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ROMAN MILITARY EQUIPMENT FROM THE RIVER LJUBLJANICA

Typology, Chronology and Technology

RIMSKA VOJAŠKA OPREMA IZ REKE LJUBLJANICE

Arheološke in naravoslovne raziskave

Janka Istenič

NARODNI MUZEJ SLOVENIJE

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Preface

The River Ljubljanica in its stretch across the Ljubljansko barje was declared a cultural monument of national importance in 2003. It is the origin of numerous archaeological artefacts, including pieces of Roman military equipment in excellent condition that offer an important insight into that part of the Roman legacy.

The book is the result of research that began in 1999, lasting nearly two decades with several interruptions. During this time, several military finds have already been published in different scientific journals, but are brought together here and accompanied by a detailed and comprehensive analysis they certainly merit.

The book is based on the collection of artefacts kept in the Archaeological Department at the National Museum of Slovenia. The collection has been built up during the last two hundred years and has been cared for by a succession of curators. These include my colleagues Timotej Knific and Polona Bitenc, who greatly expanded the collection, gathered and organised the data on archaeological contexts and other relevant information and arranged for the conservation of a great many of the artefacts. They also studied and presented their findings to the public, both professional and general.

It would not be possible to study the Roman militaria in detail without conserving the items first. This was performed at the Department of Conservation and Restoration, in the National Museum of Slovenia. Sonja Perovšek conserved the great majority of the artefacts discussed in the book, Anita Virag, Irma Langus Hribar and Zoran Milić were charged with the rest. They invested a great amount of expertise, effort and knowledge into cleaning, conserving and restoring the artefacts, all accompanied by investigative considerations. These four colleagues, as well as Igor Ravbar, member of the same Department, were also my partners in discussions concerning the artefacts' construction and production techniques.

Sonja Perovšek (on rare occasions replaced by Anita Virag) carefully prepared the spots for the PIXE analyses and photographed them as part of process documentation. Zoran Milić conducted the XRF analyses at the National Museum of Slovenia, but also collaborated with the Jožef Stefan Institute to examine the B1 sheath and dagger using neutron radiography. He provided the X-rays until 2016, after this year his task was undertaken by Sonja Perovšek.

Ida Murgelj (National Museum of Slovenia) and Dragica Knific Lunder drew the artefacts. Ida Murgelj also made illustrations of the artefacts showing the spots measured with the PIXE method. Photographs are an important part of the publication and are the result of the dedicated work by Tomaž Lauko (National Museum of Slovenia). Vida Bitenc and Edisa Lozić prepared the maps.

Some of the Roman militaria discussed in the book are kept in the City Museum of Ljubljana. I was able to briefly get them on loan, for which I would like to thank Irena Šinkovec, curator of the Potočnik family collection, and Bernarda Županek, curator of the museum's Roman collection. From the same museum, I also collaborated with restorers Alenka Drol and Matjaž Bizjak.

The advice of Jana Horvat (Institute of Archaeology, ZRC SAZU) was a great help and support, as were her critical comments and suggestions in relation to earlier versions of Chapters 1 to 19. These were also read by Boštjan Laharnar (National Museum of Slovenia) who provided relevant information and comments.

To Marjeta Šašel Kos (Institute of Archaeology, ZRC SAZU) I would like to extend my gratitude for her valuable comments on the early version of Chapter 19. Peter Kos (National Museum of Slovenia) helped me in noting the overly ambitious interpretation of the coin finds proposed in the early version of Chapter 18.

Predgovor

Ljubljanica na Barju je bila leta 2003 razglašena za kulturni spomenik državnega pomena. Med najdbami iz reke so odlično ohranjeni predmeti, pomembni za razumevanje razvoja rimskega orožja.

Izhodišče za knjigo so bile raziskave, ki sem jih začela leta 1999, torej je z monografijo povezano delo, s krajšimi in daljšimi prekinitvami, trajalo dvajset let. Posamezni izsledki proučevanja rimske vojaške opreme iz Ljubljanice so bili že objavljeni v znanstvenih člankih, vendar ta izjemna zbirka rimskih vojaških predmetov zasluži poglobljeno celostno obravnavo.

Monografija temelji na zbirki predmetov iz reke Ljubljanice, ki jo hrani Arheološki oddelek Narodnega muzeja Slovenije. Med številnimi, ki so bili v njenem skoraj dvestoletnem nastajanju zaslužni za njen obstoj, želim izpostaviti kustosa zbirke v zadnjih dobrih dvajsetih letih, Timoteja Knifica in Polono Bitenc. Poskrbela sta za veliko povečanje zbirke, pridobitev in ureditev najdiščnih in drugih pomembnih podatkov, njeno urejenost in konserviranje velikega števila predmetov ter preučevanje in predstavitev rezultatov znanstveni in laični javnosti.

Poglobljeno preučevanje predmetov ne bi bilo mogoče brez konserviranja predmetov, ki so ga izvedli na Oddelku za konserviranje in restavriranje Narodnega muzeja Slovenije. Veliko večino predmetov, ki jih obravnavam v knjigi, je konservirala Sonja Perovšek, ostale pa Anita Virag, Irma Langus Hribar in Zoran Milić. V raziskovalno čiščenje, konserviranje in redko tudi v restavriranje predmetov so vložili svoje bogate izkušnje, znanje in veliko truda. Našteti in Igor Ravbar, prav tako član Oddelka za konserviranje in restavriranje, so bili tudi moji sogovorniki pri vprašanjih o zgradbi in načinu izdelave predmetov.

Sonja Perovšek (izjemoma jo je nadomestila Anita Virag) je skrbno pripravila mesta za analize PIXE in jih fotografsko dokumentirala. Zoran Milić je opravil analize XRF z aparatom v Narodnem muzeju Slovenije ter v sodelovanju z Institutom "Jožef Stefan" nožnico bodala B1 pregledal z nevtronsko radiografijo. Skrbel je tudi za izdelavo rentgenskih posnetkov; to delo je leta 2016 prevzela Sonja Perovšek.

Predmete sta narisali Ida Murgelj (Narodni muzej Slovenije) in Dragica Knific Lunder. Ida Murgelj je naredila tudi risbe, ki kažejo, kje smo izvedli analize PIXE. Pomemben del knjige so fotografije predmetov, ki jih je naredil Tomaž Lauko (Narodni muzej Slovenije). Zemljevidi so delo Vide Bitenc in Edise Lozić.

Predmete rimske vojaške opreme, ki jih hranijo v Mestnem muzeju v Ljubljani, sem si lahko začasno izposodila, za kar sem hvaležna Ireni Šinkovec, ki skrbi za zbirko družine Potočnik, in Bernardi Županek, kustosinji rimske zbirke; prijazno sta sodelovala tudi restavratorja Alenka Drol in Matjaž Bizjak iz istega muzeja.

Jana Horvat (Inštitut za arheologijo ZRC SAZU) mi je bila s pogovori in nasveti v oporo med pisanjem knjige, poleg tega je prečitala poglavja 1 do 19 in dala dragocene predloge za izboljšave. Za koristne podatke in pripombe k besedilom poglavij 1 do 19 sem hvaležna tudi Boštjanu Laharnarju (Narodni muzej Slovenije).

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1
Introduction

Figure 1
The Ljubljanica flowing through the region of transition between the Apennine Peninsula and the Balkans. Data sources for topographic base: EU-DEM in EU-Hydro (European Environment Agency, Copernicus Land Monitoring Service).

Slika 1
Reka Ljubljanica na prehodnem območju med Apeninskim in Balkanskim polotokom. Vira podatkov za topografsko osnovo: EU-DEM in EU-Hydro (Evropska agencija za okolje, Copernicus storitev za spremljanje kopnega).

The Ljubljanica is a typical karst river and runs through central Slovenia (*Figs. 1–2*). It is a short, roughly 45 km long river (*Figs. 3–4*) that begins in a multitude of karst springs (*Fig. 5*) at the western edge of the Ljubljansko barje (also Barje; the Ljubljana Moors), a few kilometres west of the town of Vrhnika, and ends at the confluence with the River Sava at Zalog, east of Ljubljana. In its stretch across the marshy plain of the Barje (*Fig. 10*), the Ljubljanica is roughly 23km long and up to 30m wide, and is an archaeological site of great richness and significance.

The artefacts recovered from the Ljubljanica span from the Middle Stone Age to the modern period.[1] Among the many European rivers rich in archaeological finds,[2] the course of the Ljubljanica across the Barje stands out for the large number of finds per riverbed length. This is in part the consequence of the many investigations that took place here, but much more of the silty bottom (*Fig. 10*) that both preserves artefacts and facilitates their discovery. From Ljubljana onwards, the bottom of the river is gravelly and artefacts in riverbeds with thick gravel deposits are usually buried deep under the bottom surface. For the Ljubljanica this results in the lack of archaeological finds from the lower reaches.

The Ljubljanica on the Barje is two and a half to seven metres deep at normal water level, it has steep underwater banks, a bed without rock outcrops and a calm, slow flow,[3] which makes it very suitable for navigation both downstream or upstream.

In the Roman period, the Ljubljanica was called *Nauportus*.[4] It was navigable from Vrhnika (*Nauportus*) onwards, where it was accessed from the easiest and main land route leading from Aquileia across the Razdrto Pass (*Ocra*) and Postojna Basin towards the

1 Turk et al. 2009b.
2 E.g. Pollack 1986; Pauli 1987; Schalles, Schreiter 1993; Milne, Bates, Webber 1997, 139–141; Bonnamour 2000; Kuhnen 2001; Milošević 2003; Radman-Livaja 2004; Dumont 2006; Booth et al. 2007; Zee 2007.
3 Gaspari 2017, 169.
4 Šašel Kos 2017a.

1
Uvod

Figure 2
The Ljubljansko barje and the Ljubljanica from its springs near Vrhnika to its confluence with the River Sava east of Ljubljana. The basemap digital terrain model at 5 m resolution (DTM5) is derived from the airborne LiDAR data (source: www.evode.gov.si).

Slika 2
Ljubljansko barje z obrobjem in celotni tok Ljubljanice, od izvirov na Vrhniki do sotočja s Savo. Podlaga karte je digitalni model reliefa z osnovno celico velikosti 5 m (DMR5), izdelan iz podatkov zračnega laserskega skeniranja (vir: www.evode.gov.si).

Ljubljanica je značilna kraška reka v osrednjem delu Slovenije (*sl. 1–2*). Njen površinski tok (*sl. 3–4*) je kratek (okrog 45 km): začne se s številnimi kraškimi izviri na zahodnem robu Ljubljanskega barja (*sl. 5*), nekaj kilometrov zahodno od Vrhnike, ter konča z izlivom v reko Savo vzhodno od Ljubljane, pri Zalogu. Dno približno 23 km dolge in največ 30 m široke struge Ljubljanice po Barju (*sl. 10*), od Vrhnike do Ljubljane, je bogato arheološko najdišče.

Najstarejši predmeti, najdeni v Ljubljanici, so iz srednje kamene dobe, najmlajši pa iz moderne dobe.[1] Med številnimi evropskimi rekami z bogatimi arheološkimi najdbami[2] tok Ljubljanice po Barju izstopa po gostoti najdb (številu najdb glede na dolžino toka). To je verjetno posledica precej dobre raziskanosti, predvsem pa značilnosti dna, ki je muljasto (*sl. 10*), kar je za ohranitev in odkrivanje predmetov zelo ugodno. Od Ljubljane dalje je dno Ljubljanice prodnato, kar je najverjetneje vzrok za to, da s tega dela struge arheoloških najdb ne poznamo. V rekah s prodnatim dnom so namreč arheološke najdbe zaradi debelih nanosov proda običajno globoko pod površino dna.

Ljubljanica na Barju je ob normalnem vodostaju globoka večinoma med dva in pol ter sedem metrov, ima strme podvodne brežine in dno brez čeri ter miren in počasen tok,[3] zato je zelo primerna za plovbo s tokom ali proti njemu. Rimljani so jo imenovali Navport (*Nauportus*).[4] Plovna je bila že na Vrhniki (Navport), kamor je prek prelaza Razdrto (Okra/*Ocra*) in Postojne vodila glavna povezava po kopnem med Italijo (Akvilejo/*Aquileia*) in Balkanom oziroma srednjim Podonavjem. Do verjetno poznoavgustejske dobe, ko so Rimljani zgradili cesto ob severnem robu Barja,[5] je bilo logično nadaljevanje te poti naprej od Vrhnike po Ljubljanici do Ljubljane (*Emona*) (*sl. 137*), saj so bile

1 Turk et al. 2009a.
2 Npr. Pollack 1986; Pauli 1987; Schalles, Schreiter 1993; Milne, Bates, Webber 1997, 139–141; Bonnamour 2000; Kuhnen 2001; Milošević 2003; Radman-Livaja 2004; Dumont 2006; Booth et al. 2007; Zee 2007.
3 Gaspari 2017, 169.
4 Šašel Kos 2017a.
5 Istenič 2009c, 78, op. 22.

Figure 3
Area of the Ljubljanica in 2008. Aerial photography and photo mosaic production: Geodetski zavod Slovenije.

Slika 3
Območje ob Ljubljanici leta 2008. Letalsko snemanje in izdelava mozaika: Geodetski zavod Slovenije.

Balkans or the central Danube Basin. Until the Late Augustan period,[5] when the Romans constructed a road along the northern fringes of the Ljubljansko barje, this communication between Vrhnika/*Nauportus* and Ljubljana/*Emona* (*Fig. 137*) led along the Ljubljanica, as the possibilities of land passages on land were highly limited by the marshy terrain (*Fig. 6*).[6]

The Roman period, in particular the reign of the Emperor Augustus, left behind a predominant share of the finds from the Ljubljanica riverbed. Most of these are pottery.[7]

In addition to the boundary stone between the territories of *Aquileia* and *Emona* (*Fig. 144*),[8] several sunken ships[9] (*Fig. 11, Fig. 138*) and certain other objects,[10] it is the finds of Roman military equipment that attracted the attention of many a researcher. Their publications have shown that this body of finds includes very well preserved items that are of importance in our understanding of the development of Roman weaponry,[11] which prompted me to study and publish them in a detailed and comprehensive monograph.

The book presents the Roman military equipment from the Ljubljanica dating from the Republican period to the end of the Principate. It comprises weapons, metal parts of military belts, military decorations and tools. Most of the artefacts are complete and very well preserved, which offers an excellent insight into their construction and production manner.

In addition, the outfit of a soldier also included brooches, but these are not featured in the book because the brooches worn by soldiers either did not differ from those that fastened the clothes of the civilian population or the potential differences have not yet been detected. The Alesia type brooches, worn between ca. 60 to ca. 20 BC, are an exception in this sense, as evidence suggests a close association with the Roman army.[12] A single Alesia brooch is known from the Ljubljanica and has already been published.[13] More numerously represented are their direct typological and chronological successors, i.e. the Aucissa type brooches (six examples[14]), but these were certainly worn by both soldiers and civilians.[15]

The Ljubljanica thus far yielded no known pieces of horse equipment. This is another group of finds where we are unable to distinguish between the items used by the military and those used by the civilians.[16]

There is an extensive list of publications on Roman military equipment not based on studying the artefacts first hand, but rather on the data available from publications and hence fraught with all the dangers this entails. This led me to the realisation that it is all the more important to study such artefacts by physically examining them, but also to publish them accompanied by precise and comprehensive descriptions, as well as detailed drawings and photographs.

This book is based on the artefacts kept in the National Museum of Slovenia (NMS), which represent the

5 Istenič 2009d, 83, Fn. 22.
6 Istenič 2009d, 81; on the Barje landscape in the Roman period, see Gaspari 2017, 147–148.
7 Istenič 2009d; Istenič 2009h.
8 Šašel Kos 2002.
9 Gaspari 2017.
10 Gaspari, Krempuš 2002; Istenič 2002; Gaspari 2004; Istenič 2009h; Istenič, Šmit 2014.
11 See Chapter 2.
12 Istenič 2005, particularly 189, 190. The grave of a woman buried at Sion (Switzerland), which held rich grave goods including three Alesia brooches (Moret, Rast-Eicher, Taillard 2000), shows that such brooches were exceptionally worn by civilians in prehistoric (non-Roman) milieus.
13 Istenič 2009h, Cat. No. 73 – left brooch.
14 National Museum of Slovenia, Inv. Nos. V 1343, V 1393, V 1974, V 1997, V 4328, V 4365 (= Istenič 2009h, Cat. No. 73 – right brooch).
15 Erice Lacabe 1995, 126.
16 Deschler-Erb 2012, 97, 98, Fn. 580.

možnosti prehodov po kopnem zaradi močvirnega terena na Barju omejene (*sl. 6*).[6]

Zajeten delež najdb iz struge Ljubljanice je iz rimske dobe; med njimi je največ avgustejskih. Prevladujejo keramični predmeti.[7]

Med rimskimi najdbami iz Ljubljanice je poleg mejnika med Akvilejci in Emonci (*sl. 144*),[8] ostankov plovil[9] (*sl. 11, sl. 138*) in posameznih drugih predmetov[10] največ zanimanja raziskovalcev zbudila rimska vojaška oprema. Dosedanje objave so pokazale, da vključuje zelo dobro ohranjene in za razumevanje razvoja rimskega orožja pomembne primerke.[11] To me je spodbudilo k pripravi monografske objave rimske vojaške opreme iz Ljubljanice.

V knjigi obravnavam rimsko vojaško opremo iz reke Ljubljanice, od republikanske dobe do konca principata. Poleg orožja vključuje vojaške pasove (oz. njihove kovinske dele), odlikovanja in orodje. Večina predmetov je skoraj cela in zelo dobro ohranjena, kar omogoča dober uvid v njihovo zgradbo in način izdelave.

K vojaški noši so sodile tudi fibule, vendar jih v monografijo nisem vključila, ker se zdi, da se tiste, ki so jih nosili vojaki, niso razlikovale od onih, ki so jih nosili civilisti, oziroma teh razlik ne poznamo. Izjema so fibule skupine Alezija, v rabi od ok. leta 60 do ok. 20 pr. Kr., pri katerih se kaže ozka povezava z rimsko vojsko.[12] Iz Ljubljanice poznamo le eno fibulo skupine Alezija.[13] Številnejše so njihove neposredne tipološke in časovne naslednice, fibule skupine Aucissa (šest primerkov[14]), ki jih je poleg vojakov nedvomno uporabljalo tudi civilno prebivalstvo.[15]

Iz Ljubljanice ne poznam rimske konjske opreme, za katero sicer velja, da ne znamo razlikovati med vojaško in civilno.[16]

Delo temelji na predmetih, ki jih hrani Narodni muzej Slovenije (NMS) in predstavljajo levji delež rimske vojaške opreme iz Ljubljanice. Z opisi, risbami in fotografijami so podrobno predstavljeni v Katalogu, obenem pa iz njih izhajajo študije predmetov v poglavjih 4–17. Obsežna literatura o rimski vojaški opremi, ki ne temelji na raziskavah predmetov samih, ampak le na podatkih iz objav, mi je namreč pokazala pasti, ki jih prinašajo take študije, in pomembnost objav predmetov rimske vojaške opreme s kvalitetnimi opisi, risbami in fotografijami.

V 2. poglavju je kratek oris zgodovine arheoloških raziskav Ljubljanice. Cilje in metode dela sem pojasnila v 3. poglavju. V obravnavo posameznih vrst rimske vojaške opreme (od 4. do 15. poglavja) sem poleg predmetov iz Narodnega muzeja Slovenije vključila predmete iz druge največje zbirke rimske vojaške opreme iz Ljubljanice, ki jo hrani Mestni muzej Ljubljana (MM).[17] Predmete te zbirke sem v ustreznih poglavjih predstavila s fotografijami in opisi, ki so podani v podnapisih k fotografijam. V besedilu jih navajam po enakem sistemu kot predmete iz Narodnega muzeja Slovenije, le da se okrajšave začenjajo z MM (npr. MM A22), številčenje pa se od zadnjega primerka v zbirkah Narodnega muzeja Slovenije zvezno

6 Istenič 2009c, 77. Naravno okolje Barja v rimskem obdobju: Gaspari 2017, 147.
7 Istenič 2009c; Istenič 2009g.
8 Šašel Kos 2002.
9 Gaspari 2017.
10 Gaspari, Krempuš 2002; Istenič 2002; Gaspari 2004; Istenič 2009g; Istenič, Šmit 2014.
11 Glej pogl. 2.
12 Istenič 2005, predvsem 204, 205. Grob ženske iz Siona (Švica), ki vsebuje bogate pridatke, med katerimi so tri fibule skupine Alezija (Moret, Rast-Eicher, Taillard 2000), kaže, da so fibule te skupine izjemoma v prazgodovinskih okoljih, kjer so jih (lahko) nosili civilisti.
13 Istenič 2009g, kat. 73 – leva fibula.
14 Narodni muzej Slovenije, inv. št. V 1343, V 1393, V 1974, V 1997, V 4328, V 4365 (= Istenič 2009g, kat. 73 – desna fibula).
15 Erice Lacabe 1995, 126.
16 Deschler-Erb 2012, 97, 98, op. 580.
17 Prim. pogl. 2. Mestni muzej Ljubljana je sestavni del javnega zavoda Muzej in galerije mesta Ljubljane.

largest collection of Roman military equipment recovered from the Ljubljanica. Each artefact is presented in written description, drawing and photograph in the Catalogue, which forms the basis for the artefact studies and discussions in Chapters 4–17.

Chapter 2 provides a brief history of archaeological investigations of the Ljubljanica. Aims and methods of the publication are explained in Chapter 3. This is followed by Chapters 4 to 15 that present the results of the artefact analyses according to individual groups of Roman military equipment. In addition to the finds kept in the National Museum of Slovenia and described in detail in the Catalogue, these chapters also deal with the artefacts in the second largest collection of Roman military equipment from the Ljubljanica held in the City Museum of Ljubljana (MM).[17] The items from the latter collection are presented in respective chapters with photographs (or rarely drawings) and descriptions in the captions; they are cited in the text according to the same system as the objects from the NMS except for the abbreviations that are preceded by MM (for example MM A22), while the numbers succeed those for the objects from the NMS (for example swords A1–A21, MM A22–MM A34). Similarly, I included the E4 spear in the discussion, which is to my knowledge the only piece of Roman military equipment from a private collection.[18]

An important part of the study is the systematic examination of the elemental composition of non-ferrous metals and their alloys (in the publication, both are referred to as metals), as well as pieces of enamel, which is a novelty in the study of Roman military equipment and a rarity in the study of the material culture in the Roman period in general. All the artefacts composed of non-ferrous metals/alloys and/or enamel decoration from the National Museum of Slovenia have been examined, but only some from the City Museum of Ljubljana. The process and the results of the analyses using the method of proton induced X-ray emission spectrometry (PIXE), combined with proton-induced gamma-ray emission method (PIGE) for the pieces with enamel, are described in Chapter 16.

The results of the scientific analyses are included in the descriptions of individual artefacts in the Catalogue, but also in Chapters 4–15 and 17. The word bronze is used here to refer to an alloy of copper and tin, the word leaded bronze to an alloy of copper, tin and (more than 4%) lead, brass to an alloy of copper and zinc,[19] while pewter refers to an alloy of lead and tin.[20] The alloys with more than 90% silver are referred to as silver (the correct metallurgic term would be silver alloy). The term iron is used in accordance with the standard practice in archaeological literature, i.e. to stand for an alloy of iron and a very small amount of carbon; metallurgic publications refer to this alloy as steel.[21] The metals of the finds mentioned in the text as parallels were for the most part not scientifically analysed, but described according to their appearance and are therefore given in inverted commas, for example 'bronze' (a more correct, but longer term would be copper alloy) and 'silver' (without scientific analyses it is unclear whether the material is tin, lead or silver alloy).

Chapter 17 discusses the choices of metals in the production of the military equipment as revealed by the artefacts from the Ljubljanica and their implications for the research of the Roman military equipment production. The dating, distribution and numerous other aspects regarding the weapons and military gear from the Ljubljanica are all discussed in the penultimate Chapter 18. The last chapter summarises the observations and conclusions of the previous chapters and also discusses the possible reasons for such numerous deposition of Roman military equipment in the Late Republican and even more so the Early Imperial period in the watery environment of the Ljubljanica.

Figure 6
The flooded Ljubljansko barje, aerial view looking roughly eastwards. The Ljubljanica (downstream from the Kamnik pod Krimom section) is in the background with the water-filled bed of the Stara Ljubljanica (with a bend) in front. The extensive drainage works conducted from the 18th century onwards succeeded in minimising the devastating floods, but the central part of the Ljubljansko barje is still regulary flooded every spring and autumn.

Slika 6.
Barje med poplavami, pogled iz zraka, približno proti vzhodu. Vidi se z vodo zapolnjena struga Stare Ljubljanice (z zavojem), za njo struga Ljubljanice (od odseka pri Kamniku pod Krimom proti Ljubljani). Kljub obsežnim izsuševalnim delom, ki so se začela v 18. st., so spomladanske in jesenske poplave osrednjega dela Barja vsakoletni pojav, obsežnejše poplave pa so redkejše.

17 Cf. Chapter 2. The City Museum of Ljubljana is part of the Museum and Galleries of Ljubljana public institute.

18 I believe I was able to inspect most of the private collections in Slovenia, while I know nothing of the possible Roman finds from the Ljubljanica in collections abroad. Roman weapons and other military items are highly sought after items and such finds from the Ljubljanica are attractive for a number of reasons, which leads me to suspect that valuable archaeological finds are (were) illegally exported abroad, the information on the context intentionally withheld.

19 Cf. Chapter 17.1.

20 The determination of the alloys is based on Bayley, Butcher 2004, 12–15.

21 Rekar 1972, 481; Williams 2003, 6–10; Pleiner 2006, 21–22.

Figure 4
The Ljubljanica at Blatna Brezovica in the Ljubljansko barje.

Slika 4
Ljubljanica na Barju pri Blatni Brezovici.

Figure 5
The spring of the Ljubljanica at Retovje.

Slika. 5
Izvir Ljubljanice pri Retovju.

nadaljuje (npr. meči A1–A21, MM A22–MM A34). Podobno sem k obravnavi pritegnila sulico E4, ki je edini meni poznan predmet rimske vojaške opreme iz zasebne zbirke v Sloveniji.[18]

Pomemben del izsledkov raziskav je sistematična opredelitev elementne sestave neželeznih kovin in njihovih zlitin (v knjigi večinoma za oboje uporabljam izraz kovina, ki v širokem pomenu vključuje kovine in njihove zlitine) ter emajlov, kar je novost v proučevanju rimske vojaške opreme in redkost pri obravnavi materialne kulture rimske dobe nasploh. Take opredelitve smo naredili za vse predmete, ki jih hrani Narodni muzej Slovenije, za predmete iz Mestnega muzeja Ljubljana pa le izjemoma. Potek in rezultati teh raziskav, narejenih z metodo protonsko vzbujene rentgenske spektrometrije (PIXE), ki smo jo pri analizi emajlov kombinirali z metodo protonsko vzbujenih žarkov gama (PIGE), so opisani v 16. poglavju.

Izsledke opredelitev kovin sem vključila v opise predmetov v Katalogu ter v poglavjih 4–15 in 17. Pri tem velja, da je bron zlitina bakra in kositra, svinčev bron zlitina bakra, kositra in (več kot 4 %) svinca, medenina zlitina bakra s cinkom,[19] zlitino svinca in kositra[20] pa v slovenščini zaradi odsotnosti ustreznega izraza navajam opisno. Zlitine, v katerih je več kot 90 % srebra, sem imenovala srebro (z naravoslovnega gledišča bi bilo pravilno srebrova zlitina). Izraz železo uporabljam, v skladu z običajno rabo v arheološki literaturi, za oznako materiala, ki kemijsko ni čisto železo, temveč zlitina železa in majhnega dela ogljika. V metalurški literaturi tako zlitino imenujejo jeklo.[21] Pri primerjalnem gradivu, za katerega so poznane zgolj empirične opredelitve kovinskih materialov, te navajam v navednicah, npr. »bron« (daljši, a ustreznejši izraz bi bil neopredeljena bakrova zlitina) in »srebro« (brez analiz ni jasno, ali gre za kositrovo, svinčevo ali srebrovo zlitino).

Značilnosti uporabe kovin pri izdelavi vojaške opreme iz Ljubljanice in njihov prispevek k osvetlitvi proizvodnje rimske vojaške opreme sem obravnavala v 17. poglavju. Analizo datacije, prostorske razporejenosti po strugi in drugih značilnosti rimske vojaške opreme iz Ljubljanice zajema 18. poglavje. V Sklepu (19. poglavje) sem povzela izsledke predhodnih poglavij ter obravnavala morebitne vzroke za kopičenje rimske vojaške opreme poznorepublikanske in predvsem zgodnjecesarske dobe v Ljubljanici.

18 Ocenjujem, da sem imela vpogled v večino slovenskih zbirk v zasebni lasti, o rimskih najdbah iz Ljubljanice v tujini pa lahko le ugibam. Rimsko orožje in druga vojaška oprema sta pri zbiralcih zelo priljubljena, najdbe iz Ljubljanice pa so v več ozirih zelo privlačne, zato domnevam, da (je) dragoceno arheološko gradivo nelegalno odteka(lo) v tujino, pri čemer so podatke o najdišču namenoma prikrili in so ali bodo kmalu izgubljeni.

19 Prim. pogl. 17.1.

20 Pri opredelitvi zlitin sem sledila Bayley, Butcher 2004, 12–15.

21 Rekar 1972, 481; Williams 2003, 6–10; Pleiner 2006, 21–22.

2
The Ljubljanica – a brief history of artefact collection and archaeological investigation

The investigation of the archaeological remains in the River Ljubljanica enjoys a long history and will celebrate its bicentenary in 2021.[22] It has been presented in several publications,[23] hence it is only briefly summarised here.

The first finds from the Ljubljanica were recorded in the first half of the 19th century and mainly came to light during the river engineering works that took place in Ljubljana in the 1820s and 1830s. The artefacts that fishermen and children were pulling out of the river at Vrhnika between the late 1870s and the early 1890s were brought to the Provincial Museum of Carniola (predecessor of the National Museum of Slovenia). This led Karl Dežman, then director of the museum, to organise a systematic survey of the riverbed at Vrhnika. In 1884, he also organised underwater investigations carried out by the divers of the Austro-Hungarian Imperial and Royal Navy. Later, finds came to light in the Bevke section during low water levels, collected more precisely in the Ljubljanica at the Kržmanc (*Figs. 7–8*) and Lichtenberg farmsteads near Bevke. These were purchased in 1913 by the Provincial Museum in 1938 and 1940 or 1941 by its successor, the National Museum.

The National Museum of Slovenia conducted systematic archaeological investigations of the Ljubljanica in two campaigns, one between 1980 and 1985 (*Fig. 9*), the other from 1990 to 1999.[24] From 2003 onwards, this work is carried out by the Underwater Archaeology Division at the Institute for the Protection of Cultural Heritage of Slovenia (*Figs. 10–11*).[25]

Figure 7
Franc Kržmanc with a display of artefacts he had discovered in the riverbed of the Ljubljanica, in the vicinity of his home at Bevke.

Slika 7
Franc Kržmanc z razpostavljenimi predmeti, ki jih je našel v strugi Ljubljanice v bližini svoje domačije v Bevkah.

The rich finds in the Ljubljanica attract amateur divers. During the late 1970s and even more in the early 1980s, their activities in the Ljubljansko barje stretch of the river were particularly intense and without any supervision of the archaeological institutions. This was finally brought to an end or at least considerably limited in 2003, when the Ljubljanica in its stretch across the Ljubljansko barje was declared a cultural monument of national importance where diving was only allowed with the permission of the Ministry of Culture.

The National Museum of Slovenia keeps most of the (surviving) finds recovered from the Ljubljanica in the 19th and the first half of the 20th century, the finds collected during the museum campaigns in the 1980s and 1990s, but also a large part of the objects previously in private collections in Slovenia that it has systematically documented from 1992 onwards.[26]

22 A group of 40 small bronze coins from the Ljubljanica came to the Provincial Museum of Carniola in 1821, the year in which it was established (Illyrisches Blatt 1832, 13, No. 121; Gaspari 2002, 32).
23 Bitenc, Knific 1997, 19–20; Gaspari 2002, 29–52; Bras Kernel 2006; Gaspari 2009b; Gaspari 2012a.
24 Logar, Bitenc 1984; Svoljšak et al. 1997, 257–267.
25 Gaspari 2012a, 47–48.
26 Podvodna arheologija v Sloveniji 1; Podvodna arheologija v Sloveniji 2; Svoljšak et al. 1997, 225–226, 257–267, Pl. 8: 8–10, Pl. 9: 2–7, Pls. 10–19, Pl. 20: 1–2.

2
Ljubljanica – kratka zgodovina pridobivanja najdb in arheoloških raziskav

Figure 8
Artefacts from the Ljubljanica displayed in the Kržmanc farmstead at Bevke. The artefacts discussed in this book are marked with appropriate catalogue numbers.

Slika 8
Predmeti iz Ljubljanice, razstavljeni v Kržmančevi domačiji v Bevkah. Predmeti, ki so obravnavani v knjigi, so označeni s kataloškimi številkami.

Raziskovanje arheoloških ostalin v reki Ljubljanici bo leta 2021 imelo 200 let staro zgodovino,[22] ki je že bila obravnavana,[23] zato bom zelo kratko povzela njene najpomembnejše mejnike.

Prve najdbe v reki so odkrili v prvi polovici 19. st., največ med poglabljanjem struge in urejanjem brežin v Ljubljani v dvajsetih in tridesetih letih. Najdbe, ki so jih ribiči in otroci med koncem sedemdesetih in začetkom devetdesetih let tega stoletja dvignili iz Ljubljanice na Vrhniki in so prišle v Deželni muzej za Kranjsko (predhodnik Narodnega muzeja Slovenije), so Karla Dežmana, ravnatelja tega muzeja, spodbudile, da je na Vrhniki organiziral sistematično pregledovanje rečnega dna in nato leta 1884 podvodne raziskave, ki so jih izvedli potapljači cesarsko-kraljeve vojne mornarice. Del najdb iz osrednjega dela Ljubljanice na Barju so zbrali na domačijah Kržmanc (*sl. 7–8*) in Lichtenberg z območja pri Bevkah – večino oziroma del predmetov je odkupil Deželni muzej leta 1913 oziroma njegov naslednik Narodni muzej v letih 1938 in 1940 ali 1941.

V minulem stoletju je sistematične arheološke raziskave v Ljubljanici začel Narodni muzej Slovenije. Tekle so med letoma 1980 in 1985 (*sl. 9*) ter letoma 1990 in 1999.[24] Od leta 2003 izvaja sistematične raziskave Ljubljanice Skupina za podvodno arheologijo pri Zavodu za varstvo kulturne dediščine Slovenije (*sl. 10–11*).[25]

Od konca sedemdesetih in predvsem od začetka osemdesetih let 20. st. so arheološke predmete iz Ljubljanice na Barju brez nadzora arheoloških institucij pobirali potapljači. Ta dejavnost se je prenehala ali vsaj zelo omejila po letu 2003, ko je Ljubljanica na Barju postala kulturni spomenik državnega pomena in je potapljanje v njej dovoljeno le z odobritvijo ministrstva za kulturo.

V Narodnem muzeju Slovenije je večina (ohranjenih) najdb, najdenih v Ljubljanici v 19. in prvi polovici 20. st. Narodni muzej Slovenije prav tako hrani najdbe iz svojih raziskav v osemdesetih in devetdesetih letih minulega stoletja, pridobil je tudi velik del predmetov iz zasebnih zbirk v Sloveniji, ki jih od leta 1992 sistematično dokumentira.[26]

V nepojasnjenih okoliščinah je iz Narodnega muzeja Slovenije v Mestni muzej Ljubljana prišel del najdb iz nekdanje Kržmančeve zbirke, med katerimi so meči (z ostanki nožnic) MM A22, MM A23 in MM

22 Leta 1821, ko je bil ustanovljen Deželni muzej za Kranjsko, je prejel 40 majhnih bronastih novcev iz Ljubljanice (Illyrisches Blatt 1832, 13, št. 121; Gaspari 2002, 32).
23 Bitenc, Knific 1997, 19–20; Gaspari 2002, 29–52; Bras Kernel 2006; Gaspari 2009a; Gaspari 2012a.
24 Logar, Bitenc 1984; Svoljšak et al. 1997, 257–267.
25 Gaspari 2012a, 47–48.
26 Podvodna arheologija v Sloveniji 1; Podvodna arheologija v Sloveniji 2; Svoljšak et al. 1997, 225–226, 257–267, t. 8: 8–10, t. 9: 2–7, t. 10–19, t. 20: 1–2.

Under unknown circumstances, part of the finds from the former Kržmanc Collection left the National Museum of Slovenia and came to the City Museum of Ljubljana, among them the MM A22, MM A23 and MM A24 swords (with remains of scabbards).[27] In addition the City Museum also keeps part of the finds recovered by the Underwater Archaeology Division (MM A34 sword) and a large part of the Potočnik Family Collection (MM A25–A33 swords, MM F7–F8 double-sided heavy tools, MM J2–J4 tent pegs, MM SG shield boss).[28]

The archaeological investigations of the River Ljubljanica and the recovered artefacts are discussed in numerous articles and books, the most comprehensive of which is the catalogue of The Ljubljanica – a River and its Past exhibition,[29] which was on display at the National Museum of Slovenia (15 February–31 October 2009) and in a slightly reduced form also in the *Armémuseum* in Stockholm (Sweden, 25 May 2011–8 January 2012). The publications of the military equipment are given individually for each item in the Catalogue.

Figure 9
The topographic survey of the bottom and riverbed measurements in the Ljubljanica at Blatna Brezovica, conducted by the National Museum of Slovenia in the summer of 1984.

Slika 9
Topografski pregled dna in merjenje struge Ljubljanice pri Blatni Brezovici, raziskave Narodnega muzeja Slovenije poleti 1984.

27 Bras Kernel 2006, 17–18, 23.

28 The National Museum of Slovenia obtained a small part of the Potočnik Family Collection in 1980 (Podvodna arheologija v Sloveniji 1, 30–32, Cat. Nos. 309–328). The remaining part, which Andrej Gaspari discusses in his dissertation (Gaspari 2002), is to be kept in the City Museum of Ljubljana, though several pieces of Roman military equipment (one pilum, one double-sided heavy tool, two turf cutters, one tent peg; cf. Gaspari 2002, Pl. 12: 3, Pl. 25: 3, Pl. 31: 7, 9, Pl. 31: 4) have not been handed to the museum by September 2016, hence their photographs could not be included into this book.

29 Turk et al. 2009b.

Figure 10
The riverbed surveys in the Ljubljanica at Blatna Brezovica (Lipavec site), performed by the Group for Underwater Archaeology in April 2001.

Slika 10
Pregled struge Ljubljanice pri Blatni Brezovici (ledina Lipavec), raziskave Skupine za podvodno arheologijo aprila 2001.

Figure 11
The roman ship from the Ljubljanica at Sinja Gorica (Zaloke site) during the 2012 investigations by the Group for Underwater Archaeology. The dendrochronological analyses indicate a dating after AD 3.

Slika 11
Rimska ladja iz Ljubljanice pri Sinji Gorici (ledina Zaloke) med raziskavami Skupine za podvodno arheologijo leta 2012. Dendrokronološke raziskave kažejo na datacijo ladje po letu 3 po Kr.

A24.[27] Mestni muzej Ljubljana iz Ljubljanice poleg omenjenih predmetov Kržmančeve zbirke hrani del najdb, ki izhajajo iz raziskav Skupine za podvodno arheologijo (MM A34), in velik del zbirke družine Potočnik (meči MM A25–A33, dvostranski težki orodji MM F7–F8, šotorski klini MM J2–J4, ščitna grba MM SG).[28]

Arheološke raziskave reke Ljubljanice in v njej najdeni predmeti so bili tema številnih objav, med katerimi je najpomembnejši katalog pregledne razstave Ljubljanica – kulturna dediščina reke,[29] ki je bila na ogled v Narodnem muzeju Slovenije (15. februar–31. oktober 2009) in v malo zmanjšanem obsegu in z naslovom River and its Past v Stockholmu (Švedska; Armémuseum, 25. maj 2011–8. januar 2012). V katalogu so navedene vse objave rimske vojaške opreme.

27 Bras Kernel 2006, 17–18.

28 Majhen del predmetov je leta 1980 od Mira Potočnika pridobil Narodni muzej Slovenije (Podvodna arheologija v Sloveniji 1, 30–32, kat. 309–328). Preostali predmeti, ki so osnova disertacije Andreja Gasparija (Gaspari 2002), so v glavnem prešli v varstvo Mestnega muzeja Ljubljana. Izmed predmetov rimske vojaške opreme Mestni muzej v začetku septembra 2016 od družine Potočnik še ni prevzel enega piluma, enega dvostranskega težkega orodja, dveh orodij za rezanje ruše in enega šotorskega klina (prim. Gaspari 2002, t. 12: 3, t. 25: 3, t. 31: 7, 9, t. 31: 4), zato fotografij teh predmetov nisem mogla vključiti v knjigo.

29 Turk et al. 2009a.

3
Aims, methods and stages of research

The Roman military equipment of the (Late) Republican period and the Principate that was recovered from the River Ljubljanica represents an important body of evidence in its field and is presented here in a monographic study.

The book has two main aims. The first is to provide a catalogue of artefacts that comprises drawings, photographs and a detailed description of each artefact resulting from a meticulous observation. The second aim is to analyse the artefacts described in the Catalogue and held in the National Museum of Slovenia, but also all other known pieces of Roman military equipment from the Ljubljanica in terms of their typology, construction, composition, parallels, dating and other features, and to present the results to the professional community.

In the course of my work and the studies of comparative material it became clear how important it was to provide precise and comprehensive descriptions of artefacts and their construction based on in-depth observation and a good knowledge of the subject matter.[30] It is precisely such work that has, for example, allowed me to establish a new group of daggers and their sheaths with clearly defined characteristics and a short period of use.[31] My own contribution in this respect is presented in the Catalogue and applied throughout the book.

The process of studying the Roman military equipment from the Ljubljanica went hand in hand with the conservation work on the artefacts conducted at the Department of Conservation and Restoration in the National Museum of Slovenia.[32] Many important details, such as gilding hidden under a patina and traces of soldering, only emerged during careful cleaning and observation under an optic microscope both during conservation and after it.

The interior of artefacts was examined with the help of X-ray images, as well as neutron radiography when we wished to examine the possible organic remains.[33]

The artefacts are discussed according to type, i.e. swords, daggers, helmets and so forth. The discussion of each artefact type opens with a short outline of the established typochronology relevant for the attribution of the artefacts from the Ljubljanica, and proceeds with their in-depth analysis. The artefacts that I could not positively identify or at least reasonably presume to be Roman in date are not included in the book. These are objects uncharacteristic in form or production manner that were in use over longer periods, as well as objects that revealed no clear connections with the Roman army (e.g. heads of pilum-like and other projectiles, several spearheads).

The most reliably dated artefacts are those with close parallels from narrowly dated sites. The ones to which I most frequently refer, especially in Chapters 4–13, are the following:

- Dangstetten (Germany), fortress along the Rhine, ca. 15 (or 20–11 BC) to 9/8 BC,[34]
- Oberaden (Germany), fortress along the River Lippe, 11–9/8 BC,[35]
- Hedemünden, fort along the River Werra, ca. 11/10–8/7 BC,[36]

30 E.g. Fingerlin 1986; Fingerlin 1998.
31 Istenič 2012.
32 Milić et al. 2009b.
33 Cf. Rant et al. 2006.
34 Fingerlin 1986, 10; Fingerlin 1998, 9; Roth-Rubi 2002; Roth-Rubi 2006, 103; Ehmig 2010.
35 Von Schnurbein 1989; Kühlborn 1992, 123, 133.
36 Grote 2012, 136–137. For a different interpretation of the site see the references in Zanier 2016, 83, Fn. 166.

3
Cilji, metode in potek raziskav

Težišče raziskav rimske vojaške opreme (pozno) republikanske dobe in principata iz Ljubljanice je bila njihova poglobljena primerjalna analiza in iz nje izhajajoči izsledki.

Monografija ima dva glavna cilja. Prvi je natančna, iz poglobljenega proučevanja izhajajoča ter z risbami in fotografijami dokumentirana predstavitev predmetov rimske vojaške opreme iz Ljubljanice, ki je podana v Katalogu. Raziskovalcem rimske vojaške opreme bo močno približala korpus pomembnega primerjalnega gradiva. Drugi cilj je znanstvena obravnava v Katalogu zajetega gradiva in tistih predmetov rimske vojaške opreme, ki jih ne hrani Narodni muzej Slovenije, ter predstavitev izsledkov znanstveni javnosti.

Študij primerjalnih najdb mi je pokazal, kako dragoceni so dobri in natančni opisi predmetov, ki izhajajo iz poglobljenega opazovanja in dobrega poznavanja gradiva.[30] Pri obravnavi bodal in njihovih nožnic mi je prav natančno opazovanje omogočilo ugotoviti novo skupino z jasnimi značilnostmi in kratkim časom uporabe.[31] Zato sem opazovanju predmetov in proučevanju njihove zgradbe posvetila veliko pozornosti. Ugotovitve sem strnila v opisih, fotografijah in risbah predmetov, ki sestavljajo Katalog.

Proučevanje predmetov rimske vojaške opreme je bilo tesno povezano s konservatorskimi postopki, ki so potekali v Oddelku za konserviranje in restavriranje Narodnega muzeja Slovenije.[32] Marsikatero pomembno podrobnost (npr. pod patino skrito pozlato, sledove spajkanja) je odkrilo natančno čiščenje predmeta med konservacijo ter opazovanje predmetov pod optičnim mikroskopom med konservacijo in po njej.

Poleg rentgenskega fotografiranja smo, kadar smo želeli ugotavljati organske strukture v notranjosti predmeta, uporabili nevtronsko radiografijo.[33]

Gradivo sem obravnavala po vrsti predmetov (meče, bodala, čelade itd.). Pri opredelitvah sem izhajala iz (objavljenega) primerjalnega gradiva. Na začetku obravnave posameznih vrst vojaške opreme sem zato kratko orisala uveljavljene tipokronologije, ki so merodajne za opredelitev gradiva iz Ljubljanice. Sledi poglobljena primerjalna analiza najdb iz Ljubljanice. Predmetov, ki jih nisem mogla opredeliti kot rimske oz. vsaj utemeljeno domnevati, da so rimski, nisem vključila v knjigo. To so po obliki in načinu izdelave neizraziti predmeti, ki so bili v uporabi več obdobij, in predmeti, za katere primerjava s poznano (objavljeno) rimsko vojaško opremo ni pokazala jasne povezave z rimsko vojsko (npr. pilumom podobne osti, sulične in druge osti).

Najbolj zanesljivo sem lahko datirala tiste kose rimske vojaške opreme iz Ljubljanice, ki imajo dobre primerjave med najdbami z ozko datiranih najdišč. Med njimi se v poglavjih 4–13 najpogosteje sklicujem na naslednja najdišča in njihove datacije:

- Dangstetten (Nemčija), legijski tabor ob Renu, ok. 15 (oziroma 20–11 pr. Kr.) do 9/8 pr. Kr.,[34]
- Oberaden (Nemčija), legijski tabor ob reki Lippe, 11–9/8 pr. Kr.,[35]
- Hedemünden, vojaški tabor ob reki Werri, ok. 11/10–8/7 pr. Kr.,[36]
- Comacchio (Italija), vzhodni del Padske nižine, ladja s tovorom, potopljena v predzadnjem

30 Npr. Fingerlin 1986; Fingerlin 1998.
31 Istenič 2012.
32 Milić et al. 2009a.
33 Prim. Rant et al. 2006.
34 Fingerlin 1986, 10; Fingerlin 1998, 9; Roth-Rubi 2002; Roth-Rubi 2006, 103; Ehmig 2010.
35 Von Schnurbein 1989; Kühlborn 1992, 123, 133.
36 Grote 2012, 136–137. Za drugačno interpretacijo najdišča glej literaturo, navedeno v Zanier 2016, 83, op. 166.

- Comacchio (Italy), eastern Po Plain, shipwreck dated between 19 and 12 BC or soon afterwards,[37]
- Anreppen (Germany), fortress along the River Lippe, AD 4–6/9,[38]
- Haltern (Germany), fortress along the River Lippe, from 7/5 BC to AD 9/16,[39]
- Kalkriese (Germany), site of the Battle of the Teutoburg Forest, AD 9,[40]
- Lahnau-Waldgirmes (Germany), settlement, from 4/3 BC to AD 9/10 or 16 at the latest,[41]
- Ljubljana (Slovenia), workshops or repair shop of Roman military equipment, last decade BC and first two or three decades AD.[42]

The parallels from sites attributable to the final period of prehistory were dated in accordance with the Central European chronological framework that defines the time between 70 and 15 BC as the LT D2 phase.[43]

The artefacts without close parallels among the finds from the narrowly dated contexts were chronologically attributed mainly on the basis of the presumed development of the form (for example the A1 sword). For some objects (for example the A1 sword), it was the use of pure brass that provided the crucial chronological evidence. The characterisation of the metal was also of great importance in investigating the origin of artefacts (for example for the A20 sword).[44]

The analysis also included a research of the materials and the technological processes involved in the production of the Roman military equipment. These processes comprise the production of objects as a whole or their parts (using procedures such as hammering, casting, cutting, polishing), the possible decoration (such as punching, engraving, embossing, plating), binding of individual parts together (such as riveting, soldering) and others. Of particular interest here was the degree of uniformity in the production processes that may lead to conclusions regarding the organisation of production.

Most of the surviving materials are metals and enamel. Their elemental composition was roughly determined using X-ray fluorescent spectroscopy (EDS XRF) performed at the National Museum of Slovenia during the conservation process,[45] as the results were important to ensure the optimal conservation procedure by revealing, for example, the presence of metal plating hidden under the patina.

A more accurate elemental composition of the basic metals, of the possible surface plating and of inlaid decoration, was gained by examining the artefacts using the technique of proton-induced X-ray emission (PIXE). It was combined with the proton-induced gamma-ray emission (PIGE) technology for analysing enamel. The PIXE and PIGE analyses were performed on the tandem accelerator at the Jožef Stefan Institute in Ljubljana.[46]

The results of the investigations into the metals and the production technology provided important evidence regarding the degree of standardisation in the production of Roman military equipment. A more general study of the latter question is hindered by the paucity of such analyses for the Roman military equipment (and the Roman material culture in general) from other sites.[47]

37 Berti 1990, 72–75; García-Bellido 1998, 2; Domergue, Nesta, Quarati, Trincherini 2012.
38 Tremmel 2008, 147–150, 159; Kühlborn 2009, 32–34.
39 Aßkamp 2009, 176–177.
40 Moosbauer, Wilbers-Rost 2009, 61–62.
41 The results of the dendrochronological analyses, the site stratigraphy and the historic circumstances show that the Romans built the settlement in 4/3 BC at the latest and abandoned it in AD 16 at the latest, but not before the autumn of AD 9 or the spring of AD 10 (Becker 2015, 70–72).
42 Vičič 2002, 196.
43 Božič 2008, 87, 144–148, Tab. 5.
44 Cf. Istenič 2005; Istenič 2012; Istenič, Šmit 2007; Istenič, Šmit 2014.
45 X-Ray Analyzer Model PEDUZO 01/Am/Sp-250, made at the Jožef Stefan Institute in Ljubljana. For details on the instrument see: Istenič, Milić, Šmit 2003, 292–293.
46 For details on the instrument: see Chapter 16.
47 The archaeometric research in Roman archaeology is increasingly focused on lead isotope analyses, the main objective of which is to establish the geographic origin of the lead ore used to make ingots and (from them) other lead items such as slingshot (e.g. Bode, Hauptmann, Mezger 2009; Hanel et al. 2013; Rothenhöfer, Hanel 2013).

desetletju pr. Kr. (med letoma 19 in 12 pr. Kr. ali kmalu po tem),[37]
- Anreppen (Nemčija), legijski tabor ob reki Lippe, 4–6/9 po Kr.,[38]
- Haltern (Nemčija), legijski tabor ob reki Lippe, od 7/5 pr. Kr. do 9/16 po Kr.,[39]
- Kalkriese (Nemčija), prizorišče spopada v Tevtoburškem gozdu, 9 po Kr.,[40]
- Lahnau-Waldgirmes (Nemčija), naselje, od 4/3 pr. Kr. do 9/10 oziroma najpozneje 16. po Kr.,[41]
- Ljubljana (Slovenija), delavnica ali popravljalnica rimske vojaške opreme, zadnje desetletje pr. Kr. in prvi dve oziroma tri desetletja po Kr.[42]

Pri navajanju primerjalnega gradiva z najdišč iz obdobja izteka prazgodovine sem uporabljala srednjeevropsko kronološko shemo, ki čas med letoma 70 in 15 pr. Kr. opredeljuje kot stopnjo LT D2.[43]

Predmete, ki nimajo dobrih primerjav med najdbami z (ozko) datiranih najdišč, sem časovno opredelila glede na domnevni razvoj oblik, kot ga nakazujejo objavljeni predmeti (npr. meč A1). V posameznih primerih je bila za datiranje pomembna opredelitev barvnih kovin (npr. meč A1). Ta je lahko dragocen podatek tudi pri vprašanjih izvora predmetov (npr. meč A20).[44]

Raziskovala sem tudi materiale in tehnološke postopke, ki so jih uporabili pri izdelavi rimske vojaške opreme. Tehnološki postopki vključujejo način izdelave predmetov oziroma njihovih delov (npr. kovanje, ulivanje, brušenje, poliranje) in morebitnega okrasa (npr. punciranje, izrezovanje, iztolčenje, prevleke), tehnike spenjanja posameznih delov predmetov (npr. kovičenje, spajkanje) in podobno. Pri tem me je najbolj zanimala stopnja enotnosti uporabljenih tehnoloških postopkov, ki bi – ob primerjavi z rimsko vojaško opremo z drugih najdišč – lahko vodila k utemeljenim domnevam o načinu in organizaciji njene proizvodnje.

Večino ohranjenih materialov zajemajo kovine in emajli. Grobe opredelitve kovin in njihovih zlitin s tehniko rentgenske fluorescenčne spektrometrije (EDS XRF), izvedene z napravo v Narodnem muzeju Slovenije,[45] so bile narejene med konservatorskim postopkom, saj so bile pomembne za optimalen potek konservacije (lahko so npr. opozorile na s patino prekrite površinske prevleke).

Razmeroma natančno ugotavljanje sestave osnovnega materiala predmetov, morebitnih površinskih prevlek iz kovin oziroma kovinskih zlitin ter tavširanih okrasov je omogočila metoda protonsko vzbujene rentgenske spektrometrije (PIXE), ki smo jo pri analiziranju emajlov dopolnili z metodo protonsko vzbujenih žarkov gama (PIGE). Raziskave z obema metodama smo izvajali na tandemskem pospeševalniku Instituta Jožef Stefan.[46]

Ugotovitve o kovinah in tehnoloških postopkih, ki so jih uporabili pri izdelavi rimske vojaške opreme iz Ljubljanice, so omogočile pomemben uvid v stopnjo standardiziranosti izdelave rimske vojaške opreme. Pri oceni, koliko tozadevni izsledki veljajo za zgodnjerimsko vojaško opremo na splošno, je težava redkost vključenosti tovrstnih analiz v raziskave rimske vojaške opreme (pa tudi rimske materialne kulture nasploh) z drugih najdišč.[47]

37 Berti 1990, 72–75; García-Bellido 1998, 2; Domergue, Nesta, Quarati, Trincherini 2012.
38 Tremmel 2008, 147–150, 159; Kühlborn 2009, 32–34.
39 Aßkamp 2009, 176–177.
40 Moosbauer, Wilbers-Rost 2009, 61–62.
41 Dendrokronološke analize, stratigrafija najdišča in zgodovinske okoliščine kažejo, da so Rimljani naselbino zgradili najkasneje 4/3 pr. Kr. in opustili najpozneje 16 po Kr., vendar ne pred jesenjo leta 9 oziroma pomladjo 10 po Kr. (Becker 2015, 70–72).
42 Vičič 2002, 196.
43 Božič 2008, 87, 144–148, pregl. 5.
44 Prim. Istenič 2005; Istenič 2012; Istenič, Šmit 2007; Istenič, Šmit 2014.
45 X-Ray Analyzer Model PEDUZO 01/Am/Sp-250, izdelan na Institutu Jožef Stefan v Ljubljani. Podrobnosti o napravi: Istenič, Milić, Šmit 2003, 297.
46 Podrobnosti o napravi: glej pogl. 16.
47 Na področju arheometrije v rimski arheologiji so v razmahu raziskave z analizo svinčevih izotopov, pri katerih je glavni cilj ugotavljanje geografskih območij izvora svinčeve rude, iz katere so izdelovali ingote in (iz njih) druge svinčene predmete, med drugim želode za pračo (npr. Bode, Hauptmann, Mezger 2009; Hanel et al. 2013; Rothenhöfer, Hanel 2013).

4
Swords and scabbards

4.1 Presumed typological predecessors of the Mainz type scabbards and swords (A1–A4, MM A23)

Distinguishing between Celtic swords and those of the Roman Late Republican and Early Augustan periods[48] is a challenging undertaking, as one influenced the other.[49] Sloping shoulders, for instance, are a feature of the Celtic (La Tène)[50] swords that can also be found on presumably Roman swords and, vice versa blades with a tapering point characteristic of Roman swords are also known on some of the Celtic swords.[51] Furthermore, the presumably Roman swords come from contexts that do not allow us to reliably identify the swords or their scabbards as Roman.[52] An example is two swords from Grad near Šmihel (Slovenia; *Figs. 14–16)*, which are widely accepted as Roman.[53] However, they form part of a hoard of weapons recovered from the ruins of the hillfort's rampart that comprises Roman weaponry, mainly *pila* and other projectiles, but also two Celtic swords.[54] The characteristics of the *pila*, the military finds found scattered at the site and the broader historical context indicate that the weapons of the hoard were collected immediately after a major Roman military assault on the indigenous settlement in the 2nd century BC.[55]

The multifaceted and complex task of identifying swords and scabbards as either Roman or Celtic can also be aptly illustrated by the MM A22 example (*Fig. 13*).[56] It ranks among the scabbards (and associated swords) with non-ferrous, usually brass openwork plates produced between 40/30 and 15 BC; they are Celtic in the basic formal characteristics, but the use of pure brass[57] and the map of findspots show that their production and distribution were likely in Roman hands. They may be seen as Roman gifts to the dignitaries of the Celts and their contemporaries outside the Roman state.[58]

The identification of swords as Roman and hence their inclusion into this study was greatly aided by the associated scabbard remains. Remains of wood on the blade are regarded as indicating a Roman sword, as these were used with wooden scabbards that commonly had metal fittings such as plates, bands, guttering and sheet covers, while the Celtic swords were furnished with scabbards completely made of metal.[59] The main criterion for the swords without scabbard remains was a waisted blade, a feature not shared by the Celtic swords.[60]

48 I deliberately avoid using the Latin terms *gladius*, *spatha* and *semispatha*, because the surviving ancient texts reveal neither their characteristics nor the differences between them. Moreover, the meaning of the terms seems to have changed in the course of time (cf. Bishop, Coulston 2006, 78; Miks 2007, 19–23; James 2011, 28–29).

49 Rapin 2001, 48; Ortisi 2015, 17–18.

50 The word 'Celtic' is used in its broad sense, for non-Roman communities with a characteristic Late Iron Age material culture.

51 James 2011, 106–107, Fig. 35.

52 Miks 2007, 43, 48; Stiebel 2004; Davoli, Miks 2015, par. 23, 24; Ortisi 2015, 17–18.

53 Horvat 2002, 133, Pl. 1: 1–2; Bishop, Coulston 2006, 54–56, Fig. 25: 4; James 2011, 80, Fig. 25. To the contrary, Miks (2007, 48) considers them as more likely La Tène swords.

54 Horvat 2002, 133–134, 140, Figs. 9–10, Pl. 1: 3.

55 Jana Horvat (2002, 142) dated the hoard to the late 3rd and first half of the 2nd century BC. Recent finds have confirmed that the prehistoric hillfort, located so as to control the Razdrto/*Ocra* Pass (key pass on the easiest route from the north-eastern Apennine Peninsula towards the Danube Basin and the Balkans), was indeed destroyed by the Roman army (Laharnar 2015, 11–14; Laharnar, Lozić 2016, 60–65). This probably occurred after 181 BC, when the colony of Aquileia was founded, and before the end of the 2nd or beginning of the 1st century BC, when a Roman trading post was established at the Razdrto/*Ocra* Pass; Horvat, Bavdek 2009, 93–96).

56 Last detailed publication: Istenič 2010, 152–153, Figs. 2, 3, App. 1. For PIXE analyses, see Šmit, Istenič, Perovšek 2010.

57 For a discussion on pure brass, see Ch. 17.1.

58 Istenič 2010; Istenič 2015b; Istenič, Šmit 2014.

59 Rapin 2001, 33, 36, 40–41; Pernet 2006, 44–45.

60 Connolly 1997; Rapin 2001, 40.

4
Meči in nožnice

4.1 Domnevni tipološki predhodniki nožnic in mečev tipa Mainz (A1–A4, MM A23)

Razlikovanje keltskih in rimskih mečev[48] poznorepublikanske (in zgodnjeavgustejske) dobe je težavno, saj so vplivali drug na drugega.[49] Tako imajo npr. poševna ramena, ki so značilnost keltskih (latenskih)[50] mečev, tudi domnevni rimski meči, rezila z izrazito konico, značilna za rimske meče, pa imajo lahko tudi nekateri keltski meči.[51] Poleg tega kaže opozoriti, da domnevni rimski primerki tega obdobja izvirajo iz najdiščnih okoliščin, ki ne omogočajo povsem zanesljive opredelitve mečev oziroma nožnic kot rimske.[52] Tak je tudi primer dveh mečev z Gradu pri Šmihelu (*sl. 14–16*), za katera je široko sprejeto, da sta rimska.[53] Izvirata iz skupne najdbe orožja, ki je bilo najdeno v ruševinah obzidja prazgodovinskega gradišča in vsebuje rimsko orožje, predvsem pilume (ki skupaj z drugimi najdbami z gradišča in z zgodovinskimi okoliščinami kažejo na datacijo v 2. st. pr. Kr.[54]) in druge izstrelke, a tudi dva keltska meča.[55] Opredelitve dveh mečev kot rimskih torej ne moremo zanesljivo izpeljati iz najdiščnih okoliščin.

Večplastnost in zapletenost opredeljevanja mečev in nožnic kot rimske ali keltske dobro ponazarja primerek MM A22 (*sl. 13*).[56] Sodi med meče z nožnicami, ki imajo v predrti tehniki okrašene medeninaste okove in so jih izdelovali med letoma 40/30 in 15 pr. Kr. Po osnovnih oblikovnih značilnostih so keltski, vendar so na njih opazni očitni rimski vplivi, uporaba čiste medenine[57] in slika njihove razširjenosti pa kažeta, da sta bili njihova izdelava in distribucija verjetno v rimskih rokah; domnevam, da so jih Rimljani podarjali vodilnim med Kelti in njihovimi sodobniki zunaj rimske države.[58]

Pri vključitvi mečev v monografijo so bili v veliko pomoč ostanki nožnic. Morebitni ostanki lesa na rezilu govorijo za rimski meč – ti so imeli lesene nožnice, ki so (lahko) imele kovinske okove in pločevinasto oblogo, medtem ko so imeli keltski meči kovinske nožnice.[59] Pri mečih brez ostankov nožnice je bil glavni kriterij oblika rezila: v zgornji polovici usločeno in v spodnji tretjini izbočeno rezilo je značilnost rimskih mečev, ki je keltski meči niso poznali.[60]

Razvoj rimskih mečev in nožnic pred avgustejsko dobo, ko so se uveljavili meči in nožnice razmeroma jasno opredeljenega tipa Mainz, ni dobro poznan. Grški tip meča z izrazito razširjenim rezilom v spodnjem delu (*xiphoi*), ki je bil v Italiji v uporabi v republikanski dobi do vključno 3. st. pr. Kr.,[61] je

48 Latinskim pojmom gladij (*gladius*), spata (*spatha*) in semispata (*semispatha*) sem se izogibala, ker iz njihove rabe v ohranjenih antičnih pisnih virih ni mogoče razbrati, kakšne so bile njihove značilnosti oziroma razlike med njimi; zdi se tudi, da se je pomen teh terminov s časom spreminjal (prim. Bishop, Coulston 2006, 78; Miks 2007, 19–23; James 2011, 28–29).

49 Rapin 2001, 48; Ortisi 2015, 17–18.

50 Pojem »keltski« uporabljam v širokem pomenu, za nerimske skupnosti, ki jih povezuje značilna mlajšeželeznodobna materialna kultura.

51 James 2011, 106–107, sl. 35.

52 Miks 2007, 43, 48; Stiebel 2004; Davoli, Miks 2015, par. 23, 24; Ortisi 2015, 17–18.

53 Horvat 2002, 155, t. 1: 1–2; Bishop, Coulston 2006, 54–56, sl. 25: 4; James 2011, 80, sl. 25. Izjema je Miks (2007, 48), ki se nagiba k mnenju, da sta meča latenska.

54 Jana Horvat (2002, 154–155) je to najdbo datirala v konec 3. in prvo polovico 2. st. pr. Kr. Kasneje odkrite najdbe so potrdile, da je prazgodovinsko naselbino, s katere je bil mogoč nadzor prelaza Razdrto/*Ocra* (ključni prelaz na najlažji poti iz severovzhodne Italije proti Podonavju in Balkanu), uničila rimska vojska (Laharnar 2015, 11–14; Laharnar, Lozić 2016, 60–65). To se je verjetno zgodilo po letu 181 pr. Kr. (ustanovitev kolonije Akvileja) in pred koncem 2. ali začetkom 1. st. pr. Kr. (nastanek rimske trgovske postojanke na prelazu Razdrto/*Ocra*; Horvat, Bavdek 2009, 93–96).

55 Horvat 2002, 155, 157, sl. 9–10, t. 1: 3.

56 Zadnja poglobljena objava: Istenič 2010, 124–127, sl. 2, 3, pril. 1. analize PIXE: Šmit, Istenič, Perovšek 2010.

57 Čista medenina: glej pogl. 17.1.

58 Istenič 2010; Istenič 2015b; Istenič, Šmit 2014.

59 Rapin 2001, 33, 36, 40–41; Pernet 2006, 44–45.

60 Connolly 1997; Rapin 2001, 40.

61 Miks 2007, 30–38; James 2011, 48–49, sl. 15.

Figure 12
The constituent parts of Roman swords and scabbards.

Slika 12
Rimski meč z nožnico: poimenovanje posameznih delov.

We know little of the development of the Roman swords and scabbards prior to the Augustan period, when the relatively clearly defined Mainz type swords and scabbards became widely used. The Greek *xiphoi* with a markedly waisted blade were wielded in Italy during the Republican period to the end of the 3rd century BC,[61] but were afterwards, probably during the Second Punic War when the Romans came into contact with Iberian[62] warriors, replaced by *gladius hispaniensis* mentioned in Polybius. The Mainz type swords developed from the latter.[63]

The archaeological evidence from the Late Republican period includes few (presumably) Roman swords. They have relatively long waisted blades, a long point and sloping shoulders. I concur with the widely accepted view that these swords are *gladii hispanienses*[64] rather than (Celtic) swords of Roman allies (cavalry) produced under the influence of the Roman *gladius hispaniensis*,[65] as the archaeological evidence includes no better candidates for the former.

The earliest presumed *gladii hispanienses* are the two above-mentioned swords of the probably 2nd-century BC hoard from Grad near Šmihel (*Figs. 14–16*).[66] Other relatively well preserved and also relatively narrowly dated examples include a sword and the remains of its wooden scabbard with iron parts (guttering with terminal knob, upper suspension band with a ring, fragment of the lower suspension band, mouth band and crossband) from Grave 471 at Giubiasco

61 Miks 2007, 30–38; James 2011, 48–49, Fig. 15.
62 The name 'Iberians' and 'Iberian' is used here to denote the different inhabitants of the Iberian Peninsula before its integration into the Roman state.
63 Miks 2007, 30–38; James 2011, 79–80.
64 Thus e.g. James 2011, 80–84 (by comparing Iberian swords with the presumed 'Spanish swords').
65 This has been suggested by Miks 2007, 43–51. For a brief overview of the arguments and opinions, see Ortisi 2015, 17–18.
66 Horvat 2002, 133, Pl. 1: 1–2.

Figure 13
The iron MM A22 sword in its scabbard from the Ljubljanica at Bevke (Krajna or Na zrnici) or at Blatna Brezovica (Tri lesnice). The front of the scabbard (a) with openwork decoration is made of brass, the back (b) of iron. Surviving length 733 mm. City Museum of Ljubljana, Inv. No. 510:LJU;32582.

Slika 13
Železen meč v nožnici MM A22 iz Ljubljanice pri Bevkah (Krajna ali Na zrnici) ali Blatni Brezovici (Tri lesnice). Sprednja stran nožnice (a) je iz medenine in ima predrt okras, zadaj (b) je železna. Ohranjena dolžina 733 mm. Mestni muzej Ljubljana, inv. št. 510:LJU;32582.

(verjetno med drugo punsko vojno, ko so Rimljani prišli v intenziven stik z iberskimi[62] bojevniki) zamenjal »španski meč« (*gladius hispaniensis*), ki ga omenja Polibij. Iz takih mečev so se razvili meči tipa Mainz.[63]

Med arheološkimi najdbami poznorepublikanske dobe so (domnevni) rimski meči maloštevilni. Imajo razmeroma dolga usločena rezila, dolgo konico in poševna ramena. Med arheološkimi najdbami ni drugih (domnevnih) rimskih mečev poznorepublikanske dobe, zato se strinjam z mnenjem, da predstavljajo »španske meče«[64] in ne npr. (keltskih) mečev rimskih zaveznikov (konjenikov), na katere naj bi vplivali rimski »španski meči«.[65]

Najstarejša domnevna rimska »španska meča« sta že omenjena primerka z Gradu pri Šmihelu (*sl. 14–16*) in sta verjetno iz 2. st. pr. Kr.[66] Med razmeroma

62 Poimenovanje »Iberci«, »iberski« uporabljam v zvezi z različnimi prebivalci Iberskega polotoka pred vključitvijo v rimsko državo.
63 Miks 2007, 30–38; James 2011, 79–80.
64 Tako npr. James 2011, 80–84 (s primerjavo iberskih mečev z domnevnimi primerki »španskih mečev«).
65 Tako domneva Miks 2007, 43–51. Kratek pregled argumentov in mnenj: Ortisi 2015, 17–18.
66 Horvat 2002, 155, t. 1: 1–2.

(Switzerland),[67] probably dating to the first third of the 1st century BC.[68] They also comprise a sword in a leather scabbard with surviving iron guttering and suspension bands with rings from Delos that predates 69 BC.[69] Two other presumably Late Republican swords, from Jericho (Palestine) and Masada (Israel) have recently been published.[70] The one from Jericho has sloping shoulders, a 760 mm long blade that is only slightly waisted and a tapering point, and was found in a grave together with perfume flasks from the 2nd or early 1st century BC at the latest. Of its scabbard only pieces of the U-sectioned iron guttering survive.[71] The other sword, from Masada, has sloping shoulders, a 610 mm long waisted blade and pieces of the scabbard that include U-sectioned iron guttering; it is believed to be a weapon hidden in the time of Herod the Great (37–4 BC), which the Jewish rebels discovered and reused in AD 73 and 74.[72]

The typologically earliest among the Roman scabbards from the Ljubljanica is the A1, 650 mm long, made of wood and metal parts that include a net-like fitting (*Pl. 1; Fig. A1.1a, b*). The metal parts are of pure brass,[73] which is a chronologically diagnostic element. It is the Romans who around 60 BC introduced the production and use of brass, i.e. a copper-zinc alloy, to Europe.[74] The use of pure brass[75] also clearly reveals the scabbard as a Roman product, as only the Romans could produce brass in this part of Europe.[76] The high zinc content suggests that the A1 scabbard fittings were made from brass ingots rather than by remelting brass artefacts such as brooches and coins. The brass coins of the Arverni, minted during the Roman siege of Alesia in 52 BC,[77] and the scabbard from western Ukraine of probable Tiberian date,[78] indicate

Figure 14
Presumed Roman swords from Grad near Šmihel (Slovenia), 2nd century BC.
1) Drawn reconstruction of a roughly 742 mm long sword bent in three places, kept in the National Museum of Slovenia, Inv. No. P 3621;
2) 693 mm long sword, kept in the Institut für Urgeschichte und Historische Archäologie, Vienna, Studiensammlung, Inv. No. 26726.
Scale 1 : 4. From Horvat 2002, Pl. 1: 1, 2.

Slika 14
Domnevna rimska meča z Gradu pri Šmihelu, 2. st. pr. Kr.
1) Risarska rekonstrukcija približno 742 mm dolgega meča s trikrat zapognjenim rezilom, Narodni muzej Slovenije, inv. št. P 3621;
2) 693 mm dolg meč, Institut für Urgeschichte und Historische Archäologie na Dunaju, Studiensammlung, inv. št. 26726.
Merilo 1 : 4. Po Horvat 2002, t. 1: 1, 2.

67 Carlevaro, Pernet, Tori, 2006, 329, Grave 471: 1; Miks 2007, 595–596, A231, Pl. 6; Pernet 2010, Pl. 103: 1, 2.
68 The dating is based on the Almgren 65 and Nauheim brooches (Carlevaro, Pernet, Tori 2006, 329, Grave 471: 7–8; Pernet 2010, Pl. 104: 7, 8). For the dating of these brooches see Božič 2008, 81, 86–87, 144–146, Tab. 5.
69 Siebert 1986, 637, Figs. 17–19; Miks 2007, 563, Pl. 1: A123.
70 Not included in Miks 2007.
71 Stiebel 2004.
72 Stiebel, Magness 2007, 3–4, 31, 68, Pl. 4.
73 See Ch. 16, *Table A1: 4–7, 9–10, 13–16, 18–24*; on pure brass cf. Ch. 17.1.
74 Istenič, Šmit 2007.
75 For the term 'pure brass' see Ch. 17.1.
76 Istenič, Šmit 2007.
77 Nieto 2004; Istenič, Šmit 2007, 145–146.
78 This scabbard was made in the pre-Roman Celtic tradition, but shows Roman influences, most clearly in the shape of the relief decoration that imitates glass medallions depicting the bust of the Emperor Tiberius flanked by the portraits of Germanicus and Drusus the Younger (Miks 2015). The scabbard is probably not the product of a Roman workshop (Miks 2015), although the decorative mount is made of brass with 13.7–15.6% zinc (Miks o.c., Fn. 20; according to the information provided by Christian Miks, the scabbard surface was analysed in five places covering 3 mm² each and after having removed the patina; from this I conclude that the measured alloy composition is broadly representative of its core). The zinc content is lower than in typical Roman fresh pure brass gained from ingots, but its composition otherwise corresponds well with that of pure brass, which leads

Figure 15
Sword from the 2nd century BC, found at Grad near Šmihel (Slovenia). National Museum of Slovenia, Inv. No. P 3621.

Slika 15
Meč iz 2. st. pr. Kr., najden na Gradu pri Šmihelu. Narodni muzej Slovenije, inv. št. P 3621.

dobro ohranjenimi meči sta ozko datirana tudi meč z ostanki lesene nožnice z železnimi okovi (robni okov, ki se na konici zaključi z gumbom, dva prečna okova z obročkom za obešanje ter prečni okovi ob ustju in v spodnjem delu nožnice) iz groba 471 v Giubiascu (Švica),[67] ki je verjetno iz prve tretjine 1. st. pr. Kr.,[68] in meč z ostanki usnjene nožnice z železnimi okovi (ohranjeni so deli robnega okova in dva železna prečna okova z obročkom za obešanje) z Delosa, ki ni mlajši od leta 69 pr. Kr.[69] Omeniti je treba še dva, v novejšem času objavljena[70] meča iz Jericha (Palestina) in iz Masade (Izrael). V grobu z balzamariji iz Jericha iz 2. ali najkasneje začetka 1. st. pr. Kr. je bil najden meč s poševnimi rameni in 760 mm dolgim rezilom, ki (skorajda) ni usločeno, a ima izrazito konico. Od nožnice so ohranjeni deli železnega robnega okova U-preseka.[71] Iz Masade izvira meč s poševnimi rameni, 610 mm dolgim in izrazito usločenim rezilom ter ostanki nožnice, ki ji pripada železen robni okov U-preseka. Domnevajo, da gre za orožje, ki je bilo deponirano v času kralja Heroda Velikega (37–4 pr. Kr.) in so ga židovski uporniki odkrili in uporabili v letih 73 in 74 po Kr.[72]

Med rimskimi nožnicami iz Ljubljanice je po tipoloških kriterijih najstarejša 650 mm dolga nožnica A1 z mrežastim in drugimi okovi (*t. 1; sl. A1.1a, b*), ki so iz čiste medenine.[73] To je pomembno za njeno datiranje. Izdelavo in uporabo medenine, tj. zlitine bakra in cinka, so namreč v Evropi uvedli Rimljani okrog leta 60 pr. Kr.[74] Poleg tega je uporaba čiste medenine[75] jasen pokazatelj, da gre za rimski izdelek, saj so le Rimljani v tem delu Evrope medenino znali pridobivati.[76] Iz visokega deleža cinka v medeninastih okovih nožnice A1 namreč sklepam, da so jih naredili iz ingotov in ne s pretapljanjem medeninastih predmetov (npr. fibul in novcev), ki so ga Kelti in druga ljudstva v Evropi obvladala – tako namreč kažejo npr. medeninasti novci Arvernov, skovani v času rimskega obleganja Alezije leta 52 pr. Kr.,[77] in nožnica iz zahodne Ukrajine, verjetno iz tiberijske dobe.[78]

Nožnica A1 za zdaj nima dobrih primerjav. Mrežasti okov jo povezuje z nožnico s Štalenske gore (Avstrija). Ta ima na spodnjem delu ohranjena okova iz bakrove zlitine: mrežast okov in robni okov, ki na konici preide v pahljačasto oblikovan zaključek.[79] Dolenz domneva, da je bil mrežasti okov že prvotno omejen na spodnji del nožnice.[80] Predmet izvira iz žganinske plasti, ki je po drobnih najdbah (predvsem zgodnji sigilati) datirana med približno 30 in 20 pr. Kr.[81]

67 Carlevaro, Pernet, Tori, 2006, 329, grob 471: 1; Miks 2007, 595–596, A231, t. 6; Pernet 2010, t. 103: 1, 2.
68 Datacija temelji na fibulah tipa Almgren 65 in Nauheim (Carlevaro, Pernet, Tori 2006, 329, grob 471: 7–8; Pernet 2010, t. 104: 7, 8). Za datacijo fibul glej Božič 2008, 81, 86–87, 144–146 tabla 5.
69 Siebert 1986, 637, sl. 17–19; Miks 2007, 563, t. 1: A123.
70 V Miks 2007 nista vključena.
71 Stiebel 2004.
72 Stiebel, Magness 2007, 3–4, 31, 68, t. 4.
73 Glej pogl. 16, *pregl. A1: 4–7, 9–10, 13–16, 18–24;* glede čiste medenine prim. pogl. 17.1.
74 Istenič, Šmit 2007.
75 Za pojem »čista medenina« prim. pogl. 17.1.
76 Istenič, Šmit 2007.
77 Nieto 2004; Istenič, Šmit 2007, 145–146.
78 Nožnica je narejena v predrimski keltski tradiciji, a obenem kaže jasne rimske vplive, med katerimi je najizrazitejši reliefen okras, ki posnema steklene medaljone z upodobitvijo doprsja cesarja Tiberija med portretoma Germanika in Druza ml. (Miks 2015). Nožnica verjetno ni nastala v rimski delavnici (Miks 2015), vendar je okrasni okov iz medenine, ki je vsebovala 13,7–15,6 % cinka (Miks o. c., op. 20; po podatkih, ki mi jih je posredoval Christian Miks, so nožnico analizirali na petih mestih na površini 3 mm², s katere so neposredno pred merjenjem odstranili patino – utemeljeno torej domnevam, da je izmerjena sestava zlitine reprezentativna za njeno jedro). Odstotek cinka v medenini je nižji, kot je značilno za rimsko svežo čisto medenino, pridobljeno iz ingotov, sicer pa njena sestava ustreza čisti medenini, zato domnevam, da so bili vir medenine rimski predmeti, najverjetneje rimski denar (sesterci in dupondiji; prim. pogl. 17.1). Ti so bili iz čiste medenine in so v času cesarja Avgusta običajno vsebovali 20–25 % cinka, v času Tiberija pa je bil delež cinka nižji, okoli 20 % (Riederer, Briese 1972; Riederer 2001, 211–212). Pri njihovem pretapljanju se je delež cinka v medenini zmanjšal (Jackson, Craddock 1995, 93; Ponting 2012, 171, op. 39). Caley (1964, 99, 100) ocenjuje, da se je pri vsakem taljenju rimske čiste medenine vsebnost cinka v njej zmanjšala za približno 10 %.
79 Dolenz 1998, 49–53, t. 1: M1; Istenič 2003c, 276–277, sl. 7a.
80 Dolenz 1998, 53, sl. 19 (višina mrežastega okova, kot je prikazana na sl. 19 citiranega dela, je hipotetična).
81 Dolenz 1998, 49–53, t. 1: M1.

that Celts and other peoples in Europe melted brass objects to make new ones.

The A1 scabbard has no close parallels that I am aware of. In the net-like fitting, it is similar to a scabbard from Magdalensberg (Austria) that has copper alloy pieces surviving in the lower part, more precisely a net-like fitting and guttering that continues into a fan-shaped terminal.[79] Dolenz presumes that the scabbard's net-like fitting was limited to its lower part already in the original design.[80] The scabbard was found in a layer of burnt remains that the associated finds (mainly sigillata wares) date roughly between 30 and 20 BC.[81]

Copper alloy or silver net-like fittings, either complete or in fragments, that undoubtedly only adorned the lower parts of scabbards are known from the River Kupa at Sisak (Croatia),[82] from a ship that sank in the Po delta at Comacchio (Italy) in the second decade BC,[83] from a prestige scabbard discovered at Kalkriese (Germany) that was probably made soon after 18–16 BC and lost in the Varrian disaster of AD 9,[84] from a presumably Augustan-period grave at Pîtres/*Pistae* in Normandy,[85] as well as from an unknown context at Saintes/*Mediolanum Santonum* (France).[86] Another fragment of a brass net-like fitting that may have belonged to the point of a sword scabbard was unearthed at Ambroževo gradišče near Slavina (Slovenia),[87] though the fitting may not have been limited to the point. The Roman military finds, Italian tableware and coins from Ambroževo gradišče indicate a Roman military presence in the pre-Augustan and Middle/Late Augustan periods.[88]

The parallels listed above indicate that the scabbards with net-like fittings limited to their lower part are Augustan.[89] A sword scabbard with such a fitting is depicted on a tombstone from the Claudian period,[90] which suggests exceptional later use in the 40s of the 1st century.[91]

A fragment of a heavily deformed net-like fitting from a sword scabbard (in secondary use, possibly intended for reuse?) was found at Winterthur/*Vitudurum* (Switzerland), a Roman settlement which dendrochronological analyses showed to have been established in AD 7.[92] Another possible candidate is the fragment from Münsterhügel in Basel (Switzerland),[93] found in a ditch together with objects of Late La Tène and Augustan date.[94]

The Early Imperial Mainz type swords (and the later Pompeii type) were worn on the belt by way of four rings inserted into respective loops in the sides of two suspension bands. Such suspension is shared by the previously mentioned swords with scabbard remains from Grave 471 at Giubiasco (probable date: first third of the 1st century BC) and the scabbard from Delos (Greece; date: prior to 69 BC).[95] Among non-Roman finds, scabbards with two suspension bands and rings are characteristic of much earlier daggers (three rings)[96] and swords (one ring per suspension band) from the Iberian Peninsula,[97] which presumably influenced the development of the *gladius hispaniensis* and the associated scabbard.[98]

The suspension bands on the A1 scabbard are similar to those of the Mainz type in some features and different in others. As opposed to the Mainz type, they are not as wide and their ends do not meet, but are widened and folded over the guttering to the front.

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me to presume that the alloy was obtained by melting Roman brass products, most likely Roman coins (*sestertii* and *dupondii*; cf. Ch. 17.1). These were made of pure brass, commonly containing 20–25% zinc during the reign of Augustus and only around 20% under Tiberius (Riederer, Briese 1972; Riederer 2001, 211–212). The zinc content decreased during the melting process (Jackson, Craddock 1995, 93; Ponting 2012, 171, Fn. 39); Caley (1964, 99, 100) estimates that each melting of Roman pure brass reduced the zinc content by about 10%.

79 Dolenz 1998, 49–53, Pl. 1: M1; Istenič 2003c, 276–277, Fig. 7a.

80 Dolenz 1998, 53, Fig. 19 (the height referred to in this figure is hypothetical).

81 Dolenz 1998, 49–53, Pl. 1: M1.

82 Two examples: Istenič 2003c, 271–273, Fig. 1 and Fig. 3, with earlier references.

83 Invernizzi 1990, 100, 101 – Figs. 4, 101, 260, 261, Pl. 68: 229; Istenič 2003c, 272, Fig. 6. The possibility of the object being the sheath of a dagger cannot be ruled out (cf. Istenič 2000a, 176, Fn. 4). For the dating of the shipwreck, see Ch. 3.

84 The fitting is made of silver alloy and bears a precious intaglio: Franzius 1999, 573–587, 591–599, 606, Figs. 3–11, 15, 16; for its alloy analyses, see: Riederer 1999. For site dating, see Ch. 3.
The net-like fittings from Sisak, Comacchio, Saintes, the Ljubljanica and Magdalensberg were fastened to the scabbard by folding the crossbars over the guttering and pressing them against the scabbard plate at the back. The proposition of Georgia Franzius (1999, 596), of the crossbars being riveted to the back of the scabbard from Kalkriese, thus seems less likely.

85 Dechezleprêtre, Adrian, Roudié 2008.

86 Dechezleprêtre, Adrian, Roudié 2008; Feugère 2002; Istenič 2003c, Fig. 5.

87 Laharnar 2015, 21, 22, 31, Pl. 3: 21.

88 Laharnar 2015, 21, 22, 31, Pl. 3: 19–21; Horvat 1995; it is the numerous hobnails with a characteristic pattern on the underside (Alesia, Type D: Brouquier-Reddé, Deyber 2001, Pl. 93: 138) that are clear evidence of a pre-Augustan military presence (kept in the NMS, Inv. Nos. R 27041–27044, 27048–27052, 27054–27064, 27069, 27071–27072; for the dating cf. Istenič 2015a, 57–58).

89 Istenič 2003c.

90 Miks 2007, 257, Pl. 306: C, D.

91 Miks 2007 (257, 796, Pl. 200: B63,6) mentions a fragment from Chichester (Great Britain) as forming part of a net-like fitting, which may support the continued use of such fittings into the Claudian period as it probably does not predate the conquest of Britain in AD 43. However, I doubt that the fragment belonged to a sword scabbard as none of the other such fittings on sword scabbards bears tin plating that is reported for this fragment.

92 Deschler-Erb 1996a, 15, 318, Pl. 34: 1381; Deschler-Erb 2011, 241, Fn. 1834.

93 Deschler-Erb 2011, 241–242, Fig. 274: 13. The drawing is rather unconvincing of the fragment being part of a net-like fitting on a sword scabbard.

94 Furger-Gunti 1979, 377–278, Fig. 50a.

95 See Fns. 67–69.

96 Stary 1994, 134, Pls. 7: 3e, 10: i, 12: 2a, 14: 2a, 15: 1a, 2c, 16: 1a, 18: c, d, 20: 1c etc.; Quesada Sanz 1997, Fig. 156: 1.

97 Stary 1994, 125–126, Figs. 16: 15, 16, Pl. 44: c; Miks 2007, 39–43, Fig. 8.

98 James 2011, 80–84.

Figure 16
Sword from the 2nd century BC, found at Grad near Šmihel (Slovenia), front (a), back (b). Institut für Urgeschichte und Historische Archäologie, Vienna, Studiensammlung, Inv. No. 26726.

Slika 16
Meč iz 2. st. pr. Kr., najden na Gradu pri Šmihelu, a) spredaj, b) zadaj. Institut für Urgeschichte und Historische Archäologie na Dunaju, Studiensammlung, inv. št. 26726.

Mrežaste okove iz bakrove zlitine ali srebra oziroma njihove odlomke, ki so zanesljivo krasili le konice nožnic mečev, poznamo iz Kolpe v Sisku,[82] z rimske ladje, ki se je v drugem desetletju pr. Kr. potopila v delti reke Pad pri Comacchiu (Italija),[83] s prestižne nožnice iz Kalkrieseja (Nemčija), ki je bila verjetno narejena kmalu po 18–16 pr. Kr., a je bila v uporabi ob Varovem porazu, tj. leta 9 po Kr.,[84] iz domnevnega groba iz avgustejske dobe v Pîtres/*Pistae* v Normandiji[85] ter iz Saintes/*Mediolanum Santonum* (Francija), kjer najdiščne okoliščine niso poznane.[86] Konici nožnice meča je verjetno pripadal tudi odlomek medeninastega mrežastega okova z Ambroževega gradišča pri Slavini,[87] vendar ni izključeno, da mrežast okov ni bil omejen na konico. Rimske vojaške najdbe, italska fina namizna keramika in novci namreč na Ambroževem gradišču nakazujejo predavgustejsko in srednje/poznoavgustejsko vojaško navzočnost.[88]

Iz naštetih primerjav sklepam, da so nožnice z mrežastimi okovi na konicah uporabljali v avgustejski dobi.[89] Upodobitev meča s takim okovom na zaključku nožnice na nagrobniku iz dobe cesarja Klavdija[90] morda nakazuje, da so nožnice s takimi okovi izjemoma uporabljali še v štiridesetih letih 1. stoletja.[91]

Odlomek močno deformiranega mrežastega okova nožnice meča (v sekundarni uporabi, morda namenjen predelavi?) izvira iz rimskega naselja Winterthur/*Vitudurum* (Švica), za katerega dendrokronološke

82 Dva primerka: Istenič 2003c, 271–273, sl. 1 in sl. 3, z navedeno starejšo lit.

83 Invernizzi 1990, 100, 101 – sl. 4, 101, 260, 261, t. 68: 229; Istenič 2003c, 272, sl. 6. Ni mogoče povsem izključiti, da gre za nožnico bodala (cf. Istenič 2000a, 176, op. 4). Datacija potopa: glej pogl. 3.

84 Okov je iz srebrove zlitine in vključuje dragoceno gemo: Franzius 1999, 573–587, 591–599, 606, sl. 3–11, 15, 16; analize zlitine okovov: Riederer 1999. Datacija najdišča: glej pogl. 3.
Mrežasti okovi nožnic iz Siska, Comacchia, Saintes, Ljubljanice in s Štalenske gore so bili na nožnico pritrjeni tako, da so bile prečke okova zapognjene prek robnega okova in pritisnjene ob hrbtno stran nožnice. Tako se mi zdi malo verjetna domneva Georgie Franzius (1999, 596), da so bile prečke mrežastega okova na nožnici iz Kalkrieseja na hrbtno stran nožnice prikovane.

85 Dechezleprêtre, Adrian, Roudié 2008.

86 Dechezleprêtre, Adrian, Roudié 2008; Feugère 2002; Istenič 2003c, sl. 5.

87 Laharnar 2015, 21, 31, t. 3: 21.

88 Laharnar 2015, 21, 31, t. 3: 19–21; Horvat 1995; predavgustejsko vojaško navzočnost jasno kažejo številni okovni žebljički vojaških obuval z značilnim »vzorcem« (Alezija, tip D: Brouquier-Reddé, Deyber 2001, t. 93: 138) na strani, ki je nalegla na podplat (predmete hrani Narodni muzej Slovenije, inv. št. R 27041–27044, 27048–27052, 27054–27064, 27069, 27071–27072; za datacijo prim. Istenič 2015a, 57–58).

89 Istenič 2003c.

90 Miks 2007, 257, t. 306: C, D.

91 Miks 2007 (257, 796, t. 200: B63,6) kot del mrežastega okova navaja odlomek iz Chichestra (Velika Britanija), ki bi lahko bil argument za datacijo takih okovov še v čas Klavdijeve vlade, saj verjetno ni starejši od Klavdijeve osvojitve Britanije leta 43 po Kr. Vendar dvomim, da gre za okov nožnice meča; temu nasprotuje dejstvo, da je bil pokositren – pokositrenje namreč ni bilo opaženo na drugih mrežastih okovih nožnic mečev.

Similarly to the Mainz type, they form loops to hold suspension rings (missing) and are riveted to the guttering. They also greatly differ from the very simple iron suspension bands on the scabbards from Giubiasco and Delos. Disregarding the differences in metals, they are very similar to the iron suspension band from the *oppidum* at Gondole (France), a site that probably played a role during Caesar's siege of Gergovia in 52 BC and was no longer inhabited after 30/20 BC; the Roman weapons from this site thus likely date between 52 and 30/20 BC.[99]

The back of the A1 scabbard has a roughly rectangular fitting with transverse bars continuing from each of the corners to fold over the guttering and terminate on the front in the shape of animal heads, only the right two of which survive (*Fig. A1.1c*). In the centre of this fitting is an approx. 6 mm wide round hole through which an unusual, solid rectangular fitting of brass with two side loops is inserted (*Fig. A1.6*). It reaches roughly 3 mm under the thin fitting and must originally have been anchored into the wood of the scabbard (*Fig. A1.8*).[100] I was unable to find any parallels for this fitting, neither was I able to identify its function. La Tène swords have a different, longitudinal loop at the back, which was intended for sword suspension.

The A1 sword is missing its hilt and the shoulders may have been sloping. Of the blade, only small parts are visible where the scabbard is missing. The poorly surviving middle part makes it unclear whether the blade was waisted, while the point is long and tapering. The maximum blade width measured 45 mm, while its length is estimated at around 600 mm.

The surviving parts of the sword suggest a *gladius hispaniensis*, ranking among the shortest of its kind.[101] The blades that Miks ascribed to the classic variant of the Mainz type measure between 480 and 550 mm in length and from 50 to 70 mm in width.[102] The Mainz Type sword blades from the Ljubljanica are between 472 and 553 mm long.[103]

The upper limit for dating the A1 scabbard is the beginning of the Roman use of brass around 60 BC.[104] I suppose that – typologically speaking – the A1 scabbard is a predecessor of the scabbards with a net-like fitting limited to the lower part, the earliest reliably dated example of which is that from the Comacchio shipwreck attributed to the second decade BC. The scabbard from Magdalensberg is a decade earlier, but its net-like fitting may not have been limited to the lower part. All this indicates that the A1 scabbard should be dated to the Early Augustan period or even earlier, i.e. between 60 and 30/15 BC.

Bishop and Coulston ascribe the A1 scabbard among the earliest examples of the Mainz type.[105]

Miks discussed the A1 scabbard separately from its sword.[106] He classified the sword among the 'Nauportus type *spathae*',[107] which he tied not to the *gladius hispaniensis* and the typological predecessors of the Mainz type, but rather to the Celtic weapons (of Roman allies).[108] The archaeological contexts pertaining to the 'Nauportus type spathae' show that the type spanned the 1st century BC and the Augustan period.[109]

This separate discussion of the A1 sword and scabbard, however, does not seem to be a good idea as not much is known on the sword, and its attribution is largely based on that of its scabbard, with the shape of most of its metal parts and the use of pure brass indicating it to be a Roman sword.[110] Moreover, the group of 'Nauportus type *spathae*' does not appear to be homogeneous, comprising swords with differently shaped blades (either waisted or evenly tapering) and shoulders (sloping or straight).[111]

Miks discusses the A1 scabbard as part of the group with net-like decoration (*Stegdecor*), more precisely examples with net-like fittings characterised by bars meeting at the right angle. This group includes the scabbard from Kalkriese and other examples mentioned above.[112] Alas, it also comprises scabbards with completely different fittings, such as those on the scabbard from a ship that sank in the Gulf of Porto Novo in Corsica after AD 27 or 28.[113] Typologically, the latter stand at the beginning of the development of the Pompeii type swords and scabbards that

99 Deberge et al. 2018, 75–78, Fig. 3: 4.
100 Istenič 2000a, 174–175; Perovšek, Milić 2000, 191, Figs. 5, 6.
101 The A1 scabbard and sword are close in length to the ones from Delos (Istenič 2000a, 178).
102 Miks 2007, 58–59.
103 Cf. below, Ch. 4.2.2.
104 Istenič, Šmit 2007.
105 Bishop, Coulston 2006, 81–82, Fig. 41: 1.
106 Miks 2007, 79–80, 257–258, Pl. 6: A767.
107 Miks 2007, 77, 79–80, Tab. 15, Pl. 6: A767.
108 Miks 2007, 47–50.
109 Miks 2007, 79–80, Tab. 15, Pls. 6, 7; Davoli, Miks 2015, paragraph 29.
110 For the arguments related to brass, cf. Ch. 17.1.
111 The group includes two other swords published after 2007: Ortisi 2015, 17–18, Pl. 1: A1, A2. It should also be noted that the choice of the group's name is unfortunate, as the MM A23 sword that inspired the name was not actually found at Vrhnika/*Nauportus* (cf. below, MM A23 sword).
112 Miks 2007, 256–258, Pl. 200. Apart from the cited examples, his group further includes the suspension bands with side loops from the temple in Empel (Netherlands; Miks 2007, 806–807, Pl. 194: B91, 3–4), which differ from others in their form (net-like fitting continues from the suspension band that shows all the characteristics of the developed form of the Mainz type scabbard in contrast to other examples of the group) and tin plating not present elsewhere.
113 Miks 2007, 257–258, 708, A596, Pl. 28.

analize kažejo na začetek poselitve leta 7 po Kr.[92] Morda je mrežastemu okovu nožnice pripadal tudi odlomek z Münsterhügla v Baslu (Švica),[93] najden v jarku skupaj s poznolatenskimi in avgustejskimi predmeti.[94]

Pritrjevanje nožnice meča na pas s pomočjo obročkov, ki so vdeti v štiri zanke na dveh prečnih okovih, je značilno za zgodnjecesarske meče tipa Mainz (in mlajše skupine Pompeji). Tako pritrjevanje sta imeli tudi že omenjena nožnica z železnimi okovi iz groba 471 v Giubiascu (verjetno iz prve tretjine 1. st. pr. Kr.) in nožnica z železnimi okovi z otoka Delos (Grčija; datacija: pred 69 pr. Kr.).[95] Med nerimskim gradivom so nožnice z dvema prečnima okovoma, na katera so bili pritrjeni obročki, značilne za dosti starejša bodala (trije obročki)[96] in meče (po en obroček v vsakem prečnem okovu) na Iberskem polotoku,[97] ki so najverjetneje vplivali na razvoj rimskega »španskega meča« in pripadajoče nožnice.[98]

Prečna okova na nožnici A1 se precej razlikujeta od tistih pri tipu Mainz: sta ožja in nista sklenjena, ampak se na straneh lica nožnice zaključita z rahlo razširitvijo. Tako kot pri nožnicah tipa Mainz ob obeh straneh tvorita zanke (v katerih pa niso ohranjeni obročki za obešanje nožnice) in sta prikovana na robni okov. Zelo se razlikujeta tudi od izrazito enostavnih železnih prečnih okovov na nožnicah z Giubiasca in Delosa, zelo podobna (razen kovine) pa sta železnemu prečnemu okovu iz opida Gondole (Francija), ki je bil verjetno vmešan v Cezarjevo obleganje Gergovije leta 52 pr. Kr. in ki po 30/20 pr. Kr. ni bil več naseljen. Rimsko orožje s tega najdišča je torej verjetno iz obdobja med 52 in 30/20 pr. Kr.[99]

Na hrbtni strani nožnice je okov približno pravokotne oblike, ki se v vogalih zoži v trakove; ti so prepognjeni čez robni okov na sprednjo stran nožnice, kjer so se ob straneh zaključili v obliki živalskih glavic, ki sta ohranjeni na desni strani (*sl. A1.1c*). Sredi tega okova na hrbtni strani nožnice je pribl. 6 mm široka luknja, skozi katero je pravokotno v nožnico pritrjena nenavadna masivna zanka z dvema luknjama (*sl. A1.6*). Sega približno 3 mm pod pločevino okova in je bila verjetno sidrana z leseno platico pod okovom (*sl. A1.8*).[100] Tej zanki nisem našla ustreznih primerjav niti ne vem, čemu je bila namenjena. Drugačna, navpična zanka na hrbtni strani, namenjena obešanju nožnice, je značilnost latenskih mečev.

Ročaj meča ni ohranjen, ramena so bila morda poševna. Od rezila so na mestih, kjer nožnica ni ohranjena, vidni le majhni deli. Zaradi slabo ohranjenega srednjega dela ni jasno, ali je bilo rezilo usločeno; konica je dolga in izrazita. Rezilo je bilo široko največ 45 mm, njegovo dolžino pa ocenjujem na okoli 600 mm.

Ohranjeni deli meča nakazujejo njegovo uvrstitev med »španske meče«, med katerimi sodi med najkrajše primerke.[101] Rezila mečev, ki jih je Miks uvrstil v klasično različico tipa Mainz, so dolga od 480 do 550 mm in široka od 50 do 70 mm,[102] rezila mečev tipa Mainz iz Ljubljanice so dolga od 472 do 553 mm.[103]

Zgornja meja za datacijo nožnice A1 je začetek uporabe medenine pri Rimljanih okrog leta 60 pr. Kr.[104] Domnevam, da je – tipološko gledano – nožnica A1 predhodnica nožnic z mrežastim okovom na konici, med katerimi je najstarejši zanesljivo datiran primerek tisti z ladje, ki se je v 2. desetletju pr. Kr. potopila pri Comacchiu. Desetletje starejša je nožnica s Štalenske gore, pri kateri pa ni zanesljivo, da je bil mrežasti okov omejen na konico. Povedano nakazuje datacijo nožnice A1 v zgodnjeavgustejsko dobo ali neposredno pred njo oziroma med 60 in 30/15 pr. Kr.

Bishop in Coulston nožnico A1 pripisujeta najstarejšim primerkom tipa Mainz.[105]

Miks je nožnico in meč A1 obravnaval ločeno.[106] Meč je uvrstil v »spate tipa Nauportus«,[107] ki jih ne povezuje s »španskimi meči« oziroma tipološkimi predhodniki mečev tipa Mainz, ampak s keltskim orožjem (rimskih zaveznikov).[108] Najdiščne okoliščine za »spate tipa Nauportus« nakazujejo datacijo v 1. st. pr. Kr. in avgustejsko dobo.[109]

Ločena obravnava meča in nožnice A1 se mi ne zdi smiselna, ker je meč precejšnja neznanka, za njegovo opredelitev pa je bistvena nožnica, pri kateri oblika okovov in material, tj. medenina, kažeta, da gre

92 Deschler-Erb 1996a, 15, 318, t. 34: 1381; Deschler-Erb 2011, 241, op. 1834.
93 Deschler-Erb 2011, 241–242, sl. 274: 13. Pripadnost mrežastemu okovu nožnice se mi glede na risbo ne zdi povsem prepričljiva.
94 Furger-Gunti 1979, 377–278, sl. 50a.
95 Glej op. 67–69.
96 Stary 1994, 134, t. 7: 3e, 10: i, 12: 2a, 14: 2a, 15: 1a, 2c, 16: 1a, 18: c, d, 20: 1c itd.; Quesada Sanz 1997, sl. 156: 1.
97 Stary 1994, 125–126, sl. 16: 15, 16, t. 44: c; Miks 2007, 39–43, sl. 8.
98 James 2011, 80–84.
99 Deberge et al. 2018, 75–78, sl. 3: 4.
100 Istenič 2000a, 174–175; Perovšek, Milić 2000, 191, sl. 5, 6.
101 Po dolžini sta nožnica oziroma meč A1 podobna primerku z Delosa (Istenič 2000a, 182).
102 Miks 2007, 58–59.
103 Prim. spodaj, pogl. 4.2.2.
104 Istenič, Šmit 2007.
105 Bishop, Coulston 2006, 81–82, sl. 41: 1.
106 Miks 2007, 79–80, 257–258, t. 6: A767.
107 Miks 2007, 77, 79–80, pregl. 15, t. 6: A767.
108 Miks 2007, 47–50.
109 Miks 2007, 79–80, pregl. 15, t. 6, 7; Davoli, Miks 2015, par. 29.

followed the swords and scabbards of the Mainz type, while their decorative fittings have no formative or typological connection with the scabbards such as the A1 scabbard and its parallels stated above).

The surviving parts of the A2 and A3 scabbards (*Pl. 1; Figs. A2.1–A3.4*) look very much alike, but their findspots at Bevke and at Ljubljana and minute differences in form (the suspension band of A3 is finer than that of A2, as well as 5 mm narrower) show that they did not belong to the same scabbard.

The elements that tie the A2 and A3 scabbard remains to the Mainz type are the U-sectioned guttering and the idea of suspension bands with side loops that hold the rings to hang the scabbard from the military belt. However, the shape of the suspension bands is distinctly different; it is without longitudinal mouldings, the ends do not overlap but rather end in stylised bird's heads. They are, in fact, similar to the suspension bands of the A1 scabbard, with which they also share the manner of fastening to the guttering with brass (rather than copper as usual for the Mainz type – cf. Chapter 4.2.1) rivets, as well as the bird's head terminals (cf. *Fig. A1.1c*). The bird's heads on the A2 and A3 suspension bands resemble the handle terminals on the Late Republican 'bronze' ladles,[114] as well as the terminal on the fragment of a mount from a Late Augustan–Tiberian context in Ljubljana, which probably formed part of an articulated plate armour.[115]

In shape, but not the choice of metal, the suspension bands are similar to the iron suspension band from the *oppidum* at Gondole, dated between 52 and 30/20 BC and mentioned above while discussing the A1 scabbard; they only differ in the simpler terminals.[116]

The formal features of the A2 and A3 scabbard suspension bands indicate they were typological predecessors of the Mainz type suspension bands, which dates them prior to or parallel with the earliest Mainz type scabbards, i.e. the Early or Middle Augustan period. In addition, the comparison with the A1 scabbard suggests that the bird's head terminals of the suspension band were located on the front.

The remains of scabbard wood surviving on the blade identify the A4 sword (blade length 680 mm; *Pl. 1*; *Fig. A4.2*a, b) as Roman. In the form of the blade, which appears to be waisted in spite of its poor state of preservation, as well as in the sloping shoulders, it stands in line with other swords of the Late Republican period that are believed to represent *gladii hispanienses*.[117] The photograph taken soon after discovery (*Fig. 8*) shows the now missing upper part of the scabbard.

Standing in the same line is the MM A23 sword (*Fig. 17*), which was not discovered at Vrhnika/*Nauportus*, but rather in the Ljubljanica at Bevke.[118] It has a 664 mm long and pronouncedly waisted blade with a long point and sloping shoulders.[119] Miks ascribed it to his group of Nauportus type *spathae*,[120] which I have commented above in the discussion on the A1 sword.

4.2 Mainz type scabbards and swords (A5–A18, A35, MM A24–A30, MM A34)

The Mainz type is understood here in its broadest sense following the definition proposed by Günter Ulbert. He described it as a sword with a long slender point and usually slightly waisted blade.[121] The scabbard is fitted with the guttering along the whole length that comes together in a terminal knob with a neck.[122] To this we should add horizontal shoulders that join the tang roughly at the right angle.

Miks' division of the Mainz type into variants does not seem applicable to the artefacts from the Ljubljanica as it is based on swords rather than scabbards.[123] The Ljubljanica yielded swords many of which come with remains of their scabbards and it is the latter that generally bear more numerous and more distinct formal features, thus offering better grounds for typological division. In addition, the cutting edges of the blades are often poorly preserved, which influences the shape of the blade that is important in classifying swords according to Miks' groups.

Swords of the Mainz type and/or their scabbards form the most numerous items (22) of military equipment from the Ljubljanica: A5–A18, A35 and MM A24–A30, MM A34. The A5 sword and scabbard survive the best; they are also closest parallels to the

114 E.g. from the fortress at Cáceres el Viejo (Spain) that ended in ca. 80 BC (Ulbert 1984, 192–194, 220, Pl. 15: 95, 96).

115 The fitting originates from an 'Early Roman deposit': Gaspari 2010, 91, Pl. 28: Š 1016. The dating to the Late Augustan–Tiberian period is based on the wider context of the publication.

116 Deberge et al. 2018, 75–78, Fig. 3: 4.

117 See above.

118 Earlier literature erroneously states that the sword formed part of a hoard from Vrhnika (Horvat 1990, 135, 293, Cat. No. 570, Pl. 27: 2, with earlier references), but it later transpired that it was actually recovered from the Ljubljanica at Bevke (Istenič 2003b; Bras Kernel 2006; Istenič 2009f, 86–87, Fig. 85).

119 Horvat 1990, 135, 293, Cat. No. 570, Pl. 27: 2; Miks 2007, A769,2, 79–80, 757, Pl. 7.

120 Miks 2007, 79–80, Tab. 15, Pls. 6, 7.

121 Ulbert 1969a, 120–121; Deschler-Erb 1996a, 80.

122 Ulbert 1969a, 120–121; Miks 2007, *Vortafel* A: 4 (*Rahmenscheide*).

123 Miks 2007, 58–65.

Figure 17
The MM A23 sword from the Ljubljanica at Bevke (Krajna or Na zrnici) or at Blatna Brezovica (Tri lesnice). Iron. Length 710 mm, blade length 664 mm. City Museum of Ljubljana, Inv. No. 510:LJU;32583.

Slika 17
Meč MM A23 iz Ljubljanice pri Bevkah (Krajna ali Na zrnici) ali pri Blatni Brezovici (Tri lesnice). Železo. Dolžina 710 mm, dolžina rezila 664 mm. Mestni muzej Ljubljana, inv. št. 510:LJU;32583.

za rimski meč.[110] Poleg tega se mi skupina »spate tipa Nauportus« po obliki rezila (v spodnjem delu razširjeno ali enakomerno zožujoče se) in ramen (poševna ali vodoravna) mečev ne zdi homogena.[111]

Nožnico A1 Miks obravnava v skupini primerkov z mrežastim okrasom (uporablja poimenovanje paličast okras – *Stegdecor*), natančneje med mrežastimi okovi stroge oblike (zanjo so značilni kraki, ki se pravokotno stikajo), h katerim uvršča nožnico iz Kalkrieseja in druge prej navedene primerke.[112] K nožnicam z mrežastim okrasom je Miks sicer priključil nožnice s povsem drugačnimi okovi, kakršni so npr. na nožnici z ladje, ki se je po letu 27 oziroma 28 po Kr. potopila v zalivu Porto Novo na Korziki.[113] Take nožnice so – tipološko gledano – na začetku razvoja nožnic mečev tipa Pompei, ki so zamenjali meče in nožnice tipa Mainz, njihovi okrasni okovi pa nimajo razvojno-tipološke povezave z nožnicami, ki imajo mrežaste okove s pravokotno sekajočimi se kraki (tj. z nožnico A1 in prej navedenimi primerjavami).

Ohranjena dela nožnic A2 in A3 (*t. 1; sl. A2.1–A3.4*) sta si izredno podobna, vendar njuni najdišči (pri Bevkah in pri Ljubljani) in majhne razlike (prečni okov A3 je 5 mm ožji in gracilnejši kot A2) kažejo, da nista pripadala isti nožnici.

Ostanka nožnic A2 in A3 z nožnicami tipa Mainz povezujeta robni okov U-preseka in ideja prečnih okovov z zankama, v katere je vdet obroček za pritrditev nožnice na vojaški pas. Vendar se od tipa Mainz močno razlikujeta po obliki prečnega okova (nimata podolžnih reliefnih reber, nista sklenjena, ampak se zaključita v obliki stiliziranih ptičjih glavic). Precej sta podobna prečnima okovoma nožnice A1, s katero imata skupen tudi način pritrditve prečnega okova na robni okov z medeninasto (in ne bakreno, kot je običajno pri tipu Mainz – prim. pogl. 4.2.1) zakovico in zaključek prečnih okovov v obliki živalskih (ptičjih) glavic (prim. *sl. A1.1c*). Ptičje glavice na okovih A2 in A3 so podobne zaključkom poznorepublikanskih »bronastih« zajemalk,[114] pa tudi zaključku odlomka okova (verjetno del sestavljenega oklepa) iz poznoavgustejsko-tiberijske plasti v Ljubljani.[115]

Po obliki, ne pa izbiri kovine, sta okova podobna pri obravnavi nožnice A1 omenjenemu železnemu prečnemu okovu iz opida Gondole, ki je iz obdobja med 52 in 30/20 pr. Kr. in ima enostavneje oblikovana zaključka.[116]

Oblikovne značilnosti odlomkov nožnic A2 in A3 torej nakazujejo, da sta iz tipološkega vidika predhodnika nožnic tipa Mainz, kar govori za njuno datacijo pred ali vzporedno z začetkom tega, tj. v zgodnje- ali srednjeavgustejsko dobo. Primerjava z nožnico A1 me navaja k domnevi, da je sprednja stran nožnice tista, na kateri prečni okov ni sklenjen.

Meč A4 (dolžina rezila 680 mm; *t. 1*; *sl. A4.2*a, b) kot rimskega opredeljujejo ostanki lesa nožnice, vidni na rezilu. Oblika rezila (kljub slabi ohranjenosti robov je nakazana razširitev rezila v spodnji tretjini, zaključek je koničast) in poševna ramena ga povezujejo z rimskimi meči poznorepublikanske dobe, za katere domnevamo, da predstavljajo »španski meč«.[117] Na fotografiji predmeta kmalu po odkritju (*sl. 8*) se vidi takrat še ohranjeni zgornji del nožnice.

Po mojem mnenju enako velja za meč MM A23 (*sl. 17*), ki ni bil najden na Vrhniki/*Nauportus*, ampak v Ljubljanici pri Bevkah.[118] Meč ima 664 mm dolgo in izrazito usločeno rezilo z dolgo konico ter visoka poševna ramena.[119] Miks je ta meč uvrstil v skupino »spate tipa Nauportus«,[120] ki sem jo komentirala pri obravnavi meča A1.

4.2 Nožnice in meči tipa Mainz (A5–A18, A35, MM A24–A30, MM A34)

Pri obravnavi mečev iz reke Ljubljanice tip Mainz razumem v najširšem pomenu, pri čemer izhajam iz opredelitve Günterja Ulberta. Po njem je za ta tip mečev značilna dolga konica, rezili sta (praviloma)

110 Glede z medenino povezanih argumentov prim. pogl. 17.1.
111 K skupini sodita še dva, po letu 2007 objavljena meča: Ortisi 2015, 17–18, t. 1: A1, A2. Omeniti je treba še, da je poimenovanje skupine ponesrečeno, saj meč MM A23, ki je dal skupini ime, ne izvira z Vrhnike/Navporta (prim. spodaj, meč MM A23).
112 Miks 2007, 256–258, t. 200. Poleg navedenih primerkov v isto skupino prišteva prečna okova z zankama s svetišča v kraju Empel (Nizozemska; Miks 2007, 806–807, t. 194: B91, 3–4), ki od ostalih odstopata po obliki (mrežast okov izhaja iz prečnega okova, ki v nasprotju z drugimi primerki te skupine kaže značilnosti razvite oblike nožnic tipa Mainz) in pokositrenju površine, ki je na drugih primerkih ni.
113 Miks 2007, 257–258, 708, A596, t. 28.
114 Npr. iz tabora Cáceres el Viejo (Španija), konec uporabe ok. 80 pr. Kr. (Ulbert 1984, 192–194, 220, t. 15: 95, 96).
115 Okov izvira iz »zgodnjerimskega depozita«: Gaspari 2010, 91, t. 28: Š 1016. Datacija v poznoavgustejsko-tiberijsko dobo izhaja iz širšega konteksta objave.
116 Deberge et al. 2018, 75–78, sl. 3: 4.
117 Glej zgoraj.
118 V starejši literaturi je zmotno veljalo, da je ta meč del na Vrhniki najdenega zaklada (Horvat 1990, 135, 293, kat. 570, t. 27: 2, z navedeno starejšo lit.), kasneje pa se je izkazalo, da izvira iz Ljubljanice pri Bevkah (Istenič 2003b; Bras Kernel 2006; Istenič 2009e, 81–82, sl. 85).
119 Horvat 1990, 135, 293, kat. 570, t. 27: 2; Miks 2007, A769,2, 79–80, 757, t. 7.
120 Miks 2007, 79–80, pregl. 15, t. 6, 7.

examples recovered from the Rhine at Mainz, which gave rise to the name of the type.[124]

4.2.1 Mainz type scabbards

Ten Mainz type scabbards or their parts are known from the Ljubljanica (A5–A13/MM A24 and MM A34). Eight of these are very similar to one another and discussed in a special chapter.

The currently accepted chronological span for the Mainz type swords and scabbards is from the Augustan to the Claudian period.[125] The earliest narrowly dated examples come from the Comacchio shipwreck,[126] as well as the Dangstetten fortress,[127] which suggests their beginning in the second decade BC at the latest, i.e. the end of the Early or the beginning of the Middle Augustan period.

4.2.1.1 Scabbards (A5–A11 and MM A34)

Eight of the ten partially surviving Mainz type scabbards from the Ljubljanica (A5–A11, MM A34) are formally very close to one another and best represented by the well preserved A5 scabbard.

The core of these scabbards was made of wood and parts of the wooden laths still survive on the A6–A8 and MM A34 examples (*Figs. A6.2, A7.5, A8.1a, b*). The front lath was completely covered by a thin sheet of brass, in one example of bronze (A9), tinned on the outer side (surviving on A5–A7, A9–A10, MM A34; *Figs. A5.1a, A5.3, A5.7a, A6.2, A6.3, A7.5, A9.2, A10; Figs. 18a, 19a, 20–21*).[128] Iron guttering (surviving on A6-A11 and in traces also on A5; *Figs. A5.6, A6.1, A6.2, A7.1, A7.5, A7.6, A9.2, A10, A11*) runs along both sides of the scabbard and ends in a brass (surviving on A5; *Fig. A5.7*)[129] or iron (surviving on A10, A11; *Figs. A10, A11*) terminal knob with a moulded neck; both surviving iron terminal knobs have the neck decorated with a band of sheet brass.

124 E.g. Feugère 1993, fig. on p. 138, 139; Bishop, Coulston 2006, Fig. 41: 2; Miks 2007, Pl. 11: A463, A464, A478.

125 Deschler-Erb 1999, 23; Bishop, Coulston 2006, 78–83.

126 Parts of a scabbard with net-like decoration on the point, with remains of associated sword: Invernizzi 1990, 258–281, Nos. 227, 229. Dating: second decade BC (see Ch. 3).

127 Openwork mounts (Fingerlin 1986, 222, 567:1, Pl. 3; Fingerlin 1998, 22–23, 61, 657: 3, 804: 1, Pl. 1), mouth bands (Fingerlin 1998, 44, 78, 729: 3, 873: 29, suspension bands/crossbands (Fingerlin 1986, 66, 176: 3, Pl. 3; Fingerlin 1998, 15, 24, 56, 114, 125, 168, 607: 3?, 658: 4, 788: 6?, 994: 2, 1234: 4, 1037: 4, Pl. 1), sheet metal chape? (Fingerlin 1986, 164: 4, Pl. 3), terminal part of the guttering (Fingerlin 1986, 63, 164: 22), terminal part of the guttering with terminal knob (Fingerlin 1986, 82, 211:5; Fingerlin 1998, 56, 80, 788:11, 876: 4, Pl. 1). Dating: ca. 15–9/8 BC (see Ch. 3).

128 See Ch. 16, *Tables A5: 7–10, A6: 1, 4, 8, A7: 15, 16, 19, A9: 1, 3, 4, 6* (sheet bronze), *A10: 1–5, 8–10, MM A34: 6–8, 11.*

129 See Ch. 16, *Table A5: 13.*

Figure 18
Upper part of the MM A34 sword with the handguard plate and remains of its scabbard from the Ljubljanica at Vrhnika, found in 2006 at Dolge njive. Front (a), back (b). Surviving length 471 mm, surviving blade width 59 mm, handguard plate width 83 mm, weight 388 g. City Museum of Ljubljana, Inv. No. 510:LJU;0062963.

Slika 18
Zgornji del meča s ščitnikom branika ročaja in z okovi zgornjega dela nožnice MM A34, ki so ga našli v Ljubljanici na Vrhniki, pri naselju na Dolgih njivah leta 2006. Sprednja stran (a), hrbtna stran (b). Ohranjena dolžina 471 mm, ohranjena širina rezila 59 mm, širina ščitnika branika 83 mm, teža 388 g. Mestni muzej Ljubljana, inv. št. 510:LJU;0062963.

The scabbards are horizontally bound with a mouth band (surviving on A5–A8 and MM A34; *Figs. A5.3, A6.2, A6.3, A7.1–A7.3, A8.1–A8.2; Figs. 18–21*), an oval mouth plate at the top of the scabbard (surviving on A5–A6, A8, MM A34; *Fig. A5.4; Fig. 20*), two suspension bands and a crossband (at least one survives on A5–A7 and A9; *Figs. A5.1, A6.1, A6.2, A7.1, A9.2*). All these mounts are pure brass.[130]

The oval mouth plate slightly exceeds the mouth band (A5–A8) and is soldered to it with a tin-lead alloy[131] or with tin[132] (*Figs. A6.3, A7.4, A8.2*).

The mouth band is usually made of sheet metal that overlaps at the back (A6, A7, A8, MM A34), exceptionally on the front (A5); the overlapping ends are soldered with tin[133] or with an alloy of tin and a small amount of lead[134] (*Figs. A5.3, A7.2, A7.3; Fig. 20*). The mouth bands are horizontally moulded on the front (*Figs. A7.1, A8.1*) or on both the front and the back (*Fig. A5.1*), while two bands bear openwork (*opus interasile*) decoration on the front (*Fig. A6.1a; Figs. 18a, 19a, 21*). A hole at the back of the mouth band on the A5 scabbard (*Fig. A5.1b*) shows that the mouth bands could be riveted to the scabbards.

130 See Ch. 16, A5–A8.

131 See Ch. 16, *Tables A6: 17, A8: 6.*

132 See Ch. 16, *Table A7: 1, 7.*

133 See Ch. 16, *Tables A5: 6, A7: 17.*

134 See Ch. 16: *Table A7: 2.*

Figure 19
Part of the MM A34 sword with the handguard plate and remains of its scabbard, front (a), back (b). The handguard plate has a finely chased rim. The ends of the mouth band with openwork decoration overlap at the back, on the right. The sheet metal covering the scabbard front is visible under the openwork mouth band and survives in a very limited extent down the front. Remains of the wooden lath of the scabbard survive between the sheet metal and the blade.
The PIXE analyses of the corroded surfaces carried out before conservation indicate that the handguard plate is made of either copper or bronze and tinned on the outer surface (inner surface not analysed), that the sheet metal covering the front of the scabbard is brass tinned on the outer surface and that the openwork mouth band is pure brass (cf. Ch. 16).

a

b

Slika 19
Okovi na zgornjem delu nožnice in ščitnik branika ročaja meča MM A34, spredaj (a), zadaj (b). Ščitnik branika ima drobno punciran rob. Presegajoča konca okova s predrtim okrasom se prekrivata na desni strani hrbta nožnice. Pločevina na sprednji strani nožnice je deloma vidna pod okovom s predrtim okrasom, ohranjen je tudi majhen del njenega nadaljevanja navzdol po sprednji strani nožnice. Med njo in rezilom meča so ohranjeni ostanki lesene platice nožnice.
Analize PIXE korodiranih površin pred začetkom konservacije nakazujejo, da je bil ščitnik ročajnega branika meča iz bakra ali brona in je bil na zgornji strani pokositren (na spodnji strani nismo naredili meritev), da je pločevina na sprednji strani nožnice iz medenine, ki je bila na licu pokositrena, in da je okov s predrtim okrasom iz čiste medenine (prim. pogl. 16).

Figure 20
The X-ray image (150 KV, 0.5mA, 240 seconds) of the MM A34 sword and its scabbard clearly shows the overlapping ends of the scabbard's mouth band that are soldered together (left), the sheet metal that mainly only survives under the mouth band (edge visible on the right), but originally covered the whole front, the oval mouth plate and the remains of the blade under the mouth band.

Slika 20
Na rentgenskem posnetku (150 KV, 0,5mA, 240 sekund) meča z okovi nožnice MM A34 so med drugim dobro vidni okov ob ustju nožnice s spajkanima presegajočima se zaključkoma (na levi strani posnetka), pločevina, ki je ohranjena v glavnem pod tem okovom (na desni strani posnetka je dobro viden rob) in je prvotno prekrivala celo sprednjo stran nožnice, ovalni okov na vrhu nožnice in ostanki rezila meča pod okovom ob ustju nožnice.

rahlo usločeni in brez opaznega preloma preideta v sloko konico.[121] Nožnice imajo robni okov po celotni dolžini in zaključni gumb z vratom.[122] Dodati je treba, da imajo meči tega tipa vodoravna ramena (prehod med ročajnim jezikom in rameni je oster oziroma približno pravokoten).

Miksova delitev tipa Mainz na »variante« se mi za gradivo iz Ljubljanice ne zdi primerna, ker temelji na mečih,[123] pri številnih primerkih iz Ljubljanice pa so poleg mečev ohranjene nožnice oziroma njihovi deli, ki so za tipološke opredelitve primernejši od mečev, ker imajo več oblikovnih značilnosti, ki so tudi izrazitejše. Poleg tega so pri mečih pogosto slabo ohranjene stranice (ostrine) rezil, kar vpliva na obliko rezila, ki je za uvrstitev v posamezen tip mečev pomembna.

Med najdbami iz Ljubljanice največ (22) mečev in/ali nožnic oziroma njihovih delov pripada tipu Mainz: A5–A18, A35 in MM A24–A30, MM A34. Najbolje sta ohranjena meč in nožnica A5, ki sta tudi najboljša primerjava primerkom iz Rena pri Mainzu, po katerih je ta tip mečev in nožnic imenovan.[124]

4.2.1 Nožnice tipa Mainz

Iz Ljubljanice poznam deset nožnic oziroma delov nožnic tipa Mainz (A5–A13/MM A24 in MM A34). Med njimi si jih je osem zelo podobnih, zato jih obravnavam v posebnem poglavju.

Za meče in nožnice tipa Mainz velja datacija od avgustejske do vključno klavdijske dobe.[125] Najstarejši ozko datirani primerki izvirajo z ladje, ki se je potopila pri Comacchiu,[126] in iz tabora v Dangstettnu,[127] kar kaže na njihov začetek najkasneje v 2. desetletju pr. Kr. oziroma ob koncu zgodnjeavgustejske ali na začetku srednjeavgustejske dobe.

121 Ulbert 1969a, 120–121; Deschler-Erb 1996a, 80.
122 Ulbert 1969a, 120–121; Miks 2007, Vortafel A: 4 (Rahmenscheide).
123 Miks 2007, 58–65.
124 Npr. Feugère 1993, sl. str. 138, 139; Bishop, Coulston 2006, sl. 41: 2; Miks 2007, t. 11: A463, A464, A478.
125 Deschler-Erb 1999, 23; Bishop, Coulston 2006, 78–83.
126 Deli nožnice z mrežastim okrasom na konici in deli meča: Invernizzi 1990, 258–281, št. 227, 229. Datacija: drugo desetletje pr. Kr. (glej pogl. 3).
127 Okovi s predrtim okrasom (Fingerlin 1986, 222, 567: 1, t. 3; Fingerlin 1998, 22–23, 61, 657: 3, 804: 1, t. 1), okovi ob ustju (Fingerlin 1998, 44, 78, 729: 3, 873: 29), prečni okovi (Fingerlin 1986, 66, 176: 3, t. 3; Fingerlin 1998, 15, 24, 56, 114, 125, 168, 607: 3?, 658: 4, 788: 6?, 994: 2, 1234: 4, 1037: 4, t. 1), pločevina končnega dela sprednje strani nožnice? (Fingerlin 1986, 164: 4, t. 3), končni del robnega okova (Fingerlin 1986, 63, 164: 22), končni del robnega okova z gumbom nožnice (Fingerlin 1986, 82, 211: 5; Fingerlin 1998, 56, 80, 788: 11, 876: 4, t. 1). Datacija: ok. 15–9/8 pr. Kr. (glej pogl. 3).

Scabbards have three brass crossbands with longitudinal mouldings on the front and a plain back (*Figs. A5.1, A5.7a, A6.1, A6.2, A7.1, A9.2*). The upper two are suspension bands with loops on each side that are also moulded; the loops hold suspension rings (*Figs. A5.1, A6.1, A6.2, A9.2*). The crossbands are made of sheet brass; their ends overlap at the back where they are fastened together with a copper[135] rivet (A5, A6, A7, A9; *Figs. A5.1b, A5.5, A5.6a, b, A6.1b, A6.4, A7.6a*), one scabbard even shows traces of soldering with tin[136] (*Fig. A7.6*). With the same rivet on one side and a second rivet on the other, the suspension bands are fastened to the back of the guttering (A5–A7, A9; *Figs. A5.1b, A5.5, A5.6a, A6.1b, A6.4, A7.1b A7.6a, A9.2b*). The third crossband is fastened with a single copper rivet (A5, A7; *Figs. A5.1b, A5.6b, A7.6a*).

Two of the scabbards (A5, A11; *Figs. A5.1a, A5.7a, A11a*) have a triangular openwork (*opus interasile*) chape. It covers the thin sheet of tinned brass and partially also the iron guttering. The A11 scabbard shows the chape was soldered to the tinned brass sheet with a tin-lead alloy.[137]

Openwork decoration characterises the early, Augustan–Tiberian scabbards of the Mainz type;[138] four of the scabbards from the Ljubljanica bear such decoration (A5, A6, A11, MM A34).

The earliest dated examples with openwork decoration have been unearthed at the Dangstetten fortress (ca. 15–9/8 BC).[139] The latest examples date to the (Early) Tiberian period,[140] suggesting the end of their production in the Late Augustan period.

The closest parallels for the openwork scabbards mounts from the Ljubljanica can be found among the artefacts from the Middle Augustan fortress at Oberaden (A11)[141] and from Kalkriese (MM A34),[142] the latter presumably the site of the *clades Variana* of AD 9.[143] The only other scabbard terminal knob of iron with a brass band on the neck (cf. A10 and A11; *Figs. A10, A11*) comes from Dangstetten.[144]

The A5–A11 and MM A34 scabbards show a considerable uniformity of form, construction, production manner (cf. Chapter 4.2.3) and choice of metal, which suggests a relatively short period of production (Middle and Late Augustan period) in one or a series of interconnected workshops.

Figure 21
Upper part of the MM A34 sword and the remains of its scabbard. Scale 1 : 3. From Gaspari 2010, 92, *Fig. 53*.

Slika 21
Zgornji del meča z okovi nožnice MM A34. Merilo 1 : 3. Po Gaspari 2010, 92, *sl. 53*.

4.2.1.2 Other Mainz type scabbards (A12, A13/MM A24)

The A12 lower part of the guttering and the terminal knob are of silver plated iron (*Figs. A12.1, A12.2*).[145] In literature, I was unable to find any other silvered guttering and terminal knob pieces belonging to Roman swords. A similarly shaped and vertically

135 See Ch. 16, *Tables A5: 18, 19, A6: 11, A7: 3, 13.*
136 See Ch. 16, *Table A7: 11.*
137 See Ch. 16, *Table A11: 9.*
138 Cf. Deschler-Erb 1996a, 80; Istenič 2003c, 274–275.
139 Fingerlin 1986, 222, 567: 1, Pl. 3; Fingerlin 1998, 22–23, 68, 175, 657: 3, 804: 1, Pl. 1, 1265: 1. For the dating of the fortress, see Ch. 3.
140 Istenič 2003c, 274–275; Miks 2007, 238–240.
141 Albrecht 1942, 153, B 33, Pl. 45: 10; Künzl 1996, OI 35, 352–453, Pl. 41: 4. Dating: 11 and 8/7 BC (see Ch. 3).
142 Harnecker, Franzius 2008, 5, Pl. 3: 26.
143 See Ch. 3.
144 Fingerlin 1998, 56, 788/11.

145 See Ch. 16, A12.

4.2.1.1 Nožnice (A5–A11 in MM A34)

Osem (deloma ohranjenih) nožnic tipa Mainz iz Ljubljanice (A5–A11, MM A34) si je zelo podobnih. Najbolje jih predstavlja odlično ohranjena nožnica A5.

Nožnice so bile lesene (deli lesenih platic so ohranjeni pri A6–A8 in MM A34; *sl. A6.2, A7.5, A8.1a, b*). Na celotni sprednji strani jih je prekrivala tenka medeninasta/v enem primeru bronasta pločevina (A9), ki je bila na licu pokositrena (ohranjena pri A5–A7, A9–A10, MM A34; *sl. A5.1a, A5.3, A5.7a, A6.2, A6.3, A7.5, A9.2, A10; sl. 18a, 19a, 20–21*).[128] Po vsej dolžini nožnic potekajoč robni okov je železen (ohranjen pri A5 – sledovi, A6–A11; *sl. A5.6, A6.1, A6.2, A7.1, A7.5, A7.6, A9.2, A10, A11*). Na konici je nanj nadet medeninast (ohranjen pri A5; *sl. A5.7*)[129] ali železen (ohranjen pri A10, A11; *sl. A10, A11*) zaključni gumb s profiliranim vratom; pri obeh železnih zaključnih gumbih je vrat okrašen s trakom iz medeninaste pločevine.

Nožnice prečno povezujejo okov ob ustju (ohranjen pri A5–A8 in MM A34; *sl. A5.3, A6.2, A6.3, A7.1–A7.3, A8.1–A8.2; sl. 18–21*), ovalni okov na zgornji strani nožnice (ohranjen pri A5–A6, A8, MM A34; *sl. A5.4; sl. 20*) in trije prečni okovi (najmanj en prečni okov je ohranjen na A5–A7 in A9; *sl. A5.1, A6.1, A6.2, A7.1, A9.2*). Vsi ti okovi so iz čiste medenine.[130]

Ovalen okov na zgornji strani nožnice je malenkost širši od okova ob ustju nožnice (A5–A8) ter je nanj prispajkan z zlitino kositra in svinca[131] ali s kositrom[132] (*sl. A6.3, A7.4, A8.2*).

Okovi ob ustju nožnic so narejeni iz traku in sklenjeni na hrbtni (A6, A7, A8, MM A34) ali izjemoma sprednji (A5) strani nožnice; prekrivajoča (presegajoča) se zaključka sta spajkana s kositrom[133] ali z zlitino, v kateri je poleg kositra malo svinca[134] (*sl. A5.3, A7.2, A7.3; sl. 20*). Okrašeni so z vodoravnimi plastičnimi rebri na sprednji (*sl. A7.1, A8.1*) oziroma na sprednji in hrbtni strani (*sl. A5.1*), dva pa imata na sprednji strani predrt (*opus interasile*) okras (*sl. A6.1a; sl. 18a, 19a, 21*). Luknjica na hrbtni strani tega okova na nožnici A5 (*sl. A5.1b*) kaže, da so okov na nožnico lahko prikovičili.

Nožnice imajo tri medeninaste prečne okove, ki so na sprednji strani vodoravno profilirani in gladki na hrbtni strani (*sl. A5.1, A5.7a, A6.1, A6.2, A7.1, A9.2*). Prvi in drugi okov imata ob robovih zanki, ki sta prav tako vodoravno narebreni; v zanki je vdet obroček, ki omogoča obešanje nožnice (*sl. A5.1, A6.1, A6.2, A9.2*). Prečni okovi so narejeni iz traku; presegajoča se zaključka sta na hrbtni strani speta z bakreno[135] zakovico (A5, A6, A7, A9; *sl. A5.1b, A5.5, A5.6a, b, A6.1b, A6.4, A7.6a*), na eni nožnici je vidno spajkanje iz kositra[136] (*sl. A7.6*). Prvi in drugi prečni okov sta pritrjena na robni okov nožnice s hrbtne strani s po eno bakreno zakovico na vsaki strani (A5–A7, A9; *sl. A5.1b, A5.5, A5.6a, A6.1b, A6.4, A7.1b, A7.6a, A9.2b*), tretji prečni okov pa z eno bakreno zakovico (A5, A7; *sl. A5.1b, A5.6b, A7.6a*). Ena zakovica obenem (poleg spajkanja) spenja presegajoča se zaključka prečnih okovov.

Dve nožnici (A5, A11; *sl. A5.1a, A5.7a, A11a*) imata na konici sprednje strani trikoten in v predrti tehniki (*opus interasile*) okrašen okov. Prekrival je tenko pokositreno medeninasto pločevino in delno tudi železen robni okov. Pri A11 smo ugotovili, da je bil ta okov z zlitino kositra in svinca prispajkan na podlago, tj. na pokositreno medeninasto pločevino.[137]

Nožnice sodijo k starejšim, tj. avgustejsko-tiberijskim nožnicam tipa Mainz, za katere je med drugim značilen predrt okras.[138] Ta je ohranjen na štirih nožnicah (A5, A6, A11, MM A34).

Najstarejši datirani primerki predrtega okrasa nožnic mečev so iz tabora v Dangstettnu (ok. 15–9/8 pr. Kr.),[139] najmlajši pa iz (zgodnje) tiberijske dobe.[140] Domnevam, da so jih nehali izdelovati v poznoavgustejski dobi.

Podrobnejša primerjava predrtih okrasov na nožnicah iz Ljubljanice je pokazala, da imajo najboljše primerjave med okovi iz srednjeavgustejskega tabora v Oberadnu (A11)[141] in iz Kalkrieseja (MM A34),[142] ki je najverjetneje povezan z Varovim porazom leta 9 po Kr.[143] Železna gumba na koncu nožnice, ki imata z medeninastim trakom okrašen vrat (A10 in A11; *sl. A10, A11*), imata dobro primerjavo le med primerki iz Dangstettna.[144]

128 Glej pogl. 16, pregl. A5: *7–10, A6: 1, 4, 8, A7: 15, 16, 19, A9: 1, 3, 4, 6* (pločevina iz brona), *A10: 1–5, 8–10, MM A34: 6–8, 11.*
129 Glej pogl. 16, *pregl. A5: 13.*
130 Glej pogl. 16, A5–A8.
131 Glej pogl. 16, *pregl. A6: 17, A8: 6.*
132 Glej pogl. 16, *pregl. A7: 1, 7.*
133 Glej pogl. 16, *pregl. A5: 6, A7: 17.*
134 Glej pogl. 16, *pregl. A7: 2.*
135 Glej pogl. 16, *pregl. A5: 18, 19, A6: 11, A7: 3, 13.*
136 Glej pogl. 16, *pregl. A7: 11.*
137 Glej pogl. 16, *pregl. A11: 9.*
138 Prim. Deschler-Erb 1996a, 80; Istenič 2003c, 279.
139 Fingerlin 1986, 222, 567: 1, t. 3; Fingerlin 1998, 22–23, 68, 175, 657: 3, 804: 1, t. 1, 1265: 1. Datacija tabora: glej pogl. 3.
140 Istenič 2003c, 279; Miks 2007, 238–240.
141 Albrecht 1942, 153, B 33, t. 45: 10; Künzl 1996, OI 35, 352–453, t. 41: 4. Datacija: 11 in 8/7 pr. Kr. (glej pogl. 3).
142 Harnecker, Franzius 2008, 5, t. 3: 26.
143 Glej pogl. 3.
144 Fingerlin 1998, 56, 788/11.

moulded terminal knob of copper alloy adorns the scabbard from Oberwinterthur/*Vitodurum* (Switzerland), which Deschler-Erb identifies as part of a later form of Mainz type scabbard and dates to the Late Tiberian–Claudian period.[146] Miks lists 26 vertically moulded terminal knobs of scabbards,[147] only four of which are dated and point to the Late Tiberian–Claudian time.[148]

The A13 suspension band with relief decoration (*Pl. 4; Figs. A13.1, A13.2; Fig. 25: 6*) belongs to the MM A24 scabbard (*Figs. 22a–e, 23–25*), of which the following silver mounts survive: mouth band (with double moulding) and the upper part of the guttering made of a single sheet of silver that overlaps at the back, on the right side, where it is soldered together (*Fig. 25: 1*), gilded sheet silver locket with figural relief decoration on a chased background[149] (*Fig. 25: 2*), oval mouth plate with the opening to receive the sword blade (*Fig. 22e*), two roughly 2 mm wide and frontally gilded bands with a central groove that cover the edges of the locket to the left and right, and are soldered to the front of the guttering and the front of the mouth band (*Fig. 25: 3*), as well as a gilded and relief decorated upper suspension band,[150] riveted on both sides to the guttering (a single rivet survives), with a silver ring surviving in its right loop (*Fig. 25: 5*).

The analyses of the A13 suspension band have shown it to be made of high-quality silver alloy (less than 3% copper) and confirmed the gilding of the front side.[151] The Romans used silver alloys with a low share of copper, which was intentionally added to increase hardness and strength,[152] for items of prestige;[153] the gilding only underscores the prestige character of the artefact.

The stylistic features and the high quality of the decorative work reveal the A13/MM A24 scabbard pieces as products of the Italian toreutics tradition of the

146 Deschler-Erb 1996a, 80, 81, Pl. 21: 302.
147 Miks 2007, Pl. 204: B2,6–B329,1.
148 The knob from Augst was found together with pottery from the second half of the 1st century (Deschler-Erb 1999, 27, 136–137, No. 122, Pl. 10; Miks 2007, 776, B13,31, Pl. 204), the knob from the fort at Hofheim dates between the Tiberian–Claudian period and 69/70 (Miks 2007, 923, B341,8), the example from the vicus at Krefeld-Gellep is dated prior to 69 (Miks 2007, 823, B127,5, Pl. 204) and the example from the fort at Zurzach/*Tenedo* (Switzerland) between 15 and 35 (Miks 2007, 923, B341,8).
149 Gilding is best preserved in the grooves and other sunken parts of the relief; an examination under the microscope has shown that the whole front side of the locket was originally gilded.
150 Gilding is best preserved in the sunken parts of the relief; an examination under the microscope has shown that the whole front side was originally gilded, but not the loops.
151 See Ch. 16, *Table A13: 5*.
152 Hughes, Hall 1979, 331–333.
153 Hughes, Hall 1979; Giumlia-Mair 1998, 244; Riederer 1999; Giumlia-Mair 2001, 297–298.

Figure 22
The MM A24 sword with the remains of its scabbard from the Ljubljanica at Blatna Brezovica (Tri lesnice). Iron and silver, partially gilded. Surviving length 416 mm, upper sword width 66 mm, width at fracture 49 mm, scabbard mouth width 78 mm, weight 472 g. Front (a), back (b), front, detail (c), back, detail – mouth band soldering (d), mouth plate with the opening for the blade (e). City Museum of Ljubljana, Inv. No. 510:LJU;32617.

Slika 22
Meč z ostanki nožnice MM A24 iz Ljubljanice pri ledini Tri lesnice (odsek Blatna Brezovica). Železo in srebro (delno s pozlato). Ohranjena dolžina 416 mm, širina meča zgoraj 66 mm, na prelomu 49 mm, širina nožnice ob ustju 78 mm, teža 472 g. Sprednja stran (a), hrbtna stan (b), sprednja stran, detajl (c), hrbtna stran, detajl – spajkanje okova ob ustju (d), pogled na okov na zgornji strani nožnice z odprtino za rezilo meča (e). Mestni muzej Ljubljana, inv. št. 510:LJU;32617.

d

e

Nožnice A5–A11 in MM A34 kažejo precejšnjo enotnost oblikovnih značilnosti, konstrukcije in načina izdelave (prim. pogl. 4.2.3) ter izbire kovin, kar govori za razmeroma kratek čas delujočo (srednja in pozna avgustejska doba) izdelavo v eni ali več med sabo povezanih delavnicah.

4.2.1.2 Druge nožnice tipa Mainz (A12, A13/MM A24)

Spodnji del robnega okova z zaključnim gumbom A12 je narejen iz železa, ki je prevlečeno s pločevino iz srebra (*sl. A12.1, A12.2*).[145] Drugih primerkov tako posrebrenih robnih okovov in zaključnih gumbov na rimskih mečih ne poznam. Za podobno oblikovan in navpično nažlebljen zaključni gumb nožnice iz Oberwinterthura/*Vitodurum* (Švica), narejen iz bakrove zlitine, je Deschler-Erb ugotovil, da pripada mlajši obliki nožnic tipa Mainz, in ga datiral v poznotiberijsko-klavdijsko dobo.[146] Miks je zbral 26 navpično nažlebljenih zaključnih gumbov nožnic.[147] Datirani so le štirje primerki, ki kažejo na poznotiberijsko-klavdijski čas.[148]

Prečni okov z reliefnim okrasom A13 (*t. 4; sl. A13.1, A13.2; sl. 25: 6*) je del nožnice MM A24 (*sl. 22a–e, 23–25*), od katere so se sicer ohranili naslednji srebrni okovi: okov ob ustju (z dvema reliefnima rebroma) in robni okov, narejena iz enega kosa pločevine, ki je sklenjena in spajkana na desni strani hrbtne strani (*sl. 25: 1*), pozlačen tanek (pločevinast) okov s figuralnim reliefnim okrasom in punciranim ozadjem na sprednji strani nožnice[149] (*sl. 25: 2*), ovalni okov z odprtino za rezilo meča na zgornji strani nožnice (*sl. 22e*), dva približno 2 mm široka in na sprednji strani pozlačena okova z žlebom v sredini, ki na levi in desni strani prekrivata rob okova s figuralnim okrasom; prispajkana sta na lice robnega okova in spodnjega dela okova ob ustju (*sl. 25: 3*), in pozlačen reliefno okrašen zgornji prečni okov,[150] ki je bil na obeh straneh z žebljičkom prikovičen na robni okov (ohranjen je le en žebljiček), v desni zanki je ohranjen srebrn obroček (*sl. 25: 5*).

145 Glej pogl. 16, A12.
146 Deschler-Erb 1996a, 80, 81, t. 21: 302.
147 Miks 2007, t. 204: B2,6–B329,1.
148 Gumb iz Augsta je bil najden s keramiko iz druge polovice 1. st. (Deschler-Erb 1999, 27, 136–137, št. 122, t. 10; Miks 2007, 776, B13,31, t. 204), gumb iz kastela v Hofheimu je iz obdobja med tiberijsko-klavdijskim časom ter 69/70 (Miks 2007, 923, B341,8), primerek iz vikusa v Krefeld-Gellepu je datiran pred leto 69 (Miks 2007, 823, B127,5, t. 204) in primerek iz kastela v Zurzachu/Tenedo (Švica) med letoma 15 in 35 (Miks 2007, 923, B341,8).
149 Pozlata je najbolje ohranjena v žlebovih in drugih globlje ležečih delih okrasa; pregled pod mikroskopom je pokazal, da je bilo najverjetneje pozlačeno celo lice okova.
150 Pozlata je najbolje ohranjena v globlje ležečih delih okrasa; pod mikroskopom se vidi, da je bila prvotno pozlačena cela reliefno okrašena sprednja stran okova, ne pa zanki ob straneh.

Middle–Late Augustan period.[154] The vine and exuberant foliage constituted some of the favourite motifs of the Augustan period (see for example the Ara Pacis Augustae). They endorsed the fertility, prosperity and abundance of the new, Golden Age (*saeculum aureum*, *Aurea Aetas*); its beginning was proclaimed in the spring of 17 BC.[155]

The only relatively close parallel for the relief decoration on the locket of the MM A24 scabbard (*Fig. 22*) is on a sword scabbard from the *Vetera* fortress (Xanten, Germany), but it is made of copper alloy (I presume brass) and plated with a silvery metal (I presume tin or possibly silver); the context of the mount does not allow for more precise dating.[156]

The quality of production, the decorative motif and the material used (gilded silver) reveal the A13/MM A24 scabbard and sword as prestige Italian products of the Middle to Late Augustan period. A similarly luxurious scabbard with silver mounts from Kalkriese[157] bears a scratched inscription that suggests it belonged to a centurion.[158]

4.2.2 Mainz type swords (A5–A9, A14–A18, A35, MM A24–A30, MM A34; *Pls. 2–6; Figs. A5.1–A5.2, A6.1, A6.4, A7.1–A7.7, A8.1–A8.3, A9.2b, A14.1–A14.2, A15.1–A15.2, A16.1–A16.2, A17, A18, A35; Figs. 18–31*).

The Mainz type swords have straight and level shoulders (A5, A7, A15, A17, A18, MM A24–A27, A29–A30). One of them survives with the handgrip made of bone with three and part of the fourth finger groove remaining[159] (A15; *Fig. A15.2*).

Only the tang survives of the hilt associated with the luxury MM A24 scabbard (*Fig. 22a, b*). The photographs made in 1913 or shortly before that (*Figs. 7–8, 23*) show the sword presumably as it was upon discovery,[160] revealing a much better state of preservation of the hilt. It bears the lower half of the pommel with its metal plating, the metal plating of the upper side of the handguard and the handguard plate (*Fig. 23: 1–3*). Surviving under the handguard is a piece (of wood?) with strongly concave sides (*Fig. 23: 4*). The photo holds no clues as to the horizontal cross section of this piece and the impression that it is composed of two flat parts may be deceiving.

The pieces of the hilt metal plating, indicated on *Fig. 24* and made of 0.2 mm thick sheet silver, survived to the early 1950s when the sword and its scabbard were first analysed by archaeologists.[161] The published photo and drawing[162] show the handguard moved down to the handguard plate (cf. *Fig. 24*) – in contrast to its position on *Fig. 23*. The 1953 publication makes no mention of the (probably wooden) piece under the handguard visible on *Fig. 23: 4*.

The data on the construction of the hilt show two unusual features: the (wooden) remains under the silver plating of the upper part of the handguard and an unusual orientation of the handguard plate.

Figure 24
The MM A24 sword still had the lower half of the pommel shell (1), the upper part of the handguard shell (2) and the handguard plate (3) of sheet silver when first published (from: Stare 1953, Pl. 1: 1, 2, Pl. 2: 2–4, only No. 3 on the right is rotated 180 degrees). Individual pieces are drawn tilted at an angle to show their upper or lower aspects on the right (1–3) and roughly correspond in size to the respective pieces on the left drawn in the scale of 1 : 3.

Slika 24
Ob prvi objavi je imel meč MM A24 ohranjeno oblogo spodnje polovice glaviča (1), oblogo zgornje strani branika ročaja (2) in ščitnik njegove spodnje strani (3), vsi so bili iz srebrne pločevine (po Stare 1953, t. 1: 1, 2, t. 2: 2–4, le št. 3 na desni strani risbe je zasukana za 180 stopinj). V perspektivi narisani detajli na desni strani (1–3) so po velikosti približno prilagojeni risbi na levi strani, ki je v merilu 1 : 3.

154 Istenič 2003b, 289. Cf. Künzl 1988c, 560–561, Cat. No. 386; Künzl 1996, 422–423.
155 Zanker 1990, 179–192; Künzl 1996, 421–423.
156 Hanel 1995, B 122, 51–52, Pl. 7: 1.
157 Franzius 1999, 578–581, 594–599, 607, Figs. 11, 16; for the alloy analyses of the mounts, see Riederer 1999.
158 Wiegels 1999.
159 Cf. Deschler-Erb 1999, 23–24, Figs. 15, 16.
160 It seems unlikely that the pieces of the hilt were removed from the tang after discovery and prior to taking the photos only to be reassembled (in a different order and/or differently orientated) at a later time, though the possibility cannot be excluded.
161 Stare 1953.
162 Stare 1953, Pl. 1: 1–2.

Figure 23
The MM A24 sword with the remains of its scabbard around 1913 (section of *Fig. 8*).
1 – lower half of the pommel shell,
2 – upper part of the handguard shell,
3 – handguard plate,
4 – piece (of wood?) with strongly concave sides.

Slika 23
Meč MM A24 z ostanki nožnice okoli leta 1913 (izsek iz *sl. 8*).
1 – spodnja polovica obloge zaključnega glaviča,
2 – obloga zgornje strani branika ročaja, 3 – ščitnik spodnje strani branika,
4 – ostanki (lesa?), ki imajo v navpični smeri izrazito usločeni stranici.

Figure 25
The MM A24 sword with reconstructed upper half of the pommel, most likely with a shell of sheet silver, and surviving pieces of the scabbard including the later recovered A13 silver suspension band. Numbers 1–6 mark parts of the scabbard – cf. Ch. 4.2.1.2. From Horvat 1990, Pl. 28: 1, with additions (a), as well as a proposed reconstruction of the handguard as indicated by the enlarged section of the archive photo on *Fig. 23* (b). Scale 1 : 3.

Slika 25
Meč MM A24 z rekonstruiranim zgornjim delom glaviča ročaja, ki je bil najverjetneje prevlečen s pločevino iz srebra, ter z ohranjenimi deli nožnice, vključno s kasneje najdenim prečnim okovom A13. S številkami 1–6 so označeni deli nožnice – prim. pogl. 4.2.1.2. Po Horvat 1990, t. 28: 1, z dopolnitvami (a) in različica branika ročaja, kot ga nakazuje povečava izseka arhivske fotografije *sl. 23* (b). Merilo 1 : 3.

Analize prečnega okova A13 so pokazale, da je iz visokokakovostne srebrove zlitine (manj kot 3 % bakra), in potrdile, da je sprednja stran okova pozlačena.[151] Srebrove zlitine z majhnim deležem bakra, ki je bil dodan namenoma, da je povečal trdoto in trdnost zlitine,[152] so bile v rimski dobi namenjene prestižnim predmetom.[153] Na to kaže tudi pozlata.

Stilne značilnosti in visoka kvaliteta izvedbe okrasov na okovih kažejo na srednje-poznoavgustejski čas in vključenost v italsko torevtsko tradicijo.[154] Vitice in cvetoča narava sodijo med priljubljene motive avgustejske dobe (npr. Ara Pacis Augustae). Oznanjali so plodnost, razcvet in obilje zlate dobe (*saeculum aureum, Aurea Aetas*); njen začetek so razglasili spomladi leta 17 pr. Kr.[155]

Edina razmeroma dobra primerjava okrasu na ustju nožnice MM A24 (*sl. 22*) je okov nožnice meča iz legijskega tabora *Vetera* (Xanten, Nemčija), ki pa je iz bakrove zlitine (domnevam, da medenine) in prevlečen s srebrno svetlečo se kovino (domnevam, da kositrom ali morda srebrom); po najdiščnih okoliščinah ga ni mogoče ozko datirati.[156]

Kvaliteta izdelave, motiv okrasa in uporabljeni materiali (srebro s pozlato) pri nožnici in meču A13/MM A24 torej kažejo na prestižen italski izdelek srednje-do poznoavgustejske dobe. Pri podobno luksuzni nožnici s srebrnimi okovi iz Kalkrieseja[157] grafit na prečnem okovu nakazuje, da je pripadala centurionu.[158]

4.2.2 Meči tipa Mainz (A5–A9, A14–A18, A35, MM A24–A30, MM A34; *t. 2–6; sl. A5.1–A5.2, A6.1, A6.4, A7.1–A7.7, A8.1–A8.3, A9.2b, A14.1–A14.2, A15.1–A15.2, A16.1–A16.2, A17, A18, A35; sl. 18–31*).

Ramena mečev so vodoravna (A5, A7, A15, A17, A18, MM A24–A27, A29–A30). Obloga ročajnega jezika je ohranjena pri enem meču: je iz kosti ter ima ležišča za prste roke[159] (A15; *sl. A15.2*).

151 Glej pogl. 16, *pregl. A13: 5.*
152 Hughes, Hall 1979, 331–333.
153 Hughes, Hall 1979; Giumlia-Mair 1998, 244; Riederer 1999; Giumlia-Mair 2001, 297–298.
154 Istenič 2003b, 296. Prim. Künzl 1988c, 560–561, kat. 386; Künzl 1996, 422–423.
155 Zanker 1990, 179–192; Künzl 1996, 421–423.
156 Hanel 1995, B 122, 51–52, t. 7: 1.
157 Franzius 1999, 578–581, 594–599, 607, sl. 11, 16; analize zlitine okovov: Riederer 1999.
158 Wiegels 1999.
159 Prim. Deschler-Erb 1999, 23–24, sl. 15, 16.

The handguard plates of the Mainz type swords in undoubtedly original positions (e.g. A6, A8, A15, MM A34) clearly show the plate in the opposite position to that on the MM A24 sword, i.e. with the concave side facing down, towards the blade. A similar observation can be made for the only other known Mainz type sword with a sheet-metal plating of the hilt, i.e. the sword found in the vicinity of Rheingönheim.[163]

The presumably wooden remains under the upper part of the handguard are certainly surprising; their height and strongly concave shape are incompatible with the reconstruction of the hilt (*Fig. 25: a*) as suggested by the comparison with the sword from Rheingönheim. The only relatively reasonable conclusion to my mind would be that the handguard had a concave middle part (*Fig. 25: b*).

The fragment of the A8 sword survives with an iron plate (or perhaps a thin mount) on the hilt, positioned roughly horizontally, i.e. transversely to the length of the sword. A hilt with such a metal plate (mount) is without parallels among the Mainz type swords either from the Ljubljanica or from any other site. Horizontally fitted metal mounts or plates are known on swords of later types from northern Europe,[164] while Late La Tène swords (from the final decades BC) from the north-eastern periphery of Gaul and sites east of the Rhine bear thin oval plates of either non-ferrous or ferrous metals on the tang.[165]

In Mainz type swords, the (probably wooden) handguard was usually plated with sheet metal (i.e. the handguard plate) only on the underside (A5–A8, A15, A16, MM A34): one of these plates is round (MM A27), others oval. They are hammered of a sheet of bronze (A6, A7, A8, A15, A16) or copper (A5),[166] unidentified copper alloy (MM A27) and either copper or bronze (MM A34).[167] Their underside is tinned (A5, A7, A15, A16, MM A27),[168] while the upper side, which fitted onto the underside of the wooden handguard, revealed the remains of a tin-lead alloy (A5, A7, A8) or tin only (A6, A15) surviving in patches and not as a compact layer.[169] All handguard plates, with the exception of the A16 sword, have roughly 5 mm high sides, only slightly curving and turned down, towards the blade, at an oblique angle, but also thickened and decorated with barely discernible chased notches at the rim. They were fitted into the slightly concave underside of the handguard.

The handguard plate of the A16 sword (*Fig. A16.2*) differs from others on the Mainz type swords from the Ljubljanica in that it is thinner, unsymmetrical in detail, of a lower quality of craftsmanship and with markedly irregular down-turned sides. This gives the A16 handguard an inferior appearance in comparison with the ones of the A5–A8, A15 and MM A27 swords. A similar handguard plate was recovered at Haltern.[170] It would appear that such examples were modelled on the handguard plates of the Mainz type swords such as those of A5–A11, but at a lower level of workmanship.

The Mainz type swords usually have oval handguard plates, with only three known examples having a round plate in addition to the MM A27 sword: from Graves 11/12 and 17 at Idrija pri Bači[171] and from the Comacchio shipwreck (Po delta, Italy) dating to the penultimate decade BC.[172] The two plates from Comacchio and Grave 17 bear embossed and chased decoration.

The A5, A14–A17, A35 and MM A25 swords (*Pls. 2, 5, 6; Figs. A5.1b, A14.2, A15.1, A16.1, A17, A35; Fig. 26*) have relatively well preserved blades. They are very thin and diamond-shaped in cross section. They also share a waisted shape with a long point that corresponds with the usual form of the Mainz type swords.[173] The MM A30 sword deviates as it appears to have evenly tapering cutting edges; the surviving part of the MM A24 sword indicates a similar blade form.

The A5 blade in its current state is 57 mm wide in the upper part, which is only 13 mm less than the width of the mouth band – the blade must therefore have fitted quite tightly into the wooden interior of the scabbard. The same holds true for the A7 sword and scabbard, but not for the A9 sword blade, which is roughly 20 mm narrower than the scabbard (the blade originally measured roughly 42 mm on the spot where the scabbard is 62 mm wide), suggesting that the sword was not made for the scabbard it ended up in. The width of the A6 and A8 blades cannot be reliably estimated (blade cross sections of A6 and A8 on *Pl. 3* are reconstructions).

163 Ulbert 1969b, Pl. 32: 1–4; Klein 2003b, 28, 50, Fig. 10 (colour photograph); Miks 2007, A 609, 711, Pls. 15, 156.
164 Biborski, Ilkjær 2007, 226–229; Miks 2007, Pl. 62: A320, Pl. 69: A321,10, 12, Pl. 175: A321,11, Pl. 176: A321,17–19, A59.
165 Haffner 1989, 229–238; Roymans 2004, 108–112, Figs. 7.4, 7.5.
166 See Ch. 16, *Tables A5: 1–2, A6: 15, A7: 9/22, A8: 1, A15: 3–4, A16: 1–2.*
167 See Ch. 16. *Table MM A34: 9.*
168 See Ch. 16, *Tables A5: 5, A7: 7/20, 8/21, A16: 3–4.*
169 See Ch. 16, *Tables A5: 3, A7: 10/23, A6: 14, A8: 3, A15: 1–2.*
170 Müller 2002, 180, No. 425, Pl. 38; Miks 2007, B120,4, 820, Pl. 158. Two example from Vindonissa may also be similar (Unz, Deschler-Erb 1997, 16, Nos. 70, 73, Pl. 6; Miks 2007, 907–908, B328,46, 48, Pl. 158).
171 Guštin 1991, Pl. 12: 3, Pl. 16: 2 (the handguard plate on Pl. 12: 3 is erroneously positioned).
172 Invernizzi 1990, 101, 103, 258, 260, Fig. 3, Pl. 68: 227. For the dating, see Ch. 3.
173 Cf. the beginning of Ch. 4.2, Fn. 121.

Figure 26
Front (a) and back (b) of the MM A25 Mainz type sword from the Ljubljanica at Vrhnika. Iron. Cutting edges are missing (surviving width 38 mm). Length 604 mm, blade length 472 mm, weight 260.6 g. City Museum of Ljubljana, Inv. No. 510: LJU;0057632.

Slika 26
Sprednja (a) in hrbtna (b) stran meča tipa Mainz MM A25 iz Ljubljanice pri Vrhniki. Železo. Robovi rezila niso ohranjeni (ohranjena širina 38 mm). Dolžina 604 mm, dolžina rezila 472 mm, teža 260,6 g. Mestni muzej Ljubljana, inv. št. 510: LJU;0057632.

Meč z luksuzno nožnico MM A24 ima od ročaja ohranjen le ročajni jezik (*sl. 22a, b*). Na fotografijah, ki sta nastali leta 1913 ali malo pred tem (*sl. 7–8, 23*) in za kateri se zdi, da kažeta meč, kakršen je bil ob odkritju,[160] je ročaj dosti bolje ohranjen. Na njem so spodnja polovica obloge zaključnega glaviča, obloga zgornje strani branika ročaja in ščitnik njegove spodnje strani (*sl. 23: 1–3*). Pod oblogo zgornje strani branika so ostanki (lesa?; *sl. 23: 4*), ki imajo v navpični smeri izrazito usločene stranice. Iz fotografije ni mogoče jasno razbrati, kakšen je bil vodoravni presek teh ostankov; vtis, da gre za dva ploščata dela, je lahko varljiv.

Na začetku petdesetih let 20. stoletja, ob prvi strokovni objavi meča z nožnico, so bile še ohranjene na *sl. 24* vidne obloge ročaja meča iz 0,2 mm debele srebrne pločevine.[161] Objavljena fotografija in risba[162] kažeta, da je bila – v primerjavi s stanjem iz okrog leta 1913 (*sl. 23*) – obloga zgornje strani ročajnega branika premaknjena proti spodnjemu delu ročaja, tik do ščitnika spodnje strani branika (prim. *sl. 24*). V objavi niso omenjeni (verjetno leseni) ostanki, ki so bili okrog leta 1913 ohranjeni pod oblogo zgornje strani branika (*sl. 23: 4*).

Med zbranimi podatki o prvotni zgradbi ročaja so neobičajni (leseni) ostanki pod pločevinasto oblogo zgornjega dela branika in orientacija pločevinastega ščitnika spodnje strani branika.

Ščitniki na mečih tipa Mainz, ki imajo nedvomno prvotno orientacijo (npr. A6, A8, A15, MM A34), jasno kažejo, da je ščitnik običajno obrnjen obratno kot pri meču MM A24, torej tako, da je vbočen s spodnje strani. Zdi se, da je podobno pri edinem drugem meču tipa Mainz, ki ima s pločevino prevlečen ročaj, tj. z mečem, ki je bil najden v okolici Rheingönheima.[163]

Še dosti bolj presenečajo verjetno leseni ostanki pod pločevinasto oblogo zgornjega dela branika. Njihova višina in oblika (izrazita usločenost razširitev v spodnjem delu) nista združljivi z rekonstrukcijo ročaja (*sl. 25: a*), ki jo narekuje primerjava z mečem iz Rheingönheima. Zanje se ne morem domisliti boljše razlage, kot da je imel branik v sredini usločen del (*sl. 25: b*).

160 Malo verjetno se zdi, da so dele ročaja po odkritju in pred fotografiranjem sneli z ročajnega jezika in nato (v drugačnem zaporedju in/ali z drugačno orientacijo) nanj ponovno namestili, vendar tega ni mogoče izključiti.
161 Stare 1953.
162 Stare 1953, t. 1: 1–2.
163 Ulbert 1969b, t. 32: 1–4; Klein 2003b, 28, 50, sl. 10 (barvna fotografija); Miks 2007, A 609, 711, t. 15, 156.

The length of the blade is known for five swords (A5, A15–A17; MM A25)[174] and ranges from 472 mm (MM A25[175]) to 553 mm (A5). As for the blade width, it is either known or can be estimated for fifteen swords: just below the shoulder, it measures from roughly 40 mm (A6, A9, A17, MM A25–A27) to 59 mm (MM A34),[176] with the exception of MM A24 (66 mm) and even more so A16 (reconstructed width 70 mm) and MM A29 (70 mm) that are considerably wider; the A16 sword also stands out for its handguard plate.

The length to width ratio ranges between 9.7 (A5) to 12 (A17: presumed original width 43 mm) or 12.8 (A15; presumed width 40 mm) with the exception of the A16 (ratio 7.8) and MM A29 swords (width 70 mm, presumed original length ca. 500 mm, ratio 7.1).

The length and shape of the blades might be chronologically diagnostic features that help date swords without associated scabbards. Swords with long and narrow blades with a long point are often earlier, while wider and shorter blades seem to characterise later Mainz type swords.[177] Using this criterion, the A7, A8, A9, A14, A15, A17 and MM A25–A27 swords rank among the early examples. For the A5, A6, A11, MM A24 and MM A34 swords, such an early date (Middle Augustan period) would correspond with the dating of the associated scabbards,[178] for the MM A27 sword such dating is indicated by its handguard plate.[179] A short and wide blade of the A16 and MM A29 swords suggest the (Late) Tiberian–Claudian period.

Figure 27
Upper part of the MM A26 Mainz type sword from the Ljubljanica (exact findspot unknown), front (a) and back (b). Tang terminal and large part of the blade are missing, as are the cutting edges. Iron. Surviving length 217 mm, surviving width 42 mm, blade thickness 4.1 mm (lenticular cross section), weight 98.9 g. City Museum of Ljubljana, Inv. No. 510: LJU;0058645.

Slika 27
Zgornji del meča tipa Mainz MM A26 iz Ljubljanice (podrobneje najdišče ni znano), sprednja (a) in zadnja (b) stran. Konica ročajnega jezika in večji del rezila nista ohranjena; prav tako na ohranjenem delu rezila nista ohranjena robova. Železo. Ohranjena dolžina 217 mm, ohranjena širina 42 mm, debelina rezila 4,1 mm (lečast presek), teža 98,9 g. Mestni muzej Ljubljana, inv. št. 510: LJU;0058645.

4.2.3 Characteristics of the Mainz type swords and scabbards in terms of construction and materials

The A5–A11 and MM A34 scabbards show great uniformity in form, production manner and choice of materials.

The largely wooden scabbards (wood survives in the A6, A7, A8 and MM A34 scabbards as well as on the A4 and A35 sword blades; *Figs. A6.1–A6.3, A7.5,*

Figure 29
Front (a) and back (b) of the MM A28 Mainz type sword point from the Ljubljanica (exact findspot unknown). Iron. Point not thickened. Surviving length 144 mm, width 33 mm, thickness 3 mm (lenticular cross section), weight 40.9 g. City Museum of Ljubljana, Inv. No. 510: LJU;0058642.

Slika 29
Obe strani (a, b) konice rezila meča tipa Mainz MM A28 iz Ljubljanice (podrobneje najdišče ni znano). Železo. Konica ni odebeljena. Ohranjena dolžina 144 mm, širina 33 mm, debelina 3 mm (lečast presek), teža 40,9 g. Mestni muzej Ljubljana, inv. št. 510: LJU;0058642.

174 Blade lengths – A5: 553 mm, A15: 512 mm, A16: 540 mm, A17: 520 mm, MM A25: 472 mm.
175 Gaspari 2007, 151, Fig. 4: 1.
176 Blade widths (just below the shoulders unless so stated) – A5: 57 mm, A6: ca. 40 mm (judged from the scabbard w.), A7: ca. 54 mm, A8: ca. 42 mm, A9: 39 mm (at the suspension band), A14: 47 mm (lower half of the sword), A15: surv. w. 36 mm (cutting edges missing), A16: 704 mm (reconstructed w.), A17: ca. 41 mm, A18: ca. 47 mm, MM A24: 66 mm, MM A25: surv. w. 38 mm; MM A26: estimated w. 45 mm, MM A27: 44 mm, MM A34: 590 mm.
177 Deschler-Erb 1996a, 80, Fig. 66. The swords with an exceptionally short and wide blade from dated contexts point to the Claudian period (Miks 2007, 558, 747, 758, Pl. 12: A102, Pl. 13: A774, A747.
178 See Ch. 4.2.1.1.
179 See above for the MM A27 sword.

a b c d

Figure 28
Upper part of the MM A27 Mainz type sword from the Ljubljanica at Kamnik pod Krimom (the Zornica site). Iron, handguard plate of copper alloy with well preserved grey plating (probably tinning) on the underside and poorly preserved remains of a possible grey plating on the upper side. The plate is turned down along the edge, in the width of ca. 5 mm; the rim is slightly thickened and may be chased from the side with a small chisel. The upper side of the plate bears four chased dots forming a 5 mm long straight line. Cutting edges do not survive. Surviving length 188 mm, surviving blade width 44 mm (at the top of the blade, probably roughly the original width), weight 135.9 g; handguard plate: diameter 61 mm, thickness 1.2 mm. View from front and back (a, b), upper side of the handguard plate (c), upper part of the blade and underside of the handguard plate (d). City Museum of Ljubljana, Inv. No. 510: LJU;0057629.

Slika 28
Zgornji del meča tipa Mainz MM A27 iz Ljubljanice pri Kamniku pod Krimom (ledina Zornica). Železo, ščitnik iz bakrove zlitine, na spodnji strani dobro ohranjena siva prevleka (verjetno pokositrenje), na zgornji strani slabo ohranjeni ostanki morebitne sive prevleke. Ščitnik je na robu, v širini okoli 5 mm, rahlo upognjen navzdol; zaključek roba je komaj opazno odebeljen in morda s strani punciran z drobnim dletom. Na zgornji strani ščitnika so štiri puncirane pike v 5 mm dolgi ravni liniji. Prvotni robovi rezila niso ohranjeni. Ohranjena dolžina 188 mm, ohranjena širina rezila 44 mm (na vrhu rezila, verjetno približno ustreza prvotni širini), teža 135,9 g; ščitnik ročajnega branika: premer 61 mm, debelina 1,2 mm. Pogled z dveh strani (a, b), zgornja stran ščitnika (c), zgornji del rezila in spodnja stran ščitnika (d). Mestni muzej Ljubljana, inv. št. 510: LJU;0057629.

Na ročaju meča A8 se je ohranil železen, približno vodoravno ležeč okov (ali morda ploščica), ki nima primerjav med meči tipa Mainz iz Ljubljanice niti z drugih najdišč. Vodoravno nameščene kovinske okove ali ploščice poznamo z ročajev mečev mlajših tipov z najdišč v severni Evropi.[164] Poznolatenski meči (iz zadnjih desetletij pr. Kr.) s tenkimi ovalnimi ploščicami iz barvne kovine ali železa na ročajnem trnu so znani s severovzhodnega obrobja Galije in z najdišč vzhodno od Rena.[165]

Pri mečih tipa Mainz je imel (verjetno lesen) branik ročaja običajno kovinsko oblogo (tj. ščitnik branika) le na spodnji strani (A5–A8, A15, A16, MM A34): eden je krožne oblike (MM A27), ostali so ovalni. Skovani so iz brona (A6, A7, A8, A15, A16) ali bakra (A5),[166] neopredeljene bakrove zlitine (MM A27) oziroma bakra ali brona (MM A34).[167] Spodnja stran je pokositrena (A5, A7, A15, A16, MM A27),[168] na zgornji strani, ki je nalegala na spodnjo stran branika ročaja, pa so ostanki zlitine kositra in svinca (A5, A7, A8) ali le kositra (A6, A15), ki pa niso ohranjeni kot strnjena plast, ampak le na posameznih delih površine.[169] Vsi ščitniki, razen pri meču A16, imajo približno 5 mm široko in komaj opazno usločeno poševno stranico z rahlo odebeljenim in drobno punciranim robom. Nameščeni so bili v poglobljeno spodnjo stran branika tako, da je zunanja stran branika, ki je gledala proti rezilu meča, vbočena.

164 Biborski, Ilkjær 2007, 226–229; Miks 2007, t. 62: A320, t. 69: A321,10, 12, t. 175: A321,11, t. 176: A321,17–19, A59.
165 Haffner 1989, 229–238; Roymans 2004, 108–112, sl. 7.4, 7.5.
166 Glej pogl. 16, *pregl. A5: 1–2, A6: 15, A7: 9/22, A8: 1, A15: 3–4, A16: 1–2.*
167 Glej pogl. 16. *pregl. MM A34: 9.*
168 Glej pogl. 16, *pregl. A5: 5, A7: 7/20, 8/21, A16: 3–4.*
169 Glej pogl. 16, *pregl. A5: 3, A7: 10/23, A6: 14, A8: 3, A15: 1–2.*

A8.1–A8.2, A4.2, A35; Figs. 18–19) are held together along the edges by U-sectioned guttering made of iron in all the surviving examples (A5–A11; *Figs. A5.6, A6.1–A6.2, A7.6, A8.1, A9.2, A11.1*). The terminal knobs are of pure brass (*Fig. A5.7*) or of iron with a decorative brass plating on the neck (*Figs. A10, A11*). They are made separately and fixed onto the iron tip of the guttering (best visible on *Fig. A5.7b*).

All scabbard fittings with the exception of the guttering are made of pure brass.[180]

All crossbands are horizontally moulded at the front and plain at the back. Their ends overlap at the back of the scabbard, where they are affixed with a copper rivet and with solder. The same rivet – in the suspension bands with another rivet on the opposite side – fastened the bands to the guttering (*Figs. A5.1, A5.5, A5.6, A6.1–A6.3, A7.1, A7.5, A7.6, A9.2*).

The oval mouth plates at the very top of the scabbards were soldered to the mouth bands below with a tin-lead alloy or with tin (*Figs. A6.3, A7.4, A8.2*).

The mouth bands are decorated with horizontal mouldings on the front and sides (*Figs. A5.1, A5.3, A7.1–A7.3, A8.1*) or in openwork on the front (*Figs. A6.1, A6.2; Fig. 19a*), while they are plain at the back. The overlapping ends were soldered together with tin, usually at the back (*Figs. A6.4, A7.2, A7.3, A8.1b, A8.2b; Figs. 19b, 20*) and exceptionally at the front (*Fig. A5.3*).

The A11 scabbard fragment suggests that chapes were soldered with a tin-lead alloy to the tinned sheet metal underneath.

The sheet metal covering the front of the scabbards is very thin, measuring around 0.2 mm, made of pure brass and tinned on the front (*Figs. A5.1a, A5.7a, A6.1a, A6.2, A6.3, A7.5, A10; Fig. 19*). The A9 scabbard is an exception here, with the sheet metal of bronze rather than brass; it was also tinned on the front (*Fig. A9.2*).

As their scabbards, the A5–A11 and MM A34 swords are quite uniform as well. They are discussed together with the A14, A15, A17 and MM A25–A28 swords found without their scabbards.

The handguard plates are usually oval and only exceptionally round, they have down-turned sides with a slightly thickened rim decorated with chased notches. Most are made of bronze (A6, A7, A8, A15), one of copper (A5), two of either bronze or copper (MM A27, MM A34). The underside is tinned (A5, A7, A16), while the upper side bears traces of a tin-lead alloy (A5, A7, A8) or just tin (A6, A15) that may represent the traces of fastening the plate to the handguard underside (*Figs. A5.2, A7.1, A8.1c, A15.2; Figs. 28, 69c*).

The Mainz type swords and their scabbards from the Ljubljanica, especially their construction and the metals used, can only be compared with those from other sites to a limited extent, as the descriptions of the latter are for the most part far too brief, colour photographs an exception and metal analyses very rare.[181] Only four scabbard fragments and a handguard plate from Haltern are published complete with the results of metal analyses and a catalogue description

Figure 30
Front (a) and back (b) of the MM A29 Mainz type sword from the Ljubljanica at Črna vas (the Ljubljanske senožeti site, at the outflow of the Iška stream). Tang terminal, blade tip and cutting edges are missing. Surviving length 480 mm, blade length 404 mm, shoulder width 70 mm, maximum blade thickness 4 mm, tang thickness 6 mm, weight 300 g. City Museum of Ljubljana, Inv. No. 510: LJU;0057630.

Slika 30
Obe strani meča (a, b) tipa Mainz MM A29 iz Ljubljanice pri Črni vasi (Ljubljanske senožeti, pri izlivu Iške). Zaključek ročajnega jezika, zaključek konice in robovi rezila niso ohranjeni. Ohranjena dolžina 480 mm, dolžina rezila 404 mm, širina (na ramenih) 70 mm, največja debelina rezila 4 mm, debelina ročajnega jezika 6 mm, teža 300 g. Mestni muzej Ljubljana, inv. št. 510: LJU;0057630.

180 The data on metals is given in Ch. 16, the main findings summarised in Ch. 4.2.1.1 and discussed in Ch. 17.

181 Riederer 2001, 238–239.

Ščitnik meča A16 (*sl. A16.2*) se od običajnih ščitnikov mečev tipa Mainz iz Ljubljanice razlikuje po tem, da je tanjši, v podrobnostih nesimetričen, manj kvalitetno izdelan in da je zapognjeni del ob straneh izrazito nepravilno oblikovan. Izgled spodnje strani ročajnega branika tega meča je bil v primerjavi z meči A5–A8, A15 in MM A27 okoren. Podoben ščitnik je med gradivom iz Halterna.[170] Kot se zdi, je tem ščitnikom skupno, da se zgledujejo po jasno profiliranih in natančno izdelanih ščitnikih na mečih tipa Mainz, kot so A5–A11, vendar so manj kvalitetno narejeni.

Običajni ščitniki branikov mečev tipa Mainz so ovalni. Krožne ščitnike imajo (razen primerka MM A27) le trije meči: iz grobov 11/12 in 17 v Idriji pri Bači[171] ter z ladje, ki se je v predzadnjem desetletju pr. Kr. potopila pri Comacchiu v delti Pada (Italija).[172] Ščitnika iz Comacchia in iz groba 17 v Idriji pri Bači druži (iztolčen reliefen oziroma punciran) okras.

Rezila so razmeroma dobro ohranjena pri mečih A5, A14–A17, A35 in MM A25 (*t. 2, 5, 6; sl. A5.1b, A14.2, A15.1, A16.1, A17, A35; sl. 26*). Presek ima obliko zelo nizkega romba. Skupna jim je v spodnjem delu rezila nakazana zožitev, sledita ji razširitev in dolga konica, kar ustreza običajni obliki tipa Mainz.[173] Od te oblike odstopa meč MM A30, pri katerem se zdi, da se robova rezila enakomerno ožita. Podobno obliko rezila nakazuje ohranjeni del meča MM A24.

Ohranjena širina rezila meča A5 zgoraj je 57 mm, kar je le 13 mm manj od širine okova ob ustju nožnice – torej se je rezilo precej tesno prilegalo notranji strani lesene nožnice. Enako velja za meč in nožnico A7, ne pa za A9, kjer je rezilo meča okoli 20 mm ožje od nožnice (na mestu, kjer je nožnica široka 62 mm, je rezilo meča prvotno merilo okoli 42 mm), kar morda nakazuje, da meč izvorno ni bil narejen za nožnico, v kateri je bil najden. Pri meču A6 je viden le osrednji del rezila na koncu ohranjenega dela, zato njegove širine ni mogoče oceniti, pri meču A8 pa rezilo v prelomu ni zanesljivo vidno (preseka rezil A6 in A8 na *t. 3* sta rekonstrukciji).

Dolžina rezil mečev je znana v petih primerih (A5, A15–A17; MM A25)[174] in meri od 472 mm (MM A25[175]) do 553 mm (A5). Širino rezil poznam ali jo lahko ocenim pri petnajstih mečih. Pod rameni meri od okrog 40 mm (A6, A9, A17, MM A25–A27) do 59 mm (MM A34),[176] če izvzamem meč MM A24 (širina 66 mm) ter predvsem meča A16 (rekonstruirana širina 70 mm) in MM A29 (širina 70 mm), ki sta izrazito širša; pri meču A16 od običajnih primerkov odstopa tudi ščitnik ročajnega branika.

Razmerje med dolžino in širino rezila je od 9,7 (A5) do 12 (A17: domnevna prvotna širina rezila je 43 mm) oziroma 12,8 (A15; domnevna širina rezila je 40 mm). Od tega odstopata A16 (razmerje med dolžino in širino znaša 5,8) in MM A29 (širina 70 mm, domnevna prvotna dolžina okoli 500 mm, razmerje 7,1).

Ožje datiranje mečev tipa Mainz, pri katerih nožnica ni ohranjena, nakazujeta dolžina in oblika rezila. Meči z dolgimi in ozkimi rezili z dolgo konico so običajno starejši, širša in krajša rezila pa se zdijo značilna za mlajše meče tipa Mainz.[177] Po tem kriteriju med starejše primerke tipa Mainz sodijo meči A7, A8, A9, A14, A15, A17 in MM A25–A27. Na enako datacijo pri mečih A5, A6, A11, MM A24 in MM A34 kažejo ostanki pripadajočih nožnic[178] in pri meču MM A27 ščitnik branika ročaja (srednjeavgustejski čas[179]). Pri mečih A16 in MM A29 kratko in široko rezilo nakazuje datacijo v (pozno)tiberijsko-klavdijsko dobo.

4.2.3 Značilnosti nožnic in mečev tipa Mainz: zgradba in materiali

Oblika, način izdelave in izbira materialov pri nožnicah A5–A11 in MM A34 so zelo enotni.

V osnovi lesene nožnice (les je ohranjen pri nožnicah A6, A7, A8 in MM A34 ter na rezilih mečev A4 in A35; *sl. A6.1–A6.3, A7.5, A8.1–A8.2, A4.2, A35; sl. 18–19*) je ob straneh spenjal robni okov U-preseka, ki je v vseh (vsaj v sledovih) ohranjenih primerih železen (A5–A11; *sl. A5.6, A6.1–A6.2, A7.6, A8.1, A9.2, A11.1*). Zaključni gumb z vratom je iz čiste medenine (*sl. A5.7*) ali iz železa z okrasnim trakom iz medenine (*sl. A10, A11*). Narejen je posebej in nasajen na železno konico, v katero se združita robna okova (najbolje vidno na *sl. A5.7b*).

170 Müller 2002, 180, št. 425, t. 38; Miks 2007, B120,4, 820, t. 158. Morda sta podobna še dva primerka iz Vindonisse (Unz, Deschler-Erb 1997, 16, št. 70, 73, t. 6; Miks 2007, 907–908, B328,46, 48, t. 158).

171 Guštin 1991, t. 12: 3, t. 16: 2 (ščitnik na risbi t. 12: 3 je narobe obrnjen).

172 Invernizzi 1990, 101, 103, 258, 260, sl. 3, t. 68: 227. Datacija: glej pogl. 3.

173 Prim. začetek poglavja 4.2, op. 121.

174 Dolžine rezil – A5: 553 mm, A15: 512 mm, A16: 540 mm, A17: 520 mm, MM A25: 472 mm.

175 Gaspari 2007, 151, sl. 4: 1.

176 Širine rezil (zgoraj, pod rameni, če ni drugače navedeno) – A5: 57 mm, A6: okoli 40 mm (glede na šir. nožnice), A7: okoli 54 mm, A8: okoli 42 mm, A9: 39 mm (pri prečnem okovu), A14: 47 mm (spodnja polovica meča), A15: ohr. šir. 36 mm (robovi rezila niso ohranjeni), A16: 70 mm (rekonstruirana šir.), A17: okrog 41 mm, A18: okrog 47 mm, MM A24: 66 mm, MM A25: ohr. šir. 38 mm; MM A26: ocenjena šir. 45 mm, MM A27: 44 mm, MM A34: 59 mm.

177 Deschler-Erb 1996a, 80, sl. 66. Meči z izrazito kratkim in širokim rezilom, ki izvirajo iz datiranih kontekstov, kažejo na klavdijski čas (Miks 2007, 558, 747, 758, t. 12: A102, t. 13: A774, A747).

178 Glej pogl. 4.2.1.1.

179 Glej zgoraj, obravnava meča MM A27.

with drawings or photographs.[182] Other publications of metal analyses of the Mainz type swords and/or scabbards lack detailed archaeological information.[183]

The handguard plates of the Mainz type swords from other sites are very similar to the examples from the Ljubljanica, down to the chased notches on the rim. They are made of copper alloy. Publications often mention tinning, but it is unclear whether it is located on the underside, the upper side or both.[184] The handguard plate from Haltern is of leaded bronze (with 12.46% tin and 4.81% lead);[185] its description makes no mention of tinning.[186]

The Mainz type scabbards from the Rhine at Mainz survived together with the wooden laths,[187] two even with leather that covered them.[188]

The Mainz type scabbards with iron guttering were contemporaneous with those that used brass/unidentified copper alloy for the guttering. Dangstetten revealed three with iron[189] and one with 'bronze' guttering,[190] the fortresses at Haltern three with iron[191] and four with copper alloy guttering,[192] two of the latter identified as brass.[193] The late scabbards of this type also have guttering of either iron or copper alloy.[194] The Mainz type scabbards from Slovenia have an iron guttering,[195] with one exception.[196]

The oval mouth plates, mouth bands, suspension and crossbands, chapes and terminal knobs of the Mainz type scabbards are made of copper alloys, exceptionally of silver;[197] all three of the scabbards analysed as to the alloy revealed it to be pure brass.[198]

Few publications of scabbards state that the mouth plate is soldered to the mouth band[199] or that the overlapping ends of the suspension and crossbands are soldered together at the back.[200] Several chapes reportedly hold the remains of solder on the back;[201] one chape was established to have been soldered to the guttering.[202]

Most of the well-preserved scabbards have a thin sheet of copper alloy on the front,[203] which is tinned.[204] Such tinning has also been established on the scabbard of the so-called Sword of Tiberius held in the British Museum in London, of which different publications state either brass[205] or copper[206] for the underlying sheet metal.

To sum up, the comparison of the Mainz type swords from the Ljubljanica with those from other sites shows numerous similarities in the manner of production, as well as the choice of materials (inasmuch as the information on the latter is given). There are clear differences in the choice of metal for the guttering, which is iron on all the examples from the Ljubljanica, but either iron or copper alloy (brass) on the scabbards from other sites, as well as in the metal used for the handguards, as the single characterised one (from Haltern) is of leaded bronze, which was not used for the handguard plates from the Ljubljanica.

182 Müller 2002, Cat. Nos. 416, 418, 419, 421, 424; Riederer 2002a, 120.
183 Riederer 2001, 236–239.
184 Copper alloy handguard plates, tinning not mentioned: Miks 2007, 661–662, Pl. 11, A463, A464, A478; probably also Miks 2007, 907–908, B328/40, 41, 46, 48, Pl. 158.
Tinned copper alloy handguard plates: Miks 2007, 617–618, Pls. 10, 17, A318, A319. Other possible Mainz type swords in Miks 2007, 907–908, B328/42–45, 47, Pl. 158.
185 Riederer 2002a, 120, Tab. 17: 424.
186 Müller 2002, 180, Cat. No. 424.
187 Klein 2003b, 47–51, Figs. 6a, b, 8, 9; Miks 2007, A75, A462, A463, A479, A480, A481.
188 Klein 2003b, 48–49, Fig. 7b; Miks 2007, A479, A480; Deschler-Erb 1996b, 17–18 (latest version of Mainz type scabbards, for which analyses shows the laths to be made of lime wood).
189 Fingerlin 1986, 63, 82, F.O. 164/22, 211/5; Fingerlin 1998, 56, F.O. 788/11; Miks 2007, 834, B 154/30, 31, 34, Pls. 201, 202.
190 Fingerlin 1998, 80, 876/4; Miks 2007, 834, B154/36, Pls. 201, 202.
191 Harnecker 1997, 88, Nos. 768, 769 (mentions 'bronze' remains – they are presumably connected with the brass terminal knob), Pl. 72; Müller 2002, 180, No. 420, Pl. 38 (iron guttering with copper alloy terminal knob); Miks 2007, 821, B120/24, 25, 29, Pls. 201, 202.
192 Müller 2002, 180, Nos. 418, 419, 422, 423, Pls. 37, 38.
193 Riederer 2002a, 120, Nos. 418, 419.
194 'Bronze' guttering: e.g. Miks 2007, 657, A445 (dating: after AD 45); iron guttering: e.g. Deschler-Erb 1996b, 17 (= Miks 2007, 761–762, A790; Claudian–Flavian context).
195 In addition to the examples from the Ljubljanica also e.g. Guštin 1991, 16, Pl. 12: 3, Pl. 16: 2; Breščak 2015, 89–90, Gr. 112, Pl. 22: 4; Gaspari et al. 2015, 132, 134–138, Pl. 1: 1–3, Fig. 7.
196 Breščak 2015, 88, Cat. No. 12.
197 Miks 2007, A50, A72, A75, A115, A318–A319, A457, A461–A466, A477–A481, A495–A496, A499, A501, A563, A783, A790, A802, B17,5, B18,6, B23,6–7, B30,2, B43,1–4, B96,1, B97, B120,7–22, B154,10–27, 32–33, B168,1, B177,11–26, B178,17, B230,1, B279,1–3, B300,3,4, B 328,52–65,115–116,138–145, B337,1, B341,5–6. The exception is the poorly surviving scabbard suspension and crossband associated with the Mainz type sword from Grave 25 in the Kamieńczyk cemetery, which are described as iron in the publications (Miks 2007, 629, A335, Pl. 19, with references). Distinguishing between iron and copper alloy in poorly preserved items requires special attention on the part of the restorer/conservator; on the items from the Ljubljanica, for example, the rivets on the B3 dagger sheath were covered with a patina that gave the impression of iron.
198 Riederer 2002a, 120, Tab. 17, Nos. 416, 419, 421.
199 Miks 2007, A501, A480, A481.
200 Miks 2007, A563, A480, A75.
201 Unz 1973, 18–19, Cat. Nos. 16–18, Fig. 5: 16–18; Miks 2007, 913, B328/138, 140, 141, Pl. 188.
202 Von Detten, Schalles, Schreiter 1993, 201, Mil. 31, Fig. 32, Pl. 33; Miks 2007, A802.
203 The description of a scabbard from the Rhine at Xanten (von Detten, Schalles, Schreiter 1993, 201, Pl. 33, Mil. 31; Miks 2007, A802) mentions a thin sheet of copper alloy at the back (not front!), but this is not visible on the accompanying drawing. As it would be the only scabbard with sheet metal at the back, I suspect that the sheet metal in fact covered the front, as on all other scabbards.
204 Klein 2003b, 46–51, Figs. 5a, b, 7, 8; Miks 2007, A501, A464, A318, A563, A461, A462, A479, A480, A481, A75. In later Mainz type scabbards, this sheet was relief decorated and (partially?) gilded on the front (Deschler-Erb 1996b, 17–18).
205 Klumbach 1970, 130.
206 Roberts 2009.

Figure 31
Front (a), back (b) and side view (c) of the MM A30 sword from the Ljubljanica at Vrhnika. Iron. Lower part is missing, cutting edges only partially preserved. Surviving length 514 mm (blade 344 mm, tang 170 mm), surviving blade width 56 mm (roughly corresponds with the original blade width), maximum blade thickness 6 mm (lenticular cross section), maximum tang thickness 8 mm (rectangular cross section), weight 446 g. The sword is bent in the upper part of the tang and roughly in the middle of the blade. City Museum of Ljubljana, Inv. No. 510: LJU;0057631.

Slika 31
Meč MM A30 iz Ljubljanice pri Vrhniki a) spredaj, b) zadaj, c) s strani. Železo. Spodnji del ni ohranjen, prvotni robovi rezila so deloma ohranjeni. Ohranjena dolžina 514 mm (rezilo 344 mm, ročajni trn 170 mm), ohranjena širina rezila 56 mm (približno ustreza prvotni širini rezila), največja debelina rezila 6 mm (lečast presek), največja debelina ročajnega trna 8 mm (pravokoten presek), teža 446 g. Meč je v zgornjem delu ročajnega trna in približno na sredini rezila zvit. Mestni muzej Ljubljana, inv. št. 510: LJU;0057631.

Vsi okovi, razen robnega, so iz čiste medenine.[180]

Prečni okovi imajo na sprednji strani nožnice vodoravna rebra, na hrbtni strani so gladki. Narejeni so iz trakov, ki so z bakreno zakovico in s spajkanjem sklenjeni na hrbtni strani nožnice. Z isto zakovico – in zgornja prečna okova s še eno tako zakovico na drugi strani – so pritrjeni na robni okov (*sl. A5.1, A5.5, A5.6, A6.1–A6.3, A7.1, A7.5, A7.6, A9.2*).

Ovalni okov na zgornji strani nožnice je s spajkanjem (z zlitino kositra in svinca ali s kositrom) pritrjen na okov ob ustju nožnice (*sl. A6.3, A7.4, A8.2*).

Okov ob ustju nožnice ima na sprednji strani (in ob straneh) vodoravna rebra (*sl. A5.1, A5.3, A7.1–A7.3, A8.1*) ali predrt okras (*sl. A6.1, A6.2; sl. 19a*), zadaj pa je gladek; narejen je iz traku s presegajočima se koncema, ki sta spajkana (s kositrom) na hrbtni strani (*sl. A6.4, A7.2, A7.3, A8.1b, A8.2b; sl. 19b, 20*) ali redko na sprednji strani (*sl. A5.3*).

Za trikoten okov na koncu nožnice smo v enem primeru (A11) ugotovili, da je bil (z zlitino kositra in svinca) prispajkan na pokositreno pločevino.

Pločevina, ki prekriva sprednjo stran nožnice, je izredno tenka (okoli 0,2 mm), iz čiste medenine in na sprednji strani pokositrena (*sl. A5.1a, A5.7a, A6.1a, A6.2, A6.3, A7.5, A10; sl. 19*) oziroma v enem primeru iz brona in na sprednji strani pokositrena (*sl. A9.2*).

Precej enotni so tudi meči, ki pripadajo nožnicam skupine A5–A11 in MM A34. Prištejemo jim lahko meče A14, A15, A17 in MM A25–A28, ki so bili najdeni brez (ostankov) nožnic.

Ščitniki ročajnih branikov so ovalne (izjemoma krožne) oblike, z zapognjeno stranico in rahlo odebeljenim robom, ki je okrašen z drobnimi punciranimi

180 Podatki o kovinah so navedeni v pogl. 16, v glavnem povzeti v pogl. 4.2.1.1 in obravnavani v 17. pogl.

4.3 Other swords and scabbards (A19–A21, MM A31–A33)

The A19 sword (*Pl. 6; Figs. A19.1–A19.2*) corresponds with the Mainz type in the shape of the shoulders and the width of the blade, but differs in the shape of the blade. Its cutting edges have not survived, but the blade does not appear to be waisted; it is certainly much longer in comparison with the Mainz type swords, as the surviving length of 413 mm shows no tapering.

Also different from the Mainz type (cf. Chapter 4.2.3) is the A19 handguard plate. It is made of a 0.6 mm thick sheet of pure brass, completely flat and round to slightly oval (length 66 mm, width 62 mm). Judging from the published drawing, a similarly flat and round (smaller diameter: 44 mm) handguard plate of thin sheet metal comes from the canabae at Vindonissa (Windisch, Switzerland) as the only surviving piece of a sword.[207] Also round, albeit rarely, are the handguard plates of the Mainz type swords (cf. MM A27; *Fig. 28*), but these have the characteristic downturned sides with a thickened rim (cf. Chapter 4.2.3) and are considerably wider than the A19 handguard plate.

A disc of copper alloy very similar to the thin brass disc on the A19 pommel (*Fig. A19.2a*) adorns the tang of the Mainz type sword from the River Sava at Dubravica (Serbia).[208]

The use of pure brass[209] for the handguard plate and for the disc on the pommel,[210] coupled with the characteristically shaped shoulders leave no doubt as to the A19 sword being a Roman weapon. As for its dating, the round shape of the handguard plate may only coincidentally resemble the round handguard plates of the Mainz Type swords from the (Middle) Augustan period and is therefore undiagnostic. The surviving part of the blade shows it was originally longer than the blades of the Mainz type swords and had almost parallel cutting edges; this suggests either a cavalry sword of the Augustan period/1st century AD or a later infantry or cavalry sword.

The A20 sword has a long blade with parallel cutting edges, slightly concave shoulders and a particularly narrow oval handguard plate (*Pl. 6; Figs. A20.1–A20.3*) made of a very thin sheet of pure brass,[211] i.e. obtained directly from an ingot, which indicates a Roman product.[212] During the Roman period, peoples outside the Empire were not producing brass, while the potential remelting of Roman brass products (such as coins, brooches, military equipment) to make new artefacts would result in a significantly decreased zinc content.[213] The handguard plate was tinned on the underside, like those on the Mainz type swords (*Fig. A20.2b*).[214] In its shape, production manner (of thin sheet metal) and dimensions, it is quite similar to a copper alloy handguard plate from the Dangstetten fortress.[215]

The remains of the A20 scabbard survive in such a poor condition that it is not possible to ascertain whether it was made of wood now permeated with iron corrosion or of iron; the latter would point to a connection with Celtic scabbards.

The only chronologically diagnostic element on the A20 sword is the handguard plate with its parallel from Dangstetten, which points to the Middle Au-

Figure 32
Upper part of the MM A31 sword from the Ljubljanica (exact findspot unknown), front (a) and back (b). Iron. Tang and upper part of the blade survive, the latter badly damaged and missing its cutting edges. The tang-shoulder junction is not symmetrical: sharp on one side with a level shoulder (surviving length ca. 4 mm), concave on the other side (surviving shoulder width ca. 4 mm). A pair of parallel, roughly half a millimetre wide and partially surviving grooves run along the middle of the blade on both sides, at a distance of roughly 1.5 mm. Surviving length 240 mm (tang 128 mm), surviving blade width 36 mm, blade thickness 4 mm (lenticular cross section), tang thickness 3.5 mm (rectangular cross section), weight 73.8 g. City Museum of Ljubljana, Inv. No. 510: LJU;0058639.

Slika 32
Zgornji del meča MM A31 iz Ljubljanice (podrobneje najdišče ni znano), spredaj (a) in zadaj (b). Železo. Ohranjena sta ročajni jezik in zgornji del rezila, ki je precej poškodovano (prvotni robovi niso ohranjeni). Prehod iz ročajnega jezika v rame na levi in desni strani ni simetričen: na eni strani je prehod oster in rame ravno (ohranjena dolžina približno 4 mm), na drugi je prehod usločen (ohranjena širina ramena okoli 4 mm). Na sredini obeh strani rezila sta delno ohranjena vzporedna, približno pol mm široka žlebiča v razdalji približno 1,5 mm. Ohranjena dolžina 240 mm (ročajni jezik 128 mm), ohranjena širina rezila 36 mm, debelina rezila 4 mm (lečast presek), debelina ročajnega jezika 3,5 mm (pravokoten presek), teža 73,8 g. Mestni muzej Ljubljana, inv. št. 510: LJU;0058639.

207 Unz, Deschler-Erb 1997, 16, No. 74, Pl. 6: 74; Miks 2007, B328, 50, 908, Pl. 157.
208 Vujović 2001, 119, 121, Fig. 3.
209 See Ch. 4.1, p. 34 and Ch. 17.1.
210 See Ch. 16, A19.
211 See Ch. 16, A20.
212 Cf. Ch. 17.1.
213 See Ch. 17.1. Caley (1964, 99, 100) estimates that each melting of Roman pure brass reduced the zinc content by about 10%.
214 See Ch. 16, A20.
215 Fingerlin 1998, FO 1234/3; Miks 2007, 833, Pl. 158/B154.

linijami. Običajno so iz brona (A6, A7, A8, A15), eden je iz bakra (A5), dva sta iz brona ali bakra (MM A27, MM A34); spodnja stran, ki je bila vidna, je bila pokositrena (A5, A7, A16), na zgornji strani so ostanki zlitine kositra in svinca (A5, A7, A8) ali le kositra (A6, A15), ki so morda sledovi pritrditve ščitnika na spodnjo stran branika (*sl. A5.2, A7.1, A8.1c, A15.2; sl. 28, 69c*).

Primerjava z meči in nožnicami tipa Mainz z drugih najdišč je mogoča le v majhnem obsegu, ker so opisi predmetov v večini objav za tako primerjavo preskopi, barvne fotografije prej izjema kot pravilo, analize kovin pa izjemno redke.[181] Rezultati analiz kovin in arheološka kataloška predstavitev mečev in nožnic z risbami ali fotografijami ter opisi so podani le za štiri odlomke nožnic in ščitnik branika iz Halterna.[182] Druge objave raziskav kovin in zlitin mečev oziroma nožnic tipa Mainz so brez ožjih arheoloških opredelitev.[183]

Ščitniki branikov ročajev mečev tipa Mainz z drugih najdišč so zelo podobni (vključno z drobno punciranim robom) primerkom iz Ljubljanice. Narejeni so iz bakrove zlitine. V objavah je pogosto navedeno, da so pokositreni, pri čemer ni jasno, na kateri strani (zgoraj, spodaj, oboje?).[184] Ščitnik iz Halterna je iz svinčevega brona (vsebuje 12,46 % kositra in 4,81 % svinca).[185] Pokositrenje v opisu predmeta ni omenjeno.[186]

Pregled objav je pokazal, da so pri nožnicah tipa Mainz iz Rena pri Mainzu ohranjene lesene platice,[187] pri dveh primerkih pa tudi usnje, ki jih je prekrivalo.[188]

Nožnice tipa Mainz z robnimi okovi iz železa in medenine/neopredeljene bakrove zlitine so bile sočasne. Iz Dangstettna izvirajo trije železni[189] in en »bronast« robni okov,[190] iz taborov v Halternu pa trije železni[191] in štirje robni okovi iz bakrove zlitine,[192] ki je bila v dveh primerih opredeljena kot medenina.[193] Iz pozne dobe uporabe nožnic tipa Mainz so prav tako nožnice z robnimi okovi iz železa in iz bakrove zlitine.[194] Večina nožnic mečev tipa Mainz iz Slovenije ima železne robne okove,[195] ena pa iz bakrove zlitine.[196]

Ovalni okov na vrhu nožnice, okov ob ustju nožnice, prečni okovi, trikoten okov in zaključni gumb so pri nožnicah tipa Mainz iz bakrove ali izjemoma srebrove zlitine;[197] pri vseh treh primerkih, pri katerih je bila zlitina določena, ustreza čisti medenini.[198]

Za redke nožnice je v objavah navedeno, da sta ovalni okov na vrhu nožnice in okov ob ustju nožnice spajkana[199] oziroma da so spajkani presegajoči se zaključki prečnih okovov na hrbtni strani.[200] Ostanki spajkanja na hrbtni strani trikotnih okovov na koncu nožnice so omenjeni pri več nožnicah;[201] na enem okovu so ugotovili, da je bil prispajkan na robni okov.[202]

Na večini dobro ohranjenih nožnic se je na sprednji strani[203] ohranila tenka pločevina iz bakrove zlitine, ki je na licu pokositrena.[204] Pokositrenje pločevine na licu nožnice je bilo ugotovljeno tudi pri nožnici t. i. Tiberijevega meča, ki ga hrani Britanski muzej v Londonu, navedbe o vrsti kovine oziroma zlitine

181 Riederer 2001, 238–239.
182 Müller 2002, kat. 416, 418, 419, 421, 424; Riederer 2002a, 120.
183 Riederer 2001, 236–239.
184 Ščitniki iz bakrove zlitine, kositrenje ni omenjeno: Miks 2007, 661–662, t. 11, A463, A464, A478; verjetno tudi Miks 2007, 907–908, B328/40, 41, 46, 48, t. 158.
Pokositreni ščitniki iz bakrove zlitine: Miks 2007, 617–618, t. 10, 17, A318, A319. Mečem tipa Mainz pripadajo verjetno tudi Miks 2007, 907–908, B328/42–45, 47, t. 158.
185 Riederer 2002a, 120, pregl. 17: 424.
186 Müller 2002, 180, kat. 424.
187 Klein 2003b, 47–51, sl. 6a, b, 8, 9; Miks 2007, A75, A462, A463, A479, A480, A481.
188 Klein 2003b, 48–49, sl. 7b; Miks 2007, A479, A480; Deschler-Erb 1996b, 17–18 (najmlajša različica nožnic tipa Mainz, analize so pokazale, da so platice iz lipovega lesa).
189 Fingerlin 1986, 63, 82, F.O. 164/22, 211/5; Fingerlin 1998, 56, F.O. 788/11; Miks 2007, 834, B 154/30, 31, 34, t. 201, 202.
190 Fingerlin 1998, 80, 876/4; Miks 2007, 834, B154/36, t. 201, 202.
191 Harnecker 1997, 88, št. 768, 769 (omenja ostanke »brona« – domnevam, da so povezani z medeninastim gumbom na koncu nožnice), t. 72; Müller 2002, 180, št. 420, t. 38 (železen robni okov z zaključnim gumbom iz bakrove zlitine); Miks 2007, 821, B120/24, 25, 29, t. 201, 202.
192 Müller 2002, 180, št. 418, 419, 422, 423, t. 37, 38.
193 Riederer 2002a, 120, št. 418, 419.
194 »Bronast« robni okov: npr. Miks 2007, 657, A445 (datacija: po 45 po Kr.); železen robni okov: npr. Deschler-Erb 1996b, 17 (= Miks 2007, 761–762, A790 (klavdijsko-flavijski kontekst).
195 Poleg primerkov iz Ljubljanice npr. Guštin 1991, 16, t. 12: 3, t. 16: 2; Breščak 2015, 89–90, gr. 112, t. 22: 4; Gaspari et al. 2015, 132, 134–138, t. 1: 1–3, sl. 7.
196 Breščak 2015, 88, kat. 12.
197 Miks 2007, A50, A72, A75, A115, A318–A319, A457, A461–A466, A477–A481, A495–A496, A499, A501, A563, A783, A790, A802, B17,5, B18,6, B23,6–7, B30,2, B43,1–4, B96,1, B97, B120,7–22, B154,10–27, 32–33, B168,1, B177,11–26, B178,17, B230,1, B279,1–3, B300,3,4, B 328,52–65,115–116,138–145, B337,1, B341,5–6. Izjema so slabo ohranjeni odlomki prečnih okovov nožnice, ki je sodila k meču tipa Mainz iz gr. 25 na grobišču Kamieńczyk, za katere je v objavi navedeno, da so železni (Miks 2007, 629, A335, t. 19, z navedeno literaturo), kar pa bi kazalo preveriti. Pri slabo ohranjenih predmetih lahko razlikovanje železa od bakrove zlitine zahteva posebno pozornost restavratorja/konservatorja – pri predmetih iz Ljubljanice so bile npr. zakovice na nožnici bodala B3 prekrite s patino, ki je dajala vtis, da so železne.
198 Riederer 2002a, 120, pregl. 17, št. 416, 419, 421.
199 Miks 2007, A501, A480, A481.
200 Miks 2007, A563, A480, A75.
201 Unz 1973, 18–19, kat. 16–18, sl. 5: 16–18; Miks 2007, 913, B328/138, 140, 141, t. 188.
202 Von Detten, Schalles, Schreiter 1993, 201, Mil. 31, sl. 32, t. 33; Miks 2007, A802.
203 V opisu nožnice iz Rena pri Xantnu (von Detten, Schalles, Schreiter 1993, 201, t. 33, Mil. 31; Miks 2007, A802) je omenjena tanka pločevina iz bakrove zlitine na hrbtni (ne sprednji!) strani nožnice, vendar iz risbe v objavi ni razvidno, da je ta pločevina prekrivala hrbtni del nožnice. Ker bi to bila edina nožnica s pločevino na hrbtni strani, domnevam, da je tako kot pri ostalih nožnicah prekrivala sprednjo stran.
204 Klein 2003b, 46–51, sl. 5a, b, 7, 8; Miks 2007, A501, A464, A318, A563, A461, A462, A479, A480, A481, A75. Pri mlajših nožnicah tipa Mainz je ta pločevina reliefno okrašena in je bila na licu (delno?) pokositrena (Deschler-Erb 1996b, 17–18).

gustan period; this corresponds with the dating of the vast majority of Roman swords and scabbards from the Ljubljanica. The parallel cutting edges and the length of the blade, which shows no tapering at the surviving length of 500 mm, suggest a rather long and hence probably cavalry sword.

Only the hilt with a ring pommel and a small section of the very narrow blade survive of the A21 sword (*Pl. 6; Figs. A21.1, A21. 2*). It corresponds with the third subtype of ring-pommel hilts after Miks,[216] where the ring is slightly ellipsoid and the handguard not rectangular-sectioned, but conically thickened at both ends and in the centre.

The Roman army only used ring-pommel swords in the 2nd century, most commonly in its second half. Numerous examples of such swords were found outside the Roman state, as grave goods in Sarmatia and Germania Libera. It would seem that the Romans were introduced to such swords through their contacts with the peoples living beyond the Danube, possibly the Sarmatians encountered during Trajan's Dacian and Marcus Aurelius' Marcomannic wars.[217]

The construction of A21 sword is typical of the Roman swords with a ring pommel: the pommel and the upper part of the tang were made in one piece and subsequently pinned to the lower part of the tang that was forged in one with the blade (*Fig. A21.2*). In such swords, the pommel is actually only rarely hammered onto the tang. The ring pommels of Roman swords are predominantly of iron, rarely copper alloy and may bear inlaid decoration; they are associated with blades of different shapes.[218]

The MM A31 sword[219] (*Fig. 32*), which bears a pair of narrow parallel groves on the blade, could not be typologically attributed due to its poor state of preservation. It may have been of the Mainz type that has, albeit rarely, similar grooves on the blade.[220]

The MM A32 sword with a characteristically short point belongs to the Pompeii type (*Fig. 33*).[221] The rounded shape of the shoulders is probably the consequence of its poor state of preservation, as the Pompeii type swords usually have horizontal shoulders.[222]

The Pompeii type swords and scabbards were produced between the middle and the late 1st century and went out of use in the beginning of the 2nd century.[223]

Only the upper part survives of the MM A33 sword: tang and upper part of the 47 mm wide lenticular-sectioned blade that tapers towards the tip (it narrows roughly 3 mm per surviving length of 156 mm; *Fig. 34*).[224] There is a rectangular stamp on the blade with barely discernible first three letters: LEP (*Fig. 34c*).

A study on stamped Roman swords published in 1994 has shown that they bear Celtic, Latin or Greek names, probably of the sword makers or their superiors, written in Latin. It is mainly long swords, of 640 mm or over, of different types that are thus stamped. Most of the swords with name stamps were found outside the Roman state, at offering sites in the marshes of northern Europe, but they are nevertheless considered to be Roman products.[225]

Thirty-eight swords with name stamps and four swords with rectangular stamps without (surviving) names had been published up until 2003.[226] In 2007, another 27 swords with stamps were published, from the site of Illerup (Denmark).[227] The stamps are usually rectangular, rarely round and located either on the blade (in the upper part below the shoulders) or on the tang.

The sample is small (65 items) and incomplete as it is unclear how many of such Roman swords have not been published; however, it shows certain common traits that do not appear to be coincidental.

We know the site location for 62 swords with stamps. Two were found in graves dating to the time of the Roman conquests in areas west of the Rhine (Bell and

216 Miks 2007, 177–187, *Vortafel* D: 17.

217 Bishop, Coulston 2006, 133; Miks 2007, 180–197. In addition to the examples cited in Miks (l.c.), the dating into the 2nd century is supported by the ring-pommel sword from a grave at Ptuj (Istenič 2000c, 195–197, Gr. 600, Pl. 129: 5).

218 Miks 2007, 177–197, Pls. 177–183.

219 Gaspari 2002, Pl. 9.

220 Cf. Radman-Livaja 2004, Fig. 2, Pl. 10: 36; Miks 2007, Pl. 16: A477, Pl. 22: A380.

221 Gaspari 2002, 90–91, 289, Pl. 8: 5.

222 The 'classic' variant of the Pompeii type swords after Miks (2007, 65–67, Pls. 29–35). His Pompeii type includes two other variants (2007, 67–70, Pls. 35–45) that comprise swords considerably different from the 'classic' variant, which is in accordance with the definition of the Pompeii type given by Ulbert (1969a).

223 Miks 2007, 176–280; Ortisi 2015, 19–21. I followed Miks' dating for scabbards, which can be much more reliably attributed as to their type in comparison with swords.

224 Gaspari 2002, 91, 290, Pl. 9.

225 Rald 1994; Biborski, Ilkjær 2007, 305–306; Miks 2007, 138–139, Tab. 29.

226 Miks 2007, 138–139, Tab. 29 and corresponding pages in the catalogue. The stamp on the Miks A354 sword (Klein-Winternheim) is questionable. I therefore did not consider it in the statistics. The statistics do include two swords from Vechten-Bunnik (Netherlands) and Silchester (Great Britain), although there is a possibility, particularly for the sword from Silchester, that the stamps relate numbers rather than names. I also included the swords from Söttern and the Guttman Collection, the descriptions of which mention illegible stamps. Other swords with rectangular stamps, for which publications make no mention of letters (Miks 2007, A321,10, A146,25, A111, A321,31) are excluded.

227 Biborski, Ilkjær 2007, 296–298, 307–309, Tab. 59.

Figure 33
The MM A32 Pompeii type sword from the Ljubljanica at Vrhnika (the Dolge njive site), front (a) and back (b). Iron. Length 653 mm (blade 511 mm, tang 142 mm), surviving width 44 mm, blade thickness 7 mm (lenticular cross section), blade thickness at the thickened tip (roughly last 20 mm) 13 mm (diamond cross section); maximum tang thickness 8 mm (rectangular cross section), weight 448 g. The cutting edges may only survive at the point. City Museum of Ljubljana, Inv. No. 510: LJU;0057628.

Slika 33
Sprednja (a) in hrbtna (b) stran meča tipa Pompei MM A32 iz Ljubljanice pri Vrhniki, ledina Dolge njive. Železo. Dolžina 653 mm (rezilo 511 mm, ročajni trn 142 mm), ohranjena širina 44 mm, debelina rezila 7 mm (lečast presek), na zaključku konice (približno zadnjih 20 mm), ki je izrazito odebeljena, 13 mm (rombast presek); največja debelina ročajnega trna 8 mm (pravokoten presek), teža 448 g. Prvotni robovi rezila so morda ohranjeni le na konici. Mestni muzej Ljubljana, inv. št. 510: LJU;0057628.

a b

pločevine pa si v objavah nasprotujejo, zato ni jasno, ali je iz medenine[205] ali bakra.[206]

Primerjava mečev in nožnic tipa Mainz iz Ljubljanice s primerki z drugih najdišč torej nakazuje precej podobnosti v načinu izdelave, pa tudi izbiri materialov (kolikor je zadnje glede na stanje objavljenosti mogoče primerjati). Očitne razlike so pri robnih okovih, ki so pri primerkih iz Ljubljanice brez izjeme železni, pri nožnicah z drugih najdišč pa železni ali iz bakrove zlitine (medenine). Od primerkov iz Ljubljanice se razlikuje tudi edina ugotovljena zlitina ščitnika branika ročaja meča.

4.3 Drugi meči in nožnice (A19–A21, MM A31–A33)

Meč A19 (*t. 6; sl. A19.1–A19.2*) po obliki ramen in širini rezila ustreza tipu Mainz, vendar se od njega razlikuje po obliki rezila. Njegova prvotna robova (ostrini) nista ohranjena, a se zdi, da nista bila usločena, vsekakor pa je rezilo bistveno daljše kot pri mečih tipa Mainz, saj pri ohranjeni dolžini 413 mm še ni videti prehoda v konico.

Drugačen kot pri tipu Mainz (prim. pogl. 4.2.3) je tudi ščitnik branika ročaja tega meča. Narejen je iz zelo tenke pločevine (debelina 0,6 mm) iz čiste medenine, je raven in okrogle oziroma rahlo elipsaste oblike (dolžina 66 mm, širina 62 mm). Glede na objavljeno risbo podoben raven okrogel (premer je manjši: 44 mm) ščitnik iz tenke pločevine izvira iz ožje nepoznanih okoliščin na območju kanab v Vindonissi (Windisch, Švica); deli meča, ki mu je pripadal, niso poznani.[207] Okrogle oblike so izjemoma tudi ščitniki mečev tipa Mainz, vendar imajo značilno zapognjeno stranico z odebeljenim robom (MM A27; *sl. 28*; prim. pogl. 4.2.3) in so bistveno debelejši od ščitnika A19.

Zelo podobna krožna ploščica iz bakrove zlitine, kot je medeninasta ploščica na glaviču meča A19 (*sl. A19.2a*), je na vrhu ročaja meča tipa Mainz iz reke Save pri Dubravici (Srbija).[208]

Čista medenina,[209] iz katere sta ščitnik branika ročaja meča in spodnja ploščica (podložka) na glaviču A19,[210] ter značilna oblika ramen meča ne dopuščata dvoma o tem, da gre za rimski izdelek. Okrogla oblika

205 Klumbach 1970, 130.
206 Roberts 2009.
207 Unz, Deschler-Erb 1997, 16, št. 74, t. 6: 74; Miks 2007, B328, 50, 908, t. 157.
208 Vujović 2001, 119, 121, sl. 3.
209 Glej pogl. 4.1 (str. 35) in 17.1.
210 Glej pogl. 16, A19.

Söttern, Germany),[228] four on the frontier of the Roman state either in or at the Rhine (the Rhine at Bonn/*Bonna*, the Rhine at Neupotz – two swords, Vechten-Bunnik/*Fectio*) and a single one, with a stamp that probably indicates a number rather than a name, comes from a site within the Roman state (Silchester hoard, Great Britain).[229] The sites of all other swords with name stamps lie outside the Roman state. Most of them (45 examples) are cult sites in the marshes of northern Europe, most numerous in Denmark (such as Illerup Ådal, Nydam, Vimose),[230] nine were found in graves (Slovakia, Netherlands, Sweden and Poland),[231] one in a river (NE Germany).[232]

The two earliest swords with name stamps originate from the cemeteries at Wesołki (Poland) and Zemplín (Slovakia).[233] They are associated with scabbards bearing copper (or silver) alloy openwork decoration produced from roughly 40 to 15 BC, probably in Roman workshops for men of leading social strata outside the Roman state.[234] They are chronologically followed by the sword from the Late La Tène–Early Roman cemetery at Bell (Germany),[235] which formally corresponds with the Mainz type swords, while its length might indicate a connection with typological predecessors of this type. Two other swords with name stamps belong to the Mainz type,[236] while all others are of different types of swords with long blades, mostly variants of the Straubing-Nydham type after Miks. The dating for a large part of these is indicated by their archaeological contexts, which show the earliest derived from the second half of the 2nd, most from the 3rd century and none reliably later than the early 4th century.[237] They were used by cavalry and infantrymen.[238] A similar dating is suggested by the stamped swords from Illerup Ådal, most of which were unearthed in Sites A and B where deposition took place around 200 and 230, respectively.[239]

To sum up, the Roman swords with name stamps are of different types and dates, spanning from the final

a b

c

Figure 34
Upper part of the MM A33 sword from the Ljubljanica (exact findspot unknown), front (a), back (b), stamp (c). Iron. The tang (length 194 mm) has an oval to diamond-shaped cross section (thickness 6.5 mm) and a conical terminal. It survives together with the upper part of the blade (surviving length 156 mm, width 47 mm, thickness 5 mm, lenticular cross section) with well preserved tapering cutting edges. Total surviving length 350 mm, weight 212.8 g. The blade bears a poorly preserved rectangular stamp (height ca. 3 mm, length at least 10 mm) roughly 50 mm below the shoulder and parallel with the cutting edges. The sunken field contains an inscription with raised letters, of which the first three letters can be read as LEP. The inscription reads from tip to hilt. City Museum of Ljubljana, Inv. No. 510: LJU;0058640.

Slika 34
Zgornji del meča MM A33 iz Ljubljanice (podrobneje najdišče ni znano): a) spredaj, b) zadaj, c) pečat. Železo. Ohranjena sta cel ročajni trn (dolžina 194 mm), ki je zgoraj koničast in ima ovalen do rombičen presek (debelina 6,5 mm), ter zgornji del rezila (ohranjena dolžina 156 mm, širina 47 mm, debelina 5 mm, lečast presek), ki ima dobro ohranjena prvotna robova in se zožuje proti konici. Skupna ohranjena dolžina 350 mm, teža 212,8 g. Na rezilu, približno 50 mm pod rameni in vzporedno z robovoma, je slabo ohranjen pravokoten pečat (višina približno 3 mm, dolžina najmanj 10 mm). Na poglobljenem ozadju so slabo vidne reliefno rahlo dvignjene črke, od katerih so berljive le prve tri: LEP (najbolj zanesljivo je **čitanje** druge črke, najmanj pa tretje). Lega črk na pečatu kaže, da je orientiran v smeri od konice proti ročaju. Mestni muzej Ljubljana, inv. št. 510: LJU;0058640.

228 Miks 2007, Tab. 29: A677 (Söttern, Germany), A44 (Bell, Germany), A 520,7 (the Rhine at Neupotz, Germany), A61 (the Rhine at Bonn, Germany), A520,6 (Neupotz, Germany), A752 (Vechten-Bunnik, Netherlands).
229 Miks 2007, 138–139, Tab. 29: A654.
230 Biborski, Ilkjær 2007, 300–302; Miks 2007, 138–139, Tab. 29: A288, A320, A321,5, A536,8, A762,9, A51, A536,28, A536,17, A536,18, A536,42, A762,5, A536,43, A321,2, A321,4, A321,7, A321,70, A321,21, A321,33, A321,16.
231 Miks 2007, 138–139, Tab. 29: A814, A776, A611,2, A51, A543, A144, A238, A385, A686.
232 Miks 2007, 138–139, Tab. 29: A566,1; Istenič 2010, 161, 163–164, list: No. 17b – with references.
233 Miks 2007, A776 and A814, with references.
234 Istenič 2010, 142–146.
235 Miks 2007, 138, 543, Tab. 29: A44.
236 Miks 2007, 138, Tab. 29: A200, A677.
237 Miks 2007, 138–139, Tab. 29.
238 Bishop, Coulston 2006, 154.
239 Biborski, Ilkjær 2007, 13, 299–300.

ščitnika branika ročaja je morda zgolj po naključju podobna okroglim ščitnikom mečev tipa Mainz iz (srednje) avgustejske dobe, zato je datacija meča A19 nejasna. Ohranjeni del rezila kaže, da je bilo daljše kot pri mečih tipa Mainz in je imelo skoraj vzporedni stranici. Morda gre za konjeniški meč avgustejske dobe/1. stoletja ali pa za mlajši meč pešaka ali konjenika.

Meč A20 je imel dolgo rezilo z vzporednimi stranicami, usločena ramena ter izrazito ozek ovalen ščitnik branika ročaja iz zelo tenke pločevine (*t. 6; sl. A20.1–A20.3*). Ščitnik je narejen iz čiste oziroma sveže, tj. neposredno iz ingota pridobljene medenine,[211] kar govori za rimski izdelek.[212] Nerimska ljudstva namreč v rimski dobi niso izdelovala medenine, pri morebitnem pretapljanju rimskih medeninastih predmetov (npr. denarja, sponk, delov vojaške opreme) za izdelavo novih izdelkov pa bi bil delež cinka bistveno nižji.[213] Ščitnik je bil, tako kot pri mečih tipa Mainz, na spodnji strani pokositren (*sl. A20.2b*).[214] Po obliki, načinu izdelave (iz tenke pločevine) in merah zelo podoben raven ščitnik branika ročaja iz bakrove zlitine je med najdbami iz legijskega tabora Dangstetten.[215]

Ostanki nožnice meča A20 so tako slabo ohranjeni, da ni bilo mogoče ugotoviti, ali je bila nožnica iz lesa, ki ga je prepojila železova korozija, ali pa iz železa, kar bi kazalo na povezavo s keltskimi nožnicami.

Edini element za datacijo A20 je navedena paralela za ščitnik branika ročaja iz Dangstettna, ki govori za srednjeavgustejsko dobo, kar se ujema s časovno opredelitvijo številnih drugih rimskih mečev in nožnic iz Ljubljanice. Vzporedni stranici in dolžina rezila meča, ki pri ohranjeni dolžini 500 mm še ne kaže prehoda v konico, nakazujejo, da gre za precej dolg in zato verjetno konjeniški meč.

Od meča A21 (*t. 6; sl. A21.1, A21. 2*) sta ohranjena ročaj z obročastim glavičem in majhen del izrazito ozkega rezila. Po Miksovi tipologiji ustreza tretjemu podtipu ročajev z obročastim glavičem,[216] pri katerem je obročasti del elipsasto razpotegnjen, branik pa nima pravokotnega preseka, temveč je v sredini in ob straneh koničasto odebeljen.

Meči z ročaji, ki imajo obročast glavič, so v rimski oborožitvi omejeni na 2. stoletje, najpogostejši so v njegovi drugi polovici. Številne primerke so našli zunaj rimske države, v sarmatskih grobovih in grobovih svobodne Germanije. Zdi se, da so jih Rimljani spoznali v stikih z ljudstvi onkraj Donave, morda s Sarmati, s katerimi so prišli v stik med drugim med Trajanovimi dačanskimi vojnami in med markomanskimi vojnami.[217]

Meč A21 je narejen, kot je za rimske meče te vrste značilno: obročast glavič je skupaj z izkovanim jezikom glaviča narejen posebej, na jezik ročaja meča je pritrjen z zakovicami (*sl. A21.2*), kot je običajno – redko je namreč nakovan. Obročasti glaviči rimskih mečev so večinoma iz železa in so lahko okrašeni v tehniki tavširanja, redko pa so iz bakrove zlitine. Rezila mečev z obročastimi ročaji so različno oblikovana.[218]

Meča MM A31[219] (*sl. 32*), ki ima na rezilu ozka vzporedna žlebiča, zaradi slabe ohranjenosti ramen in rezila ni mogoče opredeliti. Ni izključeno, da je pripadal tipu Mainz, pri katerem (sicer redko) po rezilu tečeta podobna žlebiča.[220]

Tipu Pompei pripada meč MM A32 z značilno kratko konico (*sl. 33*).[221] Zaobljena ramena so verjetno posledica slabe ohranjenosti. Meči tipa Pompeji imajo namreč običajno vodoravna in ostro od ročajnega jezika ločena ramena.[222] Nožnice in meče tipa Pompeji so izdelovali od sredine do poznega 1. st., na začetku 2. stoletja pa so izginili iz obtoka.[223]

Od meča MM A33 je ohranjen zgornji del: ročajni trn in zgornji del 47 mm širokega rezila z lečastim presekom, ki se oži proti konici (na ohranjeni dolžini 156 mm se zoži za približno 3 mm; *sl. 34*).[224] Za opredelitev meča je pomemben na rezilu vtisnjen pravokoten žig, na katerem s težavo razberem prve tri črke: LEP (*sl. 34c*).

Iz leta 1994 objavljene študije o rimskih mečih s pečati izhaja, da so na njih z latinskimi črkami zapisana keltska, latinska ali grška imena, verjetno izdelovalcev mečev ali njihovih nadrejenih. Pečate imajo v glavnem

211 Glej pogl. 16, A20.
212 Prim. pogl. 17.1.
213 Glej pogl. 17.1. Caley (1964, 99, 100) ocenjuje, da se je pri vsakem taljenju rimske čiste medenine vsebnost cinka v njej zmanjšala za pribl. 10 %.
214 Glej pogl. 16, A20.
215 Fingerlin 1998, FO 1234/3; Miks 2007, 833, t. 158/B154.
216 Miks 2007, 177–187, predtabla D: 17.
217 Bishop, Coulston 2006, 133; Miks 2007, 180–197. Poleg primerkov, ki jih navaja Miks (l.c.), za datacijo v 2. stoletje govori meč z obročastim ročajem iz groba na Ptuju (Istenič 2000c, 195–197, gr. 600, t. 129: 5).
218 Miks 2007, 177–197, t. 177–183.
219 Gaspari 2002, t. 9.
220 Prim. Radman-Livaja 2004, sl. 2, t. 10: 36; Miks 2007, t. 16: A477, t. 22: A380.
221 Gaspari 2002, 90–91, 289, t. 8: 5.
222 »Klasična« različica mečev tipa Pompei po Miksu (2007, 65–67, t. 29–35). Miks (2007, 67–70, t. 35–45) k tipu Pompei prišteva še dve različici, med katerima so meči, ki močno odstopajo od »klasične« različice in od osnovne definicije, ki jo je postavil Ulbert (1969a).
223 Miks 2007, 176–280; Ortisi 2015, 19–21. Upoštevala sem Miksovo datacijo nožnic, kajti pri teh je opredelitev tipa v primerjavi z meči dosti bolj zanesljiva.
224 Gaspari 2002, 91, 290, t. 9: 9.

decades BC to the early 4th century, being by far the most common in the 3rd century. A single such sword was found inside the Roman state (possibly stamped with a number rather than a name), rare examples originate from frontier zone and the great majority from areas and regions outside it. This suggests that stamping was mainly associated with the swords, more precisely tanged blades without the finished hilt,[240] which were intended for clients outside the Roman state where the swords were subsequently fitted with grips. The stamp presumably functioned as a proof of origin and associated quality. The Roman export of weapons to Barbaricum was probably linked with the Roman foreign policy that included military and other support, as well as diplomatic gifts to select political entities beyond the frontiers.[241]

To return to the Ljubljanica, the typological and chronological attribution of the MM A33 sword is hindered by the fact that a large part of it is missing. The surviving part of the blade and the shoulder-tang junction appear similar to that on a sword from Iža (Slovakia), the site of a Roman fort from the time of the Marcomannic wars, more precisely the second half of the 170s.[242]

240 Biborski, Ilkjær 2007, 306.
241 Cf. James 2011.
242 Rájtar 1994, 83, Fig. 3: 1; dating of the fort: Rájtar 1992, 162, 167.

dolgi meči (dolžina rezila 640 mm in več) različnih tipov. Redki meči z imenskimi pečati so bili najdeni v rimski državi, razmeroma številni pa zunaj nje, največ na daritvenih mestih v močvirjih v severni Evropi. Kljub temu so meči z imenskimi pečati verjetno rimski izdelki.[225]

Do leta 2003 je bilo objavljenih 38 mečev z imenskimi pečati praviloma pravokotne in redko krožne oblike ter štirje meči s pravokotnimi pečati, na katerih so morda bili imenski pečati, a se niso ohranili.[226] Prišteti je treba še 27 mečev iz Illerupa (Danska), objavljenih leta 2007.[227] Pečati so na rezilih mečev (v zgornjem delu, pod rameni) ali na ročajnem trnu.

Vzorec je majhen (65 mečev) in pomanjkljiv (ni jasno, koliko rimskih mečev z imenskimi pečati ni objavljenih), vendar kaže poteze, ki se ne zdijo slučajne.

Za 62 mečev poznamo najdišča. Dva meča sta bila najdena v grobovih iz obdobja rimskega osvajanja območij zahodno od Rena (Bell in Söttern, Nemčija),[228] štirje na meji rimske države – v reki Ren ali ob njej (najdišča: Ren v Bonnu/*Bonna*, Ren v Neupotzu – dva meča, Vechten-Bunnik/*Fectio*) in le eden – na pečatu je verjetno odtisnjena številka, ne ime – v notranjosti rimske države (meč iz depoja, najden v Silchestru, Velika Britanija).[229] Najdišča ostalih mečev z imenskimi pečati so zunaj rimske države. Med njimi je daleč največ (45 primerkov) s kultnih mest v močvirjih severne Evrope, predvsem na Danskem (npr. Illerup Ådal, Nydam, Vimose);[230] devet mečev izvira iz grobov (Slovaška, Nizozemska, Švedska in Poljska),[231] eden pa iz reke (severovzhod Nemčije).[232]

Najstarejša meča s pečatom sta z grobišč Wesołki (Poljska) in Zemplín (Slovaška).[233] Povezana sta z nožnicama s predrtim okrasom iz bakrove zlitine, ki so jih izdelovali od ok. 40 do 15 pr. Kr., verjetno v rimskih delavnicah in za odjemalce zunaj rimske države, predvsem za vodilni sloj.[234] Časovno jima sledi meč s poznolatensko-zgodnjerimskega grobišča Bell (Nemčija),[235] ki po obliki ustreza mečem tipa Mainz, njegova dolžina pa morda nakazuje povezave s tipološkimi predhodniki tega tipa. Tipu Mainz pripadata še dva meča s pečatom.[236] Ostali primerki sodijo k različnim vrstam mečev z dolgimi rezili, največ k različicam tipa Straubing-Nydham po Miksu. Za večino teh primerkov datacijo nakazujejo najdiščne okoliščine: najstarejši meč je iz druge polovice 2. st., večina iz 3. st., nobeden pa ni zanesljivo mlajši od začetka 4. st.[237] Uporabljali so jih konjeniki in pešaki.[238] Podobno datacijo kažejo meči s pečati z najdišča Illerup Ådal: izvirajo v glavnem z mest A in B, kjer so predmete odlagali okrog leta 200 oziroma 230.[239]

Imenski pečati so torej na rimskih mečih različnih tipov in datacij, od zadnjih desetletij pr. Kr. do začetka 4. st., daleč najpogostejši pa so na mečih iz 3. st. Znotraj rimske države je bil najden le en tak meč (pa še na tem je v pečatu verjetno številka, ne ime), redki na meji, ogromna večina pa zunaj nje. To navaja k domnevi, da so pečatili predvsem meče (rezila z ročajnim jezikom, torej brez izdelanega ročaja[240]), ki so bili namenjeni odjemalcem zunaj rimske države, kjer so dodali ročajne obloge; pečat je bil verjetno pokazatelj izvora in z njo povezane kvalitete. Pomemben del rimskega izvoza orožja v barbarik je bil verjetno povezan z rimsko zunanjo politiko, ki je vključevala vojaško in drugo podporo ter diplomatska darila izbranim političnim skupnostim v ožjem ali širšem zaledju meja rimske države.[241]

Tipološka in časovna opredelitev meča MM A33 je težavna, ker ga velik del manjka. Ohranjeni del rezila in prehod v ročajni trn se zdita podobna meču iz Iže (Slovaška), rimskega vojaškega tabora iz časa markomanskih vojn, natančneje druge polovice sedemdesetih let 2. stoletja.[242]

225 Rald 1994; Biborski, Ilkjær 2007, 305–306; Miks 2007, 138–139, pregl. 29.

226 Miks 2007, 138–139, pregl. 29 in ustrezne strani v katalogu. Pečat na meču A354 (Klein-Winternheim) je vprašljiv, zato ga v statistiki nisem upoštevala. V statistiko mečev z imenskim pečatom pa sem vključila meča z najdišč Vechten-Bunnik (Nizozemska) in Silchester (Velika Britanija), čeprav (predvsem pri primerku iz Silchestra) ni izključeno, da napisa podajata številki in ne imena. Prav tako sem upoštevala meč iz Söterna in iz zbirke Guttman, pri katerih je v opisih navedeno, da pečata nista čitljiva. Ostalih mečev s pravokotnimi pečati, pri katerih črke niso omenjene (Miks 2007, A321,10, A146,25, A111, A321,31), nisem vključila v statistiko mečev z imenskimi pečati.

227 Biborski, Ilkjær 2007, 296–298, 307–309, pregl. 59.

228 Miks 2007, pregl. 29: A677 (Söttern, Nemčija), A44 (Bell, Nemčija), A 520,7 (Ren pri Neupotzu, Nemčija), A61 (Ren pri Bonnu, Nemčija), A520,6 (Neupotz, Nemčija), A752 (Vechten-Bunnik, Nizozemska).

229 Miks 2007, 138–139, pregl. 29: A654.

230 Biborski, Ilkjær 2007, 300–302; Miks 2007, 138–139, pregl. 29: A288, A320, A321,5, A536,8, A762,9, A51, A536,28, A536,17, A536,18, A536,42, A762,5, A536,43, A321,2, A321,4, A321,7, A321,70, A321,21, A321,33, A321,16.

231 Miks 2007, 138–139, pregl. 29: A814, A776, A611,2, A51, A543, A144, A238, A385, A686.

232 Miks 2007, 138–139, pregl. 29: A566,1; Istenič 2010, 161, 163–164, seznam: št. 17b – z navedeno literaturo.

233 Miks 2007, A776 in A814 – z navedeno literaturo.

234 Istenič 2010, 159–172.

235 Miks 2007, 138, 543, pregl. 29: A44.

236 Miks 2007, 138, pregl. 29: A200, A677.

237 Miks 2007, 138–139, pregl. 29.

238 Bishop, Coulston 2006, 154.

239 Biborski, Ilkjær 2007, 13, 299–300.

240 Biborski, Ilkjær 2007, 306.

241 Prim. James 2011.

242 Rájtar 1994, 83, sl. 3: 1; datacija tabora: Rájtar 1992, 162, 167.

5
Daggers and sheaths

5.1 Typo-chronological development of daggers and their sheaths in the Republican period and the Early Principate

Daggers were a standard piece of equipment of Roman soldiers serving in the infantry (legionaries and members of auxiliary units) and probably also cavalry. Most of the surviving Roman daggers or their sheaths date to the last two decades BC and the 1st century AD.[243]

The earliest Roman daggers have a round pommel.[244] They were influenced by the daggers that the warriors of the Iberian Peninsula used from the late 4th/early 3rd century BC, when engaged in lengthy wars with the Romans.[245] It has generally been accepted that the Roman daggers adopted their form, as well as techniques of manufacture and decoration,[246] from the Iberian/Celto-Iberian daggers.[247] In fact, the similarity is such that it is not possible to reliably distinguish between Roman and Iberian daggers with a round pommel recovered from the Roman forts of the 2nd and 1st centuries in Spain.[248]

In the Caesarean period at the latest, the Romans were making and using daggers with a round pommel simultaneously with those bearing a cross-like pommel. We know this because of their joint depiction on Roman coins minted in 43 or 42 BC that carried a clear propaganda message: the assassination of Caesar freed the Roman state (*Fig. 35*). Both dagger types were still in use in the Middle Augustan period.[249]

The Iberian daggers were associated with wood/leather sheaths with an open metal binding (similar to the scabbards of the Mainz type swords in construction) that included the guttering, suspension and crossbands, often also sheet metal plates.[250] Few Roman daggers are associated with sheaths of this type; one is a dagger with a cross-shaped pommel from Taranto (Italy; dating: 50s–20s BC)[251] and two with a semicircular and rectangular pommels, respectively (from Titelberg in Luxembourg[252] and Palencia in Spain[253]); the dagger with a round pommel and a sheath with an open metal binding from El Molón (Spain) may also be Roman.[254] In addition, sheaths with an open metal binding or their parts, which most likely belonged to

243 Scott 1985; Obmann 2000.

244 Most are known from Spain, where it is believed that Roman soldiers began using such daggers (which were probably not yet Roman products) in the second half of the 2nd century BC at the latest (Fernández Ibáñez 2008, 95–98, 107–111, Figs. 2–7; Fernández Ibáñez, Kavanagh de Prado, Vega Avelaira 2012). Others were found in the River Saône (Connolly 1997, 56–57, Fig. 13, N), the Middle Augustan fort at Oberaden (Albrecht 1942, 160, Pls. 52, 6, 6a; Römer in Westfalen 1989, Figs. 50, 87) and near Štanjel, western Slovenia (Istenič 2009a).

245 Cf. Kavanagh de Prado, Quesada Sanz, 2006; Kavanagh de Prado 2008; Fernández Ibáñez, Kavanagh de Prado, Vega Avelaira 2012, 202–205; Kavanagh 2016.

246 Istenič 2009a, 336–339.

247 Cf. Ch. 4.1, Fn. 62.

248 Fernández Ibáñez, Kavanagh de Prado, Vega Avelaira 2012, 203–204.

249 Mackensen 2001, 352–353, Fig. 5: 1; Istenič 2009a, 339. The handle of the dagger with a round pommel from the Roman fortress at Herrera de Pisuerga (Spain) was most probably an antique item at the time of the fortress' use in the Augustan–Tiberian period (Fernández Ibáñez, Kavanagh de Prado, Vega Avelaira 2012, 205–207, Fig. 3: 7).

250 Schüle 1969, Pls. 37: 2, 43: 1, 57: 1, 8, 115: 1, 166: 1, 2; Quesada Sanz 1997, 280–281, Figs. 164–165. For an Iberian or Roman dagger with a round pommel and a sheath with an open metal binding, see: Fernández Ibáñez, Kavanagh de Prado, Vega Avelaira 2012, Fig. 3: 6. Kavanagh de Prado and Quesada Sanz (Kavanagh de Prado, Quesada Sanz 2006; Kavanagh de Prado 2008; Kavanagh 2016) see further similarities between the pre-Roman sheaths on the Iberian Peninsula and the Roman dagger sheaths.

251 Mackensen 2001, 353, 354, Fig. 2: 1, 5. Its dating is based on the depictions on silver coins minted in 43/42 BC (*Fig. 35*) and 25/23 BC, as well as on the dagger with a cross-shaped pommel from Oberaden (Albrecht 1942, Pl. 52: 8; Mackensen 2001, 349, Fig. 3: 1).

252 Metzler 1995, 348–350, Figs. 185–186; Mackensen 2001, Fig. 2: 5, 6.

253 Fernández Ibáñez 2008, 97, 104, Cat. No. 25, Figs. 8–10.

254 Fernández Ibáñez, Kavanagh de Prado, Vega Avelaira 2012, Fig. 3: 6.

5
Bodala in nožnice

5.1 Tipološko-kronološki razvoj bodal in nožnic republikanske dobe in zgodnjega principata

Bodala so bila ustaljen del opreme rimskih vojakov, pešcev (legionarjev in pripadnikov pomožnih enot) ter verjetno tudi konjenikov. Največ ohranjenih bodal oziroma njihovih nožnic je iz zadnjih dveh desetletij pr. Kr. in 1. stoletja po Kr.[243]

Najstarejša rimska bodala imajo krožen ploščat zaključek ročaja (glavič).[244] Na njih so močno vplivala bodala z enakim glavičem, ki so jih ob koncu 4. ali začetku 3. st. pr. Kr. začeli uporabljati domačini na Iberskem polotoku, kjer so bili Rimljani zapleteni v dolgotrajne vojne.[245] Rimska bodala so od iberskih[246] prevzela obliko, zgradbo in tavširan okras.[247] Podobnost rimskih in iberskih bodal z okroglim ploščatim ročajem je tako velika, da med najdbami iz rimskih taborov 2. in 1. st. pr. Kr. v Španiji ne znamo zanesljivo razlikovati rimskih in iberskih izdelkov.[248]

Najkasneje v Cezarjevi dobi so Rimljani izdelovali in uporabljali bodala s krožnim in bodala s križnim glavičem, saj so z njimi ubili Cezarja. Taka bodala so namreč upodobljena na leta 43 ali 42 pr. Kr. kovanih rimskih novcih z jasnim propagandnim sporočilom: z ubojem Cezarja je bila osvobojena rimska država (*sl. 35*). Bodala s krožnim in bodala s križnim glavičem so bila v obtoku še v srednjeavgustejski dobi.[249]

K iberskim bodalom so sodile t. i. okviraste nožnice (ki so po zgradbi podobne nožnicam mečev tipa Mainz), pri katerih je bila nožnica iz organskega materiala, kovinski pa so bili njen okvir, prečne povezave ter pogosto tudi obloga iz pločevine.[250] Take nožnice poznamo tudi v povezavi z redkimi rimskimi bodali: z bodalom s križnim glavičem iz Tarenta (Italija; datacija: 5.–2. desetletje pr. Kr.)[251] in z dvema bodaloma s polkrožnim do pravokotnim glavičem (najdišči: Titelberg v Luksemburgu[252] in Palencia v Španiji[253]); morda je rimsko tudi bodalo s krožnim glavičem z okvirasto nožnico z najdišča El Molón (Španija).[254] Poleg tega so okviraste nožnice (oz. njihovi deli), ki so najverjetneje sodile k bodalom, med najdbami iz tabora v Dangstettnu.[255] To me napeljuje k domnevi, da so v okvirastih nožnicah nosili rimska predavgustejska, zgodnjeavgustejska in verjetno še del

243 Scott 1985; Obmann 2000.

244 Največ jih poznamo iz Španije, kjer se zdi, da so rimski vojaki taka bodala (ki pa verjetno še niso bila rimski izdelki) začeli uporabljati najkasneje v drugi polovici 2. st. pr. Kr. (Fernández Ibáñez 2008, 95–98, 107–111, sl. 2–7; Fernández Ibáñez, Kavanagh de Prado, Vega Avelaira 2012). Sicer izvirajo še iz Saône (Connolly 1997, 56–57, Fig. 13, N), srednjeavgustejskega tabora v Oberadnu (Albrecht 1942, 160, t. 52, 6, 6a; Römer in Westfalen 1989, sl. 50, 87) in okolice Štanjela v zahodni Sloveniji (Istenič 2009a).

245 Prim. Kavanagh de Prado, Quesada Sanz, 2006; Kavanagh de Prado 2008; Fernández Ibáñez, Kavanagh de Prado, Vega Avelaira 2012, 202–205; Kavanagh 2016.

246 Prim. pogl. 4.1, op. 62.

247 Istenič 2009a, 336–339.

248 Fernández Ibáñez, Kavanagh de Prado, Vega Avelaira 2012, 203–204.

249 Mackensen 2001, 352–353, fig. 5: 1; Istenič 2009a, 339. Ročaj bodala s krožnim ploščatim glavičem iz legijskega tabora Herrera de Pisuerga (Španija) je bil v avgustejsko-tiberijski dobi (Fernández Ibáñez, Kavanagh de Prado, Vega Avelaira 2012, 205–207, sl. 3: 7), ko je bil tabor v uporabi, najverjetneje star predmet.

250 Schüle 1969, t. 37: 2, 43: 1, 57: 1, 8, 115: 1, 166: 1, 2; Quesada Sanz 1997, 280–281, sl. 164–165. Bodalo (ibersko ali rimsko?) s ploščatim glavičem in okvirasto nožnico: Fernández Ibáñez, Kavanagh de Prado, Vega Avelaira 2012, sl. 3: 6. Več podobnosti med predrimskimi nožnicami na Iberskem polotoku in rimskimi nožnicami bodal vidita Kavanagh de Prado in Quesada Sanz (Kavanagh de Prado, Quesada Sanz 2006; Kavanagh de Prado 2008; Kavanagh 2016).

251 Mackensen 2001, 353, 354, sl. 2: 1, 5. Elementi za datacijo: upodobitev na srebrnikih, kovanih 43/42 pr. Kr. (*sl. 35*) in 25/23 pr. Kr., ter bodalo s križnim glavičem iz Oberadna (Albrecht 1942, t. 52: 8; Mackensen 2001, 349, sl. 3: 1).

252 Metzler 1995, 348–350, sl. 185–186; Mackensen 2001, sl. 2: 5, 6.

253 Fernández Ibáñez 2008, 97, 104, kat. 25, sl. 8–10.

254 Fernández Ibáñez, Kavanagh de Prado, Vega Avelaira 2012, sl. 3: 6.

255 Fingerlin 1986, 74, 101, najdišči 188/11, 280/5; Fingerlin 1998, 124, najdišče 1034/2.

daggers, were found at Dangstetten.[255] This suggests that such sheaths carried Roman daggers, including the earliest daggers with semicircular pommels, from the pre-Augustan, Early Augustan and probably partly the Middle Augustan periods.[256]

The daggers with a round pommel led to the development of daggers with a semicircular pommel. These were used with metal sheaths that do not have Iberian predecessors. Scott published a typology of these daggers and sheaths in 1985, which is still valid with the exception of some of his views that call for a revision, notably chronological. Scott's basic division, into metal sheaths with a wood or leather liner (Type A) and sheaths made of wood and leather with decorated iron plates fixed to the front (Type B), was adopted by Obmann (as Types Mainz and Vindonissa). Both authors subdivided their types based on decoration, but there are certain differences in their subtypes.[257]

The earliest daggers with a semicircular pommel and/or associated metal sheaths are known from the Middle Augustan fortresses at Dangstetten[258] and Oberaden,[259] as well as from Basel-Münsterhügel, a site that yielded several examples presumably contemporaneous with the finds from Pit 7 at the same site,[260] which is also Middle Augustan.[261] Further evidence for the daggers with a semicircular pommel or associated sheaths from the Middle Augustan period comes from *Raum* OR/17 at Magdalensberg.[262]

The above indicates that the daggers with a semicircular pommel and associated sheaths began to be produced at the latest at the beginning of the Middle Augustan period. A large portion of the Roman daggers with a semicircular pommel and associated scabbards bear enamel decoration, which appears in the Late Augustan period at the latest,[263] but more likely already in the Middle Augustan period and is most probably a Celtic influence that can simultaneously be observed on the Weisenau helmets.[264]

Figure 35

Reverse of the *denarii* and gold coins that Marcus Junius Brutus (his head in profile immortalised on the obverse), one of the three leaders in the successful conspiracy that assassinated Caesar, had minted in either 43 or, more likely, 42 BC. Scale ca. 2 : 1.

Two daggers are depicted, one with a cross-shaped pommel and the other with a round pommel and a swelling below it, but with identical blades of a waisted form with a pronounced midrib.

The daggers refer to Caesar's assassination, in which a group of senators used their daggers to kill him. Shown between the daggers is a *pileus*, symbol of freedom and the Dioscuri as saviours of Rome, that together with the daggers and the legend EID(ibus) MAR(tiis) convey the coin's propaganda message of Brutus liberating the Roman state by leading the assassination of Caesar.

Slika 35

Risba hrbtne strani denarijev in zlatnikov, ki jih je dal leta 43 ali verjetneje 42 pr. Kr. kovati Mark Junij Brut (profil njegove glave je ovekovečen na sprednji strani novcev), eden izmed treh voditeljev uspešne zarote proti Cezarju. Merilo približno 2 : 1.

Upodobljeni sta dve bodali: eno s križnim glavičem in drugo s krožnim glavičem in nakazano odebelitvijo v sredini ročaja. Rezili obeh bodal sta enaki in imata izrazito sredinsko rebro.

Bodali se nanašata na Cezarjev umor (skupina senatorjev ga je zabodla z bodali). Med bodaloma je *pileus* (simbol svobode in Dioskurov – rešiteljev Rima), ki skupaj z bodaloma in legendo EID(ibus) MAR(tiis) jasno izraža propagandno sporočilo novca: Brut je s Cezarjevim umorom, ki ga je vodil, osvobodil rimsko državo.

The daggers in the Augustan period had flat tangs. They were replaced, probably at the end of Claudius' or early into Nero's reign, by daggers with a rod tang;[265] the latter are not among the finds from the Ljubljanica.

Metal sheaths were produced to the Claudian period.[266] At least from the Tiberian period onwards, daggers with a semicircular pommel were also associated with other types of sheaths, made of organic materials (wood) and fitted with metal plates on the front and back (Type B after Scott or Type Vindonissa after Obmann).[267]

The River Ljubljanica yielded three daggers with associated sheaths (B1–B3) and one without it (B4). They are all Early Imperial daggers with a semicircular pommel in metal sheaths with a wood liner (Type A after Scott).[268]

255 Fingerlin 1986, 74, 101, *Fundstellen* 188/11, 280/5; Fingerlin 1998, 124, *Fundstelle* 1034/2.

256 The copper alloy frame sheath from Saintes-Maries-de-la Mer, formally similar to the Titelberg sheath, was recovered without the associated dagger. It was among the artefacts washed ashore, presumably from an anchoring place at the mouth of one of the branches of the River Rhône (Teyssier 2009, 350–351, Cat. No. 4).

257 Scott 1985, 165–173; Obmann 2000, 6–10.

258 Fingerlin 1986, 78–79, 152, *Fundstellen* 207/3, 420/2; Fingerlin 1998, 19, 108, 143, 150, *Fundstellen* 550/9, 972/5, 1143/5; possibly also the daggers in Fingerlin 1986, *Fundstelle* 552/8 and Fingerlin 1998, *Fundstelle* 112/4, with a missing pommel. For dating, see Ch. 3.

259 Albrecht 1942, 160, Pl. 52: 1, 3–5, 9; possibly also Kühlborn 1992, 147, Pl. 34: 66. For dating, see Ch. 3.

260 Helmig 1990, 158–160; Berger, Helmig 1991, Fig. 9: 9.

261 Roth-Rubi 2006, 103, 117–118.

262 Dolenz, Flügel, Öllerer 1995, 64, 70, 74, Figs. 7: 11, 13: 98, 15: 124. Discussed in detail in Ch. 5.2.

263 See Ch. 5.3.

264 Cf. the helmet with iron rivets and pronounced sunken parts probably intended to take enamel, from Grave 1 at Verdun, Slovenia: Breščak 2015, 85, Pls. 4–6 (enamel not mentioned in the description).

265 Scott 1985, 162–163.

266 Scott 1985, 165, 166.

267 Scott 1985, 166; Obmann 2000, 6. Dolenz, Flügel and Öllerer (1995, 70, 74, Figs. 12, 15, Cat. Nos. 73 and 113) mention two 'bronze' loops of a dagger sheath among the finds from the Middle Augustan work/repair shop at Magdalensberg. However, I believe this interpretation of the two items to be rather questionable as the volutes on such loops are contiguous and curve in a more pronounced manner. In addition, such suspension loops would belong to dagger sheaths of Scott's Type B or Obmann's Type Vindonissa, the production of which has not been documented prior to the Tiberian period.

268 Scott 1985, 160–167.

srednjeavgustejskih bodal, vključno z najzgodnejšimi bodali s polkrožnim ploščatim glavičem.[256]

Iz bodal z okroglim ploščatim glavičem izhajajo bodala s polkrožnim ploščatim glavičem. Nosili so jih v glavnem v polnokovinskih nožnicah, ki nimajo iberskih vzorov. Za ta bodala in nožnice je Scott leta 1985 objavil tipologijo, ki je za zdaj še vedno najboljša, čeprav je del njegovih mnenj, npr. glede datacij, treba revidirati. Scottovo osnovno delitev nožnic na polnokovinske (tip A) in take iz organskega materiala, pri katerih so bile kovinske le obloge (tip B), je prevzel Obmann (tipa Mainz in Vindonissa). Njuni podrobnejši tipologiji nožnic temeljita na okrasu in se razlikujeta.[257]

Najstarejša bodala s polkrožnim glavičem in/ali njim pripadajoče polnokovinske nožnice poznamo iz srednjeavgustejskih legijskih taborov v Dangstettnu[258] in Oberadnu[259] ter z najdišča Basel-Münsterhügel, kjer so verjetno sočasna z najdbami iz jame 7,[260] ki je prav tako srednjeavgustejska.[261] Na Štalenski gori, v prostoru OR/17, so – med drugimi predmeti, ki kažejo na srednjeavgustejsko delavnico oziroma popravljalnico rimske vojaške opreme – našli zanke za pripenjanje nožnic bodal in zakovice z reliefno okrašenimi glavicami iz bakrove zlitine,[262] kakršne poznamo z bodal (in nožnice) B3 in B4 ter jih podrobno obravnavam v pogl. 5.2.

Iz navedenega izhaja, da so bodala s polkrožnim zaključkom ročaja in pripadajoče polnokovinske nožnice začeli izdelovati najkasneje na začetku srednjeavgustejske dobe, ko so bili še v uporabi starejši tipi bodal (bodala s krožnim ploščatim in s križnim glavičem) in nožnic (t. i. okviraste nožnice). Velik del bodal s polkrožnim zaključkom ročaja in njihovih nožnic ima, verjetno od srednjeavgustejske in gotovo od poznoavgustejske dobe dalje emajliran okras;[263] najverjetneje je keltski vpliv, ki ga sočasno lahko opazujemo na čeladah tipa Weisenau.[264]

Bodala avgustejske dobe so imela ročajne jezike. Verjetno ob koncu Klavdijeve ali v začetku Neronove vlade so jih zamenjala bodala z ročajnim trnom,[265] ki jih med najdbami iz reke Ljubljanice ni.

Polnokovinske nožnice so izdelovali do vključno klavdijskega časa.[266] Najkasneje od tiberijske dobe so z bodali s polkrožnim zaključkom ročaja uporabljali tudi drugačne nožnice, ki so bile iz organskega materiala (lesa) ter so imele na sprednji in hrbtni strani kovinsko oblogo (nožnice tipa B po Scottu oz. tipa Vindonissa po Obmannu).[267]

Iz Ljubljanice poznamo tri bodala s pripadajočimi nožnicami (B1–B3) in eno bodalo brez nožnice (B4). Sodijo k zgodnjecesarskim bodalom s polkrožnim zaključkom oz. k polnokovinskim nožnicam, ki so bile podložene z lesom (tip A po Scottu).[268]

5.2 Bodala in nožnice z medeninastimi zakovicami (skupina Dangstetten; B3–B4)

Bodalo B4 in nožnica z bodalom B3 imajo medeninaste zakovice in medeninaste zanke, ki so držale obročke za obešanje nožnice. Glavice zakovic imajo dvignjen rob in izbočeno bunkico v sredini ter niso bile emajlirane. Zlato sijoče medeninaste zanke in zakovice so železno nožnico krasile.

Uporaba bakrove zlitine za zanke in zakovice odstopa od večine polnokovinskih nožnic (tip A po Scottu, tip Mainz po Obmannu) in njim pripadajočih bodal s polkrožnim zaključkom držaja. Zanje so namreč značilne železne zakovice z emajliranim okrasom in železne zanke za pripenjanje nožnic na pas.[269] Podrobna obravnava bodal in nožnic z zakovicami in zankami iz bakrove zlitine je pokazala, da sestavljajo homogeno skupino (po oblikovnih značilnostih in

256 Za okvirasto nožnico iz bakrove zlitine iz Saintes-Maries-de-la Mer, ki je po obliki podobna nožnici iz Titelberga, ne vemo, kakšnemu bodalu je pripadala. Najdena je bila med naplavljenimi najdbami, za katere domnevajo, da izvirajo iz sidrišča ob izlivu enega od rokavov reke Rone (Rhône) v morje (Teyssier 2009, 350–351, kat. 4).

257 Scott 1985, 165–173; Obmann 2000, 6–10.

258 Fingerlin 1986, 78–79, 152, najdišča 207/3, 420/2; Fingerlin 1998, 19, 108, 143, 150, najdišča 550/9, 972/5, 1143/5; morda tudi bodali Fingerlin 1986, najdišče 552/8, in Fingerlin 1998, najdišče 112/4, pri katerih zaključek ročaja ni ohranjen. Datacija: 3. pogl.

259 Albrecht 1942, 160, t. 52: 1, 3–5, 9; morda tudi Kühlborn 1992, 147, t. 34: 66. Datacija: 3. pogl.

260 Helmig 1990, 158–160; Berger, Helmig 1991, sl. 9: 9.

261 Roth-Rubi 2006, 103, 117–118.

262 Dolenz, Flügel, Öllerer 1995, 64, 70, 74, sl. 7: 11, 13: 98, 15: 124. Prim. pogl. 5.2.

263 Glej pogl. 5.3.

264 Prim. čelado z železnimi zakovicami, ki imajo izrazite vdolbine, v katerih je bil najverjetneje emajl iz gr. 1 v Verdunu: Breščak 2015, 85, t. 4–6 (emajl v opisu ni omenjen).

265 Scott 1985, 162–163.

266 Scott 1985, 165, 166.

267 Scott 1985, 166; Obmann 2000, 6. Dolenz, Flügel, Öllerer (1995, 70, 74, sl. 12, 15, kat. 73 in 113) navajajo, da sta med najdbami iz srednjeavgustejske delavnice ali popravljalnice na Štalenski gori dve »bronasti« zanki del nožnice bodala. Po mojem mnenju je to zelo vprašljivo. Pri podobnih zankah z nožnic se namreč volutna dela vedno stikata in sta izraziteje zavita. Poleg tega bi volutni zanki za pripenjanje pripadali nožnicam tipa Scott B oz. Obmann tip Vindonissa, za katere ni podatkov za izdelavo pred tiberijsko dobo.

268 Scott 1985, 160–167.

269 Npr. Niemeyer 1990; Wamser, Flügel, Ziegaus 2000, 321, 330–331, kat. 22a, 38a; Milošević 2003, naslovnica; Radman-Livaja 2004, sl. 8, 9. Iz objav zaradi pomanjkljivih opisov pogosto ni mogoče razbrati, iz česa so zakovice in zanke. Trditev v Bishop, Coulston 2006, 85, da so bile zanke za pripenjanje nožnic iz bakrove zlitine, je napačna. Prav tako je napačna rekonstrukcija nožnice iz Kolpe pri Sisku, ki prikazuje medeninaste zanke (Obmann 2000, t. 72). Zanke in pripadajoče zakovice tega bodala in nožnice so namreč železne (prim. Radman-Livaja 2004, 52, 128, sl. 9, kat. 60).

5.2 Daggers and sheaths with brass rivets (Dangstetten group; B3–B4)

The B4 dagger and the B3 sheath and dagger have brass rivets and brass loops that held rings for dagger suspension. The rivet heads have raised edges, a small knob in the centre and no enamel; it is the golden shine of the brass that decorated the otherwise iron sheath.

In the use of copper alloy for loops and rivets, the two items stand apart from most of the metal sheaths (Type A after Scott, Type Mainz after Obmann) and associated daggers with a semicircular pommel, which typically have iron rivets with enamel decoration and iron loops for suspending the sheaths from belts.[269] A detailed analysis of the daggers and sheaths with copper alloy rivets and loops has shown them to form a homogeneous group, with common formal characteristics and materials, which can be narrowly dated; it was named the Dangstetten group after the site that yielded the greatest number of examples, either complete or in fragments.[270] The text below presents the recently published evidence on this group, supplemented with new findings.

The Middle Augustan fortress at Dangstetten yielded one dagger with the remains of its sheath (*List 1: 2*) and fragments of 'bronze' loops and rivets (*List 1: 1, 3–5, 7*), while 'bronze' rivets with characteristically shaped decorative heads are present on another sheath (*List 1: 6*), where the (damaged?) suspension loops were replaced by simple rings, two of which survive. Similar to the daggers and sheaths of the Dangstetten group is a sheath with 'bronze' rivets the heads of which are not characteristic of the Dangstetten group according to the description in their publication; in addition, the only surviving loop also differs from the examples on *List 1: 1–5*.[271]

The Dangstetten group further includes a dagger from the Middle Augustan fort at Hedemünden (*List 1: 12*) and another dagger found in its vicinity (*List 1: 13*), the latter with a rectangular rather than semicircular pommel as in all other examples.

Copper alloy loops and decorative rivets of the Dangstetten group daggers/sheaths are also among the finds from the Middle Augustan work/repair shop at Magdalensberg (*List 1: 16*). Probably sharing the same form are the 'bronze' rivets on the dagger handle and the sheath from the Middle Augustan fortress at Oberaden (*List 1: 10*); renewed conservation and careful examination of the daggers and sheaths from this site may reveal other examples with brass rivets and loops.

A sheath sporting loops and rivets with characteristically decorated heads of copper alloy is among the finds from the fortress at Anreppen, dated between AD 4 and 6/9[272] (*List 1: 11*).

The fragments of 'bronze' loops from a Late Augustan workshop unearthed in Ljubljana (*List 1: 19*) also belonged to Dangstetten sheaths.[273] The same is true of the dagger sheath found during the excavations in the southern part of the street of Slovenska cesta in Ljubljana, conducted in 2015 (*List 1: 20*). It was excavated in a small pit dug either just before the perimeter wall construction of Insula XXVII or during the preparation work for this construction, indicating a dating to the end of the 1st century BC or the beginning of the 1st century AD.[274]

Characteristic brass loops and rivets can also be seen on a dagger and sheath from the Rhine at Mainz (*List 1: 8*; *Fig. 36*), while only rivets without the suspension loops survive on the dagger and associated sheath from the centre of Mainz (*List 1: 9*; *Fig. 37*).

The well-preserved daggers of the Dangstetten group from Döttenbichl or Ambronenstein near Oberammergau (*List 1: 14, 15*) are almost identical. The copper alloys of one dagger have been analysed and the results have shown that the rivets with a raised edge and a central knob are brass, while those with a domed head and sheet metal closing the sides of the pommel are bronze.[275]

Zanier[276] ties the military finds from Döttenbichl, which make up most of the metal goods, to a Roman military assault in 15 BC. Apart from the bulk of the artefacts that does not predate the Middle Augustan period (such as catapult bolts and the E526 helmet crest holder[277]), the site yielded numerous hobnails of

269 E.g. Niemeyer 1990; Wamser, Flügel, Ziegaus 2000, 321, 330–331, Cat. Nos. 22a, 38a; Milošević 2003, cover illustration; Radman-Livaja 2004, Figs. 8, 9. The brief descriptions in the publications often do not reveal the material of the rivets and loops. Bishop and Coulston (2006, 85) state that copper alloy is used for the dagger suspension loops, but this is not true. Also erroneous is the reconstruction of the sheath from the River Kupa at Sisak that shows brass loops (Obmann 2000, Pl. 72); both the loops and rivets on this dagger are in fact iron (cf. Radman-Livaja 2004, 52, 128, Fig. 9, Cat. No. 60).

270 Istenič 2012.

271 Fingerlin 1998, 150, *Fundstelle* 1143/5; Istenič 2012, Fig. 8: 1143/5.

272 For dating, cf. Ch. 3.

273 Horvat 2012a, 280–281. Vičič (2002, 196) proposed a broader dating into the last decade BC or first two/three decades AD.

274 Information kindly provided by Matej Draksler, Skupina STIK.

275 Zanier 2016, 862–864, E2, E3, Pl. 18: E2, Pl. 19, Pl. 20.

276 Zanier 2016, 546–548.

277 Zanier 2016, Pl. 26: E81–E84.

Figure 36
Dangstetten group dagger in its sheath with the upper part of the hilt missing, recovered from the Rhine at Mainz (cf. *List 1: 8*). Germanisches Nationalmuseum, Nürnberg, Inv. No. 484.

Slika 36
Nožnica z bodalom (zgornji del ročaja ni ohranjen) tipa Dangstetten iz reke Ren v Mainzu (prim. *seznam 1: 8*). Hrani Germanisches Nationalmuseum, Nürnberg, inv. št. R 484.

uporabljenih materialih), ki jo je mogoče ozko datirati in sem jo – po najdišču z največjim številom primerkov oziroma odlomkov – poimenovala skupina Dangstetten.[270] V nadaljevanju povzemam že objavljene izsledke, dopolnjene z novimi ugotovitvami.

Iz srednjeavgustejskega tabora v Dangstettnu izvirajo bodalo z ostanki nožnice (*seznam 1: 2*) ter odlomki »bronastih« zank in zakovic (*seznam 1: 1, 3–5, 7*). »Bronaste« zakovice z enako oblikovanimi okrasnimi glavicami ima še ena nožnica iz Dangstettna (*seznam 1: 6*), pri kateri so (poškodovane?) zanke za pripenjanje nadomestili z enostavnimi obročki (ohranjena sta dva). Bodalom in nožnicam skupine Dangstetten je blizu nožnica z »bronastimi« zakovicami, ki glede na opis v objavi nimajo značilno oblikovanih glavic; tudi edina ohranjena zanka za obešanje je drugačna kot pri primerkih *seznam 1: 1–5*.[271]

K skupini Dangstetten sodita bodalo iz srednjeavgustejskega rimskega tabora v Hedemündnu (*seznam 1: 12*) in v njegovi bližini najdeno bodalo (*seznam 1: 13*) z glavičem pravokotne (in ne polkrožne kot pri ostalih primerkih) oblike.

Medeninaste zanke in okrasne zakovice nožnic oziroma bodal skupine Dangstetten so med najdbami iz srednjeavgustejske delavnice ali popravljalnice na Štalenski gori (*seznam 1: 16*). Verjetno so bile tako oblikovane tudi »bronaste« zakovice na ročaju bodala in na nožnici iz srednjeavgustejskega legijskega tabora v Oberadnu (*seznam 1: 10*). Ponovno konserviranje ter natančen pregled bodal in nožnic s tega najdišča bi morda pokazala, da so med njimi še drugi primerki z medeninastimi zakovicami in zankami.

Nožnica z zankami in zakovicami, ki imajo značilno okrašene glavice iz bakrove zlitine, je med najdbami iz legijskega tabora v Anreppnu, datiranega med 4 in 6/9 po Kr.[272] (*seznam 1: 11*).

Nožnicam skupine Dangstetten so pripadali odlomki »bronastih« zank iz delavnice ali popravljalnice rimske vojaške opreme v Ljubljani (*seznam 1: 19*), ki je delovala v poznoavgustejski dobi.[273] V isto skupino nožnic sodi tista, ki izvira z izkopavanj južnega dela Slovenske ceste v Ljubljani leta 2015 (*seznam 1: 20*). Najdena je bila v majhni jami, izkopani pred gradnjo obodnega zidu insule XXVII ali med pripravljalnimi deli za to gradnjo, kar govori za datacijo od konca 1. st. pr. Kr. do začetka 1. st. po Kr.[274]

Značilne medeninaste zanke in zakovice z okrasnimi glavicami imata bodalo in nožnica iz Rena pri Mainzu (*seznam 1: 8*; *sl. 36*), na bodalu oziroma nožnici iz središča Mainza (*seznam 1: 9*; *sl. 37*) pa so se ohranile le značilne zakovice, zanke za obešanje pa ne.

Dobro ohranjeni bodali skupine Dangstetten z Döttenbichla oziroma Ambronensteina pri kraju Oberammergau (*seznam 1: 14, 15*) sta skoraj enaki. Bakrove zlitine so opredelili na enem bodalu: zakovice z glavicami, ki imajo dvignjen rob in izbočenje v sredini, so iz medenine, žeblji s polkrožnimi glavicami in pločevina, ki zapira zgornjo stransko ploskev glaviča, pa so iz brona.[275]

270 Istenič 2012.

271 Fingerlin 1998, 150, najdišče 1143/5; Istenič 2012, sl. 8: 1143/5.
272 Datacija: prim. 3. pogl.
273 Horvat 2012a, 280–281. Vičič (2002, 196) je predlagal širšo datacijo: zadnje desetletje pr. Kr. ali prvi dve/tri desetletja po Kr.
274 Za podatke se zahvaljujem Mateju Drakslerju, Skupina STIK.
275 Zanier 2016, 862–864, E2, E3, t. 18: E2, t. 19, t. 20.

military footwear that belong to types[278] known from sites spanning the period from Caesar's Gallic Wars to the Early Augustan era.[279] Döttenbichl yielded no Roman military items that would reliably postdate the Middle Augustan period.

A dagger from the River Kupa at Sisak also belongs to the Dangstetten group (*List 1: 21*).

The defining characteristics of the Dangstetten type daggers and sheaths are copper alloy suspension loops and rivets with heads of a characteristic form, i.e. with a raised edge and a small central knob (*List 1: 1–21*); the copper alloy was proven to be brass for all the analysed examples (*List 1: 9, 14, 16, 17*).

The daggers share a blade with a pronounced and evenly wide midrib that reaches to the tip, as well as a waisted form with a long tapering point (see e.g. *Fig. 37*; cf. *List 1: 2, 9, 12–15, 17–18, 21*). The pronounced midrib running to the tip connects them with the earlier Roman daggers (cf. *Fig. 35*).[280]

The surviving dagger handles show a uniform structure. The flat tang reaches to the pommel and is enveloped from both sides in a layer of wood or horn, which are in turn covered with iron plates that also cover the pommel. The pommel core is of solid wood (*List 1: 12–13*). The sides of the handle are closed with a thin metal sheet of brass, bronze or undefined copper alloy (*List 1: 12–15*), in one example from Dangstetten (*List 1: 2*) of iron. The handle is held together by iron pins, which are hardly visible on the surface and may go unnoticed in the absence of an X-ray image. Evidence suggests that daggers usually had five such pins: two on the guard (established in these examples: *List 1: 2, 12–15, 17–18, 21*), one in the central section below the swelling (*List 1: 2, 8, 12, 14–15, 21*), one in the central section above the swelling (*List 1: 14–15, 21*) and one in the middle of the pommel (*List 1: 9, 12, 15*). The handle usually also had five rivets of brass/undefined copper alloy with characteristic heads on the front: two along the edges of the guard, one on the central swelling and two on the semicircular pommel. Three copper alloy nails with very long shanks and domed heads were driven into the wooden core of the pommel from its flat top (*List 1: 2, 12–15*). The copper alloy of these nails was characterised for a single example (*List 1: 14*), as bronze (copper-tin alloy).

The sheaths consist of two iron plates lined with wooden laths (e.g. *Fig. B3.1b*) and fastened together with thirteen rivets of brass-copper alloy with characteristically moulded heads: four symmetrically positioned groups of three rivets along the sides and one in the centre of the terminal; the side rivets also fastened suspension loops to the sheath. The brass/copper-alloy loops and rivets are the only decoration on these sheaths with the possible exception of a sheath from Dangstetten (*List 1: 2*).

The daggers and/or sheaths of the Dangstetten group have been found in 21 different contexts (*List 1*), fourteen of which are narrowly dated. Eleven can be attributed to the Middle Augustan (seven examples from Dangstetten and single examples from Oberaden, Hedemünden, Döttenbichl and Magdalensberg, *List 1: 1–7, 10, 12, 15–16*), one to the Middle or Late Augustan (Ljubljana, Slovenska cesta–jug, *List 1: 20*) and two to the Late Augustan period (Ljubljana, *List 1: 19* and Anreppen – dated between 4 and 6/9, *List 1: 11*). Evidence thus indicates that the daggers and sheaths of the Dangstetten group date to the Middle and Late Augustan period and rank among the earliest daggers with a semicircular pommel and a metal sheath.

List 1

Daggers and sheaths of the Dangstetten group (cf. *Fig. 38*).[281]

Germany

1

Dangstetten, *Fundstelle* 164
Suspension loop and rivet with a characteristic head, 'bronze'.
Fingerlin 1986, 63, 164/6.

2

Dangstetten, *Fundstelle* 207/3
Dagger and pieces of its sheath.
Almost complete iron dagger in two parts with partially surviving handle. The blade has a pronounced midrib. The handle bears 'bronze' rivets with characteristic heads, the pommel top surface has three 'bronze' nails with domed heads. The flat iron tang was fitted with a wooden layer on both sides, in turn

278 Zanier 2016, Pls. 41–52.
279 Cf. Ch. 11.6; Istenič 2015a, 57–58.
280 Titelberg: Helmig 1990, Fig. 3a; Metzler 1995, 349, Fig. 185. Alesia: Sievers 2001a, 155; Sievers 2001b, 220, Pl. 54: 182. Cáceres el Viejo: Ulbert 1984, Pl. 25: 195, 197–199. Daggers with a round pommel from different sites: Fernández Ibáñez, Kavanagh de Prado, Vega Avelaira 2012, Fig. 3: 1–3, 6.
281 The materials are stated as in respective publications, only bronze is given in inverted commas ('bronze') in accordance with the usage in this book; whenever the metal was determined by characterisation, it is so noted in the text. The characteristic rivet heads have a raised edge and a central knob, as on the B3 and B4 daggers/sheath.

Zanier[276] rimske vojaške najdbe z Döttenbichla, ki med kovinskim gradivom močno prevladujejo, povezuje z rimskim vojaškim napadom leta 15 pr. Kr. Poleg predmetov, ki najverjetneje niso starejši od srednjeavgustejske dobe (npr. katapultne konice in nosilec perjanice čelade E526[277]), so bili tam najdeni številni okovni žebljički vojaških čevljev tipov,[278] ki so sicer poznani z najdišč iz časa od Cezarjevih galskih vojn do vključno zgodnjeavgustejske dobe.[279] Ne glede na to pa na Döttenbichlu ni rimskih vojaških predmetov, ki bi bili zanesljivo mlajši od srednjeavgustejske dobe.

K skupini Dangstetten sodi tudi bodalo iz Kolpe v Sisku (*seznam 1: 21*).

Najbolj očitne značilnosti bodal in nožnic tipa Dangstetten so torej iz bakrove zlitine narejene zakovice z glavicami, ki imajo dvignjen rob in izbočenje v sredini, ter zanke za obešanje (*seznam 1: 1–21*); v vseh primerih, ko je bila bakrova zlitina opredeljena z analizami (*seznam 1: 9, 14, 16, 17*) se je izkazalo, da je medenina.

Bodalom je skupno rezilo z izrazitim, po celi dolžini približno enako ozkim osrednjim rebrom, ki sega do konca rezila, ter z močnim zoženjem v zgornjem delu, ki mu sledita razširjen srednji del in dolga, izrazita konica (npr. *sl. 37*; prim. *seznam 1: 2, 9, 12–15, 17–18, 21*). Izrazito, do konca rezila segajoče rebro na rezilu ta bodala povezuje s starejšimi rimskimi bodali (prim. *sl. 35*).[280]

Ohranjeni deli ročajev bodal kažejo enotno strukturo. Ročajni jezik, ki sega do glaviča, je na obeh straneh obložen z lesom (ali rogovino) in na zunanji strani obdan z železnima oblogama, ki prekrivata tudi glavič. Jedro glaviča je masiven les (*seznam 1: 12–13*). Stransko ploskev ročaja prekriva tenka pločevina iz medenine, brona ali iz neopredeljene bakrove zlitine (*seznam 1: 12–15*), na primerku iz Dangstettna (*seznam 1: 2*) pa iz železa. Ročajne dele spenjajo železni zatiči, ki na površini (skorajda) niso vidni, zato pri primerkih, ki nimajo rentgenskega posnetka, marsikateri ni ugotovljen. Domnevam, da so imela bodala običajno pet takih zatičev: dva na spodnjem delu, ki objema rezilo (ugotovljeno pri primerkih *seznam 1: 2, 12–15, 17–18, 21*), ter po enega na paličastem delu pod osrednjo debelitvijo ročaja (ugotovljeno pri primerkih *seznam 1: 2, 8, 12, 14–15, 21*) in nad njo (ugotovljeno pri primerkih *seznam 1: 14–15, 21*) in v sredini glaviča (*seznam 1: 9, 12, 15*). Na ročajih je bilo običajno pet zakovic iz medenine oziroma bakrove zlitine z značilno oblikovanimi glavicami na sprednji strani: dve na robovih spodnjega dela, ki objema vrh rezila, ena na osrednji krožni razširitvi in dve na polkrožnem glaviču. Trije žebljički iz bakrove zlitine z zelo dolgimi trni in rahlo izbočenimi do polkroglastimi glavicami so bili zabiti v leseno jedro glaviča z njegovega zgornjega ravnega roba (ugotovljeno pri primerkih *seznam 1: 2, 12–15*). Bakrova zlitina teh žebljičkov je bila opredeljena le v enem primeru (*seznam 1: 14*) – je bron (zlitina bakra s kositrom).

Nožnice so iz dveh železnih polovic, ki sta bili podloženi z lesom (npr. *sl. B3.1b*) in speti s trinajstimi zakovicami iz medenine oziroma bakrove zlitine z značilno profiliranimi glavicami: ob straneh s štirimi simetrično postavljenimi skupinami treh zakovic in z zakovico v sredini zaključka nožnice. Stranske zakovice obenem na nožnico pripenjajo zanke za obešanje nožnice. Zanke in zakovice iz medenine oziroma bakrove zlitine so edini okras nožnic. Morebitna izjema je nožnica iz Dangstettna (*seznam 1: 2*).

Bodala in/ali nožnice skupine Dangstetten oziroma njihove odlomke poznamo iz 21 najdiščnih okoliščin (*seznam 1*), od katerih je štirinajst ozko datiranih. Tako enajst primerkov lahko datiramo v srednjeavgustejski čas (sedem primerkov iz Dangstettna in po eden iz Oberadna, Hedemündna, Döttenbichla in Štalenske gore, *seznam 1: 1–7, 10, 12, 15–16*), enega v srednjeavgustejski ali poznoavgustejski čas (Ljubljana, Slovenska cesta – jug, *seznam 1: 20*) in dva v poznoavgustejski čas (Ljubljana, *seznam 1: 19* in Anreppen – datirano med 4 in 6/9, *seznam 1: 11*). Bodala in nožnice skupine Dangstetten so torej iz srednje- in poznoavgustejske dobe in sodijo med najstarejša bodala s polkrožnim zaključkom držaja in pripadajoče polnokovinske nožnice.

276 Zanier 2016, 546–548.
277 Zanier 2016, t. 26: E81–E84.
278 Zanier 2016, t. 41–52.
279 Prim. pogl. 11.6; Istenič 2015a, 57–58.
280 Titelberg: Helmig 1990, sl. 3a; Metzler 1995, 349, sl. 185. Alesia: Sievers 2001a, 155; Sievers 2001b, 220, t. 54: 182. Cáceres el Viejo: Ulbert 1984, t. 25: 195, 197–199. Bodala s krožnim zaključkom ročaja z različnih najdišč: Fernández Ibáñez, Kavanagh de Prado, Vega Avelaira 2012, sl. 3: 1–3, 6.

covered by outer iron plates. The sides of the pommel bear remains of the sheet metal that closed the gap between the front and back plates from the side. The handle is held together by iron pins (two at the guard, one just above the missing central swelling), as well as by (decorative) copper alloy nails with large domed heads (three on the upper side surface of the pommel) and rivets with flat heads with a raised edge and a central knob (two at the edge of the guard and two on the pommel).
The sheath is composed of two iron plates and a wooden liner. Only its lower part survives, without the disc terminal, and bears characteristic 'bronze' rivets, a suspension loop and a ring. The surface bears the remains of sheet bronze decoration.
Fingerlin 1986, 78–79, 207/3, Pl. 1; Istenič 2012, Fig. 7.

3

Dangstetten, *Fundstelle* 211
Four fragments of 'bronze' suspension loops.
Fingerlin 1986, 82, 211/15; Istenič 2012, Fig. 8.

4

Dangstetten, *Fundstelle* 552
Fragment of a suspension loop (material not stated, but the published drawing and description suggest copper alloy).
Fingerlin 1986, 213, 552/6; Istenič 2012, Fig. 8.

5

Dangstetten, *Fundstelle* 625B
Fragment of a suspension loop (material not stated, but the published drawing and description suggest copper alloy) and three 'bronze' rivets with characteristic heads.
Fingerlin 1998, 19, 625B/1, 2; Istenič 2012, Fig. 8.

6

Dangstetten, *Fundstelle* 972/5
Iron sheath, with a missing disc terminal, and seven 'bronze' rivets with characteristic heads: three on each side in the upper part, while in the lower part a single one survives of a series of six. The sheath was originally presumably fitted with four loops, now missing, fixed with three rivets each. The two simple 'bronze' loops, fastened with single rivets to each side of the upper sheath, differ from other loops of the Dangstetten type – I presume them to be the remains of repair work.
Fingerlin 1998, 108, 972/5; Istenič 2012, Fig. 8.

7

Dangstetten, *Fundstelle* 1112
Fragment of a 'bronze' rivet with a characteristic head.
Fingerlin 1998, 143, 1112/1 (no drawing).

8

River Rhine at Mainz (*Fig. 36*)
Iron dagger in its sheath. Upper part of the handle is missing and the blade not visible because it is corroded into the sheath. There are two brass rivets with characteristic heads at the sides of the guard. One iron pin is visible below the central swelling on the handle. No X-ray image.
The sheath is excellently preserved with the exception of the missing terminal. Four groups of three rivets fasten brass suspension loops with brass rings to the sheath. The right upper loop is attached to the sheath in an unusual manner, with the unarticulated part of the loop fixed to the front rather than the back as is otherwise usual.
Klein 2003a, 55, 66–68, Fn. 5, Fig. 14; Istenič 2012, 169, Fig. 13.

9

Mainz, Emmeransstraße (*Fig. 37*)
Iron dagger and sheath.
The blade has a pronounced midrib. The handle had two brass rivets with characteristic heads on the pommel and two more on the guard (two survive and two are indicated with holes). The large hole in the centre of the pommel indicates that an iron pin was originally fitted there. No X-ray image.
The sheath originally had four groups of three brass rivets with characteristic heads along the edges (four rivets survive, the other nine are indicated by corresponding holes). A suspension ring, probably a repair, is inserted through the hole of the central rivet in the upper right side. A characteristic brass rivet was also in the centre of the disc terminal.
Klein 2003a, 55, 67–68, Fn. 5, Fig. 15 (Klein believes that the dagger and sheath do not belong together, but this is not apparent from the published evidence).

10

Oberaden
Heavily corroded iron dagger in its sheath, both with 'bronze' rivets. The shape of the rivet heads is unclear from the publication that only offers a black and white photograph without a drawing or an X-ray image.
Albrecht 1942, 160, Pl. 52: 9.

11

Anreppen
Iron sheath with copper alloy rivets and loops, and a missing terminal. The rivet heads are characteristic of the Dangstetten group, two of the loops hold suspension rings.
Kühlborn 1995, 142, Fig. 9; Obmann 2000, 27, Fundliste 1: 1, Pl. 26; Kühlborn 2009, 14, Fig. 13, colour photo; Istenič 2012, Fig. 10.

Seznam 1

Bodala in nožnice (oz. njihovi deli) skupine Dangstetten (prim. *sl. 38*).[281]

Nemčija

1

Dangstetten, najdišče 164
Odlomek zanke za pripenjanje nožnice z zakovico, ki ima glavico značilne oblike, »bron«.
Fingerlin 1986, 63, 164/6.

2

Dangstetten, najdišče 207/3
Bodalo in deli nožnice.
Bodalo (železno, skoraj celo, v dveh delih) z delno ohranjenim ročajem. Rezilo ima izrazito rebro. Na ročaju so »bronaste« zakovice z glavicami značilne oblike in na vrhu glaviča trije »bronasti« žebljički s polkrožnimi votlimi glavicami. Železen ročajni jezik je na obeh straneh obdajala lesena podloga, njo pa zunanji železni oblogi. Na stranskih ploskvah glaviča so ostanki železne pločevine, ki je zapirala prostor med zunanjima oblogama ročaja. Ročaj je spet z železnimi zatiči (dva na razširjenem delu, ki objema rezilo, eden malo nad razširitvijo v sredini, ki se ni ohranila) in (okrašen) z zakovicami iz bakrove zlitine z velikimi polkrožnimi glavicami (tri na zgornji stranski ploskvi glaviča) oziroma s ploščatimi glavicami z dvignjenim robom in bunkico v sredini (dve na robovih dela, ki objema rezilo, in dve na glaviču).
Od nožnice, ki je bila sestavljena iz dveh železnih polovic in je imela leseno podlogo, se je ohranil spodnji del (brez konice) z značilnimi »bronastimi« zakovicami, zanko in obročkom za pripenjanje. Na površini so ostanki okrasa iz »bronaste« pločevine.
Fingerlin 1986, 78–79, 207/3, t. 1; Istenič 2012, sl. 7.

3

Dangstetten, najdišče 211
Štirje odlomki »bronastih« zank za pripenjanje nožnice.
Fingerlin 1986, 82, 211/15; Istenič 2012, sl. 8.

4

Dangstetten, najdišče 552
Odlomek zanke za pripenjanje nožnice (material ni naveden, vendar risba in zaporedje opisa v katalogu nakazujeta, da gre za bakrovo zlitino).
Fingerlin 1986, 213, 552/6; Istenič 2012, sl. 8.

5

Dangstetten, najdišče 625B
Odlomek zanke za pripenjanje nožnice (v opisu material ni naveden, vendar risba in zaporedje opisa v katalogu nakazujeta, da gre za bakrovo zlitino) in tri »bronaste« zakovice z značilnimi glavicami.
Fingerlin 1998, 19, 625B/1, 2; Istenič 2012, sl. 8.

6

Dangstetten, najdišče 972/5
Železna nožnica (konica ni ohranjena) s sedmimi »bronastimi« zakovicami, ki imajo značilno oblikovane glavice. Po tri zakovice na vsaki strani so v zgornjem delu nožnice, od spodnjega niza šestih zakovic pa se je ohranila le ena. Domnevam, da je imela nožnica prvotno štiri zanke (niso ohranjene), ki so bile prikovičene s tremi zakovicami vsaka. Enostavni »bronasti« zanki, ki sta s po eno zakovico pritrjeni na vsako stran na zgornjem delu nožnice, se razlikujeta od ostalih zank pri tipu Dangstetten – domnevam, da sta popravilo.
Fingerlin 1998, 108, 972/5; Istenič 2012, sl. 8.

7

Dangstetten, najdišče 1112
Odlomek »bronaste« zakovice z značilno glavico.
Fingerlin 1998, 143, 1112/1 (brez risbe).

8

Reka Ren v Mainzu (*sl. 36*)
Železno bodalo v nožnici. Zgornji del ročaja bodala ni ohranjen; rezilo ni vidno, ker je prikorodirano v nožnico. Ob straneh spodnjega dela ročaja sta medeninasti zakovici z značilno oblikovanima glavicama; en železen zatič je viden pod razširitvijo v sredini ročaja. Ni rentgenskega posnetka.
Nožnici manjka zaključek, sicer je odlično ohranjena. Štiri skupine po tri zakovice na nožnico pritrjujejo medeninaste zanke za obešanje, v katerih so medeninasti obročki. Pritrditev desne zanke zgoraj je neobičajna: na lice je prikovičen nerazcepljeni del zanke, ki je običajno na hrbtni strani.
Klein 2003a, 55, 66–68, op. 5, sl. 14; Istenič 2012, 169, sl. 13.

9

Mainz, Emmeransstraße (*sl. 37*)
Železno bodalo in nožnica.
Rezilo bodala ima izrazito rebro. Ročaj je imel na glaviču in spodnjem delu ročaja po dve medeninasti zakovici z značilno oblikovanimi glavicami (dve sta ohranjeni, dve pa nakazani z luknjicami). Večja luknja v sredini glaviča kaže, da je tam bil železen zatič. Ni rentgenskega posnetka.
Nožnica je imela prvotno ob robu štiri skupine po

281 Materiale sem navedla tako, kot so opisani v navedenih objavah, le bron sem dala – skladno z uporabo v tej knjigi – v navednice (»bron«); v primeru, da so material opredelili z naravoslovno analizo, sem to zapisala. Glavica zakovice značilne oblike se nanaša na glavico značilne oblike (dvignjen rob in izbočenje v sredini), kot jih imata bodali oz. nožnica B3 in B4.

12

Hedemünden

Complete iron dagger with a pronounced midrib and a very short point (the latter may originally have had the same shape as on all other daggers of the Dangstetten group, but was later reshaped, possibly as a consequence of damage to the tip). The publication states that the blade is very probably damascened, but the published evidence (drawing, photograph) does not reveal the reasons for such an interpretation. The flat tang ended below the pommel in a wooden core. The iron outer shell of the handle was fastened to the tang and the wooden (horn?) parts by iron pins and rivets. Four pins have been established in the absence of an X-ray (two on the guard, one between the central swelling and the guard, one in the centre of the pommel). The handle pieces are additionally bound together, and decorated, by five 'bronze' rivets (two on the guard, one on the central swelling, two[282] on the pommel), described in the publication as iron rivets covered by sheet 'bronze'. I presume that the rivets are actually made of copper alloy, but appear as of iron due to corrosion (cf. similar situation for the rivets on the B3 and B4 daggers from the Ljubljanica, Catalogue, *Figs. B3.4, B3.5*). Two 'bronze' rivets were driven into the top surface of the pommel; the drawing suggests they had low domed heads. Scarce remains of the sheet 'bronze' strip that closed the side gap between the two iron plates of the handle survive on the pommel.

Grote 2012, 344, Cat. No. 29, Pl. 5: 29, Fig. 89, Pl. 81: top photo.

13

Oberode near Hedemünden

Iron dagger with a pronounced midrib and a handle with a rectangular pommel. The publication positively identifies the blade as damascened, but offers no reasons for such an interpretation. The published description of the handle mentions a wooden core of the pommel and seven pins or rivets (I presume that not all pins and rivets could be observed in the absence of an X-ray, and also that the copper alloy rivets were described as iron due to heavy corrosion): four on the guard, one on the central swelling and two on the pommel. The head of one of the rivets on the guard was reported to be plated with a copper alloy sheet (I presume that the rivet was entirely made of copper alloy – cf. commentary for the dagger No. 12). The remains of a 3 mm thick strip of sheet copper alloy survive in the gap between the two iron plates of the handle; on the pommel, it bears punched decoration. Corroded remains of copper alloy plating (?) were reportedly revealed in several places during conservation, which led the authors to presume that the handle was covered in a sheet of copper alloy. However, the remains of copper alloy might be related to the copper alloy rivets and the strip that closed the handle from the side. The flat top surface of the pommel holds the remains of shanks of three copper alloy nails with missing heads.

Grote 2012, 344–345, Cat. No. 309, Pl. 5: 30, Pl. 81: top photo.

Figure 37
Dagger and its sheath of the Dangstetten group from Mainz (cf. *List 1: 9*). Landesmuseum Mainz, Inv. No. R 4001.

Slika 37
Bodalo in nožnica tipa Dangstetten iz Mainza (prim. *seznam 1: 9*). Hrani Landesmuseum Mainz, inv. št. R 4001.

282 The publication mentions three decorative rivets and one iron pin on the pommel, which is not consistent with the total number of rivets and pins reported on the handle (nine). It would appear that the central rivet on the pommel is stated twice in the description: once as iron and another time as iron with a 'bronze' plating. I presume that the poor state of rivet preservation made it very difficult to distinguish between iron pins and copper alloy rivets.

Figure 38
Distribution map of the Dangstetten group daggers/sheaths (1–14) and those related to them (15).
1 – Dangstetten (*List 1: 1–7*), 2 – the Rhine at Mainz (*List 1: 8*), 3 – Mainz (*List 1: 9*), 4 – Oberaden (*List 1: 10*), 5 – Anreppen (*List 1: 11*), 6 – Hedemünden (*List 1: 12*), 7 – Oberode near Hedemünden (*List 1: 13*), 8 – Oberammergau, Ambronenstein (*List 1: 14*), 9 – Oberammergau, Döttenbichl (*List 1: 15*), 10 – Magdalensberg (*List 1: 16*), 11 – the Ljubljanica at Sinja Gorica (*List 1: 17*), 12 – the Ljubljanica at Podpeč (*List 1: 18*), 13 – Ljubljana (*List 1: 19*, *20*), 14 – the Kupa at Sisak (*List 1: 21*), 15 Oberammergau (*List 1: 22*).

Slika 38
Karta najdišč bodal/nožnic tipa Dangstetten (1–14) in njim sorodnih bodal (15). 1 – Dangstetten (*seznam 1: 1–7*), 2 – reka Ren pri Mainzu (*seznam 1: 8*), 3 – Mainz (*seznam 1: 9*), 4 – Oberaden (*seznam 1: 10*), 5 – Anreppen (*seznam 1: 11*), 6 – Hedemünden (*seznam 1: 12*), 7 – Oberode pri Hedemündnu (*seznam 1: 13*), 8 – Oberammergau, Ambronenstein (*seznam 1: 14*), 9 – Oberammergau, Döttenbichl (*seznam 1: 15*), 10 – Štalenska gora (*seznam 1: 16*), 11 – reka Ljubljanica pri Sinji Gorici (*seznam 1: 17*), 12 – reka Ljubljanica pri Podpeči (*seznam 1: 18*), 13 – Ljubljana (*seznam 1: 19*, *20*), 14 – reka Kolpa v Sisku (*seznam 1: 21*), 15 – Oberammergau (*seznam 1: 22*).

tri medeninaste zakovice z značilnimi glavicami (ohranjene so štiri zakovice, ostalih devet pa nakazujejo luknjice na robu nožnice). Skozi luknjico (srednje zakovice) na desni strani nožnice zgoraj je vdet obroček za pripenjanje nožnice, ki je verjetno popravilo. Zakovica z značilno oblikovano glavico krasi tudi krožno oblikovano konico nožnice.
Klein 2003a, 55, 67–68, op. 5, sl. 15 (meni, da bodalo in nožnica ne sodita skupaj, kar pa iz objavljene dokumentacije ni razvidno).

10
Oberaden
Železno bodalo v nožnici, oba z »bronastimi« zakovicami. Predmeta sta močno korodirana. Oblika glavic zakovic iz objave, ki ne vključuje risbe in rentgenskih posnetkov, temveč le črno-belo fotografijo, ni razvidna.
Albrecht 1942, 160, t. 52: 9.

11
Anreppen
Železna nožnica (zaključek konice ni ohranjen) z zakovicami in zankami iz bakrove zlitine. Glavice zakovic so značilno oblikovane, v dveh zankah sta ohranjena obročka za obešanje.
Kühlborn 1995, 142, sl. 9; Obmann 2000, 27, Fundliste 1: 1, t. 26; Kühlborn 2009, 14, sl. 13, barvna fotografija; Istenič 2012, sl. 10.

12
Hedemünden
Železno bodalo (celo ohranjeno) z izrazitim rebrom na rezilu, ki ima izrazito kratko konico (domnevam, da je bila konica prvotno oblikovana podobno kot pri ostalih bodalih skupine Dangstetten in da so jo, morda ker se je njen zaključek odlomil, preoblikovali). V objavi je navedeno, da je rezilo zelo verjetno damascirano, ni pa to razvidno iz objavljene dokumentacije (risba, fotografija) niti ni pojasnjeno, kaj na to kaže. Ročajni jezik se zaključi pod glavičem, ki ima leseno jedro. Zunanji železni ročajni oblogi in ročajni jezik oziroma lesene (rožene?) dele ročaja spenjajo železni zatiči oziroma zakovice. Ob odsotnosti rentgenskega posnetka so ugotovili štiri zatiče: dva na delu, ki objema rezilo, enega med razširitvijo sredi ročaja in delom, ki objema rezilo, in enega sredi glaviča. Ročajne dele dodatno povezuje in obenem krasi pet »bronastih« zakovic (dve na delu, ki objema rezilo, ena na razširitvi sredi ročaja, dve na glaviču[282]), ki so v objavi navedene kot z »bronasto« pločevino prevlečene železne zakovice. Domnevam, da gre za zavajajoče stanje, ki je posledica korozijskih procesov, in da so zakovice iz bakrove zlitine (prim. podobno stanje pri zakovicah

282 V objavi so omenjeni en železen zatič in tri okrasne zakovice na glaviču, kar se ne sklada s skupnim številom zakovic in zatičev na ročaju, ki so omenjeni v objavi (devet). Zdi se, da so osrednjo zakovico na glaviču v opisu navedli dvakrat: enkrat so jo opredelili kot železno, drugič kot tako z »bronasto« prevleko. Zaradi slabe ohranjenosti zakovic je bilo verjetno težko razlikovati železne zatiče od zakovic iz bakrove zlitine.

14

Oberammergau, Ambronenstein (SW of the presumed cult place at Döttenbichl)
Almost complete iron dagger with a pronounced midrib. The iron outer shell and the flat tang, originally separated by wood, are fastened together by three iron pins (one between the central swelling and pommel, two on the guard) and five brass rivets with characteristic heads. Three nails with long shanks were driven into the top surface of the pommel, one of which survives with a domed head of bronze (copper-tin alloy shown by XRF analyses). The curved sides of the pommel hold the remains of sheet bronze (XRF analyses).
Zanier 1994, 97–99, Fig. 56; Zanier 1997, 47–48; Zanier 2009; Zanier 2016, 21, 271–277, 513, 863, Fig. 3: 3, Fig. 97: E2, Pl. 18: E2, Pl. 19.

15

Oberammergau, Döttenbichl
Almost complete iron dagger with a pronounced midrib. The iron outer shell and the flat tang, originally separated by wood, are fastened together by five iron pins (one on the pommel, one between the pommel and the central swelling, one between the central swelling and the guard, two on the guard) and five 'bronze' rivets with characteristic heads (two on the guard, two on the pommel, one on the central swelling). The curved sides of the pommel hold the remains of a sheet 'bronze' strip. Three 'bronze' nails with long shanks and domed heads (central one is missing) are driven into the flat top surface of the pommel.
Zanier 2009, Cat. No. 3.7.7; Zanier 2016, 21, 271–277, 863, Fig. 3: 1, Fig. 97: E3, Pl. 20.

Austria

16

Magdalensberg
Fragment of a 'bronze' suspension loop and a 'bronze' rivet.
Dolenz, Flügel, Öllerer 1995, Figs. 7: 11, 13: 98, 15: 124; Istenič 2012, Figs. 9; 15: 5.

Slovenia[283]

17

River Ljubljanica at Sinja Gorica
Iron dagger in its sheath with a large part of the handle missing; see Catalogue, B3; *Pl. 10*.
Istenič 2012, 159–163, Figs. 1–2, 5.

18

River Ljubljanica at Podpeč
Iron dagger with a missing upper part of the handle and blade tip; see Catalogue, B4; *Pl. 11*.
Istenič 2012, 159–163, Figs. 3–4, 6.

19

Ljubljana
Fragments of 'bronze' loops for sheath suspension.
Vičič 2002, 196, Pl. 12: 48–54; Istenič 2012, Fig. 11.

20

Ljubljana, Slovenska cesta – jug
Heavily corroded iron sheath with at least one surviving copper alloy rivet bearing a characteristic head (condition prior to conservation in the City Museum of Ljubljana, 27 October 2016).
Unpublished.

Croatia

21

River Kupa at Sisak
Iron dagger with a pronounced midrib and a missing pommel. Bone lining is reported between the flat tang and the iron outer shell of the handle. Four iron pins survive on the handle (two on the guard, one above the central swelling, one below it), as do three copper alloy rivets with characteristic heads (two on the guard, one on the central swelling).
Radman-Livaja 2004, 50–51, 128, Cat. No. 57, Pl. 14; Radman-Livaja 2010b, 184 (colour photo); Istenič 2012, 168, Fn. 24, Fig. 12.

Similar dagger

Germany

22

Oberammergau, roughly 260 m south of the presumed cult place at Döttenbichl (Germany)
Iron dagger with a pronounced midrib and a sheath with a wood liner. The tip of the dagger and the sheath terminal, as well as a large part of the sheath back are missing.
The dagger handle and the sheath have inlaid decoration, which the XRF analysis has shown to be silver and brass, as well as a silver inlaid inscription C.ANTONVS.FECIT [...] on the back. The iron outer shell of the handle presumably enveloped a bronze layer.[284] The flat top surface of the pommel has three silver nails, the central one survives with a

283 A dagger found in the cemeteries at Vinji vrh above Bela Cerkev (SE Slovenia; Dular 1991, 81, Pl. 41: 1) has a pronounced midrib reaching to the tip, which suggests that it belongs to the Dangstetten group. The rivets partially survive, but the published description does not mention the material as copper alloy; this may be the result of an absence of conservation.

284 Thus in Ulbert (1962, 175–177; also stated in Zanier 2016, 862). It would be sensible to verify this claim, as Ulbert may have been misled by the remains of a brass band that covered the handle sides (cf. *List 1: 2, 12–15*).

bodal iz Ljubljanice, Katalog, B3 in B4, *sl. B3.4, B3.5*). V ravno zgornjo ploskev glaviča sta zabiti dve »bronasti« zakovici; risba nakazuje, da imata glavici nizkega D preseka. Skromni ostanki »bronaste« pločevine so ohranjeni na stranski ploskvi glaviča.
Grote 2012, 344, kat. 29, t. 5: 29, sl. 89, t. 81: zgornja fotografija.

13

Oberode pri Hedemündnu
Železno bodalo z izrazitim rebrom na rezilu in z ročajem, ki ima pravokoten zaključek. V objavi je navedeno, da je rezilo gotovo damascirano, vendar za to niso podani argumenti. V objavljenem opisu ročaja so omenjeni leseno jedro glaviča in sedem železnih zatičev oziroma zakovic (domnevam, da zaradi odsotnosti rentgenskega posnetka niso ugotovili vseh zatičev in zakovic in da so posamezne zakovice iz bakrove zlitine zaradi močne korozije opisali kot železne): štirje na spodnjem delu ročaja, ki objema rezilo, eden v sredini razširitve sredi ročaja in dva na glaviču. Glavica ene od stranskih zakovic na spodnjem delu ročaja naj bi bila prevlečena s pločevino iz bakrove zlitine (domnevam, da je cela zakovica iz bakrove zlitine – prim. komentar pri bodalu št. 12). Na stranski površini ročaja so ostanki 3 mm široke pločevine (ki ima na glaviču punciran okras) iz bakrove zlitine. Med konservatorskim postopkom so na več mestih površine ročaja ugotovili (korodirane) ostanke obloge (?) iz bakrove zlitine, zato v objavi domnevajo, da je bil ročaj prevlečen s pločevino iz bakrove zlitine. Zdi se mi verjetneje, da so ostanki iz bakrove zlitine povezani z zakovicami in obrobo stranskega roba ročaja. Na zgornji (ravni) ploskvi glaviča so ostanki trnov treh žebljičkov iz bakrove zlitine, glavice pa niso ohranjene.
Grote 2012, 344–345, kat. 309, t. 5: 30, t. 81: zgornja fotografija.

14

Oberammergau, Ambronenstein (jugozahodno od domnevnega kultnega prostora na Döttenbichlu)
Železno bodalo z izrazitim rebrom na rezilu, skoraj celo. Zunanji železni oblogi in ročajni jezik, med katerimi je bil prvotno les, spenjajo trije železni zatiči (eden med razširitvijo v sredini ročaja in glavičem, dva na razširjenem delu, ki objema zgornji del rezila) in pet medeninastih zakovic z značilno oblikovanimi glavicami. Trije žebljički z dolgimi trni so bili zabiti v zgornjo ploskev glaviča, na enem se je ohranila polkroglasta glavica iz zlitine bakra s kositrom (XRF-analize). Na izbočeni stranski ploskvi glaviča so ostanki bronaste pločevine (XRF-analize).
Zanier 1994, 97–99, sl. 56; Zanier 1997, 47–48; Zanier 2009; Zanier 2016, 21, 271–277, 513, 863, sl. 3: 3, sl. 97: E2, t. 18: E2, t. 19.

15

Oberammergau, Döttenbichl
Železno bodalo z izrazitim rebrom na rezilu, skoraj celo.
Zunanji železni oblogi in ročajni jezik, med katerimi je bil les, spenja pet železnih zatičev (po eden na glaviču, med glavičem in razširitvijo sredi ročaja ter med to razširitvijo in delom, ki objema rezilo, kjer sta še dva zatiča) in pet »bronastih« zakovic z značilno oblikovanimi glavicami na ročaju (po dve na delu, ki objema rezilo, in na glaviču ter ena na razširitvi sredi ročaja). Na izbočeni stranski ploskvi glaviča so ostanki »bronaste« pločevine. Trije »bronasti« žebljički z dolgimi trni in polkroglastimi glavicami (srednja ni ohranjena) so zabiti v zgornjo ravno ploskev glaviča.
Zanier 2009, kat. 3.7.7; Zanier 2016, 21, 271–277, 863, sl. 3: 1, sl. 97: E3, t. 20.

Avstrija

16

Štalenska gora
Odlomek zanke za pripenjanje nožnice (»bron«) in zakovice (»bron«).
Dolenz, Flügel, Öllerer 1995, sl. 7: 11, 13: 98, 15: 124; Istenič 2012, sl. 9; 15: 5.

Slovenija[283]

17

Reka Ljubljanica pri Sinji Gorici
Železno bodalo (velik del ročaja ni ohranjen) v nožnici; glej Katalog, B3; *t. 10*.
Istenič 2012, 159–163, sl. 1–2, 5.

18

Reka Ljubljanica pri Podpeči
Železno bodalo (zgornji del ročaja in konica rezila nista ohranjena); glej Katalog, B4; *t. 11*.
Istenič 2012, 159–163, sl. 3–4, 6.

19

Ljubljana
Odlomki »bronastih« zank za pripenjanje nožnice.
Vičič 2002, 196, t. 12: 48–54; Istenič 2012, sl. 11.

20

Ljubljana, Slovenska cesta – jug
Močno korodirana železna nožnica z najmanj eno ohranjeno zakovico iz bakrove zlitine, ki ima značilno

283 Poleg bodal/nožnic št. 17–20 k skupini Dangstetten morda sodi bodalo z grobišč v okolici Vinjega vrha nad Belo Cerkvijo (jugovzhodna Slovenija; Dular 1991, 81, t. 41: 1). To namreč nakazuje izrazito in do konca rezila segajoče rebro tega bodala. Zakovice so (deloma) ohranjene, vendar v objavljenem opisu ni omenjeno, da bi bile iz bakrove zlitine, kar pa je lahko povezano s tem, da predmet (verjetno) še ni bil v konservatorskem postopku.

domed head. Silver suspension loops (two of them hold rings) are fastened to the sheath with three silver rivets each, the latter with characteristic heads. The publications include neither drawings nor X-ray images.
Ulbert 1962; Ulbert 1971; Zanier 1994, 97; Zanier 1997, 47–48; Bishop, Coulston 2006, Pl. 1 (colour photo); Istenič 2012, Fig. 14; Zanier 2016, 267–271, Fig. 3: 4, Fig. 23, Fig. 97: E1, 862–863, Pl. 18: E1.

5.3 Daggers and metal sheaths fitted with iron rivets and decorated with inlays of metal and enamel (B1–B2)

The B1 and B2 daggers and sheaths belong to the group of daggers with a flat semicircular pommel associated with a metal sheath (Scott's Type A, Obmann's Type Mainz) that bears iron rivets with enamel decorated heads. The B1 dagger and sheath are among the best preserved examples of the group.

The daggers and sheaths with iron rivets that can reasonably be assumed to have had enamel decorated heads rank among the earliest, i.e. Middle Augustan daggers with a semicircular pommel and associated sheaths.[285] This is suggested by the bowl-shaped rivet heads that presumably lost enamel inlay on the dagger sheath from Basel-Münsterhügel[286] and on the dagger handle from Oberaden.[287] The earliest dagger with surviving enamel in the heads of iron rivets from a narrowly dated context comes from Haltern,[288] indicating a dating between 7/5 BC and AD 9/16.[289]

The B1 sheath belongs to Scott's largest subgroup of metal sheaths characterised by brass and enamel inlays, as well as a four-zone decorative scheme. The subgroup is named after the Dunaföldvár site (Hungary). The excellently preserved sheath from Alphen aan den Rijn (Netherlands)[290] shows that examples of this subgroup were inlaid with brass, but also silver.

Scott suggests that the Dunaföldvár subgroup dates to the end of the Augustan and the Tiberian periods.[291] Because I presume that the above-mentioned dagger from Haltern,[292] which Scott did not include in his study, was associated with a similarly decorated metal sheath, it seems plausible that the sheaths of the Dunaföldvár subgroup already came into use in the Late Augustan, possibly even towards the end of the Middle Augustan period. The sheath from Utrecht, dated after AD 39 or 42,[293] indicates that they were still in use in the Claudian period.

Obmann treated the sheaths of the Dunaföldvár subgroup, as well as several others from Scott's Moers-Asberg subgroup, as part of Group 1 that he believed began to be produced in the Augustan period and remained in use up to the mid-1st century.[294]

The B2 sheath was inlaid with silver and brass, the latter used for the outer vertical lines in the second and fourth decorative zones, as well as with green enamel (cf. Catalogue, B2). In Scott's typology, it is closest to the Allériot subgroup,[295] characterised by silver inlays, particularly hatching, as well as intricate motifs in the lower triangular zone. Published evidence[296] indicates that mostly silver and in a small measure 'bronze' was used for the inlays.

In Obmann's typology, the B2 sheath belongs to Subgroup 2, characterised by silver hatching and enamel inlays, as well as a two-part division of the lowest, triangular decorative zone. Rare sheaths of this subgroup come from dated contexts and point to their use in the Tiberian period.[297]

To sum up, few examples of the metal sheath subgroups, including the B1 and B2 sheaths, come from dated contexts, which only allows for a broad dating. The B1 dagger and sheath can thus roughly be dated from the Middle Augustan to the Claudian period. The most plausible dating for the B2 extends from the Tiberian (beginning of the sheaths of Group 2 after Obmann) to the Claudian period, which marks the end of the use of metal sheaths.

The blade of the B1 dagger has a midrib defined by a pair of grooves. The X-ray images of the B1 and B2 blades show vertical lines (*Figs. B1.3, B2.3*) that represent traces of forging.

285 See Ch. 5.1.
286 Enamel either did not survive or is not mentioned in the publications (Helmig 1990, 158–160, Fig. 2; Berger, Helmig 1991, 18, Fig. 9: 9). For dating, see Roth-Rubi 2006, 103, 117–118.
287 Albrecht 1942, 160, 100, Pl. 52: 4. Enamel not mentioned in the publication; the material used for the two rivets on the dagger in Pl. 52: 2 is not stated.
288 Harnecker 1997, 87, Cat. No. 758, Pl. 70; Wamser, Flügel, Ziegaus 2000, 321, Cat. No. 22.
289 Cf. Ch. 3.
290 Fischer 2012, 194, Fig. 279; silver is not visible on the photo, but mentioned in the caption.
291 Scott 1985, 168, 169, 197–199, App. 2a.
292 Harnecker 1997, 87, Cat. No. 758, Pl. 70; Wamser, Flügel, Ziegaus 2000, 321, Cat. No. 22.
293 Obmann 2000, 8, Fn. 1, 22–23, NL 8, Pl. 7.
294 Obmann 2000, 8–9 (examples of his Group 1 are stated in Fn. 1).
295 Scott 1985, 170, 199–200, Nos. 20–23 or 26.
296 E.g. the eponymous dagger from Allériot (Obmann 2000, 25, F1).
297 Obmann 2000, 9.

oblikovano glavico (stanje med postopkom konservacije v Mestnem muzeju, 27. 10. 2016).
Neobjavljeno.

Hrvaška

21

Reka Kolpa v Sisku
Železno bodalo (glavič ročaja ni ohranjen) z izrazitim osrednjim podolžnim rebrom na rezilu. Med ročajnim jezikom in zunanjima železnima oblogama ročaja sta omenjeni koščeni oblogi. Ohranjeni so štirje železni zatiči (dva na spodnjem delu ročaja in po eden na paličastem delu nad oziroma pod razširitvijo sredi ročaja) in tri zakovice iz bakrove zlitine z značilno oblikovanimi glavicami: dve na spodnjem delu ročaja in ena na razširitvi v sredini ročaja.
Radman-Livaja 2004, 50–51, 128, kat. 57, t. 14; Radman-Livaja 2010b, 184 (barvna fotografija); Istenič 2012, 176, op. 24, sl. 12.

Sorodno bodalo

Nemčija

22

Oberammergau, približno 260 m južno od domnevnega kultnega prostora na Döttenbichlu (Nemčija)
Železno bodalo z izrazitim rebrom na rezilu, v nožnici, podloženi z lesom. Konici bodala in nožnice ter pretežni hrbtni del nožnice niso ohranjeni.
Ročaj bodala in nožnica sta okrašena s tavširanim okrasom (srebro in medenina – analiza XRF), ki vključuje napis C.ANTONVS.FECIT […] na hrbtni strani bodala. Zunanji železni oblogi ročaja naj bi imeli bronasto podlogo.[284] V zgornji ravni stranici glaviča so trije srebrni žebljički, na srednjem je ohranjena polkrožna glavica. Srebrne zanke za obešanje (v dveh sta ohranjena obročka) so v nožnico pripete s po tremi srebrnimi zakovicami, ki imajo značilno oblikovane glavice. V objavah ni risb niti rentgenskih posnetkov.
Ulbert 1962; Ulbert 1971; Zanier 1994, 97; Zanier 1997, 47–48; Bishop, Coulston 2006, pl. 1 (barvna fotografija); Istenič 2012, sl. 14; Zanier 2016, 267–271, sl. 3: 4, sl. 23, sl. 97: E1, 862–863, t. 18: E1.

284 Tako Ulbert (1962, 175–177; navedeno tudi v Zanier 2016, 862). Trditev bi bilo smiselno preveriti. Ulberta bi lahko zavedli ostanki medeninastega traku, ki je prekrival stransko ploskev ročaja (prim. *seznam 1: 2, 12–15*).

5.3 Bodala in polnokovinske nožnice z železnimi zakovicami ter tavširanim in emajliranim okrasom (B1–B2)

Bodali z nožnicama B1 in B2 sodita v skupino bodal s polkrožnim ploščatim glavičem in njim pripadajočih polnokovinskih nožnic (Scott tip A, Obmann tip Mainz), ki so okrašeni z železnimi zakovicami z glavicami, v katerih je (bil) emajl. Bodalo in nožnica B1 se uvrščata med najbolje ohranjene primerke te vrste bodal in nožnic.

Bodala in nožnice z železnimi zakovicami, za katere utemeljeno domnevamo, da so imele z emajlom okrašene glavice, so med najstarejšimi, tj. srednjeavgustejskimi bodali s polkrožnim ploščatim glavičem in pripadajočimi nožnicami.[285] Tako namreč kažejo skledasto oblikovane glavice zakovic (v katerih se emajl verjetno ni ohranil) na nožnici z najdišča Basel-Münsterhügel[286] in na ročaju bodala iz Oberadna.[287] Najstarejše bodalo z ohranjenim emajlom v glavicah železnih zakovic iz ozko datiranih najdiščnih okoliščin je iz Halterna,[288] kar kaže na datacijo med 7/5 pr. Kr. in 9/16 po Kr.[289]

Nožnica B1 sodi v največjo Scottovo podskupino polnokovinskih nožnic, za katero so značilni tavširanje z medenino, emajliran okras in delitev na štiri okrasna polja. Imenovana je po najdišču Dunaföldvár (Madžarska). Odlično ohranjena nožnica z najdišča Alphen aan den Rijn (Nizozemska)[290] kaže, da so za tavširanje primerkov te podskupine poleg medenine uporabljali srebro.

Scott je za podskupino Dunaföldvár domneval datacijo v konec avgustejske in v tiberijsko dobo.[291] Domnevam, da je k že omenjenemu bodalu iz Halterna,[292] ki ga Scott v svoji študiji ni upošteval, sodila podobno okrašena polnokovinska nožnica, torej so nožnice podskupine Dunaföldvár začeli uporabljati v poznoavgustejski ali morda že (ob koncu) srednjeavgustejski dobi. Nožnica iz Utrechta, ki je datirana po letu 39

285 Glej pogl. 5.1.
286 Emajl ni ohranjen oziroma v objavah (Helmig 1990, 158–160, sl. 2; Berger, Helmig 1991, 18, sl. 9: 9) ni omenjen. Datacija: Roth-Rubi 2006, 103, 117–118.
287 Albrecht 1942, 160, 100, t. 52: 4. Emajl v objavi ni omenjen; pri bodalu t. 52: 2 ni navedeno, iz česa sta zakovici.
288 Harnecker 1997, 87, kat. 758, t. 70; Wamser, Flügel, Ziegaus 2000, 321, kat. 22.
289 Prim. pogl. 3.
290 Fischer 2012, 194, sl. 279; srebro na fotografiji ni vidno, omenjeno pa je v podnapisu.
291 Scott 1985, 168, 169, 197–199, priloga 2a.
292 Harnecker 1997, 87, kat. 758, t. 70; Wamser, Flügel, Ziegaus 2000, 321, kat. 22.

The B1 and B2 daggers share a handle construction very similar to the one of the Dangstetten group. The blade continues into the flat tang. The latter is sandwiched between plates of wood, horn or bone and reaches to the pommel with a solid wood core (*Fig. B1.4*); presumably the end of the tang was pushed into the wood.[298] The handle had an iron shell composed of a back and a front plate. Parts of the handle were held together by thick pins, which are barely visible on the surface, but clearly distinguishable on the X-ray images (two on the guard, one below the central swelling, one above the swelling, one on the pommel; *Figs. B1.3, B2.3, B3.3, B4.2*) and iron rivets with thin shanks and enamelled heads on the front (two on the guard, one on the central swelling, three on the pommel). The curved sides of the pommel were closed off with a strip of sheet brass[299] (*Fig. B1.2c, d*), the flat top surface with an iron plate fastened to the wooden core with three nails bearing decorative heads (*Fig. B1.2e*).

The B1 and B2 sheaths are composed of two iron plates and a wooden liner (*Fig. B1.5*[300]). The B2 sheath has a flat back plate and a front plate that is curved at the sides, while the B1 sheath may have had both plates curved at the sides. The plates are fastened together along the sides with four symmetrically positioned groups of three rivets (B1) or three rivets and a pin (B2), as well as a rivet in the centre of the terminal (B1, B2). The side rivets also fasten the suspension loops to the sheath (B1).

Inlaid metal decoration survives on sheaths and handles; the inlaid metal is brass (B1) or silver and brass (B2). The two sheaths are also decorated with red (B1) or green enamel (B2). The grooves originally inlaid with enamel on the B2 sheath bear small transverse incisions (*Fig. B2.4*); they were presumably made to improve adhesion.

The disc terminals on the sheaths are decorated on the front by enamelled rivet heads, but also by a silvery plating, which is a tin-led alloy in the case of the B1 sheath and tin on the B2 sheath (cf. Catalogue, B1, B2).

298 The same has been established for the dagger with a round pommel found in the vicinity of Štanjel (Istenič 2009a, 332).
299 See Ch. 16, B1.
300 Rant et al. 1994.

5.4 Comparing the technological characteristics of the daggers and sheaths from the Ljubljanica to those from other sites

The observations pertaining to the construction of the daggers from the Ljubljanica, described in Chapters 5.2 and 5.3, correspond with those for the dagger from Ljubljana (*Fig. 39a–e*) and with the few published findings concerning similar daggers from other sites.[301]

The dagger from Haltern has been analysed in detail. The handle has a construction almost identical to that of the daggers from the Ljubljanica. The flat tang is sandwiched between pieces of horn and the pommel has a wooden core, all of which was encased in iron plates, one on each side. These pieces were held together by eleven rivets, five of them decorated. The flat top surface of the pommel was covered by a millimetre thick iron plate fastened with three rivets bearing enamelled heads, while its curved sides were covered by a pair of copper alloy strips. The flat tang ended at the pommel; the sides of the handle below the pommel were covered with a strip of copper alloy. The view of the side of the handle thus revealed five layers: brass strip in the centre, followed on both sides by horn that was probably painted and finally iron plates on the exterior.[302] Brass strips closing the handle from the side survived well on the two daggers from the River Kupa at Sisak.[303]

The dagger handles from the Ljubljanica thus differ from those found at Haltern in having one rivet less (I was not able to establish any rivets below the central swelling) and probably wooden rather than bone layers sandwiching the tang. In addition, the thin brass strip on the Ljubljanica dagger probably covered the whole side surface of the handle, as on the daggers from Ljubljana (*Fig. 39a–e*), Oberaden[304] and the River Kupa at Sisak,[305] rather than merely its central part (tang) as on the dagger from Haltern.

301 The book on Roman daggers and their sheath published by Saliola, Casprini 2012 (52–54), which I only received after this chapter had already been written, contains significant inaccuracies and errors in the description of the construction and the production manner of the metal sheaths; similar errors also occur in other parts of the book, including false data on brass on p. 10 (also cf. below, Fn. 309).
302 Westphall 1995, 99–104, Figs. 5–9.
303 Radman-Livaja 2004, Cat. Nos. 59, 60, Figs. 8, 9, Pls. 15, 16 (in the absence of accurate descriptions or detailed photos, the exact construction and appearance of the handle is unclear).
304 Albrecht 1942, 160, E 100, Pl. 52: 4.
305 Radman-Livaja 2004, Cat. Nos. 59, 60, Figs. 8, 9, Pls. 15, 16.

oziroma 42,[293] nakazuje, da so jih v klavdijskem času še uporabljali.

Obmann je nožnice podskupine Dunaföldvár in druge nožnice, npr. primerke iz Scottove podskupine Moers-Asberg, uvrstil v svojo 1. skupino, za katero je domneval začetek izdelovanja v avgustejski dobi in uporabo do sredine 1. stoletja.[294]

Nožnica B2 je bila okrašena s srebrnim in medeninastim tavširanjem (z medenino sta bili tavširani zunanji pokončni liniji v 2. in 4. okrasnem polju) ter z zelenim emajlom (prim. Katalog, B2). Po Scottovi delitvi je najbližje podskupini Allériot,[295] za katero so značilni tavširanje s srebrom (še posebej šrafirane površine) ter zapleteni in težko opisljivi motivi v spodnjem trikotnem okrasnem polju. Primerjava z objavljenimi opisi[296] je pokazala, da so za tavširanje nožnic te skupine poleg srebra, ki sicer močno prevladuje, uporabljali tudi »bron«.

Po Obmannovi delitvi nožnica B2 sodi v 2. podskupino, za katero so med drugim značilne s srebrom tavširane šrafirane površine, emajliran okras in delitev spodnjega polja v zgornji in spodnji del. Med redkimi datiranimi primerki so najstarejši iz Tiberijeve dobe.[297]

Datiranje podskupin polnokovinskih nožnic, ki jim pripadata primerka B1 in B2, je torej zaradi majhnega števila primerkov iz datiranih najdiščnih okoliščin lahko le okvirno. Bodala in nožnice B1 tako ni mogoče datirati ožje kot od poznoavgustejske (ali konca srednjeavgustejske) do vključno klavdijske dobe, za B2 pa se nakazuje datacija od tiberijske (začetek nožnic 2. skupine po Obmannu) do klavdijske dobe, ko se izteče uporaba polnokovinskih nožnic.

Rezilo bodala B1 je imelo žlebova vzdolž osrednjega rebra. Na rentgenskih posnetkih rezil bodal B1 in B2 so vidne navpično potekajoče linije (*sl. B1.3, B2.3*), ki kažejo sledove kovanja.

Bodali B1 in B2 imata zelo podobno zgradbo ročaja kot bodala skupine Dangstetten. Rezilo preide v ročajni jezik, ki je bil obložen z lesom, roževino ali kostjo in je segal do glaviča, ki je imel jedro iz masivnega lesa (*sl. B1.4*); leseni del glaviča je bil najverjetneje nasajen vrh ročajnega jezika.[298] Cel ročaj je bil obložen s sprednjo in hrbtno železno oblogo. Dele ročaja so spenjali debelejši zatiči, ki na površini (skorajda) niso vidni, kažejo pa jih rentgenski posnetki (dva v spodnjem delu ročaja in po eden na paličastem delu nad razširitvijo sredi ročaja in pod njo ter na glaviču; *sl. B1.3, B2.3, B3.3, B4.2*) in železne zakovice s tenkimi trni in emajliranimi glavicami na sprednji strani bodala (dve ob straneh spodnje strani ročaja, ena v razširitvi sredi ročaja in tri na glaviču). Izbočeni stranici glaviča sta bili zaprti z medeninasto[299] pločevino (*sl. B1.2c, d*), zgornja ravna stranica pa z železno ploščico, ki je bila v leseno jedro pritrjena s tremi žebljički z okrasnimi glavicami (*sl. B1.2e*).

Nožnici B1 in B2 sta sestavljeni iz dveh železnih polovic in sta bili podloženi z lesom (*sl. B1.5*[300]). Pri B2 je hrbtna polovica ravna, sprednja pa ob straneh zapognjena, pri B1 sta bili morda ob straneh ukrivljeni obe polovici. Obe polovici nožnic sta ob straneh speti s štirimi simetrično postavljenimi skupinami treh zakovic (B1) oz. treh zakovic in enega zatiča (B2) in z zakovico v sredini zaključka nožnice (B1, B2). Stranske zakovice obenem na nožnico pripenjajo zanke za obešanje nožnice (B1).

Tavširan okras je ohranjen na nožnicah in ročajih; vloženi material je medenina (B1) oziroma srebro in medenina (B2). Nožnici sta bili okrašeni tudi z rdečim (B1) oziroma zelenim (B2) emajlom. Na nožnici B2 sem v žlebovih, iz katerih je izpadla vložena kovina, opazila drobne prečne vreze (*sl. B2.4*); verjetno so bili narejeni zato, da bi se vložena kovina bolje oprijela podlage.

Krožno oblikovane zaključke nožnice na licu poleg emajlirane glavice zakovice krasi prevleka srebrne barve, ki je pri bodalu B1 iz zlitine kositra in svinca, pri bodalu B2 pa iz kositra (prim. Katalog, B1, B2).

293 Obmann 2000, 8, op. 1, 22–23, NL 8, t. 7.
294 Obmann 2000, 8–9 (primerki, ki jih uvršča v svojo skupino 1, so navedeni v op. 1).
295 Scott 1985, 170, 199–200, št. 20–23 oziroma 26.
296 Npr. eponimno bodalo iz Allériota (Obmann 2000, 25, F1).
297 Obmann 2000, 9.
298 Enako je bilo ugotovljeno pri bodalu s krožnim glavičem iz okolice Štanjela (Istenič 2009a, 332).
299 Glej pogl. 16, B1.
300 Rant et al. 1994.

The same construction and a similar decoration technique (inlaid brass and silver; brass strips closing the pommel from the side), can be observed on the dagger with a round pommel from the vicinity of Štanjel.[306]

The analyses of the dagger blades from Haltern, Oberaden and Great Britain[307] have shown different blade structures of Early Imperial daggers. The most elaborate is lamellar damascening, which has also been reported for two examples of the Dangstetten group daggers (see above) and is suggested by the X-ray images of the B1 and B2 daggers (*Figs. B1.3, B2.3*). It appears that this blade structure would have been

Figure 39
Dagger and sheath from Ljubljana, unearthed in 1964 near the building of the Faculty of Mechanical Engineering at Aškerčeva cesta, in the southern part of *Emona* under Street C: a) front, b) back, c–d) left and right sides of the pommel, e) pommel top surface. Sheath: surviving length 131 mm, width 60 mm, dagger: surviving length 232 mm, surviving width 51 mm. City Museum of Ljubljana, Inv. No. 510;LJU;0033671 PN 395.
Their exact archaeological context is unknown. The metal sheath is of Type A after Scott, the Dunaföldvár subgroup (cf. the B1 dagger), while the style of the hatched decoration on the hilt rather points to the Allériot subgroup (cf. the B2 dagger), which may suggest that the dagger and the sheath are not parts of the same set.
The front and back plates of the hilt enveloped a wooden core, visible on the front of the semicircular pommel, and were inlaid with silver. Three rivet heads survive, two on the pommel top surface (the third one on the left is missing) and one on the central swelling. They were most likely decorated with enamel inlays, now missing. The sides of the semicircular pommel are covered by a 6 mm wide brass strip with punched decoration.
The sheath is missing the suspension loops and heads of the rivets that fastened them to the sheath; the surface bears no traces of these rivets, but their shanks would probably have shown up in an X-ray image.
The front of the sheath is inlaid with brass, while an examination under an optic microscope also revealed traces of red enamel. The latter decorated every other leaf in the rosettes of the first and third zones, as well as larger surfaces in the second, third and probably also first zones.

306 Istenič 2009a.
307 Horstmann 1995; Lang 1995, 122–127; Westphal 1995, 95–99, 105–106.

Slika 39

Bodalo v nožnici iz Ljubljane, najdeno leta 1964 pri današnji Fakulteti za strojništvo na Aškerčevi cesti, v južnem delu Emone pod cesto C: a) sprednja stran, b) hrbtna stran, c–d) leva in desna stranska ploskev zaključka ročaja, e) zgornja ploskev zaključka ročaja. Nožnica: ohranjena dolžina 131 mm, širina 60 mm, bodalo: ohranjena dolžina 232 mm, ohranjena širina 51 mm. Mestni muzej Ljubljana, inv. št. 510;LJU;0033671 PN 395.
Bodala in nožnice po najdiščnih okoliščinah ni mogoče datirati. Nožnica sodi med polnokovinske primerke (tip A po Scottu), v podskupino Dunaföldvár (prim. bodalo B1), šrafiran okras ročaja bodala pa bi po stilu ustrezal nožnici podskupine Allériot (prim. bodalo B2), kar me navaja k domnevi, da bodalo in nožnica prvotno nista sodila skupaj.
Sprednja in hrbtna stran ročaja bodala objemata leseno podlogo (vidna na sprednji strani polkrožnega zaključka) in sta tavširani s srebrom. Ohranjene so tri glavice zakovic: dve na vrhu glaviča (skrajna leva manjka) in ena na razširitvi sredi ročaja; najverjetneje so bile okrašene z emajlom, ki ni ohranjen. Stranski ploskvi polkrožnega zaključka ročaja pokriva 6 mm širok medeninast trak s punciranim okrasom v sredini.
Na nožnici manjkajo zanke za pripenjanje in glavice zakovic, s katerimi so bile zanke prikovane na nožnico; prav tako na površini ni jasnih sledov teh zakovic, ki pa bi jih najverjetneje pokazal rentgenski posnetek.
Na sprednji strani nožnice je tavširan okras iz medenine. Sledovi rdečega emajla, ki so vidni pod optičnim mikroskopom, kažejo, da je bil z njim okrašen vsak drugi listek v zgornji in spodnji rozeti in da je pokrival večje dele površine v drugem in tretjem ter verjetno tudi prvem okrasnem polju sprednje strani nožnice.

5.4 Primerjava tehnoloških značilnosti bodal in nožnic iz Ljubljanice s primerki z drugih najdišč

Opažanja o zgradbi bodal iz Ljubljanice, opisana v pogl. 5.2 in 5.3, se ujemajo z bodalom iz Ljubljane (*sl. 39a–e*) in z maloštevilnimi objavljenimi ugotovitvami raziskav primerljivih bodal z drugih najdišč.[301]

Podrobno je bilo raziskano bodalo iz Halterna. Ročaj je sestavljen skoraj enako kot pri bodalih iz Ljubljanice. Ročajni jezik je obložen z rogovino, v glaviču pa je bil les. Zunanjost sestavljata železni oblogi. Naštete dele povezuje enajst zakovic, od katerih jih ima pet tudi okrasno funkcijo. Na zgornji (ravni) stranici glaviča je bila milimeter debela železna ploščica, ki je bila pritrjena s tremi zakovicami z emajliranimi glavicami, na izbočenih stranskih ploskvah pa je bil trak iz bakrove zlitine. Ročajni jezik se je končal pod glavičem; njegovi stranski ploskvi sta bili obloženi s pločevino iz bakrove zlitine. Tako je bilo v pogledu na stranico ročaja vidnih pet plasti: v sredini medenina, ob njej rogovina, ki je bila verjetno obarvana, in nato železni zunanji oblogi.[302] Medeninaste obloge, ki s

301 To ne velja za knjigo o rimskih bodalih in njihovih nožnicah Saliola, Casprini 2012 (52–54), ki sem jo dobila šele po zaključku pisanja tega poglavja in v kateri opis sestave in načina izdelave polnokovinskih ročajev bodal po mojem mnenju vsebuje pomembne netočnosti in napake, ki sem jih opazila tudi v drugih delih knjige (npr. popolnoma napačni podatki o medenini na str. 10; prim. tudi spodaj, op. 309).

302 Westphall 1995, 99–104, sl. 5–9.

visible on the surface and was intended to make an optic impression rather than improve the mechanical properties; it is also characteristically tied to daggers with carefully decorated handles and sheaths.[308]

The construction details of the metal sheaths are poorly studied and evidence is scant.[309] The sheath from Basel-Münsterhügel has been established as made of two iron plates.[310] The sheath of one of the daggers from Mainz has an excellently preserved wooden liner; analyses have also shown that this sheath was inlaid with brass.[311]

It is quite surprising that the metal sheath inlaid with silver, brass and enamel from Carnuntum is composed of two plates bound at the sides by U-sectioned guttering,[312] which is reminiscent of the construction of the Mainz type sheaths.

308 Horstmann 1995, 133–134; Lang 1995, 122–127; Westphal 1995, 95–99.

309 Saliola, Casprini (2012, 70–73) did not include the metal dagger sheaths such as B1–B4 from the Ljubljanica in their discussion of the production techniques. They state sheaths of a later type, made of wood and leather with decorated iron plates fixed to the front (Scott Type B/Obmann Type Vindonissa) as the only one of the Principate (their Period II).

310 Helmig 1990, 159–160.

311 Klein 2003a, 55–58, 68, Fn. 5.

312 Niemeyer 1990, 198–199, Fig. 2.

strani zapirajo ročaj, so razmeroma dobro ohranjene na dveh bodalih iz Kolpe v Sisku.[303]

Ročaji bodal iz Ljubljanice se od primerka iz Halterna torej razlikujejo po enem zatiču manj (na paličastem delu pod razširitvijo v sredini ročaja namreč nisem ugotovila zakovice) in po verjetno lesenih (in ne koščenih) oblogah ročajnega jezika. Poleg tega je tenka medeninasta pločevina verjetno prekrivala celi stranski ploskvi ročaja, kot je na primer pri bodalih iz Ljubljane (*sl. 39a–e*), Oberadna[304] in iz Kolpe pri Sisku,[305] in ne le njen srednji del (ročajni jezik), kot je to na bodalu iz Halterna.

Enako sestavljeno in podobno okrašeno (s tavširanim okrasom iz medenine in srebrove zlitine ter z medeninastim trakom na stranskih ploskvah glaviča) je bodalo s krožnim ploščatim glavičem iz okolice Štanjela.[306]

Raziskave rezil bodal iz Halterna, Oberadna in Velike Britanije[307] so pokazale, da imajo rezila zgodnjecesarskih bodal različne strukture, med katerimi je najbolj umetelno lamelno damasciranje, ki je omenjeno tudi pri posameznih primerkih bodal skupine Dangstetten (glej zgoraj) in je nakazano na rentgenskih posnetkih bodal B1 in B2 (*sl. B1.3, B2.3*). Zdi se, da je bila taka zgradba rezil vidna na površini in je bila bolj namenjena optičnemu učinku kot izboljšanju mehanskih lastnosti rezila ter da je značilna za bodala s skrbno okrašenimi ročaji in nožnicami.[308]

Podrobnosti zgradbe polnokovinskih nožnic bodal so slabo raziskane.[309] Za nožnico z najdišča Basel-Münsterhügel so ugotovili, da je narejena iz dveh železnih polovic.[310] Pri nožnici enega izmed bodal iz Mainza je odlično ohranjena lesena podloga, analize pa so pokazale, da je bila tavširana z medenino.[311]

Presenetljiva je ugotovitev, da polnokovinska, s tavširanjem (srebro in medenina) in emajlom okrašena nožnica iz Carnuntuma ni sestavljena iz dveh železnih polovic, temveč iz sprednjega in zadnjega železnega okova, ki ju ob straneh povezuje robni okov U-preseka,[312] kar spominja na zgradbo nožnic mečev tipa Mainz.

303 Radman-Livaja 2004, kat. 59, 60, sl. 8, 9, t. 15, 16 (ni natančnih opisov niti posnetkov detajlov, zato podrobnosti sestave in izgleda ročaja iz objave niso jasne).
304 Albrecht 1942, 160, E 100, t. 52: 4.
305 Radman-Livaja 2004, kat. 59, 60, sl. 8, 9, t. 15, 16.
306 Istenič 2009a.
307 Horstmann 1995; Lang 1995, 122–127; Westphall 1995, 95–99, 105–106.
308 Horstmann 1995, 133–134; Lang 1995, 122–127; Westphall 1995, 95–99.
309 Saliola, Casprini (2012, 70–73) pri opisu tehnik izdelave polnokovinskih nožnic bodal, kakršnim pripadajo nožnice B1–B4 iz Ljubljanice, sploh nista obravnavala. Kot edini tip nožnic principata (njuno obdobje II) navajata mlajši tip nožnic, torej nožnice, ki so bile iz lesa ter so imele na sprednji in hrbtni strani kovinsko oblogo (nožnice tipa B po Scottu oz. tipa Vindonissa po Obmannu – prim. zgoraj, pogl. 5.1).
310 Helmig 1990, 159–160.
311 Klein 2003a, 55–58, 68, op. 5.
312 Niemeyer 1990, 198–199, sl. 2.

6
Helmets

6.1 Helmet of the Etrusco-Italic type (C1)

The C1 helmet is of bronze with around 88% copper and around 12% tin, without the addition of lead.[313] Clear forging marks on its interior and on the X-ray image of the bowl (*Fig. C1.7*) reveal the production technique. The absence of evidence to the contrary suggests that the crest knob may also have been made by forging, in a single piece with the rest of the helmet. The exterior was polished; it shows no traces of using a lathe.

The crest knob, the lower part of the bowl and the thickened rim bear punched decoration[314] (cf. Catalogue, C1; *Figs. C1.1a–d, C1.2a–b)*.

The hinge loops on both sides of the helmet are also made of bronze without added lead.[315] They were cut of beaten sheet metal. One of the loops survives complete with an iron pin, which functioned as the axis bar.[316] Both loops are attached to the bowl with copper rivets.[317]

A hole on the neckguard indicates the spot where a fitting with two loops was attached to the underside, presumably with rivets; two straps may have been inserted into the rings in these loops, and ran on both sides through the loops in the interior part of the cheek-pieces and then under the chin, where they were tied together.[318]

The C1 helmet is of a type known under different names in literature: Etrusco-Italic,[319] Etrusco-Roman,[320] the Montefortino type[321] or conical helmets with a crest knob (*konische Helme mit Scheitelknauf*).[322] They evolved from Etruscan bronze helmets that began to be produced in the 4th century and were probably modelled on Celtic iron helmets.[323] The Roman soldiers wore the Etrusco-Italic helmets from the 3rd century[324] at the latest to the first third of the 1st century BC.[325] They also found their way into the military ranks of other peoples,[326] who may have used them to signal the high social status of the wearer.[327]

In comparison with other Etrusco-Italic helmets, the C1 example has an unusual hole on either side of the helmet, just in front of the riveted hinge loop. The same feature can be observed on a helmet of the Montefortino/Canosa subtype from an unknown findspot, which has holes both behind and in front of the riveted loop.[328]

Pernet distinguishes between earlier and later Etrusco-Italic helmets, the former simpler in decoration and spanning the 4th and 3rd centuries BC, the latter

313 See Ch. 16, *Table C1: 1, 2.*
314 Individual lines on the well-preserved parts have a roughly V-shaped cross section, which speaks against the technique of casting.
315 See Ch. 16, C1.
316 Born (1991, 74, Fig. 1, Pls. 7: 1, 8: 1) mentions iron axis bars surviving on the cast or forged cheek-pieces of the Etrusco-Italic helmets.
317 See Ch. 16, C1.
318 Cf. Junkelmann 2000, 59–60, 107–110, AG 130, AG 290.
319 E.g. Feugère 1994a, 37–41.
320 Schaaff 1988, 318–322.
321 Junkelmann 2000, 52–65.
322 Ortisi 2015, 27.
323 Schaaff 1988, 318.
324 Egg et al. 1988, No. 110; Schaaff 1988, 318–322, Fig. 3; Feugère 1993, 83–87, 118–119; Feugère 1994a, 37–41, 43, 45; Feugère 1994b, 10, 12, 20, Fig. 8; Junkelmann 2000, 59–60; Pernet 2010, 72–84. A number of Etrusco-Italic helmets have recently, between 2008 and 2013, been unearthed off the Egadi Islands along the west coast of Sicily together with parts of sunken ships, amphorae and other items. These appear to be the remains of a naval battle that took place at the end of the First Punic War, in 241 BC (https://www.haaretz.com/archaeology/MAGAZINE-diving-archaeologists-find-lion-helmet-from-punic-wars-1.5626649; last accessed 11. 6. 2018).
325 Pernet 2010, 75. Crucial evidence for dating these helmets up to the first third of the 1st century BC is a helmet from the ship that sank around 70 BC at Madrague de Giens (Feugère 1994a, 43–44).
326 Schaaff 1988, 319–322, Fig. 3; Egg et al. 1988, Cat. No. 111; Pernet 2010, 74, Fig. 38; https://www.haaretz.com/archaeology/MAGAZINE-diving-archaeologists-find-lion-helmet-from-punic-wars-1.5626649 (last accessed 11. 6. 2018).
327 Feugère 1994a, 39–40.
328 Born 1991, Pl. 13; Junkelmann 2000, 106, Fig. 29.

6
Čeladi

6.1 Čelada etruščansko-italskega tipa (C1)

Čelada C1 je iz brona, ki vsebuje okoli 88 % bakra in okoli 12 % kositra, brez dodatkov svinca.[313] Jasni sledovi kovanja, ki so vidni na notranji površini čelade in rentgenskem posnetku kalote (*sl. C1.7*), kažejo, da je bila narejena s kovanjem. Nič ne govori proti temu, da je s kovanjem nastal tudi gumb, ki je narejen v enem kosu z ostalimi deli čelade. Zunanja stran je bila spolirana, ni sledov uporabe vretena.

Na gumbu, spodnjem delu kalote in odebeljenem robu ima čelada punciran okras[314] (prim. Katalog, C1; *sl. C1.1a–d, C1.2a–b)*.

Iz brona, brez dodanega svinca, so tudi zanke ob straneh čelade.[315] Izrezane so bile iz skovane pločevine. V eni od zank se je ohranila železna palčka, ki je delovala kot os tečaja.[316] Zanki sta na kaloto pritrjeni z zakovicami iz bakra.[317]

Luknja na vratnem ščitniku kaže, kje je bil na njegovo spodnjo stran verjetno prikovičen okov z dvema zankama; vanju sta bila morda vpeta jermena, ki sta na obeh straneh vodila do zanke na notranji strani ličnih ščitnikov in bila zavezana pod brado osebe, ki je nosila čelado.[318]

Čelada C1 ustreza čeladam, za katere se v literaturi uporabljajo različna poimenovanja: etruščansko-italski tip,[319] etruščansko-rimski tip[320] ali tip Montefortino[321] oziroma konične čelade z gumbom na vrhu (*konische Helme mit Scheitelknauf*).[322] Izhajajo iz bronastih čelad, ki so jih v 4. st. začeli izdelovati v Etruriji in so se verjetno zgledovale po keltskih železnih čeladah.[323] Rimski vojaki so jih uporabljali najkasneje od 3.[324] do prve tretjine 1. st. pr. Kr.,[325] našle pa so tudi pot do bojevnikov drugih ljudstev,[326] pri katerih so lahko veljale za pokazatelja visokega socialnega položaja njihovih lastnikov.[327]

V primerjavi z drugimi čeladami etruščansko-italskega tipa je pri čeladi C1 neobičajno, da ima luknjico nad robom, pred prikovičeno zanko, na levi in desni strani čelade. Podobno je pri čeladi podtipa Montefortino/Canosa z neznanega najdišča, ki pa ima podobno luknjico tudi za prikovičeno zanko.[328]

Pernet je čelade etruščansko-italskega tipa razdelil na starejše, ki so enostavno okrašene in jih datira v 4. in 3. st. pr. Kr., ter mlajše, ki imajo bogatejši okras

313 Glej pogl. 16, *pregl. C1: 1, 2.*
314 Na dobro ohranjenih delih imajo linije približno V-presek, kar govori proti tehniki ulivanja.
315 Glej pogl. 16, C1.
316 Železne osi tečajev, ki pa so se ohranili na (ulitih ali skovanih) ličnih ščitnikih čelad etruščansko-italskega tipa, omenja Born (1991, 74, sl. 1, t. 7: 1, 8:1).
317 Glej pogl. 16, C1.
318 Prim. Junkelmann 2000, 59–60, 107–110, AG 130, AG 290.
319 Npr. Feugère 1994a, 37–41.
320 Schaaff 1988, 318–322.
321 Junkelmann 2000, 52–65.
322 Ortisi 2015, 27.
323 Schaaff 1988, 318.
324 Egg et al. 1988, št. 110; Schaaff 1988, 318–322, sl. 3; Feugère 1993, 83–87, 118–119; Feugère 1994a, 37–41, 43, 45; Feugère 1994b, 10, 12, 20, sl. 8; Junkelmann 2000, 59–60; Pernet 2010, 72–84. Številne čelade etruščansko-italskega tipa so nedavno (med letoma 2008 in 2013) našli pri otokih Egadi ob zahodni obali Sicilije, skupaj z deli ladij, amforami in drugimi predmeti. Verjetno so to sledovi pomorske bitke, v kateri so ob koncu punskih vojn, natančneje leta 241 pr. Kr., Rimljani porazili Kartažane (https://www.haaretz.com/archaeology/MAGAZINE-diving-archaeologists-find-lion-helmet-from-punic-wars-1.5626649; zadnji dostop 11. 6. 2018).
325 Pernet 2010, 75. Za datiranje teh čelad do vključno prve tretjine 1. st. pr. Kr. je ključna omemba, da je taka čelada med najdbami z ladje, ki se je potopila okrog leta 70 pr. Kr. pri Madrague de Giens (Feugère 1994a, 43–44).
326 Schaaff 1988, 319–322, sl. 3; Egg et al. 1988, kat. 111; Pernet 2010, 74, sl. 38; https://www.haaretz.com/archaeology/MAGAZINE-diving-archaeologists-find-lion-helmet-from-punic-wars-1.5626649 (zadnji dostop 11. 6. 2018).
327 Feugère 1994a, 39–40.
328 Born 1991, t. 13; Junkelmann 2000, 106, sl. 29.

lavishly decorated (also with a wave pattern or *Wellenranke*) and attributable to the 2nd and 1st centuries BC. He offers no arguments in support of the dating of his earlier helmets, mainly found across southern France and Spain;[329] the C1 helmet corresponds with his earlier group.

Helmets similar to C1 are also discussed by Quesada Sanz and Kavanagh de Prado, who write that they came to light on the Iberian Peninsula at sites from the late 3rd and the early 2nd century BC; they offer no references or arguments to substantiate their statement.[330]

Marcus Junkelmann divides the Etrusco-Italic or, as he names them, the Montefortino helmets into subtypes. The C1 helmet corresponds with his Montefortino/Cremona subtype, named after a helmet with a Latin inscription from Cremona (Italy), which is the earliest Etrusco-Italic helmet that is undoubtedly Roman. The form of the letters and the names mentioned in the inscription suggest a dating to the second half of the 3rd century BC.[331]

Given the above, the C1 helmet cannot be reasonably dated more narrowly than between the 3rd and the first third of the 1st century BC.

The published results of the elemental composition analyses of the Etrusco-Italic helmets (Montefortino/Talamone, Montefortino/Canosa and Montefortino/Cremona subtypes after Junkelmann) have shown copper alloys with around 7 to 10% tin and no added lead, which is very close to the composition established for the C1 helmet; such bronze is suitable for both casting and forging.[332]

Born[333] and Paddock[334] discuss the production technique of the Etrusco-Italic helmets in relatively great detail. Born notes they were made in one of two ways: casting the knob and the material later forged to obtain the bowl and casting the knob and the fully formed bowl, with the helmet finished by forging in both cases.[335] He presumes that the exterior was polished on the slow wheel and that the scale pattern on the knobs was made either during the casting process or later by engraving, while the pattern on the rim was made by filing.[336] In contrast, Paddock proposes that most Etrusco-Italic helmets were raised from a single sheet of bronze and the decoration added by chasing and filing; he makes no mention of polishing the exterior.

A careful examination of the C1 and other Etrusco-Italic helmets from Sv. Anton, Kovačevše and Grad near Krn reveals they were made by forging alone, without first casting, the exterior polished and decorated by punching.[337]

6.2 Helmet of the Buggenum/Haguenau type (C2)

The C2 helmet is made of bronze that contains copper and roughly 10% tin.[338] The bowl, neckguard and crest knob were made in a single piece by forging, which is indicated by forging marks on the interior and by the X-ray image (cf. Catalogue, C2; *Figs. C2.2g, C2.7*). The exterior surface was polished (e.g. with pumice) on the wheel.

The crest knob has a vertical slot on top (*Fig. C2.4*) which together with a hole on each side of the slot served to hold the crest. The fill of lead-tin alloy[339] (*Fig. C2.2f, g*) in the knob interior served to strengthen the knob. Similar fills (presumably of lead, though not confirmed by analyses) have been observed on the Etrusco-Italic and Haguenau helmets.[340]

At the sides (*Figs. C2.2c–d, C2.3a–b*) and the back (*Figs. C2.2b, C2.3c*), a tin-lead alloy was used to solder plume tubes of pure brass to the bowl.[341]

The upper hinge loops meant to hold cheek-pieces were cut out of a sheet of bronze containing around 5% tin;[342] they were fitted with an iron bar (*Fig. C2.5*) and attached to the sides on the bowl interior with a pair of copper[343] rivets each (*Fig. C2.2c–d*).

The hole in the middle of the neckguard (*Fig. C2.2e*) marks the spot where the fitting with a ring for helmet suspension would have been riveted.[344]

Among the Roman bronze helmets typologically succeeding those of the Etrusco-Italic tradition and

329 Pernet 2010, 72–74, Figs. 37, 38.
330 Quesada Sanz, Kavanagh de Prado 2006, 70–72, Fig. 2.
331 Junkelmann 2000, 60, Figs. 10, 11.
332 Born 1991, 77 (lead content under 0.25%, in a single example 1.7%).
333 Born 1991.
334 Paddock 1993, 490–493.
335 In the first case, X-ray images only show traces of forging, in the second traces of both forging and casting (Born 1991, 76–77, Pls. 12–14).
336 Born 1991, 75–76.
337 Istenič 2018.
338 See Ch. 16, C2.
339 See Ch. 16, C2.
340 Paddock 1993, 491, 562–566, 601, 604–605, 609–610, 614, 617–618, 621, 624, 634, 636, 726, 728, helmets Nos. 1, 11, 24, 47, 62, 79, 103, 112, 143.
341 See Ch. 16, C2.
342 See Ch. 16, C2.
343 See Ch. 16, C2.
344 Cf. von Detten, Schalles, Schreiter 1993, 180–185, Mil. 2–4, Pls. 21–23; Klein 2003c, 31, Fig. 4.

(med drugim motiv valovite vitice) in so iz 2. in 1. st. pr. Kr. Za datacijo starejših čelad, ki so razen v Italiji razširjene predvsem v južni Franciji in Španiji, ni navedel argumentov.[329] Čelada C1 ustreza njegovi starejši skupini.

Po Quesadi Sanz in Kavanagh de Prado so podobne čelade, kot je primerek C1, na Iberskem polotoku na najdiščih s konca 3. in začetka 2. st. pr. Kr., vendar te trditve nista utemeljila z navedbo objav, iz katerih bi bilo to razvidno.[330]

Marcus Junkelmann je etruščansko-italske čelade (imenuje jih tip Montefortino) razdelil na podtipe. Čelada C1 ustreza podtipu Montefortino/Cremona. Imenovan je po čeladi z latinskim napisom iz Cremone (Italija), ki je najstarejša zanesljivo rimska čelada etruščansko-italskega tipa. Na njej je namreč latinski napis, ki po obliki črk in v napisu navedenih imenih govori za datacijo v drugo polovico 3. st. pr. Kr.[331]

Čelade C1 torej ni smiselno datirati ožje kot od 3. stoletja do prve tretjine 1. stoletja pr. Kr.

Izsledki edinih doslej objavljenih analiz elementne sestave čelad etruščansko-italskega tipa (podtipi Montefortino/Talamone, Montefortino/Canosa in Montefortino/Cremona po Junkelmannu) so pokazali, da so iz zlitin bakra z okoli 7 do 10 % kositra (in brez svinca), kar je zelo podobno, kot smo ugotovili za čelado C1. Tak bron je primeren za ulivanje in kovanje.[332]

Z vidika tehnike izdelave sta čelade etruščansko-italskega tipa razmeroma poglobljeno obravnavala Born[333] in Paddock.[334] Born je menil, da so jih delali na dva načina: tako, da so ulili gumb in material, iz katerega so nato s kovanjem oblikovali kaloto, ali pa tako, da so ulili gumb skupaj z že oblikovano kaloto; v obeh primerih so čelado dodelali s kovanjem.[335] Domneval je, da so za poliranje zunanje površine uporabili počasno vreteno, da je okras na gumbu nastal ob vlivanju ali z graviranjem in okras na robu čelade s piljenjem.[336] Nasprotno je Paddock menil, da so večino čelad etruščansko-italskega tipa oblikovali iz enega kosa s kovanjem ter okrasili s punciranjem in piljenjem, ter opisal potek izdelave. Poliranja zunanje površine ne omenja.

329 Pernet 2010, 72–74, sl. 37, 38.
330 Quesada Sanz, Kavanagh de Prado 2006, 70–72, sl. 2.
331 Junkelmann 2000, 60, sl. 10, 11.
332 Born 1991, 77 (delež svinca je manj kot 0,25 %, le v enem primeru 1,7 %).
333 Born 1991.
334 Paddock 1993, 490–493.
335 Pri prvem načinu izdelave rentgenski posnetki kažejo le sledove kovanja, pri drugem načinu pa sledove kovanja in ulivanja (Born 1991, 76–77, t. 12–14).
336 Born 1991, 75–76.

Iz proučitve čelade C1 in čelad etruščansko-italskega tipa s Sv. Antona, Kovačevša in z Gradu pri Krnu izhaja, da so te čelade naredili zgolj s kovanjem (brez predhodnega ulivanja), zunanjo površino spolirali in okrasili s tehniko punciranja.[337]

6.2 Čelada tipa Buggenum/ Haguenau (C2)

Čelada C2 je iz brona, ki poleg bakra vsebuje okoli 10 % kositra.[338] Kalota, vratni ščitnik in gumb na njenem vrhu so bili narejeni v enem kosu, s kovanjem, ki ga nakazujejo sledovi na notranji površini in rentgenski posnetek (prim. Katalog, C2; *sl. C2.2g, C2.7*). Zunanjo površino so spolirali (npr. s plovcem) na vretenu.

Gumb ima na vrhu navpično zarezo (*sl. C2.4*), ki je bila, skupaj z luknjicama ob straneh, namenjena namestitvi okrasa (perjanice). Polnilo (zlitina svinca s kositrom;[339] *sl. C2.2f, g*) v notranjosti je gumb ojačalo. Podobna polnila (domnevno s svincem – analize niso bile narejene) so opazili na čeladah etruščansko-italskega tipa in čeladah tipa Haguenau.[340]

Ob straneh (*sl. C2.2c–d, C2.3a–b*) in na zadnji strani (*sl. C2.2b, C2.3c*) so bili na kaloto z zlitino kositra in svinca prispajkani nosilci okrasa iz čiste medenine.[341]

Zgornja dela tečaja za pritrditev ličnih ščitnikov sta izrezana iz bronaste pločevine, ki vsebuje okoli 5 % kositra,[342] in sta imela železni osi (*sl. C2.5*) ter sta bila na notranjo stran kalote pritrjena s po dvema bakrenima[343] zakovicama (*sl. C2.2c–d*).

Luknja v sredini vratnega ščitnika (*sl. C2.2e*) kaže, kje je bil z zakovico pritrjen okov z obročkom za obešanje čelade.[344]

Po tipologiji rimskih bronastih čelad, ki izhajajo iz čelad etruščansko-italske tradicije in sta jo podrobno obravnavala Schaaff in Waurick,[345] čelada C2 sodi na prehod med tipoma Buggenum in Haguenau.

337 Istenič 2018.
338 Glej pogl. 16, C2.
339 Glej pogl. 16, C2.
340 Paddock 1993, 491, 562–566, 601, 604–605, 609–610, 614, 617–618, 621, 624, 634, 636, 726, 728, čelade št. 1, 11, 24, 47, 62, 79, 103, 112, 143.
341 Glej pogl. 16, C2.
342 Glej pogl. 16, C2.
343 Glej pogl. 16, C2.
344 Prim. von Detten, Schalles, Schreiter 1993, 180–185, Mil. 2–4, t. 21–23; Klein 2003c, 31, sl. 4.
345 Schaaff 1988; Waurick 1988; Ortisi 2015, 27, 28.

analysed in detail,[345] C2 is of a transitional form between the Buggenum and Haguenau types.

The absence of a browguard and the integral hollow crest knob tie it to the typologically earlier Buggenum type.[346]

The features that indicate the Haguenau type, named after a site in Alsace (France; Hagenau in German) and characterised among other features by a separately made crest knob, are plume tubes at the sides and back of the bowl,[347] as well as a punched inscription on the neckguard. It is the Haguenau helmets that bear by far the greatest number of inscriptions relating the owner of the helmet and the unit in which he served,[348] while such inscriptions are rare on the Buggenum helmets.[349]

Similar helmets that also typologically stand between the Buggenum and Haguenau types have been found at Neuss[350] and an unknown site.[351] Like the C2 helmet, they were made integrally with the crest knob and without the browguard, while in all other features they correspond with the Haguenau type. The helmet from an unknown site also shares a punched inscription on the neckguard underside.

The beginnings of the Buggenum helmets can probably be sought in the mid-1st century BC. Their concentration along the lower reaches of the Rhine speaks of their use in the Middle (and Late) Augustan periods, when the area witnessed increased activities of the Roman army.[352]

The earliest Haguenau helmet from a chronologically narrowly dated context comes from Haltern and has all the characteristic features of the type, including the browguard.[353]

From the Augustan to the (Early) Flavian period when the Haguenau helmets fell into disuse, the neckguards grew in length and width.[354]

The shallow-angled and short neckguard on C2 (*Fig. C2.2e*) is only slightly wider than the bowl and similar to the neckguard on the helmet from Haltern.

345 Schaaff 1988; Waurick 1988; Ortisi 2015, 27, 28.
346 Cf. Schaaff 1988, 325–326.
347 Waurick 1988, 327–333; Ortisi 2015, 27; Haguenau helmet with (partially) surviving plume tubes: von Detten, Schalles, Schreiter 1993, 178–181, Mil. 1, 2, Pls. 20, 21; Klein 2003c, 30–32, Figs. 3–5.
348 Waurick 1988, 332–333.
349 Schaaff 1988, 325–326.
350 Waurick 1988, 328–329, Fig. 1: 1.
351 Junkelmann, Thüry 2000, 123, Cat. No. AG 538.
352 Schaaff 1988, 325–326; Feugère 1994a, 47–49, 79–80; Ortisi 2015, 27.
353 Müller 2002, 34–35, 181, No. 430, Pls. 39, 40.
354 Waurick 1988, 329, 356; von Detten, Schalles, Schreiter 1993, 180; Feugère 1994a, 84–85.

According to typological criteria, the C2 helmet should most probably be assigned to the final period of the Buggenum type and the beginning of the Haguenau type, i.e. to the Middle or Late Augustan period.

The inscription on the neckguard underside (*Fig. C2.6*) reveals that the helmet belonged to a soldier named Publius Oppius who served in a century commanded by a man with the cognomen Graccus or Craccus.[355] The owner of the helmet is presented with his *praenomen* and *nomen/gentilicium*, which clearly shows him to be a Roman citizen, but also indicates that the helmet predates the end of the first half of the 1st century.[356] *Oppius* is a Latin name[357] most numerously represented in Italy,[358] which suggests that the owner came from Italy. The inscription on the C2 helmet thus speaks in favour of the hypothesis that legionaries wore the Haguenau helmets.[359]

According to Waurick, the Haguenau helmets were usually forged and rarely made by combining casting and forging.[360] The six Haguenau helmets from the Rhine at Xanten, probably dating to the first half and the middle of the 1st century, were all forged.[361]

The study of the Buggenum and Haguenau helmets and their parts (crest knobs) from Slovenia has shown they were forged of bronze of a composition suitable for the purpose (10–12% tin and a negligible amount of lead). The separately cast crest knob of a helmet that belonged to a typologically later helmet of the Haguenau type was made of leaded bronze,[362] an alloy ideal for casting,[363] and soldered to the top of the bowl.

The only published data on the elemental composition of the Buggenum and Haguenau helmets pertain to the Haguenau helmet from Haltern. The browguard is brass (92.16% copper and 7.63% zink), while the helmet proper is of leaded bronze with very high tin content (major alloying metals are copper – 64.71%, tin – 26.04% and lead – 7.87%).[364] Such an alloy would be suitable for casting, but unsuitable for cold forming.[365]

355 It seems far less likely that the *gentilicium* belonged to the century commander Craccius or Graccius.
356 Bodel 2001, 83–84.
357 Solin, Salomies 1994, 132.
358 OPEL III, 114; EDCS (the name occurs in 268 inscriptions, almost half of which were found in Italy).
359 Waurick 1988, 332, 355; Schreiter 1993, 44.
360 Waurick 1988, 327–328. In contrast, Feugère (1994a, 84) believes that almost all were first cast and finished by forging.
361 Von Detten, Schalles, Schreiter 1993, 178–184, Mil. 1–6.
362 Istenič 2018.
363 Cf. Brown 1976, 25–26.
364 Riederer 2002a, 121, Table 19.
365 Cf. Brown 1976, 25–26.

S tipološko starejšim tipom Buggenum čelado C2 povezujeta odsotnost čelnega ščitnika in votel, v enem kosu s kaloto narejen gumb na vrhu čelade.[346]

Na mlajši tip čelad, poimenovan po najdišču Haguenau v Alzaciji (nem. Hagenau; Francija), pri katerem je med drugim običajen posebej izdelan gumb na vrhu čelade, pri čeladi C2 kažejo nastavki za pritrditev okrasa ob straneh in na zadnji strani čelade[347] ter punciran napis na vratnem ščitniku. Daleč največ čelad z napisi, ki se nanašajo na lastnika vojaške čelade in enoto, v kateri je deloval, namreč pripada tipu Haguenau,[348] pri tipu Buggenum so taki napisi redki.[349]

Podobni čeladi, ki sta po tipoloških merilih med tipoma Buggenum in Haguenau, izvirata iz Neussa[350] in neznanega najdišča.[351] Tako kot čelada C2 sta bili skupaj z gumbom narejeni v enem kosu in nimata čelnega ščitnika, sicer pa ustrezata tipu Haguenau. Čelada z neznanega najdišča ima na spodnji strani vratnega ščitnika punciran napis.

Čelade tipa Buggenum so se verjetno razvile v sredini 1. st. pr. Kr. Njihova razširjenost ob spodnjem Renu govori za uporabo v srednji (in pozni) avgustejski dobi, ko je bila povečana rimska vojaška dejavnost na tem območju.[352]

Najstarejša čelada tipa Haguenau iz ozko časovno opredeljenih najdiščnih okoliščin izvira iz Halterna in ima vse lastnosti tega tipa, vključno s čelnim ščitnikom.[353]

Od avgustejske do (zgodnje) flavijske dobe, ko se je uporaba čelad tipa Haguenau končala, so vratni ščitniki postajali daljši in širši.[354]

Poševen in kratek vratni ščitnik čelade C2 (*sl. C2.2e*) je le malo širši od kalote in je podoben vratnemu ščitniku čelade iz Halterna.

Po tipoloških kriterijih se zdi torej za čelado C2 verjetna datacija v zaključno obdobje uporabe čelad tipa Buggenum in na začetek uporabe čelad tipa Haguenau, tj. v srednjo ali pozno avgustejsko dobo.

Iz napisa na spodnji strani vratnega ščitnika čelade (*sl. C2.6*) izhaja, da je bila last vojaka z imenom Publius Oppius iz centurije, ki ji je poveljeval mož s kognomnom Graccus ali Craccus.[355] Lastnik čelade je podan z osebnim imenom (*praenomen*) in rodovnim/družinskim imenom (*nomen/gentilicium*), torej gre za rimskega državljana in za datacijo pred koncem prve polovice 1. st.[356] *Oppius* je latinsko ime[357] in je z največ primerki zastopano v Italiji,[358] zato domnevam, da je bil lastnik čelade doma v Italiji. Napis na čeladi C2 torej govori v prid domnevi, da so čelade tipa Haguenau nosili legionarji.[359]

Po podatkih, ki jih je zbral Waurick, so čelade tipa Haguenau običajno kovali, redko pa izdelali s kombinacijo ulivanja in hladne obdelave.[360] Skovanih je bilo tudi šest čelad tega tipa, verjetno iz prve polovice in sredine 1. st., iz Rena pri Xantnu.[361]

Raziskava čelad tipov Buggenum in Haguenau oziroma njihovih delov (vrhnjih gumbov) iz Slovenije je pokazala, da so bile narejene s kovanjem in iz brona, ki je za to primeren (vsebuje 10–12 % kositra in zanemarljivo malo svinca). Posebej narejen (ulit) gumb čelade, ki je sodil k tipološko mlajšemu primerku čelade tipa Haguenau in je bil prispajkan na vrh kalote, je iz svinčevega brona,[362] torej iz zlitine, ki je za ulivanje idealna.[363]

Edini objavljeni podatki o elementni sestavi čelad tipov Buggenum oz. Haguenau se nanašajo na čelado tipa Haguenau iz Halterna. Njen čelni ščitnik je iz medenine (92,16 % bakra in 7,63 % cinka), čelada pa je iz svinčevega brona z visokim deležem kositra (glavni zlitinski elementi so baker – 64,71 %, kositer – 26,04 % in svinec – 7,87 %).[364] Taka zlitina je ugodna za ulivanje, a neprimerna za hladno oblikovanje.[365]

346 Prim. Schaaff 1988, 325–326.
347 Waurick 1988, 327–333; Ortisi 2015, 27; čelade tipa Haguenau z (deloma) ohranjenimi nastavki za okras: von Detten, Schalles, Schreiter 1993, 178–181, Mil. 1, 2, t. 20, 21; Klein 2003c, 30–32, sl. 3–5.
348 Waurick 1988, 332–333.
349 Schaaff 1988, 325–326.
350 Waurick 1988, 328–329, sl. 1: 1.
351 Junkelmann, Thüry 2000, 123, kat. AG 538.
352 Schaaff 1988, 325–326; Feugère 1994a, 47–49, 79–80; Ortisi 2015, 27.
353 Müller 2002, 34–35, 181, št. 430, t. 39, 40.
354 Waurick 1988, 329, 356; von Detten, Schalles, Schreiter 1993, 180; Feugère 1994a, 84–85.
355 Precej manj verjetno se zdi, da je navedeno rodovno ime poveljnika centurije, to je Craccius oz. Graccius.
356 Bodel 2001, 83–84.
357 Solin, Salomies 1994, 132.
358 OPEL III, 114; EDCS (ime je omenjeno na 268 napisih, od katerih jih skoraj polovica izvira iz Italije).
359 Waurick 1988, 332, 355; Schreiter 1993, 44.
360 Waurick 1988, 327–328. Nasprotno Feugère (1994a, 84) meni, da so bile skoraj vse skovane iz ulitega »osnutka«.
361 Von Detten, Schalles, Schreiter 1993, 178–184, Mil. 1–6.
362 Istenič 2018.
363 Prim. Brown 1976, 25–26.
364 Riederer 2002a, 121, pregl. 19.
365 Prim. Brown 1976, 25–26.

7. *Pila*

The River Ljubljanica has thus far yielded seven or at the most ten pieces of Roman *pila* (D1–D9, MM D10). Nine belong to the same type, to tanged *pila* (D1–D8, MM D10; *Pl. 14; Fig. D1–6, Fig. D1, Fig. D2, Fig. D7–8; Fig. 40*)[366] that were common in the early Imperial period. They have a characteristic pyramidal head, long shaft that is usually round-sectioned in the upper and square-sectioned in the lower part, a flat tang that usually bears one, two or three rivets or rivet holes, as well as a truncated pyramidal collet that fitted on top of the wooden shaft.[367]

The dating of the tanged *pila* can be inferred from the examples recovered from Middle and Late Augustan,[368] Tiberian–Claudian[369] and Claudian–Early Vespasianic[370] sites, layers and contexts. The presumably latest *pilum* of this type, surviving without the pyramidal collet, comes from the hoard buried in AD 70 at Xanten.[371]

Three such *pila* from the fortress at Oberaden survive complete with the upper parts of wooden shafts, fitted into which were the flat tangs secured with rivets.[372]

We know that the Roman *pila* also came with iron butts,[373] but these have only rarely come to light in contexts that would allow them to be positively connected with *pila*.[374]

The very thin D9 artefact may also be a *pilum* (*Pl. 14; Fig. D9*). It is relatively similar to an iron *pilum* found at the Late Republican Fort III at Renieblas (Spain).[375]

366 The D6 and D9 *pila* may not be from the Ljubljanica. Gaspari included the MM D10 *pilum* in his dissertation (2002, 112, 291, Pl. 12: 3) stating different findspots: the Ljubljanica at Vrhnika and the bed of the Iščica stream. The Potočnik family did not hand the *pilum* to the City Museum Ljubljana by the end of 2017, hence it is only presented in this book with the drawing from Gaspari 2002, Pl. 12: 3.

367 Cf. Feugère 1993, 168; Deschler-Erb 1999, 20.

368 Dangstetten: Fingerlin 1986, 66, 130, 166, 172, 220, FO 176: 14, 360: 8, 455–457: 7, 482: 7, 562: 4; Fingerlin 1998, 23, 36, 47, 67, 72, 100, 133, 136, 150, 172, FO 657: 12, 700: 10, 747: 3, 833: 3, 844C: 3, 938: 3, 1059: 4, 1076: 1, 1143: 6, 1253: 6; Oberaden: Sander 1992, 140–141, Pls. 28, 29: 16, 18–19. The Middle/Late Augustan sites yielded similar, but typologically earlier *pila* with a narrow tang and no rivets: Hedemünden: Grote 2012, 346, Pl. 6: 34; Haltern: Harnecker 1997, 88, 90, Pl. 73: 771, Pl. 74: 792–794; Kalkriese: Harnecker, Franzius 2008, Pl. 1: 1–4; Harnecker, Mylo 2011, 3, 21, 22, Pl. 1; Lyon: Desbat, Maza 2008, 242–245, Fig. 5: 34 (layer dated to the first decade AD).

369 Dolenz 1998, 63–64, Cat. Nos. M15–M34, Pl. 4: M15–M17, M22–M25.

370 Rheingönheim (Germany): Ulbert 1969b, 52, Pl. 47: 5, 6; dating of the site: Ulbert 1969b, 15–16.

371 Hanel 1995, 48, Pl. 50: B 758. Only the flat tang and lower part of the shank survive of the *pilum*, the shank having a round rather than rectangular cross section as is usual for this type of *pilum*.

372 Albrecht 1942, 157, Pl. 48: 1–3, Pl. 49: 1–3; Bishop, Coulston 2006, 74, Fig. 36.

373 Bishop, Coulston 2006, 76.

374 Grote 2012, 246, Pl. 10: 62; cf. Hanel 1995, 48.

375 Luik 2002, 16–19, 228: R 143, Fig. 183: 143, Pl. 8: 4. The drawing, photograph and description do not reveal whether the surviving top of the *pilum* is a rather blunt tip or whether the actual tip is missing.

7. Kopja

Figure 40
Iron parts of the MM D10 *pilum* found either in the Ljubljanica at Vrhnika or in the Iščica stream. Length 1007 mm. Scale 1 : 4. From Gaspari 2002, 112, 291, Pl. 12: 3.

Slika 40
Železni deli piluma MM D10 (dolžina 1007 mm) iz Ljubljanice pri Vrhniki ali iz struge Iščice. Merilo 1 : 4. Po Gaspari 2002, 112, 291, t. 12: 3.

Iz Ljubljanice poznam sedem ali največ deset železnih delov rimskih kopij (D1–D9, MM D10). Devet od teh jih pripada istemu tipu, tj. pilumom z jezičastim nasadiščem (D1–D8, MM D10; *t. 14; sl. D1–6, sl. D1, sl. D2, sl. D7–8; sl. 40*),[366] ki so običajen tip piluma v zgodnjecesarski dobi. Zanj so značilni: piramidalna konica, dolg vrat (v zgornjem delu ima običajno okrogel, v spodnjem pa kvadraten presek), ploščato nasadišče (običajno z eno do tremi zakovicami oz. luknjami za zakovice) ter še posebej okov v obliki prisekane piramide, ki je nalegel na zgornji del lesenega ročaja.[367]

Na datacijo pilumov z jezičastim nasadiščem in piramidalnim okovom kažejo primerki iz srednje- in poznoavgustejskih,[368] tiberijsko-klavdijskih[369] in klavdijsko-zgodnjevespazijanskih[370] najdišč, plasti oz. najdiščnih okoliščin. Domneven najmlajši primerek, pri katerem pa piramidalni okov ni ohranjen, je iz depoja, ki je bil zakopan leta 70 po Kr. v Xantnu.[371]

Pri treh pilumih iz legijskega tabora v Oberadnu so se poleg železnih delov ohranili zgornji deli lesenih ročajev, v katere so bila vpeta in z zakovicami pritrjena železna jezičasta nasadišča.[372]

K železnim delom pilumov so sodila še železna kopita;[373] le redko so najdena v okoliščinah, ki omogočajo povezavo s pilumom.[374]

Rimskemu pilumu je lahko pripadal izrazito gracilen primerek D9 (*t. 14; sl. D9*). Razmeroma podoben je železnemu pilumu iz poznorepublikanskega tabora III v Renieblasu (Španija).[375]

366 Pri pilumih D6 in D9 ni zanesljivo, da sta iz Ljubljanice. Pilum MM D10 je v svojo disertacijo vključil Gaspari (2002, 112, 291, t. 12: 3), ki glede najdišča navaja nasprotujoča si podatka: Ljubljanica pri Vrhniki in struga Iščice. Do konca leta 2017 družina Potočnik piluma ni predala Mestnemu muzeju Ljubljana, zato je v knjigi predstavljen s prerisom risbe, objavljene v Gaspari 2002, t. 12: 3.

367 Prim. Feugère 1993, 168; Deschler-Erb 1999, 20.

368 Dangstetten: Fingerlin 1986, 66, 130, 166, 172, 220, FO 176: 14, 360: 8, 455–457: 7, 482: 7, 562: 4; Fingerlin 1998, 23, 36, 47, 67, 72, 100, 133, 136, 150, 172, FO 657: 12, 700: 10, 747: 3, 833: 3, 844C: 3, 938: 3, 1059: 4, 1076: 1, 1143: 6, 1253: 6; Oberaden: Sander 1992, 140–141, t. 28, 29: 16, 18–19. Na srednje- in poznoavgustejskih najdiščih so tudi podobni, a tipološko starejši pilumi, pri katerih je v leseni ročaj vpeti del ozek in nima zakovice: Heddemünden: Grote 2012, 346, t. 6: 34; Haltern: Harnecker 1997, 88, 90, t. 73: 771, t. 74: 792–794; Kalkriese: Harnecker, Franzius 2008, t. 1: 1–4; Harnecker, Mylo 2011, 3, 21, 22, t. 1; Lyon: Desbat, Maza 2008, 242–245, sl. 5: 34 (plast iz prvega desetletja po Kr.).

369 Dolenz 1998, 63–64, kat. M15–M34, t. 4: M15–M17, M22–M25.

370 Rheingönheim (Nemčija): Ulbert 1969b, 52, t. 47: 5, 6; datacija tabora: Ulbert 1969b, 15–16.

371 Hanel 1995, 48, t. 50: B 758. Ohranjena sta spodnji, železni del piluma s ploščato razkovanim delom, ki je bil nasajen v lesen ročaj, in spodnji del vratu, ki ima okrogel presek in ne kvadratnega, kot je pri tem tipu pilumov običajno.

372 Albrecht 1942, 157, t. 48: 1–3, t. 49: 1–3; Bishop, Coulston 2006, 74, sl. 36.

373 Bishop, Coulston 2006, 76.

374 Grote 2012, 246, t. 10: 62; prim. Hanel 1995, 48.

375 Luik 2002, 16–19, 228: R 143, sl. 183: 143, t. 8: 4. Iz risbe, fotografije in opisa ni jasno, ali je ohranjeni vrh piluma neizrazita konica (na risbi ni narisan presek) ali pa konica morda ni ohranjena.

8
Spearheads

The Roman mercenaries of the Late Republic and the auxiliary units of the Early Imperial period, both infantry and cavalry, were armed with spears.[376] Identifying Roman spearheads among the finds recovered from the Ljubljanica would thus clearly indicate the presence of either mercenary or auxiliary units. The difficulty, however, is in their identification, which is often difficult or unreliable in the absence of context data.[377] Moreover, it seems reasonable to assume that the members of the mercenary and auxiliary units deployed in the Roman conquests of the south-eastern Alpine areas in the second half of the 1st century BC and in the Augustan period also fought with spears of La Tène forms, which would not be identified as Roman weapons. The diversity of the spearheads used by the mercenaries and auxiliaries recruited in the south-eastern Alpine areas is clearly reflected in the grave goods unearthed at Verdun (south-eastern Slovenia).[378]

For these reasons, only the spearheads with a facetted socket are considered in this book; in addition to the clearly distinguishable features, namely facetted sockets, they have close and relatively well dated parallels.[379]

Several spearheads with a facetted socket and a leaf-shaped blade that usually has a thin diamond-shaped cross section and rarely a marked midrib, have been found in the wider area of the Ljubljansko barje, more precisely in the cemeteries at Verdun,[380] Strmec near Bela Cerkev (*Figs. 41–42*),[381] Polhov gradec[382] and Mihovo.[383] The Verdun cemetery, where the earliest grave with weapons dates to the Early Augustan period,[384] yielded spearheads with facetted sockets in Tiberian–Claudian graves.[385] The earliest graves with such spearheads from Strmec are attributable to the Middle Augustan,[386] the latest to the Tiberian–Claudian period.[387] It is presumed that the graves with the latest of the La Tène and the Early Roman weapons were the burials of local men who served in Roman auxiliary units.[388]

The spearheads with a facetted socket from Slovenia have parallels among the finds from the Alpine regions of Trento and Piedmont in Italy, Ticino in Switzerland

376 Deschler-Erb 1991, 15; Feugère 1993, 170.
377 Feugère 1993, 169–171; Bishop, Coulston 2006, 53–54, 76–78, 151–154; Radman-Livaja 2004, 27.
378 Breščak 2015.
379 Pernet, Schmid-Sikimić 2008, 369.
380 Breščak 2015, Graves 14, 24, 84, 131, 228, Pls. 7: 1, 9: 10, 17: 10, 24: 2, 28: 1.
381 An inspection of the items kept in the National Museum of Slovenia and the Natural History Museum in Vienna (the latter by Maciej Karwowski) revealed numerous spearheads with a facetted socket (Božič 1992, 75, 116, 136, 138, 142, 147, Pls. 17: 2, 24: 1–5, 27: 17, 28: 5, 29: 24, 31: 2); this can not be deduced from earlier publications (Stare 1973; Dular 1991).
382 Ložar 1938, 95, Nos. 29 and 30, Fig. 22b, c (facetting is mentioned in the description, but not visible on the photograph).
383 NMS Inv. No. P 4473. The finds kept in the Natural History Museum in Vienna that have not yet undergone conservation and appear not to include spearheads with a facetted socket (information kindly provided by Maciej Karwowski).
384 Breščak 2015, Grave 37, Pls. 10–12. The grave is dated on the basis of the sword and its scabbard (Istenič 2010, 131–133, Fig. 8, Insert 3; Breščak 2015, Pl. 11: 6); the latter belongs to the group of scabbards with brass openwork plates most likely produced in the late part of the Late La Tène period (LT D2b), i.e. from (60)/40 to 15 BC (Istenič 2010, 140–142).
385 Breščak 2015, Graves 14, 24, 84, 131, 228.
386 Strmec above Bela Cerkev, Grave A (Božič 1992, 75, 88, Pl. 17: 1–6; dating: the long shield handgrips have close parallels among the finds from the fortresses at Dangstetten and Oberaden (Fingerlin 1986, 300: 1, 426: 2; Fingerlin 1998, 1152: 1, 1156: 12, 1221: 8, 1238: 5, 1253: 5, 1254: 8, 1257: 8, 1357: 30; Kühlborn 1992, Pl. 31: 42, 43), as well as Strmec above Bela Cerkev, the Červan A cemetery, Grave 3 (Božič 1992, 136, Pl. 27: 16–17; dating: Almgren 238b2 brooch – Demetz 1999, 43, 45–46; Morel, Meylan Krause, Castella 2005, 43, Fig. 18: 96, 97).
387 Strmec above Bela Cerkev, the Červan A cemetery, Grave 8 (Božič 1992, 138, Pl. 28: 5–9; dating: Almgren 236c and Almgren 67/68 brooches – Istenič 1999, 58–60; Sedlmayer 2009, 27, 32–34; Demetz 1999, 135).
388 Pernet, Schmid-Sikimić 2008, 374; Pernet 2010, 144–145; Istenič 2013, 26.

8
Sulične osti

Rimski vojaški najemniki poznorepublikanske dobe in pomožne enote zgodnjecesarske dobe, pešaki in konjeniki, so bili oboroženi s sulicami.[376] Prepoznava rimskih suličnih osti v Ljubljanici bi bila torej jasen pokazatelj najemniških ali pomožnih enot. Težava je v tem, da je časovna opredelitev suličnih osti zelo težka oziroma nezanesljiva, če ni razvidna iz najdiščnih okoliščin.[377] Poleg tega so bili v obdobju rimskih osvajanj jugovzhodnoalpskega območja v drugi polovici 1. st. pr. Kr. in v avgustejski dobi pripadniki najemniških in pomožnih enot lahko oboroženi s sulicami latenskih oblik, zato jih ne prepoznamo kot orožje rimske vojske. Raznolikost suličnih osti v oborožitvi pripadnikov najemniških in pomožnih enot, ki so bili rekrutirani na jugovzhodnoalpskem območju, kažejo npr. grobovi iz Verduna.[378]

Zaradi naštetih dejstev bom pri gradivu iz Ljubljanice obravnavala le sulične osti s fasetiranim tulom. Poleg izrazite značilnosti (fasetiran tul) imajo namreč dobre in razmeroma ozko datirane primerjave.[379]

V širši okolici Ljubljanskega barja sulične osti s fasetiranim tulom in listasto oblikovanim zgornjim delom (nad tulom), ki ima (običajno) nizek rombičen presek ali (redko) izrazito sredinsko rebro, izvirajo z grobišč v Verdunu,[380] na Strmcu pri Beli Cerkvi (*sl. 41–42*),[381] v Polhovem Gradcu[382] in Mihovem.[383] Na grobišču v Verdunu, kjer je najstarejši grob z orožjem iz zgodnje avgustejske dobe,[384] so sulice s fasetiranimi tuli v tiberijsko-klavdijskih grobovih.[385] Najstarejša grobova s tako sulično ostjo s Strmca nad Belo Cerkvijo sta srednjeavgustejska,[386] najmlajši pa je tiberijsko-klavdijski.[387] V grobovih z najmlajšim latenskim in zgodnjim rimskim orožjem s teh grobišč so bili verjetno pokopani domačini, ki so služili v rimskih pomožnih enotah.[388]

Na geografsko bolj oddaljenih območjih imajo sulične osti s fasetiranim tulom iz Slovenije dobre primerjave med najdbami z alpskih območij Trenta in Piemonta v Italiji, Ticina v Švici in jugozahodne Bavarske, za katere najdiščne okoliščine govorijo za datacijo v konec LT D2 in zgodnjecesarsko dobo.[389] Ena izmed šestih suličnih osti s fasetiranim tulom z žgalnodaritvenega mesta Wartau-Ochsenberg (Švica) izvira iz jame, ki je datirana v konec LT D2 ali začetek avgustejske dobe in je morda povezana z orožjem, ki so ga domačini (Retijci) zaplenili pripadnikom rimskih pomožnih

376 Deschler-Erb 1991, 15; Feugère 1993, 170.
377 Feugère 1993, 169–171; Bishop, Coulston 2006, 53–54, 76–78, 151–154; Radman-Livaja 2004, 27.
378 Breščak 2015.
379 Pernet, Schmid-Sikimić 2008, 369.
380 Breščak 2015, gr. 14, 24, 84, 131, 228, t. 7: 1, 9: 10, 17: 10, 24: 2, 28: 1.
381 Iz opisov suličnih osti, ki temeljijo na ogledu najdb v Narodnem muzeju Slovenije in Naravoslovnozgodovinskem muzeju na Dunaju (Maciej Karwowski), izhaja, da so na grobišču na Strmcu sulične osti s fasetiranim tulcem številne (Božič 1992, 75, 116, 136, 138, 142, 147, t. 17: 2, 24: 1–5, 27: 17, 28: 5, 29: 24, 31: 2). Iz starejših objav (Stare 1973; Dular 1991) to ni razvidno.
382 Ložar 1938, 95, št. 29 in 30, sl. 22b, c (fasetiranje je omenjeno v opisu, na fotografiji pa ni vidno).
383 NMS inv. št. P 4473. Med najdbami, ki jih hrani Naravoslovnozgodovinski muzej na Dunaju in še niso bile konservirane, suličnih osti s fasetiranim tulom ni opaziti (za podatek se zahvaljujem Macieju Karwowskemu).
384 Breščak 2015, gr. 37, t. 10–12. Grob časovno opredeljuje meč v nožnici (Istenič 2010, 132–133, 154–155, sl. 8, pril. 3; Breščak 2015, t. 11: 6); sodi v skupino nožnic z medeninastim okovom, ki ima predrt okras in so jih najverjetneje izdelovali v mlajšem delu pozne latenske dobe (LT D2b) oziroma od (60)/40 do 15 pr. Kr. (Istenič 2010, 159).
385 Breščak 2015, gr. 14, 24, 84, 131, 228.
386 Strmec nad Belo Cerkvijo, gr. A (Božič 1992 , 75, 88, t. 17: 1–6; datacija: dolgi ročaji ščita imajo odlične primerjave med najdbami iz legijskih taborov v Dangstettnu in Oberadnu (Fingerlin 1986, 300: 1, 426: 2; Fingerlin 1998, 1152: 1, 1156: 12, 1221: 8, 1238: 5, 1253: 5, 1254: 8, 1257: 8, 1357: 30; Kühlborn 1992, t. 31: 42, 43) in Strmca nad Belo Cerkvijo, grobišče Červan A, gr. 3 (Božič 1992, 136, t. 27: 16–17; datacija: fibula Almgren 238b2 – Demetz 1999, 43, 45–46; Morel, Meylan Krause, Castella 2005, 43, sl. 18: 96, 97).
387 Strmec nad Belo Cerkvijo, grobišče Červan A, gr. 8 (Božič 1992, 138, t. 28: 5–9; datacija: fibuli Almgren 236c in Almgren 67/68 – Istenič 1999, 58–60; Sedlmayer 2009, 27, 32–34; Demetz 1999, 135).
388 Pernet, Schmid-Sikimić 2008, 374; Pernet 2010, 144–145; Istenič 2013, 26.
389 Pernet, Schmid-Sikimić 2008, 369.

Figure 41
Iron spearheads with a facetted socket from the cemetery at Strmec above Bela Cerkev (Slovenia). National Museum of Slovenia, Inv. Nos. P 4578–4582.

Slika 41
Železne sulične osti s fasetiranim tulcem z grobišča Strmec nad Belo Cerkvijo, ki jih hrani Narodni muzej Slovenije, inv. št. P 4578–4582.

and south-western Bavaria, the contexts of which suggest late LT D2 and the Early Imperial period.[389] One of the six spearheads with a facetted socket from the *Brandopferplatz* at Wartau-Ochsenberg (Switzerland) originates from a pit dated to the end of LT D2 or beginning of the Augustan period and may be connected with the weapons that the locals (*Raetii*) seized from Roman auxiliary units.[390] Grave 68 with such a spearhead from Gravellona Toce also held an Early Roman sword and Roman pottery that indicate an Augustan date.[391]

The iron spearhead from Alesia,[392] which has a blade that differs from the Ljubljanica spears in that it is markedly narrower and its cross section has the shape of an equal-sided diamond, suggests that spearheads with a facetted socket were used during the Roman siege of Alesia in 52 BC.

Such spearheads have also been found in the La Tène cemeteries of the Scordisci; at Karaburma (Serbia), one example occurred in a grave alongside a Roman ceramic vessel.[393] Another example, with a blade bearing punched decoration characteristic of the La Tène spearheads,[394] comes from a grave with a Roman pan (*patera*) in central Bosnia.[395]

The artefacts from the Augustan forts along the Rhine, its tributaries and other sites in Germania closely

389 Pernet, Schmid-Sikimić 2008, 369.
390 Pernet, Schmid-Sikimić 2008, 366–368, 374.
391 Pernet, Schmid-Sikimić 2008, 368, 374; Pernet 2010, Pl. 105: B.
392 Sievers 2001b, 228, Pl. 69: 362.
393 Drnić 2015a, 117–119; Drnić 2015b, 51.
394 Drnić 2015a, 120.
395 Marijanović 1984.

Figure 42
Iron spearheads with a facetted socket from the cemetery at Strmec above Bela Cerkev (Slovenia). National Museum of Slovenia: 1) Inv. No. P 4582, 2) Inv. No. P 4581, 3) Inv. No. P 4580, 4) Inv. No. P 4579, 5) Inv. No. P 4578. Scale 1 : 3.

Slika 42
Železne sulične osti s fasetiranim tulcem z grobišča Strmec nad Belo Cerkvijo, ki jih hrani Narodni muzej Slovenije: 1) inv. št. P 4582, 2) inv. št. P 4581, 3) inv. št. P 4580, 4) inv. št. P 4579, 5) inv. št. P 4578. Merilo 1 : 3.

enot.[390] Grob 68 s tako sulično ostjo z grobišča Gravellona Toce je vseboval zgodnjerimski meč in rimsko keramiko, ki kaže na datacijo v avgustejsko dobo.[391]

Železna ost s fasetiranim tulom, a z drugačno konico (izrazito ozko, s presekom enakostraničnega romba) iz Alezije[392] nakazuje uporabo osti s fasetiranimi tuli v času rimskega obleganja Alezije leta 52 pr. Kr.

Sulične osti s fasetiranimi tulci so med najdbami z latenskih grobišč na območju Skordiskov; v Karaburmi (Srbija) je bila taka sulična ost najdena tudi v grobu z rimsko keramično posodo.[393] Sulična ost s fasetiranim tulcem in punciranjem na listu, ki je značilno za latenske sulične osti,[394] izvira iz groba z rimskim korcem v osrednji Bosni.[395]

Med suličnimi ostmi iz avgustejskih taborov ob Renu in njegovih pritokih ter z drugih z rimsko vojsko tesno povezanih najdišč v Germaniji ni primerkov s fasetiranim tulom.[396]

Strnem lahko, da geografska razširjenost in najdiščne okoliščine suličnih osti s fasetiranimi tuli nakazujejo, da so iz obdobja ob koncu LT D2 in predvsem na začetku zgodnje cesarske dobe ter da so povezane z

390 Pernet, Schmid-Sikimić 2008, 366–368, 374.
391 Pernet, Schmid-Sikimić 2008, 368, 374; Pernet 2010, t. 105: B.
392 Sievers 2001b, 228, t. 69: 362.
393 Drnić 2015a, 117–119; Drnić 2015b, 51.
394 Drnić 2015a, 120.
395 Marijanović 1984.
396 Npr. Dangstetten (Fingerlin 1986, FO 309: 4), Haltern (Harnecker 1997, t. 75, 76, 77: 813), Rödgen (Simon 1976, t. 5: 37–39); Kalkriese (Harnecker, Franzius 2008, t. 1: 5–7, 2: 8–9; Harnecker, Mylo 2011, t. 2: 2029, 2034, 2035, t. 3: 2030, 2033); Waldgirmes (Rasbach 2015, sl. 128: 45734, 45381).

linked with the Roman army include no spearheads with a facetted socket.[396]

The distribution and contexts of the spearheads with facetted sockets suggest that the weapons were connected with the non-Roman warriors from the end of LT D2 and even more so the beginning of the Early Imperial period in the wide area from the western Alps to Slavonia, Vojvodina and Bosnia, which includes Slovenia. The graves with such weapons in Slovenia, more precisely in the territory ascribed to the Taurisci in central, southern and eastern Slovenia, as well as north-western Croatia, show that the spearheads belonged to local (non-Roman) warriors who served in the Roman army at the beginning of the Imperial period, from the Middle Augustan period onwards. The spearhead from Grave 68 at Gravellona Toce suggests a similar conclusion for the southern Alpine area in northern Italy.[397]

It should be noted that similar spearheads were used in the early[398] and possibly also late medieval period.[399] Pernet and Schmid-Sikimić believe that it is not possible to distinguish between the early medieval and earlier examples dating to the end of LT D2 or the Early Principate unless so suggested by context data.[400]

A closer examination of the spearheads with facetted sockets from the Ljubljanica and a comparison with those spearheads from the river that have been positively identified as early medieval[401] has shown that most of the early medieval examples differ from earlier ones in having a wider, less tapering upper part of the socket (below the junction with the blade) and in a blade with a less marked centre of gravity in the lower part, above the socket. This suggests that two of the spearheads with a facetted socket from the Ljubljanica on *Fig. 43* are not from the end of LT D2 or the Early Imperial period.[402] I presume the same for the examples from the River Kupa at Sisak[403] and at Vukovci (both Croatia).[404] Having said that, distinguishing between the early medieval and earlier examples in form alone is neither easy nor reliable, also because the early medieval examples include some cases, albeit rare, where the sockets taper markedly in the upper part,[405] while the examples from the Late La Tène–Early Roman cemetery at Strmec near Bela Cerkev (*Fig. 42*) include spearheads that do not show such a marked tapering.

Figure 43
Presumably early medieval (2) and possibly late medieval (1) spearheads from the Ljubljanica. National Museum of Slovenia, Inv. Nos. V 1410 (1) and V 1353 (2).

Slika 43
Domnevna zgodnjesrednjeveška (2) in morda poznosrednjeveška (1) sulična ost iz Ljubljanice. Narodni muzej Slovenije, inv. št. V 1410 (1) in V 1353 (2).

I have tentatively identified four or five spearheads with a facetted socket from the Ljubljanica (E1 may not originate from the river) that are attributable to the end of LT D2 or the Early Principate. Three are held in the National Museum of Slovenia (E1–E3; *Pl. 15; Fig. E1–3*), one forms part of a private collection (E4; *Fig. 44a, b*) and one is lost (E5).[406] Of these, the presumably etched decoration on both sides of the E3 blade (*Fig. E3*) might reflect the influence of the Przeworsk and Oksywie cultural groups.[407]

396 E.g. Dangstetten (Fingerlin 1986, FO 309: 4), Haltern (Harnecker 1997, Pls. 75, 76, 77: 813), Rödgen (Simon 1976, Pl. 5: 37–39); Kalkriese (Harnecker, Franzius 2008, Pls. 1: 5–7, 2: 8–9; Harnecker, Mylo 2011, Pl. 2: 2029, 2034, 2035, Pl. 3: 2030, 2033); Waldgirmes (Rasbach 2015, Fig. 128: 45734, 45381).

397 Cf. Fn. 391.

398 Stein 1967, 16–17, Pls. 1: 3, 6: 11, 20, 22, 7: 10, 9: 17, 12: 3, 4 etc.; Pernet, Schmid-Sikimić 2008, 365, 366, Fig. 2. The early medieval Egling type spearheads have grooves on the blade (Stein 1967, 16–17).

399 Lazar, Nabergoj, Bitenc 2018, 18, 19, Cat. No. 8; Knific, Nabergoj 2017, 126, 228, Fig. 153.

400 Pernet, Schmid-Sikimić 2008, 375.

401 Bitenc et al. 2009b, Cat. No. 91.

402 For a different opinion, see Gaspari (2002, 108–110) who interprets the spearhead on *Fig. 43: 1* as Early Roman. Nabergoj (cf. Fn. 399) sees the same spearhead as late medieval.

403 Radman-Livaja 2004, Pl. 3: 11, 12.

404 Knific 1990.

405 E.g. Stein 1967, Pls. 14: 2, 64: 6, 71: 3.

406 Horvat 1990, 297–298, Fig. 32d, Cat. No. 601. Gaspari (2002, 108, 295, Pl. 19: 50) mentions a poorly surviving spearhead from the Ljubljanica (City Museum of Ljubljana, Inv. No. 510:LJU;0058688) as another Late La Tène or Early Roman spearhead with a facetted socket, but I was unable to detect any facetting on the artefact.

407 Gaspari, Laharnar 2016, 75.

Figure 44
The iron spearhead E4 from the Ljubljanica (precise findspot unknown): a) photograph, b) drawing, scale 1 : 3. Length 487 mm, width 45 mm. It is recorded at the National Museum of Slovenia under No. ZN 1/8 and kept in a private collection.

Slika 44
Železna sulična ost E4 iz Ljubljanice (podrobneje najdišče ni znano), dolžina 487 mm, širina 45 mm: a) fotografija, b) risba, merilo 1 : 3. V Narodnem muzeju Slovenije je zavedena pod št. ZN 1/8, hranjena je v zasebni zbirki.

oborožitvijo vojščakov nerimskega izvora na širokem območju od zahodnih Alp do Slavonije, Vojvodine in Bosne. Grobovi s takimi suličnimi ostmi iz Slovenije govorijo za to, da so na območju Tavriskov (osrednja, južna in vzhodna Slovenija ter severozahodna Hrvaška) sodile k oborožitvi nerimskih lokalnih vojščakov, ki so na začetku cesarske dobe (od vključno srednje avgustejske dobe) služili v rimski vojski. Podobno za območje južnih Alp v severni Italiji nakazuje grob 68 iz Gravellone Toce.[397]

Podobne sulične osti s fasetiranimi tuli so zgodnjesrednjeveške[398] in morda tudi poznosrednjeveške.[399] Pernet in Schmid-Sikimićeva menita, da zgodnjesrednjeveških primerkov ni mogoče razlikovati od starejših (iz konca obdobja LT D2 oziroma zgodnjega principata), če tega ne omogočajo najdiščne okoliščine.[400]

Po pregledu suličnih osti s fasetiranimi tuli iz Ljubljanice in primerjavi z zanesljivo zgodnjesrednjeveškimi suličnimi ostmi z istega najdišča[401] se mi zdi, da se večina zgodnjesrednjeveških primerkov od tistih iz obdobja LT D2/zgodnji principat razlikuje po širšem (v zgornjem delu manj zoženem) zgornjem delu tula pod prehodom v list in po tem, da imajo njihovi listi manj izrazito težišče v spodnjem delu, nad tulom. Tako se mi za sulični osti s fasetiranim tulom iz Ljubljanice na *sl. 43* zdi, da nista iz obdobja konec LT D2–zgodnjecesarska doba.[402] Enako domnevam za primerke iz reke Kolpe v Sisku (Hrvaška)[403] in pri Vukovcih (Hrvaška).[404] Vendar razlikovanje zgodnjesrednjeveških suličnih osti s fasetiranimi tuli od starejših zgolj po obliki ni enostavno niti zanesljivo, saj so npr. med zgodnjesrednjeveškimi suličnimi ostmi (redki) primerki, pri katerih so tuli zgoraj izrazito zoženi,[405] pri primerkih iz poznolatensko-zgodnjerimskega grobišča na Strmcu pri Beli Cerkvi (*sl. 42*) pa se tuli proti listu ne zožijo izrazito.

Iz Ljubljanice poznam štiri ali pet suličnih osti s fasetiranim tulom (za E1 ni zanesljivo, da je iz Ljubljanice), za katere domnevam, da so iz konca LT D2 ali zgodnjega principata: tri hrani Narodni muzej Slovenije (E1–E3; *t. 15; sl. E1–3*), ena je v privatni zbirki (E4; *sl. 44a, b*) in ena izgubljena (E5).[406] Okras (domnevno izdelan s tehniko jedkanja) na obeh straneh lista sulične osti E3 (*sl. E3*) morda odseva vpliv kulturnih skupin Przeworsk in Oksywie.[407]

397 Prim. op. 391.
398 Stein 1967, 16–17, t. 1: 3, 6: 11, 20, 22, 7: 10, 9: 17, 12: 3, 4 itd.; Pernet, Schmid-Sikimić 2008, 365, 366, sl. 2. Zgodnjesrednjeveške sulične osti tipa Egling imajo na listu žlebiče (Stein 1967, 16–17).
399 Lazar, Nabergoj, Bitenc 2013, 18, 19, kat. 8; Knific, Nabergoj 2016, 126, 228, sl. 153.
400 Pernet, Schmid-Sikimić 2008, 375.
401 Bitenc et al. 2009a, kat. 91.
402 Drugače meni Gaspari (2002, 108–110), ki je sulično ost *sl. 43: 1* uvrstil med zgodnjerimske primerke. Isto sulično ost je Nabergoj (prim. op. 399) opredelil kot poznosrednjeveško.
403 Radman-Livaja 2004, t. 3: 11, 12.
404 Knific 1990.
405 Npr. Stein 1967, t. 14: 2, 64: 6, 71: 3.
406 Horvat 1990, 297–298, sl. 32d, kat. 601. Gaspari (2002, 108, 295, t. 19: 50) je k poznolatenskim oziroma zgodnjerimskim sulicam s fasetiranim tulom uvrstil slabo ohranjeno sulično ost iz Ljubljanice (Mestni muzej Ljubljana, inv. št. 510:LJU;0058688), na kateri po mojem mnenju fasetiranje ni vidno.
407 Gaspari, Laharnar 2016, 75.

9
Double-sided heavy tools

The double-sided heavy tools (*dolabrae*) differ in the combination of tools: a double axe, an axe and a pick-axe, an axe and an adze. The archaeological, documentary and representational evidence shows they were used by soldiers and civilians alike, but does not allow us to either trace their typological development in detail or offer more narrow dating of individual forms.[408]

The River Ljubljanica yielded eight or nine such tools; one (F6) may not originate from the river. Six are held in the National Museum of Slovenia (F1–F6; *Pl. 16: F1–F4, Pl. 17: F5–F6; Figs. F1–3, F4–5, F6*), three in the City Museum of Ljubljana (MM F7–F9;[409] *Figs. 45–46*).

The F1–F2 (*Fig. F1–3*), F4–F5 (*Fig. F4–5*) and MM F7–F8 tools (*Fig. 45*) are very large, measuring 320 to 459 mm in length, which suggests a military use.[410] They have close parallels from sites tightly linked with the Roman army of the Augustan period (Haltern,[411] Hedemünden,[412] Kalkriese[413]) and the Principate (e.g. Gardun/*Tilurium*,[414] Rißtissen[415]), but also sites that cannot be dated more precisely and which are probably, but not reliably, linked with the army (Sisak,[416] Augsburg-Oberhausen,[417] the Rhine at Xanten-Wardt[418]).

The relatively small F3 (*Fig. F1–3*) and MM F9 (*Fig. 46*) tools with triangular lugs are similar to several finds from the Late Republican siege camps around Numantia[419] and Alesia.[420] Large double-sided tools with triangular lugs, such as MM F7 (*Fig. 45*), were found in the Crap-Ses Gorge (Graubünden Canton, Switzerland) together with other *militaria* probably related to the Roman conquest of the Alpine passes leading northwards and dating from the 40s to the 10s BC.[421] Such tools are also known from the Middle Augustan fort at Hedemünden.[422]

Figure 45
Iron double-sided heavy tools from the Ljubljanica at Blatna Brezovica, Bistra (MM F7), and at Blatna Brezovica, Lipavec (MM F8). MM F7: length 459 mm, vertical blade length 110 mm, pick length 15 mm, thickness 6 mm, weight 1968 g. MM F8: length 447 mm, vertical blade length 150 mm, pick length 19 mm, thickness 8 mm, weight 1952 g. City Museum of Ljubljana, Inv. Nos. 510:LJU;0057633 and 510:LJU;0062097.

Slika 45
Dvostranski težki orodji iz Ljubljanice pri Blatni Brezovici, Bistra (MM F7), in pri Blatni Brezovici, Lipavec (MM F8). Železo. MM F7: dolžina 459 mm, dolžina navpičnega rezila 110 mm, dolžina vodoravne dletaste konice 15 mm, debelina 6 mm, teža 1968 g. MM F8: dolžina 447 mm, dolžina navpičnega rezila 150 mm, dolžina vodoravne dletaste konice 19 mm, debelina 8 mm, teža 1952 g. Mestni muzej Ljubljana, inv. št. 510:LJU;0057633 in 510:LJU;0062097.

408 Pietsch 1983, 15–17; Pohanka 1986, 94–96; Franzius 1993, 148–149; Gaitsch 1993, 88–90; Grote 2012, 353.
409 Gaspari 2002, 298, Pl. 25: 1–3; Istenič 2009h, Cat. No. 72: *dolabra* on top (MM F8; *Fig. 45*). The Potočnik family did not hand over the MM F9 tool (Gaspari 2002, 298, Pl. 25: 3) to the City Museum of Ljubljana by September 2016.
410 Cf. Pietsch 1983, 15–17.
411 Harnecker 1997, 46, Pl. 1: 3; dating: Aßkamp 2009, 176–177.
412 Grote 2005, 43–44, Fig. 53: bottom; Grote 2012, 354, Cat. Nos. 98, 99, 101, Pls. 15, 17, 18. Dating: ca. 11/10 to 8/7 BC (Grote 2012, 136–137).
413 Harnecker, Franzius 2008, 23, Cat. No. 359, Pl. 26 (with earlier references); site dating: Moosbauer, Wilbers-Rost 2009, 61–62.
414 Radman-Livaja 2010a, 105, Cat. No. 110; Ivčević 2004, 167, Pl. 2: 30; Ivčević 2013, 441, Fig. 8 (all these refer to the same tool). Most finds from Gardun date to the first half of the 1st century, when a legion was stationed at the site, while small units were present there to the 3rd century (Sanader, Tončinić 2010, 44–47; Ivčević 2013, 435; Sanader 2014, 22). The presence of Roman soldiers at Gardun prior to the Middle Augustan period is indicated by hobnails and an Alesia brooch (Ivčević 2014, Pls. 5: 51, 14: 137–141; Ivčević 2017, 273–276, Pls. 5: 34–48, 6: 49–58), such as were worn from Caesar's Gallic Wars to the 30s BC (cf. Istenič 2005; Istenič 2015a, 57–58, Pls. 2: 5–14, 5: 9–21).
415 Gaitsch 1993, 89–90, Fig. 74: b, c.
416 Hoffiller 1910–1911, 174–175, Fig. 17.
417 Hübener 1973, Pl. 15: 3a, b (with the VERANVS stamp).
418 Gaitsch 1993, 87–90, 260, Fig. 72 top, Fig. 74a, Pl. 65: Ger 10.
419 Peña Redonda: Luik 2002, 12, 196, Fig. 92: 211.
420 Brouquier-Reddé, Deyber 2001, 312, Pl. 98: 188, 189.
421 Rageth, Zanier 2010, Fig. 3: 8; dating: Martin-Kilcher 2011.
422 Grote 2005, 42–44, Fig. 53: top two tools, Fig. 54; Grote 2012, 136–137, Cat. Nos. 97, 99, 100, Pls. 14, 16, 18.

9
Dvostranska težka orodja

Figure 46
The MM F9 iron double-sided heavy tool from the Ljubljanica (precise location unknown). Length 314 mm. Scale 1 : 3. From Gaspari 2002, 298, Pl. 25: 3.

Slika 46
Dvostransko težko orodje MM F9 iz Ljubljanice (podrobneje najdišče ni znano), dolžina 314 mm. Železo. Po Gaspari 2002, 298, t. 25: 3. Merilo 1 : 3.

Dvostranska težka orodja (lat. *dolabrae*) se razlikujejo po kombinaciji orodij, npr. dvojna sekira (na obeh straneh sekira, rezili sta navpično postavljeni), sekira/kramp (na eni strani sekira, na drugi konica), sekira/teslo (na eni strani sekira, na drugi teslo – eno rezilo je navpično, drugo vodoravno). Iz najdišč dvostranskega težkega orodja, pisnih virov in upodobitev izhaja, da so jih uporabljali vojaki, pa tudi civilisti. Tipološki razvoj tega orodja oziroma ožje datacije posameznih oblik niso jasni oziroma so nakazani le v grobih obrisih.[408]

V Ljubljanici je bilo najdenih osem ali devet (za orodje F6 ni zanesljivo, da izvira iz Ljubljanice) dvostranskih težkih orodij, tj. sekir/tesel, dvojnih sekir in sekir/krampov. Večino hrani Narodni muzej Slovenije (F1–F6; *t. 16: F1–F4, t. 17: F5–F6; sl. F1–3, F4–5, F6*), tri pa Mestni muzej Ljubljana (MM F7–F9;[409] *sl. 45–46*).

Orodja F1–F2 (*sl. F1–3*), F4–F5 (*sl. F4–5*) in MM F7–F8 (*sl. 45*) so izrazito velika (dolžina od 320 do 459 mm), kar nakazuje vojaško uporabo.[410] Dobre primerjave imajo med najdbami z najdišč, ki so tesno povezana z rimsko vojsko avgustejske dobe (Haltern,[411] Hedemünden,[412] Kalkriese[413]) ali principata (npr. Gardun/*Tilurium*,[414] Rißtissen[415]) ter z najdišč, ki jih ni mogoče zanesljivo ozko datirati in kjer je povezava z vojsko verjetna, ni pa zanesljiva (Sisek,[416] Augsburg-Oberhausen,[417] Ren pri kraju Xanten-Wardt[418]).

Podobni orodji, kot sta razmeroma majhna primerka s trikotnimi krilci F3 (*sl. F1–3*) in MM F9 (*sl. 46*), sta med najdbami iz poznorepublikanskih oblegovalnih taborov okoli Numancije[419] in Alezije,[420] velika dvojna orodja s trikotnimi krilci, kot je MM F7 (*sl. 45*), pa so bila najdena v tesni Crap-Ses (kanton Graubünden, Švica), kjer so rimske vojaške najdbe povezane z rimskim osvajanjem prelazov čez Alpe proti severu od četrtega do prvega desetletja pr. Kr.,[421] in v srednje-avgustejskem taboru v Hedemündnu.[422]

408 Pietsch 1983, 15–17; Pohanka 1986, 94–96; Franzius 1993, 148–149; Gaitsch 1993, 88–90; Grote 2012, 353.

409 Gaspari 2002, 298, t. 25: 1–3; Istenič 2009g, kat. 72: zgornja dolabra (MM F8; *sl. 45*). Orodja MM F9 (Gaspari 2002, 298, t. 25: 3) septembra 2016 družina Potočnik še ni predala Mestnemu muzeju Ljubljana.

410 Prim. Pietsch 1983, 15–17.

411 Harnecker 1997, 46, t. 1: 3; datacija: Aßkamp 2009, 176–177.

412 Grote 2005, 43–44, sl. 53: spodaj; Grote 2012, 354, kat. 98, 99, 101, t. 15, 17, 18. Datacija: ok. 11/10 do 8/7 pr. Kr. (Grote 2012, 136–137).

413 Harnecker, Franzius 2008, 23, kat. 359, t. 26 (z navedbami starejših objav); datacija najdišča: Moosbauer, Wilbers-Rost 2009, 61–62.

414 Radman-Livaja 2010a, 105, kat. 110; Ivčević 2004, 167, t. 2: 30; Ivčević 2013, 441, sl. 8 (vse navedbe se nanašajo na isto sekiro/kramp). Večina najdb z Garduna je iz prve polovice 1. stoletja, ko je v taboru bivala legija, manjše vojaške enote pa so bile prisotne do 3. stoletja (Sanader, Tončinić 2010, 44–47; Ivčević 2013, 435; Sanader 2014, 22). Na navzočnost rimskih vojakov na Gardunu pred srednje-avgustejsko dobo jasno kažejo okovni žebljički vojaških čevljev in fibula skupine Alezija (Ivčević 2014, t. 5: 51, 14: 137–141; Ivčević 2017, 273–276, t. 5: 34–48, 6: 49–58), ki so značilni za čas od Cezarjevih galskih vojn do 3. desetletja pr. Kr. (prim. Istenič 2005; Istenič 2015a, 57–58, t. 2: 5–14, 5: 9–21).

415 Gaitsch 1993, 89–90, sl. 74: b, c.

416 Hoffiller 1910–1911, 174–175, sl. 17.

417 Hübener 1973, t. 15: 3a, b (s pečatom VERANVS).

418 Gaitsch 1993, 87–90, 260, sl. 72 zgoraj, sl. 74a, t. 65: Ger 10.

419 Peña Redonda: Luik 2002, 12, 196, sl. 92: 211.

420 Brouquier-Reddé, Deyber 2001, 312, t. 98: 188, 189.

421 Rageth, Zanier 2010, sl. 3: 8; datacija: Martin-Kilcher 2011.

422 Grote 2005, 42–44, sl. 53: zgornji dve orodji, sl. 54; Grote 2012, 136–137, kat. 97, 99, 100, t. 14, 16, 18.

10
Turf cutters

The Ljubljanica has yielded five known large tools with a very wide blade, measuring between 304 and 380 mm in width, and a curved cutting edge. The tools have a socket with a hole for fastening the tool to a wooden shaft by way of a nail.

The National Museum of Slovenia keeps three such tools (G1–G3; *Pl. 17: G1, Pl. 18: G2–G3; Fig. G1–3*), the City Museum of Ljubljana holds two (MM G4–G5; *Fig. 47*).[423] They have a crescent-shaped blade with the exception of G2, which has a higher blade in the shape of just over half a circle. The blade joins the socket via a rectangular (G1, G3, MM G4; *Fig. G1–3; Fig. 47*) or oval-sectioned part (MM G5; *Fig. 47*), while the G2 tool has a direct blade-socket junction (*Fig. G1–3*).

The tools of this shape and size, measuring 300 mm and more, are believed to have been employed for cutting turf[424] and peat.[425] The small (roughly 100 mm wide) or medium-sized (roughly 200 mm wide) objects of a similar shape served other purposes.[426]

Figure 47
Iron turf cutters from the Ljubljanica (precise location unknown, MM G4) and from the Ljubljanica at Rakova Jelša, Dolgi breg (MM G5). Scale 1 : 3. From Gaspari 2002, 301, DO 7, DO 9, Pl. 31: 7, 9.

Slika 47
Orodje za rezanje ruše iz Ljubljanice brez ožjih najdiščnih podatkov (MM G4) in iz Ljubljanice pri Rakovi Jelši, Dolgi breg (MM G5). Železo. Merilo 1 : 3. Po Gaspari 2002, 301, DO 7, DO 9, t. 31: 7, 9.

Pietsch published such a tool from Zugmantel (Germany), which is closely similar to the tools from the Ljubljanica in shape and size (width 366 mm). He cites six parallels: from the Rhine at Mainz, the Măculeni hoard (Romania), Lauriacum (Enns, Austria) and from three sites along the Upper Germanic-Rhaetian limes (Rückingen, Osterburken, Weissenburg).[427] The tools from the Măculeni hoard (blade diameter 478 mm[428]), Osterburken (width 336 mm[429]), Rückingen (width 324 mm[430]), Mainz (width 360 mm[431]) and Lauriacum (width 301 mm[432]) correspond in size to turf cutters, whereas the tool from Weissenburg is smaller (width 200 mm[433]). I was unable to find any other tool of comparable shape and size in the recently published literature.

423 Gaspari analysed the MM G4 and G5 tools in his dissertation (2002, 301, Pl. 31: 7, 9). In this book, they are not presented with a photo because the Potočnik family did not hand them over to the City Museum of Ljubljana.

424 Curle 1911, 284, Pl. 61: 3 (a single tool is published with measurements, but its 114 mm of width make it too small for a turf cutter – cf. Fuentes 1988, 57, 59); Pietsch 1983, 64; Junkelmann 1997, Pl. 69; Fischer 2012, Fig. 367.

425 Curle 1911, 284, Pl. 61: 3 (cf. previous note!).

426 Pietsch 1983, 64. These should include all the tools that Rees cites (1979, 331–332, 435–437, Figs. 132–135) and which form the core of Fuentes' article (Fuentes 1988). The particularly small tools of this shape (width up to ca. 120 mm), such as the example from Newstead (Curle 1911, 284, Pl. 61: 3 – width 114 mm), were probably leather cutting tools (Gaitsch 1980, 122–125, Pl. 23: 123), while the larger ones were either bark strippers (Fuentes 1988) or gardening and/or farming tools.

427 Pietsch 1983, 64, Fn. 687, Pl. 23: 528.

428 Glodariu, Zrinyi, Gyulai 1970, 209, 214, No. 55, Fig. 4: 2.

429 Schumacher 1895, 36–37, Pl. 7: 56.

430 Wolf 1913, 17, Pl. 2: 16.

431 Körber 1900, 109, Cat. No. 173.

432 Karnitsch 1953, 40.

433 Fabricius, Kohl, Tröltsch 1906, 42, No. 34.

10
Orodje za rezanje ruše/šote

MM G5

Iz Ljubljanice poznamo pet velikih železnih orodij z zelo širokim spodnjim delom (širina 304 do 380 mm), ki ima rezilo na izrazito izbočeni stranici. Orodja imajo navpično tulasto nasadišče, v katerem je luknja od žeblja, s katerim je bilo orodje pritrjeno na lesen ročaj.

Narodni muzej Slovenije hrani tri taka orodja (G1–G3; *t. 17: G1, t. 18: G2–G3; sl. G1–3*) in Mestni muzej Ljubljana dve (MM G4–G5; *sl. 47*).[423] Pri večini ima spodnji del z rezilom obliko luninega krajca, pri orodju G2 pa je ta del v sredini višji in ima približno obliko več kot polovice izseka kroga. Spodnji del z rezilom preide v tulasto nasadišče, pri večini primerkov prek dela s pravokotnim (G1, G3, MM G4; *sl. G1–3; sl. 47*) ali ovalnim (MM G5; *sl. 47*) presekom, pri orodju G2 (*sl. G1–3*) pa neposredno.

Za tako oblikovana in velika orodja (širina 300 mm in več) domnevamo, da so bila namenjena rezanju ruše[424] in šote.[425] Majhni (širina okoli 100 mm) ali srednje veliki (širina okoli 200 mm) predmeti podobne oblike so služili drugim namenom.[426]

Pietsch je objavil primerek iz Zugmantla (Nemčija), ki je po obliki in velikosti (širina 366 mm) dobra primerjava orodjem iz Ljubljanice. Kot primerjave je navedel šest primerkov: iz Rena pri Mainzu, depoja Măculeni (Romunija), Lauriacuma (Enns, Avstrija) in treh najdišč zgornjegermansko-retijskega limesa (Rückingen, Osterburken, Weissenburg).[427] Primerki iz depoja Măculeni (premer rezila 478 mm),[428] Osterburkna (širina 336 mm),[429] Rückingena (širina 324 mm),[430] Mainza (širina 360 mm)[431] in Lauriacuma (širina 301 mm)[432] po velikosti ustrezajo orodjem za rezanje ruše oz. šote, orodje iz Weissenburga pa je manjše (širina 200 mm).[433] V novejši literaturi nisem zasledila niti enega primerka orodja primerljive oblike in velikosti.

423 Orodij MM G4 in G5, ki jih je v svoji disertaciji obravnaval Gaspari (2002, 301, t. 31: 7, 9), družina Potočnik še ni predala Mestnemu muzeju Ljubljana, zato v monografijo nisem mogla vključiti njihove fotografije.

424 Curle 1911, 284, t. 61: 3 (z merami je podano le eno, 114 mm široko orodje, ki je premajhno za rezanje ruše ali šote – prim. Fuentes 1988, 57, 59); Pietsch 1983, 64; Junkelmann 1997, t. 69; Fischer 2012, sl. 367.

425 Curle 1911, 284, t. 61: 3 (prim. pripombo v prejšnji opombi!).

426 Pietsch 1983, 64. K takim primerkom je treba šteti vse, ki jih navaja Rees (1979, 331–332, 435–437, sl. 132–135) in na katerih temelji Fuentesov članek (Fuentes 1988). Izrazito majhna orodja take oblike (širina do okoli 120 mm), kot je primerek iz Newsteada (Curle 1911, 284, t. 61: 3 – širina 114 mm), so bila verjetno namenjena obdelavi usnja (Gaitsch 1980, 122–125, t. 23: 123), večja pa so lahko služila lupljenju drevesne skorje (Fuentes 1988) oziroma so bila vrtna in/ali poljedelska orodja.

427 Pietsch 1983, 64, op. 687, t. 23: 528.

428 Glodariu, Zrinyi, Gyulai 1970, 209, 214, št. 55, sl. 4: 2.

429 Schumacher 1895, 36–37, t. 7: 56.

430 Wolf 1913, 17, t. 2: 16.

431 Körber 1900, 109, kat. 173.

432 Karnitsch 1953, 40.

433 Fabricius, Kohl, Tröltsch 1906, 42, št. 34.

The turf cutter from the Rhine at Mainz bears a scratched inscription on the socket, only part of which is legible, possibly as T(iti) ULPI … XII.[434] Pietsch argues that the inscription proves a military use of the tool.[435] Scratched or punched owner's names are frequent on Roman military equipment, but can also be found on items used by civilians. This, in additions to the unclear significance of the number XII in the inscription, shows that the connection of the tool with the Roman army is likely, but not certain.

Turf cutters are rare finds, which indicates that Roman soldiers often used other tools for cutting turf,[436] such as wide spades with a vertical socket.[437]

Five turf cutters from the Ljubljanica is a surprisingly high number considering the general rarity of such tools. It is possibly connected with the peat beds in the Ljubljansko barje, which would suggest that such tools were primarily used for cutting peat.

Turf cutters cannot be dated on typological criteria. Those from the Ljubljanica may date to the Augustan and Augustan–Tiberian periods like most of the finds of Roman military equipment from the river. Other sites have yielded no turf cutters that would date to this timeframe.

434 Körber 1900, 109, Cat. No. 173. Both vertical sides below the socket bear decoration that may be read as the number XIIII. It appears it was made during tool production (the drawing suggests it is much deeper than the scratched inscription) and hence represents decoration rather than numbers.

435 Pietsch 1983, 64.

436 Fuentes (1988; 1991, 74) even believes that the Roman army did not employ special tools for cutting turf, but rather used other, multi-purpose tools for the job.

437 E.g. an example from Dangstetten: Fingerlin 1998, FO 1081: 5.

Orodje za rezanje ruše oz. šote iz Rena pri Mainzu ima na tulcu delno ohranjen grafit, ki ni v celoti čitljiv, morda T(iti) ULPI … XII.[434] Pietsch meni, da grafit dokazuje vojaško uporabo tega orodja.[435] Z grafiti ali punciranjem zapisana imena lastnikov so na rimski vojaški opremi pogosta, vendar jih najdemo tudi na predmetih, ki so jih uporabljali civilisti, zato se mi – ob nejasni vlogi številke XII v napisu na orodju iz Rena pri Mainzu – povezava tega orodja z rimsko vojsko zdi zelo verjetna, ne pa nedvomna.

Redkost tega orodja kaže, da so rimski vojaki za rezanje ruše pogosto uporabljali drugo orodje,[436] npr. široke lopate z navpičnim nasadiščem.[437]

Pet orodij za rezanje ruše oz. šote iz reke Ljubljanice je presenetljivo veliko število glede na siceršnjo redkost tega orodja. Morda je to povezano z bogatimi ležišči šote na Ljubljanskem barju, kar bi kazalo na to, da so taka orodja uporabljali predvsem za rezanje šote.

Datiranje orodja za rezanje ruše oz. šote po tipoloških kriterijih ni mogoče. Za primerke iz Ljubljanice datacijo morda nakazuje dejstvo, da je večina rimske vojaške opreme iz reke Ljubljanice iz avgustejske oz. avgustejsko-tiberijske dobe. V ta čas datirani primerki orodja za rezanje ruše z drugih najdišč niso poznani.

434 Körber 1900, 109, kat. 173. Na obeh navpičnih stranskih ploskvah pod tulom sta okrasa, ki bi ju lahko čitali kot številko XIIII. Zdi se, da sta bila narejena ob izdelavi predmeta (po risbi se namreč zdi, da sta dosti globlja kot grafit) in torej ne predstavljata številke, ampak okras.

435 Pietsch 1983, 64.

436 Fuentes (1988; 1991, 74) celo meni, da za rezanje ruše rimska vojska sploh ni imela posebnega orodja, da so torej za ta namen običajno uporabljali druga, večnamenska orodja.

437 Npr. primerek iz Dangstettna: Fingerlin 1998, FO 1081: 5.

11
Military belts and hobnails

11.1 Gilded silver belt-plate (H1)

The H1 belt-plate (*Pl. 19; Fig. H1*) is made of high-quality silver alloy, containing roughly 95% silver, and partially gilded[438] on the front (*Fig. 48*[439]). It is made by hammering, the acanthus leaves and other plant motifs included, and additionally decorated by chasing (cf. description in the Catalogue).

Silver belt-plates of the same basic form and bearing pseudo-hinges with spherical terminals have been unearthed at Kalkriese (Germany),[440] Herculaneum (Italy),[441] Aquileia (Italy)[442] and in a hoard from Tekija/*Transdierna* (Serbia) buried in the Domitianic period.[443] The poorly surviving plate from Kalkriese and the plates from Tekija are relief decorated with concentric circles, other examples bear mythological figural depictions, also in relief. In motifs, production manner and style, this decoration differs from that on H1; the closest is the plate from Kalkriese with gilding along the surviving edge, bearing a strip decorated with a chased wavy line[444] and made of silver, more precisely silver alloy with 2.56% copper, of equally high quality as H1.[445] A similar decorative strip, though not gilded, adorns the plate from Tekija.[446]

In motifs, style, as well as manner and quality of production, the decoration on the H1 plate corresponds closely with that on the locket of the MM A24 sword scabbard (*Fig. 22c*). The exceptional nature of H1 and the strong likeness with the locket of the equally exceptional scabbard indicate that the sword in its scabbard and the belt formed a set, as was frequent in the Early Imperial period.[447] The stylistic features, motifs and quality of decoration all point to the Middle to Late Augustan period and to the Italic toreutic tradition.[448]

Figure 48
Presumed original appearance of the H1 belt-plate (cf. Catalogue, H1, and Ch. 16, H1). Scale 1 : 1.

Slika 48
Domnevni prvotni videz okova pasu H1 (prim. Katalog, H1, in pogl. 16, H1). Merilo 1 : 1.

The bicoloured decoration, achieved by gilding parts of the silvery surface, can also be observed on other prestige products from the Early Principate, for instance on the silver disc brooch from one of the earliest layers of the Roman settlement at Lahnau-Waldgirmes (established in 4/3 BC)[449] and a pair of gilded silver brooches from Trier, the archaeological context of which is not indicative as to their dating.[450]

Similar belt-plates with pseudo-hinges are known from Kaiseraugst/*Augusta Raurica* (Switzerland; from a context dated by pottery to AD 10–50),[451]

438 See Ch. 16, H1.
439 Istenič 2009f, Fig. 86.
440 Franzius 1999, 588–590, 597–598, 607, Figs. 14: 2–4, 7–8, 17: 1. Dating: produced probably soon after 18/16 BC, but still in use in AD 9 (Franzius 1999, 594, 598–599).
441 Künzl 1988c, 562–563, Cat. No. 388; Künzl 1996, 461–462, C 11–13, 25–27, Pl. 50: 1–6.
442 Künzl 1996, 464, Cat. No. C 47, Pl. 50: 10; Giovannini 1998b.
443 Mano-Zisi 1957, 81–83, 109, Nos. 18–21, Pl. 13: 18–21, 14: 19–21.
444 Franzius 1999, 588–489, 607, Fig. 14: 2.
445 Riederer 1999.
446 Mano-Zisi 1957, 82–83, Pl. 13: 20.
447 Künzl 1996, 406–408.
448 See Ch. 4.2.1.2, pp. 46, 48.
449 Rasbach 2015, 143, 145; dating of the settlement: Ch. 3, Fn. 41.
450 Martin-Kilcher 2017, 48, 49, 51, 56, Figs. 1, 2 (dates the brooches by parallels to the second quarter of the 1st century AD – in my opinion without convincing arguments).
451 Deschler-Erb 1991, 62, Pl. 42: 41; Deschler-Erb 1999, 43–44, 152, Fig. 41 (bottom), Pl. 18: 342.

11
Deli vojaških pasov in obuval

11.1 Pozlačen srebrni okov (H1)

Pasni okov H1 (*t. 19; sl. H1*)je iz visokokakovostne srebrove zlitine (vsebuje ok. 95 % srebra) in je bil na sprednji strani delno pozlačen[438] (*sl. 48*[439]). Vključno z reliefnim okrasom (akantovi listi in drugi rastlinski motivi) je bil narejen s kovanjem in dodatno okrašen s punciranjem (prim. opis v Katalogu).

Srebrne okove vojaških pasov z navideznimi tečaji, ki so zaključeni z okroglimi okrasnimi glavicami, poznamo z najdišč Kalkriese (Nemčija),[440] Herculaneum (Italija)[441] in Akvileja (Italija)[442] ter iz zaklada, zakopanega v Domicijanovem času v Tekiji/*Transdierna* (Srbija).[443] Zelo slabo ohranjen okov iz Kalkrieseja in tekijski okovi so okrašeni z reliefnimi koncentričnimi krogi, ostali okovi pa z reliefnimi figuralnimi okrasi mitoloških vsebin. Vsi ti okrasi se po motivih, tehniki izdelave in stilu močno razlikujejo od okova H1. Z njim se najbolj ujema okov iz Kalkrieseja, ki ima na ohranjenem robu pozlačen in s puncirano valovnico okrašen trak[444] in je iz enako kvalitetnega srebra (natančneje zlitine srebra z 2,56 % bakra) kot okov H1.[445] Podoben okrasni trak, ki ni pozlačen, ima del okovov iz Tekije.[446]

Okras okova H1 po motivih, stilu, načinu in kvaliteti izdelave odlično ustreza okrasu na okovu ob ustju nožnice meča MM A24 iz Ljubljanice (*sl. 22c*). Izjemnost okova H1 in izrazita podobnost z okovom prav tako izjemne nožnice meča kažeta, da sta pas in meč z nožnico sestavljala celoto, t. i. garnituro, kar je bilo v zgodnjecesarski dobi pogosto.[447] Stilne značilnosti, motivi in kvaliteta izvedbe okrasa kažejo na srednjedo poznoavgustejsko dobo in vključenost v italsko torevtsko tradicijo.[448]

Dvobarvnost okrasa, doseženo z delno pozlato srebrnih površin, kažejo tudi drugi visoko prestižni izdelki zgodnjega principata, npr. srebrna ploščata sponka iz ene od najstarejših plasti rimskega naselja Lahnau-Waldgirmes (začetek naselja 4/3 pr. Kr.)[449] in par pozlačenih srebrnih fibul iz Triera, pri katerem najdiščne okoliščine ne omogočajo datacije.[450]

Omembe vredne primerjave okovu H1 so pasni okovi s psevdotečajem iz Kaiseraugsta/*Augusta Raurica* (Švica; datacija keramike v najdiščnem sklopu 10–50 po Kr.),[451] Hodd Hilla (Velika Britanija; prisotnost rimske vojske na najdišču je omejena na 4. desetletje po Kr.)[452] in iz drugih klavdijskih oz. klavdijsko-neronskih najdiščnih okoliščin v južni Angliji[453] ter iz Vindonisse.[454] Z okovom H1 jih povezujeta oblika (okov s psevdotečajem) in okras (motiv akantovih listov, puncirano ozadje, puncirano rebro na psevdotečajih), jasno pa se od njega razlikujejo po tem, da so bistveno tanjši, kar je povezano z izdelavo s pomočjo modela (pečata),[455] pa tudi po materialu (bakrova zlitina in

438 Glej pogl. 16, H1.
439 Istenič 2009e, sl. 86.
440 Franzius 1999, 588–590, 597–598, 607, sl. 14: 2–4, 7–8, 17: 1. Datacija: izdelava verjetno kmalu po 18–16 pr. Kr., a v uporabi še 9 po Kr. (Franzius 1999, 594, 598–599).
441 Künzl 1988c, 562–563, kat. 388; Künzl 1996, 461–462, C 11–13, 25–27, t. 50: 1–6.
442 Künzl 1996, 464, kat. C 47, t. 50: 10; Giovannini 1998b.
443 Mano-Zisi 1957, 22–23, 45, št. 18–21, t. 13: 18–21, 14: 19–21.
444 Franzius 1999, 588–489, 607, sl. 14: 2.
445 Riederer 1999.
446 Mano-Zisi 1957, 23, t. 13: 20.
447 Künzl 1996, 406–408.
448 Glej pogl. 4.2.1.2, str. 49.
449 Rasbach 2015, 143, 145; datacija naselja: pogl. 3, op. 41.
450 Martin-Kilcher 2017, 48, 49, 51, 56, sl. 1, 2. (fibuli datira po primerjavah v drugo četrtino 1. st. po Kr. – po mojem mnenju brez prepričljivih argumentov).
451 Deschler-Erb 1991, 62, t. 42: 41; Deschler-Erb 1999, 43–44, 152, sl. 41 (spodaj), t. 18: 342.
452 Brailsford 1962, 4, sl. 4: A115, 116, t. 1: A115, A116; Grew, Griffiths 1991, 54, 67: št. 60–62, sl. 10: 60–62.
453 Grew, Griffiths 1991, 54, 67: št. 63–64, sl. 10: 59, 63–64 (brez opisa materialov).
454 Unz, Deschler-Erb 1997, 33, t. 36: 880–888 (pri sedmih okovih je omenjeno pokositrenje).
455 Beck, Chew 1991, 58; Bishop, Coulston 2006, 245, sl. 149; Deschler-Erb 1999, 45.

Hodd Hill (Great Britain; presence of the Roman army at the site limited to the 40s AD),[452] as well as other Claudian and Claudian–Neronian contexts in southern England[453] and from *Vindonissa*.[454] These belt plates and the H1 plate share the same form (with a pseudo-hinge) and decoration (motif of acanthus leaves on a chased background, chased strip of sheet silver), but differ in that the former are considerably thinner, which is connected with the differences in the production technique, i.e. probably by a stamp embossed from the rear.[455] The former also differ in material, which is copper alloy combined with tinning on the front.[456] Such plates were in vogue during the reigns of Tiberius to Nero.[457]

Crucial for dating the H1 belt-plate to the Middle to Late Augustan period is its connection with the fittings of the MM A24 sword scabbard. It is further supported by the parallel from Kalkriese.[458] The considerably thinner plates from the Tiberian–Neronian period, with the same decorative motif of acanthus leaves and a similar decorative style of background chasing were produced by hammering sheet metal into a die, which rendered the production process more efficient in terms of time and material consumption, hence considerably cheaper, which corresponds with the fact that they were made of copper alloy and tinned.

11.2 Belt buckle with belt-plate (H2)

The H2 buckle with belt-plate is made of pure brass with a silvered front (*Pl. 19; Fig. H2*).[459] It ranks among the latest examples of Group A belt buckles after Deschler-Erb, spanning the Augustan to the Flavian period.[460]

The earliest parallels for the H2 belt-plate, tinned/silvered on the front, date to the end of the Early or beginning of the Middle Augustan period.[461]

452 Brailsford 1962, 4, Fig. 4: A115, 116, Pl. 1: A115, A116; Grew, Griffiths 1991, 54, 67: Nos. 60–62, Fig. 10: 60–62.
453 Grew, Griffiths 1991, 54, 67: Nos. 63–64, Fig. 10: 59, 63–64 (without describing the materials).
454 Unz, Deschler-Erb 1997, 33, Pl. 36: 880–888 (tinning is mentioned for seven belt-plates).
455 Beck, Chew 1991, 58; Bishop, Coulston 2006, 245, Fig. 149; Deschler-Erb 1999, 45.
456 Cf. Fns. 452–454.
457 Deschler-Erb 1999, 45.
458 For the dating, see Fn. 440.
459 See Ch. 16, H2.
460 Definition of the type: Deschler-Erb 1991, 22–23; dating: Deschler-Erb 1996a, 84; Deschler-Erb 1999, 40–43.
461 Deschler-Erb 1991, 28, Fns. 154, 155; Deschler-Erb 1996a, 87; Deschler-Erb 1999, 43.

A parallel to the H2 belt buckle and plate has also been unearthed in a Late Augustan–Tiberian context at *Emona*/Ljubljana.[462]

11.3 Gilded silver button and loop fastener with relief decoration (H3)

The H3 round fastener with a double loop is of high-quality silver alloy and gilded on the front(*Pl. 19; Fig. H3*).[463]

It is chased with tiny dots, like the gilded silver locket of the MM A24 sword scabbard (*Figs. 22a, c, e, 25*) and the H1 silver belt-plate, that probably form part of a set from the Middle to Late Augustan period.[464] Other artefacts boasting lavish relief decoration on a background chased with tiny dots are a pair of silver and partially gilded disc brooches from Trier, already discussed in Chapter 11.1.[465]

The general decorative scheme on the H3 fastener is similar to that of the silver disc brooch (diameter 27 mm) from Lahnau-Waldgirmes, mentioned in Chapter 11.1 and probably dating to the end of the Middle Augustan period.[466] Its upper side bears a very fine relief depiction of a pair of rosettes, one outer and one inner, with the addition of coloured glass inlays (red glass in the rivet head at the centre of the brooch and dark blue and green glass on the leaves of the outer rosette) and gilding of select parts of the surface.

The double loop of the H3 fastener points to a pre-Flavian date.[467]

The function of H3 can be inferred from that of two similar fasteners with a double loop from *Vindonissa* (Windisch, Switzerland) and Ilok (Croatia), respectively. Their archaeological contexts reveal a close connection with the military belt and the Mainz type sword scabbard.

462 Gaspari 2010, 26, Pl. 28: Š 395. The stratigraphic context is only summarily described as either the early layers at both sites (p. 98) or the Early Roman deposits (caption to Pl. 28). The Late Augustan–Tiberian date is based on a wider context of the publication.
463 See Ch. 16, H3.
464 The decorative technique of chasing continued into the Tiberian–Claudian period, mainly on objects of copper alloys (Grew, Griffiths 1991, 55–56).
465 Rasbach 2015, 145; Martin-Kilcher 2017, 47–49, 51, 56, Figs. 1–3. Cf. Fn. 450.
466 Becker, Rasbach 1998, 686, Fig. 6; Rasbach 2009; Rasbach 2015, 143–145, Figs. 125, 126. Dating of the site: Ch. 3, Fn. 41.
467 Deschler-Erb 1999, 68.

na licu pokositrenje).[456] Tako izdelani okovi so bili v modi v času od Tiberijeve do Neronove vlade.[457]

Za datacijo okova H1 v srednje- do poznoavgustejsko dobo je odločilna povezava z okovi nožnice meča MM A24. Zanjo govori tudi podoben srebrn okov iz Kalkrieseja.[458] Bistveno tanjši tiberijsko-neronski okovi z enakim okrasnim motivom (akantovi listi) in podobnim stilom okrasa (npr. punciranje ozadja) so bili narejeni z modeli, kar je omogočalo manj zamudno izdelavo in manjšo porabo materiala, zato so bili bistveno cenejši, kar se ujema z dejstvom, da so narejeni iz bakrove zlitine in pokositreni.

11.2 Spona z okovom (H2)

Spona z okovom H2 je iz čiste medenine in je na sprednji strani posrebrena (*t. 19; sl. H2*).[459] Sodi med najmanjše primerke pasnih spon skupine A po Deschler-Erbu; datirane so od avgustejske do flavijske dobe.[460]

Najstarejši neokrašeni oziroma na licu pokositreni/posrebreni okovi so iz konca zgodnje- ali začetka srednjeavgustejske dobe, najmlajši pa flavijski.[461]

H2 zelo podobna »bronasta« spona z okovom izvira iz poznoavgustejsko-tiberijske plasti v *Emoni*/Ljubljana.[462]

456 Prim. op. 452–454.
457 Deschler-Erb 1999, 45.
458 Glede datacije glej op. 440.
459 Glej pogl. 16, H2.
460 Definicija tipa: Deschler-Erb 1991, 22–23; datacija: Deschler-Erb 1996a, 84; Deschler-Erb 1999, 40–43.
461 Deschler-Erb 1991, 28, op. 154, 155; Deschler-Erb 1996a, 87; Deschler-Erb 1999, 43.
462 Gaspari 2010, 26, t. 28: Š 395. Stratigrafske okoliščine najdbe so navedene le okvirno: »iz zgodnjih plasti na obeh lokacijah« (str. 98), »v zgodnjerimskih depozitih« (podnapis k t. 28). Datacija v poznoavgustejsko-tiberijsko dobo izhaja iz širšega konteksta objave.

11.3 Reliefno okrašena pozlačena srebrna ploščica (H3)

Okrogla ploščica H3 s ploščatim nosilcem, ki se zaključi z dvojno zanko, je iz zelo kvalitetne srebrove zlitine in je na licu pozlačena (*t. 19; sl. H3*).[463]

Punciranje z drobnimi krožci predmet H3 povezuje s pozlačenim srebrnim okovom ustja nožnice meča MM A24 (*sl. 22a, c, e, 25*) in srebrnim pasnim okovom H1 iz Ljubljanice, ki sta verjetno del garniture iz srednje- do poznoavgustejske dobe,[464] ter s parom srebrnih in delno pozlačenih ploščatih fibul iz Triera (prim. pogl. 11.1).[465]

Splošna ideja okrasa na ploščici H3 (ne pa izvedba) je podobna okrasu v pogl. 11.1 omenjene ploščate okrogle srebrne sponke (premer 27 mm), verjetno iz konca srednjeavgustejske dobe, iz rimskega naselja Lahnau-Waldgirmes.[466] Na njeni zgornji strani sta reliefno upodobljeni notranja in zunanja rozeta, dodaten okras so stekleni barvni vložki (rdeče steklo v glavi zakovice v sredini sponke in temnomodro oziroma zeleno steklo na listih zunanje rozete) ter pozlata dela površine.

Dvojna zanka na koncu nosilca predmeta H3 kaže na datacijo pred predflavijsko dobo.[467]

Namembnost predmeta H3 nakazujeta podobna predmeta (verjetno iz bakrove zlitine) s ploščatim nosilcem, ki se zaključi z dvojno zanko, iz *Vindonisse* (Windisch, Švica) in iz Iloka (Hrvaška). Izvirata namreč iz najdiščnih okoliščin, ki glede uporabe kažejo na ozko povezavo z vojaškim pasom in nožnico meča tipa Mainz.

Ploščica predmeta iz *Vindonisse* (premer 40 mm) je ravna (nima izbočenega osrednjega dela) in enostavneje okrašena kot H3 ter je verjetno iz bakrove zlitine. Skupaj z mečem in deli nožnice tipa Mainz ter deli vojaškega pasu je bila najdena v jami, ki ni nastala pred sredino 1. st. in je bila v flavijskem času zasuta. Podrobnosti najdiščnega odnosa med nožnico meča in deli pasu kažejo, da je bil ob deponiranju pas večkrat ovit okoli nožnice. Med ostanki pasu ni spone, zato je Deschler-Erb domneval, da je imela ploščica

463 Glej pogl. 16, H3.
464 Okrasna tehnika punciranja se je (predvsem na predmetih iz bakrovih zlitin) nadaljevala v tiberijsko-klavdijski dobi (Grew, Griffiths 1991, 55–56).
465 Rasbach 2015, 145; Martin-Kilcher 2017, 47–49, 51, 56, sl. 1–3. Prim. op. 450.
466 Becker, Rasbach 1998, 686, sl. 6; Rasbach 2009; Rasbach 2015, 143–145, sl. 125, 126. Datacija najdišča: pogl. 3, op. 41.
467 Deschler-Erb 1999, 68.

The button of the fastener from *Vindonissa* measures 40 mm in diameter and is completely flat, without the raised central part, it is also simpler in decoration than H3 and probably made of copper alloy. It was found alongside a Mainz type sword and the mounts of its scabbard, as well as pieces of a military belt in a pit not dug prior to the mid-1st century AD and filled in the Flavian period. Context evidence shows that the belt was wrapped several times around the scabbard upon deposition. The remains of the belt include no buckle, which led Deschler-Erb to suggest that the fastener functioned as one.[468] However, we cannot exclude the possibility that it actually served to attach the scabbard to the belt,[469] in which case the belt would have been fitted with two such fasteners, one of which got lost.

The fastener from Ilok was unearthed in a cremation Grave of a Tiberian date, which also held pottery goods, a coin of Tiberius, a buckle and six mounts of a military belt, as well as a Mainz type sword in its scabbard. The fastener has a roughly 70 mm wide button with chased decoration and a double loop; it is probably made of copper alloy and tinned on the front. The fastener lay next to the sword in its scabbard and the remains of the belt.[470] Contrary to *Vindonissa*, the buckle did survive at Ilok, hence the button and loop fastener did not take its function, but rather served to attach the sword scabbard to the belt.

The hypothesis that the button and loop fasteners with a single or double loop served for suspending scabbards onto military belts is not new.[471] It is based on relief depictions on soldiers' tombstones,[472] but also on similar items with a hinge at one end that fastened them to a rectangular belt mount.[473] The set of belt mounts that include two hinged fasteners and a dagger in its sheath from an inhumation burial in a well at Velsen (the Netherlands) clearly shows that two such fasteners held the sheath.[474]

Most similar to H3 are two substantial hinged 'silver' fasteners, measuring 40 and 45 mm in diameter, from the hoard found at Tekija/*Transdierna* (Serbia).[475] One holds a punched inscription that leaves no doubt as to the owner being a soldier. The fasteners most probably formed part of one of the several military belts with 'silver' parts buried in the hoard in the Domitianic period.[476]

In view of the above, the H3 fastener can be interpreted as part of a military belt from a pre-Flavian time, probably the Middle–Late Augustan period. I presume that it was used for scabbard suspension, of a sword or a dagger. *Fig. 49* shows how a pair of such fasteners might have been fitted onto a belt and how the scabbard would then have been suspended. Such a function of the button and loop fasteners with a double loop has already been proposed by Miks;[477] his second hypothetical function, however, in which the scabbard is attached via the upper suspension rings above the belt and the lower ones below it,[478] seems less likely given the depiction of gods in full military gear on a relief from Palmyra.[479]

The fact that single fasteners with a double loop were found at *Vindonissa* and Ilok in association with a sword and a military belt may only be a coincidence and there were originally a pair, but it may also suggest that the scabbard or sheath was suspended from the belt by way of a single such fastener; in the case of Vindonissa, the button and loop fastener was perhaps used instead of a buckle.[480]

11.4 Button and loop fasteners with the depiction of Augustus flanked by augural symbols (H4 and H5)

The H4 and H5 fasteners are cast of a tin-lead alloy (*Pl. 20; Fig. H4–5*).[481] They share the diameter of 27 mm and almost identical relief depictions, but were not cast in the same mould.

They show the bust of Octavian (after 36 BC when he shaved off his beard) or Emperor Augustus (after

468 Deschler-Erb 1996b, 13–15, 28–29, Fig. 17c; the fastener is probably of copper alloy (cf. Deschler-Erb 2005, 241, Fig. 294).
469 Miks 2007, 244–245, Fig. 44: I, J.
470 Dizdar 2010, 244–245. Marko Dizdar and Asja Tonc (both Institute of Archaeology, Zagreb) kindly provided the drawing and additional information on the metal.
471 Grew, Griffiths 1991, 51; Deschler-Erb (1996b, 28, Fn. 75; in connection with sword suspension he cites pairs of button and loop fasteners with a (single?) loop from Grave 17 at Idrija pri Bači, those from Osuna and from the Rhine at Mainz. The fasteners from Idrija pri Bači, with a round loop (Guštin 1991, Pl. 17: 9), seem too slight for sword suspension); Miks 2007, Fig. 44: I, J; Fischer 2012, 119–120, 183, 195–196, Figs. 247, 282 (he suggests that larger fasteners held sword scabbards and smaller ones dagger sheaths).
472 Grew, Griffiths 1991, Pls. 14B, 15a.
473 E.g. Grew, Griffiths 1991, 51, Fig. 16: 166–181.
474 Morel, Bosman 1989; Grew, Griffiths 1991, Pl. 14: 1; Bishop, Coulston 2006, 87, Fig. 45.
475 Mano-Zisi 1957, 20–21, Nos. 15, 16, Pls. 11, 12 (hinge only survives on Cat. No. 15).
476 Mano-Zisi 1957, Cat. Nos. 15–26, Pls. 11–17.
477 Miks 2007, Fig. 44: I; Fischer 2012, 183, Fig. 247.
478 Miks 2007, Fig. 44: J; Fischer 2012, 183, Fig. 247.
479 Fischer 2012, 183, Fig. 246:1.
480 Fischer already suggested this (2012, 120), though without detailing the manner of attachment.
481 See Ch. 16, H4, H5.

Figure 49
Illustration showing how the H3 fastener may have been attached to the belt (a) and how a sword scabbard may have been suspended from a belt with two such fasteners (b).

Slika 49
Prikaz možne pritrditve predmeta H3 na pas (a) in pripetja nožnice meča na pas s pomočjo dveh takih predmetov (b).

z dvojno zanko funkcijo pasne spone.[468] Vendar ni izključeno, da je bila ploščica iz *Vindonisse* namenjena pritrjevanju nožnice meča na pas[469] – v tem primeru sta k pasu sodili dve taki ploščici, a se ena ni ohranila.

V Tiberijevo dobo datiran žgan grob iz Iloka poleg predmetov iz keramike in Tiberijevega novca vsebuje kovinske dele vojaškega pasu (pasna spona in šest okovov), meč v nožnici tipa Mainz in približno 70 mm široko okroglo ploščico (verjetno iz bakrove zlitine, na sprednji strani pokositrena) s punciranim okrasom in ploščatim nosilcem, ki se zaključi z dvojno zanko. Ploščica, meč v nožnici in ostanki pasu so ležali skupaj.[470] V tem primeru je pasna spona (v nasprotju z najdbo iz *Vindonisse*) ohranjena, zato je jasno, da ploščica z dvojno zanko ni služila spenjanju pasu; glede na najdiščne okoliščine se zdi najverjetneje, da je bila namenjena pritrditvi nožnice meča na pas.

Domneva, da so okrogle ploščice z dvojno ali enojno zanko na koncu ploščatega nosilca služile pripenjanju nožnic mečev in bodal na pas, ni nova.[471] Izhaja iz reliefnih upodobitev na nagrobnikih vojakov[472] in iz primerjave s podobnimi predmeti, ki so imeli na koncu ploščatega nosilca tečaj, s katerim so bili pritrjeni na pravokoten pasni okov.[473] Garnitura pasnih okovov in bodala v nožnici iz skeletnega pokopa v vodnjaku iz Velsna (Nizozemska) jasno kaže, da sta dve taki ploščici, ki sta bili del pasu, služili pritrditvi nožnice bodala na pas.[474]

Med ploščicami s tečajem na koncu nosilca sta predmetu H3 najbolj podobni masivni »srebrni« ploščici (premer 40 oziroma 45 mm) iz depoja, najdenega v Tekiji/*Transdierna* (Srbija).[475] Na eni ploščici je punciran napis, ki ne dopušča dvoma o tem, da je bil lastnik okova vojak. Ploščici sta najverjetneje del enega od več vojaških pasov s »srebrnimi« kovinskimi deli, ki jih vsebuje v Domicijanovem času zakopan zaklad.[476]

Ploščica H3 je torej del vojaškega pasu iz predflavijske, verjetno (srednje-pozno)avgustejske dobe. Domnevam, da je bila nanjo pritrjena nožnica meča (ali morda bodala). *Sl. 49* kaže, kako je bil morda par takih ploščic pritrjen na pas in kako bi lahko bila nanju obešena nožnica meča. Tak način uporabe ploščic z dvojnim zaključkom zanke je predstavil že Miks;[477]

468 Deschler-Erb 1996b, 13–15, 28–29, sl. 17c; glede na Deschler-Erb (2005, 241, sl. 294) je verjetno iz bakrove zlitine.
469 Miks 2007, 244–245, sl. 44: I, J.
470 Dizdar 2010, 244–245. Za risbo predmeta in dodatne informacije (o kovini) se zahvaljujem Marku Dizdarju in Asji Tonc (oba Institut za arheologiju, Zagreb).
471 Grew, Griffiths 1991, 51; Deschler-Erb (1996b, 28, op. 75; v zvezi s pripenjanjem mečev na pas navaja grobove s parom ploščatih nosilcev z (enojno?) zanko iz groba 17 iz Idrije pri Bači, iz Osune in iz Rena pri Mainzu. V primeru groba 17 iz Idrije pri Bači se zdita predmeta s ploščico in okroglo zanko (Guštin 1991, t. 17: 9) za obešanje meča premalo močna; Miks 2007, sl. 44: I, J; Fischer 2012, 119–120, 183, 195–196, sl. 247, 282 (meni, da so na večje ploščice pripenjali nožnice mečev, na manjše pa nožnice bodal).
472 Grew, Griffiths 1991, t. 14B, 15a.
473 Npr. Grew, Griffiths 1991, 51, sl. 16: 166–181.
474 Morel, Bosman 1989; Grew, Griffiths 1991, t. 14: 1; Bishop, Coulston 2006, 87, sl. 45.
475 Mano-Zisi 1957, 20–21, št. 15, 16, t. 11, 12 (tečajni del je ohranjen le pri predmetu kat. 15).
476 Mano-Zisi 1957, kat. 15–26, t. 11–17.
477 Miks 2007, sl. 44: I; Fischer 2012, 183, sl. 247.

early 27 BC) in profile,[482] with a curved augural staff or *lituus* in front and a (metal) jug (*urceus*) behind, the latter used by augurs and other priests.[483] Divination (*auspicia*) was associated with military command.[484] Under Augustus, *lituus* was also a token of imperial power.[485] The depictions on the two button and loop fasteners thus indicate a military context. A similar motif, i.e. a combination of Octavian's head in profile flanked by a jug and augur's staff together with two other priestly symbols, ladle (*simpulum*) and sprinkler (*aspergillum*), already appears on *denarii* minted between 37 and 34 BC.[486]

The flat stub at the back of the H4 fastener probably terminated in a loop, such as survives on a closely similar item of unknown provenance.[487] Künzl presumed that this item was suspended via the loop from a leather strap hanging off a military belt. This, however, does not seem very likely as the relief depictions would be facing head down; the same applies to the depiction on the H4 fastener if thus suspended. H4 must have been oriented with the loop pointing downwards. I presume that the loop was first inserted through a vertical slit and the whole object then turned at the right angle so that the loop would be turned downwards and the head would be in the upright position in the final position; this would more securely keep it in place, similarly as suggested for the H3 fastener with a double loop (cf. *Fig. 49*).

It seems probable that fasteners such as H4 and H5 formed parts of military belts,[488] but their unsubstantial construction speaks against the possibility of them carrying dagger sheaths.[489] Such fasteners may have functioned in a manner similar to cufflinks if the loop passed through the slits on two objects.

Button and loop fasteners with flat or convex discs of either simple decoration or undecorated and of varying diameters are not rare in Roman military contexts and were probably used for a variety of purposes.[490]

482 Cf. Trillmich 1988, Cat. Nos. 303, 304, 321, 322, 329, 331–333, 336, 337, 340, 343, 346, 347, 364, 368, 370–372; Künzl 1988c, 560–561, Cat. No. 387; Künzl 1996, 433, Pl. 50: 7.
483 Cf. Stevenson 1982, headwords *augures, lituus Augurum, praefericulum*, 95–97, 520, 648.
484 Künzl 1988c, 561, Cat. No. 387.
485 Von Gonzenbach 1965, 9; Künzl 1988c, 560–561, Cat. No. 387.
486 Trillmich 1988, 502, Cat. No. 309.
487 Künzl 1988c, 560–561, Cat. No. 387; Künzl 1996, 433, Pl. 50: 7.
488 Künzl 1988c, 560–561, Cat. No. 387; Künzl 1996, 433, Pl. 50: 7; Miks 2007, 244–245, Fig. 43: A.
489 Cf. Miks, 2007, 244–245, Fig. 43: A.
490 Deschler Erb 1999, 68.

11.5 Buckle (H6)

The D-shaped buckle (*Pl. 19; Fig. H6*) of pure brass[491] may be related to Roman military equipment, possibly fastening a thin (military) belt[492] or strap. However, a number of such buckles from sites buried during the Vesuvius eruption show them to have been common in civilian settlements.[493] They were in use from the Late Republican period to the 2nd century AD.[494]

11.6 Hobnails (H7 and H8)

The available information reveals only two hobnails (*Pl. 19; Fig. H7–8*) recovered from the Ljubljanica, though more have been reportedly observed along its stretch at Bevke and between Bevke and Vrhnika.[495]

The underside of the H7 hobnail bears a relief pattern consisting of an embossed cross and four dots.

Most sites with hobnails such as H7 and its variants[496] are connected with Caesar's campaigns in Gaul.[497] Numerous examples with this pattern on the underside, designed for a better fit between the nail and the leather sole, have also been unearthed at Andagoste, the site of a military conflict between the Romans and the indigenous population that took place some time between 44 and 30 BC,[498] but also at sites linked to military encounters during the Cantabrian Wars (29–19 BC) in northern Spain.[499] None came to light at the Dangstetten fortress and later Augustan forts.

Hobnails such as H7 might first have been used even before Caesar. This possibility is raised by such hobnails that came to light at Barda-Roba, a site overlooking the Natisone valley (north-eastern Italy), among the surface finds of military items including lead slingshot as well as coins that point to Roman military activities in the first decades of the 1st century BC.[500]

491 See Ch. 16, H6.
492 Cf. Ortisi 2015, 65–66, Fig. 22, Cat. Nos. E 176, E 172, E 199, Pls. 63, 64, 90.
493 Deschler Erb 1999, 66–67, 180–183, Pl. 40; Ortisi 2015, 63–67, Pls. 49, 58–67, 90, Nos. 3–254.
494 Deschler Erb 1999, 66–67, 180–183, Pl. 40.
495 Istenič 2009f, 86, 90, Fn. 2.
496 Cf. Brouquier-Reddé, Deyber 2001, 303–305, Pl. 93: 138 D 4-4.
497 Brouquier-Reddé, Deyber 2001, 303–305, Pl. 93: 138 D 4-4; Poux 2008, 376–381, Figs. 53, 54; Hornung 2012, 217, Fig. 7; Hornung 2015, 113.
498 Ocharán Larrondo, Unzueta Portilla 2002, Fig. 2: 11, 12; Ocharán Larrondo, Unzueta Portilla 2006, 475–476, 480, 482, 484, Fig. 121: 11–12).
499 Fernández Vega et al. 2012, 240, No. 1, Fig. 15; Peralta Labrador, Hierro Gárate, Gutiérrez Cuenca 2011, 163, Fig. 17; Rodríguez Morales et al. 2012, 160, Fig. 8.
500 Istenič 2015a, 57–58.

njegova druga hipotetična možnost uporabe takih ploščic, pri kateri je nožnica na pas pripeta tako, da sta zgornji zanki nožnice nad pasom, spodnji dve pa pod njim,[478] se mi zdi – glede na upodobitev bogov v bojni opremi na reliefu iz Palmire[479] – manj verjetna.

Dejstvo, da je bila v *Vindonissi* in Iloku z mečem in vojaškim pasom najdena le po ena taka ploščica z nosilcem, ki se zaključi z dvojno zanko, je lahko slučaj (v obeh primerih se je od para predmetov ohranil le eden), ni pa izključeno, da je bila nožnica meča (ali bodala) na pas pritrjena s pomočjo le enega takega predmeta;[480] pri najdbi iz Vindonisse je ploščica z dvojno zanko lahko imela vlogo pasne spone.

11.4 Ploščici z upodobitvijo Avgusta s svečeniškimi simboli (H4 in H5)

Ploščici H4 in H5 (*t. 20; sl. H4–5*) sta uliti iz zlitine kositra s svincem.[481] Imata enak premer (27 mm) in skoraj enaki reliefni podobi, vendar nista bili uliti v istem kalupu.

Prikazujeta profil Oktavijana (po letu 36 pr. Kr., ko si je obril brado) oziroma cesarja Avgusta (od začetka leta 27 pr. Kr. dalje),[482] pred njim *lituus* – simbol avgurov, za njim pa (kovinski) vrč (*urceus*), ki so ga uporabljali avguri in svečeniki.[483] Razlaganje božjih znakov (*auspicia*) je povezano z vojaškim poveljstvom.[484] *Lituus* je poleg tega v času Avgusta tudi simbol imperatorske oblasti.[485] Upodobitev na ploščicah torej kaže na njuno uporabo v vojaškem okolju. Podoben motiv, tj. kombinacija Oktavijanove glave v profilu, vrča in avgurske palice (skupaj s še dvema simboloma svečeništva, tj. zajemalko/*simpulum* in vodno pahljačo/*aspergillum*), je zastopan že na denarijih, kovanih med letoma 37 in 34 pr. Kr.[486]

Ploščati nosilec na hrbtni strani ploščice H4 se je verjetno na koncu razširil v obroček, ki je ohranjen na izredno podobnem predmetu z neznanega najdišča.[487] Künzl je za ta predmet domneval, da je bil z obročkom obešen na usnjen jermen, ki je visel z vojaškega pasu. To se mi zdi malo verjetno, ker bi v tem primeru – glede na odnos med zanko in usmeritvijo upodobitve na predmetu z neznanega najdišča in na H4 – bila upodobitev obrnjena na glavo. Ploščica je morala biti nameščena tako, da je bil nosilec z zanko obrnjen navzdol. Domnevam, da je bil nosilec z zanko najprej vdet skozi navpično režo in cel predmet nato zasukan tako, da je bila zanka v končnem položaju postavljena pravokotno na režo, kar je povečalo zanesljivost pritrditve – podobno, kot sem to predpostavila za namestitev ploščice z dvojno zanko H3 (prim. *sl. 49*).

Zdi se verjetno, da so bile ploščice, kot sta H4 in H5, del vojaških pasov,[488] vendar njihova nežnost govori proti domnevi, da so bile na njih pripete nožnice bodal.[489] Take ploščice so lahko delovale podobno kot manšetni gumbi, če je bil nosilec z enojno zanko hkrati vdet skozi režo na dveh predmetih.

Enostavno okrašene ali neokrašene, ravne ali izbočene okrogle ploščice različnih premerov z enojno zanko v rimskih vojaških okoljih niso redke in so jih verjetno uporabljali za zelo različne namene.[490]

11.5 Spona (H6)

Z rimsko vojaško opremo je lahko povezana enostavna, iz čiste medenine[491] narejena spona D-oblike (*t. 19; sl. H6*), čeprav veliko število takih spon med najdbami z najdišč, ki jih je zasul izbruh Vezuva, kaže, da so bile v civilnih naseljih pogoste.[492] Take spone so uporabljali od poznorepublikanske dobe do 2. stoletja.[493] Spona H6 je morda spenjala tanek (vojaški) pas[494] ali jermen.

478 Miks 2007, sl. 44: J; Fischer 2012, 183, sl. 247.
479 Fischer 2012, 183, sl. 246:1.
480 Tako že Fischer (2012, 120), ki pa ne pojasni načina pritrditve.
481 Glej pogl. 16, H4, H5.
482 Prim. Trillmich 1988, kat. 303, 304, 321, 322, 329, 331–333, 336, 337, 340, 343, 346, 347, 364, 368, 370–372; Künzl 1988c, 560–561, kat. 387; Künzl 1996, 433, t. 50: 7.
483 Prim. Stevenson 1982, gesla *augures, lituus Augurum, praefericulum*, 95–97, 520, 648.
484 Künzl 1988c, 561, kat. 387.
485 Von Gonzenbach 1965, 9; Künzl 1988c, 560–561, kat. 387.
486 Trillmich 1988, 502, kat. 309.
487 Künzl 1988c, 560–561, kat. 387; Künzl 1996, 433, t. 50: 7.
488 Künzl 1988c, 560–561, kat. 387; Künzl 1996, 433, t. 50: 7; Miks 2007, 244–245, sl. 43: A.
489 Prim. Miks, 2007, 244–245, sl. 43: A.
490 Deschler-Erb 1999, 68.
491 Glej pogl. 16, H6.
492 Deschler-Erb 1999, 66–67, 180–183, t. 40; Ortisi 2015, 63–67, t. 49, 58–67, 90, št. 3–254.
493 Deschler-Erb 1999, 66–67, 180–183, t. 40.
494 Prim. Ortisi 2015, 65–66, sl. 22, kat. E 176, E 172, E 199, t. 63, 64, 90.

The earliest hobnails of Roman military footwear have recently been discovered at Lampourdier, a site that also yielded coins and other finds dating to the end of the 2nd century BC. The archaeological finds from this site are believed to be the remains of a Roman army camp in use during the Roman battle against the Cimbri and Teutons, which took place in 105 BC at Orange (*Arausio*; France) and ended in a crushing Roman defeat. The site yielded 668 hobnails. Roughly three quarters of them are large (13–25 mm in diameter), others are smaller (6–12 mm), while all share a pattern composed of semicircles and dots on the underside.[501]

This shows the importance of the pattern on the underside in dating hobnails rather than the size or shape of the head. The average head size decreased in time,[502] though small hobnails are already represented among the earliest examples (e.g. at Lampourdier or Alesia[503]). Hobnails with large heads therefore date to the Late Republican and Early Augustan periods, those with small heads may be contemporary with the large ones or later. As for the shape of the head, the different shapes of the hobnails from sites related above show that this was not a chronologically diagnostic feature.

Hobnails such as H7 were fitted onto Roman military footwear at least from Caesar's Gallic Wars to around 20 BC. Similar hobnails, though without a pattern on the underside (H8), have also been found at sites dating to the time of the Gallic Wars.[504] Smaller hobnails of this type, measuring around 10 mm or less in head diameter, remained in use throughout the Augustan period and even later.[505]

501 Deyber, Zaaraoui, Buffat 2018.
502 Poux 2008, 380, Fig. 56.
503 The hobnails from Lampourdier measure between 6 and 25 mm in diameter (Deyber, Zaaraoui, Buffat 2018, 36), those from Alesia between 10 and 38 mm (Brouquier-Reddé, Deyber 2001, 304, Pl. 93: 138D).
504 Brouquier-Reddé, Deyber 2001, 303–305, Pl. 93: 138 A.
505 Poux 2008, 380, Fig. 56.

11.6 Okovna žebljička obuval (H7 in H8)

Iz Ljubljanice sta po razpoložljivih podatkih ohranjena le dva okovna žebljička obuval (*t. 19; sl. H7–8*), čeprav so jih v Ljubljanici, pri Bevkah ter med Bevkami in Vrhniko, opazili več.[495]

Spodnja stran žebljička H7 je s štirimi reliefnimi rebri razdeljena na štiri enaka polja, v vsakem od njih je izbočena bunkica.

Večina najdišč žebljičkov, kot je H7 (z variacijami[496]), je povezana s Cezarjevim delovanjem v Galiji oziroma obuvali njegovih vojakov.[497] Številne žebljičke s takim vzorcem na spodnji strani (ki je služil boljši namestitvi žebljička na usnjen podplat) so našli na prizorišču spopada med Rimljani in domačini pri Andagoste (datacija: med 44 in 30 pr. Kr.)[498] in na najdiščih, ki so povezana s spopadi med kantabrijskimi vojnami (29–19 pr. Kr.) v severni Španiji.[499] Med najdbami iz legijskega tabora v Dangstettnu in v mlajših avgustejskih vojaških taborih žebljičkov s takim vzorcem na spodnji strani ni.

Ni izključeno, da so žebljičke, kot je H7, začeli uporabljati pred Cezarjem. So namreč med na površini najdenimi rimskimi vojaškimi najdbami z najdišča Barda-Roba nad dolino reke Nadiže (severovzhodna Italija), kjer druge najdbe (svinčeni izstrelki, denar) nakazujejo delovanje rimske vojske v prvih desetletjih 1. stoletja pr. Kr.[500]

Najstarejše okovne žebljičke rimskih vojaških obuval so nedavno odkrili na najdišču Lampourdier, kjer novci in druge najdbe prepričljivo govorijo za datacijo na konec 2. st. pr. Kr. Doslej raziskane ostaline povezujejo s taborom rimske vojske med spopadom Rimljanov s Kimbri in Tevtoni leta 105 pr. Kr. pri Orangu (*Arausio*; Francija), v katerem so bili Rimljani uničujoče poraženi. Z najdišča izvira 668 okovnih žebljičkov. Približno tri četrtine je velikih (13 do 25 mm), ostali so manjši (6 do 12 mm). Skupen jim je vzorec na spodnji strani, ki ga sestavljajo polkrogi in bunkice.[501]

Za datacijo posameznih okovnih žebljičkov vojaških obuval je torej bistven njihov vzorec na spodnji strani, ne pa velikost ali oblika glavice. Povprečna velikost glavic žebljičkov se je s časom manjšala,[502] vendar so majhni žebljički že med najstarejšimi žebljički (npr. Lampourdier, Alezija[503]). Žebljičke z velikimi glavicami torej lahko opredelimo kot poznorepublikanske ali zgodnjeavgustejske, tisti z majhnimi glavicami so jim lahko sočasni ali mlajši. Različne oblike glavic žebljev iz zgoraj naštetih najdišč tudi kažejo, da oblika njihovih glavic ni časovni pokazatelj.

Žebljički, kot je H7, so torej okovali rimska vojaška obuvala najkasneje od vključno Cezarjevih galskih vojn do okrog 20 pr. Kr. Podobni žebljički, ki pa na spodnji strani nimajo reliefnega vzorca (H8), so prav tako zastopani že na najdiščih iz časa galskih vojn,[504] vendar so bili – v povprečju manjši – taki žebljički v uporabi še v celi avgustejski dobi in kasneje.[505]

495 Istenič 2009e, 81, 84, op. 2.
496 Prim. Brouquier-Reddé, Deyber 2001, 303–305, t. 93: 138 D 4-4.
497 Brouquier-Reddé, Deyber 2001, 303–305, t. 93: 138 D 4-4; Poux 2008, 376–381, sl. 53, 54; Hornung 2012, 217, sl. 7; Hornung 2015, 113.
498 Ocharán Larrondo, Unzueta Portilla 2002, sl. 2: 11, 12; Ocharán Larrondo, Unzueta Portilla 2006, 475–476, 480, 482, 484, sl. 121: 11–12).
499 Fernández Vega et al. 2012, 240, št. 1, sl. 15; Peralta Labrador, Hierro Gárate, Gutiérrez Cuenca 2011, 163, Fig. 17; Rodríguez Morales et al. 2012, 160, sl. 8.
500 Istenič 2015a, 57–58.
501 Deyber, Zaaraoui, Buffat 2018.
502 Poux 2008, 380, sl. 56.
503 Premer žebljičkov z najdišča Lampourdier je med 6 in 25 mm (Deyber, Zaaraoui, Buffat 2018, 36) in iz Alezije med 10 in 38 mm (Brouquier-Reddé, Deyber 2001, 304, t. 93: 138D).
504 Brouquier-Reddé, Deyber 2001, 303–305, t. 93: 138 A.
505 Poux 2008, 380, sl. 56.

12
Military decorations

12.1 Medallion with the portrait of Augustus (I1)

The I1 round medallion measures 48 mm across (*Pl. 20; Fig. I1*), it is cast of tin-lead alloy and silvered on the front.[506] The front shows the bust of a man in frontal view. He is dressed in a *tunica* and *toga*, and wears a laurel wreath on his head; the wavy wreath-ties can be seen hanging down on either side, reaching from near the earlobes to the shoulders. To the right of his face is an eagle-tipped sceptre, the eagle depicted with partially spread wings and the head turned back. To the left is a branch with symmetrically placed elongated leaves and berries on long stalks, which suggests a myrtle branch.[507] The medallion is bordered by a triple moulding, with the central moulding higher and wider than the lateral two.

The back shows it was soldered to a setting that has not survived. Its surface varies (*Fig. I1b* and *Fig. 50*):

1) relatively smooth surface of irregular outline that is sunk deepest and located in the upper right quarter of the medallion (*Fig. 50: 1*); PIXE analyses indicate a tin-lead alloy;[508]
2) darker and rougher surface, higher than Surface 1 and deeper than Surface 3 (*Fig. 50: 2*); PIXE analyses indicate tin or an alloy of tin and a small amount of lead;[509]
3) relatively flat surface with clear traces of incised furrowing running in different directions across much of the outer part (*Fig. 50: 3*); PIXE analyses show a tin-lead alloy and 3.4% to 13.4% copper on the surface, which might have been left behind by a copper tool furrowing the surface.[510]

Figure 50
Back of the I1 medallion, presumably a military decoration, with marked Surfaces 1, 2 and 3 showing different degrees of adhesion between the surviving disc and the missing backing.

Slika 50
Hrbtna stran dela domnevnega odlikovanja I1 z označenimi območji 1, 2 in 3, ki kažejo različno dober spoj s podlago.

The strongest bond between the medallion and the missing setting was on Surface 2 (*Fig. 50: 2*), where the high tin content indicates that the latter was of an alloy with predominant tin. A large part of the back (*Fig. 50: 3*) shows a weaker bond, but also furrowing for better adhesion, while a small part (*Fig. 50: 1*) never properly adhered to the setting.[511]

The characteristics of the face, neck and hairstyle reveal the portrait as that of the Emperor Augustus, more precisely the Prima Porta portrait type introduced in 27 BC or soon after.[512]

The laurel wreath initially crowned a triumphator, later the emperor.[513] Octavian was the first Roman to have the right to wear a laurel wreath at all times, following the Battle of Naulochus in 36 BC.[514] His earliest depiction with a laurel wreath and wreath-ties hanging down the neck appears on the coins minted in 28 BC.[515]

The victorious military commanders wore an eagle-tipped sceptre in their left hand during their triumph.

506 See Ch. 16, I1.
507 Cf. Baumann 2000, 42–43. Laurel branches have unsymmetric leaves and its berries short stalks.
508 See Ch. 16, *Table I1: 3.*
509 See Ch. 16, *Table I1: 4, 6, 10.*
510 See Ch. 16, *Table I1: 5, 7, 11.*

511 Istenič 2003a, 264–267; Dobršek 2003; Šmit 2003.
512 Hofter 1988, 298, 322–327, Cat. Nos. 167, 168, 170; Hölscher 1988, 386–389, Cat. No. 215; Zanker 1990, 98–100.
513 Jones 1990, 73.
514 Zanker 1990, 41.
515 Trillmich 1988, 505–506, Cat. No. 320.

12
Odlikovanji

12.1 Medaljon s portretom Avgusta (I1)

Ploščat predmet I1 krožne oblike (medaljon) s premerom 48 mm (*t. 20; sl. I1*) je ulit iz zlitine kositra in svinca ter na sprednji strani posrebren.[506] Na sprednji strani je upodobljeno doprsje moškega v pogledu od spredaj. Oblečen je v tuniko in togo, na glavi ima lovorjev venec z zaključkoma trakov, ki segata od ušesnih mečic do ramen in sta vidna na obeh straneh. Na desni strani je žezlo, ki ima na vrhu orla z delno razprtimi perutmi in nazaj obrnjeno glavo. Vejica na levi strani ima listke, ki iz debla rastejo simetrično v parih, in plodove na dolgih pecljih, kar omogoča, da jo opredelim kot mirtino vejo.[507] Ob robu so tri koncentrična rebra, ki jih ločita žlebova; srednje rebro je najširše in najvišje.

Hrbtna stran predmeta kaže sledove spajanja s podlago, ki se ni ohranila. Na neenakomerni površini hrbtne strani predmeta so tri območja (*sl. I1b* in *sl. 50*):

1) razmeroma gladek del površine nepravilne oblike, ki leži najgloblje in v zgornji desni četrtini medaljona (*sl. 50: 1*); analize PIXE nakazujejo zlitino kositra in svinca;[508]
2) temnejša in groba površina, ki leži manj globoko od površine 1 in globlje od površine 3 (*sl. 50: 2*); analize PIXE nakazujejo kositer oziroma zlitino kositra in majhnega deleža svinca;[509]
3) razmeroma raven del z jasno vidnimi sledovi brazdanja v različnih smereh, ki obsega skoraj ves zunanji del površine (*sl. 50: 3*); analize PIXE so pokazale zlitino kositra in svinca ter na površini od 3,4 do 13,4 % bakra, ki je morda posledica brazdanja te površine z bakrenim orodjem.[510]

Najmočnejši spoj je nastal na območju površine 2 (*sl. 50: 2*), pri kateri visok delež kositra nakazuje, da je bila podlaga iz zlitine, v kateri je prevladoval kositer. Največji del površine (*sl. 50: 3*) izkazuje slabšo povezavo s podlago, ki so jo zaradi izboljšanja sprijetja pred spajanjem nabrazdali. Na majhnem delu (*sl. 50: 1*) do spoja ni prišlo.[511]

Značilnosti upodobitve obraza, vratu in pričeske kažejo, da je na medaljonu prikazan cesar Avgust, natančneje njegov portret tipa Prima Porta, ki so ga uvedli 27 pr. Kr. ali kmalu po tem.[512]

Lovorjev venec je prvotno označeval triumfatorja, nato pa cesarja.[513] Avgust je bil prvi Rimljan, ki ga je – po bitki pri Navlohu (*Naulochus*) leta 36 pr. Kr. – smel trajno nositi.[514] Najstarejša upodobitev lovorjevega venca z zaključkoma, ki visita ob vratu, je na Avgustovih (oz. Oktavijanovih) novcih, kovanih leta 28 pr. Kr.[515]

Zmagoviti vojaški poveljniki so med triumfom v levici nosili žezlo z orlom na vrhu. V cesarski dobi so žezla pritiklina cesarjev.[516]

Lovorjev venec in žezlo z orlom sta torej del triumfalnega okrasja, zato to domnevam tudi za tuniko in togo, čeprav na upodobitvi ni mogoče prepoznati toge pikte oz. tunike palmate.[517] Preseneča torej mirtina

506 Glej pogl. 16, I1.
507 Prim. Baumann 2000, 42–43. Pri lovorju listi rastejo iz stebla posamič, brez reda, plodovi pa imajo kratke peclje.
508 Glej pogl. 16, *pregl. I1: 3.*
509 Glej pogl. 16, *pregl. I1: 4, 6, 10.*
510 Glej pogl. 16, *pregl. I1: 5, 7, 11.*
511 Istenič 2003a, 264–267; Dobršek 2003; Šmit 2003.
512 Hofter 1988, 298, 322–327, kat. 167, 168, 170; Hölscher 1988, 386–389, kat. 215; Zanker 1990, 98–100.
513 Jones 1990, 73.
514 Zanker 1990, 41.
515 Trillmich 1988, 505–506, kat. 320.
516 Künzl 1988a, 86–87, 90–91, sl. 51a, b, 56, 57.
517 Maxfield 1981, 102; Künzl 1988a, 85–92, sl. 56, 57; Jones 1990, 106, 281, 308.

In the Imperial period, sceptres were reserved for emperors.[516]

The laurel wreath and eagle-tipped sceptre were part of triumphal ornaments, the same may be supposed for the tunic and toga, though the depiction on the I1 medallion is insufficiently precise for the identification of either a purple toga richly embroidered with gold stars (*toga picta*) or a palm-embroidered tunic (*tunica palmata*).[517] The myrtle branch is surprising, though, as we would rather expect a laurel branch in connection with a triumph, which the triumphator held in his right hand.[518]

Symbols of triumph do appear in combination with myrtle when referring to a so-called lesser triumph (*ovatio*), during which the victorious general wore a myrtle wreath.[519] Among the achievements that merited an *ovatio* instead of a triumph, ancient authors mention a victory attained without bloodshed.[520] Augustus achieved such a victory against the Parthians in 20 BC, when he was able to recover the eagles and other standards (*signa*) lost during Crassus' annihilating defeat against the Parthians in 53 BC, but also to repatriate the Roman prisoners of war through diplomatic efforts.

In Augustan ideology, the victory in Parthia was endowed with an extraordinary significance, regarded as one of the prerequisites for the opening of the Golden Age (*saeculum aureum*). The senate granted Augustus a triumph, which the emperor refused, only agreeing to display publicly the recovered standards lost by Crassus in 53 BC. In the celebration of this victory was realised a new conception of victory, which saw Augustus as the invulnerable victor and guarantor of the world order.[521]

The victory over the Parthians in 20 BC, also celebrated on the statue of Augustus from the Villa of Livia at Prima Porta, located near ancient Rome, and on the *signis receptis* coin series, was a frequent motif of Augustan propaganda.[522] In spite of Augustus' refusal to accept the honour of a triumph, the depictions associated with this victory included triumphal symbols (*ornamenta/insignia triumphalia*). The symbolism of the depiction on the reverse of the *denarii* minted in 18 BC is closely linked with the medallion from the Ljubljanica. It shows an empty quadriga, while the obverse features triumphal symbols (*toga picta*, *tunica palmata*, laurel wreath and an eagle, of which the latter may also represent a legionary standard). The empty quadriga and triumphal symbols allude to Augustus' refusal to accept the award of a triumph.[523]

Figure 51
Presumed construction of a *phalera*, Roman military decoration with a glass medallion. Scale ca. 1 : 1. Adapted from Boschung 1987, 199–203, Figs. 10, 11.

Slika 51
Shematski prikaz rekonstruiranega rimskega odlikovanja falera s steklenim osrednjim delom. Merilo približno 1 : 1. Dopolnjeno po Boschung 1987, 199–203, sl. 10, 11.

The depiction on the I1 medallion thus signals a close connection with imperial propaganda, which indicates a use in a military environment. Its owner may even have seen it as possessing apotropaic powers, as the triumphator represented to the Romans a person with magical powers, a conveyor of good luck and good fortune, as well as a guarantor of success.[524]

The depiction on the medallion does not appear to have close parallels among archaeological finds. The broad parallels in items of a similar shape bearing a relief depiction of Augustus, however, do open interesting questions as to the purpose of the medallion.

Vindonissa (Windisch-Brugg, Switzerland) yielded two discs measuring 42 mm across and cast of tin-lead alloy that bear a relief bust of the Emperor Augustus. He is shown in profile wearing a cuirass and a military cloak with a laurel wreath on his head, Victoria behind and a *lituus* in front.[525] The back of the disc has a bronze[526] shank with a missing tip cast into the disc. Traces of leather and wood on the back of one of the discs reveal that it was attached to a wooden object covered in leather.[527] In secondary use, both discs were pierced in one or two places. They originally date to the Augustan period, but were found in contexts suggesting an Early Tiberian use.[528]

516 Künzl 1988a, 86–87, 90–91, Figs. 51a, b, 56, 57.
517 Maxfield 1981, 102; Künzl 1988a, 85–92, Figs. 56, 57; Jones 1990, 106, 281, 308.
518 Künzl 1988a, 86–87, 91, Figs. 51a, b, 56.
519 RE XVIII, 2, 1891–1893; Maxfield 1981, 102, 104–105; Künzl 1988a, 100–101.
520 RE XVIII, 2, 1893–1896; Maxfield 1981, 102; 104–105; e.g. Plutarch, Marcellus XXII. 2–4.
521 Zanker 1990, 183–186.
522 Trillmich 1988, 486, 514–516, Cat. Nos. 340–344; Zanker 1990, 183–189, Figs. 145–146, 148–149; Weisser 2009b.
523 Trillmich 1988, 486, 516, Cat. No. 344. Trillmich (l. c.) interprets the eagle as a legionary symbol, while Jones (1990, 308) sees it as a mark of triumph.
524 Künzl 1988a, 7, 93.
525 Unz 1972, 43–44, 47–48; Künzl 1996, 457, M29–30, Pl. 46: 4–5; Dahmen 2001, 209–210, Mil. 19–20, Pl. 208: Mil. 19.
526 The publication reveals that a single medallion was determined as to its alloy using the XRF method, though the same alloys are stated for the other medallion (Unz 1972, 43–44, 47–48, Sketch 1).
527 Unz 1972, 47–48, sketch 1.
528 Unz 1972, 47.

vejica, saj bi v povezavi s triumfom pričakovali lovorjevo, ki jo je triumfator običajno držal v desnici.[518]

Simboli triumfa v kombinaciji z mirtino vejico najverjetneje kažejo na tako imenovani manjši triumf (*ovatio*), med katerim je zmagoviti general nosil mirtin venec.[519] Med dosežki, za katere je vojskovodja lahko prejel *ovatio* namesto triumfa, antični pisci omenjajo zmago, doseženo brez prelivanja krvi.[520] Avgust je tako zmago dosegel proti Partom leta 20 pr. Kr., ko je legijske znake, izgubljene ob katastrofalnem Krasovem porazu proti Partom leta 53 pr. Kr., in od takrat v ujetništvu živeče rimske vojake pridobil z diplomatskimi sredstvi.

V avgustejski ideologiji je imela zmaga nad Parti velik pomen, saj so jo razumeli kot predpogoj za začetek zlate dobe (*saeculum aureum*). Senat je Avgustu dodelil triumf, ki ga je cesar odklonil, sprejel pa je javno razstavitev znova pridobljenih legijskih orlov in drugih oznak vojaških enot, ki jih je Kras izgubil leta 53 pr. Kr. Ob slavljenju te zmage se je oblikoval nov koncept zmage, ki je Avgusta slavil kot neranljivega zmagovalca in poroka svetovnega reda.[521]

Zmaga leta 20 pr. Kr. nad Parti, ki jo med drugim slavijo marmorni kip Avgusta iz Livijine vile v Prima Porta pri antičnem Rimu in novci serije *signis receptis*, je bila pogost motiv propagandnih upodobitev avgustejske dobe.[522] Kljub Avgustovi odklonitvi triumfa so s to zmago povezane upodobitve prikazovale triumfalne simbole (*ornamenta/insignia triumphalia*). Simbolni pomen upodobitve na hrbtni strani denarijev, skovanih leta 18 pr. Kr., je ozko povezan z medaljonom iz Ljubljanice. Na njihovi hrbtni strani je prazna kvadriga, na sprednji pa triumfalni simboli (toga pikta, tunika palmata, lovorjev venec in orel, ki se lahko nanaša tudi na legijski znak). Kombinacija prazne kvadrige in simbolov triumfa aludira na Avgustovo zavrnitev dodeljenega triumfa ob zmagi nad Parti.[523]

Upodobitev na medaljonu torej izraža ozko povezavo s cesarsko propagando, kar nakazuje uporabo v vojaškem okolju. Za lastnika je lahko imela apotropejski pomen, saj je bil triumfator za Rimljane oseba z magičnimi močmi, prinašalec sreče in odvračevalec nesreče ter porok uspeha.[524]

Med arheološkimi najdbami upodobitvi na medaljonu iz Ljubljanice ne poznam ozkih primerjav. Predmeti podobne oblike z reliefno podobo Avgusta so zanimivi pri iskanju odgovora na vprašanje o namembnosti tega predmeta.

Iz *Vindonisse* (Windisch-Brugg, Švica) izvirata iz zlitine kositra in svinca uliti krožni ploščici (premer 42 mm) z reliefno upodobitvijo doprsja cesarja Avgusta v profilu, z lovorjevim vencem, oklepom in vojaškim plaščem, z Viktorijo za njim in svečeniško palico (*lituus*) pred njim.[525] Na hrbtni strani je bil v ploščici zalit bronast[526] trn z odlomljenim spodnjim delom. Sledovi usnja in lesa na hrbtni strani ene ploščice kažejo, da je bila pritrjena na les, prevlečen z usnjem.[527] Obe ploščici sta bili, v sekundarni rabi, preluknjani na enem oziroma dveh mestih. Predmeta sta iz avgustejske dobe, najdena pa sta bila v najdiščnih okoliščinah, ki kažejo na zgodnjetiberijski čas.[528]

»Bronasta« ploščica z zelo podobno reliefno upodobitvijo izvira iz Akvileje.[529]

Malo večjo (premer 49 mm), iz »svinca« ulito krožno ploščico s podobnim reliefnim okrasom (doprsje Avgusta z lovorjevim vencem in Viktorijo na globusu za njim, stranski pogled) in s trnom na hrbtni strani so našli v kanalu med rekama Aare in Zihl v Švici.[530]

Podobna okrasna ploščica (premer okoli 44 mm) z reliefno podobo profila Avgusta ali Tiberija z lovorjevim vencem je pritrjena na sprednjo stran t. i. Tiberijeve nožnice, ki izvira iz Mainza.[531] V nobeni od objav ni opisano, kako je ploščica pritrjena na nožnico, niti ni naveden njen osnovni material, omenjeno pa je, da je njena površina prevlečena s tenko pločevino iz medenine.[532]

Unz za vse navedene ploščice meni, da so krasile nožnice mečev,[533] kar se zdi povsem mogoče. Vendar je treba omeniti, da je za sledove usnja in lesa na

518 Künzl 1988a, 86–87, 91, sl. 51a, b, 56.
519 RE XVIII, 2, 1891–1893; Maxfield 1981, 102, 104–105; Künzl 1988a, 100–101.
520 RE XVIII, 2, 1893–1896; Maxfield 1981, 102; 104–105; npr. Plutarch, Marcellus XXII. 2–4.
521 Zanker 1990, 183–186.
522 Trillmich 1988, 486, 514–516, kat. 340–344; Zanker 1990, 183–189, sl. 145–146, 148–149; Weisser 2009b.
523 Trillmich 1988, 486, 516, kat. 344). Trillmich (l. c.) razlaga orla kot legijski simbol, Jones (1990, 308) pa kot znak triumfa.
524 Künzl 1988a, 7, 93.
525 Unz 1972, 43–44, 47–48; Künzl 1996, 457, M29–30, t. 46: 4–5; Dahmen 2001, 209–210, Mil. 19–20, t. 208: Mil. 19).
526 Iz objave izhaja, da so zlitino ugotovili (s tehniko rentgenske fluorescenčne spektrometrije XRF) le pri enem medaljonu, čeprav sta tudi za drugi medaljon navedeni enaki zlitini (Unz 1972, 43–44, 47–48, skica 1).
527 Unz 1972, 47–48, skica 1.
528 Unz 1972, 47.
529 Giovannini 1998a; Dahmen 2001, 210.
530 Unz 1972, 44–45, sl. 3; Künzl 1996, 454, M6, t. 46: 1; Dahmen 2001, 210, Mil. 21. Za tenko »bronasto« plast na hrbtni strani (Unz, l. c.) se mi zdi verjetno, da je korozijski produkt (prim. Unz 1972, 43–44, 47–48).
531 Klumbach 1970, t. 8; Künzl 1996, 403, 455, M10, t. 45: 1, 46: 6; Roberts 2009; Dahmen 2001, 209, Mil 18, t. 208.
532 Klumbach 1970, 130. Navedel je mnenje B. F. Cooka iz raziskovalnega laboratorija Britanskega muzeja: »There is a brass leaf on the medallion which appears to have been repaired, probably in ancient times.«
533 Unz 1972.

A 'bronze' plate with a very similar relief depiction has been found at Aquileia.[529]

A slightly larger plate, measuring 49 mm in diameter, cast of lead with a similar relief depiction (bust of Augustus in profile with a laurel wreath and Victoria on a globe behind him) and a shank at the back was found in the channel connecting the Rivers Aare and Zihl in Switzerland.[530]

Another similar plate, measuring roughly 44 mm, with the relief depiction of either Augustus or Tiberius wearing a laurel wreath is attached to the front of the scabbard associated with the Sword of Tiberius found at Mainz.[531] Its publications describe neither how the plate is attached to the scabbard, nor the material it is made of, but Klumbach mentions that its surface is coated in brass foil.[532]

Unz considers that all the above medallions decorated sword scabbards,[533] which seems likely. Having said that, the traces of leather and wood on the back of the plate from *Vindonissa* are more probably related to its secondary rather than original use.

A small disc from Kalkriese, measuring 38 mm across, may also have been fitted on a scabbard. The plate is probably made of lead and was attached to a backing of copper alloy, while its front may have been silvered. The drawing and description suggest that it had either a shank or a loop at the back, but this is now missing.[534]

Kalkriese yielded another plate 38 mm in diameter, already mentioned, but thin and made of silver. It was probably made from a *denarius*[535] and shows an empty triumphal quadriga in relief that refers to the victory over the Parthians in 20 BC. Its context suggests it was fitted onto a sword scabbard.[536] There is no shank at the back and no visible traces of soldering,[537] hence the manner of fastening to the backing is unclear.

The I1 medallion from the Ljubljanica differs from most of the above in that it was soldered rather than riveted to the backing. This may also be the case for the silver plate from Kalkriese (made from a *denarius*), possibly even for the Sword of Tiberius (see above).

A further point of difference is that the bust of August on the I1 medallion is shown *en face* rather than in profile. This ties it to the glass medallions with relief portraits of the members of the Julio–Claudian imperial family. All the male members are shown facing forwards; the earliest is the Late Augustan depiction of Tiberius.[538] The rare glass medallions that survive together with their setting show they fitted into the sunken round 'bronze' setting with a flat bottom measuring 60 to 70 mm in diameter bearing a double loop at the back, which enabled attachment to leather straps. Two examples have the 'bronze' setting with a tin-lead alloy frame that also covers the edges of the glass medallion and thereby holds it in place (*Fig. 51*).[539] Such glass medallions were probably military decorations,[540] named *phalerae* in ancient texts and inscriptions on stone monuments.[541] The depictions and inscriptions on stone show that, during the Principate, they were conferred in sets, most frequently of nine, to soldiers with the rank of centurion or lower, that they were round and were worn attached to straps across the chest.[542]

A partially surviving object of cast 'bronze' measuring 77 mm in diameter, recovered from the old bed of the Rhine at Xanten (Germany; *Fig. 52*), was probably also a military decoration and is similar to the decorations with a glass medallion.[543]

The other rare archaeological finds that may be interpreted as *phalerae*,[544] as well as their depictions on stone reliefs,[545] frequently feature the heads or busts of lions, gods and goddesses, satyrs and gorgoneia.[546] They are made of 'bronze' or 'silvered bronze'. Ancient authors mention *phalerae* of either silver or gold; we can presume that cheaper materials were also used to replace the two precious metals.[547]

In summary, I presume that the image of the Emperor Augustus with triumphal symbols and a myrtle branch on the I1 medallion refers to the victory over the Parthians in 20 BC. The decorative motif has close parallels on contemporary coins and reveals imperial propaganda, which in turn reveals a connection with the army. A comparison with the glass medallions

529 Giovannini 1998a; Dahmen 2001, 210.
530 Unz 1972, 44–45, Fig. 3; Künzl 1996, 454, M6, Pl. 46: 1; Dahmen 2001, 210, Mil. 21. The thin 'bronze' layer at the back (Unz, l.c.) seems likely to be corrosion product (cf. Unz 1972, 43–44, 47–48).
531 Klumbach 1970, Pl. 8; Künzl 1996, 403, 455, M10, Pls. 45: 1, 46: 6; Roberts 2009; Dahmen 2001, 209, Mil 18, Pl. 208.
532 Klumbach 1970, 130 (he quotes B. F. Cook from the British Museum Research laboratory: "There is a brass leaf on the medallion which appears to have been repaired, probably in ancient times").
533 Unz 1972.
534 Künzl 1996, 454, M 5, Pl. 46: 2–3 (material determined as copper alloy); Dahmen 2001, 210–211, Mil. 22; Harnecker, Franzius 2008, 11, Pl. 12: 133 (material determined as lead, possibly with silvering on the front).
535 Cf. above (Trillmich 1988, 486, 516, Cat. No. 344).
536 Franzius 1999, 589, 591–595, 607, Figs. 14:1, 15, 16: 2.
537 Franzius 1999, 593.
538 Boschung 1987, 223, 228.
539 Boschung 1987, 199–203, Figs. 6–12.
540 Maxfield 1981, 92; Boschung 1987, 200–205.
541 Steiner 1906, 18.
542 Maxfield 1981, 92–95, 120–127.
543 Schreiter 1993, 55; von Detten, Schalles, Schreiter 1993, 226, Fig. 36, Pl. 47: Mil 81.
544 Boschung 1987, 202, Fn. 47.
545 Boschung 1987, 202, Fn. 48.
546 Steiner 1906, 21–22; Maxfield 1981, 92; Boschung 1987, 202–203;
547 Maxfield 1981, 94–95; von Detten, Schalles, Schreiter 1993, 226, Fig. 36, Pl. 47: Mil 81.

Figure. 52
Presumed military decoration from the old bed of the Rhine at Xanten (Germany). The 77 mm wide object is rather substantial and composed of a front part bearing relief decoration and a back part, of which only a small piece survives. The front has a round central panel with a relief bust of a cuirassed man in front view, of which only the lower third survives. This is surrounded by a roughly 13 mm wide strip with a laurel wreath in relief, which probably represents a *corona civica*, a military decoration. Scale 1 : 1. From von Detten, Schalles, Schreiter 1993, 226, Fig. 36, Pl. 47: Mil 81.

Slika 52
Domnevno vojaško odlikovanje iz starega toka Rena pri Xantnu (Nemčija). Predmet širine 77 mm je razmeroma masiven, sestavljen iz sprednjega dela z reliefnim okrasom in iz hrbtnega dela, od katerega je ohranjen le majhen del. V sredini sprednjega dela je krožno polje z ostanki reliefne podobe doprsja z oklepom v pogledu od spredaj (zgornji dve tretjini doprsja, vključno z glavo, nista ohranjeni). Obdaja ga približno 13 mm širok pas z reliefnim okrasom lovorjevega venca, ki verjetno ponazarja vojaško odlikovanje *corona civica*. Merilo 1 : 1. Po von Detten, Schalles, Schreiter 1993, 226, sl. 36, t. 47: Mil 81.

hrbtni strani ploščice iz *Vindonisse* verjetneje, da so povezane z drugotno kot s prvotno uporabo ploščice.

Na nožnico bi bila lahko nameščena tudi manjša krožna ploščica (premer 38 mm) iz Kalkrieseja. Verjetno je iz svinca, pritrjena je bila na podlago iz bakrove zlitine, njena sprednja stran pa je bila morda posrebrena. Glede na risbo in opis se zdi, da je imela na hrbtni strani trn ali zanko, ki pa sta odlomljena.[534]

Iz Kalkrieseja izvira tudi že omenjena tenka srebrna ploščica (premer 38 mm) z reliefno podobo praznega triumfalnega voza s četverovprego, ki je bila verjetno narejena iz denarija[535] in se nanaša na zmago nad Parti leta 20 pr. Kr. Najdiščne okoliščine nakazujejo, da je bila nameščena na nožnico meča.[536] Na hrbtni strani ni trna in zdi se, da tudi sledov spajkanja ne,[537] zato ni jasen način pritrditve na podlago.

Medaljon iz Ljubljanice se od večine naštetih primerjav razlikuje po tem, da na podlago ni bil prikovan, ampak prispajkan. Tak način pritrditve lahko domnevamo le pri srebrni (iz denarija narejeni) ploščici iz Kalkrieseja, pri t. i. Tiberijevi nožnici pa ni izključena (glej zgoraj).

Na medaljonu iz Ljubljanice je Avgustovo doprsje upodobljeno v pogledu od spredaj (*en face*), pri drugih naštetih primerjavah pa s strani. To ga povezuje s steklenimi medaljoni z reliefnimi portreti članov julijsko-klavdijske cesarske družine. Vsi moški predstavniki so upodobljeni v pogledu od spredaj; najstarejša je poznoavgustejska podoba Tiberija.[538] Redki stekleni medaljoni, ki so ohranjeni skupaj s podlago, kažejo, da so jih nameščali v poglobitve krožnih »bronastih« ploščic (premera 60 do 70 mm) s ploščatim nosilcem z dvojno zanko na hrbtni strani, ki je omogočila pritrditev na usnjene jermene. V dveh primerih ima »bronasta« podlaga na sprednji strani okvir iz zlitine kositra s svincem, ki prekriva tudi robove steklenega medaljona in ga tako pritrjuje na podlago (*sl. 51*).[539] Take ploščice s steklenimi medaljoni so bile verjetno vojaška odlikovanja,[540] za katera iz pisnih virov (tj. del antičnih piscev in napisov na kamnitih spomenikih) poznamo poimenovanje *phalerae*.[541] Upodobitve in napisi na kamnitih spomenikih kažejo, da so jih v času principata podeljevali v garniturah (najpogosteje po devet) vojakom od čina centurija navzdol, da so bile krožne oblike in da so jih nosili nameščene na jermene na prsih.[542]

Na odlikovanja s steklenimi medaljoni v sredini spominja delno ohranjen iz »brona« ulit predmet (premer 77 mm), verjetno vojaško odlikovanje, iz starega toka reke Ren pri Xantnu (Nemčija; *sl. 52*).[543]

Na ostalih, redkih arheoloških najdbah, ki jih lahko interpretiramo kot vojaška odlikovanja *phalerae*,[544] in njihovih upodobitvah na kamnitih spomenikih[545] so pogosti motivi figuralnih upodobitev glave oz. doprsja levov, bogov in boginj, Gorgon in satirjev.[546] Omenjene arheološke najdbe so iz »brona« ali »posrebrenega brona«. Antični pisci omenjajo, da so bile falere iz srebra ali zlata; domnevamo lahko, da so ti dve plemeniti kovini tudi posnemali s cenejšimi materiali.[547]

534 Künzl 1996, 454, M 5, t. 46: 2–3 (material opredeljen kot bakrova zlitina); Dahmen 2001, 210–211, Mil. 22; Harnecker, Franzius 2008, 11, t. 12: 133 (material je opredeljen kot svinec, morda s posrebritvijo lica).
535 Prim. zgoraj (Trillmich 1988, 486, 516, kat. 344).
536 Franzius 1999, 589, 591–595, 607, sl. 14:1, 15, 16: 2.
537 Franzius 1999, 593.
538 Boschung 1987, 223, 228.
539 Boschung 1987, 199–203, sl. 6–12.
540 Maxfield 1981, 92; Boschung 1987, 200–205.
541 Steiner 1906, 18.
542 Maxfield 1981, 92–95, 120–127.
543 Schreiter 1993, 55; von Detten, Schalles, Schreiter 1993, 226, sl. 36, t. 47: Mil 81.
544 Boschung 1987, 202, op. 47.
545 Boschung 1987, 202, op. 48.
546 Steiner 1906, 21–22; Maxfield 1981, 92; Boschung 1987, 202–203;
547 Maxfield 1981, 94–95; von Detten, Schalles, Schreiter 1993, 226, sl. 36, t. 47: Mil 81.

bearing busts of the members of the Julio–Claudian dynasty and with the 'bronze' *phalera* from the Rhine at Xanten (*Fig. 52*) suggests that the I1 medallion is the essential, central part of a military decoration, which would have been worn fastened to straps across the chest and usually awarded in sets that the ancient texts refer to as *phalerae*. The fact that the front of I1 was silvered, giving the impression of an item of solid silver, is in line with such an interpretation.

Moreover, a comparison with the *phalerae* with glass medallions and the *phalera* from the Rhine at Xanten indicates that I1 was fitted into a round backing of a slightly larger diameter, the front of which had a decorated metal cover that, like those on the *phalerae* with glass medallions, would have reached over the edge of the medallion, additionally fixing it to the backing. The back of I1 clearly shows it was soldered to a backing of an alloy either of pure tin or largely of tin, which ties it to the other presumed decoration from the Ljubljanica, the I2 torque.

Pliny's information on the prices of tin and lead objects suggest that tin-lead alloys were widely used in the Roman period and represented a cheap substitute for silver and its alloys. The price ratio between tin and lead was roughly 11 : 1 (a pound of tin cost 80 *denarii*, a pound of lead cost 7), hence adding lead considerably cheapened the alloy. As cheaper substitutes for tin, Pliny states a tin-lead alloy in the ratio of 1 : 2 (*tertiarium*) and 1: 1 or 2 : 1 (*argentarium*). He informs us that *tertiarium* fetched 20 denarii a pound (*libra*, 327.45g[548]), while *argentarium* cost 70 denarii a pound.[549]

The I1 medallion is of a tin-lead alloy roughly in the ratio of 2 : 1, which corresponds with *argentarium*. In addition to the relatively low price, compared to silver, this alloy was suitable for casting.[550] Silvering the front was aimed at giving the impression of solid silver. The fact that the more expensive of the tin-lead alloys was used (an alloy in the 1 : 1 or 1 : 2 ratio would have been cheaper), corresponds with the quality of the relief and indicates an object of medium quality.

12.2 Torque (I2)

The I2 artefact (*Pl. 20; Fig. I2*) is reminiscent of Celtic[551] and Thracian[552] torques in form, but not in size (length 125 mm, width 92 mm), being too small to be worn round the neck.

Its bird-head terminals suggest a Roman date, as similar terminals adorn the handles of bronze cooking-pans produced in the last two decades BC and first two or three decades AD in Campania,[553] and exported, even to distant markets.[554]

It is made of an alloy with roughly 98% tin and 2% copper, while lead is only present in trace amounts.[555] A comparison with the few published data on the elemental composition of Roman and prehistoric objects of tin or alloys with a strong predominance of tin[556] shows that such objects are rare; when the material is an alloy, the second element is usually lead.[557] Tin alloy with low copper content (1–5%) has been established in very rare artefacts.[558] Analyses have revealed tin without intentional additions in ingots, some from the Roman period,[559] but also earlier ones going back to the Bronze Age.[560] Roman ingots were also of alloys with various shares of lead.[561]

A document dated to 1348 suggests that a tin alloy with 1–3% copper was the better quality of two tin alloys commonly used in medieval England to make pots. The few published analyses of medieval items suggest that very different tin alloys were in use, usually with the addition of bismuth or antimony from the 17th or 18th centuries onwards.[562]

Given the above, the I2 elemental composition does not speak against a Roman date, though I was unable to find any Roman object of a similar alloy of tin, a few percent of copper and less than 0.1% lead. A comparison with Roman ingots suggests that I2 was made of a pure tin ingot, with a small amount of added copper. Such an alloy is considerably harder than pure tin that is extremely soft and malleable.[563] An object made of such an alloy, as indeed of pure tin, could be polished to high lustre, giving an appearance very similar to that of silver.

The size of I2 and the possible Roman date led me to compare it with *torques*, i.e. the military decorations

548 Hultsch 1971, 161.
549 Plinius, N.h. 34.48.17; Beagrie 1989, 170–171, 173–174.
550 Dobršek 2003; see Ch. 16, I1.
551 Beck, Chew 1991, 69; Vercingétorix et Alésia 1994, 25–27, 111, 114–116, 172–174, Cat. Nos. 111, 119–123, 171–174). One statuette of a divinity wearing a twisted Celtic torque was also found in the Ljubljanica (Istenič 2001; Istenič 2002).
552 Ruseva–Slokoska 1991, 36–37.
553 Petrovszky 1993, 30–35,160, 281–282, Pl. 1: II,1a, II,2, Pl. 11: C.20.03, C.20.04, Pl. 16: E.03.01, Pl. 22: N.15.03, Pl. 23: P.03.01, Pl. 30: Y.22, Pl. 31: Y.38.
554 Istenič 2009h, Cat. No. 55.
555 See Ch. 16, I2.
556 Tylecote 1986, 47–50, Table 28; Northover, Gillis 1999, 78–79 (with references); Beagrie 1989, 171–172.
557 Tylecote 1986, 40, Table 28 (two Roman objects which contain 1.23% and 1.40% copper, respectively, as well as just over 4% lead); Beagrie 1989, 171.
558 Beagrie 1989, 171; Tylecote 1986, 47–50, Table 50.
559 Colls et al. 1975, 83–84, 94; Beagrie 1989, 173.
560 Wang et al. 2016 (with references). Numerous tin ingots are not dated (e.g. Fox 1996; Paynter 2003).
561 Tylecote 1986, 50, Table 28; Paynter 2003.
562 Beagrie 1989, 169.
563 Cf. Beagrie 1989, 169, 171, 175.

Sklenem torej lahko, da je podoba cesarja Avgusta s triumfalnimi znaki in mirtino vejico na ploščici I1 najverjetneje povezana z zmago nad Parti leta 20 pr. Kr. Motiv okrasa ima dobre primerjave med sočasnimi novci in izraža ozko povezavo s cesarsko propagando, kar nakazuje povezavo z vojaškim okoljem. Primerjava s steklenimi medaljoni, na katerih so upodobljena doprsja članov julijsko-klavdijske dinastije, in z »bronasto« falero iz Rena pri Xantnu (*sl. 52*) me navaja k domnevi, da je ploščica I1 bistveni osrednji del (medaljon) vojaškega odlikovanja, ki so ga nosili na jermenju na prsih in običajno podeljevali v kompletih, za katere iz pisnih virov poznamo ime *phalerae*. S tako interpretacijo se ujema dejstvo, da je bil predmet I1 na sprednji strani posrebren in je tako dajal videz masivnega srebrnega predmeta.

Primerjava s falerami, ki so imele steklene medaljone, in s falero iz Rena pri Xantnu poleg tega nakazuje, da je bil medaljon I1 pritrjen na krožno podlago, ki je imela večji premer kot medaljon, in da je bila na sprednji strani podlaga okoli sredinskega medaljona prekrita z okrašeno kovinsko prevleko, ki je (tako kot pri falerah s steklenimi medaljoni) verjetno prekrivala tudi rob medaljona I1 in ga tako dodatno pritrjevala na podlago. Hrbtna stran medaljona I1 namreč jasno kaže, da je bila pritaljena na podlago iz zlitine, v kateri je prevladoval kositer (oz. iz čistega kositra), kar jo povezuje z drugim domnevnim odlikovanjem iz Ljubljanice, tj. predmetom I2.

Iz Plinijevih navedb o cenah kositra in svinca izhaja, da so bile zlitine kositra s svincem v rimski dobi široko v uporabi in da so bile cenen nadomestek srebra in njegovih zlitin. Razmerje med ceno kositra in svinca je bilo približno 11 : 1 (funt kositra je stal 80 denarijev, funt svinca pa 7), zato je dodajanje svinca zlitino močno pocenilo. Plinij kot cenejše nadomestke kositra navaja zlitino kositra in svinca v razmerju 1 : 2 (*tertiarium*) oziroma v razmerju 1 : 1 in 2 : 1 (*argentarium*). Za *tertiarium* omenja ceno 20 denarijev za funt (*libra*, 327,45 g[548]), za *argentarium* pa 70 denarijev za funt.[549]

Medaljon I1 je iz zlitine kositra in svinca, ki sta približno v razmerju 2 : 1, in torej ustreza zlitini, ki so jo imenovali *argentarium*. Poleg razmeroma nizke cene je bila ugodna zaradi dobrih lastnosti za ulivanje.[550] Posrebritev sprednje strani jasno kaže, da so skušali doseči vtis srebrnega predmeta. Dejstvo, da so med kositrno-svinčevimi zlitinami izbrali dražjo (zlitina v razmerju 1 : 1 ali 1 : 2 bi bila cenejša), se sklada s kakovostjo reliefa in nakazuje, da gre za predmet srednje kvalitete.

548 Hultsch 1971, 161.
549 Plinij, n. h. 34.48.17; Beagrie 1989, 170–171, 173–174.
550 Dobršek 2003; glej pogl. 16, I1.

12.2 Torkves (I2)

Predmet I2 (*t. 20; sl. I2*) spominja na keltske[551] in tračanske[552] ovratnice, ki pa jim ne ustreza po velikosti (dolžina 125 mm, širina 92 mm), saj je premajhen za nošnjo okoli vratu.

Zaključka v obliki ptičjih glavic na predmetu I2 nakazujeta datiranje v rimsko dobo. Podobna sta namreč okrasu zaključkov ročajev bronastih korcev, ki so jih v zadnjih dveh desetletij pr. Kr. in prvih dveh do treh desetletjih po Kr. izdelovali v Kampanji[553] in izvažali tudi na oddaljena tržišča.[554]

Predmet I2 je iz zlitine, ki vsebuje približno 98 % kositra in okoli 2 % bakra, svinec pa le v sledovih.[555] Primerjava z zelo redkimi objavljenimi podatki o elementni sestavi rimskih in prazgodovinskih predmetov iz kositra ali zlitin, v katerih kositer močno prevladuje,[556] pokaže da so predmeti z deležem kositra nad 95 % redki. Če so iz zlitine, je drugi element v zlitini svinec.[557] Majhne količine bakra (1–5 %) so ugotovili pri zelo redkih predmetih.[558] Iz kositra brez namernih dodatkov so ingoti, med katerimi so zanesljivo rimski primerki,[559] najstarejši pa so iz bronaste dobe.[560] Rimski ingoti so lahko tudi iz zlitine kositra z različno visokimi deleži svinca.[561]

Iz pisnega vira iz leta 1348 bi lahko sklepali, da je bila zlitina kositra z 1–3 % bakra v Angliji v srednjem veku ena (kvalitetnejša) od dveh kositrovih zlitin, ki sta bili običajni za izdelavo posod. Redke objavljene analize srednjeveških predmetov pa kažejo, da so uporabljali zelo različne kositrove zlitine, ki so jim od 17. oziroma 18. st. običajno dodajali bizmut ali antimon.[562]

Elementna sestava zlitine predmeta I2 torej ne govori proti dataciji v rimsko dobo, čeprav nisem našla rimskega predmeta enake ali podobne sestave, tj. iz zlitine kositra s par odstotki bakra in z manj kot 0,1 % svinca. Primerjava z rimskimi ingoti nakazuje, da so predmet

551 Beck, Chew 1991, 69; Vercingétorix et Alésia 1994, 25–27, 111, 114–116, 172–174, kat. 111, 119–123, 171–174). Kipec božanstva s tordirano keltsko ovratnico je bil med drugim najden v reki Ljubljanici (Istenič 2001; Istenič 2002).
552 Ruseva-Slokoska 1991, 36–37.
553 Petrovszky 1993, 30–35,160, 281–282, t. 1: II,1a, II,2, t. 11: C.20.03, C.20.04, t. 16: E.03.01, t. 22: N.15.03, t. 23: P.03.01, t. 30: Y.22, t. 31: Y.38.
554 Istenič 2009g, kat. 55.
555 Glej pogl. 16, I2.
556 Tylecote 1986, 47–50, pregl. 28; Northover, Gillis 1999, 78–79 (z navedeno lit.); Beagrie 1989, 171–172.
557 Tylecote 1986, 40, pregl. 28 (dva rimska predmeta z 1,23 % oz. 1,40 % Cu in malo več kot 4 % svinca); Beagrie 1989, 171.
558 Beagrie 1989, 171; Tylecote 1986, 47–50, pregl. 50.
559 Colls et al. 1975, 83–84, 94; Beagrie 1989, 173.
560 Wang et al. 2016 (z navedeno lit.). Številnih kositrovih ingotov ni mogoče datirati (npr. Fox 1996; Paynter 2003).
561 Tylecote 1986, 50, pregl. 28; Paynter 2003.
562 Beagrie 1989, 169.

depicted relatively often on Roman stone reliefs and mentioned in Roman texts.[564] In its form, I2 also corresponds with an *armilla*, a decoration worn on the wrist,[565] but is considerably larger.

Roman *torques* as military decorations probably developed from the torques seized from defeated opponents.[566] The Celts and other 'barbarian' peoples considered them symbols of warriors and dignitaries, as well as ornaments of divinities.[567] The gold torque weighing 100 Roman pounds (almost 33 kilograms[568]) that the Cisalpine Gauls offered to the Emperor Augustus should probably be interpreted along these lines.[569]

The stone monuments with relief depictions of torques date to the Augustan period and later.[570] From the Augustan period onwards, the torque was a lesser military decoration awarded, like *armillae* and *phalerae*, to individual Roman citizens up to the rank of centurion, as well as to army units.[571]

The representational evidence comes with certain limitations, as the appearance of the torques on the Roman reliefs depends on the mason's skills and the fact that details were probably painted rather than carved. This notwithstanding, it does suggest that the torques were all round, but differed in more detailed shape, being twisted, plain, decorated, undecorated and so forth. They were usually penannular, without an apparent clasping mechanism and with thickened terminals possibly in the shape of animal heads.[572]

Of particular interest in connection with I2 are the twisted examples. These are depicted on a slab of a tomb from Mérida (Spain),[573] dating to the Augustan period or the early 1st century AD, on a centurion's tombstone from Burnum (Croatia),[574] the tombstone of a soldier from Narona (Croatia),[575] a stela from Philippi (Greece) erected for Tiberius Claudius Maximus, who was decorated during the Dacian Wars under the reigns of Domitian and Trajan,[576] the stela of Gaius Gavius Celer from the Flavian period,[577] the stela of Quintus Sertorius Festus from Verona[578] and on the side of the funerary monument erected in Rome in honour of Quintus Sulpicius Celsus (Early Flavian period).[579] All but the last show a pair of twisted torques. These are mainly penannular with thickened terminals,[580] some in the shape of animal heads;[581] rare ones are annular[582] or not clearly visible.[583] The I2 from the Ljubljanica is comparable with these in its basic form, but not in details such as the shape and decoration of the terminals. Moreover, I2 appears rather slender in comparison with the relief depictions on stone, though these may be exaggerated to emphasise their importance.

In addition to representational, there is also archaeological evidence that may be related to torques as Roman military decorations.

Half of a bronze round-sectioned torque from Alesia survives with a part of a hinge and a discoid terminal that probably had an ornament soldered onto it. Its size with an internal diameter of around 139 mm[584] indicates it was meant to be worn round the neck. The archaeological context is unclear as to whether the item is Celtic or Roman.

The grave of a cavalryman buried in the Claudian period at Chassenard (France) contained, among other goods, a gilded and rectangular-sectioned torque of copper alloy. Its size (external diameter 170 mm, internal ca. 140 mm) and the closing mechanism indicate it was worn round the neck.[585] It seems likely that the torque belonged to a Celtic dignitary and cavalryman, although we cannot exclude the possibility of it representing a Roman military decoration as the man served in the Roman army under Tiberius.[586]

Deschler-Erb[587] attributes the fragment of a simple round-sectioned torque, presumably made of gilded brass and unearthed in an Augustan layer at Basel (Switzerland), to a cavalryman of Celtic descent serving in an auxiliary unit; its diameter indicates it was worn round the neck.[588]

564 Steiner 1906, 47–73; Maxfield 1981, 86–89, 262–272, Figs. 9, 10, Pls. 2a–c, 5c, 6a–b, 8a, 9a, c, 10a, b, 11a–c, 12a, b, 13a–c, 14b–c; Keppie 1997, 7–8, Fig. 5.
565 Steiner 1906, 23, 26–29; Maxfield 1981, 89–91, Figs. 9, 10, Pls. 2a, c, 6a–c, 7b, 8a, 9a, 10a, 11a, b, 12a, b, 13a–c, 14b.
566 Maxfield 1981, 86, 87; Schuppe 1937, 1803, 1804.
567 Schuppe 1937, 1801; Beck, Chew 1991, 69; Grüßinger 2009; Guštin 2009, 484.
568 Cf. Hultsch 1971, 161.
569 Schuppe 1937, 1802.
570 Maxfield 1981, 88–89, 123, Fig. 13, Pls. 2a–c, 5c?, 6a–c, 8a, 8c?, 9a–c, 10a, b, 11a–c, 12a, b, 13a–c, 14b–c; Keppie 1997, 7–8, Fig. 5.
571 Maxfield 1981, 87–88, 200–226.
572 Steiner 1906, 24, 25; Maxfield 1981, 88–89, Fig. 9, Pls. 2a–c, 5c, 6a–b, 7c, 8a, 9a–c, 10a, b, 11a, b, 12a, b, 13a–c, 14b–c; Keppie 1997, 6–8, Figs. 4, 5.
573 Keppie 1997, 7–8, Fig. 5.
574 Steiner 1906, Pl. 2: 4; Maxfield 1981, Pl. 11b.
575 Maxfield 1981, Pl. 12b; CIL III 8438; ILS 2597.
576 Maxfield 1981, Pl. 8a.
577 Maxfield 1981, Pl. 6b.
578 Steiner 1906, Fig. 13; Maxfield 1981, Pl. 2b; CIL V 3374.
579 Maxfield 1981, Pl. 5c; EDR 121476.
580 Maxfield 1981, Pls. 6b, 8a; Keppie 1997, 7–8, Fig. 5.
581 Maxfield 1981, Pls. 5c, 11b.
582 On the tombstones of Q. Sulpicius Celsus (Maxfield 1981, 5c) and Q. Sertorius Festus, where the torques taper towards the terminals (Steiner 1906, Fig. 13).
583 Maxfield 1981, 12b.
584 Brouquier-Reddé, Deyber 2001, 300, Pl. 93: 75.
585 Beck, Chew 1991, 68–69, Cat. No. 33.
586 In contrast, Beck and Chew (1991, 69) believe it was more likely a decoration.
587 Deschler-Erb 2011, 244.
588 Ohnsorg 2004, 64–68, Pl. 11: 2510.

naredili iz čistega kositra (tj. iz ingota), ki so mu dodali malo bakra. Taka zlitina je bila bistveno trša kot čisti kositer, ki je izrazito mehak in plastičen.[563] Obenem je bilo predmet iz take zlitine, tako kot iz čistega kositra, mogoče spolirati do visokega sijaja; izgled kositrnega predmeta je bil tako zelo podoben predmetu iz srebra.

Velikost predmeta I2 in utemeljena domneva, da je iz rimske dobe, sta me vodili k primerjavi s torkvesi, tj. vojaškimi odlikovanji, ki so na razmeroma številnih rimskih kamnitih spomenikih upodobljeni in/ali omenjeni v besedilu.[564] Predmet I2 bi po obliki lahko ustrezal tudi armili, tj. odlikovanju, ki so ga nosili na zapestju,[565] vendar je za to prevelik.

Rimsko odlikovanje torkves se je najverjetneje razvilo iz zaplenjenih ovratnic, ki so jih Rimljani odvzeli premaganim nasprotnikom.[566] Pri Keltih in drugih »barbarih« so bile namreč ovratnice simbol vojščakov in odličnikov ter okras božanstev.[567] Tako je treba verjetno razumeti 100 rimskih funtov (tj. skoraj 33 kilogramov[568]) težak zlat torkves, ki so ga cesarju Avgustu podarili cisalpinski Galci.[569]

Kamniti spomeniki z upodobljenimi torkvesi so iz avgustejske dobe ali mlajši.[570] Od vključno avgustejske dobe je bil torkves manjše vojaško odlikovanje, ki so ga, tako kot armile in falere, praviloma podeljevali rimskim državljanom (posameznikom) do vključno čina centurija in vojaškim enotam.[571]

Na izgled rimskih odlikovanj torkvesov na rimskih kamnitih spomenikih sta vplivala klesarjeva spretnost in dejstvo, da so bile podrobnosti lahko upodobljene s poslikavo. Kljub tem omejitvam iz ohranjenih upodobitev izhaja, da so se torkvesi precej razlikovali (npr. tordirani, gladki, okrašeni, neokrašeni). Njihova skupna značilnost je krožna oblika. Običajno so nesklenjeni in brez očitnega sistema zapiranja ter z odebeljenima zaključkoma, ki imata lahko obliko živalskih glavic.[572]

Tordirani torkvesi, ki me zaradi primerjave s predmetom I2 posebej zanimajo, so upodobljeni npr. na plošči grobnice (verjetno iz avgustejske dobe ali začetka 1. st.) iz Méride (Španija),[573] na nagrobniku centurija iz Burnuma (Hrvaška),[574] nagrobniku vojaka iz Narone (Hrvaška),[575] na steli Tiberija Klavdija Maksima iz Filipov (Grčija), ki so ga odlikovali med dačanskimi vojnami v času Domicijana in Trajana,[576] na steli Gaja Gavija Celerja iz flavijske dobe,[577] na steli Kvinta Sertorija Festa iz Verone[578] in na nagrobnem spomeniku, ki so ga v Rimu postavili Kvintu Sulpiciju Celsu (zgodnjeflavijska doba).[579] Na vseh teh upodobitvah, razen na zadnji, nastopata dva (par) tordirana torkvesa. Torkvesi običajno niso sklenjeni in imajo odebeljena zaključka,[580] lahko v obliki živalskih glavic;[581] redki torkvesi so sklenjeni[582] oz. niso dobro vidni.[583] Primerek iz Ljubljanice je tem upodobitvam podoben po osnovni obliki, ne pa po podrobnostih, kot sta oblika in okras zaključkov. Poleg tega se zdi v primerjavi z upodobitvami gracilen, kar pa je lahko posledica poudarjanja odlikovanj na kamnitih spomenikih.

Med objavljenim arheološkim gradivom je več predmetov, ki jih v zvezi z rimskim odlikovanjem torkves kaže omeniti.

Iz Alezije poznamo pol bronastega torkvesa okroglega preseka, z delom tečaja in z diskoidnim zaključkom, na katerega je bil verjetno prispajkan okras. Velikost (notranji premer okoli 139 mm)[584] nakazuje, da je bil namenjen nošnji okoli vratu. Iz konteksta ni jasno, ali gre za keltski ali rimski predmet.

Iz groba konjenika, ki je bil pokopan v Klavdijevi dobi na najdišču Chassenard (Francija), izvira pozlačena razklenjena ovratnica iz bakrove zlitine, s pravokotnim presekom. Velikost (zunanji premer 170 mm, notranji ok. 140 mm) in zapiralo nakazujeta, da je konjenik ovratnico nosil okoli vratu.[585] Zdi se verjetno, da je bil torkves v tem primeru znak keltskega odličnika in bojevnika v rimski vojski Tiberijeve dobe, čeprav ni izključeno, da je bil vojaško odlikovanje.[586]

563 Prim. Beagrie 1989, 169, 171, 175.
564 Steiner 1906, 47–73; Maxfield 1981, 86–89, 262–272, sl. 9, 10, t. 2a–c, 5c, 6a–b, 8a, 9a, c, 10a, b, 11a–c, 12a, b, 13a–c, 14b–c; Keppie 1997, 7–8, sl. 5.
565 Steiner 1906, 23, 26–29; Maxfield 1981, 89–91, sl. 9, 10, t. 2a, c, 6a–c, 7b, 8a, 9a, 10a, 11a, b, 12a, b, 13a–c, 14b.
566 Maxfield 1981, 86, 87; Schuppe 1937, 1803, 1804.
567 Schuppe 1937, 1801; Beck, Chew 1991, 69; Grüßinger 2009; Guštin 2009, 484.
568 Prim. Hultsch 1971, 161.
569 Schuppe 1937, 1802.
570 Maxfield 1981, 88–89, 123, sl. 13, t. 2a–c, 5c?, 6a–c, 8a, 8c?, 9a–c, 10a, b, 11a–c, 12a, b, 13a–c, 14b–c; Keppie 1997, 7–8, sl. 5.
571 Maxfield 1981, 87–88, 200–226.
572 Steiner 1906, 24, 25; Maxfield 1981, 88–89, sl. 9, t. 2a–c, 5c, 6a–b, 7c, 8a, 9a–c, 10a, b, 11a, b, 12a, b, 13a–c, 14b–c; Keppie 1997, 6–8, sl. 4, 5.
573 Keppie 1997, 7–8, sl. 5.
574 Steiner 1906, t. 2: 4; Maxfield 1981, t. 11b.
575 Maxfield 1981, t. 12b; CIL III 8438; ILS 2597.
576 Maxfield 1981, t. 8a.
577 Maxfield 1981, t. 6b.
578 Steiner 1906, sl. 13; Maxfield 1981, t. 2b; CIL V 3374.
579 Maxfield 1981, t. 5c; EDR 121476.
580 Maxfield 1981, t. 6b, 8a; Keppie 1997, 7–8, sl. 5.
581 Maxfield 1981, t. 5c, 11b.
582 Na nagrobniku Kv. Sulpicija Celsa (Maxfield 1981, 5c) in na steli Kv. Sertorija Festa, kjer se torkvesa proti zaključkoma zožita (Steiner 1906, sl. 13).
583 Maxfield 1981, 12b.
584 Brouquier-Reddé, Deyber 2001, 300, t. 93: 75.
585 Beck, Chew 1991, 68–69, kat. 33.
586 Nasprotno Beck in Chew (1991, 69) menita, da gre bolj verjetno za odlikovanje.

Roughly half of a presumably hollow and penannular torque of tinned copper alloy with thickened terminals in the shape of lion's heads was found in the vicus of the fort at Dambach (Germany) and may originally have been hinged. Its size (147 × 153 mm; thickness ca. 15 mm; interior measurements ca. 117 × 123 mm) indicates it was worn round the neck. The context points to the late 2nd or the first half of the 3rd century.[589] The terminal of a similar item was found in the fort at Aalen (Germany).[590]

Half of a presumably two-piece torque, measuring around 245 mm in diameter and dated to the 2nd or the first third of the 3rd century, has been found in the villa at Treuchtlingen-Weibergshof (Germany). It is of gilded sheet bronze (thickness ca. 1 mm), narrow at one end and widening towards the other end where it terminates in a lion's head. The torque bears relief decoration that probably represents Hercules' weapon (club) and trophy (Nemean lion) as symbols of heroic deeds.[591] Its size indicates it was worn round the neck. Among funerary depictions, it closely resembles the pair of torques under the collarbone of centurion Marcus Caelius who died in the Teutoburg Forest and is depicted on a cenotaph from Xanten.[592]

The silver torques from Tsenovo (Bulgaria) form part of a hoard together with 1200 coins and other artefacts buried in the mid-3rd century; it may have belonged to a soldier.[593]

An excellently preserved copper alloy torque with thickened terminals and a hinge was found at Magdalensberg, in a layer dated from the mid-1st century to around 20 BC. Given its size (internal measurements ca. 111 × 96 mm), the torque seems too small to be worn round the neck in spite of the hinge.

Half of a hollow bronze artefact with an animal-head terminal has been discovered in the alluvial gravel of the River Inn in the vicinity of Pfaffenhofen am Inn (Germany) and may also represent part of a torque.[594] Its interior diameter (ca. 80 × 120 mm) suggests it could not be worn round the neck.

The size of most of the objects listed above suggests they were worn round the neck with the exception of those from Magdalensberg and the Inn at Pfaffenhofen, which seem too small for such use and may represent the Roman *torques* attached below the collarbones.

As for documentary evidence, Roman texts mention gold and silver torques.[595]

To sum up, the bird-head terminals on I2 hint at a Roman dating, even more narrowly the Augustan or (Early) Tiberian period. Its size and the depictions on funerary monuments suggest it can be seen as a *torques*, a Roman military decoration usually awarded in pairs and worn below the collarbones. The use of almost pure tin indicates that I2 was made of a pure tin ingot. The alloy served to imitate the considerably more valuable silver, which corresponds with the silver torques mentioned by ancient authors, while the addition of copper served to harden the artefact.

A systematic examination of the elemental composition of the metal objects from the Roman period would reveal whether there are other objects of tin with a few percent of copper and without lead, which would strongly support the Roman date for the I2 torque. As things stand, the absence of detailed analyses makes it very difficult to distinguish between objects of silver, tin or their alloys.[596] The results of such analyses would shed some light onto the question of whether the use of pure or almost pure tin was as rare in the Roman period as suggested by currently published data. In connection with that, it would also be necessary to study the stability of (almost) pure tin in different natural conditions.[597] Metallic tin is only stable above 13° C. At temperatures below this the form of tin which is stable is a non-metallic grey-brown material which usually exists as powder. Tin is the only common metal which undergoes such a drastic change as a transformation from a metal to a non-metal form at normal temperatures. Also open is the question of the degree of decomposition affecting tin objects when exposed to temperatures below 13° C.[598]

The excellent state of preservation and the absence of patina on I2 is probably related to the natural conditions on the bottom of the Ljubljanica, where it presumably lay for the last 2000 years.[599]

589 Garbsch 1986, 334–336, Fig. 2: 1, Pl. 15: 1.
590 Garbsch 1986, 334–335, Fig. 2: 2.
591 Grabert, Koch 1986, 325–330, Fig. 2.
592 Schalles, Willer 2009, 27, 84.
593 Ruseva–Slokoska 1991, 37, 135, 136, Cat. Nos. 86–87. Genčeva (1996) sees them as military decorations.
594 Czysz 1976, 104–105, Fig. 42: 1; Garbsch 1986, 334–336, Fig. 1.
595 Maxfield 1981, 88, 95, 127; CIL II, 00115 and p. 805 (= EDCS-05500125).
596 La Niece 1993, 201.
597 The tin ingots recovered from the Bronze Age Cape Gelidonya shipwreck off the southern coast of Turkey have turned to powdery tin oxide through the electrolysis between copper and tin ingots (Bass 1967, 52, 82, 83).
598 Tylecote 1986, 49–53.
599 Cf. Beagrie 1989, 176.

S konjenikom keltskega izvora, ki je služil v pomožni enoti, Deschler-Erb[587] povezuje odlomek enostavnega torkvesa okroglega preseka (domnevno iz pozlačene medenine) iz avgustejske plasti v Baslu (Švica); njegov premer nakazuje, da so ga nosili okoli vratu.[588]

Približno pol domnevnega votlega in nesklenjenega torkvesa iz pokositrene bakrove zlitine z odebeljenima zaključkoma v obliki levjih glavic je lahko del ovratnice, ki je morda imela tečaj. Izvira iz vikusa kastela Dambach (Nemčija). Mere (147 × 153 mm; debelina okoli 15 mm; notranje mere okoli 117 × 123 mm) kažejo na nošnjo okoli vratu. Najdiščne okoliščine govorijo za datacijo v konec 2. ali prvo polovico 3. st.[589] Zaključek podobnega predmeta je bil najden v kastelu Aalen (Nemčija).[590]

Polovica domnevne dvodelne ovratnice (premer okoli 245 mm) iz vile rustike v Treuchtlingen-Weibergshof (Nemčija), ki je datirana v 2. st. ali prvo tretjino 3. st., je iz pozlačene bronaste pločevine (debelina okoli 1 mm) in je na eni strani ozka ter se širi proti drugemu koncu, kjer se zaključi v obliki levje glave. Površina je reliefno okrašena. Verjetno ponazarja Herkulovo orožje (kij) in trofejo (nemejski lev), kar se zdi primerno kot simbol junaštva.[591] Velikost nakazuje nošnjo okoli vratu. Med upodobitvami na nagrobnikih ima odlično primerjavo v paru torkvesov pod ključnicama centurija Marka Celija, ki je umrl v Tevtoburškem gozdu in je upodobljen na kenotafu iz Xantna.[592]

Depo iz Tsenova (Bolgarija), ki je poleg že omenjenih srebrnih torkvesov med drugim vseboval 1200 novcev in je bil zakopan v sredini 3. st., je morda pripadal vojaku.[593]

Odlično ohranjen torkves iz bakrove zlitine, z odebeljenima zaključkoma in tečajem za zapiranje, je bil najden na Štalenski gori, v plasti iz sredine 1. st. do okoli 20 pr. Kr. Glede na velikost (notranje mere okoli 111 × 96 mm) se zdi, da je kljub tečaju premajhen za nošenje okoli vratu.

Polovica votlega bronastega predmeta z zaključkom v obliki živalske glave izvira iz naplavljenega proda reke Inn v okolici Pfaffenhofna (Nemčija) in je morda del torkvesa.[594] Glede na notranji premer (okoli 80 × 120 mm) ga ni bilo mogoče nositi okoli vratu.

Med naštetimi primerki pri večini velikost nakazuje, da so jih nosili okoli vratu, le torkvesa s Štalenske gore in iz reke Inn v okolici Pfaffenhofna se zdita za tako rabo premajhna in morda ustrezata rimskemu odlikovanju *torques*, ki so ga nosili pripetega pod ključnicama.

Rimski pisni viri omenjajo zlate in srebrne torkvese.[595]

Strnem lahko, da pri predmetu I2 zaključka v obliki ptičjih glavic nakazujeta datacijo v rimski čas oziroma ožje, v avgustejsko ali (zgodnje)tiberijsko dobo. Primerjava z upodobitvami na nagrobnikih in velikost predmeta dovoljujeta domnevo, da je ta predmet rimsko vojaško odlikovanje *torques*, ki so ga običajno podeljevali v paru in nosili pod ključnicama. Uporaba skoraj čistega kositra nakazuje, da je bila surovina za izdelavo predmeta I2 ingot iz čistega kositra. Z uporabljeno zlitino so posnemali dosti dragocenejše srebro, kar se ujema z omembo srebrnih torkvesov pri antičnih piscih. Z dodanim bakrom so dosegli večjo trdoto predmeta.

Sistematično ugotavljanje elementne sestave kovinskih predmetov rimske dobe bi pokazalo, ali obstajajo drugi rimski predmeti iz zlitine kositra s par odstotki bakra in brez svinca, ki bi bili potrditev datacije predmeta I2 v rimsko dobo. Razlikovanje predmetov iz srebra in kositra oziroma njunih zlitin je namreč brez ustreznih analiz težko.[596] Rezultati takih raziskav bi delno osvetlili vprašanje, ali je uporaba (skoraj) čistega kositra v rimski dobi tako zelo redka, kot izhaja iz doslej objavljenih podatkov. S tem v zvezi bi bilo treba raziskati obstojnost predmetov iz (skoraj) čistega kositra v različnih (naravnih) okoljih.[597] Kositer v kovinski obliki je namreč precej nagnjen k vrnitvi v prvotno stanje, to je v nekovinsko snov, ki je običajno v obliki prahu. Brez odgovora ostaja npr. vprašanje stopnje korozije kositrnih predmetov pri izpostavljenosti nizkim temperaturam, saj je kovinski kositer stabilen pri temperaturah nad 13 °C.[598]

Izjemno dobra ohranjenost in odsotnost patine pri predmetu I2 je verjetno povezana z naravnim okoljem na dnu Ljubljanice, v katerem je bil predmet verjetno okoli 2000 let.[599]

587 Deschler-Erb 2011, 244.
588 Ohnsorg 2004, 64–68, t. 11: 2510.
589 Garbsch 1986, 334–336, sl. 2: 1, t. 15: 1.
590 Garbsch 1986, 334–335, sl. 2: 2.
591 Grabert, Koch 1986, 325–330, sl. 2.
592 Schalles, Willer 2009, 27, 84.
593 Ruseva-Slokoska 1991, 37, 135, 136, kat. 86–87. Genčeva (1996) meni, da sta vojaški odlikovanji.
594 Czysz 1976, 104–105, sl. 42: 1; Garbsch 1986, 334–336, sl. 1.
595 Maxfield 1981, 88, 95, 127; CIL II, 00115 in str. 805 (= EDCS-05500125).
596 La Niece 1993, 201.
597 Kositrni ingoti z bronastodobnega potopa pri polotoku Gelidonya na južni obali Turčije so se zaradi elektrolize, ki je potekla med bakrenimi in kositrenimi ingoti, spremenili v kositrov oksid, ki je prah (Bass 1967, 52, 82, 83).
598 Tylecote 1986, 49–53.
599 Prim. Beagrie 1989, 176.

13
Tent pegs

Iron pegs with a loop or a hole through which a ring is passed usually occur at sites connected with the Roman army. They were used to secure in place tents and other items.[600]

There are two basic forms of iron pegs. The more common one has a symmetrical hole below a usually tapering upper end with a flat top and a ring passed through the hole (e.g. J1, MM J3, MM J4; *Pl. 18: J1; Fig. J1; Fig. 53:* MM J3, MM J4). The second form is characterised by a loop positioned asymmetrically on one side at or just below the top and made by hammering it from the top of the peg and rolled downwards (e.g. MM J2, MM J5; *Fig. 53:* MM J2, *Fig. 54*).[601]

The pegs of the first form began to be used in the Late Republic; they are common at Augustan and rare at later sites dating up to the mid-1st century.[602] Standing apart in chronological terms is a peg found at Harzhorn (Germany), the site of a battle that took place around 253.[603] In appearance, it differs only slightly from other pegs in a barely discernible tapered top, though this feature also occurs on some of the Late Republican[604] and Augustan pegs.[605]

The earliest peg with an asymmetric loop appears to have been unearthed at Magdalensberg, where the archaeological context points to the end of the 1st century BC.[606] Few such pegs are among the finds from Haltern,[607] while not a single one was found at the Middle Augustan fort at Hedemünden, although the site revealed numerous pegs of the first form.[608] Pegs with an asymmetric loop went on to be used at least into the 3rd century.[609]

Five tent pegs are known from the Ljubljanica (*Pl. 18: J1; Fig. J1; Figs. 53–54*).[610] Three were found at Vrhnika (MM J2, MM J4 and MM J5), one at Sinja Gorica (MM J3) and one at Podpeč (J1). Both forms are represented in roughly equal numbers: three pegs with a symmetric hole (J1, MM J3–J4) and two with an asymmetric loop (MM J2, MM J5).

Standing apart from the tent pegs is a substantial peg with barbs in its lower part (*Fig. 55*), which was found during the excavations of a wooden structure, presumably a landing pier, on the north bank of the Ljubljanica at the Augustan settlement at Dolge njive in Vrhnika.[611] The barbs suggest it was driven into wood; it was presumably secured to a wooden pier and served to moor ships.

600 Gaitsch 1993, 98, Fn. 60; Harnecker 1997, 19–20; Dolenz 1998, 103–104; Grote 2012, 365.
601 Gaitsch 1993, 98; Harnecker 1997, Pls. 36–73: 406–433.
602 Grote 2012, 365, with references cited in Fns. 95 and 96.
603 Berger et al. 2010, Fig. 24: 3.
604 Ulbert 1984, Pl. 26: 219, 221.
605 Harnecker 1997, Pl. 37: 429.
606 Dolenz 1998, 105, M264.
607 Ulbert 1984, 117, Fn. 349; Harnecker 1997, 20.
608 Grote 2012, 44, Pl. 34: 328–331, Pl. 35: 332–338, Pl. 36: 342–349, Pl. 37: 350–356, Pl. 38: 357–362, Pl. 39: 363–366.
609 Herrmann 1969, 138–139, Fig. 8: 10–17; Dolenz 1998, 104.
610 The pegs on *Fig. 53* correspond with those in Gaspari 2002, Pl. 31: 1–3, the peg on *Fig. 54* to Gaspari 2002, Pl. 31: 4; the Potočnik family did not hand over the last item to the City Museum of Ljubljana by the autumn of 2016, hence it is only presented here with a drawing.
611 Only short reports have thus far been published on the excavations of the landing pier: Logar 1986; Horvat, Kocuvan, Logar 1986. Additional photographs of the excavated structures in: Horvat 2009b, Fig. 99; Horvat 2012a, Fig. 4. The small finds range in date from the Augustan period to the 4th century (Horvat 2012a, 290, Fig. 4).

13
Šotorski klini

Železni klini z zanko oziroma luknjo, v katero je (bil) vdet obroček, običajno izvirajo z najdišč, povezanih z rimsko vojsko. Namenjeni so bili pritrjevanju šotorov, pa tudi drugih zadev.[600]

Razlikujemo dve osnovni obliki železnih klinov. Pogostejši so tisti, ki imajo simetrično ležečo luknjo pod ravnim (in običajno s strani zoženim) vrhom; v luknjo je vdet obroček (npr. J1, MM J3, MM J4; *t. 18: J1; sl. J1; sl. 53:* MM J3, MM J4). Za drugo obliko klinov je značilna asimetrično, na eni strani ob vrhu klina (ali tik pod njim) ležeča zanka, ki so jo naredili tako, da so jo skovali z vrha klina in zavili navzdol (npr. MM J2, MM J5; *sl. 53:* MM J2*, sl. 54*).[601]

Kline prve skupine so začeli uporabljati v poznorepublikanski dobi; pogosti so na avgustejskih najdiščih, mlajši (do vključno sredine 1. st.) so maloštevilni.[602] Po dataciji je osamljen klin te skupine, najden na prizorišču vojaškega spopada ok. leta 253 v Harzhornu (Nemčija).[603] Od običajnih klinov prve skupine odstopa po tem, da ima komaj opazno zožen vrh, kar je sicer tudi značilnost posameznih primerkov iz poznorepublikanske[604] in avgustejske dobe.[605]

Zdi se, da je najstarejši klin z asimetrično zanko s Štalenske gore: ožje najdiščne okoliščine kažejo na datacijo v konec 1. st. pr. Kr.[606] Med najdbami iz Halterna so klini z asimetrično zanko redki,[607] v srednjeavgustejskem taboru v Hedemündnu pa niso našli niti enega (pač pa številne kline prve skupine).[608] Kline z asimetrično zanko so uporabljali najmanj še v 3. st.[609]

Iz Ljubljanice poznam pet šotorskih klinov (*t. 18: J1; sl. J1; sl. 53–54*).[610] Trije so bili najdeni na Vrhniki (MM J2, MM J4 in MM J5) ter po eden pri Sinji Gorici (MM J3) in Podpeči (J1). Uravnoteženo so zastopani klini s simetrično ležečo luknjo za obroček (J1, MM J3–J4) in tisti z asimetrično zanko (MM J2, MM J5).

Po velikosti, masivnosti in še posebej po simetrično na robovih spodnjega dela klina narejenih zarezah se od šotorskih klinov razlikuje masiven klin (*sl. 55*), najden med izkopavanji lesenega pomola na Ljubljanici ob severnem bregu rimske naselbine avgustejske dobe na Dolgih njivah na Vrhniki.[611] Zareze v spodnjem delu nakazujejo, da je bil zabit v les. Domnevam, da je bil pritrjen na lesen pomol in je bil namenjen privezovanju plovil.

600 Gaitsch 1993, 98, op. 60; Harnecker 1997, 19–20; Dolenz 1998, 103–104; Grote 2012, 365.
601 Gaitsch 1993, 98; Harnecker 1997, t. 36–73: 406–433.
602 Grote 2012, 365, z literaturo, navedeno v op. 95 in 96.
603 Berger et al. 2010, sl. 24: 3.
604 Ulbert 1984, t. 26: 219, 221.
605 Harnecker 1997, t. 37: 429.
606 Dolenz 1998, 105, M264.
607 Ulbert 1984, 117, op. 349; Harnecker 1997, 20.
608 Grote 2012, 44, t. 34: 328–331, t. 35: 332–338, t. 36: 342–349, t. 37: 350–356, t. 38: 357–362, t. 39: 363–366.
609 Herrmann 1969, 138–139, sl. 8: 10–17; Dolenz 1998, 104.
610 Klini na *sl. 53* ustrezajo Gaspari 2002, t. 31: 1–3, klin *sl. 54* pa Gaspari 2002, t. 31: 4; zadnjega do jeseni 2016 družina Potočnik še ni predala v Mestni muzej Ljubljana, zato v knjigo nisem mogla vključiti fotografije, ampak le risbo.
611 O izkopavanjih pomola so objavljena le kratka poročila: Logar 1986; Horvat, Kocuvan, Logar 1986. Dodatne fotografije izkopavanih struktur: Horvat 2009a, sl. 99; Horvat 2012a, sl. 4. Drobne najdbe z izkopavanj pomola so iz obdobja med avgustejsko dobo in 4. st. (Horvat 2012a, 290, sl. 4).

Figure 53
Tent pegs from the Ljubljanica at Vrhnika (MM J2, MM J4) and at Sinja Gorica, Zaloke (MM J3). Iron. MM J2 (length 162 mm, weight 146 g), MM J3 (length 162 mm, weight 42 g), MM J4 (length 164 mm, weight 48 g). City Museum of Ljubljana, Inv. Nos. 510:LJU;0057637, 510:LJU;0057636 and 510:LJU;0057634.

Slika 53
Šotorski klini iz Ljubljanice pri Vrhniki (MM J2, MM J4) in pri Sinji Gorici, Zaloke (MM J3). Železo. MM J2 (dolžina 162 mm, teža 146 g), MM J3 (dolžina 162 mm, teža 42 g), MM J4 (dolžina 164 mm, teža 48 g).
Mestni muzej Ljubljana, inv. št. 510:LJU;0057637, 510:LJU;0057636 in 510:LJU;0057634.

Figure 54
The MM J5 iron tent peg from the Ljubljanica at Vrhnika. From Gaspari 2002, 302, Pl. 31: 4. Scale 1 : 3 (the scales of this and other pegs on Pl. 31: 1–4 indicate a length of 168 mm, while the description of this peg states a length of 116 mm).

Slika 54
Šotorski klin MM J5 iz Ljubljanice pri Vrhniki. Po Gaspari 2002, 302, t. 31: 4. Merilo 1 : 3 (prikazan je 168 mm dolg klin; taka dolžina izhaja iz razmerja med šotorskimi klini na t. 31: 1–4, v opisu pa je navedena dolžina 116 mm).

Figure 55
Large iron peg with a ring excavated at the landing pier of the Roman settlement at Dolge njive in Vrhnika:
a) photograph, b) drawing, scale 1 : 3. Length 190 mm, ring diameter 117 mm, weight 632 g. National Museum of Slovenia, Inv. No. V 1510.

Slika 55
Masiven železen klin z ušesom in obročkom (dolžina 190 mm, premer obročka 117 mm, teža 632 g; Narodni muzej Slovenije, inv. št. V 1510) s pomola naselbine na Dolgih njivah na Vrhniki:
a) fotografija, b) risba, merilo 1 : 3.

a

b

14
Shield boss

The MM SG shield boss with a star-shaped flange measures 212 mm in width, 0.5–1 mm in plate thickness and 202 g in weight (*Figs. 56, 57*). It was found in the Ljubljanica at Bistra near Blatna Brezovica and is made of brass.[612] Its external surface shows traces of turning on a lathe.

Its round bowl is incomplete, missing roughly two thirds of its maximum diameter and a roughly 25 mm wide central part. The edges of the surviving central part of the bowl suggest a rather steep transition into a possibly pointed centre (*Fig. 56b*).[613]

The star-shaped flange is eight-pointed and is evenly downturned from its junction with the bowl towards six of the eight points, while towards the other two points it flattens between the rivet hole and the tip. The front bears two groups of two or three concentric and roughly 1 mm wide grooves; these run smoothly into one another, suggesting they were made on a turning lathe. Each of the eight points is decorated with a roughly 6 mm wide and 2 mm high boss raised from the rear.

The flange has six holes of irregular, but roughly round shape, measuring 4 to 5 mm across. They were punched from the rear and spaced roughly equidistantly from the centre of the bowl, along the axis of six points and at a distance of 22 to 27 mm from the centre of the hole to the tip. Two of the holes, at opposite points, bear rivets with a domed brass[614] head measuring roughly 15 mm in diameter and 8 mm in height. On another pair of holes, also at opposite points, the existence of such a rivet is indicated by traces in the corrosion products (*Figs. 56a, 57*). The last pair of holes at opposite points bears no traces of rivets.

The remains of corrosion products with a high iron[615] content at the rear of four rivet holes suggest that the rivet shanks were made of iron. This is supported by the two X-ray images that show a clearly delimited space of lower density at the centre of the rivets (*Fig. 58a, b*). The damage on one of the rivet heads (*Fig. 56d*) reveals that the head is only plated with brass, while the core is of another material, possibly a tin-lead alloy that would have been suitable for securing the iron shank to the brass head.

The shield boss has close parallels among the finds from Dura Europos (Syria), which the Persians captured in 256 in spite of a strong Roman garrison stationed there. The site yielded two copper alloy bosses with a star-shaped flange and fragments of two other such bosses; they were probably all made on a lathe.[616] One of the bosses survives with traces of two rivet heads (ca. 15 mm in diameter) in the corrosion products.[617] Rivet heads survived on two of the circular shield bosses from the same site. The rivet shanks are iron and the domed heads, 25 mm in diameter, are plated with copper alloy.[618]

Both the star-shaped and circular bosses from Dura Europos were presumably associated with roughly one metre tall and 0.9 m wide oval and probably slightly convex shields, which survived at the site because of the desert conditions.[619] The shield-boards were made of vertically oriented poplar planks carefully glued edge to edge, covered on both sides with

612 See Ch. 16, MM SG.
613 Although only a very small part (width 10 mm, height ca. 4 mm) of the steep section survives, it does appear to be in its original condition rather than deformed.
614 See Ch. 16, MM SG.
615 XRF analyses, NMS.
616 James 2004, 160, 162, 174–175, Fig. 95, Cat. Nos. 603–606.
617 James 2004, 174, 175, Fig. 95, Cat. No. 603.
618 James 2004, 172–173, Fig. 94, Cat. Nos. 595, 596.
619 James 2004, 160, 161, Fig. 92.

14
Ščitna grba

Ščitno grbo MM SG (širina 212 mm, debelina sten 0,5–1 mm, teža 202 g) z osemkrakimi robovi (*sl. 56, 57*) so našli v Ljubljanici ob ledini Bistra pri Blatni Brezovici. Narejena je iz medenine,[612] na zunanji površini so vidni sledovi vrtenja na stružnici.

Okrogla kalota grbe ni cela ohranjena: manjkata približno dve tretjini največjega oboda in približno 25 mm širok osrednji del (vrh). Zaključek ohranjenega dela v sredini ščitne grbe nakazuje razmeroma strm prehod v (koničast?) vrh kalote (*sl. 56b*).[613]

Okrajek grbe se v šestih oseh (med nasproti si stoječimi konicami zvezdastih krakov) približno enakomerno spušča od stika s kaloto do roba, v eni osi pa se med luknjo žeblja in robom okrajka približno zravna. Na sprednji strani sta dve skupini z dvema do tremi plitvimi koncentričnimi žlebovi (širina žlebov približno 1 mm); tekoče prehajanje dveh žlebov v tri nakazuje, da so bili narejeni na vretenu. Vsak od osmih zvezdastih izrastkov je na koncu okrašen s približno 6 mm široko in 2 mm visoko bunčico, iztolčeno s hrbtne strani.

Na okrajku ščitne grbe je šest lukenj nepravilne, približno okrogle oblike (premer 4 do 5 mm). Izbite so bile s hrbtne strani. Vse so približno enako oddaljene od sredine grbe in ležijo v oseh med šestimi (od osmih) nasproti si ležečimi konicami zvezdastih razširitev okrajka (sredina luknje trna je 22 do 27 mm od zunanjega roba konice zvezdaste razširitve). Dve na isti osi ležeči luknji sta na sprednji strani pokriti s polkrožno medeninasto[614] glavico (premer okoli 15 mm, višina okoli 8 mm), pri drugih dveh luknjah, ki prav tako ležita na isti osi, pa taki glavici nakazuje sled v koroziji (*sl. 56a, 57*). Pri preostalih dveh luknjah, ki se sicer ne razlikujeta od drugih štirih, ni sledov glavice niti v njih ni korozije.

Ostanki korozijskega produkta z visoko vsebnostjo železa[615] v teh štirih luknjah na hrbtni strani govorijo za to, da so bili trni žebljev železni. S tem se skladata rentgenska posnetka, ki v sredini zakovic jasno kažeta dobro omejen prostor z manjšo gostoto (*sl. 58a, b*). Poškodba na eni glavici (*sl. 56d*) razkriva, da ima glava zakovice medeninast plašč, notranjost pa je iz drugega materiala – morda iz zlitine kositra in svinca, ki bi bila primerna, da bi železen trn zalili v medeninasto glavico.

Zvezdasta oblika ščitne grbe ima dobre primerjave med najdbami iz rimskega utrjenega mesta Dura Europos (Sirija), ki so ga kljub močni rimski posadki v mestu Perzijci osvojili leta 256. Tam so našli dve ščitni grbi iz bakrove zlitine z osemkrakim zvezdastim robom ter odlomka še dveh; verjetno so bile narejene na vretenu.[616] Na eni ščitni grbi so se v korozijskih produktih ohranili sledovi glavic (premer okoli 15 mm) dveh žebljev.[617] Glavice žebljev so se ohranile na dveh okroglih ščitnih grbah z istega najdišča. Trni žebljev so železni, polkrožne glave (premer 25 mm) pa so na površini iz bakrove zlitine.[618]

Verjetno so zvezdaste in okrogle ščitne grbe iz Dure Europos pripadale okoli meter visokim in 0,9 m širokim ovalnim in, kot se zdi, rahlo izbočenim ščitom, ki so se zaradi izjemnih (puščavskih) razmer ohranili na tem najdišču.[619] Narejeni so bili iz pokončnih desk topola, ki so bile ob stranicah pazljivo zlepljene ter na obeh straneh prevlečene z usnjem ali mavcem.

612 Glej pogl. 16, MM SG.
613 Čeprav je stožčasti del majhen (širina 10 mm, višina okoli 4 mm), se namreč zdi, da usločeni del ustreza prvotnemu stanju in torej ni nastal zaradi deformiranja.
614 Glej pogl. 16, MM SG.
615 Analize XRF, NMS.
616 James 2004, 160, 162, 174–175, sl. 95, kat. 603–606.
617 James 2004, 174, 175, sl. 95, kat. 603.
618 James 2004, 172–173, sl. 94, kat. 595, 596.
619 James 2004, 160, 161, sl. 92.

leather or gesso, and brightly painted.[620] James presumes they were slightly convex.[621] The flat flanges of most of the presumably associated bosses indicate that this convexity was minimal.[622]

The star-shaped bosses and their fragments from Dura Europos are very similar to the shield boss from the Ljubljanica, but differ in the rounded rather than pointed centre of the bowl,[623] the flat flange[624] and four rivet holes for securing the boss to the shield.[625] The rivet shanks are copper alloy[626] or iron.[627]

The circular shield bosses from Dura Europos were also fastened to the shield-boards with four rivets;[628] two of the rivets survive complete with the domed copper alloy heads.[629] The rivets appear to have usually been positioned obliquely in an 'X' formation. The rear of one circular boss has a horizontally fitted iron grip, a component part of the shield.[630] James believes that another circular boss also had such an iron grip; in addition to four holes with domed heads this boss also bears two other holes without any traces of rivet heads.[631]

The Roman fort at Zugmantel (Germany), located at the Upper Germanic limes and occupied from the reign of Domitian to the abandonment of this part of the limes around 260,[632] yielded an octagonal copper alloy shield boss. The small published photo reveals no details as to the rivet heads and rivet holes, possible decorative bosses on the points and so forth. The shield boss measures around 120 mm in maximum width,[633] which makes it considerably smaller than the shield bosses from the Ljubljanica (diameter 210 mm) and Dura Europos (diameter 219 and 238 mm[634]). The flange on the Zugmantel shield boss also appears to be much narrower relative to the width of its bowl in comparison with the shield bosses from the Ljubljanica and Dura Europos.

A far less close parallel is the fragment of a shield boss from Carnuntum, with a four-pointed flange. The surviving fragment encompasses one of the points and part of the bowl. It is not clear from the publication

a

b

c

620 James 2004, 159–168, 176–182, Figs. 92–105, Cat. Nos. 616–628.
621 James 2004, 160.
622 Cf. James 2004, 172, 174, Figs. 94, 95, Cat. Nos. 590, 593, 594, 603.
623 James 2004, 174, Fig. 95, Cat. Nos. 603, 604.
624 James 2004, 174, Fig. 95, Cat. No. 603.
625 James 2004, 174, Fig. 95, Cat. Nos. 603, 604.
626 James 2004, 175, Cat. No. 603.
627 James 2004, 175, Cat. No. 604.
628 James 2004, 162, 171–173, Fig. 94, Cat. Nos. 589–592, 594.
629 James 2004, 172–173, Fig. 94, Cat. Nos. 595–596.
630 James 2004, 162, 171–172, Fig. 94, Cat. No. 590.
631 James 2004, 162, 172–173, Fig. 94, Cat. No. 595.
632 Jacobi 1909, 64, Pl. 11: 27.
633 Based on the photograph in Jacobi 1909, 64, Pl. 11: 27, published in the scale of 2 : 5.
634 James 2004, 175, Cat. Nos. 603, 604.

Figure 56
The MM SG shield boss from the Ljubljanica at Blatna Brezovica: a) front, b) side, c) back, d) damage on the rivet head. City Museum of Ljubljana, Inv. No. 510:LJU;0058607.

Slika 56
Ščitna grba MM SG iz Ljubljanice pri Blatni Brezovici: a) sprednja stran, b) stranski pogled, c) hrbtna stran, d) poškodba glave zakovice. Mestni muzej Ljubljana, inv. št. 510:LJU;0058607.

d

Poslikani so bili z živimi barvami.[620] James domneva, da so bili ti ščiti rahlo izbočeni v vseh oseh.[621] Ravni okrajki večine domnevno pripadajočih ščitnih grb nakazujejo, da je bilo izbočenje minimalno.[622]

Zvezdaste ščitne grbe (oz. njihovi odlomki) iz Dure Europos so zelo podobne grbi iz Ljubljanice, od katere pa se razlikujejo po zaobljenem vrhu kalote,[623] po vodoravnem okrajku[624] in po štirih luknjah, povezanih s pritrditvijo na ščit.[625] Trni žebljev so iz bakrove zlitine[626] oziroma železa.[627]

S štirimi žeblji so bile na ščit pritrjene tudi okrogle ščitne grbe iz Dure Europos;[628] pri dveh žebljih so se ohranile polkrožne glave iz bakrove zlitine.[629] Zdi se, da so bili žeblji običajno razporejeni v obliki črke X. Na hrbtno stran ene okrogle ščitne grbe je bila v vodoravni liniji pritrjena železna prečka, ki je bila sestavni del ročaja ščita.[630] James meni, da je imela železno prečko na hrbtni strani še ena okrogla ščitna grba, ki ima poleg štirih lukenj, na katerih so se ohranile polkrožne glave žebljev, še dve luknji, ki sta popolnoma prazni in brez sledov glave žeblja na površini v okolici.[631]

Osemkotna ščitna grba iz bakrove zlitine je bila najdena v kastelu Zugmantel (Nemčija) ob zgornjegermanskem limesu,[632] ki je datiran od vlade cesarja Domicijana do opustitve tega dela limesa ok. leta 260. Iz majhne fotografije v objavi morebitne podrobnosti (glave oz. luknje od zakovic, morebitne okrasne izbokline na krakih ipd.) niso razvidne. Največja širina ščitne grbe je bila okoli 120 mm,[633] torej je bila precej manjša kot ščitna grba iz Ljubljanice (premer 210 mm) in grbi iz Dure Europos (219 mm in 238 mm[634]). Zdi se, da je okrajek ščitne grbe iz Zugmantla v primerjavi s širino okrogle kalote ožji kot pri ščitnih grbah iz Ljubljanice in Dure Europos.

Dosti bolj oddaljena primerjava kot primerki iz Dure Europos in Zugmantla je odlomek ščitne grbe iz Carnuntuma z zvezdasto oblikovanim okrajkom, ki je imel štiri krake. Na odlomku sta ohranjena en zvezdasto oblikovan vogal grbe in del kalote. Iz objave ni jasno, ali je odlomek iz železa ali iz bakrove zlitine.[635] Glede na merilo, navedeno ob objavljeni risbi, je bil največji premer grbe okrog 290 mm, torej je bila večja od osemkrakih ščitnih grb iz Dure Europos in iz Ljubljanice.

Z neznanega najdišča in neznanih najdiščnih okoliščin izvira odlično ohranjena ščitna grba iz bakrove zlitine s trombastim vrhom kalote in z zvezdasto oblikovanim okrajkom, ki ima osem krakov (vsak je okrašen z bunčico, iztolčeno s hrbtne strani).[636] Zelo je podobna eni izmed ščitnih grb iz Dure Europos.[637] S ščitno grbo iz Ljubljanice jo povezujejo podobne mere (premer 210 mm), število, oblika in okras krakov (bunčice), dve skupini plitvih koncentričnih žlebov na okrajku in usločen prehod v vrh kalote (ki je na grbi iz Ljubljanice le nakazan, ker vrh kalote ni ohranjen). Razlikuje pa se po razporeditvi lukenj zakovic, ki so jo pritrjevale na leseni ščit. Iz fotografije sklepam, da ima le dve luknjici, ki ležita simetrično na ožjem delu okrajka, med dvema zvezdastima izrastkoma.

Na ščitni grbi iz Ljubljanice so luknje razporejene podobno kot na okroglih ščitnih grbah št. 590 in 595 iz Dure Europos. Na grbi št. 595 sta v dveh simetrično ležečih luknjah zakovici (s polkrožnima glavama), ki na spodnjo stran grbe pripenjata železno oblogo ročaja ščita; ročaj je bil pritrjen le na ščitno grbo.[638] To bi lahko nakazovalo, da sta na grbi iz Ljubljanice luknji, ob katerih ni sledov glave žeblja, povezani s pritrditvijo ročaja ščita na hrbtno stran ščitne grbe.

Možna je tudi drugačna razlaga. Domnevam, da okrajek ni nalegel na ščit v celi svoji širini, temveč le

620 James 2004, 159–168, 176–182, sl. 92–105, kat. 616–628.
621 James 2004, 160.
622 Prim. James 2004, 172, 174, sl. 94, 95, kat. 590, 593, 594, 603.
623 James 2004, 174, sl. 95, kat. 603, 604.
624 James 2004, 174, sl. 95, kat. 603.
625 James 2004, 174, sl. 95, kat. 603, 604.
626 James 2004, 175, kat. 603.
627 James 2004, 175, kat. 604.
628 James 2004, 162, 171–173, sl. 94, kat. 589–592, 594.
629 James 2004, 172–173, sl. 94, kat. 595–596.
630 James 2004, 162, 171–172, sl. 94, kat. 590.
631 James 2004, 162, 172–173, sl. 94, kat. 595.
632 Jacobi 1909, 64, t. 11: 27.
633 Glede na fotografijo Jacobi 1909, 64, t. 11: 27, ki je objavljena v merilu 2 : 5.
634 James 2004, 175, kat. 603, 604.
635 Von Groller 1901, 117–119, t. 20: sl. 14. Na začetku opisa ščitnih grb je zapisano, da so vse iz železa, vendar ni zanesljivo, da to velja tudi za t. 20: sl. 14, za katero piše, da se zdi, da je od ščitne grbe. V objavi manjka opis predmeta in na risbi presek.
636 Nabbefeld 2008, 281, kat. 737, t. 116: 737; Fischer 2012, 176, sl. 230.
637 James 2004, 174, sl. 95: 608.
638 James 2004, 171–173, sl. 94: 590, 595.

whether it is of iron or copper alloy.[635] Given the scale stated in the caption of the drawing, its bowl measured roughly 290 mm in maximum diameter, which makes it larger than the star-shaped bosses from Dura Europos and the Ljubljanica.

An excellently preserved copper alloy shield boss comes from an unknown site and unknown context. It has a trumpet-like projection in the centre of the bowl and an eight-pointed flange, each of the points bearing a boss raised from the rear.[636] It resembles very closely one of the shield bosses from Dura Europos.[637] It is similar to the example from the Ljubljanica in its size (diameter of 210 mm), in the number, form and decoration of the flange points, in the two groups of shallow concentric grooves on the flange and in the steep bowl-top junction (the latter only indicated on the boss from the Ljubljanica as the top is missing). It differs, however, in the position of the rivets that fastened the boss to the wooden shield-board. The photograph of the boss from an unknown site suggests it only has two holes placed at opposite ends on the narrower part of the flange, between two points.

Figure 57
The MM SG shield boss from the Ljubljanica at Blatna Brezovica. Scale 1 : 2.

Slika 57
Ščitna grba MM SG iz Ljubljanice pri Blatni Brezovici. Merilo 1 : 2.

The rivet holes on the shield boss from the Ljubljanica are positioned similarly to those on the circular bosses Nos. 590 and 595 from Dura Europos. Boss No. 595 has rivets with domed heads in two opposite holes, which fasten the iron part of the grip; the handgrip was only fastened to the shield boss.[638] This may indicate that the two holes without traces of rivet heads on the shield boss from the Ljubljanica may be connected with fastening the iron handgrip to the rear of the boss.

Another explanation is possible. I presume that the flange was not in direct contact with the shield-board in all of its width, but only in its outer part, roughly from the rivet holes to the outer edge.[639] The part of the flange not in contact with the shield-board might therefore have served as shock absorber. The outer part of the flange, between the hole and the tip of the point, is flat exactly along the axis determined by the two empty holes without any traces of a rivet (cf. description above), which might point to the vertical axis of the shield boss (cf. *Fig.* 57). In this case, the boss would belong to a shield that was vertically flat or only very slightly convex, but more markedly convex horizontally. The shield boss from the Ljubljanica would thus lack holes on the flange in the horizontal axis, which would correspond with the position of the handgrip fastened to the rear of the shield-board, but not also to the rear of the shield boss as is the case in most of the shield bosses from Dura Europos.[640] The six surviving holes would thus be connected with fastening the shield boss to the shield-board, though it is still unclear why two of the holes bear no traces of rivet heads.

The shield bosses from Dura Europos indicate that the boss from the Ljubljanica should also be dated to the mid-3rd century.

635 Von Groller 1901, 117–119, Pl. 20: Fig. 14. The description of the shield bosses states they were all iron, but it is not certain whether this also applies to the example on Pl. 20: Fig. 14, interpreted as probably belonging to a shield boss. The publication lacks the item's description and its drawing lacks a cross section.

636 Nabbefeld 2008, 281, Cat. No. 737, Pl. 116: 737; Fischer 2012, 176, Fig. 230.

637 James 2004 174, Fig. 95: 608.

638 James 2004, 171–173, Fig. 94: 590, 595.

639 On the correlation between the shield boss flange and the form of the shield, see Ratsdorf 2009.

640 Cf. James 2004, 162, 168.

a b

Figure 58
X-ray images (a: 80 kV, 2 mA, 30 seconds, b: 90 kV, 4 mA, V 60 seconds) of the central part and two rivets of the MM SG shield boss from the Ljubljanica. Among other things, they show shanks, probably iron, in the centre of rivets and the damage to one of the rivet heads.

Slika 58
Rentgenska posnetka (a: 80 kV, 2 mA, 30 sekund, b: 90 kV, 4 mA, V 60 sekund), osrednjega dela ščitne grbe MM SG iz Ljubljanice. Med drugim so vidni (verjetno železni) trni zakovic in poškodba plašča ene zakovice.

z zunanjim delom, približno od luknje žeblja do zunanjega roba.[639] Od podlage odmaknjeni del okrajka je (lahko) deloval kot blažilec udarcev na ščitno grbo. Zunanji del okrajka (med luknjo in konico zvezdastega izrastka) je raven v eni osi (določata jo prazni luknji brez sledov glavice ali trna žeblja, prim. opis zgoraj), kar morda nakazuje, da je to navpična os ščitne grbe (prim. *sl.* 57). Grba bi v tem primeru pripadala ščitu, ki je bil v navpični smeri raven ali zelo rahlo izbočen, v vodoravni smeri pa izraziteje izbočen.

Grba iz Ljubljanice pri taki orientaciji na okrajku ne bi imela lukenj v vodoravni osi, v kateri domnevam, da je bil na hrbtni strani ščita ročaj, torej bi bil ročaj pritrjen le na leseni ščit, ne pa tudi na ščitno grbo, kar velja za večino ščitnih grb iz Dure Europos.[640] Šest ohranjenih lukenj bi bilo torej povezanih s pritrditvijo ščitne grbe na ščit, pri čemer ni jasno, zakaj se pri dveh luknjah ni ohranila sled glavic žebljev.

Primerjava s ščitnimi grbami iz Dure Europos kaže na datacijo ščitne grbe iz Ljubljanice v sredino 3. st.

639 O povezavi med okrajkom ščitne grbe in obliko ščita glej Ratsdorf 2009.
640 Prim. James 2004, 162, 168.

15
Objects similar to obstacles

Figure 59
Pointed iron objects with a right-angle bend from the Ljubljanica: PO1–PO6. National Museum of Slovenia.

Slika 59
Železne osti s pravokotnim zavojem iz Ljubljanice: PO1–PO6. Hrani Narodni muzej Slovenije.

The Ljubljanica yielded six objects (PO1–PO6) similar in appearance to the iron parts of obstacles (spikes; *stimulus* in Latin; *Figs. 59–60*).[641] I have already published two of them (PO1 and PO2) as *stimuli*,[642] though an in-depth analysis has raised certain doubts as to the validity of such an interpretation.

Caesar described *stimuli* in his Gallic Wars,[643] while they are only represented archaeologically at Alesia, where two complete and four partially surviving iron spikes with a characteristic right-angle bend have been found. The shank (part below the bend), which Caesar describes as driven into a Roman foot long (roughly 295 mm) wooden stake, are square or rectangular in cross section and terminate in a pointed tip. The roughly 70 mm long upper part (above the bend) has a square- or rectangular-sectioned neck, varies in thickness from 5 × 5 to 9 × 7 mm and ends in an asymmetric head with a one-sided barb.[644]

641 PO1: Inv. No. V 1710 (the Ljubljanica at Bevke, Na zrnici; underwater topographic survey in 1994, NMS acquired in 1994); PO2: Inv. No. V 1797 (the Ljubljanica at Bevke, Na zrnici; underwater topographic survey in 1994, NMS acquired in 1994); PO3: Inv. No. V 2542 (the Ljubljanica at Rakova Jelša; diving, NMS acquired in 1992); PO4: Inv. No. V 2543 (the Ljubljanica at Črna vas; diving, NMS acquired in 1993); PO5: Inv. No. V 2536 (the Ljubljanica at Rakova Jelša, Teren; underwater topographic survey in 1992, NMS acquired in 1992); PO6: Inv. No. V 2077 (the Ljubljanica at Podpeč; diving, NMS acquired in 1993).

642 Inv. Nos. V 1710 and V 1797: Istenič 2008, 297, 298, Fig. 4. Cf. Poux 2008, 389, 390, Fig. 63.

643 Gallic Wars VII, 73: "Stakes a foot long, with iron hooks attached to them, were entirely sunk in the ground before these, and were planted in every place at small intervals; these they called spurs."

644 Sievers 2001a, 173–174; Sievers 2001b, 239, Pl. 85: 754–757.

15
Konice, podobne protipehotnim oviram

Figure 60
Pointed iron objects with a right-angle bend from the Ljubljanica: PO1–PO6. National Museum of Slovenia. Scale 1 : 3.

Slika 60
Železne osti s pravokotnim zavojem iz Ljubljanice: PO1–PO6. Hrani Narodni muzej Slovenije. Merilo 1 : 3.

Iz Ljubljanice izvira šest osti PO1–PO6, ki spominjajo na železne dele protipehotnih ovir (žela; lat. *stimulus*; *sl. 59–60*).[641] Dve osti (PO1 in PO2) iz Ljubljanice sem že objavila kot stimula,[642] vendar me poglobljena obravnava primerkov iz Ljubljanice navdaja z dvomi o pravilnosti take interpretacije.

Stimule je opisal Cezar,[643] njihove materialne ostanke pa poznamo le iz Alezije, kjer so našli dve celi in štiri delno ohranjene železne konice z značilnim pravokotnim zavojem. Trn (del pod zavojem), ki je bil, kot je opisal Cezar, zabit v približno en rimski čevelj (približno 295 mm) dolg lesen količek, ima kvadraten ali pravokoten presek in se koničasto zaključi. Zgornji del (nad zavojem) ima vrat kvadratnega ali pravokotnega preseka (debeline zgornjega dela nad zavojem so zelo različne, od 5 × 5 do 9 × 7 mm) in se zaključi z asimetrično konico z enostransko zalustjo. Dolžina dela nad zavojem je okrog 70 mm.[644]

641 PO1: inv. št. V 1710 (Ljubljanica pri Bevkah, Na zrnici; podvodna arheološka topografija 1994, Narodni muzej Slovenije pridobil 1994); PO2: inv. št. V 1797 (Ljubljanica pri Bevkah, Na zrnici; podvodna arheološka topografija 1994, Narodni muzej Slovenije pridobil 1994); PO3: inv. št. V 2542 (Ljubljanica pri Rakovi Jelši; potapljanje, Narodni muzej Slovenije pridobil 1992); PO4: inv. št. V 2543 (Ljubljanica pri Črni vasi; potapljanje, Narodni muzej Slovenije pridobil 1993); PO5: inv. št. V 2536 (Ljubljanica pri Rakovi Jelši, Teren; podvodna topografija 1992, Narodni muzej Slovenije pridobil 1992); PO6: inv. št. V 2077 (Ljubljanica pri Podpeči; potapljanje, Narodni muzej Slovenije pridobil 1993).

642 Inv. št. V 1710 in V 1797: Istenič 2008, 297, 298, sl. 4. Prim. Poux 2008, 389, 390, sl. 63.

643 Galske vojne VII, 73: »Pred njimi (lilijami) so povsem zabili v zemljo en čevelj dolge kole, ki so imeli pritrjene železne kavlje. Nastavili so jih drug blizu drugega povsod naokoli. Imenovali so jih žela.«

644 Sievers 2001a, 173–174; Sievers 2001b, 239, t. 85: 754–757.

The objects from the Ljubljanica share the roughly right-angle bend, the shape of the head and the cross section of the neck and shank with the examples from Alesia. They come in two size groups: the smaller ones measure approximately 105–115 mm in the upper part (PO1–PO3, PO5), the larger one (PO4) has a roughly 155 mm long upper part. Corresponding with the larger group is a similar spike with a different, less pronounced bend that would originally probably have been fitted with a double-barbed head (PO6; *Figs. 59–60*).

The objects from the Ljubljanica are thus considerably larger than those from Alesia, and their lower parts are much shorter than the upper ones, but differ even more substantially in the shape of their lower part. Two examples from the Ljubljanica (PO1, PO4; *Figs. 59–60*) survive with a complete or partial lower end that shows an outward curve, in the opposite direction to the bend that would have been just above the wooden stake. This speaks against the interpretation of them representing part of *stimuli*, as the curved lower ends could not be driven into wood. Moreover, the part below the bend on the objects from the Ljubljanica is very short in comparison with the part above it, which is unlike the items from Alesia.

The objects from the Ljubljanica thus differ from the only known archaeologically represented *stimuli*, those from Alesia. Their function and dating remain unknown; they may even be connected with fishing. I have included them in this book because two of them had previously been published as parts of Roman *stimuli*.[645]

645 See Fn. 642.

Železne osti iz Ljubljanice s primerki iz Alezije povezujejo približno pravokoten zavoj, oblika konice in presek vratu ter trna. Po velikosti jih lahko razvrstim v dve skupini: pri manjših je dolžina dela nad pravokotnim zavojem približno 105–115 mm (štirje primerki PO1–PO3, PO5), pri večjih pa okrog 155 mm (en primerek PO4). Večji skupini po velikosti ustreza podobna ost, ki ima drugačen, manj izrazit zavoj med zgornjim in spodnjim delom in je verjetno prvotno imela konico z dvema zalustma (PO6; *sl. 59–60*).

Osti iz Ljubljanice so torej precej večje od tistih iz Alezije. Bistvena se mi zdi razlika v spodnjem delu osti. Dva primerka iz Ljubljanice (PO1, PO4; *sl. 59–60*) imata ohranjen oziroma nakazan pravokotno navzven (v drugo smer kot zavoj, ki naj bi bil nad količkom) zavit zaključek spodnjega dela. To govori proti temu, da bi to bile konice stimulov, saj se je pri stimulih spodnji del železne osti zaključil v lesenem količku, torej zaključka trna ni bilo mogoče zaviti. Poleg tega so, v nasprotju s primerki iz Alezije, pri osteh iz Ljubljanice deli pod zavojem v primerjavi z zgornjim delom kratki.

Železne konice iz Ljubljanice torej zaradi pravokotno zavitega zaključka spodnjega dela bistveno odstopajo od edinih poznanih arheoloških ostankov stimulov, tj. železnih osti iz Alezije. Funkcija in datacija osti iz Ljubljanice nista znani. Morda so povezane z ribolovom. V knjigo sem jih vključila, ker sem dva primerka objavila kot konici rimskih stimulov.[645]

645 Glej op. 642.

16
Research using the methods of proton-induced X-ray emission (PIXE) and proton-induced gamma emission (PIGE)

Janka Istenič and Žiga Šmit*

16.1 Selection and description of the methods

The method of proton-induced X-ray emission spectrometry (PIXE) was selected for the characterization of the metals on Roman military equipment as it requires no sampling, allows measurements of large objects and is appropriate for the analysis of metals, of which the objects were made, as well as of surface coatings and enamels. With the examples that contain light elements. i.e. those with enamels, we combined PIXE with the method of proton-induced gamma rays (PIGE). The measurements were performed at the Tandetron accelerator of the Jožef Stefan Institute, using the in-air measuring line.

Sampling would allow us to apply techniques that provide more accurate results with higher sensitivity, like atomic emission spectroscopy in an inductively coupled plasma (ICP AES) or atomic absorption spectroscopy (AAS), but their usage would be possible only with a reasonably small number of pieces of Roman military equipment or their parts, as the thickness of most of them is about a millimeter or less, so a sufficiently large quantity of material could not be sampled,[646] or would cause an unacceptable alteration of the object. The same holds for the objects with a badly preserved metal core. Sampling is also inappropriate for the analysis of thin metal films (created by gilding, silvering and tinning) and of soldering, which is frequently used at Roman military equipment.

The other minimally destructive techniques, like laser ablation inductively coupled plasma mass spectrometry (LA ICP MS) could not be applied as well due to the limitations of the investigated objects (100 mm × 100 mm × 15 mm).

The method of PIXE is based on the irradiation of the target with a proton beam. During proton collision with the atom, vacancies are created in the inner shell, and during their recombination X-rays with characteristic energies may be emitted. With numerical treatment of the X-ray spectra we first determine the energies and intensities of particular lines, and from them the concentrations of respective elements.

For spectral deconvolution we used the AXIL code, while the concentrations were calculated by the program developed by ourselves. The numerical procedure is based on the method of independent physical parameters and takes into account the secondary fluorescence of X-rays in metal targets. The concentrations were normalized according to the condition that their sum equals 100%.

The measurements were executed by a proton beam in air, which was realized by extraction of protons through a window made of thin metal foil. The window was typically made of 8 μm thick aluminum, though some measurements were also carried out with a 2 μm thick tantalum foil, which we usually use for the measurements with gamma rays (the method of PIGE) since tantalum produces low gamma background. The nominal proton energy for most of the measurements was 3 MeV; however, on account of energy loss in the exit window and in about 1 cm air gap between the window and target it was reduced to

646 For the analysis that would give us more accurate results (for example, ICP AES or ICP MS), we would need 30 mg or at a stretch 15 mg sample mass (the limiting factor is the sample mass, as masses below 15 mg cannot be accurately determined), which for copper alloy represents a cube with a side of 1.6 mm or 1.2 mm. Since the surface layer had to be removed, we could only sample the objects with a metal core that is at least 1.8 or 1.4 mm thick, while for thinner or less preserved objects it would be necessary to enlarge the side. For a 0.5 mm thick object, after removing the surface layer, the side of the sampled material would measure 3.5 mm (30 mg) or at least 2.5 mm (15 mg), which means that we would have to cut a 3.5 × 3.5 mm or 2.5 × 2.5 mm sized section of the objects through the whole thickness.

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16
Raziskave z metodama protonsko vzbujene rentgenske spektrometrije (PIXE) in protonsko vzbujenih žarkov gama (PIGE)

Janka Istenič in Žiga Šmit*

16.1 Izbor in opis metod

Metodo protonsko vzbujene rentgenske spektrometrije (PIXE) smo izbrali za opredeljevanje kovin na rimski vojaški opremi, ker ne zahteva odvzemanja vzorcev, omogoča merjenje velikih predmetov in je primerna za analizo kovin, iz katerih so predmeti narejeni, ter kovinskih površinskih prevlek in emajlov. Pri vzorcih, ki vsebujejo lahke elemente, tj. pri emajlih, smo jo kombinirali z metodo protonsko vzbujenih žarkov gama (PIGE). Meritve smo izvajali na tandemskem pospeševalniku Instituta Jožef Stefan, na žarkovni liniji s protonskim žarkom v zraku.

Odvzem vzorcev bi omogočil uporabo tehnik, ki dajo natančnejše rezultate z višjo mejo občutljivosti, npr. ICP AES (atomska emisijska spektroskopija z induktivno sklopljeno plazmo) in AAS (atomska absorpcijska spektroskopija), vendar bi bil mogoč le pri razmeroma majhnem številu predmetov rimske vojaške opreme oziroma njihovih delov, saj so številni debeli le milimeter ali manj, zato odvzem dovolj velikega vzorca[646] ne bi bil mogoč oziroma bi pomenil nesprejemljivo velik poseg v predmet. Enako velja za primere, ko je kovinsko jedro zelo slabo ohranjeno. Poleg tega odvzem vzorcev ne bi bil primeren za analize prevlek (pozlata, posrebritev, kositrenje) in spajkanja, ki so na rimski vojaški opremi pogosti.

Druge minimalno destruktivne tehnike, kot je LA ICP MS (masna spektrometrija z vzbujanjem v induktivno sklopljeni plazmi z laserskim odparevanjem), niso prišle v poštev zaradi omejitve velikosti preiskovanega predmeta (100 mm × 100 mm × 15 mm).

Metoda PIXE temelji na obsevanju tarče s protonskim žarkom. Ob trku protona z atomom se v notranjih lupinah ustvarjajo vrzeli, ob njihovi zapolnitvi pa se lahko izsevajo rentgenski žarki z značilnimi energijami. Pri obdelavi rentgenskih spektrov najprej določimo energije in jakosti posameznih črt, nato pa iz njih vsebnost posameznih elementov.

Za obdelavo spektrov smo uporabljali program AXIL, vsebnosti pa smo računali s programom, ki smo ga razvili sami. Računska metoda temelji na neodvisnih fizikalnih parametrih in upošteva sekundarno vzbujanje rentgenskih žarkov v kovinskih tarčah. Koncentracije smo normirali s pogojem, da je vsota vseh izmerjenih vsebnosti enaka 100 %.

Meritve smo izvajali s protonskim žarkom v zraku; tega dobimo tako, da protone speljemo na prosto skozi okence iz tanke kovinske folije. Kot okence smo navadno uporabljali 8 μm debel aluminij, nekaj meritev smo izvedli tudi z 2 μm debelo tantalovo folijo, ki jo sicer uporabljamo pri meritvah z žarki gama (metoda PIGE) zaradi majhnega ozadja črt gama. Nominalna energija protonov pri večini meritev je bila 3 MeV, zaradi energijskih izgub v okencu in približno 1 cm široki zračni reži med okencem in tarčo se je na površini tarče zmanjšala na približno 2,77 MeV. Zaradi sipanja protonov na tej poti se je žarek razmazal po kotu (smeri), tako da je imel na tarči približno širino 0,8 mm na polovični višini. V praksi je to pomenilo širino žarka 2–3 mm na tarči. V nekaterih primerih smo žarek dodatno zožili z zaslonko iz aluminija, v kateri je bila luknjica s premerom 0,2 mm. Pri zelo

646 Za analizo, ki bi dala zelo natančne rezultate (npr. ICP AES ali ICP MS), bi potrebovali 30 mg ali v skrajnem primeru 15 mg vzorca (omejujoči faktor je teža vzorca, saj se teže pod 15 mg ne da zanesljivo določiti), kar pri bakrovi zlitini predstavlja kocko s stranico približno 1,6 mm oz. 1,2 mm. Zaradi nujnosti odstranitve površinske plasti bi tak vzorec lahko vzeli s predmetov, pri katerih je kovinsko jedro debelo najmanj 1,8 oz. 1,4 mm, pri tanjših ali slabše ohranjenih predmetih bi morali ustrezno povečati osnovno stranico. Pri predmetu debeline 0,5 mm bi bila tako, ob upoštevanju odstranitve površinske plasti, osnovna stranica odvzetega vzorca približno 3,5 mm (30 mg) oz. najmanj 2,5 mm (15 mg), kar pomeni, da bi morali izrezati 3,5 × 3,5 oz. 2,5 × 2,5 mm velik del predmeta v celi debelini.

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about 2.77 MeV at the target surface. Proton scattering along this path smeared the beam lateral distribution, so it had a width of about 0.8 mm at half-maximum at the target surface. In practice it meant that the beam at the target surface measured 2–3 mm. In a few cases we additionally narrowed the beam using a diaphragm with an opening of 0.2 mm. For a very short distance between the diaphragm and target (about 3 mm) we achieved the beam size at the target of about 0.3 mm. However, as a consequence, the resulting X-ray count rate was very low, therefore we used such a set-up for selected cases only and accepted low counting statistics.

The X-rays were detected by a Si(Li) detector with an energy resolution of 165 eV at 5.89 keV. On the way towards the detector, the X-rays passed an approximately 6 cm wide air-gap, which partly attenuated them. The copper alloys were measured with an additional absorber of 0.3 mm thick aluminum foil, which attenuated copper X-rays lines that appeared rather intensive in comparison with weak, but more penetrative K X-rays of silver, tin and antimony. The disadvantage of this type of measurement was interference of the copper escape peak at 6.30 keV with the Kα line of iron. We were not able to sufficiently distinguish between the two lines, so we generally overestimated the iron content for most of the measurements (typically we determined 0.5–1% Fe instead of a few tenths of percent). In order to get more reliable concentration of the elements lighter than copper, we for most part made another, shorter measurement using the air-gap as the only absorber, thus reducing the relative contribution of the copper escape peak. In this way we also obtained more accurate values for nickel and cobalt. For calculation of concentrations of the elements lighter than copper we then took into account the measurement in the air, while for heavier elements we relied on the measurement with the aluminum absorber. We also made some test measurements using a selective absorber of cobalt foil, which strongly attenuates copper X-rays, but we gave up since we did not dispose of accurate enough X-ray attenuation coefficients in cobalt. The measurements of the objects made of silver alloy with about 90% Ag were made with an aluminum absorber of 0.1 mm thickness. Because of less intense attenuation of iron X-rays in comparison with the thicker aluminum absorber, and due to relatively weak copper lines, an additional measurement without the aluminum absorber was not necessary.

The measurements were performed between the years 1999 and 2017, usually in parallel with the conservation of particular objects or immediately after it. During this period, in accordance with the experience we gained, we varied the experimental setting with the proton beam in air, and improved the documentation of the measured points on the objects. For instance, we abandoned measurement on iron[647] (as on the edges of sword scabbards) because we could recognize it by eye or with magnetic testing, yet the method of PIXE is not able to analyze the composition of iron alloys (steel).

Most of the measurements were made on the surface of the objects or their parts after the end of conservation procedure. Such surfaces were almost without patina.[648] At the points selected for the measurement we removed the patina up to the metal core in area of about 2–3 mm^2. Inspection of the so prepared points under the stereo microscope revealed that a complete removal of the patina is hard to achieve, so one has to be aware that the analytical results from such points refer to the metal core with (minimal) remains of the patina.

16.2 Results of the measurement

The results of the measurements are given in mass % in the tables and for each object separately. The number of given digits is in accordance with accuracy of the measurement. Most of the measurements are given with a precision of three digits, but with two digits only for the case of elements that were measured with an uncertainty larger than 10%. In a few cases, when the concentrations were determined from the very weak X-ray lines sitting on the low-energy tails of intense X-ray lines, the values are given by one digit only. The list of chemical elements in particular tables can be different and involves all elements that were detected in a particular series of measurements. If an element at a particular measurement of the series was not detected, its concentration was below the detection limit, and in the table we denoted it with the sign -.

The measurements in the points, from which the patina was removed, thus exposing the bare metal core, are marked with a star (*) in the tables. The measurements with a narrow proton beam are marked with ¤, both attached to the number that denotes the measured point.

647 When using the expression iron we understand that this is not a chemically clean iron, but it may also contain the admixtures of light elements, such as carbon (compare Chapter 1).

648 The expression patina is used as a synonym for corrosion (surface oxides) at the object surface.

kratki razdalji med zaslonko in tarčo (okoli 3 mm) smo dosegli, da je imel žarek na tarči velikost okrog 0,3 mm. Seveda je bila hitrost štetja rentgenskih žarkov tedaj zelo majhna, zato smo tako nastavitev uporabili le v izbranih primerih in se zadovoljili s slabšo števno statistiko.

Rentgenske žarke smo zaznavali z detektorjem Si(Li) z energijsko ločljivostjo okoli 165 eV pri 5,89 keV. Žarki so do detektorja potovali po približno 6 cm široki zračni reži, kjer so se zaradi absorpcije v zraku oslabili. Bakrove zlitine smo merili z dodatnim absorberjem iz 0,3 mm debele aluminijeve folije, saj smo s tem udušili bakrove črte, ki so močne v primerjavi z zelo šibkimi, a bolj prodornimi črtami K srebra, kositra in antimona. Slabost takšnega merjenja je bila interakcija ubežne bakrove črte pri energiji 6,30 keV s črto Kα železa. Obeh črt nam ni uspelo zadovoljivo ločiti, zato smo pri večini meritev določili prevelike vsebnosti železa (tipično 0,5–1 % Fe, namesto nekaj desetink odstotka). Da bi dobili točnejše vrednosti elementov, ki so lažji od bakra, smo v večini primerov naredili dodatno, krajšo meritev, z zračno režo kot edinim absorberjem, s čimer smo zmanjšali relativni prispevek bakrovega ubežnega vrha. S tem smo dobili tudi natančnejše vsebnosti niklja in kobalta. Pri izračunu vsebnosti elementov, lažjih od bakra, smo upoštevali meritve v zraku, za težje elemente vključno z bakrom pa smo se zanesli na meritev z aluminijevim absorberjem. Nekaj poskusnih meritev smo naredili s selektivnim absorberjem iz kobaltove folije, ki močno uduši ravno bakrove črte, vendar smo tak način merjenja opustili, ker nismo imeli dovolj natančnih podatkov za atenuacijske koeficiente rentgenskih žarkov v kobaltu. Meritve predmetov iz srebrove zlitine z okoli 90 % Ag smo opravili z aluminijevim absorberjem debeline 0,1 mm. Zaradi manjše atenuacije železovih črt, v primerjavi z debelejšim aluminijevim absorberjem, in zaradi razmeroma šibkih bakrovih črt dodatna meritev brez absorberja ni bila potrebna.

Meritve smo izvajali med letoma 1999 in 2017, običajno vzporedno s konservacijo posameznih predmetov oziroma takoj po njej. V tem obdobju smo, v skladu z izkušnjami, ki smo jih pridobivali, spreminjali nastavitve poskusa s protonskim žarkom v zraku in izpopolnjevali dokumentiranje lege merjenih mest na predmetih. Tako smo na primer meritve na železu[647] (npr. robni okovi nožnic mečev) opustili, ker smo ga v večini primerov prepoznali na pogled in z magnetnim preizkusom, poleg tega pa metoda PIXE ni primerna za ugotavljanje sestave železovih zlitin (jekla).

Večino meritev smo naredili na površini predmetov oz. njihovih delov po konservaciji. Take površine so lahko skorajda brez patine[648] ali pa je ta bolj ali manj izrazita. Na izbranih mestih meritev smo (kolikor dobro je bilo ob zmerni invazivnosti mogoče) s površine premera 2–3 mm^2 odstranili površinsko plast do kovinskega jedra. Opazovanje tako pripravljenih mest pod stereomikroskopom je pokazalo, da je popolno odstranitev patine težko doseči, zato se je treba zavedati, da se rezultati meritev takih mest nanašajo na kovinsko jedro z (minimalnimi) ostanki patine.

16.2 Rezultati meritev

Rezultate meritev podajamo v masnih %, v preglednicah in za vsak predmet posebej. Število podanih mest se ujema z natančnostjo meritve. Večina meritev je podana na tri mesta natančno, v primeru elementov, ki so merjeni z napako, večjo od 10 %, pa na dve mesti. V redkih primerih, ko smo vsebnost posameznih elementov razbrali iz šibkih rentgenskih črt na nizkoenergijskih repih močnih rentgenskih črt, so vrednosti podane le z enim mestom. Nabor elementov v posameznih preglednicah je lahko različen in obsega vse elemente, ki smo jih zaznali v izbranem sklopu meritev. Če kakega elementa iz nabora pri posamezni meritvi nismo zaznali, pomeni, da je bila njegova vsebnost pod mejo občutljivosti; v preglednici smo v takih premerih uporabili znak -.

Meritve mest, s katerih je bila s površine odstranjena patina, tako da je izpostavljeno kovinsko jedro, so v preglednicah označene z zvezdico (*), meritve z ožjim protonskim žarkom pa z ¤; oboje ob številki, ki označuje mesto meritve.

Mesta meritev smo številčili z zaporednimi števili, vendar zaradi različnih vzrokov (kovina se je na primer izkazala za železo) nismo vedno izvedli vseh meritev. V takih primerih so številke predvidenih, a neopravljenih meritev v preglednicah rezultatov izpuščene.

Lego in izgled merjenih mest smo fotografsko dokumentirali. V knjigi so merjena mesta praviloma označena na risbah (izjemoma na fotografijah) predmetov in običajno vidna na fotografijah predmetov, kot so bili pripravljeni za analize PIXE. Fotografij predmetov z označenimi mesti meritev PIXE nismo objavili, kadar ne dajejo več podatkov kot risba predmeta z označenimi mesti meritev in

647 Ob rabi izraza železo privzemamo, da ne gre za kemijsko čisto železo, ampak vsebuje primesi lahkih elementov, na primer ogljik (prim. 1. pogl.).

648 Izraz patina uporabljamo kot sinonim za korozijo (površinske okside) na površini predmeta.

The measured points were numbered in sequential order, yet due to different reasons (the metal, for instance, being recognized as iron) we did not execute all measurements. In such cases, the numbers of planned, but not realized measurements are omitted.

The position and appearance of the measured points were photographically documented. In the book, the measured points are as a rule marked on the drawings of the objects (exceptionally on the photographs) and they are usually visible in the photographs of the objects that were prepared for the PIXE analyses. The photographs of the objects with the marked points of measurements were not published if they do not provide more information than the drawing of the object with the marked measured points and a photography of the object in the Catalogue. In the first years of research, the photographic documentation of the measured points was not yet systematic; in such cases, the measured points are given in the publication just in the object drawings.

All tables with the measured results are followed by a commentary that contains an explanation of the results and eventually additional clarification.

To check the accuracy of the method we used the brass standard NIST 1107 that contains 0.037% Fe, 0.098% Ni, 61.2_1% Cu, 37.3_4% Zn, 0.18% Pb and 1.04% Sn (according to the updated data, 1.066% Sn). With an accuracy of a few percent we were able to reproduce the concentration of both major elements Cu and Zn and the concentration of Pb.

We found out that our measurements showed a too high content of Fe (due to the contribution of copper escape peak). For the measurement with the aluminum absorber of 0.3 mm we measured the apparent iron content of about 1%, while for the combined measurement with an Al absorber and without it, the measured value (0.05–0.07%) was only slightly higher than the standard value.

Too high values were also measured for Ni, as its Kα line sits on the tail of the intense copper Kα line; the measured values between 0.1 and 0.18% were close to the detection limit.

For Sn we obtained values between 1.0 and 1.1%. Simulation of the experimental set-up showed that the measured Sn values are rather sensitive to geometrical parameters – proton impact angle and X-ray take-off angle. Since we were not able to control them with an accuracy greater than 10°, the accuracy of small concentrations of Ag, Sn and Sb may be uncertain up to ±10% of the measured values.

The iron concentrations that were only measured by the aluminum absorber, are given in the tables by two digits only (one decimal place).

For the elements that are important for the analysis of copper alloys, we were limited by the detection limits. Iron, cobalt and nickel at concentrations above 0.1% could only be detected if we made an additional measurement without aluminum absorber. The zinc Kα line coincides with the low-energy tail of the copper Kβ line, so the presence of zinc could only be identified from the presence of zinc Kβ line. This determines the detection limit of zinc for our measurements, which was approximately 0.4%.

The detection limits for lead (Pb), bismuth (Bi), arsenic (As) and selenium (Se) were about 0.05%, while the arsenic K lines could only be resolved from the lead L lines through the arsenic Kβ line. The detection limits for silver (Ag), tin (Sn) and antimony (Sb) were 0.1–0.2%; the main reason for this was low counting statistics as a consequence of small ionization cross sections. The detection limits worsened by an order of magnitude when we cut the beam with the 0.2 mm diaphragm.

Results obtained from the repeated measurements on the same object spots often varied more than we expected according to the described limitations and findings (see *Table A7: 2, 7*). We explain this by the spots that were prepared for the measurement not always being uniform (for example, non-uniformly distributed remains of patina on the prepared spot, or for the measurement on patina, its non-uniform composition in a small area) and by the variation of geometrical parameters at our measurements. The most variable was the iron content, which was rather high for the measurement on patinated surfaces of the copper-alloy objects. From the iron intensities we even guessed how well we hit the pre-prepared measured spot with the proton beam, or how thoroughly the patina was removed from the spot.[649] In a few examples, when we measured a tiny color-alloy structure on an iron substrate, the main contribution of the iron signal was attributed to the substrate and was not taken into account for the calculation of concentrations.

The range of 1 MeV protons in copper is 7 micrometers (7 μm; 0,007 mm), and for 3 MeV protons it is 35 μm. As the ionization cross section is a rapidly decreasing function of the decreasing proton energy, and the induced X-rays are attenuated in the target,

649 Patina could be defined as the accumulation of corrosion products and other materials from the environment (Scott 2002, 9). We conjecture that the main source of iron in the patina was the iron of the mud or from the surrounding object (cf. Ingo et al. 2006, 586).

fotografije predmeta v Katalogu. V prvih letih raziskav fotografsko dokumentiranje merjenih mest še ni bilo sistematično; v takih primerih so mesta meritev v objavi podana le na risbah predmetov.

Vsaki preglednici z rezultati meritev sledi komentar, ki vsebuje razlago rezultatov in morebitna dodatna pojasnila.

Za preverjanje točnosti metode smo uporabljali medeninast standard NIST 1107, ki vsebuje 0,037 % Fe, 0,098 % Ni, $61{,}2_1$ % Cu, $37{,}3_4$ % Zn, 0,18 % Pb in 1,04 % Sn (po novejših podatkih 1,066 % Sn). Pri tem smo z natančnostjo nekaj % reproducirali vsebnosti obeh prevladujočih elementov Cu in Zn ter koncentracijo Pb.

Ugotovili smo, da naše meritve pokažejo previsok delež Fe (zaradi prispevka bakrovega ubežnega vrha). Pri meritvah z aluminijevim absorberjem 0,3 mm smo izmerili navidezno vsebnost Fe okrog 1 %, s kombiniranima meritvama z Al absorberjem in brez njega pa je bila izmerjena vsebnost železa (0,05–0,07 %) le malo višja od standardne vrednosti.

Prevelike vsebnosti smo izmerili tudi pri Ni, saj njegova črta Kα sedi na repu močne bakrove črte Kα; izmerjene vsebnosti med 0,1 in 0,18 % so bile na meji zaznave.

Za vsebnosti Sn smo dobili vrednosti med 1,0 in 1,1 %. S simulacijo eksperimentalne nastavitve smo se prepričali, da na izmerjene vsebnosti Sn močno vplivajo geometrijski parametri – vpadni kot protonov in izstopni kot rentgenskih žarkov. Ker ju nismo mogli nadzorovati bolj kot na 10° natančno, so vrednosti majhnih vsebnosti Ag, Sn in Sb lahko negotove do ±10 % izmerjene vrednosti.

Vsebnosti železa pri meritvah, ki smo jih opravili le z aluminijevim absorberjem, so v tabelah podane le z dvema mestoma (eno decimalko).

Pri elementih, ki so pomembni za analizo bakrovih zlitin, smo bili omejeni z mejami zaznave. Železo, kobalt in nikelj smo pri vsebnostih nad 0,1 % lahko ugotavljali le, če smo naredili dodatno meritev brez aluminijevega absorberja. Cinkova črta Kα sovpada z nizkoenergijskim delom bakrove črte Kβ, zato smo na prisotnost cinka sklepali po prisotnosti cinkove črte Kβ. Ta določa mejo, pri kateri so naše meritve zaznale cink, pri približno 0,4 %.

Pri svincu (Pb), bizmutu (Bi), arzenu (As) in selenu (Se) je bila meja zaznave okoli 0,05 %, pri čemer smo arzenovi črti K lahko ločili od svinčevih črt L le po arzenovi črti Kβ. Meja zaznave za srebro (Ag), kositer (Sn) in antimon (Sb) je bila 0,1–0,2 %, k čemur je prispevala slaba števna statistika zaradi majhnih ionizacijskih presekov. Meja zaznave je bila za velikostni red slabša, kadar smo žarek obrezali z zaslonko 0,2 mm.

Pri ponavljanju meritev na istih mestih predmetov so se rezultati včasih (npr. *pregl. A7: 2, 7*) razlikovali bolj, kot bi pričakovali glede na opisane omejitve oziroma ugotovitve. To si razlagamo tako, da za meritev pripravljena oziroma izbrana mesta niso povsem enotna (npr. neenakomerno razporejeni ostanki patine na za meritev pripravljenem mestu ali pri meritvah na patini njena neenakost na razmeroma majhnih površinah), vzrok za odstopanje bi lahko bilo tudi spreminjanje geometrijskih parametrov pri meritvah. Najbolj so se spreminjale vsebnosti železa, ki so bile izrazito visoke pri meritvah na patinirani površini predmetov iz bakrovih zlitin, tako da smo po izmerjenih vrednostih železa sklepali, kako dobro smo zadeli za meritev pripravljeno mesto brez patine oziroma kako temeljito je bila patina z njega odstranjena.[649] V nekaterih primerih, npr. ko smo merili drobno strukturo iz barvne zlitine v železni podlagi, smo večino železovega signala pripisali podlagi in ga nismo upoštevali pri izračunu vsebnosti.

Doseg protonov z energijo 1 MeV v bakru je 7 mikrometrov (7 μm; 0,007 mm), pri energiji 3 MeV pa 35 μm. Ionizacijski presek zelo hitro pada z energijo protonov, rentgenski žarki pa se v snovi absorbirajo, zato je efektivna debelina za produkcijo rentgenskih žarkov še manjša: pri pravokotnem vpadu protonov z energijo 1 MeV v baker znaša 1,4 μm, pri 3 MeV protonih pa je 7,1 μm. V čistem kositru, ki seva prodornejše žarke, so efektivne debeline nekoliko večje, in sicer 2 μm pri 1 MeV in 12,5 μm pri 3 MeV. Efektivni doseg protonskih žarkov v srebru je med vrednostma za baker in kositer.

Metodo PIXE lahko uporabimo tako, da v isti točki opravimo več zaporednih meritev z različnimi energijami, pri čemer vzbujamo rentgenske žarke pri več efektivnih globinah. To nam omogoči, da iz rezultatov zaporedja meritev izračunamo profile vsebnosti za posamezne merjene kemijske elemente (diferencialna metoda PIXE).[650] Tako smo ugotavljali debelino pokositrenja na bronasti pločevini nožnice A9 in srebrne prevleke na okovu spone H2 (glej spodaj).

649 Patino sestavljajo korozijski produkti in materiali iz okolice (Scott 2002, 9). Domnevava, da so bili glavni vir železa v patini železni predmeti v bližini ali železo v mulju (prim. Ingo et al. 2006, 586).
650 Šmit, Istenič, Knific 2008.

the effective thickness for X-ray production is even smaller: at perpendicular impact of 1 MeV protons it is 1.4 μm, and for 3 MeV protons it is 7.1 μm. In pure tin, which emits more penetrative X-rays, it is slightly greater, 2 μm at 1 MeV and 12.5 μm at 3 MeV. The effective range of protons in silver is between the values for copper and tin.

The method of PIXE can also be applied in such a way that we make a series of measurements on the same spot with different impact energies, thus inducing X-rays at different effective depths. This allows us to de-convolute the series of measurements into the concentration profiles of the particular chemical elements (differential PIXE method).[650] In this way we determined the thickness of tinning on the bronze sheet of scabbard A9 and of the silver plating on the buckle plate H2 (see below).

A. Swords and scabbards

A1 (*Table A1; Fig. 61*)

Measurements were taken immediately after conservation. There was no visible patina on the measured scabbard fittings.

All fittings are of brass, containing from ca. 15% to 21% zinc (*Table A1: 4–7, 9, 10, 13–16, 18–24*). This variation in zinc content which is largely attributable to the traces of patina not visible with the naked eye. Because of de-zincification, the proportion of zinc in the corrosion layer on objects of brass or gunmetal is expected to be smaller than in the metal core,[651] hence even the smallest remains of corrosion products influence the measured zinc content.

The scabbard's brass guttering is composed of five pieces, with bronze lining at the joints (*Table A1: 2–3, 11, 17*). The interior (concave) surface of the lining is not contaminated with soldering (*Table A1: 17*), hence the measurement there is relevant for estimating the actual composition of the lining.

Pieces of the guttering and the net-like fitment were soldered together using a tin-lead alloy (*Table A1: 1, 8, 11, 12*). The measured tin and lead contents vary greatly. This is in part due to the solder only surviving in small patches that were very difficult to hit with the proton beam and the presence of copper indicates that in some instances the surrounding area was measured as well. We can also not exclude the possibility that the solder was less than 0.01 mm thick and the proton beam penetrated to the underlying metal.

The exceptionally high iron content measured on Spot 12 shows that the patina was not well removed here.

The rivets were not measured; their appearance corresponds with that of the brass fittings.

Table A1
Preglednica A1

Spot/ Mesto	Fe	Cu	Zn	Sn	Pb
1	1.78	7.3	0.43	69.2	21.2
2	1.21	88.0	-	9.8	1.0
3	1.16	86.8	-	10.8	1.2
4	0.57	77.3	20.4	1.3	0.3
5	0.29	82.5	15.5	1.0	0.7
6	0.37	78.9	19.3	1.3	0.1
7	1.09	79.5	16.9	1.9	0.5
8	3.2	14.0	1.5	55.0	26.3
9	0.35	83.4	15.2	0.9	0.1
10	0.29	82.2	16.5	0.9	0.1
11	0.68	72.7	-	25.3	1.31
12	8.6	4.1	0.4	75.0	11.9
13	0.31	79.1	19.9	0.3	0.4
14	0.52	80.8	17.2	0.6	0.8
15	0.63	81.0	16.8	1.4	0.2
16	0.75	79.7	18.1	1.2	0.2
17	0.82	93.7	-	5.3	0.1
18	0.38	79.7	18.6	0.4	0.9
19	0.46	84.3	14.9	0.3	0.04
20	1.14	82.9	14.9	0.9	0.1
21	0.49	80.2	18.5	0.7	0.1
22	0.61	77.6	20.7	0.8	0.2
23	0.47	78.4	20.0	0.9	0.2
24	1.8	79.1	18.2	0.7	0.2

650 Šmit, Istenič, Knific 2008.
651 Pollard, Heron 1996, 211; Scott 2002, 27–31.

Figure 61
Scabbard A1: the measured spots.

Slika 61
Nožnica A1, lega merjenih mest.

A. Meči in nožnice

A1 (*pregl. A1; sl. 61*)

Meritve smo naredili na sveže konserviranem predmetu. Na površini merjenih okovov nožnice s prostim očesom ni bilo videti patine.

Vsi okovi so iz medenine, ki vsebuje od najmanj okoli 15 do 21 % cinka (*pregl. A1: 4–7, 9, 10, 13–16, 18–24*). Glavni vzrok za precejšnje razlike v izmerjenih vrednostih so verjetno ostanki patine na merjenih mestih. Vsebnost cinka v korodirani površini predmetov iz medenine (in drugih bakrovih zlitin s cinkom) je namreč bistveno nižja kot v kovinskem jedru,[651] zato že majhni ostanki korozije na analiziranem mestu vplivajo na izmerjeni delež cinka.

Medeninast robni okov je sestavljen iz petih delov. Na stikih je podloga iz brona (*pregl. A1: 2–3, 11, 17*). Delež kositra, izmerjen na notranji (vbočeni) površini podloge (5,3 %; *pregl. A1: 17*), je primeren za oceno dejanskega deleža kositra in svinca v podlogi, ker ta površina ni kontaminirana s spajkanjem.

Za spajkanje delov robnega okova in mrežastega okova so uporabili zlitino kositra in svinca (*pregl. A1: 1, 8, 11, 12*). Na različnih mestih izmerjeni deleži kositra in svinca se močno razlikujejo. To je med drugim verjetno posledica dejstva, da je lot ohranjen na majhnih površinah, ki jih je bilo s protonskim žarkom težko zadeti (zato je zadel tudi okolico, kar jasno kažejo izmerjeni deleži bakra); ni izključeno, da je lot tenak manj kot 0,01 mm in je zato protonski žarek lahko dosegel podlago.

Visok odstotek na mestu 12 izmerjenega železa kaže, da je bila tam patina odstranjena slabše kot drugje.

Zakovic nismo merili; po izgledu povsem ustrezajo robnemu in drugim okovom iz medenine.

651 Pollard, Heron 1996, 211; Scott 2002, 27–31.

A2 (*Table A2, Figs. 62, 63*)

Measurements were taken immediately after conservation. There was no visible patina on the measured spots.

The suspension band (*Table A2: 2, 4*) and the two rivets (*Table A2: 1, 5*) fastening it to the guttering are of brass containing ca. 16–18% zinc.

The guttering is of iron (*Table A2: 3*). The measured copper, zinc and arsenic were presumably transferred onto the guttering during conservation.

Spot/ Mesto	Fe	Cu	Zn	As	Pb	Ag	Sn
1	2.4	80.6	16.0	0.02	0.07	0.1	0.8
2	1.8	79.3	18.1	0.02	0.17	-	0.6
3	98.2	1.3	0.2	0.04	-	-	-
4	1.8	80.8	16.4	0.03	0.15	-	0.7
5	2.5	78.6	16.7	0.02	0.05	0.1	1.0

Table A2
Preglednica A2

A3 (*Table A3, Figs. 64, 65a, b*)

The metals were measured on spots where the patina had largely been removed.

The suspension band (*Table A3: 1*), rivets (*Table A3: 3*) and ring on the suspension band (*Table A3: 4*) are of brass with at least ca. 19% zinc. The guttering is of iron (*Table A3: 2*).

The iron content measured on Spots 1, 3 and 4 is uncertain, as single measurements were taken with a 0.3 mm thick aluminium absorber. The values in the table show that either the patina was not entirely removed or the proton beam hit the area around the spot prepared for measurement.

Spot/ Mesto	Fe	Ni	Cu	Zn	As	Pb	Sn
1*	1.3	0.23	78.1	19.5	-	0.27	0.62
2	97.6	-	0.91	1.44	0.05	0.05	-
3*	1.5	0.22	78.7	18.6	-	0.14	0.76
4*	1.5	0.19	78.2	19.2	-	0.38	0.53

Table A3
Preglednica A3

A5 (*Table A5, Figs. 66, 67a–i*)

Measurements were taken immediately after conservation. There was no visible patina on the measured spots.

The sword's handguard plate is of copper (*Table A5: 1, 2*). The shiny surface on the underside is a very thinly (1.5 µm at Spot 4, 1.1 µm at Spot 5) applied layer of tin through which the beam penetrated to the underlying copper (*Table A5: 4, 5*). The traces of a tin-lead alloy on the upper side (*Table A5: 3*) suggest remains of soldering.

The sheet metal covering the front of the scabbard is of brass with at least ca. 24.6% zinc (*Table A5: 9, 10*). Its well-preserved shiny silvery surface revealed ca. 11 and 19% tin, indicating that the sheet brass was tinned, while the beam also penetrated to the underlying brass (*Table A5: 7, 8*).

The mouth band (*Table A5: 14*), all three crossbands (*Table A5: 15–17*), the ring on one of the suspension bands (*Table A5: 20*), the openwork chape (*Table A5: 12*) and the terminal knob (*Table A5: 13*) are of brass.

Spot/ Mesto	Fe	Cu	Zn	As	Pb	Sn
1	0.6	98.6	0.4	0.13	0.11	0.1
2	0.6	98.4	0.4	0.15	0.13	0.1
3	-	28.8	1.5	-	5.7	64.0
4	1.3	83.8	0.3	0.13	0.19	14.2
5	0.6	88.2	0.3	0.14	0.17	10.5
6¤	1.1	67.8	16.2	0.08	0.58	14.1
7	1.1	66.2	21.5	0.01	0.05	11.1
8	0.6	60.8	18.8	-	0.21	19.5
9	0.8	73.6	24.7	-	0.03	0.8
10	0.6	73.3	24.6	0.01	0.03	1.3
11	93.5	4.4	1.4	-	0.1	0.6
12	0.8	77.2	21.2	0.19	0.07	0.5
13	1.0	71.8	26.4	0.21	0.08	0.4
14	0.5	78.4	20.4	0.06	0.10	0.5
15	0.5	75.2	23.3	0.17	0.12	0.6
16	0.3	75.4	23.3	0.19	0.08	0.7
17	0.9	75.0	23.3	0.19	0.08	0.5
18¤	1.2	96.8	1.4	0.36	0.04	0.2
19	1.0	97.1	1.1	0.39	0.02	0.3
20	0.6	75.2	23.3	0.17	0.06	0.6

Table A5
Preglednica A5

Figure 62
Sword scabbard fragment A2: the measured spots.

Slika 62
Nožnica A2, lega merjenih mest.

Figure 63
Spots measured on the A2 sword scabbard fragment: measured Spots 1 and 5 on the rivet, Spots 2 and 4 on the suspension band and cross band and Spot 3 on the guttering.

Slika 63
Nožnica A2, mesta 1 in 5 (zakovica), 2, 4 (prečni okov) in 3 (robni okov).

Figure 64
The A2 sword scabbard fragment: the measured spots.

Slika 64
Nožnica A3, lega merjenih mest.

Figure 65a
Spots measured on the A3 sword scabbard fragment: measured Spot 1 on the suspension band, Spot 2 on the guttering and Spot 3 on the rivet.

Slika 65a
Nožnica A3, mesta 1 (prečni okov), 2 (robni okov) in 3 (zakovica).

Figure 65b
Sword scabbard fragment A3: measured Spot 4 on the suspension ring.

Slika 65b
Nožnica A3, mesto 4 (obroček na prečnem okovu).

A2 (*pregl. A2, sl. 62, 63*)

Meritve smo naredili na sveže konserviranem predmetu. Na merjenih mestih ni bilo očitnih sledov patine. Rezultati kažejo, da so prečni okov (*pregl. A2: 2, 4*) in zakovici (*pregl. A2: 1, 5*), ki sta ga pripenjali na robni okov, iz medenine z najmanj okoli 16 do 18 % cinka. Robni okov je iz železa (*pregl. A2: 3*). Izmerjeni deleži bakra, cinka in arzena so bili na robni okov najverjetneje zaneseni med konservacijo.

A3 (*pregl. A3, sl. 64, 65a, b*)

Barvne kovine smo merili na mestih, s katerih smo v glavnem odstranili patino.

Rezultati kažejo, da so prečni okov (*pregl. A3: 1*), zakovici (*pregl. A3: 3*) in obroček na prečnem okovu (*pregl. A3: 4*) iz medenine, ki vsebuje najmanj okoli 19 % cinka. Robni okov je železen (*pregl. A3: 2*).

Na mestih 1, 3 in 4 izmerjene vsebnosti železa so negotove, ker smo naredili le po eno meritev z 0,3 mm debelim Al absorberjem. Vrednosti v tabeli tudi dopuščajo, da patina ni bila povsem odstranjena z merjenih površin ali/in pa je protonski žarek pri meritvah zadel tudi okolico za meritve pripravljenega mesta.

A5 (*pregl. A5, sl. 66, 67a–i*)

Meritve smo izvajali na sveže restavriranem predmetu. Na merjenih mestih ni bilo očitnih sledov patine.

Ščitnik branika meča je iz bakra (*pregl. A5: 1, 2*). Svetleča se površina na spodnji strani je izredno tenko (1,5 μm v točki 4 in 1,1 μm v točki 5) nanesena plast kositra, skozi katero je žarek segel do bakrene podlage (*pregl. A5: 4, 5*), ostanki zlitine kositra in svinca na zgornji strani (*pregl. A5: 3*) pa nakazujejo ostanke spajkanja.

Pločevina, ki prekriva sprednjo stran nožnice, je iz medenine z najmanj okoli 24,6 % cinka (*pregl. A5: 9, 10*). Meritve na dobro ohranjeni srebrno svetleči se površini so pokazale okoli 11 oziroma 19 % kositra, ki govori za to, da je bila medeninasta pločevina na zunanji strani prekrita z zelo tenko plastjo kositra, skozi katero je žarek dosegel podlago (*pregl. A5: 7, 8*).

Okov ob ustju (*pregl. A5: 14*), vsi trije prečni okovi (*pregl. A5: 15–17*), obroček na prečnem okovu (*pregl. A5: 20*) ter okov s predrtim okrasom na konici (*pregl. A5: 12*) in zaključni gumb (*pregl. A5: 13*)

The measured zinc content varies between 20.4 and 26.4%. The low iron content (0.3–1.0%) indicates that not much patina remained on the measured spots.

Measurements of the mouth band (*Table A5: 6*) show that the overlapping ends were most likely soldered together with tin; the measured copper, zinc and arsenic indicate that the beam also hit a large part of the brass surrounding the soldering and, where solder was thin, even the underlying brass.

The rivets on the suspension bands are most likely of copper. The measured iron indicates traces of patina, while the zinc content shows the beam also hit the brass suspension band (*Table A5: 18, 19*).

Figure 66
Sword and scabbard A5: the measured spots.

Slika 66
Meč in nožnica A5, lega merjenih mest.

Figure 67a
The upper side of the A5 handguard plate: measured Spots 1 and 2 (without patina) on the metal from which the object was made and Spot 3 on the patch with silvery appearance.

Slika 67a
Ščitnik branika ročaja meča A5, zgornja stran, mesta 1–2 (osnovna zlitina, brez patine) in 3 (srebrno sijoče mesto na površini).

Figure 67b
The underside of the A5 handguard plate: measured Spots 4 and 5 on the coating with silvery appearance.

Slika 67b
Ščitnik branika ročaja meča A5, spodnja stran, mesti 4 in 5 (srebrno sijoča prevleka na površini).

Figure 67c
The front of the A5 scabbard: measured Spot 6 on the solder on the mouth band and Spot 7 on the silvery coating on the front sheet metal.

Slika 67c
Nožnica A5, sprednja stran, mesti 6 (spajkanje okova ob ustju) in 7 (srebrno sijoča prevleka na pločevini).

Figure 67d
The front of the A5 scabbard: measured Spot 8 on the silvery coating of the sheet metal and Spot 9 on the sheet metal.

Slika 67d
Nožnica A5, sprednja stran, mesti 8 (srebrno sijoča prevleka na pločevini) in 9 (rumena pločevina).

so iz medenine. Izmerjeni deleži cinka nihajo med 20,4 in 26,4 %. Izmerjeni odstotki železa (0,3–1,0 %) nakazujejo, da na merjenih mestih ni bilo veliko ostankov patine.

Rezultat meritve spajkanja na okovu ob ustju (*pregl. A5: 6*) govori za to, da sta bila presegajoča se zaključka tega okova najverjetneje spajkana s kositrom; izmerjeni baker, cink in arzen kažejo, da je žarek zadel tudi razmeroma velik del medenine okoli spajkanja in na tankih delih spajkanja morda tudi podlago pod lotom. Zakovice na prvem in drugem prečnem okovu so najverjetneje iz bakra, izmerjeni odstotki železa kažejo na ostanke patine, odstotki cinka pa, da je žarek zadel tudi medeninasti okov (*pregl. A5: 18, 19*).

Figure 67e
The front of the A5 scabbard: measured Spot 10 on the sheet metal and Spot 11 on the traces of corroded iron guttering.

Slika 67e
Nožnica A5, sprednja stran, mesti 10 (rumena pločevina) in 11 (sledovi korodiranega robnega okova).

Figure 67f
The front of the A5 scabbard: measured Spot 12 on the chape and Spot 13 on the terminal knob.

Slika 67f
Nožnica A5, sprednja stran, mesti 12 (rumena površina okova na konici) in 13 (rumena površina gumba na konici).

Figure 67g
The back of the A5 scabbard: measured Spot 14 on the mouth band, Spot 15 on the upper suspension band and Spot 18 on the rivet.

Slika 67g
Nožnica A5, hrbtna stran, mesta 14 (rumena površina okova ob ustju), 15 (rumena površina prvega prečnega okova) in 18 (zakovica).

Figure 67h
The back of the A5 scabbard: measured Spot 16 on the second suspension band and Spot 19 on the rivet.

Slika 67h
Nožnica A5, hrbtna stran, mesti 16 (rumena površina drugega prečnega okova) in 19 (zakovica).

Figure 67i
The back of the A5 scabbard: measured Spot 17 on the cross band.

Slika 67i
Nožnica A5, hrbtna stran, mesto 17 (rumena površina tretjega prečnega okova).

A6 (*Table A6, Figs. 68, 69a–d*)

Three spots were measured on the upper side of the sword's handguard plate: 15 (measured twice, the second time after removing the surface layer down to the shiny metal core), 14 (surface of a silvery appearance) and 13 (patina). The results show that the handguard plate is of bronze (*Table A6: 15*) and bears patches of a tin layer on the upper surface (*Table A6: 14*).

The sheet metal and fittings of the scabbard are very poorly preserved. We presumed that the metal core did not survive due to the advanced corrosion, hence measurements were taken on the surface of the front sheet metal, fittings and rivets after conservation. As expected, the results show a (very) high iron content (*Table A6: 1, 2, 5, 6–11, 19–20*; cf. Chapter 16.2).

The sheet metal on the scabbard front is of brass (*Table A6: 1, 4, 8*). The measured tin content and the analogy with other Mainz type scabbards (e.g. A5) point to tinning on the front (*Table A6: 1, 4, 8*).

The mouth band (*Table A6: 5, 12*) and the suspension band (*Table A6: 9*) are also of brass. The rivet on the suspension band is of copper (*Table A6: 11*). The mouth plate is soldered to the mouth band with tin-lead alloy (*Table A6: 17*). The guttering is of iron (*Table A6: 3*).

A7 (*Table A7, Figs. 70, 71a–f*)

The sword's handguard plate is of bronze (*Table A7: 9/22*). The measurements on the poorly surviving, slightly silvery surface of the underside revealed tinning (*Table A7: 7/20, 8/21*). The measurements on the upper side, with the standard and the narrow beam, show that the two small silvery patches are tin-lead alloy (*Table A7: 10/23*). The differences in the lead content or the lead-tin ratio between the measurements are probably largely attributable to an inhomogeneous alloy (results of wide beam measurements are therefore closer to the real values), while the differences in the copper content probably show that the beam did not hit the prepared spot only.

The very thin sheet metal covering the front of the scabbard is brass with at least 20.3% zinc (*Table A7: 16, 19*); the measurement in the area of a poorly preserved thin grey layer on the front shows tinning (*Table A7: 15*).

Spot/ Mesto	Fe	Cu	Zn	As	Pb	Ag	Sn
1	9.1	80.4	9.1	0.08	0.16	-	1.1
2	65.1	33.4	1.3	0.05	0.11	-	-
3	92.9	3.9	2.0	0.10	-	-	1.1
4	3.9	78.9	16.3	0.06	0.04	-	0.8
5	6.7	77.3	15.4	0.04	0.12	0.1	0.4
6	88.9	9.5	1.2	0.14	0.23	-	-
7	94.5	3.9	0.7	0.06	0.07	-	0.7
8	5.6	73.7	19.7	0.05	0.06	-	0.9
9	6.6	77.5	15.6	0.07	0.15	-	-
10	8.3	76.7	14.6	0.02	0.07	0.1	0.2
11	8.6	90.2	1.1	-	0.05	-	-
12	1.0	79.4	18.9	0.07	0.11	-	0.5
13	0.3	92.5	0.6	0.08	0.26	-	6.2
14	2.6	72.2	0.5	0.14	0.24	-	24.2
15	1.2	91.5	0.8	-	0.37	-	6.1
15*	0.7	92.5	0.7	0.09	0.14	-	5.9
17	4.5	10.2	2.1	-	34.8		48.3
19*	94.0	4.60	1.12	-	0.9	0.04	0.10
20*	81.7	16.9	0.77	-	0.34	0.03	0.18

Table A6
Preglednica A6

Figure 68
Sword and scabbard A6: the measured spots.

Slika 68
Meč in nožnica A6, lega merjenih mest.

Figure 69a
The front of the A6 sword and scabbard: measured Spots 1, 2, 4, 7 and 8 on the metal sheet, Spot 3 on the guttering, Spots 5, 6 and 20 on the mouth band, Spot 17 on the solder attaching the mouth plate to the mouth band and Spot 19 on the upper suspension band. Spot 16 was not measured.

Slika 69a
Meč in nožnica A6, sprednja stran, mesta 1, 2, 4, 7, in 8 (pločevina), 3 (robni okov), 5, 6 in 20 (okov ob ustju), 17 (spajkanje okova ob ustju in ovalnega okova) ter 19 (prvi prečni okov). Mesto 16 ni bilo merjeno.

Figure 69b
The back of the A6 sword and scabbard: measured Spots 9 and 10 on the suspension band, Spot 11 on the rivet of the suspension band and Spot 12 on the mouth band.

Slika 69b
Meč A6, hrbtna stran, točke 9 in 10 (prečni okov), 11 (zakovica na prečnem okovu) in 12 (okov ob ustju).

Figure 69c
The upper side of the A6 handguard plate: measured Spots 13 and 15 (patina) on the metal from which the object was made and Spot 14 on the badly preserved silvery patch on the surface.

Slika 69c
Ščitnik branika ročaja meča A6, zgornja stran, mesta 13, 15 (patina še ni odstranjena) in 14 (slabo ohranjeno srebrnkasto mesto na površini).

Figure 69d
The upper side of the A6 handguard plate: measured Spot 15 after the patina was removed.

Slika 69d
Ščitnik branika ročaja meča A6, zgornja stran, mesto 15 (patina odstranjena).

A6 (*pregl. A6, sl. 68, 69a–d*)

Na zgornji strani ščitnika meča smo merili tri mesta: 15 (dvakrat – drugič po tem, ko smo površinsko plast odstranili do sijočega kovinskega jedra), 14 (površina srebrnega videza) in 13 (patina). Rezultati meritev kažejo, da je ščitnik iz brona (*pregl. A6: 15*) in da so na zgornji strani ostanki plasti kositra (*pregl. A6: 14*).

Pločevina in okovi nožnice so zelo slabo ohranjeni. Ocenili smo, da kovinsko jedro zaradi napredovale korozije verjetno ni ohranjeno, zato smo meritve izvedli na površini pločevine, okovov in zakovice po konservaciji. V skladu s pričakovanji so meritve pokazale (zelo) visoke odstotke železa (*pregl. A6: 1, 2, 5, 6–11, 19–20*; prim. zgoraj, pogl. 16.2).

Iz rezultatov meritev sklepamo, da je bila pločevina na sprednji strani nožnice iz medenine (*pregl. A6: 1, 4, 8*). Izmerjene vsebnosti kositra in primerjava z drugimi nožnicami tipa Mainz (npr. A5) nakazujejo, da je bila na sprednji strani pokositrena (*pregl. A6: 1, 4, 8*).

Iz medenine sta tudi okov ob ustju nožnice (*pregl. A6: 5, 12*) in prečni okov (*pregl. A6: 9*). Zakovica na prečnem okovu je bakrena (*pregl. A6: 11*). Ovalni okov na vrhu nožnice in okov ob ustju nožnice sta spajkana z zlitino kositra in svinca (*pregl. A6: 17*). Robni okov je železen (*pregl. A6: 3*).

A7 (*pregl. A7, sl. 70, 71a–f*)

Ščitnik branika ročaja meča je iz brona (*pregl. A7: 9/22*). Rezultati meritev na slabo ohranjeni, rahlo srebrni plasti na spodnji strani kažejo, da je bil na spodnji strani pokositren (*pregl. A7: 7/20, 8/21*). Drobna ostanka srebrne barve na zgornji površini branika sta, glede na meritvi (z običajnim in zoženim žarkom), zlitina kositra in svinca (*pregl. A7: 10/23*). Razlike v deležu svinca oziroma v razmerju med svincem in kositrom pri obeh meritvah so verjetno posledica nehomogenosti razporeditve svinca v zlitini (glede tega so bližje dejanski vrednosti rezultati meritve s širšim žarkom), razlike v deležu bakra pa verjetno izvirajo iz dejstva, da je bilo z običajnim žarkom nemogoče zadeti le površino spajkanja brez okolice.

Zelo tenka pločevina, ki je prekrivala sprednjo stran nožnice, je iz medenine z najmanj 20,3 % cinka (*pregl. A7: 16, 19*); meritev na mestu, kjer je slabo ohranjena tenka plast sive barve (na sprednji strani pločevine), govori za to, da je bila pločevina na sprednji strani pokositrena (*pregl. A7: 15*).

The mouth band and surviving crossbands are of brass (*Table A7: 4, 8, 9, 12, 14, 18*). The ends of the bands overlap at the back and are soldered with tin (*Table A7: 11, 17*) or tin-lead alloy (*Table A7: 2*). Tin is also used for soldering the mouth band to the mouth plate (*Table A7: 1, 7*).

The rivets are of copper (*Table A7: 3, 13*).

Spots 5 and 6 were not measured quantitatively, as they were found to be of iron after a short (ten-second) measurement.

Spot / Mesto	Fe	Ni	Cu	Zn	Pb	Ag	Sn
1	2.6	-	18.1	3.7	0.3	-	75.4
2	-	-	3.6	0.6	5.9	-	89.9
2	0.6	-	2.3	0.5	4.9	-	91.8
3	0.51	-	97.6	1.9	-	-	-
4	1.1	-	76.7	21.5	0.2	0.08	0.4
7	22.2	-	7.4	1.6	0.17	-	68.7
7	13.0	-	8.3	1.8	0.19	-	76.6
8	2.2	-	74.4	22.8	0.25	-	0.4
9	2.0	-	77.4	19.4	0.36	0.1	0.3
11¤	3.1	-	0.8	0.5	0.17	-	95.4
12*	1.8	-	-	21.1	0.16	-	0.3
13	1.2	-	98.5	-	0.11	0.1	0.1
14	1.7	-	75.4	22.3	0.19	0.1	0.4
15	1.4	-	68.7	19.6	-	-	10.1
16	1.1	-	77.4	20.8	0.20	-	0.4
17	1.9	-	8.8	2.1	0.18	-	86.7
17¤	0.66	-	10.9	2.5	0.16	-	85.7
18	1.0	0.11	77.3	20.8	0.38	0.04	0.4
19	2.6	0.09	76.5	20.3	0.17	0.03	0.2
7/20	4.1	-	74.4	0.4	0.9	-	20.1
8/21	4.5	0.14	74.6	0.4	1.2	-	19.3
9/22*	0.54	0.13	94.2	-	0.5	-	4.6
10/23	7.04	-	33.7	-	6.5	-	52.7
10/23¤	0.87	-	17.1	-	12.9	-	69.1

Table A7
Spots 2 and 7 were measured twice. The measured spots on the handguard plate were initially marked as Nos. 7–10 (cf. *Fig. 71a, b*).

Preglednica A7
Na mestih 2 in 7 smo merili dvakrat. Merjena mesta na ščitniku branika ročaja meča so bila prvotno označena s št. 7–10 (prim. *sl. 71a, b*).

Figure 70
The A7 sword and scabbard: the measured spots.

Slika 70
Meč in nožnica A7, lega merjenih mest.

Figure 71a
The upper side of the A7 handguard plate: measured Spot 9 on the base metal and Spot 10 on the silvery patch; in *Table A7* they are referred to as Spots 9/22 and 10/23 respectively.

Slika 71a
Ščitnik branika ročaja meča A7, zgornja stran, mesti 9 (ščitnik) in 10 (ostanki mesta srebrnega videza), ki sta v *pregl. A7* označeni kot 9/22 in 10/23.

Figure 71b
The underside of the A7 handguard plate: measured Spots 7 and 8, the last one on the relatively well surviving silvery coating; in *Table A7* they are referred to as Spots 7/20 and 8/21.

Slika 71b
Ščitnik branika ročaja meča A7, spodnja stran, mesti 7 in 8 (zadnje z dobro vidno prevleko srebrnega videza), ki sta v *pregl. A7* označeni kot 7/20 in 8/21.

Figure 71c
The A7 swords scabbard: measured Spot 7 on the solder that fixed the mouth band to the mouth plate (left of the marked spot) and Spot 8 on the remains of the mouth plate.

Slika 71c
Nožnica A7, mesti 7 (spajka na okovu ob ustju, levo od označenega mesta) in 8 (sledovi ovalnega okova).

Figure 71d
The back of the A7 sword scabbard: measured Spots 2 and 3 (solder and rivet on the upper cross band) and Spot 4 on the upper cross band; measurements on Spots 5 and 6 were abandoned.

Slika 71d
Nožnica A7, hrbtna stran, prvi prečni okov, mesta 2 (spajkanje), 3 (zakovica) in 4 (okov); mesti 5 in 6 na robnem okovu nista izmerjeni.

Okov ob ustju nožnice in oba ohranjena prečna okova so iz medenine (*pregl. A7: 4, 8, 9, 12, 14, 18*). Presegajoči se konci teh okovov se na hrbtni strani nožnice prekrivajo in so spajkani s kositrom (*pregl. A7: 11, 17*) ali zlitino kositra in svinca (*pregl. A7: 2*). Kositer so uporabili tudi za spojitev okova ob ustju nožnice z medeninastim ovalnim okovom (*pregl. A7: 1, 7*).

Zakovici sta bakreni (*pregl. A7: 3, 13*).

Mest 5 in 6 nismo merili kvantitativno, ker smo po kratki meritvi (10 sekund) ugotovili, da sta železni.

Figure 71e
The lower suspension band of the A7 sword scabbard: measured Spot 11 on the solder, Spot 12 on the suspension band and Spot 13 on the rivet.

Slika 71e
Nožnica A7, hrbtna stran, drugi prečni okov, mesta 11 (spajka), 12 (prečni okov) in 13 (zakovica).

Figure 71f
The front of the A7 sword scabbard: measured Spot 9 on the mouth band and Spot 19 on the sheet metal.

Slika 71f
Nožnica A7, sprednja stran, mesti 9 (okov ob ustju) in 19 (pločevina).

A8 (*Table A8, Figs. 72, 73a–c*)

Measurements were taken after conservation.

The sword's handguard plate is of bronze (*Table A8: 1*). The shiny silvery remains on its upper side are tin-lead alloy (*Table A8: 3*). The horizontal metal plate on the grip was measured on the spot where surface accretions were removed to expose the metal core; measurements show the plate to be of iron (*Table A8: 8*) or steel.

The scabbard's mouth plate is of brass (*Table A8: 4*). The shiny silvery layer along its upper edge is tin-lead alloy (*Table A8: 6*) used to solder the band to the mouth plate.

Spot/ Mesto	Fe	Ni	Cu	Zn	As	Pb	Ag	Sn
1	1.6	0.21	86.4	0.46	0.03	1.75	-	9.56
3	2.2	-	1.35	0.26	-	11.4	-	84.8
4	2.1	0.17	76.9	19.9	-	0.55	0.06	0.24
6	15	-	6.19	1.83	-	20.4	-	56.5
8*	99.9	-	-	0.01	-	0.07	-	-

Table A8
No. 7 was accidentally left out when assigning numbers to measured spots.

Preglednica A8
Pri številčenju mest meritev je bila št. 7 pomotoma izpuščena.

Figure 72
Sword and scabbard A8: the measured spots.

Slika 72
Meč in nožnica A8, lega merjenih mest.

A9 (*Table A9, Figs. 74, 75a–d*)

The scabbard guttering is of iron (*Table A9: 5*).

The front of the scabbard is covered with a sheet of bronze containing ca. 6–7% tin (*Table A9: 1, 6*) and tinned (*Table A9: 3, 4*). The differential PIXE analyses show that the layer of tin is very thin (ca. 1.2 µm = 0.0012 mm).[652]

The suspension band is of brass with at least 22% zinc (*Table A9: 1/7, 3/9*). The metal core of the band's suspension ring could not be measured due to its poor condition; the results on the corroded metal indicate it was of brass (*Table A9: 2/8*).

Spot/ Mesto	Fe	Cu	Zn	As	Pb	Ag	Sn	Br
1	4.9	87.8	0.5	0.06	0.15	-	6.6	-
3	0.9	79.3	0.3	0.07	0.10	-	19.3	-
4	2.1	72.7	0.2	0.04	0.07	-	24.9	-
5	98.9	0.9	0.1	0.02	0.02	-	-	-
6	1.2	92.3	-	-	0.18	-	6.4	-
1*/7*	2.3	73.7	22.0	-	0.21	-	0.3	1.5
2/8	3.3	88.8	6.1	0.11	0.52	-	1.2	-
3*/9*	0.8	72.5	26.1	0.04	0.08	0.08	0.34	-

Table A9
The measured spots on the suspension band were initially marked with Nos. 1–3 (cf. *Fig. 75a, b*).

Preglednica A9
Merjena mesta na prečnem okovu so bila prvotno označena s št. 1–3 (prim. *sl. 75a, b*).

Figure 74
Sword and scabbard A9: the measured spots.

Slika 74
Nožnica A9, lega merjenih mest.

Figure 75a
The back of the A9 suspension band: measured Spot 1, referred to as Spot 1/7 in *Table A9*.

Slika 75a
Nožnica A9, hrbtna stran prečnega okova, mesto 1, ki je v *pregl. A9* označeno kot 1/7.

Figure 75b
The front of the A9 suspension band: measured Spot 3 on the suspension band and Spot 2 on the suspension ring, referred to as Spots 3/9 and 2/8 in *Table A9*.

Slika 75b
Nožnica A9, mesti 3 (sprednja stran prečnega okova) in 2 (obroček), ki sta v *pregl. A9* označeni kot 3/9 in 2/8.

652 Šmit, Istenič, Knific 2008, 2330, Fig. 1.

Figure 73a
The upper side of the A8 handguard plate: measured Spot 1 on the base metal and Spot 3 on the patch with silvery appearance.

Slika 73a
Zgornja stran ščitnika branika ročaja meča A8, mesti 1 (rumena sijoča površina) in 3 (srebrno svetleče se mesto na površini).

Figure 73b
The back of the A8 sword and scabbard: measured Spot 4 on the mouth band and Spot 8 on the metal plate or mount on the grip.

Slika 73b
Meč in nožnica A8, hrbtna stran, mesti 4 (okov ob ustju) in 8 (kovinski vložek v ročaju).

Figure 73c
Sword and scabbard A8: measured Spot 6 on the soldering attaching the mouth plate to the mouth band.

Slika 73c
Meč in nožnica A8, mesto 6 (spajka med ovalnim okovom in okovom ob ustju).

Figure 75c
The front of the A9 scabbard sheet metal and guttering: the Spot 2 on the base metal, Spots 3 and 4 on the coating of the sheet metal and Spot 5 on the guttering. Spot 2 was not measured.

Slika 75c
Nožnica A9, sprednja stran, pločevina – mesta 2 (brez prevleke), 3 in 4 (prevleka) in robni okov – mesto 5. Mesto 2 ni bilo merjeno.

Figure 75d
The back of the A9 scabbard sheet metal: measured Spot 6.

Slika 75d
Nožnica A9, hrbtna stran pločevine nožnice, mesto 6.

A8 (*pregl. A8, sl. 72, 73a–c*)

Meritve smo izvajali na konserviranem predmetu.

Rezultati kažejo, da je ščitnik branika ročaja meča iz brona (*pregl. A8: 1*). Srebrno svetleči se ostanki na njegovi zgornji površini so zlitina kositra s svincem (*pregl. A8: 3*). Na vodoravnem kovinskem obroču, ki je viden na ročaju, smo merili na mestu, kjer je bila površina odstranjena do kovinskega jedra; meritve so pokazale, da je iz železa (*pregl. A8: 8*) oziroma jekla.

Okov ob ustju nožnice je iz medenine (*pregl. A8: 4*). Srebrno sijoča plast na njegovem zgornjem robu je zlitina kositra s svincem (*pregl. A8: 6*), s katero je bil nanj prispajkan ovalni okov na vrhu nožnice.

A9 (*pregl. A9, sl. 74, 75a–d*)

Robni okov nožnice je iz železa (*pregl. A9: 5*).

Sprednja stran nožnice je prekrita s pločevino iz brona z okoli 6–7 % kositra (*pregl. A9: 1, 6*). Na sprednji strani je pokositrena (*pregl. A9: 3, 4*). Diferencialne analize PIXE so pokazale, da je plast kositra zelo tenka (okoli 1,2 μm = 0,0012 mm).[652]

Prečni okov je iz medenine z najmanj 22 % cinka (*pregl. A9: 1/7, 3/9*). Na nanj pritrjenem obročku zaradi slabe ohranjenosti ni bilo mogoče meriti kovinskega jedra; rezultati na korodirani kovini nakazujejo, da je bil iz medenine (*pregl. A9: 2/8*).

652 Šmit, Istenič, Knific 2008, 2330, sl. 1.

A10 (*Table A10, Figs. 76, 77a, b*)

Measurements were taken during conservation. There was no visible patina on Spots 4, 6, 8 and 10.

The sheet metal covering the scabbard front is brass with at least ca. 21% zinc (*Table A10: 4, 8*).

The tin content on the patina-covered sheet metal front (*Table A10: 1–3, 5*) differs little from that of the patina-covered back of the sheet metal (*Table A10: 9*), i.e. it does not indicate tinning on the front. In contrast, the EDS XRF measurements taken prior to conservation indicate precisely that, on one spot showing 4% tin.[653]

The decorative strip covering the neck of the terminal knob is of brass (*Table A10: 6*).

Spot/ Mesto	Fe	Cu	Zn	As	Sr	Ag	Sn	Pb
1	8.03	80.2	10.2	0.077	0.049	0.06	0.55	0.80
2	0.33	80.0	18.7	-	-	0.04	0.50	0.37
3	1.49	83.8	13.7	0.030	-	0.07	0.61	0.38
4	0.33	76.7	21.9	-	-	0.05	0.49	0.47
5	0.47	78.1	20.7	-	-	0.05	0.35	0.25
6	0.89	79.7	18.1	-	0.087	0.07	0.98	0.19
8	0.33	77.9	21.0	-	-	0.05	0.34	0.43
9	8.62	73.7	16.7	-	-	0.06	0.54	0.31
10	0.42	78.5	20.2	-	-	0.05	0.43	0.39

Table A10
Spot 7 was not measured.

Preglednica A10
A10. Na mestu 7 meritev nismo izvedli.

Figure 76
The A10 scabbard fragment: the measured spots.

Slika 76
Ostanki nožnice A10, lega merjenih mest.

A11 (*Table A11, Figs. 78, 79a, b*)

Measurements were taken immediately after conservation. With the exception of Spot 5, they were taken on the patina-covered surface, hence the high iron content comes as no surprise.

The openwork scabbard chape is of brass with ca. 22% zinc (*Table A11: 5*). The measurements of the patina-covered front show it was not plated (*Table A11: 1–3*). The tin and lead detected in the patina on two spots at the back of the chape (*Table A11: 4, 9*) suggest it was soldered to the underlying part with tin-lead alloy.

The cuboid element at the neck of the terminal knob is covered in sheet brass (*Table A11: 7, 8*).

The guttering is of iron (*Table A11: 6*).

Spot/ Mesto	Fe	Cu	Zn	As	Pb	Sn
1	54.3	40.6	4.3	-	0.78	-
2	53.2	42.0	4.2	0.18	0.28	-
3	3.4	87.2	8.7	0.06	0.07	0.5
4	92.9	2.1	0.4	-	2.82	1.8
5*	1.91	74.4	21.9	-	0.48	1.31
6	99.9	0.1	-	-	0.02	-
7	53.3	38.6	7.8	0.03	0.04	0.3
8	11.8	78.9	8.3	0.04	0.07	0.9
9	65.1	6.73	1.32	-	15.20	11.6

Table A11

Preglednica A11

653 The measured spot has a diameter of ca. 11 mm. On the apparatus and measurements, see Ch. 3, Fn. 45.

Figure 77a
The front of the A10 scabbard fragment: measured Spots 1–5 on the sheet metal and Spot 6 on the neck of the terminal knob.

Slika 77a
Ostanki nožnice A10, sprednja stran, lega merjenih mest 1–5 (površina pločevine z različnimi deleži patine) in 6 (rumena pločevina na vratu gumba).

Figure 77b
The back of the A10 scabbard fragment: measured Spots 7–10 on the sheet metal.

Slika 77b
Ostanki nožnice A10, hrbtna stran pločevine, lega merjenih mest 7–10 (površina pločevine z različnimi deleži patine).

Figure 78
The A11 sword scabbard fragment: the measured spots.

Slika 78
Ostanki nožnice A11, lega merjenih mest.

Figure 79a
The front of the A11 sword scabbard fragment: measured Spots 1–3 on the chape, Spot 6 on the guttering and Spot 7 on the terminal knob.

Slika 79a
Ostanki nožnice A11, mesta 1, 2 in 3 (površina sprednje strani predrtega okova, različni deleži patine), 6 (robni okov) in 7 (zlato sijoča pločevina na vratu gumba).

Figure 79b
The back of the A11 sword scabbard fragment: measured Spots 4–5 on the chape and Spot 8 on the terminal knob.

Slika 79b
Ostanki nožnice A11, mesta 4 in 5 (hrbtna stran predrtega okova) in 8 (zlato sijoča pločevina na vratu gumba).

A10 (*pregl. A10, sl. 76, 77a, b*)

Meritve smo naredili med konservacijskim postopkom. Na merjenih mestih 4, 6, 8 in 10 na površini ni bilo očitne patine.

Pločevina, ki je prekrivala sprednjo stran nožnice, je iz medenine z najmanj okoli 21 % cinka (*pregl. A10: 4, 8*).

Rezultati meritev na patinirani površini sprednje strani pločevine (*pregl. A10: 1–3, 5*) se po vsebnosti kositra bistveno ne razlikujejo od meritev na patini hrbtne strani (*pregl. A10: 9*), torej ne kažejo, da je bila sprednja stran pokositrena. Vendar pa sledove kositrenja nakazujejo meritve EDS XRF na sprednji strani pločevine pred začetkom konservacije, ki so na enem mestu pokazale 4 % kositra.[653]

Okrasni trak na vratu gumba na zaključku nožnice je iz medenine (*pregl. A10: 6*).

A11 (*pregl. A11, sl. 78, 79a, b*)

Meritve so bile narejene po konservaciji predmeta. Razen na mestu 5 smo meritve naredili na patinirani površini, zato izmerjene visoke vsebnosti železa ne presenečajo.

Predrti okov na konici nožnice A11 je iz medenine z okrog 22 % cinka (*pregl. A11: 5*). Meritve patine na njegovi sprednji strani kažejo, da ni imel prevleke (*pregl. A11: 1–3*). Izmerjeni odstotki kositra in svinca na patini na dveh mestih hrbtne površine tega okova (*pregl. A11: 4, 9*) govorijo za to, da je bil na podlago prispajkan z zlitino kositra in svinca.

Kvadratni del konice predmeta je prevlečen s pločevino iz medenine (*pregl. A11: 7, 8*).

Robni okov nožnice je železen (*pregl. A11: 6*).

653 Premer merjene površine je bil približno 11 mm. Glede naprave in meritev glej pogl. 3, op. 45.

A12 (*Table A12, Figs. 80, 81a, b*)

The sheet metal covering the scabbard's iron guttering and terminal knob is silver alloy with ca. 4% copper and a low share of gold.[654] The results show the sheet silver to be thick enough for the beam not to have penetrated to the underlying metal (*Table A12: 1–3*).[655]

Spot/ Mesto	Fe	Cu	Zn	Au	Pb	Ag
1	0.49	4.79	0.03	0.75	0.43	93.5
2	0.18	4.08	0.05	0.60	0.45	94.7
3	0.36	2.44	0.02	0.67	0.42	96.1

Table A12
Preglednica A12

Figure 80
Scabbard A12: the measured spots.

Slika 80
Ostanki nožnice A12, lega merjenih mest.

A13 (*Table A13, Fig. 82*)

Measurements were taken immediately after conservation. The patina on the measured spots was largely removed (*Table A13: 1, 2*).

The suspension band is of silver alloy with less than 3% copper (*Table A13: 2*). Remains of gilding survive under the patina on the front (*Table A13: 5*; Catalogue, *Fig. A13.2a*); the gilding is thin (estimated 0.7–1.5 μm) and the beam penetrated to the underlying metal. The measurements on the patina-covered back (*Table A13: 4*) show an absence of gilding.[656] In Roman silver alloys, low gold content is not indicative of gilding or intentional addition of gold, but rather the consequence of extracting silver from lead ore.[657]

The high iron content of the tin filling (*Table A13: 1*; Catalogue, *Fig. A13.2b*), with which the craftsman reinforced the spot of a small flaw that occurred during embossing, shows that the beam hit not only the surface of removed patina, but also the surrounding area. The patina or the surface around the measured spot is also the origin of the detected silver and copper; the filling is thus probably pure tin.[658]

Spot/ Mesto	Fe	Cu	Au	Pb	Ag	Sn
1*	7.9	2.30	-	0.39	1.20	88.1
2*	0.9	2.30	0.70	0.51	95.6	-
2*¤	0.82	2.80	0.74	0.48	95.2	-
4	8.1	1.30	1.00	0.42	89.1	-
5¤	1.8	1.10	33.9	0.20	63.0	-

Table A13
Preglednica A13

Figure 82
The A13 sword suspension band: the measured spots.

Slika 82
Prečni okov nožnice A13, lega merjenih mest.

A15 (*Table A15, Figs. 83, 84a, b*)

Measurements were taken after conservation. There was no visible patina on Spots 1–4.

The shiny silvery patches on the upper side of the sword's handguard plate are of tin (*Table A15: 1, 2*). The high copper content in two measurements suggest that the beam either hit the surrounding area or penetrated to the underlying metal.

The basic alloy of the handguard plate can be deduced from the measurements on two spots without discernible tin, from which we did not remove the surface layer. The results (*Table A15: 3–4*) indicate that the handguard plate is of bronze with less than 2% tin.

Spot/ Mesto	Fe	Cu	Zn	As	Pb	Sn
1	-	52.7	0.2	-	0.60	46.5
2	2.5	93.2	0.6	0.13	0.36	3.3
3	1.9	95.4	0.5	0.12	0.13	2.0
4	2.9	94.7	0.4	0.13	0.18	1.7
5	5.5	92.8	0.4	0.05	0.11	1.2

Table A15
Preglednica A15

654 Cf. A13.
655 Šmit, Istenič, Knific 2008, 2331, 2332, Fig. 5.
656 For more details, see Istenič, Milić, Šmit 2003.
657 Hughes, Hall 1979, 325–335; Craddock 1995, 213, 231.
658 For more details, see Istenič, Milić, Šmit 2003.

Figure 81a
The A12 sword scabbard fragment: measured Spot 1 on the coating of the guttering.

Slika 81a
Odlomek nožnice A12, mesto 1 (prevleka srebrnega videza na robnem okovu).

Figure 81b
The A12 sword scabbard fragment: measured Spot 2 on the guttering coating and Spot 3 on the terminal knob coating.

Slika 81b
Odlomek nožnice A12, mesti 2 (prevleka srebrnega videza na robnem okovu) in 3 (prevleka srebrnega videza na zaključnem gumbu).

Figure 83
The A15 sword handguard plate: the measured spots.

Slika 83
Ščitnik branika ročaja meča A15, lega merjenih mest.

Figure 84a
The upper side of the A15 sword handguard plate: measured Spots 1 and 2 on the grey surface, Spot 3 on the base metal and Spot 5 on the dark grey patina. Spot 2 was not measured.

Slika 84a
Ščitnik branika ročaja meča A15, zgornja stran, mesta 1 in 2 (siva snov na površini), 3 (površina brez prevleke), 5 (temnosiva patina). Mesto 2 ni bilo merjeno.

Figure 84b
The underside of the A15 sword handguard plate: measured Spot 4 on the base metal.

Slika 84b
Ščitnik branika ročaja meča A15, spodnja stran, mesto 4.

A12 (*pregl. A12, sl. 80, 81a, b*)

Pločevina, s katero sta prevlečena železen robni okov in gumb na koncu nožnice, je iz srebrove zlitine, ki vsebuje okoli 4 % bakra in majhen delež zlata.[654] Rezultati kažejo, da je srebrna pločevina tako debela, da protonski žarek ni dosegel podlage (*pregl. A12: 1–3*).[655]

A13 (*pregl. A13, sl. 82*)

Meritve smo naredili po konservaciji predmeta; z dveh mest smo v glavnem odstranili površinsko patinirano plast (*pregl. A13: 1, 2*).

Okov je narejen iz srebrove zlitine, ki je vsebovala manj kot 3 % bakra (*pregl. A13: 2*). Na sprednji strani so pod patino ohranjeni ostanki pozlate (*pregl. A13: 5*; Katalog, *sl. A13.2a*), ki je tako tenka, da je protonski žarek dosegel podlago; njena ocenjena ohranjena debelina je 0,7–1,5 µm. Meritev na patinirani površini hrbtne strani (*pregl. A13: 4*) kaže, da tu okov ni imel pozlate.[656] Pri rimskih srebrovih zlitinah namreč nizka vsebnost zlata ne kaže na pozlato ali namerno dodajanje zlata zlitini, temveč je posledica pridobivanja srebra iz svinčeve rude.[657]

Visok odstotek železa v rezultatu meritve zalivke (*pregl. A13: 1*; Katalog, *sl. A13.2b*), s katero je na hrbtni strani zalito mesto, kjer je med izdelavo okrasa nastala napaka, kaže, da je merilni žarek poleg površine, s katere smo odstranili patino, zadel tudi okolico. Iz patine oziroma površine v okolici merjenega mesta najverjetneje izvirajo tudi izmerjeni odstotki srebra in bakra. Zalivka je torej verjetno iz čistega kositra.[658]

A15 (*pregl. A15, sl. 83, 84a, b*)

Meritve smo naredili na konserviranem predmetu. Na merilnih mestih 1–4 ni izrazite patine.

Meritve na srebrno sijoči plasti, ki je na več mestih vidna na zgornji strani ščitnika, so pokazale, da gre verjetno za ostanke plasti kositra (*pregl. A15: 1, 2*). Iz visokega odstotka bakra pri teh dveh meritvah sklepamo, da je žarek zadel tudi okolico srebrno svetleče se plasti oziroma da je dosegel podlago.

Za opredelitev osnovne zlitine ščitnika branika ročaja meča so merodajne meritve na dveh mestih, kjer ni

654 Prim. A13.
655 Šmit, Istenič, Knific 2008, 2331, 2332, sl. 5.
656 Podrobneje: Istenič, Milić, Šmit 2003.
657 Hughes, Hall 1979, 325–335; Craddock 1995, 213, 231.
658 Podrobneje: Istenič, Milić, Šmit 2003.

The dark grey surface on the upper side of the handguard plate (*Table A15: 5*) presumably occurred because of the corrosion processes in the water.

A16 (*Table A16, Figs. 85, 86a, b*)

Measurements were taken after conservation. The surface layer on Spot 2 was largely removed.

The sword's handguard plate is of bronze with ca. 11% tin (*Table A16: 1–2*). The measurements on the well-preserved silvery surface of the underside indicate a very thin layer of tin, through which the beam penetrated to the underlying bronze (*Table A16: 3–4*).

Spot/ Mesto	Fe	Ni	Cu	Zn	As	Pb	Sn
1	0.6	-	87.0	-	0.13	1.82	10.5
2*	1.0	0.14	85.7	-	0.13	1.83	11.2
3	1.0	-	73.4	-	0.13	1.33	24.1
4	1.2	-	64.3	0.40	0.08	1.04	33.0

Table A16
Preglednica A16

Figure 85
The A16 sword handguard plate: the measured spots.

Slika 85
Ščitnik branika ročaja meča A16, lega merjenih mest.

A19 (*Table A19, Figs. 87, 88a–c*)

Measurements were taken after conservation. The patina was largely removed from Spots 1–3 and 5.

The handguard plate is of brass with at least 16% zinc (*Table A19: 1–2*; the result for Spot 2 suggests that the beam hit a large part of the surrounding area).

The thin disc on the pommel was measured with the standard and the narrow beam on a spot where the patina had previously been removed (*Table A19: 3*) and on a surface with patina still present (*Table A19: 4*). The results show that the disc is of brass. The tin measured on Spot 3 appears likely to be originally present in the brass, but may also originate in the remains of patina transferred from the adjacent pommel.

The sub-square pommel plate was measured on spots with and without patina; the two results show that the plate is of bronze and not plated (*Table A19: 5, 6*).

Spot/ Mesto	Fe	Cu	Zn	Pb	Ag	Sn
1*	1.6	81.3	16.0	0.59	0.1	0.5
2*	1.4	91.5	6.1	0.59	0.1	0.2
3*	0.7	89.7	7.7	0.24	-	1.7
3*¤	1.1	87.3	9.7	0.38	0.1	1.5
4	2.6	88.1	6.9	0.66	-	1.8
5*	0.79	90.1	-	0.34	-	8.7
6	0.22	92.4	-	-	-	7.4

Table A19
Preglednica A19

Figure 87
Sword A19: the measured spots on the handguard plate and pommel.

Slika 87
Meč A19, lega merjenih mest na braniku ročajnega ščitnika in glaviču ročaja.

Figure 86a
The upper side of the A16 sword handguard plate: measured Spot 1 on the base metal.

Slika 86a
Ščitnik branika ročaja meča A16, zgornja stran, mesto 1 (brez prevleke).

Figure 86b
The underside of the A16 sword handguard plate: measured Spot 2 on the base metal and Spots 2–3 on the shiny silvery coating.

Slika 86b
Ščitnik branika ročaja meča A16, spodnja stran, mesta 2 (branik brez prevleke) ter 3 in 4 (siva sijoča prevleka).

Figure 88a
The upper side of the A19 handguard plate: measured Spot 2.

Slika 88a
Ščitnik branika ročaja meča A19, zgornja stran, mesto 2.

Figure 88b
The underside of the A19 handguard plate: measured Spot 1.

Slika 88b
Ščitnik branika ročaja meča A19, spodnja stran, mesto 1.

Figure 88c
The A19 sword pommel: measured Spots 3 and 4 on the disc and Spots 5–6 on the sub-square plate.

Slika 88c
Glavič ročaja meča A19, mesta 3 in 4 (krožna ploščica) ter 5 in 6 (štirikotna ploščica).

bilo videti prevleke, a površinske plasti nismo dodatno odstranili. Rezultati (*pregl. A15: 3–4*) nakazujejo, da je ščitnik iz brona z manj kot 2 % kositra.

Za temnosivo površino na zgornji strani branika (*pregl. A15: 5*) domnevamo, da je posledica korozijskih procesov v vodi.

A16 (*pregl. A16, sl. 85, 86a, b*)

Meritve smo naredili na konserviranem predmetu. Z mesta 2 smo v glavnem odstranili površinsko plast.

Ščitnik branika ročaja meča je iz brona, ki vsebuje približno 11 % kositra (*pregl. A16: 1–2*). Meritve na dobro ohranjeni površini srebrne barve na spodnji strani ščitnika kažejo na zelo tenko plast kositra, skozi katero je žarek dosegel bronasto podlago (*pregl. A16: 3–4*).

A19 (*pregl. A19, sl. 87, 88a–c*)

Meritve smo naredili na konserviranem meču. Z mest 1–3 in 5 smo v glavnem odstranili patino.

Ščitnik branika je iz medenine, ki vsebuje najmanj 16 % cinka (*pregl. A19: 1–2*; mesto 2 je imelo majhno površino, rezultat nakazuje, da je žarek zadel velik del okolice).

Spodnjo, krožno ploščico na vrhu glaviča smo merili z običajnim in ozkim žarkom na mestu, kjer smo odstranili patino z zelo majhne površine (*pregl. A19: 3*), in na površini s patino (*pregl. A19: 4*). Rezultati kažejo, da je ploščica iz medenine. Za vsebnost kositra, izmerjeno na mestu 3, se zdi verjetneje, da je sestavni del medenine, vendar ni mogoče izključiti, da izvira iz ostankov patine, kamor bi prišla iz zgoraj ležeče štirikotne ploščice.

Zgornjo, štirikotno ploščico na glaviču smo merili na površini, s katere je bila v glavnem odstranjena patina, in na patini; rezultata kažeta, da je ploščica iz brona in da ni imela prevleke (*pregl. A19: 5, 6*).

A20 (*Table A20, Figs. 89, 90a, b*)

The handguard plate is of brass (*Table A20: 2*). The two measurements on the patina-covered upper side indicate a poorly and patchily surviving layer of tin (*Table A20: 3–4*). The measurement on the underside shows no such layer (*Table A20: 1*).

Spot/ Mesto	Fe	Cu	Zn	Ag	Sn	Pb
1	6.40	80.8	11.4	0.07	0.80	0.63
2*	0.59	80.4	17.6	0.07	0.78	0.62
3	3.35	77.3	11.9	0.14	6.88	0.45
4	0.82	82.0	15.8	0.08	0.89	0.39

Table A20

Preglednica A20

Figure 89
The A20 sword handguard plate: the measured spots.

Slika 89
Ščitnik branika ročaja meča A20, lega merjenih mest.

Figure 90a
The underside of the A20 sword handguard plate: measured Spots 1 on the surface with patina and Spot 2 on the surface without patina.

Slika 90a
Ščitnik branika ročaja meča A20, spodnja stran, mesti 1 in 2.

Figure 90b
The upper side of the A20 sword handguard plate: measured Spots 3 and 4 on surface with patina.

Slika 90b
Ščitnik branika ročaja meča A20, zgornja stran, mesti 3 in 4.

MM A22 (*Table MM A22, Fig. 91*)

The front plate of the scabbard is of brass with ca. 16% zinc (*Table MM A22: 1, 2*). Measurements on the spots with patina and those without it revealed very few differences, which corresponds well with the observation that there is almost no patina on the scabbard.

The sword's handguard plate, peen block plating and the measured rivet on the suspension band are of brass with 18–19% zinc (*Table MM A22: 5, 7, 8*).

The iron rungs forming the front of the laddered chape bear layers of bronze with ca. 4–7% tin (*Table MM A22: 11a, 12a, 13, 15*) on their inside. There are iron corrosion products on the underside of the crossbars and between the crossbars and the sheet brass (*Table MM A22: 12b, 16*).[659]

The layers of bronze in the front rungs examined in full detail show that several layers of iron were soldered with bronze. This suggests that the laddered chape was made by first forging a 'net' that was then folded lengthwise and its rungs soldered together on the front.[660]

The symmetrical arrangement of the brass and bronze lining of the U sectioned part of the laddered chape on the left and right sides of the scabbard (at the level of the ninth bridge) suggests the laddered chape was made in at least two parts, which were assembled by soldering onto the underlying brass or bronze lining (*Table MM A22: 9, 14*).

Spot/ Mesto	Fe	Ni	Cu	Zn	As	Ag	Sn	Sb	Pb
1	0.62	0.14	81.1	16.7	-	0.1	0.8	-	0.68
2*	0.42	-	81.3	16.4	-	0.1	0.8	-	1.00
3	0.59	-	81.2	16.8	-	0.1	0.7	-	0.71
4*	0.41	-	81.8	16.3	-	0.1	0.7	-	0.75
5	0.34	-	78.9	19.1	-	0.15	1.1	-	0.47
7*	1.54	0.11	77.8	18.5	-	0.1	0.9	-	0.98
8	1.90	0.11	78.1	18.1	-	0.1	0.9	-	0.71
9	3.57	0.13	90.8	4.60	-	0.04	0.4	--	0.42
11	4.2	-	87.9	0.49	-	0.17	7.1	0.09	0.15
12a	2.98	0.2	92.8	0.47	-	-	3.6	-	-
12b	93.9	-	3.5	2.31	0.16	-	3.6	-	-
13	4.14	0.1	88.9	0.86	-	0.12	5.7	-	0.11
14	5.11	-	88.0	-	-	0.20	6.3	0.33	0.11
15	7.13	-	87.6	-	-	0.09	4.7	-	0.48
16	96.8	-	1.80	1.19	-		-	-	0.17

Table MM A22
Spots 6 and 10 were not measured. On Spots 2, 4–7, 9, 12a and 14, the low-energy part of the spectra was measured with a narrow beam.

Preglednica MM A22
Na mestih 6 in 10 meritev nismo izvedli. Pri meritvah (2, 4–7, 9, 12a, 14) smo nizkoenergijski del spektra izmerili z malim žarkom.

659 Istenič 2010; Šmit, Istenič, Perovšek 2010, 166–169, Fig. 1, Table 1; Istenič, Kosec, Perovšek, Gosar, Nagode 2011; Istenič, Šmit 2014, 211–218, Figs. 3–9.

660 Istenič, Kosec, Perovšek, Gosar, Nagode 2011; Istenič, Šmit 2014, 211–218, Figs. 3–9.

Figure 91
Sword and scabbard MM A22: the measured spots.

Slika 91
Meč in nožnica MM A22, lega merjenih mest.

A20 (*pregl. A20, sl. 89, 90a, b*)

Ščitnik branika ročaja meča je iz medenine (*pregl. A20: 2*). Meritvi na patini zgornje strani branika kažeta na slabo in le mestoma ohranjeno plast kositra (*pregl. A20: 3–4*). Meritev na površini spodnje strani (*pregl. A20: 1*) ne kaže take plasti.

MM A22 (*pregl. MM A22, sl. 91*)

Sprednja platica nožnice je iz medenine z okoli 16 % cinka (*pregl. MM A22: 1, 2*). Med analizami na mestih s patino oziroma brez nje so le majhne razlike, kar se dobro ujema z dejstvom, da na nožnici skorajda ni patine.

Ščitnik branika ročaja meča in obloga gumba na ročaju ter izmerjena zakovica na okovu z zanko za obešanje nožnice so bili narejeni iz medenine, ki vsebuje 18–19 % cinka (*pregl. MM A22: 5, 7, 8*).

V železnih prečkah na sprednji strani nožnice so plasti brona s pribl. 4–7 % kositra (*pregl. MM A22: 11a, 12a, 13, 15*). Na spodnji strani prečk in med prečkami ter medeninasto pločevino je plast železovih korozijskih produktov (*pregl. MM A22: 12b, 16*).[659]

Plasti brona v podrobno raziskani prečki na sprednji strani nožnice kažejo, da je bilo več plasti železa (oz. jekla) spajkanih z bronom. Sklepamo, da so lestvičasti okov naredili tako, da so skovali »mrežo«, ki so jo nato po dolžini ob obeh straneh zapognili in sklenili s spajkanjem sprednjih prečk.[660]

Medenina oziroma bron pod železnim (jeklenim) robnim okovom, simetrično na levi in desni strani nožnice (v višini devete sprednje prečke), govori za to, da so okov naredili najmanj v dveh delih, ki so ju sestavili s spajkanjem na medeninasto oziroma bronasto podlago (*pregl. MM A22: 9, 14*).

659 Istenič 2010; Šmit, Istenič, Perovšek 2010, 167, 168, 173, sl. 1, pregl. 1; Istenič, Kosec, Perovšek, Gosar, Nagode 2011; Istenič, Šmit 2014, 211–218, sl. 3–9.

660 Istenič, Kosec, Perovšek, Gosar, Nagode 2011; Istenič, Šmit 2014, 211–218, sl. 3–9.

MM A34 (*Table MM A34, Figs. 92, 93a, b*)

Measurements were taken before conservation. Patina was only removed on Spot 1.

The measurements taken on the corroded surface of the sword's handguard plate (*Table MM A34: 9*) and the comparison with other handguard plates of the same sword type show that the handguard plate is either of copper or of bronze with a layer of tin-lead alloy on the upper side.

The scabbard's mouth band is of brass (*Table MM A34: 1*). The corrosion products on the band show copper and a high amount of iron (*Table MM A34: 2, 4, 5*).

Measurements on Spots 6–8 and 11 reveal copper (and the iron originating in the corrosion products), a low zinc content and 4.2–12.1% tin. This suggests that the beam hit the corroded sheet metal covering the front of the scabbard and underlying the openwork locket; this sheet metal in the Mainz type scabbards (such as MM A34) is usually made of brass and tinned on the outer surface (cf. A5). The presence of lead on Spot 8 cannot be explained.

Spot/ Mesto	Fe	Ni	Cu	Zn	As	Sn	Pb
1*	1.6	0.21	85.3	12.7	-	0.2	-
1*¤	1.9	0.23	77.3	20.3	-	0.2	0.09
2	3.6	0.21	89.9	5.5	-	0.6	0.26
4	23.9	-	70.6	3.5	1.92	-	-
5	21.2	-	71.7	6.8	0.20	-	-
6	4.5	-	82.3	0.8	0.09	12.1	-
7	26.0	-	68.3	1.4	0.04	4.2	-
8	17.4	-	69.2	1.9	-	7.7	3.70
9	6.3	-	67.1	0.7	0.12	20.7	5.02
11	0.9	-	86.9	0.9	0.03	11.3	-

Table MM A34
Preglednica MM A34

Figure 92
Sword and scabbard MM A34: the measured spots.

Slika 92
Meč in nožnica MM A34, lega merjenih mest.

B. Daggers and sheaths

B1 (*Tables B1.1–2, Figs. 94, 95a–c*)

Measurements were taken after conservation. The patina was not additionaly removed before measuring.

The strips at the sides of the iron dagger handle (*Table B1.1: 13, 14*) are of brass (*Table B1.1: 15, 16*); the high iron content on Spot 16 is most likely caused by the remains of patina (cf. Catalogue, *Fig. B1.2d*). The inlays on the sheath are also of brass (*Table B1.1: 5, 6*).

Part of the front surface on the sheath's disc terminal is covered with an alloy of tin and lead in a 1 : 1 ratio (*Table B1.1: 1*). Measurements show that the parts of the sheath that obtained a silvery metallic shine during conservation, including the loops and rivets, are of iron (*Table B1.1: 2–4, 10, 11*).

Figure 93a
The front of the MM A34 sword and scabbard: measured Spots 5–8 and 11 on the mouth band and the sheet metal underneath.

Slika 93a
Sprednja stran nožnice MM A34, mesta 5–8 in 11 na okovu ob ustju in na pločevini pod njim.

Figure 93b
Sword and scabbard MM A34: measured Spots 1, 2 and 4 on the back of the scabbard and Spot 9 on the upper side of the sword handguard plate. All the measurements were made on surfaces with patina except for Spot 1 from where the patina was removed after the photo was taken.

Slika 93b
Meč in nožnica MM A34, mesta 1, 2 in 4 na hrbtni strani okova ob ustju nožnice ter mesto 9 na zgornji strani okova branika meča. Z mesta 1 je bila naknadno odstranjena patina, ostala mesta so bila merjena na patinirani površini.

MM A34 (*pregl. MM A34, sl. 92, 93a, b*)

Meritve so bile narejene pred začetkom konservacije, zato je na vseh merjenih mestih izrazita plast patine, le na mestu 1 je bila patina v glavnem odstranjena.

Iz rezultatov meritev na korodirani površini ščitnika branika ročaja meča (*pregl. MM A34: 9*) in primerjave z drugimi ščitniki mečev istega tipa sklepamo, da je ščitnik iz bakra ali brona in je imel na površini zgornje strani plast zlitine kositra in svinca.

Okov ob ustju nožnice je iz medenine (*pregl. MM A34: 1*), na kateri so nastali korozijski produkti, v katerih je poleg bakra veliko železa (*pregl. MM A34: 2, 4, 5*).

Na mestih 6–8 in 11 so meritve poleg bakra (in železa, ki izvira iz korozijskih produktov) in majhnega deleža cinka pokazale 4,2 do 12,1 % kositra. Sklepamo, da je žarek na teh mestih zadel korodirano pločevino, ki je prekrivala lice nožnice in je bila pod okovom s predrtim okrasom ob ustju nožnice; ta pločevina je pri tipu Mainz (ki ji pripada nožnica MM A34) običajno iz medenine, ki je bila na licu pokositrena (prim. A5). Vsebnosti svinca na mestu 8 ne znamo pojasniti.

B. Bodala in nožnice

B1 (*pregl. B1.1–2, sl. 94, 95a–c*)

Meritve smo izvajali na konserviranem predmetu. Na merilnih mestih patine nismo odstranjevali.

Železni ročaj bodala (*pregl. B1.1: 13, 14*) je ob straneh zaprt s trakom pločevine iz medenine (*pregl. B1.1: 15, 16*; visok delež na mestu 16 izmerjenega železa je najverjetneje povezan z ostanki patine (prim. Katalog, *sl. B1.2d*). Nožnica je tavširana z medenino (*pregl. B1.1: 5, 6*).

Del površine sprednje strani zaključka nožnice je prekrit z zlitino kositra in svinca v razmerju 1 : 1 (*pregl. B1.1: 1*). Za več delov nožnice (vključno z zankami in

Table B1.1
Results of metal analyses.

Preglednica B1.1.
Rezultati analiz kovin.

Spot/ Mesto	Fe	Cu	Zn	As	Pb	Bi	Ag	Sn
1	-	0.31	-	-	49.4	0.28	-	50.0
2*	99.6	0.19	0.15	0.06	0.03	-	-	-
3*	99.9	0.06	-	0.04	-	-	-	-
4*	99.8	0.13	-	0.11	-	-	-	-
5	7.4	74.6	15.8	0.08	1.09	0.03	0.07	1.0
6	3.9	78.3	16.1	0.11	0.75	-	0.05	0.8
10*	99.9	-	0.05	0.04	-	-	-	-
11*	99.8	0.08	0.08	0.04	0.02	-	-	-
13	99.9	0.12	-	0.01		-	-	-
14	99.9	0.10	-	0.01	0.01	-	-	-
15¤	0.3	75.7	25.0	-	-	-	-	-
16	5.6	71.0	22.6	0.03	0.18	-	0.03	0.6

Table B1.2
Results of the PIXE/PIGE analyses of red enamel.

Preglednica B1.2.
Rezultati analiz rdečega emajla z metodama PIXE in PIGE.

Spot/ Mesto	Na_2O	MgO	Al_2O_3	SiO_2	Cl	K_2O	CaO	TiO_2	MnO	Fe_2O_3	CuO	SnO_2	Sb_2O_3	PbO
7	6.75	0.57	1.49	45.0	1.11	0.47	4.85	0.23	0.06	12.4	5.96	0.29	0.64	20.2
8	7.54	0.61	1.13	46.6	1.05	0.47	4.47	0.17	0.06	10.4	7.39	0.13	0.56	19.5
9	5.01	0.39	0.93	45.0	1.12	0.54	4.17	0.19	0.13	13.6	5.73	0.20	0.70	22.3
12	9.02	0.69	1.42	46.3	1.44	0.84	5.36	0.23	0.0.9	4.68	5.73	0.21	0.72	23.2

Figure 94
Dagger and scabbard B1: the measured spots.

Slika 94
Bodalo in nožnica B1, lega merjenih mest.

The elemental composition of the enamel on the B1 dagger and sheath was examined on four spots (*Table B1.2: 7–9, 12*). The low potassium and magnesium contents reveal the use of natron glass, which was common in the Roman period.[661] The measured values of SiO_2 suggest that glass comprises roughly two thirds of the mass. The red colour was obtained by adding copper (5.73–7.39%) and possibly also lead oxides (19.5–23.2%). The latter probably improved the melting of broken glass, as they are present in most of the analysed enamel. The iron oxide content measured on Spot 12 deviates considerably from that measured on Spots 7–9. It is not possible to exclude the possibility that some of the measured spots were contaminated with the iron corrosion (rust) from the surrounding area or that the beam hit the iron surrounding the enamel.

B2 (*Tables B2.1–2, Figs. 96, 97a–c*)

Measurements on Spots 1, 2, 4 and 5 were taken before conservation, on patina-covered surfaces. This is reflected in the high iron content, which is particularly high on Spots 2 and 4 because the very small surviving enamel pieces made it impossible to avoid

661 Istenič, Šmit 2012, 302. Henderson (2013, 80), in contrast, writes that glass with plant ash as flux was commonly used in the Roman period to obtain brown-red enamel.

Spot/ Mesto	Fe	Cu	Zn	As	Mo	Pb	Ag	Sn
1	13.3	0.74	-	-	-	0.32	85.7	-
2	18.2	0.57	-	-	-	0.27	81.0	-
4	77.5	-	0.10	0.04	-	0.09	22.3	-
5	7.9	-	0.07	-	-	0.42	-	91.6
6	-	89.2	9.74	-	-	0.35	0.72	-
7	-	82.3	17.2	0.12	-	-	-	0.07
8	-	5.39	1.05	0.18	0.12	1.77	91.5	-
9	-	1.15	0.10	-	-	0.47	98.3	-

Table B2.1
Spot 6 was initially on the handle, but after ten seconds of measuring we realised that the material was iron and did not proceed with the quantitative measurement. The number 6 was then used for a spot on the sheath. On Spots 7 and 8 cf. *Fig. 96* and Catalogue, *Fig. B2.4a* (Spot 8) and *Fig. B2.4b* (Spot 7).

Preglednica B2.1
Mesto 6 je bilo prvotno označeno na ročaju, kjer smo po kratki meritvi (10 sekund) ugotovili, da gre za železo, zato kvantitativne meritve nismo izvedli. S številko 6 smo nato označili mesto na nožnici. Glede merilnih mest 7 in 8 primerjaj *sl. 96* in Katalog, *sl. B2.4a* (mesto 8) in *sl. B2.4b* (mesto 7).

Figure 95a
The front of the B1 dagger scabbard: measured Spots 2, 3 and 4 on the shiny silvery surface without patina, Spots 5 and 6 on metal inlay of golden appearance, Spots 7–9 on red inlays. Spot 15 on the suspension ring was not measured.

Slika 95a
Nožnica bodala B1, sprednja stran, mesta 2, 3 in 4 (srebrno svetleča se površina), 5 in 6 (zlato svetleč se kovinski vložek), 7–9 (rdeči vložki); na mestu 15 (obroček na zanki) nismo merili.

Figure 95b
The back of the B1 dagger scabbard: measured Spot 11 on the rivet shank and Spot 10 on the suspension loop.

Slika 95b
Nožnica bodala B1, hrbtna stran, mesti 11 (trn zakovice) in 10 (zanka za pripenjanje).

Figure 95c
The front of the B1 dagger scabbard: measured Spot 1 on the silvery coating of the disc terminal.

Slika 95c
Nožnica bodala B1, sprednja stran, mesto 1 (srebrna plast na površini konice).

zakovicami), ki so med postopkom konservacije dobile srebrn kovinski sij, so meritve pokazale, da so iz železa (*pregl. B1.1: 2–4, 10, 11*).

Elementno sestavo emajla na bodalu/nožnici B1 smo ugotovili na štirih mestih (*pregl. B1.2: 7–9, 12*). Nizka deleža kalija in magnezija kažeta, da so uporabili natronovo steklo, ki je bilo v rimski dobi običajno.[661] Iz izmerjenih vsebnosti SiO_2 sklepamo, da je bil delež stekla v masi približno dve tretjini. Rdečo barvo so dosegli z dodatkom bakrovih (5,73–7,39 %) in morda tudi svinčevih oksidov (19,5–23,2 %). Zadnji so verjetno pripomogli k boljšemu taljenju zmletega stekla, saj so prisotni v večini analiziranih emajlov. Na mestu 12 izmerjeni odstotek železovega oksida močno odstopa od vsebnosti tega oksida na mestih 7–9. Ne moremo izključiti, da so bila nekatera merjena mesta kontaminirana z rjo iz okolice, niti možnosti, da je žarek ob robu zadel železno okolico emajla.

B2 (*pregl. B2.1, sl. 96, 97a–c*)

Meritve na mestih 1, 2, 4 in 5 smo naredili pred konserviranjem predmeta, ko je bilo na merjenih mestih še precej patine. To med drugim odsevajo visoki odstotki na teh mestih izmerjenega železa. Pri meritvah mest 2 in 4 je delež železa še višji, ker se zaradi izredno majhnih mest, ki smo jih ciljali, ni dalo izogniti temu, da protonski žarek poleg namerjenega mesta ne bi zadel še železne okolice. Zadnje velja tudi za meritve v točkah 6–9, ki so poleg tavširanega okrasa zajele velik del okolice, ki je železna, zato so v tabeli podani rezultati meritev preračunani tako, da izmerjeni delež železa ni upoštevan (vsota izmerjenih elementov brez železa = 100 %); te rezultate je smiselno obravnavati previdno.

Rezultati meritev (preračunani tako, da je izmerjeno železo izločeno) kažejo, da je železna nožnica okrašena z vložki iz srebrove zlitine visoke kvalitete (*pregl. B2.1: 1, 2, 4, 8, 9*), medenine (*pregl. B2.1: 6, 7*) in emajla (*pregl. B2.2: 3*), ki je narejen iz natronovega stekla,[662] zeleno barvo pa mu je dal bakrov oksid. Različne vrste bakrovih oksidov so namreč steklo oziroma emajle obarvale različno.

Sprednja stran okroglega zaključka nožnice je pokositrena (*pregl. B2.1: 5*).

Table B2.2
Results of the PIXE/PIGE analyses of green enamel. In addition to the elements in the table, it also contained 0.24% Cr_2O_3, 0.06% Ag, 0.03% ZnO and 0.004% NiO. Iron content is not given, as it originated from the beam hitting the surrounding area.

Preglednica B2.2.
Rezultati analiz zelenega emajla z metodama PIXE in PIGE. Poleg elementov v preglednici so v njem še 0,24 % Cr_2O_3, 0,06 % Ag, 0,03 % ZnO in 0,004 % NiO. Železa nismo določili, ker je žarek oplazil železno okolico.

Spot/ Mesto	Na_2O	MgO	Al_2O_3	SiO_2	Cl	K_2O	CaO	TiO_2	MnO	Fe_2O_3	CuO	SnO_2	Sb_2O_3	PbO
3	16.9	1.46	2.87	49.0	0.71	0.94	8.14	0.11	0.58	-	5.00	0.67	1.51	12.0

661 Istenič, Šmit 2012, 302. Henderson (2013, 80) navaja nasprotno, da so za rimske emajle rjavordeče barve pogosto uporabili steklo, pri katerem je bilo talilo rastlinski pepel.
662 Prim. B1.

the surrounding iron. The same holds true of the measurements on Spots 6–9, hence the results in the table are given without the iron content (the sum of the measured elements without iron = 100%); these results should be treated with caution.

The results when disregarding the iron content show that the iron sheath was decorated with inlays of a high-quality silver alloy (*Table B2.1: 1, 2, 4, 8, 9*), brass (*Table B2.1: 6, 7*) and enamel (*Table B2.2: 3*); the enamel is made of natron glass,[662] and coloured using copper oxide. Different copper oxides could produce different colours.

The front of the sheath's disc terminal is tinned (*Table B2.1: 5*).

Figure 96
Dagger and sheath B2: the measured spots.

Slika 96
Bodalo in nožnica B2, lega merjenih mest.

B3 (*Table B3, Figs. 98, 99*)

Measurements were taken immediately after conservation on spots where the patina had largely been removed.

The measured rivet and both loops on the sheath are of brass (*Table B3: 1–3*). The measured iron content on Spots 2 and 3 suggest traces of patina.

Spot/ Mesto	Fe	Cu	Zn	Pb	Ag	Sn
1*¤	0.7	77.4	21.6	0.27	-	-
2*	2.8	73.7	22.6	0.48	-	0.1
3*	1.7	76.2	21.0	0.57	0.07	0.5

Table B3
Preglednica B3

B4 (*Table B4, Figs. 100, 101*)

Measurements were taken immediately after conservation, without additionally removing the upper layers.

Both measured rivets are of brass (*Table B4: 1, 2*). The iron content suggest traces of patina.

Spot/ Mesto	Fe	Ni	Cu	Zn	As	Pb	Ag	Sn
1	2.2	0.1	78.5	18.4	0.08	0.12	-	0.6
2	2.1	0.2	79.4	17.3	0.04	0.46	0.09	0.5

Table B4
Preglednica B4

Figure 98
Dagger scabbard B3: the measured spots.

Slika 98
Nožnica B3, lega merjenih mest.

Figure 99
The back of the B3 dagger scabbard: measured Spot 1 on the rivet shaft as well as Spots 2 and 3 on the suspension loops.

Slika 99
Nožnica B3, hrbtna stran, mesta 1 (trn zakovice) ter 2 in 3 (zanki za obešanje).

662 Cf. B1.

Figure 97a
The front of the B2 dagger scabbard: measured Spots 1, 2 and 4 on the shiny silvery inlays as well as Spot 3 on the green inlay. The measurement on Spot 6 on the handle revealed in a few seconds that it was iron, therefore the quantitative measurement was omitted. Number 6 was then assigned to the metal inlay in the scabbard (cf. *Fig. 97c* and *Table B2: 6*).

Slika 97a
Nožnica B2, sprednja stran, mesta 1, 2 in 4 (srebrno svetleči se vložki) in 3 (zelen vložek). Na mestu 6 na ročaju (vidno na fotografiji) smo po kratki meritvi (10 sekund) ugotovili, da gre za železo, zato kvantitativne meritve nismo izvedli. S številko 6 smo nato označili tavširan kovinski okras na nožnici (prim. *sl. 97c* in *pregl. B2: 6*).

Figure 97b
The front of the B2 dagger scabbard: measured Spot 2 on the shiny silvery inlay and Spot 5 on the disc terminal coating.

Slika 97b
Nožnica B2, sprednja stran, mesti 2 (srebrno svetleč se vložek) in 5 (prevleka na površini konice).

Figure 97c
The front of the B2 dagger scabbard: measured Spot 6 on the yellow shiny metal inlay and Spot 9 on the inlaid cross (the measured spot is not marked with a number).

Slika 97c
Nožnica B2, sprednja stran, mesti 6 (rumen svetleč se kovinski vložek) in 9 (tavširan križček; oznaka merjenega mesta na posnetku je brez številke).

Figure 100
Dagger B4: the measured spots.

Slika 100
Bodalo B4, lega merjenih mest.

Figure 101
The front of the B4 dagger scabbard: measured Spots 1 and 2 on the rivet heads.

Slika 101
Nožnica B4, sprednja stran, mesti 1 in 2 (glavici zakovic).

B3 (*pregl. B3, sl. 98, 99*)

Meritve smo naredili neposredno po zaključku konservacije na mestih, s katerih smo v glavnem odstranili patino.

Rezultati kažejo, da so izmerjena zakovica in obe izmerjeni zanki nožnice iz medenine (*pregl. B3: 1–3*). Iz izmerjenih odstotkov železa v točkah 2 in 3 sklepava, da so bili na merjenih mestih ostanki patine.

B4 (*pregl. B4, sl. 100, 101*)

Obe zakovici smo merili na sveže očiščeni površini, brez dodatnega odstranjevanja vrhnjih plasti.

Rezultati kažejo, da sta zakovici iz medenine (*pregl. B4: 1, 2*); iz izmerjenih odstotkov železa sklepava, da so bili na merjenih mestih ostanki patine.

C. Helmets

C1 (*Table C1, Figs. 102, 103a–d*)

Measurements were taken several years after conservation. On Spots 1–4, a thin surface layer was removed before measuring so as to expose the metal core.

The helmet bowl is of bronze with ca. 11–12% tin (*Table C1: 1–2*) and the cheek piece hinges of bronze with a lower tin content (*Table C1: 3–4*). Both measured rivets are of copper (*Table C1: 5–6*).

Spot/ Mesto	Ni	Cu	As	Pb	Sn
1*	0.3	88.1	0.10	0.12	11.4
2*	0.3	87.6	0.14	0.07	11.9
3*	0.3	91.7	0.35	0.08	7.6
4*	0.6	95.1	0.06	-	4.3
5	0.4	99.1	0.41	0.07	-
6	0.3	99.3	0.04	0.15	0.2

Table C1
Iron (Fe) is not included in the table as its content was too low to distinguish its peak from the copper escape peak.

Preglednica C1
Železo (Fe) ni vključeno v preglednico, ker ga je bilo izmerjenega tako malo, da ga ni bilo mogoče ločiti od bakrovega ubežnega vrha.

Figure 102
Helmet C1: the measured spots.

Slika 102
Čelada C1, lega merjenih mest.

Figure 103a
The right inner side of helmet C1: measured Spot 1 on the rim of the bowl and Spot 3 on the cheek-piece hinge, both without patina.

Slika 103a
Čelada C1, notranjost desne strani, mesti 1 (rob kalote) in 3 (zanka tečaja), obe brez patine.

Figure 103b
The left inner side of helmet C1: measured Spot 2 on the rim of the bowl and Spot 4 on the cheek-piece hinge, both without patina.

Slika 103b
Čelada C1, notranjost leve strani, mesti 2 (rob kalote) in 4 (zanka tečaja), obe brez patine.

Figure 103c
The right outer side of helmet C1: measured Spot 5 on the rivet head.

Slika 103c
Čelada C1, desna stran, mesto 5 (glava zakovice).

Figure 103d
The left outer side of helmet C1: measured Spot 6 on the rivet head.

Slika 103d
Čelada C1, leva stran, mesto 6 (glava zakovice).

Spot/ Mesto	Fe	Ni	Cu	Zn	As	Se	Pb	Ag	Sn
1*	1.8	0.3	87.2	-	0.14	-	-	-	10.5
2*	-	0.5	99.2	-	0.17	-	-	-	0.1
3*	-	0.4	99.4	-	0.18	-	-	-	-
4*	-	0.5	93.5	-	0.19	-	0.44	-	5.4
5*	1.9	0.6	92.2	-	0.18	-	0.37	-	4.7
6	-	0.1	97.6	1.7	0.03	-	0.18	0.04	0.3
7*	-	0.1	85.5	14.0	0.03	0.11	0.11	0.04	0.2
8	8.5	-	4.9	1.0	0.11	0.03	24.0	-	61.4
9	2.0	-	0.72	0.1	0.08	0.04	46.3	-	50.7
10	-	0.3	91.1	8.2	0.05	0.01	0.06	0.06	0.3
11*	-	0.2	76.1	23.2	-	-	0.07	0.11	0.4
12	-	0.3	89.8	9.3	0.04	-	0.19	0.08	0.3
13*	3.0	-	0.93	0.25	0.16	-	52.9	0.16	42.7
14*	1.3	0.2	75.0	22.4	0.08	-	0.25	0.25	0.25

Table C2

Preglednica C2

C. Čeladi

C1 (*pregl. C1, sl. 102, 103a–d*)

Meritve smo naredili več let po konservaciji predmeta; z mest 1–4 smo odstranili tanek površinski sloj.

Rezultati meritev kažejo, da je kalota čelade iz brona, ki vsebuje približno 11–12 % kositra (*pregl. C1: 1–2*), tečaja pa sta iz brona z manjšim odstotkom kositra (*pregl. C1: 3–4*). Obe izmerjeni zakovici sta bakreni (*pregl. C1: 5–6*).

C2 (*pregl. C2, sl. 104, 105a–c*)

Meritve smo delali po konservaciji. Z mest 1–5, 7, 11, 13–14 smo v glavnem odstranili tenko površinsko plast; visoke vsebnosti železa, ki jih kažejo meritve na mestih 1, 5 in 13, so najverjetneje povezane z nepopolno odstranjeno patino.

Rezultati meritev kažejo, da je kalota čelade iz brona, ki vsebuje okoli 10–11 % kositra (*pregl. C2: 1*).

Nastavki za okras ob straneh in na zadnjem delu čelade so iz medenine, v kateri smo izmerili okoli 22–23 % (*pregl. C2: 11, 14*) oziroma 14 % cinka (*pregl. C2: 7*).

Nastavki za okras so bili na kaloto čelade prispajkani z zlitino kositra in svinca (*pregl. C2: 8, 9, 13*).

Tečaja za pritrditev ličnih ščitnikov sta iz brona z okoli 5 % kositra (*pregl. C2: 4–5*) in sta bila na kaloto pritrjena z bakrenimi zakovicami (*pregl. C2: 2–3*).

C2 (*Table C2, Figs. 104, 105a–c*)

Measurements were taken after conservation. Spots 1–5, 7, 11, 13–14 were prepared by removing patina so as to expose the metal core; the high iron content on Spots 1, 5 and 13 most likely indicates incomplete patina removal.

The helmet bowl is of bronze with ca. 10–11% tin (*Table C2: 1*).

The plume tubes at the sides and the back are of brass with ca. 22–23% (*Table C2: 11, 14*) and 14% zinc (*Table C2: 7*), respectively.

The plume tubes were fastened to the bowl with a tin-lead alloy solder (*Table C2: 8, 9, 13*).

The cheek piece hinges are of bronze with ca. 5% tin (*Table C2: 4–5*) and were fastened to the bowl with copper rivets (*Table C2: 2–3*).

We could not reach the dark grey material inside the crest knob (Catalogue, *Fig. C2.2g*) with the proton beam, hence some of it was scraped off with a piece of cotton that was then measured. The results reveal an alloy of lead (95%) and tin (4.5%). For comparison, we repeated the procedure with a modern lead-tin solder in a 40 : 60 ratio and the measurement showed a considerably higher percentage of lead (80 : 20) with respect to its actual share in the alloy. This suggests that the same may hold true of the alloy used to fill the crest knob; the said filling can therefore be seen as made of a tin-lead alloy in which lead probably predominates.

Figure 104
Helmet C2: the measured spots.

Slika 104
Čelada C2, lega merjenih mest.

H. Pieces of military belts

H1 (*Table H1, Figs. 106, 107*)

Measurements were taken during conservation. Patina was removed on Spots 1–3.

Measurements on spots without patina reveal that the belt plate is made of an alloy with at least 95% silver (*Table H1: 1*); the same is true of the measurements on the patina (*Table H1: 4, 6*). The differences in the contents measured on the patina and on surfaces without patina are relatively small. It is not unusual for

Spot/ Mesto	Fe	Cu	Au	Pb	Ag
1*¤	0.36	3.20	0.99	0.24	95.2
2*	0.30	3.20	1.00	0.27	95.2
3*	0.30	3.40	0.93	0.29	95.1
4	1.3	1.50	0.88	0.16	96.2
5	0.72	2.80	0.86	0.32	95.3
6	0.93	1.60	0.95	0.19	96.3
7	0.18	0.76	0.69	0.38	98.0
8	0.90	0.14	0.30	0.14	98.5
9	0.42	0.22	0.46	0.16	98.7
10	0.56	1.20	1.10	0.22	96.9
11	1.5	1.00	7.3	0.10	90.0
12	2.3	0.91	20.7	0.07	76.0
13	2.9	3.90	2.70	0.69	89.9
14	0.77	3.50	1.30	0.34	94.1

Table H1
Measurements were taken with a 0.1 mm thick aluminium absorber except on Spots 2 and 12, where a 0.3 mm thick absorber was employed. Measurements with a narrow beam were not taken with an absorber.

Preglednica H1
Meritve so bile opravljene z aluminijevim absorberjem debeline 0,1 mm, razen na mestih 2 in 12, kjer je bila debelina absorberja 0,3 mm. Pri meritvi z ozkim žarkom absorberja nismo uporabili.

Figure 105a
The left side of helmet C2: measured Spot 1 on the neckguard, Spot 3 on the rivet head, Spot 4 on the cheek-piece hinge, Spots 12 and 14 on the plume tubes, as well as Spot 13 on the solder that fixed the plume tubes to the bowl.

Slika 105a
Čelada C2, leva stran, mesta 1 (vratni ščitnik), 3 (glavica zakovice), 4 (zanka tečaja), 12 in 14 (nastavek za okras) ter 13 (lota ob nastavku).

Figure 105b
The right side of helmet C2: measured Spot 2 on the rivet head, Spot 5 on the cheek-piece hinge as well as Spot 10 and Spot 11 on the plume tubes.

Slika 105b.
Čelada C2, desna stran, mesta 2 (glavica zakovice), 5 (zanka tečaja) ter 10–11 (nastavek za okras).

Figure 105c
The back of helmet C2: measured Spots 6 and 7 on the plume tubes as well as Spots 8 and 9 on the solder.

Slika 105c.
Čelada C2 zadaj, mesta 6–7 (nastavek za okras) ter 8–9 (lot).

Temnosive snovi v gumbu čelade (Katalog, *sl. C2.2g*) nismo mogli doseči s protonskim žarkom, zato smo njeno približno elementno sestavo skušali ugotoviti tako, da smo jo na majhnem delu podrgnili s kosmom vate ter tega nato merili. Rezultati so pokazali zlitino svinca (95 %) s kositrom (4,5 %). Za primerjavo smo enako naredili s sodobnim svinčevo-kositrnim lotom v razmerju 40 : 60. Izkazalo se je, da je meritev ostrgane plasti na vati pokazala bistveno višji odstotek svinca (80 : 20). Sklepamo, da je (lahko) enako pri zlitini, s katero je bil zalit gumb čelade C2, za katerega torej lahko rečemo le, da je iz zlitine svinca in kositra, v kateri verjetno prevladuje svinec.

H. Deli vojaških pasov

H1 (*pregl. H1, sl. 106, 107*)

Meritve smo naredili med postopkom konservacije; z mest 1–3 smo dodatno odstranili tenko površinsko plast.

Meritve na mestih brez patine so pokazale, da je okov iz zlitine z najmanj 95 % srebra (*pregl. H1: 1*); enako kažejo meritve na patini (*pregl. H1: 4, 6*). Razlike v vsebnosti posameznih elementov med meritvami na patini in na mestih brez patine so razmeroma majhne. Majhen delež zlata je pri rimskih srebrovih zlitinah pogost.[663] Iz rezultatov meritev na patini gumbov na tečajih in glavi zakovice v sredini okova sklepamo, da so iz enake ali zelo podobne zlitine kot okov (*pregl. H1: 7–9*). Iz podobne srebrove zlitine sta tudi zatiča zakovic, pri katerih smo izmerili patino (*pregl. H1: 13–14*).

Na s krogci punciranem osrednjem delu lica okova so meritve potrdile s prostim očesom vidno pozlato (*pregl. H1:11–12*; prim. Katalog, *sl. H1.1a*).

Meritev na reliefno dvignjenem delu okrasa je pokazala v primerjavi z meritvami na mestih 1–3 minimalno povečan odstotek zlata (*pregl. H1: 10*). Pregled teh delov okova pod mikroskopom je pokazal zelo slabo ohranjene, a nedvomne ostanke pozlate (prim. Katalog, H1).

Večje povečanje deleža zlata smo ugotovili na trnih zakovic s polkrožnimi okrasnimi glavicami (*pregl. H1:*

663 Prim. zgoraj, A13.

Roman silver to contain substantial traces of gold.[663] The results on the patina of the spherical terminals and of the rivet head in the centre of the plate suggest they are of the same or very similar alloy as the rest of the plate (*Table H1: 7–9*). We also measured the patina on two rivet shanks, which were found to be of a similar silver alloy (*Table H1: 13–14*; the relatively high gold content, particularly on Spot 13, is difficult to explain as the measurements were taken on the patina).

Measurements confirmed the visually detected gilding on the central front part of the plate, which is chased with tiny circles (*Table H1:11–12*; cf. Catalogue, *Fig. H1.1a*).

The measurements on the raised parts of the decoration show a minimal increase in gold content (*Table H1: 10*) in comparison with the measurements on Spots 1–3 (*Table H1:* 1–3). A repeated examination of this part under the microscope revealed poorly surviving, but positively identifiable remains of gilding (cf. Catalogue, H1).

Higher gold content has been established on the shanks of the rivets with decorative hemispherical heads (*Table H1: 13–14*); the heads bear no traces of gilding (cf. measurement on the central rivet: *Table H1: 9*), which suggests that gold spread there either while gilding other parts or during conservation (surfaces with and without gilding were cleaned with the same tool).

The results of the XRF analyses correspond with those of the PIXE analyses.[664]

Figure 106
Belt-plate H1: the measured spots.

Slika 106
Pasni okov H1, lega merjenih mest.

Spot/ Mesto	wFe	Ni	Cu	Zn	As	Ag	Sn	Sb	Au	Pb
1	5.8	-	3.8	0.4	0.05	89.1	-	-	0.67	0.13
2	3.7	-	5.6	0.2	0.07	89.4	-	-	0.60	0.42
3	0.97	-	80.6	16.3	0.078	0.31	1.2	-	-	0.52
3*¤	0.56	-	79.6	18.3	0.043	0.22	1.0	-	-	0.32
4	0.83	0.21	76.3	20.3	0.066	0.18	1.1	0.38	-	0.59
4*¤	0.61	0.22	77.2	20.0	0.038	0.12	1.0	0.27	-	0.43
5	46.4	-	48.8	2.1	0.23	0.49	1.3	-	-	0.70
6*	-	-	99.8	-	-	-	-	-	-	0.19
7*	-	-	100.0	-	-	-	-	-	-	0.02

Table H2

Preglednica H2

H2 (*Table H2, Figs. 108, 109a–c*)

Measurements were taken on three occasions, all after conservation. The second measurements on Spots 3 and 4 were taken on surfaces after the patina had been removed (cf. *Fig. 109b, c*). The table only gives the last measurement for each spot.

The buckle and associated plate are both of brass (*Table H2: 3, 4*). They are silvered on the front (*Table H2: 1, 2*). The differential PIXE analyses on the well-preserved shiny silvery surface show the layer of high-quality silver alloy to be relatively homogeneous and thick enough for the excitation of X-rays in the substrate to be negligible; the silver layer is estimated to be more than 30 μm thick. The silver

Figure 108
The H2 belt-plate and buckle: the measured spots.

Slika 108
Pasna spona in okov H2, lega merjenih mest.

663 Cf. above, A13.
664 Cf. Istenič, Milić, Šmit 2003, 291–293, Table 3.

Figure 107
The back of the H1 belt-plate: measured Spots 1–3 on the surfaces without patina.

Slika 107
Pasni okov H1, lega merjenih mest 1–3 z odstranjeno patino na spodnji strani.

Figure 109a
The front of the H2 belt-plate and buckle: measured Spots 1 and 2 on the coating with silvery appearance.

Slika 109a
Pasna spona z okovom H2, zgornja stran, mesti 1 in 2 (srebrna plast na površini).

Figure 109b
The back of the H2 belt-plate and buckle: measured Spots 3 and 4 before the removal of the patina, Spot 5 on the dark grey layer, as well as Spots 6 and 7 on the rivents.

Slika 109b
Pasna spona z okovom H2, spodnja stran, mesta 3–4 na okovu oz. sponi (patina še ni odstranjena), 5 (temnosiva plast na površini okova) ter 6–7 (zakovici).

Figure 109c
The back of the H2 belt-plate and buckle: measured Spots 3 and 4 after the removal of the patina.

Slika 109c
Pasna spona z okovom H2, mesti 3 in 4 z odstranjeno patino na spodnji strani spone oz. okova.

13–14); ker na glavicah ni sledov pozlate (prim. meritev na osrednji zakovici: *pregl. H1: 9*), domnevava, da je zlato tja zašlo med zlatenjem sprednje strani oziroma med konservacijo (pozlačene in nepozlačene dele namreč čistijo z istim orodjem).

Z rezultati meritev PIXE so skladne analize XRF.[664]

H2 (*pregl. H2, sl. 108, 109a–c*)

Meritve smo izvajali trikrat, vse po konservaciji. Po prvih meritvah smo z mest 3 in 4 bolje odstranili patino (prim. *sl. 109b, c*). V preglednici rezultatov so navedene le zadnje meritve na vsakem mestu.

Spona in pripadajoči okov sta iz medenine (*pregl. H2: 3, 4*). Njuna sprednja stran je posrebrena (*pregl. H2: 1, 2*). Diferencialne analize PIXE na dobro ohranjeni srebrno sijoči površini so pokazale, da je plast visokokvalitetne srebrove zlitine razmeroma homogena in tako debela, da je bilo vzbujanje rentgenskih žarkov v podlagi zanemarljivo – debelino srebrne plasti ocenjujeva na večjo od 30 μm. Na površini izmerjena vsebnost srebra je – verjetno zaradi kontaminacije s patino – malo manjša od dejanske.[665]

Meritve na temnosivi plasti, vidni na več mestih na hrbtni strani okova, nakazujejo, da ta stran ni bila posrebrena (*pregl. H2: 5*).

Zakovice so bakrene (*pregl. H2: 6, 7*).

H3 (*pregl. H3, sl. 110, 111a, b*)

Z mest 1–3 smo odstranili površinsko plast, vendar meritve na mestu 3 nismo izvedli. Žarek tarče namreč ne bi zadel pod ustreznim kotom.

Rezultati meritev kažejo, da sta ploščica in zanka iz zelo kvalitetne srebrove zlitine, ki vsebuje okrog 97 % srebra (*pregl. H3: 1–2*); zelo nizka vsebnost zlata je za rimske srebrove zlitine običajna.[666] Na zgornji strani ploščice so ostanki pozlate (*pregl. H3: 4–5*). Glede na odsotnost živega srebra domnevava, da so za zlatitev uporabili zlate lističe.[667]

664 Prim. Istenič, Milić, Šmit 2003, 297–298, tabla 3.
665 Šmit, Istenič, Knific 2008, 2331, 2332.
666 Prim. zgoraj, A13.
667 Šmit, Istenič, Knific 2008, 2331, 2332.

content measured on the surface is – probably due to a contamination with patina – slightly lower than actual.[665]

The measurement on the dark grey layer visible in several areas on the back of the plate suggests that the back was not silvered (*Table H2: 5*).

The rivets are of copper (*Table H2: 6, 7*).

H3 (*Table H3, Figs. 110, 111a, b*)

The surface layer on Spots 1–3 was removed, but Spot 3 was not measured as we found the beam would not hit the target at the appropriate angle.

The head and the loop are of silver alloy with ca. 97% silver (*Table H3: 1–2*); it is common for Roman silver alloys to contain traces of gold.[666] The upper side of the head bears traces of gilding (*Table H3: 4–5*). The absence of mercury suggests that gold leaves were used to gild the fastener.[667]

Spot/ Mesto	Fe	Cu	Au	Pb	Bi	Ag
1*	0.2	1.59	0.54	0.32	-	97.3
2*	1.0	1.08	0.79	0.19	0.03	96.9
4	10.4	0.93	16.4	0.27	-	72.0
5	5.2	0.96	12.8	0.28	0.03	80.8

Table H3

Preglednica H3

Figure 110
The H3 button and loop fastener: the measured spots.

Slika 110
Ploščica z dvojno zanko H3, lega merjenih mest.

H4 (*Table H4, Figs. 112, 113a–c*)

The head of the fastener was cast of an alloy of tin and lead roughly in a 1 : 1 ratio (*Table H4: 3*). The surviving part of the loop at the back is of brass (*Table H4: 5*).

Measurements on two other spots of the patina-covered front of the head show tin and lead, as well as iron that mainly originates in the patina (*Table H4: 1–2*). Great differences in the ratio between tin and lead probably reflect the inhomogeneity of the alloy.

Spot/ Mesto	Fe	Cu	Zn	As	Ag	Sn	Pb
1	55.0	2.5	0.3	0.10	0.14	12.8	29.2
2	7.4	1.04	0.13	-	-	55.7	35.8
3*	0.4	1.41	0.06	-	-	48.8	49.3
5*¤	0.22	78.9	19.9	0.023	0.11	0.7	0.13
5*	0.26	76.9	21.7	0.025	0.12	0.6	0.42

Table H4
Spot 4 was not measured.

Preglednica H4
Meritev na mestu 4 ni bila izvedena.

Figure 112
The H4 button and loop fastener: the measured spots.

Slika 112
Ploščica z zanko H4, lega merjenih mest.

665 Šmit, Istenič, Knific 2008, 2331, 2332.
666 Cf. above, A13.
667 Šmit, Istenič, Knific 2008, 2331, 2332.

Figure111a
The back of the H3 button and loop fastener: measured Spot 1 on the loop and Spot 2 on the head; the Spot 3 was not measured.

Slika 111a
Ploščica z dvojno zanko H3, spodnja stran, lega mest 1 (na zanki), 2 in 3; na mestu 3 meritev ni bila opravljena.

H4 (*pregl. H4, sl. 112, 113a–c*)

Ploščica je ulita iz zlitine kositra in svinca v razmerju približno 1 : 1 (*pregl. H4: 3*). Nastavek z odlomljenim zaključkom na hrbtni strani predmeta je iz medenine (*pregl. H4: 5*).

Meritev na dveh mestih na patini na licu je, poleg železa, ki izvira predvsem iz patine, pokazala kositer in svinec (*pregl. H4: 1–2*). Velika razlika v razmerju med kositrom in svincem v meritvah je verjetno posledica nehomogenosti zlitine kositra s svincem.

Figure 111b
The upper side of the H3 button and loop fastener: measured Spots 4 and 5, both with patina.

Slika 111b
Ploščica z dvojno zanko H3, zgornja stran, lega mest 4 in 5, obe s patino.

Figure 113a
The front of the H4 button and loop fastener: measured Spots 1 (on the cheek of the man's head) and 2.

Slika 113a
Ploščica H4, sprednja stran, lega mest 1 (merjeno na licu portreta, pod konico puščice, ki označuje mesto 1) in 2.

Figure 113b
The back of the H4 button and loop fastener: measured Spots 3 and 4 on the head (the patina was removed from Spot 3) and Spot 5 on the loop, before the patina was removed.

Slika 113b
Ploščica H4, hrbtna stran, mesta 3 in 4 (ploščica; na mestu 3 je patina odstranjena) ter 5 (zanka, pred odstranitvijo patine).

Figure 113c
The back of the H4 button and loop fastener: Spot 5 on the loop.

Slika 113c
Ploščica H4, hrbtna stran, lega mesta 5 na zanki.

H5 (*Table H5, Figs. 114, 115a, b*)

Commentary

The head is of tin-lead alloy (*Table H5: 3*). The measurement on the patina-covered front (*Table H5: 1*) shows no significant deviations from the measurements on the surface without patina (*Table H5: 3*). This is clear when recalculating the results by disregarding iron: Spot 1 reveals 37.1% tin and 58.3% lead, while Spot 3 reveals 35.5% tin and 59.4% lead. This shows that the front was most likely not plated either with tin or other metals.

The surface on the back is rather uneven and its patina has a considerably lower lead content (*Table H5: 2*); this may reflect an inhomogeneous alloy or a different ion transport in the patination process.

Spot/ Mesto	Fe	Cu	Zn	Sn	Pb
1	11.0	0.48	0.18	57.5	30.8
2	13.9	7.81	0.32	59.9	18.0
3*	2.6	0.71	0.05	61.6	35.1

Table H5
Preglednica H5

Figure 114
Button and loop fastener H5: the measured spots.
Slika 114
Ploščica H5, lega merjenih mest.

H6 (*Table H6, Figs. 116, 117*)

The buckle is of brass with at least ca. 16% zinc.

Spot/ Mesto	Fe	Ni	Cu	Zn	As	Ag	Sn	Pb
1*	0.34	0.10	83.2	15.8	-	0.07	0.3	0.19
1*¤	0.33	0.08	82.7	16.2	0.011	0.07	0.4	0.22

Table H6
Preglednica H6

Figure 116
Buckle H6: the measured spot.
Slika 116
Pasna spona H6, lega merjenega mesta.

I. Decorations

I1 (*Table I1, Fig. 118*)

The medallion is made of an alloy of tin and lead roughly in a 2 : 1 ratio (*Table I1: 8, 9*). The measured iron most likely indicates that the proton beam hit the surrounding area, where the patina had not been removed. The measurements on Spots 12 and 13 also indicate a tin-lead alloy, but in a different ratio; here, the patina was removed from areas of damage to the original surface. Spots 12 and 13 are smaller than Spots 8 and 9, hence the proton beam also hit the surrounding area. This shows that the latter two spots are relevant in terms of the alloy used to cast the object.

The front is silvered (*Table I1: 1, 2, 12, 13*). The differences in the measured silver content on the surface are caused by uneven preservation of the silvering and possibly also the uneven thickness of the silvering layer, as the beam penetrated to the underlying metal; if the silvering layer were ca. 30 µm thick or more, the measurements would only show silver. The traces of gold in the silver (*Table I1: 2, 13*) are not indicative of intentional addition, but rather originate in the ore.[668]

Spot/ Mesto	Mn	Fe	Cu	Zn	Ag	Sn	Au	Pb
1	0.6	8.0	0.8	-	40.0	32.1	-	18.6
2	0.3	16.4	0.6	-	65.8	9.2	0.3	7.3
3	0.4	11.3	0.1	0.05	-	75.5	-	12.6
4	0.1	6.7	0.5	-	-	92.2	-	0.4
5	0.3	6.8	13.4	0.6	9.2	47.6	-	22.0
6	0.1	6.5	0.4	0.05	-	86.9	-	6.0
7*¤	0.1	3.5	7.44	0.3	1.0	53.1	-	34.4
8*¤	0.1	3.2	0.25	0.2	-	60.3	-	35.9
9*¤	0.2	6.9	0.27	0.2	-	61.4	-	30.9
10*¤	0.1	6.0	0.34	0.3	-	92.1	-	1.0
11*¤	0.1	4.3	3.45	0.4	1.1	53.8	-	36.8
12*¤	0.2	5.9	0.47	0.4	11.6	38.4	-	42.9
13*¤	0.3	10.8	0.82	0.3	30.9	19.6	0.5	36.8

Table I1
Preglednica I1

668 Hughes, Hall 1979, 325–335; Istenič 2003b, 283; Šmit, Istenič, Knific 2008, 2331.

Figure. 115a
The front of the H5 button and loop fastener: measured Spot 1.

Slika 115a
Ploščica H5, sprednja stran, lega mesta 1.

Figure. 115b
The back of the H5 button and loop fastener: measured Spots 2 (with patina) and 3 (the patina was removed).

Slika 115b
Ploščica H5, lega mest 2 in 3 (patina je odstranjena) na hrbtni strani.

Figure 117
The back of the H6 buckle: measured Spot 1 (patina was removed).

Slika 117
Pasna spona H6, hrbtna stran, lega mesta 1 (patina je odstranjena).

H5 (*pregl. H5, sl. 114, 115a, b*)

Ploščica je iz zlitine kositra in svinca (*pregl. H5: 3*). Meritev na patini na licu (*pregl. H5: 1*) ni pokazala pomenljivih odstopanj od meritev na mestu brez patine (*pregl. H5: 3*). To postane jasno, če rezultata preračunamo tako, da zanemarimo železo: na mestu 1 dobimo 37,1 % kositra in 58,3 % svinca, na mestu 3 pa 35,5 % kositra in 59,4 % svinca. Sprednja stran torej najverjetneje ni imela kositrne ali druge prevleke.

Na patini hrbtne strani, ki ima precej neenotno površino, smo izmerili bistveno manjši delež svinca (*pregl. H5: 2*). Vzrok je morda nehomogenost zlitine ali drugačen transport ionov po tvorbi patine.

H6 (*pregl. H6, sl. 116, 117*)

Predmet je iz medenine z najmanj okoli 16 % cinka.

I. Odlikovanji

I1 (*pregl. I1, sl. 118*)

Figure 118
Medallion I1: the measured spots on the front and back.

Slika 118
Ploščica I1 z reliefnim okrasom, lega merjenih mest.

Predmet je iz zlitine kositra in svinca približno v razmerju 2 : 1 (*pregl. I1: 8, 9*). Izmerjeno železo najverjetneje nakazuje, da je protonski žarek zadel tudi okolico površine, s katere je bila odstranjena patina. Na zlitino kositra in svinca, vendar v drugačnih razmerjih, kažeta tudi meritvi na mestih 12 in 13. Tu smo patino odstranili s površine mest, kjer je bila prvotna površina predmeta že poškodovana. Merjeni mesti sta manjši kot mesti 8 in 9, zato je protonski žarek poleg za meritev predvidene površine zadel tudi okolico; za predstavo o zlitini, iz katere je bil predmet ulit, sta merodajnejši meritvi na mestih 8 in 9.

Sprednja stran predmeta je bila posrebrena (*pregl. I1: 1, 2, 12, 13*). Razlike v izmerjenem deležu srebra na površini so povezane z neenakomerno ohranjenostjo posrebritve in lahko tudi z neenakomerno debelino prvotnega sloja srebra na površini – žarek je namreč dosegel in izmeril plast pod srebrom. Pri debelini srebrne prevleke okoli 30 μm ali več bi meritve pokazale le srebro. Izmerjeni sledovi zlata v srebru (*pregl. I1: 2, 13*) niso posledica namernega dodajanja, temveč izvirajo iz rude.[668]

668 Hughes, Hall 1979, 325–335; Istenič 2003b, 294; Šmit, Istenič, Knific 2008, 2331.

Measurements on the back (*Table I1: 5, 7, 11*) also reveal the presence of silver, which indicates that silver was transferred there either during the original silvering of the front or during conservation (cf. above, H1).

Measurements on the part of the back bearing traces of incised furrowing (Surface 3, cf. Chapter 12.1, *Fig. 50: 3*) reveal the presence of copper (*Table I1: 5, 7, 11*). This may indicate the use of tools of copper alloy for treating the back surface of the medallion or the surface of the backing.[669] This is supported by the highest copper content measured on the surface (*Table I1: 5*) and a lower one in areas where the surface layer had been removed (*Table I1: 7, 11*).

Surface 2 (*Fig. 50: 2*; cf. Chapter 12.1) revealed a high tin content (92.1, 92.2 and 86.9%), which indicates the area where the medallion adhered well to the backing of either tin or an alloy of tin and a low share of lead (*Table I1: 4, 6, 10*).

The measurement on Surface 1 (*Table I1: 3; Fig. 50*: 1) indicates the area where the back of the medallion adhered very poorly to the backing.

The alloy of tin and lead roughly in a 2 : 1 ratio, which was used for the I1 medallion, has the lowest melting point in the Sn-Pb binary system, at 183 °C. This made it highly fluid and suitable for filling small sunken areas (e.g. embossed decoration) during casting. The melting point of the backing, made of either tin or an alloy with tin predominant, was higher, roughly 220–235 °C. The medallion was presumably fastened to the backing in either of two ways: a) by pressing it against the backing previously heated to the temperature that made it malleable/plastic, or b) by heating the backing together with the medallion and thereby indirectly heating the back of the medallion which (partly) fused with the backing because of the lower melting point. Surfaces 1, 2 and 3 (*Fig. 50*) indicate that the back only adhered to the backing in a small part (Surface 2).[670]

The relatively high contents of iron and manganese possibly originate from the patina, which formed in the prolonged exposure to water and was apparently not completely removed on Spots 7–13.

I2 (*Table I2, Figs. 119, 120*)

The object is well preserved and conservation was not necessary. Spot 1 was prepared by removing a thin layer of surface.

The object is made of an alloy of tin with ca. 2% copper and less than 1% lead (*Table I2: 1*). The measurement on the surface without visible patina, where the surface layer was not removed (*Table I2: 2*), shows a higher copper content.

Spot/ Mesto	Fe	Cu	Pb	Au	Sn
1*	0.3	1.96	0.07	0.010	97.7
2	0.4	4.13	0.33	0.009	95.1

Table I2
Preglednica I2

Figure 119
Torque I2: the measured spots.

Slika 119
Torkves I2, lega merjenih mest.

669 Dobršek 2003.
670 Dobršek 2003.

Na več mestih izmerjeni delež srebra nakazuje, da se je pri posrebritvi lica ali med konservatorskim postopkom (prim. zgoraj, H1) malo posrebritve zaneslo na hrbet predmeta (*pregl. I1: 5, 7, 11*).

Meritve na hrbtni strani so na površini s sledovi brazdanja (površina 3, prim. pogl. 12.1, *sl. 50: 3*) pokazale prisotnost bakra (*pregl. I1: 5, 7, 11*). Morda je to povezano z obdelavo površine hrbtne strani predmeta I1 ali pa z obdelavo površine, na katero je bil predmet prispajkan, z orodjem iz bakrove zlitine.[669] Temu v prid govori dejstvo, da smo najvišji odstotek bakra izmerili na površini (*pregl. I1: 5*), bistveno manjšega pa na mestih z odstranjenim površinskim slojem (*pregl. I1: 7, 11*).

Na površini 2 (*sl. 50: 2*; prim. pogl. 12.1) smo izmerili visok odstotek kositra (92,1, 92,2 oz. 86,9 %), kar kaže, da se je tu predmet dobro sprijel s podlago, ki je bila iz kositra ali zlitine kositra z majhnim deležem svinca (*pregl. I1: 4, 6, 10*).

Meritev na površini 1 (*pregl. I1: 3; sl. 50*: 1) nakazuje, da se je tam hrbet predmeta I1 slabo sprijel s podlago.

Za predmet I1 uporabljena zlitina kositra in svinca v razmerju približno 2 : 1 ima v binarnem sistemu Sn-Pb najnižje tališče, tj. 183 °C, zato je imela visoko fluidnost (tečnost) in je bila zelo primerna za zapolnjevanje majhnih površin (npr. pri reliefnem okrasu) pri ulivanju. Tališče podlage, ki je bila iz kositra oz. iz zlitine, v kateri je prevladoval kositer, je bilo višje, okoli 220–235 °C. Domnevamo, da je bil predmet I1 na podlago pritrjen tako, a) da so ga pritisnili na podlago, ki so jo pred tem segreli do temperature, pri kateri je postala plastična, ali pa tako, b) da so segrevali podlago in nanjo nameščen predmet I1, pri čemer se je posredno segrel tudi hrbet predmeta I1, ki se je zaradi nižjega tališča (delno) zlil s podlago. Na hrbtni strani ugotovljene površine 1, 2 in 3 (*sl. 50*) nakazujejo, da je bil hrbet predmeta I1 le na majhnem delu (površina 2) dobro sprijet s podlago.[670]

Razmeroma visoki deleži železa in mangana so najverjetneje povezani s patino, ki je nastala med dolgotrajno lego v vodi in očitno z mest 7–13 ni bila povsem odstranjena.

Figure 120
Torque I2: measured Spots 1 and 2.

Slika 120
Torkves I2, mesti 1 in 2.

I2 (*pregl. I2, sl. 119, 120*)

Predmet je tako dobro ohranjen, da konservacija ni bila potrebna. Z mesta 1 smo odstranili tanek sloj površine.

Predmet je iz zlitine kositra z okoli 2 % bakra in manj kot 1 % svinca (*pregl. I2: 1*). Meritev na površini brez vidne patine, s katere pa nismo odstranili površinskega sloja (*pregl. I2: 2*), kaže višji odstotek bakra.

669 Dobršek 2003.

670 Dobršek 2003.

SG. SCHIELD BOSS

MM SG (*Table MM SG, Figs. 121, 122a, b*)

The shield boss (*Table MM SG: 3, 4*) and the heads of its rivets (*Table MM SG: 1, 2*) are of brass with just over 2% tin. The measurements on Spots 5, 6 and 7 show the rivet shanks to be of iron.

Spot/ Mesto	Fe	Ni	Cu	Zn	As	Se	Sn	Pb
1	3.8	0.2	77.0	15.4	0.56	0.06	2.7	0.19
2	-	0.2	86.8	9.82	-	-	2.8	0.38
3	2.0	0.2	77.2	16.8	0.15	-	3.2	0.43
4*	1.7	0.2	74.2	21.0	0.11	-	2.2	0.60
4*¤	1.3	0.3	74.2	21.3	0.08	-	2.1	0.69

Table MM SG
Preglednica MM SG

Figure 121
Shield boss MM SG: the measured spots.

Slika 121
Ščitna grba MM SG, lega merjenih mest.

SG. ŠČITNA GRBA

MM SG (*pregl. MM SG, sl. 121, 122a, b*)

Ščitna grba (*pregl. MM SG: 3, 4*) in glavici zakovic (*pregl. MM SG: 1, 2*) so iz medenine, ki vsebuje malo več kot 2 % kositra. Meritve na mestih 5, 6 in 7 so pokazale, da so trni zakovic železni.

Figure 122a
The front of the MM SG shield boss: measured Spots 1 and 2 (both with patina) on the rivet heads.

Slika 122a
Ščitna grba MM SG, zgornja stran, lega mest 1 in 2 na glavicah zakovic.

Figure 122b
The back of the MM SG shield boss: measured Spots 3 (on patina) and 4 (cleared of patina) on the flange; Spots 5–7 on the corroded iron rivet shanks were not measured.

Slika 122b
Ščitna grba MM SG, spodnja stran, lega mest 3 in 4 na spodnji strani okrajka ter mest 5–7 na korodiranih trnih zakovic; na mestih 5–7 nismo merili.

17
The choice of metals in the production of Roman military equipment and its implications

The Roman military equipment from the Ljubljanica that is kept in the National Museum of Slovenia, plus some additional items kept elsewhere, has been systematically analysed as to the elemental composition of metals and alloys; for the sake of brevity the text below uses the term metal in its broad sense to refer to both of them. The results of the analyses, presented in detail in Chapter 16, offer an insight into the metals that were used in the production of Roman military gear.

A group of finds from the Ljubljanica that offers a particularly valuable insight into the production technique is the Mainz type swords and/or scabbards. They are represented with 22 examples and include of fifteen scabbards and/or swords[671] that show a marked uniformity of production manner and material.[672] The scabbards share the iron guttering and the use of brass for all other fittings. Furthermore, the front of the scabbards is covered with tinned sheet brass, in one example with sheet bronze. Tin-lead (soft solder) is used for soldering and copper rivets for riveting. The handguard plates are made of a copper-tin alloy or of copper and tinned on the underside, while the traces of tin or tin-lead alloy on the upper side are presumably connected with fastening the plate to the underside of the handguard proper.

Other groups of artefacts are represented in lower numbers, making it impossible to establish any possible common features in the choice of metals within individual groups.

For this reason, the text below discusses the use of metals in the militaria from the Ljubljanica together with a brief description of their characteristics, for select metals also an outline of the state of research into their use in the Roman period. The sections on brass and silver also briefly deal with ingots.

The findings are compared with the evidence on the use of metals for individual groups of Roman military equipment from other sites, albeit that scientific analyses for the latter are rare.[673] It was not possible to directly compare the data on the metals for the items published without a typo-chronological attribution or without drawings, photographs or descriptions that would allow such an attribution,[674] neither was this possible for items of types not represented among the artefacts from the Ljubljanica.[675]

I only quote the results of the measurements in Chapter 16 exceptionally, as they are given there in an easy-to-find manner.

17.1 Brass

The copper alloy most frequently used in the Roman military equipment from the Ljubljanica is brass.

In the scabbards presumed to represent the typological predecessors of the Mainz type, brass was used for the rivets and fittings on A1, and for rivets and fittings except the guttering on A2 and A3.

In the Mainz type scabbards, brass is used for all fittings with the exception of the guttering, for the sheet

671 Eight scabbards, most of them complete with swords (A5–A11 and MM A34), and seven swords without scabbard remains (A14, A15, A17 and MM A25–A28).

672 See Ch. 4.2.3

673 E.g. Riederer 1999; Riederer 2002a.

674 E.g. Ponting, Segal 1998; Riederer 2001, 225–228, 235–238, 250 (finds from Kalkriese); Ponting 2002; Ponting 2012.

675 E.g. a set of Roman military horse-trappings from the 50s and 60s, found at Xanten (Craddock, Lambert 1985; Jenkins 1985), prestige horse-trappings, phalerae and cavalry equipment from the late 1st to the early 2nd century and forming part of the Ribchester hoard (Jackson, Craddock 1995), as well as military items that are not close parallels of the Ljubljanica assemblage (Cowell 1990).

17
Zastopanost kovin in njihova izpovednost z gledišča proizvodnje rimske vojaške opreme

Na rimski vojaški opremi iz Ljubljanice, ki jo hrani Narodni muzej Slovenije, in izjemoma tudi na tisti, ki jo hranijo drugje, smo sistematično ugotavljali elementno sestavo kovin in njihovih zlitin. V nadaljevanju za oboje uporabljam izraz kovina. Rezultati so podani v 16. poglavju in omogočajo vpogled v uporabo kovin pri izdelavi rimske vojaške opreme.

Meči in/ali nožnice tipa Mainz so med obravnavanim gradivom zastopani v razmeroma velikem številu (22 primerkov), zato omogočajo vpogled v njihovo izdelavo. Med njimi je skupina 15 nožnic in/ali mečev,[671] pri kateri smo ugotovili izrazito enotnost pri načinu izdelave in izbiri kovin.[672] Za nožnice so značilni železni robni okovi in uporaba medenine za ostale okove. Pločevina na sprednji strani nožnice je iz medenine (v enem primeru iz brona) in na sprednji strani pokositrena. Za spajkanje so uporabili zlitino kositra in svinca (mehki lot), za kovičenje pa bakrene zakovice. Ščitniki branikov ročajev mečev te skupine so iz zlitine baker-kositer ali iz bakra in so na spodnji strani, ki je bila vidna, prevlečeni s tenko plastjo kositra, za sledove kositra ali zlitine kositer-svinec na zgornji strani ščitnika pa domnevamo, da so povezani s pritrditvijo ščitnika na spodnjo stran branika.

Ostale skupine predmetov so zastopane z majhnim številom primerkov, zato morebitne enotnosti pri izbiri kovin v okviru posameznih vrst predmetov ni bilo mogoče ugotavljati.

V tem poglavju podajam pregled posameznih kovin, ki smo jih ugotovili pri rimski vojaški opremi iz Ljubljanice. Dodala sem kratek opis značilnosti teh kovin in pri izbranih kovinah tudi kratek povzetek stanja raziskav o njihovi uporabi v rimski dobi. Pri medenini in srebru kratko obravnavam tudi ingote.

Ugotovitve sem primerjala s podatki o uporabi kovin pri posameznih skupinah rimske vojaške opreme z drugih najdišč, med katerimi so naravoslovne analize elementne sestave kovin redkost.[673] Neposredna primerjava ni bila mogoča pri podatkih o kovinah, navedenih brez ustreznega arheološkega aparata (brez tipološke klasifikacije predmetov ali brez risb oziroma fotografij in opisov predmetov, ki bi tako klasifikacijo omogočili),[674] niti pri podatkih o tistih vrstah vojaške opreme, ki jih med najdbami iz Ljubljanice ni.[675]

Sklice na rezultate meritev v 16. poglavju sem navedla le izjemoma, ker menim, da so tam pregledno navedeni in jih bo bralec z lahkoto našel ter da bi številni sklici po nepotrebnem otežili preglednost besedila tega poglavja.

17.1 Medenina

Najpogosteje ugotovljena bakrova zlitina rimske vojaške opreme iz Ljubljanice je medenina.

Na nožnicah, ki so domnevni tipološki predhodniki tipa Mainz, so iz medenine okovi in zakovice (A1–A3) ter pri nožnici A1 tudi robni okov.

671 Osem nožnic, večina z meči (A5–A11 in MM A34) in sedem mečev brez delov nožnic (A14, A15, A17 in MM A25–A28).

672 Glej pogl. 4.2.3.

673 Npr. Riederer 1999; Riederer 2002a.

674 Npr. Ponting, Segal 1998; Riederer 2001, 225–228, 235–238, 250 (najdbe z najdišča Kalkriese); Ponting 2002; Ponting 2012.

675 Npr. komplet rimske konjske opreme petega in šestega desetletja 1. st. iz Xantna (Craddock, Lambert 1985; Jenkins 1985) in prestižna konjska oprema, vojaška odlikovanja in konjeniška oprema iz zaklada iz poznega 1. ali zgodnjega 2. st., ki je bil najden v Ribchestru (Jackson, Craddock 1995), ter vojaški predmeti, ki najdbam iz Ljubljanice niso ozke primerjave (Cowell 1990).

metal covering the front (only A9 has a bronze front), for the terminal knob (with a hollow centre through which iron guttering is inserted) on A5 and for decorating the iron terminal knobs on A10 and A11.

The MM A22 scabbard has a brass guttering, as well as a brass openwork locket and a sheet of brass covering the front, while brass in the associated sword is used for the handguard plate and the peen block plating.

Brass is also used for the handguard plates of the A19 and A20 swords, as well as for the A19 pommel disc.[676]

Apart from swords and their scabbards, brass is the material of rivets and suspension loops on the daggers and sheaths of the Dangstetten group (B3, B4), the inlaid decoration and sheet metal on the B1 and B2 daggers and sheaths,[677] the plume tubes on the Buggenum/Haguenau type C2 helmet,[678] the H2 and H6 belt buckles,[679] as well as of the MM SG shield boss.[680]

All these items were made by cold working,[681] and decorated with chasing, cutting, filing and possibly polishing.

The elemental composition of the brass from the Ljubljanica militaria, except for the 3rd century shield boss, corresponds with the usual Roman brass containing roughly 20% zinc and less than around 2% of other elements that include lead and iron. Such an alloy has numerous advantages such as low corrosion tendency, high malleability, workability and toughness. These characteristics render it easy to forge or beat into shape, as well as file, saw and polish. Also significant is its ability to increase hardness; because of its iron content, albeit very low, such brass can be hardened by repeated annealing, quenching, tempering and forging. Roman brass was therefore highly suitable for cold working and casting. It was a substitute for bronze mainly when producing artefacts that required demanding cold working.[682] In the Roman period, brass was more expensive than bronze.[683]

Because of the low boiling point of zinc, brass production is a relatively complex procedure. In Antiquity, brass was made by reacting copper metal with zinc ore directly in a solid state process known as cementation.[684] Research shows that prehistoric peoples in western and central Europe did not master the procedure.[685] From the beginning of the 1st century BC at the latest, brass was produced in Asia Minor, where the Romans acquired the knowledge. They began producing brass in the time of Caesar, around 60 BC.[686]

Most Roman products of pure brass contain around 20% zinc and very little (ca. 2%) other elements, usually lead and iron. The highest measured zinc content is 28%, the lowest around 14%. The procedures that the Romans employed could most likely not produce brass with the zinc content exceeding 28%, and certainly not above 33%.[687]

Very few brass ingots from the Roman period have thus far been found.

The earliest seems to be a large flat ingot from the 2008–2010 excavation at Bratislava (Slovakia). It measures 1020 × 105 mm, weighs 11.9 kg[688] and contains around 19% zinc.[689] Its archaeological context suggests a dating to the middle or third quarter of the 1st century BC.[690]

A much smaller ingot has been found at Haltern and dates to the Augustan period. It is an irregularly shaped block measuring 107 × 16 × 10 mm, weighing 0.103 kg and bearing a stamped inscription MA.SILEN.F (*Marcus Silenius fecit*).[691] It contains 23.5% zinc.[692]

Of the same shape as the one from Bratislava is a brass ingot from *Camulodunum* (Colchester, Great Britain).

676 For swords and scabbards, cf. Chs. 4 and 16.
677 Cf. Chs. 5 and 16.
678 Cf. Chs. 6 and 16.
679 Cf. Chs. 11 and 16.
680 Cf. Chs. 14 and 16.
681 Cold working comprises various techniques such as forging, thinning, spinning, wire drawing and chasing/embossing (Voß, Hammer, Lutz 1998, 179, 325).
682 Voß, Hammer, Lutz 1998, 184, 185, Figs. 22, 23; Brüggler et al. 2012, 140–143, 148.
683 Burnett, Craddock, Preston 1982, 267.
684 Jackson, Craddock 1995, 91, 93; Pollard, Heron 1996, 197; Brüggler et al. 2012, 147–148; Ponting 2012, 172.
685 Istenič, Šmit 2007; Schwab 2011, 275–278.
686 Craddock 1995, 292–302; Jackson, Craddock 1995, 93; Pollard, Heron 1996, 196–204; Istenič, Šmit 2007; Schwab 2011, 275–178, 283; Brüggler et al. 2012, 147–148. The brass ingots (with the XRF analyses revealing around 20% zinc) interpreted as part of the cargo of a ship that sank in the 6th century BC off Gela (Sicily) suggest a considerably earlier date, though the as yet unpublished information (http://archeostory.info/index.php/archeostory/item/381-gela-nel-mare-i-lingotti-di-atlantide; http://corrieredelmezzogiorno.corriere.it/catania/arte_e_cultura/17_febbraio_10/dal-mare-gela-spuntano-lingotti-oricalco-metallo-atlantide-00f86bec-ef9f-11e6-939f-115a5b4eb723.shtml?refresh_ce-cp; last accessed 4. 1. 2018) cannot be deemed completely reliable and does not allow for conclusions to be drawn.
687 Craddock, Lambert 1985, 164; Craddock 1995, 296, 298; Jackson, Craddock 1995, 93–94. Cf. Pollard, Heron 1996, 198–200, 204.
688 Resutík 2014, 160–161, 166, Fig. 15 (thickness not stated, but can be estimated at around 10 mm; the article was published before the results of the analysis came in, when the ingot was believed to be copper); Resutík 2017, 61, 62.
689 Resutík, B., Bratislava Castle Hill – Domus II – House of a wealthy merchant. First evidence of a brass ingot in the environment of the Bratislava oppidum in the 1st century BC. Bratislava in the 1st century BC – Celtic *oppida* on the Middle Danube. International round-table, Bratislava Castle, Lapidary under the Court of Honour, Slovakia, September 4 & 5, 2017 (lecture on 4 September 2017; the ingot composition was determined using the SEM/EDS analysis).
690 Čambal 2014, 43; Kysela, Olmer 2014.
691 Müller 2002, 246, Pl. 1: 1488.
692 Cu 75.62%, Sn 0.53%, Pb 0.11%, Zn 23.52%, Fe 0.11%, Ni 0.05%, Ag 0.05%, Sb < 0.02%, Au < 0.10%. Riederer 2002a, 132, Table 46: 1488.

Na nožnicah mečev tipa Mainz so iz medenine vsi okovi, razen robnih, pločevina na sprednji strani nožnic (izjema je nožnica A9), cel zaključni gumb razen jedra (A5) oziroma okras železnega zaključnega gumba (A10, A11).

Medeninast robni okov ima nožnica MM A22, pri kateri sta iz medenine tudi okov s predrtim okrasom in pločevina na sprednji strani, na pripadajočem meču pa so medeninasti ščitnik branika in prevleka zaključka ročajnega glaviča.

Iz medenine so tudi ščitniki branikov mečev A19 in A20 ter okras na zaključku glaviča A19.[676]

Medeninasti so zakovice in nosilne zanke bodal in nožnic tipa Dangstetten (B3, B4) ter okras bodal in nožnic B1 in B2 (tavširanje in pločevinaste obloge),[677] nastavki za okras čelade C2 (tip Buggenum/Haguenau),[678] pasni sponi H2 in H6[679] ter ščitna grba MM SG.[680]

Našteti predmeti so nastali s postopki, ki vključujejo preoblikovanje v hladnem,[681] ter so okrašeni s punciranjem, rezanjem, piljenjem, morda tudi poliranjem.

Razen pri ščitni grbi, sestava medenine predmetov iz Ljubljanice ustreza običajni rimski medenini z okrog 20 % cinka in z zelo nizko vsebnostjo drugih elementov, med katerimi sta svinec in železo (skupaj manj kot okoli 2 %). Taka zlitina ima v primerjavi z drugimi bakrovimi zlitinami številne prednosti. Zaradi teh lastnosti jo je lažje plastično preoblikovati, piliti, žagati in polirati. Pomembna je možnost povečevanja njene trdote. Zaradi (sicer zelo nizke) vsebnosti železa v zlitini se da namreč pri medenini s ponavljajočim se žarjenjem, gašenjem, popuščanjem in kovanjem doseči večjo trdoto. Rimska medenina je bila torej odlična za plastično preoblikovanje in za ulivanje. Bron je nadomestila predvsem pri izdelavi predmetov, ki so nastali z zahtevnim plastičnim preoblikovanjem.[682] V rimski dobi je imela višjo ceno kot bron.[683]

Pridobivanje medenine je zaradi nizkega vrelišča cinka razmeroma zapleteno. V antiki so uporabljali t. i. cementacijski postopek, pri katerem je kovinski baker, ne da bi se stalil, neposredno reagiral s cinkovo rudo.[684] Dosedanje raziskave kažejo, da prazgodovinska ljudstva v zahodni in srednji Evropi tega postopka niso obvladala.[685] Najkasneje od začetka 1. st. pr. Kr. so medenino pridobivali v Mali Aziji, kjer so se z njo seznanili Rimljani, ki so jo v Cezarjevem času (ok. 60 pr. Kr.) sami začeli pridobivati.[686]

Večina rimskih predmetov iz čiste medenine vsebuje okoli 20 % cinka in zelo malo (okoli 2 %) drugih elementov, običajno svinca in železa. Najvišji izmerjeni delež cinka je 28 %, najnižji pa okoli 14 %. S postopki, ki so jih Rimljani poznali, zelo verjetno niso mogli pridobiti medenine z vsebnostjo cinka nad 28 %, zanesljivo pa ta ni presegla 33 %.[687]

Poznamo maloštevilne rimske medeninaste ingote.

Najstarejši je velik ploščat ingot, ki so ga našli med izkopavanji v letih od 2008 do 2010 na Gradu v Bratislavi (Slovaška). Meri 1020 × 105 mm, tehta 11,9 kg[688] ter vsebuje okoli 19 % cinka.[689] Najdiščne okoliščine govorijo za datacijo v sredino ali tretjo četrtino 1. st. pr. Kr.[690]

Iz avgustejske dobe je dosti manjši ingot iz Halterna. Je nepravilne kvadraste oblike, meri 107 × 16 × 10 mm in tehta 0,103 kg ter ima pečat MA.SILEN.F (*Marcus Silenius fecit*).[691] Vsebuje 23,5 % cinka.[692]

Enake oblike kot primerek iz Bratislave je medeninast ingot iz Camulodunuma (Colchester, Velika Britanija). Najdiščne okoliščine kažejo na datacijo pred uporom Boudike (Boudicca) leta 60 ali 61 po Kr.,

676 Glede mečev in nožnic prim. pogl. 4 in 16.
677 Prim. pogl. 5 in 16.
678 Prim. pogl. 6 in 16.
679 Prim. pogl. 11 in 16.
680 Prim. pogl. 14 in 16.
681 Plastično preoblikovanje poleg kovanja vključuje tanjenje, vlečenje, struženje in stiskanje/vtiskovanje (Voß, Hammer, Lutz 1998, 179, 325).
682 Voß, Hammer, Lutz 1998, 184, 185, sl. 22, 23; Brüggler et al. 2012, 140–143, 148.
683 Burnett, Craddock, Preston 1982, 267.
684 Jackson, Craddock 1995, 91, 93; Pollard, Heron 1996, 197; Brüggler et al. 2012, 147–148; Ponting 2012, 172.
685 Istenič, Šmit 2007; Schwab 2011, 275–278.
686 Craddock 1995, 292–302; Jackson, Craddock 1995, 93; Pollard, Heron 1996, 196–204; Istenič, Šmit 2007; Schwab 2011, 275–278, 283; Brüggler et al. 2012, 147–148. Omembe medeninastih ingotov (po analizah XRF vsebujejo okoli 20 % cinka) s tovora pri Geli na Siciliji potopljene ladje, ki jo datirajo v 6. st. pr. Kr. (http://archeostory.info/index.php/archeostory/item/381-gela-nel-mare-i-lingotti-di-atlantide; http://corrieredelmezzogiorno.corriere.it/catania/arte_e_cultura/17_febbraio_10/dal-mare-gela-spuntano-lingotti-oricalco-metallo-atlantide-00f86bec-ef9f-11e6-939f-115a5b4eb723.shtml?refresh_ce-cp; zadnji dostop 4. 1. 2018), nakazujejo precej starejšo datacijo, ki pa je pred izidom znanstvene objave ne moremo obravnavati kot zanesljivo.
687 Craddock, Lambert 1985, 164; Craddock 1995, 296, 298; Jackson, Craddock 1995, 93–94. Prim. Pollard, Heron 1996, 198–200, 204.
688 Resutík 2014, 160–161, 166, sl. 15 (debelina ni navedena, znaša pa okoli 10 mm; ob tej objavi še niso bile narejene analize in so menili, da je ingot bakren); Resutík 2017, 61, 62.
689 Resutík, B., Bratislava Castle Hill – Domus II – House of a wealthy merchant. First evidence of a brass ingot in the environment of the Bratislava oppidum in the 1st century BC. Bratislava in the 1st century BC – Celtic *oppida* on the Middle Danube. International roundtable, Bratislava Castle, Lapidary under the Court of Honour, Slovakia, September 4 & 5, 2017 (Predavanje 4. 9. 2017; sestavo ingota so določili z analizo SEM/EDS).
690 Čambal 2014, 43; Kysela, Olmer 2014.
691 Müller 2002, 246, t. 1: 1488.
692 Cu 75,62 %, Sn 0,53 %, Pb 0,11 %, Zn 23,52 %, Fe 0,11 %, Ni 0,05 %, Ag 0,05 %, Sb < 0,02 %, Au < 0,10 %. Riederer 2002a, 132, pregl. 46: 1488.

Its archaeological context indicates it is earlier than Boudicca's revolt (AD 60 or 61) and suggests a mid-1st century date, as it can be assumed that it postdates the Roman conquest. It measures 910 × 150 × 5 mm, weighs 9.358 kg, bears a rectangular V.H.ET.B. stamped inscription and contains 26.8% zinc.[693]

The ingot from an unknown site in the Mediterranean, measuring 1543 × 147 × 5 mm, weighing 14.4 kg and bearing three rectangular C PETRON HERME stamps, is very similar to the one from *Camulodunum* and is therefore believed to be brass.[694] Its elemental composition is not known.

Twenty-one very different brass ingots were part of the cargo of a ship that sank at Aléria, off the east coast of Corsica. Their dating rests on the stamped lead ingots (presumably) forming part of the same cargo and pointing to the 2nd century AD. The brass ingots are ovoid in shape, measure 175–245 mm in length and their zinc content varies between 22.1% and 28.2%, in one ingot even reaching 29.5%,[695] which exceeds the zinc content thus far measured in Roman brass (cf. above). Moreover, the lead content in these ingots (up to 3.31%) also exceeds the values for Roman pure brass.[696] The zinc and lead contents thus challenge the interpretation of the ingots as Roman.

Because of its volatility, zinc content in brass objects was greatly reduced (maximum 10%) with every melting.[697]

For the brass of the Ljubljanica militaria, the low contents of tin, lead and other metals, coupled with a high zinc content (measured values at least 14–26.2%, most frequently between 18 and 22%[698]) indicate pure brass, obtained from either ingots or semi-finished products (billets). Only the shield boss, with just over 2% tin, was presumably made of an alloy obtained by adding tin to pure brass.

The low zinc content (below 18%), coupled with a low iron content (up to 1%), which shows that the patina was thoroughly removed, may also be the consequence of local dezinfication.[699]

The variability of zinc content in brass products may be due either to the varying zinc contents of the brass ingots (cf. above) or to a loss of zinc caused by (repeated) melting[700] or heating and annealing in the production process.[701]

17.2 Bronze

A copper-tin alloy, containing roughly 4.6–11% tin and 0.23–1.8% lead, was used to make four handguard plates of the Mainz type swords.[702] The sheet bronze on the front of the A9 Mainz type sword scabbard is of similar bronze, containing 6–7% tin and less than 0.2% lead.[703] The same is true of the lining onto which individual pieces of the brass guttering on the A1 scabbard were soldered,[704] and of the A19 pommel disc.[705] All these items are made of a copper-tin alloy (tin bronze) using cold working, mainly forging. The lead content reaches up to 0.5%, indicating that the lead originates from the impurities in the copper. A higher lead content of 1.83% has been measured in the handguard plate of the A16 sword,[706] but it is too low to prove intentional addition;[707] its low content did not substantially alter the mechanical properties of the alloy.[708]

The C1 and C2 helmets are of pure tin bronze with around 12% (C1) and 10.5% tin (C2).

Tin bronze is a common alloy for Roman products that were either beaten or first cast and finished by cold working techniques such as spinning.[709] The tin bronze typical of Antiquity contains roughly 10% tin and its melting point is between 850 and 1000 °C.[710]

693 Musty 1975, 409–410, Fig. 6. The atomic absorption spectroscopy (AAS) results have revealed the following ingot composition: Cu 21%, Zn 26.8%, Ni 0.02%, Fe 0.14%, Sb 0.05%, Ag 0.007%, trace amounts of P, Sn and Pb.

694 Rothenhöfer 2015; Rothenhöfer 2016.

695 Weisgerber 2007, 148–150, 154, Table 2; Hanel, Bode 2016, 170, Table 1. The ingot with 29.5% zinc stands out, as roughly 28% is believed to be the highest zinc content in Roman brass (cf. above).

696 Cf. the elemental composition of the ingots from Haltern and Colchester, as well as that of pure brass.

697 Jackson, Craddock 1995, 93; Ponting 2012, 171, Fn. 39. Caley (1964, 99, 100) estimates that zinc content decreased by approximately 10% with every melting of Roman pure brass.

698 Only the measurements with iron content below 1% have been taken into consideration (14% – Ch. 16, *Table C2:* 7; 26.4% – Ch. 16, *Table A5: 13*). Presuming that the detected iron derives either from the remains of patina or are related to the fact that the measurements were carried out on the corroded brass surface, interpreting the measurements that revealed more than 1% iron content should take into account that the actual zinc content is higher.

699 Brüggler et al. 2012, 141–142, 144. E.g. the plume tubes on the C2 helmet: the measurements have revealed brass with roughly 22–23% (Ch. 16, *Table C2: 11, 14*) and 14% zinc (Ch. 16, *Table C2: 7*). It seems likely that the three tubes were made from the same brass, so one of the measured spots (No. 7) suggests local dezincification.

700 Cf. above, Fn. 697.

701 Such a production process has been established for the pure brass *manica segmentata* from the last third of the 1st to the first third of the 2nd century (Brüggler et al. 2012, 140, 144–145) and for the armour scales from Augsburg (Raub 2010).

702 Ch. 16, *Tables A6: 15, A7: 9/22, A8: 1, A16: 2.*

703 Ch. 16, *Table A9: 1, 6.*

704 Ch. 16, *Table A1: 17.*

705 Ch. 16, *Table A19: 5.*

706 Measurements of the A8 handguard plate were taken on a patinated surface.

707 Copper alloy is considered to be intentionally leaded if it contains more than 2% lead (Cowell 1990, 76).

708 Brown 1976, 25; Cowell 1990, 78.

709 Brown 1976, 40; Riederer 2002b, 284–285.

710 Voß, Hammer, Lutz 1998, 179; Schwab 2011, 273.

zgodovinske okoliščine pa na čas po rimski osvojitvi leta 43 po Kr. Meri 910 × 150 × 5 mm, tehta 9,358 kg in ima pravokoten pečat V.H.ET.B. ter vsebuje 26,8 % cinka.[693]

Ingot z neznanega najdišča (v Sredozemlju) je po obliki zelo podoben tistemu iz Camulodunuma (mere: 1543 × 147 × 5 mm, teža 14,4 kg; ima tri pravokotne pečate C PETRON HERME), zato domnevajo, da je medeninast.[694] Njegova elementna sestava ni bila ugotovljena.

Zelo drugačnih je 21 medeninastih ingotov, ki so bili del tovora pri kraju Aléria (ob vzhodni obali Korzike) potopljene ladje. Njihova datacija temelji na (domnevno) iz istega potopa izvirajočih svinčevih ingotih s pečati, ki kažejo na datacijo v 2. st. po Kr. Ingoti imajo obliko jajc dolžine od 175 do 245 mm, delež cinka se giblje med 22,1 in 28,2 %, pri enem ingotu celo 29,5 %,[695] kar presega doslej pri rimski medenini izmerjene vsebnosti cinka (prim. zgoraj). Z rimsko čisto medenino se prav tako ne ujemajo visoki deleži svinca v teh ingotih (do 3,31 %).[696] Opredelitev teh ingotov kot rimskih se mi torej ne zdi prepričljiva.

Pri vsakem taljenju medeninastih predmetov se je zaradi hlapnosti cinka občutno zmanjšal (za največ 10 %) njegov odstotek v medenini.[697]

Pri medenini rimskih vojaških predmetov iz Ljubljanice nizki deleži kositra, svinca in drugih kovin ter visoki deleži cinka (izmerjene vrednosti 14–26,2 %, najpogosteje izmerjene vrednosti med 18 in 22 %[698]) kažejo, da gre za svežo oziroma čisto (npr. iz ingotov ali polizdelkov dobljeno) medenino. Le za ščitno grbo, pri kateri smo izmerili malo več kot 2 % kositra, domnevam, da je iz zlitine, ki je nastala iz čiste medenine, ki so ji dodali kositer.

Vzrok za nizke vrednosti cinka (pod 18 %) ob nizki vsebnosti železa (do 1 %), ki kažejo, da je bila patina dobro odstranjena, je lahko lokalno izluženje cinka.[699]

Med vzroki, da so medeninasti predmeti že prvotno vsebovali različne deleže cinka, so nihanja vsebnosti cinka v ingotih (prim. zgoraj) in izguba cinka med (večkratnim) taljenjem[700] ali segrevanjem do žarjenja ob izdelavi predmetov.[701]

17.2 Bron

Iz zlitine baker-kositer, ki vsebuje od okrog 4,6 % do okrog 11 % kositra in od okoli 0,23 % do okoli 1,8 % svinca, so štirje ščitniki branikov ročajev mečev tipa Mainz.[702] Bronasta pločevina na sprednji strani nožnice meča A9 (tip Mainz) je iz podobnega brona: vsebuje 6–7 % kositra in manj kot 0,2 % svinca.[703] Enako velja za podlogo, s pomočjo katere so sestavili medeninast robni okov nožnice A1,[704] in za ploščico na glaviču ročaja meča A19.[705] Vsi ti predmeti so torej iz zlitine baker-kositer (kositrov bron) in so nastali s plastičnim preoblikovanjem (predvsem kovanjem). Vsebnosti svinca so do 0,5 %, kar kaže, da izvirajo iz nečistoč v bakru. Izjema je ščitnik branika ročaja meča A16, kjer smo izmerili 1,83 % svinca,[706] vendar tudi v tem primeru verjetno ne gre za namerno dodajanje svinca,[707] vsekakor pa njegova nizka vsebnost ni bistveno spremenila mehanskih lastnosti zlitine.[708]

Čeladi (C1, C2) sta iz čistega kositrovega brona z okoli 12 % (C1) oziroma okoli 10,5 % kositra (C2).

Kositrov bron je običajna zlitina rimskih kovanih ali najprej ulitih in nato s plastičnim preoblikovanjem (npr. stiskanje z obdelavo na vretenu) dokončanih izdelkov.[709] Značilen antični kositrov bron vsebuje približno 10 % kositra. Njegovo tališče je med 850 in 1000 °C.[710]

Objavljeni rezultati analiz elementnih sestav etruščansko-italskih čelad (ki jim pripada čelada C1)

693 Musty 1975, 409–410, sl. 6. Rezultati atomske absorpcijske analize (AAS) so pokazali naslednjo sestavo ingota: 21 % Cu, 26,8 % Zn, 0,02 % Ni, 0,14 % Fe, 0,05 % Sb, 0,007 % Ag, sledovi P, Sn in Pb.

694 Rothenhöfer 2015; Rothenhöfer 2016.

695 Weisgerber 2007, 148–150, 154, pregl. 2; Hanel, Bode 2016, 170, pregl. 1. Preseneča ingot z 29,5 % cinka, saj okoli 28 % velja za zgornjo mejo deleža cinka v rimskih medeninah (prim. zgoraj).

696 Prim. elementno sestavo ingotov iz Halterna in Colchestra ter elementno sestavo čiste medenine.

697 Jackson, Craddock 1995, 93; Ponting 2012, 171, op. 39. Caley (1964, 99, 100) ocenjuje, da se je pri vsakem taljenju rimske čiste medenine vsebnost cinka v njej zmanjšala za približno 10 %.

698 Upoštevala sem le meritve, pri katerih vsebnost železa ne presega 1 % (14 % – pogl. 16, *pregl. C2: 7*; 26,4 % – pogl. 16, *pregl. A5: 13*). Ob domnevi, da večina železa v rezultatih meritev izvira iz ostankov patine oziroma je povezana z meritvami korodirane medenine, je namreč pri meritvah, ki so pokazale vsebnost železa nad 1 %, treba upoštevati, da je dejanska vrednost cinka višja.

699 Brüggler et al. 2012, 141–142, 144. Npr. nastavki za perjanice na čeladi C2: meritve so pokazale medenino z okoli 22–23 % (pogl. 16, *pregl. C2: 11, 14*) oziroma 14 % cinka (pogl. 16, *pregl. C2: 7*). Zdi se verjetno, da so bili vsi trije nastavki iz enake medenine, zato domnevam, da je na enem merjenem mestu prišlo do lokalnega izluženja cinka (mesto 7).

700 Prim. zgoraj, op. 697.

701 Tak način izdelave so ugotovili za iz čiste medenine narejen rokavni del členastega oklepa (*manica segmentata*) iz zadnje tretjine 1. do prve tretjine 2. st. (Brüggler et al. 2012, 140, 144–145) in luske oklepa iz Augsburga (Raub 2010).

702 Pogl. 16, *pregl. A6: 15, A7: 9/22, A8: 1, A16: 2.*

703 Pogl. 16, *pregl. A9: 1, 6.*

704 Pogl. 16, *pregl. A1: 17.*

705 Pogl. 16, *pregl. A19: 5.*

706 Meritev ščitnika branika ročaja meča A8 je bila narejena na patinirani površini.

707 V bakrovih zlitinah na namerno dodan svinec kažejo njegovi deleži nad 2 % (Cowell 1990, 76).

708 Brown 1976, 25; Cowell 1990, 78.

709 Brown 1976, 40; Riederer 2002b, 284–285.

710 Voß, Hammer, Lutz 1998, 179; Schwab 2011, 273.

The published results of the elemental composition analyses of the Etrusco-Italic helmets, among them also the C1 helmet, show they were made of tin bronze with 6–12% tin.[711] Interestingly, the same type of bronze (binary copper-tin alloy with 5–7% to 10–12% tin) was used for the Late Bronze Age helmets from Mušja jama.[712]

Of the later, Buggenum and Haguenau type Roman bronze helmets from Slovenia apart from the C2 helmet from the Ljubljanica, elemental composition has been established for three crest knobs made integrally with the bowl and for one crest knob separately cast of leaded bronze and soldered to the top of the bowl. All three integrally made knobs are of a binary copper-tin alloy with 12.7–13% tin (lead and other elements only present in trace amounts),[713] which corresponds with the composition of the C2 helmet. This shows that the Roman master craftsmen of the Imperial period made these helmets from an alloy similar to the one commonly used for helmets in the Bronze Age, i.e. an alloy with around 13% tin, or slightly less, which is optimal in hardness and toughness.[714]

A considerably different elemental composition has been established for the Haguenau helmet from Haltern, which is the only Buggenum/Haguenau helmet outside Slovenia to be published complete with its elemental composition data. Its browguard is brass (92.16% copper and 7.63% zinc), while the helmet itself is of a tertiary alloy of copper (64.71%), tin (26.04%) and lead (7.87%).[715] Such an alloy, which seems unusual for a helmet,[716] is suitable for casting, but not for forging.[717] This suggests that the Haltern helmet had poorer mechanical properties in comparison with helmets made of an alloy of copper and around 12% tin.[718]

711 For the elemental composition of the helmet from Krn (Slovenia), see Istenič 2018, helmet No. 4; for that of the eleven helmets from unknown sites (Axel Guttmann Collection, Berlin), see Born 1991.
712 Trampuž Orel 2016, 333.
713 Istenič 2018, Nos. 8–10, 13.
714 Brown 1976, 25.
715 Riederer 2002a, 121, Table 19. Other elements are represented with under 1% proportion by mass and do not appear to have been added intentionally.
716 Similar tertiary alloys are mentioned in connection with ancient bells and mirrors (Scott 1991, 26).
717 Scott 1991, 26.
718 Brown 1976, 25–26; Born 1991, 77.

17.3 Copper

Copper was used to produce one[719] or at most three handguard plates of the Mainz type swords,[720] as well as a great majority of the analysed rivets (A5, A6, C1, C2, H2).

Melted pure copper is poor at filling small cavities and hence not suitable for casting objects of anything but the simplest of shapes. Cast copper billets, however, are suitable for cold working.[721] Such copper is both tough and malleable, and therefore appropriate for fastening elements such as rivets that were exposed to relatively great stress.

Roman copper ingots are usually shaped as flat round 'cakes' weighing roughly between 20 and 90 kg. The vast majority of analysed ingots contain more than 99% copper and originate from southern Spain.[722]

17.4 Silver

The mounts of the A13/MM A24 Mainz type scabbard, as well as the H1 and H3 belt-pieces are of a high-quality silver alloy with 3–4% copper. A very similar alloy was used for the roughly 3 mm thick sheet covering the iron guttering and terminal knob on the A12 Mainz type scabbard; it appears to have been attached to the underlying iron guttering either mechanically or with an organic glue that has not survived.[723]

A roughly 0.1 mm thick layer of silver alloy covers the upper surface of the H2 brass buckle with belt-plate.[724] The silvering of the I1 medallion front is considerably thinner and not visible with the naked eye. We could not establish which of the numerous techniques used by the Romans was adopted to silver these two items; the absence of mercury excludes the amalgamation technique.[725]

Silver or silver alloy of a high quality was used for inlaying the B2 dagger sheath.

Silver alloy with 3–4% copper was also used for the only militaria made of silver that I know to have been published complete with the results of the elemental

719 Ch. 16, *Table A5: 1, 2.*
720 Ch. 16, *Tables A15:3, 4, MM A34: 9.*
721 Voß, Hammer, Lutz 1998, 179.
722 Rico et al. 2005–2006; Klein et al. 2007.
723 Cf. La Niece 1993, 202.
724 See Ch. 16: H2.
725 La Niece 1993; Voß, Hammer, Lutz 1998, 194–196; Vlachou, McDonnell, Janaway 2002; Šmit, Istenič, Knific 2008, 2331.

kažejo, da so jih izdelovali iz kositrovega brona s 6–12 % kositra.[711] Iz enakega brona (binarna zlitina baker-kositer z od 5–7 % do 10–12 % kositra) so poznobronastodobne čelade iz Mušje jame.[712]

Za mlajše rimske bronaste čelade, to je tipa Buggenum in Haguenau, iz Slovenije poleg čelade C2 iz Ljubljanice poznamo elementno sestavo treh vrhnjih delov čelad in enega zaključnega gumba, ki je bil ulit posebej, iz svinčevega brona, in prispajkan na vrh kalote. Vse tri čelade so iz binarne zlitine baker-kositer z 12,7–13 % kositra (svinec in ostali elementi so prisotni le v sledovih),[713] kar se ujema s sestavo zlitine čelade C2. Rimski mojstri so torej omenjene čelade cesarske dobe naredili iz podobne zlitine, kot je bila pri izdelavi čelad običajna že v bronasti dobi. Uporabili so zlitino z okrog 13 % kositra (ali malo manj), pri kateri sta trdota in žilavost optimalni.[714]

Od elementne sestave zlitin čelad iz Slovenije se bistveno razlikuje elementna sestava čelade tipa Haguenau iz Halterna, ki je edina čelada tipov Buggenum oziroma Haguenau zunaj Slovenije, za katero so objavljeni podatki o elementni sestavi. Čelni ščitnik te čelade je iz medenine (92,16 % bakra in 7,63 % cinka), čelada pa iz terciarne zlitine bakra (64,71 %), kositra (26,04 %) in svinca (7,87 %).[715] Taka zlitina, ki se za čelado zdi neobičajna,[716] je dobra za ulivanje, ni pa primerna za kovanje.[717] Zdi se torej, da je imela čelada iz Halterna slabše mehanske lastnosti kot čelade iz zlitine bakra z okoli 12 % kositra.[718]

17.3 Baker

Iz bakra so en[719] ali največ trije ščitniki branikov ročajev mečev tipa Mainz[720] in velika večina zakovic, pri katerih smo analizirali elementno sestavo (A5, A6, C1, C2, H2).

Staljen čisti baker slabo zapolnjuje majhne prostore, zato je slab za ulivanje predmetov, razen če imajo enostavno obliko. Uliti bakrovi polizdelki so dobri za plastično preoblikovanje.[721] Tak baker odlikujeta žilavost in plastičnost, zato je zelo primeren za povezovalne elemente, kot so zakovice, na katere so delovale razmeroma velike sile.

Rimski bakrovi ingoti so običajno nizke pogače krožnega tlorisa, ki tehtajo od okoli 20 do 90 kg. Velika večina analiziranih ingotov vsebuje več kot 99 % bakra in izvira iz južne Španije.[722]

17.4 Srebro

Okovi ene nožnice tipa Mainz (A13/MM A24) in dva dela pasu (H1, H3) so iz visokokvalitetne zlitine srebra s 3–4 % bakra. Iz zelo podobne zlitine je do okoli 3 mm debela pločevina, ki odeva železen robni okov in zaključni gumb nožnice meča tipa Mainz (A12); zdi se, da je bila na podlago nameščena mehansko ali z organskim lepilom, ki se ni ohranilo.[723]

Okrog 0,1 mm debela plast srebrove zlitine prekriva zgornjo površino medeninaste spone z okovom H2.[724] Posrebritev lica medaljona I1 je bistveno tanjša in s prostim očesom ni vidna. Nismo ugotovili, katerega od (številnih) načinov, ki so jih Rimljani poznali, so uporabili za posrebritev teh dveh predmetov; odsotnost živega srebra v posrebritvi nakazuje, da niso uporabili amalgamske tehnike.[725]

Srebro oziroma srebrovo zlitino visoke kvalitete so uporabili tudi za tavširanje nožnice bodala (B2).

Edini predmeti rimske vojaške opreme z (meni poznano) objavljeno elementno sestavo srebrove zlitine so okovi nožnice meča in deli pripadajočega pasu z najdišča Kalkriese; zlitina vsebuje 3–4 % bakra.[726]

Zlitina srebra z majhnim deležem bakra (do okoli 4 %) je za rimske srebrne predmete visoke kakovosti običajna.[727] Enako velja za srebrn denar, denarije. Večina kovnic je Avgustove denarije izdelovala iz zelo natančno določenih srebrovih zlitin. Avgustovi (oziroma Oktavijanovi) denariji italske in rimske kovnice vsebujejo npr. 96,25–96,80 % srebra, tisti iz kovnic v Španiji in Lugdunu pa 97,40–98,10 % srebra. Od 12 pr. Kr. so Avgustove denarije kovali le v Lugdunu, vsebnost srebra v njih je bila precej okoli

711 Rezultati analiz čelade iz vasi Krn (Slovenija): Istenič 2018, čelada št. 4; rezultati analiz enajstih čelad z neznanih najdišč (zbirka Axel Guttmann, Berlin): Born 1991.
712 Trampuž Orel 2016, 333.
713 Istenič 2018, št. 8–10, 13.
714 Brown 1976, 25.
715 Riederer 2002a, 121, pregl. 19. Ostali elementi so zastopani z manj kot 1 % masnega deleža, kar kaže, da jih niso dodali namerno.
716 Podobne terciarne zlitine omenjajo v zvezi z antičnimi zvonci in zrcali (Scott 1991, 26).
717 Scott 1991, 26.
718 Brown 1976, 25–26; Born 1991, 77.
719 Pogl. 16, *pregl. A5: 1, 2.*
720 Pogl. 16, *pregl. A15:3, 4, MM A34: 9.*
721 Voß, Hammer, Lutz 1998, 179.
722 Rico et al. 2005–2006; Klein et al. 2007.
723 Prim. La Niece 1993, 202.
724 Glej pogl. 16: H2.
725 La Niece 1993; Voß, Hammer, Lutz 1998, 194–196; Vlachou, McDonnell, Janaway 2002; Šmit, Istenič, Knific 2008, 2331.
726 Riederer 1999.
727 Sherlock 1976, 12; Hughes, Hall 1979, 325–335; Wiegels 2003, 48.

composition analysis, i.e. the mounts of the sword scabbard and associated belt from Kalkriese.[726]

An alloy of silver and up to 4% copper is standard for Roman silver artefacts of high quality.[727] The same is true of silver coins, the *denarii*. Most mints produced *denarii* of Augustus using precisely defined silver alloys. The *denarii* of Augustus (or Octavian) from mints in Italy and Rome contain 96.25%–96.80% silver, while those from the mints in Spain and *Lugdunum* contain 97.40%–98.10% silver. From 12 BC onwards, the *denarii* of Augustus were only minted at *Lugdunum*, their silver content was consistently around 98% and remained standard until Nero's reform in AD 64. Contemporary *quinarii*, with a nominal value of half a *denarius*, were minted from a lower quality (with roughly 92–93% silver) and less standardised silver alloy (greater standard deviation of silver content).[728]

Copper was added to silver to increase hardness and strength.[729]

Almost all of the 97 known Roman silver ingots date to the Late Roman period;[730] none have been found that date to the Augustan period or the 1st century AD.[731]

The ingots are of different shapes, by far the most commonly (roughly two thirds) of a double axe-head. They weigh approximately one or two Roman pounds (Roman pound = 327.45 g), frequently bear stamps and mainly date to the 4th or the early 5th century.[732]

Only in rare cases has their elemental composition been published, more or less precisely. Most are of silver-copper alloy containing 95–98% silver and shaped as double axe-heads.[733] A group of nine silver alloy ingots of an irregular elongated shape found in Ljubljana, in a hoard together with coins from the mid-4th century, includes one analysed in the early 19th century.[734]

Coin finds show that the price of silver in the Augustan period exceeded that of brass roughly by a factor of 27.[735] Silver alloys with a high silver content were thus intended for prestigious artefacts of high quality,[736] which corresponds with the fact that the items of such an alloy from the Ljubljanica (fittings of the A13/MM A24 scabbard and the H1 and H3 belt-pieces) are also gilded.[737]

17.5 Gold

Gold is present as thin plating on artefacts of high-quality silver alloy, namely the locket and suspension bands of the A13/MM A24 Mainz type scabbard, as well as the H1 and H3 belt pieces. None of these revealed mercury (Hg) in the gilding, indicating that the production process did not involve fire or amalgamation gilding, but rather one of the many other techniques used in Antiquity.[738]

17.6 Tin

A number of analysed artefacts are tinned.

A thin layer of tin (an estimated 1.2 μm in A9) covers the front of all the analysed metal sheets on the Mainz type scabbards (A5–A7, A9, A10) and the underside of all the analysed handguard plates (A5, A7, A16) except A15. A shiny silvery layer, which has not been analysed, also survives well on the underside of the MM A27 handguard. Apart from swords, the front of the B2 dagger sheath terminal is tinned.

Polishing a tinned surface produced a shiny silvery appearance, best preserved on the A5 scabbard. Tinning probably involved the application of liquid tin onto the surface of an object that was then heated in a reducing atmosphere to form an intermetallic compound.[739]

726 Riederer 1999.
727 Sherlock 1976, 12; Hughes, Hall 1979, 325–335; Wiegels 2003, 48.
728 Walker 1976, 4–25.
729 Sherlock 1976, 12; Hughes, Hall 1979, 325–335.
730 Wiegels 2003.
731 Wiegels 2003 (ingots from the 1st–2nd or the second half of the 2nd century: 73–74, 91, Cat. Nos. 1–2, 43–47).
732 Wiegels 2003, 13–16.
733 The ingot from Biesheim-Oedenburg in Alsace (France): 98% Ag, other elements not mentioned (Wiegels 2003, 11), the ingot from London: 95% Ag, 3.7% Cu, 0.4% Au, 0.5% Pb (https://commons.wikimedia.org/wiki/File:Roman_silver_ingots.jpg; http://www.britishmuseum.org/research/collection_online/collection_object_details.aspx?objectId=1362011&partId=1; last accessed 6. 2. 2019), the ingot from Kent (Great Britain): Ag 95.2%, Cu 4.10%, Au 0.81%, Pb 1.22%, Fe 0.10% (Painter 1972, 84), the sub-square ingot from Ljubljana: Ag 94.12%, Cu 3.89%, Au 1.02%, Pb 0.32%, Fe 0.16% (Schmid 1913, 177–179; Wiegels 2003, 105, Cat. No. 67 – analysis not mentioned), Schmid (1913, 176) cited the analyses of three ingots from Diersdorf (Germany): 1. – Ag 96.32%, Au 0.96%, Cu 2.10%, Fe 0.06%, 2. – Ag 96.70%, Au 1.20%, Cu 1.50%, Fe 0.08%, 3. – Ag 97.45%, Au 0.88%, Cu 1.20%, Fe 0.04%.
734 Analysis results: Ag 93.75%, Au 2.89%, Cu 2.71%, Pb 0.49%, Zn 0.10% (Schmid 1913, 175–177). Wiegels 2003, 27, 105, Cat. Nos. 69–77 (analysis not mentioned).
735 Burnett, Craddock, Preston 1982, 268.
736 Hughes, Hall 1979; Franzius 1999; Giumlia-Mair 2001, 297–298.
737 See below and Ch. 16: A13, H1, H3.
738 Voß, Hammer, Lutz 1998, 190–193; Ingo et al. 2004, 172, 173; Šmit, Istenič, Knific 2008, 2331, 2332.
739 Meeks 1986; Tylecote 1986, 112–113; Meeks 1993; Voß, Hammer, Lutz 1998, 196–198; Šmit, Istenič, Knific 2008, 2330, 2333.

98 % in je ostala standard do Neronove reforme 64 po Kr. Sočasne kvinarije, ki so imeli nominalno vrednost pol denarija, so kovali iz manj kakovostne (vsebnost srebra približno 92–93 %) in manj natančno narejene (večja standardna deviacija vsebnosti srebra) srebrove zlitine.[728]

Baker v srebrovi zlitini je povečal njeno trdoto in trdnost.[729]

Med 97 znanimi ingoti rimske dobe so skoraj vsi iz pozne rimske dobe.[730] Srebrnih ingotov iz avgustejske dobe ali 1. st. po Kr. ne poznamo.[731]

Oblike ingotov so različne. Daleč najštevilnejši (približno dve tretjini) so ingoti, pri katerih oblika spominja na dvojno sekiro. Tehtajo približno en ali dva rimska funta (rimski funt = 327,45 g) in so zelo pogosto pečateni ter so v glavnem iz 4. ali začetka 5. stoletja.[732]

Le za redke ingote je (bolj ali manj natančno) poznana elementna sestava. Večina ima obliko dvojne sekire in je iz zlitine srebra (95 do 98 %) z bakrom.[733] Z začetka 19. st. je analiza elementne sestave enega iz skupine devetih podolgovatih ingotov nepravilnih oblik, najdenih v Ljubljani, v depoju skupaj z novci iz sredine 4. st.[734]

Novci kažejo, da je bila cena srebra v avgustejski dobi približno 27-krat višja kot vrednost medenine.[735] Srebrove zlitine z visokim deležem srebra so bile torej namenjene prestižnim predmetom visoke kvalitete,[736] kar se sklada z dejstvom, da so bili predmeti iz take zlitine iz Ljubljanice (okovi nožnice A13/MM A24 ter pasna okova H1 in H3) pozlačeni.[737]

728 Walker 1976, 4–25.
729 Sherlock 1976, 12; Hughes, Hall 1979, 325–335.
730 Wiegels 2003.
731 Wiegels 2003 (ingoti iz 1.–2. oziroma druge polovice 2. st.: 73–74, 91, kat. 1–2, 43–47).
732 Wiegels 2003, 13–16.
733 Ingot z najdišča Biesheim-Oedenburg v Alzaciji (Francija): 98 % Ag, drugi elementi niso omenjeni (Wiegels 2003, 11), ingot iz Londona: 95 % Ag, 3,7 % Cu, 0,4 % Au, 0,5 % Pb (https://commons.wikimedia.org/wiki/File:Roman_silver_ingots.jpg; http://www.britishmuseum.org/research/collection_online/collection_object_details.aspx?objectId=1362011&partId=1; zadnji dostop 6. 2. 2019), ingot iz Kenta (Velika Britanija): 95,2 % Ag, 4,10 % Cu, 0,81 % Au, 1,22 % Pb, 0,10 % Fe (Painter 1972, 84), skoraj kvadratno oblikovan ingot iz Ljubljane: 94,12 % Ag, 3,89 % Cu, 1,02 % Au, 0,32 % Pb, 0,16 % Fe (Schmid 1913, 177–179; Wiegels 2003, 105, kat. 67 – brez navedbe analize), Schmid (1913, 176) navaja analize treh ingotov iz Diersdorfa (Nemčija): 1. – 96,32 % Ag, 0,96 % Au, 2,10 % Cu, 0,06 % Fe, 2. – 96,70 % Ag, 1,20 % Au, 1,50 % Cu, 0,08 % Fe, 3. – 97,45 % Ag, 0,88 % Au, 1,20 % Cu, 0,04 % Fe.
734 Rezultati analize: 93,75 % Ag, 2,89 % Au, 2,71 % Cu, 0,49 % Pb, 0,10 % Zn (Schmid 1913, 175–177). Wiegels 2003, 27, 105, kat. 69–77 (brez navedbe analize).
735 Burnett, Craddock, Preston 1982, 268.
736 Hughes, Hall 1979; Franzius 1999; Giumlia-Mair 2001, 297–298.
737 Glej spodaj in pogl. 16: A13, H1, H3.

17.5 Zlato

Zlato je prisotno kot tanka prevleka na površini predmetov iz srebrove zlitine visoke kakovosti: na okovih nožnice tipa Mainz (A13/MM A24) in na dveh pasnih okovih (H1, H3). V nobenem primeru v pozlati nismo zaznali živega srebra (Hg), kar kaže, da niso zlatili z amalgamiranjem (ognjena pozlata), ampak z enim od številnih drugih načinov, ki so jih uporabljali v antiki.[738]

17.6 Kositer

Prevleke iz kositra imajo številni analizirani predmeti.

Tenka plast kositra (pri A9 ocenjena na okoli 1,2 μm) je na licih vseh analiziranih pločevin, ki so prekrivale sprednje strani nožnic tipa Mainz (A5–A7, A9, A10), in na spodnjih straneh vseh ščitnikov branikov mečev, ki smo jih analizirali (A5, A7, A16), razen A15. Srebrna svetleča se plast je dobro ohranjena tudi na spodnji strani branika meča MM A27, na katerem nismo naredili analize. Poleg tega pokositrena površina krasi sprednjo stran zaključka železne nožnice bodala B2.

S poliranjem pokositrene površine so dosegli sijoč srebrn izgled, ki je najbolje ohranjen na nožnici A5. Kositrenje so verjetno izvedli tako, da so na površino predmeta nanesli tekoč kositer in predmet segreli v redukcijski atmosferi, da so nastale intermetalne spojine.[739]

Na zgornjih straneh ščitnikov branikov ročajev mečev (A6, A15, A20) kositer ni ohranjen kot tenka plast, ki bi prekrivala celotno površino, ampak kot otoki debelejših nanosov, kar po mojem mnenju nakazuje, da so v teh primerih kositer (podobno kot zlitino kositer-svinec – glej pogl. 17.7) uporabljali kot snov, namenjeno sprijetju kovinskega ščitnika z lesenim ali koščenim branikom.

Za spajkanje kovinskih delov so kositer uporabili na dveh okovih nožnic mečev tipa Mainz: A5 (okov ob ustju) in A7 (spajkanje spodnjega prečnega okova in spajkanje ovalnega okova z okovom ob ustju).

Kositer so uporabili za zalivko na spodnji strani srebrnega prečnega okova A13, na mestu, kjer je ob izdelavi reliefnega okrasa prišlo do nehotenega predrtja okova.[740]

738 Voß, Hammer, Lutz 1998, 190–193; Ingo et al. 2004, 172, 173; Šmit, Istenič, Knific 2008, 2331, 2332.
739 Meeks 1986; Tylecote 1986, 112–113; Meeks 1993; Voß, Hammer, Lutz 1998, 196–198; Šmit, Istenič, Knific 2008, 2330, 2333.
740 Glej Katalog, A13.

On the upper sides of the handguard plates (A6, A15, A20), tin survives not as a thin layer covering the whole surface, but rather in thicker patches, which I believe indicates tin being used as an adhesive to fasten the metal handguard plate to the handguard of either wood or bone (like a tin-lead alloy – see Chapter 17.7).

Tin was used as solder in two Mainz type scabbards, to fix the overlapping ends of the mouth and suspension bands, as well as to fix the mouth band to the mouth plate (A5 and A7 scabbards).

Tin was also used as filling on the underside of the A13 suspension band, to reinforce the flaw that occurred while embossing.[740]

The I2 torque is not of pure tin, but rather of an alloy of tin and around 2% copper. Such an alloy is much harder than pure tin.[741] I have been unable to find any Roman or prehistoric artefacts of a similar composition; the closest are Roman ingots of pure tin.[742]

Tin is a soft and malleable metal with a low melting point (232 °C) that has an appearance similar to silver, so much so that it is difficult to distinguish the two without analyses.[743] Pure tin has been documented in ingots, which certainly include Roman examples,[744] while the earliest such ingots date back to the Bronze Age.[745]

17.7 Tin-lead alloy

This alloy was most frequently used as solder, but also occurs as surface decoration (to cover the terminal of the B1 dagger sheath), as filling in the crest knob of the C2 helmet and to cast objects (H4, H5 and I1). This reflects the mechanical properties of the alloy, which is soft with a low melting point (ca. 300 °C), and hence highly suitable for casting objects of a complex form or decoration, but unsuitable for cold working.

The same qualities make the alloy highly suitable for soldering. It was used in this function on the A1 scabbard (soldering the brass parts of the guttering to the bronze lining, soldering together the brass parts of the net-like fitting) and on the Mainz type swords (on the upper sides of the A7, A8, A13/MM A34 handguard plates) and scabbards (soldering the oval mouth plate to the mouth band on A6 and A9, the overlapping ends of the A7 suspension band and the openwork chape to a probably brass sheet on A11).

Tin-lead solder was widespread in the Roman period.[746] Ingots of this alloy, with varying contents of tin and lead,[747] show that Roman masters were supplied with ready-made alloys.

Alloys of tin and lead were relatively cheap in Roman times,[748] and often represented a cheap substitute for silver alloys. The tin to lead price ratio was roughly 11 : 1, hence adding lead greatly cheapened the alloy.[749]

17.8 Conclusions[750]

Objects of copper, copper-tin alloy, brass and high-quality silver alloy were formed by cold working (forging, turning, polishing), and therefore had relatively good mechanical properties. In comparison, cast metals have a considerably lower hardness and ductility.[751]

By far the commonest copper alloy in the Roman military equipment from the Ljubljanica is brass. It is used for most mounts and decorative elements on sword scabbards, dagger sheaths, helmets and belts. These items were made and decorated by cold working. The brass elemental composition shows they were made from ingots and billets, perhaps also from other objects of pure brass.

Bronze is rare and only occurs as a binary copper-tin alloy in forged objects. It is used for several handguard plates of the Mainz type swords, and for both helmets. As in previous periods, helmets in the Augustan era continued to be made of bronze, which was not replaced by brass. The reasons for this should probably be sought in the mechanical properties of the alloys; hardness is essential for a helmet, measuring just under 1000 N/mm^2 for a copper-tin alloy with 10% tin and around 700 N/mm^2 for a copper-zinc alloy with 20% zinc. Helmets were therefore made of bronze probably because of its hardness even though it required more effort when cold working (forging,

740 See Catalogue, A13.
741 Cf. Beagrie 1989, 169, 171, 175.
742 See Ch. 12, I2.
743 La Niece 1993, 201.
744 Colls et al. 1975, 83–84, 94; Beagrie 1989, 173.
745 Wang et al. 2016 (with references). Numerous ingots are not dated (e.g. Fox 1996; Paynter 2003).
746 Brown 1976, 26.
747 Tylecote 1986, 50, Table 28; Paynter 2003.
748 Cf. Ch. 12, I1.
749 See Ch. 12, I1.
750 The conclusions do not pertain to the rare artefacts postdating the Augustan period and the Early Principate.
751 Voß, Hammer, Lutz 1998, 181, 182.

Torkves I2 ni iz čistega kositra, ampak iz zlitine kositra in okoli 2 % bakra. Taka zlitina je trša od čistega kositra.[741] Rimskih ali prazgodovinskih predmetov take sestave ne poznam. Najbližji so mu rimski ingoti iz čistega kositra.[742]

Kositer je mehka in plastična kovina z nizkim tališčem (232 °C), ki je po videzu zelo podobna srebru. Brez analiz je namreč kositer težko razlikovati od srebra.[743] Iz čistega kositra so ingoti, med katerimi so zanesljivo rimski primerki,[744] najstarejši pa so iz bronaste dobe.[745]

17.7 Zlitina kositra in svinca

Zlitina kositer-svinec je bila najpogosteje uporabljena kot spajka. Poleg tega je zastopana kot okrasna prevleka (na konici železne nožnice bodala B1), polnilo gumba čelade (C2) in zlitina za izdelavo ulitih predmetov (H4, H5 in I1), kar se sklada z mehanskimi lastnostmi zlitine kositer-svinec: je mehka in ima nizko tališče (okrog 300 °C), zato je odlična za ulivanje predmetov z zapleteno obliko ali okrasom, ni pa primerna za plastično preoblikovanje.

Zaradi istih lastnosti je zlitina kositer-svinec odlična za spajkanje. Ugotovili smo jo na nožnici A1 (spajkanje delov medeninastega robnega okova na podlogo iz brona in spajkanje delov medeninastega mrežastega okova) ter na mečih (na zgornji strani ščitnikov branikov mečev A7, A8, A13/MM A34) in nožnicah tipa Mainz (spajkanje ovalnega okova z okovom ob ustju na nožnicah A6 in A9, spajkanje presegajočih se zaključnih delov drugega prečnega okova nožnice A7, spajka na hrbtni strani predrtega okova na konici nožnice A11).

Spajkanje z zlitino kositra in svinca je bilo v rimski dobi splošno razširjeno.[746] Rimski ingoti iz zlitine kositer-svinec z različno visokimi deleži ene oziroma druge kovine[747] kažejo, da so imeli rimski mojstri na razpolago že pripravljene zlitine.

Zlitine kositra s svincem so bile v rimski dobi razmeroma poceni[748] in so bile pogosto ceneni nadomestek srebrovih zlitin. Razmerje med ceno kositra in svinca je bilo približno 11 : 1, zato je dodajanje svinca zlitino močno pocenilo.[749]

17.8 Sklep[750]

Predmete iz bakra, zlitine baker-kositer, medenine in visokokvalitetne srebrove zlitine so naredili s plastičnim preoblikovanjem (kovanjem, struženjem, poliranjem), zato so imeli razmeroma dobre mehanske lastnosti. Kovine v ulitem stanju imajo namreč bistveno nižjo trdnost in razteznost kot tiste, ki so bile plastično preoblikovane.[751]

Daleč najpogosteje ugotovljena bakrova zlitina na predmetih rimske vojaške opreme iz Ljubljanice je medenina. Iz nje je večina okovov in drugih okrasov na nožnicah mečev in bodal, čeladah ter pasovih. Narejeni in okrašeni so s postopki, ki vključujejo plastično preoblikovanje. Elementna sestava medenine kaže, da so bili njen vir ingoti, polizdelki ali morda drugi predmeti iz čiste medenine.

Bron je zastopan redko, v vseh primerih kot binarna zlitina baker-kositer in za izdelavo kovanih predmetov. Iz nje so predvsem del ščitnikov branikov ročajev mečev tipa Mainz in obe čeladi. Vzrok, da v avgustejski dobi pri izdelavi čelad medenina ni zamenjala brona, je verjetno v mehanskih lastnostih obeh zlitin. Za čelado je namreč bistvena trdota, ki je pri zlitini baker-kositer z 10 % kositra malo manj kot 1000 N/mm^2, pri zlitini baker-cink z 20 % cinka pa okoli 700 N/mm^2. Za čelade so torej verjetno uporabili bron zaradi njegove trdote, čeprav ga je bilo težje plastično preoblikovati (kovati, stružiti, polirati) kot medenino. Natezna trdnost in predvsem razteznost kositrnega brona sta namreč nekoliko nižji kot pri medenini.[752]

Kositer so redko uporabili za spajke in izjemoma za zalivke, pogosto pa za površinske prevleke. Kositrene so vse sprednje strani tenkih medeninastih (v enem primeru bronaste) pločevin na sprednji strani nožnic tipa Mainz in vse spodnje strani ščitnikov branikov (ki so iz brona ali bakra) ročajev mečev tega tipa. Nanos tenke plasti kositra na površino v teh primerih ni

741 Prim. Beagrie 1989, 169, 171, 175.
742 Glej pogl. 12, I2.
743 La Niece 1993, 201.
744 Colls et al. 1975, 83–84, 94; Beagrie 1989, 173.
745 Wang et al. 2016 (z navedeno lit.). Številnih kositrovih ingotov ni mogoče datirati (npr. Fox 1996; Paynter 2003).
746 Brown 1976, 26.
747 Tylecote 1986, 50, pregl. 28; Paynter 2003.
748 Prim. pogl. 12, I1.
749 Glej pogl. 12, I1.
750 Sklep se ne nanaša na redke predmete, ki so mlajši od avgustejske dobe oziroma zgodnjega principata.
751 Voß, Hammer, Lutz 1998, 181, 182.
752 Voß, Hammer, Lutz 1998, 184, 185, sl. 22, 23 (podatki so izraženi v kp/mm^2; prevedla sem jih v enoto, ki se je v zadnjem času uveljavila za merjenje trdote).

spinning, polishing) than brass; tin bronze has lower tensile strength and, more importantly, lower ductility than brass.[752]

Tin was rarely used for soldering and exceptionally for filling, but frequently for plating. All the sheet brass (in one example bronze) fronts of the Mainz type scabbards are tinned, as are the undersides of all handguard plates (of either bronze or copper) of the Mainz type swords. Tin plating on these pieces was not intended to protect against corrosion,[753] neither did it protect the wearer from noxious substances,[754] it was there for appearance' sake, as the polished tinned surface gave the appearance of silver.

Binary tin-lead alloy was used for casting cheap products with relief decoration. It was used for most of the soldering.

Silver is rare and used as the high-quality silver alloy (ca. 96–97% Ag) for the production of prestige items such as the fittings of the A13/MM A24 Mainz type scabbard and the H1 and H3 belt-pieces, also for plating as sheet silver that covered iron guttering (A12), or as a thin surface layer on artefacts of brass (H2) or tin-lead alloy (I1).

The choice of copper for most rivets has to do with the mechanical properties of the metal, but also its price and appearance. The same is true of the much rarer iron rivets (B1, B2, MM SG). Wrought iron (low-carbon steel) obtained from iron bloom is distinguished for its toughness, forgeability and low hardness, which allows a high degree of plastic deformation.[755] Brass rivets are limited to the presumed predecessors of the Mainz type scabbards (A1–A3) and to the B3 and B4 daggers/sheaths, where the choice of brass was probably linked to its decorative effect. High-quality silver alloy was used for rivets on objects of the same alloy (A13/MM24, H1).

The study of the metals of the Roman military equipment from the Ljubljanica has thus revealed a high degree of uniformity in the materials, both in the choice of metals and their elemental composition. This corresponds with the findings pertaining to the very similar construction of a large part of the Mainz type swords/scabbards[756] and the daggers/sheaths from the Ljubljanica,[757] but also to the rather uniform picture provided by the military equipment from the Augustan period in general.

A comparison with the observations on the military equipment from other sites shows similarities, but also differences. The former include a consistent use of copper alloys (when performed, analyses usually revealed the use of pure brass) for items of certain types or their parts (e.g. mounts on sword scabbards and belts, plume tubes on Haguenau helmets), but also a predominance of pure brass among copper alloys,[758] the use of very high-quality silver alloy (at least 96% Ag) for the production of prestige items[759] and plating with metals with a silvery shine.[760] As for the differences, there is published evidence that indicates a greater diversity of materials than that displayed by the artefacts from the Ljubljanica. In the Mainz type swords and scabbards, for example, the guttering may also be brass,[761] while the only other analysed handguard plate is of leaded bronze and not tinned.[762] Moreover, the elemental composition of the helmet from Haltern[763] is very different from the binary copper-tin alloy used for the helmets from Slovenia.

The elemental composition analyses of Roman products show that a specific metal was employed for a particular kind of product that best suited its production and function. This is particularly apparent in the Augustan period and the early 1st century. From the mid-1st century onwards, there seems to be an apparent increase in the use of alloys that suggest metal recycling, although quality items continued to be produced from metals of a standard composition, i.e. those that ensured successful production.[764]

The relatively small number of chosen metals and the uniformity of their elemental composition suggest that the brass and silver alloys needed to make mili-

752 Voß, Hammer, Lutz 1998, 184, 185, Figs. 22, 23 (the data there is given in kp/mm²; which I converted into the unit that has become prevalent in measuring hardness).

753 Usually the surface of less precious metals was plated with more noble metals (Voß, Hammer, Lutz 1998, 187, Fn. 172). Copper is more precious than tin (Voß, Hammer, Lutz 1998, 187, Fn. 172; for a standard electrode potential table indicating the metal preciousness, see https://www.engineeringtoolbox.com/electrode-potential-d_482.html; last accessed 6. 2. 2019). Precious alloys are less clearly defined as they are not of standard composition, but it would appear that brass has a higher resistance to corrosion than tin (https://en.wikipedia.org/wiki/Galvanic_series; last accessed 6. 2. 2019).

754 This was the most likely reason for tinning bronze vessels (Šmit, Istenič, Knific 2008, 2330).

755 Pleiner 2006, 16–20.

756 Cf. beginning of Ch. 17 and Ch. 4.2.3 (group of Mainz type swords and scabbards comprising A5–A11, A14, A15, A17, MM A25–MM A28, MM A34).

757 Cf. Ch. 5.4.

758 Craddock, Lambert 1985; Ponting, Segal 1998; Riederer 2001; Ponting 2002, 559; Riederer 2002a; Ponting 2012, 167, 168.

759 Riederer 1999.

760 E.g. on the Mainz type scabbards: Klein 2003b; on various objects: Deschler-Erb 1991. It is not possible to reliably distinguish between copper-tin alloy and brass, tinning from silvering and so forth without appropriate analyses.

761 Riederer 2002a, 120, Table 17: 418, 419, 421.

762 Riederer 2002a, 120, Table 17: 424.

763 Riederer 2002a, 121, Table 19: 430a.

764 Voß, Hammer, Lutz 1998, 201–203; Riederer 2002b; Brüggler et al. 2012, 148, 149.

bil namenjen zaščiti pred korozijo[753] niti zaščiti pred izločanjem zdravju škodljivih snovi,[754] temveč videzu, saj je zglajena pokositrena površina na videz zelo podobna srebrni/posrebreni površini.

Binarno zlitino kositer-svinec so uporabljali za ulivanje cenenih predmetov z reliefnim okrasom. Iz te zlitine je tudi večina spajk.

Srebro je zastopano redko: kot visokokvalitetna srebrova zlitina (okrog 96–97 % Ag) za izdelavo prestižnih predmetov (okovi nožnice meča tipa Mainz A13/MM A24, okova pasu H1, H3) oziroma pločevine, s katero so obdali železen robni okov (A12), ali pa kot tenka površinska plast na predmetih iz medenine (H2) ali zlitine kositer-svinec (I1).

Izbira bakra za večino zakovic je povezana z mehanskimi lastnostmi te kovine, ceno in videzom. Enako velja za dosti redkejše železne zakovice (B1, B2, MM SG). Kovno železo (oziroma nizkoogljično jeklo), pridobljeno iz volka, namreč odlikujejo velika žilavost in kovnost ter nizka trdota, zato prenese visoko stopnjo plastične deformacije.[755] Medeninaste zakovice so omejene na domnevne predhodnike nožnic mečev tipa Mainz (A1–A3) in na bodala/nožnice B3 in B4, kjer je bila izbira medenine verjetno povezana z njihovo okrasno funkcijo. Visokokvalitetno srebrovo zlitino so uporabili za zakovice na predmetih iz enake zlitine (A13/MM24, H1).

Raziskave kovin rimske vojaške opreme iz Ljubljanice torej kažejo visoko stopnjo enotnosti pri uporabljenih kovinah, tako pri izbiri posameznih kovin (npr. medenine, zlitin baker-kositer, kositer-svinec, srebrove zlitine) kot pri njihovi elementni sestavi (enotna/standardizirana sestava medenine, brona, srebrovih zlitin). To se ujema z ugotovitvami o zelo podobni zgradbi in načinu izdelave velikega dela mečev/nožnic tipa Mainz[756] in bodal/nožnic iz Ljubljanice,[757] pa tudi s precej enotno sliko, ki jo na sploh daje vojaška oprema avgustejske dobe.

Primerjava z izsledki raziskav vojaške opreme z drugih najdišč kaže izrazite podobnosti, pa tudi razlike. Med podobnostmi so dosledna uporaba bakrove zlitine (kjer so bile narejene analize, se je pokazalo, da gre običajno za čisto medenino) za predmete določenih tipov ali njihove dele (npr. okove nožnic mečev in pasov, nosilce perjanic na čeladah tipa Haguenau), prevlada čiste medenine med bakrovimi zlitinami,[758] uporaba zelo podobne visokokvalitetne srebrove zlitine (najmanj 96 % Ag) za izdelavo prestižnih predmetov[759] in prekrivanje površin s srebrno svetlečimi se prevlekami.[760] Po drugi strani nekatere objavljene analize nakazujejo, da je bila raznolikost uporabe materialov večja, kot jo kažejo predmeti iz Ljubljanice. Pri mečih in nožnicah tipa Mainz so npr. robni okovi lahko iz medenine,[761] edini analizirani ščitnik branika ročaja pa je iz svinčevega brona in ni pokositren.[762] Prav tako od binarne zlitine baker-kositer, ki smo jo ugotovili pri čeladah iz Slovenije, močno odstopa elementna sestava čelade iz Halterna.[763]

Analize elementne sestave kovin rimskih predmetov kažejo, da so za vsako vrsto predmetov uporabljali določeno vrsto kovine, ki je bila najprimernejša. To je posebej izrazito v avgustejski dobi in zgodnjem 1. stoletju, medtem ko se zdi, da so od sredine 1. st. vse pogostejše zlitine, ki kažejo na uporabo odpadnega kovinskega materiala, vendar so kvalitetne predmete še vedno izdelovali iz standardiziranih kovin, saj sicer niso mogli zagotoviti uspešne izdelave predmetov.[764]

Domnevam, da so bili glavni vir medenine in srebrovih zlitin pri izdelavi rimske vojaške opreme avgustejske dobe, kakršna je med najdbami iz Ljubljanice, polizdelki (npr. par milimetrov debela pločevina) in ingoti. Podobno se zdi verjetno za zlitino kositer-svinec. Za domnevo o izključni oziroma pretežni uporabi polizdelkov in ingotov govorijo enotnost zlitin in razmeroma majhno število ugotovljenih kovin.

Dejstvo, da gre pri medenini rimske vojaške opreme avgustejske dobe iz Ljubljanice vedno za čisto medenino, se sklada z načinom izdelave obravnavanih predmetov. V nasprotju z zlitinami, namenjenimi zgolj ulivanju predmetov, so morale namreč zlitine, namenjene plastičnemu preoblikovanju (npr. kovanju, zvijanju, struženju), s katerim je iz ulitega surovca

753 Običajno so površine manj žlahtnih kovin prekrivali s tenko plastjo bolj žlahtnih kovin (Voß, Hammer, Lutz 1998, 187, op. 172). Baker je žlahtnejši od kositra (Voß, Hammer, Lutz 1998, 187, op. 172; standardna tabela žlahtnosti posameznih kovin: https://www.engineeringtoolbox.com/electrode-potential-d_482.html; zadnji dostop 6. 2. 2019). Pri zlitinah je žlahtnost manj jasno opredeljena, saj nimajo standardne sestave, vendar kaže, da je medenina bolj odporna proti koroziji kot kositer (https://en.wikipedia.org/wiki/Galvanic_series; zadnji dostop 6. 2. 2019).

754 To je bil najverjetneje vzrok za kositrenje bronastih posod (Šmit, Istenič, Knific 2008, 2330).

755 Pleiner 2006, 16–20.

756 Prim. začetek pogl. 17 in pogl. 4.2.3 (skupina mečev/nožnic tipa Mainz A5–A11, A14, A15, A17, MM A25–MM A28, MM A34).

757 Prim. pogl. 5.4.

758 Craddock, Lambert 1985; Ponting, Segal 1998; Riederer 2001; Ponting 2002, 559; Riederer 2002a; Ponting 2012, 167, 168.

759 Riederer 1999.

760 Npr. na nožnicah tipa Mainz: Klein 2003b; na različnih predmetih: Deschler-Erb 1991. Brez analiz ni mogoče zanesljivo razlikovati zlitine baker-kositer od medenine, kositrenja od srebrenja in podobno.

761 Riederer 2002a, 120, pregl. 17: 418, 419, 421.

762 Riederer 2002a, 120, pregl. 17: 424.

763 Riederer 2002a, 121, pregl. 19: 430a.

764 Voß, Hammer, Lutz 1998, 201–203; Riederer 2002b; Brüggler et al. 2012, 148, 149.

tary equipment in the Augustan period, such as was found in the Ljubljanica, was mainly obtained from billets, for example several millimetres thick sheets of metal, as well as ingots. The same was likely true of the tin-lead alloy.

The fact that the brass pieces of the Augustan military equipment from the Ljubljanica are all made of pure brass, is in accordance with the techniques of their production. In contrast to the alloys only used for casting, those intended for cold working (e.g. forging, bending, turning), to turn the cast blank into the desired objects, had to have a specific composition so adding scrap metal of unknown composition was out of the question.[765]

The metallographic studies of the Roman brass militaria and the experiments to make similar objects using the techniques known to the Romans have revealed a great complexity of procedures, hence a wide and specialised knowledge of materials that a Roman master metalworker had to possess.[766] In light of that, the hypothesis of large and specialised workshops that mass produced brass billets (e.g. large pieces of sheet metal), seems plausible. The billets were then used by other specialised workshops to make finished products.[767]

It is reasonable to think that a large part of the Roman military equipment in the Augustan period and the Early Principate was produced in a few large workshops with mass production and broad markets. The choice of the metals was influenced by their mechanical properties, appearance and price. Supporting the hypothesis of mass production is the standardisation of materials, production techniques, forms and appearance of products, while the existence of broad markets is clear from the close similarities in numerous items of the Roman military equipment recovered from different and even very distant sites. Of these, the uniformity of the group of Mainz type swords and scabbards from the Ljubljanica[768] is too great to only be attributable to the same narrow dating and a general uniformity of the Augustan military equipment alone; I presume that it can only be explained by a production in a single or in several closely connected workshops.

Military equipment was likely also produced in smaller workshops with relatively small markets, which imitated the products of the large workshops; their products differ in details from those of large workshops (e.g. the A16 sword).

The Romans had a preference for a gold-silvery appearance of their military equipment. The expensive items of prestige were made by using silver alloys and gold, either for objects as a whole or for plating, while all other objects used cheaper materials to achieve this effect, i.e. brass, tin, alloys of tin and lead, copper and tin, as well as iron. Brass and bronze surfaces have a yellow metallic shine when polished, reminiscent of gold, while polished tin surfaces are similar to silver.

Suetonius mentions the abuse of these similarities in connection with the Emperor Vitellius, who 'was said to have stolen some of the offerings and ornaments from the temples and changed others, substituting tin and brass for gold and silver' during his proconsulship in Africa.[769]

Of importance regarding the organisation of Roman military equipment production is a hypothesis, put forward on several occasions, regarding the monopoly of the Roman central government over the production and use of brass in the early period of its Roman use, i.e. from the mid-1st century BC to the 1st century AD.[770] Because of the extremely widespread use of the alloy in this production, such a monopoly would even argue for the centralised control over the production of Roman military equipment as a whole in the Augustan period and the Principate.

The established beginnings of the Roman use of brass, dating to around 60 BC, are in fact connected with the Roman military equipement and the rare issues of brass coins.[771] However, the copper alloys of this time are poorly investigated and it is not possible to speculate on whether the use of brass was limited to military equipment and coins. It seems that pure brass was the prevailing copper alloy for the Roman military equipment already at the beginning of the Roman use of brass, but certainly in the Augustan period and the Early Principate.[772] From the monetary reform around 23 BC onwards, pure brass was also used for part of the coins (*sestertii*, *dupondii*) minted in Rome.[773] From the Augustan period at the latest,

765 Voß, Hammer, Lutz 1998, 201–203.
766 Brüggler et al. 2012, 142, 144, 149.
767 Brüggler et al. 2012, 148.
768 A5–A11, A14, A15, A17, MM A25–MM A28, MM A34; cf. Ch. 4.2.3.
769 Beagrie 1989, 170.
770 Craddock, Lambert 1985, 164; Bayley 1990, 20; Jackson, Craddock 1995; Rehren 1999; Ponting 2012, 166.
771 Istenič, Šmit 2007.
772 Craddock, Lambert 1985; Ponting, Segal 1998; Istenič 2000a; Istenič 2000b; Šmit, Pelicon 2000; Riederer 2001; Ponting 2002, 559; Riederer 2002a; Istenič 2005; Istenič, Šmit 2007; Ponting 2012, 167, 168.
773 Burnett, Craddock, Preston 1982; Burnett 1987.

nastal želen predmet, imeti natančno določeno sestavo, zato dodajanje odpadnega materiala nepoznane sestave ni bilo sprejemljivo.[765]

Metalografske raziskave rimske vojaške opreme iz medenine in poskusi, da bi z Rimljanom poznanimi tehnikami naredili podobne izdelke, so pokazali izredno zapletenost postopkov, torej so rimski mojstri imeli široko in specializirano znanje o materialih.[766] Domneva o velikih in specializiranih delavnicah, ki so serijsko izdelovale medeninaste polizdelke (npr. pločevino velikih dimenzij), se zdi smiselna. Iz nje so druge specializirane delavnice izdelovale končne izdelke.[767]

Domnevam, da so v avgustejski dobi in zgodnjem principatu velik del rimske vojaške opreme naredili v maloštevilnih velikih delavnicah s serijsko proizvodnjo, ki so imele obširna tržišča. Na izbiro kovin so vplivali njihove mehanske lastnosti, videz in cena. Za serijsko proizvodnjo govorijo standardizacija materialov, načinov izdelave, oblik in videza predmetov, za velika tržišča pa izredna podobnost številnih predmetov rimske opreme na različnih, geografsko močno oddaljenih najdiščih. Za skupino mečev/nožnic tipa Mainz iz Ljubljanice[768] domnevam na primer izdelavo v eni delavnici ali v več ozko povezanih delavnicah, saj je njihova enotnost tako velika, da se ne zdi verjetno, da bi bila vzroka zanjo le ozka datacija in splošna enotnost vojaške opreme avgustejske dobe.

Verjetno so vojaško opremo izdelovale tudi manjše delavnice z ožjimi tržišči, ki so se pri izdelavi vojaške opreme zgledovale po izdelkih velikih delavnic; njihovi izdelki se od njih razlikujejo po podrobnostih (npr. meč A16).

Pri izdelavi vojaške opreme so stremeli k zlato-srebrnemu videzu. Pri dragih, prestižnih predmetih so ga dosegli z uporabo srebrovih zlitin in zlata (za izdelavo predmetov ali prekrivanje njihove površine), pri ostalih pa z uporabo cenejših materialov: medenine, kositra, zlitin kositer-svinec in baker-kositer ter železa. Spolirane medeninaste in bronaste površine imajo namreč rumen kovinski sij in spominjajo na zlato, spolirane površine kositra pa so po videzu podobne srebru.

Zlorabo podobnosti pri videzu teh kovin omenja Svetonij v zvezi s (poznejšim) cesarjem Vitelijem, ki je, ko je bil prokonzul v Afriki, v templjih ukradel zlate in srebrne darove ter okrase oziroma jih je zamenjal z medeninastimi in kositrnimi.[769]

V zvezi z vprašanji o organizaciji izdelave rimske vojaške opreme je pomembna v literaturi večkrat izražena domneva o monopolu rimske centralne uprave pri pridobivanju in uporabi medenine v zgodnji dobi njene rimske uporabe, tj. od sredine 1. stoletja pr. Kr. do 1. st. po Kr.[770] Monopol rimskih državnih oblasti nad medenino bi bil namreč zaradi močno uveljavljene uporabe te zlitine pri izdelavi vojaške opreme močan argument v prid domnevi o nadzoru centralne uprave pri izdelavi rimske vojaške opreme v avgustejski dobi in principatu.

Doslej ugotovljeni začetki uporabe medenine pri Rimljanih ok. 60 pr. Kr. so povezani prav z rimsko vojsko in redkimi izdajami medeninastega denarja.[771] Vendar pa so bakrove zlitine tega obdobja slabo raziskane, zato ni mogoče sklepati, da je bila v tem obdobju uporaba medenine omejena na vojaško opremo in denar. Zdi se, da je bila čista medenina prevladujoča bakrova zlitina pri rimski vojaški opremi že na začetku rimske uporabe medenine, vsekakor pa v avgustejski dobi in zgodnjem principatu.[772] Od denarne reforme okoli 23 pr. Kr. je bil iz čiste medenine tudi del denarja (sesterci, dupondiji), ki so ga kovali v Rimu.[773] Najkasneje od avgustejske dobe so čisto medenino množično uporabljali tudi za izdelavo predmetov civilne sfere,[774] pri katerih nič ne govori za nadzor centralne uprave. Enako velja za pečata na medeninastih ingotih iz Halterna in Colchestra.[775]

Rimska centralna oblast je torej morda nadzorovala pridobivanje in uporabo medenine v najzgodnejšem obdobju, najkasneje od (srednje)avgustejske dobe pa najverjetneje ne.

Za sedaj torej ni pokazateljev za domnevo o državnem nadzoru proizvodnje vojaške opreme v avgustejski dobi. Zdi se verjetno, da sta njeni proizvodnja in distribucija potekali podobno kot npr. proizvodnja finega namiznega posodja (predvsem terre sigillate in keramike tenkih sten), s katerim so trgovci rimske vojake (in druge) v velikih količinah oskrbovali tudi

765 Voß, Hammer, Lutz 1998, 201–203.
766 Brüggler et al. 2012, 142, 144, 149.
767 Brüggler et al. 2012, 148.
768 A5–A11, A14, A15, A17, MM A25–MM A28, MM A34; prim. pogl. 4.2.3.
769 Beagrie 1989, 170.
770 Craddock, Lambert 1985, 164; Bayley 1990, 20; Jackson, Craddock 1995; Rehren 1999; Ponting 2012, 166.
771 Istenič, Šmit 2007.
772 Craddock, Lambert 1985; Ponting, Segal 1998; Istenič 2000a; Istenič 2000b; Šmit, Pelicon 2000; Riederer 2001; Ponting 2002, 559; Riederer 2002a; Istenič 2005; Istenič, Šmit 2007; Ponting 2012, 167, 168.
773 Burnett, Craddock, Preston 1982; Burnett 1987.
774 Riederer 2001; Riederer 2002b, 286–288; Bayley, Butcher 2004, 209, 210; Ponting 2012, 165–169.
775 Prim. pogl. 17.1.

pure brass was in massive use for the production of objects for the civilian population,[774] which shows no signs of a centralised control; the same is true of the two stamps on the brass ingots from Haltern and Colchester.[775]

The Roman central government may have exercised control over the production and use of brass in the earliest period, but this was probably not the case from at least the (Middle) Augustan period onwards.

In short, we lack clear indications to support the hypothesis of a state-controlled production of the military equipment in the Augustan period. It seems more likely that its production and distribution was organised similarly as the production of fine tableware, such as terra sigillata and thin-walled wares, which the merchants supplied in great numbers to the Roman soldiers and civilians across the empire. These tablewares were initially produced in workshops in central and northern Italy, with subsidiaries springing up at Lyon in the Early Augustan period and later followed by others. For the workshops of these tablewares, the army was such a great customer that the good communication routes along rivers to the areas along the Rhine, where many army units were stationed in the Middle and Late Augustan periods, must have played a very important role in establishing the subsidiaries at Lyon and Vienne in the Augustan period.[776]

774 Riederer 2001; Riederer 2002b, 286–288; Bayley, Butcher 2004, 209, 210; Ponting 2012, 165–169.
775 Cf. Ch. 17.1.
776 Desbat 2000; Roth-Rubi 2006; Rudnick 2006, 59–63.

v oddaljenih taborih. Prvotno so ga izdelovale delavnice v srednji in severni Italiji, v zgodnjeavgustejski dobi pa so nastale njihove podružnice v Lyonu in kasneje drugje. Za delavnice tega posodja je bila vojska tako velik odjemalec, da je bila njihova dobra prometna povezava po rekah z območji ob Renu, kjer je bila v srednji in poznoavgustejski dobi velika gostota vojaških enot, verjetno zelo pomemben dejavnik pri odpiranju podružnic italskih delavnic v Lyonu in Vienne v avgustejski dobi.[776]

776 Desbat 2000; Roth-Rubi 2006; Rudnick 2006, 59–63.

18
Characteristics of the Roman military equipment from the Ljubljanica

The discussion in this chapter is based on 79 artefacts that have been positively identified as originating from the Ljubljanica. The A7, F6, D6, D9, MM D10 and E1 artefacts, which are included either in the catalogue or in the discussion on the different kinds of military equipment, do not feature in this chapter as their findspot may not be the Ljubljanica.

18.1 Dating

The Ljubljanica has yielded 54 artefacts that may be connected with the Roman army and attributed a narrow timeframe as detailed below (*Fig. 123*):

- prior to the Middle Augustan period – six items (A1, A4, MM A22, MM A23, C1, H7),
- Octavianic or Augustan – two items (H4, H5),
- Octavianic to Claudian – four spearheads (E2–E5),
- Early/Middle Augustan – two items (A2, A3),
- Middle Augustan to Early Tiberian – thirteen items (A5, A6, A8–A11, A14, A15, A17, MM A25–A27, MM A34),
- Middle/Late Augustan – six items (A13/MM A24, B3, B4, C2, H1, H3),
- Augustan – one item (I1),
- Middle Augustan to Claudian – six items (A16, A18, A35, MM A28–A30),
- Late Augustan to Claudian – one item (B1),
- Augustan to Flavian – eight items (D1–D5, D7, D8, H2),
- Tiberian–Claudian – two items (A12, B2),
- middle and second half of the 1st century – one item (MM A32),
- 2nd century – one item (A21),
- 3rd century – one item (MM SG).

There is a strong prevalence of artefacts from the 1st century BC and the first half of the 1st century AD. Only two objects are certain to be later: sword from the 2nd century, probably its second half, and a shield boss from the mid-3rd century.

Six items predate the Middle Augustan period (*Fig. 123*). With the exception of the H7 hobnail, which is fairly reliably dated from the mid-1st century BC to the Early Augustan period, they cannot be dated with any more precision because of limited knowledge of the development of Roman weapons prior to the Middle Augustan period.[777] According to typological criteria, the C1 helmet is not later than the first third or first half of the 1st century BC. For swords and their scabbards, typological features indicate a dating between the beginning of the 1st century BC and the Early Augustan period (A4, MM A23), to the Octavianic–Early Augustan period (MM A22) or between roughly 60 BC and the Early Augustan period (A1).

By far the most numerous items (43) are attributable to spans that include part of the Middle Augustan up to the Early Tiberian period. Eleven of these predate the beginning of Tiberius' reign (A2, A3, A13/MM24, B3, B4, C2, H1, H3–H5, I1), others have broader dates that include the Early Tiberian (thirteen items), Claudian (eleven items) or Flavian (eight items) period (*Fig. 123*).

Apart from two artefacts later than the 1st century AD, typological criteria show three more artefacts as reliably later than the Augustan period: two from the Tiberian–Claudian period and one from the middle or the second half of the 1st century (*Fig. 123*).

There is a striking absence of most groups of the Roman military equipment characteristic of the Tiberian–Claudian period, such as the later variants of the Mainz type scabbards with sheet metal fronts bearing

777 Cf. sections on this topic in Chs. 4 and 6.

18
Značilnosti rimske vojaške opreme iz Ljubljanice

Pri obravnavi upoštevam 79 predmetov, ki so bili zanesljivo najdeni v Ljubljanici. Predmete A7, F6, D6, D9 in MM D10 ter E1, ki so navedeni v katalogu ali pri obravnavi posameznih vrst vojaške opreme, sem iz obravnave v tem poglavju izključila, ker ni zanesljivo, da so bili najdeni v Ljubljanici.

18.1 Datacija

Štiriinpetdeset predmetov iz Ljubljanice, ki jih je mogoče utemeljeno povezati z rimsko vojsko in obenem razmeroma ozko časovno opredeliti, je datiranih takole (*sl. 123*):

- pred srednjeavgustejsko dobo – šest predmetov (A1, A4, MM A22, MM A23, C1, H7),
- oktavijanska ali avgustejska doba – dva predmeta (H4, H5),
- oktavijanska do klavdijska doba – štiri sulične osti (E2–E5),
- zgodnja do srednjeavgustejska doba – dva predmeta (A2, A3),
- srednjeavgustejska do zgodnjetiberijska doba – 13 predmetov (A5, A6, A8–A11, A14, A15, A17, MM A25–A27, MM A34),
- srednja/pozna avgustejska doba – šest predmetov (A13/MM A24, B3, B4, C2, H1, H3),
- avgustejska doba – en predmet (I1),
- srednjeavgustejska do klavdijska doba – šest predmetov (A16, A18, A35, MM A28–A30),
- poznoavgustejska do klavdijska doba – en predmet (B1),
- avgustejska do flavijska doba – osem predmetov (D1–D5, D7, D8, H2),
- tiberijsko-klavdijska doba – dva predmeta (A12, B2),
- sredina in druga polovica 1. st. – en predmet (MM A32),
- 2. st. – en predmet (A21),
- 3. st. – en predmet (MM SG).

Močno torej prevladujejo predmeti iz 1. st. pr. Kr. in prve polovice 1. st. po Kr. Zanesljivo mlajša sta le dva predmeta: meč iz (druge polovice) 2. st. in ščitna grba iz sredine 3. st.

Šest predmetov je starejših od srednjeavgustejske dobe (*sl. 123*). Razen pri okovnem žebljičku (H7), ki je razmeroma zanesljivo datiran od sredine 1. st. pr. Kr. do zgodnjeavgustejske dobe, je njihova ožja datacija negotova zaradi slabo poznanega razvoja rimskega orožja pred srednjeavgustejsko dobo.[777] Čelada C1 po tipoloških kriterijih ni mlajša od prve tretjine (ali prve polovice) 1. st. pr. Kr. Pri mečih in nožnicah tipološke značilnosti nakazujejo datacijo med začetkom 1. st. pr. Kr. in zgodnjeavgustejsko dobo (A4, MM A23), oktavijansko-zgodnjeavgustejsko dobo (MM A22) oziroma med ok. 60 pr. Kr. in zgodnjeavgustejsko dobo (A1).

Daleč največ (43) predmetov je iz obdobij, ki vključujejo del srednjeavgustejskega do zgodnjetiberijskega časa. Med njimi je enajst predmetov starejših od začetka Tiberijeve vlade (A2, A3, A13/MM24, B3, B4, C2, H1, H3–H5, I1), ostali pa so datirani v širša obdobja, ki vključujejo zgodnjetiberijski (13 predmetov), klavdijski (11 predmetov) ali flavijski (osem predmetov) čas (*sl. 123*).

Poleg dveh predmetov, ki sta mlajša od 1. st. po Kr., so po tipoloških pokazateljih še trije predmeti zanesljivo mlajši od avgustejske dobe: dva iz tiberijsko-klavdijske dobe in eden iz sredine ali druge polovice 1. st. (*sl. 123*).

777 Prim. ustrezne dele v pogl. 4 in 6.

Figure 123
Dating of Roman militaria up to the end of the 3rd century from the Ljubljanica.

Slika 123
Časovna razporeditev predmetov rimske vojaške opreme iz Ljubljanice do vključno 3. stoletja.

repoussé decoration created by hammering the sheet metal into a die,[778] belt mounts of thin sheet metal with such decoration, as well as belt mounts decorated with niello.[779]

The Roman military equipment from the Ljubljanica thus includes six items (11% of the artefacts with a narrow dating) that predate the Middle Augustan period; five artefacts are reliably later than the Augustan period. This shows that the time of the most marked concentration of Roman military finds in the Ljubljanica is the Middle and Late Augustan periods. Six items date only to this timeframe, though a large part of the finds with a broader date, i.e. from the Middle/Late Augustan to the Early Tiberian (thirteen items), Claudian (eleven items) or Flavian period (eight items) may also share this dating. This is indicated by the marked paucity of artefacts dated to the Tiberian(–Claudian) period (*Fig. 123*) and an absence of the novelties characteristic of the Roman military gear of this time. We are thus dealing with a substantial reduction in the number of Roman military artefacts from the Ljubljanica from the end of the Augustan or the Early Tiberian period onwards.

18.2 Representation of individual groups of military equipment

Diffrent categories of Roman military equipment from the Ljubljanica are represented as follows (*Fig. 124*):

- swords and/or scabbards or their parts – 33 items,
- daggers and/or sheaths – four items,
- helmets – two items,
- *pila* – seven items,
- spearheads – four items,
- double-sided heavy tools – eight items,
- turf cutters – five items,
- belt parts – six items,
- hobnails – two items,
- military decorations – two items,
- tent pegs – five items,
- shield boss – one item.

This shows a marked predominance of swords and their scabbards.

Most groups of offensive and defensive weapons are present, even the shield, albeit with a boss from the 3rd century.

What are absent are parts of cuirasses and projectiles such as catapult bolts, arrowheads and slingshot. Also missing is military horse harness and related equipment,[780] though even if it were represented, it is

778 Istenič 2003b, 275. Miks (2007, 240–256) does not distinguish between the scabbards with this decoration and the earlier scabbards with repoussé sheet-metal mounts that only cover part of the scabbard's front (e.g. the A13/MM A24 scabbard).

779 Deschler-Erb 1999, 43–45, Pls. 18–20. The presence of such belt mounts among the finds from the River Kupa at Sisak (Radman-Livaja 2004, 88, Pls. 35: 206–207, 36: 209–211) indicates that their absence in the Ljubljanica is linked to their dating rather than geographic distribution.

780 With the exception of a horse bit found next to the mouth of a horse in a presumably Roman layer on the bank of the Ljubljanica at Dolge njive in Vrhnika, excavated as part of the investigations of the wooden landing pier: Logar 1986, 126–127, Fig. 2. The finds from these excavations are mentioned in this book only exceptionally (cf. Ch. 13).

Figure 124
Different categories of Roman military equipment up to the end of the 3rd century from the Ljubljanica.

Slika 124
Zastopanost posameznih skupin predmetov rimske vojaške opreme iz Ljubljanice do vključno 3. stoletja.

Pomenljiva se mi zdi odsotnost večine za tiberijsko-klavdijsko dobo značilnih skupin rimske vojaške opreme, npr. mlajših različic nožnic mečev tipa Mainz, pri katerih je sprednja stran prekrita s pločevino, ki ima reliefen, s pomočjo modela iztolčen okras,[778] pasnih okovov iz tenke pločevine z enako narejenim reliefnim okrasom ter pasnih okovov z niello okrasom.[779]

Med rimsko vojaško opremo iz Ljubljanice je torej šest predmetov (11 % ožje datiranih predmetov) starejših od srednjeavgustejske dobe. Pet predmetov je zanesljivo mlajših od avgustejske dobe. Izrazito časovno težišče rimske vojaške opreme iz Ljubljanice je v srednji in pozni avgustejski dobi. Šest predmetov je datiranih le v to obdobje, verjetno pa vanj sodi tudi velik del predmetov z datacijami, ki poleg srednje do poznoavgustejske dobe vključujejo zgodnjetiberijsko (13 predmetov), klavdijsko (11 predmetov) ali flavijsko dobo (osem predmetov). Za to govorita izrazita maloštevilnost v tiberijsko(-klavdijsko) dobo datiranih predmetov (*sl. 123*) in odsotnost novosti, značilnih za rimsko vojaško opremo te dobe. Nakazuje se torej izrazito zmanjšanje števila rimske vojaške opreme iz Ljubljanice od konca avgustejske ali od zgodnjetiberijske dobe dalje.

18.2 Zastopanost posameznih vrst vojaške opreme

Posamezne skupine predmetov rimske vojaške opreme so med najdbami iz Ljubljanice zastopane takole (*sl. 124*):

- meči in/ali nožnice mečev oziroma njihovi deli – 33 primerkov,
- bodala in/ali nožnice bodal – štirje primerki,
- čelade – dva primerka,
- pilumi – sedem primerkov,
- sulične osti – štirje primerki,
- dvostranska težka orodja – osem primerkov,
- orodje za rušo – pet primerkov,
- deli pasov – šest primerkov,
- okovni žebljički obuval – dva primerka,
- odlikovanja – dva primerka,
- šotorski klini – pet primerkov,
- ščitna grba – en primerek.

Izrazito torej prevladujejo meči in njihove nožnice.

Nastopa večina napadalnega in obrambnega orožja ter vojaške opreme. Ščit je zastopan le z grbo iz 3. st.

Manjkajo deli oklepov in razni izstrelki (katapultne in puščične konice, želodi). Prav tako ni konjske opreme,[780] pri kateri sicer pogosto ne znamo zanesljivo razlikovati vojaških predmetov od civilnih.[781]

778 Istenič 2003b, 279. Miks (2007, 240–256) nožnic s takim okrasom v obravnavi ne razlikuje od starejših nožnic, pri katerih pločevinasti okovi z reliefnim okrasom prekrivajo le del sprednje strani nožnice (npr. nožnica A13/MM A24).

779 Deschler-Erb 1999, 43–45, t. 18–20. Prisotnost takih pasnih okovov med najdbami iz Kolpe v Sisciji (Radman-Livaja 2004, 88, t. 35: 206–207, 36: 209–211) kaže, da je njihova odsotnost v Ljubljanici povezana z datacijo in ne z geografsko razširjenostjo.

780 Izjema so žvale, ki so bile najdene ob konjskem gobcu v verjetno rimski plasti na bregu Dolgih njiv na Vrhniki med izkopavanji lesenega pomola: Logar 1986, 126–127, sl. 2. V knjigi najdb s teh izkopavanj ne obravnavam oziroma jih omenjam le izjemoma (prim. pogl. 13).

781 Deschler-Erb 1999, 49.

a group of finds notoriously difficult to reliably distinguish from equivalent objects in civilian use.[781]

The absence of small iron objects, such as arrowheads,[782] and lead slingshot, may be due to their size. In contrast, this cannot be true of the parts of cuirasses and shields, which are larger pieces and in part made of more resistant copper alloys.

The division into offensive and defensive weapons reveals a marked predominance of the former (*Fig. 124*): 33 swords and/or their scabbards, four daggers (with sheaths), seven *pila* and four spearheads, making altogether 48 artefacts. The actual number may be even greater, as only some of the spearheads could be positively identified as Roman. Only three items represent the defensive weapons, namely two helmets and one 3rd century shield boss.

Other items are pieces of the belt, hobnails, decorations, tools and tent pegs, altogether numbering 28 artefacts (*Fig. 124*).

18.3 The bearers of the military equipment

18.3.1 Roman and non-Roman soldiers

Most of the objects under discussion can reasonably be assumed to have been worn and used by Roman soldiers. This is not so clear for the objects predating the Middle Augustan period. The MM A22 sword in its scabbard is one such item, presumably dating between 40/30 and 15 BC, and connected with a soldier of non-Roman origin who collaborated with the Romans.[783] Similarly can be suggested of the A20 and possibly also the MM A33 swords, which are difficult to interpret given their unclear dating. The C1 helmet, which is probably no later than the first third of the 1st century BC, may have been worn by a Roman soldier or a non-Roman, who may not have been associated with the Roman army.[784] The spearheads with a facetted socket appear to have been used by mercenaries or members of the auxiliary units (infantry or cavalry), possibly recruited in the south-eastern Alpine area.[785]

781 Deschler-Erb 1999, 49.
782 Cf. Bishop, Coulston 2006, 89, Fig. 46: 5–12.
783 Istenič 2010; Istenič 2015b.
784 Istenič 2018, 306.
785 Cf. Ch. 8.

18.3.2 Infantry and cavalry

As much as it is possible to make this distinction, the Early Imperial military equipment from the Ljubljanica belonged almost exclusively to infantrymen. These are the Mainz and Pompeii type swords,[786] daggers,[787] *pila*,[788] Etrusco-Italic and Buggenum/Haguenau helmets,[789] tools and belt parts.[790] Spearheads were wielded by both infantrymen and cavalrymen.[791] The item likely to have been used by a mounted soldier is the A20 sword, possibly also the A19, MM A33[792] and MM A22 swords.[793]

18.3.3 Legionaries and other soldiers

From the Middle Augustan to the Flavian period, the armament of the infantrymen serving in legions, auxiliary regiments and other units connected with the Roman army[794] (the latter two hereinafter referred to as 'non-legionaries' for the sake of brevity) differed in their use of several types of weapons, while others were the same.

Evidence shows that short swords in associated scabbards (of the Mainz and Pompeii types)[795] and daggers were used by both legionaries and 'non-legionaries'.[796] Only the former wielded *pila* and convex shields, while the auxiliary units were armed with spearheads and flat shields; segmented armour was mainly worn by legionaries, chainmail by soldiers in auxiliary units.[797] The Buggenum and Haguenau helmets are believed to have been donned by legionaries,[798] while the Weisenau helmets were initially worn by soldiers in auxiliary units and towards the end of the 1st century also by legionaries.[799] Depictions on Trajan's Column show that legionaries used large double-sided tools (double axes, axe/pickaxes, axe/adzes),[800] while

786 Deschler-Erb 1999, 23.
787 Bishop, Coulston 2006, 85; Saliola, Casprini 2012, 35–38.
788 Deschler-Erb 1999, 19.
789 Bishop, Coulston 2006, 100–104.
790 It would appear that only infantrymen had belts with metal mounts (Deschler-Erb 1999, 19, 20, 23, 29, 40).
791 Deschler-Erb 1999, 20; Bishop, Coulston 2006, 78.
792 See Ch. 4.3.
793 Longer swords with an openwork scabbard, such as MM A22, belonged to cavalrymen, while the shorter swords were presumably used by members of the infantry (Istenič 2010, primarily 140, 145, 146).
794 Cf. Waurick 1994, 23.
795 Deschler-Erb 1999, 23; Bishop, Coulston 2006, 78.
796 Bishop, Coulston 2006, 85.
797 Junkelmann 1997, 188; Bishop, Coulston 2006, 78, 255–259.
798 Waurick 1988, 354–356; Schreiter 1993, 44; Istenič 2018, 307.
799 Waurick 1988, 353–356; von Detten, Schalles, Schreiter 1993, 180; Schreiter 1993, 47; Deschler-Erb 1999, 29 (infantry and cavalry); Fischer 2012, 143–144; Istenič 2018, 307.
800 Schumacher 1989, 271–273, Figs. 4–5; Bishop, Coulston 2006, 117–118.

Vzrok za odsotnost majhnih železnih predmetov, kot so puščične osti,[782] in svinčenih izstrelkov bi lahko bila njihova majhnost. To pa ne velja za ostanke oklepov in ščitov, ki so večji in deloma narejeni iz bakrovih zlitin, ki so obstojnejše od železa.

Pregled orožja po delitvi na napadalno oziroma obrambno pokaže izrazito prevlado napadalnega orožja (*sl. 124*): 33 mečev oz. nožnic, štiri bodala (z nožnicami), sedem pilumov in štiri sulične osti, torej skupaj 48 predmetov. Dejansko število je verjetno večje, ker sem prepoznala le del rimskih suličnih osti. Obrambnemu orožju pripadajo le trije predmeti: dve čeladi in ščitna grba iz 3. st.

Ostali predmeti rimske vojaške opreme iz Ljubljanice so deli pasov, okovna žebljička obuval in odlikovanji ter orodje (13 predmetov) in šotorski klini, skupaj 28 predmetov (*sl. 124*).

18.3 Nosilci vojaške opreme

18.3.1 Rimski vojaki in drugi

Za večino obravnavanih predmetov utemeljeno domnevamo, da so jih uporabljali rimski vojaki. Izjeme so med predmeti, ki so starejši od srednjeavgustejske dobe. Pri meču v nožnici MM A22, ki je verjetno iz obdobja med 40/30 in 15 pr. Kr., je jasna povezava z vojščakom nerimskega izvora, ki je sodeloval z Rimljani.[783] Podobno bi lahko bilo z mečem A20 in morda tudi z mečem MM A33, ki ju je zaradi nejasne datacije težko interpretirati. Čelado C1, ki verjetno ni mlajša od prve tretjine 1. st. pr. Kr., je lahko nosil rimski vojak ali pa »Nerimljan«, ki z rimsko vojsko ni bil povezan.[784] Zdi se, da so bili s suličnimi ostmi s fasetiranim tulom oboroženi možje najemniških oziroma pomožnih enot (pešakov ali konjenikov), ki so bili morda rekrutirani na območju jugovzhodnih Alp.[785]

18.3.2 Pešaki in konjeniki

Tiste vrste zgodnjecesarske vojaške opreme iz Ljubljanice, ki omogočajo utemeljeno domnevo o tem, ali so pripadali pešakom ali konjenikom, torej kažejo skoraj izključno pešake. To so meči tipa Mainz in Pompei,[786] bodala,[787] pilumi,[788] čelade etruščansko-italskega tipa in tipa Buggenum/Haguenau,[789] orodja, deli pasov.[790] S suličnimi ostmi so bili oboroženi pešaki in konjeniki.[791] Edini predmet, za katerega se zdi verjetno, da je pripadal konjeniku, je meč A20. Konjeniki so morda uporabljali tudi meče A19, MM A33[792] in MM A22.[793]

18.3.3 Legionarji in drugi

Od srednjeavgustejske do flavijske dobe je bila oborožitev pešakov v legijah ter pešakov v pomožnih in drugih z rimsko vojsko organizacijsko povezanih enotah[794] (zaradi jasnosti in enostavnosti jih bom v nadaljevanju imenovala »nelegionarji«) deloma enotna, deloma pa različna.

Kratke meče v pripadajočih nožnicah (tipa Mainz in Pompei) [795] in bodala so uporabljali oboji.[796] Zgolj k legionarski opremi so sodili pilumi in izbočeni ščiti, k opremi pomožnih enot pa sulične osti in ravni ščiti; segmentne oklepe so nosili predvsem legionarji, verižno srajco pa vojaki pomožnih enot.[797] Za čelade tipa Buggenum in Haguenau je utemeljena domneva, da so jih nosili legionarji,[798] čelade tipa Weisenau pa najprej vojaki pomožnih enot, proti koncu 1. st. pa tudi legionarji.[799] Upodobitve na Trajanovem stebru kažejo, da so velika dvostranska orodja (dvojne sekire, sekire/krampi, sekire/tesla) uporabljali legionarji,[800] taka orodja v grobovih z nerimskim orožjem (npr. na grobišču Wederath-Belginum)[801] govorijo za to, da so jih uporabljali tudi »nelegionarji«. Odlikovanja so običajno prejemali rimski državljani, drugi pa le izjemoma (in ne kot posamezniki, ampak cele enote).[802]

Velika večina z vojsko povezanih predmetov zgodnjecesarske dobe iz Ljubljanice (kratki meči in bodala – oboji lahko v nožnicah, deli pasov, šotorski klini, orodja) torej ne omogoča razlikovanja med opremo

782 Prim. Bishop, Coulston 2006, 89, sl. 46: 5–12.
783 Istenič 2010; Istenič 2015b.
784 Istenič 2018, sl. 326.
785 Prim. pogl. 8.
786 Deschler-Erb 1999, 23.
787 Bishop, Coulston 2006, 85; Saliola, Casprini 2012, 35–38.
788 Deschler-Erb 1999, 19.
789 Bishop, Coulston 2006, 100–104.
790 Zdi se, da so bili le pasovi pešakov obloženi z okovi (Deschler-Erb 1999, 19, 20, 23, 29, 40).
791 Deschler-Erb 1999, 20; Bishop, Coulston 2006, 78.
792 Glej pogl. 4.3.
793 Daljši meči z nožnico, ki ima predrt okras, kakršen je na MM A22, so sodili h konjenikom, za krajše pa domnevam, da so jih uporabljali pešaki (Istenič 2010, predvsem 158, 161, 162).
794 Prim. Waurick 1994, 23.
795 Deschler-Erb 1999, 23; Bishop, Coulston 2006, 78.
796 Bishop, Coulston 2006, 85.
797 Junkelmann 1997, 188; Bishop, Coulston 2006, 78, 255–259.
798 Waurick 1988, 354–356; Schreiter 1993, 44; Istenič 2018, 326.
799 Waurick 1988, 353–356; von Detten, Schalles, Schreiter 1993, 180; Schreiter 1993, 47; Deschler-Erb 1999, 29 (pešaki in konjeniki); Fischer 2012, 143–144; Istenič 2018, 326.
800 Schumacher 1989, 271–273, sl. 4–5; Bishop, Coulston 2006, 117–118.
801 Grobova 697 in 2215 (Haffner 1974, t. 184–185; Schumacher 1989, 268: k, 271, 274, op. 9; Cordie-Hackenberg, Haffner 1997, t. 604: d–g, t. 605).
802 Maxfield 1981, 121–127.

the finds of such tools in graves with non-Roman weapons (e.g. at the Wederath-Belginum cemetery)[801] suggest they were also used by 'non-legionaries'. Military decorations were usually awarded to Roman citizens, only exceptionally to others who received them as units and not as individuals.[802]

The vast majority of Early Imperial artefacts from the Ljubljanica connected with the Roman army (short swords in scabbards, daggers in sheaths, belt parts, tent pegs, tools) do not allow us to distinguish between the equipment of legionaries and 'non-legionaries'. There are, however, eleven items clearly associated with legionaries (*pila*, helmets, decorations). The four spearheads with a facetted socket may reliably be linked to 'non-legionaries', infantry or cavalry. The equipment not characteristic of legionaries also includes the A19, A20 and MM A33 swords.

Available evidence also suggests that the Roman marines were equipped in a similar fashion to land forces, so from the military equipment alone it is impossible to distinguish fleet from land forces.[803]

In the 3rd century, which is the timeframe of the star-shaped shield boss, there was no longer a clear dividing line between the armament of the legions and that of the auxiliary units; they both used oval shields.[804]

18.3.3.1 Mainz type swords and scabbards as weapons of legionaries?

Most of the Mainz type swords and scabbards from graves associated with burials of 'non-legionaries', such as those from the Ljubljana,[805] Verdun,[806] Wederath-Belginum[807] and other cemeteries,[808] appear simpler than the swords from the Ljubljanica. This may have led some scholars to suggest a differentiation between the Mainz type swords and scabbards used by legionaries and those wielded by 'non-legionaries';[809] they would also have come from different workshops.

The published information on the swords and scabbards from the above-mentioned 'non-legionary' graves reveals that almost all lack the handguard plate,[810] while the scabbards either have not survived[811] or are only represented by iron guttering and terminal knobs, as well as copper alloy crossbands and suspension rings,[812] and not a single example has tinned sheet brass or openwork mounts. Certainly the evidence for these scabbards is scant, but the surviving parts do not substantially differ from those known on the scabbards from the Ljubljanica.

Two burials from the Posočje region (Idrija pri Bači, Graves 11/12 and 17), ascribed to locals fighting in the Roman army,[813] contained swords that do have copper alloy handguard plates or very well preserved scabbard parts (suspension bands with rings, chape, mouth band), with one scabbard including tinned copper alloy sheet on the front, however.[814]

The last two scabbards clearly show it is not reasonable to differentiate between the Mainz type swords and scabbards used by legions and those used by other units of the Roman army. At least for the Augustan period, it seems clear that soldiers not serving in legions were, at least in part, armed with the Mainz type swords and scabbards of the same quality and production as the examples recovered from the Ljubljanica. I suspect that the reason that the impression has arisen that the swords and scabbards from the graves associated with 'non-legionaries' were of inferior quality lies rather in their poorer state of preservation as the result of the environment in which they were found.

801 Graves 697 and 2215 (Haffner 1974, Pls. 184–185; Schumacher 1989, 268: k, 271, 274, Fn. 9; Cordie-Hackenberg, Haffner 1997, Pl. 604: d–g, Pl. 605).
802 Maxfield 1981, 121–127.
803 Junkelmann 1997, 188 (*pila, gladius*); Bishop, Coulston 2006, 259.
804 James 2004, 168–169; Bishop, Coulston 2006, 259.
805 Gaspari et al. 2015, 132, 134–138, 156–160, Pl. 1: 1–3, Fig. 7.
806 Breščak 2015, 85, 88, 90, 91, Graves 1, 41, 84, 112, 136, Pl. 2: 7, 10, Pl. 1: 10, Pl. 13: 1–4, Pl. 18: 3, Pl. 21: 1, Pl. 22: 1–4, Pl. 25: 10; for the connection with auxiliary units or mercenaries, see Istenič 2013.
807 Graves 2215 (Schumacher 1989; Miks 2007, 758, A774, Pl. 13) and 1344 (Haffner 1989, 105, 108, Fig. 72 = Miks 2007, 757–758, A773, Pls. 23, 152). The drawing and description suggest that the relatively poorly preserved sword from Grave 269 also belongs to the Mainz type, but not the even more poorly preserved scabbard (Haffner 1971, 60, Pl. 65: 3a).
808 Urmitz (sword without handguard plate, scabbard mounts): Waurick 1994, 5–6, Fig. 4: 1; Miks 2007, 748, Pl. 13, A747 and 885, B296, Pl. 197, Pl. 202. Koblenz-Neuendorf (sword without handguard plate and scabbard mounts): Waurick 1994, 8, 10, Fig. 6: 4, 9; Miks 2007, 634, A355, Pl. 14. Speyer (sword with a narrow and sub-rectangular 'bronze' handguard plate): Waurick 1994, 10–11, Fig. 7: 10; Miks 2007, 730–731, A682, Pls. 18 and 159). Straßburg (sword, scabbard mounts): Waurick 1994, 10–11, Fig. 7: 13; Miks 2007, 875, B274,4–6, Pl. 197.
809 E.g. Haffner 1989, 105; Schumacher 1989; Gaspari et al. 2015, 136. Cf. Waurick 1994, 14, 15.
810 The swords from the graves at Ljubljana, Verdun, Wederath-Belginum lack handguard plates (cf. Fn. 805–807); of the swords from sites listed in Fn. 808 only the one from Speyer has a handguard plate.
811 Examples from Wederath-Belginum and Graves 1, 41, 84 and 136 at Verdun – cf. Fn. 806, 807.
812 Graves 41 and 112 from Verdun, a grave from Ljubljana, graves from Urmitz, Koblenz-Neuendorf and Straßburg – cf. Fns. 805, 806, 808.
813 Istenič 2013.
814 Guštin 1991, 15–16, Pl. 12: 3, Pl. 16: 2, Pl. 30: 3.

legionarjev in »nelegionarjev«. Enajst predmetov je jasno povezanih z legionarji (pilumi, čeladi, odlikovanji). Z »nelegionarji«, pešaki ali konjeniki, je mogoče povezati štiri sulične osti, ki verjetno niso zajete v celoti, saj sem prepoznala le najznačilnejše primerke, tj. tiste s fasetiranim tulom. K opremi, ki ni značilna za legionarje, sodijo še meči A19, A20 in MM A33.

Razpoložljivi podatki nakazujejo, da so bili mornarji oboroženi zelo podobno kot kopenski vojaki, zato jih zgolj po vojaški opremi ne moremo razlikovati.[803]

V 3. stoletju, iz katerega je ščitna grba, ni bilo več jasne delitve med oborožitvijo legij in pomožnih enot; oboji so uporabljali ovalni ščit.[804]

18.3.3.1 Legionarski meči in nožnice tipa Mainz?

Večina mečev in nožnic tipa Mainz iz grobov, ki jih v literaturi povezujejo z »nelegionarji«, npr. tisti iz Ljubljane,[805] Verduna,[806] Wederath-Belginuma[807] in drugih grobišč,[808] je na prvi pogled enostavnejša od tistih mečev, ki jih poznamo npr. iz Ljubljanice. Zdi se, da je to posamezne raziskovalce vodilo k domnevi, da so se nožnice in meči tipa Mainz, ki so jih uporabljali legionarji, razlikovali od tistih, ki so jih uporabljali »nelegionarji«,[809] kar bi bilo povezano z izdelavo v različnih delavnicah.

Pregled podatkov o mečih in nožnicah iz omenjenih grobov »nelegionarjev« kaže, da so skoraj vsi brez ščitnika branika ročaja,[810] od nožnic pa ni ohranjenih ostankov[811] ali pa so to železni robni okovi in zaključni gumbi, prečni okovi ter obročki za obešanje iz bakrove zlitine,[812] niti v enem primeru pa ni tenke pokositrene medeninaste pločevine ali okovov s predrtim okrasom. Pomembno je, da se ohranjeni deli nožnic ne razlikujejo bistveno od nožnic, kakršne poznamo npr. iz Ljubljanice.

Po drugi strani dva grobova iz Posočja (Idrija pri Bači, gr. 11/12 in 17), ki jih povezujemo z v rimsko vojsko vključenima domačinoma,[813] vsebujeta meča z ohranjenima branikoma ročajnega ščitnika iz bakrove zlitine in z zelo dobro ohranjenimi deli nožnic (prečni okovi z obročki za obešanje, okov na zaključku nožnice, okov ob ustju), ki v enem primeru vključujejo pokositreno pločevino iz bakrove zlitine na sprednji strani nožnice.[814]

Razlikovanje med meči in nožnicami tipa Mainz, ki so jih uporabljali v legijah in zunaj njih, torej ni mogoče. Najmanj za avgustejsko dobo je jasno, da so bili vojaki, ki niso služili v legijah, lahko oboroženi z meči in nožnicami tipa Mainz enake kvalitete in izdelave, kot so primerki iz Ljubljanice. Domnevam, da je vzrok za vtis slabše kvalitete mečev in nožnic iz večine grobov, ki jih povezujemo z »nelegionarji«, njihova slaba ohranjenost, ki je posledica najdiščnih okoliščin.

18.4 Delež ohranjenosti, namerne poškodbe predmetov

Približno štiri desetine (11 od 28) mečev oziroma njihovih delov so bile najdene skupaj z deli nožnice (*sl. 125*).[815] Glede na delež ohranjenosti[816] so ti meči približno enakomerno razporejeni od manj kot četrtine meča do skoraj celih mečev (*sl. 126*).

Brez sledov nožnice je 17 mečev (*sl. 125*).[817] Iz prikaza deležev njihove ohranjenosti (*sl. 127*)[818] izhaja, da je brez delov nožnic približno enako število dobro (več kot 75 % meča) in slabo (manj kot pol meča) ohranjenih mečev.

803 Junkelmann 1997, 188 (pilumi, gladij); Bishop, Coulston 2006, 259.
804 James 2004, 168–169; Bishop, Coulston 2006, 259.
805 Gaspari et al. 2015, 132, 134–138, 156–160, t. 1: 1–3, sl. 7.
806 Breščak 2015, 85, 88, 90, 91, gr. 1, 41, 84, 112, 136, t. 2: 7, 10, t. 1: 10, t. 13: 1–4, t. 18: 3, t. 21: 1, t. 22: 1–4, t. 25: 10; povezava z pomožnimi enotami oz. najemniki: Istenič 2013.
807 Grob 2215 (Schumacher 1989; Miks 2007, 758, A774, t. 13) in 1344 (Haffner 1989, 105, 108, sl. 72 = Miks 2007, 757–758, A773, t. 23, 152). Po risbi in opisu se med meče tipa Mainz uvršča tudi razmeroma slabo ohranjen meč iz groba 269, ne pa zelo slabo ohranjena nožnica (Haffner 1971, 60, t. 65: 3a).
808 Urmitz (meč brez branika in okovi nožnice): Waurick 1994, 5–6, sl. 4: 1; Miks 2007, 748, t. 13, A747 in 885, B296, t. 197, t. 202. Koblenz-Neuendorf (meč brez branika in okovi nožnice): Waurick 1994, 8, 10, sl. 6: 4, 9; Miks 2007, 634, A355, t. 14. Speyer (meč z »bronastim« ozkim ščitnikom branika približno pravokotne oblike): Waurick 1994, 10–11, sl. 7: 10; Miks 2007, 730–731, A682, t. 18 in 159. Straßburg (meč, okovi nožnice): Waurick 1994, 10–11, sl. 7: 13; Miks 2007, 875, B274,4–6, t. 197.
809 Npr. Haffner 1989, 105; Schumacher 1989; Gaspari et al. 2015, 136. Prim. Waurick 1994, 14, 15.
810 Meči iz grobov v Ljubljani, Verdunu, Wederath-Belginumu so brez ščitnikov (prim. op. 805–807); med meči z najdišč, ki so navedena v op. 808, pa ima ščitnik le meč iz Speyerja.
811 Primerki iz Wederath-Belginuma ter grobov 1, 41, 84 in 136 v Verdunu – prim. op. 806, 807.
812 Grobova 41 in 112 iz Verduna, grob iz Ljubljane, grobovi iz Urmitza, Koblenz-Neuendorfa in Straßburga – prim. op. 805, 806, 808.
813 Istenič 2013.
814 Guštin 1991, 15–16, t. 12: 3, t. 16: 2, t. 30: 3.
815 A1, A4–A6, A8–A9, A20, MM A22, A13/MM A24, MM A34, A35.
816 Delež ohranjenosti se nanaša na kovinske dele. Stoodstotna ohranjenost torej pomeni, da se je od meča ohranilo toliko, kolikor lahko domnevamo, da se je ohranilo od meča, ki je v vodo prišel cel. Za meče tipa Mainz sem upoštevala dolžino okoli 710 mm (okoli 550 mm rezilo in okoli 150 mm ročajni trn – prim. pogl. 4.2.2).
817 A14–A19, A21, MM A23, MM A25–A33.
818 Pri sedmih mečih je ohranjenih najmanj 90 % (A15–A17, MM A23, MM A25, MM A29, MM A32), pri dveh od okoli tri četrtine do okoli 90 % (A19, MM A30), pri enem od okoli polovice do tri četrtine (A14), pri šestih približno četrtina do polovica (A18, MM A26, MM A27, MM A28, MM A31, MM A33) in pri enem manj kot četrtina (A21).

18.4 Condition and intentional damage

Eleven of the 28 swords or their parts were found together with the remains of their scabbards (*Fig. 125*).[815] Given the condition,[816] the swords are almost evenly represented across different states of preservation ranging from less than a quarter surviving to near complete (*Fig. 126*).

Seventeen swords have been recovered without any traces of scabbards (*Fig. 125*).[817] The proportions of swords found in different states of preservation (*Fig. 127*)[818] shows that roughly equal numbers are without their scabbards whether their preservation is good (over 75% of the sword) or poor (less than half of the sword).

Figure 125
Roman military equipment up to the end of the 3rd century from the Ljubljanica: the number of swords with or without scabbard remains and the number of scabbards without associated swords.

Slika 125
Rimska vojaška oprema iz Ljubljanice do vključno 3. stoletja: število mečev z ostanki nožnic oziroma brez njih in nožnic, ki so bile najdene brez mečev.

This suggests that the condition has no bearing on whether the sword survived with its scabbard or not.

Five scabbard pieces have been recovered without their swords (*Fig. 125*), which is just over one third of the sixteen scabbards surviving on swords to different degrees.[819] In all five examples, less than a quarter of the scabbard survives (A2, A3, A10–A12). The A13 suspension band, that turned out to belong to the MM A24 scabbard found roughly a century earlier, indicates that scabbard fragments may originate from scabbards that entered the river in a set with a sword.

The MM A30 sword shows possible intentional damage.

Given the degree of preservation of three swords in scabbards, it is clear that they entered the river complete, for further two this is likely (*Fig. 126*), as it is for nine swords surviving to at least 75% and without scabbard remains (*Fig. 127*). As for the other swords and scabbards, this can be neither assumed nor refuted. The A13 suspension band and the MM A24 sword and scabbard show that the share of swords and scabbards that entered the river complete was originally higher than what can be inferred from the number of surviving swords in their scabbards.

The two helmets lack their cheek-pieces, C2 also a large part of its plume tubes.

The daggers appear to have all arrived in the river complete and three of the four survive with their sheaths. One reason for the considerably higher percentage of daggers surviving with their sheaths is in the fact that the metal sheaths are more durable in comparison with the sword scabbards made of wood and only covered in metal parts.

The A9 scabbard with sword and the B3 dagger in its sheath were found corroded together upon discovery, the back of the dagger sheath aligned to the front of the sword scabbard (*Fig. A9.1a, b*). Moreover, they share the same timeframe of the Middle–Late Augustan period, which indicates they entered the river together.

All but one of the *pila* survive almost complete, save for their wooden parts. Two are bent at the neck almost at the right-angle (D1, D3) and one only slightly (D4). Similarly bent necks on albeit much earlier *pila* can be found among the Roman weapons from Grad near Šmihel, which were unquestionably used in combat.[820] This suggests that the D1, D3 and D4 *pila* might also have been damaged in combat (immediately) before coming into the Ljubljanica, though it is also possible that they were intentionally bent at the neck.

815 A1, A4–A6, A8–A9, A20, A35, MM A22, A13/MM A24, MM A34.

816 The condition refers to the metal parts; 100% preservation signifies that the sword survived to the same degree as would a sword that entered the water complete. For the Mainz type swords, the original length is estimated at around 710 mm (ca. 550 mm for the blade and ca. 150 mm for the tang – cf. Ch. 4.2.2).

817 A14–A19, A21, MM A23, MM A25–A33.

818 Seven swords survive to at least 90% (A15–A17, MM A23, MM A25, MM A29, MM A32), two from three quarters to 90% (A19, MM A30), one from half to three quarters (A14), six from a quarter to a half (A18, MM A26, MM A27, MM A28, MM A31, MM A33) and one to at least a quarter (A21).

819 Cf. A2, A3, A10–A12 and A1, A4– A6, A8–A9, A20, A35, MM A22, A13/MM A24, MM A34.

820 Horvat 2002, Pls. 4: 1, 6: 1, 5, 12: 5. Ancient authors mention that the necks of *pila* bent when hitting the shield and that the *pilum* heads were stronger (from Caesar onwards?) than the necks (Kmetič, Horvat, Vodopivec 2004, 304–306). Metallographic analyses of two of the *pila* from Grad near Šmihel have confirmed that the heads were indeed stronger and have also shown that the steel of the necks contains many large non-metal inclusions (remains of slag and calcium silicate; Kmetič, Horvat, Vodopivec 2004, 304–306); such inclusions may represent a weak spot where the neck would have bent upon impact. Connolly (2001–2002, 6–8) believed that the necks of *pila* usually did not bend when hitting a shield, but rather upon impacting a harder target.

Figure 126
Roman swords associated with scabbard parts up to the end of the 3rd century from the Ljubljanica; the surviving parts are given in percentages (%), cf. Fn. 816.

Slika 126
Rimski meči iz Ljubljanice do vključno 3. stoletja: ohranjenost mečev, ki so bili najdeni skupaj z ostanki nožnic, izražena kot odstotek ohranjenih kovinskih delov (prim. op. 816).

Zdi se torej, da delež ohranjenosti mečev ne vpliva na (ne)prisotnost njihovih nožnic.

Samo delov nožnic, brez meča, je pet (*sl. 125*), torej dobra tretjina vseh 16 nožnic mečev, od katerih se je ohranila vsaj sled.[819] V vseh petih primerih je ohranjena manj kot četrtina nožnice: prečni okov (A2, A3) ali kovinski deli konic nožnic (A10–A12). Prečni okov A13, za katerega se je izkazalo, da je del približno sto let pred njim najdene nožnice MM A24, govori za to, da so ohranjeni deli nožnic mečev, ki so bili najdeni brez mečev, v reko lahko prišli kot sestavni deli celih nožnic in pripadajočih mečev.

Morebitno namerno poškodbo nakazuje meč MM A30.

Pri treh mečih v nožnicah glede na delež ohranjenosti ni dvoma o tem, da so v reko prišli celi, in za dva se to zdi verjetno (*sl. 126*). Enako velja za devet mečev brez ostankov nožnice, od katerih so ohranjene najmanj tri četrtine (*sl. 127*). Pri ostalih mečih in nožnicah ni mogoče utemeljeno domnevati, ali so v reko prišli celi ali le njihovi deli. Prečni okov A13 in nožnica MM A24 nakazujeta, da je bil delež mečev in nožnic, ki so v reko prišli skupaj oziroma celi, večji, kot to kaže obstoječe število mečev z ohranjenimi ostanki nožnic.

Čeladama manjkajo lični ščitniki in čeladi C2 tudi velik del nastavkov za okras.

Bodala so najverjetneje v vodo prišla cela; od štirih so tri v nožnici. Med vzroki za bistveno večji delež ohranjenih nožnic pri bodalih kot pri mečih je verjetno dejstvo, da so polnokovinske nožnice bodal obstojnejše od nožnic mečev, ki so bile lesene in s kovinskimi deli le obložene.

819 Prim. A2, A3, A10–A12 ter A1, A4–A6, A8–A9, A20, A35, MM A22, A13/MM A24, MM A34.

Nožnica z delom rezila meča A9 in bodalo v nožnici B3 sta bila ob odkritju sprijeta na hrbtu nožnice bodala in licu nožnice meča ter poravnana po dolžini (*sl. A9.1a, b*), poleg tega se po dataciji (srednja do pozna avgustejska doba) ne razlikujeta, zato sta najverjetneje v reko prišla skupaj.

Med devetimi konicami pilumov so vse, razen ene, ohranjene skoraj cele. Dve imata izrazito, skoraj pravokotno (D1, D3), ena (D4) pa rahlo zapognjen vrat. Podobno zviti vratovi (sicer dosti starejših) pilumov so med rimskim orožjem z Gradu pri Šmihelu, ki je bilo nedvomno uporabljeno v boju.[820] To nakazuje možnost, da so bili pilumi D1, D3 in D4 uporabljeni v boju, (neposredno) preden so prišli v Ljubljanico, vendar bi jih na enak način verjetno lahko zvili namerno.

Sulične osti, orodja, šotorski klini in ščitna grba so (skoraj) celi. Od pasov (in morda jermenov) so ohranjeni le posamezni okovi oziroma spone, ki so celi. Za medaljon domnevam, da je del odlikovanja, torkves je cel.

Povzamem torej lahko, da predmeti rimske vojaške opreme iz Ljubljanice nimajo namerno povzročenih poškodb, razen morda meč MM A30 in tri konice pilumov. Štiri desetine mečev so bile najdene z ostanki nožnice, vendar utemeljeno domnevam, da je bil delež mečev, ki so v reko prišli v nožnicah, višji. Od štirih bodal so bila tri najdena v nožnicah. V enem primeru sta v vodo skupaj prišla meč v nožnici in bodalo v nožnici. Delež ohranjenosti bodal, čelad, pilumov, suličnih osti, dvostranskih težkih orodij, orodij za rezanje ruše, šotorskih klinov, odlikovanj in ščitne grbe kaže, da so v vodo prišli celi. Pri mečih se delež ohranjenosti zelo razlikuje, od skoraj celih primerkov do majhnih delov, in ni mogoče oceniti, koliko jih je celih prišlo v vodo, kjer so nato razpadli na več kosov, od katerih smo našli le posamezne. Podobno velja za dele pasov.

820 Horvat 2002, t. 4: 1, 6: 1, 5, 12: 5. Antični pisci omenjajo, da so se vratovi pilumov ob zadetku ščita upognili in da so bile konice pilumov (od Cezarja dalje?) trše od vratu (Kmetič, Horvat, Vodopivec 2004, 308–312). Metalografske raziskave dveh pilumov z Gradu pri Šmihelu so potrdile, da je konica trša od vratu, in pokazale, da so v jeklu vratov številni veliki nekovinski vključki (ostanki žlindre in kalcijev silikat; Kmetič, Horvat, Vodopivec 2004, sl. 308–312); tak vključek je lahko bil šibka točka, na kateri se je vrat piluma ob trku s tarčo zvil. Connolly (2001–2002, 6–8) je sicer menil, da se vratovi pilumov ob zadetku ščita običajno niso zvili, zvili naj bi se ob zadetku trše tarče.

The spearheads, tools, tent pegs and the shield boss are almost complete. Only individual mounts or buckles survive of the belts (and possible straps), but these are complete. The medallion is believed to have formed part of a military decoration, the torque is complete.

This shows that the Roman military equipment from the Ljubljanica does not bear traces of intentional damage with the possible exception of the MM A30 sword and three *pila*. Less than half of the swords was associated with the remains of scabbards, but this share would originally have been higher. Three of the four daggers were found in their sheaths. We even have an example of a sword and a dagger entering the water together and complete with respective sheaths. The condition of the daggers, helmets, *pila*, spearheads, double-sided heavy tools, turf cutters, tent pegs, decorations and the shield boss shows they, too, came into the water complete. The condition varies most with the swords, from almost complete examples to small parts, and it is impossible to estimate how many of them entered the water complete and later fell into pieces, only some bits of which were recovered. The same is true of the belts.

Figure 127
Roman swords without any remains of sheaths up to the end of the 3rd century from the Ljubljanica; the surviving parts are given in percentages (%)., cf. Fn. 816.

Slika 127
Rimski meči iz Ljubljanice do vključno 3. stoletja: ohranjenost mečev brez sledov nožnice, izražena kot odstotek ohranjenih kovinskih delov (prim. op. 816).

18.5 Distribution of finds along the riverbed

The River Ljubljanica in its section across the Ljubljansko barje, not in Ljubljana, witnessed no interventions that would significantly alter the archaeological record until the late 1970s, when amateur divers began lifting artefacts.[821]

Research has shown that the Ljubljanica does not have a current strong enough to move large artefacts, while small ones can be gradually transported up to several hundred metres during flooding.[822] The 800 m of distance between the findspots of the A13 sword suspension band and the H1 belt buckle,[823] which presumably formed part of the same set comprising a military belt and a sword in its scabbard,[824] indicate that the distance between entry point and eventual findspot may occasionally be even greater.[825] What is certain is that the accuracy of findspot evidence is such that it does not importantly alter the results of the distribution analysis.

Assessing the distribution of artefacts along the marshy stretch of the Ljubljanica should take into account several facts:

1. the context record varies in quality, from very accurate data on the artefacts found during the systematic surveys in recent years, to very limited information on the finds from the 19th century. Most, however, were obtained from amateur divers who provided context data of varying accuracy and reliability.

2. The riverbed of the Ljubljanica downstream from Špica (at the beginning of the Gruber Canal) in Ljubljana witnessed extensive river engineering interventions that brought to light numerous artefacts including those from the Roman period; very little is known of their contexts.

During the 19th and the first half of the 20th century, river engineering interventions considerably changed the bed and banks of the Ljubljanica in its stretch through Ljubljana. Previously, the river had gently sloping banks in this stretch, it was quite shallow, less than a metre deep at the outflow of the Gradaščica stream and much wider than today (*Fig. 143*). The construction of the Gruber Canal between 1771 and 1780 intended to improve the outflow of water coming from the Ljubljansko barje (to Ljubljana), was not sufficient to prevent flooding in Ljubljana. Hence vast river engineering works were undertaken to deepen the bed and consolidate the banks in the city centre. This included constructing cofferdams and almost drying the riverbed, as well as removing material from its bottom.[826] Numerous finds that came to light during these works are mentioned in the archives, but it

821 Gaspari 2002, 54.
822 Gaspari 2002, 55, 56; Gaspari 2012b, 181.
823 Istenič 2003b, 287, Fig. 7.
824 Cf. Ch. 11.1.
825 The possibility of the belt and sword in its scabbard not entering the water together and in the same spot cannot be excluded.

826 Gaspari 2009b. Interventions deep into the bottom of the river involving extensive removal of material from the 1930s are documented on film (https://siol.net/novice/slovenija/prvic-objavljeni-posnetki-kako-so-regulirali-ljubljanico-video-437828; last accessed 19. 6. 2018).

Figure 128
Sections and sites along the Ljubljanica at Barje, referred to in the text.
The basemap digital terrain model at 5 m resolution (DTM5) is derived from the airborne LiDAR data (source: www.evode.gov.si).
Section I, Vrhnika: site 1 – Dolge njive;
Section II, Sinja Gorica: sites 2 – Zaloke, 3 – Japljeve ujske, 4 – Nove gmajne;
Section III, Blatna Brezovica: sites 5 – Dolnji breg, 6 – Lipavec, 7 – Bistra, 8 – Bržič, 9 – Tri lesnice;
Section IV, Bevke: sites 10 – Krajna, 11 – Na zrnici, 12 – Podpeški mah, 13 – Trebež;
Section V, Kamnik pod Krimom: site 14 – Zornica;
Section VI, Podpeč: sites 15 – Dolenje senožeti, 16 – Velike senožeti, 17 – Deli, 18 – Široka;
Section VII, Lipe: sites 19 – Bistra loka, 20 – Škofljica, 21 – Križenca;
Section VIII, Črna vas: sites 22 – Ljubljanske senožeti, 23 – Za Ljubljanico, 24 – Tarene;
Section IX, Rakova Jelša: sites 25 – Rakova jelša, 26 – Volar, 27 – Za terenom, 28 – Teren, 29 – Dolgi breg;
Section X, Ljubljana: sites 30 – Livada, 31 – Špica, 32 – Breg.

Slika 128.
Odseki in ledine ob strugi Ljubljanice na Barju, kot so uporabljeni v knjigi. Podlaga karte je digitalni model reliefa z osnovno celico velikosti 5 m (DMR5), izdelan iz podatkov zračnega laserskega skeniranja (vir: www.evode.gov.si).
I. odsek, Vrhnika: ledina 1 – Dolge njive;
II. odsek, Sinja Gorica: ledine 2 – Zaloke, 3 – Japljeve ujske, 4 – Nove gmajne;
III. odsek, Blatna Brezovica: ledine 5 – Dolnji breg, 6 – Lipavec, 7 – Bistra, 8 – Bržič, 9 – Tri lesnice;
IV. odsek, Bevke: ledine 10 – Krajna, 11 – Na zrnici, 12 – Podpeški mah, 13 – Trebež;
V. odsek, Kamnik pod Krimom: ledina 14 – Zornica;
VI. odsek, Podpeč: ledine 15 – Dolenje senožeti, 16 – Velike senožeti, 17 – Deli, 18 – Široka;
VII. odsek, Lipe: ledine 19 – Bistra loka, 20 – Škofljica, 21 – Križenca;
VIII. odsek, Črna vas: ledine 22 – Ljubljanske senožeti, 23 – Za Ljubljanico, 24 – Tarene;
IX. Odsek, Rakova Jelša: ledine 25 – Rakova jelša, 26 – Volar, 27 – Za terenom, 28 – Teren, 29 – Dolgi breg;
X. odsek, Ljubljana: ledine/mestni deli 30 – Livada, 31 – Špica, 32 – Breg.

18.5 Razporejenost najdb po strugi

V Ljubljanici na Barju, razen v Ljubljani, do konca sedemdesetih let minulega stoletja, ko so amaterski potapljači začeli dvigovati predmete, ni bilo sprememb, ki bi bistveno poškodovale arheološki zapis.[821]

Kot nakazujejo dosedanje raziskave, tok Ljubljanice ni dovolj močan, da bi prestavljal večje predmete, manjše predmete pa je lahko ob poplavah postopoma premikal do nekaj sto metrov daleč.[822] Okoli 800 m med najdiščema okovov A13 in H1,[823] za katera domnevam, da sta sodila k istemu kompletu vojaškega pasu z nožnico meča in mečem,[824] morda nakazuje, da je razdalja med najdiščem in mestom, kjer je predmet prišel v vodo, izjemoma lahko večja.[825] Vsekakor natančnost zajetih najdiščnih podatkov ni tako velika, da bi bili taki premiki predmetov v reki bistveni pri obravnavi razporejenosti predmetov v strugi.

821 Gaspari 2002, 54.

822 Gaspari 2002, 55, 56; Gaspari 2012b, 181.
823 Istenič 2003b, 287, sl. 7.
824 Prim. pogl. 11.1.
825 Ni mogoče izključiti možnosti, da pas in nožnica z mečem niso prišli v vodo hkrati in na istem mestu.

is for the most part impossible to distinguish Roman finds from those of other periods, neither is it possible to identify the actual finds from these works in the collections of the National Museum of Slovenia, the successor to the Provincial Museum of Carniola.[827] As a consequence, we know very little about the artefacts from the Ljubljanica in Ljubljana. Two collections largely consisting of objects recovered between Špica and the Prule bridge indicate that artefacts were diligently collected, but included few from the Roman period.[828]

3. The intensity of river surveys varies along its course. Amateur divers tended to survey the most easily accessible sections, and of those the stretches where finds were known to be most frequent.[829] The accuracy of the systematic archaeological surveys also varied from section to section, from a detailed survey of the stretch between the outflows of the Zrnica and Borovniščica streams to an absence of surveying in the over 3 km long stretch at Črna vas, roughly at the Za Ljubljanico and Tarene sites (cf. *Fig. 128: 23, 24*).[830]

Fifteen of the 79 pieces of Roman militaria dating up to the 3rd century are without exact or reliable context data (A17, MM A26, MM A28, MM A31, MM A33, D3, E4, E5, F2, F4, F5, MM F9, G2, G3, MM G4). The distribution of the findspots of the remaining 64 pieces and of the Alesia brooch,[831] the latter also likely associated with the Roman army,[832] is shown according to individual section of the river *Fig. 128* that succeed each other in the following order (*Fig. 129*):[833]

Section I, Vrhnika – A21, MM A25, MM A30, C2, MM J2, MM J4, MM J5
1 / the Dolge njive site (MM A32, MM A34, D7, D8)
total 11

Section II, Sinja Gorica
2 / the Zaloke site[834] (MM J3)
3 / the Japljeve ujske site
4 / the Nove gmajne site (D4)
total 2

Figure 129
Spatial distribution of the Roman military equipment up to the end of the 3rd century in the Ljubljanica. Cf. *Fig. 128*.

Slika 129
Razporeditev rimske vojaške opreme do vključno 3. stoletja po odsekih Ljubljanice. Prim. *sl. 128*.

Section III, Blatna Brezovica
5 / the Dolnji breg site (A1, A8[835])
6 / the Lipavec site (A9, A15, A18, B3, MM F8)
7 / the Bistra site (MM F7, MM SG)
8 / the Bržič site (I2)
9 / the Tri lesnice site (A3, A13/MM A24,[836] C1, D1, H1, H4)
total 16

Section IV Bevke – A4,[837] A10,[838] A14,[839] MM A22,[840] MM A23,[841] D5
10 / the Krajna site (I1)
11 / the Na zrnici site (A19, D2)
10 or 11 (A5, A12, H3)
12 / the Podpeški mah site
13 / the Trebež site (Alesia brooch[842])
12 or 13 (H6)
total 14

Section V, Kamnik pod Krimom – A20
14 / the Zornica site (MM A27)
total 2

Section VI, Podpeč – F3, J1
15 / the Dolenje senožeti site
16 / the Velike senožeti site (B4)
17 / the Deli site
18 / the Široka site
total 3

827 Gaspari 2002, 29–31; Gaspari 2009b.
828 The items that S. Mlekuž and Franc Dermastja sold to the National Museum in 1940 or 1941 (the inventory books, the diary of the Department of Archaeology at the museum and its accession books state different dates) mainly came to light during the river engineering works conducted in 1936–1938 between Špica and the Prule bridge (Gaspari 2002, 36, 37; NMS, Inv. Nos. B 5877b–B 5973, B 6007, P 10827–P 10833, R 14456–R 14459).
829 Gaspari 2012b, 178.
830 Gaspari 2012a, Fig. 54; Gaspari 2012b; Erjavec, Gaspari 2012.
831 Istenič 2009h, Cat. No. 73.
832 Istenič 2005.
833 The artefacts are given beside the name of the section if only that is known and not the actual site.
834 This includes the area known in literature as 'Sinja Gorica'.
835 Dolnji breg or Lipavec.
836 The A13 suspension band is part of the MM A24 sword and scabbard (cf. Catalogue, A13 and Ch. 4.2.1.2 with *Figs. 22–25*).
837 The item may originate from the Ljubljanica at the Tri lesnice site (easternmost part of the Blatna Brezovica section).
838 See Fn. 837.
839 See Fn. 837.
840 See Fn. 837.
841 See Fn. 837.
842 Istenič 2009h, Cat. No. 73.

Pri vrednotenju razporeditve predmetov v strugi Ljubljanice je treba upoštevati nekaj dejstev.

1. Najdiščni podatki o predmetih so različno kakovostni, od natančnih podatkov o predmetih, odkritih med sistematskimi raziskavami v zadnjih letih, do skopih podatkov najdb iz 19. stoletja. Največ predmetov izvira iz dejavnosti amaterjev/športnih potapljačev, ki so posredovali različno natančne in zanesljive najdiščne podatke.

2. V strugi v Ljubljani od Špice navzdol so bila izvedena obsežna gradbena dela, med katerimi so našli številne predmete, o katerih imamo zelo slabe podatke, torej o rimskih najdbah iz tega dela struge vemo zelo malo.

V Ljubljani so v 19. in prvi polovici 20. stoletja temeljito spremenili rečno korito in bregove Ljubljanice, ki je pred tem tu imela zložne bregove ter je bila zelo plitva (pri izlivu Gradaščice manj kot meter) in bistveno širša, kot je danes (*sl. 143*). Izgradnja Gruberjevega kanala med Gradom in Golovcem (med letoma 1771 in 1780) ni odpravila zastajanja voda v Ljubljanici pri Ljubljani, zato so se lotili obsežnega poglabljanja struge in urejanja bregov v mestnem jedru. Dela so vključevala izdelavo zapor in skorajda osušitev struge ter izkop in prelaganje materiala z njenega dna.[826] V arhivskih virih so zabeleženi številni predmeti, ki so jih našli ob teh delih, vendar med njimi v glavnem ni mogoče razlikovati rimskih od drugih, niti posameznih najdb povezati s predmeti iz Narodnega muzeja Slovenije, ki je naslednik Deželnega muzeja za Kranjsko.[827] Najdbe iz Ljubljanice v Ljubljani torej slabo poznamo. Zbirki, sestavljeni (v glavnem) iz predmetov, najdenih med Špico in Prulskim mostom, nakazujeta, da so predmete skrbno pobirali in da so bile rimske najdbe s tega odseka redke.[828]

3. Pregledanost struge je zelo neenakomerna. Amaterji oziroma športni potapljači so najpogosteje pregledovali najlažje, z avtomobili dostopne odseke reke, med katerimi so največ izbirali take, kjer so bile najdbe najpogostejše.[829] Natančnost sistematskih arheoloških pregledov posameznih odsekov struge je bila prav tako zelo različna, od temeljitega pregleda dela struge med izlivoma Zrnice in Borovniščice do na primer več kot 3 km dolgega dela struge pri Črni vasi (približno ob ledinah Za Ljubljanico in Tarene – prim. *sl. 128: 23, 24*), ki ni bil pregledan.[830]

Med 79 predmeti rimske vojaške opreme do vključno 3. st. iz Ljubljanice za 15 nimam podrobnejših oziroma dovolj zanesljivih najdiščnih podatkov (A17, MM A26, MM A28, MM A31, MM A33, D3, E4, E5, F2, F4, F5, MM F9, G2, G3, MM G4). Najdišča ostalih 64 predmetov in fibule skupine Alezija,[831] pri kateri je povezava z rimsko vojsko verjetna,[832] so po posameznih delih struge, ki so prikazani na *sl. 128*, razporejena takole (*sl. 129*):[833]

I. odsek Vrhnika – A21, MM A25, MM A30, C2, MM J2, MM J4, MM J5
1 / ledina Dolge njive (MM A32, MM A34, D7, D8)
skupaj 11

II. odsek Sinja Gorica
2 / ledina Zaloke[834] (MM J3)
3 / ledina Japljeve ujske
4 / ledina Nove gmajne (D4)
skupaj 2

III. odsek Blatna Brezovica
5 / ledina Dolnji breg (A1, A8[835])
6 / ledina Lipavec (A9, A15, A18, B3, MM F8)
7 / ledina Bistra (MM F7, MM SG)
8 / ledina Bržič (I2)
9 / ledina Tri lesnice (A3, A13/MM A24,[836] C1, D1, H1, H4)
skupaj 16

IV. odsek Bevke – A4,[837] A10,[838] A14,[839] MM A22,[840] MM A23,[841] D5
10 / ledina Krajna (I1)
11 / ledina Na zrnici (A19, D2)
10 ali 11 (A5, A12, H3)
12 / ledina Podpeški mah
13 / ledina Trebež (fibula skupine Alezija[842])
12 ali 13 (H6)
skupaj 14

826 Gaspari 2009a. Globoki posegi v dno reke, z obsežnim odvažanjem materiala, ki so jih izvedli v tridesetih letih 20. stoletja, so dokumentirani na filmskem posnetku (https://siol.net/novice/slovenija/prvic-objavljeni-posnetki-kako-so-regulirali-ljubljanico-video-437828; zadnji dostop 19. 6. 2018).
827 Gaspari 2002, 29–31; Gaspari 2009a.
828 Predmeti, ki sta jih Narodnemu muzeju leta 1940 ali 1941 (podatki v Inventarnih knjigah in Dnevniku Arheološkega oddelka NMS ter Akcesijskih knjigah NMS se razlikujejo) prodala S. Mlekuž in Franc Dermastja, v glavnem izvirajo iz regulacijskih del med letoma 1936 in 1938 na odseku med Špico in Prulskim mostom (Gaspari 2002, 36, 37; Narodni muzej Slovenije, inv. št. B 5877b–B 5973, B 6007, P 10827–P 10833, R 14456–R 14459).
829 Gaspari 2012b, 178.
830 Gaspari 2012a, sl. 54; Gaspari 2012b; Erjavec, Gaspari 2012.
831 Istenič 2009g, kat. 73.
832 Istenič 2005.
833 Če je znan le odsek, so predmeti zapisani ob navedbi odseka, sicer pa v oklepaju ob navedbi ledine.
834 Vključuje območje, ki ga v literaturi navajajo kot »Sinja Gorica«.
835 Dolnji breg ali Lipavec.
836 Okov nožnice A13 je del meča z ostanki nožnice MM A24 (prim. Katalog, A13 in pogl. 4.2.1.2 s *sl. 22–25*).
837 Predmet morda izvira iz Ljubljanice ob ledini Tri lesnice (skrajni vzhodni del odseka pri Blatni Brezovici).
838 Glej op. 837.
839 Glej op. 837.
840 Glej op. 837.
841 Glej op. 837.
842 Istenič 2009g, kat. 73.

Figure 130
Chronological distribution of the relatively closely dated Roman pottery from the 2nd century BC to the 3rd century AD from the Ljubljanica.

Slika 130
Časovna razporeditev razmeroma ozko datiranih keramičnih predmetov iz Ljubljanice od 2. st. pr. Kr. do 3. st. po Kr.

Section VI, Lipe
19 / the Bistra loka site
20 / the Škofljica site
21 / the Križenca site
total 0

Section VIII, Črna vas – B2
22 / the Ljubljanske senožeti site (G1)
23 / the Za Ljubljanico site (MM A29)
24 / the Tarene site
total 3

Section IX, Rakova Jelša – H7, H8
25 / the Rakova jelša site (B1, H2)
26 / the Volar site (A6, A16)
27 / the Za terenom site (A11)
28 / the Teren site
29 / the Dolgi breg site (G5)
total 8

Section X, Ljubljana – A2, A35
30 / the Livada site (H5)
31 / the Špica site
32 / the Breg site
total 3

One item (F1) was found in the Ljubljanica between Podpeč and Črna vas, i.e. in the Podpeč, Lipe or Črna vas sections, two spearheads (E2, E3) came to light between the Bistra and Na zrnici sites.

The overview above and *Fig. 129* show that by far the most items of Roman military gear came to light in the Vrhnika (eleven items), Blatna Brezovica (sixteen items) and Bevke sections (fourteen items[843]). Between the concentrations at Vrhnika and Blatna Brezovica, the section at Sinja Gorica only yielded two pieces, while relatively high numbers of finds continue to occur without interruption from the Blatna Brezovica to the Bevke section. Finds become much rarer east of there, with a slight concentration at Rakova Jelša (eight items).

The ratio between the number of finds from the riverbed between Vrhnika and the sharp bend that ends the Bevke section and the number of finds from the bend to and including Ljubljana is 45 : 20,[844] with the river up to the bend being much shorter than in the part after it (ratio ca. 1 : 2).

18.6 Comparison with other Roman finds from the Ljubljanica up to the 3rd century

18.6.1 Dating

The most numerous group of finds from the Ljubljanica is pottery, which is also chronologically most diagnostic.[845] Roughly two thirds of the relatively narrowly dated pottery consist of Italic tableware, mostly thin-walled and a half lesser amount of black-slip and terra sigillata wares. The rest falls to oil lamps, mortaria, locally made tableware and rare imported coarseware. Their chronological distribution is shown in

843 The A4, A10, A14 and MM A22, MM A23 artefacts are treated as found in the Bevke section, though it is also possible they were recovered in the easternmost part of the adjacent Blatna Brezovica section (cf. Fns. 837–841).

844 In addition to the data shown on *Fig. 129*, I also took into account the findspots of the F1 axe/adze and the E2 and E3 spearheads.

845 The statistics on pottery is based on the finds kept in the Department of Archaeology at the NMS.

V. odsek Kamnik pod Krimom – A20
14 / ledina Zornica (MM A27)
skupaj 2

VI. odsek Podpeč – F3, J1
15 / ledine Dolenje senožeti
16 / ledina Velike senožeti (B4)
17 / ledina Deli
18 / ledina Široka
skupaj 3

VII. odsek Lipe
19 / ledina Bistra loka
20 / ledina Škofljica
21 / ledina Križenca
skupaj 0

VIII. odsek Črna vas – B2
22 / ledina Ljubljanske senožeti (G1)
23 / ledina Za Ljubljanico (MM A29)
24 / ledina Tarene
skupaj 3

IX. odsek Rakova Jelša – H7, H8
25 / ledina Rakova jelša (B1, H2)
26 / ledina Volar (A6, A16)
27 / ledina Za terenom (A11)
28 / ledina Teren
29 / ledina Dolgi breg (G5)
skupaj 8

X. odsek Ljubljana – A2, A35
30 / ledina/mestni del Livada (H5)
31 / ledina/mestni del Špica
32 / ledina/mestni del Breg
skupaj 3

En predmet (F1) je bil najden v Ljubljanici med Podpečjo in Črno vasjo, torej na odsekih Podpeč, Lipe ali Črna vas, dve sulični osti (E2, E3) pa med ledinama Bistra in Na zrnici.

Iz pregleda in *sl. 129* izhaja, da daleč največ rimske vojaške opreme izvira iz odsekov Vrhnika (11 predmetov), Blatna Brezovica (16 predmetov) in Bevke (14 predmetov[843]). Med zgoščinama na Vrhniki in pri Blatni Brezovici je odsek struge pri Sinji Gorici z zgolj dvema predmetoma rimske vojaške opreme, nasprotno pa se zgoščina pri Blatni Brezovici zvezno nadaljuje v zgoščino pri Bevkah. Vzhodno od tu so najdbe dosti redkejše, nakazuje pa se zgoščina pri Rakovi Jelši (osem predmetov).

Razmerje med številom rimske vojaške opreme iz Ljubljanice od vključno Vrhnike do izrazitega zavoja, s katerim se zaključi odsek pri Bevkah, ter od zavoja do vključno Ljubljane je 45 : 20,[844] pri čemer je dolžina struge do zavoja pri Bevkah bistveno krajša kot od tam do Ljubljane (razmerje približno 1 : 2).

18.6 Primerjava z drugimi rimskimi najdbami iz Ljubljanice do konca 3. st.

18.6.1 Časovna opredelitev

V Ljubljanici so daleč najštevilnejše keramične najdbe, ki so časovno tudi najobčutljivejše.[845] Med razmeroma ozko datiranimi predmeti približno tri četrtine pripadajo italski fini namizni keramiki, med katero je največ posodic, ki sodijo v skupino keramika tenkih sten, približno pol manj je keramike s črnim oziroma rdečim sijočim premazom (keramika s črnim premazom in terra sigillata). Ostalo so predvsem oljenke, meljnice, domače namizno posodje in zelo redke uvožene kuhinjske posode. Časovno razporejenost teh keramičnih predmetov kaže *sl. 130*. Iz avgustejske dobe ali starejših je 42 % predmetov (32 predmetov), od tega iz obdobja med koncem 2. st. pr. Kr. in vklj. sredino 1. st. pr. Kr. 13 % (10 predmetov), zgolj iz avgustejske dobe pa 26 % (20 predmetov). 17 skodelic keramike tenkih sten sodi v obliko Štalenska gora 68, fabrikat C, ki so jo izdelovali že v avgustejski dobi, vendar je bila njihova uporaba pogosta v času vlade Tiberija.[846] Od avgustejske dobe je zanesljivo mlajših 29 % (22 primerkov) časovno ožje opredeljene keramike, med katero so iz Tiberijeve dobe najmanj štiri posodice.

Amfore so zastopane z 18 primerki (posamezni odlomki in ena cela amfora), ki jih je mogoče datirati. Predavgustejskemu tipu (Lamboglia 2) pripadajo dva ali trije primerki,[847] po šest primerkov amforam tipov Dressel 6A in Dressel 6B ter po ena amfora tipom Dressel 2–5, Dressel 7–11 in Camulodunum 184. Zdi se torej, da jih je največ datiranih v obdobje 1. st. pr. Kr. do 1. st. po Kr., dve pa sta iz 1. do 2. st.

843 Predmete A4, A10, A14 in MM A22, MM A23 sem upoštevala v odseku pri Bevkah, čeprav ni izključeno, da izvirajo iz struge ob skrajnem vzhodnem delu sosednjega odseka pri Blatni Brezovici (prim. op. 837–841).

844 Poleg podatkov, ki so prikazani na *sl. 129*, sem upoštevala tudi najdišča sekire/tesla F1 ter suličnih osti E2 in E3.

845 Upoštevala sem keramične predmete, ki jih hrani Arheološki oddelek Narodnega muzeja Slovenije.

846 Schindler-Kaudelka 1975, 31–32, 84–87, 173–176; Istenič 1999, 108–109; Horvat 2012b, 275–276, sl. 7: 1–7 (po najdiščnih okoliščinah iz tiberijske dobe); Schindler Kaudelka 2012, 330–331, sl. 10: 6, 26, 11: 13, 12: 6, 13: 13.

847 Pri enem ni mogoče ugotoviti, ali sodi k tipu Lamboglia 2 ali Dressel 6A.

Fig. 130. As much as 42% (32 items) of all finds date to the Augustan period or earlier, of which 13% (ten items) date between the late 2nd and the mid-1st century BC, while 26% (twenty items) date only to the Augustan period. Seventeen thin-walled cups are of the Magdalensberg 68 form, Fabric C, the production of which began in the Augustan period, but was most common in the Tiberian period.[846] Some 29% (22 items) of the narrowly datable pottery certainly postdates the Augustan period, of which at least four vessels are Tiberian in date.

The finds from the Ljubljanica further include one complete amphora and the sherds of a further 17 datable examples. Two or three amphorae are pre-Augustan (Lamboglia 2),[847] six examples are Dressel 6A and six Dressel 6B, while the Dressel 2–5, Dressel 7–11 and Camulodunum 184 types are represented with single examples. This shows that most date to the 1st century BC–1st century AD, only two to the 1st–2nd centuries.

According to available evidence, the Ljubljanica yielded 46 Roman bronze vessels[848] if buckets that cannot be dated more precisely are disregarded. They were made in Italian workshops. Two ladles and one jug predate the Augustan period.[849] As many as 32 vessels are cooking pans (*paterae*) from the Augustan–Tiberian period, while three cooking pans certainly postdate the Augustan period, but still date to the 1st century.[850] No bronze vessels can reliably be considered to be later than the 1st century.

The recovered Roman brooches begin in the second half of the 1st century BC, are particularly numerous in the Augustan period and continue without interruption up to the 3rd century.[851]

There are 121 individually found Roman coins published as originating in the Ljubljanica, as well as three group finds of coins from the Republican period and the Principate.[852] The earliest coins were minted in the first half of the 2nd century BC (one of them more precisely in 154 BC).[853] There are 41 individual coins that date up to the end of the Augustan period (16 of these minted under Augustus and nine between Caesar's death and the beginning of the Augustan period), as well as two group finds, with the latest minted coin of the first group dating to 147 BC[854] and that of the second group to 42 BC.[855] Having said that, a detailed study of the coins from the Ljubljanica, published and not yet published, is still pending.[856]

The existing evidence does allow me to conclude that the narrowly dated Roman finds of the Republican period and the Principate largely date to the 1st century BC and the 1st century AD, with a marked predominance in the Augustan or Augustan–Tiberian period. Their dating is thus similar to that of the Roman military equipment. The chronologically most sensitive pottery indicates a marked decrease following the end of the Augustan period (*Fig. 130*), with 28% of artefacts reliably later in date, which is less substantial than observable for the military equipment (*Fig. 123*), with a mere 12% of post-Augustan finds (cf. Chapter 18.1). For the bronze vessels, it is only possible to say that their number decreased drastically at the end of Tiberius' reign at the latest.

18.6.2 Distribution of findspots along the Ljubljanica

The distribution of the findspots of amphorae differs from that of finewares and other chronologically sensitive ceramic finds[857] (*Fig. 131*). By far the highest number of amphorae was found in the Vrhnika section. This section revealed very little fineware and other narrowly dated ceramics, but their numbers increase in the direction towards Bevke, with the Bevke section revealing the greatest number of items;

846 Schindler-Kaudelka 1975, 31–32, 84–87, 173–176; Istenič 1999, 108–109; Horvat 2012b, 275–276, Fig. 7: 1–7 (archaeological context points to the Tiberian period); Schindler Kaudelka 2012, 330–331, Figs. 10: 6, 26, 11: 13, 12: 6, 13: 13.

847 One is either Lamboglia 2 or Dressel 6A.

848 I took into account all vessels kept in the Department of Archaeology at the NMS, those in the Potočnik Family Collection (Gaspari 2002, Pl. 4 and Fig. 64; Breščak 1995, Fig. 1, Fig. 2: 1–3, Fig. 3: 3–5, Fig. 4: 2) and the cooking pan kept in the Landesmuseum Joanneum in Graz, Austria (Breščak 1982, 40, Cat. No. 4, Pl. 1: 4).

849 Jug and ladle (Gaspari, Trampuž Orel, Turk 2009b, Cat. No. 42), as well as a Pescate type ladle (Horvat 1990, 270, 297, Cat. No. 598, Fig. 32b).

850 The pans with a trefoil perforation at the end of the handle, NMS, Inv. No. R 1880, Acc. No. AO NMS 2018/22-184 and Breščak 1995, 15, Fig. 3: 4.

851 I took into account the examples kept in the Department of Archaeology at the NMS and the ones in the Potočnik Collection (Gaspari 2002, 284, Pl. 2: NA 14–NA 22).

852 FMRSl I 155/45, 1–13, 24–26; FMRSl I 155/46; FMRSl III 84, 1–2; FMRSl III 107; FMRSl IV 84; FMRSl IV 88, 1–2; FMRSl IV 91, 1–9, 23–25; FMRSl IV 92, 1–6, 10–17; FMRSl IV 109/1, 1–2; FMRSl IV109/2; FMRSl IV 110; FMRSl IV 115; FMRSl V 61, 1; FMRSl V 64, 1, 24; FMRSl V 65, 1–2; FMRSl V 81, 1–4; FMRSl V 82, 1–3; FMRSl VI 72; FMRSl VI 73, 1–3; FMRSl VI 74, 1, 8; FMRSl VI 76; FMRSl VI 77, 1–4, 12–13; FMRSl VI 78, 1; FMRSl VI 87, 1; FMRSl VI 88, 1, 3–5; FMRSl VI 89; FMRSl VI 90; FMRSl VI 100, 1–6, 10; FMRSl VI 101, 1–2; FMRSl VI 102, 1–8; FMRSl VI 104, 1–3; FMRSl VI 105, 1–5; FMRSl VI 107, 1–3; FMRSl VI 108, 1–5, 7; FMRSl VI 109; FMRSl VI 110 1–3.

853 FMRSl VI 72, 1; FMRSl VI 77, 1; FMRSl VI 102, 1.

854 Kos, Šemrov 2003.

855 FMRSl IV 109/2.

856 The Numismatic Cabinet of the National Museum of Slovenia keeps the overwhelming majority of the coins from the Ljubljanica or at least records on them.

857 I took into account the examples kept in the Department of Archaeology at the NMS.

Iz Ljubljanice poznam 46 rimskih bronastih posod,[848] ne upoštevaje vedra, ki jih ni mogoče ozko datirati. Izvirajo iz delavnic v Italiji. Iz predavgustejske dobe sta zajemalki in vrček.[849] Velika večina (32 posod) so korci avgustejsko-tiberijske dobe. Od avgustejske dobe so zanesljivo mlajši trije korci, ki pa še sodijo v 1. st.[850] Zanesljivo mlajših bronastih posod ni.

Rimske fibule se iz druge polovice 1. st. pr. Kr. in še posebej avgustejske dobe brez prekinitve nadaljujejo v drugo polovico 1., 2. in 3. st.[851]

Iz Ljubljanice je objavljenih 121 posamezno najdenih rimskih novcev in tri skupne najdbe republikanske dobe in principata.[852] Najstarejši rimski denar je bil skovan v prvi polovici 2. st. pr. Kr. (ozko je datiran novec iz leta 154 pr. Kr.).[853] Iz obdobja do konca avgustejske dobe je 41 posamič najdenih novcev (od tega 16 iz časa Avgustove vlade ter devet iz obdobja med Cezarjevo smrtjo in začetkom avgustejske dobe) in dve skupni najdbi (najmlajši novec v prvi je iz 147 pr. Kr.[854] in v drugi iz 42 pr. Kr.[855]). Za interpretacijo novčnih najdb iz Ljubljanice bi bila potrebna poglobljena numizmatična obravnava in upoštevanje še neobjavljenega denarja.[856]

Sklenem lahko, da je med ožje časovno opredeljivimi rimskimi najdbami republikanske dobe in principata velika večina iz 1. st. pr. Kr. in 1. st. po Kr., z izrazitim težiščem v avgustejski oziroma avgustejsko-tiberijski dobi. Njihova datacija je torej podobna kot pri rimski vojaški opremi. Tisti keramični predmeti, ki so kronološko dovolj občutljivi, kažejo, da njihovo število po koncu avgustejske dobe bistveno upade (*sl. 130*), vendar manj kot pri vojaški opremi (*sl. 123*). Pri keramičnih predmetih je namreč 28 % predmetov zanesljivo mlajših od avgustejske dobe, pri rimski vojaški opremi pa le 12 % (prim. pogl. 18.1). Pri bronastih posodah je mogoče reči le, da se je njihovo število drastično zmanjšalo najkasneje ob koncu Tiberijeve vlade.

18.6.2 Razporeditev najdišč po strugi Ljubljanice

Razporejenost najdišč odlomkov amfor ter fine in druge ozko časovno opredeljene keramike[857] se razlikujeta (*sl. 131*). Amfor je daleč največ z odseka Vrhnika. Fine in druge ozko časovno opredeljene keramike je pri Vrhniki malo, nato pa se gosti v smeri proti Bevkam, kjer je je daleč največ, vzhodno od tega odseka so bili najdeni le redki primerki pri Podpeči in Rakovi Jelši.

Izraziti težišči ožje datiranih bronastih korcev in redkih drugih posod (zajemalke, sito, vrček), ki jih je mogoče ožje časovno opredeliti,[858] sta območji pri Vrhniki (14 predmetov) in pri Bevkah, kjer devetim ohranjenim predmetom lahko prištejemo sedem korcev, ki so izginili neznano kam in so del skupine osmih korcev, ki so bili najdeni zloženi drug v drugega[859] (*sl. 131*).

Bronasta vedra so bila najdena le pri Vrhniki (*sl. 131*).

Med fibulami po številčnosti zelo izstopa odsek pri Bevkah.[860]

Pri sliki prostorske razporejenosti sekir do vključno 3. st. (*sl. 132*)[861] se zdijo pomenljivi odsotnost sekir z odseka pri Vrhniki, zmerno število z odseka pri Bevkah in izrazito veliko število sekir z odseka pri Podpeči.

Največ rimskega denarja do leta 284 izvira iz odsekov pri Rakovi Jelši in Ljubljani (pri ledini Livada), razmeroma dosti jih je tudi od Vrhnike do vključno odseka pri Bevkah (*sl. 133*). Podrobnejša analiza nakazuje, da so avgustejski in starejši novci podobno razporejeni kot rimska vojaška oprema, le na odsekih

848 Upoštevala sem predmete, ki jih hrani Arheološki oddelek Narodnega muzeja Slovenije, predmete iz zbirke družine Potočnik (Gaspari 2002, t. 4 in sl. 64; Breščak 1995, sl. 1, sl. 2: 1–3, sl. 3: 3–5, sl. 4: 2) in korec, ki ga hrani Deželni muzej Joanneum v Gradcu (Breščak 1982, 40, kat. 4, t. 1: 4).

849 Vrček in zajemalka (Gaspari, Trampuž Orel, Turk 2009a, kat. 42) ter zajemalka tipa Pescate (Horvat 1990, 270, 297, kat. 598, sl. 32b).

850 Korci s trolistno predrtino na koncu ročaja, Narodni muzej Slovenije, inv. št. R 1880, akcesija AO NMS 2018/22-184 in Breščak 1995, 15, sl. 3: 4.

851 Upoštevala sem primerke iz Arheološkega oddelka Narodnega muzeja Slovenije in iz zbirke družine Potočnik (Gaspari 2002, 284, t. 2: NA 14–NA 22).

852 FMRSl I 155/45, 1–13, 24–26; FMRSl I 155/46; FMRSl III 84, 1–2; FMRSl III 107; FMRSl IV 84; FMRSl IV 88, 1–2; FMRSl IV 91, 1–9, 23–25; FMRSl IV 92, 1–6, 10–17; FMRSl IV 109/1, 1–2; FMRSl IV109/2; FMRSl IV 110; FMRSl IV 115; FMRSl V 61, 1; FMRSl V 64, 1, 24; FMRSl V 65, 1–2; FMRSl V 81, 1–4; FMRSl V 82, 1–3; FMRSl VI 72; FMRSl VI 73, 1–3; FMRSl VI 74, 1, 8; FMRSl VI 76; FMRSl VI 77, 1–4, 12–13; FMRSl VI 78, 1; FMRSl VI 87, 1; FMRSl VI 88, 1, 3–5; FMRSl VI 89; FMRSl VI 90; FMRSl VI 100, 1–6, 10; FMRSl VI 101, 1–2; FMRSl VI 102, 1–8; FMRSl VI 104, 1–3; FMRSl VI 105, 1–5; FMRSl VI 107, 1–3; FMRSl VI 108, 1–5, 7; FMRSl VI 109; FMRSl VI 110 1–3.

853 FMRSl VI 72, 1; FMRSl VI 77, 1; FMRSl VI 102, 1.

854 Kos, Šemrov 2003.

855 FMRSl IV 109/2.

856 Numizmatični kabinet Narodnega muzeja Slovenije hrani veliko večino novcev iz Ljubljanice ali vsaj podatke o njih.

857 Upoštevala sem primerke iz Arheološkega oddelka NMS.

858 Prim. op. 848.

859 Gaspari 2012a, 28, sl. 26; Gaspari 2002, 162.

860 Upoštevala sem predmete, ki jih hrani Arheološki oddelek NMS, in predmete iz zbirke družine Potočnik (Gaspari 2002, 284, t. 2: NA 14–NA 21).

861 Upoštevala sem sekire, ki jih hrani Arheološki oddelek NMS, in tiste iz zbirke družine Potočnik (Gaspari 2002, 299–300, t. 26–28, t. 29: 19–21). Za časovno opredelitev sekir se zahvaljujem Poloni Bitenc (NMS).

Figure 131
Spatial distribution of Roman finds other than militaria up to the end of the 3rd century in the Ljubljanica.

Slika 131
Razporeditev rimskih predmetov do vključno 3. st. po Kr. po odsekih Ljubljanice.

east of this section only rare diagnostic shards were recovered at the Podpeč and Rakova Jelša sections.

The highest number of bronze cooking pans (*paterae*) and rare other narrowly datable vessels (ladles, strainer, jug)[858] come from the Vrhnika (fourteen items) and Bevke sections, the latter yielding nine surviving examples, as well as seven cooking pans that are now missing and formed part of a set of eight pans placed one into the other[859] (*Fig. 131*).

Bronze buckets only came to light at Vrhnika (*Fig. 131*).

The section that revealed most brooches is that at Bevke.[860]

The distribution map of axes dating up to the 3rd century (*Fig. 132*)[861] shows an absence in the Vrhnika section, a moderate number at Bevke and a concentration in the Podpeč section.

The greatest numbers of Roman coins dating up to AD 284 come from the Rakova Jelša and Ljubljana sections (in the latter at the Livada site), they are also relatively numerous from Vrhnika to the Bevke section (*Fig. 133*). Augustan and earlier coins show a distribution similar to the Roman military equipment, but are more highly concentrated in the Rakova Jelša and even more so in the Ljubljana section (*Fig. 133*).[862]

The distributions of the ceramics, metal vessels (*Fig. 131*) and brooches dating up to the 3rd century differ in details, but are similarly predominant west of the bend at the end of the Bevke section, as has also been observed for the distribution of the Roman military equipment (*Fig. 129*); all these groups of finds, with the exception of amphorae, are most numerous in the Bevke section. The group showing the greatest similarity with the distribution of the Roman military equipment is that of narrowly dated pottery, mainly fineware, which differs from the Roman militaria in the paucity of finds at Vrhnika and an absence of Augustan-period artefacts in the Rakova Jelša section[863] (*Fig. 129* and *Fig. 131*).

858 Cf. Fn. 848.
859 Gaspari 2012a, 28, Fig. 26; Gaspari 2002, 162.
860 I took into account the items kept in the Department of Archaeology at the NMS and in the Potočnik Collection (Gaspari 2002, 284, Pl. 2: NA 14–NA 21).
861 I took into account the axes kept in the Department of Archaeology at the NMS and in the Potočnik Collection (Gaspari 2002, 299–300, Pls. 26–28, Pl. 29: 19–21). Polona Bitenc (NMS) kindly provided a chronological attribution of the axes.
862 The information on the Late Roman coins from the Ljubljanica is taken from FMRSl I–VI.
863 Two examples were found in this section, one pre-Augustan and the other from the second half of the 1st to the first half of the 2nd century (NMS, Inv. Nos. V 1070, V 1176).

Figure 132
Spatial distribution of Roman axes in the Ljubljanica.

Slika 132
Razporejenost najdišč rimskih sekir po odsekih Ljubljanice.

Figure 133
Number of Roman coins of various minting periods until AD 284 from individual sections of the Ljubljanica.

Slika 133
Razporeditev rimskega denarja posameznih kovnih obdobij do leta 284 po odsekih Ljubljanice.

Rakova Jelša in predvsem Ljubljana so močneje zastopani (*sl. 133*).[862]

Razporejenosti rimskih keramičnih najdb, kovinskih posod (*sl. 131*) in fibul do vključno 3. stoletja se v podrobnostih razlikujejo, vsem pa je skupna izrazita prevlada v strugi zahodno od zavoja na koncu odseka pri Bevkah, ki sem jo ugotovila tudi za rimsko vojaško opremo (*sl. 129*). Pri vseh, razen pri amforah, je največja gostota najdb v odseku pri Bevkah. V podrobnostih se razporejenost predmetov teh skupin razlikuje od razporejenosti rimske vojaške opreme.

862 Vir podatkov o poznorimskem denarju iz Ljubljanice so FMRSl I–VI.

The findspots of axes dating up to the 3rd century show a very different distribution (*Fig. 132*). They are roughly evenly represented in all sections except at Vrhnika, where no axes have been found, and at Podpeč, where numerous axes have been recovered. I suppose that other factors influenced their presence in the riverbed, different from those pertaining to the Roman military equipment, amphorae and ceramics; possibly the axes were lost while clearing the vegetation on the banks as part of towpath maintenance.

18.7 Comparison with the finds from the Late Iron, Late Roman and early medieval periods: distribution of findspots along the riverbed

The findspots of weapons and other artefacts from the Late Iron Age concentrate in the western part of the riverbed up to and including the Kamnik pod Krimom section, with particularly numerous finds in the Blatna Brezovica and Bevke sections[864] (cf. *Fig. 128*, Sections III–V, Sites 6–14). They differ from the distribution of Roman military equipment up to the 3rd century in the paucity of finds from the Vrhnika section, but also in that the area of dense finds to the east includes the Kamnik pod Krimom section.

The river also yielded Late Roman objects associated with soldiers and public servants, i.e. mainly belt pieces and crossbow brooches, but these are few in number and show a distribution that differs from that of the earlier Roman militaria. More than three quarters of these finds were recovered east of the Bevke section (*Fig. 134*). There is no such difference in the distribution of the other metal finds east of Bevke (*Fig. 134*). The 122 or so individual Late Roman coins[865] and one group find[866] largely originate from the Rakova Jelša section and the Livada site in the Ljubljana section (*Fig. 135*), where there was also a concentration of earlier Roman coins. Apart from that, the distribution of the Late Roman coins differs from that of the earlier ones. They are very rare west of the Rakova Jelša section, where earlier coins are

Figure 134
Number of Late Roman finds from individual sections of the Ljubljanica. Cf. *Fig. 128*.

Slika 134
Razporeditev poznorimskih predmetov po odsekih Ljubljanice. Prim. *sl. 128*.

Figure 136
Number of early medieval finds from individual sections of the Ljubljanica.

Slika 136
Razporeditev zgodnjesrednjeveških predmetov po odsekih Ljubljanice.

864 Gaspari 2009d, Fig. 73; Gaspari 2009f, Fig. 43. The quantity of Late Iron Age finds decreases east of the bend at Bevke (Dinver), but much less than the quantity of the Early Roman finds.

865 FMRSl I 155/45, 14–23, 27; FMRSl III 84, 3; FMRSl IV 90, 1–3; FMRSl IV 91, 10–22, 26–27; FMRSl IV 92, 7–9, 20–22; FMRSl IV 103; FMRSl IV 109/1, 3; FMRSl V 61, 2; FMRSl V 64, 2–23, 25–33; FMRSl V 65, 3–24; FMRSl VI 74, 2–7; FMRSl VI 75, 2–7, 9; FMRSl VI 77, 5–11; FMRSl VI 87, 2–3; FMRSl VI 88, 2, 6; FMRSl VI 100, 7–9; FMRSl VI 102, 9; FMRSl VI 103, 1; FMRSl VI 108, 6.

866 FMRSl IV 109/3.

Figure 135
Number of coins minted after AD 284 from individual sections of the Ljubljanica.

Slika 135
Razporejenost novcev, kovanih po letu 284, po odsekih Ljubljanice.

Najbolj ji je podobna razporejenost najdišč ozko datirane (predvsem fine namizne) keramike, ki pa se od razporejenosti rimske vojaške opreme razlikuje predvsem po izrazito maloštevilnih najdbah z Vrhnike in odsotnosti avgustejskih predmetov z odseka pri Rakovi Jelši[863] (*sl. 129* in *sl. 131*).

Zelo drugače so razporejena najdišča sekir do vključno 3. stoletja (*sl. 132*). Po odsekih so zastopane približno enakomerno, razen na Vrhniki, kjer jih ni, in pri Podpeči, kjer jih je zelo veliko. Domnevam, da so za njihovo prisotnost v strugi odgovorni drugi dejavniki kot pri rimskih vojaških predmetih, amforah ter keramičnem in namiznem posodju. Najverjetnejša se zdi izguba sekir ob sekanju odvečnega rastja na bregovih Ljubljanice, ki je bilo za uporabo vlečnih poti nujno.

18.7 Primerjava s predmeti mlajše železne, poznorimske in zgodnjesrednjeveške dobe: razporejenost najdišč po strugi

Najdišča orožja in drugih predmetov mlajše železne dobe iz Ljubljanice so daleč najgostejša v zahodnem delu struge do vključno odseka pri Kamniku pod Krimom z zgoščino v odsekih pri Blatni Brezovici in pri Bevkah[864] (prim. *sl. 128*, odseki III, IV in V, ledine 6 do 14). Od razporeditve rimske vojaške opreme do 3. stoletja se torej razlikuje po odsotnosti zgoščine pri Vrhniki in po tem, da območje večje gostote na vzhodu vključuje odsek pri Kamniku pod Krimom.

Poznorimski predmeti, ki jih povezujemo z vojaki in uradniki (predvsem deli pasov in čebuličaste fibule), so maloštevilni, vendar nakazujejo drugačno razporeditev po strugi kot starejša rimska vojaška oprema: več kot tri četrtine predmetov izvira iz struge vzhodno od odseka pri Bevkah (*sl. 134*). Maloštevilni drugi poznorimski kovinski predmeti z ožje znanimi najdišči (predvsem sekire in obročaste fibule) so približno enako zastopani vzhodno in zahodno od Bevk (*sl. 134*). Med okrog 122 posamič najdenimi

863 S tega odseka sta dva predmeta, eden predavgustejski in drugi iz druge polovice 1. do prve polovice 2. st. (Narodni muzej Slovenije, inv. št. V 1070, V 1176).

864 Gaspari 2009c, sl. 73; Gaspari 2009e, sl. 43. Količina mlajšeželeznodobnih najdb se vzhodno od zavoja pri Bevkah (Dinver) zmanjša, vendar bistveno manj kot pri zgodnjerimskih najdbah.

more numerous, particularly in the Bevke and Blatna Brezovica sections (*Figs. 133, 135*).

The occurrence of early medieval metal finds is considerably denser east of Bevke than west of it, with concentrations in the Podpeč and Rakova Jelša sections (*Fig. 136*). The same sections also yielded most weapons, mainly consisting of spearheads, battle knives and battle axes.

The distribution of the Roman military equipment up to the 3rd century is therefore only characteristic of that period and differs from the distributions of finds from earlier and later periods. What appears to be significant is the marked concentration in the riverbed west of the bend at the eastern end of the Bevke section, which also yielded the boundary stone marking the border between the administrative territories of *Aquileia* and *Emona*.[867]

867 Šašel Kos 2002.

poznorimskimi novci[865] in eno skupno najdbo[866] jih je izrazito največ z odseka pri Rakovi Jelši in ob ledini Livada (odsek Ljubljana; *sl. 135*), kjer so našli tudi največ starejšega rimskega denarja. Sicer pa se razporejenost poznorimskih novcev razlikuje od razporejenosti starejših: zahodno od odseka pri Rakovi Jelši so zelo redki, medtem ko je starejšega denarja v tem delu reke več, posebno iz odsekov pri Bevkah in Blatni Brezovici (*sl. 133, 135*).

Gostota zgodnjesrednjeveških kovinskih najdb je bistveno večja vzhodno od Bevk, z izrazitima zgoščinama na odsekih Podpeč in Rakova Jelša (*sl. 136*). Na istih odsekih je bilo najdeno tudi največ orožja (predvsem sulične osti, bojni noži in bojne sekire).

Slika, ki jo kaže razporeditev rimske vojaške opreme do 3. st. po Kr., je torej značilna le za to obdobje, saj se razlikuje od razporeditve predmetov starejših in mlajših obdobij. Bistvena se zdi izrazita zgoščenost v strugi zahodno od izrazitega zavoja na vzhodnem zaključku odseka pri Bevkah, v katerem je bil najden mejnik med upravnima območjema Akvileje in Emone.[867]

865 FMRSl I 155/45, 14–23, 27; FMRSl III 84, 3; FMRSl IV 90, 1–3; FMRSl IV 91, 10–22, 26–27; FMRSl IV 92, 7–9, 20–22; FMRSl IV 103; FMRSl IV 109/1, 3; FMRSl V 61, 2; FMRSl V 64, 2–23, 25–33; FMRSl V 65, 3–24; FMRSl VI 74, 2–7; FMRSl VI 75, 2–7, 9; FMRSl VI 77, 5–11; FMRSl VI 87, 2–3; FMRSl VI 88, 2, 6; FMRSl VI 100, 7–9; FMRSl VI 102, 9; FMRSl VI 103, 1; FMRSl VI 108, 6.
866 FMRSl IV 109/3.
867 Šašel Kos 2002.

19
Conclusion

19.1 Roman military equipment from the Ljubljanica up to the 3rd century AD (summary of Chapters 4–18)

The silty riverbed of the Ljubljanica in its stretch across the Barje, from Vrhnika to Ljubljana, is a rich archaeological site that has yielded a multitude of artefacts ranging in date from the Early Stone Age to the modern period. In contrast, the riverbed east of Ljubljana is gravelly and is not known to have yielded any finds.

The assemblage of the Roman militaria from the river, discussed here, extends up to the 3rd century in date and comprises 79 items. This represents an important share of all finds from the Roman period. For 54 of them, it has been possible to establish a relatively narrow dating, mostly to the Middle and Late Augustan periods. Six are reliably earlier and five reliably later, with three of the later ones from the 1st and two from the 2nd and 3rd centuries. This shows that very few items postdate the end of the Augustan/Early Tiberian period (*Fig. 123*).

There is a marked predominance of assault weapons, mostly swords and their scabbards (33), followed by iron parts of *pila* (seven), daggers and their sheaths (four), as well as spearheads (at least four). Armour is poorly represented, with two helmets (two), there is also a 3rd century shield boss. Relatively numerous are heavy double-sided tools (eight), turf cutters (five) and tent pegs (five). Six items formed part of belts and two hobnails studded military footwear. Two objects are believed to be military decorations. Horse equipment is absent.

The different groups of military equipment occur in numbers that argue against the assemblage being purely random in nature. In a random assemblage, we would expect to find pieces of the cuirass, as well as a roughly equal share of swords and daggers. In the case of the Ljubljanica, however, swords largely predominate over daggers and all other groups of objects, while cuirass pieces are absent altogether.

Most of the military equipment belongs to types used by the infantry, with a single sword presumed to have been wielded by a cavalryman. Two swords, a sword in a scabbard and four spearheads could be infantry or cavalry equipment.

The infantry militaria mainly belong to types that could be used by legionaries and auxiliaries alike, but eleven may be related to just legionaries.

A single item (the MM A30 sword) may have been intentionally damaged. The condition of the recovered artefacts shows they entered the water complete; this is clear for all groups except for swords, where the degree of preservation varies greatly, from less than a quarter to almost complete (*Figs. 126–127*).

While as many as three of the four daggers were recovered in their sheaths, fewer than half of the swords were found with remains of their scabbards. The reason for this may lie in a poorer durability of the sword scabbards (made of wood with metal only used for the front sheet and fittings) in comparison with the dagger sheaths (the basic material for both the Dangstetten and Mainz type sheaths is iron).

In one instance, the circumstances of discovery indicate that a dagger and a sword (A9, B3), both in respective sheaths, went into the river at the same time, probably forming the armament of a single individual.

19
Sklep

19.1 Značilnosti rimske vojaške opreme do 3. st. po Kr. iz Ljubljanice (povzetek izsledkov poglavij 4–18)

Muljasta struga Ljubljanice na Barju, od Vrhnike do Ljubljane, je bogato arheološko najdišče. V njej najdeni predmeti segajo od starejše kamene do moderne dobe. Iz Ljubljanice vzhodno od Ljubljane, kjer je dno prodnato, najdbe niso znane.

Rimska vojaška oprema do vključno 3. stoletja obsega 79 predmetov. Med rimskimi najdbami iz Ljubljanice po količini predmetov predstavljajo močno skupino. Časovno razmeroma ozko sem jih opredelila 54. Njihovo izrazito časovno težišče je v srednji in pozni avgustejski dobi. Šest predmetov je zanesljivo starejših in pet zanesljivo mlajših, od tega trije iz 1. stoletja in dva iz 2. in 3. st. Številčnost rimske vojaške opreme se po koncu avgustejske/zgodnje tiberijske torej bistveno zmanjša (*sl. 123*).

Izrazito prevladuje napadalno orožje. Daleč največ je mečev in njihovih nožnic (33), sledijo železni deli pilumov (7), bodala s pripadajočimi nožnicami (4) in sulične osti (najmanj 4). Obrambno orožje je zastopano le s čeladama (2) in bistveno mlajšo ščitno grbo (3. st.). Razmeroma dosti je težkih dvostranskih orodij (8), orodij za rezanje ruše (5) in šotorskih klinov (5). Vojaškim pasovom pripada šest predmetov in obuvalom dva okovna žebljička. Za dva predmeta domnevam, da sta odlikovanji. Konjske opreme ni.

Pregled zastopanosti posameznih vrst vojaške opreme ne kaže naključnega vzorca. To je očitno iz razmerja med bodali in meči ter iz odsotnosti delov oklepov. Pri naključno nastalem vzorcu bi pričakovala dele oklepov ter približno enako število mečev in bodal.

Tiste vrste orožja iz Ljubljanice, pri katerih se da utemeljeno domnevati, da so jih uporabljali pešaki oziroma konjeniki, govorijo skoraj izključno za pešake. Le za en meč domnevam, da je konjeniški; za dva meča in en meč z nožnico ter štiri sulične osti ni jasno, ali so del oborožitve pešaka ali konjenika.

Med predmeti, ki so sodili k pešakom prevladujejo taki, ki so jih lahko uporabljali legionarji in vojaki pomožnih enot. Zgolj z oborožitvijo legionarjev je povezanih 11.

Namerno je bil poškodovan največ en predmet (meč MM A30). Delež ohranjenosti predmetov vseh skupin, razen mečev, nakazuje, da so v strugo prišli celi. Pri mečih je delež ohranjenosti različen, od manj kot četrtine do skoraj celih (*sl. 126–127*).

Od štirih bodal so bila tri najdena v nožnici, medtem ko so ostanki nožnic ohranjeni le pri manj kot polovici mečev. Vzrok za to razliko je lahko manjša obstojnost nožnic obravnavanih mečev (osnova teh nožnic je iz lesa, iz kovine so okovi in obloge) v primerjavi z nožnicami v Ljubljanici najdenih tipov bodal (tipa Dangstetten in Mainz: osnovni material nožnic je železo).

V enem primeru najdiščne okoliščine kažejo, da sta bodalo in meč, oba v nožnicah (A9, B3), v strugo prišla hkrati, torej verjetno kot del orožja iste osebe.

Za večino predmetov rimske vojaške opreme iz Ljubljanice torej utemeljeno domnevam, da so v reko prišli celi in brez namerno povzročenih poškodb. Bodala so bila praviloma v nožnici. Meči so imeli manj obstojne nožnice, zato se zdi verjetno, da jih je skupaj z nožnico v reko prišlo bistveno več, kot kažejo meči z ohranjenimi ostanki nožnice, tj. štiri desetine vseh mečev.

In conclusion, most militaria can reasonably safely be assumed to have entered the Ljubljanica complete and without intentional damage. Daggers were predominantly found in their sheaths, while the swords had less durable scabbards and it therefore seems likely that a much greater proportion of the swords entered the river in their scabbards than indicated by the roughly 40% of cases where swords actually survived with scabbard remains.

More than two thirds of the militaria originate from the riverbed between Vrhnika and the bend at Bevke, and less than a third from the considerably longer stretch between the said bend and Ljubljana. In the first part, the section at Sinja Gorica stands out for the paucity of finds, while the section at Rakova Jelša in the stretch downstream from the bend stands out for the opposite reason – it yielded a disproportionately large number of artefacts (*Fig. 129*).

The chronological distribution of the militaria is similar to that of other Republican and Early Imperial finds from the Ljubljanica, only the decrease in the number of items postdating the Augustan or the Early Tiberian period is more substantial (*Figs. 123, 130*).

The spatial distribution of the military finds roughly corresponds with that of most other groups of contemporary finds (*Figs. 129, 131*), most closely with the overall distribution of imported pottery, including both amphorae and fineware. All groups share a marked concentration in the western third of the riverbed, from Vrhnika to the bend at Bevke.

Very differently distributed are the findspots of axes dating up to the end of the 3rd century (*Fig. 132*). Their presence in the river may be related to factors different from those for the Roman militaria, amphorae, pottery, bronze vessels and likely also coins. The axes were probably accidentally lost in the Ljubljanica while clearing the vegetation on its banks.

Also clearly different from the Roman militaria and most other groups of artefacts from the Late Republican and Early Imperial periods is the distribution of military items from the Late Roman and early medieval periods (*Figs. 134–136*), as well as the distribution of the Late Iron Age artefacts that mainly originate from the western part of the Ljubljanica including the section at Kamnik pod Krimom.

To conclude, the findspot distribution of the Roman military equipment and most other Roman finds from the Late Republican and Early Imperial periods, with an emphasis in the Augustan period, is specific to the said time span. What appears of crucial importance is that the great majority of artefacts came to light in the stretch of the riverbed from Vrhnika to the bend at the eastern end of the Bevke section. The most numerous finds from the Vrhnika section are those of military equipment, amphorae and bronze vessels (*Figs. 129, 131*), from the Blatna Brezovica, and even more so, the Bevke section, those of military equipment and Italic tableware. Republican and Augustan coins occur in roughly equal numbers in all three sections (*Fig. 133*).

An important part of the research was to systematically examine the elemental composition of the nonferrous metals employed in the production of the Roman military equipment from the Ljubljanica. The results show a great uniformity in the choice of the metals (such as brass and silver) and their elemental composition. This corresponds with the uniformity of construction and production techniques[868] and speaks in favour of a mass production in one or several possibly interconnected production centres. The high uniformity of forms (types) and, inasmuch as researched, of the metals used in the production of the military equipment of the Augustan period and the 1st century AD from different and geographically distant sites suggests that a large part of the militaria from the Augustan period and the Early Principate were mass produced in a small number of large workshops supplying vast markets. I presume that their production and distribution resembled that of the Roman fineware. Military equipment was probably also produced in smaller workshops to supply smaller markets, their products being modelled on those of the large workshops, though still differing from them in details.

The choice of the metals was determined by their mechanical properties, appearance and price. The desired appearance of militaria was that of silver and gold. For expensive, prestige items this was achieved by using silver and gold, either to make the objects or to plate them. For the rest, cheaper materials were used: brass, tin, tin-lead and copper-tin alloys, as well as iron; brass and bronze surfaces obtain a yellow metallic shine when polished, while polished tin surfaces have a silvery appearance.

868 Cf. Ch. 4.2.3 (group of Mainz type swords/scabbards: A5–A11, A14, A15, A17, MM A25–MM A28, MM A34.

Več kot dve tretjini rimske vojaške opreme izvira iz struge od Vrhnike do izrazitega zavoja pri Bevkah, slaba tretjina pa iz bistveno daljšega dela struge med omenjenim zavojem in Ljubljano. V strugi do zavoja izstopa odsek pri Sinji Gorici po maloštevilnosti predmetov rimske vojaške opreme, v strugi nizvodno od zavoja pa odsek pri Rakovi Jelši z razmeroma številnimi predmeti (*sl. 129*).

Časovna razporeditev rimske vojaške opreme je podobna kot pri drugih rimskih najdbah republikanske in zgodnje cesarske dobe iz Ljubljanice, le upad števila predmetov po koncu avgustejske ali zgodnje tiberijske dobe je izrazitejši (*sl. 123, 130*).

Razporeditev najdišč rimske vojaške opreme v strugi se grobo ujema z razporeditvijo večine najdišč drugih sočasnih najdb iz Ljubljanice (*sl. 129, 131*), čeprav se v podrobnostih od vsake od njih razlikuje. Vsem je skupna izrazita prevlada v zahodni tretjini struge, od Vrhnike do zavoja pri Bevkah. Razporejenost najdišč vojaške opreme je podobna kombinaciji razporejenosti najdišč z amforami in najdišč s fino keramiko.

Zelo drugače so razporejena najdišča sekir do vključno 3. stoletja (*sl. 132*). Domnevam, da so k njihovi prisotnosti v strugi pripomogli drugi dejavniki kot pri rimskih vojaških predmetih, amforah, keramičnem in bronastem posodju ter verjetno tudi denarju. Verjetno gre za slučajne izgube ob sekanju odvečnega rastja na bregovih Ljubljanice.

Od razporeditve rimske vojaške opreme in večine sočasnih predmetov poznorepublikanske in zgodnje cesarske dobe se jasno razlikuje razporeditev poznorimskih in zgodnjesrednjeveških vojaških predmetov (*sl. 134–136*). Prav tako je bistveno drugačna razporeditev najdišč predmetov mlajše železne dobe, ki izrazito prevladujejo v zahodnem delu Ljubljanice do vključno odseka pri Kamniku pod Krimom.

Razporeditev rimske vojaške opreme in večine drugih najdb poznorepublikanske in zgodnje cesarske, predvsem avgustejske dobe v Ljubljanici je torej značilna le za to obdobje. Bistvena se zdi močna količinska prevlada predmetov iz struge od Vrhnike do izrazitega zavoja na vzhodnem zaključku odseka pri Bevkah. Med najdbami iz struge pri Vrhniki izstopajo vojaška oprema, amfore in bronasto posodje (*sl. 129, 131*), med tistimi z odsekov pri Blatni Brezovici in še bolj pri Bevkah pa vojaška oprema in italska namizna keramika. Republikanski in avgustejski denar je približno enako dobro zastopan na teh treh odsekih (*sl. 133*).

Pomemben del monografije so rezultati sistematičnih raziskav elementne sestave neželeznih kovin rimske vojaške opreme iz Ljubljanice. Kažejo visoko stopnjo enotnosti pri njihovi izbiri (npr. medenina, srebro) in elementni sestavi. To se ujema z zelo podobno zgradbo in načinom izdelave teh predmetov[868] in govori za njihovo serijsko proizvodnjo v enem ali več med seboj morda povezanih proizvodnih središčih. Precejšna enotnost oblik (tipov) in, kolikor je raziskano, tudi materialov vojaške opreme avgustejske dobe in 1. stoletja z različnih, geografsko močno oddaljenih najdišč govori za izdelavo velikega dela rimske vojaške opreme avgustejske dobe in zgodnjega principata v maloštevilnih velikih delavnicah s serijsko proizvodnjo, ki so imele obširna tržišča. Domnevam, da sta proizvodnja in distribucija rimske vojaške opreme v avgustejski dobi in principatu potekali podobno kot npr. proizvodnja finega namiznega posodja. Verjetno so vojaško opremo izdelovale tudi manjše delavnice z ožjimi tržišči. Zgledovale so se po izdelkih velikih delavnic, vendar se njihovi izdelki v podrobnostih razlikujejo od serijskih izdelkov velikih delavnic.

Pri vojaških predmetih so na izbiro kovin vplivali njihove mehanske lastnosti, videz in cena. Stremeli so k zlato-srebrnemu videzu. Pri dragih, prestižnih predmetih so ga dosegli z uporabo srebra in zlata (za izdelavo predmetov ali prekrivanje njihove površine), pri ostalih pa z uporabo cenejših materialov: medenine, kositra, zlitin kositer-svinec in baker-kositer ter železa. Spolirane medeninaste in bronaste površine imajo namreč rumen kovinski sij in spominjajo na zlato, spolirane površine kositra pa so po videzu podobne srebru.

19.2 Plovna pot po Ljubljanici ter Navport in Emona v poznorepublikanski dobi in na začetku principata (povzetek stanja raziskav)

19.2.1 Ljubljanica

Ljubljanica na Barju je globoka najmanj dva metra ter ima miren in počasen tok, zato je zelo primerna za plovbo s tokom ali proti njemu.

Rimsko ime Ljubljanice je bilo najverjetneje *Nauportus*.[869]

868 Prim. pogl. 4.2.3 (skupina mečev/nožnic tipa Mainz A5–A11, A14, A15, A17, MM A25–MM A28, MM A34).
869 Šašel Kos 2017a.

- autonomous town/avtonomno mesto
- other civil settlement/drugo naselje
- fortress/legijski tabor
- presumed fortress/domnevni legijski tabor (the site of the fortress at Aquileia is unknown/kraj tabora v okolici Akvileje ni znan)
- other or unspecified military post/drugo ali neopredeljeno vojaško oporišče
- presumed military post/domnevno drugo ali neopredeljeno vojaško oporišče

Figure 137
Area between Aquileia and Siscia in the first decade AD.

Slika 137
Območje med Akvilejo in Siscijo v prvem desetletju po Kr.

19.2 The navigable route along the Ljubljanica and its relation to Nauportus and Emona in the Late Republican period and the Early Principate

19.2.1 The River Ljubljanica

The Ljubljanica in its stretch across the Ljubljansko barje is a calm, slow and at least two metres deep river, suitable for navigation both upstream and downstream.

In the Roman period, it was most likely known as *Nauportus*.[869]

Before the construction of a road connecting the settlements of *Nauportus* (Vrhnika) and *Emona* (Ljubljana), the Ljubljanica represented the most convenient communication between the two settlements as the marshy terrain of the Ljubljansko barje limited the possible passages on land.[870] On a broader scale, it formed part of an ancient route leading across the Razdrto Pass (*Ocra*) and linking the Apennine Peninsula with the Balkans and the central Danube Basin up to the Baltic (*Fig. 137*).[871]

Several Roman ships have been found in the Ljubljanica. Two stand apart in their size.

The first one was roughly 30 metres long and found in 1890 at Lipe[872] (*Figs. 138–139*). It carried no cargo upon discovery and was located some 300 metres away from the riverbed, suggesting that the ship was removed from service and out of the Ljubljanica so as not to obstruct traffic.[873] Several of the ship's wooden pieces were sampled and the dendrochronologically calibrated radiocarbon dates place its construction between the mid-2nd and mid-1st centuries BC.[874]

869 Šašel Kos 2017a.

870 Istenič 2009d, 81; Gaspari 2017, 147.
871 Istenič 2009d, 83, 85, Fn. 22.
872 Gaspari 1998b; Gaspari 1998c; Gaspari 2009j; Gaspari 2017, 140, 141, Fig. 120. The ship was left *in situ* with the exception of a small part that was removed and brought to the National Museum of Slovenia (Inv. Nos. P 3880, 3881, P 3882, P 3883, B 5043d).
873 Istenič 2009d, 83.
874 Gaspari 2017, 140–141, Figs. 120, 184.

Figure 138
The roughly 30-metre-long ship found in 1890 at Lipe in the Ljubljansko barje. Mid-2nd to mid-1st century BC.

Slika 138
Približno 30 m dolga ladja, ki so jo leta 1890 našli pri Lipah na Barju. Sredina 2. do sredina 1. st. pr. Kr.

Ljubljanica na Barju, med Vrhniko (*Nauportus*) in Ljubljano (*Emona*), je bila do izgradnje cestne povezave med naseljema del stare in najugodnejše prometnice, ki je prek prelaza Razdrto (Okra/*Ocra*) in Postojne povezovala Apeninski polotok z Balkanskim polotokom in srednjim Podonavjem ter Baltskim morjem (*sl. 137*).[870] Možnosti prehodov po kopnem čez Barje so bile namreč zaradi močvirnega terena omejene.[871]

Med rimskimi plovili iz Ljubljanice po velikosti izstopata dve ladji. Prva je bila dolga približno 30 metrov in je bila leta 1890 odkrita pri Lipah na Barju[872] (*sl. 138–139*). Dejstvi, da na ladji ni bilo tovora in da je njeno najdišče pribl. 300 m oddaljeno od struge Ljubljanice, nakazujeta, da so ladjo – verjetno zaradi dotrajanosti – umaknili iz Ljubljanice, kjer bi ovirala plovbo.[873] Radiokarbonske datacije z dendrokronološko kalibracijo več delov lesenih ostankov ladje kažejo na izgradnjo ladje v obdobju med sredino 2. in sredino 1. st. pr. Kr.[874]

Drugo ladjo so raziskali nedavno v Ljubljanici pri Sinji Gorici (*sl. 11, 139*). Verjetno je bila dolga okoli 20 metrov, dendrokronološke analize kažejo, da je bila zgrajena kmalu po letu 3 po Kr.[875]

K velikim tvornim ladjam je verjetno sodila tudi pri Vrhniki odkrita šivana ladja (*sl. 139–140*), za katero radiokarbonske analize nakazujejo datacijo na konec 2. st. pr. Kr.[876]

Deblake so pri plovbi po Ljubljanici uporabljali od prazgodovine do 19. stoletja.[877] Za deblak, najden pri Vrhniki (*sl. 139–140*), radiokarbonske analize kažejo na datacijo v konec 2. st. pr. Kr.[878]

Plovba od Emone dalje je bila, predvsem zaradi brzic na Ljubljanici pri Fužinah[879] (*sl. 139*) in še bolj zaradi slapov in brzic na Savi med Litijo in Zidanim Mostom (*sl. 1*), bistveno težja.[880] Antični pisni vir,[881] mit o Argonavtih[882] ter ob Ljubljanici in Savi ugotovljena mesta čaščenja s plovbo povezanih božanstev in situacija v mlajših obdobjih nakazujejo,[883] da so izkušeni čolnarji

870 Istenič 2009c, 78, 80, op. 22.
871 Istenič 2009c, 77; Gaspari 2017, 147.
872 Gaspari 1998b; Gaspari 1998c; Gaspari 2009i; Gaspari 2017, 140, 141, sl. 120. Večji del ladje so pustili na mestu, majhen del pa shranili (NMS inv. št. P 3880, 3881, P 3882, P 3883, B 5043d).
873 Istenič 2009c, 78.
874 Gaspari 2017, 140–141, sl. 120, 184.
875 Erič et al. 2014; Gaspari 2017, 128, 141–142, 184, sl. 113: 6, 121, 122.
876 Gaspari 2017, 85–87, 128, 181, sl. 85–87, 113: 2.
877 Erič 1994, 74–75; Erič, Gaspari, Kavur 2012.
878 Gaspari 2017, 13–84, 128, sl. 113: 2.
879 Šašel Kos 2017a, 232–233, sl. 1.
880 Črešnar 2012; Gaspari 2017, 148–155; Šašel Kos 2017b, 448, 454, sl. 7.
881 Strabo, 4, 6, 10 in 7, 5, 2 ter Plinij, n. h. 3, 128 (Šašel Kos 1990, 17–21).
882 Šašel Kos 2009c; Šašel Kos 2017b, 447–448.
883 Šašel Kos 1994; Gaspari 2017, 148–155; Šašel Kos 2017a, 232–233, sl. 1; Šašel Kos 2017b, 448, 451–454, sl. 7.

Figure 139
The Ljubljansko barje with the places and sites mentioned in the text. The basemap digital terrain model at 5m resolution (DTM5) is derived from the airborne LiDAR data (source: www.evode.gov.si).

Slika 139
Ljubljansko barje s kraji in najdišči, omenjenimi v besedilu. Podlaga karte je digitalni model reliefa z osnovno celico velikosti 5 m (DMR5), izdelan iz podatkov zračnega laserskega skeniranja (vir: www.evode.gov.si).

The second ship has only recently been investigated at Sinja Gorica (*Figs. 11, 139*). It measured an estimated 20 metres in length and was built, according to the results of the dendrochronological analyses, soon after AD 3.[875]

In addition to these two, the sewn ship recovered at Vrhnika (*Figs. 139–140*), radiocarbon dated to the end of the 2nd century BC, probably also served as a large cargo ship.[876]

Another means of navigation was by logboats, used on the Ljubljanica from prehistory to the 19th century.[877] One was found at Vrhnika (*Figs. 139–140*) and radiocarbon dated to the end of the 2nd century BC.[878]

Navigating the river downstream from Emona was considerably more difficult, mainly because of the rapids at Fužine[879] (*Fig. 139*) and even more so because of the waterfalls and rapids on the Sava between Litija and Zidani most (*Fig. 1*).[880] Ancient authors,[881] the myth of the Argonauts,[882] the cult places along the Ljubljanica and the Sava where divinities connected with navigation were venerated, as well as the situation in later periods all indicate[883] that experienced boatmen did navigate the Ljubljanica downstream from Emona, but in vessels considerably smaller than the two barges from Sinja Gorica and Lipe. When travelling upstream, ships were toed along the tow paths in the rivers' more difficult sections.[884]

Strabo, in Books 4 and 7 of his Geography, reveals the great importance of transport along the Ljubljanica in the last two centuries BC.[885] He relates that merchandise from Aquileia was conveyed in wagons across Ocra to Nauportus and from there down the rivers as far as the Danube.[886]

19.2.2 Vrhnika (Nauportus)

This was an important spot on the eastward trade route from Aquileia, where the road descended from the hills to the plain of the Ljubljansko barje and the River Ljubljanica (*Fig. 137*). In the 2nd century BC, Nauportus was probably a Tauriscan (Celtic) settlement.[887] Later, it was a Roman settlement, where eastward bound goods were reloaded from wagons onto

875 Erič et al. 2014; Gaspari 2017, 128, 141–142, 184, Figs. 113: 6, 121, 122.
876 Gaspari 2017, 85–87, 128, 181, Figs. 85–87, 113: 2.
877 Erič 1994, 74–75; Erič, Gaspari, Kavur 2012.
878 Gaspari 2017, 13–84, 128, Fig. 113: 2.
879 Šašel Kos 2017a, 232–233, Fig. 1.
880 Črešnar 2012; Gaspari 2017, 148–155; Šašel Kos 2017b, 448, 454, Fig. 7.
881 Strabo 4, 6, 10 and 7, 5, 2; Plinius, N. h. 3, 128 (Šašel Kos 1990, 143–146).
882 Šašel Kos 2009d; Šašel Kos 2017b, 447–448.
883 Šašel Kos 1994; Gaspari 2017, 148–155; Šašel Kos 2017a, 232–233, Fig. 1; Šašel Kos 2017b, 448, 451–454, Fig. 7.
884 Gaspari 2017, 148–155; Šašel Kos 2017b, 448.
885 Cf. Fn. 881.
886 Horvat 1990, 17–18; Šašel Kos 1990, 143–145; Šašel Kos 2009b.
887 In Book 7 and probably using sources referring to the situation in the 2nd century BC, Strabo writes that Nauportus was a settlement of the *Taurisci* (Strabo 7, 5, 2; Šašel Kos 1990). They were a Celtic people inhabiting central and eastern Slovenia, as well as north-western Croatia (Božič 1991, 471; Šašel Kos 2005, 416; Guštin 2008, 27–30).

Figure 140
The River Ljubljanica at Vrhnika with the sites mentioned in the text, aerial view looking towards the north.

Slika 140
Ljubljanica in Vrhnika, pogled iz zraka proti severu. Označena so najdišča, omenjena v besedilu.

plovbo po Ljubljanici od Emone dalje obvladovali, vendar v bistveno manjših plovilih, kot sta v Ljubljanici pri Sinji Gorici in pri Lipah na Barju najdeni ladji; pri plovbi proti toku so na težavnejših odsekih ladje vlekli s pomočjo vlečnih poti ob reki.[884]

Velik pomen prevozov po Ljubljanici v zadnjih dveh stoletjih pr. Kr. izhaja iz 4. in 7. knjige Strabonove Geografije.[885] Pravi, da so iz Akvileje čez Okro na vozovih vozili blago v Navport, od tam pa so ga prevažali z ladjami po rekah do Donave.[886]

19.2.2 Vrhnika (*Nauportus*)

Trgovska pot iz Akvileje na vzhod se je spustila s hribovja na Ljubljansko barje in k Ljubljanici pri Vrhniki (*sl. 137*). V Navportu, ki je bil verjetno v 2. st. pr. Kr. tavriskijsko (keltsko)[887] in nato rimsko naselje, so proti vzhodu namenjene tovore preložili z vozov na ladje oziroma, pri prevozih v obratno smer, z ladij na vozove. Rimski Navport je bil vas (*vicus*), ki pa je bila ob koncu avgustejske dobe na pogled razmeroma imenitna, saj Tacit pravi, da je bila kot municipij.[888]

Navport je zaradi svojega strateškega pomena od prve polovice ali najkasneje sredine 1. st. pr. Kr., ko so Rimljani v njem prevzeli nadzor,[889] do polne uveljavitve rimske prevlade v širši okolici potreboval vojsko za nadzor okolice in zaščito. Vojska je sodelovala tudi pri izgradnji infrastrukture v okolici. Navzočnost vojske v Navportu neposredno pred Avgustovo smrtjo in ob njej izhaja iz navedbe v 1. knjigi Tacitovih Analov (1, 20, 1),[890] ki jo obravnavam spodaj.

884 Gaspari 2017, 148–155; Šašel Kos 2017b, 448.
885 Glej op. 881.
886 Horvat 1990, 17–18; Šašel Kos 1990, 17–19; Šašel Kos 2009a.
887 Strabo v 7. knjigi, kjer verjetno povzema vire, ki se nanašajo na situacijo v 2. stoletju pr. Kr., pravi, da je bil Navport naselje Tavriskov (Strabo, 7, 5, 2; Šašel Kos 1990). Tavriski so bili keltsko ljudstvo v osrednji in vzhodni Sloveniji ter v severozahodni Hrvaški (Božič 1991, 471; Šašel Kos 2005, 416; Guštin 2008, 27–30).
888 Tacit, Ann. 1, 20, 1; Šašel Kos 1990, 21.
889 Horvat 2012a, 287.
890 Šašel Kos 1990, 21.

Figure 141
The River Ljubljanica and the Ljubljana Gate, aerial view looking roughly northwards.

Slika 141
Ljubljanica in Ljubljanska vrata, pogled približno proti severu.

boats and vice versa when travelling west. Roman Nauportus was a *vicus*, and must have been quite impressive at the end of the Augustan period as Tacitus refers to it as resembling a town.[888]

Because of its strategic significance, Nauportus with its vicinity was under military control and protection from the early to mid-1st century BC, when the Romans gained control of the settlement,[889] to the time when they achieved complete dominance over the wider area. The army also participated in the construction of the infrastructure here. The presence of the army at Nauportus just before Augustus' death is clear from Tacitus' Annals,[890] which is discussed below.

The location of the pre-Roman Nauportus has not yet been established, but perhaps lay on the nearby hill of Tičnica that held a prehistoric hillfort.[891]

The earliest site with predominantly Roman finds at Vrhnika (Stara pošta, on the left bank) dates to the first half of the 1st century BC.[892] The walled and moated Roman settlement with extensive warehouses and a harbour at Dolge njive, on the right bank of the Ljubljanica, may already have existed in the Octavianic, but certainly in the Early to Late Augustan period,[893] while a later settlement from the 1st–4th centuries, also furnished with warehouses, has been investigated on the opposite bank at the Kočevarjev vrt site (*Fig. 140*).[894]

888 Tacitus, Ann. 1, 20, 1; Šašel Kos 1990, 148.
889 Horvat 2012a, 287.
890 Ann. 1, 20, 1; Šašel Kos 1990, 148.
891 Gaspari, Masaryk 2009; Horvat et al. 2016, 233, 234.
892 Vojakovič, Bekljanov Zidanšek, Toškan 2019.
893 Horvat 1990, 229–232.
894 Horvat 2009b.

The late 2nd century BC logboat and barge from Vrhnika (*Fig. 139–140*), were found at the right bank of the Ljubljanica just before the settlement at Dolge njive.[895]

19.2.3 Ljubljana (Emona)

The navigable way across the Ljubljansko barje ends at Ljubljana, where the Ljubljanica cut its bed between the hills of Šišenski hrib (428 m), which is the southernmost foothill of the Julian Alps, and Ljubljanski grad (366 m), a northern foothill of the Dolenjsko gričevje at the western end of the Dinaric Alps. The roughly kilometre wide passage between the two hills called Ljubljanska vrata (Ljubljana Gate; *Fig. 141*) is of great strategic importance and a junction of communications. Roads from the Apennine Peninsula, the Balkans and the central Danube Basin converge here (*Fig. 137*); the route from Italy forks, with one branch continuing towards *Poetovio* (Ptuj, Slovenia) and further on to the central Danube Basin, and the other leading to the geopolitical centre at *Siscia/Segest(ic)a* (Sisak, Croatia) and the Balkans.

At Emona, a large part of the merchandise needed to be trans-shipped from large onto smaller vessels or onto wagons, or vice versa. Cargo headed towards the central Danube Basin continued on land. For the cargo destined for markets to the southeast, it is not clear how much of it continued along the Ljubljanica and the Sava (possibly with short distances by land to avoid the most dangerous sections)[896] and how much of it was hauled on wagons by land.

895 Gaspari 2017, 13–87, 128, Fig. 113: 2.
896 A trans-shipment point probably operated at Gradišče near Zalog. Gaspari 2017, 148–155.

Figure 142.
The River Ljubljanica at Ljubljana with the sites and geographical features mentioned in the text, aerial view looking roughly northwards.
1 – walled town, 2 – Kongresni trg, 3 – Stari trg, 4 – Gornji trg, 5 – Tribuna, 6 – Prule 9.

Slika 142
Ljubljanica in Ljubljana, pogled iz zraka približno proti severu. Označeni so najdišča in zemljepisni pojmi, omenjeni v besedilu.
1 – obzidano mesto; 2 – Kongresni trg, 3 – Stari trg, 4 – Gornji trg, 5 – Tribuna.

Lega predrimskega Navporta ni znana, morda je bil na griču Tičnica, kjer je bilo prazgodovinsko gradišče.[891]

Najstarejši sklop rimske materialne kulture na Vrhniki (najdišče Stara pošta, na levem bregu) je iz prve polovice 1. st. pr. Kr.[892] Z obzidjem in obrambnimi jarki utrjeno rimsko naselje z obsežnimi skladišči in pristanom na Dolgih njivah na desnem bregu Ljubljanice je morda že iz oktavijanske, gotovo pa iz zgodnje do poznoavgustejske dobe,[893] iz 1.–4. stoletja pa je na najdišču Kočevarjev vrt, na levem bregu nasproti Dolgih njih izkopano naselje s skladišči (*sl. 140*).[894]

Ob desnem bregu Ljubljanice na Vrhniki, tik pred naseljem na Dolgih njivah, sta bila najdena že omenjena deblak in ladja (*sl. 139–140*) iz konca 2. st. pr. Kr.[895]

19.2.3 Ljubljana (*Emona*)

Plovna pot po Ljubljanici na Barju se konča v Ljubljani, kjer si je Ljubljanica utrla strugo med Šišenskim hribom (428 m), ki je skrajni južni izrastek Julijskih Alp, in Ljubljanskim gradom (366 m), severnim izrastkom dolenjskega gričevja, ki zaključuje Dinarsko gorovje. Približno kilometer širok prehod med Šišenskim hribom in Ljubljanskim gradom, t. i. Ljubljanska vrata (*sl. 141*), je strateško in prometno zelo pomemben. Sem se stekajo poti iz Apeninskega in Balkanskega polotoka ter srednjega Podonavja (*sl. 137*). Tu sta se torej ločili poti proti Poetovioni (*Poetovio*; Ptuj, Slovenija) in srednjemu Podonavju ter proti severnemu Balkanu z geopolitičnim središčem v Sisciji (*Siscia/Segest(ic)a*; Sisek, Hrvaška).

V Emoni in njeni bližini so velik del tovorov morali preložiti z večjih na manjša plovila ali s plovil na vozove oziroma obratno. Tovori, namenjeni proti srednjemu Podonavju, so pot nadaljevali po kopnem, za tiste v smeri proti jugovzhodu pa nimamo podatkov o tem, koliko jih je pot nadaljevalo po Ljubljanici in Savi (morda s kratkimi prevozi po kopnem na najzahtevnejših odsekih plovbe)[896] ter koliko na vozovih po kopnem.

Prebivalci predrimske Emone so po jeziku sodili v severnojadransko jezikovno območje, tako kot območja, kjer so živeli Veneti, Liburni in Histri.[897] Najkasneje v zaključnem obdobju mlajše železne dobe je bila Emona, tako kot Navport, pomembno trgovsko središče s pristaniščem ob plovni Ljubljanici; zdi se, da so v Cezarjevi dobi ali malo kasneje v njej ob domačih delovali rimski trgovci.[898] Verjetno že v času Oktavijanovih ilirskih vojn in gotovo v avgustejski dobi je bila Emona ključno prometno vozlišče, med drugim za oskrbo vzhodno od nje delujočih rimskih vojaških enot.[899]

Arheološke raziskave zadnjih dveh desetletij in pol so poznavanje prazgodovinske in zgodnjerimske Emone bistveno izboljšale.

891 Gaspari, Masaryk 2009; Horvat et al. 2016, 178.
892 Vojakovič, Bekljanov Zidanšek, Toškan 2019.
893 Horvat 1990, 126–129.
894 Horvat 2009a.
895 Gaspari 2017, 13–87, 128, sl. 113: 2.
896 Pri Gradišču pri Zalogu je bilo verjetno pretovarjališče. Gaspari 2017, 148–155.
897 Repanšek 2016; Šašel Kos 2017c.
898 Šašel Kos (2012, 103; 2017c, 451) domneva rimski emporij.
899 Šašel Kos 2014, 91–93.

The inscriptions suggest that the pre-Roman inhabitants of Emona belonged to the north Adriatic linguistic group, along with the Veneti, Liburni and Histri.[897] By the end of the Late Iron Age if not earlier, Emona, like Nauportus, was an important trade centre with a harbour on the Ljubljanica. It would appear that by the time of Caesar or slightly later, Roman merchants were active here alongside local ones.[898] Emona was probably already a key transport hub during Octavian's Illyrian Wars and certainly was in the Augustan period, also involved in supplying the Roman military effort in areas to the east.[899]

In the recent two and a half decades, archaeological investigations have significantly advanced our knowledge of prehistoric and Early Roman Emona.

The earliest, albeit scarce traces of prehistoric habitation on the hill of Ljubljanski grad begin in the Late Bronze Age. Much more is known of the habitation at the southern foot of the hill (present-day city areas of Stari trg, Gornji trg and particularly Prule), where people lived with interruptions from the Late Bronze Age onwards. Their settlement had a rectilinear street grid (*Fig 142: 3–5*).[900] Material evidence shows an increasing presence of imported Italian goods from the third quarter of the 1st century BC onwards; they eventually came to dominate in the Middle Augustan period. Just east of the civilian settlement below Ljubljanski grad at Prule (the Tribuna site; *Fig. 142: 5*), two successive forts were active from the Middle Augustan (after 10 BC) to the Early Tiberian periods.[901] Of the early fort, investigations revealed a 30 metres long stretch of the eastern fortification wall; given the available space, it was not a fortress.[902] Probably associated with one of the forts was a workshop making or repairing military equipment in the civil settlement below Grad (*Fig. 142: 4*);[903] rivets belonging to Dangstetten type daggers and sheaths recovered from the workshop date it to the Middle and/or Late Augustan period.[904]

Traces of several camps or forts have also been unearthed on the left bank of the Ljubljanica (within and immediately adjacent to the area later occupied by the town; *Fig. 142: 1*).[905] They predate the walled town with rectilinear street grid and insulae, which was constructed in the Late Augustan period, to judge from the archaeological evidence.[906]

Furthermore, the two Middle/Late Augustan burials excavated at Kongresni trg (*Fig. 142: 2*) provide additional evidence for the Roman army – its auxiliary units to be precise – at Emona.[907]

The town of Emona was a Roman colony. It already existed as such in AD 14 or 15, but opinions differ as to the date of its foundation.[908]

Marjeta Šašel Kos believes this occurred before Tiberius' Pannonian War (12–8 BC), probably either immediately after the end of Octavian's Illyrian Wars (33 BC) or after his victory at Actium (31 BC), but nevertheless allows for the possibility that it happened in the Late Augustan period, though no later than the end of the Pannonian-Dalmatian rebellion in AD 9. In her opinion, this early colony is not associated with the walled town on the left bank, but rather with the settlement at the south foot of Grad, on the right bank of the Ljubljanica.[909]

Archaeological evidence shows that the walled town on the left bank was constructed in the Late Augustan period,[910] which corresponds with the imperial building inscription from AD 14 or 15.[911] The foundation of the colony in the Late Augustan period thus seems at least as likely as its earlier date.

Before the large-scale river engineering works in the 19th century, the Ljubljanica at Ljubljana was considerably shallower and broader, with gentle banks (*Fig. 143*).[912] Recent excavations of a small area right next to the right bank (Prule 9 site; *Fig. 142: 6*) have revealed substantial Augustan layers and a contemporary shallow ditch with a palisade. The ditch ran east–west and probably ended in the Ljubljanica; it

897 Repanšek 2016; Šašel Kos 2017c.
898 Šašel Kos (2012, 91; 2017c, 440) posits the existence of a Roman emporium.
899 Šašel Kos 2014, 91–93.
900 Vojaković 2014; Novšak, Bekljanov Zidanšek, Vojaković 2017.
901 Gaspari 2014, 127–133; Gaspari et al. 2014, 137–146, 152; Novšak, Bekljanov Zidanšek, Vojaković 2017, 16–17, 24–28.
902 Novšak, Bekljanov Zidanšek, Vojaković 2017, 30.
903 Vičič 1993; Vičič 1994; Vičič 2002; Vičič 2003, 22–23; Gaspari 2014, 120–122; Vojakovič 2014; Žerjal 2017, 65–66.
904 Istenič 2012, 168.
905 The published evidence on the existence of camps or forts on the left bank includes: i) a ditch excavated between 2009 and 2011 in the south part of the square of Kongresni trg that may be the NE corner of a camp/fort with a 'playing-card' layout (cf. Gaspari et al. 2015, Fig. 2); ii) two characteristically V-sectioned ditches and an entrance clavicula (Gaspari 2010, 113–114; Gaspari 2014, 135, Fig. 143; Gaspari et al. 2014, 146–149; iii) a V-sectioned, 2 m wide and 1.5 m deep ditch excavated in the length of 19 m south of the north town wall (Gaspari 2010, 114–116, Fig. 68; Gaspari 2014, 136–137); iv) a water well, latrine and ovens for preparing food, as well as wooden buildings oriented differently than the *insulae* (Gaspari 2014, 135–138, Figs. 144–146; Gaspari et al. 2014, 148).
906 Gaspari 2014, 134–141.
907 Gaspari et al. 2015.
908 Šašel Kos 2014, 91–93.
909 Šašel Kos 1995, 231–234; Šašel Kos 2000, 296; Šašel Kos 2002, 378; Šašel Kos 2012, 87–92; Šašel Kos 2014, 91–93; Šašel Kos 2017c, 441, 442.
910 See above.
911 Šašel, Weiler 1963–1964; Mráv 2001; Šašel Kos 2014, 85–90.
912 Cf. Ch. 18.5.

Figure 143
Hubert Maurer and Franz Wolf, Pristanišče na Bregu ob Ljubljanici (Harbour on the Ljubljanica at Breg). Chalk lithograph, around 1826.
The lithograph shows the gently sloping banks of the still unimproved bed of the Ljubljanica at Ljubljana, between the bridges of Šentjakobski most (Zoisova cesta) and Čevljarski most, view looking downstream.
A custom's house stands on the left bank.
City Museum of Ljubljana, Inv. No. 510:LJU;0019338.

Slika 143
Hubert Maurer in Franz Wolf, Pristanišče na Bregu ob Ljubljanici. Litografija s kredo, okrog leta 1826.
Upodobitev prikazuje še neregulirano Ljubljanico in njena bregova v Ljubljani, med današnjim Šentjakobskim (Zoisova cesta) in Čevljarskim mostom, pogled v smeri toka. Bregova sta izrazito položna. Ne levem bregu je mitninska postaja.
Hrani Mestni muzej Ljubljana, inv. št. 510:LJU;0019338.

Slabo ohranjeni sledovi prazgodovinske poselitve na Ljubljanskem gradu se začnejo s pozno bronasto dobo. Dosti bolje so ohranjeni ostanki poselitve južnega vznožja Gradu (današnji mestni predeli Stari trg, Gornji trg in predvsem Prule), ki je, s prekinitvami, trajala od pozne bronaste dobe. Naselje ima pravokotno sekajoče ulice (*sl. 142: 3–5*).[900] Od tretje četrtine 1. st. pr. Kr. materialni ostanki kažejo naraščajočo prisotnost italskih dobrin, ki od srednje avgustejske dobe dalje prevladujejo. Na Prulah (najdišče Tribuna, *sl. 142: 5*), neposredno vzhodno ob civilnem naselju pod Gradom , sta bila dva časovno zaporedna vojaška tabora srednjeavgustejske (natančneje po 10 pr. Kr.) do zgodnje tiberijske dobe.[901] Starejši tabor, za katerega poznamo lego pribl. 30 metrov dolgega dela vzhodnega obzidja, je bil glede na razpoložljiv prostor gotovo manjši od legijskega.[902] Verjetno je bila z enim od taborov povezana delavnica ali popravljalnica vojaške opreme z območja civilnega naselja pod Gradom (*sl. 142: 4*).[903] Zakovice bodal oziroma nožnic tipa Dangstetten, ki so med najdbami te delavnice, kažejo na datacijo v srednjo in pozno avgustejsko dobo.[904]

Sledove več taborov so odkrili tudi na levem bregu (znotraj območja kasnejšega mesta z obzidjem in ob njem; *sl. 142: 1*).[905] So starejši od enotno zasnovanega pravokotnega mesta z insulami in obzidjem, za katerega izsledki arheoloških izkopavanj kažejo, da so ga gradili v poznoavgustejski dobi.[906]

Navzočnost rimske vojske, natančneje pomožnih enot, kažeta tudi grobova s Kongresnega trga iz obdobja srednje do pozne avgustejske dobe (*sl. 142: 2*).[907]

Mesto Emona je bila rimska kolonija. Leta 14 ali 15 po Kr. je gotovo že obstajala, o tem, kdaj je bila ustanovljena, pa so mnenja različna.[908]

Marjeta Šašel Kos meni, da se je to zgodilo neposredno po koncu Oktavijanovih ilirskih vojn (33 pr. Kr.) ali po njegovi zmagi pri Akciju (31 pr. Kr.) oziroma pred Tiberijevimi panonskimi vojnami (12–8 pr. Kr.) vendar dopušča možnost, da je bila kolonija ustanovljena v poznoavgustejski dobi, a ne pozneje kot po koncu panonsko-delmatskega upora leta 9 po Kr.; s to kolonijo povezuje z izkopavanji ugotovljeno naselje na južnem vznožju Gradu.[909]

Arheološki izsledki kažejo, da je bilo z obzidjem obdano mesto na levem bregu Ljubljanice, ki ga tradicionalno povezujemo s kolonijo Emono, zgrajeno v pozni avgustejski dobi,[910] kar se ujema s cesarskim gradbenim napisom iz leta 14 ali 15 po Kr.[911]

Ustanovitev kolonije Emone v poznoavgustejski dobi se mi torej zdi najmanj enako verjetna kot njen zgodnejši nastanek.

Ljubljanica v Ljubljani je bila pred 19. stoletjem, ko so začeli temeljito preurejati strugo in bregove Ljubljanice, bistveno plitvejša in širša ter je imela položne bregove[912] (*sl. 143*). Nedavna izkopavanja na Prulah 9 (*sl. 142: 6*) so odkrila majhen del neposredne bližine njenega desnega brega z izrazitimi plastmi avgustejske dobe in s sočasnim plitvim jarkom s palisado. Jarek v smeri vzhod–zahod se je verjetno iztekel v Ljubljanico; domnevajo, da je enega ali oba tabora na Prulah ščitil pred poplavljanjem reke.[913]

900 Vojaković 2014; Novšak, Bekljanov Zidanšek, Vojaković 2017.
901 Gaspari 2014, 127–133; Gaspari et al. 2014, 137–146, 152; Novšak, Bekljanov Zidanšek, Vojaković 2017, 16–17, 24–28.
902 Novšak, Bekljanov Zidanšek, Vojaković 2017, 30.
903 Vičič 1993; Vičič 1994; Vičič 2002; Vičič 2003, 22–23; Gaspari 2014, 120–122; Vojakovič 2014; Žerjal 2017, 65–66.
904 Istenič 2012, 176.
905 Med objavljenimi izsledki izkopavanj kažejo na vojaške tabore na levem bregu Ljubljanice na primer: i) med letoma 2009 in 2011 na južnem delu Kongresnega trga odkrit jarek, ki kaže na severovzhodni vogal vojaškega tabora oblike »igralne karte« (prim. Gaspari et al. 2015, sl. 2); ii) jarka z značilnim V-presekom in v tlorisu vidnim vhodom v obliki klavikule (Gaspari 2010, 113–114; Gaspari 2014, 135, sl. 143; Gaspari et al. 2014, 146–149; iii) dva metra širok in 1,5 metra globok jarek V-profila, izkopan v dolžini 19 m južno od severnega obzidja mesta (Gaspari 2010, 114–116, sl. 68; Gaspari 2014,136–137); iv) vodnjak, latrina in peči za pripravo hrane ter lesene barake, ki so orientirane drugače kot insule (Gaspari 2014, 135–138, sl. 144–146; Gaspari et al. 2014, 148).
906 Gaspari 2014, 134–141.
907 Gaspari et al. 2015.
908 Šašel Kos 2014, 91–93.
909 Šašel Kos 1995, 231–234; Šašel Kos 2000, 296; Šašel Kos 2002, 382; Šašel Kos 2012, 100–104; Šašel Kos 2014, 91–93; Šašel Kos 2017c, 452, 453.
910 Glej zgoraj.
911 Šašel, Weiler 1963–1964; Mráv 2001; Šašel Kos 2014, 85–90.
912 Prim. pogl. 18.5.
913 Žerjal 2017.

presumably served as flood protection for one or both of the forts at Prule.[913]

Recent excavations at the western and north-western foot of Ljubljanski grad have shown that the right bank of the Ljubljana in the Roman period lay some 30 or 40 metres away from the present-day bank.[914]

No traces of a harbour have as yet come to light at Emona. In the Middle and Late Augustan period, one would probably have operated at the fort on the right bank.[915]

19.3 The interpretation of the Roman military equipment from the Ljubljanica

The distribution of the Roman militaria and most other finds of the Late Republican and Early Imperial, particularly Augustan, periods in the Ljubljanica is specific to that time frame. More than two thirds of the militaria originate from the stretch starting at Vrhnika and ending at the pronounced bend at Bevke, with a paucity of finds in the Sinja Gorica section (cf. *Fig. 128*). Less than a third came from the considerably longer stretch between the bend and Ljubljana, with only the Rakova Jelša section standing out as having fairly numerous finds (cf. Chapters 18.5–18.7, 19.1).

The high number of military and other items from the section at Vrhnika, at the beginning of the navigable route, is not surprising (cf. Chapter 19.2). Most of the militaria are contemporary with the settlement at Dolge njive,[916] two swords are later.[917] I presume that the pieces of military equipment from this part can largely be seen as accidental losses by soldiers active at Nauportus.

One would expect similarly high numbers of military and other finds at Ljubljana, but this is not the case. Roman finds are few and those from the final decades BC and the early 1st century AD even fewer;[918] coins are relatively well represented (*Fig. 133*), though they were not found at the city centre, but rather at Livada (*Fig. 128:30*).

The records on the finds gathered during the river engineering works at Ljubljana[919] only rarely allow us to identify Roman artefacts. The surviving finds include small pieces,[920] which shows that care was taken during collection.

I presume that roughly the same quantity of artefacts sunk to the bottom of the river at Ljubljana as at Vrhnika. The possible reasons for the paucity of finds at Ljubljana may be the manner in which the river engineering works in the city centre were conducted, as well as the fact that the banks were later built up, greatly altering the form they took in the Roman period, and have only very recently been investigated.[921]

The significance of the traffic along the Ljubljanica across the Barje and the situation established for several other rivers[922] lead me to presume that the Roman army controlled navigation along the Ljubljanica. The marshy terrain prevented control by cavalry, which corresponds with the absence of horse equipment in the Ljubljanica.

Traffic along the Ljubljanica could thus have been controlled from ships or boats and/or from check points on the bank.[923] Such a check point may have existed at Rakova Jelša, as suggested by the relatively numerous pieces of Roman military equipment in that section of the river.

The high numbers of army-related finds from the Blatna Brezovica and Bevke sections require more detailed discussion.

The channel of the Ljubljanica is shallower along the Bevke section,[924] which renders the discovery and collection of artefacts easy, especially during low water levels.[925] Although this may have contributed to the high numbers of the Roman militaria from this section, it does not seem to be the main reason because the finds from the Late Roman period concentrate elsewhere.

The decrease in the number of artefacts east of the bend at Bevke, particularly obvious down to the

913 Žerjal 2017.
914 Excavations that the City Museum Ljubljana conducted in 2011 and 2016 at Krojaška ulica and in the atrium of the Administrative Unit Ljubljana at Mačkova ulica (Draksler 2018a; Draksler 2018b).
915 Gaspari 2014, 141; Žerjal 2017.
916 The MM A25, MM A30 and MM A34 swords, the C2 helmet, the D7 and D8 *pila* and the MM J2, MM J4 and MM J5 tent pegs.
917 The A21 and MM A32 swords.
918 Istenič 2009j, 105, 106, Figs. 107, 108.
919 Gaspari 2002, 29–39; Žargi 2009b, Figs. 180, 181.
920 National Museum of Slovenia, Inv. Nos. B 5877b–B 5973, B 6007, P 10827–P 10829, P 10831–P 10833, R 14456–R 14459.
921 Draksler 2018a; Draksler 2018b.
922 Graafstahl 2009; see Ch. 19.4.
923 Cf. Graafstahl 2009.
924 For a description of this part of the riverbed, see Erjavec, Gaspari 2012, 269–271.
925 In February or March 1913, for example, Franc Kržmanc (vulgo Kamin), who lived near the Ljubljanica at Bevke, at the outflow of the Pekov graben, collected numerous artefacts including Roman militaria (cf. Catalogue, A4, A10, A14 and Ch. 4, MM A22–MM A24) from the Ljubljanica during low water levels. It is not clear whether the low water levels were the result of river engineering measures (Bras Kernel 2006, 12–16).

V zadnjih letih izvedena izkopavanja ob zahodnem in severozahodnem vznožju Gradu so pokazala, da je v rimski dobi desni breg Ljubljanice segal 30 oziroma 40 metrov stran od roba današnje struge.[914]

Ostankov rimskih pristanišč niso odkrili. V srednji in pozni avgustejski dobi je bilo pristanišče verjetno ob vojaškem taboru na desnem bregu.[915]

19.3 Rimska vojaška oprema iz Ljubljanice v prostoru in času

Razporeditev rimske vojaške opreme in večine drugih najdb poznorepublikanske in zgodnje cesarske, predvsem avgustejske dobe v Ljubljanici je značilna le za to obdobje. Več kot dve tretjini rimske vojaške opreme izvira iz struge od Vrhnike do izrazitega zavoja pri Bevkah (z odsekom z zelo redkimi vojaškimi predmeti pri Sinji Gorici), slaba tretjina pa iz bistveno daljšega dela struge med omenjenim zavojem in Ljubljano (prim. *sl. 128*). V strugi vzhodno od zavoja izstopa odsek pri Rakovi Jelši z razmeroma številnimi predmeti (prim. pogl. 18.5–18.7, 19.1).

Številnost rimskih vojaških in drugih najdb iz Ljubljanice pri Vrhniki, kjer se je plovna pot začela, ne preseneča (prim. pogl. 19.2). Večina rimske vojaške opreme je sočasna naselju na Dolgih njivah,[916] dva meča pa sta mlajša.[917] Domnevam, da je v Ljubljanici pri Vrhniki najdena vojaška oprema v glavnem posledica naključnih izgub ob delovanju vojakov v Navportu.

Podobno zgoščino rimskih vojaških in drugih predmetov iz Ljubljanice kot na Vrhniki bi pričakovala v Ljubljani, vendar ni tako. Zapisi o najdbah, ki so jih zbrali ob urejanju struge in bregov Ljubljanice v Ljubljani,[918] le v redkih primerih omogočajo prepoznati rimske predmete. Med ohranjenimi najdbami so zelo majhni predmeti,[919] kar kaže, da so jih skrbno zbirali. Rimske najdbe so maloštevilne, predmeti iz zadnjih desetletij pr. Kr. in začetka 1. st. po Kr. so še posebej redki.[920] Razmeroma dosti je rimskega denarja (*sl. 133*), ki pa ne izvira iz mestnega jedra, temveč iz odseka ob ledini Livada (*sl. 128: 30*).

Domnevam, da je na dno Ljubljanice v Ljubljani potonilo približno toliko predmetov kot na Vrhniki. Med možnimi vzroki za majhno količino v Ljubljani najdenih predmetov sta način izvedbe gradbenih del ob regulaciji Ljubljanice v mestnem jedru in dejstvo, da so rimske bregove in skrajne stranske dele struge Ljubljanice po rimski dobi pozidali, zato so skorajda neraziskani.[921]

Iz velikega pomena plovbe po Ljubljanici na Barju in situacije ob drugih rekah[922] sklepam, da je vojska plovbo po Ljubljanici nadzorovala. Zaradi močvirnega terena to ni bilo mogoče s spremljevalno konjenico, kar se sklada z odsotnostjo konjske opreme v Ljubljanici.

Promet po Ljubljanici so torej lahko nadzorovali s plovili in/ali iz nadzornih mest na bregu reke.[923] Pri Rakovi Jelši nadzorno točko nakazujejo razmeroma številni predmeti rimske vojaške opreme.

Interpretacija zgoščine z vojsko povezanih predmetov pri Blatni Brezovici in pri Bevkah zahteva daljšo obravnavo.

K velikemu številu pri Bevkah najdenih predmetov je morda pripomoglo dejstvo, da dno Ljubljanice v delu tega odseka oblikuje prag,[924] zato je bilo ob nizkih vodostajih razmeroma lahko na dnu struge najti in pobirati predmete.[925] Vendar to ne more biti glavni vzrok zgoščine predmetov pozne republike in principata v Ljubljanici pri Blatni Brezovici in Bevkah, saj so zgoščine poznorimskih najdb na drugih odsekih.

Na upad količine predmetov vzhodno od zavoja pri Bevkah, ki je posebno izrazit do odseka pri Rakovi Jelši, bi lahko vplivali morebitni rimski gradbeni posegi v plovno pot med Navportom in Emono.

Zapletenost tega vprašanja, ki ima dolgo zgodovino raziskav, dajejo slutiti analize lidarskih posnetkov Barja z Ljubljanico na območju Črne vasi.[926] V zadnjih desetletjih se je z njim največ ukvarjal Andrej Gaspari,

914 Najdišči: Krojaška ulica in atrij Upravne enote Ljubljana na Mačkovi ulici; izkopavanja Mesnega muzeja Ljubljana leta 2011 in 2016 (Draksler 2018a; Draksler 2018b).
915 Gaspari 2014, 141; Žerjal 2017.
916 Meči MM A25, MM A30 in MM A34, čelada C2, konici pilumov D7 in D8 ter šotorski klini MM J2, MM J4 in MM J5.
917 Meča A21 in MM A32.
918 Gaspari 2002, 29–39; Žargi 2009a, sl. 180, 181.
919 Narodni muzej Slovenije, inv. št. B 5877b–B 5973, B 6007, P 10827–P 10829, P 10831–P 10833, R 14456–R 14459.
920 Istenič 2009i, 98, 99, sl. 107, 108.
921 Draksler 2018a; Draksler 2018b.
922 Graafstahl 2009; glej pogl. 19.4.
923 Prim. Graafstahl 2009.
924 Opis tega dela struge: Erjavec, Gaspari 2012, 269–271.
925 Tako je na primer Franc Kržmanc (vulgo Kamin), ki je živel ob Ljubljanici pri Bevkah, ob izlivu Pekovega grabna, februarja ali marca leta 1913 ob nizkem vodostaju v strugi Ljubljanice ob svoji domačiji našel številne predmete, ki vključujejo rimsko vojaško opremo (prim. Katalog, A4, A10, A14 in pogl. 4, MM A22–MM A24); ni jasno, ali je bil nizek vodostaj morda povezan z regulacijo struge (Bras Kernel 2006, 12–16).
926 Mlekuž 2012.

Rakova Jelša section, might have been caused by hypothetical Roman river improvements between Nauportus and Emona.

The question of river engineering in the Roman period is one of a long history of research and great complexity, the latter indicated by the analyses of the LiDAR data of the Barje and the Ljubljanica in the Črna vas section.[926] In the last decades, the issue has been discussed in detail by Andrej Gaspari, who initially believed that the Ljubljanica in the Roman period did not require large-scale engineering and that the Romans only slightly improved the bends and removed possible other obstacles.[927] In his most recent work, however, he changed his view without offering clear arguments.[928] For the riverbed east of the Bevke section, he posits 'large-scale regulation interventions, including the corrections of parts of the old riverbeds and the excavation of completely new sections', without stating the exact location and nature of the posited changes.[929]

Prehistoric finds from the Ljubljanica between the bend at Bevke and the section at Lipe[930] suggest that this stretch was used before the Romans dug the posited parallel canal to shorten the route, which might have survived to this day as the Stara Ljubljanica ('old Ljubljanica' in translation; *Figs. 6, 145–146*). In this case, the decrease of Roman finds east of the beginning of the posited canal would speak in favour of Romans using the canal to transport the bulk of their military supplies and most other goods; the scarcity of Augustan finds from the stretch between Bevke and Lipe would suggest that the canal was constructed prior to the Middle Augustan period.

For now, the question of Roman river engineering and navigability of the Stara Ljubljanica must remain open; answers may be obtained by trial trenching the bed of the Stara Ljubljanica.

In the current absence of clear evidence, I believe we should regard the possibility of navigation between the bend at Bevke and the Lipe section along a route other than that of the present-day Ljubljanica as purely hypothetical.

926 Mlekuž 2012.
927 Gaspari 1998a, 33; Gaspari 2009h. The same opinion in Verbič, Horvat 2009b, 17–19.
928 Gaspari 2017, 145–147.
929 Gaspari 2017, 145–147, Figs. 123, 124. His arguments for the changes in the riverbed during the Roman period seem unconvincing and include the scarcity of prehistoric finds between the bend at Bevke and the Lipe section, which is the same argument he had previously used to suggest that the Romans did not make major changes to the riverbed (Gaspari 1998a, 37; Gaspari 2009h).
930 Gaspari 2009d, 72, 73, Figs. 72, 73; Gaspari 2009f, 43, Fig. 43; Turk, Gaspari 2009b, 63, Figs. 65, 66.

19.3.1 Religious rituals at the eastern boundary of Cisalpine Gaul/ Italy?

Just before the bend at Bevke, a boundary stone was found that marked the border between the administrative territories of Aquileia and Emona (*Figs. 139, 144–146*).[931] Its location shows it originally stood on the bank of the Ljubljanica. It is made of Aurisina limestone, a material typically used for the earliest Roman monuments at Emona,[932] from the last decade of Caesar's reign to the Augustan period, exceptionally also later. The formal features of the letters suggest the Augustan period. It was probably made in Aquileia.[933] It differs from other boundary stones separating administrative territories of autonomous towns in that it makes no mention of a territorial dispute.[934]

The inscription on the boundary stone reveals that, when it was erected, Aquileia and Emona with respective territories belonged to the same larger administrative unit, otherwise the different units would have been given.[935] This large unit was Italy. Speaking against the possibility of it being Cisalpine Gaul are historical circumstances, as it is not possible for Emona to have been founded before 42 BC when Cisalpine Gaul became part of Italy.[936]

Dating the foundation of Emona as a colony has already been discussed above (Chapter 19.2); this might have occurred as early as the beginning of the Augustan period or just before it, and it is certain that the walled town constructed at the end of Augustus' reign on the left bank of the Ljubljanica enjoyed the status of a colony. The bulk of the Roman militaria and other artefacts from the Ljubljanica might therefore predate the foundation of the colony.

Is there a connection between the boundary separating the territories of Aquileia and Emona and the concentration of Late Republican/Early Principate Roman militaria, finewares and brooches recovered from the Ljubljanica west of this boundary?

For the Romans, *limitatio* was purifying act that enclosed land whose boundary stones (*termini*) were of special symbolic and religious significance. They were protected by Terminus, later also by Jupiter Terminus

931 Šašel Kos 2002; location of the site: Istenič 2009d, 82, Fig. 82: 6.
932 Djurić 2017, 138–140.
933 Šašel Kos 2002; Šašel Kos 2012; Šašel Kos 2013, 197–199; Šašel Kos 2016. The early publications do not exclude a dating up to Claudius' reign, while the most recent article (Šašel Kos 2016, 221) narrows it to the Augustan period.
934 Šašel Kos 2002, 376.
935 Šašel Kos 2002.
936 Šašel Kos 2002.

ki je bil sprva mnenja, da velikopotezna regulacijska dela Ljubljanice niso bila potrebna ter da so Rimljani le delno popravili zavoje in odstranili različne ovire.[927] V svojem zadnjem delu pa je brez jasno predstavljenih argumentov svoje mnenje spremenil.[928] Za današnjo strugo Ljubljanice vzhodno od odseka pri Bevkah domneva »velikopoteznejše regulacijske posege, vključno s korekcijami delov starih strug in izkopom povsem novih odsekov«, vendar ne pojasni, kakšne in kje naj bi bile domnevne spremembe.[929]

Prazgodovinske najdbe iz struge Ljubljanice med zavojem pri Bevkah in odsekom pri Lipah[930] nakazujejo, da so ta del struge uporabljali, preden so Rimljani morda naredili vzporedno in krajšo plovno pot (kanal) od zavoja pri Bevkah do odseka pri Lipah, ki je ohranjena kot Stara Ljubljanica (*sl. 6, 145–146*). V tem primeru bi zmanjšanje števila rimskih najdb v Ljubljanici vzhodno od morebitnega odcepa kanala govorilo za to, da so Rimljani za vojaške in večino drugih prevozov uporabljali predvsem kanal, za katerega bi pričakovali – glede na redkost avgustejskih najdb iz struge med Bevkami in Lipami –, da bi ga naredili pred srednjeavgustejsko dobo.

Vprašanje o rimskih regulacijah Ljubljanice in plovnosti Stare Ljubljanice torej ostaja brez odgovora. Zdi se, da bi ga dala sondiranja struge Stare Ljubljanice.

Menim, da je – do pridobitve morebitnih prepričljivih novih argumentov – možnost plovbe med zavojem pri Bevkah in odsekom pri Lipah po morebitni plovni poti, ki ne ustreza današnjemu poteku Ljubljanice, treba zanemariti oziroma obravnavati kot povsem hipotetično.

19.3.1 Verski obredi ob vzhodni meji Cisalpinske Galije oz. Italije?

V Ljubljanici, tik pred (gledano v smeri toka) izrazitim zavojem, ki na vzhodu zaključuje odsek pri Bevkah, so našli kamnit mejnik med upravnima območjema mest Akvileja in Emona (*sl. 139, 144–146*).[931] Prvotno je stal na bregu Ljubljanice. Je iz nabrežinskega apnenca, ki je na emonskem območju značilen za najstarejše rimske kamnite spomenike,[932] tj. obdobje med zadnjim desetletjem Cezarjeve dobe in avgustejsko dobo. Oblikovne značilnosti črk na mejniku nakazujejo, da je iz avgustejske dobe. Verjetno je bil narejen v Akvileji.[933] Od drugih mejnikov med upravnima ozemljema dveh avtonomnih mest se razlikuje po tem, da napis ne omenja ozemeljskega spora.[934]

V času, ko je bil postavljen mejnik, sta torej Akvileja in Emona s svojima mestnima območjema sodili v isto večjo upravno enoto, sicer bi bilo to v napisu na mejniku omenjeno.[935] To je bila Italija. Glede na zgodovinske okoliščine se namreč ne zdi mogoče, da bi bila kolonija Emona ustanovljena pred letom 42 pr. Kr., ko je provinca Cisalpinska Galija postala del Italije.[936]

Vprašanje datacije ustanovitve Emone sem orisala v prejšnjem poglavju (19.2). Morda je bila ustanovljena že v zgodnjeavgustejski dobi ali tik pred njo, nedvomno pa je imelo status kolonije mesto z obzidjem na levem bregu Ljubljanice, zgrajeno ob koncu avgustejske dobe. Velika večina predmetov rimske vojaške opreme, pa tudi drugih rimskih najdb iz Ljubljanice, je torej lahko iz časa pred nastankom kolonije Emone.

Kako je bila meja med mestnima ozemljema Akvileje in Emone lahko povezana z zgoščino rimske vojaške opreme, fine namizne keramike in sponk iz poznorepublikanske dobe in prvih desetletij principata v strugi Ljubljanice zahodno od te meje?

Za Rimljane je bila omejitev prostora (*limitatio*) očiščevalno dejanje, ki je omejilo ozemlje. Mejniki (*termini*) so imeli simbolen in verski pomen, njihov zaščitnik je bil bog *Terminus* oziroma kasneje tudi Jupiter Terminus ali Jupiter Terminalis. Postavitev mejnika je bila povezana z verskimi obredi na mestu postavitve.[937] Kult Jupitra Termina je bil povezan z uspešnostjo rimske države ter odseva skrb za njeno širitev in ohranitev notranjega reda.[938]

Rimljani so razlikovali katastrsko urejeno/izmerjeno in organizirano ozemlje, ki je bilo pod civilno rimsko upravo (*ager limitatus*) in je imelo določene meje (*termini, fines*), ter ozemlje zunaj tega prostora, običajno omejeno z naravnimi mejami (npr. gorovji, rekami, morjem), ki je bilo pod vojaško upravo (*ager arcifinius*). Obe območji sta bili znotraj okvira moči

927 Gaspari 1998a, 33; Gaspari 2009g. Enakega mnenja sta Verbič, Horvat 2009a, 16–18.
928 Gaspari 2017, 145–147.
929 Gaspari 2017, 145–147, sl. 123, 124. Po mojem mnenju ni navedel prepričljivih argumentov za spremembe struge v rimski dobi. Med njimi omenja redkost prazgodovinskih najdb iz Ljubljanice med zavojem pri Bevkah in odsekom pri Lipah. Z istim argumentom je v preteklosti zagovarjal mnenje, da Rimljani struge niso bistveno spremenili (Gaspari 1998a, 37; Gaspari 2009g).
930 Gaspari 2009c, 68, 69, sl. 72, 73; Gaspari 2009e, 41, sl. 43; Turk, Gaspari 2009a, 67, sl. 65, sl. 66.
931 Šašel Kos 2002; lega najdišča: Istenič 2009c, 76, sl. 82: 6.
932 Djurić 2017, 138–140.
933 Šašel Kos 2002; Šašel Kos 2012; Šašel Kos 2013, 197–199; Šašel Kos 2016. V starejših objavah ni izključena datacija mejnika do časa Klavdijeve vlade, v zadnji objavi (Šašel Kos 2016, 221) pa je zožena na avgustejsko dobo.
934 Šašel Kos 2002, 380.
935 Šašel Kos 2002.
936 Šašel Kos 2002.
937 Marbach 1934; Whittaker 1994, 18; Jennings, Scheid 2012.
938 Whittaker 1994, 29.

Figure 144
Boundary stone between the territories of Aquileia and Emona, found in 2001 just before the bend of the Ljubljanica east of Bevke. Last three decades BC or possibly first decades AD. National Museum of Slovenia, Department of Archaeology, Inv. No. L 204.

Slika 144
Mejnik med mestnima območjema Akvileje in Emone, ki so ga leta 2001 našli tik pred zavojem Ljubljanice vzhodno od Bevk. Zadnja tri desetletja pr. Kr. ali morda prva desetletja po Kr. Hrani Arheološki oddelek Narodnega muzeja Slovenije, inv. št. L 204.

or Jupiter Terminalis. Setting up boundary stones involved rituals performed on the actual boundary.[937] The cult of Jupiter Terminus was specifically linked to the 'prosperity' of the Roman state; it reveals Roman concern for the maintenance of internal order as well as for the continuation of expansion.[938]

The Romans distinguished between the organised, cadastrated land with defined boundaries (*termini*, *fines*) under civil administration (*ager limitatus*) and the land outside it usually with natural boundaries such as mountain ranges, rivers, seas, that was under military administration (*ager arcifinius*); both were 'incorporated within the orbit of power and collective ownership of the city-state'.[939] This shows that there was an area between Roman territory stricto sensu (*ager limitatus)* and enemy territory, which the Romans controlled: *ager arcifinius*.

The rituals of Rome's boundaries (*finis*, *fines*) include *suovetaurilia.* This was a ritual dedicated to Mars to purify and bless the land, and involved the sacrifice of three animals sacred to Mars (pig, sheep, bull). Part of the prayers was to the gods who watched over the empire, so *suovetaurilia* was clearly associated with the expansion and maintenance of Roman power. In Rome, the ritual began within the civilian boundary of the city (*pomerium*), while the procession and actual sacrifice were in the 'military zone' of the Campus Martius or, if the army was on campaign, outside the camp.[940]

We have an example of how the ceremony was applied in practice. In AD 35 the Roman general L. Vitellius celebrated the *suovetaurilia* on the banks of the Euphrates as a preliminary to an aggressive attack into Mesopotamia.[941]

The same ritual, *suovetaurilia*, is illustrated on one half of a distance slab from the Antonine Wall in Scotland; it probably shows the ceremony of lustration by the soldiers before embarking on a campaign north of the wall.[942]

It would appear that Roman armies performed purifying rituals at the onset of a campaign, before crossing the boundary of the *ager limitatus*.

The oldest boundary of the city of Rome, which represented the original boundary of the Roman state, was a place of worship at the sixth milestone on the *via Laurentina*.[943]

937 Marbach 1934; Whittaker 1994, 18; Jennings, Scheid 2012.
938 Whittaker 1994, 29.
939 Whittaker 1994, 12–20, 25; Richardson 2011.
940 Whittaker 1994, 21, 23.
941 Whittaker 1994, 23; Tacitus, Ann. 6.37.
942 Whittaker 1994, 23. The slab comes from Bridgeness near Carriden at the eastern end of the Antonine Wall and relates the length of Wall built by a detachment of *Legio II Augusta* (CSIR 1.4, No. 68; RIB I, No. 2139).
943 Marbach 1934; Jennings, Scheid 2012.

in skupne lastnine rimske države.[939] Med rimsko državo v ožjem pomenu (*ager limitatus)* in ozemljem sovražnika je bilo torej območje, ki so ga Rimljani nadzorovali (*ager arcifinius*).

Z rimskimi mejami (*finis, fines*) so bili povezani verski obredi, npr. *suovetaurilia.* To je bil Marsu posvečen obred, namenjen očiščenju in posvetitvi izbranega ozemlja, pri katerem so žrtvovali tri Marsu posvečene živali, svinjo, ovco in bika. Del molitev je bil namenjen drugim bogovom, ki so bedeli nad imperijem, torej so *suovetaurilia* povezane z širitvijo in ohranjanjem moči rimske države. V Rimu se je ta obred začel znotraj civilnih meja mesta (*pomerium*), procesija in dejansko žrtvovanje pa sta se nadaljevala na »vojaškem območju«, tj. na Marsovem polju. Na vojaškem pohodu so ta obred izvedli izven tabora.[940]

Ohranil se je opis *suovetaurilia* na meji rimske države na Evfratu leta 35 po Kr. Obred je izvedel general L. Vitelij (L. Vitellius) pred napadom na Mezopotamijo.[941]

Enak obred, *suovetaurilia,* ki ga izvaja rimska legija, je upodobljen na reliefni plošči z Antoninskega zidu na Škotskem in verjetno prikazuje očiščevalne obrede vojakov pred začetkom vojaškega pohoda na ozemlje severno od zidu.[942]

Zdi se torej, da so rimske vojske na začetku vojaških pohodov, pred prečkanjem meje *ager limitatus*, opravile očiščevalne verske obrede.

Najstarejšo mejo mesta Rima, ki je bila izvorno meja rimske države, so častili pri 6. miljniku ob *via Laurentina*.[943]

Štirje votivni spomeniki cesarske dobe z območja ob potoku Vinxtbach (*Obrincas*), ki se izliva v Ren, govorijo za čaščenje božanstev meje (*Fines*) in drugih na obeh bregovih potoka, po katerem je tekla meja med provincama Zgornja in Spodnja Germanija. Posvetitelji so bili konsularni beneficiariji in običajni vojaki legij, nastanjenih v obeh provincah. Provincialni upravniki so jih verjetno oddelili od matičnih enot, da so služili v domnevni majhni vojaški postojanki (*statio militum*) ob rečici. Glavna vloga postojanke je bil verjetno nadzor tokov ljudi, blaga in informacij.[944]

939 Whittaker 1994, 12–20, 25; Richardson 2011.
940 Whittaker 1994, 21, 23.
941 Whittaker 1994, 23; Tacit, Ann. 6.37.
942 Whittaker 1994, 23. Plošča je bila najdena v kraju Bridgeness pri Carridenu na vzhodnem koncu Antoninskega zidu in sporoča dolžino zidu, ki jo je zgradil oddelek Legio II Augusta (CSIR 1.4, št. 68; RIB I, št. 2139).
943 Marbach 1934; Jennings, Scheid 2012.
944 Kolb, Zingg 2016.

Manj zanesljivi kot pisni se zdijo arheološki podatki, ki nakazujejo, da so bili na mejah med kmetijskimi posestvi svetišča, votivni depoji in podobno.[945]

Nisem zasledila virov, ki bi kazali na versko čaščenje mej med upravnimi območji avtonomnih mest. Prav tako nič ne kaže, da bi imele te meje več kot zgolj upravni pomen.

Pri Rimljanih so bili torej meje in mejniki povezani z božanstvi in njihovim verskim čaščenjem. V zvezi z Ljubljanico so posebno zanimivi verski obredi, ki jih je izvajala rimska vojska na mejah rimske države (*ager limitatus*) pred vojaškimi pohodi (*suovetaurilia* – Tacitova omemba za leto 35 po Kr. ob Evfratu in reliefna upodobitev z Antoninskega zidu), in vojaško versko čaščenje mej med provincami (votivni spomeniki ob potoku Vinxtbach, ki je razmejeval Zgornjo in Spodnjo Germanijo).

Glede na navedeno se mi zdi verjetno, da je tik pred zavojem pri Bevkah tekla vzhodna meja akvilejskega agra že pred ustanovitvijo kolonije v Emoni, torej v času, ko lahko domnevam, da je bila vzhodna meja akvilejskega upravnega območja obenem vzhodna meja Cisalpinske Galije (oziroma Italije po letu 42 pr. Kr.) in zunanja meja urejenega rimskega ozemlja pod civilno upravo *(ager limitatus*). Območje neposredno vzhodno od tu so Rimljani nadzorovali (*imperium*), ni pa bilo pod njihovo neposredno civilno upravo oziroma še ni bilo del rimske province (*ager arcifinius*). Domneva o taki ureditvi območja Emone in njene širše okolice se ujema s sliko, ki jo dajejo arheološki in pisni viri ter geopolitična lega tega ozemlja. Predvidevam, da se je položaj spremenil z ustanovitvijo kolonije Emone, ko je bilo njeno mestno ozemlje vključeno v *ager limitatus* oziroma urejeni del rimske države, natančneje v Italijo. Ker so mejnike postavljali (predvsem) na spremenjenih (in pred tem lahko nejasnih/spornih) potekih meja,[946] se zdi najverjetnejši čas za postavitev v Ljubljanici najdenega mejnika ob ustanovitvi kolonije Emone oziroma kmalu po njej. V primeru meje, ki jo je ta mejnik označeval, se ni spremenil njen potek, temveč njena narava: zunanja meja države je postala notranja meja med upravnima ozemljema avtonomnih mest.

Tacitova omemba verskih obredov rimske vojske na meji rimske države ob Evfratu leta 35 po Kr. in reliefna plošča z antoninskega zidu z upodobitvijo podobnega obreda kažeta, da je bilo za vojsko prečkanje meje *ager limitatus* (lahko) povezano z verskimi obredi.

945 Schucany 2014, 502.
946 Kolb, Zingg 2016; Tomas 2016, 108–113.

Figure 145
Mosaic of vertical aerial images showing the Ljubljansko barje, oriented roughly northwards, with the ca. 4 km-long section of the Ljubljanica to the east of the mouth of the Bistra stream (2). According to the river sections on *Fig. 128*, the photograph shows the east part of the Blatna Brezovica section (the Lipavec, Bistra, Bržič, Tri lesnice sites), the Bevke section and the west part of the Kamnik pod Krimom section.

The boundary stone between the territories of Aquileia and Emona was found just before the bend of the Ljubljanica (6). Roughly at the same spot, the course of the Stara Ljubljanica suggests a junction with the Ljubljanica (7). The old farmstead locally known as Kamin (4) is located on the part of the left bank not prone to flooding.

1 – Ljubljanica, 2 – Bistra stream, 3 – Zrnica stream, 4 – Kamin farmstead, 5 – Borovniščica stream, 6 – findspot of the boundary stone, 7 – dry bed of the Stara Ljubljanica, 8 – Gradišče near Bevke, 9 – Bevke, 10 – Blatna Brezovica. Sites along the Ljubljanica are also marked (cf. *Fig. 128*).

Image acquired with an aerial digital mapping camera, by Geodetski zavod Slovenije, March 2008.

Slika 145
Letalski ortogonalni posnetek Barja, orientiran približno proti severu, s približno 4 km dolgim delom Ljubljanice vzhodno od izliva Bistre (2). Po delitvi odsekov na *sl. 128* ta del Ljubljanice ustreza vzhodnemu delu odseka Blatna Brezovica (ledine Lipavec, Bistra, Bržič, Tri lesnice), odseku Bevke in zahodnemu delu odseka Kamnik pod Krimom.

Na zahodnem začetku zavoja pri Bevkah je bil najden mejnik med upravnima ozemljema Akvileje in Emone (6). Približno na istem mestu potek Stare Ljubljanice (7) nakazuje stik z Ljubljanico. Na levem bregu, na nepoplavnem terenu, je stara kmetija z domačim imenom Kamin (4).

1 – Ljubljanica, 2 – potok Bistra, 3 – potok Zrnica, 4 – domačija Kamin, 5 – potok Borovniščica, 6 – najdišče mejnika, 7 – suha struga Stare Ljubljanice, 8 – Gradišče pri Bevkah, 9 – Bevke, 10 – Blatna Brezovica. Vpisana so imena ledin ob reki, po katerih sem imenovala dele reke (prim. *sl. 128*).

Mozaik navpičnih letalskih posnetkov; snemanje z metrično kamero, Geodetski zavod Slovenije, marec 2008.

Four votive inscriptions of the Imperial period, found at the stream of Vinxtbach (*Obrincas*), a tributary of the Rhine, show that gods of border(s) (*Fines*) were worshipped alongside other deities on both banks of the stream that represented the boundary between the provinces of Upper and Lower Germania. The dedicators were *beneficiarii consulares* and ordinary soldiers of the legions stationed in the two provinces. They had presumably been detached from their units by the provincial governors to serve in a small military post (*statio militum*) there. Its main task was probably to supervise the flow of people, merchandise and information on this spot.[944]

Archaeological evidence on boundaries is less reliable than literary sources, but seems to suggest the existence of sanctuaries, votive hoards and other remains at the boundaries between farming estates.[945]

I have not come across any records to indicate religious practices related to boundaries between the territories of autonomous towns. There is also nothing to indicate that these boundaries had more than a mere administrative significance.

The discussion above shows that the Romans associated borders and boundary stones with gods and their worship. Of importance in connection with the Ljubljanica are the rituals by Roman military/soldiers on the boundaries of Roman state (*ager limitatus*) before embarking on campaigns (*suovetaurilia* – mentioned by Tacitus for AD 35 at the Euphrates and depicted on distance slab from the Antonine wall) and on boundaries between the provinces (votive inscriptions found at the stream of Vinxtbach).

Given all the evidence, it seems likely that the Aquileian *ager* already terminated at the very beginning of the bend at Bevke before the foundation of the colony of Emona, i.e. at a time when the Aquileian eastern border presumably coincided with the eastern border of Cisalpine Gaul (or Italy after 42 BC) and with the boundary of the cadastrated Roman land under civil administration (*ager limitatus*). The Romans did control (*imperium*) the area east of it, but it was not under Roman civil administration, not part of a Roman province (*ager arcifinius*). Such a position of what was to become the ager of Emona corresponds with what can be surmised from the archaeological and literary evidence, as well as from the geopolitical location of the area. I presume that the situation changed when the colony of Emona was established and its territory included into *ager limitatus*, i.e. into Italy. Boundary stones were (mainly) set up at recently changed (and/or) disputed/uncertain boundaries,[946] so the most likely time for setting up the boundary stone found in the Ljubljanica is at or soon after the foundation of the colony of Emona. In this case, the location of the border would not change, but its nature would: the boundary of the Roman state would become an internal boundary between the administrative territories of two *coloniae*.

944 Kolb, Zingg 2016.
945 Schucany 2014, 502.
946 Kolb, Zingg 2016; Tomas 2016, 108–113.

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Tacitus' note on the religious rituals that the army performed on the border of the Roman state on the banks of the Euphrates in AD 35 and the relief slab from the Antonine Wall depicting a similar ritual show that the army crossing the boundary of the *ager limitatus* may have been an act associated with religious rituals.

The rituals in the examples cited above and at the sixth milestone on the *via Laurentina* near Rome involved animal sacrifice (pig, sheep and bull), which cannot be directly related to the artefacts recovered from the Ljubljanica. However, as observed in Chapters 18 and 19.1, the assemblage of Late Republican to Late Augustan/Early Tiberian militaria from the Ljubljanica at Blatna Brezovica and Bevke is clearly not a random in nature, with disproportionate numbers of certain categories, notably swords, and a riverine distribution pattern which differs markedly from those of other periods. This, together with the absence of other credible explanations, supports the hypothesis that this concentration of Roman military equipment and other contemporary finds is linked to the likelihood that, until the end of the Augustan period, the eastern boundary of Cisalpine Gaul/Italy (coinciding with the limits of the *ager arcifinius*), was situated at the bend of the Ljubljanica just east of Bevke. The Romans controlled the area east of here, gradually conquering it, but it was not yet organised as a province. The situation in the Ljubljansko barje in this early period was similar to that north of the Antonine Wall, where the Romans protected the main route leading northwards with a series of forts and outposts.[947]

The religious acts that may have been associated with the boundary of Cisalpine Gaul/Italy at Bevke include purification rituals of the Roman army (performed before marching into lands outside the *ager limitatus*),[948] but possibly also votive offerings of soldiers and other individuals or groups.

The only Roman items reliably identified as votive offerings from the Ljubljanica are two (probably Late Republican) statuettes of Apollo. They were found in the Blatna Brezovica section (at Bržič; *Fig. 128: 8*).[949] This supports the assumption that several Roman finds from the Bevke and Blatna Brezovica sections represent traces of religious rituals.

If we entertain the possibility that the eastern boundary of Cisalpine Gaul/Italy (i.e. the *ager limitatus*) lay at the bend of the Ljubljanica east of Bevke in the time up to the end of the Augustan period, it seems rational to posit the existence of a small military post just before the border. The most suitable spot for such a post is at the Krajna site on the left bank (*Figs. 145: 4, 146: D*), where the elevated terrain is not vulnerable to flooding; it is also the site of an old farmstead locally known as Kamin. This post would control the movement of people, goods and information in the border zone, particularly along the Ljubljanica. It may have been associated with a small civilian settlement,[950] though an *emporium*[951] seems less likely given the proximity of Nauportus and the site's position in the middle of the marshy Barje which could not be easily negotiated except by using waterways, mainly the Ljubljanica and its tributaries.

After the end of the Augustan/Early Tiberian period, the number of artefacts recovered from the Blatna Brezovica and Bevke sections decreases drastically.[952] If the density of finds from these two sections is indeed related to the eastern border of Cisalpine Gaul/Italy, then this decrease must be connected with the shift in the limits of the *ager limitatus* when the boundary at Bevke became an internal one, separating the territories of two *coloniae,* Aquileia and newly founded Emona. Accordingly, the fact that the number of finds from the Blatna Brezovica and Bevke sections sharply decreases after the end of the Augustan/Early Tiberian period argues in favour of dating the foundation of the colony of Emona to the end of the Augustan period. The imperial building inscription of AD 14/15,[953] found in Emona, would thus date from the time around the colony's foundation.

However, we should also note that the said decrease in the number of finds pertains to the entire riverbed of the Ljubljanica across the Barje, and is probably caused by other factors as well, discussed in Chapter 19.4.

To sum up, the available evidence leads me to presume that the high numbers of the Late Republican and Augustan militaria and several other groups of finds from the Ljubljanica are mainly related to the activities at the harbours (Vrhnika) and control points along the river (Bevke and Rakova Jelša), as

947 Breeze, Dobson 2000, 113; Keppie 2004, 159–170, 175.

948 Rituals performed on the bank of the Euphrates in AD 35, before the campaign in Mesopotamia (see above, Fn. 941), and the depiction on a slab relating the distances between individual forts of the Antonine Wall (see above, Fn. 942). The analysis of the 2nd and 3rd-century finds (many of them of a military character) from the River Tees at Piercebridge, around 40 km south of Hadrian's Wall and strategically located along the Roman road leading from York towards Hadrian's and Antonine Walls, and further on to areas beyond the Roman state, led Philippa Walton independently of my study of the military finds from the Ljubljanica to suggest military votive offerings into the river that may have marked the beginning of the border zone (Walton 2016; Walton in print).

949 Istenič 2001; Istenič 2002; Gaspari, Krempuš 2002.

950 Istenič 2009d, 84.

951 Šašel Kos 2002, 373–374.

952 Cf. Ch. 18.

953 Mráv 2001; Šašel Kos 2012, 84–87 (with references).

V navedenih primerih in pri obredih ob 6. miljniku ob *via Laurentina* pri Rimu so žrtvovali živali (svinjo, ovco in bika), kar ne kaže neposredne povezave z najdbami v Ljubljanici. Kljub temu se mi, zaradi v poglavjih 18 in 19.1 navedenih opažanj (močna zastopanost rimske vojaške opreme poznorepublikanske do poznoavgustejske/zgodnjetiberijske vojaške opreme iz Ljubljanice pri Blatni Brezovici in Bevkah ter dejstvo, da ne kaže naključnega vzorca; najdišča poznorimskih in zgodnjesrednjeveških predmetov niso zgoščena na teh dveh odsekih, pri predmetih mlajše železne dobe pa se zgoščina nadaljuje v odsek pri Kamniku pod Krimom) in zaradi odsotnosti drugih verjetnih razlag zdi upravičena domneva, da je zgostitev rimske vojaške opreme in dela drugih najdb poznorepublikanske do poznoavgustejske dobe pri Blatni Brezovici in Bevkah vzročno povezana z domnevnim potekom vzhodne meje Cisalpinske Galije oziroma Italije in *ager arcifinius* vzhodno od Bevk do konca avgustejske dobe. Sosednje ozemlje proti vzhodu so Rimljani nadzorovali in postopoma osvojili v celoti, ni pa (še) bilo urejeno kot provinca. Situacija na Ljubljanskem barju v zgodnjem obdobju je bila podobna kot severno od Antoninskega zidu, kjer so Rimljani z vojaškimi utrdbami in začasnimi tabori ščitili trgovske poti proti severu.[947]

Med verskimi dejanji, ki so lahko bila povezana z mejo Cisalpinske Galije/Italije pri Bevkah, so bile poleg očiščevalnih verskih obredov rimske vojske (pred pohodi na ozemlje zunaj *ager limitatus* rimske države)[948] morda prisotne npr. zaobljubne daritve vojakov ter drugih posameznikov in skupin.

Edini nedvomno votivni najdbi iz Ljubljanice sta (verjetno poznorepublikanska) kipca Apolona. Izvirata iz odseka pri Blatni Brezovici (pri ledini Bržič; *sl. 128: 8*).[949] To govori v prid domnevi, da je del rimskih najdb z odsekov pri Bevkah in Blatni Brezovici sled verskih obredov.

V luči domnevne meje Cisalpinske Galije oziroma Italije (in obenem *ager limitatus* rimske države) v času do konca avgustejske dobe pri Bevkah se mi zdi smiselno ob Ljubljanici pred mejo domnevati postojanko z majhno vojaško posadko. Najprimernejši se zdi odsek na levem bregu ob ledini Krajna, na rahlo dvignjenem območju, kjer ne poplavlja in kjer je stara kmetija z domačim imenom Kamin (*sl. 145: 4, 146: D*). Ta postojanka bi nadzirala gibanje ljudi, blaga in informacij v mejnem območju, po Ljubljanici. Zraven bi lahko bil majhen zaselek civilnega prebivalstva,[950] trgovsko naselje (emporij)[951] pa se mi zdi – zaradi bližine Navporta ter lege sredi močvirnega in po kopnem zelo težko prehodnega Barja, kjer so bile zanesljive le vodne poti, predvsem Ljubljanica in njeni pritoki – malo verjetno.

Po koncu avgustejske ali najkasneje po zgodnjetiberijski dobi količina pri Blatni Brezovici in pri Bevkah najdenih predmetov izrazito upade.[952] Če je gostota najdb s teh dveh odsekov res povezana s potekom vzhodne meje Cisalpinske Galije oziroma Italije, potem je upad števila predmetov povezan s premikom meje *ager limitatus* rimske države, ko je ob ustanovitvi kolonije Emona meja pri Bevkah postala notranja (meja med upravnima območjema mest Akvileja in Emona). Ta premik se je verjetno zgodil ob ustanovitvi kolonije Emone. Upad količine najdb z odsekov pri Blatni Brezovici in pri Bevkah torej govori za ustanovitev kolonije Emone ob koncu avgustejske dobe. Cesarski gradbeni napisi iz leta 14 ali 15 po Kr.[953] bi bil torej približno iz časa ustanovitve kolonije.

Vendar je treba opozoriti, da je izrazit upad količine rimske vojaške opreme najkasneje po zgodnjetiberijski dobi značilen za celotno strugo Ljubljanice na Barju, ne le za odseka pri Blatni Brezovici in Bevkah, ter je verjetno povezan še z drugimi dejavniki, ki jih obravnavam v poglavju 19.4.

Strnem torej lahko, da iz razpoložljivih podatkov po mojem mnenju izhaja utemeljena domneva, da so zgoščine rimske vojaške opreme poznorepublikanske in avgustejske dobe iz Ljubljanice povezane predvsem z dejavnostmi v pristaniščih (Vrhnika) in nadzornih mestih ob reki (pri Bevkah in Rakovi Jelši) ter z verskimi obredi pred prečkanjem meje Cisalpinske Galije/Italije (približno 3 km dolgega dela struge pri Blatni Brezovici in pri Bevkah), ki je bila obenem meja urejenega rimskega ozemlja (*ager limitatus*) ob zavoju Ljubljanice vzhodno od Bevk, kjer je od ustanovitve kolonije Emone dalje tekla meja med upravnima ozemljema Akvileje in Emone.

947 Breeze, Dobson 2000, 113; Keppie 2004, 159–170, 175.

948 Obredi ob bregu Evfrata leta 35 po Kr., pred vojaškim pohodom v Mezopotamijo (glej zgoraj, op. 941), in upodobitev na plošči, ki je označevala razdalje med utrdbami Antoninskega zidu (glej zgoraj, op. 942). Obravnava najdb iz 2. in 3. stoletja (številne imajo vojaški značaj), ki izvirajo iz reke Tees v Piercebridgeu, okoli 40 km južno od Hadrijanovega zidu in na strateški legi ob rimski cesti iz Yorka proti Hadrijanovemu in Antoninskemu zidu ter naprej na območja zunaj rimske države, je Philippo Walton – neodvisno od moje obravnave rimskih vojaških najdb iz Ljubljanice – navedla na domnevo o vojaških votivnih darovanjih v reko, ki je morda označevala začetek obmejnega območja (Walton 2016; Walton v tisku).

949 Istenič 2001; Istenič 2002; Gaspari, Krempuš 2002.

950 Istenič 2009c, 78.

951 Šašel Kos 2002, 379.

952 Glej pogl. 18.1.

953 Mráv 2001; Šašel Kos 2012, 98–100 (z navedenimi objavami).

Figure 146
The Ljubljanica at Bevke, aerial view looking upstream, towards the west.
The bend of the Ljubljanica at the east end of the Bevke section is in the lower half of the photo; the boundary stone between the territories of Aquileia and Emona was found just to the west of the bend (A). The photo also shows the bed of the Stara Ljubljanica (B) as well as the Pri Jurju (C) and Kamin farmsteads (D). The Blatna Brezovica section begins just west of the Kamin farmstead, at the top of the photo (Cf. *Figs. 128*, *145*).

Slika 146
Ljubljanica na Barju pri Bevkah, pogled iz zraka v smeri proti toku oziroma proti zahodu.
V spodnjem delu fotografije je zavoj, ki ga Ljubljanica naredi na vzhodnem zaključku odseka pri Bevkah; na njegovem začetku na zahodni strani je bil najden mejnik med upravnima območjema Akvileje in Emone (A). Viden je potek Stare Ljubljanice (B). Označeni sta kmetiji z domačima imenoma Pri Jurju (C) in Kamin (D). Na zgornjem robu fotografije, nad kmetijo Kamin, je odsek pri Blatni Brezovici (prim. *sl. 128*, *145*).

well as to religious rituals performed before crossing the boundary of Cisalpine Gaul/Italy (a roughly 3 km long stretch of the riverbed at Blatna Brezovica and Bevke). This boundary was the limit of the cadastrated Roman land (*ager limitatus*) and was located at the bend of the Ljubljanica east of Bevke; upon the foundation of the colony of Emona, it became the boundary between the territories of that city and Aquileia.

19.4 Supplying the Roman army along the Ljubljanica

The quantity of the Early Roman militaria decreased drastically after the end of the Augustan or after the Early Tiberian period at the latest, while the number of other finds decreased gradually from the Tiberian period onwards (Chapters 18.1, 18.6.1, 19.1). Is this the consequence of a road constructed between Nauportus and Emona and/or of the sharp reduction in warfare in the south-eastern Alps, the central Danube Basin and the northern Balkans?

The road between Nauportus and Emona along the northern edge of the Barje was built immediately after or contemporaneously with the road 'across the Julian Alps', the construction of which Festus, writing in the 4th century, dates to the time of Augustus.[954] This refers to the road across the Hrušica Pass (*Ad Pirum*), which shortened the route from Aquileia to Nauportus in comparison with the older road over the Razdrto Pass (*Ocra*).[955] It is therefore likely that the road from Nauportus to Emona was also constructed in the Augustan period, possibly by the detachments of the Pannonian legions stationed at Nauportus at the end of Augustus' reign. In his Annals, Tacitus describes thus, '*Meanwhile there were the companies dispatched to Nauportus before the beginning of the mutiny. They had been detailed for the repair of roads and bridges, and on other service, but the moment news came of the disturbance in camp, they tore down their ensigns and looted both the neighbouring villages and Nauportus itself, which was large enough to claim the standing of a town. The centurions resisted, only to be assailed with jeers and insults, and finally blows…*'[956] If these Pannonian detachments were indeed tasked with it, the road from Nauportus to Emona was probably constructed at the end of Augustus' reign.[957] An answer to this chronological question may lie in the future dendrochronological analyses, for instance of remains like the oak logs unearthed during trial trenching at Lesno brdo; laid lengthwise and crosswise, these formed part of the bedding of the road on the marshy terrain of the Barje.[958]

954 Festus, Breviarium VII 51, 10–13.

955 Šašel 1975–1976, 435–436.

956 Tacitus, Ann. 1.20.1, '*Interea manipuli ante coeptam seditionem Nauportum missi ob itinera et pontes et alios usus, postquam turbatum in castris accepere, vexilla convellunt direptisque proximis vicis ipsoque Nauporto, quod municipii instar erat, retinentis centuriones inrisu et contumeliis …*'; Šašel 1975, 75; Šašel Kos 1990, 148; Šašel Kos 2014, 83–85.

957 Šašel Kos (2014, 93).

958 Vuga 1979a; Horvat 1990, 167. The road discovered at Log pri Brezovici did not have such wooden bedding (Vuga 1979b; Vuga 1981; Horvat 1990, 167).

19.4 Oskrba rimske vojske po Ljubljanici

V prejšnjih poglavjih (18.1, 18.6.1, 19.1) smo ugotovili, da količina zgodnjerimskih vojaških najdb po avgustejski ali najkasneje po zgodnjetiberijski dobi hitro upade, količina drugih predmetov pa se zlagoma zmanjšuje od tiberijske dobe. Je to povezano z izgradnjo ceste med Navportom in Emono in/ali z bistveno zmanjšanim vojskovanjem v jugovzhodnih Alpah, srednjem Podonavju in severnem Balkanu?

Cesto Navport–Emona, ki je tekla po severnem robu Barja, so zgradili sočasno s cesto čez Julijske Alpe (ali neposredno po njej), za katero pisec iz 4. stoletja pravi, da je bila zgrajena v času cesarja Avgusta.[954] Omemba se nanaša na cesto čez prelaz na Hrušici (*Ad pirum*), ki je bila krajša kot starejša povezava Akvileje z Navportom čez prelaz Razdrto (Okra).[955] Cesto Navport–Emona so torej zelo verjetno zgradili v avgustejski dobi. Njena gradnja je morda povezana z delovanjem oddelkov panonskih legij, nameščenih v Navportu ob koncu Avgustove vlade. Te oddelke so malo pred Avgustovo smrtjo poslali v Navport, med drugim zato, da bi gradili ceste in mostove. Tacit v Analih, v zvezi z uporom panonskih legij ob Avgustovi smrti, namreč pravi: *Medtem so bili oddelki še pred začetkom upora poslani v Navport, da bi gradili ceste in mostove in opravili razna druga dela; ko pa so izvedeli za nemire v glavnem taboru, so raztrgali prapore, izropali bližnje vasi in sam Navport, ki je bil kot municipij, stotnike pa, ki so jih mirili, so zasmehovali in sramotili …*.[956] Cesto Navport–Emona so torej zelo verjetno gradili ob koncu Avgustove vlade.[957] Ključne podatke za datacijo gradnje bi verjetno dale dendrokronološke analize, npr. vodoravno in prečno na cestišče nameščenih hrastovih debel, kakršne so odkrili ob sondiranju pri Lesnem brdu in so bila zaradi barjanskih tal na posameznih odsekih nujna podlaga ceste.[958]

Iz geopolitične situacije izhaja, da je bila zaradi oskrbe rimske vojske vloga plovne poti po Ljubljanici velika v obdobju vojaških osvajanj ter utrjevanja rimske nadvlade na jugovzhodnoalpskem območju, severnem Balkanu ter srednjem Podonavju, tj. od sredine 1. st. pr. Kr. do konca avgustejske dobe.[959]

Časovna razporeditev v Ljubljanici najdenih in nedvomno z vojsko povezanih predmetov nakazuje, da je oskrbovanje vojske po Ljubljanici potekalo med Oktavijanovimi ilirskimi vojnami (35–33 pr. Kr.) in še posebno med panonskimi vojnami (11–9 pr. Kr.) ter panonsko-delmatskim uporom (6–9 po Kr.).[960] Med arheološkimi najdbami na prevoz velikih količin blaga po Ljubljanici, za vojaške in druge potrebe, poleg v njej odkritih plovil[961] kažejo skupine opek[962] in posredno tudi velika skladišča na Dolgih njivah na Vrhniki.[963]

Na velik pomen plovnih rek za oskrbo rimske vojske zgodnjega principata pri osvajanju novih ozemelj med drugim kažejo tri utrjene rečne poti: 1. sistem majhnih utrdb iz začetka štiridesetih let 1. stoletja ob južnem bregu Rena (Oude Rijn, Nizozemska), ki je bil najverjetneje povezan z oskrbo vojske med Klavdijevim osvajanjem Britanije, 2. od Tiberijeve dobe utrjen desni breg Donave na območju Železnih vrat (Srbija, na meji z Romunijo) in 3. sistem utrdb iz tridesetih in štiridesetih let 1. stoletja ob zgornji Donavi (Nemčija) med Rißtissnom, kjer je Donava že plovna, in Oberstimmom. Na začetku in koncu utrjene plovne poti po spodnjem Renu in zgornji Donavi so ugotovili vozlišči s podobno vlogo, kot sta jo imela Navport in Emona za prevoze po Ljubljanici na Barju. Promet na drugih rekah ali njihovih odsekih, ki jih niso varovali z utrdbami, so verjetno zavarovali z mornarico in/ali konjenico.[964]

Vzročna povezava med drastičnim zmanjšanjem rimske vojaške opreme iz Ljubljanice po koncu avgustejske ali najkasneje zgodnje tiberijske dobe ter zaključkom rimskih vojaških osvajanj oziroma pacifikacijo območij, ki so postala del province (Spodnji) Ilirik,[965] se zdi torej na dlani. Zanjo govorijo tudi izsledki izkopavanj v Ljubljani, neposredno ob desnem bregu Ljubljanice, morda v bližini pristanišča: izrazito prevladujejo drobne najdbe avgustejske dobe,

954 Festus, Breviarium VII 51, 10–13.

955 Šašel 1975–1976, 435–436.

956 Tacit, Ann. 1.20.1: *Interea manipuli ante coeptam seditionem Nauportum missi ob itinera et pontes et alios usus, postquam turbatum in castris accepere, vexilla convellunt direptisque proximis vicis ipsoque Nauporto, quod municipii instar erat, retinentis centuriones inrisu et contumeliis ....*; Šašel 1975, 75; Šašel Kos 1990, 21; Šašel Kos 2014, 83–85. Primerjaj prevod 1. knjige Analov v slovenščino: Hriberšek 2006.

957 Šašel Kos (2014, 93).

958 Vuga 1979a; Horvat 1990, 44. Pri Logu pri Brezovici ta cesta ni imela lesene podlage (Vuga 1979b; Vuga 1981; Horvat 1990, 44).

959 Istenič 2009b, 861; Roman forts/camps in the strategically important Brežice Gates: Guštin 2014; Mason 2006; Mason 2008.

960 Zgodovinski oris rimske osvojitve Ilirika: Šašel Kos 2011; Šašel Kos 2015; Šašel Kos 2018.

961 Glej pogl. 19.2.1.

962 Gaspari 2017, 123.

963 Horvat 1990; Mušič, Horvat 2007.

964 Graafstahl 2009; za spodnji Ren tudi van Dinter 2013.

965 Ilirik je bil upravno organiziran kot senatna provinca leta 27 pr. Kr. in se je po koncu panonsko-delmatskega upora (6–9 po kr.) verjetno razdelil na Zgornji in Spodnji Ilirik, kasnejši provinci Dalmacija in Panonija (Šašel Kos 2013, 182, 193–195). V Cezarjevem času Ilirik verjetno še ni bil provinca v upravnem pomenu besede (Šašel Kos 2015, 65).

As for the geopolitical situation, the navigable route along the Ljubljanica was by far the most important when the Romans needed to supply the army engaged in conquering new territories and imposing the Roman rule in the south-eastern Alps, the northern Balkans and central Danube Basin, i.e. from the mid-1st century BC to the end of the Augustan period.[959]

The chronological distribution of the army-related artefacts found in the Ljubljanica indicates that this supply line was used during Octavian's Illyrian War (35–33 BC) and even more intensively during the Pannonian Wars (11–9 BC) and the Pannonian-Dalmatian rebellion (AD 6–9).[960] The size of the ships found in the river,[961] the groups of bricks[962] and indirectly also the extensive warehouses unearthed at Dolge njive in Vrhnika show that large quantities of military and other supplies were transported along the Ljubljanica.[963]

Rivers were very important in supplying the Roman army of the Early Principate, when it was deployed to conquer new territories. This is clear from the example of three fortified transport corridors: 1) a system of small forts from the early 40s AD along the south bank of the Rhine (Oude Rijn, the Netherlands), most likely set up for provisioning the army during Claudius' invasion of Britain, 2) right bank of the Danube in the Iron Gates (Serbia, on the border with Romania) fortified from the Tiberian period onwards and 3) a system of forts from the 30s and 40s AD along the upper reaches of the Danube (Germany) between Rißtissen, where the river is already navigable, and Oberstimm. Critical nodes that played a role similar to that of Nauportus and Emona for the traffic along the Ljubljanica have been identified at the beginning and the end of the navigable fortified corridors along the lower Rhine and the upper Danube. Traffic along other rivers or their sections not protected with forts was probably controlled by the navy and/or the cavalry.[964]

There is a clear correlation between the drastic decrease in the quantity of Roman militaria from the Ljubljanica following the Augustan/Early Tiberian period and the end of the Roman conquests and the pacification of areas that became incorporated in the province of (Lower) Illyricum.[965] This correlation is also suggested by the results of the excavations in Ljubljana conducted near the right bank of the Ljubljanica, possibly in the vicinity of the town's harbour, the finds from which predominantly date to the Augustan period and rarely postdate the Early Tiberian period.[966]

The imported Roman pottery and other artefacts from the Ljubljanica indicate a contemporary, but gradual reduction in the amount of cargo along the river in comparison with Roman military equipment. This suggests that the main reason for the marked decrease in the quantity of militaria is the substantial reduction in the movement of military supplies in this region after the end of the Augustan or in the Early Tiberian period.

In conclusion, the available evidence suggests that the chronological and spatial distribution of Roman military equipment in the riverbed of the Ljubljanica between Vrhnika and Ljubljana was mainly determined by two factors: firstly, the great importance of traffic along the Ljubljanica for provisioning the Roman army in the Late Republican and particularly in the Augustan period, and secondly, the location of the eastern border of Cisalpine Gaul/Italy and of the *ager limitatus* on the bend of the Ljubljanica at Bevke. Both factors changed significantly roughly at the same time, at the end of the Augustan or the beginning of the Tiberian period.

959 Istenič 2009b, 861; Roman forts/camps in the strategically important Brežice Gates: Guštin 2014; Mason 2006; Mason 2008.
960 Šašel Kos 2011; Šašel Kos 2015; Šašel Kos 2018.
961 See Ch. 19.2.1.
962 Gaspari 2017, 123.
963 Horvat 1990; Mušič, Horvat 2007.
964 Graafstahl 2009; for the lower Rhine also van Dinter 2013.
965 Illyricum was organised as a senatorial province in 27 BC and was afterwards, presumably at the end of the Pannonian-Dalmatian rebellion (AD 6–9), divided into Upper and Lower Illyricum, later provinces of Dalmatia and Pannonia (Šašel Kos 2013, 182, 193–195). Under Caesar, Illyricum had administratively probably not yet been organised as a Roman province (Šašel Kos 2015, 65).
966 Žerjal 2017, 67.

tiste, ki so mlajše od zgodnje tiberijske dobe, pa so redke.[966]

Uvožena rimska keramika in drugi predmeti iz Ljubljanice nakazujejo sočasno, a (v primerjavi z rimsko vojaško opremo) bolj postopno zmanjšanje količine prevozov po reki, zato domnevam, da je bil glavni vzrok upada količine predmetov rimske vojaške opreme bistveno zmanjšana potreba po oskrbi vojaških enot v tem delu rimske države po koncu avgustejske ali najkasneje zgodnje tiberijske dobe.

Povzamem torej lahko, da razpoložljivi podatki nakazujejo, da sta na časovno in prostorsko razporeditev rimske vojaške opreme v strugi Ljubljanice med Vrhniko in Ljubljano vplivala predvsem dva dejavnika: velik pomen prevozov po Ljubljanici za oskrbo rimske vojske v poznorepublikanski in še posebej avgustejski dobi ter domneven potek vzhodne meje Cisalpinske Galije oz. Italije in urejenega ozemlja rimske države (*ager limitatus*) tik pred zavojem Ljubljanice pri Bevkah. Oba dejavnika sta se bistveno spremenila približno sočasno, ob koncu avgustejske ali na začetku tiberijske dobe.

966 Žerjal 2017, 67.

Catalogue

Katalog

Introduction

The catalogue presents the Roman military equipment from the River Ljubljanica that is kept in the National Museum of Slovenia, mostly at the Department of Archaeology and three items at the Department of History and Applied Arts; the pieces are presented in drawings, photographs and written descriptions.

Drawings are published in different scales – 1 : 1 (belt parts, hobnails, military decorations, details), 2 : 3 (daggers and their sheaths), 1 : 3 (swords and their scabbards, helmets, spearheads, double-sided tools, turf cutters, tent peg) and 1 : 4 (*pila*).

Photographs are not published to scale unless so specified in the captions.

Descriptions are provided for each object separately. Objects are marked with an abbreviation (e.g. A1–A21, A35 for swords and scabbards) followed by drawing and photograph references given in brackets. In the second line, a short definition of the object is given, of its material, measurements and the inventory number as recorded in the inventory books of the Department of Archaeology unless otherwise stated. The lines below give the findspot, the circumstances and year of discovery if known ('diving' signifies unmonitored collection of objects during diving activities by non-archaeologists), the year of acquisition by the National Museum of Slovenia and previous publications of the object. This is followed by a detailed description of the object.

The designations of left and right in the descriptions take the viewer's point of view, with the object facing the viewer and orientated so that its top (e.g. sword/dagger hilt, helmet crest-knob etc.) is uppermost.

The names for individual metals and metal alloys (iron, bronze, leaded bronze, brass, silver and so forth) are explained in Chapter 1. Here the term *patina* is used to describe a smooth, continuous layer that preserves detail and shape, while the term *corrosion* describes mineral deposits that do not form a continuous and smooth layer. *Surface accretions* represent a state in which soil minerals, textiles, wood and so on are bonded to a surface with corrosion products.[967]

Measurements are given in millimetres (mm).

The findspot information begin with the section of the river wherever known; the sections are generally named after places along the Ljubljanica. This is followed by the name of the specific site at which the object was found. The site names are taken from the basic topographic map with the scale of 1 : 5000 (sheets Vrhnika 2730, Ljubljana J-4, J-11 to J-14 and J-21; issued in 1987 by the Surveying and Mapping Authority of the Republic of Slovenia). I added the site of Dolge njive at Vrhnika (not indicated on the map), which is an important archaeological site in its own right. For the findspots in Ljubljana, the part of the city where an object was found is given.

967 Scott 2002, 9.

Uvod

Katalog sestavljajo risbe, fotografije in opisi predmetov rimske vojaške opreme iz Ljubljanice, ki jih hrani Narodni muzej Slovenije – večino Arheološki oddelek, tri predmete pa Oddelek za zgodovino in uporabno umetnost.

Za risbe veljajo različna merila – 1 : 1 (deli pasov, okovna žebljička, odlikovanja, razni detajli), 2 : 3 (bodala z nožnicami), 1 : 3 (meči in nožnice, čeladi, sulične osti, dvojna orodja, orodje za rušo, šotorski klin), 1 : 4 (pilumi).

Fotografije niso objavljene v merilu, razen če je v podnapisu drugače navedeno.

V kataloških opisih okrajšani oznaki predmeta (npr. A1–A21, A35 za meče in nožnice) v oklepaju sledi navedba risb in fotografij predmeta. V novi vrstici sem podala kratko poimenovanje predmeta, materiale, mere in inventarno številko, ki se – če ni drugače navedeno – nanaša na inventarne knjige Arheološkega oddelka NMS. V naslednjih vrsticah si v navedenem zaporedju sledijo ime najdišča, okoliščine in leto odkritja najdbe – oboje, če je znano (»potapljanje« označuje nenadzorovano pobiranje predmetov med potapljanjem nearheologov), leto pridobitve predmeta v NMS ter objave predmeta. Temu sledi podroben opis predmeta.

Pri opisih se leva oziroma desna stran predmeta nanašata na gledišče opazovalca, pri čemer je predmet opisa obrnjen z licem proti gledalcu in z zgornjim delom predmeta (npr. ročaj meča/bodala, vrh čelade itd.) zgoraj.

Poimenovanja posameznih kovin in zlitin (železo, bron, svinčev bron, medenina, srebro itd.) sem pojasnila v 1. poglavju. Izraz patina sem uporabljala za gladko in enotno plast, ki ohranja obliko in podrobnosti prvotne površine, izraz korozija pa za mineralne plasti, ki ne tvorijo gladke in enotne plasti ter ne ohranjajo oblike prvotne površine. Kadar so ostanki preperelega lesa, tekstila, mineralov mulja in podobno sprijeti in na površino predmeta pritrjeni s korozijo, sem uporabila izraz korozijski prirastek.[967]

Mere so navedene v milimetrih (mm).

Pri navedbi najdišča sem najprej navedla odsek reke, razen kadar podatki o najdišču tega ne omogočajo. Ti odseki so praviloma poimenovani po krajih ob Ljubljanici. V oklepaju sledi ime ledine, ob kateri je bil predmet najden. Ledinska imena sem povzela po Temeljnem topografskem načrtu 1 : 5000 (listi Vrhnika 2730, Ljubljana J-4, J-11 do J-14 in J-21; izdala Republiška geodetska uprava 1987). Dodala sem ledino Dolge njive na Vrhniki, ker je pomembno arheološko najdišče in že uveljavljen pojem. Pri najdiščih z območja mesta Ljubljane sem navedla mestne dele, ob katerih so bili predmeti najdeni.

Odseki reke Ljubljanice in ledine si od izvira proti izlivu sledijo takole:
I. odsek, Vrhnika – ledina Dolge njive,
II. odsek, Sinja Gorica – ledine Zaloke, Japljeve ujske, Nove gmajne,

967 Scott 2002, 9.

Sections of the River Ljubljanica and the sites along the river succeed each other from spring to the outflow in the following order:
Section I, Vrhnika – the Dolge njive site,
Section II, Sinja Gorica – the Zaloke, Japljeve ujske, Nove gmajne sites,
Section III, Blatna Brezovica – the Dolnji breg, Lipavec, Bistra, Bržič, Tri lesnice sites,
Section IV, Bevke – the Krajna, Na zrnici, Podpeški mah and Trebež sites,
Section V, Kamnik pod Krimom – the Zornica site,
Section VI, Podpeč – the Dolenje senožeti, Velike senožeti, Deli, Široka sites,
Section VII, Lipe – the Bistra loka, Škofljica, Križenca sites,
Section VIII, Črna vas – the Ljubljanske senožeti, Za Ljubljanico, Tarene sites,
Section IX, Rakova Jelša – the Rakova jelša, Volar, Za terenom, Teren, Dolgi breg sites and
Section X, Ljubljana – the Livada, Špica, Breg sites.

Abbreviations

approx. = approximately
CM = City Museum of Ljubljana (part of Museum and Galleries of Ljubljana)
DA = Department of Archaeology at the NMS
DHAA = Department of History and Applied Arts at the NMS
diam. = diameter
h. = height
Inv. No. = inventory number
l. = length
PIXE = Proton Induced X-ray Emission
surv. = surviving
th. = thickness
w. = width
wgt. = weight

III. odsek, Blatna Brezovica – ledine Dolnji breg, Lipavec, Bistra, Bržič, Tri lesnice,
IV. odsek, Bevke – ledine Krajna, Na zrnici, Podpeški mah in Trebež,
V. odsek, Kamnik pod Krimom – ledina Zornica,
VI. odsek, Podpeč – ledine Dolenje senožeti, Velike senožeti, Deli, Široka,
VII. odsek, Lipe – ledine Bistra loka, Škofljica, Križenca,
VIII. odsek, Črna vas – ledine Ljubljanske senožeti, Za Ljubljanico, Tarene,
IX. odsek, Rakova Jelša – ledine Rakova jelša, Volar, Za terenom, Teren, Dolgi breg in
X. odsek, Ljubljana – ledine oz. mestni deli Livada, Špica, Breg.

Okrajšave

AO = Arheološki oddelek NMS
deb. = debelina
dol. = dolžina
inv. št. = inventarna številka
MM = Mestni muzej Ljubljana (del javnega zavoda Muzej in galerije mesta Ljubljane)
NMS = Narodni muzej Slovenije
ohr. = ohranjena
OZUU = Oddelek za zgodovino in uporabno umetnost NMS
PIXE = analitska metoda protonsko vzbujene rentgenske spektrometrije (Proton induced X-ray emission)
pr. = premer
pribl. = približno
šir. = širina
viš. = višina

A
SWORDS AND SCABBARDS

Presumed typological predecessors of the Mainz type (A1–A4)

A1 (*Pl. 1; Fig. A1.1–Fig. A1.9*)

Sword in its scabbard. Iron, wood, brass. Scabbard: l. 650 mm, w. 55 mm (at the mouth). Inv. No. V 1366.
River Ljubljanica at Blatna Brezovica, Dolnji breg.
Diving; NMS acquired in 1993.
Istenič 2000a; Istenič 2000b; Šmit, Pelicon 2000; Perovšek, Milić 2000; Miks 2007, 79–80, A767, Pl. 6.

The sword and scabbard were broken in two upon discovery, with only the central longitudinal spine of the net-like fitting keeping the two parts together.

The iron sword is corroded into its scabbard. They arrived in the NMS in three pieces: the upper and the lower part, which fit closely at the fracture, as well as a fragment of guttering. The surface was covered with a thick hard layer of river sediments later carefully removed by restoration experts in the museum.[968]

The iron blade of the sword is visible at the left edge just below the upper suspension band (*Fig. A1.1a, Fig. A1.1c*), where we can estimate the maximum blade width of 45 mm. The distance between the rivets fastening the two suspension bands to the guttering indicate a similar width. Part of the blade is also visible at the tip where the back part of the scabbard is damaged (*Fig. A1.1b*). The outline of the blade at the tip corresponds well with that of the scabbard and forms a tapering point.

The presumed remains of the hilt have corroded into an amorphous lump together with river sediments (*Fig. A1.1*).

The scabbard survives in its whole length (*Fig. A1.1*). It is composed of the front and back plates made of

Figure A1.1
The A1 sword and scabbard after conservation: a) front, b) back, c) detail of the front, blade visible at the left edge.

Slika A1.1
Nožnica in meč A1 po konservaciji: a) sprednja stran, b) hrbtna stran, c) detajl sprednje strani, na levem robu je vidno rezilo meča.

968 Cf. Perovšek, Milić 2000.

A
MEČI IN NOŽNICE

Figure A1.2
Guttering in the left upper part of the A1 scabbard; visible bronze lining (reddish), soldering (silvery) and brass guttering (golden yellowish).

Slika A1.2
Mesto spajkanja robnega okova na levi strani zgornjega dela nožnice A1; vidni so bronasta podloga (rdečkasta kovina), spajkanje (srebrne barve) in del medeninastega robnega okova (zlatorumene barve).

Figure A1.3
Guttering in the right upper part of the A1 scabbard; visible bronze lining (reddish), soldering (silvery) and bottom left also brass guttering (golden yellowish).

Slika A1.3
Mesto spajkanja robnega okova na desni strani zgornjega dela nožnice A1; vidni so bronasta podloga (rdečkasta kovina) in na njej spajkanje (srebrne barve) ter levo spodaj del medeninastega robnega okova (zlatorumene barve).

Domnevni tipološki predhodniki tipa Mainz (A1–A4)

A1 (*t. 1; sl. A1.1–sl. A1.9*)

Meč v pripadajoči nožnici. Železo, les, medenina. Nožnica: dol. 650 mm, šir. 55 mm (ob ustju). Inv. št. V 1366.
Ljubljanica pri Blatni Brezovici (Dolnji breg).
Potapljanje; NMS pridobil 1993.
Istenič 2000a; Istenič 2000b; Šmit, Pelicon 2000; Perovšek, Milić 2000; Miks 2007, 79–80, A767, t. 6.

Meč in nožnica sta bila ob odkritju prelomljena, zgornji in spodnji del pa je še povezovala podolgovata os mrežastega okova.

Meč in nožnica sta povsem sprijeta. V Narodni muzej Slovenije sta prišla v treh kosih, tj. zgornji in spodnji del, ki se na odlomljenem mestu dobro prilegata, ter odlomek robnega okova. Površina je bila pokrita z debelo in trdo plastjo rečnih sedimentov, ki so jih v restavratorski delavnici strokovno odstranili.[968]

Železno rezilo meča je vidno na levem robu tik pod zgornjim prečnim okovom (*sl. A1.1a, sl. A1.1c*), kjer lahko ocenimo njegovo širino, največ 45 mm. Na podobno širino rezila meča kaže razdalja med zakovicami, s katerimi sta prečna okova pritrjena na robni okov. Rezilo je deloma vidno tudi na konici, kjer je nožnica na hrbtnem delu poškodovana (*sl. A1.1b*). Tu se rezilo dobro prilega obliki nožnice in tvori ozko konico.

Morebitni ostanki ročaja meča so korodirali v brezoblično, z rečnimi sedimenti prepojeno gmoto (*sl. A1.1*).

Nožnica je ohranjena v celotni dolžini (*sl. A1.1*). Narejena je iz sprednje in hrbtne platice, ki sta iz orehovega

968 Cf. Perovšek, Milić 2000.

walnut or possibly maple wood.[969] They are fixed together along the edges with brass guttering that begins 4 mm below the scabbard mouth and continues uninterruptedly to the tip where it terminates in an ovoid knob.

Guttering is composed of at least five forged pieces soldered together in four places, three of which have survived: two symmetrically positioned on each side at the height of the lower suspension band and one on the loose guttering fragment that was originally most likely positioned at midpoint of the scabbard length (*Fig. A1.2–Fig. A1.4*). Individual pieces of guttering were soldered to an approx. 30 mm long, U-shaped lining of bronze using a tin-lead alloy.[970] The lower part of the guttering was made in a single piece that included the terminal knob.

The front of the scabbard has a net-like brass fitting composed of a longitudinal central bar or spine and six equidistant crossbars, the latter folded over the guttering and pressed against the scabbard plate at the back. The spine and four of the crossbars were made in a single piece, while the second and fifth crossbars were made separately and subsequently riveted and soldered onto the spine using a tin-lead alloy[971] (*Fig. A1.5*). The seventh spot is taken up by a deltoid fitting, also made of brass, fixed to the spine in the same manner.

The back of the scabbard in its upper part bears two brass suspension bands located approx. 98 mm apart. They are both folded over the guttering to the front of the scabbard, where they form loops that originally held suspension rings. They are fastened to the guttering with a rivet on each side (*Fig. A1.1, Fig. A1.7*).

The back also bears an unusual brass fitting located below the upper suspension band. The fitting is rectangular with transverse bars continuing from each of the corners to fold over the guttering and terminate on the front in the shape of animal heads, only two of which survive. In the centre of this fitting is an approx. 6 mm wide round hole that holds a solid rectangular fitting of brass with two side loops (*Fig. A1.6, Fig. A1.8*). It must originally have been anchored into the wood of the scabbard, otherwise it would easily have come loose.

All fittings are made of brass.[972]

969 Metka Culiberg from ZRC SAZU, Ljubljana, has analysed the wood remains. The wood species could not be accurately identified because the samples were subjected to analyses only after conservation that involved the use of the sucrose method.
970 Cf. Chapter 16, *Table A1: 1, 12.*
971 Cf. Chapter 16, *Table A1: 8.*
972 Cf. Chapter 16, *Table A1: 4–7, 9, 10, 13–16, 18–24.*

Figure A1.4
Guttering in the detached middle piece of the A1 scabbard: a) outer side – soldering (silvery) on a bronze lining (reddish) with a piece of brass guttering (golden yellowish) at the right edge, b) inner side – bronze lining, soldering at both edges and piece of brass guttering.

Slika A1.4
Mesto spajkanja robnega okova na odlomku, ki je bil prvotno na sredini dolžine nožnice A1: a) zunanji del – spajkanje (srebrne barve) na bronasti podlogi (rdečkasta kovina) in na desnem robu ostanek medeninastega robnega okova (zlatorumene barve), b) notranji del – notranja stran bronaste podloge, spajkanje in del medeninastega robnega okova.

Figure A1.5
Upper front part of the A1 scabbard; the central bar was soldered and riveted to each of the crossbars.

Slika A1.5
Sprednja stran zgornjega dela nožnice A1; mesto, kjer sta navpični in prečni krak okova speta z zakovico in spajkanjem.

Figure A1.6
Back of the A1 scabbard; brass fitting with two side loops.

Slika A1.6
Masivni okov z dvema zankama na hrbtni strani nožnice A1.

Figure A1.7
X-ray image (100 KV, 4 mA, 60 seconds) of the A1 sword and scabbard: a) upper part, b) bottom part (upper part of the net-like fitting not included).

Slika A1.7
Rentgenski posnetek (100 KV, 4 mA, 60 sekund) nožnice z mečem A1: a) zgornji del (posnetek s hrbtne strani), b) spodnji del (posnetek z lica; zgornji del mrežastega okova v posnetku ni zajet).

Figure A1.8
X-ray image (90 KV, 4 mA, 60 seconds) of the loop at the back of the A1 scabbard: a) view from the side, b) view from the top, at a slightly oblique angle.

Slika A1.8
Rentgenski posnetek (90 KV, 4 mA, 60 sekund) zanke na hrbtni strani nožnice A1: a) s strani, b) z vrha, rahlo poševno.

Figure A1.9
Remains of wood (walnut or maple) at the back of the A1 scabbard.

Slika A1.9
Ostanki lesa (oreh ali javor) na hrbtni strani nožnice A1.

ali morda javorjevega lesa.[969] Speti sta z medeninastim robnim okovom. Ta se začne 4 mm pod ustjem nožnice in se nepretrgano nadaljuje do konice, ki se zaključi z ovalnim gumbom.

Robni okov je bil sestavljen iz najmanj petih kovanih delov, spajkanih na štirih mestih, od katerih so tri ohranjena: dva simetrično na obeh straneh v višini spodnjega prečnega okova in eden na odlomku robnega okova, ki je najverjetneje ležal približno v sredini dolžine nožnice (*sl. A1.2–sl. A1.4*) Na teh mestih je bil robni okov z zlitino kositra in svinca[970] prispajkan na pribl. 30 mm dolgo, v obliki črke U zvito podlogo iz brona. Spodnji del robnega okova je bil narejen v enem kosu, skupaj z gumbom na konici.

Na licu nožnice je mrežast medeninast okov, sestavljen iz paličaste osi in prečk, ki so prepognjene čez robni okov in stisnjene ob nožnico. Podolgovata os in štiri prečne palčke so bile narejene v enem kosu, druga in peta prečna palčka sta bili izdelani posebej ter na podolgovato os prikovani in prispajkani z zlitino kositra in svinca[971] (*sl. A1.5*). Na konici nožnice je bil na enak način na podolgovato os pritrjen deltoiden okov, prav tako iz medenine.

Na zgornjem delu hrbtne strani sta, pribl. 98 mm narazen, prečna medeninasta okova. Prepognjena sta čez robni okov na sprednjo stran nožnice, tako da na obeh straneh tvorita zanke, v katere je bilo mogoče vdeti obročke za obešanje nožnice. S po eno medeninasto zakovico sta na obeh straneh prikovana na robni okov (*sl. A1.1, sl. A1.7*).

Pod zgornjim prečnim okovom je na hrbtni strani nožnice nenavaden medeninast okov. Je pravokotne oblike in se v vogalih zoži v trakove. Ti so prepognjeni čez robni okov in se zaključijo na sprednji strani v obliki živalskih glavic, ki so ohranjene le na eni strani. V sredini tega okova je pribl. 6 mm široka okrogla odprtina, iz katere moli masiven pravokoten medeninast okov z dvema luknjama (*sl. A1.6, sl. A1.8*). Verjetno je bil umeščen v leseni del nožnice, saj sicer ne bi bil dobro sidran.

Vsi okovi so narejeni iz medenine.[972]

969 Ostanke lesa je analizirala Metka Culiberg, ZRC SAZU, Ljubljana. Vrste lesa ni bilo mogoče zanesljivo določiti, ker so bili vzorci oddani v analizo šele po konservaciji, med katero je bil les prepojen s sladkorjem.
970 Glej pogl. 16, *pregl. A1: 1, 12.*
971 Glej pogl. 16, *pregl. A1: 8.*
972 Glej pogl. 16, *pregl. A1: 4–7, 9, 10, 13–16, 18–24.*

A2 *(Pl. 1; Fig. A2.1–Fig. A2.4)*

Part of a sword scabbard. Iron, brass, wood. W. 85 mm, h. 12 mm, max. l. of surv. guttering 52 mm, scabbard w. between guttering in the best preserved part 68 mm. Inv. No. V 1385.
River Ljubljanica at Ljubljana.
Diving; NMS acquired in 1996.

The scabbard part (*Fig. A2.1a, b*) comprises iron guttering surviving in the length of 52 mm and a brass suspension band.[973] On one side (presumably the back), the suspension band is approx. 1.8 mm thick; it narrows and thickens at the edges where it forms a loop, and terminates at the opposite side (presumably the front) in bird's (duck's?) heads that face each other. The suspension band is fastened to guttering with a brass[974] rivet on each side; both rivets are visible with the naked eye on the back of the suspension band (*Fig. A2.1b*) and one also on the inner side of the guttering (*Fig. A2.2*). The X-ray image (*Fig. A2.4*) clearly shows that the rivets are fastened to the front and back of guttering, but only to the back of the suspension band.

It is difficult to distinguish between the patina, corrosion and surface accretions on the guttering. The original edge of the guttering is discernible on the back of the surviving part of the scabbard on the left and suggests that the guttering measures 6 mm in width. The guttering is clearly visible in side view (*Fig. A2.3*) and on the X-ray image (*Fig. A2.4*) as empty space surrounded by corrosion products.

The presumed back side of the suspension band has an approx. 5 mm wide circular hole in the centre, which is most likely not an original feature of the piece.

The surface accretions on the inner side of the suspension band and guttering probably include the remains of the wooden scabbard lining (*Fig. A2.1a, Fig. A2.2*).

Figure A2.1
Fragment of the A2 scabbard: a) front, b) back.

Slika A2.1
Odlomek nožnice A2: a) sprednja stran, b) hrbtna stran.

Figure A2.2
Fragment of the A2 scabbard; shank of a brass rivet and corrosion on the guttering inner side.

Slika A2.2
Odlomek nožnice A2; pogled na notranjo stran, kjer sta vidna zatič medeninaste zakovice in korozija.

973 Cf. Chapter 16, *Table A2: 2, 4.*
974 Cf. Chapter 16, *Table A2: 1, 5.*

Figure A2.3
Fragment of the A2 scabbard, view from above; U-sectioned iron guttering appears as empty space in corrosion.

Slika A2.3
Pogled z vrha na odlomek nožnice A2; zdi se, da se robni železni okov U-preseka na obeh straneh kaže kot prazen prostor v koroziji.

Figure A2.4
X-ray image (80 KV, 2.5 mA, 60 seconds) of the A2 scabbard fragment, view from above; the right side shows iron guttering as empty space in corrosion and a brass rivet fastening the suspension band (probably from the back) to both edges of guttering, but not to the (presumably upper) side of the suspension band with terminals in the shape of bird's heads.

Slika A2.4
Rentgenski posnetek (80 KV, 2,5 mA, 60 sekund) odlomka nožnice A2, pogled z vrha. Na desni strani posnetka se robni železni okov kaže kot prazen prostor znotraj korozije. Tam je tudi dobro vidno, da medeninasta zakovica iz (verjetno hrbtne strani) prečnega okova sega skozi spodnjo in zgornjo stran železnega robnega okova, ne pa v (verjetno zgornjo) stran prečnega okova, ki je oblikovana kot ptičja glavica.

A2 (*t. 1; sl. A2.1–sl. A2.4*)

Del nožnice meča. Železo, medenina, les. Šir. 85 mm, viš. 12 mm, največja dol. ohr. dela robnega železnega okova 52 mm, šir. nožnice med robnima okovoma v najbolje ohr. delu 68 mm. Inv. št. V 1385.
Ljubljanica pri Ljubljani.
Potapljanje; NMS pridobil 1996.

Del nožnice meča (*sl. A2.1a, b*). Železen robni okov U-preseka je ohranjen v dolžini 52 mm. Prečni okov je iz medenine.[973] Na eni (domnevno hrbtni) strani je razkovan v pribl. 1,8 mm debel trak, ki se ob prehodu v zanko na vsaki strani zoži in odebeli. Okov se zaključi v obliki masivnih, nasproti si gledajočih ptičjih (račjih?) glavic na drugi (domnevno sprednji) strani nožnice. Prečni okov je na obeh straneh pritrjen na železen robni okov z dvema medeninastima[974] zakovicama, ki sta s prostim očesom vidni na hrbtni strani okova (*sl. A2.1b*) in na eni strani tudi na notranji strani robnega okova (*sl. A2.2*). Rentgenski posnetek (*sl. A2.4*) jasno kaže, da sta zakovici pritrjeni na zgornjo in spodnjo stran železnega robnega okova, v medeninast okov pa segata le na spodnji strani.

Težko je razlikovati med korozijo robnega železnega okova in korozijskim prirastkom. Zdi se, da je prvotni rob robnega okova viden na hrbtni strani ohranjenega dela nožnice na levi strani, in kaže, da je robni okov širok okoli 6 mm. Robni okov je dobro viden v stranskem pogledu (*sl. A2.3*) in na rentgenskem posnetku (*sl. A2.4*) – kaže se kot prazen prostor, obkoljen s korozijskim prirastkom.

Na domnevni hrbtni strani okova je približno v sredini pribl. 5 mm široka okrogla luknja, ki je bolj verjetno posledica propadanja predmeta kot pa prvotno stanje.

Na notranji strani nožnice je na medeninastem prečnem okovu in železnih robnih okovih korozijski prirastek, med katerim je verjetno z železovo korozijo prepojen les – ostanki lesene platice nožnice (*sl. A2.1a, sl. A2.2*).

973 Glej pogl. 16, *pregl. A2: 2, 4.*
974 Glej pogl. 16, *pregl. A2: 1, 5.*

A3 (*Pl. 1; Fig. A3.1–Fig. A3.4*)

Part of a sword scabbard. Iron, brass, wood. Surv. guttering l. 33 mm, max. scabbard w. between guttering 66 mm, suspension band w. 82 mm, h. 11 mm, th. approx. 1 mm. Inv. No. V 2163.
River Ljubljanica at Blatna Brezovica, Tri lesnice.
Underwater topographic survey in 2005; NMS acquired in 2005.
Gaspari 2007, 151, Fig. 4: 2; Gaspari 2012b, 187, 197, Fig. 9: 54, Pl. 7: 54.

The surviving scabbard part consists of approx. 33 mm long heavily corroded iron guttering and an 81 mm wide suspension band attached to it with a rivet on each side. The rivets and the suspension band are brass.[975] On the presumed back, the suspension band forms an approx. 1.8 mm thick band that narrows and thickens at the edges to form a loop. It terminates on the presumed front in bird's (duck's?) heads that face each other. The photo of the inner side of the guttering (*Fig. A3.2*) and the X-ray image (*Fig. A3.4*) clearly show that the suspension band is fastened with two rivets, from the back, to both the back and front of the guttering, but the rivets do not reach the front of the suspension band. One of the loops of the suspension band holds a brass ring[976] measuring 21–22 mm in diameter.

During conservation, it was very difficult to distinguish between the patina, corrosion and surface accretions (that possibly include the remains of the wooden lining permeated with corrosion) on the guttering. The guttering edge is discernible on the right side of the scabbard front, indicating that the guttering measured 6–7 mm in width. Its U-shaped section is visible in side view on the left as an empty space in the surface accretions (*Fig. A3.3*) and on the X-ray image (*Fig. A3.4*).

Figure A3.1
Fragment of the A3 scabbard: a) front, b) back.

Slika A3.1
Odlomek nožnice A3: a) sprednja stran, b) hrbtna stran.

975 Cf. Chapter 16, *Table A3: 1, 3.*
976 Cf. Chapter 16, *Table A3: 4.*

Figure A3.2
Fragment of the A3 scabbard; shank of a brass rivet and corrosion on the guttering inner side.

Slika A3.2
Pogled s strani na notranjo stran robnega okova odlomka nožnice A3, kjer sta vidna medeninasti zatič zakovice in korozija.

Figure A3.3
Fragment of the A3 scabbard, view of the left side; iron guttering appears as empty space in the corrosion.

Slika A3.3
Prečni pogled na odlomek nožnice A3; na levi strani je železen robni okov viden kot prazen prostor v koroziji.

Figure A3.4
X-ray image (80 KV, 2.5 mA, 60 seconds) of the A3 scabbard fragment, view from below; the right side shows iron guttering as empty space in the corrosion, the left side clearly shows a brass rivet fastening the suspension band (presumably from the back) to both edges of guttering, but not to the (presumably upper) side of the suspension band with terminals in the shape of bird's heads.

Slika A3.4
Rentgenski posnetek (80 KV, 2,5 mA, 60 sekund) odlomka nožnice A3, pogled od spodaj. Na desni strani posnetka se robni železni okov kaže kot prazen prostor znotraj korozije. Na levi strani je dobro vidno, da medeninasta zakovica iz (verjetno hrbtne strani) prečnega okova sega skozi spodnjo in zgornjo stran železnega robnega okova, ne pa v (verjetno sprednjo) stran prečnega okova, ki ima obliko ptičje glavice.

A3 (*t. 1; sl. A3.1–sl. A3.4*)

Del nožnice meča. Železo, medenina, les. Dol. ohr. robnega okova 33 mm, največja šir. nožnice med železnima okovoma 66 mm, šir. prečnega okova 82 mm, viš. 11 mm, deb. pribl. 1 mm. Inv. št. V 2163. Ljubljanica pri Blatni Brezovici (Tri lesnice). Podvodna topografija 2005; NMS pridobil 2005. Gaspari 2007, 151, sl. 4: 2; Gaspari 2012b, 187, 197, sl. 9: 54, t. 7: 54.

Ohranjen je pribl. 33 mm dolg del obeh strani močno korodiranega železnega robnega okova U-profila in nanj na vsaki strani s po eno zakovico pripet 81 mm širok prečni okov. Zakovica in okov sta iz medenine.[975] Prečni okov je na eni strani razkovan v pribl. 1,8 mm debel trak, ki se ob prehodu v zanko na vsaki strani zoži in odebeli. Okov se zaključi v obliki masivnih, nasproti si gledajočih ptičjih (račjih?) glavic na robovih druge (verjetno sprednje) strani nožnice. Pogled na notranjo stran robnega okova (*sl. A3.2*) in rentgenska fotografija (*sl. A3.4*) jasno kažeta, da je prečni okov s hrbtne strani pritrjen na obe stranici robnega okova z zakovicama, ki na sprednji strani ne segata v prečni okov. Na eni strani je v zanki, ki jo tvorita prečni in robni okov, ohranjen medeninast obroček premera 21–22 mm.[976]

Pri konservaciji ni bilo mogoče razlikovati med korodiranimi ostanki robnega železnega okova in korozijskimi prirastki (med drugim morda z železovo korozijo prepojeni ostanki lesenih platic), zato rob okova ni bil jasno ugotovljen. Zdi se, da je prvotni rob robnega okova viden na desni strani domnevne sprednje strani nožnice, kjer je njegova širina 6–7 mm. Na levi strani je robni U-okov verjetno viden v stranskem pogledu, kjer se kaže kot prazen prostor v korozijskem prirastku (*sl. A3.3*). Enako kaže rentgenski posnetek (*sl. A3.4*).

975 Glej pogl. 16, *pregl. A3: 1, 3.*
976 Glej pogl. 16, *pregl. A3: 4.*

A4 (*Pl. 1; Fig. A4.1–Fig. A4.2*)

Sword with traces of its scabbard. Iron, wood. L. 710 mm, w. 47 mm. Inv. No. R 24449.
River Ljubljanica at Bevke, Krajna or Na zrnici, or at Blatna Brezovica, Tri lesnice.[977]
Part of the Franc Kržmanc collection; NMS acquired in 1913.
Bras Kernel 2006, 20, Cat. No. 22; Istenič 2009f, 86–87, Fig. 85 (right sword).

A large part of the hilt tang is missing. The shoulders slope steeply; the right one is damaged.

The sword blade survives in its entire length and measures 680 mm. The original cutting edge is only partially preserved on the right. Maximum surviving blade width is 47 mm. The original surface of the blade is visible in the central part that reveals a slightly diamond-shaped cross section. In its present condition, the blade appears to be slightly waisted, with its maximum width at the end of the third quarter, after which it runs into a long and tapering point without thickening in cross section.

The front and back blade surfaces bear traces of wood that represent the only surviving remains of the scabbard. A photograph from the beginning of the 20th century (*Fig. 7, Fig. 8: penultimate object on the right*) shows the scabbard considerably better preserved in the upper part; its surface appears to have been covered with surface accretions which included river sediments.

Figure A4.1
The A4 sword with wooden remains of the scabbard prior to conservation, a) front, b) back.

Slika A4.1
Meč A4 z ostanki lesa nožnice pred konservacijo, a) sprednja stran, b) hrbtna stran.

977 The items in the Franc Kržmanc collection originate from a roughly 700 m long stretch of the Ljublajnica at his farmstead, located on the left bank at the confluence with the stream of Pekov graben (Bras Kernel 2006). The findspot of the A13 scabbard suspension band shows that artefacts were also collected west of the farmstead, at the Tri lesnice site (the Blatna Brezovica section). Cf. Fn. 1029.

Figure A4.2
The A4 sword with wooden remains of the scabbard, a) front, b) back.

Slika A4.2
Meč A4 z lesenimi ostanki nožnice na obeh straneh rezila, a) sprednja stran, b) hrbtna stran.

A4 (*t. 1; sl. A4.1–sl. A4.2*)

Meč z ostanki nožnice. Železo, les. Dol. 710 mm, šir. 47 mm. Inv. št. R 24449.
Ljubljanica pri Bevkah (Krajna ali Na zrnici) ali pri Blatni Brezovici (Tri lesnice).[977]
Del zbirke Franca Kržmanca; NMS pridobil 1913.
Bras Kernel 2006, 20, kat. 22; Istenič 2009e, 81–82, sl. 85 (desni meč).

Velik del ročajnega jezika manjka. Ramena meča so poševna. Rob leve strani ramen je dobro ohranjen, rob desne strani pa slabše.

Rezilo meča je ohranjeno v celotni dolžini in meri 680 mm. Prvotni rob rezila je deloma ohranjen le na desni strani. Največja ohranjena širina rezila meri 47 mm. Površina rezila je deloma ohranjena v njegovem osrednjem delu, ki nakazuje rahlo rombičen presek. Zdi se, da se je rezilo na koncu tretje četrtine svoje dolžine rahlo razširilo in nato prešlo v dolgo in izrazito konico, ki v preseku ni odebeljena.

Na sprednji in hrbtni površini rezila so na več mestih vidni ostanki lesa, ki so edini ohranjeni ostanki nožnice meča. Na fotografiji z začetka 20. stoletja (*sl. 7, sl. 8: predzadnji predmet na desni*) se vidi, da je bila takrat nožnica v zgornjem delu dosti bolje ohranjena; zdi se, da je bila njena površina prekrita z rečnimi sedimenti.

977 Predmeti iz zbirke Franca Kržmanca izvirajo iz približno 700 m dolgega dela Ljubljanice ob njegovi kmetiji, ki je bila na levem bregu ob izlivu Pekovega grabna (Bras Kernel 2006). Najdišče okova nožnice meča A13 kaže, da so najdbe med drugim pobirali zahodno od kmetije, ob ledini Tri lesnice (odsek Blatna Brezovica). Prim. op. 1029.

Type Mainz (A5–A18)

A5 (*Pl. 2; Fig. A5.1–Fig. A5.7*)

Sword in its scabbard. Iron, brass, copper, tin plating. Sword l. 723 mm, blade l. 553 mm, blade w. 57 mm, scabbard l. 586 mm, metal sheet th. approx. 0.2 mm. Inv. No. R 17110.
River Ljubljanica at Bevke, Krajna or Na zrnici.
Diving; NMS acquired in 1992.
Bitenc, Knific 1997, Fig. 13; Istenič 2009h, Cat. No. 62; Miks 2007, 655, A453, Pl. 26.

The sword and its scabbard are very well preserved, with only the back of the scabbard missing (*Fig. A5.1a, b*).

The original cutting edges have not survived (possibly only at the tip) and the seemingly waisted appearance (narrowing at mid-point and widening towards the tip) might only be the consequence of the state of preservation. The tapering point is thickened in cross section at the tip. The tang tapers upwards and appears to have survived in its entire length. The shoulders are straight and level.

The handguard plate (*Fig. A5.2*) is slightly raised towards the centre and beaten out of a copper sheet,[978] with traces of hammering visible on the upper surface. Tin plating is well preserved on the underside,[979] while the upper side bears traces of soldering.[980] The rim of the plate is decorated by chasing. The centre has a roughly rectangular hole (22 × 6 mm) that allowed the plate (beneath the handguard) to be fitted onto the tang. The blade side of the handguard plate bears a poorly visible X (possibly XI or IX) that may be an intentionally scratched mark.

The complete front of the scabbard (*Fig. A5.1a*) is covered with an excellently preserved and very thin brass sheet,[981] tinned at the front.[982] The remains of the presumed wooden lath covered in leather underneath the brass sheet do not survive.

The mouth band of the scabbard (*Fig. A5.3*) is made of roughly 0.7 mm thick brass sheet[983] and has four approx. 4 mm wide mouldings in its upper part. The ends of the band meet on the front side (to the right) where they show a roughly 4 mm overlap soldered

Figure A5.1
The A5 sword and scabbard: a) front, b) back; the back of the scabbard is missing, replaced by a transparent back plate during conservation.

Slika A5.1
Meč in nožnica A5: a) sprednja stran, b) hrbtna stran. Hrbtna stran ni ohranjena, zato so med konservacijo namesto nje namestili prozoren hrbet in nanj pritrdili okove.

978 Cf. Chapter 16, *Table A5: 1–2.*
979 Cf. Chapter 16, *Table A5: 4–5.*
980 Cf. Chapter 16, *Table A5: 3.*
981 Cf. Chapter 16, *Table A5: 9–10.*
982 Cf. Chapter 16, *Table A5: 7–8.*
983 Cf. Chapter 16, *Table A5: 14.*

Figure A5.2
Handguard plate of the A5 sword, tinned copper:
a) underside, b) upper side.

Slika A5.2
Meč A5, ščitnik branika ročaja, pokositren baker:
a) spodnja stran, b) zgornja stran.

a

b

Figure A5.3
The A5 sword and scabbard; brass mouth band covers the tinned sheet brass of the scabbard and is soldered together at the front.

Slika A5.3
Meč in nožnica A5; medeninast okov, ki ob ustju nožnice prekriva pokositreno medeninasto pločevino, je spajkan na sprednji strani.

Figure A5.4
The A5 sword and scabbard; oval mouth plate with a lenticular opening for the blade.

Slika A5.4
Meč in nožnica A5; ovalni okov z odprtino za rezilo meča na zgornji strani nožnice in meč.

Tip Mainz (A5–A18)

A5 (*t. 2; sl. A5.1–sl. A5.7*)

Meč v nožnici. Železo, medenina, baker, pokositrenje. Dol. meča 723 mm, dol. rezila 553 mm, šir. rezila 57 mm, dol. nožnice 586 mm, deb. pločevine pribl. 0,2 mm. Inv. št. R 17110.
Ljubljanica pri Bevkah (Krajna ali Na zrnici).
Potapljanje; NMS pridobil 1992.
Bitenc, Knific 1997, sl. 13; Istenič 2009g, kat. 62; Miks 2007, 655, A453, t. 26.

Meč in pripadajoča nožnica sta zelo dobro ohranjena, le nožnici manjka hrbtna stran (*sl. A5.1a, b*).

Prvotni robovi rezila meča niso ohranjeni (morda le deloma na konici), zato je videz, da se rezilo v sredini zoži in nato razširi, morda posledica stanja ohranjenosti. Jasno izražena konica je v preseku odebeljena. Ročajni jezik se izrazito zožuje proti vrhu; zdi se, da je v celoti ohranjen. Ramena so vodoravna.

Ščitnik branika ročaja (*sl. A5.2*) je ovalne oblike in izdelan iz bakra[978] ter je bil iztolčen iz pločevine (na zunanji površini rahlo usločene stranice ščitnika so vidni sledovi izdelave s tolčenjem). Na spodnji površini je dobro ohranjeno pokositrenje[979] na zgornji površini pa so sledovi spajkanja.[980] Rob ščitnika je okrašen v tehniki punciranja. V sredini ščitnika je izrezana pribl. pravokotna luknja (22 × 6 mm), ki omogoča namestitev ščitnika (ta je bil pritrjen na spodnjo stran branika) na ročajni trn. Na spodnji strani ščitnika je slabo viden vrezan znak X (ali XI oz. IX) – morda namerno narejen grafit.

Na celi sprednji stranici nožnice (*sl. A5.1a*) je odlično ohranjena zelo tenka medeninasta[981] pločevina, na kateri je prav tako zelo dobro ohranjena tanka plast pokositrenja.[982] Ostanki domnevne lesene oplate, ki jo je ta pločevina pokrivala, niso vidni.

Okov ob ustju nožnice (*sl. A5.3*) je narejen iz okoli 0,7 mm debele medeninaste[983] pločevine in ima v zgornjem delu štiri pribl. 4 mm široka rebra. Na licu okova (desno) je očitno, kje je bil okov, narejen iz traku, sklenjen. Vidno je namreč pribl. 4 mm dolgo prekrivanje obeh koncev traku, ki sta bila spajkana s

978 Glej pogl. 16, *pregl. A5: 1–2.*
979 Glej pogl. 16, *pregl. A5: 4–5.*
980 Glej pogl. 16, *pregl. A5: 3.*
981 Glej pogl. 16, *pregl. A5: 9–10.*
982 Glej pogl. 16, *pregl. A5: 7–8.*
983 Glej pogl. 16, *pregl. A5: 14.*

with tin.[984] On the back of the scabbard, there is a 3 mm wide hole in the band below the mouldings (*Fig. A5.1b*), presumably associated with a (missing) rivet or pin that fastened the band to the scabbard. Placed onto the mouth band (no traces of soldering) is a 70 mm long, 20 mm wide and approx. 0.7 mm thick oval mouth plate of brass with a lenticular opening (width 66 mm) through which the blade of the sword was inserted into the scabbard (*Fig. A5.4*).

The two brass suspension bands[985] have a loop on each side that holds a suspension ring (probably of brass). The bands bear a pair of mouldings on the front, while they are plain and around 0.5 mm thick on the back. They were most probably cast and their back parts subsequently forged. A pair of copper rivets[986] visible on the back, one on each side, secured the bands to iron guttering, of which only approx. 1.5 mm thick iron corrosion survives on the inner side of the brass suspension bands (*Fig. A5.6a*). On one side (right on *Fig. A5.5*), the same rivets also held together the two ends of each band. No traces of soldering.

The lower part of the scabbard holds a crossband bearing the same mouldings as the suspension bands; it was probably also made in the same manner. A copper rivet fastened the band to iron guttering. This survives as heavily corroded remains on the left and right edges of the scabbard (*Fig. A5.6b, c*), as well as under the chape (see cross section on the drawing in *Pl. 2*) and is indicated by iron corrosion at the left edge of the front of the scabbard, between the crossband and the brass chape (*Fig. A5.7a*).

The brass chape (*Fig. A5.7a*)[987] bears openwork decoration and shallow grooves. It covers the remains of iron guttering at the edges.

The brass[988] terminal knob is hollow and spherical, with a cylindrical neck. It is placed onto the terminal of iron guttering visible on the tip of the knob (*Fig. A5.7b*).

Figure A5.5
Upper back part of the A5 sword and scabbard; iron blade, brass suspension bands with rings and copper rivets.

Slika A5.5
Zgornji del hrbta meča in nožnice A5; železno rezilo meča, medeninasta prečna okova z obročki in bakrenimi zakovicami.

Figure A5.7
The A5 sword and scabbard: a) lower front part of the scabbard with tinned sheet brass bearing iron corrosion on the left (remains of iron guttering), a crossband, a brass chape with openwork decoration and a brass terminal knob, b) view from below of the brass terminal knob with an iron core.

Slika A5.7
Spodnji del nožnice A5: a) spodnji del lica: vidni so pokositrena medeninasta pločevina z železovo rjo na levi strani (ostanki železnega robnega okova nožnice U-preseka), tretji medeninast prečni okov, zaključni trikotni medeninast okov z okrasom v predrti tehniki in zaključni medeninast gumb nožnice, b) pogled od spodaj na medeninast zaključni gumb nožnice in železno jedro.

984 Cf. Chapter 16, *Table A5: 6.*
985 Cf. Chapter 16, *Table A5: 15–16.*
986 Cf. Chapter 16, *Table A5: 18–19.*
987 Cf. Chapter 16, *Table A5: 12.*
988 Cf. Chapter 16, *Table A5: 13.*

a

b

c

Figure A5.6
The A5 sword and scabbard: a) remains of corroded iron guttering on the back of the upper brass suspension band, b) left back side of the brass crossband showing the overlapping ends of the band, the remains of iron guttering and the head of the copper rivet that fastened the crossband to guttering, c) remains of iron guttering in the right bend of the crossband (upper side of the crossband is above on the photo).

Slika A5.6
Meč in nožnica A5: a) ostanek korodiranega železnega robnega okova na hrbtni strani zgornjega prečnega medeninastega okova, b) leva hrbtna stran tretjega prečnega medeninastega okova: vidijo se spoj spodnje in zgornje pločevine okova, ostanek železnega robnega okova, od katerega je ohranjena pribl. polovica U-profila, in glava bakrene zakovice, s katero je prečni okov pritrjen na železen robni okov, c) ostanki železnega robnega okova nožnice pod desno stranjo tretjega prečnega okova (zgornja stran okova je zgoraj).

kositrom.[984] Na hrbtni strani okova ob ustju je 3 mm široka luknja (*sl. A5.1b*) – domnevam, da je bil okov na tem mestu z zakovico ali zatičem pritrjen na leseno platico. Na zgornji strani okova nanj nalega (ni sledov spajkanja) 70 mm dolg in 20 mm širok ter pribl. 0,7 mm debel medeninast okov ovalne oblike z izrezano lečasto oblikovano odprtino (širina 66 mm), skozi katero je v nožnico vdeto rezilo meča (*sl. A5.4*).

Medeninasta[985] prečna okova v zgornjem delu nožnice imata na vsaki strani zanko, v kateri je po en (verjetno medeninast) obroček za pritrditev nožnice. Okova imata na sprednji strani enako profilacijo (dve izraziti rebri), na hrbtni strani pa preideta v enostaven, okoli 0,5 mm debel pločevinast trak. Okova sta bila verjetno ulita, njuni hrbtni deli pa po ulivanju kovani. Okova imata na hrbtni strani bakreni[986] zakovici, na vsaki strani po eno. Zakovice so prečna okova pritrjevale na železen robni okov nožnice. Pri vseh štirih zakovicah je namreč na tisti notranji strani prečnih okovov, kjer sta nalegala na rob nožnice, ohranjena pribl. 1,5 mm debela železova korozija – ostanek robnega okova (*sl. A5.6a*). Zakovici na eni strani (na fotografiji *sl. A5.5* na desni) sta obenem spenjali presegajoča se zaključka okovov. Spajkanje ni vidno.

V spodnjem delu nožnice je še en prečni okov z enako profilacijo kot na prečnih okovih v zgornjem delu nožnice; verjetno je tudi izdelan enako. Okov ima na hrbtni strani le eno bakreno zakovico. Z njo je pritrjen na železen robni okov nožnice – njegovi močno korodirani ostanki so se ohranili na levem in desnem robu nožnice (*sl. A5.6b, c*). Za železen robni okov nožnice govorijo tudi ostanki rje na robu sprednje strani nožnice levo, med spodnjim prečnim okovom in zaključnim trikotnim okovom (*sl. A5.7a*), ter ostanki tega železnega okova pod trikotnim medeninastim okovom na konici nožnice (glej presek na risbi na *t. 2*).

Trikoten medeninast[987] okov na konici (*sl. A5.7a*) je okrašen v predrti tehniki; na zgornji stranici so nepravilni, približno vodoravni plitvi žlebovi. Okov na robovih nožnice nalega na ostanek železnega robnega okova U-profila.

Na konici nožnice je medeninast[988] votel kroglast gumb s cilindričnim vratom. Nataknjen je na zaključek železnega robnega okova, ki je viden na koncu gumba (*sl. A5.7b*).

984 Glej pogl. 16, *pregl. A5: 6.*
985 Glej pogl. 16, *pregl. A5: 15–16.*
986 Glej pogl. 16, *pregl. A5: 18–19.*
987 Glej pogl. 16, *pregl. A5: 12.*
988 Glej pogl. 16, *pregl. A5: 13.*

A6 (*Pl. 3; Fig. A6.1–Fig. A6.4*)

Upper part of a sword in its scabbard. Iron, brass, bronze, copper, tin plating, wood. Surv. l. 218 mm, handguard plate w. 70 mm, sheet metal th. approx. 0.2 mm. Inv. No. V 556.
River Ljubljanica at Rakova Jelša, Volar.
Diving; NMS acquired in 1994.

Upper part of a sword in its scabbard, corroded together. Only the tang, the handguard plate and partly the blade (at the fracture) are visible of the sword (*Fig. A6.1*). The iron tang is rectangular in cross section and tapers upwards; its uppermost part is broken off. Surface accretions on the front of the tang probably include the remains of a wooden (?) handgrip.

The handguard plate is forged of sheet bronze.[989] Its upper (and possibly the underside) surface holds the remains of thin tin spots.[990] The underside of the rim is decorated by chasing using a fine chisel-like punch.

The scabbard survives from the mouth to and including the upper suspension band. The remains of the wooden laths are clearly visible, particularly on the front (*Fig. A6.2*).

The thin brass sheet[991] that covered the front of the scabbard survives in part (*Fig. A6.1a*). The guttering is of iron.[992]

The brass mouth band[993] is 23 mm high and 58 mm wide. It covers the tinned brass sheet described above. Remains of openwork (*opus interrasile*) decoration with an arcade motif survive on its poorly preserved front. The band is slightly everted at the mouth. The everted part bears the remains of soldering (*Fig. A6.3*)[994] that attached it to the mouth plate. Only a very small piece of the mouth plate is visible on the right side (*Fig. A6.3*), the rest blocked by the handguard plate.

The brass suspension band[995] is poorly preserved. It is 10 mm high and moulded on the front and on the loops. One of the loops survives complete, the other in part. The band was fastened to the iron guttering from the back with a pair of copper rivets.[996] The left rivet also fixed the overlapping ends of the band; no visible traces of soldering. A piece of the left loop

Figure A6.1
Upper part of the A6 sword and scabbard: a) front, b) back.

Slika A6.1
Zgornji del meča in nožnice A6: a) sprednja stran, b) hrbtna stran.

989 Cf. Chapter 16, *Table A6: 15.*
990 Cf. Chapter 16, *Table A6: 14.*
991 Cf. Chapter 16, *Table A6: 1, 4, 6.*
992 Cf. Chapter 16, *Table A6: 3.*
993 Cf. Chapter 16, *Table A6: 5, 12.*
994 Cf. Chapter 16, *Table A6: 17.*
995 Cf. Chapter 16, *Table A6: 9.*
996 Cf. Chapter 16, *Table A6: 11.*

Figure A6.2
Front of the A6 scabbard with the remains of a wooden lath.

Slika A6.2
Ostanki lesene platice na sprednji strani nožnice A6.

Figure A6.3
The A6 scabbard: remains of soldering on the upper edge of the mouth band. The soldering secured the band to the mouth plate and nearly completely coated the surface of its edge not covered by the mouth band in the view from below.

Slika A6.3
Ostanki spajkanja na zgornjem robu okova ob ustju nožnice A6. Z njim je bil pritrjen okov z odprtino za rezilo meča – njegov rob se vidi na desni strani fotografije.

Figure A6.4
X-ray image (90 KV, 4 mA, 60 seconds) of the upper part of the A6 sword and scabbard. Iron guttering does not appear in the image because it only survives as corrosion.

Slika A6.4
Rentgenski posnetek (90 KV, 4 mA, 60 sekund) zgornjega dela meča in nožnice A6. Na rentgenskem posnetku nista vidna železna robna okova, ker sta ohranjena le kot korozija.

A6 (*t. 3; sl. A6.1–sl. A6.4*)

Zgornji del meča v nožnici. Železo, medenina, bron, baker, pokositrenje, les. Ohr. dol. 218 mm, šir. ščitnika branika 70 mm, deb. pločevine pribl. 0,2 mm. Inv. št. V 556.
Ljubljanica pri Rakovi Jelši (Volar).
Potapljanje; NMS pridobil 1994.

Zgornji del meča in nožnice, sprijeta zaradi korozije (*sl. A6.1*). Od meča sta vidna le jezik in ščitnik branika ročaja ter delno rezilo, na mestu, kjer sta meč in nožnica odlomljena. Železen jezik ročaja ima pravokoten presek in se oži proti vrhu; skrajni vrhnji del je odlomljen. Na spodnjem delu sprednje strani ročajnega jezika je korozijski prirastek, verjetno z železovo korozijo prepojen ostanek lesene (?) obloge ročaja.

Ščitnik branika je skovan iz brona.[989] Na njegovi zgornji (in morda tudi na spodnji) površini je na več mestih tenka plast kositra.[990] Spodnja stran njegovega roba je puncirana z drobno dletasto punco.

Nožnica je ohranjena od vrha, tj. okova ob ustju in ovalnega okova z odprtino za rezilo meča, do vključno prvega prečnega okova. Ostanki lesene platice so dobro vidni predvsem na sprednji strani nožnice (*sl. A6.2*).

Deloma je še ohranjena tenka medeninasta[991] pločevina, ki je prekrivala celo sprednjo stran nožnice (*sl. A6.1a*). Stranska robova nožnice sta utrjena z železnim[992] robnim okovom, ki ima presek v obliki črke U.

Okov ob ustju nožnice je medeninast,[993] visok 23 mm in širok 58 mm. Zgoraj je rahlo izvihan. Na sprednji strani nožnice je pod njim že opisana tenka medeninasta in pokositrena pločevina. Okov je na sprednji strani zelo slabo ohranjen. Vidni so ostanki okrasa, izdelanega v predrti tehniki (*opus interrasile*), ki prikazuje loke. Na izvihanem delu zgoraj so ostanki spajkanja[994] (*sl. A6.3*), s katerim je na zgornji rob tega okova pritrjen pravokotno nanj ležeč ovalen okov z odprtino, skozi katero rezilo meča sede v nožnico. Od tega okova je viden le delček na desni strani (*sl. A6.3*), ker ga prekriva ščitnik branika ročaja meča.

Medeninast[995] prečni okov z zankama je slabo ohranjen. Visok je bil 10 mm ter na sprednji strani in zankah narebren v vodoravni smeri. Ena zanka je ohran-

989 Glej pogl. 16, *pregl. A6: 15.*
990 Glej pogl. 16, *pregl. A6: 14.*
991 Glej pogl. 16, *pregl. A6: 1, 4, 6.*
992 Glej pogl. 16, *pregl. A6: 3.*
993 Glej pogl. 16, *pregl. A6: 5, 12.*
994 Glej pogl. 16, *pregl. A6: 17.*
995 Glej pogl. 16, *pregl. A6: 9.*

broke off and now adheres, by way of the corrosion products, to the left side of the guttering just above the suspension band (*Fig. A6.1a*).

A7 (*Pl. 3; Fig. A7.1–Fig. A7.7*)

Sword with parts of its scabbard. Iron, brass, tinned brass, copper. Sword: surv. l. 551 mm; scabbard: surv. l. 39.2 mm, surv. sheet metal th. 0.2 mm. Inv. No. R 1843.
River Ljubljanica, Dolge njive or Vrhnika, Dolge njive.[997]
NMS acquired in 1888.
Müllner 1899, 87, Fig. 3; Müllner 1900, Pl. 56: 6; Horvat 1990, 288, Pl. 23: 1; Miks 2007, A768, 757, Pl. 10.

Part of the iron blade (l. 400 mm), together with the tang (l. 151 mm) that tapers upwards, plus the handguard plate survive. The shoulders, straight and level, are visible approx. 8 mm above the scabbard mouth (*Fig. A7.1*). The blade is poorly preserved. Its width is approx. 47 mm at the broken end and an estimated 56 mm at the shoulders. Part of the blade's upper part was missing (*Fig. A7.2*) and has been restored during conservation (cf. *Fig. A7.3*).

The oval handguard plate has 4–5 mm high sides, turned down at an oblique angle, and thickened and decorated with barely discernible chased notches at the rim. The centre has a rectangular hole for the tang. It is made of forged sheet bronze (th. less than 1mm) that is tinned on the underside.[998] The upper side bears an irregular patch of a slightly silvery surface (4 × 2 mm), the composition of which suggests that it forms the remains of tin-lead solder.[999]

Both sides of the scabbard bear the remains of iron guttering[1000] measuring approx. 8 mm in width.

The wooden lining of the scabbard survives in several places on the front. It is around 2 mm thick at the end of the surviving part of the scabbard and was covered over its entire length with a sheet of tinned[1001] brass[1002] less than half a millimetre thick (*Fig. A7.5*).

Figure A7.1
The A7 sword and scabbard: a) front, b) back.

Slika A7.1
Meč in nožnica A7: a) sprednja stran, b) hrbtna stran.

997 The sword with the remains of its scabbard, as well as the D6 iron *pilum*, the E1 spearhead and two other items came to the Provincial Museum of Carniola in 1888 as a gift from Franc Kotnik from Verd, the owner of the land at Dolge njive and of the brickworks east of Dolge njive.
998 Cf. Chapter 16, *Table A7: 9/20–9/22.*
999 Cf. Chapter 16, *Table A7: 10/23.*
1000 Cf. Chapter 16, A7.
1001 Cf. Chapter 16, *Table A7: 15.*
1002 Cf. Chapter 16, *Table A7: 16, 19.*

Figure A7.2
Upper part of the A7 sword during conservation, view of the back.

Slika A7.2
Zgornji del rezila meča A7 med konserviranjem, pogled na hrbtno stran.

Figure A7.3
Back of the A7 sword and scabbard at the end of conservation; tang and partly restored shoulders of the blade, scabbard mouth band soldered to the mouth plate (surviving in traces).

Slika A7.3
Hrbtna stran meča in nožnice A7 po zaključku konservacije: ročajni jezik in delno dopolnjena ramena meča, okov ob ustju nožnice s spajkanjem in ostanki nanj prispajkanega medeninastega okova z odprtino za rezilo meča (viden s strani, predvsem na desni strani fotografije).

Figure A7.4
Upper part of the A7 sword and scabbard; the upper edge of the brass mouth band bears a layer of solder (silvery) and the scarce remains of the brass mouth plate.

Slika A7.4
Na zgornjem robu medeninastega okova ob ustju nožnice A7 je plast spajke (srebrna barva) in na njej na par mestih ostanki medeninastega okova z odprtino za rezilo meča.

jena skoraj v celoti, druga slabše. Prečni okov je bil s hrbtne strani z bakrenima[996] zakovicama pritrjen na železen robni okov. Zakovica na levi strani hrbtne strani okova obenem spenja presegajoča se zaključka prečnega okova; spajkanje ni vidno. Odlomljen delček leve zanke tega okova je s korozijo pritrjen na železen robni okov na levi strani nožnice, tik nad prečnim okovom (*sl. A6.1a*).

A7 (*t. 3; sl. A7.1–sl. A7.7*)

Meč z deli nožnice. Železo, medenina, pokositrena medenina, baker. Meč: ohr. dol. 551 mm; nožnica: ohr. dol. 39,2 mm, ohr. deb. pločevine 0,2 mm. Inv. št. R 1843.
Ljubljanica (Dolge njive) ali Vrhnika (Dolge njive).[997]
NMS pridobil 1888.
Müllner 1899, 87, sl. 3; Müllner 1900, t. 56: 6; Horvat 1990, 288: 482, t. 23: 1; Miks 2007, A768, 757, t. 10.

Od meča sta ohranjena železen del rezila (dol. 400 mm) z ročajnim jezikom (dol. 151 mm), ki se proti vrhu močno zoži, in ščitnik ročaja. Meč ni do konca potisnjen v nožnico, temveč so ramena pribl. 8 mm nad njenim ustjem (*sl. A7.1*). Rezilo je slabo ohranjeno. Njegova širina na koncu ohranjenega dela je pribl. 47 mm, pri ramenih jo ocenjujem na 56 mm. Del rezila zgoraj ni ohranjen (*sl. A7.2*) in je bil ob konservaciji dopolnjen (prim. *sl. A7.3*).

Ovalni ščitnik branika ročaja ima 4–5 mm širok rob, zavihan poševno navzdol in zaključen z rahlo odebelitvijo, ki je okrašena s komajda opaznimi drobnimi punciranimi zarezami. V sredini je pravokoten izrez za trn ročaja. Narejen je iz kovane bronaste pločevine (deb. manj od 1mm), ki je bila na spodnji površini pokositrena.[998] Na zgornji površini je ohranjena srebrno svetleča se površina nepravilne oblike (4 × 2 mm), ki je glede na sestavo ostanek kositrno-svinčenega lota.[999]

Na obeh straneh nožnice so ohranjeni deli železnega[1000] robnega okova U-preseka širine pribl. 8 mm.

Na licu nožnice so na več mestih ostanki lesene platice, ki je na prelomu na koncu ohranjenega dela nožnice debela okoli 2 mm. Delno je ohranjena manj

996 Glej pogl. 16, *pregl. A6: 11.*
997 Meč z ostanki nožnice je skupaj z železnim kopjem D6, sulično ostjo E1 in dvema drugima predmetoma Deželnemu muzeju za Kranjsko leta 1888 podaril Franc Kotnik z Verda, lastnik Dolgih njiv in opekarne vzhodno od njih.
998 Glej pogl. 16, *pregl. A7: 9/20–9/22.*
999 Glej pogl. 16, *pregl. A7: 10/23.*
1000 Glej pogl. 16, A7.

The sheet brass is covered by a 14 mm wide mouth band of brass.[1003] The ends of the band meet at the back with an approx. 11 mm long overlap soldered with tin[1004] (*Fig. A7.2, Fig. A7.3*). The front reveals a poorly preserved original surface of the mouth band with mouldings. The upper edge of the band bears a thin (up to 0.8 mm) layer of tin,[1005] up to 5 mm wide, used to solder the band to the mouth plate (*Fig. A7.4*). Only traces survive of this fitting that show it was made of brass.[1006]

Nothing survives of the uppermost suspension band and rings. Of the lower suspension band, made of brass,[1007] a 16 mm long and 13 mm wide piece survives on the back of the scabbard, on the spot where the two ends of the band overlap and are soldered with tin[1008] (*Fig. A7.6b, Fig. A7.7*). The overlap is additionally fastened with a copper rivet[1009] that also secures the band to the guttering.

The lowest band is best preserved. It is made of sheet brass.[1010] On the back (left side), its overlapping ends are soldered together with tin[1011] and on the right a copper rivet secures the band to the guttering (*Fig. A7.6b, Fig. A7.7*).[1012]

The back shows no traces of either the wooden plates or sheet metal of the scabbard.

Figure A7.5
Lower front part of the A7 sword and scabbard: blade, remains of the wooden lath and remains of a tinned brass sheet.

Slika A7.5
Ostanki lesene platice na sprednji strani nožnice A7. Pod njo je železno rezilo meča, nad njo pa ostanki pokositrene medeninaste pločevine, ki je prekrivala sprednjo stran nožnice.

a b

Figure A7.6
Back of the A7 sword and scabbard; soldering remains on a) the lower suspension band and b) the crossband.

Slika A7.6
Hrbtna stran meča in nožnice A7: ostanki spajkanja drugega (a) in tretjega (b) prečnega okova.

1003 Cf. Chapter 16, *Table A7: 9, 18.*
1004 Cf. Chapter 16, *Table A7: 17.*
1005 Cf. Chapter 16, *Table A7: 1, 7.*
1006 Cf. Chapter 16, *Table A7: 8.*
1007 Cf. Chapter 16, *Table A7: 4.*
1008 Cf. Chapter 16, *Table A7: 2.*
1009 Cf. Chapter 16, *Table A7: 3.*
1010 Cf. Chapter 16, *Table A7: 12.*
1011 Cf. Chapter 16, *Table A7: 11.*
1012 Cf. Chapter 16, *Table A7: 13.*

Figure A7.7
X-ray image (80 KV, 4 mA, 60 seconds) of the A7 sword and scabbard.

Slika A7.7
Rentgenski posnetek (80 KV, 4 mA, 60 sekund) meča in nožnice A7.

kot pol mm debela medeninasta[1001] pločevina, ki je bila pokositrena[1002] in je prekrivala leseno oplato po celem licu nožnice (*sl. A7.5*).

Ob ustju nožnice medeninasto pločevino prekriva okov, izdelan iz 14 mm širokega medeninastega[1003] pločevinastega traku. Zaključka traku se na hrbtni strani prekrivata v dolžini pribl. 11 mm in sta spajkana s kositrom[1004] (*sl. A7.2, sl. A7.3*). Na sprednjem delu je slabo ohranjena prvotna površina okova, ki je bila vodoravno narebrena. Na zgornjem robu okova je tenka (do 0,8 mm), do 5 mm široka plast kositra,[1005] s katerim je bil na vrhu nožnice na ta okov prispajkan ovalni okov z odprtino za rezilo meča (*sl. A7.4*). Od njega so se ohranili le ostanki kovine na kositrni plasti, ki kažejo, da je bil iz medenine.[1006]

Od prvega prečnega okova z zankama za obročke, ki je služil pritrditvi nožnice na pas, ni sledov, od drugega je na hrbtni strani nožnice ohranjen 16 mm dolg in 13 mm širok del medeninastega[1007] okova, na mestu, kjer se oba zaključka trakaste pločevine prekrivata in sta bila spajkana s kositrom[1008] (*sl. A7.6b, sl. A7.7*). Z bakreno[1009] zakovico sta bila zaključka dodatno speta in pritrjena na robni okov.

Dobro je ohranjen spodnji (tretji) prečni okov. Narejen je iz medeninastega[1010] traku; presegajoča se zaključka na levi hrbtni strani nožnice sta spajkana s kositrom,[1011] na eni strani hrbta pa je ta okov z bakreno[1012] zakovico pritrjen na železni robni okov (*sl. A7.6b, sl. A7.7*).

Na hrbtnem delu ni ostankov lesenih oplat nožnice niti pločevine.

1001 Glej pogl. 16, *pregl. A7: 16, 19.*
1002 Glej pogl. 16, *pregl. A7: 15.*
1003 Glej pogl. 16, *pregl. A7: 9, 18.*
1004 Glej pogl. 16, *pregl. A7: 17.*
1005 Glej pogl. 16, *pregl. A7: 1, 7.*
1006 Glej pogl. 16, *pregl. A7: 8.*
1007 Glej pogl. 16, *pregl. A7: 4.*
1008 Glej pogl. 16, *pregl. A7: 2.*
1009 Glej pogl. 16, *pregl. A7: 3.*
1010 Glej pogl. 16, *pregl. A7: 12.*
1011 Glej pogl. 16, *pregl. A7: 11.*
1012 Glej pogl. 16, *pregl. A7: 13.*

A8 (*Pl. 3; Fig. A8.1–Fig. A8.3*)

Part of the hilt, blade and scabbard of a sword. Iron, brass, tin plating, wood. Surv. l. 72 mm, handguard plate w. 67 mm. Inv. No. V 1829.
River Ljubljanica at Blatna Brezovica, Dolnji breg or Lipavec.
Diving; NMS acquired in 1994.

The surface accretions on the handle presumably include the remains of wood permeated with iron corrosion products (*Fig. A8.1a, b*). The X-ray image (*Fig. A8.3*) shows a distinct transverse line that is also visible on the back (*Fig. A8.1b*), which suggests that a thin iron[1013] oval plate or a mount (it is unclear whether it only covered the surface or reached into the grip) was placed onto the handle transversely to its length, perhaps between the guard and the grip.

The upper part of the surviving handle shows a rectangular hole (*Fig. A8.1c*) that is probably the negative of the iron tang (one side is clearly visible). The X-ray image shows two longitudinal lines in the handle, which probably indicate the edges of the tang (*Fig. A8.3*) measuring 16–17 mm in width.

The bronze handguard plate is forged.[1014] Its rim is decorated with short punched lines. Its upper side holds the remains of a tin-lead alloy (*Fig. A8.1*).[1015] The blade side of the handguard plate and the mouth band are partly covered by surface accretions (*Fig. A8.2*).

The blade is visible at the fracture.

Parts of both wooden laths (permeated with iron corrosion products) survive and touch along the edges. Their maximum thickness is 2 mm (*Fig. A8.2a, b*).

The brass mouth band[1016] has three mouldings on the front and is plain on the back (*Fig. A8.1a, b, Fig. A8.2a, b*). Its ends overlap on the back (*Fig. A8.1b, Fig. A8.2b*, right), where they are soldered together; the soldering is only visible on the X-ray image (*Fig. A8.3*).

The mouth band is soldered to the (probably brass) mouth plate. It is largely hidden from view by the handguard plate that is corroded onto the scabbard in such a way that only an approx. 2 mm wide rim covered with solder is visible (*Fig. A8.2a, b*).

a

b

c

Figure A8.1
Fragment of the A8 sword and scabbard: a) front, b) back, c) view from above.

Slika A8.1
Del ročaja in nožnice meča A8: a) sprednja stran, b) hrbtna stran, c) pogled od zgoraj.

1013 Cf. Chapter 16, *Table A8: 8.*
1014 Cf. Chapter 16, *Table A8: 1.*
1015 Cf. Chapter 16, *Table A8: 3.*
1016 Cf. Chapter 16, *Table A8: 4.*

Figure A8.2
Fragment of the A8 sword and scabbard, underside of the handguard plate and mouth band soldered to the mouth plate with the opening for the blade: a) front, b) back.

Slika A8.2
Del ročaja in nožnice meča A8, pogled na spodnjo stran branika ročaja, okov ob ustju nožnice in rob nanj prispajkanega okova z odprtino za rezilo meča: a) sprednja stran, b) hrbtna stran.

a

b

Figure A8.3
X-ray image (90 KV, 4 mA, 60 seconds) of the A8 sword and scabbard.

Slika A8.3
Rentgenski posnetek (90 KV, 4 mA, 60 sekund) ročaja in nožnice meča A8.

A8 (*t. 3; sl. A8.1–sl. A8.3*)

Del ročaja, rezila in nožnice meča. Železo, medenina, pokositrenje, les. Ohr. dol. 72 mm, šir. ščitnika ročajnega branika meča 67 mm. Inv. št. V 1829. Ljubljanica pri Blatni Brezovici (Dolnji breg ali Lipavec). Potapljanje; NMS pridobil 1994.

Na ročaju meča je korozijski prirastek, ki verjetno vključuje z železovo korozijo prepojen les (*sl. A8.1a, b*). Na rentgenskem posnetku (*sl. A8.3*) je na ročaju izrazita vodoravna linija, vidna tudi na hrbtni strani ročaja (*sl. A8.1b*), iz česar sklepam, da je pravokotno na ročajni jezik (morda na mestu, kjer je bil stik branika in ročajnih oblog) nameščena tanka ovalna železna[1013] ploščica ali okov (ni jasno, ali je bil le na površini ali je segal v globino ročajne obloge).

Na vrhnji strani ohranjenega dela ročaja je vidna luknja pravokotnega preseka (*sl. A8.1c*), ki je verjetno negativ železnega jezika ročaja: na eni strani je stranski rob dobro viden. Rentgenski posnetek na ročaju kaže navpični liniji, ki verjetno ustrezata robovoma ročajnega jezika (*sl. A8.3*) – na levi strani je namreč ta rob tako na rentgenskem posnetku kot v negativu ročajnega jezika, ki je viden na vrhnji strani ohranjenega dela ročaja (*sl. A8.1c*), pribl. 12 mm umaknjen v notranjost glede na vodoravni kovinski vložek na ročaju. Širina jezika meča na tistem delu ročaja, ki je viden na rentgenskem posnetku, je torej 16–17 mm (*sl. A8.3*).

Ščitnik branika ročaja je skovan iz brona.[1014] Njegov spodnji rob je okrašen z drobnimi punciranimi črticami. Na zgornji strani ščitnika so ostanki zlitine kositra in svinca (*sl. A8.1*).[1015] Spodnja stran ščitnika in okov ob ustju nožnice sta deloma prekrita s korozijskim prirastkom (*sl. A8.2*).

Rezilo meča je delno vidno v pogledu od spodaj.

Ohranjeni sta (z železovo korozijo prepojeni) leseni platici nožnice, ki se na robovih stikata. Njuna največja debelina je 2 mm (*sl. A8.2a, b*).

Ob ustju nožnice je medeninast[1016] okov, ki ima na sprednji strani vodoravna rebra, na hrbtni strani pa je gladek (*sl. A8.1a, b, sl. A8.2a, b*). Narejen je iz traku; njegova presegajoča se konca sta spajkana na hrbtni strani (na fotografijah *sl. A8.1b* in *sl. A8.2b* na desni strani). Spajkanje je vidno le na rentgenskem posnetku (*sl. A8.3*).

1013 Glej pogl. 16, *pregl. A8: 8.*
1014 Glej pogl. 16, *pregl. A8: 1.*
1015 Glej pogl. 16, *pregl. A8: 3.*
1016 Glej pogl. 16, *pregl. A8: 4.*

A9 (*Pl. 4; Fig. A9.1–Fig. A9.2*)

Part of the blade and scabbard of a sword. Iron, bronze with tin plating, brass. Blade: surv. l. 106 mm, w. 39 mm; scabbard: surv. l. 217 mm, w. 60 mm, sheet metal th. approx. 0.2 mm. Inv. No. V 443b.
River Ljubljanica at Blatna Brezovica, Lipavec.
Diving; NMS acquired in 1993.

The scabbard and the sword were corroded onto the B3 dagger upon discovery, the front of the scabbard being corroded onto the back of the dagger's sheath (*Fig. A9.1a, b, Fig. B3.2*).

Only a 106 mm long section of the blade, broken off at both ends, survives of the sword (*Fig. A9.2b*). It has a diamond-shaped cross section and measures 39 mm in surviving width and 4 mm in thickness. The left edge is relatively well preserved, the right one poorly. The distance from the midpoint of the blade width (the thickest part in cross section) to the cutting edge (in the seemingly best preserved part) suggests that the blade was originally around 42 mm wide.

The surviving metal pieces of the scabbard's central section measure 217 mm in length (*Fig. A9.2*). The edges of the scabbard are reinforced with iron guttering[1017] that is 8 mm wide and 8 mm high. Attached to the guttering is a brass suspension band.[1018] One of its loops holds a brass ring.[1019] Only a small part of the band survives on the back of the scabbard. Heavily corroded rivets are visible on the back, on both sides of the band; they fasten the band to the guttering, probably only to its back. The preservation of the rivets is too poor to allow for metal analyses to be performed.

The scabbard front is lined with a 0.25 mm thick and 56 to 57 mm wide sheet of bronze,[1020] with well-preserved tin plating (*Fig. A9.2a*).[1021]

Figure A9.1
Fragment of the A9 sword and scabbard corroded into the B3 dagger and sheath prior to conservation: a) front of the dagger sheath corroded at the back into the front of the sword scabbard, b) surviving central piece of the sword blade, inner side of the front sheet of the scabbard, guttering and inner side of the suspension loop. Both photos show the front of the detached disc terminal of the dagger sheath on the right.

Slika A9.1
Del nožnice in meča A9 ter bodalo v nožnici B3 pred začetkom konservatorskega postopka: a) pogled na sprednjo stran nožnice bodala, ki je na hrbtni strani sprijeta s sprednjo stranjo nožnice meča, b) pogled na ohranjeni del rezila meča, notranjo stran pločevine, ki je prekrivala sprednjo stran pripadajoče nožnice, robni okov in hrbtno stran nanj prikovanega prečnega okova. Na obeh fotografijah je na desni strani vidna sprednja stran odlomljenega zaključka nožnice bodala.

1017 Cf. Chapter 16, *Table A9: 5.*
1018 Cf. Chapter 16, *Table A9: 1/7, 3/9.*
1019 Cf. Chapter 16, *Table A9: 2/8.*
1020 Cf. Chapter 16, *Table A9: 1, 6.*
1021 Cf. Chapter 16, *Table A9: 3–4.*

Figure A9.2
Fragment of the A9 sword and scabbard: a) front, b) inner side; the impression of the suspension band shows the original position of the detached guttering and suspension band.

Slika A9.2
Del nožnice in meča A9: a) lice, b) notranja stran. Prvotno lego odlomljenega robnega in prečnega okova kaže odtis prečnega okova na pločevini nožnice.

Na zgornjo stran okova ob ustju je prispajkan pravokotno nanj ležeč ovalen (verjetno medeninast) okov z odprtino za rezilo meča. Od tega okova je zaradi ščitnika branika ročaja, ki je prikorodiran na nožnico, viden le do pribl. 2 mm širok, s spajkanjem prekrit rob (*sl. A8.2a, b*).

A9 (t. 4; sl. A9.1–sl. A9.2)

Del rezila in nožnice meča. Železo, bron s pokositrenjem, medenina. Rezilo: ohr. dol. 106 mm, šir. 39 mm; nožnica: ohr. dol. 217 mm, šir. 60 mm, deb. pločevine pribl. 0,2 mm. Inv. št. V 443b.
Ljubljanica pri Blatni Brezovici (Lipavec).
Potapljanje; NMS pridobil 1993.

Sprednja stran nožnice je bila ob odkritju sprijeta s hrbtno stranjo nožnice bodala B3 (*sl. A9.1a, b, sl. B3.2*).

Od meča je ohranjen le 106 mm dolg del rezila, ki je na obeh koncih odlomljen (*sl. A9.2b*). Rezilo je lečastega preseka, ohranjena širina je 39 mm, debelina 4 mm. Levi rob rezila je razmeroma dobro ohranjen, desni slabo. Iz razdalje od sredine rezila (ki jo nakazuje v preseku najdebelejši del rezila) do dobro ohranjenega roba rezila sklepam, da je bila prvotna širina rezila okoli 42 mm.

Ohranjeni so kovinski deli srednjega dela nožnice dolžine 217 mm (*sl. A9.2*). Robovi nožnice so utrjeni z železnim[1017] robnim okovom, ki je zavit v obliki 8 mm široke in 8 mm visoke črke U. Nanj je pritrjen medeninast[1018] prečni okov z zankama ob straneh. V eni zanki je ohranjen medeninast[1019] obroček. Ohranjen je le majhen del hrbtne strani tega okova. Na hrbtu sta na obeh straneh vidni močno korodirani zakovici, s katerima je bil prečni okov s hrbtne strani pritrjen na železen robni okov – zdi se, da le na njegovo hrbtno stran. Zakovici sta tako slabo ohranjeni, da ni mogoče ugotoviti, iz katere kovine sta narejeni.

Sprednjo stran nožnice prekriva 0,25 mm debela in od 56 do 57 mm široka bronasta[1020] pločevina; na njenem licu je odlično ohranjeno pokositrenje (*sl. A9.2a*).[1021]

1017 Glej pogl. 16, *pregl. A9: 5.*
1018 Glej pogl. 16, *pregl. A9: 1/7, 3/9.*
1019 Glej pogl. 16, *pregl. A9: 2/8.*
1020 Glej pogl. 16, *pregl. A9: 1, 6.*
1021 Glej pogl. 16, *pregl. A9: 3–4.*

A10 (*Pl. 4; Fig. A10*)

Sheet metal and terminal knob of a sword scabbard chape. Brass, possibly tin plating. Surv. l. 240 mm, w. 50.3 mm, metal sheet th. 0.2 mm. Inv. No. R 24446. River Ljubljanica at Bevke, Krajna or Na zrnici, or at Blatna Brezovica, Tri lesnice.[1022]

Part of the Franc Kržmanc collection; NMS acquired in 1913 (the item was kept among the uninventoried finds until 2006; it was attached with a string to the lower part of the blade of the A14 sword; conservation in 2016 revealed that the remains of the scabbard and the sword probably do not belong together).
Bras Kernel 2006, 19, Cat. No. 18.

The brass sheet was probably tinned on the front.[1023] The end of the chape bears the remains of the heavily corroded iron guttering; its original form is only discernable on the right side (over an 18 mm length). The presence of guttering is also indicated by a 3 mm wide surface along both edges of the brass sheet that has a different patina than elsewhere (*Fig. A10*).

The iron scabbard terminal is 23 mm long (including the terminal knob). The upper, approx. 8 mm high part is rectangular in cross section and includes an approx. 4 mm high surface, delimited by a thin moulding above and below, that is plated with a strip of sheet brass.[1024] The iron terminal knob has a thin neck (*Fig. A10*).

A11 (*Pl. 4; Fig. A11*)

Chape of a sword scabbard. Iron, brass. Surv. l. 189 mm. Inv. No. V 574.
River Ljubljanica at Rakova Jelša, Za terenom.
Underwater topographic survey; NMS acquired in 1993.

U-sectioned iron[1025] guttering with the chape. The two sides of the guttering join in a cuboid element (h. 11 mm, w. 13 mm, th. 13 mm) that narrows to a short neck and ends in the terminal iron knob. The cuboid element bears two pairs of mouldings (at the upper and lower ends) that delimit a 4.5 mm high surface plated with a thin (estimated th. 1 mm) strip of sheet brass.[1026]

Figure A10
Fragment of the A10 sword scabbard after conservation: a) front, b) inner side.

Slika A10
Ohranjeni del nožnice meča A10 po konservaciji: a) lice, b) notranja stran.

1022 Cf. Fns. 977 and 1029.
1023 Cf. Chapter 16, *Table A10: 4, 8*.
1024 Cf. Chapter 16, *Table A10: 6*.
1025 Cf. Chapter 16, *Table A11: 6*.
1026 Cf. Chapter 16, *Table A11: 7–8*.

Figure A11
Chape of the A11 sword scabbard: a) front, b) back.

Slika A11
Konica nožnice meča A11: a) sprednja stran, b) hrbtna stran.

a

b

A10 (*t. 4; sl. A10*)

Pločevina spodnjega sprednjega dela nožnice z zaključnim gumbom. Medenina, morda pokositrenje. Ohr. dol. 240 mm, šir. 50,3 mm, deb. pločevine 0,2 mm. Inv. št. R 24446.
Ljubljanica pri Bevkah (Krajna ali Na zrnici) ali pri Blatni Brezovici (Tri lesnice).[1022]
Del zbirke Franca Kržmanca; NMS pridobil 1913 (predmet je bil do leta 2006 shranjen med neinventariziranim gradivom; z vrvico je bil pritrjen na spodnji del rezila meča A14; med konserviranjem leta 2016 se je izkazalo, da ostanki nožnice in meča verjetno ne sodijo skupaj).
Bras Kernel 2006, 19, kat. 18.

Pločevina je iz medenine, ki je bila na sprednji strani verjetno pokositrena.[1023]

Na konici nožnice so korodirani ostanki železnega robnega okova; njegova prvotna oblika je ohranjena le na desni strani do višine 18 mm. Sled robnega okova je tudi pribl. 3 mm širok pas površine z rahlo drugačno patino ob robovih medeninaste pločevine – domnevam, da nakazuje, kje je robni okov prekrival pločevino (*sl. A10*).

Železen zaključek nožnice je, skupaj z zaključnim gumbom, visok 23 mm. Zgornji, pribl. 8 mm visok del ima pravokoten presek. Drobni vodoravni rebri omejujeta pribl. 4 mm visok pas površine, prevlečene z medeninastim trakom.[1024] Okrogel zaključni gumb ima ozek vrat (*sl. A10*).

A11 (*t. 4; sl. A11*)

Konica nožnice meča. Železo, medenina. Ohr. dol. 189 mm. Inv. št. V 574.
Ljubljanica pri Rakovi Jelši (Za terenom).
Podvodna topografija; NMS pridobil 1993.

Železen[1025] robni okov s presekom v obliki črke U obrobla spodnji del nožnice meča ozke trikotne oblike. V spodnjem delu se robna okova združita in preideta v kvadrasto oblikovan del (viš. 11 mm, šir. 13 mm, deb. 13 mm), ki ima zgoraj in spodaj po dve rebri, 4,5 mm širok poglobljen vmesni prostor pa je okrašen s tenkim (ocenjena deb. 1 mm) medeninastim[1026] trakom. Kvadrasti del se prek okrogle zožitve nadaljuje v železen zaključni gumb.

1022 Prim. op. 977 in 1029.
1023 Glej pogl. 16, *pregl. A10: 4, 8.*
1024 Glej pogl. 16, *pregl. A10: 6.*
1025 Glej pogl. 16, *pregl. A11: 6.*
1026 Glej pogl. 16, *pregl. A11: 7–8.*

The front of the chape bears an approx. 0.9 mm thick brass plate[1027] with openwork decoration. It overlaps the guttering by 4–5 mm on each side. The remains of a tin-lead alloy on its back[1028] indicate it was soldered to the lining (the A5–A7, A10 and A34 sword scabbards indicate this was sheet brass, tinned on the front), which did not survive.

A12 (*Pl. 4; Fig. A12.1–Fig. A12.2*)

Fragment of the chape of a sword scabbard. Iron, silver, wood. Surv. l. 180 mm. Inv. No. V 1828.
River Ljubljanica at Bevke, Krajna or Na zrnici, or at Blatna Brezovica, Tri lesnice.[1029]
Diving; NMS acquired in 1996.
Šmit, Istenič, Knific 2008, 2331, Fig. 5.

The remains consist of guttering, terminal knob and fragments of wooden laths on the inner side of the guttering (*Fig. A12.1, Fig. A12.2*).

The iron guttering is lined on both the inner and outer sides with silver alloy sheeting up to 3 mm thick[1030] (*Fig. A12.2*). The terminal knob and its neck are also iron and plated with sheet of silver alloy. [1031] The neck is 13 mm long and has four mouldings, while the knob bears fourteen ribs.

Figure A12.1
Fragment of the A12 sword scabbard: a) front, b) back.

Slika A12.1
Odlomek nožnice A12: a) sprednja stran, b) hrbtna stran.

1027 Cf. Chapter 16, *Table A11: 5.*
1028 Cf. Chapter 16, *Table A11: 4, 9.*
1029 The inventory book states the Ljubljanica at Bevke, Kamin as the findspot. The section of the Ljubljanica known to the divers as Kamin is named after a farmstead located at the confluence with the stream of Pekov graben and predominantly refers to the section of the Ljubljanica at Bevke, at the Krajna site; only rarely is Kamin noted as the findspot of artefacts recovered at the Na zrnici site (cf. Turk et al. 2009b). Erjavec, Gaspari (2012, 269) use the name Kamin for a longer stretch of the Ljubljanica between the confluences with the Zrnica and Borovniščica streams.
1030 Cf. Chapter 16, *Table A12: 1–2.*
1031 Cf. Chapter 16, *Table A12: 3.*

a

b

Figure A12.2
The A12 sword scabbard: a) sheet silver on the inner side of iron guttering, b) corroded iron guttering with a lining of sheet silver and corrosion products permeated with the remains of a wooden lath.

Slika A12.2
Pogled na notranjo stran robnega okova nožnice A12: a) srebrna pločevina na notranji strani železnega robnega okova, b) korodiran železen robni okov U-preseka s prevleko iz srebrne pločevine in s korozijo prepojeni ostanki lesenih platic nožnice.

Na sprednji strani nožnice je 0,9 mm debel medeninast[1027] okov, okrašen v predrti tehniki. Na robni okov je nameščen tako, da ga za 4–5 mm prekriva. Ostanki svinca in kositra na njegovi spodnji strani[1028] nakazujejo, da je bil prispajkan na podlago (glede na nožnice mečev A5–A7, A10 in MM A34 verjetno na medeninasto in na licu pokositreno pločevino), ki je prekrivala sprednjo stran nožnice, a se ni ohranila.

A12 (*t. 4; sl. A12.1–sl. A12.2*)

Odlomek spodnjega dela nožnice. Železo, srebro, les.
Ohr. dol. 180 mm. Inv. št. V 1828.
Ljubljanica pri Bevkah (Krajna ali Na zrnici) ali pri Blatni Brezovici (Tri lesnice).[1029]
Potapljanje; NMS pridobil 1996.
Šmit, Istenič, Knific 2008, 2331, sl. 5.

Spodnji del nožnice meča: robni okov in zaključni gumb z vratom ter deli lesenih platic, ki so ohranjeni na notranji strani robnega okova (*sl. A12.1, sl. A12.2*).

Robni okov je iz železa, ki je na zunanji in notranji strani prevlečeno z do 3 mm debelo pločevino iz srebrove zlitine[1030] (*sl. A12.2*). Zaključni gumb in njegov vrat sta prav tako iz železa in prevlečena s pločevino iz srebrove zlitine.[1031] Vrat gumba, ki je visok 13 mm, ima štiri vodoravna rebra, zaključni gumb pa 14 navpičnih reber.

1027 Glej pogl. 16, *pregl. A11: 5.*
1028 Glej pogl. 16, *pregl. A11: 4, 9.*
1029 V inventarni knjigi je kot najdišče navedeno Ljubljanica pri Bevkah, Kamin. Odsek struge Ljubljanice, ki ga potapljači imenujejo Kamin, ima ime po kmetiji ob izlivu Pekovega grabna in se v prvi vrsti nanaša na Ljubljanico pri Bevkah ob ledini Krajna; redko so kot Kamin navedli najdišča predmetov iz odseka ob ledini Na zrnici (prim. Turk et al. 2009a). Erjavec, Gaspari (2012, 269) poimenovanje Kamin uporabljata za širši odsek Ljubljanice med izlivoma pritokov Zrnica in Borovniščica.
1030 Glej pogl. 16, *pregl. A12: 1–2.*
1031 Glej pogl. 16, *pregl. A12: 3.*

A13 (*Pl. 4; Fig. A13.1–Fig. A13.3*)

Suspension band of a sword scabbard. Silver, gilding. L. 97 mm, w. 10 mm, wgt. 32.62 g. Inv. No. V 4198. River Ljubljanica at Blatna Brezovica, Tri lesnice. Diving; NMS acquired in 2013.
Istenič 2003b, 285–286, Figs. 1–3, 8; Istenič 2009h, Cat. No. 61.

The basic form of the silver suspension band[1032] was obtained by hammering, while the relief decoration was embossed from the back and chased from the front. The centre of the front, where relief is highest, has a small flaw (*Fig. A13.2a*), which occurred during manufacture. It led the craftsman to reinforce the spot with an irregular (approx. 10 mm long and 10 mm wide) tin[1033] filling (*Fig. A13.2b*).

The centre of the band is decorated with a plant motif flanked on both sides by a pair of mouldings separated by a chased thin wavy line. The upper and lower edges of the front are decorated with a line of chased vertical lines (approx. 1 mm long). The front was gilded[1034] (*Fig. A13.3*).

The back part of the suspension band was forged thin. The ends of the band show an approx. 15 mm long overlap and are fastened together by a silver rivet on the left side (*Fig. A13.1c*). This rivet also, together with the symmetrically positioned rivet on the right, fastened the band to the guttering.

The loops of the suspension band have pronounced mouldings on the exterior. Each of them holds a ring measuring 17 mm across, also moulded along the exterior with the highest moulding decorated in the same manner as the edges of the front part of the crossband (*Fig. A13.1*).

The suspension band is part of the sword scabbard (with associated sword) kept in the CM and shown on *Fig. 22–Fig. 25*.

Figure A13.1
Suspension band of the A13 sword scabbard: a) front, b) back, c) view from below.

Slika A13.1
Prečni okov nožnice meča A13: a) sprednja stran, b) hrbtna stran, c) pogled od spodaj.

1032 Cf. Chapter 16, *Table A13: 2, 4.*
1033 Cf. Chapter 16, *Table A13: 1.*
1034 Cf. Chapter 16, *Table A13: 5.*

A13 (*t. 4; sl. A13.1–sl. A13.3*)

Prečni okov nožnice meča. Srebro, pozlata. Dol. 97 mm, šir. 10 mm, teža 32,62 g. Inv. št. V 4198.
Ljubljanica pri Blatni Brezovici (Tri lesnice).
Potapljanje; NMS pridobil 2013.
Istenič 2003b, 294–295, sl. 1–3, 8; Istenič 2009g, kat. 61.

a

b

Figure A13.2
Suspension band of the A13 sword scabbard: a) remains of gilding under the silver patina and the flaw that occurred during manufacture, b) tin-lead alloy filling on the inner side of the band (repair of the flaw). The violet coloured patch represents remains of coating characteristic of the finds from the Ljubljanica before conservation.

Slika A13.2
Prečni okov nožnice meča A13: a) ostanki pozlate pod srebrovo patino in napaka, ki je nastala med izdelavo okova, b) zalivka iz zlitine kositra in svinca na spodnji strani okova (popravilo napake). Vijolična plast je ostanek obloge, značilne za predmete iz Ljubljanice pred konservacijo.

Osnovna oblika srebrnega okova[1032] je nastala s kovanjem. Reliefen okras je iztolčen s hrbtne strani in punciran z lica. V sredini sprednje strani okova – na mestu, kjer je reliefni okras najvišji – je na licu vidna drobna razpoka (*sl. A13.2a*), ki je nastala pri izdelavi okrasa. Zaradi te napake so na tem delu okova hrbtno stran podložili s pribl. 10 mm dolgo in 10 mm široko kositrno[1033] zalivko (*sl. A13.2b*).

V osrednjem delu okova upodobljeni rastlinski motiv je ob straneh obdan s po dvema rebroma, ki ju loči drobna valovnica, narejena s punciranjem z lica. Robova sprednjega dela okova sta okrašena z linijo prav tako z lica punciranih pokončnih, pribl. milimeter dolgih linij. Sprednji del okova je bil pozlačen[1034] (*sl. A13.3*).

Hrbtni del okova je tenko skovan. Zaključka se presegata pribl. v dolžini 15 mm, spenja ju srebrna zakovica na levi strani okova (*sl. A13.1c*). Ta je obenem, tako kot simetrično postavljena zakovica na desni strani okova, okov pritrjevala na robni okov nožnice meča.

Zanki ob straneh prečnega okova sta na zunanji strani izrazito profilirani. V vsako zanko je vdet po en obroček premera 17 mm, ki je na zunanji strani izrazito profiliran, najbolj izstopajoče rebro pa je drobno narebreno na enak način kot robova sprednjega dela okova (*sl. A13.1*).

Okov je del nožnice, ki jo (skupaj s pripadajočim delom meča) hrani Mestni muzej Ljubljana, prikazana sta na *sl. 22–sl. 25*.

Figure A13.3
Front of the suspension band of the A13 sword scabbard; remains of gilding under the silver patina.

Slika A13.3
Ostanki pozlate pod srebrovo patino na licu prečnega okova nožnice meča A13.

1032 Glej pogl. 16, *pregl. A13: 2, 4.*
1033 Glej pogl. 16, *pregl. A13: 1.*
1034 Glej pogl. *16, pregl. A13: 5.*

A14 (*Pl. 5; Fig. A14.1–Fig. A14.2*)

Fragment of the central and bottom parts of a sword blade. Iron. Surv. l. 463 mm, max. surv. w. 46 mm, surv. th. 5 mm. Inv. No. R 24445.
River Ljubljanica at Bevke, Krajna or Na zrnici, or at Blatna Brezovica, Tri lesnice.[1035]
Part of the Franc Kržmanc collection; NMS acquired in 1913 (the item was kept among the uninventoried finds until 2006; it was attached with a string to the A10 scabbard; conservation in 2016 revealed that the remains of the scabbard and the sword probably do not belong together).
Bras Kernel 2006, 19, Cat. No. 17.

The blade has a slightly diamond-shaped cross section. The cutting edges are poorly preserved. The blade width at the top of the surviving part measures 41 mm. It widens lower down and terminates in a long tapering point that is not thickened at the tip in cross section (th. 3 mm).

Figure A14.1
Blade of the A14 sword prior to conservation: a) front, b) back.

Slika A14.1
Ohranjeni del rezila meča A14 pred konservacijo: a) sprednja stran, b) hrbtna stran.

A15 (*Pl. 5; Fig. A15.1–Fig. A15.2*)

Sword. Iron, copper, tin plating, bone. Surv. sword l. 600 mm, blade l. 512 mm, surv. blade w. 36 mm. Inv. No. V 444.
River Ljubljanica at Blatna Brezovica, Lipavec.
Istenič 2009h, Cat. No. 66.

The iron tang (w. bottom 21 mm, top 11 mm) bears an oval-sectioned (36 × 27 mm) handgrip of bone with three and part of the fourth finger groove remaining. The pommel is missing. Only the plate survives of the handguard. The height of the handguard roughly corresponded with the distance between the shoulder of the sword and the handgrip, which measures 24 mm. The handguard plate is hammered sheet bronze;[1036] remains of tin survive on a spot on the upper surface;[1037] the underside bears no apparent traces of plating.

The cutting edges have not survived and the original width of the blade is unknown. The point is long, diamond-shaped in cross section and perhaps slightly thickened at the tip.

Figure A14.2
Blade of the A14 sword after conservation: a) front, b) back.

Slika A14.2
Ohranjeni del rezila meča A14 po konservaciji: a) sprednja stran, b) hrbtna stran.

1035 Cf. Fns. 977 and 1029.
1036 Cf. Chapter 16, *Table A15: 2–5*.
1037 Cf. Chapter 16, *Table A15: 1*.

Figure A15.1
Front of the A15 sword.

Slika A15.1
Sprednja stran meča A15.

Figure A15.2
Hilt of the A15 sword, front and back.

Slika A15.2
Ročaj meča A15, pogled na obe strani.

A14 (*t. 5; sl. A14.1–sl. A14.2*)

Srednji in spodnji del (konica) rezila meča. Železo. Ohr. dol. 463 mm, največja ohr. šir. 46 mm, ohr. deb. 5 mm. Inv. št. R 24445.
Ljubljanica pri Bevkah (Krajna ali Na zrnici) ali pri Blatni Brezovici (Tri lesnice).[1035]
Del zbirke Franca Kržmanca; NMS pridobil 1913 (predmet je bil do leta 2006 shranjen med neinventariziranim gradivom; z vrvico je bil nanj pritrjen del nožnice A10; med konserviranjem leta 2016 se je izkazalo, da ostanki nožnice in meča verjetno ne sodijo skupaj).
Bras Kernel 2006, 19, kat. 17.

Rezilo ima rahlo rombičen presek. Robovi rezila so slabo ohranjeni. Širina rezila na vrhu ohranjenega dela je 41 mm. V spodnjem delu se razširi in preide v dolgo in izrazito konico, ki v preseku ni odebeljena (deb. 3 mm).

A15 (*t. 5; sl. A15.1–sl. A15.2*)

Meč. Železo, baker, kositrenje, kost. Ohr. dol. meča 600 mm, dol. rezila 512 mm, ohr. šir. rezila 36 mm. Inv. št. V 444.
Ljubljanica pri Blatni Brezovici (Lipavec).
Istenič 2009g, kat. 66.

Železen jezik ročaja (šir. spodaj 21 mm, zgoraj 11 mm) je obdan s koščeno oblogo ovalne oblike (36 × 27 mm), ki ima tri vodoravne vdolbine (ležišča za prste roke), od četrte vdolbine je ohranjen le del. Glavič na zgornjem zaključku manjka.

Od branika ročaja je ohranjen le ščitnik. Višina branika je približno ustrezala razmiku med rameni meča in spodnjim robom koščene obloge, tj. 24 mm. Ščitnik branika je bil iztolčen iz bronaste[1036] pločevine. Na zgornji površini so na enem mestu ohranjeni ostanki plasti kositra.[1037] Na spodnji površini branika ni očitnih sledov kositrenja.

Rezilo meča nima ohranjenih prvotnih robov, zato njegova prvotna širina ni znana. Konica je dolga in v preseku morda odebeljena.

1035 Prim. op. 977 in 1029.
1036 Glej pogl. 16, *pregl. A15: 2–5.*
1037 Glej pogl. 16, *pregl. A15: 1.*

A16 (*Pl. 5; Fig. A16.1–Fig. 16.2*)

Sword. Iron, tinned bronze. Sword l. 689 mm, blade l. 540 mm, surv. blade w. 64 mm. Inv. No. V 573.
River Ljubljanica at Rakova Jelša, Volar.
Diving; NMS acquired in 1994.
Müllner 1900, Pl. 56: 4; Miks 2007, 61, 655, A434, Pl. 8.

The sword is damaged in the left shoulder area. The cutting edges have not survived. The presumed original blade width in the upper part measured 74 mm. In the lower third, the blade tapers to a point that is slightly thickened in cross section.

The tang tapers towards the top.

The bronze[1038] handguard plate is tinned on the underside.[1039] No traces of solder or coating have been observed on the upper side. In comparison with the handguard plates of the other Mainz type swords from the Ljubljanica, this one gives the impression of being of lesser quality. It is made of sheet metal and is roughly oval in shape (82 × 50 mm). It has a rather crudely cut out rectangular opening in the centre (33 × 7 mm) and a slightly and unevenly downturned rim that is not thickened, bearing shallow and uneven chased lines in several places (*Fig. A16.2*).

Figure A16.1
The A16 sword.

Slika A16.1
Meč A16.

Figure A16.2
Handguard plate of the A16 sword: a) upper side, b) underside of the handguard plate fixed to the blade with epoxy resin.

Slika A16.2
Meč A16, ščitnik branika ročaja: a) zgornja stran, b) spodnja stran (viden je tudi zgornji del rezila z epoksi kitom, s katerim je ščitnik pritrjen na rezilo).

A17 (*Pl. 6; Fig. A17*)

Tang and blade of a sword. Iron. L. 672 mm, blade l. 520 mm, surv. w. 40 mm. Inv. No. R 3406.
River Ljubljanica, possibly Ljubljana at Breg.[1040]
NMS acquired before 1899.
Müllner 1900, Pl. 56.

The shoulders are straight and level. The blade is narrow and has a long point slightly thickened in cross section. The cutting edges are poorly preserved, but do suggest that the original blade width did not measure much more than 40 mm.

1038 Cf. Chapter 16, *Table A16: 1–2*.
1039 Cf. Chapter 16, *Table A16: 3–4*.
1040 The sword came to the Provincial Museum long before 1899, because its inventory entry states: *'Laibach Fluss, Die Nummern 3401–3414 sind schon lange in der Sammlung aber von Schulz erst jetzt irgend in einer Lade gefunden. Juni 99'*. The fact that the earliest finds from the Ljubljanica received at the Museum all originated from Ljubljana, mainly from the river engineering works between Špica and Tromostovje, suggests that the sword came from the Ljubljanica at Ljubljana.

Figure A17
The A17 sword.

Slika A17
Meč A17.

A16 (*t. 5; sl. A16.1–sl. 16.2*)

Meč. Železo, pokositren bron. Dol. meča 689 mm, dol. rezila 540 mm, ohr. šir. rezila 64 mm. Inv. št. V 573.
Ljubljanica pri Rakovi Jelši (Volar).
Potapljanje; NMS pridobil 1994.
Müllner 1900, t. 56: 4; Miks 2007, 61, 655, A434, t. 8.

Meč ima poškodovano levo stran ramen. Robovi rezila niso ohranjeni. Domnevna prvotna širina rezila meča zgoraj je 74 mm. V spodnji tretjini se rezilo hitro zoži in zaključi z izrazito konico, ki je v preseku rahlo odebeljena.

Jezik ročaja se enakomerno zožuje proti vrhu.

Bronast[1038] ščitnik branika ročaja je bil na spodnji strani pokositren,[1039] na zgornji strani pa ni videti ostankov prevlek. V primerjavi s ščitniki drugih mečev tipa Mainz iz reke Ljubljanice daje vtis manj kakovostnega izdelka. Narejen je iz pločevine in je pribl. ovalne oblike (82 × 50 mm). V sredini je nevešče izrezana pribl. pravokotna odprtina (33 × 7 mm). Ob straneh je rahlo in neenakomerno upognjen, sam rob pa ni odebeljen in je na več mestih plitvo in neenakomerno punciran (*sl. A16.2*).

A17 (*t. 6; sl. A17*)

Ročajni jezik in rezilo meča. Železo. Dol. 672 mm, dol. rezila 520 mm, ohr. šir. 40 mm. Inv. št. R 3406.
Ljubljanica, morda Ljubljana (Breg).[1040]
NMS pridobil pred 1899.
Müllner 1900, t. 56.

Meč ima ravna ramena, rezilo je ozko in ima dolgo konico, ki se v preseku zdi rahlo odebeljena. Robovi rezila niso dobro ohranjeni, vendar domnevam, da prvotna širina meča ni dosti presegala 40 mm.

1038 Glej pogl. 16, *pregl. A16: 1–2.*
1039 Glej pogl. 16, *pregl. A16: 3–4.*
1040 Meč je prišel v Deželni muzej dosti pred letom 1899, saj so ob njegovi inventarizaciji zabeležili: *Laibach Fluss, Die Nummern 3401–3414 sind schon lange in der Sammlung aber von Schulz erst jetzt irgend in einer Lade gefunden. Juni 99.* Dejstvo, da so najzgodnejše najdbe iz Ljubljanice, ki jih je prejel Deželni muzej, izvirale iz Ljubljane, predvsem iz regulacijskih posegov v strugo med Špico in Tromostovjem, govori za domnevo, da meč izvira iz Ljubljanice pri Ljubljani.

A18 (*Pl. 6; Fig. A18*)

Tang and upper part of the blade of a sword. Iron. Surv. l. 247 mm, surv. w. 46 mm. Inv. No. V 1870.
River Ljubljanica at Blatna Brezovica, Lipavec.
Underwater topographic survey in 1992; NMS acquired in 1992.

The tang evenly tapers upwards. The shoulders are straight and level. The cutting edges have not survived, but do suggest that the original blade width did not measure much more than 46 mm.

Figure A18
Fragment of the A18 sword.
Slika A18
Ohranjeni del meča A18.

Other types of swords and scabbards (A19–A21, A35)

A19 (*Pl. 6; Fig. A19.1–Fig. A19.2*)

Sword. Iron, bone, brass, bronze. Surv. sword l. 577 mm, surv. blade l. 413 mm, max. blade w. 40 mm. Inv. No. V 405.
River Ljubljanica at Bevke, Na zrnici.
Diving; NMS acquired in 1992.

The tang tapers upwards. It bears a bone pommel of a roughly ellipsoid form, surmounted by a thin brass disc (diam. approx. 24 mm, th. 0.6 mm; upper surface decorated with a pair of chased parallel lines)[1041] and a slightly convex sub-square bronze plate[1042] (approx. 1 mm thick: sides measuring 14–16 mm) with a thin groove running approx. 1 mm from the edge. The peen block is missing.

The handguard plate is nearly round (l. 66 mm, w. 62 mm) and made of very thin (th. approx. 0.6 mm) sheet brass.[1043] It has a sub-rectangular opening for the tang just off the centre.

The shoulders are straight and level. The cutting edges are poorly preserved. The blade is widest at the shoulders (w. 40 mm) and tapers evenly towards the missing point.

1041 Cf. Chapter 16, *Table A19: 3–4.*
1042 Cf. Chapter 16, *Table A19: 5–6.*
1043 Cf. Chapter 16, *Table A19: 1–2.*

Figure A19.1
The A19 sword.

Slika A19.1
Meč A19.

Figure A19.2
Pommel of the A19 sword:
a) side view, b) view from above.

Slika A19.2
Glavič ročaja meča A19:
a) pogled s strani, b) pogled na zgornjo stran.

a

b

A18 (*t. 6; sl. A18*)

Ročajni jezik in zgornji del rezila meča. Železo. Ohr. dol. 247 mm, ohr. šir. 46 mm. Inv. št. V 1870.
Ljubljanica pri Blatni Brezovici (Lipavec).
Podvodna topografija 1992; NMS pridobil 1992.

Ročajni jezik se proti vrhu enakomerno oži, na spodnji strani pa pravokotno preide v rezilo. Prvotni robovi rezila niso ohranjeni, vendar se zdi, da prvotna širina rezila ni dosti presegala 46 mm.

Drugi meči in nožnice (A19–A21, A35)

A19 (*t. 6; sl. A19.1–sl. A19.2*)

Meč. Železo, kost, medenina, bron. Ohr. dol. meča 577 mm, ohr. dol. rezila 413 mm, največja šir. rezila 40 mm. Inv. št. V 405.
Ljubljanica pri Bevkah (Na zrnici).
Potapljanje; NMS pridobil 1992.

Jezik ročaja se proti vrhu izrazito oži. Nanj so nataknjeni koščen glavič pribl. elipsaste oblike ter nad njim pribl. okrogla medeninasta ploščica (pr. pribl. 24 mm, deb. 0,6 mm; na zgornji strani dve vzporedni puncirani liniji),[1041] in rahlo izbočena, pribl. 1 mm debela bronasta[1042] ploščica pribl. kvadratne oblike z rahlo usločenimi stranicami (dol. stranic 14–16 mm), ob katerih pribl. 1 mm od roba poteka tanek žleb. Domnevam, da je bil na vrhu gumb, ki je onemogočil snetje na jezik ročaja nanizanih delov.

Od ročaja je ohranjen tudi ščitnik branika iz zelo tenke (deb. pribl. 0,6 mm) medeninaste[1043] pločevine rahlo ovalne oblike (dol. 66 mm, šir. 62 mm). Pribl. v sredini ima luknjo nepravilne pravokotne oblike, ki omogoča nasaditev na ročajni jezik.

Prehod ročajnega jezika v rezilo meča je pribl. pravokoten, ramena meča so ravna. Rezilo nima dobro ohranjenih robov. Najširše je zgoraj (širina 40 mm) in se enakomerno zožuje proti konici, ki ni ohranjena.

1041 Glej pogl. 16, *pregl. A19: 3–4.*
1042 Glej pogl. 16, *pregl. A19: 5–6.*
1043 Glej pogl. 16, *pregl. A19: 1–2.*

A20 (*Pl. 6; Fig. A20.1–Fig. A20.3*)

Sword with remains of its scabbard. Iron, brass. Surv. l. 654 mm, surv. blade l. 500 mm, surv. upper blade w. 39 mm. Inv. No. P 16775.
River Ljubljanica at Kamnik pod Krimom.
Diving 1979; NMS acquired in 1980.

The tang tapers towards the missing top. The shoulders are short and slightly curved. The blade is poorly preserved, covered with corrosion and surface accretions across much of its surface. The surviving blade width at the shoulders is 39 mm, while the original width presumably measured a few millimetres more. The blade width approx. 70 mm above the fracture also measures 39 mm, indicating parallel edges. The blade has a diamond-shaped cross section.

The narrow oval handguard plate is made of approx. 0.5 mm thick brass[1044] sheet. The upper surface bears traces of tin on one spot, which may represent the remains of soldering to the blade face of the handguard.[1045] The blade face of the handguard plate was either not tinned or the tin plating did not survive.[1046]

During the 1992 conservation, the blade with surface accretions (presumably with remains of the scabbard) was strengthened in several places with epoxy resin, while the holes and cracks were filled with epoxy filler. The condition after this conservation suggested the presence of wooden lath remains, permeated with iron corrosion.

The partial revision conservation in 2016 revealed probable remains of sheet iron on both sides of the scabbard, but did not confirm the presence of the wooden laths.

Figure A20.1
The A20 sword and scabbard: a) front, b) back.

Slika A20.1
Ohranjeni del meča in nožnice A20: a) sprednja stran, b) hrbtna stran.

1044 Cf. Chapter 16, *Table A20: 2.*
1045 Cf. Chapter 16, *Table A20: 3–4.*
1046 Cf. Chapter 16, *Table A20: 1.*

Figure A20.2
Handguard plate of the A20 sword: a) upper side, b) underside.

Slika A20.2
Ščitnik meča A20: a) zgornja stran, b) spodnja stran.

a

b

Figure A20.3
Detail of the A20 sword and scabbard; blade, corroded remains of sheet metal (iron), epoxy resin, corrosion on the right edge that appears to have adopted the form of the now disintegrated wooden lath.

Slika A20.3
Detajl meča in nožnice A20: rezilo meča, korodirani ostanki (železne) pločevine, epoksi kit in na desnem robu korozija, za katero se zdi, da je prevzela obliko lesene platice.

A20 (*t. 6; sl. A20.1–sl. A20.3*)

Meč z ostanki nožnice. Železo, medenina. Ohr. dol. 654 mm, ohr. dol. rezila 500 mm, ohr. šir. rezila zgoraj 39 mm. Inv. št. P 16775.
Ljubljanica pri Kamniku pod Krimom.
Potapljanje 1979; NMS pridobil 1980.

Ročajni jezik meča se oži proti vrhu, kjer je odlomljen. Ramena meča so kratka in usločena. Rezilo je slabo ohranjeno oziroma na veliki površini prekrito s korozijskim prirastkom. Ohranjena širina na vrhu rezila je 39 mm, prvotno je bila najverjetneje par milimetrov večja. Pribl. 70 mm nad odlomljenim delom rezila je njegova širina prav tako 39 mm, kar kaže, da sta bila robova rezila pribl. vzporedna. Presek rezila je nizek, lečast.

Izrazito ozek ovalen in raven ščitnik ročajnega branika je narejen iz okoli 0,5 mm debele pločevine iz medenine.[1044] Na zgornji površini so na enem mestu ostanki kositra[1045] – morda ostanki pritrditve na spodnjo stran branika. Spodnja stran ni bila pokositrena ali pa pokositrenje ni ohranjeno.[1046]

Rezilo meča in korozijske prirastke, ki verjetno vključujejo ostanke nožnice, so med konservatorskim postopkom leta 1992 na več mestih utrdili z umetno (epoksi) smolo, luknje in razpoke pa zapolnili z epoksi kitom. Stanje po tej konservaciji je na nekaterih mestih nakazovalo z železovo korozijo prepojene dele lesenih platic, ki sta se na robovih nožnice stikali.

Delna revizijska konservacija leta 2016 je na obeh straneh nožnice pokazala verjetne ostanke železne pločevine, ni pa potrdila, da so se ohranili ostanki lesenih platic.

1044 Glej pogl. 16, *pregl. A20: 2.*
1045 Glej pogl. 16, *pregl. A20: 3–4.*
1046 Glej pogl. 16. *pregl. A20: 1.*

A21 (*Pl. 6; Fig. A21.1–Fig. A21.2*)

Hilt with part of the blade. Iron. Surv. l. 167 mm, pommel w. 41 mm, handguard w. 38 mm. Inv. No. V 3051.
River Ljubljanica at Vrhnika.
Diving; NMS acquired in 2006.

The surviving part of the blade is 30 mm long and does not include the original cutting edges. The width of the handguard and the preservation of the blade on the left just below the handguard indicate that the blade was originally around 25 mm wide.

The lower part of the tang was forged in one with the blade. The iron crossguard was slipped onto it. The crossguard is wider in the centre and at the ends, and is not completely symmetrical: it is 3 mm thicker and 2 mm higher at one end than at the other.

The ring pommel and the upper part of the tang were made in one piece, but separately from the rest of the tang. The two parts of the tang overlap in the length of approx. 65 mm and are fastened together with two square-sectioned and one round-sectioned pin, which are barely discernible on the surface, but clearly visible on the X-ray image (*Fig. A21.2*). The ends of the overlapping parts of the tang are forged together without a clear transition visible apart from the tang being slightly thinner at these points than in the centre where the overlap is greatest.

A35 (*Pl. 6; Fig. A35*)

Fragment of the bottom part of a sword blade with remains of its scabbard. Iron, wood. Surv. l. 252 mm, w. 54 mm, th. 4 mm. Inv. No. V 2616.
River Ljubljanica at Ljubljana.
Diving; NMS acquired in 1994.

Bottom part of a sword blade that is well-preserved (particularly at the tip) and bears the remains of its wooden scabbard on one side of the point. It is widest just below the part where it broke off, narrows upwards and tapers downwards. The blade is flat diamond-shaped in section and thickest at the tip.

Figure A21.1
Fragment of the A21 sword, front (a) and back (b).

Slika A21.1
Ohranjeni del meča A21, sprednja (a) in hrbtna (b) stran.

Figure A21.2
X-ray image (90 KV, 4 mA, 60 seconds) of the A21 sword.

Slika A21.2
Rentgenski posnetek (90 KV, 4 mA, 60 sekund) meča A21.

Figure A35
Point of the A35 sword, front (a) and back (b).

Slika A35
Konica rezila meča A35, sprednja (a) in hrbtna (b) stran.

A21 (*t. 6; sl. A21.1–sl. A21.2*)

Ročaj z delom rezila meča. Železo. Ohr. dol. 167 mm, šir. zaključka ročaja 41 mm, šir. branika ročaja 38 mm. Inv. št. V 3051.
Ljubljanica pri Vrhniki.
Potapljanje; NMS pridobil 2006.

Rezilo meča je ohranjeno v dolžini 30 mm. Prvotni ostrini rezila nista ohranjeni; glede na širino branika in ohranjenost rezila na levi strani tik pod branikom domnevam, da je bila prvotna širina rezila okoli 25 mm.

Spodnji del ročajnega jezika je skovan v enem kosu z rezilom. Na spodnji strani je nanj nataknjen železen branik, ki je v sredini in ob straneh razširjen in ni povsem simetričen: na eni strani je 3 mm debelejši in 2 mm višji kot na drugi strani.

Obročast glavič je skupaj z zgornjim delom ročajnega jezika narejen posebej. Oba dela ročajnega jezika se presegata pribl. v dolžini 65 mm in sta pritrjena drug na drugega z dvema zatičema kvadratnega preseka ter verjetno z enim zatičem okroglega preseka, ki so na površini komajda opazni, dobro pa so vidni na rentgenskem posnetku (*sl. A21.2*). Zaključka presegajočih se delov ročajnega jezika sta skovana tako, da prehod ni viden, vidno pa je, da je ročajni jezik na zgornjem in spodnjem koncu tanjši kot v osrednjem delu, kjer se oba dela ročajnega jezika prekrivata.

A35 (*t. 6; sl. A35*)

Spodnji del rezila meča z ostanki nožnice. Železo, les. Ohr. dol. 252 mm, šir. 54 mm, deb. 4 mm. Inv. št. V 2616.
Ljubljanica pri Ljubljani.
Potapljanje; NMS pridobil 1994.

Spodnji del rezila meča je dobro ohranjen (posebno na konici) in ima na eni strani na konici ostanke lesene nožnice. V zgornjem delu je nakazana zožitev, ki ji sledita razširitev in dolga konica. Presek rezila ima obliko nizkega romba. Debelina rezila je na konici rahlo odebeljena.

B
DAGGERS

B1 (*Pl. 7, Pl. 8; Fig. B1.1–Fig. B1.7*)

Dagger and its sheath. Iron, wood; decoration: brass, tin-lead alloy, enamel. Dagger: l. 341 mm, w. 63 mm, wgt. 200.22 g; sheath: l. 264 mm, w. (at the mouth) 71 mm, wgt. 212.27 g. Inv. No. V 417.
River Ljubljanica at Rakova Jelša, Rakova jelša.
Underwater topographic survey in 1992; NMS acquired in 1992.
Rant et al. 1994; Svoljšak et al. 1997, 259–260, No. 62/I-9e, Fig. 32a–c, Fig. 33; Bitenc, Knific 1997, 24, Fig. 13/left; Milić, Rant, Nemec 1997; Istenič 2009h, Cat. No. 68.

The dagger and its sheath are in excellent condition and not corroded together (*Fig. B1.2*).

The dagger survives complete. The blade is waisted, it has a long and strongly tapering point and a pronounced midrib flanked and defined by grooves. Both cutting edges are well preserved. Remains of wooden sheath lining survive in the iron corrosion on both sides of the blade (*Fig. B1.1, Fig. B1.2a, b*).

The core of the handle (*Fig. B1.2c–e, Fig. B1.3*) is the tang, forged in one with the blade; it seems to end at the beginning of the pommel. The outer shell of the handle consists of iron front and back plates. They encased the upper end (shoulders) of the blade and the tang, as well as the wooden parts on both sides of the tang (remains in accretions between the tang and the outer plates?) and in the pommel. All elements are fastened together with ten rivets: four on the handguard, three on the central (vertical) part and three on the semicircular (flat-topped) pommel. Five of the rivets (two on the handguard, two on the central part and one in the centre of the pommel) are either not visible or barely discernible on the surface, but are clear on the X-ray image, while eight rivets have clearly visible heads decorated with red enamel[1047] (five on the front of the handle and three on the flat top of the pommel).

Wood survives at the pommel. It is visible in the side view (*Fig. B1.2c, d*) and on the neutron radiography

Figure B1.1
Front of the B1 dagger and sheath (including wooden lining) prior to conservation.

Slika B1.1
Sprednja stran bodala (z ostanki lesa nožnice) in nožnice B1 pred začetkom konservacije.

Figure B1.2
The B1 dagger and sheath after conservation: a) front, b) back, c, d) pommel sides, detail of the wooden interior of the pommel and remains of sheet brass, e) top side of the pommel.

Slika B1.2
Bodalo in nožnica B1 po konservaciji: a) sprednja stran, b) hrbtna stran, c, d) stranski ploskvi glaviča, detajl – vidijo se les v notranjosti glaviča in ostanki medeninaste pločevine, e) zgornja ploskev glaviča.

1047 Cf. Chapter 16, *Table B1.2:12.*

c d

e

b

B
BODALA

B1 (*t. 7, t. 8; sl. B1.1–sl. B1.7*)

Bodalo in pripadajoča nožnica. Železo, les; okras: medenina, zlitina kositra in svinca, emajl. Bodalo: dol. 341 mm, šir. 63 mm, teža 200,22 g; nožnica: dol. 264 mm, šir. (pri ustju) 71 mm, teža 212,27 g. Inv. št. V 417.
Ljubljanica pri Rakovi Jelši (Rakova jelša).
Podvodna topografija 1992; NMS pridobil 1992.
Rant et al. 1994; Svoljšak et al. 1997, 259–260, št. 62/I-9e, sl. 32a–c, sl. 33; Bitenc, Knific 1997, 24, sl. 13/levo; Milić, Rant, Nemec 1997; Istenič 2009g, kat. 68.

Bodalo in pripadajoča nožnica sta izjemno dobro ohranjena in nista sprijeta (*sl. B1.2*).

Bodalo je ohranjeno v celoti. Rezilo je v zgornji tretjini usločeno, ima dolgo in izrazito konico. Obe ostrini sta odlično ohranjeni. Po sredini rezila teče izrazito rebro, ki ga ob straneh spremljata široka žlebova. Na zgornjem delu rezila so se na sprednji in hrbtni strani v železovi koroziji ohranili ostanki lesa (*sl. B1.1, sl. B1.2a, b*), ki so prvotno pripadali notranjemu delu nožnice.

Jedro ročaja je jezičast del, ki se nadaljuje iz rezila in sega do začetka glaviča. Na obeh straneh je bil najverjetneje obložen z lesenima podlogama (ostanki v korozijskem prirastku?). Zunanjost ročaja sta sestavljali sprednja in hrbtna železna obloga. Elementi ročaja so speti z desetimi zakovicami: štirimi na spodnjem (vodoravno ležečem) delu ročaja, tremi na osrednjem pokončnem delu ročaja in tremi na polkrožnem zaključku ročaja. Petih zakovic (po dve na prečnem in pokončnem delu ročaja ter ena v sredini glaviča) na površini ni videti oz. so komajda opazne, jasno pa so razpoznavne na rentgenskem posnetku, osem zakovic (pet na sprednji strani ročaja in tri na zgornjem robu glaviča) pa ima jasno vidne, z rdečim emajlom[1047] okrašene glavice (*sl. B1.2a, b, sl. B1.3*).

Les je dobro ohranjen v glaviču. Viden je na strani ročaja (*sl. B1.2c, d*) ter na posnetku, narejenem z nevtronsko radiografijo (*sl. B1.4*). Sklepamo, da so iz lesene veje (ali tenkega stebla) primerne debeline

1047 Glej pogl. 16, *pregl. B1.2: 12.*

image (*Fig. B1.4*). The latter shows that a disc was cut from a suitably thick branch perpendicularly to the tree rings. Roughly half of it was then cut away and the rest used for the core of the pommel.[1048] The end of the tang was probably pushed into the pommel wood.

The 6 to 9 mm wide gaps between the two metal plates of the pommel were originally closed by a strip of sheet brass,[1049] the remains of which survive in two places (*Fig. B1.2c, d*). On the flat top side of the pommel, a separately made thin iron plate was inserted in the gap between the upper edges of the two metal plates and attached with three rivets that have decorated heads and very long shanks (*Fig. B1.3*). The plate is broken in two places on the right side, between the second and third rivets (*Fig. B1.2e, B1.3*).

The sheath survives almost complete, with only two suspension rings on the left missing. It consists of the roughly 2 mm thick iron plate at the front and the slightly thinner (th. around 1.3 mm) iron plate at the back. It is not clear whether both plates or just the front one are curved (cf. the daggers under B2 and B3), but they fit together perfectly along the sides and the contact is not visible. The remains of wood on the blade (*Fig. B1.1,* Fig. *B1.2*) and the neutron radiography images (*B1.5*) show the sheath was lined with thin wooden plates after the iron parts of the sheath had been made.[1050]

The front and back plates of the sheath are fastened together with thirteen rivets (*Fig. B1.2, Fig. B1.3*). Twelve of them (in four groups of three) along the edges also serve to fasten four loops with suspension rings (only two survive) to the sheath. All the rivets have their heads on the front and are decorated with red enamel.[1051]

A rivet with a red enamelled head also pierces the disc terminal (diam. approx. 24 mm, th. approx. 9 mm) of the sheath, decorated at the front with a 3–4 mm wide circular moulding which is chased with small radially arranged lines and plated with a tin-lead alloy.[1052]

The front plate of the sheath is inlaid with enamel. The decoration is divided into four zones, the upper three being rectangular and the lower one triangular.

The first and third zones are similar in form and size. They have a frame of around 1.5 mm thick inlaid brass. Most lines of the inlaid frame are straight, only

Figure B1.3
X-ray image (140 KV, 5 mA, 50 seconds) of the B1 dagger and sheath.

Slika B1.3
Rentgenski posnetek (140 KV, 5 mA, 50 sekund) bodala in nožnice B1.

Figure B1.4
Neutron image of the upper part of the B1 dagger handle.

Slika B1.4
Zgornji del ročaja bodala B1, nevtronska radiografija.

1048 Milić, Rant, Nemec 1997, 138, Fig. 11.
1049 Cf. Chapter 16, *Table B1.1: 15–16.*
1050 Milić, Rant, Nemec 1997, 137–139, Figs. 5–7.
1051 Cf. Chapter 16, *Table B1.2: 7–8.*
1052 Cf. Chapter 16, *Table B1.1: 1.*

Figure B1.5
Neutron image of the central part of the B1 dagger sheath.

Slika B1.5
Srednji del nožnice bodala B1, nevtronska radiografija.

Figure B1.6
Lower part of the B1 dagger sheath prior to conservation, detail; a sheathed dagger is depicted within a triangular frame and the semi-circular pommel of the dagger bears the remains of red enamel inlay.

Slika B1.6
Spodnji del nožnice B1 pred začetkom konservacije, detajl. V trikotnem polju je dobro vidna upodobitev bodala v nožnici; zdi se, da so v polkrožnem zaključku ročaja ostanki rdečega emajla.

Figure B1.7
Presumed original appearance of the B1 dagger and sheath; the decoration of the second zone from the top (marked with light grey) is too poorly preserved to be reconstructed.

Slika B1.7
Domneven prvotni videz bodala v nožnici B1. Na sivo označenem polju (drugem od zgoraj) zaradi slabe ohranjenosti ni bilo mogoče rekonstruirati videza okrasa.

pravokotno na letnice izrezali kolut lesa, mu odrezali pribl. polovico ter ga uporabili za jedro glaviča.[1048] Tega so najverjetneje nasadili na vrh ročajnega jezika.

Prvotno sta 6 do 9 mm široki izbočeni stranici glaviča zapirala trakova medeninaste[1049] pločevine. Njuni ostanki so ohranjeni na dveh mestih (*sl. B1.2c, d*). Na zgornji, ravni stranici glaviča površino med robovoma, ki ju predstavljata sprednja in hrbtna železna obloga ročaja, prekriva tenka železna ploščica, ki je na desni strani (med 2. in 3. zakovico) na dveh mestih razlomljena (*sl. B1.2e, B1.3*). Pritrjena je s tremi zakovicami, ki imajo okrasne glavice in zelo dolge trne (*sl. B1.3*).

Nožnica je ohranjena skoraj v celoti, manjkata le dva obročka za pripenjanje na levi strani. Sestavljena je iz sprednje, okoli 2 mm debele polovice in malo tanjše hrbtne železne polovice (deb. okoli 1,3 mm). Ni jasno, ali sta ob straneh upognjeni obe polovici ali le sprednja (prim. bodali B2 in B3), vsekakor pa obe ob straneh odlično nalegata, tako da stik ni opazen. Ostanki lesa na rezilu bodala (*sl. B1.1, sl. B1.2*) in posnetki z nevtroni (*B1.5*) kažejo, da je bil v notranjosti nožnice les, najverjetneje v obliki lesenih ploščic, ki so bile v nožnico vstavljene po tem, ko je bil železni del nožnice že narejen.[1050]

Sprednji in hrbtni polovici nožnice spenja trinajst zakovic (*sl. B1.2, sl. B1.3*). Vse imajo na sprednji strani nožnice glavice, okrašene z rdečim emajlom.[1051] Dvanajst zakovic (štiri skupine po tri zakovice) ob strani nožnice nanjo pripenja tudi štiri zanke, v katerih so bili obročki (ohranjena sta le dva), ki so služili obešanju bodala na vojaški pas.

Ena zakovica je v sredini krožne razširitve (premer okoli 24 mm, debelina okoli 9 mm) na koncu nožnice, ki je na sprednji strani okrašena s 3–4 mm širokim krožnim rebrom, prevlečenim z zlitino kositra in svinca[1052] ter punciranim okrasom. Zakovica ima rdeče emajlirano glavico.

Okrašena je sprednja stran nožnice. Okras je razporejen v štiri polja, zgornja tri so pravokotna, spodnje pa trikotno.

Prvo in tretje polje sta podobne oblike in podobnih mer. Omejujejo ju okoli 1,5 mm debele medeninaste tavširane linije. Te so ravne, le ena (spodnja stranica tretjega okrasnega polja) je vijugasta. V sredini obeh

1048 Milić, Rant, Nemec 1997, 138, sl. 11.
1049 Glej pogl. 16, *pregl. B1.1: 15–16.*
1050 Milić, Rant, Nemec 1997, 137–139, sl. 5–7.
1051 Glej pogl. 16, *pregl. B1.2: 7–8.*
1052 Glej pogl. 16, *pregl. B1.1: 1.*

one (lower side of the third decorative zone) is wavy. The centres of both zones have a circle of inlaid brass, containing poorly preserved enamel motifs: a wreath in the first zone and a rosette in the third (*Fig. B1.2, Fig. B1.7*).

The second or central decorative zone is higher than the adjacent two. It is delimited by poorly preserved inlaid brass. The decorative motif in this zone is damaged beyond recognition (*Fig. B1.2, Fig. B1.7*).

The lowest decorative zone has a triangular frame and another triangle inscribed within (*Fig. B1.6, Fig. B1.7*). Both frames are made of inlaid brass (only surviving in traces). The roughly 6 mm wide band between the two triangles is filled with a chased motif that would originally probably have been inlaid with red enamel, now missing. The smaller triangle bears a sheathed dagger with a semicircular pommel that was originally inlaid with red enamel (surviving in the pommel).

The probable original appearance of the dagger in its sheath is shown on *Fig. B1.7*.

B2 (*Pl. 9; Fig. B2.1–Fig. B2.6*)

Dagger in its sheath. Iron, wood; decoration: silver, brass, enamel. Surv. dagger and sheath l. 312 mm, wgt. 390 g; sheath l. 268 mm, sheath w. (at the mouth) 65 mm, dagger w. 67 mm. Inv. No. V 1714.
River Ljubljanica at Črna vas.
Diving; NMS acquired in 2002.
Istenič 2009h, Cat. No. 69.

The dagger and its sheath are corroded together.

Only the guard (w. 66 mm) and the lower part of the central vertical part survive of the dagger. It is composed of front and back iron plates that envelop the upper part of the blade and the tang. The latter is visible on the back of the handle where the vertical part of the outer plate is missing (*Fig. B2.1b*).

The outline of the sheath suggests that the blade is waisted. The X-ray image (*Fig. B2.3*) shows that it has a pronounced midrib flanked and defined by grooves, similar to the B1 dagger. The tip of the blade reaches almost to the interior end of the sheath, indicating that the blade measures around 235 mm in length.

The X-ray image (*Fig. B2.3*) also shows that the iron plates of the handle were attached to the blade with four rivets at the guard. Two are approx. 20 mm from the edge, clearly visible on the X-ray image, but al-

Figure B2.1
The B2 dagger and sheath after conservation: a) front, b) back.

Slika B2.1
Bodalo in nožnica B2 po konservaciji: a) sprednja stran, b) hrbtna stran.

Figure B2.2
The B2 sheath prior to conservation: a) central part with traces of green enamel, b) disc terminal.

Slika B2.2
Nožnica B2 pred konservacijo: a) osrednji del, viden je zelen emajl, b) zaključek nožnice.

Figure B2.3
X-ray image (150 KV, 2.5 mA, 60 seconds) of the B2 dagger and sheath.

Slika B2.3
Rentgenski posnetek (150 KV, 2,5 mA, 60 sekund) bodala in nožnice B2.

Figure B2.4
Remains of inlaid brass decoration on the B2 sheath: a) right (cf. *Fig. 96 : 8*), b) left (cf. *Fig. 96 : 7*).

Slika B2.4
Ostanki tavširane medenine na nožnici B2: a) na desni strani (prim. *sl. 96 : 8*), b) na levi strani (prim. *sl. 96 : 7*).

polj je krog, omejen s tavširano medeninasto linijo in okrašen s slabo ohranjenim emajliranim okrasom (*sl. B1.2, sl. B1.7*).

Srednje pravokotno polje je dosti višje kot prvo in tretje polje. Omejuje ga medeninasta tavširana linija; medeninasti vložki so slabo ohranjeni. Okras v tem polju ni ohranjen (*sl. B1.2, sl. B1.7*).

Spodnje okrasno polje omejuje trikoten okvir, v katerem je še en trikotnik (*sl. B1.6, sl. B1.7*). Oba sta bila izdelana iz medenine v tehniki tavširanja (medenina v železu; ostanki medenine so ohranjeni le v sledovih). V okoli 6 mm širokem pasu med trikotnikoma je enakomerno razporejen punciran okras, prvotno najverjetneje zapolnjen z rdečim emajlom, ki pa ni ohranjen. V manjšem trikotniku je bilo z nizko poglobitvijo, ki je bila zapolnjena z rdečim emajlom, upodobljeno bodalo s polkrožnim zaključkom ročaja v nožnici. Ostanki emajla so ohranjeni na upodobitvi polkrožnega glaviča.

Rekonstrukcija prvotnega izgleda bodala v nožnici je prikazana na *sl. B1.7*.

B2 (*t. 9; sl. B2.1–sl. B2.6*)

Bodalo in pripadajoča nožnica. Železo, les; okras: srebro, medenina, emajl. Ohr. dol. bodala in nožnice 312 mm, teža 390 g; dol. nožnice 268 mm, šir. nožnice (pri ustju) 65 mm, šir. bodala 67 mm. Inv. št. V 1714.
Ljubljanica pri Črni vasi.
Potapljanje; NMS pridobil 2002.
Istenič 2009g, kat. 69.

Bodalo v nožnici, s katero je sprijeto s korozijo.

Od bodala je viden le ohranjeni del ročaja, tj. spodnji, prečni del (širina 66 mm) in spodnji del navpičnega dela ročaja. Ročaj je sestavljen iz sprednje in hrbtne obloge. Objemata zgornji del rezila bodala in njegovo jezičasto nadaljevanje, vidno na hrbtni strani bodala, kjer paličasti del ročajne obloge ni ohranjen (*sl. B2.1b*).

Iz oblike nožnice izhaja, da je bilo rezilo bodala v zgornjem delu usločeno. Rentgenski posnetek (*sl. B2.3*) kaže, da je rezilo imelo izrazito osrednje rebro in na vsaki strani rebra še en manj izrazit greben, podobno kot bodalo B1. Konica bodala sega skoraj do konca notranjega dela nožnice, iz česar sklepam, da je bilo rezilo dolgo okoli 235 mm.

most imperceptible on the surface (only one is visible at the back: *Pl. 9; Fig. B2.1b*). The other two, with considerably thinner shafts and clearly visible decorative heads on the front, are located at the edges (*Fig. B2.1a*). They are not preserved well, but similar sheaths suggest they resembled the rivet heads on the sheath of the dagger.

The front of the handle bears partially surviving inlaid silver decoration, which is clearly visible on the X-ray image (*Fig. B2.3*): two longitudinal stripes of reticular design on the central section of the handle and parallel oblique lines on the handguard.

The sheath survives nearly complete; only four suspension loops are missing (*Pl. 9; Fig. B2.1*). It is composed of a slightly convex front plate and a flat back plate; the front is curved at the sides and meets the back plate at roughly the right angle.

The front of the sheath has three decorated rivet heads positioned symmetrically on each side below the mouth. The X-ray image (*Fig. B2.3*) for this part shows three shanks on the left and four on the right; one of the shanks on the right (the third from the top down) cannot be related to any heads, suggesting it is a pin. A similar situation can be observed in the lower group of rivets: three heads are visible on each side on the surface, while the X-ray image (*Fig. B2.3*) clearly shows four shafts on each side, of which the third from the top down is headless, i.e. it is a pin.

The decorated rivet heads show no traces of enamel, but these may be hidden under the corrosion.

The sheath terminates in a disc (diam. 25 mm, th. 8 mm) pierced in the centre by a rivet that originally most probably had a decorated head on the front, which was moulded and tinned.[1053] The photo of its condition prior to conservation (*Fig. B2.2b*) indicates the front bore low relief decoration.

The front is decorated with inlaid silver,[1054] brass[1055] and green enamel.[1056] Many of the lines engraved to take the metal inlay, which later fell out, clearly show minute transverse incisions (*Fig. B2.5, Fig. B2.6*) that probably ensured better adhesion of the inlay.

The decoration shown on *Pl. 9* is based on the existing condition, the X-ray image and the photos of the dagger and its sheath prior to and during conservation.

Figure B2.5
Front of the B2 sheath, bottom (triangular) zone, detail; a groove for inlaid decoration shows minute transverse incisions and remains of inlaid silver.

Slika B2.5
Sprednja stran nožnice B2, spodnje (trikotno) okrasno polje, detajl: tavširana linija z drobnimi prečnimi vrezi in ostanki vloženega srebra.

The decoration on the sheath is divided into four zones, three of them rectangular and the lower one triangular (*Pl. 9*).

The first and third zones most likely had similar silver inlaid decoration composed of a rectangular frame with an inscribed double circle and a rosette in the centre. The space between the circle and the outer frame was filled with tiny parallel inlaid lines, traces of which are only visible in the upper field. The centre of the rosette in the upper zone shows the remains of a rivet head measuring around 1.5 mm across (*Fig. B2.1a*), while the X-ray image (*Fig. B2.3*) shows a round hole on the same spot; a rivet shaft is discernible in the centre of the rosette of third zone. This suggests that the first and third zones had a rivet in the centre of the rosettes, which presumably had a decorated head that has not survived.

The decoration of the second, elongated rectangular zone is very poorly preserved. It has a thin rectangular frame, the surviving remains of which suggest it was made of inlaid brass (*Fig. B2.4a*). The central part bears two hemispherical fields that touch in the centre and are framed with an inlaid line and filled with green enamel (*Fig. B2.2a*). Each of the four corners (of the frame) has a slight protrusion measuring around 1.5 mm across, presumably the heads of rivets. The X-ray image (*Fig. B2.3*) shows round holes on these spots, with remains of rivet shafts; they presumably had decorative heads. The second zone also has an approx. 7 mm high field above and below, decorated with inlaid crosses (or possibly a reticular design).

The lower triangular zone has a frame of inlaid silver. Parallel to the longitudinal sides of the frame and outside the frame are lines of inlaid brass, of which

1053 Cf. Chapter 16, *Table B2.1: 5.*
1054 Cf. Chapter 16, *Table B2.1: 1–2, 4, 7–9.*
1055 Cf. Chapter 16, *Table B2.1: 6.*
1056 Cf. Chapter 16, *Table B2.2: 3.*

Figure B2.6
Front of the B2 sheath, bottom (triangular) zone, detail of the decoration; silver and brass (small cross in the centre) inlays.

Slika B2.6
Sprednja stran nožnice B2, spodnje (trikotno) okrasno polje, detajl okrasa: tavširanje s srebrom in medenino (križček v sredini).

Rentgenski posnetek (*sl. B2.3*) tudi kaže, da sta bili železni oblogi ročaja v spodnjem, v črko T oblikovanem delu na rezilo pritrjeni s štirimi zakovicami: dve ležita približno 20 mm od roba in sta na rentgenskem posnetku izraziti, na površini pa komajda zaznavni (vidna je le ena, na hrbtni strani: *t. 9; sl. B2.1b*), drugi dve, ki imata bistveno tanjši zatič, sta ob robu; njuni glavici sta jasno vidni na sprednji strani bodala (*sl. B2.1a*). Nista dovolj dobro ohranjeni, da bi lahko sklepali o njunem prvotnem videzu. Po analogijah domnevam, da sta bili podobni glavicam zakovic na nožnici bodala.

Na sprednji strani ročaja je deloma ohranjen srebrn tavširan okras, ki je dobro viden na rentgenskem posnetku (*sl. B2.3*): dve navpični liniji motiva mreže na pokončnem delu ročaja in vzporedne poševno ležeče linije v T oblikovanem delu ročaja.

Nožnici manjkajo vse štiri zanke za pripenjanje, sicer pa je v celoti ohranjena (*t. 9; sl. B2.1*). Sestavljena je iz sprednje, rahlo izbočene in skoraj ravne hrbtne polovice; sprednja je ob straneh močno upognjena, tako da pribl. pravokotno nalega na hrbtno polovico.

Na sprednji strani nožnice ležijo na robu pod ustjem, na obeh straneh približno simetrično postavljene tri okrasne glavice zakovic. Na rentgenskem posnetku (*sl. B2.3*) so na tem delu nožnice vidni na levi strani trije, na desni strani pa štirje trni, predzadnji spodaj brez sledov glavice. Domnevam, da ta trn ustreza zatiču, tj. zakovici brez glavice. Podobno je pri spodnji skupini zakovic ob robu sprednjega dela nožnice: na površini so vidne tri glavice okrasnih zakovic na vsaki strani, na rentgenskem posnetku (*sl. B2.3*) pa je na vsaki strani poleg trnov zakovic viden zatič brez glavice (tretji od zgoraj navzdol).

V okrasnih glavicah zakovic ni bilo opaziti ostankov emajla, ki pa so lahko pod korozijo.

Nožnica se spodaj zaključuje s krožno razširitvijo (premer 25 mm, debelina 8 mm), ki ima na sprednji, s kositrom[1053] prekriti površini poglobitev in zakovico, ki je verjetno prvotno imela okrasno glavico. Posnetki stanja pred konservacijo (*sl. B2.2b*) kažejo, da je imela pokositrena površina plitev reliefen okras.

Sprednja stran nožnice je okrašena s tavširanjem (srebro[1054] in medenina[1055] v železu) in zelenim emajlom.[1056] Na številnih tavširanih linijah, kjer ni ohranjena vložena kovina, so jasno vidni drobni prečni vrezi (*sl. B2.5, sl. B2.6*), ki so bili najverjetneje narejeni zato, da bi se emajl bolje sprijel s podlago.

Pri risbi okrasa (*t. 9*) smo se oprli na zdajšnje stanje, rentgenski posnetek ter na fotografije, narejene pred konservacijo in med njo.

Okras nožnice je razporejen v štiri polja, tri pravokotna in spodnje trikotno (*t. 9*).

Prvo in tretje polje sta imeli najverjetneje podoben, s srebrom v železo tavširan okras, ki ga sestavljata pravokoten okvir in rozeta v dveh krožnicah. Prostor med krožnico in pravokotnim okvirjem je bil zapolnjen z vzporednimi tavširanimi linijami, od katerih so sledovi vidni le v zgornjem polju. V sredini rozete v zgornjem polju je videti glavico zakovice premera okoli 1,5 mm (*sl. B2.1a*), rentgenski posnetek (*sl. B2.3*) pa na istem mestu kaže okroglo luknjico; ta je očitna tudi v tretjem okrasnem polju, vendar je v njej viden zatič. To kaže, da je bila v prvem in tretjem okrasnem polju v sredini rozete zakovica, za katero domnevam, da je imela okrasno glavico, a se ta ni ohranila.

Okras srednjega okrasnega polja, ki je podolgovate pravokotne oblike, je zelo slabo ohranjen. Omejen je bil s tenkim pravokotnim okvirjem, za katerega glede na ohranjene ostanke domnevam, da je bil tavširan z medenino (*sl. B2.4a*). V osrednjem delu sta bili pokončni polkrožni polji, omejeni s tavširano linijo in zapolnjeni z emajlom zelene barve (*sl. B2.2a*). V vsakem vogalu tega dela okrasa je vidna po ena izboklina premera okoli 1,5 mm, domnevno glava zakovice. Rentgenski posnetek (*sl. B2.3*) na teh mestih kaže okrogle luknjice izrazito pravilne oblike. V njih so vidni ostanki trnov zakovic; domnevam, da so prvotno imele okrasne glavice. Okrasno polje ima zgoraj

1053 Glej pogl. 16, *pregl. B2.1: 5.*
1054 Glej pogl. 16, *pregl. B2.1: 1–2, 4, 7–9.*
1055 Glej pogl. 16, *pregl. B2.1: 6.*
1056 Glej pogl. 16, *pregl. B2.2: 3.*

only the barely discernible groove, in one spot with a trace of brass,[1057] survives (*Fig. B2.4b*). The upper part of the triangular zone has a roughly 7 mm high field decorated with inlaid crosses. Decoration is best preserved in the right part of the fields (*Fig. B2.6*) and shows that most of the crosses are made of silver and the central one of brass.[1058] The X-ray (*Fig. B2.3*) shows a small hole, the right one holding a rivet shaft, on the lower edge on each side of this field. Below is a roughly 23 mm high field that repeats the motifs of hemispheres delimited with inlaid silver and possibly also filled with green enamel. The area outside the hemispheres is decorated with minute parallel lines of inlaid silver, visible on the X-ray image (*Fig. B2.3*). The lowest part of the triangular zone is poorly preserved. The upper right corner presumably bears a rosette within an inlaid circle and with a rivet in the centre, judging from the X-ray image. The symmetrically positioned hole on the left side and the remains of an inlaid silver circle indicate symmetrical decoration. The inlaid decoration in the lowest part is only discernible from the X-ray image and indicates two triangular fields positioned side by side and filled with small oblique and parallel lines.

B3 (*Pl. 10; Fig. B3.1–Fig. B3.5, Fig. A9*)

Dagger in its sheath. Iron, wood; decoration: brass. Surv. dagger and sheath l. 232 mm, sheath l. 207 mm, sheath w. (at the mouth) 70 mm, wgt. 218 g. Inv. No. V 443a.
River Ljubljanica at Blatna Brezovica, Lipavec.
Diving; NMS acquired in 1993.
Istenič 2012, 159–163, Figs. 1–2, 5.

The dagger is corroded into its sheath. The back of the B3 sheath was found corroded onto the front of the A9 sheath (*Fig. A9.1, Fig. B3.2*); the B3 and A9 items have been separated during conservation.

The surviving part of the handle includes the handguard (surv. w. 58 mm) and the lowest vertical part (surv. h. 15 mm). It is composed of the front and back plates that envelop the upper part of the blade and the tang, the latter visible on the front, where the outer plate has not survived, and from above. The front and back handle plates are attached to the upper part of the blade with four rivets: two roughly 4 mm thick ones in the centre and two thinner ones at the sides, of which only one survives (*Fig. B3.3*). The rivets at the sides probably had decorated heads on the front, but these are not preserved.

Figure B3.1
The B3 dagger and sheath after conservation: a) front, b) back.

Slika B3.1
Bodalo in nožnica B3 po konservaciji: a) sprednja stran, b) hrbtna stran.

1057 Cf. Chapter 16, *Table B2.1: 7.*
1058 Cf. Chapter 16, *Table B2.1: 6, 9.*

Figure B3.2
X-ray image (90 KV, 4 mA, 30 seconds) of the B3 dagger and sheath corroded into the A9 sword and scabbard, prior to conservation.

Slika B3.2
Rentgenski posnetek (90 KV, 4 mA, 30 sekund) bodala in nožnice B3 in dela meča z nožnico A9 pred začetkom konservacije.

Figure B3.3
X-ray image (100 KV, 4 mA, 60 seconds) of the B3 dagger and sheath.

Slika B3.3
Rentgenski posnetek (100 KV, 4 mA, 60 sekund) bodala in nožnice B3.

in spodaj pribl. 7 mm visok pas, ki je bil s tavširanjem okrašen z motivom križčkov (ali morda mreže).

Spodnje okrasno polje trikotne oblike omejuje okvir, izdelan v tehniki tavširanja srebra v železo. Zunaj trikotnega polja in vzporedno z daljšima stranicama sta ležali z medenino tavširani liniji, od katerih sta ohranjena slabo viden utor in na enem mestu delček medenine[1057] (*sl. B2.4b*). V zgornjem delu trikotnega polja je bil okoli 7 mm visok pas, okrašen s tavširanimi križčki. Najbolje je ohranjen okras v desnem delu pasu (*sl. B2.6*), ki kaže, da je bila večina križčkov srebrna, sredinski pa je medeninast.[1058] Rentgenski posnetek (*sl. B2.3*) kaže, da je ob vsaki strani spodnjega roba tega pasu luknjica, ki je na desni strani delno zapolnjena s trnom zakovice. Pod njim je okoli 23 mm visoko polje, v katerem se ponovi motiv dveh polkrogov, ki sta omejena s srebrno tavširano linijo in sta bila morda zapolnjena z zelenim emajlom. Prostor zunaj polkrogov je bil okrašen z drobnimi vzporednimi srebrnimi tavširanimi linijami, ki so vidne na rentgenskem posnetku (*sl. B2.3*). Skrajni spodnji del okrasa je zelo slabo ohranjen. V zgornjem desnem vogalu lahko razberemo odtis rozete, ki je bila glede na rentgenski posnetek obdana s tavširano krožnico in je imela v sredini zakovico. Simetrično ležeča luknja, ki kaže na zakovico, in ostanki tavširane krožnice kažejo na simetričnost tega dela okrasa. Tavširan okras v zaključnem delu tega okrasnega polja je razviden le iz rentgena in nakazuje dve pokončni trikotni polji, zapolnjeni z drobnimi poševnimi vzporednimi linijami.

B3 (*t. 10; sl. B3.1–sl. B3.5, sl. A9.1*)

Bodalo in pripadajoča nožnica. Železo, les; okras: medenina. Ohr. dol. bodala in nožnice 232 mm, dol. nožnice 207 mm, šir. nožnice (pri ustju) 70 mm, teža 218 g. Inv. št. V 443a.
Ljubljanica pri Blatni Brezovici (Lipavec).
Potapljanje; NMS pridobil 1993.
Istenič 2012, 159–163, sl. 1–2, 5.

Bodalo v nožnici, s katero je sprijeto s korozijo. Hrbtna stran nožnice je bila ob odkritju po celotni dolžini sprijeta z licem nožnice meča A9 (*sl. A9.1, sl. B3.2*); predmeta so v konservatorskem posegu ločili.

Od bodala je viden le ohranjeni del ročaja, tj. spodnji, prečni del (ohr. širina 58 mm) in spodnji del navpičnega dela ročaja (ohr. višina 15 mm). Ročaj je sestavljen iz sprednje in hrbtne obloge. Objemata zgornji del rezila bodala in njegovo jezičasto nadaljevanje, ki je vidno

1057 Glej pogl. 16, *pregl. B2.1: 7.*
1058 Glej pogl. 16, *pregl. B2.1: 6, 9.*

The X-ray image (*Fig. B3.3*) shows a well preserved blade measuring approx. 185 mm in length and around 46 mm in width, with a pronounced midrib.

The sheath consists of two iron plates, the front one that is slightly convex with curved edges that meet the flat back plate at roughly the right angle. The back shows wood underneath the iron plate (*Fig. B3.1b*). The two iron pieces are fastened together with four groups of three rivets that also fasten brass[1059] suspension loops to the sheath, one of which is missing. All rivet heads are of the same form and decoration. The brass shafts[1060] of the centrally placed rivets are clearly visible on the back of the sheath. A detailed examination of the rivet heads revealed that they are made wholly of brass (*Fig. B3.4*), although some were initially suspected – probably because of the expanded iron corrosion – to have had an iron core (*Fig. B3.5*).

The sheath has a disc terminal that bears a central rivet with a decorated head on the front, the appearance of which, coupled with what analyses have shown for other rivets, suggests that it, too, was made of brass.

The surface of the sheath is poorly preserved. There are no visible traces of decoration.

Figure B3.4
The B3 sheath, side view of the brass rivet and upper brass suspension loop on the right side.

Slika B3.4
Stranski pogled na medeninasto zakovico in zgornjo medeninasto zanko na desni strani nožnice B3.

Figure B3.5
The B3 sheath, rivet on the disc terminal.

Slika B3.5
Zakovica na zaključku nožnice B3.

B4 (*Pl. 11; Fig. B4.1–Fig. B4.3*)

Dagger. Iron and brass (rivets). Surv. l. 200 mm, surv. w. 62 mm, wgt. 60 g. Inv. No. V 2126.
River Ljubljanica at Podpeč, Velike senožeti.
Diving; NMS acquired in 1996.
Istenič 2012, 159–163, Figs. 3, 4, 6.

The blade is waisted. It originally measured around 51 mm at its widest point (below the handguard) and 38 mm at its narrowest point. It has a well preserved and 3–4 mm wide midrib of a triangular cross section. The point is missing.

The blade is forged in one with the tang. The latter and the upper part of the blade are enveloped by the front and back handle plates of iron. The front plate has a moulding at the junction of the guard and the vertical part of the handle. The two iron plates were originally separated by wood, which was up to 2 mm thick at the guard, while the thickness elsewhere was adapted to the form of the pieces. They are fastened together at the guard with one brass rivet[1061] on each side (*Fig. B4.3*). The heads of both rivets are carefully made and

Figure B4.2
X-ray image (80 KV, 4 mA, 30 seconds) of the B4 dagger.

Slika B4.2
Rentgenski posnetek (80 KV, 4 mA, 30 sekund) bodala B4.

1059 Cf. Chapter 16, *Table B3: 1, 3.*
1060 Cf. Chapter 16, *Table B3: 2.*
1061 Cf. Chapter 16, *Table B4: 1–2.*

Figure B4.1
The B4 dagger after conservation: a) front, b) back.

Slika B4.1
Bodalo B4 po konservaciji: a) sprednja stran, b) hrbtna stran.

na sprednji strani ob straneh, kjer del ročajne obloge ni ohranjen, kakor tudi v pogledu na ročaj od zgoraj. Oblogi sta bili pritrjeni na zgornji del rezila s štirimi zakovicami: dvema, debelima okoli 4 mm in tanjšima ob straneh, od katerih je ohranjena le ena (*sl. B3.3*). Zakovici ob straneh sta verjetno na sprednji strani imeli okrasni glavici, ki pa nista ohranjeni.

Rentgenski posnetek (*sl. B3.3*) kaže dobro ohranjeno rezilo bodala, dolžine pribl. 185 mm in širine okoli 46 mm, z izrazitim podolžnim rebrom v sredini.

Nožnica je sestavljena iz dveh železnih polovic, rahlo izbočene sprednje, ki je ob straneh približno pravokotno zapognjena, in iz hrbtne, ki je ravna. Na hrbtni strani je pod železom viden les (*sl. B3.1b*). Obe polovici nožnice sta speti s štirimi skupinami po treh zakovic, ki obenem na nožnico pritrjujejo tudi medeninaste[1059] zanke za obešanje, od katerih ena ni ohranjena. Vse glavice zakovic so enako oblikovane in so imele okrasno funkcijo. Zaključki medeninastih[1060] trnov srednjih zakovic so jasno vidni na hrbtni strani nožnice. Podroben pregled glavic zakovic je pokazal, da so cele iz medenine (*sl. B3.4*), čeprav se je pri nekaterih – verjetno zaradi razširitve železove korozije/preperine – zdelo, da je jedro njihovih glavic iz železa (*sl. B3.5*).

Konica nožnice je okrogla in na sprednji strani v sredini okrašena z zakovico, ki je glede na izgled in ostale zakovice na bodalu verjetno iz medenine.

Površina nožnice je zelo slabo ohranjena, sledov okrasa ni videti.

B4 (*t. 11; sl. B4.1–sl. B4.3*)

Bodalo. Železo in medenina (zakovici). Ohr. dol. 200 mm, ohr. šir. 62 mm, teža 60g. Inv. št. V 2126.
Ljubljanica pri Podpeči (Velike senožeti).
Potapljanje; NMS pridobil 1996.
Istenič 2012, 159–163, sl. 3, 4, 6.

Rezilo bodala je v zgornjem delu izrazito usločeno. Na najširšem mestu, tj. pod ročajem, je prvotno merilo okoli 51 mm, v zožitvi pa 38 mm. Po sredini poteka izrazito in dobro ohranjeno, 3–4 mm široko osrednje rebro, ki ima strehast presek. Konica rezila ni ohranjena.

Rezilo v ročajnem delu preide v ročajni jezik. Tega, obenem z zgornjim delom rezila, s sprednje in hrbtne strani objemata železni ročajni oblogi. Na sprednji

1059 Glej pogl. 16, *pregl. B3: 1, 3.*
1060 Glej pogl. 16, *pregl. B3: 2.*

also had a decorative function. The X-ray image (*Fig. B4.2*) also shows two iron pins (not visible on the surface) that fasten the handle plates to the blade and have a more central position in comparison with the brass rivets.

Figure B4.3
Rivets on the B4 dagger: a) left rivet in front view, roughly 16× magnification, b) left rivet in side view, roughly 18× magnification, c) right rivet in side view.

Slika B4.3
Zakovici na bodalu B4: a) leva zakovica, pogled od spredaj, povečava pribl. 16-krat, b) leva zakovica, pogled s strani, povečava pribl. 18-krat, c) desna zakovica, pogled s strani.

a

C
HELMETS

C1 (*Pl. 12; Fig. C1.1–Fig. C1.7*)

Helmet. Bronze, copper, iron. H. 223 mm, bowl th. 1 mm, wgt. 1182 g. Inv. No. R 18915.
River Ljubljanica at Blatna Brezovica, Tri lesnice.
Underwater topographic survey in 1984; NMS acquired in 1984.
Istenič 2009l.

The helmet is of bronze with around 12% tin.[1062]

The clear forging marks visible on the interior with the naked eye and on the X-ray image (*Fig. C1.1g, Fig. C7*) show the helmet to be made integrally with the hollow crest knob and the neckguard. Its exterior was polished and originally probably had an appearance similar to that achieved through conservation in 1985 (*Fig. C1.1a–d*).

The crest knob is decorated with a chased scale pattern composed of two superimposed lines of scales (*Fig. C1.2a, b*). The top of the knob has an approx. 1 mm wide and 1 mm deep indentation (*Fig. C1.2c*). There is a flaw discernible on the front side of the knob and below it (*Fig. C1.2b*).

1062 Cf. Chapter 16, *Table C1: 1–2.*

b

c

strani je pokončni del ročajnih oblog na prehodu v prečni del na vsaki strani okrašen z rebrom. Med navedenimi železnimi deli ročaja je bil prvotno zelo verjetno les, ki je bil v spodnjem delu, kjer ročajni oblogi objemata zgornji del rezila, debel največ 2 mm, v zgornjem delu se je njegova debelina prilagajala obliki ročajnih oblog. Ročajni oblogi sta na robovih spodnjega, v črko T oblikovanega dela ročaja speti na vsaki strani s po eno medeninasto[1061] (*sl. B4.3*) zakovico. Glavici obeh medeninastih zakovic sta skrbno izdelani in sta bili bodalu v okras. Na rentgenskem posnetku (*sl. B4.2*) sta dobro vidna železna zatiča, ki spenjata železni oblogi ročaja in njegovo rezilo, a na površini nista vidna.

C
ČELADI

C1 (*t. 12; sl. C1.1–sl. C1.7*)

Čelada. Bron, baker, železo. Viš. 223 mm, deb. kalote 1 mm, teža 1182 g. Inv. št. R 18915.
Ljubljanica pri Blatni Brezovici (Tri lesnice).
Podvodna arheološka topografija 1984; NMS pridobil 1984.
Istenič 2009k.

Čelada je iz brona, ki vsebuje okoli 12 % kositra.[1062]

Jasni sledovi kovanja, ki so vidni na notranji strani čelade in na rentgenskem posnetku (*sl. C1.1g, sl. C1.7*), kažejo, da je bila čelada skovana v enem kosu, vključno z votlim gumbom na vrhu in vratnim ščitnikom. Njena zunanja površina je bila spolirana. Najverjetneje je imela zunanja površina čelade podoben prvotni videz, kot po zaključku konservatorskega postopka leta 1985, ko so jo spolirali do rumenega kovinskega leska (*sl. C1.1a–d*).

Na gumbu čelade sta liniji (druga nad drugo) punciranih pokončnih lokov (*sl. C1.2a, b*). Na vrhu gumba je pribl. 1 mm široka in 1 mm globoka vdolbinica

1061 Glej pogl. 16, *pregl. B4: 1–2.*
1062 Glej pogl. 16, *pregl. C1: 1–2.*

a

b

e

f

c

d

g

Fig. C1.1
The C1 helmet after cleaning and conservation: a) front, b) right, c) left, d) back, e) view from above, f) interior, view towards the hollow crest knob, g) interior with visible forging marks.

Slika C1.1
Čelada C1 po čiščenju in konserviranju: a) spredaj, b) desna stran, c) leva stran, d) zadaj, e) pogled od zgoraj, f) notranjost, pogled proti votlemu gumbu, g) notranjost, vidni so sledovi kovanja.

Figure C1.2
Crest knob of the C1 helmet: a) best preserved part of the decoration, b) manufacture flaw (?), c) view from above.

Slika C1.2
Gumb na vrhu čelade C1: a) najbolje ohranjeni del okrasa, b) napaka v izdelavi (?), c) pogled od zgoraj.

The rim is thickened and decorated with chased lines forming a cable pattern; several lines on the front are almost vertical, but become oblique towards the sides and meet in the centre of the neckguard. One to two irregular lines of chased impressions (of a triangular- or square-sectioned point) run above the cable pattern all around the helmet (*Fig. C1.1a–d*).

The lower part of the bowl bears three, roughly parallel, chased grooves (*Fig. C1.1b–d, Fig. C1.4*).

The neckguard is narrow. The surface of the outer side has narrow deepened and wide raised lines. There is a hole in the middle that measures 6 mm in diameter.

The lower part of the bowl and the neckguard have cracks that presumably occurred during the production process.

Attached at the rim on both sides of the helmet is the upper part of a cheek-piece hinge of sheet bronze (tin content: 4 and 8%).[1063] Each hinge is attached with a pair of copper rivets.[1064] An iron pivot bar survives in the right hinge (*Fig. C1.3*). In front of each hinge is an approx. 4 mm wide hole (on the left inner side, it is located 6 mm from the hinge, on the right side the hinge partially covers the hole).

The underside of the neckguard bears a scratched inscription that probably represents the letter A (*Fig. C1.5*), while a scratched XI can be read on the interior of the bowl (viewed with the knob above the inscription; *Fig. C1.6*).

Figure C1.3
The C1 helmet; iron pivot bar survives in the bronze cheek-piece hinge fastened to the inner right side of the bowl with copper rivets.

Slika C1.3
V bronasti in z bakrenima zakovicama pritrjeni zanki na desni strani čelade C1 so ohranjeni ostanki železne osi.

Figure C1.4
Neckguard of the C1 helmet.

Slika C1.4
Vratni ščitnik čelade C1.

1063 Cf. Chapter 16, *Table C1: 3–4.*
1064 Cf. Chapter 16, *Table C1: 5–6.*

Figure C1.5
The C1 helmet; letter A scratched on the underside of the neckguard.

Slika C1.5
Grafit – črka A – na spodnjem delu vratnega ščitnika čelade C1.

Figure C1.6
The C1 helmet; scratched inscription on the inner side of the bowl.

Slika C1.6
Grafit na notranji strani kalote čelade C1.

Figure C1.7
X-ray image (100 KV, 4 mA, 30 seconds) of the bowl of the C1 helmet with clear forging marks.

Slika C1.7
Rentgenski posnetek (100 KV, 4 mA, 30 sekund) dela kalote čelade C1 jasno kaže, da je bila kovana.

(*sl. C1.2c*). Na sprednji strani gumba in pod njim je nepravilnost (*sl. C1.2b*).

Rob čelade je odebeljen in okrašen s punciranimi linijami, ki so v sredini spredaj pokončne, nato pa poševne in obrnjene z zgornjim delom navzven tako, da se v sredini zadnjega dela čelade zadnji dve liniji strehasto srečata. Nad robom sta ena do dve liniji neenakomernih punciranih odtisov (tri- do štirikotne konice), ki se nadaljujeta na vratnem ščitniku (*sl. C1.1a–d*).

Na spodnjem delu kalote so trije približno vzporedni žlebiči, narejeni s punciranjem (*sl. C1.1b–d, sl. C1.4*).

Vratni ščitnik je kratek. Na površini zunanje strani so ozke poglobljene in širše dvignjene linije. Na sredini je 6 mm široka luknjica.

V spodnjem delu kalote in na vratnem ščitniku so razpoke, ki so verjetno nastale med izdelavo.

Na obeh straneh čelade je zgornji del tečaja (za pritrditev ličnih ščitnikov) iz bronaste pločevine (delež kositra: 4 oz. 8 %),[1063] ki je na čelado pritrjen s po dvema bakrenima[1064] zakovicama. V cevi tečaja na desni strani čelade je ohranjen del železne osi (*sl. C1.3*). Pred tečajema je na vsaki strani po ena pribl. 4 mm široka luknja (na notranji strani je na levi 6 mm oddaljena od tečaja, na desni pa tečaj delno pokriva luknjo).

Na spodnji strani vratnega ščitnika je vrezan grafit, ki verjetno predstavlja črko A (*sl. C1.5*), na notranji površini kalote (gledano proti vrhu čelade) pa je grafit XI (*sl. C1.6*).

1063 Glej pogl. 16, *pregl. C1: 3–4.*
1064 Glej pogl. 16, *pregl. C1: 5–6.*

C2 (*Pl. 13; Fig. C2.1–Fig. C2.7*)

Helmet. Bronze, copper, brass, tin-lead alloy. H. 193 mm, l. 262 mm, w. 207 mm, th. at knob apex approx. 1.5 mm, lower bowl th. 1 mm, wgt. 1136 g. Inv. No. V 1950.
River Ljubljanica at Vrhnika (under the motorway bridge).
Diving?; NMS acquired in 1998.
Istenič 2009h, 306–307, Cat. No. 76.

The bowl is of bronze with roughly 10% tin.[1065]

Running circularly on the inside of the bowl, from the knob downwards, are hammering marks (*Fig. C2.2g, Fig. C2.7*). The bowl, neckguard and crest knob were hammered from a single piece. There are two cracks on the knob, which occurred during the production process. Regular parallel horizontal traces on the exterior show that the surface here was polished (e.g. with pumice) on the wheel.

The crest-knob is filled with a hard grey substance, presumably pewter (*Fig. C2.2f, g*).[1066] It has a vertical V-sectioned slot on top (w. approx. 3 mm, depth approx. 9 mm) and a pair of horizontal holes at the sides (w. and depth around 3 mm) that conically narrow towards the interior without reaching the slot. The knob is around 1 mm thick at the holes (*Fig. C2.4*). There are also two minute cracks on top of the knob that probably occurred during production.

The bowl rim is thickened. Soldered to the sides (*Fig. C2.2c–d, Fig. C2.3a–b*) and the back of the bowl (*Fig. C2.2b, Fig. C2.3c*) with a tin-lead alloy[1067] were plume tubes, made of brass with a minimum of around 14, 22 or 23% zinc, respectively.[1068] The best preserved tube is that on the right: it is soldered to the bowl with a wide lower end that runs into a tubular part (in the current condition, the latter is deformed and flattened against the bowl).

The upper parts of cheek-piece hinges are fastened above the rim on both inner sides (*Fig. C2.2c–d*) with pairs of copper rivets.[1069] The hinges are of sheet bronze (with roughly 5% tin).[1070] There is iron corrosion inside the loop of the hinge on the right (*Fig. C2.5*), which probably represents the remains of the iron pivot bar. The cheek-pieces have not survived.

a

b

c

Figure C2.1.
The C2 helmet prior to conservation: a) front, b) back, c) left, d) right, e) view from above, f) interior.

Slika C2.1.
Čelada C2 pred začetkom konservacije: a) spredaj, b) zadaj, c) leva stran, d) desna stran, e) pogled od zgoraj, f) notranjost.

1065 Cf. Chapter 16, *Table C2: 1.*
1066 Cf. Chapter 16, C2.
1067 Cf. Chapter 16, *Table C2: 8, 9, 13.*
1068 Cf. Chapter 16, *Table C2: 7, 11, 14.*
1069 Cf. Chapter 16, *Table C2: 2–3.*
1070 Cf. Chapter 16, *Table C2: 4–5.*

C2 (*t. 13; sl. C2.1–sl. C2.7*)

d

e

f

Čelada. Bron, baker, medenina, zlitina kositra in svinca. Viš. 193 mm, dol. 262 mm, šir. 207 mm, deb. na vrhu gumba pribl. 1,5 mm, deb. spodnjega dela kalote 1 mm, teža 1136 g. Inv. št. V 1950.
Ljubljanica pri Vrhniki (pod avtocestnim mostom).
Potapljanje?; NMS pridobil 1998.
Istenič 2009g, 282–283, kat. 76.

Čelada je iz brona z okoli 10 % kositra.[1065]

Na notranji strani čelade so vidni krožno po obodu potekajoči sledovi izdelave s kovanjem, od gumba navzdol (*sl. C2.2g, sl. C2.7*). Kalota, vratni ščitnik in gumb na njenem vrhu so bili narejeni s kovanjem, v enem kosu. Razpoki na gumbu sta nastali med izdelavo. Pravilni, vzporedni vodoravni sledovi na zunanji strani čelade kažejo na poliranje zunanje površine (npr. s plovcem) na vretenu.

Gumb na vrhu kalote je na notranji strani zapolnjen s trdo sivo snovjo – verjetno zlitino svinca s kositrom (*sl. C2.2f, g*).[1066] Na zunanji strani ima na vrhu navpično zarezo V-preseka (širina pribl. 3 mm, globina pribl. 9 mm) in ob straneh vodoravno ležeči luknjici (širina in globina okoli 3 mm), ki se stožčasto zožita proti notranjosti gumba in ne segata do navpične V-zareze. Debelina brona ob luknjicah je okoli 1 mm (*sl. C2.4*). Na vratu gumba sta drobni razpoki, ki sta verjetno nastali med izdelavo.

Rob kalote je odebeljen. Ob straneh (*sl. C2.2c–d, sl. C2.3a–b*) in na zadnji strani (*sl. C2.2b, sl. C2.3c*) so bili na kaloto z zlitino kositra in svinca[1067] prispajkani nosilci okrasa iz medenine z najmanj okoli 14, 22 oziroma 23 % cinka.[1068] Najbolje je ohranjen nastavek na desni strani: na čelado je prispajkan z razširjenim spodnjim delom, ki preide v cevast nastavek (v obstoječem stanju je cevasti del deformiran – potisnjen proti kaloti). Na spodnji strani ob straneh (*sl. C2.2c–d*) sta s po dvema bakrenima[1069] zakovicama na notranjo stran čelade pritrjena zgornja dela tečaja za pritrditev ličnih ščitnikov. Narejena sta iz bronaste pločevine (vsebuje okoli 5 % kositra).[1070] V cevi tečaja na desni strani je železova rja (*sl. C2.5*) – verjetno ostanki železne osi tečaja. Lična ščitnika nista ohranjena.

1065 Glej pogl. 16, *pregl. C2: 1.*
1066 Glej pogl. 16, C2.
1067 Glej pogl. 16, *pregl. C2: 8, 9, 13.*
1068 Glej pogl. 16, *pregl. C2: 7, 11, 14.*
1069 Glej pogl. 16, *pregl. C2: 2–3.*
1070 Glej pogl. 16, *pregl. C2: 4–5.*

a

b

c

d

e

f

g

Figure C2.2.
The C2 helmet after cleaning and conservation: a) front, b) back, c) left, d) right, e) view from above, f) interior, g) interior with visible forging marks.

Slika C2.2.
Čelada C2 po čiščenju in konserviranju: a) spredaj, b) zadaj, c) leva stran, d) desna stran, e) pogled od zgoraj, f) notranjost, g) notranjost, vidni so sledovi kovanja.

a

b

c

Figure C2.3
Plume tubes on the C2 helmet: a) right, b) left, c) back.

Slika C2.3
Čelada C2, nastavki za okras: a) na desni strani, b) na levi strani, c) zadaj.

There are no traces of a brow-guard or its attachment to the bowl.

The underside of the neckguard bears an inscription in punched dots P. OPPI > CRACCI (*Fig. C2.6*). The neckguard also has a centrally positioned rivet hole (*Fig. C2.2e*) that most probably held the fitting with a suspension ring.

Figure C2.4
Crest knob of the C2 helmet with a pewter fill.

Slika C2.4
Gumb na vrhu čelade C2, vidno je polnilo iz zlitine svinca in kositra.

Figure C2.5
The C2 helmet; corroded remains of the iron pivot bar in the right cheek-piece hinge.

Slika C2.5
Korodirani ostanki železne osi tečaja na desni strani čelade C2.

Figure C2.6
The C2 helmet; inscription on the underside of the neckguard.

Slika C2.6
Napis na spodnji strani vratnega ščitnika čelade C2.

Ni sledov čelnega ščitnika niti njegovega pripenjanja na kaloto.

Na spodnji strani vratnega ščitnika je punciran napis P. OPPI > CRACCI (*sl. C2.6*).
Luknja v sredini vratnega ščitnika (*sl. C2.2e*) kaže, kje je bil z zakovico pritrjen okov z obročkom za obešanje čelade.

Figure C2.7
X-ray image (100 KV, 4 mA, 25 seconds) of the bowl of the C2 helmet with clear forging marks.

Slika C2.7
Rentgenski posnetek (100 KV, 4 mA, 25 sekund) dela kalote čelade C2 jasno kaže sledove kovanja.

D
PILA

D1 (*Pl. 14; Fig. D1–6, Fig. D2*)

Pilum. Iron. L. 96 mm (approx. 104 mm if extended).
Inv. No. V 1454.
River Ljubljanica at Blatna Brezovica, Tri lesnice.
Underwater topographic survey in 1998; NMS acquired in 1998.
Istenič 2009h, Cat. No. 70 (right).

Pilum with surviving pyramidal head, shank, narrow tang with a hole for attachment and collet (which fitted on top of the pyramidal shaft expansion); the shank is bent at a point 130 mm down from the tip.

D2 (*Pl. 14; Fig. D1–6, Fig. D1–2*)

Pilum. Iron. Surv. l. 104 mm. Inv. No. V 1352.
River Ljubljanica at Bevke, Na zrnici.
Underwater topographic survey in 1999; NMS acquired in 1999.

Pilum with surviving pyramidal head, shank, part of a narrow tang and collet.

D3 (*Pl. 14; Fig. D1–6*)

Pilum. Iron. Surv. l. 96 mm (approx. 99 mm if extended). Inv. No. V 1346.
River Ljubljanica.
Diving?; NMS acquired in 1999.

Pilum with surviving pyramidal head, shank and stub of a narrow tang; the shank is bent 170 mm down from the tip.

D4 (*Pl. 14; Fig. D1–6*)

Pilum. Iron. Surv. l. 962 mm. Inv. No. V 411.
River Ljubljanica at Sinja Gorica, Nove gmajne.
Underwater topographic survey in 1991; NMS acquired in 1991.

Pilum with surviving pyramidal head and shank.

Figure D1–6
Iron heads of the D1–D6 pila; arranged from left to right: D6, D1, D3, D4, D5 and D2.

Slika D1–6
Železne konice kopij D1–D6. Od leve proti desni si sledijo D6, D1, D3, D4, D5 in D2.

D
KOPJA

Figure D1
The D1 pilum; bottom part of the iron head.

Slika D1
Spodnji zaključek konice kopja D1.

D1 (*t. 14; sl. D1–6, sl. D1*)

Kopje. Železo. Dol. 96 mm (iztegnjeno bi merilo okoli 104 mm). Inv. št. V 1454.
Ljubljanica pri Blatni Brezovici (Tri lesnice).
Podvodna topografija 1998; NMS pridobil 1998.
Istenič 2009g, kat. 70 (desno).

Ohranjeni so piramidalna konica, vrat, ozek jezičast nastavek z luknjo za pritrditev v lesen ročaj in okov, ki je ščitil vrh lesenega ročaja; vrat je zapognjen 130 mm pred koncem konice.

D2 (*t. 14; sl. D1–6, sl. D2*)

Kopje. Železo. Ohr. dol. 104 mm. Inv. št. V 1352.
Ljubljanica pri Bevkah (Na zrnici).
Podvodna topografija 1999; NMS pridobil 1999.

Ohranjeni so piramidalna konica, vrat, del ozkega jezičastega nastavka za pritrditev v lesen ročaj in okov, ki je ščitil vrh lesenega ročaja.

Figure D2
The D2 pilum; bottom part of the iron head.

Slika D2
Spodnji zaključek konice kopja D2.

D3 (*t. 14; sl. D1–6*)

Kopje. Železo. Ohr. dol. 96 mm (iztegnjeno bi merilo okoli 99 mm). Inv. št. V 1346.
Ljubljanica.
Potapljanje?; NMS pridobil 1999.

Ohranjeni so piramidalna konica, vrat in začetek ozkega jezičastega nastavka za pritrditev v lesen ročaj; vrat je zapognjen 170 mm pred koncem konice.

D4 (*t. 14; sl. D1–6*)

Kopje. Železo. Ohr. dol. 962 mm. Inv. št. V 411.
Ljubljanica pri Sinji Gorici (Nove gmajne).
Podvodna topografija 1991; NMS pridobil 1991.

Ohranjena sta piramidalna konica in vrat.

D5 (*Pl. 14; Fig. D1–6*)

Pilum. Iron. L. 105 mm. Inv. No. R 8123.
River Ljubljanica at Bevke.
The Lichtenberg collection; NMS acquired in 1938.
Istenič 2009h, Cat. No. 70 (left).

Pilum with surviving pyramidal head, shank and stub of a *pilum* tang.

D6 (*Pl. 14; Fig. D1–6*)

Pilum. Iron. Surv. l. 428 mm. Inv. No. R 1891.
River Ljubljanica, Dolge njive or Vrhnika, Dolge njive.[1071]
NMS acquired in 1888.
Müllner 1900, Pl. 56: 15; Horvat 1990, 288–289, Cat. No. 486, Pl. 23: 5.

Pilum with surviving pyramidal head and part of the shank.

D7 (*Fig. D7–8.1, Fig. D7–8.2*)

Pilum. Iron. L. 990,[1072] 1000[1073] or 1030 mm.[1074] Inv. No. R 1892a, missing.
River Ljubljanica at Vrhnika, Dolge njive.
Underwater topographic survey in 1884; NMS acquired in 1884.
Deschmann 1887, 142, 143, Fig. 2; Müllner 1900, Pl. 56: 13 (right *pilum*); Hoffiller 1912, 84–85; Horvat 1990, 297, Cat. No. 599, Fig. 32c.

Dežman reports that the metal part of the *pilum* measured 1 m in length and weighed around half a kilogram together with the remains of *pilum* D8. The shank was square-sectioned in lower part and round-sectioned in the upper part, towards the head, which was square-sectioned at the base. The flat tang had two rivet holes and a truncated pyramidal collet.[1075]

Only one hole can be seen on the drawing (*Fig. D7–8.1: right pilum*).

Dežman's description and drawing do not correspond entirely with the photograph published by Müllner (*Figs. D7–8.2: right pilum*),[1076] which shows one rivet hole at the tang and perhaps a head of the second rivet at its end.

Hoffiller's detailed description suggests that he saw the item personally. He offers the following data: the *pilum* was 1030 mm long, it had two holes on the tang, the collet was 54 mm high, 19 and 25 mm wide in the upper and lower parts, respectively, and held wooden remains.

The sources give three differing lengths of the *pilum*.

D8 (*Fig. D7–8.1, Fig. D7–8.2*)

Pilum. Iron. L. 1005,[1077] 1100[1078] or 1055 mm.[1079] Inv. No. R 1892b, missing.
River Ljubljanica at Vrhnika, Dolge njive.
Underwater topographic survey in 1884; NMS acquired in 1884.
Deschmann 1887, 142, Fig. 2 (left *pilum*; description does not exactly correspond with the drawing; description and drawing do not correspond in detail with the photograph published by Müllner; reported length – 1.1 m – does not correspond with the information in the inventory book); Müllner 1900, Pl. 56: 13 (*left pilum*; Hoffiller 1912, 84–85 (detailed description, no illustration); Horvat 1990, 297, Cat. No. 600, Fig. 32c.

Dežman reports that metal part of the *pilum* measured 1.1 m in length and weighed around half a kilogram together with the remains of the *pilum* D7. The shank was square-sectioned in the lower part and round-sectioned towards the head, which was square-sectioned at the base. The tang ended in an oval knob, also depicted on the drawing (*Fig. D7–8.1: left pilum*). The pyramidal collet was movable.[1080]

Dežman's description and drawing do not entirely correspond with the photograph published by Müllner (*Figs. D7–8.2: left pilum*),[1081] which shows no oval knob terminal of the tang, but rather a rivet head or corrosion accretions at the surviving end part of the tang.

1071 Cf. Fn. 997.
1072 Inventory book of the DA.
1073 Deschmann 1887, 142.
1074 Hoffiller 1912, 84.
1075 *Von besonderem Interesse waren zwei eiserne wurfspießartige Waffen (Figs. 1, 2) welche man, falls sie ein größeres Gewicht besäßen, als das italische Pilum, die furchtbare römische Angriffswaffe zu erklären versucht währe. Allein sie sind zusammen nur beiläufig ein halb Kilo schwer, die Länge des einen ist 1.1 M, des anderen 1 M. Bei beiden läuft die im unteren Theile vierkantige nach oben drehrunde Stange in eine bolzenartige, scharf viereckige Spitze zu. Der Griff des einen trägt einen ovalen Knopf, beim zweiten ist er flach gehämmert und mit zwei Löchern versehen, eine verschiebbare eiserne Hülse, in der Form einer abgestutzten vierseitigen Pyramide, diente zur Befestigung des an der Handhabe angebrachten, nicht mehr vorhandenen Beschläges aus Holz oder Garn* (Deschmann 1887, 142, 143).

1076 Müllner 1900, Pl. 56: 13.
1077 Inventory book of the DA.
1078 Deschmann 1887, 142.
1079 Hoffiller 1912, 84.
1080 Cf. Fn. 1075.
1081 Müllner 1900, Pl. 56: 13.

Figure D7–8.1
The D7 and D8 pila. From Deschmann 1887, 142, Figs. 1, 2.

Slika D7–8.1
Železna dela kopij D7 in D8. Po Deschmann 1887, 142, sl. 1, 2.

D5 (*t. 14; sl. D1–6*)

Kopje. Železo. Dol. 105 mm. Inv. št. R 8123.
Ljubljanica pri Bevkah.
Zbirka Lichtenberg; NMS pridobil leta 1938.
Istenič 2009g, kat. 70 (levo).

Ohranjeni so piramidalna konica, vrat in začetek jezičastega nastavka za pritrditev v lesen ročaj.

D6 (*t. 14; sl. D1–6*)

Kopje. Železo. Ohr. dol. 428 mm. Inv. št. R 1891.
Ljubljanica (Dolge njive) ali Vrhnika (Dolge njive).[1071]
NMS pridobil 1888.
Müllner 1900, t. 56: 15; Horvat 1990, 288–289, kat. 486, t. 23: 5.

Ohranjena sta piramidalna konica in del vratu.

D7 (*sl. D7–8.1–sl. D7–8.2*)

Kopje. Železo. Dol. 990 mm,[1072] 1000 mm[1073] ali 1030 mm.[1074] Inv. št. R 1892a, pogrešano.
Ljubljanica pri Vrhniki (Dolge njive).
Podvodna topografija 1884; NMS pridobil 1884.
Deschmann 1887, 142, 143, sl. 2; Müllner 1900, t. 56: 13 (desni pilum); Hoffiller 1912, 84–85; Horvat 1990, 297, kat. 599, sl. 32c.

Po Dežmanu je meril kovinski del kopja 1 m, njegova teža skupaj s kovinskim delom kopja D8 je bila okrog pol kilograma. Vrat je imel v spodnjem delu štirikoten, v zgornjem krožen presek, baza konice je štirikotna. Na ploščato skovanem nasadišču sta dve luknji in premičen okov, ki ima obliko prisekane piramide.[1075] Na risbi (*sl. D7–8.1: desni pilum*) se vidi le ena luknja na nasadišču.

Dežmanov opis in risba se le delno ujemata s fotografijo v Müllnerjevi objavi (*sl. D7–8.2: desni pilum*),[1076]

1071 Prim. op. 997.
1072 Inventarna knjiga AO.
1073 Deschmann 1887, 142.
1074 Hoffiller 1912, 84.
1075 *Von besonderem Interesse waren zwei eiserne wurfspießartige Waffen (Fig. 1, 2) welche man, falls sie ein größeres Gewicht besäßen, als das italische Pilum, die furchtbare römische Angriffswaffe zu erklären versucht währe. Allein sie sind zusammen nur beiläufig ein halb Kilo schwer, die Länge des einen ist 1.1 M, des anderen 1 M. Bei beiden läuft die im unteren Theile vierkantige nach oben drehrunde Stange in eine bolzenartige, scharf viereckige Spitze zu. Der Griff des einen trägt einen ovalen Knopf, beim zweiten ist er flach gehämmert und mit zwei Löchern versehen, eine verschiebbare eiserne Hülse, in der Form einer abgestutzten vierseitigen Pyramide, diente zur Befestigung des an der Handhabe angebrachten, nicht mehr vorhandenen Beschläges aus Holz oder Garn* (Deschmann 1887, 142, 143).
1076 Müllner 1900, t. 56: 13.

Hoffiller's detailed description suggests that he saw the item personally. He offers the following data: the *pilum* was 1055 mm long, it had one hole on the tang, the pyramidal collet was 23 mm high, 16 and 21 mm wide in the upper and lower parts, respectively, and held wooden remains.

The sources give three differing lengths of the *pilum*.

D9 (*Pl. 14; Fig. D9*)

Pilum. Iron. Surv. l. 690 mm, wgt. 81.9 g. Inv. No. V 1347.
River Ljubljanica?
NMS acquired by 1999.

Very thin iron *pilum* with a narrow socket, square-sectioned shank that gradually narrows towards the short unpronounced head of a sub-square cross section.

Figure D7–8.2
The D7 and D8 pila. From Müllner 1900, Pl. 56: 13.

Slika D7–8.2
Železna dela kopij D7 in D8. Po Müllner 1900, t. 56: 13.

Figure D9
Iron head of the D9 pilum.

Slika D9
Železna konica kopja D9.

na kateri se na ohranjenem delu ploščatega nasadišča vidi le ena luknjica zakovice, na njegovem koncu pa morda glavica druge zakovice.

Iz Hoffillerjevega natančnega opisa sklepam, da je pilum videl. Navaja naslednje podatke: pilum je meril 1030 mm, na nasadišču je imel luknjici, piramidalni okov je bil visok 54 mm in širok zgoraj 19, spodaj 25 mm, v njem so bili ostanki lesa.

V virih so navedene tri različne dolžine piluma.

D8 (*sl. D7–8.1, sl. D7–8.2*)

Kopje. Železo. Dol. 1005 mm,[1077] 1100 mm[1078] ali 1055 mm.[1079] Inv. št. R 1892b, pogrešano.
Ljubljanica pri Vrhniki (Dolge njive).
Podvodna topografija 1884; NMS pridobil 1884.
Deschmann 1887, 142, sl. 2 (levi pilum; opis se ne ujema povsem z risbo; opis in risba se v podrobnostih ne ujemata s fotografijo, ki jo je objavil Müllner; navedena dolžina – 1,1 m – se ne ujema s podatkom v inventarni knjigi); Müllner 1900, t. 56: 13 (levi pilum); Hoffiller 1912, 84–85 (podroben opis, brez slike); Horvat 1990, 297, kat. 600, sl. 32c.

Po Dežmanovem opisu je kovinski del kopja meril 1,1 m, tehtal pa je – skupaj s kovinskim delom kopja D7 – okrog pol kg. Vrat je imel v spodnjem delu štirikoten, v zgornjem krožen presek, baza konice je bila štirikotna. Na nasadišču z ovalnim gumbom, ki je prikazan tudi na risbi (*sl. D7–8.1: levi pilum*), je bil premičen okov piramidalne oblike.[1080]

Dežmanov opis in risba se ne ujemata povsem s fotografijo v Müllnerjevi objavi (*sl. D7–8.2: levi pilum*),[1081] na kateri na koncu ohranjenega dela jezičastega nasadišča ni videti ovalnega gumba, ampak morda glavo zakovice ali korozijski prirastek.

Iz Hoffillerjevega opisa sklepam, da je pilum videl. Navaja naslednje podatke: pilum je meril 1055 mm, na nasadišču je imel eno luknjico, piramidalni okov je bil visok 23 mm in zgoraj širok 16 mm, spodaj 21 mm, v njem so bili ostanki lesa.

V virih so navedene tri različne dolžine piluma.

D9 (*t. 14; sl. D9*)

Kopje. Železo. Ohr. dol. 690 mm, teža 81,9 g. Inv. št. V 1347.
Ljubljanica?
NMS pridobil pred 1999.

Zelo gracilen železen del kopja ima ozek tul, tanek vrat kvadratnega preseka, ki se počasi oži proti vrhu, ter kratek in neizrazit vrh približno kvadratnega preseka.

1077 Inventarna knjiga AO.
1078 Deschmann 1887, 142.
1079 Hoffiller 1912, 84.
1080 Prim. op. 1075.
1081 Müllner 1900, t. 56: 13.

E
SPEARHEADS

E1 (*Pl. 15; Fig. E1–3*)

Spearhead. Iron. L. 532 mm, w. 39 mm, wgt. 298 g. Inv. No. R 1844.
River Ljubljanica, Dolge njive or Vrhnika, Dolge njive.[1082]
NMS acquired in 1888.
Horvat 1990, 297–298, Pl. 23: 6.

The socket is octagonally facetted on the exterior. The blade is lozenge-sectioned.

E2 (*Pl. 15; Fig. E1–3*)

Spearhead with the remains of the wooden shaft. Iron, wood. L. 347 mm, w. 36 mm, wgt. 186 g. Inv. No. P 11367.
River Ljubljanica at Blatna Brezovica (Bistra, Bržič, Tri lesnice) or at Bevke (Krajna or Na zrnici).[1083]
Vuga 1980, 202, Pl. 3: 4 (stated Blatna Brezovica as the findspot).

The socket is octagonally facetted on the exterior and holds the remains of the wooden shaft in the interior. The blade is lozenge-sectioned.

E3 (*Pl. 15; Fig. E1–3, Fig. E3*)

Spearhead. Iron. L. 448 mm, surv. w. 35 mm, wgt. 200 g. Inv. No. P 11366.
River Ljubljanica at Blatna Brezovica (Bistra, Bržič, Tri lesnice) or at Bevke (Krajna or Na zrnici).[1084]
Vuga 1980, Pl. 3: 1 (socket facetting and blade decoration not drawn); Gaspari, Trampuž Orel, Turk 2009b, Cat. No. 32 (second spearhead from the left); Gaspari, Laharnar 2016, 70–75, Fig. 6.

Blade with pronounced midrib and etched decoration on both sides. The socket is octagonally facetted on the exterior.

1082 Cf. Fn. 997.
1083 The item forms part of the Karl Lichtenberg collection, which the Provincial Museum acquired just before World War II. The collection is composed of items recovered from the stretch of the Ljubljanica between the confluence with the Bistra stream and Kamin, mainly during low water levels (DA NMS inventory book; Gaspari 2002, 42–46).
1084 Cf. Fn. 1083.

Figure E1–3
The E1 (top), E2 (bottom) and E3 (centre) iron spearheads.

Slika E1–3
Železne sulične osti E1–E3: E1 (zgoraj), E3 (v sredini), E2 (spodaj).

Figure E3
The E3 spearhead; decoration on the blade.

Slika E3
Okras na listu sulične osti E3.

E
SULIČNE OSTI

E1 (*t. 15; sl. E1–3*)

Sulična ost. Železo. Dol. 532 mm, šir. 39 mm, teža 298 g. Inv. št. R 1844.
Ljubljanica (Dolge njive) ali Vrhnika (Dolge njive).[1082]
NMS pridobil 1888.
Horvat 1990, 297–298, t. 23: 6.

Tul je fasetiran tako, da je na zunanji strani nakazanih osem ploskev. List ima rombičen presek.

E2 (*t. 15; sl. E1–3*)

Sulična ost z ostanki lesenega droga/ročaja. Železo, les. Dol. 347 mm, šir. 36 mm, teža 186 g. Inv. št. P 11367.
Ljubljanica pri Blatni Brezovici (Bistra, Bržič, Tri lesnice) ali pri Bevkah (Krajna ali Na zrnici).[1083]
Vuga 1980, 202, t. 3: 4 (kot najdišče je navedel Blatno Brezovico).

Tul je fasetiran tako, da je na zunanji strani nakazanih osem ploskev. V njem so ostanki lesenega droga. List ima rombičen presek.

E3 (*t. 15; sl. E1–3, sl. E3*)

Sulična ost. Železo. Dol. 448 mm, ohr. šir. 35 mm, teža 200 g. Inv. št. P 11366.
Ljubljanica pri Blatni Brezovici (Bistra, Bržič, Tri lesnice) ali pri Bevkah (Krajna ali Na zrnici).[1084]
Vuga 1980, t. 3: 1 (fasetiranje tulca in okras na listu nista narisana); Gaspari, Trampuž Orel, Turk 2009a, kat. 32 (druga sulična ost z leve); Gaspari, Laharnar 2016, 70–75, sl. 6.

List sulične osti ima izrazito rebro in na obeh straneh (jedkan) okras. Tul osti je fasetiran tako, da je na zunanji strani nakazanih osem ploskev.

1082 Prim. op. 997.
1083 Predmet je del zbirke Karla Lichtenberga, ki jo je Deželni muzej pridobil tik pred drugo svetovno vojno. Nastala je z zbiranjem predmetov iz Ljubljanice med izlivom Bistre in Kaminom, predvsem ob nizkih vodostajih (inv. knjiga AO NMS; Gaspari 2002, 42–46).
1084 Prim. op. 1083.

F
DOUBLE-SIDED HEAVY TOOLS

F1 (*Pl. 16; Fig. F1–3*)

Axe/adze. Iron. L. 320 mm, blade w. 100 and 50 mm, wgt. 1510 g. Inv. No. V 338.
River Ljubljanica, between Podpeč and Črna vas.
Diving 1991 or 1992; NMS acquired in 1993.
Svoljšak et al. 1997, 261, Pl. 16: 2, Fig. 47; Istenič 2009h, Cat. No. 72 (centre).

Triangular lugs on both sides of the eye.

F2 (*Pl. 16; Fig. F1–3*)

Double axe. Iron. L. 367 mm, blade w. 99 and 35 mm, wgt. 1550 g. Inv. No. V 1941.
River Ljubljanica.
Diving?; NMS acquired in 1994.
Istenič 2009h, Cat. No. 72 (bottom).

Rectangular lugs on both sides of the eye.

F3 (*Pl. 16; Fig. F1–3*)

Axe/adze. Iron. L. 285 mm, w. 89 (longer blade) oz. 75 mm (shorter blade), wgt. 956 g. Inv. No. V 637.
River Ljubljanica at Podpeč.
Diving?; NMS acquired in 1991.

Unpronounced lugs on both sides of the eye.

F4 (*Pl. 16; Fig. F4–5*)

Axe/pickaxe. Iron. L. 484 mm, blade w. 102 and 23 mm, wgt. 2258 g. DHAA Inv. No. N 37648.
River Ljubljanica.[1085]
Circumstances unknown; NMS acquired in 1894.

Figure F1–3
The F1 (centre), F2 (top) and F3 (bottom) double-sided heavy tools.

Slika F1–3
Dvostranska težka orodja F1–F3: F1 (v sredini), F2 (zgoraj) in F3 (spodaj).

1085 Inventory book (from the end of the 1880s to the beginning of the 1990s) of the DHAA, Inv. No. 149. Apart from the information in the inventory book, the Ljubljanica as the findspot is also suggested by the characteristic purple-red algae (cf. Milić et al. 2009b, 32, Fig. 24) visible on the surface of the artefact in several places.

F
DVOSTRANSKA TEŽKA ORODJA

Figure F4–5
The F4 (bottom) and F5 (top) double-sided heavy tools.

Slika F4–5
Dvostranski težki orodji F4 (spodaj) in F5 (zgoraj).

F1 (*t. 16; sl. F1–3*)

Sekira/teslo. Železo. Dol. 320 mm, šir. rezil 100 oz. 50 mm, teža 1510 g. Inv. št. V 338.
Ljubljanica (med Podpečjo in Črno vasjo).
Potapljanje 1991 ali 1992; NMS pridobil 1993.
Svoljšak et al. 1997, 261, t. 16: 2, sl. 47; Istenič 2009g, kat. 72 (v sredini).

Na ušesu orodja so trikotni izrastki (krilca).

F2 (*t. 16; sl. F1–3*)

Dvojna sekira. Železo. Dol. 367 mm, šir. rezil 99 oz. 35 mm, teža 1550 g. Inv. št. V 1941.
Ljubljanica.
Potapljanje?; NMS pridobil 1994.
Istenič 2009g, kat. 72 (spodaj).

Izrastki na ušesu orodja so pravokotne oblike.

F3 (*t. 16; sl. F1–3*)

Sekira/teslo. Železo. Dol. 285 mm, šir. 89 (daljše rezilo) oz. 75 mm (krajše rezilo), teža 956 g. Inv. št. V 637.
Ljubljanica pri Podpeči.
Potapljanje?; NMS pridobil 1991.

Izrastki na ušesu orodja so neizraziti.

F4 (*t. 16; sl. F4–5*)

Sekira/kramp. Železo. Dol. 484 mm, šir. rezil 102 oz. 23 mm, teža 2258 g. OZUU inv. št. N 37648.
Ljubljanica.[1085]
Okoliščine neznane; NMS pridobil leta 1894.

1085 Inventarna knjiga OZUU s konca osemdesetih let 19. st. do začetka devetdesetih let 20. st., inv. št. 149. Poleg podatkov v inventarni knjigi na izvor iz Ljubljanice kažejo značilne vijolično-rdeče alge (prim. Milić et al. 2009a, 30, sl. 24), ki so pod mikroskopom vidne na več mestih na površini predmeta.

The tool has not undergone conservation. It has wide rectangular lugs on both sides of the eye.

F5 (*Pl. 17; Fig. F4–5*)

Double axe. Iron. L. 454 mm, blade w. 135 and 33 mm, wgt. 2426 g. DHAA Inv. No. N 37649.
River Ljubljanica.[1086]
Circumstances unknown; NMS acquired around 1894.

The tool has not undergone conservation. The upper side of the eye is damaged, the lower side has rectangular lugs.

F6 (*Pl. 17; Fig. F6*)

Axe/adze. Iron. L. 319 mm, blade w. 120 and 48 mm, wgt. 1634 g. DHAA Inv. No. N 37647.
Possibly River Ljubljanica.
Circumstances unknown; NMS acquired between 1892 and 1894.
Gaspari 2012, 107, Fig. 61.[1087]

The tool has not undergone conservation. It has triangular lugs with a short flat terminal on both sides of the eye.

Figure F6
The F6 double-sided heavy tool may originate from the River Ljubljanica.

Slika F6
Iz Ljubljanice morda izvira dvostransko težko orodje F6.

G
TURF CUTTERS

G1 (*Pl. 17; Fig. G1–3*)

Turf cutter. Iron. H. 262 mm, w. 338 mm, wgt. 1154 g. Inv. No. V 1891.
River Ljubljanica at Črna vas, Ljubljanske senožeti.
Diving; NMS acquired in 2003.
Gaspari 2002, 301, DO 8; Istenič 2009h, Cat. No. 71 (first tool on top).

1086 Inventory book (from the end of the 1880s to the beginning of the 1990s) of the DHAA, Inv. No. 150.
1087 Gaspari presumes that the item formed part of the Lichtenberg family collection; the documents (Nos. 13 and 279) held in the archives of the DA provide no evidence to support this.

Orodje ni bilo konservirano. Na ušesu ima široke pravokotne izrastke.

F5 (*t. 17; sl. F4–5*)

Dvojna sekira. Železo. Dol. 454 mm, šir. rezil 135 oz. 33 mm, teža 2426 g. OZUU inv. št. N 37649.
Ljubljanica.[1086]
Okoliščine neznane; NMS pridobil okrog leta 1894.

Orodje ni bilo konservirano. Zgornja stran ušesa je poškodovana, na spodnji sta pravokotna izrastka.

F6 (*t. 17; sl. F6*)

Sekira/teslo. Železo. Dol. 319 mm, šir. rezil 120 oz. 48 mm, teža 1634 g. OZUU inv. št. N 37647.
Morda Ljubljanica.
Okoliščine neznane; NMS pridobil med letoma 1892 in 1894.
Gaspari 2012, 107, sl. 61.[1087]

Orodje ni bilo konservirano. Na ušesu ima trikotne izrastke s kratkim ravnim zaključkom.

Figure G1–3
The G1 (centre), G2 (bottom) and G3 (top) turf cutters.

Slika G1–3
Orodje za rezanje ruše G1 (v sredini), G2 (spodaj) in G3 (zgoraj).

G
ORODJE ZA REZANJE RUŠE

G1 (*t. 17; sl. G1–3*)

Orodje za rezanje ruše. Železo. Viš. 262 mm, šir. 338 mm, teža 1154 g. Inv. št. V 1891.
Ljubljanica pri Črni vasi (Ljubljanske senožeti).

1086 Vir: Inventarna knjiga OZUU s konca osemdesetih let 19. st. do začetka devetdesetih let 20. st., inv. št. 150.
1087 Gaspari meni, da predmet izvira iz zbirke družine Lichtenberg. Pregled arhiva AO NMS, št. 13 in 279, je pokazal, da ni podatkov, ki bi sekiro/teslo povezovali s to zbirko.

The socket has a hole that held a nail that fastened the iron part of the tool to the wooden haft.

G2 (*Pl. 18; Fig. G1–3*)

Turf cutter. Iron. H. 304 mm, w. 281 mm, wgt. 1066 g.
Inv. No. V 1892.
River Ljubljanica.
Diving; NMS acquired in 2003.
Istenič 2009h, Cat. No. 71 (centre).

The socket has a hole that held a nail that fastened the iron part of the tool to the wooden haft.

G3 (*Pl. 18; Fig. G1–3*)

Turf cutter. Iron. H. 357 mm, w. 380 mm, wgt. 1644 g.
Inv. No. V 1927.
River Ljubljanica.
Diving; NMS acquired in 2003.
Istenič 2009h, Cat. No. 71 (bottom).

The socket has a hole that held a nail that fastened the iron part of the tool to the wooden haft.

H
MILITARY BELTS AND HOBNAILS

H1 (*Pl. 19; Fig. H1, Fig. 48*)

Military belt-plate. Silver with traces of gilding. W. 51 mm, wgt. 34.20 g. Inv. No. V 2019.
River Ljubljanica at Blatna Brezovica, Tri lesnice.
Istenič 2003b, 285–289, Figs. 4–6, 9, 11; Istenič 2009h, Cat. No. 60.

a

b

Figure H1
The H1 belt-plate: a) front, b) back.

Slika H1
Pasni okov H1: a) sprednja stran, b) hrbtna stran.

Potapljanje; NMS pridobil 2003.
Gaspari 2002, 301, DO 8; Istenič 2009g, kat. 71 (prvo orodje zgoraj).

Na tulu je luknja, skozi katero je segal žebelj, ki je železen del orodja pritrjeval na lesen ročaj.

G2 (*t. 18; sl. G1–3*)

Orodje za rezanje ruše. Železo. Viš. 304 mm, šir. 281 mm, teža 1066 g. Inv. št. V 1892.
Ljubljanica.
Potapljanje; NMS pridobil 2003.
Istenič 2009g, kat. 71 (v sredini).

Na tulu je luknja, skozi katero je segal žebelj, ki je železen del orodja pritrjeval na lesen ročaj.

G3 (*t. 18; sl. G1–3*)

Orodje za rezanje ruše. Železo. Viš. 357 mm, šir. 380 mm, teža 1644 g. Inv. št. V 1927.
Ljubljanica.
Potapljanje; NMS pridobil 2003.
Istenič 2009g, kat. 71 (spodaj).

Na tulu je luknja, skozi katero je segal žebelj, ki je železen del orodja pritrjeval na lesen ročaj.

H PASOVI IN OBUVALA

H1 (*t. 19; sl. H1, sl. 48*)

Okov vojaškega pasu. Srebro z ostanki pozlate. Šir. 51 mm, teža 34,20 g. Inv. št. V 2019.
Ljubljanica pri Blatni Brezovici (Tri lesnice).
Istenič 2003b, 295, sl. 4–6, 9, 11; Istenič 2009g, kat. 60.

Okov je odlično ohranjen. Je precej masiven, pravokotne, skoraj kvadratne oblike, izdelan je bil s kovanjem. Površina je pokrita s tenko plastjo temnosive patine. Manj kot 1 mm debela srebrna pločevina je na podolžnih straneh zavita navzgor tako, da na vsaki strani tvori 3–4 mm široko cevko. V obeh cevkah je palčka (os), ki je v cevko pritrjena s po eno masivno, pribl. 6 mm široko glavico na vsaki strani. Cevka in os tvorita cevast tečaj, ki je imel zgolj okrasni namen (t. i. psevdotečaj). Stik zgornje strani okova in nazaj zavite pločevine tečaja je prekrit s pribl. 4 mm širokim in okoli 1 mm debelim trakom. Ta je na eni stranici okrašen z linijo drobnih punciranih krogcev, na drugi pa z drobno valovnico, ki je bila prav tako narejena s punciranjem.

Osrednji del okova je krožne oblike in omejen s pribl. 2 mm širokim in plitvim žlebom. Okrašen je z reliefnim okrasom, ki je bil iztolčen s hrbtne strani in punciran z lica. Upodobljeni so simetrično postavljeni rastlinski motivi: dva široka akantova lista, štirje ožji listi in šest popkov. Ozadje je puncirano z drobnimi krogci. V sredino tega okrasa je z zakovico, ki ima okroglo okrasno glavico, pritrjena posebej izdelana rozeta z osmimi listki.

Pozlata je jasno vidna na osrednjem punciranem delu okova. Pregled pod mikroskopom je pokazal ostanke pozlate tudi na reliefno izvedenih listih rozete v sredini okova in reliefno dvignjenih ozkih listih ter zelo slabo ohranjene ostanke na enem od akantovih listov. Pod mikroskopom so prav tako jasno vidni ostanki pozlate na obeh trakovih na tečajih, v punciranih krogcih in ob valovnici. Meritve PIXE so potrdile pozlato punciranega ozadja.[1088] Ostankov pozlate na ostalih mestih nismo merili oziroma smo merili na mestu, kjer pozlata ni ohranjena.[1089] Utemeljeno lahko domnevamo, da je bila sprednja stran okova deloma pozlačena (*sl. 48*). Učinkovitost okrasa je povečalo nasprotje med zlato in srebrno svetlečo se površino. Pozlačen osrednji okras sta uravnotežila pozlačena okrasna trakova ob straneh okova (*sl. 48*). Vsi okrasi so izvedeni vešče in zelo kvalitetno.

Okov je bil na pas pritrjen s štirimi simetrično postavljenimi srebrnimi zakovicami, od katerih sta ohranjeni dve, na mestu drugih dveh pa sta vidni luknjici premera pribl. 3 mm. Ohranjeni zakovici krasita pribl. 6 mm široki okrogli glavici, ki sta malo večji (premer 7 mm) kot zaključki osi tečajev. Dolžina trnov ohranjenih zakovic kaže, da je bil usnjeni del pasu debel pribl. 4 mm.

1088 Glej pogl. 16, *pregl. H1: 11, 12.*
1089 Glej pogl. 16, *pregl. H1: 9, 10.*

The belt-plate is very well preserved. It is rectangular, almost square, and relatively massive, made by hammering. The surface is covered by a thin layer of dark grey patina. Its silver sheet is less than a millimetre thick and rolled over along the vertical sides to form a 3–4 mm wide tube on each side. A pin (axis bar) is inserted in each of the tubes and has a solid spherical terminal (c. 6 mm wide) at both ends. The tube and pin form a tubular hinge with a merely decorative function (pseudo-hinge). The line (of contact) of the rolled-over sheet is covered with an approx. 4 mm wide and 1 mm thick strip of sheet silver decorated with a line of tiny chased circles on the inner and a wavy line on the outer side.

The central part of the belt-plate has a round field framed with a shallow, roughly 2 mm wide groove. The decoration on the field is embossed from the back and chased from the front. It consists of symmetrical plant motifs: two broad acanthus leaves, each forming a *calyx*, four narrower leaves and six buds. The background is chased with tiny circles. The centre of the field holds another, smaller field bearing a rosette with eight petals, fastened to the plate with a spherical-headed rivet.

The gilding is clearly visible on the central, chased part of the belt-plate. Examinations under a microscope also revealed traces of gilding on the relief petals of the rosette, the narrow leaves, one of the broad acanthus leaves and on both strips at the pseudo-hinges (in the punched dots and along the wavy lines). PIXE measurements confirmed gilding on the background chased with tiny circles.[1088] The gilding traces elsewhere were either not measured or the measurements were taken in places where gilding has not survived.[1089] This leads us to conclude that gilding was applied to the front of the plate in parts only (*Fig. 48*). The combination of gilding and the shiny silver surface only enhanced the decorative effect. The gilded centre was balanced by the gilded strips at the sides (*Fig. 48*). All decoration is skilfully executed and indicates high-quality craftsmanship.

The plate was fastened to the leather of the belt with four symmetrically positioned silver rivets, two of which survive, while the positions of the other two are indicated by holes (3 mm in diameter). The surviving rivets have approx. 6 mm wide spherical heads that are slightly larger (diam. 7 mm) than the terminals of the axis bars in the pseudo-hinges. The length of the rivet shanks shows that the leather strap of the belt was approx. 4 mm thick.

1088 Cf. Chapter 16, *Table H1: 11, 12.*
1089 Cf. Chapter 16, *Table H1: 9, 10.*

The plate and the rivets are of silver alloy with at least 95% silver.[1090]

H2 (*Pl. 19; Fig. H2*)

Hinged belt buckle with buckle plate. Brass, silvered front. Surv. l. (buckle and plate) 700 mm, w. 26 mm, wgt. 21.68 g. Inv. No. V 1629.
River Ljubljanica at Rakova Jelša, Rakova jelša.
Underwater topographic survey in 1994; NMS acquired in 1994.
Istenič 2009h, Cat No. 75.

The cast D-shaped buckle has internal volutes and a buckle tongue of the 'fleur-de-lys' type. It is hinged to a rectangular plate that only survives in part. The buckle and plate are of brass and silvered on the front.[1091] The plate was fastened to the (leather) belt with four copper rivets.[1092] The flat rivet heads are also silvered, indicating that silvering was applied after the plate had been riveted to the leather belt. The plate was additionally fastened by inserting the (shorter) end of the leather strap into the rectangular-sectioned groove on the back of the hinge of the plate. The interior width of the groove shows that the (leather) strap onto which the plate was attached measured approx. 4 mm.

H3 (*Pl. 19; Fig. H3.1, Fig. 49*)

Button and loop fastener with a round head and a double loop. Silver with traces of gilding. Diam. 40 mm, h. 21 mm, disc edge th. 0.7 mm, loop th. 2.3 mm, wgt. 14 g. Inv. No. V 449.
River Ljubljanica at Bevke, Krajna.[1093]
Underwater topographic survey in 1984; NMS acquired in 1984.
Istenič 2009h, Cat No. 74.

The loop is quite substantial in comparison with the head. It is not clear whether the two parts were made as a single piece or separately and the shank of the loop subsequently fitted through the head into the solid hemispherical knob on the upper side. The X-ray image does not show the shank of the loop to be inserted either into the head or the knob. The latter has roughly a millimetre wide and equally deep protrusion in the centre.

1090 Cf. Chapter 16, *Table H1: 1–14.*
1091 Cf. Chapter 16, *Table H2: 1–4.*
1092 Cf. Chapter 16, *Table H2: 6–7.*
1093 I received the information just before the publication of the book; Ch. 18.5 therefore states the earlier information (The Krajna or Na zrnici sites).

a

b

Figure H2
The H2 belt buckle with buckle plate: a) front, b) back.

Slika H2
Pasna spona z okovom H2: a) lice, b) hrbtna stran.

a b

Figure H3
The H3 button and loop fastener: a) front, b) back.

Slika H3
Ploščica z dvojno zanko H3: a) lice, b) hrbtna stran.

Okov je, vključno z zakovicama, iz srebrove zlitine, ki vsebuje najmanj 95 % srebra.[1090]

H2 (*t. 19; sl. H2*)

Spona, s tečajem pritrjena na okov, ki ni v celoti ohranjen. Medenina, lice posrebreno. Ohr. dol. (spona in okov) 700 mm, šir. 26 mm, teža 21,68 g. Inv. št. V 1629.
Ljubljanica pri Rakovi Jelši (Rakova jelša).
Podvodna topografija 1994; NMS pridobil 1994.
Istenič 2009g, kat. 75.

Ulita spona z notranjo voluto in trirogeljnim trnom je s tečajem pritrjena na pravokoten okov, ki ni v celoti ohranjen. Spona in okov sta iz medenine in sta bila na licu posrebrena.[1091] Štiri bakrene[1092] zakovice so okov pritrjevale na podlago (usnjen pas?). Na licu jih prekriva posrebritev, kar kaže, da je bil predmet posrebren po tem, ko je bil pritrjen na podlago. Okov je bil na podlago pritrjen tudi s tem, da je bil usnjen pas vdet v vdolbino/utor pravokotnega preseka na hrbtni strani tečaja; notranja širina utora kaže, da je debelina (usnjenega) pasu, na katerega je bil pritrjen okov, merila pribl. 4 mm.

H3 (*t. 19; sl. H3, sl. 49*)

Okrašena ploščica z izbočenim osrednjim delom in ploščatim nosilcem z dvojno zanko. Srebro z ostanki pozlate. Pr. 40 mm, viš. 21 mm, deb. ploščice na robu 0,7 mm, deb. zanke 2,3 mm, teža 14 g. Inv. št. V 449.
Ljubljanica pri Bevkah (Krajna).[1093]
Podvodna topografija, potop 1984; NMS pridobil 1984.
Istenič 2009g, kat. 74.

Zanka je v primerjavi s ploščico masivna. Ni jasno, ali je bil predmet narejen v enem kosu ali pa sta bila ploščica in nosilec narejena posebej in je bil nosilec s spodnje strani skozi sredino ploščice vdet v masivno polkrožno glavico na zgornji strani ploščice. V ploščico in polkrožno glavico vdeti del nosilca na rentgenskem posnetku ni viden. Polkrožna glavica ima v sredini zgornje strani pribl. milimeter široko in enako globoko luknjico.

Na zgornji strani ploščice je geometrijski okras, narejen z zgornje strani v tehniki punciranja krožcev ter

1090 Glej pogl. 16, *pregl. H1: 1–14.*
1091 Glej pogl. 16, *pregl. H2: 1–4.*
1092 Glej pogl. 16, *pregl. H2: 6–7.*
1093 Podatek sem dobila, ko je bila knjiga tik pred izidom; v poglavju 18.5 sem upoštevala starejši najdiščni podatek, tj. ledini Krajna ali Na zrnici.

The upper side of the head has geometric decoration of small circles, as well as short and long lines chased from the front. The raised central part bears a four-petalled rosette with the hemispherical knob in the centre. The petals are made up of tiny circles, the background of lines.

The decoration on the flange is framed with a pair of circular mouldings on each side. The design in between shows a rosette with fifteen triangular petals. The chasing here is the opposite of that on the raised part: the background is filled with dots and the petals with short lines.

The head and the loop are of silver.[1094] The upper side shows traces of gilding,[1095] which are very poorly preserved and do not reveal whether gilding was applied over the whole surface or just parts of it.

H4 (*Pl. 20; Fig. H4–5*)

Button and loop fastener with relief decoration and a loop with a missing end. Lead-tin alloy, brass. Diam. 27 mm, h. 6.4 mm, wgt. 6.97 g. Inv. No. V 1453.
River Ljubljanica at Blatna Brezovica, Tri lesnice.
Diving; NMS acquired in 2000.
Istenič 2009h, Cat. No. 65 (top).

The head was cast in pewter; no traces of plating could be found.[1096] The relief decoration shows the head of Octavian or the Emperor Augustus in profile, with a curved augural staff in front and a jug behind. The surface at the back of the head is unevenly finished; there are traces of minute grooves running in different directions on a large part of it. The brass loop[1097] was cast into the back of the head.

H5 (*Pl. 20; Fig. H4–5*)

Button and loop fastener with relief decoration. Lead-tin alloy. Diam. 27 mm, disc th. 4 mm, wgt. 5.44 g. Inv. No. V 2111.
River Ljubljanica at Ljubljana, Livada.
Diving prior to 1999; NMS acquired in 2005.
Istenič 2009h, Cat. No. 65 (bottom).

The head is cast in pewter; no traces of plating were found.[1098] The relief decoration shows the head of Octavian or the Emperor Augustus in profile, with a curved augural staff in front and a jug behind. The surface at the back is uneven. The loop is missing.

Figure H4–5
The H4 (right) and H5 (left) button and loop fasteners: a) front, b) back.

Slika H4–5
Ploščici z reliefnim okrasom in enojno zanko H4 (na desni) in H5 (na levi): a) lice, b) hrbtna stran.

H6 (*Pl. 19; Fig. H6*)

Buckle. Brass. W. 29 mm, l. 23.4 mm, wgt. 2 g. Inv. No. V 1999.
River Ljubljanica at Bevke, Podpeški mah or Trebež.
Diving; NMS acquired in 1994.

The cast D-shaped brass buckle has a triangular-sectioned loop that flattens at both ends where holes are drilled. The pin bar is inserted into the holes and secured with hemispherical terminals. The pin bar holds a free moving buckle tongue. Analysis of the loop shows it is brass;[1099] the appearance of the tongue and the pin bar suggest they are of the same alloy.

1094 Cf. Chapter 16, *Table H3: 1–2.*
1095 Cf. Chapter 16, *Table H3: 4–5.*
1096 Cf. Chapter 16, *Table H4: 1–3.*
1097 Cf. Chapter 16, *Table H4: 5.*
1098 Cf. Chapter 16, *Table H5: 1, 3.*
1099 Cf. Chapter 16, *Table H6: 1.*

kratkih in daljših linij. Izbočeni del v sredini je okrašen z motivom štirilistne rozete, ki ima v sredini polkrožno glavico. Listi rozete so puncirani z drobnimi krožci, ozadje pa z linijami.
Okras na ploščatem delu, ki ga na zunanjem in notranjem robu omejujeta po dve rebri, prikazuje rozeto iz 15 cvetnih listov trikotne oblike. Tu je punciranje obratno, kot na izbočenem delu: ozadje je okrašeno z drobnimi krožci, cvetni listki pa z drobnimi linijami.

Ploščica in nosilec sta narejena iz srebra.[1094] Na zgornji strani so ostanki pozlate,[1095] ki pa je slabo ohranjena, zato ne vemo, ali je prekrivala celotno površino ali le njene dele.

a

b

Figure H6
The H6 belt buckle: a) front, b) back.

Slika H6
Pasna spona H6: a) sprednja stran, b) hrbtna stran.

1094 Glej pogl. 16, *pregl. H3: 1–2.*
1095 Glej pogl. 16, *pregl. H3: 4–5.*

H4 (*t. 20; sl. H4–5*)

Ploščica z reliefnim okrasom, na hrbtni strani ploščat nosilec z odlomljenim zaključkom. Zlitina svinca in kositra, medenina. Pr. 27 mm, viš. 6,4 mm, teža 6,97 g. Inv. št. V 1453.
Ljubljanica pri Blatni Brezovici (Tri lesnice).
Potapljanje; NMS pridobil 2000.
Istenič 2009g, kat. 65 (zgoraj).

Reliefni okras prikazuje profil Oktavijana oz. cesarja Avgusta, pred njim je avgurska palica z zavitim ročajem, za njim pa vrč. Površina hrbtne strani ni enotna, na velikem delu so sledovi drobnih brazd v različnih smereh. V ploščico je s hrbtne strani zalit ploščat nosilec iz medenine.[1096] Ploščica je ulita iz zlitine kositra in svinca; na licu nismo ugotovili prevleke.[1097]

H5 (*t. 20; sl. H4–5*)

Ploščica z reliefnim okrasom. Zlitina svinca in kositra. Pr. 27 mm, deb. ploščice 4 mm, teža 5,44 g. Inv. št. V 2111.
Ljubljanica pri Ljubljani (Livada).
Potapljanje pred 1999; NMS pridobil 2005.
Istenič 2009g, kat. 65 (spodaj).

Reliefni okras prikazuje profil Oktavijana oz. cesarja Avgusta, pred njim avgursko palico z zavitim ročajem, za njim pa vrč. Površina hrbtne strani ni enotna. Nosilec, ki je bil v ploščico zalit s hrbtne strani, ni ohranjen. Ploščica je ulita iz zlitine kositra in svinca; na licu nismo ugotovili prevleke.[1098]

H6 (*t. 19; sl. H6*)

Spona. Medenina. Šir. 29 mm, dol. 23,4 mm, teža 2 g. Inv. št. V 1999.
Ljubljanica pri Bevkah (Podpeški mah ali Trebež).
Potapljanje; NMS pridobil 1994.

Lok spone D-oblike ima trikoten presek, ki se na obeh koncih splošči. Os spone je vdeta v luknji na loku in zavarovana s polkrožnima bunkicama. Jezik spone je nataknjen na os in je gibljiv. Analiza loka je pokazala, da je iz medenine;[1099] izgled trna in osi nakazuje, da sta iz iste zlitine.

1096 Glej pogl. 16, *pregl. H4: 5.*
1097 Glej pogl. 16, *pregl. H4: 1–3.*
1098 Glej pogl. 16, *pregl. H5: 1, 3.*
1099 Glej pogl. 16, *pregl. H6: 1.*

H7 (*Pl. 19; Fig. H7–8*)

Hobnail. Iron. W. 17 mm, surv. h. 11 mm, wgt. 2.33 g.
Inv. No. V 2854.
River Ljubljanica at Rakova Jelša.
Diving; NMS acquired in 2006.

The underside of the hobnail head bears a poorly surviving, but clearly recognisable relief pattern consisting of an embossed cross and four dots.

H8 (*Pl. 19; Fig. H7–8*)

Hobnail. Iron. W. 18.5 mm, surv. h. 12 mm, wgt. 3.24 g.
Inv. No. V 2855.
River Ljubljanica at Rakova Jelša.
Diving; NMS acquired in 2006.

No relief pattern is visible on the underside.

Figure H7–8
The H7 (left) and H8 (right) hobnails: a) back, b) front.

Slika H7–8
Železna okovna žebljička obuval H 7 (levo) in H8 (desno), a) spodnja stran, b) zgornja stran.

I
DECORATIONS

I1 (*Pl. 20; Fig. I1, Fig. 50*)

Medallion with relief decoration. Tin-lead alloy, silver. W. 48 mm, h. 7 mm, wgt. 24.9 g. Inv. No. V 1881.
River Ljubljanica at Bevke, Krajna.
Diving; NMS acquired in 2003.
Istenič 2003a; Istenič 2009h, Cat. No. 63.

The front shows the bust of the Emperor Augustus in relief and in frontal view. He wears a tunic and a toga, as well as a laurel wreath on his head. To the right of his face is an eagle tipped sceptre, to the left is a branch with symmetrically placed elongated leaves and berries on long stalks.

It is cast of a tin-lead alloy and silvered on the front.[1100] The back surface shows that it was soldered to a backing that appears to have been of tin or an alloy in which tin is predominant[1101] (*Fig. 50*).

1100 Cf. Chapter 16, *Table I1: 1–2, 8–9, 12–13;* Istenič 2003a, 272–273.
1101 Cf. Chapter 16, *Table I1: 4, 6, 10*; Istenič 2003a, 272–273.

H7 (*t. 19; sl. H7–8*)

Okovni žebljiček. Železo. Šir. 17 mm, ohr. viš. 11 mm, teža 2,33 g. Inv. št. V 2854.
Ljubljanica pri Rakovi Jelši.
Potapljanje; NMS pridobil 2006.

Na spodnji strani žebljička je slabo ohranjen, vendar nedvomen reliefen vzorec: štiri rebra površino delijo na štiri pribl. enaka polja z bunkico v sredini.

H8 (*t. 19; sl. H7–8*)

Okovni žebljiček. Železo. Šir. 18,5 mm, ohr. viš. 12 mm, teža 3,24 g. Inv. št. V 2855.
Ljubljanica pri Rakovi Jelši.
Potapljanje; NMS pridobil 2006.

Na spodnji strani ni videti reliefnega vzorca.

I
ODLIKOVANJI

I1 (*t. 20; sl. I1, sl. 50*)

Ploščica z reliefnim okrasom. Zlitina kositra in svinca, srebro. Šir. 48 mm, viš. 7 mm, teža 24,9 g. Inv. št. V 1881.
Ljubljanica pri Bevkah (Krajna).
Potapljanje; NMS pridobil 2003.
Istenič 2003a; Istenič 2009g, kat. 63.

Na sprednji strani je v reliefu upodobljeno doprsje cesarja Avgusta v pogledu od spredaj. Oblečen je v tuniko in togo, na glavi ima lovorjev venec. Desno od obraza je žezlo z orlom na vrhu, levo veja s simetrično postavljenimi podolgovatimi listi in plodovi na dolgih pecljih.

Ploščica je ulita iz zlitine kositra s svincem in na sprednji strani posrebrena.[1100] Površina hrbtne strani ploščice kaže, da je bila prispajkana na podlago iz kositra ali zlitine, v kateri je kositer prevladoval[1101] (*sl. 50*).

a

b

Figure I1
The I1 medallion with the depiction of Augustus, probably part of a military decoration: a) front, b) back.

Slika I1
Ploščica I1 z upodobitvijo cesarja Avgusta, verjetno del vojaškega odlikovanja: a) sprednja stran, b) hrbtna stran.

1100 Glej pogl. 16, *pregl. I1: 1–2, 8–9, 12–13*; Istenič 2003a, 272–273.
1101 Glej pogl. 16, *pregl. I1: 4, 6, 10*; Istenič 2003a, 272–273.

I2 (*Pl. 20; Fig. I2*)

Torque. Tin. L. 125 mm, w. 92 mm, wgt. 46.71 g. Inv. No. V 4199.
River Ljubljanica at Blatna Brezovica, Bržič.
Diving; NMS acquired in 2013.
Istenič 2003a; Istenič 2009h, Cat. No. 64.

The twisted penannular and ellipsoid torque is thickest in the centre (th. 7.5 mm) and thins towards the ends where it again widens to form terminals in the shape of reverted bird heads. The torque is plain in the length of approx. 40 mm before the terminals and is thinnest (th. 4 mm) just behind the terminals.

The surface has no patina and was already pitted upon discovery, according to the finder who claimed to have only washed the object with water. The conservation at the NMS only involved rinsing with distilled water.

The item was forged and twisted; the details on the terminals were made by chasing. It is made of a tin-copper alloy with around 2% copper.[1102]

Figure I2
The I2 torques, military decoration.

Slika I2
Torkves I2, vojaško odlikovanje.

J
TENT PEG

J1 (*Pl. 18; Fig. J1*)

Peg with a hole through which a ring is passed. Iron. H. 144 mm, ring diam. 37 mm, wgt. 46 g. Inv. No. V 2563.
River Ljubljanica at Podpeč.
Diving; NMS acquired in 1993.

The rectangular-sectioned peg has a tapering upper end that is flattened on top and has a hole that holds a ring.

1102 Cf. Chapter 16, *Table I1: 1.*

I2 (*t. 20; sl. I2*)

Torkves. Kositer. Dol. 125 mm, šir. 92 mm, teža 46,71 g. Inv. št. V 4199.
Ljubljanica pri Blatni Brezovici (Bržič).
Potapljanje; NMS pridobil 2013.
Istenič 2003a; Istenič 2009g, kat. 64.

Tordiran odprt obroč v obliki elipse je najdebelejši v sredini (deb. 7,5 mm) in se tanjša proti zaključkoma, kjer se znova razširi in zaključi v obliki nazaj obrnjenih ptičjih glavic. Pribl. 40 mm pred glavicama obroč ni tordiran in je najtanjši (deb. 4 mm) tik pred zaključkoma.

Na površini predmeta ni patine, vidne pa so drobne luknjice, ki jih je bilo po podatkih najditelja opaziti že ob odkritju. Po zagotovilu najditelja je predmet po odkritju samo spral v vodi. Konservatorski postopek v NMS je obsegal le spiranje v destilirani vodi.

Predmet je bil skovan in tordiran, podrobnosti na ptičjih glavicah pa narejene s punciranjem. Je iz zlitine kositra z okoli 2 % bakra.[1102]

Figure J1
The J1 tent peg.
Slika J1
Šotorski klin J1.

J
ŠOTORSKI KLIN

J1 (*t. 18; sl. J1*)

Klin z ušesom in obročkom. Železo. Viš. 144 mm, premer obročka 37 mm, teža 46 g. Inv. št. V 2563.
Ljubljanica pri Podpeči.
Potapljanje; NMS pridobil 1993.

Klin ima pravokoten presek. Vrh je raven in zožen; pod njim je luknja, v katero je vdet obroček.

1102 Glej pogl. 16, *pregl. I1: 1.*

Plate 1
Iron, brass, wood (A1–A3); iron, wood (A4).
Scale 1 : 3.

Tabla 1
Železo, medenina, les (A1–A3); železo, les (A4).
Merilo 1 : 3.

Plate 2
Iron, brass, copper, tinning.
Scale 1 : 3.

Tabla 2
Železo, medenina, baker, pokositrenje.
Merilo 1 : 3.

Plate 3
Iron, brass, bronze, copper, tinning, wood (A6); iron, brass, tinning, copper (A7); iron, brass, tinning, wood (A8).
Scale 1 : 3.

Tabla 3
Železo, medenina, bron, baker, pokositrenje, les (A6); železo, medenina, pokositrenje, baker (A7); železo, medenina, pokositrenje, les (A8).
Merilo 1 : 3.

Plate 4
Iron, tinned bronze, brass (A9); brass (A10); iron, brass (A11); iron, silver, wood (A12); silver, gilding (A13).
Scale 1 : 3.

Tabla 4
Železo, pokositren bron, medenina (A9); medenina (A10); železo, medenina (A11); železo, srebro, les (A12); srebro, pozlata (A13).
Merilo 1 : 3.

Plate 5
Iron (A14); iron, copper, tinning, bone (A15); iron, tinned bronze (A16).
Scale 1 : 3.

Tabla 5
Železo (A14); železo, pokositren baker, kost (A15); železo, pokositren bron (A16).
Merilo 1 : 3.

Plate 6
Iron (A17, A18, A21); iron, bone, brass, bronze (A19); iron, brass (A20); iron, wood (A35).
Scale 1 : 3.

Tabla 6
Železo (A17, A18, A21); železo, kost, medenina, bron (A19); železo, medenina (A20); železo, les (A35).
Merilo 1 : 3.

Plate 7
Iron, brass, wood, enamel.
Scale 2 : 3.

Tabla 7
Železo, medenina, les, emajl.
Merilo 2 : 3.

Plate 8
Iron, wood, brass, tin-lead alloy, enamel.
Scale 2 : 3.

Tabla 8
Železo, les, medenina, zlitina kositra in svinca, emajl.
Merilo 2 : 3.

Plate 9
Iron, wood, silver, brass, enamel.
Scale 2 : 3.

Tabla 9
Železo, les, srebro, medenina, emajl.
Merilo 2 : 3.

Plate 10
Iron, wood, brass.
Scale 2 : 3.

Tabla 10
Železo, les, medenina.
Merilo 2 : 3.

Plate 11
Iron, brass.
Scale 2 : 3.

Tabla 11
Železo, medenina.
Merilo 2 : 3.

Plate 12
Bronze, copper, iron.
Scale 1 : 3.

Tabla 12
Bron, baker, železo.
Merilo 1 : 3.

Plate 13
Bronze, copper, brass,
tin-lead alloy.
Scale 1 : 3.

Tabla 13
Bron, baker, medenina,
zlitina kositra in svinca.
Merilo 1 : 3.

Plate 14
Iron.
Scale 1 : 4.

Tabla 14
Železo.
Merilo 1 : 4.

Plate 15
Iron.
Scale 1 : 3.

Tabla 15
Železo.
Merilo 1 : 3.

Plate 16
Iron.
Scale 1 : 3.

Tabla 16
Železo.
Merilo 1 : 3.

Plate 17
Iron.
Scale 1 : 3.

Tabla 17
Železo.
Merilo 1 : 3.

Plate 18
Iron.
Scale 1 : 3.

Tabla 18
Železo.
Merilo 1 : 3.

Plate 19
Silver, gilding (H1, H3); brass, silvering (H2); brass (H6); iron (H7, H8).
Scale 1 : 1.

Tabla 19
Srebro s pozlato (H1, H3); medenina s posrebritvijo (H2); medenina (H6); železo (H7, H8).
Merilo 1 : 1.

Plate 20
Tin-lead alloy, brass (H4); tin-lead alloy (H5); tin-lead alloy, silvering (I1); tin (I2).
Scale 1 : 1.

Tabla 20
Zlitina svinca in kositra, medenina (H4); zlitina svinca in kositra (H5); zlitina svinca in kositra s posrebritvijo (I1); kositer (I2).
Merilo 1 : 1.

Abbreviations

CM = City Museum of Ljubljana (part of Museum and Galleries of Ljubljana)
DA = Department of Archaeology at the NMS
DHAA = Department of History and Applied Arts at the NMS
Inv. No. = inventory number
NMS = National Museum of Slovenia
PIXE = Proton Induced X-ray Emission

Okrajšave

AO = Arheološki oddelek NMS
inv. št. = inventarna številka
MM = Mestni muzej Ljubljana (del javnega zavoda Muzej in galerije mesta Ljubljane)
NMS = Narodni muzej Slovenije
OZUU = Oddelek za zgodovino in uporabno umetnost NMS
PIXE = analitska metoda protonsko vzbujene rentgenske spektrometrije (Proton induced X-ray emission)

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