to Serbian copper ores, *Praehistorische Zeitschrift* 68: 1–54.
Peroni 1970 – V. B. Peroni, *Die Schwerter in Italien*, PBF IV/1, Munich, 1970.
Primas und Pernicka 1998 – M. Primas, E.Pernicka, Der Depot fund von Oberwilflingen. Neue Ergebnissezur Zirkulation von Metallbarren, *Germania* 76: 35–65.
Sabatini 2016 – S. Sabatini, Late Bronze Age Oxhide And Oxhide-like Ingots from areas other than the Mediterranean: Problems and Challenges, *Oxford Journal of Archaeology* 35(1): 29-45
Sayre, Aslihan Yener, Joel 1995 – E. V. Sayre, Y. Aslihan Yener, E. C. Joel, Oxhide Ingots, Recycling and the Mediterranean Metals Trade, *Journal of Mediterranean Archaeology* 8: 45–53.
Shalev 2004 – S. Shalev, *Swords and Daggers in Late Bronze Age Canaan*, PBF IV/13, Stuttgart, 2004.
Stavropoulou Gatsi *et al*. 2012 – M. Stavropoulou Gatsi, R. Jung, M. Mehoefer, Tafos "Mykinaiou" polemisti ston Kouvara Aitoloakarnanias. Proti Parousiasi, in: *Athanasia: The Earthly, the Celestial and the Underworld in the Mediterranean from the Late Bronze and Early Iron Age*, eds. N. Ch. Stampolidēs, A. Kanta, A. Giannikourē , Heraklio, 2012: 247–265.
Tomas 2010 – H. Tomas, The World Beyond the Northern Margin: The Bronze Age Aegean and the East Adriatic Coast", in: *Archaic State Interaction: The Eastern Mediterranean in the Bronze Age*, eds. W. A. Parkinson, M. L. Galaty, Santa Fe, 2010: 181–212.
Trampuž-Orel 1996 – N. Trampuž-Orel, Spectrometric Research of the Late Bronze Age Hoard Finds, in: *Hoards and Individual Metal Finds from the Eneolithic and Bronze Ages in Slovenia*, ed. B. Teržan, Ljubljana, 1996: 165–243.

List of authors / Списак аутора

Stefan Alexandrov
National Institute of Archaeology and Museum
Bulgarian Academy of Sciences
2 Saborna Str.
1000 Sofia, Bulgaria
stefanalexandrov@abv.bg

Dragana Antonović
Institute of Archaeology, Belgrade
Knez Mihailova 35/IV
11000 Belgrade, Serbia
d.antonovic.960@gmail.com

Tiberius Bader
Max Eyth Str. 12
71282 Hemmingen, Deutschland
tib.bader@web.de

Martina Blečić Kavur
Univerza na Primorskem, Fakulteta za
humanistične študije, Titov trg 5
6000 Koper, Slovenia
martina.blecic.kavur@upr.si

Jan Bouzek
Charles University
Smetanovo nábřeží 6
11001 Prague, Czech Republic
Jan.Bouzek@ff.cuni.cz

Dragan Božič
Znanstvenoraziskovalni center SAZU
Inštitut za arheologijo
Novi trg 2
SI–1000 Ljubljana, Slovenija
dragan.bozic@zrc-sazu.si

Игорь Викторович Бруяко
Одесский археологический музей
Национальной академии наук Украины
Ланжероновская ул.4
65026 Одесса, Украина
ibruyako@yandex.ru

Aleksandar Bulatović
Institute of Archaeology, Belgrade
Knez Mihailova 35/IV
11000 Belgrade, Serbia
abulatovic3@gmail.com

Marko Dizdar
Institute of Archaeology
Ljudevita Gaja 32
10000 Zagreb, Croatia
marko.dizdar@iarh.hr

Katarina Dmitrović
Narodni muzej Čačak
Cara Dušana 1
32000 Čačak, Serbia
katarina.dmitrovic@gmail.com

Aca Đorđević
National Museum in Belgrade
Trg Republike 1a
11000 Belgrade, Serbia
a.djordjevic@narodnimuzej.rs

Vojislav Filipović
Institute of Archaeology, Belgrade
Knez Mihailova 35/IV
11000 Belgrade, Serbia
vfilipov1@gmail.com

Blagoje Govedarica
Institut für Prähistorische Archaologie
der FU Berlin, c/o Eurasien Abteilung des DAI
Im Dol 2-6, Haus II
14195 Berlin, Germany
blagoje.govedarica@dainst.de

Mitja Guštin
profemeritus
Pusterla 7
6330 Piran, Slovenia
mitja.gustin@upr.si

✞ **Bernhard Hänsel**
Institut für Prähistorische Archäologie,
Freie Universität
Fabeckstraße 23-25
14195 Berlin, Deutschland

Aleksandar Kapuran
Institute of Archaeology, Belgrade
Knez Mihailova 35/IV
11000 Belgrade, Serbia
a.kapuran@gmail.com

Boris Kavur
Univerza na Primorskem, Fakulteta za
humanistične študije, Titov trg 5
6000 Koper, Slovenia
boris.kavur@upr.si

Jovan Koledin
Muzej Vojvodine
Dunavska 35
21000 Novi Sad, Srbija
jovan.koledin@muzejvojvodine.org.rs

List of authors / Списак аутора

Мирослав Д. Лазић
Универзитет у Београду, Филозофски факултет,
Одељење за археологију, Археолошка збирка
Чика Љубина 18-20
11000 Београд, Србија
mdlazic@gmail.com

Ljuben Leshtakov
National Institute of Archaeology with Museum,
Bulgarian Academy of Sciences
Sofia, 2 Saborna str.
1000 Sofia, Bulgaria
l_leschtakow@abv.bg

Marija Ljuština
Univerzitet u Beogradu, Filozofski fakultet
Odeljenje za arheologiju
Čika-Ljubina 18-20
11000 Beograd
mljustin@f.bg.ac.rs

Daria Ložnjak Dizdar
Institut za arheologiju
Ljudevita Gaja 32
10000 Zagreb, Hrvatska
dldizdar@iarh.hr

Predrag Medović
Narodnog fronta 71
21000 Novi Sad, Serbia

Dragi Mitrevski
Ss. Cyril and Methodius University
blvd. Goce Delcev 9
1000 Skopje, Macedonia
dragimit@yahoo.com

Ognjen Đ. Mladenović
Institute of Archaeology, Belgrade
Knez Mihailova 35/IV
11000 Belgrade, Serbia
mladenovic40@gmail.com

Kristina Mihovilić
Arheološki muzej Istre
Carrarina ulica 3
52100 Pula, Hrvatska
kristina.mihovilic@ami-pula.hr

Barry Molloy
School of Archaeology
University College Dublin
Newman Building
Dublin 4, Ireland
barrymolloy@gmail.com

Јовица Станковски
Т. Думба 88/4-21
1100 Куманово, Македонија
stankovskijovica@yahoo.com

Milorad Stojić
Milutina Milankovića 28
11000 Beograd, Srbija
milestojic@gmail.com

Marija Svilar
Institute of Archaeology, Belgrade
Knez Mihailova 35/IV
11000 Belgrade, Serbia
marijasvilar@yahoo.com

Josip Šarić
Institute of Archaeology, Belgrade
Knez Mihailova 35/IV
11000 Belgrade, Serbia
josips@eunet.rs

Biba Teržan
Filozofska fakulteta, Univerza v Ljubljani
Aškerčeva cesta 2
1000 Ljubljana, Slovenia
biba.terzan@ff.uni-lj.si

Денис Топал
Университет «Высшая антропологическая школа»
Зимбрулуй 10а
2024 Кишинев, Молдова
denis.topal@gmail.com

Selena Vitezović
Institute of Archaeology, Belgrade
Knez Mihailova 35/IV
11000 Belgrade, Serbia
selenavitezovic@gmail.com