

CIA

2022

Cremations
in Archaeology

Abstract Book

Abstract Book

Session 1. Cremations and chronology (10 abstracts)

Session 2. Diet, mobility, and society (6 abstracts)

Session 3. New developments for the study of cremations and cremated human remains (11 abstracts)

Session 4. Pyre technology and funerary practices (9 abstracts)

Posters (14 abstracts)

Conference Schedule

	Tuesday 25	Wednesday 26	Thursday 27	Friday 28
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9.20		Opening	Talk 11	Talk 22
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12.20		LUNCH	LUNCH	LUNCH
12.40				
13.00				
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Session 1. Cremations and chronology (Talks 1 to 10)

Session 2. Diet, mobility, and society (Talks 12 to 16)

Session 3. New developments for the study of cremations and cremated human remains (Talks 17 to 27)

Session 4. Pyre technology and funerary practices (Talks 28 to 36)

Organizing Committee – The CRUMBEL Team

- Guy De Mulder
- Christophe Snoeck
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- Mathieu Boudin
- Giacomo Capuzzo
- Barbara Veselka
- Sarah Dalle
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List of talks and posters

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Talk 3	Mario Gavranović	Cremations, stone circles and copper smelting – Bronze Age urn cemeteries in northeastern Serbia
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Talk 33	Omar Larentis	Funerary practices of the Golasecca Civilization (Northwestern Italy, Iron Age 9th-4th century BCE): an overview
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2	Amanda Sengeløv	The odd one out: discussing the origins of the highest $^{87}\text{Sr}/^{86}\text{Sr}$ value found in cremated bones in Belgium using a preliminary BASr of Belgium
3	Emma Legrand	Mobility and diet: studying the population of the vicus of Tienen, Belgium (1-4th c. AD)
4	Lucia Martina Scalise	Preliminary virtual examination of Middle-Late Bronze Age non-excavated urns from Northern Italy
5	Christina Cheung	Palaeomobility at the Urnfield burial site Přáslavice (Moravia, Czech Republic)
6	Carina T. Gerritzen	New insights from $\delta^{88}\text{Sr}$ – results from cremation and contamination experiments
7	Yannis Chatzikonstantinou	The custom of cremation in Central Macedonia, Greece during the Early Iron Age: Preliminary results from Polichni, Thessaloniki
8	Hannah F. James	Strontium isotope analysis of cremated remains from Tongobriga: examining mobility at the western edge of the Roman Empire
9	Elisavet Stamataki	Cremations through time and space in Belgium: Investigating the changes in cremation conditions from the Metal Ages to the Medieval period using FTIR-ATR and carbon and oxygen isotope analysis.
10	Jessica Mongillo	Diachronic evaluation of cremation rituals in necropolises of northern Italy
11	Katarína Hladíková	Practicing cremation at the beginning of the 1st Millenium in south-western Slovakia
12	Hannah Skerjanz	The Middle Bronze Age Burial Mounds of Unterradlberg
13	Karina Grömer	Cremation experiment series – focus on textiles in a pyre
14	Giovanni Magno	Experimental cremation as a reconstruction of ancient Veneti rituals

Session 1. Cremations and chronology

1. Time for Stone Circles

Christie Willis¹, Seren Griffiths²

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Stone circles are some of the most evocative monuments in Britain, with famous examples like Avebury constructed at a massive scale. At many of these sites cremation burial seems to have been the dominant practice in much of the 3rd century cal BC. However, we know relatively little about the chronology of many of these sites or the chronologies of activities associated with their use; the highly unusual monument at Stonehenge has dominated much of the research emphasis.

This paper presents new evidence for cremation practices from sites in Wales. We suggest that cremation burial rites represent an under-recognised tradition in the mid-fourth millennium cal BC — the middle of the conventional ‘British Neolithic’ culture. We also present new evidence for surprisingly early use of stone circles in this part of the world. However, we emphasise that focusing on the earliest activity at these sites can be also counterproductive. Instead, we propose that we need to think about these monuments as evolving places, which were brought into being by practices across long and complicated histories.

2. Late Bronze Age and Early Iron Age cremations in southern Carpathian Basin: chronology and funerary practices

Daria Ložnjak Dizdar¹, Petra Rajić Šikanjić², Stašo Forenbaher³

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Cremation was the predominant burial practice during the Bronze Age and Iron Age in southern Carpathian Basin. We explored the diachronic variability of cremation funerary practices during those periods at six cemeteries in northern Croatia. Some of those cemeteries were of short duration (about 50 years), while others lasted much longer. Contents of the 146 graves were submitted to anthropological and zooarchaeological analyses, and a substantial number of graves were radiometrically dated. Cremated human bones were usually sampled for dating purposes, while cremated animal bones or charcoal were dated in just a few instances. Spatial (local and regional) and temporal variability in mortuary practices (funeral attire, urn selection, manner of the deposition of body remains, evidence of funerary feast, funeral scenography) indicates that cremation funerals were complex events. Fragmentary vestiges of those events allow us to investigate past communities and their members split into different biological sex, gender and age groups, their apparel, diet, activities within the community, mobility, and memories. We focus on investigation of reliably dated undisturbed burials in their geographical and temporal context.

3. Cremations, stone circles and copper smelting – Bronze Age urn cemeteries in northeastern Serbia

Mario Gavranović¹, Lukas Waltenberger¹, Aleksandar Kapuran²

¹ Austrian Archaeological Institute, Austrian Academy of Sciences, Vienna, Austria

² Institute of Archeology, Belgrade, Serbia

The paper will discuss the urn cemeteries in northeastern Serbia, well known for its copper ore deposits exploited since the Copper Age. The appearance of the urn cemeteries in this region with a distinctive grave architecture (circularly arranged stone construction around the urn) was considered as originated from the general Urnfield expansion in Late Bronze Age Europe for many years. However, our investigations and radiocarbon dates from cremations and charcoal clearly demonstrate that the cemeteries are 500 years older than previously perceived (20th and 18th century BC). Furthermore, the radiocarbon dates convincingly support the association of the cemeteries with the nearby copper producing settlements.

The analyses of human cremations pointed to high burning temperature (+800°C). All body parts were present and occasionally anatomically layered within the urn. The anthropological analyses of the sites Trnjane, Krivaljski Kamen und Hajdučka česma revealed that, all age groups are represented, with a prevalence of subadults and young adults. One of the urns from Hajdučka Česma contained the remains of a young female and a newborn. Furthermore, the size of the circular stone grave monuments (3-4 m in diameter) does not correlate with the age of the deceased.

The distribution of urn cemeteries, the number of graves and demographic structure suggests the general acceptance of cremations among copper producers already at the transition between the Early and Middle Bronze Age.

4. Transformation of the burial rite in Middle Bronze Age in the area of North-Western Poland

Mateusz Stróżyk¹

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The presented paper concerns on the adoption of the cremation burial rite in the Middle Bronze Age (ca. 1600-1300 BC) and chronological dynamics of that process. In Central Europe, the role of the key substrate in the process of the transformations from inhumation to cremation was played by the local groups associated with the Tumulus Culture. The still lively traditions of inhumation under barrows often coexisted with a new type of burial in the form of cremation graves.

The research was conducted in relation to area of North-Western Poland. Some preliminary results of chronological analysis of materials from two crucial and unique funeral sites will be presented: Pudliszki and Górzycza. In general, the main aim of mentioned research is to conduct a multidimensional analysis and interpretation of the genesis of the transformation process of Middle Bronze Age funeral rite in Poland. This paper will seek answers to key questions about the nature of the profound burial rite change related to the appearance and development of the Tumulus Culture community.

5. The chronology of the cremation burials from Setefilla (SW Spain) from the Bronze Age to the Iron Age

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Setefilla is one of the most important archaeological sites in western Andalusia, offering an opportunity to trace changes in material culture and in funerary practices from the Bronze Age to the Iron Age. Recently, a substantial series of cremated bone samples from Setefilla have been the subject of a programme of radiocarbon dating by Accelerator Mass Spectrometry (AMS). The aim of this paper is twofold. Firstly, a revision of the chronological sequence of the graves of Setefilla is undertaken in order to refine the internal chronology of the site, which has important consequences for our understanding of the Bronze Age/Iron Age transition in southwestern Iberia. Secondly, on the basis of the available evidence, the chronology of biconical urns is reexamined, recognizing them as the earliest type of ceramic vessel within the sequence of the SW Orientalizing Complex.

6. Investigating the Use of Fire in Mortuary Practices in Cyprus: Current Problems and Future Perspectives

Natalie M. Branca¹ and Kirsi O. Lorentz¹

¹The Cyprus Institute, Nicosia, Cyprus

The use of fire as a means of disposal of the dead is considered rare throughout Cypriot history. Possibly, for this reason, it remains widely understudied. The results of an in-depth investigation of the published archaeological literature on the use of fire in mortuary practices in Cyprus will be presented. The aims are to highlight the temporal distribution of the practice from the Neolithic (10th -6th millennia BC) through the Hellenistico-Roman (312 BC – AD 395) periods; highlight current debates on cremation in Cyprus and; identify problems and future perspectives. At present, it is accepted that the earliest evidence of the practice of cremation in Cyprus dates to the Late Bronze Age (c. 1100-1050 BC). The practice is interpreted as a foreign and elite rite that was imported to Cyprus as a result of the so-called Late Bronze Age collapse (c.1200-1150 BC). However, the practice has never been systematically studied from a theoretical or a bioarchaeological perspective. Bioarchaeological data in particular is currently scarce and represents a large gap in the current cremation debate. Future research on the matter should place a greater emphasis on bioarchaeological data as a valuable source of information.

7. The cremation burial rite of the Slavs in the 7th-8th century in the Morava River basin (Austria, Slovakia, and the Czech Republic)

Marek Hladík¹, Michaela Látková¹

¹ Institute of Archaeology of the Academy of Sciences of the Czech Republic, Brno, Czech Republic

In the region of Morava River basin, during the 7th and 8th centuries, the Slavic ethnicity was established. At the turn of the 8th and 9th centuries, there were several changes in the area of settlement relations, economic innovation, but also religious ideas. In the funeral rite, these processes were manifested by the transition from cremation to inhumation.

In the scientific debate, the fundamental and still unsolved problem is the precise dating of these changes and the discovery of their primary cause. The search for answers to these questions has so far been very limited by the small number of examined necropolises from the 7th and 8th centuries. The absence of cremation necropolises even led to the hypothesis that it is not a state of research but a consequence of the application of archeologically difficult to identify forms of cremation burial.

However, in recent years, several investigations of cremation burials have been carried out (e.g. Bernhardsthal, Gbely). In the paper, we will present the basic parameters of the above discussion and the research of the Gbely-Kojatín burial mound, which by applying modern excavation, documentation, and analytical methods (photogrammetry, anthracology, archaeobotany, 14C dating, GIS) fundamentally contributes to the above discussion.

8. On lentils and ashes. Fragmentation of cremated remains in Poland from late Mesolithic to Early Middle Ages

Elżbieta Jaskulska¹

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Polish archaeological and anthropological research of cremated burials began nearly 100 years ago, with the first scientific paper published by Adam Wrzosek in 1928. Since then, the research on prehistoric cremated remains has been a significant branch of bioarchaeology, as cremation occurred in the area of modern Poland from the late Mesolithic to early Middle Ages and was a dominant rite for much of this period. The presentation aims to show a significant variation in the fragmentation levels of cremated remains from different chronological periods, cultures, sites and burials, attempting to show how the variability can be encountered and how it will influence the identification process during cremains analysis.

9. Where are the dead? Funerary practices and population dynamics in prehistoric and historic Belgium, the impact of radiocarbon dating cremated bones

Giacomo Capuzzo¹, Guy De Mulder², Charlotte Sabaux^{1,2,3}, Sarah Dalle^{2,3}, Mathieu Boudin⁴, Rica Annaert⁵, Marta Hlad^{3,1}, Kevin Salesse⁶, Amanda Sengeløv^{1,2,7}, Elisavet Stamataki^{3,1}, Barbara Veselka^{3,8}, Eugène Warmenbol⁹, Martine Vercauteren¹, Christophe Snoeck^{3,8}

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The radiocarbon dating lab at the Royal Institute for Cultural Heritage (KIK-IRPA) in Brussels has a long tradition in ¹⁴C dating cremated bones since 2003, after it was demonstrated that calcined bone can be dated by using the carbon in the bioapatite of bone. This discovery has led to an exponential increase in the amount of ¹⁴C dates associated with cremation burials. Additionally, in the last four years, 500 new samples of calcined bone have been dated at KIK-IRPA within the CRUMBEL project. The aim of this presentation is to explore the outcomes of this large dating campaign to shed light on variations in past funerary practices and population dynamics in Belgium from the Neolithic to the Early Medieval period by statistically modelling ¹⁴C dates from settlements and funerary contexts (both cremation and inhumation burials). Results highlight a major episode of population decline in the Final Neolithic-Bronze Age transition in correspondence with the 4.2 ka cal. BP climatic event and a repopulation of Belgium in the Middle Bronze Age from 1800 BC. A remarkable increase in the number of cremation deposits and settlements is observed in the 1st century AD following the romanisation of the area.

10. Cremation and Great Debates in Ancient South America: New Perspectives and Old Dates

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²Teesside University, UK

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In South America, a significant diversity of funerary practices exist within a rich archaeological record and broad spatio-temporal distribution. However, poor definitions, data management and lack of bioarchaeological analysis mean that such evidence has not been brought to bear on the grand challenges for South American archaeology.

Over 120 sites from the 13 states and territories of mainland South America were analysed in a comprehensive and critical review to ascertain confirmed cremation practices. Radiocarbon dates were modelled using Bayesian and Kernel Density analysis with new calibration curves. Terminology and methodology were reviewed and critiqued. Data were compared against hypotheses and evidence for regional socio-cultural changes.

The results present 62 sites with significant evidence for cremation practices, refined dates spanning 11952 cal BP until the nineteenth century, and contextualised funerary data on 18 regional cultural complexes and 13 ceramic traditions.

In summary, the research defines new areas for funerary archaeology, bioarchaeology, and cremation to contribute to grand challenges in South American archaeology, including past population expansions and interaction spheres between linguistic and cultural groups, while pointing out much-needed improvements for cremated human remains research methodology and terminology.

Session 2. Diet, mobility and society

11. There and back again: indications of mobility at the large-scale early medieval cremation cemetery at Cleatham, Lincolnshire, UK

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² AMGC, Vrije Universiteit Brussel, Belgium

³ MARI, Vrije Universiteit Brussel, Belgium

This study presents $^{87}\text{Sr}/^{86}\text{Sr}$ and [Sr] data of 54 cremated human and 5 animal remains from one of the largest known early medieval cremation cemeteries in Britain. The burials from this commemoration space date to the fifth and sixth centuries AD, a period which is often termed ‘the Dark Ages’ because of a relative absence of primary source material. In this context, the strontium data from this cemetery is not only immensely useful in highlighting individual mobility to and within the area, but also allows us to look closer at grave good provision and animal-human relationships. Also presented in this study is new plant strontium data from within a 25km catchment around the cemetery to improve the assessment of the spatial variation of $^{87}\text{Sr}/^{86}\text{Sr}$.

12. A multidisciplinary approach to the history of social groups and meaningful individuals in the early urnfields between the Danube and the Po River plains

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⁷ Hungarian National Museum, Budapest, Hungary

The introduction of the “urnfield model” in the regions comprised between the Danube and the Po River plains reflects important changes in the ideological sphere and in the social organization of Bronze Age communities. The large number of graves and the demographic composition of the groups emphasizes the inclusive character of these societies, although social hierarchies can be marked by the articulation of grave goods. We conducted archaeological, osteological and isotopic analysis of several key-sites located in Central Hungary and Northern Italy dated to the second millennium BC. The integrated data reveal complex funerary practices involving bones and grave goods, preferential enucleation of enlarged family groups/lineages, a general tendency towards female exogamy and patrilocality, differential mobility patterns between high- and low-rank individuals. The focus on meaningful individuals’ “biographies”, such as the high-status woman of Szigetszentmiklós-Ürgehegy, contributes to a better understanding of “Bronze Age lives”, and the movement of people and things in the broader scenario of second millennium BC networks.

13. Funeral practices transformation at the turn of the Late Bronze and Early Iron Age of the Lusatian Urnfield culture in SW Poland

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The Lusatian Urnfield culture (LUC) is dated around 1300 to 400 BC and within the SW Poland was characterized by a cremation funeral rite. Archaeological studies of LUC cemeteries indicate the presence of Late Bronze Age (LBA) egalitarian cemeteries, followed by a transformation of funeral practices at the Early Iron Age (EIA). During this period, burials with prestigious/elite construction and numerous grave goods appear, indicating connections with the Hallstatt culture and contacts with civilizations from the Mediterranean areas.

Bioarchaeological research was carried out to verify the archaeological assumption at the biological level. 14 LUC cemeteries from the SW Poland were selected and a total of 1,924 individuals from 1,563 burials were examined. The sex and age at death of individuals were determined, applying standard morphological methods, as well as metric ones, including LA (lateral angle) and histological TCA (tooth cementum annulation). This made it possible to develop data in terms of palaeodemography and to analyze the variability of the biological condition of LUC communities in particular chronological periods. For one of the most impressive graves, a complex of 6 burials, dated from the V BA period to Halstatt C, studies of strontium isotopes were also carried out, indicating some of individuals as non-local.

The research was carried out as a part of research project no. UMO-2018/29/N/HS3/00887, 2019/32/T/HS3/00292, funded by the National Science Center, Poland.

14. Society on the periphery of the Roman Empire: constraints from Sr isotope systematics of cremated individuals in Nijmegen, the Netherlands

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The Dutch city of Nijmegen, which is located on the banks of the river Waal, provides a unique opportunity to study population dynamics in a Roman borderscape. Not only was *Ulpia Noviomagus* the most important Roman town built within the Netherlands between 100-270 CE, it was also a key strategic military location along the lower Germanic limes, the northernmost border of the Roman empire. Consequently, *Ulpia Noviomagus* attracted people from different parts of the Roman Empire and from a variety of different cultural backgrounds.

Cremation was the dominant burial ritual in Roman Nijmegen, not only in the urban and military cemeteries, but also in the rural cemeteries of the Batavian countryside north of the Waal. To date, more than a dozen funerary sites containing at least 3000 individuals have been recovered. These graves are potentially providing new insights in population dynamics within the northern region of the Roman Empire and specifically along the lower Germanic limes borderscape. Sr isotopes and concentrations of the cremated remains provide new understandings of the population that lived in Nijmegen. In this paper, the first results are presented that give a unique insight into the landscape and society on the periphery of the Empire.

15. Unlocking the secrets of cremated human remains from Late Bronze Age Austria

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Cremation as a new way of dealing with the dead resulted in large cemeteries with several hundred urn burials in the Late Bronze Age (c. 1300–800 BC). Recently, advances in isotope analysis and osteological sexing increased the information extractable from cremations.

We analysed 690 urn burials from the cemeteries of Franzhausen-Kokoron, Inzersdorf, Statzendorf, and Getzersdorf located in the Lower Austrian Traisen valley. Methods included strontium isotope analysis of 450 human bones and comparative environmental samples to identify local and non-local individuals, 100 radiocarbon dates of cremations and unburnt meat offerings, osteological age and sex assessment, as well as tooth cementum annulation in individuals with no diagnostic elements present. Compared to the gender, age and status analysis based on grave goods, the data obtained in this project significantly advances our knowledge of ritual practices, gendered mobility and social relations in Late Bronze Age Austria. Preliminary results indicate different patterns of gendered migration at different sites and in different chronological periods. Non-local individuals at the early Urnfield Culture cemetery of Inzersdorf are primarily sub-adult and female, whereas male mobility was more frequently detected at the late Urnfield Culture cemetery of Franzhausen-Kokoron. Further analysis will provide insights into how identity categories intersect with aspects of mobility.

16. Reconstructing individual sociocultural values using funerary practices: an Early Bronze Age case study from Ermelose Heide, the Netherlands

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Excavated in the 1950's, Ermelose Heide yielded 37 cremation deposits distributed over 17 barrows dating to the Early Bronze Age. Barrow 14 contained seven cremation graves of which grave 255 was located in a separate mount within the barrow. This mount-within-a-mount contained the cremated remains of an adult female and a fetus aged ~28 weeks in utero. The female displayed spinal developmental anomalies and lumbar fractures, potentially caused by falling. Although it is not possible to determine if the female was the mother of the fetus due to the destructive changes to the skeletal material resulting from the cremation process, the female may actually have been the mother in which case she would have been visibly pregnant. The spinal lesions may have affected walking or could even have been related to the cause of death. The deviant way she was buried, her own private mount within the group mount and her skeleton being nearly complete, may have been related to her pregnant state and the way she died. This paper stresses the importance funerary practices had in past societies and how they were used as tools to demonstrated differences in individual sociocultural values, needing to be expressed also after death.

Session 3. New developments for the study of cremations and cremated human remains

17. Scanning for cremations. New methods for excavating cremated human remains.

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In the fall of 2020, large parts of an extensive Late Bronze Age and Iron Age urnfield were excavated in the municipality of Tilburg, The Netherlands. Compared to similar sites in the Meuse-Demer-Scheldt region, this site is remarkably well preserved. A total of 41 barrows and long barrows and no less than 232 cremation graves have been excavated, most of them still fairly complete. The results are impressive for Dutch standards and exceeded all expectations.

The good preservation of the graves was anticipated prior to the excavation. A research strategy was set up together with an international team of specialists. New methods for excavating cremated human remains were implemented in this strategy. For instance, it includes the lifting of the most complete cremated bone packages and urns from the graves in one piece. This enabled the specialists to investigate the graves in an unprecedented way. It provides a comprehensive set of data for further physical and digital investigation.

In this paper the research strategy and methodology of the excavation will be highlighted. It focusses on the excavation of the cremated human remains and provides practical tips and tricks for future research by showing the pros and cons of the methods used. In this way, the Udenhoutseweg is already a promising (cold) case-study in the research on prehistoric human cremated remains.

18. A commercial Unit's approach to archaeological cremations from Cambridgeshire, UK.

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Osteologists working for archaeological units in the UK deal with a juxtaposition between upholding professional and personal standards vs budget and deadline compliance. It is exactly this tension that brings innovation, increasing the potential of an interesting thanatological narrative.

Cremated human remains are inherently more complex to interpret over their inhumed skeleton counterparts, being particularly sensitive to thanatic, perthotaxic, taphic and sullegic processes. Controlling the sullegic process is key to maximising the amount of data within the constraints of a commercial business.

Specialist interest and skill are key in driving this forward. From excavating urned cremations with water, standardising the use of computed tomography and a fragmentation index to increasing the yield of sex estimation, this talk will draw on examples of Bronze age and Roman cremations to outline the current and developing approach to excavating, recording, and analysing cremations at the Cambridge Archaeological Unit.

19. Investigating the potential of burnt tooth enamel for protein preservation.

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Abstract: The excellent protein preservation recently discovered in tooth enamel has opened up exciting avenues for building chronologies, phylogenies and sex determination in archaeology and palaeontology. However, its potential for providing information on cremated material is more complex, as heating will speed up protein degradation. Other heating events also occur in the geological record, either through natural processes (such as volcanism or wildfires) or anthropogenic (e.g. hearth fires, cooking, animal sacrifices). These heating events can severely impact the degradation of protein / amino acids, leading to more challenging age interpretation or loss of proteomic information. To study this in detail, high temperature artificial heating experiments on tooth enamel from three fauna (horse, cow and sheep) were conducted. The effect of high temperature heating on amino acid racemisation, composition and concentration (through RP-HPLC analysis) and peptide sequence (through LC-MS/MS analysis) was studied. Upon heating, significant changes in protein composition were observed for all three species, which were characteristic of heating rather than low temperature burial diagenesis. These patterns of degradation therefore enable us to develop a tool to identify the potential for individual heated samples to yield useful proteomic data.

20. Experimental design matters for forensic stable isotope analysis of burned bone

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Forensic science adopted the archaeological application of stable isotope analysis of bone for use in casework to provide cultural and residence information for modern remains. Several studies have evaluated the effects of burning on isotope ratio values in bone; however, the burn methods are often more suited to archaeological questions. To evaluate isotope analysis in forensic contexts, we analyzed several isotope systems ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$, $\delta^{34}\text{S}$, $\delta^{18}\text{O}$, $^{87}\text{Sr}/^{86}\text{Sr}$, and $\delta^{88/86}\text{Sr}$) to evaluate if geoprofiling inferences were altered by a burn process more similar to some modern casework. We used two burn methods: (1) open flame and fleshed porcine bone and (2) muffle furnace and dry modern human bone. Isotope systems from bone collagen, carbonate, phosphate, and strontium were analyzed and compared to unburned controls from the same individuals. Results differed between the two burn methods. Fleshed open fire samples maintained unaltered isotope ratio values (maximum temperature: 566 °C). Dry muffle furnace samples burned at 400°C and above were unable to undergo collagen analysis and $\delta^{18}\text{O}$ values in carbonate and phosphate were altered. Varying results between burn methods demonstrate that stable isotope research should implement a method reflective of the burn situation of interest.

21. The burning maze: is sexual diagnosis of the calcined human bony labyrinth still possible?

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Sex estimation of burnt human remains is a tremendous challenge in bioanthropology because of fragmentation and alteration. Due to its peculiar location within the petrous part of the temporal bone, the bony labyrinth raises interest for improving sex estimation of burnt individuals. This study proposes to test, on burnt specimens, the reliability of predictive models, previously developed on unburnt bony labyrinths. Logistic regression equations were applied on CT-scans of six bony labyrinths of donated identified adult cadavers, before and after outdoor burning experiments. Mann-Whitney *U* tests were executed to compare unburnt and burnt measurements while a geometric morphometrics approach was used to examine shape and size differences induced by fire exposure. Although estimated sex of unburnt bony labyrinths was mostly consistent with known sex, a systematic misclassification of male burnt bony labyrinths was highlighted. After calcination, significant differences in centroid size were found within males, with a reduction in cochlear size and variations in the width and length of semicircular canals in burnt specimens. Designing sex estimation standards specifically for burnt bony labyrinth may therefore be more advisable. To better understand how the burning process could impact its morphology, further experiments on larger samples and in controlled environments are recommended.

22. A multi-method approach for the assessment of structural and chemical modifications in archaeological burnt bone from Wallonia, Belgium

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Heating significantly alters bone's structural and chemical characteristics. The identification of these changes and the deep understanding of the exact causal effects can help researchers in the fields of archaeology and anthropology to puzzle out past cremation technologies and funerary rites across time and space. This study presents heat-induced modifications in 36 unidentified long bone diaphysis fragments from three archaeological sites situated in Wallonia, southern Belgium: a) Grand Bois (n=22; 799 BC – 523 BC), b) La Motte Le Comte (n=10; 221 BC – 5 BC), c) Cerfontaine (n=4; 23 BC – 27 AD). A multi-analytical approach has been adopted for a qualitative, semi-quantitative, and quantitative evaluation of the effects of temperature and duration of heating on bone characteristics from the micron to the nano level. Microscopic (optical and field emission gun scanning electron microscopy with energy dispersive spectroscopy), spectroscopic (FTIR-ATR, micro-FTIR-ATR) and X-ray diffraction (X-ray diffraction) data show significant inter-site, intra-site and intra-bone variability. The FTIR data display significant differences between the three Wallonian sites. The inter- and intra-site similarities in histology are in agreement with IR data and are also strongly related to the radiocarbon dates. The use of SEM provides additional information on the temporal (inter-/intra-site) and spatial (intra-bone; osteonal vs interstitial tissue, and periosteal vs mesosteal bone) changes in the size and morphology of the BAp crystals. Finally, the μ FTIR-ATR chemical mapping allows the visualisation of the spatial distribution of phosphate, carbonate and cyanamide content at the micron scale, while at the same time can help us understand the relationship between histological characteristics seen under the light microscope and chemical characteristics (intra-bone variability). Therefore, these observations significantly contribute to the existing knowledge on temporal variations in pyre technology and funerary rites in Belgium, and highlight possible implications of sampling strategies for future studies.

23. Decoding the dead: new osteoarchaeological, isotopic and artefact analysis of Roman cremations from antiquarian collections in Colchester (UK)

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This project re-examined the antiquarian collections curated by Colchester Museums, combining new osteoarchaeological analysis with a study of the grave and pyre goods. The work also included the first strontium isotope analysis of Romano-British cremations. Colchester was a major Iron Age centre, a legionary fortress and then the province's first capital, making it the ideal site to explore the ways in which locals and non-locals may have expressed their identities during a time of significant cultural change. The first modern osteoarchaeological analysis of these cremations identified 31 individuals, including 12 males, six females and 13 of unknown sex. In total, 23 were over 18 years of age while eight were prepubescent. Multiple pathological lesions were recorded, and an examination of macroscopic bone colour suggests generally high burning intensities, which were inconsistent and subject to insufficient oxidization. Isotopic analysis of the petrous portion of 22 individuals identified only six potential incomers and showed both agreements and disagreements between the isotopic evidence and the grave goods. This paper highlights the methodological importance of the holistic analysis of isotope, osteological and artefactual evidence and demonstrates that the relationship between origin and cultural identities as expressed in burials is complicated.

24. Reanalysing current approaches to the study of Cremations: A study of Romano-British and Anglo-Saxon Cremated Remains in the furtherance of a new methodological standard and a new approach to the study of colouration

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Archaeological studies of cremations have often fallen victim to the lack of a standardized method of recording. Whilst this could be attributed to a number of shortcomings in this growing area of interest, one of the main issues is the types of analysis needed for different projects. Simply put, most studies of cremation can fall into one of two categories: 1) detailed studies of each remnant of cremated bone, and 2) overview studies that do not require as much detail, but consider the remains as a whole. The work for the current project falls within the latter category. One of the central foci for research is the creation and development of a standardized recording sheet for such overview analyses. In future, there are ambitions to create a standardisation colour estimation application to facilitate quick, accurate and consistent colour recognition of cremated bone, with hopes to make colour-mapping in a skeleton faster and more accessible. Whilst there are many issues with the reliance on colour alone for temperature estimations, increasing accuracy through technology could help issues with human identifications. Finally, a selection of Romano-British and Anglo-Saxon sites are analysed to test the aforementioned innovations, as well as offering a fresh look into these sites.

25. Embodying identities. The interdisciplinary study of the Etruscan anthropomorphic urns from Tolle (Chianciano Terme, Italy, 7th-6th cent. BCE).

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The Etruscan necropolis of Tolle, in the ancient territory of Clusium (Tuscany), yielded over 1.000 tombs dated between the 8th and the 2nd c. BCE, and mostly consisting of cremation burials. Notably, in Tolle there is a wide use of anthropomorphic urns (the so-called ‘canopic urns’) during the 7th and the 6th BCE. This kind of urn represents a human body, as an ideal portrait of the dead, where the gender is, in many cases, iconically embodied. In order to test the consistency between the funerary ascribed identity and the biological profile of the dead, we conducted an interdisciplinary study integrating the canopic urn features and archaeological data (funerary rite, grave goods, status indicators, chrono-spatial distribution of the tombs within the necropolis) with bioarchaeological data from human remains (minimum number of individuals, sex and age-at-death) as well as from ritually associated fauna. The results allowed us to describe complex patterns of funerary behaviors, gendered role differences, and biosocial construction of identities in a large Etruscan community.

26. More than bones: Extracting maximal information from prehistoric urns

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Excavating urns is destructive, which may cause the fragile cremated bones to break and reduces the amount of information. Moreover, the soil environment captured in the urn encompasses information that is usually just cleaned away. In this multi-disciplinary approach, we used archaeo-botany, archaeo-zoology, soil-chemistry, radiology, and conservation techniques in addition to osteological age and sex determination, radio-carbon dating and strontium isotope analysis to obtain the maximal information from in-situ recovered urn burials. Two Late Bronze Age *en-bloc* recovered urns from St. Pölten served as case studies.

CT scans of the *en-bloc* recovered urns and surface meshes of the urn and its content were compared to the findings during the micro-excavation. The fragile bones of urn 1 were consolidated before recovery using paraloid B72, whereas remains in urn 2 remained untreated. The osteological examination revealed the remains of a child and a young adult female. The archaeobotanical analysis found charred remains from wild and cultivated plants, which were common for Late Bronze Age Austria. Charred animal bones were interpreted as food offerings and threshing residues were used as a fire accelerant. The increase in information obtained from the urn burials clearly justifies the time and resources necessary for this multi-disciplinary approach.

27. Urnfields, cremation graves, urns, cremains and grave goods through the prism of interdisciplinary research (experience from the southeastern Alpine region)

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Flat cremation cemeteries from the Urnfield Period, which can continue well into the Early Iron Age, have a long history of research in the southeastern Alpine region. However, most of this data was collected over half a century ago. And although research was modern for the time being, our techniques and methods have evolved rapidly in recent years, opening up new ways of extracting information from old museum archives, but also of planning new research according to existing possibilities.

Although our recent excavations of Urnfields are rare and modest in scale, we are attempting to intertwine different disciplines and approaches into an interdisciplinary research strategy. We have begun with previously unpublished material stored in museums, which has not only been prepared for publication but also studied with the help of various specialists. We have attempted to incorporate new methods and techniques into all phases of research, from the landscapes and environments in which urnfields are located to individual finds. Anthropological and zoological analyses are already standard in scientific investigations, however their further development and combination with other sets of information (histology, FTIR, stable isotope analyses) often leaves room for the creation of new knowledge. The use of CT (computed tomography) in combination with microexcavation of urns, as well as geoarchaeological analyses, can also take us a step or two further in documenting burials and understanding funerary rites. In addition, petrography of pottery and analysis of organic remains can provide new insights into the use and reuse of vessels in graves.

These new findings are exciting and they compel us to keep asking questions! And while we do not yet see the whole picture, we are nevertheless moving toward that point piece by piece...

Session 4. Pyre technology and funerary practices

28. Cremation practice as rule, exception or something else? Cremation, creativity and the *chaîne opératoire*.

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Archaeologists have a well-established tendency to look for rules and patterns when reconstructing past human behaviour. In mortuary archaeology, this leads to the identification of burial types, such as urned and unurned cremation burials. Whilst this is useful in identifying commonalities within the mortuary practices of past societies, it tends to underplay variability, and the potential role of creativity in the treatment of the dead. In this presentation I will use a *chaîne opératoire* approach to explore how creativity and variability in practice can be brought back in to our analysis of past cremation practices and can enhance our interpretations. Using published data from the British Bronze Age, I will show how cremation burials that appear very similar on the surface can result from practices with significant variation. At the same time, burials which appear different can share significant commonalities. By investigating where these similarities and differences appear in the *chaîne opératoire* of cremation, we can develop much richer understandings of past mortuary behaviours.

29. Rituals matter – (Re?)constructing urnfield pyre settings and the resulting archaeological record

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Rituals accompanying death and dying can be manifold and expressed in quite different ways. However, only very few leave traces in the archaeological record, which is often additionally distorted, selected and superimposed.

Late Bronze Age cremation burials provide the opportunity to juxtapose and compare two different steps in the death ceremony: cremation and burial ritual. However, the various steps in the funerary ritual are hard to distinguish and identify during the analysis of grave contexts and finds.

To tackle this problem, we conducted a series of five experimental cremations on the archaeological basis of the Urnfield Period cemetery of Inzersdorf ob der Traisen in Lower Austria as part of the course “Experimental Archaeology in practice” of the University of Vienna from 2018 to 2022. We analysed how and why specific metal, ceramic and textile artefacts as well as the dead (pig proxy) body change and influence each other under the particular circumstances on the pyre and while being interred.

The documentation of the remains of the experimental pyres will provide insights that help to assign specific alterations of objects to certain funerary conditions, with the goal of understanding the same alterations in Bronze Age finds and their utilization during specific rituals.

30. An experiment study of the effects of environmental conditions, time factor, fire temperatures on the cremated bones

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Cremation represents a primary funerary practice documented from prehistory until today worldwide. The current paper will discuss an archaeological experiment concerning the cremation funeral rite and other sacrificial rituals documented archaeologically in the Balkan prehistory. The experiment was realized in the village of Sultana (Mânăstirea Commune, Călăraşi County, Romania) in August 2013.

Based on archaeological data from research carried out in different sites in the Balkans, our experiment aimed at reconstructing a funeral pyre and depositing sheep corps with burial goods before the cremation. This reconstruction was followed by estimating the volume of raw materials used to raise the construction in conjunction with the human factor and the time needed to build it. After this, we proceeded to pyre ignition, and cremation of a sheep (*Ovis aries* sp.) sacrificed 1 hour before that moment. The project also aims to track and record the cremation process and the effects caused by climatic factors, in relation to time factor, wood quantity and quality, temperature obtained, and speed of the pyre, but also how deteriorating the bones during the process of cremation. After the experiment, the *Ovis aries* bones were studied from the taphonomic perspective (fragmentation degrees, burning traces, etc.) along with the measurement of several samples (selected based on the colours obtained after burning) in order to detect the temperatures that transformed the bones, using combined XRD and FTIR.

Without any doubt, this experiment helps us to achieve a better understanding of prehistoric lifeways and behaviours of the past communities. At the same time, it is a way to complete the archaeological data about some stages of prehistoric funerary and sacrificial practice, especially regarding some invisible elements from the archaeological excavation (the treatment of the deceased before and after the cremation, construction, temperature and speed of the pyre, how it behaves different bones during incineration).

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31. Studying cremated human remains: an archaeoanatomical approach to the contents of an Iron Age urn from S. Valentino, Italy

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Rarely adopted, the archaeoanatomy can also be applied to cremations. Excavated in 1973, the Iron Age necropolis of S. Valentino (S. Vito al Tagliamento, Italy. 10th - 6th B.C.E.), yielded 34 cremation burials. In 2019, during the bioarchaeological study, an earth sample never been analysed was found. This turned out to be the only complete surviving osteological material of an urn, and the remains were analysed to determine the biological profile. Furthermore, through the macroscopic study of the changes made by fire to the bones, an attempt was made to identify the position of the deceased on the pyre.

The remains belong to an adult female, with a marked insertion of the muscles involved in the flexion of the forearm and periostitis on the tibiae. The same colour shades found in fragments of the same bone and in contiguous bone fragments suggest a supine position, never altered during the burning process. U-shaped fractures, mosaic and LD effects are recognisable as alterations associated with the presence of soft tissue at the time of combustion.

Cremation archaeoanatomy is therefore possible and, in the future, the application of specific physical and chemical methods for the study of cremated bones could expand the available tools of analysis.

32. Reconciling with Prepalatial ‘cremations’: Macroscopic and infrared data from Koumasa Tholos tomb B, Crete

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Cremation is a highly sensory experience of transformation and destruction of the ephemeral nature of the human body. The differential use of the fire on the human remains as a part of multi-layered funerary rituals during the Prepalatial period in Crete involves incorporeal experiences and beliefs. Person and body are socially reconstructed through life and death, while individual and communal identities are challenged and negotiated. The cemetery of Koumasa occupies a very prominent position in Minoan archaeology. At the same time, the burnt human remains from tholos tomb B (early 3rd mill. B.C.) comprise an exceptional case of a mass grave. Macroscopic observations, including primary osteoarchaeological analysis, estimation of the minimum number of individuals, and decoding of heat-induced thermal alterations (bone colour changes), are enriched with the recognition of compositional and structural changes through the use of Fourier Transform Infrared Spectroscopy (FTIR) in Attenuated Total Reflectance (ATR) mode. The combined and multidisciplinary approach aims to offer valuable insights concerning the biological attributes of the population, focusing on the various parameters of the burning event(s) in which they were combusted (time, temperature, thermal intensity).

33. Funerary practices of the Golasecca Civilization (Northwestern Italy, Iron Age 9th-4th century BCE): an overview

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The Golasecca Civilisation (GC) developed between the 9th and 4th centuries BCE in a territory delimited by the eastern Piedmont (West) central-eastern Lombardy (Est), the Sopraceneri – Canton Ticino (North) and the Po river (South). GC is primarily known thanks to its funerary finds, and it is characterised by the preponderant use of cremation practice in the Italian area.

We present for the first time all the available anthropological data of the GC. The sample consists of a minimum of 314 individuals from 298 cinerary urns. Further data will be available from an ongoing study of some new cemeterial areas.

The study aimed to analyse the funerary practices of GC in their chronological and geographical development, summarising the aspects of the ritual body treatment and trying to standardise chronological and/or territorial peculiarities.

34. Cremation practices linked to a singular first century AD mausoleum of the Roman city of *Augusta Emerita* (Mérida, Spain): a multidisciplinary approach

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Augusta Emerita (currently Mérida, Spain) was a new colony that became capital of the Roman Lusitania province. Its north funerary area was recently excavated uncovering important remains, namely two complete funerary buildings from the first century AD. This work aims to analyze the cremation funerary practices linked to one of those edifices, a singular mausoleum, by combining anthropological, biochemical, and archaeological data.

These cremated bone remains were subjected to macroscopic/metric analysis in order to gather anthropological data about the biological profile and the cremation funerary practices involved. Samples were also examined through FTIR-ATR to obtain data on the combustion process and associated temperatures.

A minimum of two non adults and five adults of both sexes were found. Through analysis by infrared spectroscopy, comparing with data obtained for human burned bones, we concluded that most of the samples have been submitted to complete cremations in aerobic or anaerobic conditions, at temperatures up to 1000 °C. A careful bone collection from the pyre to the urn was noted, along with funerary furniture. Besides, two of urns were putted inside a tile cist. This data increases the knowledge about cremation practices among elements of higher socioeconomic status in the provincial capital's early days.

35. Pretarascan cremations in the Middle Balsas River Valley: New study of funerary urns from the Los Tamarindos cemetery

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During the archaeological salvage project in the Huetamo region (Michoacán, Mexico) in 2015, 42 funerary urns containing cremated human remains were excavated at the Los Tamarindos cemetery. This study presents the results of the bioarchaeological study of 22 cremation burials deposited in the funerary urns. After two seasons of analysis of osteological material, we could determine basic information about the paleopathologies identified on the burned remains, and about the biological profile of the deceased buried in the Los Tamarindos cemetery. On the basis of the taphonomic and fragmentation data, we could also determine information about the technological aspect of cremation burial rites practiced during the Postclassic period in the Huetamo region. We will also discuss the results of a bioarchaeological study of cremation burials in terms of the reconstruction of the spatial distribution of human remains in selected funerary urns. Finally, we will consider how we can interpret the high fragmentation of cremains in the discussed sample. We will argue if we distinguish between postdepositional and intentional posthumous body treatment as a part of burial rites as factors causing the high fragmentation of burned human remains.

36. New perspectives on the identification of pyre goods and their stories about cremation

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Thanks to new approaches and methods, we get a more and more complex picture of the event of cremation, especially of the human body or cremation technology. In my presentation, I would like to broaden this picture by talking about pyre goods which have a great potential for a more comprehensive reconstruction of cremation. In two cremation experiments, we focused on the transformation of objects to define the characteristics of pyre goods. Using these observations, we could identify pyre goods in a Late Bronze Age cremation cemetery (Jobbágyi, Hungary) and distinguish them from grave goods. In this way, we can outline different trajectories of objects in the process of burial rite. Beyond that, if we take a closer look at the traces of burnt artifacts, we can get a glimpse of their hidden stories about cremation, such as the composition and installation of the funeral pyre, the course of burning, or the condition and manipulation of objects.

Posters

1. New age-at-death histomorphological method for cremated and unburned human bones

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Age estimation on cremated and poorly preserved skeletons is a challenging task. Standard age estimation methods do not perform efficiently on skeletal material that has been altered due to high temperatures (>300°C) or intense fragmentation. In such cases, histomorphological methods can contribute to age-at-death estimation. However, existing methods are usually not applicable on cremated bones and exhibit the highest estimation error (>10 years).

In this study, we present a new histomorphological age estimation method for severe fragmented and cremated bones. We sampled femur cross-sections of cremated (n=30) and unburned individuals (n=45) of the same archaeological context (Thessaloniki, Metro osteological material). As a reference sample we used modern individuals (n=6) of known sex and age-at-death from the Human Skeletal Reference Collection of the University of Athens, and additional (n=8) individuals from forensic cases used as test sample.

We generated three regression equations based on the densities of osteons and osteon fragments: a) secondary osteon population density (OPD), b) osteon fragment population density (FPD), c) total population density (osteon and fragments) (TPD). The regressions based on FPD and TPD were the most accurate with a mean estimation error of three years, whereas the OPD regression was less accurate.

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2. The odd one out: discussing the origins of the highest $^{87}\text{Sr}/^{86}\text{Sr}$ value found in cremated bones in Belgium using a preliminary BASr of Belgium

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Within the CRUMBEL project, ca. 2000 strontium isotope measurements ($^{87}\text{Sr}/^{86}\text{Sr}$) on cremated human bones from the Late Neolithic to the Early Medieval period have been analysed. The highest $^{87}\text{Sr}/^{86}\text{Sr}$ isotope value of 0.7168 belongs to a Roman individual from Wanzoul tomb 118. Interestingly, the animal remains associated with this burial have similarly high values. The other individuals from Wanzoul however, have significantly lower $^{87}\text{Sr}/^{86}\text{Sr}$ isotope values (ranging from 0.7096 to 0.7112), suggesting that this individual originated from another region. A map of the biologically available strontium (BASr) is being created for Belgium to link the strontium isotope ratios obtained directly on human remains with their possible region(s) of origin. Different vegetation (grass, shrubs, and trees) of more than 300 points in Belgium are sampled to estimate the local $^{87}\text{Sr}/^{86}\text{Sr}$ signature of each area. Different variables are taken into account such as geology, soil type, elevation, climate, pollution, etc., which could influence the local $^{87}\text{Sr}/^{86}\text{Sr}$ signature. Using a preliminary BASr map of Belgium, the possible origin(s) of this individual are discussed. This case-study highlights both the benefits and limitations of a BASr map, and in particular, how it can be used to assess life history, diet, mobility, migration and landscape use of a Roman buried in Wanzoul.

3. Mobility and diet: studying the population of the vicus of Tienen, Belgium (1-4th c. AD)

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The Roman Empire is well known for its expansive trading network both on land and on sea, facilitating both short -and long- distance exchanges of goods, ideas, and people across Eurasia. As such, the studying of Roman mobility is an important topic of contention in archaeology, one which has been routinely investigated using Sr isotope analysis. Until recently, Sr isotope analysis has mostly focused on inhumations from urban and cosmopolitan centres, especially in Britain and Italy. Populations from rural settlements and provincial territories have less often been investigated, especially when cremation was the preferred funerary treatment.

Here, we present a case study on the southwestern cemetery of the Gallo-Roman vicus of Tienen (Belgium, 1-4th c. AD). The collection of >1,400 cremation deposits makes it one of the biggest Gallo-Roman cemeteries in the Low Countries, and offers unique insights into different aspects of rural Gallo-Roman societies. Sr isotope ratios ($87\text{Sr}/86\text{Sr}$) and concentrations [Sr] have been measured in 146 samples of cremated bone, from all phases and types of deposits. The analyses did not detect important mobility in Tienen, and suggest that the consumption of salt may have affected the Sr isotope ratios of the individuals throughout time.

4. Preliminary virtual examination of Middle-Late Bronze Age non-excavated urns from Northern Italy

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Cremation is the most destructive of funerary practices. Consequently, osteologists usually deal with highly fragmented remains. We performed CT (Computerised Tomography) analysis of ten non-excavated urns from the Middle-Late Bronze Age (15th-12th centuries BCE) necropolis of Vicofertile (Parma, Italy) to observe the remains before inevitably altering the burial with micro-excavation. The preliminary results suggest that the substantial limit to virtual analyses is technical. Using a 200 kV x-ray beam, we obtained images with sufficient quality for five samples out of ten. It was mainly due to the high density of the clay-rich soil embedding the remains. However, some valuable observations could be made. The qualitative and quantitative analysis of the remains' distribution inside the vessels provided information about the funerary practices. We assessed the potential presence of grave goods and the general taphonomy of the bones and pottery (e.g. fracture morphologies). Surprisingly, the identification of non-adult and adult remains was also possible. Finally, samples for chemical analyses (e.g. teeth and petrous bones) were localised, preventing further fragmentation or dispersion during the excavation. This research will also involve the micro-excavation of the samples, the reconstruction of the individuals' biological profiles and taphonomy of combustion, isotopic ($^{87}\text{Sr}/^{86}\text{Sr}$) analysis, and amelogenin tests.

5. Palaeomobility at the Urnfield burial site Přáslavice (Moravia, Czech Republic)

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Přáslavice is a large Late Bronze Age burial site located in the Olomouc district of the modern Czech Republic. Containing 106 graves – of which 48 are cremations, the cemetery is associated with a small village about 270m away, dating to the Middle and Late Bronze Ages (Tumulus and Urnfield cultures). Previous archaeological and anthropological investigation of the site has revealed some interesting observations. To better understand the social organization at Přáslavice, this study presents strontium isotope measurements from 32 cremated burials. In addition, modern plant samples from 65 localities across Moravia and Czech Silesia are also analysed in order to provide the first bioavailable Sr baseline map of the region.

These data has allowed us to address important questions concerning the palaeomobility of individuals buried at Přáslavice: 1) were mobility patterns of individuals belonging to different burial groups different? 2) did subadults and adults have different mobility patterns? 3) was there a temporal pattern in land use at the site? Our preliminary results have provided new insights into the complexity and dynamism of Tumulus and Urnfield societies, as well as demonstrating the promising potential of coupling anthropological and geochemical information in answering archaeological questions at Přáslavice.

6. New insights from $\delta^{88}\text{Sr}$ – results from cremation and contamination experiments

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Cremated remains are key samples recording human history, but understanding what they can tell us requires new languages. Strontium isotopes are becoming that language in archaeological studies. The commonly applied $^{87}\text{Sr}/^{86}\text{Sr}$ isotope system provides stable results in cremated remains and is resistant to diagenesis. Recent developments in Sr-isotope analyses allow for simultaneous measurements of $^{87}\text{Sr}/^{86}\text{Sr}$, and $\delta^{88}\text{Sr}$. It has been established that $\delta^{88}\text{Sr}$ varies with trophic level (Lewis et al. 2017). The question is, can that speak towards cremated human remains? Before we can interpret any results, we need to determine whether $\delta^{88}\text{Sr}$ is stable in cremations and resistant to diagenesis. Our cremation experiments show the stability of $\delta^{88}\text{Sr}$ before and after cremation. We also present experimental data from contamination experiments testing the diagenetic resistance of $\delta^{88}\text{Sr}$. Finally, some preliminary results of cremated human remains show the benefits of combined Sr-isotopic analysis.

7. The custom of cremation in Central Macedonia, Greece during the Early Iron Age: Preliminary results from Polichni, Thessaloniki

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During the Early Iron Age (11th – 7th century BC) urn cremations in central Macedonia have been revealed in a few cemeteries (e.g., Polichni, Axioupolis, Nikiti/Ai Giannis, Koukos, Makrygialos, Nea Efkarpia, Nea Philadelphia, Torone, Ierissos), and often they co-occur with inhumations. Polichni is located in the west suburbs of Thessaloniki, Greece, and contained at least 82 secondary cremations in urn-burials. The initial place of the burning events is unknown, while the cremated bones were deposited following the combustion and collection of the skeletal remains. Preliminary macroscopic investigation has revealed to date interesting variabilities in bone alterations and fragmentation due to the effect of fire and the manipulation of the cremated remains after the combustion of the bodies. The osteoarchaeological study of the human remains, in the framework of the TEFRA Project: ‘The technology and the bio-anthropology of the use of the fire on human remains in the Aegean’ aims to assess the treatment strategies for burnt bones and investigate the functional and/or social factors that correlated to and affected the funerary ritual in which fire was involved. The poster includes the preliminary results of the preservation and fragmentation of the bone assemblage, highlighting the effects of fire and exploring the funerary strategies of the population. Biological and social indicators (minimum number of individuals, estimation of biological sex, age of death, etc.) of the urn burials will be investigated and discussed within their archaeological context (pottery, artifacts, stratigraphy).

8. Strontium isotope analysis of cremated remains from Tongobriga: examining mobility at the western edge of the Roman Empire

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The site of Tongobriga (Freixo, Marco de Canaveses, northern Portugal) is located on a hillside along the Tâmega river valley, a tributary of the Douro river. Beginning as an Iron Age fortified settlement, when north-western Iberian Peninsula became part of the Roman Empire it became an important city of the Tarraconensis province. At the end of the first century A.D., Tongobriga may have acquired the status of a civitas capital. Twelve urned and unurned cremation burials were recovered from one of Tongobriga's necropolises, dated from the first century AD. Strontium isotope (⁸⁷Sr/⁸⁶Sr) analysis was undertaken to examine the mobility of ten adult individuals from this necropolis. Taking advantage of recently published and newly measured bioavailable ⁸⁷Sr/⁸⁶Sr baseline data for Portugal, the comparison of ⁸⁷Sr/⁸⁶Sr from these cremated remains to the wider environment was undertaken. This study provides insights into regional and large scale mobility at the edge of the Roman Empire.

9. Cremations through time and space in Belgium: Investigating the changes in cremation conditions from the Metal Ages to the Medieval period using FTIR-ATR and carbon and oxygen isotope analysis.

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Cremation was the dominant funerary practice in Belgium during the Bronze and Iron Age (ca. 2100-52 BCE) through to the Roman period (ca. 52 BCE- 406 AD). It remained also important during the following Early Medieval period (up to 700 AD). This represents around 3000 years of Belgian history. Recent developments in Infrared Spectroscopy and carbon and oxygen isotope analysis indicate that the study of cremated bones provides important information regarding pyre technology and body management in ancient societies.

The aim of this study is to investigate the changes in cremation conditions from the Bronze Age through to the Early Medieval period using Attenuated Total Reflectance-Fourier Transform Infrared Spectroscopy (ATR-FTIR) and carbon and oxygen isotope analysis on burnt human remains from Belgium. In total, five sites from the Metal Ages, five sites from the Roman period, and three sites from the Early Medieval period were chosen. The spectroscopic and isotopic results of the cremated remains indicate that there are statistically significant differences in the way cremation was performed between the Metal Ages and the Roman period as well as between the Roman and the Early Medieval period. This inter-and intra-site variability adds to our understanding regarding the pyre technology, body treatment, and pyre management at the studied sites and on the use of fire in funerary rituals.

10. Diachronic evaluation of cremation rituals in necropolises of northern Italy

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Among the indicative aspects of ritual funerary customs related to cremation, the chromatic changes that bones show after exposure to certain temperatures and the degree of fragmentation are the most descriptive of intentional or unintentional practices in the treatment of the body and bone material of the deceased.

In this study, 491 cremation burials from five necropolises located in the Po Valley (northern Italy) from different prehistoric and historical periods (Castello del Tartaro, Recent Bronze Age; Ponte Nuovo, Early Iron Age; Spina, Iron Age; Gazzo Veronese, Roman Age, and Bologna Central Station, Roman Age) were examined with the aim of identifying possible diachronic differences in cremation ritual.

The focus of the study is on the assessment of combustion temperatures and the degree of fragmentation. Anthropological analyses were carried out according to traditional anthropological methods. Combustion temperatures were estimated by evaluating changes in colour, texture and deformation of the bones using different chromatic scales. Postcranial bones were also subdivided according to their size ($20\text{mm} < \text{or} \geq 20\text{mm}$) to investigate the possible practice of ritual fragmentation. The conventional cut-off of 20 mm was chosen in agreement with the literature. A preponderance of fragments below this threshold is considered indicative of fragmentation due to post-burn bone treatment.

The results show interesting differences in the three periods, especially the presence of much smaller fragments in the Iron Age and Roman period. The combustion temperatures for all three periods remained high, but the presence of colourations indicating intermediate or lower temperatures in the Roman period may indicate less care in the practice of cremation or a different duration and exposure to heat. This work provides an update of previously published data with new and interesting conclusions on the funerary customs of human communities and the techniques used in the different periods.

11. Practicing cremation at the beginning of the 1st Millenium in south-western Slovakia

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The poster elucidates the state of research on cremation practices of Germanic tribes at the beginning of the 1st Millenium A.D. in south-western Slovakia during the period of 1st – 4th century A.D. It focuses on the presentation of the typical manifestation of cremation burial rite, dominant in this area, through case studies of burial grounds from the Early Roman Period and the Later Roman Period.

The preliminary results of ongoing analysis of old excavations show the correlation of the volume of cremated bones in relation to the “wealth” of the deceased and the differences in the cremation temperature between cemeteries. In general, the depositions of cremated remains show no or only a few remains from funeral pyre caused probably by the careful extraction of cremated bones from the funeral pyre or because of pre-depositional handling. The decreasing tendency of the volume of collected bones observed in the Przeworsk culture (Poland) related to the chronological aspect has to be verified in our territory. The results of analyses of new excavations can hopefully help to overcome the scepticism towards the information potential of cremation in Slovak archaeology.

12. The Middle Bronze Age Burial Mounds of Unterradlberg

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During the Middle Bronze Age Tumulus Culture, the predominant burial practice changed from inhumations to cremations within the time span of just 300 years (1600-1300 BC). In addition, the dead were buried under burial mounds with grave constructions and chambers made of stone and soil. The burial mounds of Unterradlberg in Lower Austria serve as the basis for this Master's thesis, which aims to generate new insights into the burial practices of the Middle Bronze Age.

The less than optimal preservation of archaeological features encountered in this transitional period is challenging and affords the development of new approaches. Methods include the archaeological evaluation of the burial mounds and finds, the anthropological analysis of the cremated human remains, radiocarbon dating as well as strontium isotope analysis that provide information about possible mobility of the buried individuals.

First results indicate that the Middle Bronze Age burial mounds were complex and included more than one burial per mound. The integration of Urnfield Culture elements suggests a gradual transition from the Middle to the Late Bronze Age.

13. Cremation experiment series – focus on textiles in a pyre

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Between 2018 and 2022, a series of cremation experiments was carried out at the archaeological park of MAMUZ Asparn in Austria as part of the lectures Experimental Archeology (University of Vienna, Institute for Prehistory and Historical Archaeology). For the cremation, pigs have been used to substitute humans. Within these experiments, the artefact setting of a Late Bronze Age burial from the Traisental in Lower Austria has been reconstructed, with the metal and clay items in the grave, as well as many textile layers.

A “maximal setting” of garment pieces and shrouds have been used to clarify fundamental questions in textile archeology and gain insights into the interpretation of textile artefacts found in cremation burials. Traditionally, fabric remnants that have been found corroded to metal objects in cremation burials, are interpreted as subsequent wrapping of objects after the pyre. Although this may be the conclusive way of interpretation of the respective finds we want to postulate another possibility based on the present experiments: The preliminary overview of the cremation and charring experiments presented here indicates that textiles can survive both open fire and indirect high temperatures.

These findings provide a greater understanding for the detailed conditions under which textiles might survive charring in an archaeological environment. This knowledge can give us a better idea of where textiles may be found within an archaeological site, how they might appear during excavation. The next step in experimental research will be to pursue further investigation into the impact of taphonomic conditions on charred textiles (how they react when buried in the soil), as these appear to play a major role in their preservation. For this, in November 2020 a further long-term experiment was started at the Museum Asparn. Charred textiles from the cremation experiments have been buried in urns. The setting will be re-excavated in 10 years.

14. Experimental cremation as a reconstruction of ancient Veneti rituals

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Five open-air experimental pyres were made to reconstruct the funerary cremation rites of Ancient Veneti population, correlating the results with historical, archaeological, paleobotanical and anthropological data from known Bronze and Iron Age contexts in the Veneto region (Italy). Temperature variation and effects of fire on bones and soft tissue were carefully monitored during the cremation process. Furthermore, it has been addressed the various ways of fire extinguishing, including the potential use of wine during the conclusive phases of the cremation, as per ancient funerary customs.

Preliminary analysis on the correlation between burning process and extinguishing damage, bone colors and structural alterations were made through using Photometric Scanner Imaging (PSI), and Fourier Transform Infrared (FTIR) spectroscopy. First results showed some differences in the crystalline state attained, reflected by significant differences in color evaluated by the reflectance measurements using the Photometric Scanner, which could have been correlated to different extinguishing procedures.

A new complete analysis on the bones with modern state-of-the-art analytical techniques are planned to shed a new light on how cremation rituals were performed and how these differences may affect the structural and chemical composition of bones combining FTIR and PSI methods with carbon and oxygen isotope analysis.