

CRAFT

Connecting Research Approaches to
Fabrication and Trades in Antiquity

**FIRST CRAFTS IN ANTIQUITY CONFERENCE
4-6 NOVEMBER 2026, BRNO, CZECH REPUBLIC**

BOOK OF ABSTRACTS

**Czech Academy of Sciences, Institute of Archaeology, Brno
Brno 2026**



**First Connecting Research Approaches to Fabrication and Trades in Antiquity Conference
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Institute of Archaeology of the Czech Academy of Sciences, Brno in cooperation with
University of Cologne
Institute Primus Devotus
Skupina STIK

Martijn A. Wijnhoven, Dajana Ehlers, Kaja Stemberger Flegar, Ana Kovačič and Jason Lundock (eds.)

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INTRODUCTION TO THE FIRST CRAFTS IN ANTIQUITY CONFERENCE

Welcome to the first Connecting Research Approaches to Fabrication and Trades in Antiquity (CRAFTs in Antiquity) Conference. We are delighted to welcome you to Brno for a programme of academic papers, posters, practical craft demonstrations, museum visits and social activities.

This conference developed, or shall we say it was crafted, from an informal conversation among five colleagues about what we would value in a conference devoted to ancient crafts. Over the following eighteen months, that conversation developed into the event you are attending today. Central to our vision was the wish to bring academic researchers and craftspeople together, creating opportunities to exchange knowledge, discuss interpretations and explore how practical experience can inform the study of the past.

The conference addresses craft production and trade in Europe and the Mediterranean between approximately 1000 BCE and 1000 CE. Through both academic presentations and practical craft demonstrations, the aim is to share expertise that deepens our understanding and appreciation of ancient craftworking techniques and the role of craft production in the ancient world. The chronological scope is intentionally broad, and we hope that this will encourage meaningful conversations across disciplines and areas of expertise.

We intend this to be the first in a series of CRAFTs in Antiquity conferences. Your experiences and feedback will help us shape future meetings and build a continuing exchange between researchers and craftspeople.

We gratefully acknowledge the support of the Strategy AV21 programme and the financial donation from Institute Primus Devotus, which have helped make this conference and the accompanying book of abstracts possible. We also thank our institutional partners, colleagues and volunteers for their contributions to the organisation of the event.

Thank you for joining us for this first CRAFTs in Antiquity Conference. Whether you are presenting a paper or poster, demonstrating a craft or taking part in the discussions, your contribution is an essential part of the meeting. We hope that your time in Brno brings stimulating conversations, new connections and fresh perspectives on ancient crafts and craftspeople.

Martijn A. Wijnhoven
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Ana Kovačič
Jason Lundock

ABSTRACTS OF PAPERS

Should craftsmen blame their tools? The moral ambiguity of iron in Pliny's Natural History

Hylke de Boer

In this paper, I discuss the moral ambiguity of iron in Pliny the Elder's *Natural History*. In his account of iron mines and ores in book 34, Pliny states that 'iron serves as the best and the worst instrument of life' inasmuch as we use it for agriculture and for war. On the one hand, he says, the ingenuity of humans is to blame for the bad applications of the metal. On the other hand, he argues that Nature exacts punishment on the metal itself by making rust its fatal flaw. Pliny, therefore, attributes the moral ambiguity of iron to both its users and to the metal itself.

The presentation of materials in Pliny's encyclopaedia and the moral values that he imbues them with have attracted scholarly attention in recent years. I examine Pliny's account of iron in conjunction with poetic texts, such as Vergil's *Georgics* and Lucan's *Pharsalia*, which emphasise the iron materiality of ploughs and swords, to further elucidate the meaning of Pliny's moral value judgement. I argue that Pliny's account is best understood through modern ideas about craft and technology. In Pliny's world, materials, such as iron, actively participate in the technological and art historical development of humanity. They give shape to what we do and how we think, 'mediating' our moral decisions.

Approaches to Roman bone carving: A case study

Boris Alexander Burandt, Laura Romina De Luca

Bone carving was practised by all ancient civilisations, but to the modern observer and researcher it represents an extraordinary craft that has scarcely any resonance in modern society. The excellent material properties of bone, as well as its constant availability as a by-product of food production, made bone—along with ivory, antler and horn—an attractive material for ancient societies, regardless of their level of development or region. But the fact that bone is scarcely processed in the present day leads to numerous misidentifications of archaeological finds and misinterpretations of the craftsmanship involved.

The proposed lecture addresses this topic using two examples: Roman combs and Roman sword hilts. It combines two interpretative approaches: firstly, the analysis of tool marks on ancient artefacts, and secondly, the insights gained from the processing of bone in practised contemporary craftsmanship. The proposed presentation therefore combines a paper with a practical demonstration.

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The invisible craft: Reconstructing the production of Roman unguents

Alice Capobianco

Roman unguents were complex products resulting from multi-stage processes involving the selection, transformation, and combination of organic raw materials such as oils, resins, and plant-based aromatics. Despite their widespread use in the ancient world, their production remains difficult to reconstruct archaeologically due to the perishable nature of their components and the lack of clearly identifiable workshop structures.

This paper approaches unguent production as an “invisible craft”, focusing on the technical processes and practical knowledge underlying their manufacture. Drawing on literary sources, archaeological evidence, and ethnoarchaeological observations of traditional perfume production, it seeks to reconstruct the chaîne opératoire of Roman unguents, from raw material procurement to final blending.

Particular attention is given to transformation processes such as maceration, heating, filtration, and mixing, as well as to the tools, containers, and spatial arrangements required for these operations. Ethnoarchaeological data and experimental archaeology provide insight into steps, timing, and decision-making processes that leave little or no trace in the archaeological record, helping to bridge the gap between material evidence and technical practice.

By shifting the focus from finished products to production processes, this contribution highlights the role of embodied knowledge and technical skill in shaping ancient aromatic substances. It argues that unguent production should be understood as a structured craft activity, embedded in broader economic and cultural systems, yet largely invisible in the material record.

Discovery of residual surface treatment on a knee brooch: First evidence of the silver depletion technique beyond the Norico-Pannonian limes?

Čeněk Fouček

This study presents the discovery of a residual silver-like surface layer on a Germanic knee brooch from the second century CE. The observed layer is hypothesised to result from depletion silvering, a technique in which base metals are selectively leached from a silver-copper alloy, leaving behind an enriched silver surface.

To test this hypothesis, an experimental approach was undertaken. Samples with the same composition as the brooch were subjected to a series of etching processes using vinegar, a commonly available acidic agent in Antiquity.

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The experiment successfully replicated a silver-enriched layer, demonstrating that silver depletion techniques could have been used outside the Roman Empire. To analyse the material composition and surface modifications, tabletop XRF was used to determine the alloy's elemental composition, while SEM-EDS provided high-resolution documentation of the silver-enriched surface layer.

Additionally, CIELAB colour space measurements were conducted to quantify the colour difference between the original alloy and the silver-enriched surface, objectively assessing the visual changes resulting from the depletion process. This finding provides new insights into Roman-period metalworking techniques and suggests the possibility of a broader application of silver depletion methods beyond Roman coinage production.

Consider the humble iron nail

Stefanie Hoss

Although iron nails had already been produced and used in Iron Age societies north of the Alps, their use increased significantly during the Roman period. This was linked to the general increase in metal object production, made possible by the increased production of raw materials and the prosperity brought about by growing trade.

This paper aims to demonstrate just how remarkable the humble nail is, discussing its advantages over wooden nails, the factors that determine its shape, and why nail typologies are of limited use. Special forms of nails, such as T-nails and ship's nails, will also be addressed.

The (pre)historic sling

Ivan Ilić

Over all periods of the past, slings were the chronologically longest and most commonly used weapons. Still, the greatest knowledge about the shapes and usage of slings is connected to Roman times. They were used for both hunting and warfare, but also for signalling and for scaring the enemy.

Basic sling parts include the finger loop, cord, pouch for inserting projectiles, and a cord for releasing projectiles. Materials most commonly used for making slings are ropes of plant fibres or leather. Combining materials is also possible, when the loop and the cords are made of rope and the pouch is made of leather. Regarding ammunition, the most frequently used were stones, but projectiles could also be made of clay or lead. The latter were mass produced for the needs of military campaigns.

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Finally, the sling shooting technique includes rotation of the entire arm, from shoulder to hand. Rotation speed depends on the projectile weight. Rotation can also be performed in several ways: vertically, horizontally, or at an angle.

Vertical rotation is applied when the target is in the same plane as the shooter, while the horizontal one is used for example when shooting from a rampart. The shooting technique also includes several different ways of holding the sling within one's hand.

The data presented here originate from my own research, personal interest, and practical knowledge about this type of weapon.

Roman military tile production: Technology and its transfer

Tomáš Janek

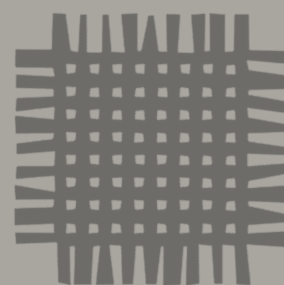
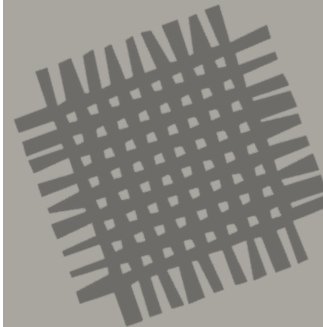
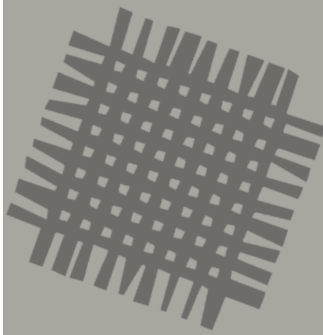
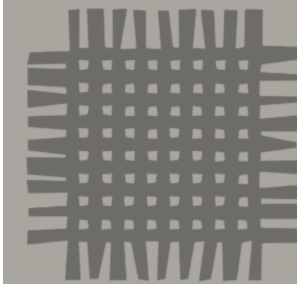
This contribution examines the development of manufacturing technologies in the production of Roman ceramic building material and their transfer between legionary production centres. The primary dataset comes from the legionary brickyard near ancient Vindobona, where the technological features of tiles—such as the shape of the lower cutaways, flange profiles, and the treatment of the underside—were statistically evaluated.

The results indicate that individual legionary units displayed clear preferences for particular manufacturing details. These preferences appear to correspond with the arrival of new units in the fortress and may reflect the introduction of different production traditions and working routines.

At the same time, several technological features overlap between units, suggesting interaction and knowledge exchange among different working groups within the brickyard.

Additional material produced by Legio X Gemina from Noviomagus and Aquincum was also examined. This broader dataset makes it possible to trace the development of certain technological traits and to identify their movement between production centres along the frontier.

The observed patterns provide insight into how manufacturing knowledge circulated within the Roman military and how production practices were maintained, adapted, and transferred across the Empire.



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The world within a vial

Fred Licci

As is well known, Pompeii provides a privileged perspective for several fields of archaeological research, particularly regarding the archaeobotanical record and organic remains. This paper examines non-endemic elements from the Vesuvian area, identified in literary sources as components of cosmetic preparations and toiletry routines, whose presence highlights the lively economic exchanges between the Roman world and the Far East.

Furthermore, the paper analyses endemic species commonly used in local perfume production, specifically those recovered from the House of the Garden of Hercules (II, 8, 6). Both the technical aspects of perfume-making and the preparation of other elements involved in the research will be reconstructed following the processes of experimental archaeology.

Materiality of identity in the mind of the metalworker: A case study of copper alloys

Jason Lundock

Materials are not static and neutral entities; they are invested with a range of cultural and symbolic meanings which affect how they are perceived, valued, and interpreted by those who engage with them.

This paper shall discuss Hellenistic and Roman symbolic associations with copper alloys as a case study in examining how cultural associations of material may influence the craftsperson's sense of self and identity in relation to their work in the context of broader society.

A review of ancient literary sources and archaeological examples shall demonstrate associations of copper alloys with concepts of healing and purification which, combined with a reflection on the metal's place within the wider perceived hierarchy of metals (gold, silver, bronze and iron), shall offer a multi-layered and diverse assortment of associations within which one's identity as a worker with this material may have been constructed and experienced.

This paper shall then close with suggestions on how considerations of materiality may further inform our understanding of the self-perception and lived experience of craftspeople in the ancient world.

ABSTRACTS OF PAPERS

Insight into early medieval Great Moravian and Bohemian elite jewellery

Estelle Ottenwelter

Since 2012, the Institute of Archaeology in Prague has conducted systematic technical research on early medieval jewellery from Great Moravia and Bohemia, integrating a multidisciplinary approach—including experimental work with a professional goldsmith.

This research has shed light on the complex construction, manufacturing processes, decoration techniques, and materials used to manufacture these artefacts. Analysis of tool marks, defects, craftsmanship quality, and alloy composition revealed both finely crafted pieces by highly skilled goldsmiths using sophisticated tools and suitable alloys, and coarser objects produced by less experienced craftsmen using more rudimentary tools and coarser materials.

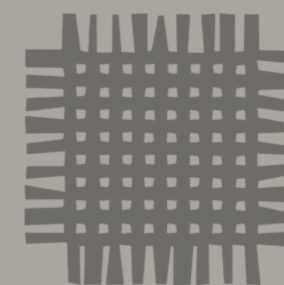
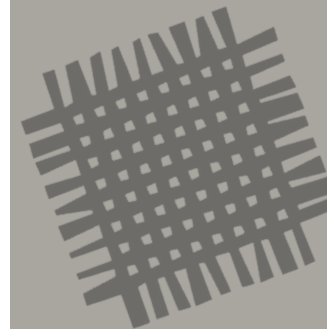
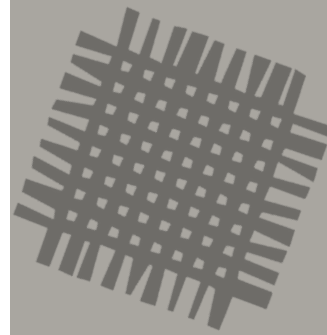
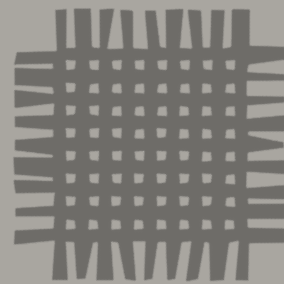
The comparison of the size, the total number of components forming the items of jewellery, the estimated manufacturing time, and the amount of precious metal needed to produce each type of item has shed light on the level of complexity involved in their manufacture and highlighted exceptional, high-quality pieces. These observations have enabled the identification of pieces likely produced in the same workshop, as well as probable imported items.

Don't chip it if it ain't broken: Knapping in the Roman period

Kaja Stemberger Flegar, Rafko Urankar

This paper addresses the recycled objects found at a pottery kiln site in Roman Colonia Ulpia Traiana Poetovio (modern Ptuj, Slovenia). As we were processing the finds, certain types of reused objects caught our attention. Several broken pieces of glass and, to a lesser degree, pottery sherds had been retouched into functional tools. Such objects are not frequently studied in Roman archaeology, but when found, they are usually related to pottery production and leather crafting. Similarly, recycling and the reuse of objects have received only limited attention in the Roman archaeology of Slovenia, meaning parallels for our specimens are few and far between.

Our analysis of the tools fashioned from glass shards proved rather straightforward once we applied the same methodology as for prehistoric stone tools. The glass objects from Ptuj could be predominantly classified as scrapers, blades, and drills. More intriguing, however, were objects made from retouched terra sigillata vessels and other types of pottery. Some of the bottoms had been reshaped so they could serve as lids, while others had been sanded down to form geometric shapes. In the context of the Roman kiln complex, these could be interpreted as potter's ribs.



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In addition to the primary classification and object use, we discuss several related questions, such as who were the people who used these tools, and why they would use these 'primitive' objects even though more specialised tools were available in the Roman era. Last but not least, we address certain issues regarding the identification and classification of knapped tools in post-Stone age eras.

The craft and technology of Roman scale armour

Martijn A. Wijnhoven

This paper examines the craft behind the production of Roman scale armour (lorica squamata), with a focus on materials, manufacturing techniques, and the role of textiles. It reconstructs the chaîne opératoire, tracing key stages in its manufacture from component production to final assembly.

Particular attention is given to the tools and techniques involved, and to the degree of specialisation required at different stages of production. The paper considers the fabrication of the individual elements (metal scales, linking wires, and textile backings) and evaluates the skills underlying their manufacture. It further explores how these components were integrated into a functional and durable armour.

The study combines archaeological evidence derived from material analysis with insights gained through experimental reconstruction. This approach situates Roman scale armour within a broader craft tradition, highlighting the labour, material knowledge, and technical expertise involved in its production.

Neutron techniques applied to the study of mail

Alan Williams, David Edge, Francesco Grazzi, Anna Fedrigo, Nikolay Kardjilov, Martin Chapman, Simon Metcalf

Neutron imaging is a non-destructive method of analysis which can provide detailed information about hidden strain within metal artefacts, as well as corrosion. In conjunction with metallography, information about forging history can be recovered.

ABSTRACTS OF DEMONSTRATIONS

Manufacture of a chased gombik

Ludmila Barčáková, Estelle Ottenwelter

The aim of this demonstration is to present the different steps involved in the manufacture of a chased gombik. Gombiky are hollow, globular pendants that were found in the graves of the wealthiest individuals in Great Moravia and Bohemia from the 9th and 10th centuries CE. They are typically discovered in pairs, placed around the collarbones of the deceased, primarily in the graves of children but also in those of women and men. Their function remains a subject of debate; they may have served as prestigious clothing fasteners, or luxurious amulets. The majority of these pendants are decorated by chasing, a technique that involves hammering the metal from the front with punches to indent and shape the surface without removing material. This demonstration will provide valuable insight into the manufacturing process of this iconic ornament of the elite. It will offer a deeper understanding of embossing, soldering, and chasing—the meticulous technique that requires thorough preparation and a high level of skill.

Sawing Roman combs

Laura Romina De Luca, Boris Alexander Burandt

Sawing Roman (and, more generally, ancient to early medieval) combs requires a special technique that allows a fine partition into narrow teeth. The method used to achieve this division under pre-industrial conditions can be deduced from archaeological finds, and transforms a practical necessity into a decorative element. The demonstration is intended, in particular, to give researchers an insight into how certain features of ancient artefacts can be explained through their production, and how conclusions about their manufacture can be drawn from them.

The production sequence of brass armour scales: From ore to finished form

Čeněk Fouček, Filip Ševčík, Matej Lelovič, Matěj Kmošek, Patrick Bárta, Eliška Petřeková

The demonstration will focus on a hypothetical production process of Roman brass armour scales used in the production of the lorica squamata type of armour, proceeding from the processing of copper ore and its enrichment with zinc, through the process of cementation, to the creation of an ingot and its hammering into a sheet from which the scales will be cut.

The demonstrators will be using historically accurate tools and utilising materials and processes known to ancient Roman craftspeople.

ABSTRACTS OF DEMONSTRATIONS

The making of slings

Ivan Ilić

The author will be demonstrating how to make slings from natural fibres and how to sew a leather pouch. Some previously made slings will be presented, as well as some ammunition made from clay. If possible, the author can also give a shooting demonstration using spectator-safe tennis balls.

Making Roman scale armour

Martijn A. Wijnhoven, Matěj Kmošek

This demonstration offers a practical exploration of how Roman scale armour (lorica squamata) could have been made. Attendees will see the process from sheet metal to finished armour, including the shaping and perforation of individual scales, linking them with wire, and assembling the components into a flexible, functional piece.

The session highlights the tools, techniques, and materials involved.

The demonstration combines experimental reconstruction with archaeological knowledge, providing a tangible understanding of the craft and technology behind Roman scale armour.

Precious metals in maille making and the historical use of wooden and metal silversmithing hammers

Anna Rennie, Nigel Allen

This demonstration explores the working properties of precious metals in maille making through experiments with silver and gold. Demonstrations of maille making in steel will provide a comparison, showing how techniques must be adapted when working with precious metals. The presentation will discuss findings from ongoing practical and historical research, considering whether and how silver and gold were incorporated into historical maille, even in small quantities, and what their use might reveal about armour as an expression of status.

A second demonstration will examine the manufacture of an early medieval silver cup through experimental replication. Using specially made wooden raising hammers, it will explore whether wooden rather than metal hammers could have been used to shape such vessels, and whether these techniques leave distinguishable traces on the finished object. Together, the demonstrations will offer opportunities to discuss how practical experiments can inform the interpretation of historical metalworking techniques.

ABSTRACTS OF DEMONSTRATIONS

Bronze Age metal cocktails: Using iron in copper alloy smelting

Rafko Urankar

A late Bronze Age hoard was unearthed during the 1998 excavations in modern Kranj, Slovenia. In addition to more than 400 bronze items, the finds curiously also included several pieces of limonite ore. Chemical analyses of the metal artefacts showed they were made of a rather unusual alloy consisting of three base metals: copper, lead, and iron. The metallurgical workshop discovered in the heart of Kranj's prehistoric settlement suggests that the alloy could have been produced locally. In the context of prehistoric metallurgical technology, the admixture of iron seems particularly problematic. Limonite, however, is relatively easy to process and had been utilised as a pigment long before it began being smelted, making it feasible to attempt experimentally replicating the alloy identified in the bronze items from the Kranj hoard, especially in the shaft hole axes, which studies have interpreted as a form of premonetary currency.

Aiming to reproduce the material composition of the shaft hole axes, we will be heating industrial copper and lead, with the addition of finely ground limonite, in an electric melting furnace to 1200 °C, high enough to melt the metals. A reducing atmosphere is necessary for two reasons: first, to prevent oxidation of the molten metals, and second, to reduce the limonite into iron, crucially enabling its embedding into the matrix of the alloy. We will ensure a reducing atmosphere by covering the raw metals in ground charcoal before smelting and by sealing the furnace to effectively prevent the influx of air.

Partial tinning of Roman military equipment

Matěj Kmošek, Martijn A. Wijnhoven

This demonstration reconstructs partial tinning, a Roman technique used to create visual contrast on copper-alloy objects, especially Roman military equipment. Selected areas are covered with animal protein (egg white/glaire) and the metal surface is coated with a thin layer of tin, producing a silvery finish that contrasts with the untreated alloy.

The process involves cleaning the object, defining the areas to be tinned, and applying tin using heat together with a flux to ensure proper adhesion. Careful temperature control is essential to achieve an even coating without damaging the base material.

The demonstration illustrates both the technical process and the visual effect of selective tinning, offering insight into Roman metalworking practices and decorative strategies.

POSTERS

Study of the maritime and underwater circulation of ingots and other metal artefacts in the Roman Period

Sara Colpo

Academic research in archaeometallurgy has made significant progress—especially in recent decades—in the study and understanding of production processes related to the exploitation of mineral deposits and the internal organisation of mines. These processes can be described with reasonable accuracy not only through ancient literary sources, but also through archaeological evidence and its markers across various Roman mining districts, particularly in the Iberian Peninsula. The study of these activities has been recognised as a valuable historical and cultural indicator for analysing aspects such as labour organisation, the degree of specialisation of the workforce, and the exploitation of raw materials.

Beyond the microcosm of Roman mining districts, the commercialisation of metal products has also been examined, occurring primarily via maritime routes. The discovery of ingots is essential for confirming both primary and secondary redistribution routes.

Although a considerable number of ingots have been recovered—forming a network of fundamental importance—the circulation of metals in the Mediterranean cannot be understood solely through their discovery. It must also take into account other artefacts that contributed to increasing distribution volumes in the Roman Mediterranean, as well as how these materials were used over time.

The study of the circulation of metal finds, particularly those recovered in underwater and maritime contexts, allows for a detailed investigation not only of overall volumes, but also of their destinations. Furthermore, by analysing other categories of finds often discovered alongside them, it becomes possible to contextualise their origin, destination, and, in some cases, their use.

Small-scale bronze working at Roman Praetorium Latobicorum (Trebnje, Slovenia)

Ana Kovačič, Luka Rozman, Maruša Urek

The Roman settlement Municipium Praetorium Latobicorum, located on the main road between Emona and Siscia, offers important evidence for the relationship between craft production, trade, and daily life. Earlier excavations revealed roadside workshops in long buildings that combined spaces for trade, craft activities, storage, and residential functions, as well as a nearby bronze foundry active in the later 1st and 2nd centuries CE.

POSTERS

Excavations carried out in 2021 added new evidence for bronze working in a similar context. The most important assemblages belong to the earliest building phase, dated to the period between the second half of the 1st century and the beginning of the 2nd century CE.

These finds include slag, fragments of small crucibles, semi-finished objects, amorphous bronze, rods, offcuts, droplets, and other production waste, together with a ceramic mould for casting a bracelet.

This assemblage documents several stages of manufacture, including smelting, casting, finishing, recycling, and waste disposal. Because such varied bronze-working evidence is still rarely recognised or fully published in Slovenia, the Trebnje material provides a useful case for examining how small-scale bronze working was organised within a Roman settlement.

Neutron techniques applied to the study of mail

Alan Williams, David Edge, Francesco Grazzi, Anna Fedrigo, Nikolay Kardjilov, Martin Chapman, Simon Metcalf

Neutron imaging is a non-destructive method of analysis which can provide detailed information about hidden strain within metal artefacts, as well as corrosion. In conjunction with metallography, information about forging history can be recovered.

The craft of protection: Reconstructing leather armour and the transfer of military craft knowledge across Eurasia

Patrick Wertmann

What knowledge is required to transform raw hide into flexible body armour made from thousands of individual scales? This poster examines two exceptionally preserved Early Iron Age leather scale armours: one from the Yanghai cemetery in northwest China and another kept in the Metropolitan Museum of Art, New York.

Although differing in form and likely tactical function, both armours reveal striking similarities in construction, standardisation, and manufacturing logic. To better understand how such armour was made and used, the MET example was reconstructed in collaboration with a master saddler using an experimental reverse-engineering approach.

The reconstruction focused on key stages of production, including scale cutting, lacing systems, structural reinforcement, edge treatment, and fastening methods.

POSTERS

The process revealed that both armours were highly sophisticated craft products requiring specialised labour, carefully organised workflows, and extensive material resources. Wear tests further demonstrated a degree of flexibility and mobility unexpected for heavily protected warriors.

The comparison between the two armours highlights the circulation not only of military technologies, but also of practical craft knowledge across Eurasia during the early first millennium BCE.

In particular, the study of leather armour demonstrates how ancient craftworking can be approached not only through artefacts themselves, but through the processes, skills, and decisions embedded within them.

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