

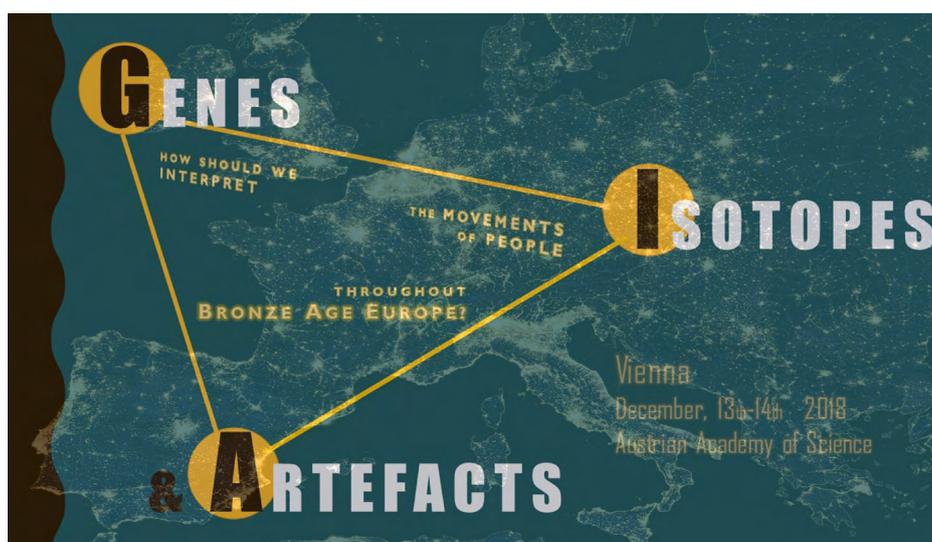
GENES, ISOTOPES AND ARTEFACTS

HOW SHOULD WE INTERPRET THE MOVEMENTS OF PEOPLE THROUGHOUT BRONZE AGE EUROPE?

This conference arises from the recent and rapid advances in genomic, isotope and archaeological research that have provided complex, but frequently contradictory, perspectives on human mobility across Bronze Age Europe (2200–800 BC). Human mobility in European prehistory has traditionally been identified through artefacts rather than people. Interpretations of movement have frequently drawn upon distribution maps of artefact types across the continent or changes in recurring artefact assemblages in graves and settlements that underpin archaeological cultures. Post-modern sociological and anthropological theories on human mobility have inspired new theoretical foundations in which archaeologists understand movement by focussing on “routes instead of roots”.

Recent technological developments in genomic sequencing and isotope analysis on teeth/bones have meant that debates concerning mobility have now shifted to direct evidence from humans (and animals). In addition, scientific developments in archaeological materials have enabled new perspectives on production and trade. Network analyses, which draw upon these and other new avenues of data, are starting to transform the Bronze Age map from a mosaic of static archaeological cultures to a mobile world of inter-dependent polities.

The aim of the conference is to identify the different scales, patterns and societal impacts of mobility throughout Europe. This international event will bring together leading scholars from all parts of the continent and research fields tackling similar problems with different methods rooted in the humanities and natural sciences. As an inter-disciplinary forum, this event will provide room for networking and discussions to lay the theoretical and methodological foundations for future scientific advancement.



PROGRAMME

THURSDAY, 13. DECEMBER, THEATERSAAL

9.00-9.30 *Arrival, Registration*

Session 1 **Chair: Barbara Horejs**

9.30-9.45 *Introduction* (Cavazzuti, Horejs, Rebay-Salisbury, Roberts)

9.45-10.15 **Svend Hansen, Sabine Reinhold, Wolfgang Haak & Chuan-Chao Wang**
At the interface of culture and biology – First results from a paleogenetic transect through Bronze Age populations of the Caucasus

10.15-10.45 **Ron Pinhasi, Daniel Fernandes & David Reich**
Steppe and Iranian ancestry among Bronze Age Central and Western Mediterranean populations

Coffee break

11.15-11.45 **Martin Sikora**
Human viruses - A new frontier in ancient pathogen genomics

11.45-12.15 **Kristian Kristiansen**
Genes, diseases, and migrations: what relationship? Indo-European expansions reconsidered

12.15-12.30 *Discussion*

Lunch

Session 2 **Chair:**

14.00-14.30 **John T. Koch**
Formation of the Indo-European Branches in the light of the Archaeogenetic Revolution

14.30-15.00 **Kiss V., Barkóczy P., Czene A., Csányi M., Dani J., Endrődi A., Fábrián Sz., Gerber D., Giblin J., Gyöngyösi Sz., Hajdu T., Káli Gy., Kasztovszky Zs., Köhler K., Maróti B., Melis E., Mende B. G., Patay R., Pernicka E., Szabó G., Szeverényi V., Szécsényi-Nagy A., Reich D. & Kulcsár G.**
People and interactions vs. genes, isotopes and metal finds from the first thousand years of the Bronze Age in Hungary (2500-1500 BCE)

15.00-15.30 **Mario Gavranovic**
Distinction and movements of the Bronze Age groups in the Balkans – a long search for indicators of mobility

Coffee break

16.00-16.30 **Barry Molloy**
In search of the Dorian Invasion: Integrating settlement, material and scientific perspectives on mobility in the later Bronze Age Balkan peninsula

16.30-17.00 **Catherine J. Frieman**
The Bronze Age and the flow of new technology – re-imagining innovation as a mobile phenomenon

17.00 *Discussion*

18.00 **Wine reception**

20.00 **Speaker's dinner** (Palatschinkenkucl, Grashofgasse 4, A-1010 Wien)

FRIDAY, 14. DECEMBER, THEATERSAAL

Session 3 Chair: Janet Montgomery

09.30-10.00 **Natalia Shishlina**
Movements across the Bronze Age steppes: seasonal migrations and subsistence system

10.00-10.30 **Karin Margarita Frei**
Tracing individual mobility in the Nordic Bronze Age

Coffee break

11.00-11.30 **Claudio Cavazzuti, Robin Skeates & Andrew Millard**
Mobility of people in Northern Italy Bronze Age communities investigated through isotope analyses

11.30-12.00 **Andrea Cardarelli & Alberta Arena**
From colonization to diaspora. Models of human mobility in the Terramare Culture between Europe and the Mediterranean

12.00-12.30 **Katharina Rebay-Salisbury**
Gendered mobility and motherhood in Bronze Age Central Europe

Lunch

Session 4 Chair:

14.00-14.30 **Corina Knipper, Philipp W. Stockhammer, Alissa Mittnik, Ken Massy, Fabian Wittenborn, Stephanie Metz & Johannes Krause**
Female exogamy, patrilocality, and social stratification at the transition from the Final Neolithic to the Early Bronze Age in Southern Germany

14.30-15.00 **Peter Clark**
How did a 'maritory' work? Maritime technology and social mobility in the Transmanche zone during the 2nd millennium BC

Coffee break

15.30-16.00 **Marc Vander Linden**
Island in the stream: on the scale of human mobility during the British Bronze Age

16.00-16.30 **Benjamin W. Roberts, Miljana Radivojević**
Metals and Mobility in Bronze Age Europe

16.30-17.00 *Discussion*

ABSTRACTS

THURSDAY, 13. DECEMBER 2018

Andrea Cardarelli*, **Alberta Arena***

*Università degli studi di Roma, "La Sapienza"

From colonization to diaspora. Models of human mobility in the Terramare Culture between Europe and the Mediterranean

The *Terramare* represent one of the most renowned archaeological cultures in European Bronze Age, at least since the late 19th century.

After a long period of decline that characterized most of the 20th century, the archaeological research has taken new impulse and has constantly grown during the last three decades, largely confirming the intuitions of the 19th century scholars.

The *Terramare* are situated in the central Po River valley and date between the mid-17th and the first half of the 12th century BC (Middle Bronze Age and Recent Bronze Age). These villages were equipped with artificial fortifications and could reach 20 hectares in size.

With the beginning of the historical cycle of the *Terramare* culture, this territory appears densely populated reaching, and perhaps exceeding, 200,000 inhabitants, during the apogee.

During these five centuries, the landscape drastically changed and became intensively anthropized, with hundreds of villages, cultivated and irrigated fields, roads and other kind of infrastructures.

The intense demographic growth recorded for the early phases of the *Terramare* cycle does not seem to be explained only by an internal increase, but rather as the result of diverse forms of human mobility. After a long period of great economic and social success, the *Terramare* culture entered a deep crisis that led to its collapse, a very complex phenomenon still not fully understood. Certainly, among the motivations that contributed to the disappearance of the *Terramare*, there were critical environmental and ecological conditions, but also the rigidity of the economic and socio-political model.

Plausibly, the disappearance of the *Terramare* is correlated with the deep socio-economic transformations that occurred in continental Italy in the last centuries of the second millennium BC. The archaeological evidence suggests that more or less large groups of refugees from the collapsing *Terramare* moved also southwards throughout the Italian peninsula.

The paper will focus on the possible role of the mobility in the rise and collapse of the *Terramare*, in the wider context of the Bronze Age Europe and Mediterranean.

Claudio Cavazzuti^{1,2}, **Robin Skeates¹**, **Andrew Millard¹**

¹Durham University, Department of Archaeology

²Istituto Centrale per la Demnoetnoantropologia, Roma

Mobility of people in Northern Italy Bronze Age communities investigated through isotope analyses

How did people move across the landscape during the Bronze Age in Northern Italy? To what extent were different categories of people mobile? How did mobility patterns change during the second millennium? Can we observe differences between small villages and large centres?

The Ex-SPACE project (Exploring Social Permeability in Ancient Communities of Europe) has addressed these questions, applying strontium, oxygen and carbon isotope analyses to a sample of 160 individuals (and 40 baseline samples) from four cemeteries situated in the Po plain. The sites, which represent various cultural contexts and chronological phases of the Bronze Age, were selected in order to understand how mobility changed in relation to the socio-political development from the small kinship-based communities of the Early

Bronze Age to the Terramare system of the Middle and Late Bronze Age, and finally, to the complex societies of the Final Bronze Age.

The sampling strategy was conceived so as to explore mobility patterns among different categories of individuals, differentiated by sex, age, burial chronology/topography and grave goods.

We found that, regardless of long-term trends, the central place of a polity played a crucial role in determining the characteristics of mobility and the permeability to non-local components. Moreover, as also highlighted by other studies in Europe (notably Knipper et al.'s 2017 study on Bell Beaker and EBA in Bavaria), the movement of female individuals appears to have been of primary importance in defining a system of alliances, power relations and trade networks.

A further element of interest is the relation between mobility and social inequalities. At Frattesina -the important port of trade which emerged as the Terramare system declined, commoners appear almost completely indigenous, while elites moved extensively across the hinterland, plausibly as part of the process of establishing and reinforcing power relations. Among them we distinguished a warrior chief, who was an outsider and may have contributed to the overcome of the traditional isonomy of the Terramare and to the institution of a more hierarchical structure of society.

Peter Clark*

*Canterbury Archaeological Trust

How did a 'maritory' work? Maritime technology and social mobility in the Transmanche zone during the 2nd millennium BC

Over the last few years there has been an increasing recognition that communities on the 2nd millennium BC on both sides of the English Channel were closely related, sharing a common material culture in terms of domestic architect, pottery, metalwork, funerary customs and so forth. This cultural entity has been described by Stuart Needham as the Channel/southern North Sea (CSNS) 'Maritory', a geographic system of peoples intimately connected by the sea. This paper considers the mechanisms by which such a maritime cultural entity came to exist and how it maintained itself over time. Looking beyond the technology of seafaring and the socio-political interaction of high status elite groups, it reviews the processes by which a kind of quotidian cultural homogeneity can be sustained through movement and contact across the seas.

Karin Margarita Frei*

*National Museum of Denmark

Tracing individual mobility in the Nordic Bronze Age

The Nordic Bronze Age (1.700 – 500 BC) has left us with vivid cultural remains, among others, the numerous burial mounds, votive depositions and rock carvings. But beyond these impressive cultural remnants, Denmark possesses the unique collections of well-preserved human remains, the well-known oak-coffin people. These individuals, both men and women, represent the elite of their time. Recent cross-disciplinary investigations, based on state-of-the-art biogeochemical, anthropological and archaeological investigations of human remains performed on some of the most iconic oak coffin burials, revealed unexpected long distance mobility. Further ongoing investigations based on identifying individual mobility by strontium isotope analyses are currently being conducted on human remains from southern Scandinavia. This paper will present the status of these ongoing investigations, as well as it wishes to discuss the differences between travels versus migration -two very different aspects of mobility. These aspects might potentially shed light on socio-dynamics mechanisms during the Nordic Bronze Age.

Catherine J. Frieman*

*Australian National University

The Bronze Age and the flow of new technology – re-imagining innovation as a mobile phenomenon

There is a growing consensus that mobility was increasingly important to people living in Europe in the 3rd and 2nd millennia BC—both as a framework to support an increasingly complex and interconnected economy and as a part of cosmology and ritual practice. Innovation and the adoption of new technologies, metal chief amongst them, seems to have driven and supported the expansion of networks of communication, contact, and probably also kinship. Yet, our interpretative instruments for discussing the mobility of innovations are few in number and highly general, often doing little more than revivifying decades'-old debates about diffusion and migration. In this paper, I will attempt to develop a more nuanced take on how innovation operates in mobile social networks. When we talk about the movement of material culture in Bronze Age studies, we too often default to dualities: local/exotic, new/old, functional/ritual even though we know these are oversimplifying a complex social pattern. I will bring a mobilities paradigm to bear on the spread of new practises and technologies in order to demonstrate that starting from a concept of flux breaks down these binaries which infest innovation discourse. Models of the Bronze Age economy are necessarily grounded in the flow of goods and people. I will argue that this flow itself is not passive but likely had a complex and tangible impact on how Bronze Age people understood novel technologies, why they chose to adopt them and what they recognised as an innovation in the first place.

FRIDAY, 14. DECEMBER, THEATERSAAL

Mario Gavranovic*

*OREA, Austrian Academy of Sciences

Distinction and movements of the Bronze Age groups in the Balkans – a long search for indicators of mobility

Due to the intermediary geographical position between Central Europe and Aegean-Mediterranean world, the Balkan Peninsula is generally perceived as a zone of high migration and movement activity from the earliest prehistory until recent days. The focus of this paper will be on the second millennia BC, a period marked by vivid cultural dynamics resulting in a number of archeologically defined regional groups. The creation of these groups was primarily based on the cultural-historical approach with material remains as a main distinction criteria and migration as a key catalyst of change. Following this argumentation, the archaeological groups were interpreted as “cultural-ethnic” units with collective, overriding identity expressed through specific artefacts and features. Moreover, they were also understood as a pre-tribal societies, implying a common biological background. Occasionally added in favor of this perspective were even some of the anthropological parameters such as different skull patterns.

Assuming that material culture mirror certain populations, there have been more than few migration theories for the Bronze Age of Balkans, including e. g. the appearance of tumuli graves, distribution of furnished/channeled pottery, expansion of the Urnfield phenomena and simultaneous occurrence of specific attire sets in the western Balkans and Macedonia. These mobility hypothesis lean however on selected archeological indications, whereas tangible analytic evidences are still lacking. In consequence, the distribution patterns of artifacts or specific features (e. g urn graves) were interpreted as signals of human mobility. Other possible explanation of particular distribution patterns (supply area of certain workshop, geographic zones with natural barriers, socio-economic aspects) were barely considered, at least until some of the recent studies.

While the concept of “cultural-ethnic” groups was believed to be more or less obsolete for the most prehistorians working in the area, the uncritical identification of biological samples and cultural identity seems again to be on the rise with some of the recent genetic studies dealing with region of Balkans. The crucial problem still appears to be the alleged association between archeological and cultural features (pottery style, jewelry items, burial constructions etc.) and specific biological population. Not to overlook are also severe implications of this hazardous concept, often misused for the political and populist purposes, especially when it comes to the recent history of the Balkans.

Svend Hansen¹, Sabine Reinhold¹, Wolfgang Haak², Chuan-Chao Wang²

¹Deutsches Archäologisches Institut, Eurasien Abteilung

²Max Planck Institut für Menschheitsgeschichte, Department of Archaeogenetics

At the interface of culture and biology – First results from a paleogenetic transect through Bronze Age populations of the Caucasus

The Caucasus is one of the most important geographical joints in Western Eurasia. Linking Europe, Western Asia and the Eurasian steppe zone, this region today is one of the genetically and linguistically most diverse spots of Eurasia. It is easy to imagine that repeated population influx and drain, but similarly compartmentalisation in the remote mountain valley is behind this modern situation.

Neolithic and Bronze Age populations play an important role in this scenario, as they represent the first epochs of formations, which can be regarded either as associated ‘cultures’ and/or coherent biological populations. A first study on the paleogenetic background of 50 individuals from the 5th to the 2nd millennium BC, which represent all cultural formations of Bronze Age Caucasia, give a first insight into highly complex scenarios of interaction. The paleogenetic perspective could proof the presence of populations with different genetic-make ups and different biological vectors of formation among these individuals. Affiliation by material cultural and other archaeological attributes, however, revealed epochs of interaction, where cultural and biological borders were crossed, and those, where no population exchange seemed to have happened among the neighbouring inhabitants of one area. This region thus allows to study in detail the mixing and interdigitation of people, their materiality and cultural systems and challenge many of the too simple models developed for another interface of the Eurasian steppe zone those directed towards Europe.

Kiss, V.1, Barkóczy, P., Czene, A., Csányi, M., Dani, J., Endródi, A., Fábrián, Sz., Gerber, D., Giblin, J., Gyöngyösi Sz., Hajdu, T., Káli Gy., Kasztovszky, Zs., Köhler, K., Maróti, B., Melis, E., Mende, B. G., Patay, R., Pernicka, E., Szabó, G., Szeverényi, V., Szécsényi-Nagy, A., Reich, D.; Kulcsár, G¹.

¹Hungarian Academy of Sciences

People and interactions vs. genes, isotopes and metal finds from the first thousand years of the Bronze Age in Hungary (2500-1500 BCE)

There is a long tradition in archaeological research of explaining the observed changes in the archaeological record through the appearance and immigration of a new population. Although these first interpretations were based on an outdated theoretical background, migration is indeed an important social strategy, often used both individually and by communities to solve their problems and improve their situation, as recent scientific results suggest. A basic question in archaeology remains: “who moved: people, objects or ideas?” The Momentum Mobility Research Group will present the current state of research from the central part of the Carpathian Basin in the first ten centuries of the Bronze Age (2500–1500 BCE), concerning bioanthropological data including stable isotope and aDNA, as well as analyses of metal finds including lead isotope results.

Corina Knipper¹, Philipp W. Stockhammer^{2, 3}, Alissa Mittnik³, Ken Massy², Fabian Wittenborn⁴, Stephanie Metz⁴, Johannes Krause³

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³Max Planck Institut für Menschheitsgeschichte

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Female exogamy, patrilocality, and social stratification at the transition from the Final Neolithic to the Early Bronze Age in Southern Germany

Human mobility, residential systems, and increasing social stratification are of crucial interest for comprehending the mechanisms behind the transition from the final Neolithic to the Early Bronze Age in Central Europe. Here we contribute to the ongoing debate and present results from an interdisciplinary project that integrates

ancient DNA and stable isotope analysis with in-depth archaeological investigation and radiocarbon dating. We focus on the Lech Valley near Augsburg in Southern Germany, where an array of hamlets and associated burials spans from the Bell Beaker Complex, over the Early Bronze Age into the Middle Bronze Age (c. 2500 – 1300 BC). Strontium isotope ratios of tooth enamel identified significantly more non-local females than males and children. Together with a diversification of mitochondrial DNA haplogroups over time this points to regularly practised female exogamy. The reconstruction of family trees using genome-wide DNA data for the same individuals confirms patrilocality as the dominating residential system. Moreover differentiated grave furnishing among related and unrelated individuals at the same cemeteries attests to the importance of kinship relations for the emergence of social inequality. Zooming into a micro-region elucidates the significance of sex-related mobility and local residential continuity over multiple generations as driving forces for long-standing inter-regional exchange and the accumulation of wealth.

John T. Koch*

*University of Wales, Centre for Advanced Welsh and Celtic Studies

Formation of the Indo-European Branches in the light of the Archaeogenetic Revolution

Philology and archaeology evolved in tandem for over a century in a general awareness that reconstructed proto-languages (such as Proto-Indo-European, Proto-Germanic, Proto-Celtic) and later prehistoric cultures inhabited the same world. In effect, the two disciplines were studying the same thing. However, mapping reconstructed linguistic evidence onto text-free archaeology presented a near insurmountable challenge. The widespread astonishment that greeted the decipherment of Linear B as Late Bronze Age Greek illustrates the unreliability of carefully argued circumstantial inferences, even at the protohistoric horizon. David Anthony's *The Horse, the Wheel, and Language* (2007) impressed many readers, but I know of no prior adherents of the Anatolian hypothesis of Indo-European origins who changed views upon reading it.

By then, we knew that ancient DNA evidence was coming. What we had not expected is that it would reveal, not incremental changes of population, but changes so dramatic that they very probably came with a change of language. In particular, this was the case with massive gene flow from the Pontic–Caspian steppe in the 3rd millennium BC, which transformed the Siberian Altai and central, northern, and western Europe. In other words, this new data seemed to confirm, for at least some key elements, the steppe hypothesis that had been constructed and won adherents on the basis of completely non-genetic evidence, rather linguistic and archaeological.

There were also less dramatic negative discoveries. For example, Cassidy et al. 2016 shows that three Early Bronze Age men from Rathlin Island were very different genetically from Neolithic woman from near Giant's Ring outside Belfast. But the men were much closer to the modern Irish. In other words, the shift at the Neolithic–Bronze Age Transition was much greater, and relatively little had happened since. The authors accordingly suggested that the Rathlin men spoke the Indo-European language that then evolved into Gaelic in situ.

We can anticipate that genome-wide samples of ancient Europeans will soon number many 10,000s, filling gaps in most parts between the expansion from the steppe and historical populations speaking attested pre-Roman languages. We shall soon see whether this new evidence (archaeogenetic and isotopic) provides a conclusive advance for mapping nodes of the Indo-European family tree onto prehistoric populations and archaeological cultures. The paper will attempt a snapshot, reviewing results of some recent archaeogenetic studies and what they might imply about languages in later prehistoric Europe. What gaps and uncertainties remain? And where might answers come from?

Kristian Kristiansen*

*University of Gothenburg

Genes, diseases, and migrations: what relationship? Indo-European expansions reconsidered

In this paper I attempt to define and interpret the driving forces behind the 3rd millennium migrations, based on a pastoral mode of production. Kinship system, traction technologies and diseases are evaluated, as well as Indo-European texts. Also a comparison with ethnographically known pastoral groups.

Barry Molloy*

*University College Dublin

In search of the Dorian Invasion: Integrating settlement, material and scientific perspectives on mobility in the later Bronze Age Balkan peninsula

The fall of the Heroic Epoch of Bronze Age Greece has been of academic interest for over 2,500 years, being touched upon by the earliest Greek literary figures. In the political climate of their time, various hazily defined ethnic identities were celebrated or blamed for developments in social order that had helped form the socio-political climate in which the authors were writing. The past was not a singular place from which the Greeks had emerged, but a diverse and mobile world in which groups had moved and shifted across land- and seascapes. Moving forward to the birth of archaeology, those documented movements of peoples – focussing on the Dorians in particular – were blamed for the collapse of civilisations, not only in Greece, but extending out into the eastern Mediterranean. In that socio-political climate, the exotic (to them) groups with which authors or their contemporaries were interacting were seen as both massive and potentially threatening. The birth of the Dorian narrative of invading hordes in those early writings thus embodied, at least to a degree, contemporary thinking. As the field developed, such fearful simplicity was roundly rejected, and with that the Dorian invaders were cast aside as an explanatory model. As the pendulum in archaeology swings back, we are once again concerned with mobility, migration and social change. The often spatially extensive framework of aDNA sampling frameworks has led us back to large scale narratives seeking to contextualise the movement of people in Europe. In this presentation, I will revisit the Dorian narratives of Greece in the light of archaeological evidence. Through this, I will explore the possibilities for applying ancient DNA and stable isotope research to elucidate the role of interaction and mobility in the collapse of the Mycenaean palatial system of the later Bronze Age.

Ron Pinhasi¹, Daniel Fernandes², David Reich³

¹University of Vienna, Department of Evolutionary Anthropology

²University College Dublin, School of Archaeology

³Harvard Medical School

Steppe and Iranian ancestry among Bronze Age Central and Western Mediterranean populations

Steppe-related ancestry is known to have reached central Europe ca. 3000 BCE, while Iran-related ancestry reached Greece by 1500 BCE. However, the time course and extent of their spread into the central/western Mediterranean remains a mystery. We analysed 48 Neolithic and Bronze Age individuals from Sicily, Sardinia and the Balearic Islands aiming to investigate when and how continental European and Aegean influences affected these insular populations. Results show that the first Balearic settlers had substantial Steppe-related ancestry which was subsequently diluted by increasing proportions of farmer-related ancestry. In Sardinia, we identified the appearance of Iran-related ancestry from the Aegean as early as the Middle Bronze Age, with no genetic influences seen from populations carrying Steppe-related ancestry despite cultural or commercial exchanges with Bell Beaker populations. In Sicily, during the Early Bronze Age, and possibly earlier, we found evidence for admixture with groups carrying both these ancestries. These results suggest that Steppe-related migrants had a crucial role in the settlement of the Balearic Islands and their ancestry reached as far south as Sicily, and that the population movements that brought Iran-related ancestry to the Aegean also impacted the Western Mediterranean around the same time the first civilizations started to develop.

Katharina Rebay-Salisbury*

*OREA, Austrian Academy of Sciences

Gendered mobility and motherhood in Bronze Age Central Europe

Women reproduce societies – both biologically and socially – and yet we are still at the beginning of understanding the basics of Bronze Age motherhood.

Most isotope data that has come out in recent years testify to a higher level of female than male individual mobility, suggesting exogamous marriage and patrilocal residence patterns. However, we know little about the age at which women had their first children, on maternal mortality, sibling spacing and the age of weaning, as well as the total number of children per woman, despite the profound consequences of these variables on the demographic development of societies.

Even subtle differences in reproductive success, engineered by practices such as longer breastfeeding, more responsive childcare or the help of grandparents, may, over time, result in significant advantages of one group over another.

Polygyny, the marriage of a man with several women, and serial monogamy as a result of women dying through the burden of childbirth, will both leave traces in the sex-specific genetic composition of a society. Considering how women's reproductive roles were embedded in Bronze Age societies we can investigate the role of female movement in shaping societies in more detail, and by considering factors beyond 'massive migrations', we may perhaps contribute to the interpretation of admixture patterns in aDNA.

Benjamin W. Roberts¹, Miljana Radivojević²

¹Durham University

²Institute of Archaeology, UCL

Metals and Mobility in Bronze Age Europe

The production, movement, recycling and deposition of bronze has invariably been central to European Bronze Age scholarship. Bronze continues to play a significant role in the current debates surrounding local, regional and pan-continental Bronze Age mobility. The paper draws upon current archaeological and archaeometallurgical research to explore the underlying implications for identifying and understanding Bronze Age mobility. It will focus on: the production and circulation of copper, tin and bronze metal stock; the transmission of bronze craft techniques; and the distribution of metalwork types. It will highlight how the evidence from Bronze Age metals strongly supports very different forms and scales of mobility and will analyse how these are manifested across *key geographical regions and time periods*.

Natalia Shishlina*

*State Historical Museum, Moscow

Movements across the Bronze Age steppes: seasonal migrations and subsistence system

Mobility of people was the main feature of the new economic model, i.e. pastoralism which was developed in the southern part of Russia starting from the end of the 5th mill BC. Life in a dry and hot climate forced prehistoric societies work out rather sophisticated mechanisms of adaptation to unfavorable natural conditions in order to survive in dry summer or severe winter. Economic adaptation of social patterns to new conditions contributed to higher mobility based on the innovative seasonal pasture rotation.

We can trace archaeological remnants of population movements through isotope data.

Stable isotope analyses of animals and humans of the Eneolithic, Yamnaya, Catacomb and other cultures demonstrate a different diet systems and its change through time. Bronze Age human and animal collagen from the steppes shows large variations in ¹³C and ¹⁵N values. One of the main reasons of this variation is the population movements across the exploited areas with different food resources.

Another isotope marker of the population movement is the ⁸⁷Sr/⁸⁶Sr value obtained from human and animal enamel. For example, variation of ⁸⁷Sr/⁸⁶Sr values of a sheep tooth from a sampling pit at Volochaika-4, which is a Catacomb site, and natural snails in contemporary ponds in a small river valley at the village of Remontnoye also demonstrate that lambing took place not in the Volochaika sites where the herders' group stayed in the second half of the summer but in a different place.

Hence, isotopic data confirm a seasonal economic cycle used by the population in the steppe belt of the Eastern Europe south which is characterized by seasonal moves within the exploited pasture system.

Martin Sikora*

*Natural History Museum of Denmark, Centre for GeoGenetics

Human viruses - A new frontier in ancient pathogen genomics

Recent advances in the sequencing of ancient DNA have yielded important insights into human evolution, past population dynamics and diseases. The recovery of ancient pathogen DNA in particular has provided a direct window into the origins and evolution of the causative agents of some of the most devastating epidemics in human history, with a particular focus on bacterial pathogens such as *Yersinia pestis* or *Mycobacterium tuberculosis*. Ancient viruses on the other hand have received considerably less attention to date, hindered by challenges such as preservation and small sizes of their genomes.

Here I will discuss our recent work on ancient viruses from the Stone and Bronze Ages to historic times. We demonstrate the successful recovery of population-scale datasets of whole viral genomes from ancient human remains. Using Hepatitis B virus (HBV) as a case study, we show that humans throughout Eurasia were widely infected with HBV for thousands of years. Our results demonstrate the power of ancient DNA to unravel the origins and evolution of viral pathogens, and establish the potential of ancient viruses as powerful proxy tools for tracing human migrations and interactions during prehistoric times.

Marc Vander Linden*

*Department of Archaeology, University of Cambridge

Island in the stream: on the scale of human mobility during the British Bronze Age

The existence of human mobility during the Later European Prehistory, and in particular the Bronze Age, has been heavily debated for many decades. Whilst metal trade by definition implies some element of connectivity between different European regions, Sr and more recently aDNA studies have demonstrated that human mobility not only happened, but most probably on a scale that few archaeologists were willing to contemplate. Yet there is a clear difference between documenting and explaining past human mobility, and extensive work remains to be done to understand its role in shaping the culture history of the corresponding populations. As argued by several scholars, archaeologists should grasp the opportunity offered by newly available scientific techniques to explore population history. This contribution will thus discuss the identification, description and role of population history for the British Bronze Age, with a focus on its earlier stages and especially the Bell Beaker Phenomenon. Particular attention will be given to the inclusion of multiple lines of evidence, including Sr, aDNA and more “traditional” archaeological data.