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**Scales of Social,
Environmental &
Cultural Change
in Past Societies**

ABSTRACT BOOK

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ABSTRACT BOOK

KIEL CONFERENCE

**Scales of Social, Environmental & Cultural Change
in Past Societies**

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Titel: Excavation of Neolithic wooden trackway from Aschen Moor, Lower Saxony, Germany. (Photo: Jan Piet Brozio)

Central Keynotes

K 01

Environment, Aggregation and Monumentality in Early Complex Societies: The Case of Valencina (Spain) (c. 3200-2300 BC).

L. G. Sanjuán

University of Seville, Seville, Spain

Long before early state societies appeared, major central places of powerful social, economic, religious and ceremonial significance set the stage for social complexity among intermediate-scale societies. These sites, usually located at environmentally diverse and geographically prominent locations, represent the first regional political organizations, and involve a scalar jump in size and complexity from bands of hunter-gatherers and farming villages. These early complex polities were quite variable across time and space and inherently unstable, but were often marked by impressive, even extravagant monumental architecture. In this lecture, I will examine one such case: the Copper Age mega-site, in southern Spain. After the first discoveries in the 1860's and then gradual, if slow, advances throughout the 20th century, research on Valencina has accelerated in the last two decades. The site is remarkable because of its large size (c. 450 hectares), monumentality, with massive ditches and some of Iberia's largest megaliths, number and density of features (estimated in the tens of thousands, many of them funerary), as well as the amount and quality of the material culture found in them, which boasts some of the finest and most accomplished examples of 3rd millennium BC craftsmanship across western Europe. Studies published in recent years include general overviews of the site, high-resolution approaches to some of its most important monuments and burials, extensive radiocarbon dating, as well as detailed analyses of metallurgical, lithic, and ivory technology. Based on this newly available information I will attempt to explain the nature of Valencina as a site, and its significance to understand early forms of social complexity.

K 02

From grassland to granary: convergent evolution of millet agriculture in Africa and Asia

D. Fuller

University College London, UCL Institute of Archaeology, London, United Kingdom

Most of the great agricultural transformations took place in the semi-arid grasslands, where the domestication of just a few species transformed the carrying capacity of grasslands for humans. Parallel processes of domestication in the western and east Sahel of Africa, the savanna zone of India, the steppe environments of northern China and southwest Asia, offer a comparative perspective on evolution both of cereals and of the human societies that came to rely on them. In this presentation we approach such comparisons through constructing a domestication episode for each case, against which to consider correlated changes such as sedentism, pastoralism and demographic growth. Barley from western Asia provides a well-known example of cereal domestication indicators that illustrates how an extended domestication timeline of ~3000 years can reframe relevant cultural changes that are linked to the economic shift to agriculture. Although more fragmentary we can take a similar approach to the emerging data from pearl millet domestication in Mali, sorghum domestication in Sudan, millet domestication in northern China and browntop millet domestication in Southern India. Each of these cases is briefly introduced with the aim of providing a plant domestication timeline against which to consider the cause or effect relationships with the emergence of sedentism, the adoption of pastoralism, and adaptations of aridification processes. What this indicates is that the pathways to cereal agriculture were diverse, with no single causal process, but similar factors inherent in domestication and semi-arid environments encouraged convergent evolution of cereal-based economies.

K 03

Transformation through connectivity in the Central European Bronze Age

C. Metzner-Nebelsick

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This talk will focus on connectivity phenomena in central and south-eastern Europe in various spatial and chronological settings. Based on case studies, I will discuss the impression of seemingly alternating periods with intensive wide-ranging contacts and periods with a less prominent degree of interregional contacts during the Bronze Age. For example, the Early Bronze Age contrasted with the early Middle Bronze Age or the early phase of the Urnfield period and its later stages. My talk will explain why these observations may result from a biased interpretation of the archaeological record. Our perception of the past might not only be obscured by deposition practices in graves and ritual hoards but also because we adhere to traditional chronological schemes. The Reinecke periodisation of the central European Bronze Age often seems

to conceal the fluidity of social-cultural transformations and, thus, social developments. In this talk, I will focus on the highly underestimated 14th century BC. It represents – viewed from a central European perspective - the end of the Middle Bronze Age. However, in my talk, I will pursue a different approach, championing the tremendous innovative impact of this period, which can be characterised as a time of intense interregional contacts and oscillating between tenacity and innovation.

K 04

Neolithic transformations: integrating genetic, cultural and environmental changes

K. Kristiansen

Department of Historical Studies, University of Gothenburg, Gothenburg, Sweden

With increasing numbers of prehistoric genomes from northern Europe, as well as high resolution pollen diagrams and strontium isotopic analyses, it is now possible to refine processes of genetic replacement into primary and secondary migrations. While the Neolithisation of Denmark still appears dramatic, we may have clues to where the Ertebølle hunter/fishers took their escape. With the role of diseases we can add demographic decline as a contributing factor to the second major genetic replacement from the steppe. We can further distinguish more clearly between primary and secondary colonization and link it to variations in material culture. Thus, we are approaching a situation where different types of evidence can be put on equal footing to produce more nuanced, historical explanations of what appears to have been major social transformation in European prehistory with a lasting impact.

S1: Mobility and exchange in the Late Neolithic and Bronze Age – Raw materials, networks, innovations

The Bronze Age is an archaeological period that is particularly known for its innovations. From the introduction of new funerary rites to wide-ranging economic changes, there is ample evidence of changes in various areas of technology, ideology and society during this era. Hence, Bronze Age research has to a certain extent been focused on studies of mobility and exchange. Many of these developments can be traced back to the Late Neolithic or have their roots there. Changes in technology, economy and crafts can be seen in the introduction of the metal sickle, changes in subsistence strategy such as the introduction of millet (Kirleis et al. 2022), the spread of tin bronzes or the introduction of three-aisled houses, to name but a few.

Changes in ideology are visible in the introduction of cremation or urn burials, the construction of burial mounds and central fortified settlements as political structures or sun and animal symbolism, which can be traced through Europe. These developments bear witness to a circulation of new ideas and knowledge as well as to a change in cosmology and world view(s). For this session we welcome contributions focusing on – but not limited to – the study of different forms of mobility, exchange routes, provenance and exchange of raw materials (e.g. amber, metals, glass, silk etc.), weapons, tools, ornaments and prestige goods through archaeological and scientific methods. Furthermore, we are interested in the study of individual biographies and mobility (e.g. aDNA, strontium and oxygen isotopes, age and gender, physical anthropology). We would like to explore Late Neolithic and Bronze Age patterns of mobility and distribution networks with regard to continuity, discontinuity and transformations, identifying connections, points of contact, interactions and influences as well as distinctions, differences and distances, addressing i. a. the following questions:

- What did mobility and exchange specifically look like in Late Neolithic and Bronze Age societies and what differences can we possibly detect?
- What kind of changes can we observe between the different archaeological periods (LN, EBA, MBA and LBA) in terms of mobility and exchange?
- Can we identify possible reasons for and forms of mobility and exchange, e. g. are we dealing with voluntary or non-voluntary mobility?

We welcome contributions from different fields and are specifically interested in an interdisciplinary exchange.

S01.001

Pastures on the move: The deep time emergence of landscapes of mobility

M. Løvschal

Aarhus University & Moesgaard Museum, Højbjerg, Denmark

Long-distance exchange networks form a key feature in Nordic Bronze Age society, enabling the movement of ideas, people, livestock, goods, and raw materials across vast distances. This keynote will adopt a deep time landscape perspective on the emergent relations and structures of governance, underlying and enabling this system. During the third millennium BC, new human-provoked landscapes expanded across Northern Europe, affording grazing pastures and social opportunities: open stretches of grasslands and *Calluna* heathlands. These landscapes required ongoing more-than-human commitment and maintenance such as grazing and cycles of controlled burning to rejuvenate them and prevent them from reforesting. In return, *Calluna* offered itself for seasonal pasture and provided fuel and raw material for barrow building. Hence, heathlands and grasslands relied on the sustained return by humans and livestock as well as networks of intercommunity connections, based on trust and collective governance, securing access and grazing rights across substantial distances, and preventing conflict and overexploitation. In this way, new pastoral niches of cyclicity, reincarnation and sustained commitment gradually came into being, pertaining to grazing patterns and pastoral mobility, rejuvenation practices and funerary activities. The emergent links between long-distance mobility, pastoral landscapes and barrow-building produced a cosmological complex, an ‘ancestral commons’. Heathlands became focal sites that orientated people and livestock around a shared cultural background, activated and reinforced by the nexus of practices pertaining to heathland maintenance, barrow building and the various scales of movement that sustained them. Hence, it is proposed that wider social ties were established already in a Corded Ware context and ready to be mobilised in the Bronze Age.

S01.002

Tracing the beginnings of the Late Neolithic and Bronze Age networks: The straight-walled beaker as a super-regional symbol.

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Scholars often regard the Late Neolithic (LN) (c. 2250–1700 BC) as the period when many Bronze Age characteristics start off. New artefacts and technologies, such as flint daggers and bronze axes, characterise the LN. Super-regional exchange systems emerge. Especially exchange of eastern Denmark and Central Germany is evident in the material culture and the deposition strategies of early bronze artefacts.

However, already before, during the late Younger Neolithic (YN) (late Corded Ware culture [CWC]) (c. 2450–2250 BC), we see a similar pattern. In north-western and central Jutland, beakers with straight walls appear that scholars mostly regard as local innovation. However, in Central Germany, Bohemia and parts of Poland, similar beakers appear. Thus, straight-walled beakers are part of the material culture of the late CWC in many regions. Especially the Central German beakers are very similar to the Jutish ones. In both regions, a special variant occurs vertical decorations – a type of decorations completely unknown during the entire YN. By the analysis of straight-walled beakers, we see the roots of a specific network, a direct connection between agglomerations, especially in Central Germany and north-western and central Jutland.

The Danish groups who adopted the super-regional sign ‘straight-walled beaker’ treated it specially. During the early and middle YN, battle axes are the most common grave good. However, during the late YN, the number of battle axes decrease drastically in burial contexts. Pottery, in contrast, especially straight-walled beakers, increases significantly. Shortly thereafter, with the onset of the LN, flint daggers appear. They overtake the function as a dominant grave good. The number of pottery in burial contexts decreases again. Moreover, it loses its quality and ornamental variability. Thus, the short-lived phenomenon of straight-walled beakers goes hand in hand with an equally short-lived change in funerary rites.

S01.003

Human mobility and exchange networks in southwestern Sweden during the Neolithic and Early Bronze Age.

M. Blank

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This paper is based on results from my PhD thesis. The main objective of the thesis was to gain new knowledge of the Neolithic and Early Bronze Age societies constructing and using megalithic graves in southwestern Sweden. The aim was addressed with an interdisciplinary approach, combining archaeological, osteological, radiocarbon, strontium isotope, and stable isotope data, genetic sex assessment and mtDNA haplogroup determination.

The study area is limited to the inland region of Västergötland with a special focus on the sedimentary zone of Falbygden. In Falbygden one of northern Europe’s largest concentrations of passage graves, along with many gallery graves are found. The clear spatial structure of the geology and the well-preserved human and animal bone material make it an unusually fruitful study area for investigations combining bioarchaeological and archaeological methods to understand prehistoric mobility, economy, and society.

In this presentation I will discuss different levels of human mobility, population dynamics and exchange networks during the two main phases of megalithic grave use: 3400-2600 cal BC and 2200-1100 cal BC.

The study relies on 221 human remains from 47 megalithic graves which were sampled for radiocarbon dating, stable isotope, and strontium isotope analyses, and to some extent for genetic sex assessment and mtDNA.

The isotope data—in association with other archaeological information—revealed somewhat changed mobility patterns and contact networks for Falbygden, from the early phase to the late phase. The data also demonstrate a distinct increase in human mobility and genetic diversity in the late use-phase compared to the early phase. Furthermore, movements of artefacts, cattle and humans seem to have been part of different, only partly overlapping networks.

S01.004

Human mobility in a changing Bronze Age world: Investigating the connections between mobility of people and metal trading networks 1300BC

H. W. Nørgaard

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In recent years, isotope-related research has changed our view of the Bronze Age. Strontium isotopes have proven a great amount of mobility and lead isotopic investigation of metal artifacts revealed that Southern Scandinavia was not exploiting its copper sources; instead, it was importing metal via large-scale exchange networks from the establishment of the Bronze Age in 2000BC. Nevertheless, little is known concerning the organization of these contact networks and the importance of specific people within.

This presentation wants to present the results of a project that applied a mixed-method approach, using qualitative classificatory mobility markers as quantitative data (LIA, TE and Sr-isotopes) in a comparative and combined manner with scientifically detected mobility data (mainly of females), markers of social hierarchy, and archaeological evidence of mobility (foreign costumes, styles, and techniques) to discuss the role of females in exchange networks. Based on southern Scandinavian case studies from the middle Bronze Age around 1300 BC, this presentation aims to suggest a future-oriented way of investigating mobility and the role of females as ambassadors in exchange networks by combining archaeological and scientific data. Further, this presentation wants to suggest a theoretical frame for future studies based on spheres of interaction, kinship relations, and *evia* for determining the motivation behind mobility in the middle Bronze Age.

S01.005

Consideration about the role of Nuragic Sardinia in the European Late Bronze Age metal trade

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Lead isotope and chemical analyses of bronze and copper finds from Scandinavia (e.g. Ling et al. 2014, 2019; Melheim et al. 2018; Nørgaard et al. 2021) revolutionized our understanding of the Bronze Age metal trade. The discovery that raw materials from very distant regions were used to manufacture local metal tools, weapons, and artefacts was a highly unexpected result. Unexpected was also the fact that models and raw materials appeared not to have necessarily travelled along the same routes, challenging earlier views, and suggesting the existence of complex interaction systems, still to be fully explored and understood. Thanks to those studies, and as for the scope of this paper, two elements gained a renewed attention in Bronze Age research: 1) the role of maritime connections and seafaring; 2) the role of the western Mediterranean as a metal producing region.

In the aftermath of such studies, it has been recently proposed (e.g., Sabatini, Lo Schiavo 2020) to reevaluate the role of Nuragic Sardinia as one possible, and so far, underestimated actor involved in both seafaring and metal production and trade. Sardinia is not only rich in mineral resources, but it is home to an impressive and technologically advanced Bronze Age society. Intriguingly enough Sardinia is also the European region where the largest number of copper oxhide ingots of Cypriot origin has been found so far. The paper is one of the first outcomes of an ongoing study on local metal production and critically explores the role of the island's Bronze Age communities in the wider Mediterranean and European copper trade during the second half of the second millennium BC.

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S01.006

Alternative pathways to complexity. The Early Bronze Age societies in southeastern Poland.

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Consistent with the commonly accepted view, mobility and exchange driven by the desire to acquire metals were behind the dynamics of Bronze Age societies development. The results of research conducted in most regions of Europe confirm that key phenomena such as social stratification, the rise of inequality and even the birth of a market economy remained closely linked to the building of and participation in a complex network of exchange and trade in tin, copper (bronze) and gold. In Europe, however, it is possible to identify areas where the briefly described model has not worked. For various historical, cultural and economic reasons, some communities underwent internal processes of development and transformation without participating in the pan-European metal exchange network. The presentation will deal with an example of an alternative development path and consider possible reasons for the phenomenon evident in the sources coming from southeastern Poland.

S01.007

A matter of scale of production... A case of a *Kugelkopf* pin in terms of local/non-local metallurgical production.

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One of the most spectacular finds from the Early Bronze Age are *Kugelkopf* pins (spherical-head with diagonal hole). The genesis, location and development of this metal objects have been published in many regions (see further Chvojka et al. 2013). The distribution of *Kugelkopf* pins spreads over the vast areas of Central Europe. The greatest accumulation is located in the Moravia (Innerhofer 2000). However, the finds from the northern part of Carpathian Basin are the ones that indicate production areas (eg. casting mold from grave no. 280, Nižná Myšľa cemetery; Olexa 1987). With these discoveries, it was possible to reconstruct the technological process of manufacturing this type of pin. In this case, it was cast with a solid clay core (inside the head), which is confirmed by numerous examples from Europe. However, were these pins produced only in the Carpathian Basin? The lead or tin isotopic composition analysis, developing in recent years, is able to determine the origin of the raw material. However, the distribution of the metal in the Early Bronze Age may have taken place over long distances. In the context of the above discussion of the origin of production areas, it makes more sense

to use the analysis of another isotope - neodymium. The isotopic composition of neodymium ($^{143}\text{Nd}/^{144}\text{Nd}$) are the best indicators of the origin of rocks, sediments and related materials (eg. ceramics, doubt). This method makes it possible to estimate the geographic origin of the samples and to identify their geological age (Beřka 2021). The paper attempts to identify the relationship between the potential origin of the raw material, through production areas and the route of distribution of spherical-headed pins. Finds from the area of Polish Lowlands will be used as the example, with particular focus put on cases from a grave in Gorszewice (Wielkopolska) and a stray find from the area around Lake Gopło (Kujawy).

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S01.008

New evidence of Bronze Age glass trade: Blue glass beads from the Tumulus culture cemetery of Maklár (NE Hungary)

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Around the middle of the second millennium BC, significant changes occurred across Central Europe, associated with the emergence of the Tumulus culture. The eastern part of the Carpathian Basin became the eastern frontier of this new phenomenon during the 15th to 13th centuries BC, where long-lived multi-layered tell settlements were just abandoned. In this period, cross-cultural communication and long-distance trade became consolidated and amber, glass, metal work and perishable goods, among others, were in the focus of exchange. Glass, as an invention of the Bronze Age, appeared first in Mesopotamia and Egypt, although it reached Mycenae and Central Europe in the form of blue glass beads quite rapidly via long distance trade networks and became the favoured jewellery of socially prominent women. Blue glass beads were known from East-Central Europe, including the well-known Cioclovina Cave at the eastern part of the Carpathian Basin, and from the tumulus graves of the Bakony Mountains in Transdanubia, but not from the Great Hungarian Plain so far. In 2021 and 2022, preventive excavations took place on the northern edge of the Great Hungarian Plain, in the vicinity of Maklár, where two cemeteries are known from the above-mentioned period, namely the sites Nagyrét II. and Koszperium. Nearly 210 cremation burials were excavated at the site Maklár-Nagyrét II., from which 11 contained translucent blue and turquoise glass beads, 34 pieces altogether.

Besides archaeological and anthropological analysis of the site and the graves, the glass beads were submitted to archaeometric examination. SEM-EDS and LA-ICP-MS analyses were performed to determine the chemical composition of glass, including colourants.

Our study presents the results of the analyses and the comparison of the beads' chemical compositions with other specimens from Europe and the Near East. Our results suggest that the blue glass beads of the Maklár-Nagyrét II. cemetery could be the earliest known glass artifacts on the Great Hungarian Plain, and they could have been made on the Near East, thus the beads could reach North-eastern Hungary via long-distance exchange.

S01.009

Who are you, where do you come from and where do you go? Mobility and connectivity at the beginning of the Urnfield Period

M. Fritzl

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The advance of the Urnfield Phenomenon is generally attributed to increased connectivity and mobility. However, various studies have pointed out that the reasons behind this assumption ranging from long term or seasonal migration to residence change upon marriage, moving warrior bands, traveling craftsmen, travel, trade and social visits are hard to grasp. Traditional archaeological techniques have reached their limits in exploring which reasons triggered the spread of cremation burials and the homogenisation in the material culture. Bio-chemical techniques provide the means of assessing individual mobility itself but the outcomes are rarely sufficiently integrated.

The cemetery of Inzersdorf ob der Traisen, Austria serves as a case study to show that mobility and connectivity should best be explored interdisciplinary. A combination of strontium isotope analysis, network analysis, analysis of the topographical features of the surrounding area and its connected sites as well as the archaeological assessment of the burials and its individuals is used to assess to which degree specific kinds of mobility and connectivity can be detected and how they influenced the community of Inzersdorf and its members in their social lives.

Through the careful application of selected techniques, we know more about which people were more mobile than others, why they were more mobile and how they were perceived within the society. Consequently, the impact of mobility on a

society becomes clearer. Furthermore, we deepen our understanding in how mobility and connectivity shaped and were shaped by the communities in order to understand the dynamics in cross-cultural communication and finally in cultural shifts.

S01.010

Sources of clay and pigments in the Middle Bronze Age. Case studies from the subcarpathian area of Moldavia (Romania)

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The Middle Bronze Age period in the subcarpathian area of Moldavia is represented by two archaeological cultures known as Costişa and Monteoru. These communities shared a geographical space rich in salt springs, a resource that was highly demanded in prehistoric times and was probably the main exchange good for the bronze artifacts discovered in the settlements of these cultures. Moreover, these settlements were located on fortified hilltops, suggesting the existence of a local elite that controlled the exchange routes. In addition to these prestigious objects, miniature vessels with consistent traces of pigments were discovered in some settlements, an aspect of great importance, because such discoveries are extremely rare for the studied area and not only. In this regard, a series of physico-chemical analyzes (petrography, SEM-EDX, μ -FT-IR and thermal analysis) were carried out to identify the source of the pigments, but also of the clay used in the manufacture of the vessels of the two communities. In order to identify the source of clay raw material was used an experimental approach, based on an interdisciplinary investigation model, that provided a series of satisfactory data.

S01.011

The Ada Tepe gold mine (LBA) in the context of resources, exchange networks and social (in)equality

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The Late Bronze Age settlement at Ada Tepe (Bulgaria), where specialized gold miners lived, offers the opportunity to discuss economic mechanisms in the context of a gold mine. Insights into social structure and demography of the mining society as well as socio-economic relations provide the basis for discussing potential correlations between access to resources and social (in)equality.

The site complex is located in Bulgaria, in the Eastern Rhodopes, and was excavated by H. Popov and his team from the National Archaeological Institute of the Bulgarian Academy of Sciences (Sofia). The data obtained by the excavations were analyzed in an interdisciplinary way by an international team in cooperation with the Austrian Academy of Sciences. This was done within the project "Bronze Age Gold Road of the Balkans - Ada Tepe mining" (PI: B. Horejs, FWF P-28451). The presented results are part of the author's doctoral thesis (supervised by: B. Horejs, R. Krauß, H. Popov), which was embedded within the project.

There is evidence of a significant increase in the number of sites in the Eastern Rhodopes from the Late Bronze Age onwards. A previously unattractive settlement area was opened up, and new types of settlements (hilltop settlements), economies and networks were developed, as well as the mining of ores (gold).

Although the mining activities on Ada Tepe testify to extensive gold extraction, the lack of gold-rich graves and other indicators of social differentiations among local groups are striking. So far it is not finally clarified for whom the Ada Tepe gold was mined - the gold did not remain on site and was probably traded elsewhere. A supra-regional embedding of the results of the Northeastern-Settlement at Ada Tepe allows to shed light on the significance of the gold mine in its socio-economic and cultural-historical context and to gain a better understanding of specialized miners' exchange networks.

S01.012

GIS for documenting ancient quarries in Greece and revealing communication routes

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The deployment of new methodologies and digital technologies in the field of cultural heritage, render possible nowadays the integrated documentation, management and highlighting of archaeological sites and finds.

GIS has become a human science research tool virtually eliminating the distance of physical space. Georeference is now

considered necessary for the integrated documentation and management of every archaeological site and its finds; GIS, as a new documentation methodology for cultural heritage, mirroring analogue documentation principles, constitutes a methodological challenge strongly related to the massive digital and technical development globally.

The rapid increase in the number of ancient quarries located in Greece, many of them not yet excavated or mapped, calls for an urgent plan concerning the related documentation, under the perspective of rendering the study of their techniques more systematic and comprehensive, as well as the interactions with other centers, thus allowing to draw conclusions about stone mining in the ancient Greek world, its movement across the Mediterranean and the resulting inter-local contacts, revealing commercial, political and cultural networks, sea and land routes.

Throughout the Bronze Age, shipping was highly developed in order to carry out trade and exchanges of products. The circum-navigation of the Peloponnese from its southern shores was the main sea route for communication between East-West and North-South in all past times. Messenia's wider area, at the southwestern corner of Greece, is, undoubtedly, integrated in the sea routes of communication and transfer of ideas and material goods from the South and East, also to and from lower Italy and Sicily. The import of obsidian from the Cyclades to the Peloponnese, Greece, more specifically, Voidokoilia bay in Messenia, for the purpose of processing it in local workshops and producing tools, is widespread in the Bronze Age.

A Geographic Information System is called to handle data entry at different layers of information, allowing thus management flexibility, qualitative and quantitative analysis and, furthermore, visualization of all the aforementioned, thus revealing routes and networks of communication.

S01.013

Mobility dynamics and socio-technological changes in the mid-late 3rd millennium BC circum-Aegean: reviewing the ceramic evidence

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The second half of the 3rd millennium BC saw significant changes in material culture in most of Europe and is generally viewed as a period of extensive social and economic transformations. Narratives of large-scale interactions and the reconstruction of exchange networks have been a favourable topic of enquiry in prehistoric Aegean archaeology, particularly during the Early Bronze Age II-III periods. Not only this is considered a time of social differentiation and the emergence of supra-regional urban centres with well-organised communities, it sees also the expansion of communications via maritime and in-land routes and the westward spread of technological novelties. This is pertinent in the appearance of pottery vessels and morphostylistic features, as well as other technological innovations (the potter's wheel), across a wide geographical area extending from inner Anatolia to Mainland Greece. This ceramic phenomenon (Lefkandi I-Kastri phase) and its associated vessels are often called as *Anatolianising*, for they have been taken to represent imitations of Anatolian prototypes and are characterised as foreign within rather 'conservative' assemblages. However, in the light of a comparative examination of such assemblages from different sites and the characterisation of raw materials through laboratory analysis (thin section petrography), this so-called intrusive, large-scale ceramic phenomenon seems to be inconsistent in terms of its introduction, adoption, distribution, and adaptation. With a particular focus in the eastern Aegean region, this paper presents a technological approach as the means to explore ceramic variability, aiming to build a regional understanding of mobility dynamics, connectivity patterns, and the circulation of ideas and influences.

S01.014

Networks of Amber Communities in the Bronze Age

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The concept of the "Amber Road" was introduced into archaeology nearly 100 year ago. Since its initial discussion the perspective of the concept changed.

For the debate on exchange systems amber is an interesting material to study for it has specific properties. Especially the known origin of amber is a key for discussing long distance relationships. With the Beginning of the Bronze Age a wide dissemination all over Europe can be seen in the archaeological record. Tracking different shapes and characteristics of amber objects can help to identify connections and exchange networks between different communities in Bronze Age Europe.

This research project aims to discuss the theory of the so-called "Amber Road" from a new methodological background, namely approaches through Network Analysis.

S01.015

The bronze cup from Dohnsen as evidence of social and physical networks

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Archaeology can transcend scales by looking at both the material results (artefacts) of individual actions and the big patterns (distribution maps) of social systems. This ability is key to postulating ideas about prehistoric modes of contact and exchange, as well as supporting them with detailed on-the-ground observations. The bronze cup found in Dohnsen (Lower Saxony, Germany) in the 1950s is a prime example of an artefact that might represent multi-faceted cultural transmissions (raw materials, style, technology) across large geographic distances. The cup is a singular object that bears striking similarities with the metalwork style of the Late Aegean Bronze Age (Sprockhoff 1961; Matthäus 1977/78). Due to its random discovery and lack of (secure) archaeological context, the cup's evidence value has been strongly contested (e.g. Sprockhoff 1961; Buchholz 1960). Given the extreme archaeological potential of the Dohnsen cup, it is perhaps surprising that these strongly opposing views have remained unchecked by modern scientific analysis for more than 70 years. However, in 2012, metal samples were taken from the vessel at the Landesmuseum Hannover and analysed by the Curt-Engelhorn-Centre of Archaeometry. This was the starting point of a re-appreciation and re-evaluation of the Dohnsen cup as a primary source of information on Bronze Age long-distance interactions (Suchowska-Ducke et al. 2021). Consequently, this contribution will provide an up-to-date review of the primary sources of information on the cup's find history and context, and discuss the results of recently published chemical and lead isotope analyses. The current state of knowledge on the Dohnsen cup still allows for multiple hypotheses about its provenance and object biography. One possible explanation is that the vessel was produced from Central European ores, but represents the metalworking skills of a travelling smith with knowledge of foreign shapes and styles.

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S01.016

Equestrian Innovation: Modeling Mobility and Exchange in Eurasia in the 2nd millennium BC

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Equestrianism is a key innovation that heralded the advent of the Bronze Age in Eurasia. The appearance of the modern domesticated horse lineage (DOM2) (Librado et al. 2021) occurs with the beginnings of tell societies in the Carpathian Basin (Kanne 2022) and the fortified settlements of the Sintashta culture in the Trans-Urals (Chechushkov et al. 2020). Society, mobility, and exchange were irrevocably transformed when horse power translated human power into action. Equestrianism created new overland travel and trade networks, linking Eurasia into a 'hyper-region' of interconnectivity (Vandkilde 2016) as it variously altered political formations. However, equestrianism was not adopted evenly throughout Eurasia, or in the same form, or within the societies regionally that adopted it, with many focused on local use, and few focused on likely surplus production for exchange or to fund political economies. Examining individual biographies for equestrianism further complicates the picture, with equestrian mobility not always conforming to extant narratives for the Bronze Age. Here, I explore equestrian mobility and exchange, combining horse and bit distribution, strontium isotope analyses, and osteobiographies, moving between a continental and individual level of analysis, discerning overall patterns, as well as local discontinuities, modeling how this innovation spread as it built far-reaching equestrian infrastructures throughout Eurasia.

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P01.07

Knowledge transmission and exchange in the European Bronze Age: episteme - techne - praxis

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This poster presents the outline of a research project that aims to investigate known routes and channels of exchange, together with changes in Europe in regard to the three spheres episteme - techne - praxis. This research builds on existing catalogues and collections and provides a structural comparison between the spread of trade goods such as amber and changes in the technical, ideological and social domains. The field of episteme includes religious ideas, cosmological models and political concepts, which can be seen in the construction of burial mounds, the introduction of cremation or urn burials, or sun and bird symbolism, the evidence of which can be traced across Europe. Also included is the construction of central fortified settlements as political structures. The second area, techne, concerns technology in the form of tools, skills and processes (including the control and management of energy, agriculture, crafts or reading and writing). Archaeologically, these are the introduction of the metal sickle, changes in subsistence strategy such as the introduction of millet, spread of tin bronzes or iron smelting, and writing or the construction of fortifications. The third area covers practice in the sense of structured behaviour (such as customs, ritual practices and habits) and is more difficult to cover archaeologically. Examples here would be razor offerings or burnt-offering sites.

P01.28

The Viksø helmets re-investigated

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The Viksø helmets, found in 1942 in Brøns Mose near Viksø, have inspired writers and artists over decades in creating images of past warriors with horned helmets. Despite its uniqueness and the difficulties in dating the helmets based on direct comparison, small elements of the helmet decoration gave the impetus to date these pieces to the Late Bronze Age (LBA), presumably between 1200/1100-750 BC [1,2], like the swan-like decorative hump row at the bottom of the helmet and the helm crest's beak-like endings. This year's archaeological news informed half of the world that organic material from one of the horns, extracted in 2018, could be scientifically 14C-dated and places the Viksø helmets in the transition between periods IV and V, making their use around 950 BC very likely [7]. All the more, newly identified stylistic similarities to the Iberian and Sardinian material culture reopen an old debate on a Southwest European origin. By creating an interdisciplinary biography of these helmets, a new project will shed light on the Viksø helmets' place within the Bronze Age European craft and style traditions.

S2: Beyond Gender transformations? Archaeological context and intersectionality

In the two large, archaeologically based research programmes at Kiel University (ROOTS, CRC 1266), inequality forms an important focus for studying connectivity and transformation. A direct possibility to conduct these studies are the analyses of human skeletal remains in connection with the archaeological material. The biological sex, an approximate age, and physiologically visible disabilities can be determined on an individual level. The biological sex, which refers to the different biological and physiological characteristics of a person, differs from gender that is socially constructed and includes norms, behaviours and roles associated with being female, male, or non-binary, as well as relationships among these. Yet, sex and gender interact during life courses and during archaeological periods, as it was discussed for instance in the international CRC 1266 workshop “Gender transformations” in 2018, published in 2019. It is consensus that gender and sex are categories of discrimination in the long tradition of (patriarchal) societies. Beyond this interaction it is important to understand the links to other categories of discriminations. How do gender, age, ethnicity, sexual orientation, gender identity, disability, class and other forms of discrimination “intersect” to create unique dynamics and effects?

In this session we want to focus on the role of gender in prehistoric and classic archaeology but also allow for the step beyond this into an intersectional discourse on the archaeological issues as well on the framing of archaeological research.

- Where are the limits of our research in gender and intersectionality in prehistory/classic periods – methodologically as well as institutionally?
- Which modern intersectional or specifically gender biases shape our research agendas and scientific approaches?
- What is necessary to embed gender-sensitive research in the archaeological agenda?
- At which scale does gender effect transformation?
- Is gender a root of inequality?
- In which chronological, spatial, and social contexts is gender a relevant social category that is noticeable in the archaeological material?

S02.017

The social construct ‘patriarchy’. A research frame and/or a research object?

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With this paper I would like to introduce the discussion about the conditions and limits of archaeological research on gender and intersectionality in prehistory. Gender research in archaeology is no longer new, it is now – more or less – one of the established fields of research, even though it is often misunderstood as exclusively ‘women’s studies’. The research focus is on the definition and identity of different gender groups, on the interaction between gender and – archaeologically visible – on the imbalances in the accessibility of resources. In this context, other social factors such as age, body, status, cultural and geographical origin also play an important role. Gender should never be analysed alone in the reconstruction of social prehistoric structures.

In the session the question will be asked, where the limits of our research in gender and intersectionality in prehistory/classic periods are - methodologically as well as institutionally. In this introduction I would like to discuss how far our view of prehistory is obscured by our position as researchers in (currently still) patriarchal social systems. A brief overview of the history of the definition of patriarchy shows how the construct of ‘patriarchy’ has been constructed over the last 300 years as a universal ahistorical social constant. For example, in his summary of world history, Yuval N. Harari has only state that most societies worldwide were ‘patriarchally’ organised since historic times, but that neither the pathway to inequality nor the causes of the development had been understood so far. In contrast, archaeological studies – apart from exceptions such as Gerda Lerner’s famous monograph ‘the creation of patriarchy’ – rarely use this term. So are the archaeological sciences the ones that could knock the universal claim of patriarchy off its pedestal in favour of a differentiated gender history? But is this possible as long as the scientific institutions themselves are embedded in patriarchal social structures? Only when we understand the concept of ‘patriarchy’ as the currently existing social system in Europe can we overcome it in order to re-evaluate the prehistoric finds and findings outside patriarchal templates.

S02.018

That's a good topic for you as a woman, isn't it?

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Suppose one talks about female role models in prehistory and early history in Germany. In that case, a significantly lower proportion of female professors can serve as role models. In 2015, the ratio of tenured male to female professors was 5:1 (Gutsmiedl-Schümann, 2016). In contrast, the gender ratio of students has been balanced since 1999 (Gutsmiedl-Schümann, 2018), and/or female students exceed males.

In addition to the unequal gender ratio, the perception and transmission of research results by female researchers is undoubtedly still an issue. Usually, only the male role models in the history of the discipline are known and well perceived, while their female colleagues go unnoticed and are thus forgotten.

Nevertheless, the question arises as to what leads to this disproportion. Do there need to be more female candidates? Who actually writes dissertations? Who habilitates? We have tried to answer this question over the decades by looking at the doctoral lists of various German institutes. While women have regularly completed doctorates, they only habilitated for a few decades. Is this due to the women's topics? Does the doctorate topic already set the course for a possible career in archaeology? Or are other aspects decisive? As early as 1998, Haidle and Owen coined the contrast of "excavator vs. analyst". While the former are given sovereignty over material and sites, the latter are assigned a supporting role. The cultural-historical interpretation remains with the "excavator" and thus the narrative historiography. However, the question is whether the shift caused by the various "science revolutions" is also reflected in the themes of the theses. From the collection of completed dissertations from several German archaeological institutions (e.g. Kiel, Tübingen, Bonn, Mainz or Marburg), we approach the above-raised questions. Not only the ratio of men to women and their supervisors is examined over the decades but above all, the topics of their theses. Are there gender-specific differences? In this talk, we will present the first results of this study.

S02.019

Adornments from the Mariupol type cemeteries and gender identification by Mykola Makarenko

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About 30 cemeteries of the so-called Mariupol type (late Mesolithic – Neolithic) are known. The study of rich grave goods provides information about age, social status, gender identification and marital status. The earliest burial complexes were located, mainly, on the Dnipro Rapids and Low Dnipro. Graves were individual, double or collective. Numerous dead were accompanied by frugal grave goods: adornments made from shells, bone, stone, pearl, carp teeth, deer canines.

As a rule, male burials were the richest adorned, children's graves were more modest, female burials were the poorest. Burials of the later phase of the Mariupol type cemeteries, from Dniester to Don river, are characterized by a special abundance and variety of the grave goods. There were numerous beads and pendants of different materials: shells, bone, marble, jet, etc. The most impressive personal ornaments are the perforated boar tusks. These ornaments are exclusively abundant at the Mariupol cemetery; they are inherent to male, female and children burials.

According to Mykola Makarenko, the author of the excavations of Mariupol cemetery, orientation of the burials depended on the gender of the dead: female burials had western orientation and male – eastern. This identification was confirmed by burial inventory and burials with children. Numerous female burials are the same rich as male. But some of them had atypical features. But some of them had atypical features: two west oriented burials had "male" attributes – stone mace in burial XXXI and two stone axes in burial LI. The same, two "male" graves XLIV and LXXIV were ornamented like female. These phenomena, probably, are an evidence of special social status of buried persons, or gender transformation.

S02.020

Gender and Social Identity within the Early and Middle Bronze Age Inhumation Burials from Western Hungary

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The virtue of investigating burials signifies the multilevel archaeological examination of gender identities and their status. However, it raises several questions: on which level is the gender identity represented or its reflections to be ignored, and what conclusions could be drawn concerning the deceased's status in the prehistoric community? Based on the univariate statistical and correspondence analysis of more than 160 inhumation burials of ten cemeteries dating to the turn of the Early and Middle Bronze Age (2100/2000–1600/1500 BC) in Hungary the sharp distinction between male and female graves cannot be observed, after all, several patterns of gender differentiation in funerary practice could be

suggested. Comparing the orientation and position of the analyzed so-called Gáta-Wieselburg burials with the tendencies of the Central European Early Bronze Age cemeteries, the combination of burial traditions in the meeting zone of Únětice-, Nitra-, and Unterwöbling communities was assumed. The representation of gender status could be established mostly on the level of grave furniture. Although the human remains under this study are relatively fragmentary, the to-be-presented investigation is the first complex gender and social analysis of the anthropological and archaeological results of the burials in the Gáta-Wieselburg culture so far. In the future, stable isotope and aDNA analyses on the osteological remains of several sampled burials included in this study may reveal the role of geographical descent and biological lineage in the burial tradition.

S02.021

“Warriors” and “Weavers”: Challenging gender stereotypes in central Italy (Osteria dell’Osa, 1000-500 BC ca) to face modern challenges and impact current policies

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Already in the 1990s, John Robb provided a comprehensive overview of the development of gender symbolism and ideology in Italian Prehistory. During the Neolithic gender representation seems to be much more ambiguous and blurred (Robb-Harris 2017). With the Copper-Bronze Age and more distinctively with the Iron Age and Archaic Period, a binary ideology seems to emerge especially from the funerary evidence between ‘martial warriors’ and ‘beautiful weavers’ (Robb 1997).

While Robb’s original model partially still holds today, many scholars have challenged this binary conception of Mediterranean and European ‘gendered’ populations both for earlier and later periods. In addition, several studies have showed that the intersectionality between indicators of personhood and identity aspects, such as age, status, class and even ethnicity and gender and sex is much more complex than previously thought (Koch-Kirleis 2019; Coltofean-Arizancu, et al. 2021). Therefore, there is need of more nuanced and articulated interpretations, which is the goal of the project I am currently conducting at the Hanse-Wissenschaftkollegen in Delmenhorst (Bremen).

Starting point is a review of burials from the cemetery of Osteria dell’Osa (Latium vetus, 1000-500 BC), which shows that individuals were mostly gendered. However, there is a significant number of burials that present both elements and there are some burials anthropologically determined as female with male objects, and *viceversa*. It is possible that anthropological analyses have been wrong, but the review highlights some complex patterns that deserve further investigation. Within this project I am planning to extend this type of analysis to other contexts in the Italian peninsula and to use peptides analyses to sex these individuals scientifically in order to disentangle objectively the complex relation between sex, gender and identity in past populations.

L. Coltofean-Arizancu, et al., *Gender Stereotypes in archaeology*, Leiden 2021

J. K. Koch and W. Kirleis eds., *Gender Transformations in Prehistoric and Archaic Societies*, Leiden 2019

Robb, J. and O.J.T. Harris, *Becoming gendered in European prehistory: Was Neolithic gender fundamentally different?* *American Antiquity*, 2017: p. 1-20.

Robb, J., *Female Beauty and Male Violence in Early Italian Society*, in *Naked Truths. Women, Sexuality and gender in classical art and archaeology*, A.O. Koloski-Ostrow and C.L. Lyons, Editors. 1997: London-New York. p. 43-65.

S3: Craft and apprenticeship in past societies: a barometer of social changes. Methods, Issues and Interpretations

Craft production requires knowledge and often a high level of skills. The related know-how is gained through apprenticeship. Depending on the recyclability of the material, apprentices can be visible (e.g. lithics) or hidden (e.g. metal, ceramic), unless decorated objects.

Apprenticeship is a social phenomenon necessary for continuity in production and socioeconomic reproduction of any society. The know-hows spread along social networks, thus, delineating the extent, density, and character of different groups. These social networks reflect so the dynamic and interactive aspect of prehistoric societies. This methodological tool is, then, a perfect barometer to study the interplay of material culture, population dynamics and social relationships. On the one hand, technical variability on a synchronic perspective can indicate the coexistence of distinct 'production groups'. We can question their relationships through the exchange networks. On the other hand, technical variability on a diachronic perspective can testify of innovation phenomena, social heterogeneity, or population mobility. Furthermore, the issue of craft specialization and its early forms can be analysed from the point of view of social context of apprenticeship and learning networks.

In this perspective, we want to gather researchers working on different culture material and on a broad chronological frame (from Paleolithic to Iron Age) to question social changes and their impact on material culture evolution. We welcome contributions related to methods, issues and interpretations related to the topic. A special attention will be made to the following questions:

- **Hidden apprentices/hidden know-hows: how to highlight transmission patterns when apprentices are invisible? How to explain that specific know-hows appear in dotted line during prehistory?**
- **Polarization versus interaction/Innovation versus endangered know-how: how to identify these processes? In which socio-political contexts? Which consequences on cultural evolution?**
- **Mobility, Migrations, Demographic fluctuations, and its impact on apprenticeship and transmission.**
- **Craft specialization and apprenticeship: which place for apprentices in this form of craft production? Emergence of an institutionalization/segmentation of apprenticeship? (v)**
- **Different rhythms of social changes: integrated studies on material culture.**

S03.022

Technological innovation by recombination: A non-deflationary framework for the study of combinatorial invention

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Technological recombination has been celebrated as one of hallmark of our species-specific capacity for cumulative technological evolution. As different traits present in a population's repertoire meet in an individual through cultural transmission, some individual combines two or more items together, creating a novel item in the population's repertoire. Recombination has been understood as a population-level process in that it is not so much the result of individual ingenuity as it is the inevitable result of the chance meeting, within an individual's mind, of two or more ideas transmitted through cultural transmission. Studies of this form of 'random recombination' have mostly consisted of mathematical models aimed at explaining the growth patterns of technological innovations. While the results of such models are informative, they are based on a deflationary understanding of the cognitive demands required for individuals to produce such inventions, black-boxing the invention process as one consisting of chance rather than intelligence.

In this paper, I argue that a closer look at the cognitive demands for combinatorial invention is a much more complex process, requiring inventors to solve three different kinds of interrelated problems: (1) inventing a functional matrix for producing a useful composite item, (2) solving how the different parts making the final artefact form need to be joined in order to produce a functional tool, and (3) figuring out a set of procedures that leads to the reliable production of the final composite artefact form. Given this complexity, I argue that combinatorial invention is more complex than typically understood, but more importantly, that this very complexity impacts what sorts of evolutionary patterns innovations by recombination can produce.

To show this, I take the 500ky old invention of hafted tools—the invention of tools composed of a working edge, a handle, and the haft binding the two—as a case study to illustrate the complexities of even the earliest composite tools. Using palaeoarchaeological data, I go beyond the study of the procedures (e.g., chaînes opératoires) needed for making such tool and reinterpret them in terms of the problems needed to be solved for the invention of hafted tool and the cognitive demands for reaching such solutions.

S03.023

Identifying individual skill levels in the Acheulean: challenges and perspectives.

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Late Acheulean is a key moment in human evolution as it precedes the emergence of Homo sapiens. Traditionally perceived as technologically persistent, new findings and new approaches developed for the study of the lithic material show the diversity of these assemblages and the number of innovations that took place during this time period. Better understanding the behavioral and cognitive process leading to the emergence of our species is therefore one of the major issues in the study of this period.

For this purpose hominin skills are evaluated, on the basis of lithic technical complexity and diversity, in an attempt to trace the origin of cumulative culture (ex. Stout et al. 2019), considered a hallmark of our species (e.g. Henrich 2015). In this paper we discuss the importance of individual skill level identification at a site level as direct evidence of learning behavior. Moreover we explore the transmission patterns behind the presence of apprentices in the lithic material, and discuss the possible implications of this approach in the understanding of social behavior during human evolution. For this purpose we will analyse two bifacial assemblages, Garba I (Melka Kunture, Ethiopia) and Jaljulia (Israel) dated to ca. 600ka and ca.500 ka respectively.

S03.024

Testing craft specialisation in Neolithic chert economy: A case study from western Anatolia

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The adoption of the Neolithic lifeway can be considered as the root of fundamental economic behaviours, including how critical resources for everyday life were managed and the development of specialisation. To understand the organisation and level of differentiation involved in craft production, Perlès (1992, 119) suggests to “*consider all commodities in circulation and systematically compare the parameters that characterise, in each case, the procurement of raw materials, commodity production, site consumption and regional distribution.*”

Archaeologically, reconstructing aspects of economic behaviour requires materials that allow for conclusive assessments. Chipped stone tools are ideally suited for this endeavour, since they are among the most ubiquitous and long living finds at pre-metal age sites. The case study presented here is from Neolithic Çukuriçi Höyük, an Anatolian tell site, which produced a rich assemblage of lithic finds. The most important components within this assemblage consist of obsidian and various types of chert. While it has been convincingly demonstrated that craft specialisation existed in the Neolithic Aegean realm for obsidian (e.g. Perlès 1992), this aspect is largely unexplored for other materials.

Therefore, this study will focus on chert economy. Neolithic economic choices and economic behaviour can be understood as social processes involving the physical actions of the procurement, processing, use, discard and distribution of raw materials as well as finished products for utilitarian needs and to create and maintain social relations. These elements of lithic resource management will be examined in the light of various degrees of specialisation in a diachronic manner with the potential to reveal socio-economic dynamics, most importantly change versus stability. For this task, an integrated analytical approach specifically designed to source chert raw materials using geochemistry and statistical data analysis coupled with quantitative technological and econometric methods is employed.

Literature

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S03.025

An intrinsic learning: lithic technology transmission in Bronze Age Southern Italy

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This contribution aims at retracing patterns of transmission of lithic expertise in Southern Italy during the entire Bronze Age. In fact, despite recent developments of the Italian research on Bronze Age lithic technology, some questions remain underrated: who produced stone tools in this period? There were specialized craftsmen? How was the knowledge related to knapping processes transmitted?

Ongoing studies on stone objects from Coppa Nevigata (Apulia, Southern Italy), a long-lived-in settlement occupied during

the entire Bronze Age, can help to answer those questions (Cazzella *et al.* 2012). At Coppa Nevigata, lithic manufacture was chiefly oriented at the production of expedient flakes; in addition, the knapping process is testified across the entire settlement, inside or near the dwelling spaces (Lucci *et al.* 2020). This demonstrates that the knowledge of lithic technology was within everyone's reach and culturally shared across the community, intrinsic in the social behaviour. Thus, is not possible to speak about apprenticeship in the strict sense: probably a transmission (intentional or not) of the knapping skills was embedded in the cultural system of the community, revealing a continuous and reiterated learning network over the entire Bronze Age. This hypothesis is substantiated by the results of a techno-morpho-functional and experimental analysis carried out on a sample of chipped stone tools from the settlement.

Finally, a comparison with the available data for coeval Southern Italian sites (Vilmercati *forthcoming*) will be provided, finding analogies and differences in the transmission of knapping skills in the diverse contexts.

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S03.026

Communities of practice and cultural traditions: looking for a scale of comparison

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In the Neolithic studies, a common and repeated observation is the fact that groups united by similarity of a ceramic style could differ by ways of chipped stone tools production. While the ceramic styles were used to define 'cultures' or 'cultural aspects', lithic industries are mostly understood now via a concept of 'community of practice'. The coherent clusters of sites defined along these two different sets of variables (that of ceramic typology and those of lithic technology) do often converge only partially with a notable degree of disagreement in space and time. Similar observations were often done in Western (Allard, Delvigne 2022), Central (Nowak 2022) and Eastern (Man'ko 2005, Telegin 1977) Europe.

The phenomenon can be interpreted in many ways and, probably, no single explanation is enough for the multiplicity of historical conditions, under which similar situations had developed. Here, we propose a concept of the scale of production as an explanatory tool for the observed phenomenon. Both lithic and ceramic industries could be organised in a variety of ways in Neolithic: from supracommunal production in the exchange network to domestic household-level production, thus reflecting the communities of practice of variable scale. The synchronous or asynchronous changes in the complexity of industries external organisation could be responsible for a visible disagreement between spatial distributions of ceramic styles and lithic technologies.

S03.027

From the *chaîne opératoire* to the social structure of early Neolithic communities: knappers versus potters from the Danubian and the Mediterranean worlds

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Our paper focuses on the social structure of early Neolithic communities, from the point of view of the identity of their knappers and potters. These activities are traditionally considered as gendered dissociated, with men knappers and women potters, without any clear actualist or archaeological reference. Ethnological data however demonstrate that it is far from being universal (e.g. Rossitto 1994) and that a patriarchal worldview could bias this construction (e.g. Gero 1991). That is why we will challenge this issue by looking into the organisation of productions among the first European farmer communities. Thanks to an integrated approach to pottery and lithic productions in two distinct study areas, i.e. Middle Belgium and southern France, we will compare for both technical sub-systems the organisation of apprenticeship (domestic *versus* specialised), the identity of the producers and their relationships.

Our method is based on the *chaîne opératoire* concept (Creswell 1976), which enables to assess the spatial segmentation of the different steps of the production. Furthermore, we can look for choices that have no technical reasons, which "sign" the identity of the producers (Gosselain 2018). Especially, the analysis of apprenticeship networks, based on transmission mechanisms of technical know-hows, is crucial to decipher the social structure of a given community of practice (Roux 2011). It enables to identify distinct socio-technical groups within a production sphere and thus to assess the segmentation of producer's groups.

Our paper addresses the social homogeneity or heterogeneity of these producers' groups according to two trajectories: - First, the integrated approach to pottery and lithic productions will tackle the segmentation of activities within a given community. Can we highlight similar or different patterns regarding both productions? How to interpret them?

- Secondly, we will compare these dynamics between the two study areas following the same chronological framework (end of VIe/beginning of Ve millennia). Can we identify similar or different patterns regarding the producer's organisation and segmentation between both chrono-cultural areas? How to interpret them? Through this integrated study of lithic and ceramic assemblages, on a broad geographical area, we will question the social organisation of the activities and highlight similarities or differences within the social structures of the first European farmers.

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S03.028

Understanding technological stability and change

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Technological traditions can last for millennia. Intergenerational cultural transmission and high-fidelity copying, given a conformist bias (a tendency to disproportionately copy the majority), have been considered to be the mechanisms maintaining these traditions and thus participating in cumulative cultural evolution. Transgressing technical traditions, i.e., changing ways of doing things and introducing new lineages of objects, raises questions at both the individual and the collective scale. But, so does the *stability* of technical traditions. In this talk, I argue that, when facing a demand for new objects, in all communities, there are experts capable of developing new adaptive strategies. However, this ability does not necessarily lead to changes at the collective scale if there is no demand for new objects. To test this hypothesis and understand the mechanisms underlying stability, we conducted field experiments with potters in five different cultural contexts. The experiments were designed to evaluate individuals' ability to cope with new challenges, i.e., new shapes of vessels. The results highlight individual adaptive behavior in the five communities. These adaptive abilities are expressed both in the strategies followed and the level of skill. Furthermore, they reveal a technological bias linking forming strategies and finished products regardless of skill level. This bias, constructed in the course of learning and combined with a social bias linking technology to social identity, explains, rather than the conformist bias, the « high fidelity copying » process and thus technological stability despite individual abilities for invention. In return, stability of technological traditions permits to trace phylogenetic links between socio-cultural groups over time and space, and, consequently, to distinguish between demic and cultural diffusion. It also underlines the importance of the evolution of demand in technological changes, whether these are the result of innovations or diffusion.

S03.029

Group and individual variability in pottery production – a case study of the LBK site Cząstków Polski XII in Mazovia, Poland

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Analyses of pottery production techniques according to the *chaîne opératoire* approach are becoming more and more popular (e. g. Cámara Manzaneda et al. 2021, further references therein) but they are still not a standard in pottery research. We present here the results of the analysis of a small and quite badly preserved LBK pottery assemblage from Cząstków Polski XII, Comm. Czosnów located in the peripheral region of the Vistula Basin where the issue of settlement permanence is not at all evident (Budziszewski, Pyzel 2022). We tested how much information can be obtained from such fragmentary data. A combination of multiple lines of evidence led to the recognition of distinct *chaînes opératoires* and even individual traits within them, indicating the occupation of the site by a single social group with multiple manufacturers sharing the same technological tradition. A comparison with data from LBK sites from other regions (e.g. Kreiter et al. 2017; Palaguta, Starkova 2021) demonstrates that despite the existence of common, general rules of pottery production within the LBK, some degree of idiosyncrasy was possible among each community of practice.

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S03.030

Organizing the pile of sherds: can the Kohonen maps cope?

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Structuring through segmentation is recognized as an important tool for the analysis of material culture, as it's potentially related to the identification of social patterns of past reality. The goal of this work was to test machine learning methods for the classification of ceramic assemblages that do not have clear boundaries between the supposed morpho-functional classes. The issue was highlighted on the materials of the Hlyboke Ozero-2 settlement in Eastern Ukraine, one of the reference sites for the study of the transition from the Late Bronze Age to the Early Iron Age in the region.

Previous studies have shown visible changes in ceramic production on the site during the transition between the stratigraphic layers II and III (in mineralogical composition of clays, in ratio and composition of ceramic types and decorative features). This transformation is seen not as an interruption but rather as a "shift" in cultural tradition caused probably by a new population inflow.

However, the lack of objective grounds for defining ceramic types is still a problem that doesn't allow to effectively quantify these observations. To solve it, the author applied a technique involving elliptic Fourier analysis to describe the outlines and Kohonen self-organizing maps (Kohonen 2001) to classify them. A Kohonen map was constructed using z-score transformed harmonic coefficients, covering 99% of the "harmonic power", followed by k-means clustering. As a result, four clusters were identified. Clusters 1, 3, 4 are considered as a reflection of certain morpho-functional standards ("types"). Though probably the most interesting observations relate to the cluster 2, a group that represents a set of vessels transitional between the three previous groups. It's not entirely clear what caused it to appear – a lack of training or some "negligence" of morpho-functional standards. Presumably, its interpretation could be related to "copying errors" arising from the transmission of knowledge and reproduction of artefacts (Cavalli-Sforza & Feldman 1981; Boyd & Richerson 1985; Roux 2003; Eerkens & Lipo 2005).

The tested technique can form the basis for organizing arrays of material with an unknown and unclear structure, for studying variations and the degree of standardisation of pottery production.

S03.031

Learning without forgetting: Early Iron Age Iberian potters between wheel and handmade techniques.

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The beginning of the Phoenician colonization of south-eastern Iberia originated important changes that transformed the pottery of Early Iron Age communities. The analytical characterisation carried out in ceramic assemblages from several autochthonous settlements in the region - Castellar de Librilla, Lorca, Torre de Sancho Manuel - reveal the adoption of the potter's kiln and the wheel from early chronologies dating back to the 8th century BC. However, the adoption of these new making strategies did not lead to a drastic replacement or abandonment of traditional practices and handmade wares. One of the distinctive aspects of the Early Iron Age potters was their ability to combine the acquisition of new technologies from the Phoenicians, mainly the double-chamber kiln and the potter's wheel, while maintaining traditional making strategies and aesthetics to manufacture handmade wares. Despite integrating these new technologies to the point of producing local wheel-thrown pottery, certain traditional ceramics continued to be produced under the same Late Bronze Age parameters, such as cooking pots, burnished table wares or post-firing painted pottery. Even in the second half of the 6th century BC, when the Phoenician colonies in the region were in decline, there was a strong increase in handmade wares, demonstrating the deep attachment of these communities to traditional pottery and LBA practices.

The aim of this contribution is to discuss the importance that innovation and tradition had in the apprenticeship and the evolution of the Early Iron Age potters of the Iberian Southeast. In a framework of colonial situation and cultural hybridization, the identification of the autochthonous wares is basic to measure the technological skills, the resistant know-hows, the survival/change of consumption patterns and the exchange networks of the period, thus re-evaluating the weight of the Phoenician presence throughout the Early Iron Age and the development of the identities of each community.

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S03.032

The sociological landscape of Martinique (French Antilles) during the Early Ceramic period: first results based on the study of pioneer waves of colonization through the analysis of ceramic technological traditions.

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The Early Ceramic period (300 BC/400 AD) in the Lesser Antilles is characterized by the migration of social groups from the South American continent (Bérard 2018; 2019) and specifically from the Orinoco Delta region (currently eastern Venezuela). In the Caribbean, Martinique has the highest concentration of known Early Ceramic sites (northeast coast of the island), these latter benefiting from a very good conservation because of the volcanic fallout related to the P2 eruption of Mount Pelée. Thus, some sites were hurriedly abandoned, offering a snapshot of daily life as well as an important potential to better define the sociological landscape of this Caribbean Island.

Understanding this process of migration from the mainland—how many continental social groups are involved and how many successive waves? —is hampered by the mobility of these social groups within the island. Indeed, these pioneer social groups practiced itinerant slash-and-burn farming, thus moving from one site to another.

In this paper, these issues of migration and mobility are approached through the ceramic chaîne opératoire, i.e., “a series of operations that transform raw material into finished product, whether it is a consumer object or a tool” (Cresswell 1976); the focus is directed to the fashioning chaîne opératoire, “a series of operations that transform the paste into a hollow volume” (Roux 2019), as well as the consumer objects, i.e. the diversity of vessels shapes. The choice of the study of technical behavior lies in the intimate link between technical traditions and social groups. On a synchronic axis, the analysis of the diversity of ceramics will allow us to understand the sociological landscape of the island. On a diachronic axis, the study of the learning and transmission of technical traditions will make it possible to highlight the continuities, discontinuities or evolution of the ways of doing things and thus to understand whether the successive migrations and the mobility correspond to the same or to different social groups.

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S03.033

First Metallurgy in Greater Poland

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The beginnings of metallurgy in the area of today's Polish lands date back to the second half of 5th millennium BC. They are related to cultural units from the Lengyel-Polgár circle (LPC). Interest in the processing of copper at the beginning of the 4th millennium BC are taking over the Funnel Beaker Culture (FBC) communities. An important determinant of the knowledge of metallurgical processes is the presence of remains at archaeological sites such as: slags, crucibles, various forms of raw material and characteristic clay objects - tubes and their fragments, interpreted as nozzles (Bourgarit 2007). A fragment of such a nozzle was discovered in 1958, during excavations at the KPL site in Kotowo, commune of Kościan state 1, province, Greater Poland. Re-analysis of Neolithic ceramics from Kotowo and obtaining 14 C dates for the KPL facility also initiated new studies of a clay nozzle (Żurkiewicz 2020). Analyzes of the subject, carried out at the Faculty of Foundry Engineering The Historical Layers Research Centre AGH University of Science and Technology in Kraków with the use of a stationary spectroscope (ED-XRF) clearly confirmed the relationship of this artifact with copper metallurgy. As a result of the analyzes, the Kotowo nozzle becomes one of the few artifacts of this type, the purpose of which has been confirmed by specialist research. Thanks to the well-recognized context, this discovery can be considered one of the oldest evidence of knowledge of metallurgy in European FCB communities and the oldest discovery of this type in Greater Poland (Gebaueretal 2021).

The presentation of the discovery from Kotowo against the background of other known clay nozzles from the LPC and the FBC allows for a number of important conclusions regarding the mutual cultural relations of these communities and the details of the implementation of early copper processing processes.

The information presented allows to quite significantly complement the current picture illustrating the spread of the gains of the new era and the related social/economic changes, often without taking into account the areas east of the Odra River.

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S03.034

Jewelry workshops made of metal (gold, copper) and other materials from Cheile Turzii (Cluj County, Romania)

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Cheile Turzii is a karst canyon with over 68 caves with traces of seasonal habitation from the Paleolithic to the Developed Middle Ages. The most interesting discoveries are related to prehistoric jewelry workshops.

Archaeological research from Peștera Ungurească/Peștera Caprelor (2003-2015) led to the identification of a jewelry workshop attributed to the Bodrogkeresztúr-Toarte pastilate/ Knobbed Handles culture, whose activity takes place between 4200-3800 cal BC. The workshop was arranged inside a building with a roof. In the workshop, a vaulted furnace and an installation for the maintenance and regulation of the fire in the furnace (with several phases of restoration/use) were identified. An anvil of larger dimensions was found, as well as other stones used in the processing of pieces of jewelry. To these are added some copper tools, a crucible, some hot air blowing tools, with tips from animal tusks, as well as microtools from different raw materials. 88 gold pieces were discovered (66 beads in different stages of processing; 20 sheets; 2 decorated plaques), along with 22 bone beads and approx. 70 from various rocks and shells. Macroscopic photographs provide information on the technologies used to obtain and decorate jewelry (beating, bending, cold welding, finishing, *au repoussé* technique).

The jewelry workshop at Peștera Ungureasca, with so many gold pieces, is unique not only in the Romanian area, but also in the European and Anatolian ones for this cultural level (Late Copper Age). Comparing the pieces discovered at the Peștera Ungurească/Hungarian Cave with those from the Moigrad hoard, we conclude that the craftsmen and their apprentices from Cheile Turzii were part of the same school of craftsmen as those from Moigrad, Ercsi and others from the Carpathian basin.

The second jewelry workshop, discovered at Peștera Binder (2016-2017) presents two stages, one related to Bodrogkeresztúr-Toarte pastilate/ Knobbed Handles, and the other to the Coțofeni I culture. The inventory of the workshop consists only of beads made from different raw materials (jasper 53; black rocks 12; bone 10; shell 6; limestone 3; 6, copper). A few copper artifacts, as well as other raw materials, were also discovered. The pieces were processed in the vicinity of hearths. The lack of gold pieces leads to the conclusion that the secret of gold processing was well kept by the craftsmen of the Peștera Ungurească.

S03.035

Transmission patterns in the production of Bronze Age solid-hilted swords

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Bronze Age swords with a bronze hilt were a highly specialised production. Casting hilts and blades and fixing them to each other require lots of precision and very specific skills. We hardly know anything about the production organisation as moulds are extremely rare, preventing us from locating workshops. However, studying swords themselves using X-ray imaging techniques allows us to reconstruct a part of the *chaîne opératoire* and gain insight into some aspects of the production processes (Dumont et al. 2020). We identify three periods in the production of solid-hilted swords at the European scale:

1. Experimental phase (1800-1450 BC): small-scaled productions by multiple workshops experimenting various ways of making swords.
2. "Monopoly" phase (1450-900 BC): swords are produced in a very standardised way in a few very specialised workshops.
3. Break phase (900-800 BC): major shift in the aspect of the swords coming along with the development of various technological traditions connected to many versatile production units.

The "monopoly" phase corresponds to the outbreak of a well-defined production process in the middle of the 15th century BC thanks to the experimentations of the first sword makers. During more than five centuries, almost all solid-hilted swords were made the exact same way: hollow wax-cast hilts were fixed to the blades by locking both parts together before adding two rivets (Hundt 1965; Ankner 1977; Dumont 2021). These techniques were reproduced by many generations of craftsmen without any significant changes during more than five centuries, suggesting well-established transmission and training systems. On the other hand, efforts were probably made to prevent widespread transmission to a large community of craftsmen, as imitations prove the techniques were not known in every production groups.

At the very end of the Bronze Age (9th century BC), structural changes occur in the production of solid-hilted swords. Besides a deep stylistic shift, various production techniques are then identified. At this time, sword production seems to have opened to several less specialised and more versatile workshops, with significantly different production qualities and the development of new methods such as the over-casting technique (Drescher 1958). An interruption of knowledge transmission could be involved in the major variations in metalwork productions at the end of the period.

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S03.036

Revival of old osseous collections: latest evidence of Final Palaeolithic osseous implements in northwestern Lithuania

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Evidence of Final Palaeolithic osseous implements in the territory of Lithuania are scarce. The first one was obtained and directly dated in 2014, supporting the spread of eponymous reindeer antler axes technology in northeastern Europe. However, for recent years this was the only such example in the territory of Lithuania. Many of stray finds and implements from settlement layers, however, were typologically ascribed to the various chronological Stone Age periods, without their direct dating. This is still a research issue as such lack of dating does not allow to ascribe particular osseous technologies to a certain chronological phases.

Northwestern Lithuania is characterized by a morainic landscape and wetlands. In the 20th century many of them were partly or completely drained, leaving only minor traces of their existence. During draining works osseous implements collections were gathered by local amateur archaeologist or random persons and transferred to the local museums. They were further included in the eastern Baltic Stone Age studies, however, their further studies by modern methods were not conducted. One of such stray finds collections were collected during Varduva river draining in Šarnelė village in northwestern Lithuania between 1940 and 1965. The collection consists only of six finds of different tool types, representing dagger, axes, and barbed points shapes. Only in 2016 their direct dating by the AMS ¹⁴C was initiated, revealing the second organic Final Palaeolithic implement in the territory of Lithuania. The organic finds collection from Šarnelė demonstrated further potential in osseous tools studies, therefore during 2021–2022 most of the finds from this collection were sampled for AMS ¹⁴C and ZooMS analysis. The results gave another tool dated to the Younger Dryas, whereas species identification (ZooMS) results indicate that not all Lateglacial organic implements in the eastern Baltic may have been produced from reindeer skeletal remains, and this would be a first case featuring other mammal species in Lithuanian Final Palaeolithic studies. With this data and methods we also refer to people adaptations to diverse raw materials and changes in tool making techniques that might had social influences to the Final Palaeolithic societies in the eastern part of the Baltic.

S03.037

Directly dated Late Upper and Final Palaeolithic osseous artefacts from collections in the Central European low mountain ranges. New data – new questions

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Central Europe is relatively rich in osseous artefacts, especially projectile points, from cave sites in the low mountain ranges of Germany, the Czech Republic and Poland. Although they are mostly palimpsests derived from old excavations, it is agreed to assign most of these finds to the Late Upper Palaeolithic techno-complex of the Magdalenian, as they show typo-technological similarities with well-dated Western European units. As part of a project on the development of the Late Upper Palaeolithic in eastern Central Europe, different artefacts from the cave sites of Bärenkeller (D), Balcarka and Pekárna (both CZ) were sampled for ¹⁴C dating and ZooMS. On the one hand, the results confirm the expectations for the Magdalenian, but on the other hand they provide evidence that the Final Palaeolithic osseous toolkits were more diverse and possibly more extensive than previously assumed. The question now arises to what extent Late Upper Palaeolithic traditions were continued and how the osseous projectile technology complemented the lithic one.

S03.038

Synergy of Stone Age technologies: new research on slotted bone points from Latvia

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Slotted bone points constitute a significant part of the rich and diverse corpus of Stone Age bone and antler artefacts from Latvia. They have been found at settlement sites (e.g., Zvejnieki II) and also as stray finds (Lake Lubāns region). Slotted bone artefacts include a variety of forms, functionally interpreted as arrowheads, spearheads, daggers, harpoons, fish-spears and leisters. The points are plain or barbed, with dense, closely spaced barbs, or else larger and with more sparsely arranged barbs. The slots can be unilateral or bilateral, running either the whole length of the tool or extending only along parts of the margins of the artefact.

At the Zvejnieki II Mesolithic settlement site all of the above-mentioned artefact types have been found (about 40 in number), but only some are intact. By contrast, the slotted bone point collection (39 in number) from Lake Lubāns consists mainly of complete artefacts. Many of the slotted bone points bear manufacturing traces. Remains of pitch are preserved in deeply made grooves of bone points. At Zvejnieki II settlement site numerous flint inserts were also found, made from conical cores using pressure technology, which indicates serial production of this kind of object. From Zvejnieki II as well as in the Lake Lubāns collection there are points still with flint inserts in the grooves. At Zvejnieki II, slotted bone points are represented in all habitation phases. The site spans the whole of the Mesolithic in Latvia (9000–5400 cal. BC), and two slotted bone points from Zvejnieki II have been radiocarbon-dated to the earliest period of habitation.

This paper presents a new interdisciplinary study on slotted bone points found in present-day Latvia. Analysis concentrates on technological and use-wear traces on bone and flint, resinous substances and the chronology of these artefacts. Further, this study seeks to discuss the craftsmanship behind these technologies and the possibility of investigating who the producers of these artefacts were. This study, part of the Latvian Council of Science project “Skills in synergy, crafts in context: an integrated study of eastern Baltic Stone Age technologies” (Izp-2021/1-0119), adds new knowledge on composite tool technology in north-eastern Europe.

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S4: Museums and university collections in the field of tension of current social discourses

Museum institutions are facing many and varied challenges in the 21st century. They cover not only the struggle for a new and contemporary definition of a museum (ICOM) but also the challenges of the Covid-19 pandemic. Furthermore, these institutions want to be places of experience ('Erlebnisort') which compete with other leisure activities, that meet the entertainment desires of an increasingly diverse public audience with changing demands. Last but not least, museum institutions intend to be the place of socially relevant topics and debates.

The related general questions are: How does the museum behave within this field? What is the responsibility of museums and university collections, which are places of mediation of past cultures but also resources for research and teaching? Especially considering that in today's times we face many social challenges such as climate change, sustainability, social inequality, war, reclaiming archaeological objects to their countries of origin, and fake news.

More specifically, we ask our session contributors to face the following questions: How can we make past crises and social upheavals visible to contemporary audiences in a museum? How can we display social challenges, then and now, in a museum context in a strong way? What are their strengths and weaknesses in implementing them? What innovations and new ways of communication are necessary for this?

This session is about the exchange between researchers and museum employees. Therefore, we are looking forward to contributions from museum employees who are willing to talk about their wishes for the complex museum of the present and future, and we are equally addressing researchers who deal with social and environmental challenges of the past and want to link them to the present and communicate them in museums.

S04.040

Looking back at 2022 – challenges completed?

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This contribution aims to address in particular the challenges from 2022 for the museum landscape in Germany. Since 2020, the Covid-19 pandemic has had a firm grip on museum activities. The year 2020 already began under these conditions. The start of the Russian invasion of Ukraine on February 24th, 2022, once again showed the dangers for cultural assets during war activities on the one hand and the effects of a war on long-standing cooperation between countries on the other hand. The energy crisis triggered by this war will also hardly pass museums by without leaving a trace. To these highly important issues must be added the protest actions of climate activists, which are expressed through repeated attacks on works of art in museums. It is only logical that museums increase their security standards to protect objects of cultural and historical value. Also because of some extremely alarming heists in museums, such as the recent one in the Kelten Römer Museum Manching. Are the museums and their staff up to all these challenges? How do they deal with them? How do larger and smaller institutions act within such challenges? In addition, there are the newly formulated requirements of the ICOM definition. The aim of this article is to get an overview of the museum landscape in 2022 during all these challenges.

S04.041

Old Museums in New Times

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Coins and Medals, Museum August Kestner, Hannover, Germany

The discussions surrounding the recently opened Humboldt Forum in Berlin and its exhibits have once again raised questions about the origins of museum objects and, above all, brought the problems surrounding their whereabouts in the future to the attention of a broad public. The focus was on cultural objects from a colonial context. Will a large proportion of these have to leave Germany?

Museums with collections on European cultural history are not unaffected by these discussions. For museums with graeco-roman and art-historical objects from the European region, too, urgent questions about the provenance of their holdings are becoming increasingly clear. A "provenancial turn" (C. Zuschlag, 2019) is becoming apparent. Protection of cultural property, today and retrospectively, as well as the possible restitution of art unlawfully seized under National Socialism are, among others, two predominant objectives in the research of collection objects. Does the consistent pursuit of these goals threaten to bleed museums dry? These goals sometimes contradict each other. So what should be done?

Previous restitutions and advanced provenance research make clear that fears of loss are misplaced. The Museum August Kestner in Hanover can serve as an example. It is a cultural history museum that owns an Egyptian collection, a collection of graeco-roman art, a collection of applied arts, and a large coin collection. Almost all of the holdings come from civic private ownership. For more than ten years, the museum has been intensively engaged in provenance and collection research in a broad sense and is one of the first museums in this respect, with the exception of painting collections. As a first résumé, it is clear that transparency with regard to museum history is rather enriching and opens up new

perspectives, for example object biographies. The diachronic view on museum objects opens up new horizons for the visitors: For example, traces of history that can be followed over more than 2000 years on the basis of one object - a small coin. This enrichment is offset by only minor losses due to restitution. There should be no fear of the museums bleeding to death; on the contrary, there is hope for a recovery spurt.

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S04.042

MUSEUMS, HERITAGE AND HATE SPEECH IN ICELANDSpeculations about white supremacy, Viking imagery, museums, and care in a changing world

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How can museums imagine the responsibilities they have towards their communities, and societies in general, when the objects and histories they engage with have become objects of affection and utility for right-wing populist movements and their grounding? In this research, we are concerned with the relationships between museums, their objects and discourses on Viking age heritage, and hate speech. Hate speech, along with populism, has become increasingly conspicuous. What once was relegated to the dark corners of unauthorized discourse has seeped into public platforms and is increasingly mobilized as normative attitudes, even stabilizing factors, in the chaos of a globalized world. While populism refers to the deliberate infiltration of right-wing agendas into popular discourse, hate speech is abusive or threatening expressions put forward in public spaces and aimed at minority groups. At the root lie ideologies and agendas rationalized by a shared past and albeit imagined, this past seeks grounding in Viking heritage and celebrates Nordic medieval imageries as symbols of a common identity. In a space that may seem unrelated at first, many Nordic museums include the same imageries and narratives that support radical right-wing identities and ideologies that remain enmeshed in contemporary narratives as tokens for Scandinavian identity and tourist attractions (Aronsson, 2016; Gradén, 2013). Our study seeks grounding in the interdisciplinary fields of museum studies, anthropology, police science, and field experience in the Icelandic police division of hate crime. It comparatively approaches two sites: the material-discursive nature of The National Museum of Iceland's main exhibition: „Making of a Nation“, and current discourses circulating in the underbelly of populist arenas, specifically the Icelandic white supremacist webpage “Norðurvígi”. In this study, we unpack these entanglements and consider how covert and complex relationships may present an opportunity for museums to turn to ethics (Marsetine, 2011) as inextricably ingrained in their worldings (Barad, 2010). We view these relationships through the lens of care (de la Bellacasa, 2017) as the readiness to sit with the tensions created by these complex relationships and the uncomfortable discussions that must be had. So, this study asks: are museums prepared to trace silent voices while contemplating all possible possibilities? How else is the world a sustainable and livable place?

S04.043

Acquisitions, Cultural Heritage Protection and the Art Market in Classical Archaeological University Collections. A Statistical Analysis.

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Questions of cultural heritage protection, looting and the trade in historical objects have been widely discussed in the last years and while museums have come under a great deal of scrutiny, university collections have barely been considered in this context. To gain insight into these issues concerning university collections, Daniel Graepler conducted a survey among universities with classical archaeological collections in Germany, Austria, and Switzerland in 2003 in which the universities were asked about their acquisition behaviour, provenance research, and general opinions on cultural heritage protection (Graepler 2004). In light of the increased interest in cultural heritage, looting, and antiquities trafficking since 2003, I repeated the survey in 2021 to analyse changes in the behaviours and opinions (upcoming: Krienen 2022). The results demonstrate significant changes in attitudes around cultural heritage protection, resulting in tangible adjustments of collection policies and acquisition behaviours. The surveys also made it possible to assess necessary changes for the universities to be able to use their collections more, engage with questions of cultural heritage protection, and conduct provenance research.

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S04.044

University Heritage – a comparative study of the Una Europa alliance universities

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This paper stems from research undertaken during my time as a research assistant for Una Europa's Parallel Heritage of European Universities (PHOENIX) program, which explored the heritage of the eight history universities which form the Una Europa alliance: Alma Mater Studiorum University of Bologna, Paris 1 Panthéon-Sorbonne University, the Jagiellonian University in Krakow, the Complutense University of Madrid, KU Leuven, the University of Edinburgh, the University of Helsinki and the Freie University Berlin. One of the central aims of the project was to identify what constituted the heritage of these institutions, according to six main categories: history of the university, built heritage, museums and collections, intangible heritage, the management of university collections, and digital heritage. The comparison between these results then allowed us to ask how these eight major European institutions with very diverse histories resemble each other or diverge when it comes to assembling, organizing, and presenting their heritage institutions, museums, and collections, and what we can learn from them going forward.

Working from the conclusions of that research, in this paper I propose to present some of its results, with a specific focus on the question of museums and collections. By taking a comparative approach, I will explore what constitutes the material heritage of each institution and how it developed over time. In doing so, this study sheds light on how universities build their collections, how past crisis and upheavals affected them, as well as how the history of each institution and its contexts helps shape how they are presented today.

One of the most remarkable results to emerge from this study is the fact that in the creation of their built heritage, their collections and even their intangible heritage, all eight universities follow broadly similar patterns. As a result, the types of collections, buildings, and traditions they share are also broadly quite similar. This can be attributed to the fact that throughout their histories, and even in periods of isolation and decline, a certain degree of communication, mobility and sharing of ideas has always existed among all European universities. This created broad trends that affected all the participating institutions, though they each adapted to these in their own way and according to the circumstances of their time and place.

S04.045

Staging the Past. Responsibilities of Museums today

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Museums are seen as educational institutions that are supposed to preserve and present history. It is often underestimated that through the selection of what is exhibited and how it is presented, they transmit history, art or cultures in very specific perspectives. Through the presentation of their objects - selection, compilation and contextualisation - museums consciously and unconsciously shape knowledge and perception of society. This is precisely where the strength of collections lies today. They can show the variability of historiography, historical interpretations and ideas of society with the help of their own history and current displays.

At the same time, museums want to and should be places where people enjoy being. How can the balancing act between a place of leisure entertainment and critical discourse be mastered? So how can the interpretation of history be made transparent? One challenge is to stimulate debates, to shape them, to remain open to suggestions from outside and to respond flexibly to social needs.

The most popular keywords here are currently participation and change of perspective. Both are interdependent. The first step towards participation is to allow visitors to cast their perspectives not only on objects, but also on the museum's treatment of the objects. At this moment, the view from the outside opens up as a questioning view of the museum work and thus has a participatory and reciprocal effect on the museum.

Many museums and collections are already taking on the responsibility of visualizing the making of history. Art museums strive to do justice to the changed educative interest of the majority of the population, world museums question their own existence and involve actors of origin. So what can archaeological collections learn from others that have already been forced into the process of shaping discourse a little earlier? It would now be up to archaeological collections to question their own traditions within the history of European education and to demonstrate their contribution to Western normative processes.

From the point of view of theoretical and practical cultural education, this contribution would like to raise questions and suggest ideas from art education for historical cultural education.

S04.046

Local residents dig into their past- community archaeology in a village in Schleswig Holstein

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Archaeological participation by members of the public from beginning to end is rare in Germany although evidence from other countries is showing vast benefits of community archaeology projects to both archaeology and participants (Lewis 2020). The Cluster of Excellence ROOTS, in participation with the University of Lincoln (UK), initiated such a project in Schenefeld, Schleswig-Holstein. The village was selected due to previous excavations which revealed two 9th-century "Grubenhäuser" (Tummscheit 2008), with a similar early date for the local church. These findings suggested that Schenefeld might be one of the oldest continuously occupied rural settlements in Schleswig-Holstein. Hence, the project aimed at finding more evidence to test this hypothesis. A public meeting introduced the idea to the residents and invited them to take part in the project and excavate in their garden or public areas. The response was overwhelmingly positive and in May and June 2022 70 members of the public spent two days excavating 31 1m² 'test pits'. They were supported by archaeologists from all of the major archaeological departments of Schleswig-Holstein and recovered more than 2,000 finds. The archaeological finds generated interesting new insights and questions about the village's historic development. Human presence in the later first millennium AD was confirmed but a surprising shortage of pottery from the first half of the second millennium was revealed. To acquire information on the participants' interest in archaeology, their wellbeing and attitude towards their village community a pre-post survey was carried out. Feedback forms show that the project had a positive impact on the participants. They appreciated the opportunity to learn something new about the history of their village and thus had a beneficial effect on their historic identity. These positive results illustrate the potential of participatory community archaeology projects for Germany.

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S04.047

How to display the German Peasants' War? An emotional approach

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In 1524–25, in large parts of southern and middle Germany, peasants rose up against their landlords and the clergy. The peasants asked for freedom, for their communal rights and for political participation. After months of unsuccessful negotiations, the peasants took up their arms and plundered monasteries and noble estates. The aristocracy's fierce reaction fed into a terrible spiral of violence which led to the death of roughly 100,000 peasants. These events became known as 'The German Peasants' War'. The pamphlets of the peasants have been the first printed claims of human rights ever, their movement may have been the first democratic movement in Europe of any importance. In view of the 500th anniversary of the events in 2024–25, the Landesmuseum Württemberg in Stuttgart (LMW) is preparing a 'state-exhibition' with the working title '1525 – Umbruch und Freiheit'.

But how can we provide an appropriate understanding of the complicated sociopolitical and cultural background of the war: the premodern agrarian market, the open questions of demography, the different forms of serfdom, semi-freedom and freedom, or the making of the premodern state? And how can we make tangible the dynamics of the conflict, and, finally, how can we explain the common ground of two 'modern' societies divided by a time gap of 500 years – taking into account that museums mostly have to deal with a very limited pre-involvement of their visitors, and that they have to fulfill the requirements of an ever increasing leisure market, too.

Fortunately, it's not about learning – it's about understanding, and understanding has a lot to do with emotions! This paper explores, thus, the possibilities of bringing together two current approaches in the field of 'emotions' – the first known to scholars of the historical sciences as 'emotional history', the second known mainly to museum professionals under the label of 'visitor experience' or similar labels. While the former investigates the history of feelings, the existence of 'emotional communities' and the role of emotions in social conflicts, the second, museological approach explores the ways in which museums can create emotions. The argument will be discussed on the basis of the main elements of the exhibition planned by the LMW – a 'storytelling' by some of the protagonists of the Peasants' War – and will include a discussion of the challenges such an approach entails in exhibition practice.

S04.048

Representation matters: On diversifying reconstructed images of the past in current museum

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In August 2022, the International Council of Museums (ICOM), published their new definition of a museum: "...Open to the public, accessible and inclusive, museums foster diversity and sustainability..." (<http://icom.museum>, revisited at the 29.10.2022) With this statement, diversity and inclusiveness were defined as major characteristics for museums and institutions of knowledge transfer. As archaeologists and science communicators we must ask if we achieve those points regarding the pictures we create of past societies.

The impact of aDNA research has changed the investigation of past migration, diseases and our knowledge of the physical appearance of past individuals and the makeup of past societies. Museums and institutions producing visual representations of such societies face challenges on how to present them to their audiences, and how to deal with backlash, such as accusations of "faking" results and "wokeism."

We will discuss many issues, such as the use of newer, more diverse images that have replaced older ones, and how academics and the wider public reacted to them, such as the example of the so-called Cheddar Man from 2018. (<http://nhm.ac.uk>, revisited 29.10.2022). What are the lessons and challenges there? The costs of re-evaluation of images and reconstructions have to be taken into account, as more museums struggle with funding. Individual case studies give us information of how a person looked like, but can be dismissed if they do not fit the status quo. Who decides if reconstructions are redone and on what basis? Does the way museums and institutions display past individuals influence the broader public, and is there a way to measure such impact?

S04.049

History of the one collection from the Cucuteni-Trypillia Site in Central Ukraine

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Key-Words: Precucuteni-Cucuteni-Trypillia, Archival Documents, Museum collection, Southern Buh Area, Central Ukraine. The Sabatynivka I is the Cucuteni A -Tripillia B1 site in Central Ukraine. It is known for its distinct collection, held in different institutions and collected during complex historical events.

Detailed study of the settlement began with excavations in 1932 by Pervomaysk Local History Museum employees as part of archaeological rescue works in the future construction of the Boh power station. The collection was kept in the Pervomaysk museum. It was considered lost during WWII.

The following year, 1933, the research was suspended due to the expedition's closure, followed by repressions against its leaders during the Great Terror. The head of the expedition, F. Kozubovsky, was arrested in 1936, and in September 1938, he was shot (Tovkailo 2018). In February 1938, T.V. Movchanivskyi was arrested. The researcher was shot in December of the same year. The fate of P. Kharlampovych is unknown after 1933 (Yanenko 2013, 644).

Works continued from 1938-1939 by the Odesa State Historical Museum. The materials of these excavations were transferred to the Odesa Archaeological Museum (more than 3,000 items).

Based on the results of these excavations, two articles were prepared for the book in honor of the 100th anniversary of the scientific work of the Odesa Archaeological Museum. Due to the evacuation of the printing house in 1941 at the beginning of the war, the edition was not printed.

Works continued from 1947-1948 after the war. The materials are held in the funds of the Institute of Archeology of the NAS of Ukraine (more than 700 items). Part of the collection is in the exhibition of the Archaeological Museum at this institution.

Despite the complex history of the settlement study, it is still part of many scientific works today. During the last decades, Ukrainian archaeologists have been processing materials from this collection and continuing archaeological research on the settlement and Buh area. One of the essential types of work is the publication of previously unpublished works because of WWII.

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P01.24

Exhibition: Discovering the past. Female Archaeologists in Schleswig-Holstein

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In order to make female role models more visible, the achievements and life paths of female archaeologists from Schleswig-Holstein in the 19th and early 20th centuries are brought into focus in this mobile exhibition. With the 6 fascinating portraits of female archaeologists, an attempt is made to resolve the imbalance between perception and actual achievements of female scientists.

The mobile exhibition presents role models for female career paths from the generations of the first female scientists. The persistent silence on the achievements of female archaeologists in the 19th and early 20th centuries and the simultaneous focus on a few exceptions such as the Kiel museum director Prof. Dr. h.c. Johanna Mestorf is thus further broken up. The following women are presented:

- Prof. Dr. h.c. Johanna Mestorf (1828-1909), autodidact, museum director in Kiel.
- Käte Rieken, née von Preen (1865-1917), autodidact, archaeological heritage volunteer in Schleswig-Holstein and head of collection in Cottbus.
- Dr. Gertrud Dorka (1893-1976), doctorate CAU, museum director in Berlin.
- Dr. Hertha Sauer (1896-1975), first student of classics in CAU Kiel, doctorate Leipzig University, lecturer at CAU.
- Dr. Gisela Asmus (1905-?), doctorate CAU, anthropologist at the University of Cologne.
- Dr. Johanna Brandt, née Peters (1922-1996), PhD CAU, archaeologist in the Rhineland, founder of the museum in Preetz.

The focus is on the women's achievements and successes as well as the resistance that led to adaptation, detours and breaks in their biographies. An introductory panel places the biographies in the history of women's education and in the changing social conditions for women in science from the German Empire to the Federal Republic.

S5+ 15: Waterscape Dynamics - Chances and Challenges in Human-Water Interactions

From the Stone Age until today, wetlands have exercised a special attraction on humans who made them their living spaces. In this session we understand “waterscapes” as environments that are used by humans and that are strongly influenced by water and are located at the transition between dry land and open water.

There is a great diversity of waterbodies along which waterscapes can develop: bogs, rivers, lakes, and coasts as well as deltas or lagoons, all with their respective ecologies. Their attraction lies in the resource diversity as well as in the character as transition areas between different environmental spheres. Furthermore, wetlands are highly dynamic systems with hydrological changes often having profound impacts on local resource availability and suitability for land use. Human practices within waterscapes are often complex and integrated into specific forms of perception and engagement: from different settlement and habitation types to infrastructural nodes and mobility networks as well as their related materiality.

Moreover, wetland environments have often favoured excellent preservation and thus the discovery of exceptional artefacts (e.g. wood, bone, or aDNA) as well as detailed palaeoenvironmental data. Consequently, they are of primary importance for understanding the relationships between humans and their environment. Yet, increasing temperatures and aridity threaten the balance of wetlands and their ability to preserve organic material. Therefore, heritage management of these sites becomes a public issue.

In this session, we would like to address the following main-topics relating to waterscapes:

- How did humans organise living at the waterfront and what are the characteristics of these sites?
- What were the different cultural, economic, and socio-political approaches in dealing with potential challenges and opportunities related to waterscapes dynamics?
- In what ways and on which temporal scale did waterscapes change? What factors and/or drivers are responsible for these changes? Were they local, regional or global phenomena?
- How can we spread the significance of wetland archaeology for our understanding of the past to the public?

We therefore invite contributions that address human-environmental interactions in wetland environments. Talks highlighting multi-proxy approaches and/or using an environmental-historical perspective are particularly welcome. While mainly focusing on the European Stone Age, the session is open to contributions from all regions and all prehistoric time periods.

S05+15.052

Archaeozoological studies on *Rangifer tarandus* in the Ahrensburgian Tunnel Valley

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The archaeological sites of the Ahrensburgian Tunnel Valley provide a wide range of opportunities to explore the late Upper Paleolithic. Due to bright preservation conditions, especially the bone material from the excavation sites Meiendorf and Stellmoor is well preserved and suitable for further research. Both sites are located in an area which was a wooded tundra interspersed with lakes and ponds and a repeatedly used place for reindeer hunters. The special circumstances in this wetland area provided an appropriate place for the hunters to benefit from their subsistence strategies concerning hunting strategies and using their knowledge about reindeer migration (cf. Weinstock 2000; Grønnow 1985). Furthermore, the bone material from reindeer allows extended osteometric research concerning sex-ratios and hunting strategies in this area (cf. Weinstock 2002).

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S05+15.053

Did they come for the lake? Late Palaeolithic settlement patterns in Lieth Moor, dist. Pinneberg/ Germany and beyond

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During the Last Glacial Maximum the Fenno-Scandinavian ice sheet covered large parts of Denmark and the northern German state of Schleswig-Holstein. When these retreated northwards, periglacial landscapes remained in which water-dominated environments developed. Deglaciation processes and impact of climate change such as soil creep due to melting permafrost, the deposition of coversands, and / or the development of the Baltic Sea still influenced these landscapes, when Late Palaeolithic hunter-gatherer groups first expanded into this area around the beginning of the Lateglacial Interstadial (GI-1e, c. 12,700 years BCE).

This first pioneering phase left only a limited number of reliable sites in Schleswig-Holstein and Denmark (Grimm et al. 2021). In the Lieth Moor area we could not identify evidence of this expansion. Perhaps, the traditional expansion route just passed by this area. Yet, the following occupation phase, that is associated with the *Federmesser-Gruppen*, can be identified in this area from a rather early date on (GI-1d/c, c. 12,000 years BCE). Some sites in this area were attributed to the Ahrensburgian and, hence, to the last Palaeolithic occupation phase in northern Germany (GS-1, beginning c. 10,700 years BCE). How continuous the settlement was during these phases is part of our ongoing research. Equally, we have been working on the relation of the campsites to a possible palaeolake in this area. How did this palaeolake develop? Has it been a lake or was this waterscape rather an area with several smaller ponds? Details about approaching these questions will be presented in a poster by Detjens et al. at this conference.

The suggested, general relation to a waterscape is comparable to other areas of Late Palaeolithic occupation in Schleswig-Holstein. However, the development of the different waterscapes and the potential adaptation of human settlement has rarely been looked at in detail for the Late Palaeolithic. Therefore, we will present here a comparison of the detailed knowledge we gathered in the Lieth Moor area so far with general patterns that we identified in the Late Palaeolithic occupation of Schleswig-Holstein (Hamer et al. 2019). We approach the question whether the waterscape environments in these northern areas represented a specific pull factor for Late Palaeolithic groups.

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S05+15.054

The Last In Mire – Opportunities and challenges of wetland archaeology in Northern Fennoscandia

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The unique datasources deposited in wetlands, such as mires, lakes, rivers, and alluvium, offer us rare opportunities to explore a diverse range of cultural and natural processes, which are usually unattainable on archaeological dryland sites. Thanks to the moist, anoxic conditions of the wetlands, organic materials are often well preserved, and the sites contain a wealth of research materials to study human lifeways, environmental conditions, and taphonomy. Although extensive peatland and submerged landscapes in northern Fennoscandia would offer significant opportunities for various wetland and underwater archaeological approaches, the full use of their well-preserved datasources is still pending. In the Nordic countries, research has focused chiefly – and for a much longer time – on southern Scandinavian materials. In contrast, the north has stayed in the background, where the archaeological knowledge is still primarily built on durable archaeological materials and charred organic remains recovered from acidic and microorganism-rich podzols on dryland sites. Through exploratory research initiatives and fieldwork during the last two decades, the picture has gradually begun to change also in the north. In my talk, I will review the current trends and challenges of wetland archaeology in the land of mires – Finland, and illustrate the situation with sites situated in paludified and alluvial landscapes. Thanks to exceptional preservation conditions, new research and fieldwork on fisheries and settlement sites used by the Late Mesolithic and Neolithic hunter-fisher-gatherers (c. 6000–2000 calBCE) have enriched our understanding of their lifeways, material culture record, modes of subsistence, and even ritual behaviour. These studies also highlight how little is still known about the archaeological heritage of northern wetlands and how exceptional and versatile materials they provide us. Strikingly, these archaeological treasure troves are already deteriorating because of the vulnerability of wetlands, which are adversely affected by drainage, acidification and climate change. The degradation and loss of knowledge across Europe represent a true crisis for archaeological science, and there is a pressing need to act now before vital information is lost entirely.

S05+15.055

Diversity and Transformation of Mesolithic Life on the shores of Ancient Lake Duvensee

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Since the discovery of the first Mesolithic sites in 1923, Duvensee peat bog in south-eastern Schleswig-Holstein, Germany,

has been for 100 years one of the most important locations for the study of early Holocene Mesolithic hunter-gatherer groups in northern Europe. The research of prehistoric sites in the Duvensee peat bog is resumed since 2010 in an interdisciplinary framework conducted by the Centre for Baltic and Scandinavian Archaeology at the Schleswig-Holstein State Museums Foundation and currently part of the Collaborative Research Centre SFB-1266 “Scales of Transformation” funded by the German Research Foundation.

Today at least 26 different camps of Stone Age hunter-gatherer groups are recorded at the banks and on former islands of the ancient Lake Duvensee. While the duration of each camp was obviously very limited in time, the full extent of the Mesolithic occupation at Duvensee spans a few millennia and encompasses notable landscape transformations. Radiocarbon dating sets the establishment of the first known Mesolithic camps within the Preboreal, whereas the youngest Mesolithic occupation is dated to the early Atlantic period. Further sites are belonging to the Early Neolithic Funnelbeaker or to the Late Neolithic Single Grave culture, i.e. to the first half of the Subboreal period.

The archaeological sites provide a vivid picture of Early Mesolithic life. Bark mats and other organic finds have been preserved, including evidence of the extensive use of hazelnuts. In the past, the well-preserved hazelnut roasting hearths on several of the sites had led to the view that the ancient Lake Duvensee was a region mainly used for gathering plant food in autumn, especially hazelnuts. During the excavations of the last few years, hunting and fishing activities could be proven to a much greater extent on the newly investigated sites. Therefore, more diversified and varied use of the ancient Lake Duvensee can now be assumed than previously known.

S05+15.056

Adaptations to wetland dynamics: new evidence from palaeoenvironmental reconstructions in context of a Neolithic wooden bog trackway in North-Western Germany

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Prehistoric wooden trackways are a well-documented phenomenon in Europe, usually crossing wetlands, peatlands and other difficult terrain. Especially in the area of north-western Germany with its widespread raised bogs the recovery of trackways during peat extraction led to a special research interest since the 19th century. In this context also the Neolithic trackway PR VII near Diepholz, Lower Saxony, was first recognised in 1893 and described by H. Prejawa. In 1984 a 100-meter long section was excavated by the H. Hajen (National Museum for Nature and Human, Oldenburg) and relating palynological studies were carried out by J. Meurers-Balke from the University of Cologne. In 2021 new investigations were carried out by the Collaborative Research Centre 1266 at the University of Kiel in collaboration with the Lower Saxony State Service for Cultural Heritage. The small scaled excavations (3x3m) on an undisturbed section of the trackway allowed sampling for additional chronological and paleoecological analyses. Beside high precision dating of the wooden trackway, using radiocarbon wiggle matching, sedimentological and macro-fossil analyses were carried. The results not only allowed relating the trackway construction in the mid-25th century to distinct changes in the local hydrology and environment – increasing wetness and the local beginning of raised peat bog formation – but also provided evidence for an older activity phase which was associated with a shift to drier conditions. This suggests a longer than originally assumed local human activity history under varying climatic conditions and provides insights in human strategies to adapt to wetland dynamics.

S05+15.057

Six feet under – the sunken neolithic landscape of the Ahlen-Falkenberger Moor

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Due to progressive cultivation and the climate-induced reduction of the bog, megalithic tombs have been appearing repeatedly in the Ahlen-Falkenberger Moor in the Elbe-Weser triangle in north-western Germany for several decades. The region itself has been in the focus of archaeological and palaeoecological research since the 1970s, but so far these have almost exclusively been focused on the Pleistocene sandy soils (Geest). Since 2019, the Lower Saxony Institute for Historical Coastal Research in Wilhelmshaven has been intensively investigating the large wetland areas between the Geest islands of Flögel and Wanna. With the help of archaeological, geophysical, geological and palaeobotanical investigations, it was possible on the one hand to discover unknown bog covered sites and partially excavate them, but also to examine the landscape changes in more detail.

Already after the last ice age, the sea level began to rise and bogs formed especially at the land-sea transition zone. With the transition from the Mesolithic to the Neolithic, the expansion of the bogs accelerated and marine conditions turned valleys within the study area into small tidal basins. Within centuries the continuously growing bog pushed the sea back again and covered the Neolithic remains like tombs and settlements. Thus, sites were preserved for thousands of years and could now be studied in a relatively undisturbed state. At the same time, it was possible to determine a shifting landscape

use in the context of landscape changes in the Ahlen-Falkenberger Moor microregion.

The talk will give an overview of the methodological approaches and the results of the project “Preserved in the bog - relics of prehistoric settlement landscapes in the Elbe-Weser triangle”.

S05+15.058

The search for Stone Age soil archives - projects, chances and challenges

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Since the last ice age, today's Wadden Sea and coastal marshes have passed through an evolution from terrestrial to coastal marine landscapes. Due to the Holocene sea-level rise, the late and post Glacial landscape of the southern North Sea basin became inundated. Around 7000 cal. BP the coast reached its present position, wide peat areas were inundated and salt marsh areas developed at the land-sea transition zone. When sea-level rise decelerated, the coastline repeatedly shifted both seaward and landward depending on local coastal morphology and sedimentation rates. Therefore, former human settling areas were covered by peat or intertidal sediments.

Due to the sheltering effect of the sediment cover, in some cases, Stone Age finds and features have been very well preserved. Likely, numerous sites are expected not only in the offshore area, but also in the coastal lowland. However, what kind of finds can be expected? How quickly did the sedimentary deposition proceed? How pronounced were erosive processes? Lastly, how can traces of earlier landscapes and communities be discovered, reconstructed and interpreted? Various projects of the Lower Saxony Institute for Historical Coastal Research (NIhK) are currently working on these questions and are testing large-scale prospection for Stone Age sites under peat, marshland and also in the Wadden Sea using different techniques. Their focus is on the timing, the rate and the dynamics of the sediment deposition. All three factors are decisive for the state of preservation of a site. Combined with investigations on human landscape use, the in-depth reconstruction of former surface reliefs also allows further consideration of human activities carried out in the offsite areas and thus potential sites for further finds.

The presentation gives an overview of the results of the interdisciplinary research projects and the resulting possibilities for the future, targeted detection of new sites in the land-sea transition zone.

S05+15.059

Lakes as Paleoenvironmental Archives to Reconstruct Population Dynamics; case study of Lake Kleiner Tornowsee, North-eastern Germany

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Paleoenvironmental archives, including lakes, provide invaluable insight into the rate of environmental and societal changes over time. As vegetation is directly or indirectly impacted by climate and human interferences, changes in vegetation composition can be indicators of past climate and human activities. The vegetation history has long been reconstructed in various regions of Europe, particularly in Germany, through pollen analyses of marine sediments to study population dynamics in the past. As the first millennium AD is a time of strong fluctuations in vegetation and societies, in this research a high-quality annually laminated sequence from Lake Kleiner Tornowsee, Northeastern Germany, was selected and a multiproxy approach, including pollen, *verve*, and 14C-AMS dating was conducted on a 1285 cm long sediment core in order to establish a high-resolution record of vegetation history, human activities, and climate variability in the first millennium AD. The pollen results demonstrate a series of settlements (AD581-766, AD1060- 1166, AD1166-1327) and abandonments (AD330- 433, AD433- 581) and subsequently changes in vegetation composition in the first millennium AD. These population discontinuities impacted landscapes by making successional changes in the vegetation composition. Simultaneously with Germanic colonization from the Early Middle Ages onwards, tree populations declined, and anthropogenic indicators (e.g., Cereal-type, *Secale*, *Artemisia*, *Plantago lanceolate*, *Rumex acetosa*, Poaceae, and micro/macro-charcoal particles) increased which indicates a favorable climatic condition for human activities and for expansion of arable lands.

S05+15.060

Dynamics of the topography of rural settlements in the basin of the Stugna River in the 11th-17th centuries

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During the survey of the territory in the lower part of the Stugna River (Dnieper basin), it was possible to establish a certain dynamic in the selection of places for the location of rural settlements during the 11th-17th centuries. By the 11th-13th centuries, there are settlements belonging to Rus, which appeared after the annexation of the territory by the Kiev princes. On the territory of 45 square kilometers, 24 settlements of different sizes were found: from 1-2 to 6 hectares, often located in direct line of sight. Traces of iron processing and fragments of imported amphora containers were found in larger settlements. Perhaps they played a special role in relation to smaller settlements.

Most of the mentioned settlements were located on a plateau cut by shallow ravines that flow both into the Stugna valley and its small tributaries. Now these territories are occupied exclusively by agricultural land. A feature of all ravines are exits to the water, which are fixed by appropriate vegetation. Larger settlements are adjacent to deeper ravines, richer in water. Only one of the settlements of that time was located in the valley, on the bank of the stream. Perhaps it had a special status, judging by the finds. All settlements ceased to exist in the middle of the 13th century.

Judging by written sources, the new stage of settlement of the territory dates back to the 16th century. Finds of ceramic products of the 16th and 17th centuries fully correspond to this dating. All of them were made on the territory of modern villages or near them. The innovation was the location of villages in the bottom of deep valleys of rivers and streams, much lower than the location of settlements of the Rus' age. Perhaps this is related to the change in land ownership, which began in the 15th and 16th centuries, passes to nobility, which made it impossible to settle territories suitable for field farming. On the other hand, the growing size of settlements and the needs of households could not be satisfied by sources that were quite sufficient for small villages of the 11th-13th centuries.

Thus, we observe a difference in the settlement strategy between the 11th-13th and 16th-17th centuries, despite the fact that the main occupation of local residents remained unchanged. The changes could be influenced by various factors: natural (lowering of the groundwater level), industrial (increasing water needs), social (change in the structure of land ownership).

S05+15.061

Just a flat surface to the eye. What we may find when we look deeper into waterscapes.

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In the recent years, a number of interesting articles on the phenomenon of the waterscapes or aquatic landscapes have appeared. Researchers have adopted a frog's eye perspective and reflected on water both as a supraregional network of transport and as important part of the landscape.

Obviously, there is more to waterscapes than meets the archaeological eye. It may be time to step back and ask what we hope to find in these environments that provides our research with not only new data but maybe a new perspective. What are interactions anyway? What could they look like in aquatic environments? And where does the concept of interactions lead us? One possible answer is that they lead us back to very basic questions, like e.g. what is a settlement?

The most radical article went a few steps further: Water is not only seen as connecting instead of separating many different actors and elements Huber/Gross (2018). Water actually is part of a network of resources and even a vector between different highly productive economic spaces of different sites, forming a kind of super-productive settlement's catchment. This view refers to Smith's concept of low-level food production. It provides a completely different perspective on the European Neolithic and has a number of implications for current research on different topics.

This talk will try to outline the scale of waterscapes in Europe's prehistory and compare some basic concepts in different regions. We will also touch the topic of models and their limitations. Still, the talk will argue for a view that looking at the Neolithic without considering the waterscapes would be like selling a chair with two legs.

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S05+15.062

Making Pottery on the Watershed: Learning Dynamics and Mobility in a Southwestern German "Waterscape" during the Late Neolithic

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The region Upper Swabia is situated between the Swabian Alb and the Lake Constance in Southwestern Germany. The European main watershed between the rivers Danube and Rhine runs through this glacial landscape. Besides two dozen prehistoric wetland settlements, evidence for pre- and protohistoric trafficking is known from this area: over 60 log boats, around 13 fragments of wooden wagon parts and numerous wooden trackways.

Drawing on the theoretical concept of waterscapes, Martin Mainberger has suggested to understand this rich archaeological landscape from a perspective of the waterbodies (see references below). He demonstrated the existence of some short and comfortable overland passages over the European main watershed which could have been used as carries in prehistory. Following this perspective, archaeological research questions arise: Is it possible to detect exchange relations and mobility practices between prehistoric communities in Upper Swabia and its neighboring regions? Are such

connections visible considering the dynamics of cultural practices and learning networks within Upper Swabia itself? The presentation will approach these questions by the analysis of pottery making practices of the early 3rd Millennium BC. The analytical focus will be on the so-called “Goldberg III” pottery which will be compared to pottery from the close-by Lake Constance and Danube area. In a second step, the perspective will be expanded to the earlier parts of the Late Neolithic. This outlook will discuss the question if waterscapes can be considered a structural element acting upon neolithic mobility and learning networks on the long term in the case of Upper Swabia.

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S05+15.063

RISE – Climate Change Resilience and Vulnerabilities of Bronze Age Waterfront Communities (2200-800 BCE)

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The archaeology of waterscapes enables us to gain a unique long-term perspective on climate change resilience and vulnerabilities of waterfront communities, when facing droughts and floods. Throughout time effects of climate change on the hydrology of landscapes have repeatedly threatened settlement areas but we still know little about the different respective social capabilities of resonating with them. Here the archaeology of submerged prehistoric sites in lake and seashore areas around the world can offer new insights. With the SNSF-Ambizione project RISE (2023-2026) we take that opportunity by researching the rich, but in this respect understudied submerged Bronze Age lakeshore settlements of the Alpine Space. The wide application of dendrochronology allows to approach the local settlement histories on an annual, and regional dynamics on a decadal scale. A major focus is on how cultural diversities as well as politics influenced social resilience capabilities to seasonal lake level fluctuations, but also climate-driven long-term lake level rises of higher magnitudes. While failed settlement attempts and settlement interruptions at the lake shores might indicate the vulnerabilities, architectural measures, spatial mobility, and the recurring re-occupation of the shores speak for the resilience capabilities of the communities. In parallel to climate, socio-political and economic causes must be factored in for settlement interruptions at lake shores. We are currently elaborating a new methodology to climate change vulnerabilities and resilience capabilities, that combines qualitative and quantitative methods of social archaeological and geoarchaeology for analysing sediments, archaeological features and finds as well as paleoclimatic proxy data. Furthermore, the chosen socio-spatial theoretical focus on ‘vulnerability’ and ‘resilience’ will re-centre agency and social practice in human-environmental relations to omit climate determinism and monocausal explanations. For more see: <https://data.snf.ch/grants/grant/208840>.

S05+15.064

MOVE – Cultural Transformations and Spatial Mobility as Resilience Capacity of Lakeshore Settlement Communities at the end of the 4th M BC.

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Understanding change in early societies is a longstanding key question in Prehistoric Archaeology, but the decisive parameters of societal vulnerability and resilience are still poorly understood. In the northern Alpine Foreland, one of the most striking societal transformations of the Late Neolithic occurred at the beginning of the second half of the 4th millennium BCE: the emergence of the «Horgen» cultural sphere – named after its enigmatic coarse pottery – dating from between 3400 and 2800 BCE. Numerous outstandingly preserved dendro-dated Neolithic lakeshore settlements provide a promising source material to study the phenomenon. The SNSF research project MOVE (2021–2024) aims to gain a deeper understanding of the formation as well as the end of the «Horgen» cultural sphere and its environmental and societal conditions. Our pilot study conducted for the time around 3400 BCE shows that at the beginning of the respective cultural transformation coincides with a climatic deterioration that led to rising lake-levels. They destroyed former settlement areas on the lakeshores and led to temporal interruptions of settlement activities. By using archaeological information on settlement features as well as various global and regional paleoclimatic proxy data we inferred that especially the longer-term lake-level rises of higher magnitudes hit the agricultural communities hard but did not lead to any form of social collapse. On the contrary, the immediate repopulation of the lakeshores after the lake floods suggests that spatial mobility and the temporary relocation of settlements to the hinterland were a successful social coping practice in dealing with these challenges. For more on this see: <https://data.snf.ch/grants/grant/197383>

S05+15.065

An annualized perspective – New dendrochronological findings on the settlement development of the lakeshore sites “Muntelier, Platzbünden” and “Sutz-Lattrigen, Neue Station” (CH) at the end of the 4th M BC

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In the lakes of the northern Alpine Foreland numerous lakeshore settlements of the Neolithic and the Bronze Age are preserved, which were listed as UNESCO World Heritage Sites in 2011. Thanks to the exceptionally favorable preservation conditions and excellent dendrochronological reference curves, the settlements' developments can ideally be reconstructed with yearly accuracy. Thus, these settlements offer a unique basis for investigating human-environment relationships in waterscapes with an extraordinary high temporal resolution.

Using existing or newly compiled dendrochronological data, the settlement phases and development of the two lakeshore settlements of Muntelier, Platzbünden (Lake Murten) and Sutz-Lattrigen, Neue Station (Lake Biel) in Western Switzerland were researched as part of the MOVE project. In 1979, an excavation was carried out on an area of 1000 m² at Lake Murten at Muntelier, Platzbünden. During this excavation, about 4500 piles were recovered, of which 3500 had already been examined in the 1980s for their tree species, shape and size. The 1800 oak piles were also dated, if possible, so that a time span from 3229 BC to 3110 BC could be postulated. Apart from a gap of felling dates between 3229 BC and 3209 BC, there are felling dates almost every year. From this it can be concluded that there was uninterrupted settlement activity in Muntelier, Platzbünden from the beginning to the end of the 32nd century BC. In total, six construction phases can be assumed during this period, whereby the oldest is clearly distinguishable from the subsequent ones, which are all similar in their village structure.

In exactly the same years, there is also evidence of settlements on Lake Biel at the site of Sutz-Lattrigen, Neue Station, about 20 km to the north. Dendrochronological research on different tree species reveals comparable structures in terms of village architecture. However, the shorter occupation periods compared to Muntelier, Platzbünden highlight the high dynamics of the settlements at that time. Both settlements thus provide an excellent data base, which will complement our understanding of phases of settlement activities and settlement interruptions during the 4th millennium BC in the northern Alpine Foreland.

S05+15.066

MOVE - Mobility, Continuity and Transformations at the end of the 4th M BC. New results from the northern Alpine wetland sites Sutz-Lattrigen and Muntelier, Platzbünden (3400-2700 BC).

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The MOVE-project focuses on settlement interruptions, cultural continuity, and transformations as well as spatial mobility as resilience capacity of lakeshore settlement communities in circum-Alpine region at the end of the 4th M BC. Two sites located in the Three-Lakes-Region in western Switzerland are of major importance, “Sutz-Lattrigen” and “Muntelier, Platzbünden”. They encompass several dendrochronologically dated settlements from the so called “Horgen” and “Lüscherz” typo-chronological units dating between 3400 and 2700 BC.

The “Muntelier, Platzbünden” site dates from 3229 BC to 3110 BC. In total 6862 pottery sherds, 502 stone axes and 1085 antler sleeves were found there. Since there is no reliable stratigraphy, the question arose whether the pottery can nevertheless be divided into younger and older objects, purely on the basis of typology. In order to answer this question, the pottery of “Muntelier” as well as the stone axes and antler sleeves were examined for their typology and compared with other contemporaneous settlements. The typology of the ceramics was furthermore used, to detect non-local pieces in search of mobility between contemporaneous adjacent settlements.

At “Sutz-Lattrigen”, there are three lake shore settlements whose dendrochronological data gives precise information about the duration of the occupations as well as the interruptions between them. Our study deals with ceramics, stone axe blades and deer antler sleeves, as well as flint and textiles. The plan of the settlement of “Neue Station” makes it possible to reconstruct a horizontal stratigraphy and to separate the material by phase. We are thus able to study the occupations independently of each other but also in an interlinked manner to identify similarities and differences between them. Ceramics lend themselves particularly well to this exercise and can give us indications of changes in terms of pottery production practices. The biggest changes in terms of pottery typology comes after the long interruption of settlement activity between the “Horgen” and “Lüscherz” period. The typological changes are radical, but is this also the case at the technological level? Are the production habits completely different? On what points? Have the modalities in terms of mobility also changed? How is resilience reflected in these changes? These are all questions that this MOVE project seeks to answer.

For more see: <https://data.snf.ch/grants/grant/197383>

S05+15.067

Finding the Missing Link: new insights into Neolithic pile-dwelling communities of the Carinthia Lakes in Southeastern Austria

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Waterlogged sites at the shores of alpine lakes and wetlands of the perialpine zone (i.e., pile-dwelling settlements) offer unparalleled preservation conditions. The study of these sites has shaped our modern interdisciplinary understanding of European prehistory. In the Austrian province of Carinthia, neither the quality nor the quantity of prehistoric wetland sites have so far been recorded systematically. Considering this, the region presents a large potential for future contributions. In response, new underwater archaeological surveys were carried out in Lake Wörthersee by the University of Innsbruck. The fieldwork produced significant archaeological discoveries. The island of Kapuzinerinsel revealed a so far unexplored prehistoric site. Several prehistoric occupation phases are present, dating to the 4th millennium BC. Kapuzinerinsel can be considered an important key site with pan-European importance, since the region can be observed as an uninvestigated missing link for understanding relations between alpine lake dwellings of the inner- and western alpine area and Southeastern Europe (the Balkans). To preserve and protect this highly erosion-exposed lake settlement site, new strategies were implemented in cooperation with the Federal Monuments Authority Austria. As an effort to prevent the undocumented loss of the site, excavation, documentation and a detailed study of the in-situ context was carried out.

S05+15.068

Dispilio, Lake Orestias (Kastoria, Greece): new insights into the chronology and architecture of a Neolithic wetland habitation

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Western Macedonia bears exceptional geophysical characteristics concerning aquatic resources compared to other parts of the Greek mainland. Consequently, several prehistoric communities exploited the region's valuable wetlands to carry out various productive activities and develop their distinctive socio-cultural characteristics.

Except for the rescue excavation of some habitations in Amindeon Basin, the Neolithic Dispilio in Lake Kastoria is the only wetland settlement in Greece that is systematically investigated since the 1990s' by the Aristotle University of Thessaloniki. Until recently, the outcome of this long-lasting project was a series of ¹⁴C dates that established the general chronological framework of the habitation (mid-6th to the late-3rd mil BCE), together with several preliminary studies of the rich archaeological materials unearthed.

The participation since 2019 of AUTH in the ERC-funded Project 'EXPLORing the dynamics and causes of prehistoric land use change in the cradle of European farming' provides the framework for developing a state-of-the-art multidisciplinary approach to crucial research objectives, aiming for an overall perception of Dispilio characteristics.

The paper presents the reconstruction of the habitation sequence, as well as concrete excavation contexts comprising large amounts of artefacts, bioarchaeological remains and building materials. The spatial distribution and the attributes of these concentrations, detected mainly in the habitation's waterlogged archaeological layers offer indications about built and open spaces within an excavated area of approximately 500m².

The key factor for understanding Dispilio's diachronic architectural development is the dendrochronological analysis of the settlement's pile field, a pioneering work for Greek archaeology. More than 800 samples of posts have been analyzed by the experts' team at Bern University resulting in oak and juniper dendro mean curves that build the chronology of the waterlogged layers from the 57th to the 53rd centuries BC.

These results have led to hypotheses regarding the diachronic development of Dispilio architecture and spatial organization by correlating the dated posts with stratified material concentrations. Moreover, aspects of the dynamic relationship between the local Neolithic community with the surrounding lake environment are discussed, reflected in the exploitation of raw materials and the diachronic development of building techniques.

S05+15.069

Water Management Strategies in Prehistorical Crete: The Case Study of the Zakros region

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Water is both a valuable resource and a formidable foe, depending on the situation. The latter was the case for David George Hogarth, the first excavator of the settlement in Kato Zakros in Crete forcing him to abandon the project after a sudden flood (Hogarth 1901, Excavations at Zakro, Crete, in *BSA* 7, 121-149). He did though manage to document

the varying waterscape of the Kato Zakros valley consisting from a main river with its delta, three smaller ravines, a marshland and the sea in a map in his short report of the excavation. This constitutes an irregularity for the rather dry island of Crete. Nikolaos Platon, the second excavator of the site, refers in almost every excavation report to the technical means used to overcome the difficulties posed from the high water-table and stagnating water (eg. Platon 1966, Zakros Excavations, in *PAE* 1962, 142-168).

So how did the Minoans manage to tame such a wild and complex waterscape, and built a palace and a city there? The archaeological work in the broader Zakros region has revealed a series of elaborate infrastructure dating in the Middle and Late Bronze Age (Platon 1974, *Zakros: the New Minoan Palace*, Athens; Chrissoulaki & Vokotopoulos 2018, Ένα εγγειοβελτιωτικό έργο της Νεοανακτορικής εποχής στην ενδοχώρα της Ζάκρου in Gavrilaki E. (eds.), *Proceedings of the 11th International Cretological Conference*, Rethymnon). This consists of dams, wells, sewers and conduits, each providing ingenious solutions of high technical quality to varying problems posed by the water in the Zakros region. The presentation will present the geological data available for the site, as well as the best preserved and most characteristic infrastructure. It will also attempt to explain which problem was each feature solving and how one can interpret those features within the broader climatic and cultural context of the Middle and Late Bronze Age in the Aegean.

S05+15.070

Living Dikes: People and the coast in the Wadden Sea area of the northern Netherlands

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People have been living along the coast of the Wadden Sea for many centuries. Throughout time, they found various ways to deal with periodic storms and flooding. These measures evolved in time from defensive diking, offensive land reclamation and adaptive strategies. In the past decades, people abandoned the explicitly offensive strategy, opting for an approach that takes the natural values of the Wadden Sea area into account as well.

Relative sea level rise forces societies to reconsider static 'grey' flood protective dikes, and move towards a more adaptive, hybrid system in which the dike itself is an element of a wider protection landscape, including the salt marshes at the seaside. The highly interdisciplinary project includes specialists in engineering, geomorphology, ecology, sociology, and landscape history. Linking on to the broader engineering concept of building with nature, Living Dikes contributes to the development of innovative coastal protection systems. The project investigates the potential of making the ecologically and culturally valuable landscape zones in front of the dikes an effective element of our coastal protection.

In this paper, we will explore the degree to which these new systems, may interact with, or even make use of, existing cultural landscape structures currently present in the landscape. This includes the 'man-made' reclamation marshes, as well as associated ditch systems and dikes. The continuous interaction between changing geomorphological and ecological circumstances and human responses to flooding demand a thorough study on how and where to apply nature based solutions, considering the inevitable effects it will have on man and nature. The Living Dikes project includes a study on the longer time frame, from the early inhabitants and their ways to deal with flooding throughout the contemporary challenges towards sustainable future living in the area.

S05+15.071

Water use in settlements of Trypillia culture

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When studying settlements, especially those whose territory covered tens or hundreds of hectares, the question of water sources for residents repeatedly arose. The water needs of the villages were significant, if we take into account the needs of people, domestic animals and crafts production. It was especially relevant for the cases of settlements located on high areas of the plateau. Surveying the territories of these settlements and their immediate surroundings was useful for finding answers. It was also useful to study the modern water use system in this area.

For small settlements and temporary sites the issue was resolved by location on the banks of rivers. In the case of the location on the plateau, the territory of the villages was adjacent to ravines, where the exits of aquifers are located either on the slopes or at the bottom. In both cases, the distance to the water did not exceed 100 meters. There is also a hypothesis regarding the possible construction of dams for the formation of reservoirs in the area of settlements.

In the case of large settlements (50-300 hectares) the choice of location was the key. Maidanetske (about 200 hectares) is an example of solving the problem for mega-sites. A significant part of the settlement was located along the banks of the Talyanka River, and in this case the distance to the water for the nearest two rows of houses did not exceed 100-200 m. The northern part of the settlement was adjacent to ravines with water outlets on the slopes. The southern part partially adjoined the valley of the stream, on the slopes of which valley there are numerous springs. In these areas, it was possible to use wells, the depth of which would not exceed 3-5 m. The most problematic for water supply was the central part of the settlement. Transport sledges equipped with containers, which are known from finds of ceramic models, could be used to

deliver water here.

Feeding of animals was decided directly on pastures located near the valleys of rivers and streams. In the Dnieper region, shepherds' camps near the Dnipro are well-known.

In our opinion, the study of the water supply of residents of Tryppillia settlements should be included in the program for the study of settlements of various types, especially in the light of hypotheses regarding the impact of epidemics on the existence of mega-sites.

S05+15.050

Oasean water dynamics: Disentangling climatically- and anthropogenically-forced environmental change in the Western Desert of Roman Egypt

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The oases in the Western Desert of Egypt were crucial agricultural, economic and administrative districts between Pharaonic times and the Roman period. The Bahariya, Farafra, Dakhla and Kharga oases are highly fertile areas situated in one of the harshest climatic regions in the world, receiving, on average, only 5mm of rain annually. What makes these areas so fertile are extensions of the Nubian Sandstone Aquifer System – the world's largest known fossil water aquifer which spans 2 million km² beneath south-eastern Libya, north-western Sudan, north-eastern Chad, and nearly all of Egypt. From the Pharaohs to the Romans, the oases were exploited agriculturally, and irrigation techniques that centred on tapping Nubian aquifer extensions evolved over time. While qanats – a type of underground aqueduct designed to draw from such aquifers – and wells were dug in the oases in late Pharaonic and Ptolemaic times, Rome ramped up water-extraction and management early on in its control of Egypt, and the Empire reaped the benefits, seeing economic and urban growth that seems incongruous with the terrain in which it blossomed. Growth and prosperity did not sustain, however, as many oasean urban centres and villages experienced degradation, both environmentally and economically, in the Middle and Late Roman periods. Following environmental changes, the archaeology shows that in late antiquity many sites shifted cultivation and settlement patterns in attempt to combat seeming agrarian stagnation, with some areas even transitioning from agriculture to caravan trade and support as their main commodity. While other towns were totally abandoned in the face of both cultivation problems and wind-erosion that, in a few cases, abraded and buried entire settlements.

This paper examines whether the observed environmental changes in Rome's Western Desert were the consequence of climatic changes, or Rome's overexploitation of aquifer extensions – a common environmental response in the oases to anthropogenic subterranean pressure. It looks at oases, and the settlements therein, on a case-by-case basis to determine whether or not a broader trend is observed in the archaeology, and what the result might tell us about oasean environment and society in the Roman period.

S05+15.051

Ancient saltmaking in coastal areas

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Before the invention of the solar evaporation process for the manufacture of salt out of sea water, a particular ignition method was widely practised around the globe since the late Neolithic age. The proto-industrial extraction of sea salt laid the foundation for fundamental cultural achievements. Owing to the high demand for fuel, woodlands got converted into open landscapes, smoothing the way for agriculture.

When highwater spring tides leave saline efflorescences on coastal mudflats, people turn up for scraping the saline soil. They leach it for obtaining a concentrated brine, with a salinity significantly higher than the salinity of sea water. The culinary salt is produced by heating that brine (the crystallization starts already far below the boiling-point).

Characteristic indicators of this ancient saltmaking technique are:

constructs for leaching the saline soil (ground filters or filters on wooden stilts); basins, ditches, pits or bowls for storing water, drainage tubes and channels; pits or bowls for receiving the concentrated brine; typical pottery (briquetage) for heating the brine; kilns or hearths;

burned wood (charcoal) or charred remains of low calory fuel (reed, grass, dry leaves); open sheds or boiling huts for weather protection; racks for drying the wet salt; palisades as wind breakers; baskets for collecting the saline soil, or to transport the salt; postholes (related to sheds, huts, palisades, supports of wooden filters or drying racks); piles or hills consisting of potsherds; mounds consisting of disposed leached soil.

Many of these earth mounds are amazingly big (piled up by generations of saltmakers), but their origin remains often unknown. Their secondary use as cementary or for horticulture is a common practice.

Today's sea shores are threatened by sealevel rise, sinking deltas and severe cyclones. They will be irretrievable lost in near future. It's urgent to document the characteristic features and archaeological remains of saltmaking at eroding coasts. Some localities of ancient coastal saltmaking however, are nowadays found further inland, due to shifted coastlines.

A few communities around the globe are still practising this ancient saltmaking technique. I documented rural saltmaking and archaeological sites in the Gangetic Delta (India, Bangladesh) and will also show evident illustrations from selected publications. It is yet to be ascertained how far this unique technology was practised across Europe.

P01.23

People – Platforms – Palaeolakes. Preliminary results of a palynological analysis from a Lateglacial-Early Holocene lake-site in northern Zealand (Denmark)

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A new Lateglacial – Early Holocene site close to Pårup (Sjælland, Denmark) was investigated by the Museum-Nordsjælland revealing lithic assemblages of both Palaeolithic and Mesolithic typologies.

The location in a former shore-line of lake Søborg featured excellent preservation conditions for organic material. Among these were two wooden platforms made of *Populus tremula* that formerly reached out into the lake and have been dated to the very early Preboreal.

A near-site sediment core has recently been taken by the National Museum of Denmark and the objective of a preliminary palynological investigation was to study changes in the local vegetation across the Pleistocene-Holocene boundary. The find situation, including the wooden platforms, is strongly reminiscent of the Star Carr site (UK). Therefore, we additionally ask whether human action and patterns in shore-line usage can be traced by looking at charcoal particles as well as alterations in the shoreline vegetation.

P01.30

Artisans of the Stone Age: The utilisation of plant- and wood-based raw materials at the Neolithic wetland site of Järvensuo 1, southwest Finland

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Research focusing on Neolithic in northern Fennoscandia remains largely based on durable archaeological materials such as pottery and lithics recovered from dryland contexts where organics have already degraded. The anoxic waterlogged contexts of boreal wetlands have not yet been fully utilised in northern archaeology, even though they preserve organic materials that allow us to reach the typically invisible component of the archaeological record. Recent fieldwork at the paludified Neolithic lake settlement of Järvensuo 1 in southwest Finland revealed detailed information on the stratigraphy of the site and yielded rich evidence of sedimentation, environmental conditions and human activities on an overgrown lakeshore zone c. 6000-2000 cal BCE. The site's well-preserved organic artefacts include, e.g., tools and utensils made of wood, plant fibres and tree bark, such as fishnet floats made of pine and birch bark and sinker stones with tree bast bindings, as well as net fragments, plant cordage, and remains of wooden structures and pieces of portable art. These extraordinary materials allow us to explore the raw material use and technological adaptations of the Neolithic hunter-fisher-gatherers on a dynamic lake environment in detail. An archaeological and comparative ethnographic study on the artefacts, structures, textiles, crafting techniques and qualities of raw materials increases our chances of achieving new levels of accuracy to elucidate prehistoric artisanship, know-how and even aesthetic solutions. Contemplating the results in a larger landscape context, and taking into account the availability of various lake and woodland resources during the main occupation phases of Järvensuo 1, gives us unique and detailed - previously unattainable - information about the Neolithic lake dwellers of the hinterland and enables us to reflect them within a wider geographical and cultural context of northern Europe.

S06: Household archaeology: new answers for old questions. Multi-analytical and multi-scalar approaches to prehistoric domestic structures

Prehistoric households represent a microcosm reflecting and modulating a society on a smaller scale. Their variability depends on multiple factors such as social organisation, local environment, individual choices, and beliefs. For this reason, they are an excellent proxy for studying regional and global narratives on demography, inequality, resilience, economy, and their transformation through time and space. In order to disentangle this complexity, we propose a session that adopts multidisciplinary and multiscale approaches to prehistoric domestic structures, including in this definition residential units and accessory facilities (byres, barn, yards, etc.). Recently, innovative methods allowed us to reconsider previous assumptions and refine our interpretations. For example, geoarchaeological studies clarify site formation processes and identify crucial markers to reconstruct domestic activities and activity areas. Archaeobotany and zooarchaeology provide further insight into our understanding of past living conditions, economic and productive practices, besides helping us reconstruct the natural environment. Geophysics allows for large and non-invasive analysis of settlements, providing important information about intrasite and architectural organisation otherwise inaccessible due to time and economic constraints. Finally, large regional databases can help reassess the importance of our contexts in a quantitative and statistical framework, increasing our possibilities in terms of demographic reconstructions, diachronic household variations, and local and regional networks.

- The key questions remain unchanged:
- What were the living conditions and lifeways of the village communities?
- How can household archaeology help us reconstruct local and global narratives?
- How were households organised and to what extent did they reflect the environment, regional population transformation processes?

With a focus on prehistoric (Neolithic-Iron Age) case studies, we welcome papers addressing these questions from different perspectives such as geoarchaeology, archaeobotany, zooarchaeology, statistics, geophysics, ethnography, demography, comparative and field archaeology, with a particular interest for multidisciplinary and multi-scalar approaches.

S06.073

Domestic or symbolic space? The spatial analysis of an uncommon Late Bronze Age structure from the fortified settlement of Coppa Nevigata (Southern Italy)

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The spatial interplay between artefacts and bioarchaeological remains represents a pivotal research line for the understanding of activities organisation of prehistoric societies. Such analyses are becoming common for Late Prehistoric contexts, bringing new insights into the socio-economic behavioural patterns of these communities. At the same time, the increasing use of geostatistics allows us to combine different types of data for the construction of interpretive model(s) and to go beyond cognitive bias, exploring latent spatial-functional connections between remains.

The Bronze Age fortified settlement of Coppa Nevigata (Southern Italy) has been the subject of integrated spatial analysis (Recchia et al., 2021) which have highlighted both the functional variability of spaces and changes of the settlement fabric over time related to socio-economic transformations. The most recent explorations at the site have brought to light a portion of the 12th century BC settlement, characterised by domestic and functional structures. In this presentation we will discuss the integrated spatial analysis of one of these, which for its structural features (the perimeter is defined by a clay bench where 11 clay rings are arranged) and patterns of use stands out from the coeval structures both in the settlements and in other coeval centres (Cazzella and Recchia, 2018).

Archaeological evidence suggests that the structure was devoted to the preparation of meals, possibly with a strong symbolic meaning (feasting?). Yet, an integrated functional and spatial analysis of artefacts and bioarchaeological remains will allow to get an in-depth understanding of the activities performed there, its overall function(s) and thus its social meaning. To achieve this aim, the analysis will combine diverse types of geostatistics using open-source software, which will enable to fully explore spatial data and contextualise them within the settlement context.

Cazzella, A., Recchia, G., 2018. Una struttura connessa con attività di feasting a Coppa Nevigata? *Scienze dell'Antichità*, 219–230.

Recchia, G., Lucci, E., Fiorentino, G., Minniti, C., Mironti, V., Primavera, M., Siracusano, G., Vilmercati, M., 2021. Interpreting long-lived-in dwelling spaces: integrated spatial analysis of a late Bronze Age area at Coppa Nevigata (South-Eastern Italy). In: Jallot, L., Peinetti, A. eds., *Use of Space and Domestic Areas: Functional Organisation and Social Strategies*. Oxford: Archaeopress, 119–137.

S06.074

Rich house, poor house, beggarman, chief? Comparing households and agro-production at tells and farmsteads of the Bronze Age Otomani

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Many authors have argued that fortified tell sites of the Bronze Age Otomani group were the seats of chiefly families or at least hubs of trade, ceremony, and prosperity. However, such central places are unlikely to have emerged without the necessary socio-economic infrastructure to support them. Unfortunately, few tells of the Otomani Group in eastern Hungary and western Romania have been published in detail, and there are almost no open settlements excavated to contrast with life at the tell. In this paper, we compare the tell site of Vésztő-Mágor and the nearby open settlement of Tarhos-Gyepesi-Átkelő. With 7 m of stratified deposit, the tell settlement of Vésztő-Mágor, dating from the Middle Neolithic to the Middle Bronze Age, is the highest tell site east of the Danube in the Carpathian Basin. Recent conservation work on the permanently open trench has allowed for targeted excavation and dating of profile deposits. Nearby, the site of Tarhos-Gyepesi-Átkelő is a small Middle Bronze Age farmstead, where excavations exposed a burned wattle and daub structure. Focusing on the Middle Bronze Age we compare households at the two sites, and their construction and use, within a detailed radiocarbon chronology. We also review the archaeobotanical evidence to assess diet and crop husbandry practices at these two different settlements.

S06.076

Spatial and temporal dynamics of a Village-like settlement derived from C14-dates

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Iron Age settlement in what is now Norway consisted mostly of single-farms, even if at least three village-like settlements have been excavated the last thirty years. One of this is Dilling, a thoroughly excavated site in the Oslofjord area. More than 380 C14-dates from 111 buildings make the site well suited to an exploration of the spatial development over time, and the large material also invites discussion of strategies for dating. In some cases, due to favourable stratigraphical circumstances and data programs utilizing Bayesian statistics, the date of single buildings could be narrowed to decades – a rare event in Norwegian archaeology. This well dated and in a Norwegian context large material will be used to explore the formation, change and decline of a village-like settlement with six house areas with 150-200 m distance. The settlement were established c. 400 BC, and expanded c. 200 BC while the settlement went out of use c. AD 200. Charcoal from fireplaces and postholes as well as charred cereals from postholes are dated, giving an opportunity to evaluate the material and contexts suited for dating buildings and to suggest a strategy for dating buildings with poor preservation of organic material and few datable objects in an area with no real building typology or -chronology.

The results, in form of precise dated buildings, make it possible to study how the settlement changed over time – the well dated material reveals that the settlement at Dilling had history, with spatial and temporal variations. Some of the house areas were unoccupied in periods, before being settled once more, and as the areas between the settled areas were as well suited to settlement as the settled area, this invites the discussion of right to land and settlement organization.

S06.077

Interpretation of settlement use of space during the Scandinavian Iron Age: a case study from Dilling, Norway

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The aim of this presentation is to describe an interdisciplinary approach for determining use of space within Scandinavian Iron Age settlements using environmental archaeological methods such as archaeobotany (carbonised plant macrofossils), geochemistry (phosphate, loss on ignition), geophysics (magnetic susceptibility), and soil micromorphology employing the site of Dilling, in Southeast Norway as a case study.

The Dilling site represents a thorough and ambitious investigation of an Iron Age settlement in South Scandinavia spanning the periods of Pre-Roman Iron Age and Roman Iron Age. Our research introduces results from multiproxy analyses on more than 100 longhouses and other settlement features. An attempt of defining the functional division of longhouses and the use of intra site space has been done. Here, we are given the opportunity to examine diet, farming and manuring practices, household activities and animal husbandry.

Another important aspect is that the presented evidence can also be used for understanding human induced changes to the landscape and settlement throughout the studied periods. Furthermore, a large body of environmental data has been generated and the full data set will be included in the SEAD environmental archaeological database. This will enable the Dilling site to be put into a wider prehistoric settlement context.

Case studies like these contribute to a better understanding of social dynamics and interaction of past agrarian communities. Moreover, we can provide valuable information about everyday life activities, survival strategies, social relationships, etc.

S06.078

The Missing Link? Households in Prepottery Neolithic Göbekli Tepe SE Turkey

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Since the beginning of the excavations at Göbekli Tepe in south-eastern Turkey, the function(s) of the buildings has been controversially discussed. The spectrum of statements ranges from the definition that all buildings are temples per se (Schmidt 2012) to that they are all domestic in nature (Banning 2011). Work based on architecture could clarify that at least not all buildings follow a certain scheme (Kurapkat 2015). Building on more recent findings with a focus on architectural features, it has recently been clearly demonstrated that the architecture at this site is not only divided into round-oval and rectangular buildings, but encompasses a wider range of building types in addition to a standard building type. However, as pointed out by Kinzel and Clare (2020), a similar building type does not necessarily mean the same function. In order to explore the functions of buildings regardless of their layout, multidisciplinary approaches are needed to examine the remains within the buildings, and assign them to specific activities. In this paper, using old and new data from the excavations, macro- and micro-botanical investigations, as well as context-oriented find analyses, statements made about the architecture are evaluated. This will allow the results to be analyzed at different scales, space-site-environment, and put into context with newly discovered PPN sites in the region.

Banning, E., 2011. So Fair a House: Göbekli Tepe and the Identification of Temples in the Pre-Pottery Neolithic of the Near East. *Current Anthropology*, 52 (5), 619-66.

Kinzel, M., Clare, L., 2020. Monumental – Compared to What? A Perspective from Göbekli Tepe. In: A. B. Gebauer, L. Sørensen, A. Teather and A. de Valera, eds. *Monumentalizing Life in Neolithic Europe: Narratives of Continuity and Change*. Oxford: Oxbow, 31-50.

Kurapkat, D., 2015. Frühneolithische Sondergebäude auf dem Göbekli Tepe in Obermesopotamien und vergleichbare Bauten in Vorderasien. Ph.D. diss. Technical University, Berlin.

Schmidt, K., 2012. *Göbekli Tepe – A Stone Age Sanctuary in South-Eastern Anatolia*. Berlin: ExOriente.

S06.079

Household-based food production and the social fabric in the Neolithic Vinča culture of the central Balkans

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Architectural, artefactual and subsistence evidence from sites of the Late Neolithic Vinča culture network (5400-4500 BC) in southeast Europe suggests that the autonomous household was the basic socio-economic unit. Archaeological reconstructions posit that one or several adjacent buildings define individual households, and that these (groups of) structures were the context of economic, social and ritual activities. How/where/when these activities were conducted was likely defined at the communal level, prescribed by supra-household social controls and embedded in ideological framework. Although no clear indications of social stratification are observable at Vinča culture sites, some inter-household status competition would have been present and was negotiated through mechanisms such as sharing and exchange, and communal works and events, the latter, for instance, documented by the faunal evidence of feasting.

Within the community-wide pattern of behaviour that ensured cohesion, social differentiation could have been maintained through household-specific food-related practices, food choices and culinary traditions. These could have served to emphasise individual affinities and identities, to delineate the smallest social units, without damaging the sense of community. As such, they may have even been encouraged. In this presentation, we look at the archaeobotanical and zooarchaeological evidence of food production and consumption from a selection of Vinča culture households, and reconstruct the sources of food, their origin and seasonality. We compare the observations for individual cases, in order to identify potential inter-household differences in the choice and use of (key) resources. We speculate on what effect such differences could have had on the social fabric of the community: whether through them the social bonds were strengthened, undermined, or both; and whether this was of relevance in the context of the dissolution of the Vinča culture.

S06.080

House holding and food 'hoarding': plant foods in Bronze Age houses in the Carpathian Basin

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Some of the investigated Bronze Age houses in the Carpathian Basin offered uniquely rich archaeobotanical assemblages. For this paper, we consider several (un)published examples of such structures dated to the 2nd millennium BC: single buildings in the settlements at Fidvár near Vrábľe (Slovakia), Kakucs-Turján mögött (Hungary), Vatin and Židovar (Serbia); while also referring to few other similar cases in the region. The buildings all witnessed burning event(s), which preserved their plant inventories. We document the composition (diversity and size) of these inventories, the un/processed state of macro-plant remains, their spatial distribution and, in few cases, their carbon and nitrogen isotopic signature. This provides us with a picture of the plant food sources exploited by the inhabitants of these architectural units, and permits a reconstruction of certain aspects of on-site food handling. Further, it allows a glimpse of crop and wild plant acquisition strategies and the properties of soils on which these plants grew. We suggest that the buildings reflect domestic units – households – that produced, stored and consumed plant food on a small scale. The food could be stored for longer periods, including accumulations ('hoards') that could buffer against failed harvests. Comparison of the archaeobotanical and plant-isotopic profiles between the houses reveals differences potentially stemming from different cultural and environmental settings within which these settlements were embedded.

S06.081

Tartessian Public Earthen Architecture: environmental interaction, labour organization and political power at Casas del Turuñuelo.

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Tartessian culture is born out of the hybridisation of autochthonous Iberian groups and the Mediterranean influences introduced by the Phoenicians in southwestern Iberian Peninsula. Specifically, in the Middle Guadiana region, the most important manifestations of this culture appeared during the 6th and 5th centuries BC as large, monumental buildings that combined political, religious, and economic functions. Earthen architecture played a central role in the construction of these buildings, including both structural and decorative elements. The building remains are still well preserved due to their inhabitants' purposeful destruction after great feasts and ceremonies.

Since 2014, the Institute of Archaeology of the Spanish National Research Council carried out the archaeological excavation at the site of Casas del Turuñuelo (Guareña, Badajoz, Spain) that has revealed a well-preserved Tartessian building, known both for its monumental complex architecture and the exceptional nature of the goods and the sacrifices made before its collapse still visible *in situ*. In this work, we present the preliminary results of the geoarchaeological study conducted on the earthen building materials used in the construction of the Casas del Turuñuelo, mainly mudbricks, mud plaster and earthen installations. We sampled a total of 61 representative individuals from different areas of the building and analysed them in an interdisciplinary methodology combining X-Ray Fluorescence, loss on ignition, thin-section petrography, grain size analysis, and scanning electron microscopy.

Our main aim is to contextualise this building as a product of a specific socio-cultural phenomenon, hence different hypotheses are tested in our analysis: the environmental impact of its construction (i.e., raw catchment areas, interaction human nature, sustainability); the technological nature of the material used (i.e., *chaîne opératoire*, know-how, gestures); and finally the political articulation and social cost (i.e., labour organization, specialisation, political control and hierarchy). This study provides the basis of an interdisciplinary approach that can be used through the prism of anthropological theory to better understanding relationship between craftsmen, communities, political entities and the built environment.

S06.082

Reconstructing daily practices through plant remains from Bronze Age Italian sites – Resolution, preservation and interpretative potential of multiple archaeobotanical proxies

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Plant remains from archaeological domestic contexts, such as fireplaces, pits and waste heaps inside and outside dwellings, represents traces of failed food processing, of fuel and of other plant selections and uses that accompanied the everyday life of ancient communities. How diverse was the amount of plant resources in use? What can we say about crops production and processing, e. g. for food, fodder? Can we detect plant materials used for architectural purposes? What is the role of wild plants? Which natural environments were mostly exploited? Within the ERC project GEODAP, on the “Geoarchaeology of Daily Practices”, we apply a wide range of archaeobotanical investigations to samples from European Bronze Age settlements. The archaeobotanical materials under study include charcoal, seeds/fruits, palynomorphs and phytoliths. We present here some preliminary data from sites currently under investigation in Northern Italy, where we can compare botanical macro- and micro-remains to address the above-mentioned research questions. Issues of resolution, preservation and interpretative potential of different kinds of plant remains will be discussed and, when available, geoarchaeological information will be integrated to archaeobotanical records in the reconstructions of Bronze Age life ways.

S06.083

Same Difference? Two long houses from a settlement of the Linear Pottery Culture at Biskupice, site 18 (Carpathian foothill zone, southern Poland)

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In the territory of Poland, intensively inhabited settlements of the Linear Pottery Culture (LBK) are known mainly from the loess areas of the upper Vistula and the Oder rivers. Biskupice site 18, belonging to the settlement cluster in the foothill area, was excavated in the years 2020-2021 (within the framework of the project no. NCN 2018/30/E/HS3/00867). Well-preserved remains of at least four long houses in Biskupice (including e.g. so-called clay extraction pits, features with hearths and post-holes) provided an excellent opportunity to obtain archaeological and archaeobotanical material. The positions of pottery sherds, lithics and archaeobotanical samples were three-dimensionally measured, what allowed accurate comparison of two fully excavated long houses. Both of them represent the youngest Żeliezowce phase of LBK (ca. 5100-5000 BC), as demonstrated by the pottery finds and Bayesian modelling of 12 radiocarbon dates. Despite their chronological coherency both houses vary not only in size (30 vs. 11 metres in length), but they also delivered a diverse range of macroscopic plant remains, both in quantitative and qualitative terms. Also, palynological analysis showed differences of the pollen spectrum in some of the clay extraction pits, suggesting diversification of the sedimentation processes. The analysis of the pottery style and microscopic examinations of technological aspects of fragments of vessels, obtained from both long houses, show a rather narrow spectrum of variability of forms and fabric types. For that reason, in order to find a possible correlation between the physical properties and function of vessels, lipid residues analysis was conducted. Finally, the distribution of the particular types of artifacts and archaeobotanical material obtained from both houses was investigated with the help of geostatistical tools. In this case, the emphasis was placed on what might be regarded as hints on long-distance networking and cultural connections, either based on the provenance (like obsidians with a determination of the outcrops; case-study financed by project no. NCN 2018/29/B/HS3/01540) or symbolic function (like vessels with anthropo- and zoomorphic motifs). This package of analytical methods was introduced in order to understand how both households in Biskupice were structured and how they might function at the settlement.

S06.084

Settlement and household archaeology in the aggregated settlement Trinca in Northern Moldova

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Recently, archaeomagnetic and archaeological research have been carried out in the Chalcolithic site Trinca in Northern Moldova. This site from the period Tripolye C1 (ca. 3800–3700 BCE) represents one of the earliest late Tripolye settlement situated in a naturally protected position on a rock plateau. With this very special location, this settlement is prototypical for the beginning of a drastic transformation process of the Tripolye C2 phase, which included among other things the disintegration of populous communities and establishment of a much more dispersed settlement pattern with considerably smaller communities. This transformation process was associated with the reorganisation of the space within settlements and the disappearance of classical ring-shaped Tripolye settlement layouts. The site Trinca represents a transitional stage in this process. Our contribution will focus on a Chalcolithic house recently excavated in Trinca: By comparing the architecture, furnishing and inventory of this building with earlier and later examples, we will explore the specific ways in which these fundamental changes in settlement patterns affected households.

Modularity in Late Helladic Architecture: The Case of the Corridor Houses

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Compared to the palatial structures of the Late Helladic III period on the Greek mainland, the less elaborate examples of Mycenaean architecture have long remained relatively neglected. Still, some proposals for a typology of non-palatial buildings have been quite influential. Among those, Hiesel's type of „Korridorhäuser“ (corridor buildings; see [1]) is regularly featured in scholarly discussion (e.g. [2], [4]). Although they are a product of the attempt to categorize domestic architecture primarily with reference to formal elements (especially ground plans), they have also been regarded as a downscaled expression of palatial ideology.[3] However, on a closer look, the corridor houses appear quite heterogeneous and are rather distinct from the palaces save for the general outline. This begs multiple questions: Are we dealing with primarily domestic structures or palaces in the making? Does their functionality indicate economic importance for a larger community or just for a single household? And do the corridor houses actually hold up as a distinct building type when not only their ground plans, but also their functions, installations and other elements are considered? As part of research for a master's thesis presented to the Institute of Prehistory at Heidelberg University, these problems were examined for the first time on the basis of Hiesel's entire corpus (which was limited to the Peloponnese), as well as several similar structures from Thessaly, Crete and the Cyclades. Attention was paid to include multiple avenues of approach (architectural, topographical, functional) to achieve a holistic view of the research objects. The results of the inquiry do not only point toward a deconstruction of the corridor house type but also indicate that a different definition for those buildings is worthwhile: This „modular definition“ that relies on small-scale architectural features instead of entire buildings enables us to fit the corridor houses more easily into the broader architectural tradition (including a cultural-historical proposal for their genesis) and offers interesting implications for their economic and cultural significance. Probably the most valuable insight, however, is that the discussion on Late Helladic household archaeology and architecture in general could benefit from a focus on modularity.

References:

[1] Hiesel, Gerhard, (1990), Späthelladische Hausarchitektur. Studien zur Architekturgeschichte des griechischen Festlandes in der späten Bronzezeit, von Zabern, Mainz; [2] Darcque, Pascal, (2005), l'Habitat Mycénien. Formes et fonctions de l'espace bâti en Grèce continentale à la fin du IIe millénaire avant J.-C., Ecoles Françaises d'Athènes, Athens, 351-352; [3] Hiesel, Gerhard, (1990), Späthelladische Hausarchitektur. Studien zur Architekturgeschichte des griechischen Festlandes in der späten Bronzezeit, von Zabern, Mainz, 208; [4] Pantou, Panagiota, (2011), Mycenaean Society outside the Palaces. A Study of Late Helladic IIB – IIIB1 Corridor Buildings, ProQuest LLC, Ann Arbor, 40, <https://www.proquest.com/docview/854323308>, 2022-06-27

Bostel di Rotzo: new insights into the domestic structures' variability in a pre-Alpine Iron Age village

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The Iron Age village of Bostel di Rotzo is the northernmost settlement of the so-called Magrè Culture, a material culture enclave spread in the Veneto foothills, in northern Italy. The Magrè Culture is characterized by the coexistence of hybrid elements from the plain, occupied by the ancient Veneti, and the Alpine area, inhabited by the Rhaetic peoples. The settlement distribution is of key relevance, as these sites can be considered nodal points for the movement of goods and people between the Venetian plain and central Europe.

The Bostel village was discovered at the end of the 18th century. Since 1993, it became the core of a systematic research project which employed a multimethodological approach such as geophysics, remote sensing, archaeometry, zooarchaeology and archaeobotany to understand the settlement organization and its structures. Over the years, several house units and crafts areas have been excavated, contributing to highlight architectural variations according to the function and chronology of the structures.

Three main structures and a fourth one in a preliminary stage of investigation will be compared. Of the three, only House A has been entirely excavated (Leonardi, Ruta Serafini 1981). The recent excavations in the twin structures of Sector C (De Guio et al. 2010) are helping us to deepen our understanding of Iron Age craft activities and settlement dynamics in the pre-Alpine region. Structure D is the oldest house unit currently identified and with a floor of over two meters depth offers an interesting starting point to evaluate the vertical organization of the domestic spaces. Finally, Sector G, although in an early stage of excavation, has already shown great potential to define the phases of dismantling, renovation, and reuse of residential buildings which could also encompass the employ of impressive masonry works (Magnini et al. 2020).

De Guio, A., Bressan, C., Ferrari, G., Mantoan, R., Gamba, M., Migliavacca, M., Padoan, C., Nicosia, C., 2011. Bostel di Rotzo (VI) – stato di avanzamento delle ricerche. *Quaderni di Archeologia del Veneto*, XXVII, pp. 168-183. • Leonardi, G., Ruta Serafini, A., 1981. L'abitato protostorico del Bostel di Rotzo (Altopiano di Asiago). *Preistoria Alpina*, 17, pp. 7-75. • Magnini, L., Bettineschi, C., De Guio, A., Burigana, L., Pedersoli, S., Griggio, E., 2020. Non solo scavo: novità dal Bostel di Rotzo (VI) a venticinque anni dall'avvio delle indagini dell'Università di Padova. *FOLD&R*, 473, pp. 1-18.

S06.087

Byre-houses: how reliable are our proxies?

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In this paper we will assess the robustness of interpretation of byre-houses given in literature for the Bronze Age and Iron Age longhouses in Northern Europe.

Archaeological structures interpreted as byre-houses are generally defined if they fulfill one or more “key features”, such as the evidence of animal dung or bones, certain types of finds, house architecture, sunken floors with organic infills, macrofossils, cattle footprints, micromorphological features, high Phosphate values and so on (for an account see Nicosia et al. 2022). However, when looking at the structures interpreted as “byre-houses”, most of them are defined solely on the basis of architectural features. The latter, defined by Waterbolk (1975), usually refers to the presence of partitions for animal boxes, a central ditch to collect manure, matting, extra post-holes, and separate entrances for the living and the byre sectors of the structures.

Therefore, it is clear that in most of the cases, the evidence is indirect and relies on a self-sustaining argument. Using typology as the only proxy causes the definition of similar houses as byre-houses, thus reinforcing the initial assumption. This will in turn generate a loop which is not necessarily relying on stable ground.

Our goal is not to disprove the architectural proxies or the interpretation of certain longhouses as byre-houses, but rather analyzing whether these proxies are robust enough to be used alone when interpreting an archaeological structure as such. We will do so using some exploratory analysis, notably (but not solely) Principal Component Analysis, in order to study the variation or the clusters in our dataset, comparing data from structures interpreted as byre-houses with others defined as simple houses or “non-byre” houses in the literature.

Nicosia, C., Polisca, F., Miller, C., Ligouis, B., Mentzer, S., Mangani, C., Gonzato, F. 2022. High-resolution sediment analysis reveals Middle Bronze Age byre-houses at the site of Oppeano (Verona province, NE Italy). *PLoS ONE* 17 (8): e0272561. <https://doi.org/10.1371/journal.pone.0272561>

Waterbolk, H.T. 1975. Evidence of cattle stalling in excavated pre- and protohistoric houses. In: Clason, A.T., ed. *Archaeozoological Studies Papers of the Archaeozoological Conference 1974*, held at the Biologisch-Archaeologisch Instituut of the State University of Groningen. Amsterdam: North-Holland Publishing Company, pp. 383–394.

S08: Analog Modelling the Late Neolithic and the Early Bronze

Chair: Vesa Arponen, John Robb

This workshop session introduces the core ideas behind the analog model being developed in a ROOTS project at Kiel University and offers an opportunity to try out the model. The model seeks to simulate certain selected socio-environmental processes in late Neolithic and early Bronze Age in North Central Europe. The analog model seeks to investigate these questions from an experimental agential perspective afforded by the analog model as something playable by researchers. Of special interest is the modeling of the costs and benefits of selected social interaction processes from inclusive or corporate towards exclusive or personal network forms of social complexity (e.g. Feinman) and how these tie up with archaeological phenomena of the period from material to social changes. After a talk introducing the model (30 minutes), up to 4 audience members have a chance to play the model in supervision of the project’s developers and, lastly, participants will be invited to discuss their experience and knowledge gained (2 hours). Any number of interested persons are invited to observe.

S09: ROOTS Past-Present Connectivities Essay Competition

This session invites selected contributions from the recent ROOTS Past-Present Connectivities essay competition to present their work. The essay competition posed the question: can we identify recurring social and/or environmental patterns in the past and present? The competition called for contributions that take a reflective, critical, and interdisciplinary point of view to the question. We particularly welcomed essays working in the “middle range” combining philosophical and other theoretical understandings of big ideas and big question with empirical and historically grounded understanding of real processes. Ultimately, investigations into past-present connectivities seeks to answer the question whether past processes or conceptions thereof could be a guide in the study of the present, and vice versa.

S09.088

“Let them have cake” - Feasting as a regulating practice in past societies

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Feasting is inherently hard to trace archaeologically as the context is so ambivalently in its interpretation. It has been assumed for groups building causewayed enclosures as these structures usually contain pits with animal or human bones or these kinds of remains are deposited in the enclosure ditches and rarely any other structures were found in their interior.

The food component in feasting, which is also important for the archaeological tracing of such activities, seems to be universal to humankind, even until recent times (for example Thanksgiving, Christmas, etc.). Therefore, the distribution of food surplus among one’s own group or neighbouring groups could potentially have been a way to obviate social inequality or the hoarding of (food-) wealth.

Prehistoric societies were most likely not very similar to our modern western societies but rather equipped with a different structure, emphasising relations and composite bodies that were changed by and through relationships but also consumption of substances such as food. These societies possibly also had other-than-human members, be it animals, plants, objects, places, or metaphysical beings. Feasting might have played a very different role to them than it does to us today and it might have been stricter who was allowed to partake.

These different aspects can only be discovered by archaeologists, if the social structure of prehistoric groups is analysed and not assumed through shared material culture (such as “Funnel Beaker Culture”) or economic reasons. If feasting was actively used to conquer social inequality in prehistoric societies or if it was a welcome side effect remains to be seen as little research has been done about feasting in prehistoric societies. It definitely leaves much food for thought for future studies.

S09.089

Charting the courses of change: A case study exploring the rising flood of AI through examination of recurring patterns between past, present and future

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The patterns which echo across time are not carbon copy repetitions, but rather recurring currents of change, and these can potentially be put to beneficial use in determining possible outcomes of the near future. The first portion of this presentation presents a framework for the mechanics of past-present connectivities. In so doing, it utilizes insights from the disciplines of biology, physics, and archaeology/history to explore why scholars identify recurring patterns in the first place. Next, it calls upon philosophical models to argue that those recurring patterns may offer vital and pertinent insights on the near future of today’s most pressing concerns and debates.

The second section builds upon the thought foundations established in the first through a case study of one of today’s most pervasive and intriguing subjects: the rise of artificial intelligence (AI). More specifically, the second section investigates the ways in which repeating patterns from the historical record might orient us towards diverse possible socioeconomic, cultural, political, technological and religious/legal developments related to the increasing prevalence of AI in today’s world. The presentation concludes with a reflection on the critical roles and ethical responsibilities which historical studies have to the present day.

S09.090

Long Day's Journey into Night: The 'Divergence Problem' of Global Explanatory Models in Archaeology

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In search for a global explanatory model in archaeology, this paper explores fundamental parameters of environmental interconnectivity and ecological functionalities. Key question is to which extent these enable the theoretical and methodological establishment of large-scale (or global) models that explain complex human patterns in different landscapes. Inherent in such an attempt to understand model complexity are principles of geography and ecology and archaeology as well as attempts of model parametrization and adaptation. Eventually, the issues raised here lead to the hypothesis of a 'Divergence Problem' in archaeological modelling and particularly in socio-environmental models, i.e., a mismatch between archaeological data complexity, explanatory variables, and the simplicity of the resulting model. With the attempt to adapt global models to regional contextualization, I would like to discuss the application of a geographic correction coefficient, which could potentially enable comparison between regionally different environmental compositions based on terrain permeability and individually derived activity spheres. Following Roland Robertson's terminology, it can be referred to as the *glocalization coefficient* (Robertson, 1995).

Robertson, R. (1995) 'Glocalization. Time-Space and Homogeneity-Heterogeneity', in Featherstone, M., Lash, S. and Robertson, R. (eds.) *Global modernities*. London: Sage, pp. 25-44.

S11: Between invasion and domestication: rethinking the socio-environmental ROOTS of crops, weeds and invasive species

The dawn of agriculture brought an array of domesticated plants as well as numerous species of arable weeds and European grassland invaders. Despite the long-standing recognition of similarities between these plant groups, so far little is known about their origin and ecological traits. We want to explore correlations between the social and environmental dynamics that have driven the intertwined development of crops, their weeds and plant invaders. We aim at discussing past and present interactions between humans and our agroecological niche. The practice of plant cultivation not only introduced non-indigenous crops, but also created never before existing ecological niches that fostered the evolution of new species and plant communities. They were not intentionally selected for, rather “unwanted” weeds opposed to the “desired” crops. But in fact, the story is more complex, as some weeds became than domesticated and later weeds again, even within an evolutionary short time period.

The Neolithic Plant Invasion Hypothesis, which emphasises that European grassland species are worldwide invaders, further stresses the relevance of wild plant adaptation to practices of cultivation at the beginning of the Neolithic. Wild progenitors of crops are considered to have evolved alongside various arable weeds including invasive species originating from Europe, sharing autecological characteristics and adaptation to open and recurrent disturbed habitats.

Highlighting the interrelation of the human cultivation practices, the history of domesticated plants, arable weeds and invasive plant species will stimulate discussion on current challenges related to plant breeding and cultivation, loss of biodiversity and need of natural heritage management. By bringing together relevant archaeological and archaeobotanical research, studies on modern plant breeding, weed ecology and environmental genomics, as well as ethical perspectives on environmental management, we envisage to open up a venue for crossdisciplinary discourse regarding the history and future of domesticated plants, arable weeds and plant invaders.

- How has plant domestication been influenced by intentional and non-intentional human activities?
- What environmental factors make wild plants and weeds become crops?
- Which genetic and/or morphological adaptations of plants can we trace with archaeobotanical and genetic information?

S11.091

Between invasion and domestication: rethinking the socio-environmental ROOTS of crops, weeds and invasive species

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We, a collaborative project in the Cluster of Excellence ROOTS, aim to bring together colleagues with expertise in plant domestication from different scientific fields.

With this session, we aim to provide a platform for interdisciplinary exchange of relevant results and recent approaches related to the study of past and present human-plant interactions in different agroecological niches. We consider that human cultivation practices, the history of domesticated plants, field weeds, and invasive plant species are closely intertwined. The deeper knowledge of the close linkages in the past will hopefully stimulate discussion of current challenges related to plant breeding and cultivation, biodiversity loss, and natural heritage management.

By bringing together relevant archaeological and archaeobotanical research, studies of modern plant breeding, weed ecology, environmental genomics, and ethical considerations of environmental management, we aim to create a venue for interdisciplinary discourse on the history and future of domesticated plants, field weeds, and invasive plants.

The main objective of our session is to uncover links between the social and environmental dynamics that have shaped cultivation practices, on the one hand, and the evolution and diversification of crops, weeds and invaders, on the other hand.

We believe that the history of socio-ecological interactions has not yet been deeply addressed in studies of modern crop production, plant breeding, or natural heritage management.

Building on knowledge about the socio-environmental roots of the plant foods that we eat and the weeds and invaders that we continuously attempt to eliminate, however, can add fundamental value to the exchange of knowledge and ideas regarding future sustainability of our cultivation practices, the crops that we grow and the biodiversity of agroecological habitats.

A closely related goal of the session is therefore to stimulate interdisciplinary discourse and raise awareness of the importance of archaeological research in addressing the current challenges of sustainable crop production and natural heritage management.

S11.092

Gras does not grow faster if you pull: On the transformative history of plants, forests, crops and people

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More than 500 million years ago, plants made their way onto land, enlivening a hitherto barren landscape. Forests were not long in coming, while our human history only dates back to about six million years ago. Most of the time, our ancestors lived as nomadic hunter-gatherers from what nature provided them.

However, transformational interventions in the environment became increasingly evident from the domestication of fire, throughout the rise of anatomically modern humans and the steadily increasing shift over time towards an at least temporarily sedentary lifestyle. During the Neolithic transition then, characterised by the domestication of plants and animals and the subsequent spread of the new sedentary lifestyle, the influence of humans on the natural world constantly increased. The history of forest ecosystems in particular shows us how closely the history of humans is interwoven with that of plants and how much green life determines our humanity in the past, present and future.

S11.093

The tangled web of domestication and speciation: the impact of our terminology on modelling early plant use

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Domestication is one of the fundamental process that has shaped our world in the last 12,000 years. Changes in the morphology, genetics, and behavior of plants and animals have redefined our interactions with our environments and ourselves. However, while great strides have been made towards understanding the mechanics, timing, and localities of domestication, a fundamental question remains at the heart of archaeological and scientific modelling of this process—how does domestication fit into a framework of evolution and natural selection? At the core of this is the ontological problem of what is a species? At the core though of all domestication definitions is the notion of a process, a protracted period of time over which gradual change occurs from the state of wild to the state of domesticated. However, within this are two related problems – the first, as Purugganan and Fuller (2009) note, has been a debate within evolutionary biology and history of science of how we fit domestication into a framework of evolution and natural selection, and secondly, as Lee et al. (2011) comment, “the differences between domesticated plants [and by extension animals] and their wild relatives are not always clear”. With archaeological data primarily providing us with points along the pathway to domestication, we are left, as archaeologists with a challenge: how are we to incorporate an evolutionary model of domestication within discussions change between one ‘thing’ (the wild taxa) at the start of the process and the ‘thing’ (domesticated taxa) it becomes? What are we to do with the ‘things’ between undomesticated and domesticated? Additionally, are the taxa at the start and end truly different: does domestication lead to ‘speciation’? In this paper, the complicated concepts and constructs underlying ‘species’ and how this can be applied to the process of domestication are explored. The case study of proto-indica rice and the Mesolithic-Neolithic transition in the Ganges Plains is used to illustrate that our choice of ‘species’ definitions carries with it ramifications for our interpretations, and that care needs to be made when handling this challenging classificatory system. The terminology around role of semi-wild/semi-domesticated, cultivated plants, proto-domesticates, culti-wilds is discussed, and how this impacts our modelling of the domestication process, transitions to agriculture, and the lifeways people engaged in.

S11.094

Is preadaptation to disturbance key to agroecosystems invasions? Empirical evidence, discussion, and future research routes

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Past, human-induced evolutionary processes can have great influence on contemporary plant introduction and invasion success. The Neolithic Plant Invasion Hypothesis proposes that since Eurasia had the longest history of agropastoral development compared to other continents, Eurasian plants are highly disturbance-adapted, which makes them successful invaders of disturbed agroecosystems. However, this Eurocentric perspective largely ignores that several other cultures around the world independently developed agropastoralism through history, which challenges this hypothesized superior adaptation of Eurasian species. To test whether geographical origin and the assumed exposure time to agropastoralism affect early-life response of invasive plants to disturbance, we performed a multi-species experiment with 30 invasive species. We divided the species into three groups: exposure long, native to Western Asia; exposure medium, native to Central Europe; exposure short, native to America. We created monospecific experimental units (n = 900), each containing 50 seeds, to which we applied three soil disturbance treatments (control/compaction/tilling) combined with two space

occupancy levels (available/occupied).

Contrary to our expectation of Eurasian species benefitting more from disturbance in terms of germination and seedling performance, all species groups profited equally from disturbance. For some traits, there were differences among the groups, regardless of the disturbance treatment. These results suggest that non-Eurasian species can cope just as well as Eurasian species with the disturbances associated with agropastoralism.

In the second part of my talk, I will discuss more in details the valuable points and shortcoming of the Neolithic Plant Invasion Hypothesis and more in general of the concept that preadaptation to disturbance is indeed key to the invasion of agroecosystems. I will report on some of the recent efforts that have been made to test this hypothesis and some new research routes that could be followed. To truly disentangle pre- from post-introduction adaptation, I believe it is necessary to bridge the disciplines of ecology and archaeobotany. Through the latter we could for example compare morphological traits of invasive species' remains in different regions or points of time and therefore gain insight on the timing of past evolutionary processes.

S11.095

Palynological studies shed new light on the Neolithisation process in central Europe

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A precisely dated, high-resolution palynological profile shows that between 5600 and 5500 bc a community that grew crops and raised livestock settled on the northern periphery of the LBK colonisation zone (NW Poland - Lower Oder area). This indicates that pioneer farmers reached this region around 200–300 years earlier than estimated by recognised models of the Neolithisation process. These findings point to the need for a revision of the Neolithisation model, not only regarding dating but also in terms of reassessing the role played by demographic pressure. The authors believe that the impact of the latter is widely overestimated, as migrations may also have led to conflicts stemming from diverse ethnicities and competition for prestige and access to the most valuable land. Cooperation with hunter-gatherer communities could have been an additional factor that may have been particularly significant during the period of pioneering colonisation.

S11.096

Ecological niche for rice in Japan during the Yayoi period via species distribution model

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The introduction of rice and millet agriculture into Japan during the 1st millennium BCE led to significant changes in lifestyle within the archipelago. Rice and millet agriculture were proliferated by migrant communities from mainland Asia; these communities spread into the Japanese islands interacting with the incumbent population of complex hunter-gatherers, the Jomon people. However, its adoption was not uniform across Japan, with some areas showing limited to no reliance on the new subsistence strategy and others, after an initial adoption, even reverting to a predominantly hunting and gathering economy. The geographically diverse response to the continental subsistence economy is generally assumed to be reflecting the underlying variation in the environmental and climatic settings of the Japanese islands. However, this assumption remains untested, and further exploration of the relationship between environmental and social factors is required to elucidate the diversity of local responses. This paper contributes to this research agenda by exploring how environmental suitability for rice agriculture impacted the spatial distribution of archaeological sites in the Yayoi period. This will be completed using species distribution modelling (SDM) of paddy field sites to create ecological niches for Japonica rice incorporating factors such as ecological thermal niche models and soil for environmental variables to see how the past environment impacted the spread of agriculture within Japan.

S11.097

The Effect of Novel Environment on Domestication Process

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In the past 15 years, researchers have demonstrated that plant and animal domestication in a range of species was a gradual transit that took place over timeframes spanning millennia, challenging previous views that domestication was a rapid process. The last decade had also witnessed considerable momentum in documenting the dispersal of domesticated species across the globe thousands of years before the historic Silk Road linked ancient China with the west. Central to this narrative is the eastern dispersal of the Fertile Crescent crops from Southwestern Asia to China and the western

movement of Chinese millet to Caucasus and Europe.

This paper draws attention to the connections between two leading theoretical frameworks that describe these processes over time and space: one associated with evolutionary biology in the context of environmental changes during the Pleistocene-Holocene transition and the other with the Bronze Age globalization and the role of agriculture in the Anthropocene. Using as examples several major crops (e.g. maize, barley and millet), this paper calls for greater attention to the conceptual coherence of these discussions. It highlights the geographical mismatch between the first evidence of the utility of a given species and the subsequent occurrences of domestication traits in markedly different environments. Such geographical decoupling between evidence of the beginning and end of the domestication process constitutes a global theme.

S11.098

Exploring the long-term interaction of the opium poppy and past human societies: first results from the archaeological database and contribution of morphometric and genetic analyses

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The opium poppy (*Papaver somniferum*) is a multi-purposes plant used for food (oil, dry seeds), in pharmaceutical or narcotic products and as an ornamental plant. Nevertheless, its history is still largely unknown, notably because of its imprecise phylogeny, the difficulty of the recovering of seed on archaeological sites, or the absence of identified morphological traits of domestication. A co-funded research project (ANR JcJc Poppy, FTC Dope) aims to unravel the origin of the plant, the complexity of its domestication process, their dispersal trajectories and its past uses using archaeological and genetic information (<https://opiumpoppy.hypotheses.org/>).

To date, first reliable chronological landmarks were established thanks to radiocarbon dating performed with the compact AMS EchoMicadas directly on archaeological opium poppy remains. The opium poppy is present in central Italy from the middle of the 6th millennium in the heart of the region supposed to shelter its wild ancestor. Nevertheless, the majority of the earliest sites that have yielded seeds are located in temperate Europe as early as 5300 BCE, raising questions about the modalities (vectors, status) of the plant's diffusion between the first two major agro-pastoral systems of Western Europe. Was the plant unintentionally disseminated with the status of crop weed, or was it already cultivated, and if so, for what purpose(s)? Initially, the aim will be to exploit an ongoing database listing the attestations of opium poppy between 6000 and 50 BCE in Europe, the Near East and North Africa. The critical analysis of the chronological attribution of the remains, and of the archaeological contexts will allow to propose preliminary research path to answer those questions. These results will then be discussed in the light of morphometric-geometric analyses of archaeological seeds and genetic analyses of current and sub-actual opium poppy varieties in order to explore the long-term interaction of the opium poppy and past human societies through a crossdisciplinary strategy.

S11.099

Broomcorn millet cultivation in northern Germany in the Bronze Age: archaeobotanical, paleoclimatic and isotopic insights

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According to a latest palaeoclimatic reconstruction, the time when broomcorn millet appeared in northern Germany, the 13-12th century BC, seems to have been a drier-than-before interval in north-central Europe; there was an apparent reduction in precipitation levels, beginning at about this time and lasting for several centuries (Schirrmacher et al. in press). This may have resulted in larger areas of suitable (i.e. dry) land for cropping, which was possibly of high significance in the western (Atlantic) part of the region, where precipitation levels are otherwise high and wetlands more extensive. Another development could have been longer periods for vegetative growth. Early summer months may have been used for cultivation of short-season crops, such as pulses and oil plants and perhaps spring barley. Broomcorn millet could have been grown in parallel or immediately after the first harvest, on dry, well-drained, warm soils. Archaeobotanical data show the presence of millet all across the region in the Bronze Age, but with only sparse finds in the west. There likely were differences in the degree of millet cultivation within the region, and differences in the local growing conditions. We explore this by looking at the ecological requirements of weeds that potentially accompanied millet in the fields, and by comparing the stable isotope composition of grains of millet from several archaeological sites located on the North Sea and Baltic coasts and inland. We tentatively suggest the cultivation of millet in (only) some locations, and its potential distribution to 'consumers' in other places.

S11.100

Inventions and innovations: The origins of spelt wheat

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What turns an invention into an innovation? How, if at all, might we observe this process archaeologically? Loosely put, new varieties of plants or animals might be considered as inventions (whether from deliberate breeding or by chance), but ones that are only taken up by humans more systematically as innovations when certain social, demographic, economic and environmental factors encourage such take-up. The archaeobotanically-observed history of spelt wheat (*Triticum spelta*) is an interesting case in this respect. Prior to 3000 BCE, spelt is occasionally found in very small amounts at sites in eastern Europe and south-west Asia, but is usually considered to be a crop weed in such contexts, rather than a cultivar. However, rather suddenly across Central Europe ~3000-2500 BCE, spelt appears more consistently at multiple Bell Beaker and contemporary sites, in quantities which suggest a shift to its use as a deliberate crop. By the full-scale Bronze Age in this region, spelt becomes one of the major crops. This paper discusses this Central European process in greater detail via macro-botanical evidence. It argues that demographic factors during the Neolithic may have inhibited the spread of Asian spelt into central Europe, and that while small amounts of local European spelt were probably present earlier on, it was only at the very end of the Neolithic, in tandem with human population increases and major technological changes such as the introduction of the plough that spelt was taken up as a cultivar. In particular, a shift by some communities in the region ~3000-2500 BCE to more extensive (and sometimes plough-enabled) agricultural strategies may have favoured deliberate cultivation of spelt on less productive soils, given this variety's relative robustness to harsher conditions. In other words, a combination of conditions was necessary for this innovation to really take hold.

S11.101

New discoveries on former cultivation methods by stable isotope (¹³C, ¹⁵N, ³⁴S) studies on medieval rye (*Secale cereale*)

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Rye (*Secale cereale*) cultivation in Europe started in the pre-Roman Iron Age but was of little importance until the Medieval. Within the Medieval, rye was established as a dominant crop in middle Europe and was cultivated with success especially on the unfertile sandy soils of northern Germany. The low demand for nutrients and robustness are seen as main reasons for its centuries long extensive cultivation. It is well known, that rye yields were increased over time by the establishment of a manuring system including sods from human caused heathlands serving as bedding material in stables and enriched in dung, the so called 'Plaggenwirtschaft' (plaggen economy).

Here we present isotope measurements on charred rye grains from archaeological sites located on the sandy mainland (Geest) close to the North Sea coast as well as from the marine influenced marshland area. They are compared to the results from grains of experimental cultivations both on manured and reference soils. The data suggest, that the history of cultivating rye on manured grounds began soon in the early Medieval and was in the beginning not necessarily associated with dry heathlands but in fact possibly started on dwelling mounds and may have included at some sites the growing on fertile marsh soils.

S11.102

Exploring diversity in chloroplast genomes of medieval *Secale cereale*

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In medieval central Europe, rye was one of the most important agricultural crops. Its properties of frost resistance, general resilience and resistance to many pathogens made it invaluable for medieval farmers. Rye has a distinct domestication history compared to other cereal crops as the domestication occurred comparatively recently. During domestication, wild populations are shaped by the means of selective breeding, which impacts the distribution of genetic variation within and between populations. To study the history of domestication, genetic sequences of present-day plant populations as well as material from historical samples can provide information about the amount and distribution of genetic diversity. We hypothesize that the cultivated and non-intentionally occurring rye comprised a larger diversity of landraces and local varieties during Medieval times. Here we set out to test this hypothesis using genetic analyses of historical and present day samples of rye material. We first applied archaeobotanical methods to characterize rye material acquired from construction material ranging from the 14th to 18th century from two different locations in Germany. Next we extracted DNA to sequence complete chloroplast genomes of six individual samples. We compared the 115,000

bp chloroplast genomes of historical rye samples to chloroplast genomes of other cereal crops and identified 78 single nucleotide variants, from which 20 are exclusive to historical samples. By comparing the aDNA chloroplast samples with modern rye chloroplasts, we show that the genetic variation in medieval populations of rye was exceptionally high compared to samples from contemporary populations. This indicates that late domestication and selective breeding in the past few centuries have reduced genetic variation in this important crop species.

S11.103

Long-term dynamics of plant invasions: how alien species, their responses to new environmental conditions and interactions with native communities change with residence time

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Biological invasions are a major threat to biodiversity, but also pose useful natural experiments with the potential to provide many ecological and evolutionary insights. One of the most consistent findings in invasion biology is that establishment success and range size of invaders depend on their residence time in the new range. Yet, few studies have considered residence time in terms of potential effects of eco-evolutionary changes during the invasion process, which will thus be the focus of my presentation. By colonizing a new region and thereby being exposed to new environmental conditions, alien species have a high potential for rapid evolution. Inter- and intraspecific selection in the new environment should thus cause population growth rates of invaders to increase with residence time. Conversely, while native communities may initially be highly impacted by alien species due to a lack of shared evolutionary history, with time they may adapt and thus increase biotic resistance to invasion. I will discuss examples of how alien species respond to new environmental conditions, and particularly how they and the invaded communities change over long timescales. To investigate such long-term dynamics of invasions, I use a species-for-time approach, whereby we study plant species along an alien-native species continuum. This includes Asteraceae species with a wide range of residence times in Germany (ca. 10-18,000 years, i.e. from recent neophyte over archaeophyte to native, including arable weeds and invaders of ruderal sites). We combine multi-species common garden experiments with historical and macroecological analyses. Using this system, we assessed whether range sizes of alien species depend on residence time, and how invasion success over time is determined by a potential mismatch between climate in the new and native range or by functional traits that fit poorly to new environmental conditions. We studied whether biotic interactions between alien plant species and native communities change over long timescales. This research thus contributes to understanding the limits to population growth and spread of invaders over long timescales. I will show how recognizing the dynamic nature of biological invasions will improve the predictability of future invasions.

P01.26

Early Neolithic plant remains from the Carpathian foothill zone (southern Poland): a case study of the Biskupice site no. 18

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The archaeological site 18 at Biskupice represents the earliest agriculture in the Wieliczka Foothills (S Poland). During excavations conducted in 2020 and 2021 (NCN project no. 2018/30/E/HS3/00867) the remnants of four houses dated to the late phase of the Linear Pottery Culture (c. 5100-5000 BC) were discovered. Thanks to the sampling strategy, aimed at gathering plant macro-remains from every archaeological feature and from each of its layers, we were able to study plant assemblages coming from various structures, such as so-called clay extraction pits, hearths and post-holes. Despite representative sampling the list of cultivated plants is rather low since only three species of cereals were found (*Triticum dicoccum*, *T. monococcum*, and *T. aestivum*) together with two other domesticated plants: *Pisum* sp. and *Linum usitatissimum*. Furthermore, wild herbaceous plants appeared frequently and among them the most ubiquitous ones were *Polygonum lapathifolium*, *P. aviculare*, *Chenopodium album*, *Echinochloa crus-galli*, *Fragaria* sp./*Potentilla* sp. and *Rumex* sp. These taxa represent nowadays segetal and/or ruderal plants, however, all of them could have been also used for consumption. A distribution of these plants within different houses will be discussed and the link between characteristics of plant assemblages and type of archaeological feature will be analyzed. Finally, the taxonomic list and the status of plants (native versus foreign species) from Biskupice will be compared with archaeobotanical data from southern Poland. Also, we will provide a discussion about plant economy based on both farming practices associated with domesticated plants and the use of wild taxa.

Additionally, samples for palynological analysis were taken from archaeological features. Only in a few cases they contained pollen grains. The results of palynological studies confirm the presence of local farming (Cerealia, *Triticum* type, and *Secale cereale* - a single finding). Interestingly, the regular presence of spores of *Anthoceros* and *Phaeoceros* hornworts was noted in one clay extraction pit. They are early land colonizers and have a cosmopolitan distribution range. They grow on moist clay soils on hills, in ditches and in moist depressions of the land. Some species, such as the field hornwort *Anthoceros agrestis*, are now associated with agricultural landscapes and grow on moist soil in fields. Their presence might shed light on the function of such pits and on their closest environment.

S13: Scales of mobility in 3rd millennium BC Europe

Is mobility just a keyword or can we disentangle, empirically and theoretically, the various scales at which interactions took place in 3rd millennium BC Europe? Ancient DNA studies have since 2014 revived interest in the origins and dispersal of three major pan-European cultural complexes, known as the Yamnaya, the Corded Ware and the Bell Beaker. In all three cases, mass or folk migrations from, ultimately, a hypothetical source in the Pontic-Caspian steppes have been suggested as a trigger, though in place supported by admixture with local populations. How to reconcile these narratives of long-range migration –and not only east-to-west but also the other-way-round– with other forms of mobility and interactions, such as regional mating networks, kinship systems in which members are returned to their own descent group at death, translocal identities, cattle pastoralism, seasonal and vertical mobility, etc.? Some networks being the size of the Eurasian continent, how to study human mobility on a local scale, particularly in relation to things, raw materials, techniques, ideas and beliefs, each of which have their own dynamics and distribution? In this session, we invite interdisciplinary papers addressing the various scales of mobility in 3rd millennium BC Europe and attempts to integrate archaeological results with genetics, stable isotopes and other proxies.

S13.105

Environmental conditions of the Gordinești II–Stînca goală settlement from the late 4th millennium BC (Northern Moldova). Case study

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Based on the results of archaeological trenching, magnetic, and GPR surveying, we may suggest that Late Tripolye Culture settlement at Gordinești II consisted of at least 16 light-constructed dwellings. Therefore, it can be classified as a small that was developed ca. 3300-2900 BC as indicated by 12 ¹⁴C. Lack of a stratigraphic relationship, stylistic consistency, and a low number of artifacts could point to homogeneity and short-term development of the settlement. The inhabitants were oriented to *cereal* cultivation and livestock husbandry. They were also using the wild hunted animals.

Analysis of plant macroremains collected from the dwellings revealed the presence of *Quercus* acorns, and charcoal of *Fraxinus excelsior*. This demonstrates that deciduous forests occurred in the settlement vicinity. Additionally, numerous macroremains of *Stipa* indicate the presence of patches of the steppe or forest-steppe communities.

Determination of whether natural conditions around the Gordinești II were conducive to the development of the local economy and whether they enabled its long-term habitation is interesting.

The settlement location for the *cereal* cultivation seems to be favorable due to the presence of fertile soils developed on loess or on clays from limestones weathering. The surface of erosion-denudation uplands, denudation valleys, and Racovăț R. fluvial terraces were available and useful for cultivation and husbandry. Isotopic analysis indicated that the livestock were well-fed. These data suggest that the cultivation of plants and grazing animals could have been successfully implemented there, but there is a question as to whether this was practiced for a long time.

The location of the Gordinești II on a highly exposed hump probably did not facilitate the use of the flowing water of Racovăț R. It was possible to dig wells, mostly in the area of depressions east of this settlement, where groundwater is shallow nowadays. There are also springs on the contemporary valley slopes. The great effort put into getting water could be a significant obstacle in the economy of inhabitants of this settlement.

Based on these data, we believe that the settlement at Gordinești II was small and briefly inhabited. Assuming that it was representative of the Gordinești group, the emergence of this settlement kind in Western Ukraine was not only the effect of migration, but also other cultural factors.

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S13.106

Across the mountains. Connections between the intra- and extra-Carpathian region at the end of the 4th and the beginning of the 3rd millennium BC

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This presentation aims to explore a well-defined region of northern Muntenia, located between the Prahova and Buzău rivers, as a space of interactions between the lowlands and the uplands, the steppe and the mountains. The circulation of people, artefacts and ideas between the intra- and extra-Carpathian regions through the easily accessible passes of the Curvature Carpathians in the last third of the 4th millennium BC and the beginning of the 3rd millennium BC resulted

in a particular archaeological record in this area. Intriguing mortuary practices unseen before emerge, burial mounds underneath which single or multiple individuals are laid inside the grave pits, sometime in successive phases, equipped with lavish grave goods consisting of pottery, weapons made of stone or copper, and ornaments made of silver, copper, bone, and shell. At the beginning of the 3rd millennium BC these graves vanish, leaving room to graves displaying Yamnaya mortuary practices. Although less obvious, a Transylvanian connection persists during the first half of the 3rd millennium BC. In this presentation, I will take the mortuary record of flat and mound graves in northern Muntenia as a starting point for analysing the intersection of influences with origins especially in the Carpathian Basin, but also the Lower Danube and the North-Pontic steppe.

S13.107

Central European crisis, culture heterogenization and migrations from the steppes in Late Neolithic

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The aim of paper is to show the symptoms of the socio-economic crisis in Central Europe (2nd part of the 4th millennium BC; cf. Kruk & Milisauskas 1999; Müller 2001) and the accompanying cultural mechanisms. The methodology used: tools of the globalization theory (network connectivity etc.; cf. Knappett 2011) and the theory of culture (heterogenization, hybridization etc.; cf. Barker 2003) were used to analyze the effects of a long-term crisis. Achieved results are: the probable correlation of the crisis and the accompanying cultural changes with the increasing migrations from the steppes and their positive impact on deep cultural changes, i.e. the formation of the Corded Ware Culture (Włodarczak 2021). Research implications: the described situation finds structural analogies in late antiquity (the fall of Rome in the conditions of the growing strength of early Christian network communities - acc. to Edward Gibbon) and today according to Oswald Spengler's idea of the fall of the West (*Untergang des Abendlandes*).

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S13.108

Push or pull? Climatic changes on the European-Asian border 5000 years ago and their role in populations dynamics

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Between 5000 and 4000 years ago, steppe populations started moving eastward in several waves from their core location in the steppes of Western Asia and Eastern Europe, possibly triggering the emergence of Bronze Age Europe. While archeologic and genetic studies well document the movement, the potential triggering factors are less well understood. In this talk, we discuss the potential role of climatic and environmental changes between 5500 and 4500 cal BP in favoring population movements from the Eastern European steppe towards Central Europe. Specifically, we aim to determine 1) local environmental changes that might have pushed populations out of their core area in the steppe and 2) regional ones, that could have pulled the same populations towards better living regions across Europe. Our study addresses how seasonally-specific climatic changes led to vegetation changes and may have affected pastoralist populations. Additionally, we also investigate how equally strong climatic changes did not play any significant role in the social dynamics, as the season in which they were occurring were not relevant for a pastoralist way of life. Our results indicate that we must consider both seasonally distinct climate reconstructions and the complex combinations of different variables in shaping the environmental conditions that were affecting past human societies and populations.

S13.109

Sex bias and selection in the westward expansion of steppe ancestry

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The migration from the Pontic-Caspian steppe into Europe has long been hypothesised to be male-biased. Here, we test this hypothesis based on ancient DNA data and simulations. We present a novel approach that combines forward simulations using actual allele frequencies from ancient populations with an ancestry-based summary statistic under demographic

models with sex bias and selection. This allows the comparison of ancestry patterns observed in real admixed individuals with those obtained from simulations. Although our approach does not allow for the full exploration of parameter space, we consider qualitatively different scenarios with parameter combinations such as number of migrants from both source populations, steppe pastoralists and Late Neolithic Europeans, male proportion in the steppe migration and selection. Selection is modeled in three different ways: fitness advantages associated with steppe ancestry either only for males or for both sexes, as well as fitness advantages linked to male steppe lineages. We find that a model with a strong fitness advantage in steppe male lineages best explains the observed data, with no support for a strong male bias or large migrating population size.

S13.110

Social and economic cases of the Corded Ware mobility

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The funeral rite of Final Eneolithic communities in south-eastern Poland (ca. 2900-2200 BC) is clearly different from the earlier period of the Late Eneolithic. The most frequently indicated connection here is the relationship between a new type of burial and the adaptation of new idea or the migration of East European steppe populations. However, the novelty is also observed in the character of items that are part of the funerary equipment. The graves contain selected products, often made of strictly defined raw materials, sometimes from remote areas (including amber, copper, gold, stone battle-axes, flints). This testifies to the mental map of members of the Corded Ware communities, which covers a large area of Europe. At the same time, this knowledge was available to a large part, or even most of the members of this community. Generally speaking, there is an impression of a social system that fits the simple models of “war democracy” that emerged at the end of the 19th century. By developing only the theme of “democracy”, an interesting question can be asked: how could the universal availability of knowledge (indicated here primarily as the “mental map”) contribute to the demographic and political success of Final Eneolithic communities? The period of the third millennium BC, in this respect, seems to be a special moment in history.

S13.111

Seeking cultural change in 3rd millennium BC in Upper Silesia

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Upper Silesia located in the foreground of the Moravian Gate is one of the crucial crossroads in Central Europe. Despite many years of research, the area should be considered relatively under-recognized although with great potential (Łęczycki 2014). New research (from remote sensing to aDNA) can trace some of the transformations that took place here during 3rd and early 2nd millennium BC (Furmanek ed. 2019). Does the local record reflect the social, cultural, economic and population changes that took place in Eurasia at that time? Are the changes connected with greater mobility and migrations or we can try to interpret it as an inter-generational change? Thanks to a set of radiocarbon dates from a unique series of settlements and burial sites it is now possible to trace processes of the cultural change.

The beginning of the 3rd millennium BC was probably a time of economic prosperity of the Globular Amphora culture societies. Its manifestation here were the vast settlements with rows of trapezoidal longhouses and with mixed agro-pastoral economy. What can be interpreted as a continuation of traditional (Neolithic) socioeconomic model. As in other regions of Central Europe, these communities are replaced/incorporated by new populations with “Eastern” ancestry. Initially they were represented by the Corded Ware culture, and in the next stage by the Bell Beaker culture. These initially coherent communities undergo numerous transformations in the following centuries, visible also at the level of local groups. The transformation taking place triggered changes in different areas of life. A heterogeneous structure of the population may suggest the existence of a multi-ethnic society. Within it there were intergroup conflicts as evidenced by the traces of violence – numerous examples of trauma and injuries were found on the skeletons in different sites. In such tumultuous way a new identity was born, which was an element of the new society Bronze Age with a formed hierarchy and elite social elites. The consequence of this may be fortified settlements or enclosures like circular enclosure in Pietrowice Wielkie with signs of collective or regulated storage

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S13.112

Modelling resource mobility and multidimensional wealth in Eneolithic Central Europe

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In connection with migrations of people from the Pontic steppe in the late 4th and 3rd millennium BCE, as well as increased mobility between the steppe and Central Europe, and within Europe in general, a more individualized form of burial became dominant. The social aspects of these steppe migrations, is still a matter of debate. How fast and how much did CWC communities get access to desirable material resources, and could restricted access to resources and resource networks have led to the development of persistent and growing social inequality?

In this study, we aim to use the provenance of grave good raw materials (from suggestions in archaeological literature) as a proxy to quantify the growth and extent of resource networks in the Bohemian and Moravian CWC. Furthermore, we investigate how resource mobility correlates with the development of, and differences in, modelled grave wealth over time using a variety of grave good value and grave wealth/status proxies in the new open source, and semi-automated, *QuantWealth* framework.

The proxies in *QuantWealth* include flexible estimates of the time and skill needed in grave good manufacture, grave good plurality, raw material scarcity, grave good exclusivity, as well as architectural features such as grave pit depth (if no barrow is preserved), and estimated meat expenditure from deposited animal bones as a proxy for funerary feasts. *QuantWealth* also incorporates the estimated minimum distances (weighted after travel modes) from the suggested raw material sources to their deposition in the graves, which we will apply here as a proxy for mobility networks. *QuantWealth* can also be applied to various measures of inequality such as the Gini coefficient or the Composite Archaeological Inequality (CAI) index.

We then combine these wealth and value proxies with demographic metadata and chronology to quantify the growth or contraction of resource connectivity over time, between sites and regions, and on demographics. Since all of the data and code in *QuantWealth* is open source, each case study contributes to an ever-growing body of data, which is applicable to these questions, and can in turn be reanalysed and reinterpreted by other researchers. These reanalyses can also be combined with more detailed bioarchaeological data on ancestry, uniparental lineages, genetic kinship, pathogens, diet, physical stress markers, isotopes reflecting human mobility, etc.

S13.113

Migration, mobilities and Corded Ware culture: the case of the Jutland Peninsula

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The early 3rd millennium BCE dispersal of the supra-regional Corded Ware phenomenon and its different regional manifestations constitute one of the most striking, large-scale patterns of European prehistory. One of the regions where this development is most evident, is the Jutland Peninsula, where a long history of research has documented the so-called Single Grave custom and its many links to other parts of the wider Corded Ware phenomenon. This paper addresses the role of different mobilities – mobility of different forms and at different scales – among the groups that inhabited the peninsula during the early Corded Ware period and the period immediately preceding it. While the role of migration in the spread of Corded Ware culture has received most of the attention since the mid-2010s when aDNA studies documented significant demic mobility, it is clear that several other forms of mobility played central parts in defining the cultural development of the period. Ranging from vast supra-regional networks to economic and social mobility at intra-regional and local scales, it appears that the particular combination of these different forms of mobility among different groups not only defined the transfer of goods, culture animals and people, but also defined degrees of compatibility (or incompatibility) between the groups. In this way, for example, different constellations of mobility played a key part in shaping the reception of migrations itself in different areas.

S13.114

The impact of steppe dispersals in Luxembourg: an archaeogenetic approach

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A new project, initiated in 2021, with the support of the Institut National de Recherches Archéologiques (INRA), Luxembourg, aims to characterise later prehistoric population changes in the Rhine-Meuse catchment area, using DNA extracted from 5th-1st millennia BC human skeletal remains from present-day Luxembourg, the discovery place of Loschbour man. As a contact zone between major cultural phenomena and landscapes, Luxembourg emerges as a key micro-region to investigate the interactions between farmers and foragers, and the Beaker phenomenon in North-West Europe. Luxembourg has yielded a few spectacular prehistoric burial finds of international significance, such as the double Beaker-period grave of Altwies, Southern Luxembourg, which resembles in layout the so-called 'echinoid burial' of Dunstable Downs in Southern Bedfordshire, England. In this seminar, I will present the initial results of our archaeogenetic study and ask how far culture and genetics overlapped in 3rd millennium BC Europe.

West-to-east directed migrations in the third millennium BC and their impact on the archaeological, genetic and linguistic landscape of Eurasia

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Following the aDNA revolution in Prehistoric Archaeology, and its coverage not only in media but also in many archaeological articles, one can easily get the common perception for late 4th and 3rd millennium BC migratory events to all of them unfolding as coming out of the Eurasian steppe belt and targeting first Central and Northern Europe, and subsequently its West and South. While this overall east-to-west trajectory of so-called ‘steppe ancestry’ and novel Y-chromosome lineages has now been proven many times, these are in no way the only expansions and migrations in our records: Yamnaya people also moved east in a long-range migration forming Afanasievo culture in Central Asia in the process; Globular Amphora users expanded both to west and east, and a good deal of them ended up in modern-day Ukraine and Belarus; Fatyanovo people being a cultural branch of the wider Corded Ware family also moved east and eventually covered a big chunk of the huge Volga lowlands of modern Russia. Even at the end of the 3rd millennium BC, we archaeologically see the transfer of typical Central European burial customs and material culture to the plains of the middle Volga, middle Don and beyond, in the context of regional Abashevo and Babyno cultures, best to be interpreted by another long-range migratory event. All these had profound impacts not only on the Eurasian archaeology but also on their genetic and linguistic landscape, and the paper wants to explore these.

A Bronze Age tumulus from Brânzeii Noi (Republic of Moldova). Interdisciplinary approaches

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In 2013, in the village of Brânzeii Noi located in the northern part of the Republic of Moldova, a burial mound was partially investigated, during some infrastructure works. The archaeological excavations which comprised half of the tumulus allowed the discovery of four graves, three of which burials and the fourth a cenotaph. Interestingly, two of the graves showed several complementary arrangements, which are not very common in Middle and Late Bronze Age burials. Specifically, grave 1 attributed to the Late Bronze Age was covered by a stone structure, an extremely rare situation in necropolises of this period, while grave 4 was protected by a wooden structure, from which several elements have been preserved. Based on evidence of specific burial rites (orientation, position of the body, presence of ocher, wooden structure characteristics), graves 3 and 4 were attributed to the Yamnaya culture.

Anthropological studies were carried out on the skeletal remains to establish the sex, phenotypic features, age at death and paleo-pathological information. The remains belonged to three male individuals, of which one young adult and two middle-aged adults, whose skeletal characteristics show traces of strenuous daily activities.

Moreover, the woody remains from grave 4 were subjected to dendrological analysis to identify the tree species used for the arrangement of the burial chamber; this further allowed deriving information on the palaeoenvironmental context, as such complementary approaches for the Bronze Age studies still remain scarce. One of the wood samples was also used for the absolute dating of the funeral complex, thus confirming its belonging to the Yamnaya culture.

The data obtained for the tumulus at Brânzeii Noi provide a series of details that complement the strictly archaeological observations and enrich the picture of the funerary behavior of the Middle and Late Bronze Age communities in the area between the Prut and Dniester rivers.

S14: Understanding past transformations: Complex patterns, scales, and anatomies

As recent events have clearly demonstrated, both our social world and the environment in which it is embedded can be transformed in what seems like an instant. Yet, with hindsight, such fundamental and enduring alterations are preceded by many and various changes in interwoven parameters across multiple areas of life. Such complex transformative processes also occurred in the past, as the last 7 years of research by the CRC 1266 – “Scales of Transformation: Human-environmental Interaction in Prehistoric and Archaic Societies” have shown.

In this session we would like to address the following research questions and more:

- How did social and environmental parameters (individually, in clusters, or through their interdependence) influence past transformational processes?
- How did the interaction between the natural environment and human populations change over time?
- Which prehistoric and archaic transformations belong in which of our identified categories of transformations: interactive, successive, disconnected or multilateral? What is the archaeological anatomy of transformation? What patterns can we identify in our data and what can they reveal to us about past transformations?

This session is dedicated to the significant results obtained within the first two funding phases of the CRC 1266, presented as contributions by Principle Investigators, PostDocs and PhD candidates from all 20 subprojects. Since 2016, CRC 1266 researchers have concentrated on specific topics, dealing with intensive comparative work on archaeological case studies, palaeoenvironmental archives, diachronic work on parameters with broad theoretical discussions, targeted model development, and cutting-edge method development in dating and sub-surface prospection, to enable true interdisciplinarity. Nevertheless, we also welcome external contributions which can contribute to the topic as outlined here.

S14.116

Scales of abstraction: The Kiel conceptual approach from heterogeneous data to interpretations

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The identification of relevant individual aspects of palaeoecology and society allows the comparison of transformation processes in completely different ecological and historic situations. This basic concept proves, on the one hand, the comparability of transformation processes, and shows on the other hand how diverse the appearance and expression of transformation can be. The investigation of transformations occurring across 15,000 years of human and environmental history is a complex undertaking and must consider archives of varying accessibility, handled by different disciplines. Combining various types of expertise and data both within and between these disciplines adds additional challenges. This presentation will show how the researchers in Kiel approach these challenges in order to work effectively together towards answering common research questions.

S14.117

Prehistoric and early historic Europe: Anatomies of transformation

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With the aim of studying the complex transformation processes of various past societies, studies of the CRC sub-projects are very detailed for transformation patterns and scales in each individual region and wider territorial zones. We are working on re-evaluating previous CRC results by expanding and concretizing them from both historical-archaeological and socio-ecological points of view. Based on the frame of reference in which the transformation processes are embedded (social, cultural, economic, and physical environment), we are trying to compile already existing results and draw parallels to European regions in certain periods that are not covered by the CRC focuses. By observing the interaction of several proxies of the transformations (the anatomies), we work to track common patterns in both spatial and temporal dimensions. In the compilation and comparison, we orient ourselves to the following research questions: Can we detect triggers for transformations in the past? Which impact did environmental changes have on ancient societies, and vice versa, how much did human societies impact the environment? The same questions can be raised on cultural proxies/economic innovations. How do the different proxies interact with each other and eventually shape transformations (interaction, succession, or disconnection)? Finally, can we differentiate periods of increased transformations from more stable times; do they occur regionally isolated or super-regionally; do they run synchronously or asynchronously in neighbouring regions? In the first part of this talk, we will introduce our research approach: The broad spectrum of proxies will be critically

evaluated under different circumstances and the diverse data from different disciplines will be visually combined. In the second part of our talk, we will illustrate our study by presenting one case study with a focus on the specific transformation at the end of the 4th and the beginning of the 3rd millennium BC that can be traced in many regions of Europe. With the effort of combing various evidence, we will show how diverse transformations can be, and how individual characteristics and broad similarities occur at the same time.

S14.118

Indicators of Transformation Processes: Change Profile as a Method for Identifying Indicators

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Societies are in a constant state of change. Archaeological research has shown how some of the driving factors of change in societies include technological innovation, change in subsistence strategies, climate change, environmental change, changes in political organisation, population increase or decrease. This list can be extended and detailed at will. However, at what point and in what combination do these factors lead to a profound transformation?

The aim of this presentation is to provide a method, not only to visualise interdisciplinary conducted results on transformations, but also to provide a multi-proxy approach to identify relevant factors in transformative phases. Change profiles allow to visualize heterogeneous results synchronously and thus to identify overlapping transformations of individual domains. Change profiles are synchronously compiled over the process of a transformation investigated by the SFB 1266 and thus the coincident of factors of diverse domains is presented. A case study will be the Early Iron Age in Baden-Württemberg.

Due to cultural diversity and human behaviour, this presentation does not aim to identify a “universally valid set of indicators” of transformation, but rather define a multi-proxy approach based on archaeological aspects, changes in subsistence and climate as well as environmental factors. The identification of indicators and their interconnection will ideally permit a better understanding of transformation patterns on a transregional and diachronic scale.

S14.127

Scales of political practice and patterns of power relations in Prehistory

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Political practices are fundamental for co-existence in human groups, yet the systematic investigation of such practices within prehistoric societies is still very much pending. Relevant discussions are often limited to cases of rather obvious asymmetric power relations and the alleged establishment of elites. In order to fill this complex gap in the current discussion we take a systematic approach exploring the nature and organization of prehistoric power relations, decision-making and conflict resolution. We will investigate changes in political practices through a diachronic set of case studies from prehistoric societies, examining the impact of these changes on the overall transformative processes of prehistoric sociality.

In our approach, we define parameters focused on the characterization of power relations and political practices. Eight parameters have been identified as meaningful markers to be used as a comparative framework and can be addressed from our archaeological data: community size, conformity/diversity, critical resource access and distribution, network configurations, organization of decision-making, property rights, (violent) conflict and resolution, and knowledge. This contribution presents different case studies from prehistoric Europe and beyond and their systematic analysis of political practices and patterns of power relations within prehistory; each exhibiting socio-political complexity in a variety of forms: Mesolithic Siberia, LBK Vráble Slovakia, Neolithic and Bronze Age Pile-dwellings Switzerland, Copper Age Tripolye Ukraine, Neolithic and Bronze Age Schleswig-Holstein, Iron Age Greece.

S14.128

Understanding the Anatomy of Abandonment: the Early Latène Settlement of Hochdorf

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At the beginning of the 4th century BC, fundamental changes within Iron Age society can be perceived from archaeological

data such as the abandonment of hilltop settlements or altered burial rites. Most of the literature suggests that in the second half of the Early Latène Period a population movement from western Central Europe to the south began, mainly driven by overpopulation, land and soil degradation, social conflicts and changing climatic conditions.

To examine the relationship between those parameters and migration, a case study of the Early Latène settlement in Hochdorf is conducted within the CRC 1070 ResourceCultures. Extensive archaeological, archaeozoological and -botanical data are available as a baseline for this settlement, which was abandoned around 380 BC (Biel et al. 2015). To identify triggers that may have led to the abandonment and population movement the following research questions are asked using an integrative multi-proxy approach: Is there evidence for soil degradation due to intensive agriculture in addition to altering climatic conditions? Was there insufficient resilience to respond to economic and/or social shift? Or was it the complex convergence of many single changes?

Based on archaeological features and findings, it is possible to explain the structure of the settlement as well as settlement activities or the economic and social structure. First results show that the settlement was embedded in an open landscape consisting of arable land as well as grassland. The faunal and plant remains indicate a prosperous rural settlement, which was characterized by agricultural as well as craft activity (Schatz/Stika 2009). Soil scientific analyses of multi layered colluvial deposits show less erosion than known from other loess regions with agricultural use (Kadereit et al. 2010). Colluviation started in the Late Neolithic, youngest Luminescence and 14C ages date to the Middle Ages. Ongoing research shall provide indications how prehistoric people dealt with soil as a resource, or why there are thinner Late Iron Age colluvial deposits than assumed.

In the synthesis, an attempt is made to understand the triggers for changing settlement and land use patterns as a whole, including farming people with their social and religious integration, their economy, their knowledge as well as ecological factors. An interplay of environmental conditions and socio-cultural circumstances is assumed.

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S14.129

The early Balkan village: Transformations of Neolithic and Chalcolithic settlements patterns in South-Eastern and Eastern Europe

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Drawing on the discourse on the 'early Balkan village', we would like to classify and historically contextualise transformations of settlement patterns throughout the Neolithic and Chalcolithic in South-Eastern and Eastern Europe. Besides regional reconstructions of settlement processes, the main source of our investigation are settlement plans obtained through excavations and archaeomagnetic surveys. Analysed parameters are site geography and topography, settlement and community size, demarcation of sites from their surroundings, and classifications of settlement behaviour. For the period between 6500 and 3500 BCE we are able, based on these criteria, to distinguish several major periods in which the configuration of human settlement patterns differs significantly. Between each of these periods, fundamental reorganisations of settlement systems took place.

S14.130

From Michelsberg to Wartberg: anatomie of a transformation

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The talk focuses on the transformation around the mid-fourth millennium BCE in the western German Lower Mountain Range, a still open question in archaeological research. A central aspect of our project lies on the scarce evidences of settlements in this period. We will start with some basic parameters that are available throughout the German Neolithic development: burials in cemeteries, houses per settlement, house sizes and cultural dynamic processes derived from the length of cultural groups defined by archaeologists to distinguish and characterise dominant transformation phases. To characterize the dynamic of one part of these parameters we compare the development of house sizes within the Neolithic between the TRB-sphere and the mountain area of the Neolithic Altsiedelland. In addition, we describe the development of house construction based on several parameters to pinpoint a central transformation phase within the Neolithic around 3.800 cal BCE.

This transformational phase is well known in central Germany by marked changes, e.g. the development of enclosures. But with respect to many other aspects the end of Michelsberg and the turn towards Wartberg in the area of Westphalia and Hesse is still unknown. This transformational phase from late Michelsberg to Wartberg will be described by selected a more detailed re-evaluation of settlement sites with house features and the typology of selected and until now unnoticed vessels or fragments. In addition, we will present the results of a first correspondence analysis bridging the gap from

Michelsberg to Wartberg. In contrast some parameters focussing on the economic sphere enable us to highlight persisting discrepancies between both groups. To close the presentation and foster the discussion we will present first results from our excavation in the fortified lowland settlement of Wittelsberg near Marburg.

S14.119

The origin of Neolithic copper in the northern Central European lowlands and southern Scandinavia: connectivities on a European scale

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The production, distribution and use of copper objects and the development of metallurgical skills in Neolithic northern Central Europe and southern Scandinavia are linked to early centers of copper metallurgy of South East Central Europe and Southeast Europe. A total of 45 Neolithic copper objects, so far the largest sample of Early Neolithic objects from the northern Central European plain and southern Scandinavia, were selected in this study for new lead isotope analyses. They aided in the identification of the origin of the copper: These new analyses indicate that the copper ore deposits in southeastern Europe, especially from the Serbian mining areas, used for the Early Neolithic northern artefacts (ca. 4100-3300 BC). Copper from the Slovak Ore Mountains, the Serbian mining areas and the eastern Alps seems the most likely source for the few Middle Neolithic artefacts (3300-2800 BC) and deposits of the Slovak Ore Mountains and Alpine Region for the Late Neolithic and the Early Bronze Age (2300-1700 BC). For the artefacts dated after 2000 BC, the Great Orme mine in Wales seem to have been also the source of copper for the analysed metals. The use of copper from different regions of Europe probably reflects changing social and cultural connectivities on a European scale and the changing chronology of copper exploitation.

S14.120

Bronze Age Transformations in North-Central Europe

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The focus of our project is on transformation processes, which we investigate along a transect from Schleswig-Holstein via Mecklenburg-Western Pomerania to Poland (Kujawy). We are particularly interested in the transition to the Middle Bronze Age around 1600/1500 BCE, as different settlement patterns are found along the transect, which we associate with different transformations as well as different reactions to changes in society, economy or ecology. Furthermore, the transition from inhumation to cremation is of major interest to us, which spreads in our working area around 1300 BCE and can often be reconstructed as a complex transformation process.

Comprehensive dating helps us to define these two central moments of transformation as well as other moments of change and to reconstruct and compare their developments along different spatial and temporal scales. We also compare our archaeological data with palynological data, which give us information about landscape development and thus, among other things, about settlement density. Bronze Age transformation processes in northern Germany and Poland can thus be recorded and compared at the micro, meso and macro levels, so that we can recognise and understand different patterns. On the micro level, we have recorded various transformations on a Bronze Age cemetery (site: Mang de Barga) and a Younger Bronze Age settlement (site: Dobbin). The recording of quantitative regional and supra-regional data shows us their embeddedness, so that the intensities and influences of certain transformations can be assessed differently. With this contribution we would like to present and discuss our current transformation research against the background of recent absolute dating.

S14.121

A new mass deposition of headless skeletons at the Early Neolithic settlement of Vráble, south-west Slovakia

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In summer of 2022 we discovered a minimum of 38 mostly headless skeletons in one of the ditch entrances of the enclosure surrounding one of the LBK settlement parts of Vráble-Velke Lehembý in southwest Slovakia. So far, this site has revealed eight such headless human individuals carefully and regularly deposited in four pairs to the west of all entrances. Beside these outstanding practices, regular burials of complete skeletons, as well as partial human depositions, all dating between 5075 and 5000 BCE, have been discovered. The new finds offer an expanded, and much more complex picture

of ritual activities connected to enclosure ditches in Vrábě. Furthermore, the discovery complements the evaluation of the broader phenomenon of irregular burial rites in the late LBK in Central Europe, with sites such as Asparn-Schletz Herxheim or Vaihingen (Enz) showing an intriguing variability of specific practices within the broader framework of the deposition of human remains in enclosure ditches. With now more than 80 individuals found at Vrábě, we have new opportunities to explore the role of ritual, magic and/or violent practices, as well as the social and genetic composition of the buried and deposited population.

S14.122

Sledges, wagons and other transportation means in prehistory and early history of the North Pontic

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The topic of appearance and spread of transportation means, especially of wheeled vehicles, is a widely discussed issue, since a tremendous impact on the life of human communities is assumed from those vehicles. One of the key-regions included in the discussions on the origin of the 'wheeled vehicles' is the Siret-Dnieper interfluvium and the North Pontic area. In particular, this issue is closely intertwined with such topics as the spread of pastoralism and the emergence of nomadism here, the development of the road system, the acceleration of remote communications, etc. In this contribution, based on the data from the mentioned regions, I will consider 1) the problem of the sources of the emergence of land transport, 2) the time and interregional context of the emergence of various types of vehicles, 3) innovations and/or transformations brought by the emergence of different types of transport, and 4) the factors that could have influenced or provoked the appearance / distribution of different types of vehicles in these territories.

S14.123

Headline hunters? How to get people interested in Stone Age transformations

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Understanding human response to climate and environmental changes seems particularly relevant in times of a climatic crisis for our societies. The last time the climate regime has shifted was at the onset of the Holocene c. 11,600 years ago. At this time human groups gained their livelihood by hunting, fishing and gathering. Hence, these forager groups were traditionally considered as living in balance with their natural environment. The B cluster of the CRC 1266 studies in how far this statement can be verified or falsified based on the archaeological record of these groups in northern Germany. The two different subprojects of this cluster study the hunter-fisher-gatherers before (B1) and after the onset of the Holocene (B2) and together the transformations related to this significant climatic event.

Despite the question whether or how the results from this very different period can be used as analogy for our future, another important question is how to reach people outside our scientific community with our results. Substantial media attention for exceptional finds such as the oldest human remains of northern Germany show the public interest for our topics. To keep this interest and to raise further awareness of our more complex results takes a lot of time with presence at sites of interest, engaging with local journals and/or social media. This time also often helps to establish a more intense community engagement with archaeological matters such as in our case studies at ancient Lake Duvensee or the Ahrensburg tunnel valley. Yet, the time to establish the local connections is not always appropriately valued in the academic system, although these direct encounters may be the amplification we need to embed the complex human-environmental interactions and the transformation therein in a wider German audience.

S14.124

Do patterns of socio-economic and cultural change occur in Neolithic and Bronze Age societies in the North European Plain? Human-environmental interaction concerning Bourdieu's forms of capital.

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Fundamental and sustainable changes in societies, both in the past and present, are linked to changes in different spheres of life. Upon closer inspection, it is apparent that the parameters characterising the individual spheres of life are tightly interwoven. In order to identify and compare individual transformation processes along their temporal and social scales, it is necessary to systematise different spheres of life. This applies in particular to diachronic long-term comparisons that

focus on socio-cultural development in a specific geographical area and consider different epochs of human history. In order to study transformation processes over a period of 3500 years, which covers the Nordic Neolithic and Bronze Age on the southern Cimbrian peninsula in the north of the Central European lowlands, a systematisation of different life spheres was established. The framework is based on Bourdieu's forms of capital, which are characterised by a reference to the whole of social relations and at the same time allow different areas of social life to be systematised and placed in relation to each other.

In this context, the definition of forms of capital based on archaeological data sets and their relationships to each other is of crucial importance. But also the integration of other factors such as demographic developments or changes in human-landscape relations should be considered. In addition to these aspects, we would like to discuss in our contribution the influenced spheres of life of characteristic transformation processes as well as patterns of transformations on the *longue durée*.

S14.125

Cereal Agriculture in Prehistoric North-Central Europe and South-East Iberia: Changes and Continuities as Potential Adaptations to Climate

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Climate change today is determining the success of agriculture on a global scale and is exerting a visible influence on agricultural decisions including the choice of cultivars. Furthermore, other factors such as technical innovations, cultural preferences, social networks, and more could affect changes in the cereal spectrum as well. Also, during the Neolithic and Bronze Age these factors influenced agrarian decisions, but disentangling their role for changes in the cultivar spectrum in the past is difficult. Particularly with regard to climate variability, a detailed comparison to archaeobotanical data is often hindered due to different chronological resolutions. This is because archaeobotanical data is usually bounded by rather broad archaeological periods; sometimes spanning up to a thousand years. Accordingly, it is difficult to precisely identify certain events or the onset of developments in prehistoric cereal spectra.

By developing an updated aoristic approach, which also considers radiocarbon dates, we are able to increase the chronological resolution of archaeological data with unprecise chronologies. We applied this methodology to regional analysis of archaeobotanical remains from south-east Iberia and north-central Europe allowing a more detailed comparison to prevailing regional climatic conditions. The selection of two study regions characterized by different climates, further, enables us to evaluate how Neolithic and Bronze Age societies have been adapted to climatic variability in the highly seasonal Mediterranean and the more moderate Atlantic climate zones.

S14.126

A comparison of supra-regional climate variability and demographic developments in prehistoric times: First results from western Europe during the Neolithic and Bronze Age

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In recent times many people are confronted with hazardous weather extremes or overall increasing climatic deteriorations. On a regional-scale, these developments may lead to a significant decline in people's living conditions; for example, due to destruction of households, restriction in subsistence, or spread of diseases. Ultimately, this could promote migrations waves of so-called climate refugees. Despite climate refugees being a recent phenomenon, it is likely that already during prehistory people have been confronted with climate deteriorations. Indeed, numerous supra-regional palaeoclimate events, such as the 4.2 ka dry event in the Mediterranean, are known. Occasionally, these are considered as hazardous for prehistoric societies resulting in transformations or even collapses on a local or regional scale. A larger supra-regional perspective, however, would be required for the identification of inter-regional migration and potential areas of destination during migration.

Here, we provide first results from supra-regional reconstructions of palaeoclimate variability and demographic developments in western Europe during the Late Neolithic and the Bronze Age. Our demographic results are based on an extensive compilation of more than 78,000 radiocarbon dates allowing an identification of periods and regions potentially pointing towards migration. A thorough comparison to patterns of palaeo-precipitation and palaeo-temperature, further, enables an evaluation of a possible climatic trigger.

P01.01

We came for the lake - Late Glacial landscape reconstruction in Lieth Moor, dist. Pinneberg

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The Lieth Moor area near Elmshorn, district of Pinneberg, is a hotspot of Stone Age settlement activity in Schleswig-Holstein. From the Palaeolithic to the Neolithic, various technocomplexes and numerous sites are reported in the area. Yet, it is still insufficiently understood what kind of environment was present there in the Late Glacial period and why it was so attractive to hunter-gatherer groups of that time.

Previously published landscape reconstructions based on drill probing campaigns come to very different results. Was there a continuous palaeolake (Lake Esingen) or rather a concentration of small ponds? Were these ponds possibly connected at times of high water levels? Were there islands where people settled, or fords where hunters could wait for herds of reindeer?

In a large-scale archaeo-geophysical study, CRC 1266 subprojects B1 and G2 focus on a possible ford of Lake Esingen, from where worked antler finds are reported. In particular, we use ground penetrating radar (GPR) and electromagnetic induction (EMI) in combination with (legacy) drill probing data to identify limnic sediments and their distribution.

In this poster contribution, we present the status quo and latest results of this ongoing case study. We will address arising questions and problems during our research and an outlook on how we plan to answer or solve them, respectively.

P01.03

Transforming Hellenistic Cityscapes: On the influence of social parameters on city planning and design

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The conquests of Alexander the Great (336 – 323 BC) and its aftermath increased cultural contacts and population transfers not only within the Mediterranean but as far East as India. Cities had to deal with acculturation processes of integration, assimilation, separation, and marginalization of various groups and individuals. Presented with different architectural traditions, we observe their transformation into new, hybrid urban environments. These negotiation processes within the urban space created unique and innovative viewing experiences for its inhabitants and visitors alike.

In addition, advances in knowledge towards a more agent-based idea of vision around 300 BC may have further influenced the way cities were planned and designed, transforming urban environments into more agent-based cityscapes. Addressing visual concepts of urban space, leads to a more pronounced understanding of the city as a lived in and experienced environment, and as a space for action and interaction.

The proposed poster contribution will investigate visualsapes and visual perception within Hellenistic city foundations, highlighting the effects increased cultural contacts, population transfers, and advances in knowledge as social parameters had on the urban built environment. Illustrated by different small-scale case studies, the contribution aims to trace overarching patterns of how city design transformed in the wake of those events.

To tackle these questions, a descriptive analysis employs theories of environmental behavior, architectural communication, reception, and vision. The key concept of those theories connects human action (in cities) to the materiality of the build environment, examining the effects the former has on the latter – on processes of design, construction, modification, and destruction – and vice versa – concerning social organization and different mental concepts of urbanity. In addition, complementary analysis using elements of space syntax and visual graph analysis via UCLDepthMapX is applied to test and illustrate hypotheses.

P01.04

First steps towards open and transparent simulation tools: Reconstructing socio-environmental transformation processes in prehistoric and archaic societies using agent-based modelling

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Agent-based modelling (ABM) is a distributed Artificial Intelligence method, which enables simulations of an agent's actions and of its interactions with other agents and the environment. The environment is considered as a virtual world, whose characteristics can affect the agent's actions and interactions with it. Due to the flexibility of the agent/agent and agent/environment paradigm, different modelling approaches have evolved. These approaches range from agent-based digital twins, projecting possible behaviours of real systems, e.g. traffic, to agents without any spatial representation to simulate the agent's integration in a network of relationships, e.g. social networks.

This paper focusses on two agent-based models of human-environment interactions, both written in the Julia programming language. The first model interlinks archaeological information and modern datasets at an unprecedented level of detail. Thus, it is used to simulate the dynamics of a rural agropastoral settlement in the Near East, capturing both short and long term fluctuations. The second model focusses on the landscape perception of Mesolithic Hunter-Gatherer societies in an abstract, artificially created environment. This enables us to assess the potentials and limitations of each approach. Our results show that both bottom-up approaches can provide valuable tools to discuss hypotheses and to shrink gaps between archaeological data and assumed socio-ecological dynamics. Thus, first steps towards open and transparent modelling of complex interactions between interrelated components are archived.

P01.05

Demography in Prehistoric Northern Europe: a computational perspective

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The aim of this contribution is to present some preliminary results about the study of population dynamics in South-Western Baltic area during the Neolithic and the Bronze Age (ca. 4000-500 BC). The methodological and theoretical background of this work are embedded in the CRC1266 Scales of Transformation F6 subproject "Population Dynamics and Socio-environmental Transformation", aiming to reconstruct past population dynamics and socio-ecological change from the local to the supra-regional level.

In particular, I will focus on absolute demographic reconstruction, population density, their relation with the local environment and their transformation through time. I will do so adopting a bottom-up approach, starting from the archaeological data available at the site level and scaling it back up to the regional and supra-regional level, without losing the connection to the local community.

Firstly, I will analyse settlement organisation and distribution from specific areas within the study region in terms of household dimension and organisation, the relation between different households and their role in the settlement. Secondly, I will move to a micro-regional scale, in order to model the distribution of contemporary settlements in the landscape using as a proxy the available archaeological data and their variation in density.

In order to connect site distribution and density to absolute demographic reconstructions I rely on house size as a demographic proxy, which I will show is the proxy less biased by external factors. Subsequently, I calculated site population and density in the different case studies modelling the presence and extent of key areas. Then I will briefly analyse the results, comparing them with what has been suggested in the literature or could be inferred from an assessment of the carrying capacity.

All the analysis presented here were carried using open source software or environments, such as R, QGIS and GRASS GIS, with a well-documented and reproducible workflow. Unfortunately, only part of data used are already published and freely accessible to everyone due to copyrights and ownership of the data.

P01.06

Mathematical Perception: Euclid's View of World

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Euclid's Optics is the first work from classical antiquity that explains visual perception in terms of geometry. It stands in a long tradition of Greek science and shows us a completely different view on perception: Whereas earlier explanations centred on the objects we perceive – the explanation of the Atomists for example, that little images detach themselves from the object and cause perception when they come into contact with the eye – the theory of the visual ray as supported by Euclid centres on the individual person: Perception is supposed to work by emission of a visual ray from the eye, that 'reports back' when it falls on some object, and thereby enables us to see. Using this theory, Euclid is able to explain many phenomena of perception we all know from our everyday experience. We can see a transformation performed by Euclid; making use of geometry and its methods, his explanations are not confined to a specific use-case which may or may not have been their origin, but give an abstract and universal explanation and diagram, both being the result of a transformation from the specific to the general.

On a wider level we can learn from the text how Euclid thought about the interaction between people and objects in their environment. As mentioned above, Euclid is completely unspecific about the type of object, using only the geometrically relevant properties. This enables us to apply the theory to any object we are interested in – for example architecture, thus moving on to interdisciplinary questions and real-life objects. By presenting some examples, different types of

transformations will be shown, covering several centuries, which will give us a better understanding of the text and diagrams of Euclid's Optics as well as the ideas behind it – which in turn will enable us to see the Hellenistic world through Hellenistic eyes (via the diagram) and understand the inside perspective and inside thoughts of people from the past on their surroundings.

P01.08

The genetic landscape in Neolithic Germany

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The early Neolithic farmers (EF) in central Europe have been associated with the Linear Pottery culture (Linearbandkeramik, LBK, 5500 – 4900 BCE). During the middle and late Neolithic (4400 – 2800 BCE), several cultural transformations resulted in the emergence of many small and regionally diverse late Neolithic farmer (LF) societies which succeeded the LBK, such as the Wartberg culture (WBC, 3500 – 2800 BCE) in the western part of present-day Germany. To understand genetic changes that accompanied these demographic and cultural transformations, we performed genome-wide analyses of six farming collectives (n = 87 individuals) that covered the 2000-year transition from the early (LBK) to the late Neolithic (WBC): Altendorf, Fellbachöffingen, Niederpöding, Rimbeck, Trebur, and Warburg. The observed gene flow between the EF and local hunter gatherers (HG) was limited, while drastically increasing later with the LF. Interestingly, the late Neolithic site of Altendorf also contained individuals dating to the Bronze Age who preserved the high HG genetic component and showed no admixture with Steppe. This finding suggests a genetic continuity in the WBC, where individuals remained unadmixed for ~800 years, resisting the influence from the Steppe migrations that had an important impact in the genetic makeup of other Bronze Age populations. Additionally, an increase in the amount of runs of homozygosity (ROH) was observed in LF when compared to the EF, while the effective population size (N_e) remained mostly unchanged. This suggests that the higher ROH in LF is likely arising from the admixture with HGs, which usually show a high ROH due to small N_e . A turnover of mitochondrial (mtDNA) and Y chromosome (chrY) haplogroups was also observed, where the most common haplogroups in EF (mtDNA: K1a; chrY: G2a2a) were replaced in LF (mtDNA: U5b; chrY: I). Our analyses show that the complex sociocultural shifts in Neolithic Germany were accompanied by likewise complex changes in the genetic landscape.

P01.09

Along the Spectra. An integrative poly-scalar approach towards the interaction between “farmers” and “foragers”.

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In archaeology the dichotomy between “farmers” and “foragers” has been a long-standing paradigm. Although anthropological/ethnographic research has shown that the picture in many societies is far more nuanced, numerous archaeological narrative expressions seem to follow the general notion that the advent of producing lifeways coincides with a displacement of procuring ones. Often such notions are coupled with the tendency to reduce “farmers” and “foragers” to coherent “blocks”, specifically when it comes to interaction and contexts of a larger scale (in terms of time as well as of space).

Starting from said situation this project, aims to investigate cases of interaction between people following more producing and more appropriating lifeways on several scales. Global, large scale quantitative analyses of ethnographic cases aim at detecting patterns of similarity/dissimilarity through the application of practice spectra and clustering methods. To get a hold of lower scales, a selection of particular archaeological, ethnohistorical and ethnographic cases from different times and different locations is being addressed. In conjunction with a theoretical footing in systemic complexity as an ontological guideline the interplay between these perspectives is intended to function as a qualitative “ground for experiment” in the assessment of universals and particulars, categorization as well as the opening of paths towards more nuanced approaches in the investigation of transformative relationships.

P01.10

Neolithic transformation manifested in diseases? A study on two populations with different subsistence strategies from Northern Germany (3300-3100/2900 BCE)

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The introduction of agriculture and sedentism was a crucial socio-economic transformation in our past with profound implications for our health. In contrast to mobile hunter-gatherer societies of the Late Mesolithic, Neolithic skeletal populations show a deterioration in oral health and an increase in non-specific physical stresses. This is associated with changes in dietary habits and exposure to pathogens. But most infections that we have genetic evidence for do not affect the skeletal body, or only in an unspecific phenotype. To tackle this research issue, the manifestation of diverse bony symptoms of inflammation and physical stress needs to be better understood and assessed regarding morbidity and mortality.

We developed and applied a detailed recording system for paleopathological analyses on two skeletal populations from Northern Germany dating to 3300-3100/2900 BCE (n=166), focusing on the skull as a key skeletal element. The subneolithic group buried at the Ostorf-Tannenwerder cemetery still relied on aquatic foraging and gathering (Ertebølle traditions), while the Late Neolithic gallery grave individuals from Sorsum were fully established farmers (Funnel Beaker). Current results indicate that in the farming community (1) the young female mortality was higher, reflecting increased risk of giving birth and/or physical burden during peak fertility, (2) suffered more from repeated or long-term inflammatory processes (respiratory infections and others) and an increase in general physiological stress, and (3) experienced a different spectrum of diseases that could be related to differences in housing, eating and hygiene. Although their disease burden seems to have been higher, the Sorsum individuals survived sufficiently long to develop relevant symptoms.

We discuss the results regarding possible underlying pathological processes and their significance for the “agricultural’s toll on health” hypothesis in the study area.

P01.12

Economy and Subsistence in the Younger and Late Neolithic of the Western German Lower Mountain Range

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In this poster contribution, the PhD project on economy and subsistence in the period of the Late Neolithic of the Western German low mountain range will be presented. Already in the first phase of the CRC, important transformation phases have been identified in the period from 3700 to 2600 BCE: The transition from the younger Michelsberg to the older Wartberg includes a change of the collective idea (from earthworks to gallery graves), on the other hand, the transition from the older to the younger Wartberg shows a change in the archaeologically observable archives (gallery graves are no longer newly erected, but settlements, preferably on mounds, appear again).

With an increased focus on settlements and enclosures, this project of the second phase aims to clarify whether substantial, economic changes between the large-scale, supraregional Michelsberg and the more small-scale, regional Wartberg were drivers for the above-mentioned transformations. A used indicator for transformations are pit structures and ceramic vessels, which are associated with stockpiling, since one strategy to ensure sufficient food supply is stockpiling. For this purpose, the metric dimensions of selected pits and vessels were examined to determine the shape and capacity of these storage containers, since the extent of stockpiling in a settlement may be an indication of change or continuity in agricultural strategies. The results on this do show differences between Late Neolithic and Late Neolithic. A popular narrative recapitulated in research is an increased mobility compared to previous epochs and the importance of transhumance as an economic system to explain the few settlement structures that have been documented so far in this period. With the help of isotope analyses on animal bones, it will be examined whether this increased mobility can be validated and which role the enclosures in the Westphalian and North Hessian area played in this context, especially within the transformation phase around 3700 BCE.

P01.14

A matter of scales? Towards a comparability of transregional Iron Age transformations

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This poster contribution will present preliminary results of the PhD project: “**A matter of scales? Towards a comparability of transregional Iron Age transformations**”, which is part of the E4 cluster: “Pre-State and State Societies”.

The project focuses on the comparability of transregional Iron Age transformations, and particularly on settlement development patterns. At the center of investigation are three regions, namely the Central Mediterranean (Central Italy, Etruria), Central Europe (Southwest Germany) and Southern Scandinavia (Denmark). The archaeological data from these regions is very diverse, depending on research history, preservation status and interpretation approaches. Furthermore, terminology and concepts are often used in a self-evident and un-reflected way within the disciplinary borders, which makes an examination of the pre-theoretical assumptions crucial before selecting specific case examples.

Key research questions in this context might be:

- How does cultural terminology shape our understanding of cultural transformations and encounters?
- How do different disciplines and researchers use (settlement) transformation terminology and are the underlying concepts comparable?
- How does the idea of a cohesive and coherent Iron Age influence our interpretation of regional, small-scale phenomena? And how can these different scales of research be integrated?

The poster contribution will present preliminary results of the selection process of and qualitative approach to specific small-scale examples. The selection process has been conducted under the premise of lowering the bias of data selection to a minimum. This has been realized through the RBias package (Günther et al. 2022) and a successive random area pick. Applied to the three main regions of investigation, this process offers the chance to work with a less biased set of data and allows for a different qualitative approach to archaeological data comparison on transregional scale.

Günther, Gerrit; Kempf, Michael; Knitter, Daniel, 2022. Rbias – calculating modern bias in archaeological research. 10.5281/zenodo.7071418 [online]. Available from: https://www.researchgate.net/publication/363536261_rbias_-_calculating_modern_bias_in_archaeological_research [Accessed 12.10.2022].

P01.15

Implementing a FAIR Repository and Data Integration System for CRC 1266

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While new technologies enable scientists to share data and research results effectively, new layers of complexity are added that need to be dealt with. Otherwise, using these tools and approaches becomes impractical. In the second phase of the CRC1266 “Scales of Transformation” the information system LandMan is implemented to satisfy FAIR requirements and exploit related advantages, guaranteeing research data and results to be findable, accessible, interoperable and reproducible. This work will illustrate selected challenges in data quality, data organization, data sparsity and data fusion combined with a socio-technical perspective on the process of developing and implementing the LandMan repository and data integration system. In this process a significant shift from full integration towards a more practical solution had to be undertaken to align the system with scientific work requirements in practice, available resources and to ensure its usability.

P01.16

The pathogen landscape of the Neolithic and its influence on the human immune gene pool

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The introduction of the agricultural lifestyle during the Neolithic in central Europe (5500 – 2200 BCE) is often thought to have influenced the pathogen landscape and increased the infectious disease burden. Several factors that come together during this period would favor the emerge and spread of human adapted pathogens, such as a closer co-existence of humans and livestock and a higher population density. In order to investigate this hypothesis, we follow a dichotomous approach, in which we analyze ancient DNA (aDNA) from human skeletal remains for the genomic presence of pathogens, as well as explore the genetic adaptation of Neolithic farming populations driven by pathogen exposure. We have been able to identify individual cases of infectious diseases of little or no epidemic potential so far. However, our analyses on genes of the human leukocyte antigen complex (HLA) show that Neolithic populations had an immunogenetic profile that differs quite strongly from that of present-day humans, suggesting that they lived in a different pathogen landscape. We performed genome-wide analyses of six farming communities (Altendorf, Fellbach-Öffingen, Niederpöding, Rimbeck, Trebur, Warburg) and present factual HLA genotypes of 87 individuals that cover the 2000-year transition from the Early to the Late Neolithic.

P01.17

Typochronological Studies on Younger and Late Neolithic Pottery in the western German Lower Mountain Range

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Within the framework of the subproject D2 of the CRC 1266, this research project deals with the Younger and Late Neolithic groups (ca. 4200-2700 BCE) in the western German Lower Mountain Range, mainly the Michelsberg and Wartberg cultures. Based on the results of phase 1, which, among other things, stated a possible constitutive event for Neolithic societies in this area around 3800 BCE in form of a second wave of construction of enclosures, the transition between the aforementioned societies is of interest in phase 2. The succession of the two cultural groups has so far only been analysed by Raetzl-Fabian (2000) and Höhn (2002) and requires a more in-depth examination, which will focus on pottery inventories. Currently, the beginning of the Wartberg group is linked to the emergence of gallery graves around c. 3400 BCE, but isolated sites of the late Michelsberg (c. 3700 BCE) show first hints in ceramic forms and decorations, which are continued in the older Wartberg (Höhn 2002; Raetzl-Fabian 2000). It will be examined whether transformations can be traced as gradual processes on artefacts, that can be classified temporally between the construction of the earthworks and gallery graves, and if so, how these are expressed and whether they are subject to influences from other regions. Also relevant is whether social changes such as the development of a collective burial custom or a different settlement pattern may have contributed to the reshaping of the pottery inventory. The generally low degree of decoration of the pottery contrasts with, for example, decorated wall stones from the gallery grave Züschen I or the house plaster from the settlement site Hasenberg, which is covered with plant imprints, and suggests a different use of symbol carriers in everyday life.

With the help of correspondence analyses, these clues will be traced and thin sections of sherds from selected sites will provide further information on technique and composition in order to prove possible changes that are not evident in the inventory in terms of form or decoration. First promising results of these investigations and their possible connections to changes in architecture and social ideas will be presented.

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P01.18

Natural Resources and settlement pattern in hilly district of Assam – An Ethnoarchaeological study

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Natural resources utilization has been studied mostly from precise angles in archaeological research; such as for settlement organization or food habits. But ethnoarchaeological data shows that most resources are used in multiple ways and are spanning over different spheres of social, cultural, economic and political arenas.

Tribes of North East India have a close relationship with the natural resources surrounding them. During recent ethnoarchaeological field survey, we came across how bamboo tubes are used for cooking, the use of bamboo utensils for serving, as well as the usage of bamboo shoots as local cuisine and essential and traditional part of the Karbi culture. Besides the practical use for different activities, the use of bamboo utensils for serving hold special social importance. This social importance is also reflected in ritual activities, in which bamboo plays a significant role in the form of divine representation, as well as in the ritual processes themselves.

On the basis of available data on the overarching use of material culture for consumption, as well as social and political purposes, this paper will discuss the gaps that are present especially in prehistoric material culture and its interpretation. It is to understand Transformation in use of Natural Resources – reflected on the socio-economical aspect and to identify the Key agents in Transformation of Natural Resource utilization. An integrated approach examining the different scales of the archaeological and ethnographic record in the region can shed light on different aspects of ways of living, including usually invisible yet abundant materials.

P01.19

Human-Environmental interaction in the central-eastern Sicily uplands: looking at the settlement systems evolution of the Hyblean plateau and its economy from the Greek to the Roman Ages (eighth c. BCE-fifth c. CE)

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The paper presents the preliminary results of the Hyblean Archaeological Landscapes Survey Project carried out since

2019 on the western Hyblean plateau (southeastern Sicily). Located in a focal point of the central Mediterranean region, with its extent of 524,3 km², the area forms a perfect case study for research on settlement dynamics, routes networks and rural economy. In order to investigate the hidden archaeological landscapes, the project is carried out through the application of a *spectrum* of methods: the integrated use of the 'traditional' field survey with proximal sensing and micro-to large-scale geophysical prospection (i.e. extensive use of seismic refraction and geomagnetic survey; intensive use of ground penetrating radar and electrical resistivity tomography) is designed for a new understanding of the ancient countryside, moving from an essentially site-based approach to a truly landscape-scale perspective. The preliminary results of the project (sherd scatters from field surveys; cropmarks from proximal sensing; anomalies from archaeological geophysics prospections) have made it possible to challenge past landscape paradigms and to move towards a more complex and comprehensive understanding of a stretch of low- and upland rural landscape in southeastern Sicily: (agriculture vs pastoralism; uncultivated landscapes vs wilderness; settlement patterns; regional vs local routes networks). Through the integration of the preliminary project's results and legacy data available for the area, a new study of the Sicilian landscapes from Greek to Roman Age will be offered, going beyond the stereotypes (*Sicilia frumentaria*) usually used for describing the island's economy in classical antiquity as based only on wheat monoculture.

P01.20

Using seismic Full waveform inversion (FWI) for investigations of tells and burial mounds

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Seismic full-waveform inversion (FWI) is a promising new geophysical method within the field of archaeological prospection and offers a considerable potential for the investigation of tells and burial mounds. Due to their size, topography and heterogeneity, these targets are often challenging for traditional geophysical prospection methods, which are limited by penetration depth and resolution. Therefore we developed a geophysical multi-method approach including seismic FWI based on hammer impact shear waves as well as geophysical borehole measurements. As case studies we performed measurements at Chalcolithic tells in the lower Danube basin near Sultana and Chiselet (Romania) and at a late neolithic burial mound in Saxony-Anhalt (Germany). The investigations were focused on the reconstruction of stratigraphical units from various construction or settlement phases, on the identification of archaeological features like house remains, pits and trenches and on the current status of conservation. Another aim was to analyze the relation between tells and their surrounding paleolandscape. Our seismic data was analyzed using two-dimensional, (visco-) elastic FWI in time-domain based on the inversion of dispersive Love- and refracted SH-waves. To enhance and verify interpretation, the results are compared to results from other geophysical methods like electric resistivity tomography (ERT) and magnetic mapping as well as to drilling cores and small-scale excavations. The FWI result from the neolithic burial mound hints at two different construction phases and shows disturbances of the central stone chamber and on the hill top as a result of former excavation activities. At Sultana tell the result of seismic FWI matches clearly with an excavated archaeological profile and shows anomalies caused by a former palisade ditch whereas for Chiselet tell a significant correlation between anomalies of increased seismic shear wave velocity and magnetic anomalies of burned house remains is observable. Furthermore at the flank of Chiselet tell anomalies of seismic velocity and electric resistivity may refer to an erosional impact of a former paleochannel. Overall, the results show the potential of seismic FWI for a high-resolution characterization of near surface archaeological targets and the advantage to constrain interpretation of other geophysical methods by integrating seismic measurements in a multi-method approach.

P01.25

Reliability of Ceramic Chronologies: Case Studies from Central European Rondel Sites Dated to the Fifth Millennium BC

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The poster presents a comparative study examining 11 rondel sites throughout Central Europe dating to the fifth millennium BC, in addition to a presentation of preliminary findings from the 2022 CRC C2 excavation at Podhájka, Slovakia which has not yet been dated but is likely contemporaneous. First, the social structuring associated with the planning and construction of large-scale earthworks such as the rondel ditches is compared with the ceramic sherds decoration and function. Ceramic typology and chronology have been very prevalent in the study area during this time period due to the general lack of alternative datable material. Secondly, the stratigraphic relation of diagnostic sherds and radiocarbon-dated materials will be presented to contest the generalized ceramic culture relative dating method.

The primary goal of the poster is to present the rondel case studies through structural, ceramic and dated materials.

A secondary goal of this poster is to identify potential shortcomings associated with relative dating based on ceramic 'cultures' in the current case studies and compare the available radiocarbon dates to the suggested ceramic chronologies across the study region. Additionally, the depositional features of the rondel ditches where the ceramics have been deposited are compared to see how ceramic form and function may be associated with larger societal practices such as the organization and planning of major collaborative construction projects.

The ceramic chronologies for the micro-regions within the broader study area have been outlined based on available local research. The ditch shape and features have been collected into a database for comparison. All available radiocarbon samples have also been added to the comparative database. Following the ceramic analysis, the relationship between the ditch forms and ceramic forms will be presented. Further, the radiocarbon-dated materials will be compared in relation to the assumed age of the depositions based on the ceramic chronology.

The work is still ongoing and the ceramic analysis will be concluded by January 2023. Emphasis will be placed on the transformational changes occurring during the ditch construction, ditch in-fill process, ceramic manufacturing, and ceramic deposition as well as a reflective look at how archaeologists approach the study of ceramic material.

P01.31

Exploring plant food practices at a Late Bronze Age settlement in northern Germany

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A wide range of cultivated and gathered plant resources were found in the Late Bronze Age in northern Germany (c. 1100 – 500 BCE). Carpological analyses for this time show presence of crop plants unknown in the assemblages from the Neolithic or Early Bronze Age (such as broomcorn millet, faba bean and gold-of-pleasure). In addition, in the end of the second millennium BC, some of the previously less used crops, for example pea and flax, became perhaps more important. At the moment, it is unclear how this influence the food choices and cooking practices.

To get an understanding of possible effects on food choice and cooking practices, we chose the settlement site Dobbin 27, dating to the Late Bronze Age, in north-eastern Germany as a case study. Charred seeds and fruits were analyzed in a first step. In a second step, charred amorphous objects with the suspicion that they present food, were analyzed with a scanning electron microscope.

We will present the first results using an example setting found in Dobbin 27. There was a fireplace with a clay pot found in situ. This pot contained large quantities of hulled barley, broomcorn millet and some emmer. Additionally, amorphous objects were found in the fireplace. We show first attempts how to connect the evidence of food production and cooking based on this. For further analysis, we are building a reference collection of food remains taking this situation as a starting point.

S16: Between over-exploitation and sustainability: Extraction of resources as a driver for societal change and inequality

Primary production of resources can lead to substantial environmental and societal impacts. It is a significant driver of environmental and societal change in past and present societies. Today, large-scale mining or logging brings ecosystems on the brink of collapse and directly affects indigenous communities. The profits and benefits of extraction concentrate far from its origins and contribute to the rise of global inequality. The solution would be the opposite: local control over the extraction that can be beneficial for the community while aiming for sustainability in terms of production and environmental impact. However, is it possible?

Looking at the long history of resource extraction, one can observe similar patterns on different scales. Even before globalisation, industrialised and artisanal resource extraction impacted societies: changes in landscapes and ecosystems endangered food production and health and created vulnerabilities towards natural hazards. Different patterns of ownership, control and participation in profits fostered inequalities and induced social changes. Even urban communities may have arisen solely due to local/regional resource extraction – some collapsed and were abandoned after over-exploitation. In contrast, others found paths to sustainability and flourished.

The session aims to explore the following questions:

- Can the primary production of resources (e.g. minerals, water, peat, wood, soils, game animals) lead to a sustainable social and environmental system or does it always generate inequalities and environmental hazards across different times, cultures and continents?
- What limits extraction?
- What controls the maximal social or environmental impact? How does global demand shape local production?
- We seek the factors and the processes of colonisation, urbanisation due to resource extraction, the reasons for over-exploitation and the resulting distress on social systems leading to change or even abandonment and for possibilities to create sustainable resource extraction in balanced systems of society, participation and exchange.

S16.133

Early neolithic raw material exploitation: Networks as cause and effect

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Exchange re-produces relationships. The acquisition and exchange of raw materials thus had severe implications for the duration, intensity and stability of certain social relations.

The focus of this paper is on far-reaching, interregional exchange networks of raw materials with a clearly determinable source. We present a collection of trans-Eurasian datasets (Neolithic to Bronze Age) that is being assembled within the “Exchange” projects, a collaboration between archaeology and data sciences at the Cluster of Excellence ROOTS and a data science/archaeology tandem project at the KI@CAU Datencampus.

What drove exploitation of raw material sources in prehistoric times? The most simple and straight forward answer is the basic need for these raw materials for artefact production. These mainly comprised daily tools but also included objects of symbolic value. Important examples are different flint varieties (e.g. Rijckholt, Lousberg, Szentgál, Grand Pressigny, Monti Lessini) and common metals used for daily purposes or exotic and rare materials like jade, ivory, lapis lazuli, kauri, spondylus or coral.

Pattern analysis raw material distribution in the time of the Linearbandkeramik (LBK, 5500 – 4950 BCE) under a network perspective point to the flow of raw materials along network structures that evolved with the initial spread of LBK to Central Europe and the subsequent development of regional groups. Using methods stemming from social network analysis (SNA), a simultaneous spatial analysis of these distribution patterns is possible. It reveals patterns that were not discernible either when looking at individual raw material distributions, analysing raw material use at regional level or from the perspective of individual sites.

We focus on network effects because of the double nature of networks, being at the same time precondition as well as outcome of social interaction.

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S16.134

Landscapes of dependencies of Kukra Hill. The case study of changes and continuities of dependencies based on human interaction with the landscape and access to resources in the pre-contact period Caribbean coast of Nicaragua

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Appearance and disappearance of monumental built structures in pre-contact period Central American archaeology typically have been interpreted as a proof for the formation of complex societies and therefore the presence of social inequality (Frost & Quilter 2012). Recently, however, an increasing amount of research has questioned it, since there is little other archaeological evidence of social stratification in the region. Instead, different social practices such as community building have been suggested as possible causes for monumentality.

This paper will look into the monumentality relationships with social inequality by using the pre-contact period Kukra Hill region of the Caribbean coast of Nicaragua as a case study. Traditionally, pre-contact Kukra Hill has been interpreted as a region with no significant human activities in the prehistoric period, inhabited by several indigenous groups with low social organization. However, the discovery of a large mounded site called El Cascal de Flor de Pino led to the assumption that there might have been hierarchical societies with some degree of inequality (Clemente Conte & Gassiot Ballbè 2005).

Recent field surveys and excavations in the Caribbean Coast of Nicaragua have revealed new data from monumental and non-monumental archaeological sites between the 5th and 9th century AD (Auzina et al. 2022). The site's access to resources such as chert, clay, food and water have been analyzed combining material studies with spatial GIS analyses.

Site-specific environments have been reconstructed by archaeobotanical analyses of seeds from excavated layers. By using these data, the different settlement access to resources are analyzed and monumentality as an indicator of social stratification is questioned. Instead, the focus is placed on the role of environmental changes and people's ability to access resources by comparing the results of the analyses in the context of known climate change data in the region.

As a result, it is suggested that in the context of the Caribbean mainland, access to resources can reveal more about social inequalities than the presence of monumentality. To understand the dependent relationships in the region, we shall rather look to those between humans and the environment than those between various groups of societies.

S16.135

Hard cheese for heavy metal workers: the integrated productive system of the Veneto-Trentini Plateaus during the Late Bronze Age

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The mining district of the Veneto-Trentino Plateaus offers an impressive 'spatio/temporal concentration' of copper metallurgical activity in an area totally lacking cuprous mineral resources (the closest copper mining district is located in Valsugana, mostly on the northern slope opposite the Veneto-Trentino Plateaus). This phenomenon is also at the origin of an accumulation, and consequent pollution, of heavy metals that has been active for more than three millennia to the present day.

This proto-industrial production system, thanks to the most recent revisions, has a relatively wide chronological range, between the end of the Middle Bronze Age and the Final Bronze Age (c. 15-9th century BC). The phenomenon, inscribed in a hypercritical phase of development of the social complexity of (not only) local populations, precedes a dramatic collapse: this catastrophic scenario seems to have propagated with 'contagious' destructuring dynamics in an extended 'world system' (North-Europe-Eastern Mediterranean) of high 'dendritic' (economic, political, cultural, and cognitive) connectivity between various 'centers', 'peripheries' and 'margins' of a complex and ephemeral 'topology of power' (De Guio 2012).

The distribution analysis of mines and smelting areas revealed an integrated system between metallurgical production and pastoral economy. The choice of the Veneto-Trentini Plateaus for the smelting process, despite the absence of actual mines, can be explained through well-defined logistical reasons including the high availability of timber, abundance of lithologies useful for easing the scorification process, and large pastures.

During the survey in Millegrובה area carried out in August 2020, seven stratigraphic windows on three different artificial pools were excavated; six organic samples were collected from these sections and dated using the ¹⁴C technique. Dates revealed that at least two of the three mountain pools were already active during the Bronze Age, confirming a direct relationship between metallurgical activities and pastoral economy.

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S16.136

Plant use and land management of Early Iron Age societies in the boreal zone of the mid-Kama region: first results

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Climate and other environmental changes trigger cultural transformation together with political and socio-economical causes. This human-environment interplay is particularly strong at environmental limits of human existence, characterized by harsh climate conditions. An exceptional example of human-environment interactions is provided by the Early Iron Age (EIA) societies in the boreal zone of the mid-Kama region of the European pre-Urals between 8th century BCE and 5th-6th century AD. Archaeologists suggest two hypotheses explaining the development of the EIA populations here: (i) amelioration of environmental conditions within the Roman climatic optimum led to a rapid development of the economy and population of the EIA cultures in the mid-Kama region after the 3rd century BCE leading to a transformation of the Ananyino to Glyadenovo culture; (ii) climate cooling starting in the 4th-5th century AD led to a lower biological productivity, provoking competition for meadows and land and finally an exodus from the territory of the mid-Kama, leading to the appearance of two new cultures: Lomovatovo to the north and Nevolino to the south [1]. We aim to test these hypotheses using palaeoenvironmental reconstructions. In order to reach this aim, we are reconstructing plant use and land management of the EIA societies inhabiting mid-Kama region and their impact on the vegetation and landscape. The multi-proxy analysis combines traditional (palynology, loss-on-ignition, archaeobotany, anthracology, wood anatomy studies) and innovative methods (non-pollen palynomorph analysis, macrocharcoal analysis, isotope studies). Our data [2, 3] indicate strong signals of environmental changes in the first millennium AD favouring climatic reasons as trigger of cultural transformations.

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S16.137

Climbing the ladder? Social dynamics of mining communities in medieval Central Europe

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In the 13th and 14th centuries, Central Europe (areas of modern Czechia, Germany, Poland and Slovakia) faced rapid development of mining of noble and base metals. The income from mining became an essential element of the local economy and attracted lords, entrepreneurs, and workers. Many new settlements and towns flourished based on the extraction of metallic ores. Their further development varied: some collapsed, and some managed to survive for an extended period. Still, the relationship between extraction strategies and mining communities' social structure needs to be clarified. This paper explores how medieval mining impacted the social dynamic of mining settlements and towns. Written records from that period are scarce and inconclusive; therefore, this paper will explore the issue by looking through the material culture perspective.

According to medieval mining law, miners were free people who were allowed to freely extract mineral resources on lands belonging to the owner of the mining monopoly. In return, they had to pay a share to the monopoly lord and the land owners. Ownership of over-extracted minerals varied according to their type (noble or base) and local arrangements. The basic organization of miners was the mining commune. Such communes probably lived together in small mining settlements. They are rich in high-quality material culture. Such smaller sites were often abandoned due to a lack of ores or capital for further exploration. In some places, mining communities were connected with urban communities. They together formed a mining town which was a holder of mining privileges in the area, i.e. had control over extraction. In towns, the social structure was much more diversified with entrepreneurs, artisans and traders. The vital factor of this growing diversification was the richness of ore deposits and their profit-making potential.

The extraction of ores led at the beginning to growing wealth and improvement of quality of life. Nevertheless, technological problems always led to decreased production. The communities with relatively flat social structures could not invest further in mining. The settlement could only thrive if it developed other non-mining functions and a much more diversified social structure.

S16.138

What about exotic species? Social significance of remains of strange and alien animals in the Baltic Sea region with special focus on Viking Age to High Medieval times (800 to 1300 CE)

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People of different social status or ethnicity could always have different dietary habits, even if they lived at the same place. Food status values are established using various criteria, in between ordinariness and rarity or exotic origin. Such differences can also be traced with archaeozoological methods. In the archaeological and historical context, exotics are animals that exist only very sporadically in the area in question at a certain time. The paper presents examples of four different categories of exotic species and discusses the social meaning of exotic animals, food or raw material. It becomes clear that previously common animal species known to everyone can become so rare that they ended up being so exotic that the authorities claim the hunt solely for themselves. The rarer species became, the more valuable they and their meat became, and in several cases - even in very recent times -, powerful state institutions reserved the right to eat the last specimens.

S16.139

Medieval Silver Production and its Impact on the Environment and Settlement (Social) Structures

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The paper will highlight the two main and archaeologically visible impacts of medieval production of silver - the essential coin metal and blood in the veins of the medieval economy. The first is the environmental impact, which was manifested by drastic deforestation and contamination of soils with heavy metals. The second was the establishment of settlements of miners and metallurgists near the mines. These settlements were short-term and temporary, but at the time of the first historically documented boom in silver production in the Kingdom of Bohemia in the 13th century, in which the towns just have been founded, there were a large number of them. The task of archaeology is to recognize social structures in these specific settlement structures. The topic will be presented on several archaeological examples from the Central Bohemian Highlands (CZ), where research has been very advanced over the last 20 years.

S16.140

Medieval peat quarrying for salt production in the coastal marshes of North Frisia (Germany): the disastrous implications of a large-scale landscape transformation.

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Frisian settlers started to occupy and cultivate coastal marshes, fenlands and peat bogs in the Wadden Sea area of North Frisia in the 12th century CE. By the 14th century, the area was widely transformed into a cultural landscape embanked by dikes ([1]).

Some salt marsh areas were left unprotected and were used primarily for salt production rather than for agriculture. Salty peat layers beneath the marshes were quarried to an industrial extent during the 12th to 14th centuries. The salty peat was dried, burnt and the ashes turned into a highly concentrated brine for salt boiling, producing a highly valuable trade commodity. To reach the peat layers, inhabitable and fertile marsh was dug up and redeposited after peat removal. Through this process, large areas were transformed into a swampy, uninhabitable wasteland. The extraction of the peat layers from the stratigraphy resulted to a subsided and severely vulnerable land surface. Catastrophic storm floods of the 14th century AD turned large parts of cultivated marsh and exploited peat areas into tidal flats ([2]; [3]; [4]), marking the end of the industrial scale salt production and forced a completely new economic strategy for the affected area. The major economic activity changed from salt production to an extensive husbandry in the remaining and re-growing salt marshes, creating the unique living environment area of the Halligen islands.

By extensive geoarchaeological and geophysical surveys around Hallig Hooe, we revealed traces of the medieval salt industry and their devastating effects on the landscape. Our results show the large-scale extent with systematic layouts of peat quarries in between the terps and small agricultural polders. On the Hallig, we discovered and partly excavated

a 12th/13th to mid-14th century terp that served as a salt production facility. In regard to the larger area, the salt peat extraction must have resulted in a remarkable fragmentation of the landscape into exploited wastelands and inhabitable patches of land.

The strong differences in economic systems and material culture between the seemingly poor salt peat areas and the embanked agricultural marshes raise the question, how the medieval salt industry was organized, the profits were distributed in the region and which degree of inequality was created, depending on the availability and exploitation of the different resources.

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S16.141

Salt extraction as source for environmental and societal hazards - Examples from Central Europe.

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Salt with his elements Sodium and Chlorine is an essential component of human nutrition. As soon as plant food contributes to higher degree on the caloric supply (Dörfler 2012) people have to find additional sources of sodium. Before the extensive application of Briquetage in the process of production, salt production is hard to proof. Thus, the mapping of natural near surface brine springs is a basic mean to estimate potential salt production areas. In some of these regions salt production is recorded historically and in many cases also for prehistoric times by archaeological excavations. The contribution will focus on examples of environmental hazards due to salt extraction and how communities reacted to this phenomenon. If salt production is run in a sustainable way, it can last for generations and provide a source for economic wealth. A find distribution of long distant travelled and rare objects will be presented in comparison to proven and potential prehistoric salt production sites.

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S16.142

Natural Resource Extraction, Sustainable Development, and Peace in Nigeria

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Decades of oil extraction in Nigeria has increased the fortunes of energy corporations while the local communities where these corporations operate are economically poor, lack a healthy environment and clean drinking water. The immediate direct suffering resulting from the cumulative deterioration of life chances and livelihoods that undermines prospects for sustainable development in the oil region has made violence an inevitable outcome of oil extraction. The idea that societies affected by conflict can work towards long-term peace through a dedicated effort to improve the economic well-being of armed groups has seen the rise of entrepreneurship as a vehicle for peacebuilding in Nigeria's Niger Delta region. While this peacebuilding strategy is instrumental to the declining activities of armed groups, at least temporarily, the effects of land, air, and water pollution continue to exacerbate already present pathologies in local communities across the Niger Delta. This paper asks, can entrepreneurship contribute to sustainable peace in Nigeria's oil region without progress toward sustainable development? How can sustainable development receive greater priority and attention in the Niger Delta peace process? The study utilized qualitative and quantitative data through surveys and key-informant interviews with former insurgents in three states: Akwa Ibom, Rivers, and Bayelsa. The qualitative results support the statistical description of entrepreneurship's impact on peacebuilding. The empirical evidence shows that peacebuilding has increased the number of small-scale entrepreneurs throughout the conflict-affected communities. However, environmental challenges in local communities continue to raise critical concerns about the nature of peace and the importance of sustainable development as a vital component of peacebuilding.

S16.143

Essential resources and social change in the southern Maya lowlands from the Classic period to the present: an ethnoarchaeological approach

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Resources are a central actor in society and can lead to substantial transformations. Especially resources whose access is essential for the members of society, i.e. vitally and morally indispensable, have an enormous influence on social relations and power structures. But what happens to society when these resources vanish, and with them a foundation of the social system? This question has been used since the beginning of Maya research to explain the prominent case of the so-called collapse of the Classic Maya societies in southern Mesoamerica around 900 CE. Deforestation, poisoning of water reservoirs, overpopulation and social conflicts are some of the most probable reasons for the rapid abandonment of construction, sculpting, and eventually domestic activities. However, these are mostly based on partial analyses and scientific models. While these methods are certainly useful, they should be complemented by other approaches in a multidisciplinary and integrative manner. The talk will present a multidisciplinary approach that combines archaeological, paleobotanical, ethnohistorical, and ethnographic sources from the Petén region in Guatemala to examine resource-based social change in ancient and contemporary Maya societies. As a particular example, natural resources traditionally used in vernacular Maya house construction are discussed, based on field research data collected between 2018 and 2022.

S16.131

The Inequality Possibility Frontier and archaeological data. Applying and interpreting a new tool on examples from the Central and Southeast European prehistory.

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The study of social inequality in prehistoric societies often relies on quantitative methods. One prominent tool is the Gini index, which measures inequality (i.e. wealth) within a distribution (i.e. society). However, this relatively simple measure does not consider the economic limitations in pre-industrial or less developed societies. In the course of the last 20 years, B. Milanovic developed the concept of the Inequality Possibility Frontier and the Inequality Extraction Ratio. With the help of these methods, the measured inequality (e.g. in the form of the Gini index) can be considered in relation to the maximum possible inequality. Further, economic limitations and possible causes for inequality can be discussed. The Inequality Possibility Frontier and the Inequality Extraction Ratio are presented in this talk and practically applied on the example of wealth disparities (of grave goods and house size) on the Bronze Age cemetery of Jelšovce (Slovakia) and the Copper Age settlements of Poljanica and Ovčarovo (Bulgaria). We aim to show that in this way a more differentiated picture of prehistoric social inequality, that also considers economic and social limitations, can be discussed.

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S17: Across Borders: Interdisciplinary Approaches to Bounded Space, Segregation, and Social Inequality in Past and Present

Against the background of today's rising global inequality, borders appear as solutions to a variety of social problems and seem to provide remedy to the threats to social belonging. However, the unilateral privileges that borders usually create, result in segregation based on exclusion and, in turn, foster and solidify inequalities worldwide.

Creating and maintaining strict social groups, delimiting space and the segregation of "us" from "others" has been a practice for millennia: then as now for reasons such as social control, defense and alleged safety. This is facilitated by physical and linguistic borders and socio-physical segregation which are concepts with consistent meanings across time and space and may be studied, experienced, and understood on many scales: In the form of territoriality, borders can exercise control over people, phenomena and relationships by claiming authority and restricting access to resources. Language can act as element of exclusion to label people as in/out-group members, creating borders which lead to socio-linguistic segregation and inequality. Over time, borders thus shape landscapes, speech communities and their interactions by representing durable physical and intangible evidence of past and anticipated societal conflicts.

A comprehensive understanding of segregation and social inequality thus requires the study of social space and built environments across time, region, and disciplines. The session thus focuses on aspects of asymmetrical border relations, such as the drawing of boundaries, but also people's resistance to them, especially from archaeological, anthropological, and linguistic perspectives. We want to explore how borders reorganize the topography of social relations and investigate the roles that built environments play in shaping social realities and vice-versa. We welcome abstracts that focus on various approaches in regard to segregation and inequality through social and physical space, as well as through territorial, linguistic or environmental borders in past and present societies.

S17.144

Exchange and Mobility at the India-Bangladesh Border – A Study of Malda

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Borders possess a distinct spatiality that is marked by patterns of migration and mobility. Migration and borders have a complicated relationship that spills over the lines of demarcation. The complexities of borderlands have been studied academically from various perspectives. While borders were initially studied historically (Chatterji 1994) and also from the lens of security in international relations (Scott 2009), a gradual methodological shift in studying borders was identified when scholars (Cons 2016; Schendel 2004; Sur 2021) took an anthropological approach to study borders. Emphasis was thus laid on the everydayness of the border and the day-to-day lives of the borderland residents. The South Asian context of borderlands and migration needs to be analysed in relation to the specificities that inform it. In this regard, the Partition of 1947 played a significant role in determining the politics of border and migration after the creation of India and Pakistan. The far-reaching impact of the 'long Partition' cuts across time and space, long after India and Pakistan came into being, leading to the creation of Bangladesh in 1971. The proposed research seeks to add to the existing body of borderland literature by studying everyday experiences at the India-Bangladesh border which is 4096 km long and the fifth longest border in the world. Although it is not a warring border, contestations and violations are a fairly regular affair. The Bengal borderland is essentially an agrarian borderland and is unique for the varied range of geographical terrain found in the region like *chars* (riverine islands), rivers, jungles, hills and foothills as compared to more rigid demarcations found in the European context of border walls and fences. This variety also indicates that the experiences emanating from the border are not uniform in nature. As a result, the India-Bangladesh borderland evokes a distinctiveness that ties together cross-border exchanges and mobility that shape identities. The borderland becomes a contested space where these everyday aspects of life interact with each other. Drawing on ethnographic field insights from Malda, a bordering district in West Bengal, my presentation seeks to shed light on how exchange and mobility at the border complicate the binary of state versus people in light of the India-Bangladesh border.

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S17.145

“The language border is the firing line!”. Framing linguistic inequality and threat by metaphors of war at the language border in the Flemish activist journals “De Taalgrens” and “De Taalgrenswacht” (1929 - 1940)

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About 100 years after the Belgian Revolution in 1830 and the rise of the Flemish Movement in Flanders, language activists decided to take action against the, from their viewpoint, ongoing supremacy of the French language in Belgium. Their goal was to prevent further loss of their Flemish language, identity, and territory as well as to ensure possibilities to partake in political decisions that were, for the most part, negotiated in French. By addressing this problem in activist journals focused on the region of the Germanic-Roman language border in Belgium, activists tried to create language awareness in their speech community and language change from below and, by their close connections to politicians and linguists, from a top-down approach.

Within these approaches, metaphors of war play a significant role in framing linguistic inequality caused by a continuing threat in the border region represented by the French language and their Wallonian speakers (Peersman et al., 2015). Furthermore, the Germanic-Roman language border is not only conceptualised by metaphors of war but also as a metonymic identification line that needs to be protected. Apart from that, standard language ideologies and related themes like language purism and linguistic othering (Milroy, 2001) arise in the investigated journals.

For this talk, these themes, the metaphors and the metonymies are analysed from a sociolinguistic and discourse-driven perspective. The talk aims to answer how metaphors and metonymies in connection to the related themes frame the perception of language borders, linguistic threats, and inequality in the specific discourse of the Flemish journals. Moreover, it aims to show that language(s) and its boundaries are instrumentalised as identity- and alterity-creating elements, not only in the Flemish journals but also in contemporary debates on linguistic inequalities and belonging in different European language areas. With that, the role of the language border as a universal tool of identification and othering will also be addressed.

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S17.146

Analysing past boundaries in a rural study area

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In archaeological research, several methodologies for reconstructing territories or the corresponding cultural or political boundaries have been introduced and discussed in several publications (e.g., Krause and Nakoinz 2009; Nakoinz and Knitter 2016, 149-168). This case study applies several approaches using a geographical information system (GIS) for analysing and reconstructing past boundaries. A linguistic boundary known as Benrath line (Wenker 1877) traverses the hilly study area east of Cologne, Germany. Diagnostic place names form the basis for reconstructing this fuzzy boundary. The accuracy of the reconstructed boundary depends both on the distance between neighbouring diagnostic places and the number of misclassifications. Early modern documents referring to political borderlines in the study area include texts (Nehls 1991) and maps (e.g., Mercator 1575). These boundaries have been digitized with an accuracy varying mostly between 50 and 200 m. GIS procedures are applied to analyse the location of these boundaries in terms of natural features such as water courses, soil quality, drainage divides or ridges, and to assess the continuity of these boundaries. Moreover, the location of central places such as churches, monasteries or castles with respect to past boundaries is investigated. Finally, the relationship between the political borderlines and the linguistic boundary is analysed.

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S17.147

Communities in the middle (of nowhere): interdisciplinary research of the Neolithic occupation in South Bohemia

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During their peak distributions, the Linear Pottery and Corded Ware cultures were spread across large parts of Central Europe. Yet, their materiality, defined by sets of distinctive artefacts, remained relatively uniform, particularly in early phases. It suggests a high degree of conformity pervading these Neolithic societies. But is this scheme generally applicable or did some more independent spatial structures exist in this uniform milieu? If so, what did constitute them and how much could their cultural trajectory differ?

We put these questions under scrutiny in the case study of the South Bohemia region. Upland landscape and a limited extent of loess soils created here less favourable conditions for Neolithic farmers in comparison to the neighbouring lowlands of the Danube, Elbe, and Morava rivers. Thus, the lower occupation density and phases with a very limited archaeological record are characteristic of the Neolithic of South Bohemia. Our interdisciplinary research aimed to reconstruct subsistence strategies, temporalities, and ways of life of local communities. We employed Bayesian modelling of radiocarbon dates, analysis of raw materials spectra, archaeobotanical analysis of cultivated and gathered plants, as well as pollen-based evaluation of human-connected vegetation changes.

We argue for asymmetrical relations between lowland regions and South Bohemia where the former played an active role propelling the changes that were imposed on the latter. However, South Bohemia appears to be resilient to new impulses since significant differences between cultural trajectories of the two realms were observed for the periods of Linear Pottery and Corded Ware cultures. These cultural phenomena entered South Bohemia with significant delay and after they did so, the ways of life might be altered in various aspects. Still, the physical borders constituted by highlands were permeable. South Bohemian communities had multiple connections with surrounding areas as evidenced by commodity exchange. Our case study points to the existence of relatively independent spatial structures that acted as a refuge for atavistic or unique ways of life in generally uniform systems and that were not, however, considerably separated in physical space. Employing such an interpretative framework for current archaeological data can improve our understanding of diverse and non-linear developments of the prehistoric world.

S17.148

Catalysis on the Yenisei: Reaction interfaces in archaeolinguistics and archaeogenetics

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This paper begins with Johanna Nichols' articulation of *catalysis* as an explanatory device at the collision fronts of language spreads in historical linguistics and sociolinguistics. I explore a generalization of this notion to interfaces between groups who may not map straightforwardly onto discrete speech communities and whose linguistic affiliations may be uncertain or irretrievable. I evaluate the prospects and limitations of operationalizing this in genome-wide studies of human ancient DNA, delimiting one particularly rich case study in several overlapping frameworks: linguistically by the complex interplay of Yeniseian, Uralic, and Turkic; geographically by South-Central Siberia and adjacent Inner Asia; chronologically by mid-Holocene to Russian imperial times and beyond; and thematically by the weak seams of common characterizations like aboriginal archaism and the inevitable recession of hunter-fishers in the face of food producers and southern states. I find catalysis to be an agile blade for certain forms of anthropological and sociological inquiry beyond linguistics and close with some consideration of how ancient human genomes can be more sharply and carefully resolved as transdisciplinary witnesses to past landscapes of affinity, alterity, boundary breach, and transformation.

S18: Prehistory of politics - politics of prehistory

Prehistoric societies are much too often treated as ‘people without history’, and without politics. They are portrayed as static, internally coherent and without the possibility to formulate and enact political agendas and actions. Change is usually attributed to external impulses, such as climate and ecological effects, diseases, demographic change, or immigration. In Western mainstream archaeology, politics, if discussed at all, is mostly seen as restricted to the realm of chiefs or vaguely defined elites, and is usually treated as a matter of top-down exercise of power, or conflicts between such chiefs and elites. This obviously has a lot to do with our modern social and political system, and with our view of ourselves as well as of prehistoric people. The prevalence of such views in academia and popular science is reflecting power structures within academia, a persistence of western exceptionalism, eurocentrism, elitism, and mirror specific views on the possibilities of individual and collective agency, political consciousness and organization. It seems important to interrogate our own premises on how aware we actually are of the political possibilities and conditions for political struggles in prehistoric communities, and how these premises are rooted in our ideological backgrounds and institutional structures of our research practice.

We thus invite contributions dealing with all periods of prehistory and early history worldwide, which focus on the following questions:

- How do we envision political institutions or political action, political agendas, forms of decision making in the past?
- How do such views of the past connect to our politics in the present?

We also invite contributions that interrogate how current politics shape our views of the past, and social anthropological contributions that deal with modern multitudes of political organization.

S18.149

Decentralization as an Active Process, Not a Failure of Centralization: Evaluating the Politics of the Marpole-Late Period Transition in the Northwest Coast

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Archaeological histories often focus on the “cultural climaxes” in any region’s past, to the detriment periods that indicate “cultural decline”. Such climaxes typically involve periods of increased consolidation and centralization of power, as opposed to the dispersal and decentralization of other periods that may follow. In the Coast Salish Northwest Coast, the period of Marpole (2400 to 1600 BP) represents such a peak, with the subsequent Late Period (1600 to 500 BP) receiving less attention. Yet, it is apparent that a politics of rejection occurred, a resistance movement that resulted with forms of sociopolitical organization that enhanced local forms of autonomy in a variety of ways. Here, I review several lines of evidence concerning an active political movements for greater autonomy, considering symbolic expressions, changes in economy, and oral historical narratives. I will close in considering how these periods are considered in light of contemporary discussions. Views from the right readily offer praise to periods of the greatest concentrations of power, yet even some from the left point to the Northwest Coast as examples of hierarchy (e.g., Graeber and Wengrow 2021). Such arguments ignore developments within the region that favour greater local autonomy and decreases in the expression of domination over others. When viewing the archaeological history as a whole, the dynamic of centralization and decentralization is apparent as active movements pressing one way or another, not the active movements for centralization against the submissive or passive backdrop of non-elites.

S18.150

Ancient Prophecies and Lost Empires. Religious and Political Ideas of Empire in Early Archaeology in North America

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This lecture will present the early research on large-scale fortified settlements and mounds in North America and how religious and political ideas of empire were received. With the help of old, influential political ideas and ideals, European settlers and missionaries and then American antiquarians developed interpretations of these mounds and earthworks between the 17th and 19th centuries. The statements and publications evaluated for this purpose come from academic laymen trained in other disciplines, from dilettantes in the field of ethnography and antiquarianism, as well as from missionaries or employees of private companies or government agencies. Their reflections are to be read and understood against the background of the independence struggles against England, the Christian missionary movement in North America, the religious debates of the Enlightenment as well as colonialism and finally the imperialism that emerged in the 19th century. These debates and developments were inextricably linked to questions of domination, expansion, state order and polity and formed, as it were, the framework of what was conceivable for past societies and cultures on both sides of the Atlantic.

S18.151

People with too much history: late capitalism, postmodernity, and politics in archaeology today.

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The idea that societies are shaped primarily by outside factors was popularized by processual archaeologists in 1960s and 1970s, and it has made a comeback in the last decade through the Third Science Revolution. In response, many archaeologists have taken the position that people themselves shaped their history and past actors were not subject exclusively to the whims of external factors, such as climate or invading forces. Furthermore, it is assumed that members of past societies had a strong role – societies were not always top-down affairs, with elites dictating the destiny of the masses.

This might all be true about certain past societies, but have we not imposed too much history onto the past? Were people in the past really that politically conscious and were they aware they could change their history?

This talk addresses the biases of postmodernity, or the logic of late capitalism, and how it has affected archaeology. Just as archaeological discourse has gone from submission to agency, from fixed to fluid social identities, from hierarchies to networks, so too did western society when it passed into postmodernity. Archaeology has simply mimicked contemporary western history and imposed it onto the past. We live and sustain the logic of late capitalism, a state of affairs where the economy has become decentralized, where individuals have inaugurated flexible ways of capital accumulation, where people have found a myriad of new ways to express their identity, and where expanded social networks have become the dominant mode of communication. Living in this world has made us lose sight of our own biases and impose onto past societies considerably more history than they probably experienced.

S18.152

Overcoming controversial bias in the interpretation of Indigenous past

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How can Africans be described as being prehistoric, when man originated from Africa - Could it be a contentious bias among academics or the persistence of colonialism in academia? It appals me how a society with the most inventive and technically produced object ever lived in the world still faces a misinterpretation of identity. Using the Agency approach to investigate the material culture of colonized societies, this paper presents the structures to understand how the colonized chose to resist, subvert or accommodate colonial rule, which is the underpinning of historical people. I aim to create the quest to investigate the active role of the colonized, to understand people's need to be studied according to their landscape, Indigenous history-making and local technological knowledge. Apparently, to dispel the bias associated with Indigenous interpretation because the colonized can no longer be lumped together as passive, unthinking machines whose actions are determined by their masters.

S18.153

Neolithic roundels as monuments and a tools of politics

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It is obvious that contemporary governments and political parties practice 'historical politics' using various tools, the most important of which are buildings (monuments) commemorating people and events. 'Historical politics' usually uses a mythologized version of history that corresponds to the interests of privileged social groups and has little to do with historical narrative in the academic sense of the word. In this respect, we are no different from the pre-literate tribal communities that did not know the distinction between history and their own mythical-heroic genealogy.

Neolithic roundels are among the oldest objects (4800-4500 cal BC) to meet the criteria for monuments. Roundels served as a ceremonial centre – a permanent feature in the landscape, built to commemorate the achievements of ancestors and to celebrate and demonstrate a community's 'ancient' land rights. It can be said that this is how the construction of the earliest monuments in Europe began, which were both then and now powerful tools for shaping historical narratives and exercising politics. In examining the roundels we go to the very roots of their origins, namely the context: the changes that brought a dramatic end to the several-hundred-year-long colonisation of Europe by the first farming communities.

In the paper I will present a comparative analysis of two roundels excavated in recent years in Nowe Objezierze (NW Poland - Pomerania) and in Targowisko (SW Lesser Poland), which functioned at the same time, but within a different cultural tradition. Project subsidised by the National Science Centre Poland (2017/27/B/HS3/02925 & 2020/39/B/HS3/02529).

S18.154

Matrilineal/Patrilineal: Diversities Within a Single Kinship Model

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With the rise of aDNA studies in prehistoric archaeology, terms such as matrilineality and patrilineality are commonly used in scholarly literature. From a socio-cultural anthropological perspective, however, the two terms are not as simple and unproblematic as commonly accepted among specialists. This paper follows a socio-cultural anthropological insight that politics cannot be understood without kinship and religion, since they are one in non-industrial societies; also those documented archaeologically. For example, the ascription of matrilineal descent to certain prehistoric societies in no way implies that women were in fact either the heads of the households or that they participated in decision-making beyond the house. Based on a few ethnographic examples, the paper exemplifies that matrilineal society is neither synonymous with societies with female leadership nor with male subordination. Matrilineality and patrilineality are umbrella terms for societies with a wide range of politics and kinship with or without a state. Therefore, archaeology must carefully refrain from essentializing and equating prehistoric communities between each other with terms such as matrilineality and patrilineality, without any further nuances, should we understand the diversity of human socio-political forms in the deep and recent past.

S18.155

The politics of local and transregional encounters in 3rd millennium Europe

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The third millennium BCE in Europe is characterised by the emergence of a set of new social values, connected to gender, personhood, violence and social organisation. They are connected to newly emerging interregional networks, classified by archaeologists as Yamnaya, Globular Amphorae, Corded Ware and Bell Beakers. Those units of material culture and burial practices represent a wide spectrum of different manifestations of those social values. Archaeology tends to treat the advent of those units as well as the underlying phenomena as uniform, regionally even and inevitable processes. This fails to take into account the regional and temporal variability of the archaeological record beyond culture labels. Such a view stems from an underestimation of the political dimension of the emergence of these values and practices, and the possibility of individual, local and regional politics, which involve selective integration, transformation, rejection and resistance. Those follow locally distinct trajectories determined by different socio-cultural premises and individual agency, which, as I argue, are the main reasons for the complex picture of regionally diverse manifestations of Yamnaya, Corded Ware and Bell Beakers that we find in the archaeological record. In this paper I will highlight some examples in which it becomes visible how we can better understand the politics of local adaptations of transregional trends.

S18.156

Chiefs & Rebels? Politics of the Bronze Age in Northern Germany

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The discussion of Bronze Age politics is mostly dominated by strict and authoritarian theories regarding the organisation of society and decision-making. However, on what basis can this be reconstructed for northern Germany and can we perhaps imagine alternative concepts? Only a few settlement sites are known for this region, but there are many burial mounds of the Older Bronze Age (1800-1200 BCE) and urn graves of the Younger Bronze Age (1200-500 BCE). The period of barrow construction is often described in terms of organisation in so-called chiefdoms linked to specific power structures, the performance of which is also mirrored in warrior graves. However, was power really that centralised? Who made the decisions and was the burial mound to be seen as an 'award' for an individual or actually for the community? The change in burial from inhumation to cremation initially affected the barrows. Thus, although the pioneers of the new custom were cremated, they continued to be buried in a coffin under a burial mound. From 1300 BCE onwards, almost everyone was cremated, but there were still individuals who were buried as an inhumation. Was it a personal decision and could opponents and strugglers still be buried as inhumations? Or did someone hold the decision on who was buried and how? At the same time, the construction of burial mounds also declined rapidly. At first, only secondary burials were placed in existing barrows, but no new ones were built. In addition, urn burial became more and more widespread and was established around 1200 BCE. With urn burial, not only were grave goods standardised, but many more people were given a grave than before. Strong political changes, especially in the decision-making issues concerning the burial system must be considered. These and other aspects will be discussed using various examples from northern Germany.

S18.157

Human Mobility in the Landscape of Tehran Plain; From Proto-Elamite Union to Modern Nomadic Rulers

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The vast plateau of Iran includes large deserts, colossal mountain ranges, and low and abundant lands where water is scarce. Water scarcity has affected nature, the agricultural system, the Iranian way of life, and even the formation and heart of government. It is not possible to discuss the history, economy, society, lifestyle, and politics of Iran without a thorough study of the Iranian nomadic society and their lifestyle in their historical and archaeological context. Iranian nomads with tribal social organization, nomadic lifestyle, and animal husbandry living methods are living on the Iranian plateau. Before the establishment of the centralized administrative and political organization, nomadic tribes ruled and controlled large parts of the Iranian plateau due to the need for essential resources as well as their way of life. Tehran plain in the center of Iran has become a crossroads of trans-regional communications. This region, which has long been considered due to its proximity to the political capital of Iran, as well as its special geographical features, is important with the presence of different tribes alongside the urban community. The nomadic community of Tehran plain is very diverse and a combination of Iranian nomads. Archaeological studies in this area have proven that the roots of the presence of nomadic communities in this plain should be traced back to the fifth millennium BC. Based on the management and administrative documents found in archaeological remains such as seals and sealings obtained from the ancient sites of this region and based on ethnographic research, the continuous presence of these tribes in this area should be estimated from the past to the present and as continuous. One of the reasons for this continued presence is due to the favorable environmental and climatic situation of the Tehran plain in different eras. In this article, an attempt is made to study and evaluate the presence of nomadic tribes in the Tehran plain in the past and present.

S18.158

Altai past and present: ethnography of an excavation

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As Russian discourses on the invasion of Ukraine are once again demonstrating, the past is easily invoked to legitimate political and territorial claims in the present. This paper will explore the interdisciplinary approach of ethnographic excavation on the basis of fieldwork conducted in the Altai Republic (Russian Federation) as part of a German-Russian project. It asks: how does ethnographic archaeology change our understanding of producing knowledge about the past? To begin, I will introduce the history and politics of the region in relation to archaeological scholarship (Tadina 2021). Then, I will give an overview of decolonial and Indigenous scholarship from Siberia and from Altai specifically (Grøn 2005). Subsequently, I will focus on ethnographic archaeology as a novel discipline situated between archaeology and ethnography (Edgeworth 2003). The fieldwork I conducted will exemplify why an ethnographic approach to excavation and the wider archaeological discipline is necessary to deconstruct past and ongoing colonial practices. Preliminary results indicate that the practice of archaeology and Russian colonialism in the Altai are intrinsically linked, with a negotiation taking place between the validity of Indigenous knowledge (Altaian), colonial power (Russian academia) and international involvement (western European team and funding). Furthermore, the development of decolonial and Indigenous archaeology is following a different path in this region than in other former Soviet contexts and parts of the world. Ethnographic archaeology offers the possibility to examine the context in which excavation is conducted, and how given communities relate to their heritage and lay claim to it. More broadly, we need to re-evaluate the role of sciences such as archaeology and ask how archaeology should be conducted in the future, especially in (post-)colonial contexts and on Indigenous lands (Bruchac 2014).

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S18.159

Politics of Commemoration in Viking Age Scandinavia

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Our thinking of politics in the past is influenced by our current politics. This includes our perceptions of the use of the past in present and thus of the use of the past in the past. The paper explores the relationship between use of the past in the Viking Age in relation to past politics. Reuse in the past is typically interpreted as the result of an elite manipulating the population through the use of material culture. With the reassessment of the how power is presented in archaeological

analyses, these structural Marxist perceptions of power have been rejected; but if reuse is not a deception to gain power, can it still be politics? In the paper, Viking Age cases of reuse are being explored in relation to social identities, acts of commemoration and relationality and their relations to Viking Age politics. The aim is to identify the social processes connected to reuse and to study the links between social identities, self-perceptions and politics. Further, as all present examples of misuses of the past demonstrate, the perception of the past in the present highly influence how we perceive the present. Consequently, a re-evaluation of how we interpret the use of the past in the past may potentially also alter the use of past in the present.

S20: De-escalation Strategies in Past Societies

In conflict archaeology, research has mainly focused on violent events so far. However, strategies of de-escalation are equally important and must be considered substantially when it comes to social consequences and economic costs for the communities involved. Successful conflict resolutions, like diplomatic relations or alliance formations, leave less clear material traces than acts of violence and are more difficult to prove without written sources.

This session aims nevertheless to discuss possible archaeological evidence and thus highlight different perceptions and (peaceful) strategies of de-escalations:

- Which historical and modern concepts were perhaps already known to prehistoric societies?
- How was it possible to peacefully manage conflicts even without state structures?
- Did a principle of deterrence already exist to prevent assaults?
- What did security mean and how was an attempt made to establish such a sentiment?
- And how is our perception of the presence and future related to our reflection of past societies?

Multidisciplinary contributions from archaeology (ca. 2000 BC – 1000 AD), cultural anthropology, philosophy, sociology, and political science are very welcome.

S20.160

Cultures of Violence. The Role of Weapon design and Production in Prehistory

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After a long period in which peaceful reading of the archaeological record has dominated scholarly debate, a paradigmatical change of interpretation caused by Laurence Keeley's groundbreaking polemic "The Myth of the Peaceful Savage"

Has changed our perspective dramatically. It has become acceptable to discuss prehistoric warfare in an academic discourse.

Within the conference the organisers want to discuss de-escalation strategies as a way of interaction in prehistoric societies. My paper will present a perspective in which violence is part of the daily life of those very people especially from the part of violence-production. I will focus on the chaîne opératoire of weapon making and waging war to highlight the importance of weapons (and their use?) in the prehistoric times of Europe and the Near East.

S20.161

Conflict and De-Escalation -- Theories, hypothesis, and assumptions

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This paper presents the ROOTS approach to conflicts and questions the role of fortifications and weapons in conflict processes. The main idea of ROOTS subcluster 6, "conflict and conciliation" is, that conflicts are not only and perhaps even not mainly concerned with violence and escalation processes, but rather with de-escalation processes. Conflict processes, starting with conflict potentials, involve many decisions that shape the whole process. These decisions address, whether further escalation has any use or de-escalating strategies provides more benefits. Thought, "winning" a conflict might be nice, the immense costs of conflict escalation that increases exponentially with each escalation level have to be considered. The interpretation of material culture as conflict indicators is based on several hypothesis and assumptions. This paper aims to discuss these interpretation parameters of fortifications and weapons. Generally, it is assumed, that fortifications are a reflex to external threats and that weapons indicate actual violence. In particular, the amount of weapons in the archaeological record, sometimes is assumed to be a proxy of conflict escalation. We are considering the role of fortifications in de-escalation strategies on different conflict levels and a monopoly of violence that controls the actual amount of weapons used in a specific society. This discussion leads to the hypothesis, that the quantity of fortifications and of weapons can not be taken directly as conflict proxy, but require a deeper contextualisation.

S20.162

Sacrifices against the state. Weapon deposition as an inner-societal de-escalation strategy

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Ritual depositions of weapons, especially of loot from warlike events, were framed by different ideological notions and pursued different purposes. Thus, both triumph was to be celebrated and enemies were to be symbolically banished through the destructive sacrifice of their equipment. At the same time, the actors reassured themselves of their social community and trauma resolution could take place. De-escalation does not only refer to the formal termination of a conflict by the group of victors, but it also limited the political options of the successful combatants. Neither were the weapons of the enemy allowed to continue to be used, nor did the military leadership manifest itself in a position of social power. On the contrary, there was a decisive separation of the two spheres. The ritual of weapon deposition thus also served to re-establish a corporate order that had been in place before the external conflict. This explains, among other things, the lack of rich burials and especially those with weapons in the wider surroundings of the cult sites. The lecture discusses these aspects on the basis of the extensive weapon hoards of the Late Bronze Age in western Europe with an outlook on the military equipment offerings of the Germanic Iron Age in the western Baltic region.

S20.163

Make peace to fight another day – insights on the function of Bronze Age weapon depositions.

V. Gentile

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Warfare is frequently regarded as one of the defining characteristics of the European Bronze Age due to the advancement in weapon technology and the widespread diffusion of martial implements in this period. Archaeological and osteological finds provide further evidence of violent conflicts, at times involving an extraordinarily large number of participants. At the same time, coeval ceremonial practices suggest that martiality also played a significant role in the world-view and ideology of these communities. For instance, numerous weapons were intentionally removed from circulation by being buried together in hoards or thrown into rivers. In addition, these weapons were sometimes deliberately rendered inoperable before being abandoned.

It is still unclear under what circumstances large-scale battles took place in the absence of state structures. Similarly, it is necessary to further reflect on the extent to which persistent conflict was sustainable for Bronze Age communities, and on what methods could have been implemented by non-state groups in order to manage conflict and prevent violence from escalating. Investigating martial ceremonies such as weapon depositions can play a key role in understanding how the reality of violence was, processed, incorporated, and thus managed within Bronze Age societies.

Through a combined approach consisting of experimental investigation and in-depth analysis of use-wear traces, it is possible to reconstruct the events that preceded the deposition of the items and gain insights on the intent behind such acts. In this paper, I discuss preliminary findings from a wear analysis campaign performed on weapons from Late Bronze Age hoards and single depositions in the Low Countries, highlighting the cases in which numerous indicators point towards scenarios compatible with peace-making and de-escalation strategies.

S20.164

„Dann schlossen sie sich zusammen und schienen zu vergessen, dass sie jemals in Opposition gestanden hatten.“ – Beispiele aus kulturalanthropologischen Berichten für De-Eskalierung durch ritualisierte und kanalisierende Gewalthandlungen.

A. Reymann

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In einem Bericht aus der Mitte des 19. Jh. beschreibt ein europäischer Reisender eine kriegerische Konfliktsituation zwischen kanadischen Gruppen der Snoqualmie und der Snohomish. Als Reaktion auf die Entführung einer Frau begegnen sich mehrere hundert Krieger auf beiden Seiten, bereit zum Kampf. Nach einer Diskussion werden zwei Decken und zwei Musketen als Entschädigung gezahlt und beide Gruppen feiern danach ein Versöhnungsfest. Obwohl somit ein Konflikt bestand, blieb die Gewalt aus – vorerst.

Die ethnologische Literatur ist bei genauerer Betrachtung tatsächlich erfüllt von Beispielen dafür, dass der Austausch von materiellen Objekten im Zuge von De-eskalierungsstrategien zentrale Bedeutung hatte – ein selbstverständlicher Fakt, da die Gemeinschaften miteinander durch eine lange Historie der Koexistenz verbunden waren. Der geplante Beitrag

möchte verschiedene dieser Strategien vorstellen und unter Einbezug der „Mikrosoziologie der Gewalt“ eine Gegenthese zu Helblings „Tribalen Kriegen“ vorstellen, einem in der prähistorischen Konfliktforschung nach wie vor etablierten spieltheoretischen Modell zur Erklärung archäologisch nachgewiesener Gewalthandlungen.

S20.165

Boundaries in landscape as a de-escalation strategy?

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In recent years, large-scale linear boundaries have been increasingly uncovered in the landscape, e.g. in northern or central Europe. These include pit alignments and pit zone alignments, but also cooking pit alignments and rows of palisades that stretch across the landscape for hundreds of metres. The construction of field boundaries and field divisions, house and settlement enclosures also show the need for demarcation, a phenomenon that begins in the Bronze Age and becomes increasingly common in the Iron Age.

The following contribution examines the significance of these linear boundaries, their occurrence in the landscape and their chronological classification. Did they serve to delimit territories and can a simultaneous evidence be found in material culture for conflict potential such as weapons and defensive technology? Or did they serve other purposes, such as ritual gatherings, as is often assumed for the cooking pit alignments.

S20.166

Creating Defenses as an Offensive Strategy - Thoughts on Conflict Resolution in Bronze Age Europe

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During the last decades our perception the Bronze Age has become more and more that of an epoch partially characterized by violence and conflict. This notion of the Bronze Age is not wrong as weapons, warrior iconography, hillforts and even large scale battles are all represented within its material record. The looming threat of armed conflict pushed communities to large scale investments in defensive structures like hillforts and professionalized warriors. Often falsely categorized as purely defensive measures these preparations for future open conflict are indeed part of an offensive strategy for conflict resolution.

Fortifying locations of importance sends a clear signal of ownership that extends towards a communities territory as a whole. The integration of weapons in burials and religious practices reflect on the importance of warriorhood within these societies. These costly displays of will and might where foremost meant to stir adversaries away from violent conflicts in the first place. As these investments drove up the costs for every enemy that would consider violent conflict as their strategy. At the same time establishing and sustaining institutions like warriorhood and fortifications allowed them to function as nodes in networks that could be utilized to resolve conflicts before they escalated further. As similar nodes in divergent communities create a social fabric that allowed for forms of diplomacy and negotiation.

The presentation will illustrate patterns in the material record that could be linked to offensive strategies of conflict resolution we can find in the ethnographic and historic record. It deliberately conceives open violent conflict as a strategy of conflict resolution. It will therefore emphasize that even a violent encounter between two groups can lead to a series of outcomes that can be advantageous for both sides. Advantages that are not imminent to our modern western concept of war as a tool of domination and/or destruction of enemies. It will argue for a more distinguished concept of raiding, feuding and warfare in prehistory that leaves space to think of violence as a vital strategy again rather than a taboo. As violent conflict in the Bronze Age will not have lead inevitably to the demise of one party and the rise of their opponents on the other side.

S20.167

Of White Elephants and Objects of Desire – A Critical Exploration of Diplomacy with Archaeo-Historic Sources.

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In conflict archaeology, research so far has mainly dealt with escalation processes. However, as Nakoinz et al. (2019) have shown, strategies of de-escalation are at least as important. One tool to de-escalate conflicts is diplomatic negotiation, which has so far been considered difficult to prove archaeologically.

Nevertheless, Mauss' concept of gift exchange (1954), on the one hand, and medieval written sources, on the other, can contribute decisively to an approach to this topic.

This paper aims to discuss interdisciplinary methods to examine the complex topic of diplomacy archaeologically.

S22: On course to drowned landscapes of the North Sea – cultural aspects, preservation potential and geoscientific challenges

Following the Last Glacial Maximum, rising sea levels flooded vast inhabited landscapes that remain submerged until today. Archaeological investigations need to include areas of continental shelf flooded during the Late Glacial and Holocene marine transgression and contextualise the human adaptation to changing environmental conditions within a dynamic landscape. A prime example is the present-day North Sea region, also known as ‘Doggerland’, which was once extensively exploited by Palaeolithic and Mesolithic communities.

Although the awareness of the relevance of drowned palaeolandscapes has been steadily growing in the last decades, vast regions of the German Exclusive Economic Zone remain terra incognita to this day. In light of the projected intensive economic use of the sector, there is an urgent need for collaborative action.

This session will unite experts from multiple disciplines and regions to assess the current status and outlook for future research on Doggerland as perceived from the German Bight. We welcome talks on Late Palaeolithic and Mesolithic archaeology and activity associated with Doggerland and what can be derived from the collected information on the lifeways and mobility patterns of its inhabitants.

The reconstruction of palaeolandscapes is vital for further archaeological assessment and investigations of submerged habitats. We welcome presentations on methods specifically aimed toward:

- The access to palaeolandscapes and environments
- Understanding the evolution of Doggerland at various spatial and temporal scales
- The preservation potential and assessment of the current risk to potential sedimentary and archaeological archives
- The effect of climate changes on hunter-gatherer groups in the past and their strategies to cope with sea level rise.

S22.168

Not drowning but waving! Doggerland and the Lost Frontiers Project

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The Bradford ERC Advanced Grant Project “Europe’s Lost Frontiers” was begun in December 2015. The project seeks to generate topographical maps of early Holocene Doggerland that are as accurate and near complete as possible. Using these data as a guide the project has used traditional environmental proxies, but also ancient DNA recovered directly from buried sediments under the sea floor, as tools for the reconstruction of the palaeoenvironments of Doggerland, to explore the development of these landscapes during the period of climatic amelioration and specifically to look for environmental markers within the marine environment which may not be recognised via traditional methodologies. These data are currently being used for broader modelling strategies to investigate the ecological development of Doggerland. The project, which includes research groups based within universities across England, Wales, Scotland, Ireland, Belgium, Holland and China, has carried out mapping and new fieldwork across the North Sea and the Irish Sea, and this paper presents some of the latest results.

S22.169

RE-COLLECTING EARTH. Seabeds as archives of the world

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During a research cruise across the Irminger Sea, Denmark Strait and Icelandic Basin with a team of ROCS scientists, I sat down with the project’s geoscientist. The sea’s swells were wreaking havoc on the cognitive abilities of my wave-challenged brain, making only possible for the simplest of questions to emerge. “Our research at ROCS focuses on the ocean, climate, and society,” I said, staring into my coffee. “Why the ocean?” He looked straight at me, with the patience imperative for transdisciplinary conversations. He replied, “because everything ends up in the ocean”. This paper rises out of this simple yet transformative conversation. It seeks empirical grounding in the samples of marine sediment cores collected with a gravity corer on the ROCS research cruise in June 2021, some of which date 40,000 years back. This research engages with the collection of cores aboard the research vessel as well as the cores themselves. This presentation cuts across the popular binaries of nature and culture as it tentatively articulates how – as everything ends up in the ocean – the seafloor is a depository where the earth’s information is collected into sediment and driven by the ocean’s layers and currents that shape its practices of “taxonomy”. In this presentation, I argue that oceans as archives for earthly

recollections based on human and non-human conversations speak to heritage as more than human constructs and troubles resilient ideas about archives as human ways of organizing and understanding the world. This paper discusses how the ocean's seabed is a depository for the earth's information. It examines how the ocean collects the earth into sediment which, driven by the ocean's behaviours, shapes its practices of "taxonomy". Such articulations speak to heritage as relational constructs that traverse human interventions.

S22.170

Integrating Direct Push techniques in geomorphological and geoarchaeological research – new approaches towards comprehensive shallow subsurface characterization

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Direct Push (DP) in situ sensing is increasingly applied in geoarchaeological and geomorphological research improving our understanding of subsurface characteristics and composition. DP techniques are minimal-invasive and time efficient and allow for data acquisition in high resolution (cm-scale) with minimal disturbance of the subsurface. A broad variety of sensors can be used that constantly measure different sedimentary, mechanical and hydraulic parameters. Once calibrated, e.g., against stratigraphic data from sediment cores or outcrops, DP techniques can be used to interpolate stratigraphic information onto a large spatial scale. In this contribution we show case studies from different depositional environments in geoarchaeological context using the hydraulic profiling tool (HPT) and cone penetration testing (CPT). The application of the HPT allows for measuring electrical conductivity, injection pressure and permeability, the CPT probe enables measurements of tip resistance, sleeve friction and pore pressure. We combine these techniques with surface-based geophysical studies (electrical resistivity tomography (ERT) and seismics) accomplished by sediment coring. We will discuss the potential of DP techniques using standard and innovative approaches of data interpretation towards detailed facies interpretation. We show that the application of DP in situ sensing significantly improves our understanding of subsurface stratigraphies and associated formation processes in geoarchaeological and geomorphological contexts.

S22.171

Drainage and submergence of the postglacial landscape in the southeastern North Sea

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At the end of the last glaciation, vast parts of the North Sea shelf formed a landmass that connected Great Britain with the continental Europe. Relict tunnel valleys, rivers and lakes as well as fenlands, floodplains and coastal areas shaped this landscape and were potentially attractive environments for Mesolithic hunter-gatherers. This landscape, known as Doggerland, was however affected by the rising sea level, during which wide parts of the coastal lowlands were converted to shelf and coastal seas. Coastlines shifted toward their present locations within a few thousand years. Today, an up to several meters thick marine sand package covers the remains of this palaeolandscape. A prominent feature of the southeastern region of the Doggerland is the Elbe Palaeovalley (Elbe-Urstromtal), a gently shaped, 250 km long and about 50 km wide valley configuration stretching from the today's Outer Elbe northwards to east of the Dogger Bank. The Elbe Palaeovalley was fed by several tributaries which drained the Doggerland and the continental plains. During multiple research expeditions the Elbe Palaeovalley and some of its tributary systems along whose western flank has been mapped geophysically and sampled with sediment cores. The investigations revealed a braided river system along the thalweg of the Elbe Palaeovalley and relicts of the palaeolandscape along the western valley flank. Unfortunately, it turned out that most of the valley fill was deposited only in the course or after the marine transgression. At the northern reach of the Elbe Palaeovalley a network of shallow rivers and tributaries that originated from glacial meltwater channels, drained the southeastern region of the Dogger Bank into the palaeovalley. Comparable structures are also known from other regions of the Dogger Bank. At the southern reach of the Elbe Palaeovalley, investigations of the now submerged palaeo-extension of the modern Ems River shed light on the morpho-stratigraphic relationship of the tributary with the palaeovalley. The Palaeo-Ems formed a unified depositional system with the early phase of the Elbe Palaeovalley thus contributed to the last terrestrial phase of the complex palaeovalley evolution. The unified system was later submerged due to the rapid rising sea-level which overwhelmed the adaptation capabilities of the system. Sedimentary analyses showed that the Palaeo-Ems drowned within a few hundred years.

S22.172

The unknown landscapes of Doggerland east of the Elbe Paleo Valley

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Doggerland, the former now buried and submerged landscape between Jutland and England, has fascinated archaeologists and geologists for several decades. While this fascination has inspired regional paleolandscape mapping campaigns in the British, Belgian and Dutch EEZ's (Economic Exclusive Zones), the Danish and German sectors remain little understood. This is mainly due to a lack of coherent mapping approaches. These years, the availability of high-resolution geophysical data in the Danish EEZ is however increasing rapidly due to the construction of energy islands and offshore wind farms, and there is thus a huge potential for understanding and mapping the lost landscapes of the easternmost Doggerland. In this presentation, new regional mapping results based on high-resolution seismo-acoustic data are presented, which provide a unique insight into how the landscape looked like on the eastern shores of the Elbe Paleo Valley. Understanding this landscape as well as the development of the Elbe Paleo Valley is critical for understanding and predicting human migration patterns across Doggerland.

S22.173

Let's go to the red mountain – Preliminary results of and future plans for Late Pleistocene - Early Holocene palaeolandscape reconstruction off the Heligoland coast

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Heligoland must have been of immense importance within the vast and dynamic Late Glacial landscape of the southeastern North Sea. It served as a landmark, vantage point and source region of unique red flint that was extracted and transported into today's mainland during the Late Palaeolithic. The reconstruction of Late Palaeolithic living and migration conditions in the area of the North Sea, especially around Heligoland, is one of the central unresolved questions of today's Stone Age research for northern Central Europe.

High-resolution sediment echo sounding data has been acquired in the vicinity of Heligoland during cruises AL496, AL511 and MSM98/2. The preliminary analysis of this data shows an increased density of shallow channels that display (apparent) widths of 200 m to 600 m. Our initial results point to an extensive Late Pleistocene - Early Holocene drainage pattern. We aim to reconstruct this drainage pattern for the Heligoland area, as it will enable us to determine likely locations of hunter-gatherer settlements and related migration paths on land and water through the period in question.

However, as the spacing of available sediment echosounding profiles is not dense enough with respect to target size, the correlation of channels and other landforms between profiles is not always possible. The extension of the channel network to Heligoland is not known yet. Future fieldwork (German Research Foundation cruise TRAPA, planning pending) is intended to countermeasure this. We plan to map a 20x23 km wide area northeast of Heligoland at very high lateral resolution with a Teledyne Parasound system. Ground truthing and dating of land surfaces will be accomplished by means of a 6 m Vibrocoring.

Is this waterscape connected to the present tidal stream Heverstrom and/or the river Eider? Does the channel network extend towards Heligoland and thus serve to guide reindeer herds and their hunters past the red massif? How dynamic is this palaeolandscape expected to have been? Are the courses of major rivers stable, or do they change on a shorter than millennial time scale? Up to now, there are endless questions and the promise of answers once we venture at sea.

S22.174

Fringing Doggerland...the terrestrial Late Glacial fluvial records to the Doggerland catchments.

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Whilst current palaeolandscape research is mostly focussed on the submerged Doggerland landscape, from an archaeological perspective the major river systems on the fringes of the North Sea and their associated archaeological complexes have great importance. These may also be projected to some extent along the modelled major catchments of now-submerged Doggerland.

Three Major catchments are apparent: The Channel River in the South-West, The Wash and Trent fluvial systems (connected or not) in the North-West, and the Elbe catchment to the East. These major river systems structure the landscape and to some extent the human choices and the archaeology of terrestrial landscapes, and by the projection, into today's submerged landscapes. I will here present some of the archaeological and fluvial Late Glacial references on the "fringes" that can provide some insights into Late-Glacial Doggerland.

S22.175

Drowned Landscapes in the North American Great Lakes: A case study from across the Atlantic

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Hunting and gathering is, and has been, the most successful human adaptation ever to exist. Foraging peoples moved across the globe, encountered every type of habitat, engaged with their environment in flexible and innovative ways, and were witnesses to vast climatic changes. One of the most significant planetary changes since the Pleistocene are global water level fluctuations and the landscapes they submerged. Global fluctuations in sea level are mirrored at a regional scale in the North American Great Lakes, where just in the Lake Huron basin alone, 250,000 hectares of land were available for plant, animal, and human occupation 9,000 years ago – this paleolandscape is now submerged. Over that last decade interdisciplinary research has been conducted on this submerged landform and documented stone constructed caribou hunting sites, stone tools, and preserved paleoenvironmental proxies. This collaborative project combines archaeological methods with interdisciplinary science, indigenous voices, and community-based approaches with goals to develop transferable methodologies for exploring drowned landscapes in other regions.

S22.176

Blinkerwall: A Late Paleolithic - Mesolithic archeological site in the southwestern Baltic Sea?

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The seafloor is veiled from our eyes and we often rely on geophysical surveys to investigate morphologies on basin-scales. Many small structures at the bottom of our oceans, however, have simply not been discovered to date due to insufficient resolution of legacy data. Instrumental technology has advanced over the decades, and in shallow water environments we start to resolve centimeter-scale structures. Here we report on the Blinkerwall, a curious morphologic feature discovered during a high-resolution multibeam echosounder survey in the Bay of Mecklenburg (Baltic Sea). The wall, which had escaped resolution in previous studies, locates in a water depth of 21 m and stretches over a distance of 983 m. It elevates up to 1 m from the surrounding seafloor. Video observations from scientific research diving and a portable ROV show that the Blinkerwall is formed by a succession of decimeter-scale boulders. The larger boulders are also resolved in side-scan sonar data. Regional sediment echosounder data indicate that the wall is located on basal till deposits of the Weichselian glaciation. Its straight orientation, size, sorted structure, and location suggest that the wall is not of natural origin. We further find no evidence for a modern age origin of the wall, due to its location away from any submarine cables, pipelines, seabed constrictions or stone-fishing grounds. Instead, we are testing the hypothesis that the wall was constructed during the Late Paleolithic or Mesolithic prior to the Littorina transgression (~8.6-8.0 ka BP) that drowned the surrounding landscape. Present considerations include a possible role as coastal protection site during the Littorina transgression when the sea level in the western Baltic Sea rose from -28 m to -10 m. Alternatively, the wall may represent a hunting structure, a so-called drive line, constructed by the early Hunter-gatherer that roamed the region after the retreat of the ice and similar to prehistoric game drive systems identified beneath the Great Lakes. For spring 2023, we plan an AUV survey, additional multibeam campaigns and ground truthing by means of scientific research diving to evaluate the ancient function of the wall. Finally, we discuss additional sites in the Bay of Mecklenburg where basal till crops out at the seafloor in water depths beyond 20 m. These sites may provide crucial but yet missing information on the development of the Late Paleolithic and Mesolithic culture in the western Baltic Sea region.

S22.177

Resurfacing Doggerland: from finds to narratives

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Over the past two decades major efforts have been put into the mapping of palaeolandscape structures hidden under the North Sea floor. Combined with lithostratigraphic information, radiocarbon dates and palaeoenvironmental data (including sedaDNA), insights into the geoarchaeological potential of various parts of Doggerland is steadily increasing. Important information is also coming from many thousands of archaeological and palaeontological finds collected on beaches along the Dutch coast, or extracted from fishing nets. Some pilot studies, using e.g. aDNA, ZooMS, stable isotope analysis, and AMS dating, revealed the surprising information potential of these 'stray' finds. The project *Resurfacing*

Doggerland (2021-26), financed by the Dutch science organisation NWO, aims at the further enhancement of the scientific and societal information value of North Sea finds, by using an array of modern and more traditional approaches. Focussing on the post-LGM drowning of Doggerland, several aspects are being studied:

1. Human-deer relationships: an object-biography approach to bone/antler tools through use-wear analysis.
2. Artefact typo-/technology: cultural and functional characterisation of stone and bone/antler tools.
3. Human populations: bio-anthropological characterisation of human remains through aDNA, stable isotope (C-N; O-Sr), and osteological analysis.
4. Environment and geography: characterisation of animal populations and landscape context through palaeontological, stable isotope analysis and spatial modelling.

In order to frame finds chronologically, a large number of AMS dates will be conducted. This will also permit to connect archaeological and palaeontological remains to sea-level time-depth curves, which are important for palaeogeographic modelling.

Furthermore, special attention is paid to the development of heritage management approaches applicable in the context of massive economic developments in the very near future. This not only involves the question of how to deal with the disturbance of potentially important archaeological/palaeolandscapes zones, but also how to combine and optimise information from the industry and finds reported by (private) collectors, who play a pivotal role in the safeguarding of this unique record. In this contribution we will highlight the various dimensions of this multidisciplinary project, and assess how it may contribute to further the understanding of Doggerland from an integrated social and ecological perspective.

S22.178

Looking Back, Moving Forward: Going beyond the Lost Frontier's Project

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During the last decade, significant progress has been made regarding our understanding of changes in Holocene relative sea-level and the submerged archaeological landscape within the North Sea. Perhaps the most significant of the research during this period has been undertaken part of the ERC funded *Europe's Lost Frontiers* (ELF) which ran between 2015-2021. This research, currently being published as several volumes, has radically improved our understanding of the Mesolithic landscape of the region and took the first steps towards locating sites in deeper waters.

The progress that has been made by Lost Frontier's presents real opportunities to develop new avenues of research within the field of submerged prehistory. This talk will outline the new projects and continuing research which is being undertaken by the team at Bradford that will allow research in this area to advance beyond what was previously possible and to look deeper into the archaeological past. Through the use of new techniques and technologies, it will be argued that the recovery of archaeological materials is becoming increasingly real prospect for the deeper areas of the continental shelf, a development which is timely given pressing nature of the accelerating development in these offshore regions.

S23: Through the flames and into the grave – multidisciplinary research into past and present cremation practices and burials

Cremation is gaining popularity in present-day Europe, while inhumation is rejected for primarily economic and practical reasons, i.e. cremations being a more affordable option and for lack of burial plots in the larger cities. The reasons for choosing between cremation and inhumations were however not as simplistic in the past, a cremation pyre will for example require knowledge and large amounts of wood and might not have been neither easier nor economically more affordable. Recent archaeological studies have shown that the ‘simple’ cremation graves hold valuable information about intricate mortuary processes and practices (e.g. body treatments) surrounding the funerals, which opens the space for further questions and interpretations regarding social, cultural or religious aspects (e.g. body concepts, symbolic communication, change of religious beliefs and taboos in death rituals). Interdisciplinary studies have revealed detailed insight into burning conditions on the pyre as well as absolute dating and mobility analyses of the cremated bone.

We invite papers from a broad range of disciplines working with cremation practices and burials in the past and today, including archaeological case studies of cremation cemeteries, burial rites and burial goods. We especially welcome paper investigating historical and ethnographic sources, religious and social studies, anthropological studies of human and animal remains, and applications of scientific methods on cremation remains, e.g. strontium, carbon and oxygen isotope analysis and radiocarbon dating.

S23.179

How to get rid of a body: Cremation and other body-related practices

A. Gramsch

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What are cremations? In this keynote presentation I will try to show paths to possible answers from a number of standpoints. One is to consider cremation as one among many possible manipulations of bodies and to scrutinize it from a praxeological point of view – what exactly happened and how did it affect the participants?; from a social point of view – did it affect social relations and social identities?; and from an ideological point of view – is the practice related to worldviews or result from practical considerations? Another is to consider the research fields and approaches that can or should be involved in recording, reconstructing, analysing, and interpreting cremations, i.e. both the bodily remains resulting from this practice and the practice itself. The paths will take detours to turn to the role of the human body in society and to the role of body-related practices beyond burials. And they will lead me to plea for an ‘archaeology of the body’ that does not start from the *locus* – grave, burial site or cremation scattering etc. – but from the body and its *généralité*.

S23.180

Beyond ashes: reconstruction of the funerary rite of Tumulus TU-1 of the cemetery of Vall de la Clamor (Catalonia)

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Grave goods and cinerary urns from cremation tombs have traditionally been the focus of attention far beyond other aspects of funerary structures. Other features including their means of construction and the reconstruction of the rites that took place during and after the burial have largely remained unexplored.

Recent research on these themes such as that by McKinley (2013: 147) has emphasised the complex and multifaceted mode of treating the corps during the rite of cremation. Moreover, grasping the process requires applying an interdisciplinary approach. The objective of this presentation is twofold. The first is to emphasise the need of adopting an interdisciplinary method which in this case comprised stratigraphic, micromorphological, anthropological (burned human remains) and material culture analyses. The second consists of applying these analyses to reconstructing the sequence of the funerary rite which took place at Tumulus TU-1 of the cemetery of Vall de la Clamor (Soses, Lleida).

This cemetery is set on a small elevation along the left bank of the Clamor, an old branch of the Segre River. The first archaeological intervention was carried out in 2003 (Colet *et al.* 2005). The site since 2019 has been the object of a programmed excavation in the framework of a research project. To date the fieldwork has identified 30 structures of which 29 were excavated. The current state of the research does not allow specifying with certainty where the bodies were cremated. However, the findings of the analyses of Tumulus TU-1 reveal evidence that the cremation in certain cases could have taken place at the spot where the burial mound was subsequently raised.

The recent completion of the excavation of TU-1 reveals that this funerary structure dating to the 9th century BCE contained a level of ash and charcoal, as well as calcined bones and fragments of bronze objects, beneath a series of concentric stone rings. This layer capped a level of burnt earth of which three samples were collected for micromorphological analyses in order to characterise the combustion activities carried out prior to raising the tumulus. The human remains collected were likewise the subject of anthropological analyses.

In short, the presentation advances a holistic perspective gleaned from the results of the different studies carried out for this structure that allow reconstructing its funerary rite.

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S23.181

The necropolis of Borgo Panigale (BO) between archaeology and anthropology: new data from child burials

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The necropolis of Borgo Panigale with its 188 burials by incineration and one inhumation[1] constitutes an archaeological context with great informative potential for understanding the socio-cultural aspects of the earliest phase of the Villanovan period in Bologna (c. 925-800 BC)[2] The study conducted on the cremated remains of 167 tombs identified 28% of *Infans 1* (within the age of 6 years), 12% of infants between 6 and 12 years of age, 7% of *juvenes* and 53% of adults and mature people. On the basis of the weight values of the cremated remains, differentiated ossileges were observed with selective bone collection for some individuals and complete bone collection for others, as well as a good representation of the practice of placing the skull bones in the top (anatomical) position of the osteological block[3]. The present contribution aims to integrate the anthropological data with the new data that have emerged from the archaeological study of the material culture in order to reconstruct the peculiar aspects of the Villanovan ritual. The razor and the pin are typical markers of male burials while the spindle, twisted or helical arch fibulae, and necklace elements connote the burials of female individuals. The analysis of the decorative syntax on ceramics reveals a clear prevalence of comb-engraved meander motifs, alongside N-shaped motifs and, less frequently, metopal motifs, sometimes rendered with different decorative techniques combined on the same vase support. Particularly interesting are the data that emerged from the archaeological analysis of child burials. The percentage of infants found in the necropolis of Borgo Panigale appears numerically conspicuous both in relation to the total number of deceased buried there and in relation to the average percentage attested in contemporary cremation necropolises[4]. The biconical, whose use is exclusive to the other age classes, proves to be the most widespread type of ossuary even among the burials of children; undecorated biconicals prevail in the *Infans 1* class, with a progressive inversion of the trend in the *Infans 2* class where biconicals decorated with meander appear. In the graves of children under the age of 6, other vascular forms such as ollae, jugs or amphorae are also attested. In some cases, a close connection also emerges between the minute size of the vase and the weight value found, which is often minimal or extremely low.

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S23.182

Cremation as a message in the times of urnfield cultures

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The urnfield culture's circle was established in areas where tumulus cultures had previously developed. So it was a continuation in some way - but the nature of this process is still debatable. The new culture is also an ideological change, and it is indicated by the new way of treating the dead. Generally, it was the time of abandoning burial mounds and inhumation in favor of flat graves and cremation. A new type of cemetery became a characteristic part of the culture of this period. The graves of the people of the urnfield cultures are characterized by a repetitive form - distinct for vast areas of Europe. Therefore, it can be assumed that they constituted a commonly understood message. It concerned the perception of society and understanding of the human body - its physical and spiritual aspects. In addition, the funeral rites had to correspond to the vision of the world adopted at that time. The applied actions had to be completely coherent with it. Actually, a ritual is the realization of a myth. It seems that fire was the primary medium of meanings. After all, its contact with the deceased was a key part of the ritual. Therefore, all possible information that could be carried by fire, glow, smoke, etc., will be analyzed. Another issue is the use of cinerary urns and burying them in the ground. It seems that this part of the ritual refers to the Neolithic traditions associated with a positive valorization of fertility. Another crucial factor is the depositing of numerous ceramic vessels inside the graves. It can be presumed that collective consumption was an important factor in building interpersonal relations for the societies of that time. Most likely, these elements - fire, urns, and additional ceramic vessels - described the most important values. It also seems that the funeral rituals were paratheatrical in nature. It was a multi-sensory medium of communication. In this way, memorization was facilitated - which was especially important for pre-literate communities.

S23.183

The dying of the light. The devaluation of cremation in Roman Imperial Pisidia (SW Asia Minor).

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Based on archaeological datasets, cremation was the only manner of processing the dead in 200/150-50/25 BCE Pisidia (SW-Anatolia). Burning the dead remained the sole method for 25 BCE-50 CE, when the region was incorporated into the Roman Empire. For the first time, inhumation is documented in the form of two vaulted burial chambers during 50-100 CE. Finally, during 100-150 CE, we observe the local emergence and subsequent proliferation of inhumation-based sarcophagi, and larger sepulchers like temple tombs. During 50/100-300 CE, cremation and inhumation were thus practiced alongside each other at least at the Pisidian *poleis* of Sagalassos and Termessos. Gradually, inhumation overtook cremation. Based on the epigraphic and archaeological datasets of various Pisidian sites, we will argue that various social processes, including elite preferences for inhumation, and the association of cremation-based funerary phenomena with less affluent groups (e.g. *arcosolia*), resulted in the gradual social devaluation of cremation *vis-à-vis* inhumation. Last, we will discuss how this resulted in the eventual disappearance of cremation, together with conspicuous aboveground funerary monuments. As a result, this paper goes beyond progressive understandings of cremation and inhumation in Hellenistic and Roman Imperial Asia Minor, and presents a relational understanding of their involvement in regional funerary practices.

S23.184

The Burial Mounds of Unterradlberg: a multidisciplinary approach to shed light on Middle Bronze Age cremations

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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 cremation burial per mound. Secondary burials including subadult individuals imply a prolonged use of the mounds as part of a burial landscape. The evaluation of the archaeological finds and the resulting radiocarbon dates suggest a gradual transition from the Middle to the Late Bronze Age.

S23.185

Burnt, Buried, Recovered – Interdisciplinary Investigations of a Late Bronze Age Grave in Gränichen-Lochgasse (AG)

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In the Bronze Age settlement of Gränichen-Lochgasse (Middle to Early Late Bronze Age; BzC/D1; Canton of Aargau, Switzerland), a large-scale rescue excavation revealed a grave which dates to the Early Late Bronze Age, the later phase of the settlement (BzD1) (Joray et al. 2020). This grave belongs to the type “body-length cremation grave” (*körperlanges Brandgrab*) and contains, in addition to three ceramic vessels, two concentrations of burnt (human) bones and a charcoal layer at the bottom of the grave.

Graves of this type are known in Switzerland north of the Alps as well as in south-western Germany and in Alsace (France) but are quite rare and occur only in small numbers. Interdisciplinary results are available for some of these graves; however, so far there is a lack of cultural-historical contextualisation. This means that the activities and practices behind this phenomenon are barely known.

Thanks to an innovative excavation and sampling strategy applied during the archaeological excavation, anthropological, archaeobotanical, zooarchaeological, anthracological and – for the first time in this context – geoarchaeological and histotaphonomic analyses are carried out in addition to a study of the grave's structure and the objects found within.

With this broad interdisciplinary approach, the social practices behind this unique structure will be made visible. The project aims to provide answers regarding the buried individuals themselves, activities linked to how the bodies were treated, the location and type of the pyre, the practices that took place at the burial pit itself (grave goods, backfilling process), any possible later activities and the role of the grave within the settlement.

In this presentation, first interdisciplinary results will be presented and put in a cultural-historical context. In addition, some methodological aspects will be discussed.

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S23.186

Rituals matter and rituals leave matter

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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 and 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.

In this talk we will focus on the bronze objects where we specifically tried to answer the following questions:

Which temperature and which exposure time has to be assumed in order to alter the surface of bronze and ceramic artefacts?

Why and when does the shape of objects change?

How do cremation-patina and “normal” corrosion-patina differ?

How do the objects change during interment?

And, to what extent does the degree of destruction can be matched to certain usages during the cremation ritual?

In addition to a microscopic assessment of the changes found on each object in terms of their spatial distribution in relation to the respective heat exposure, thin sections of selected artefacts will be made and examined with complementary XRF-analysis in order to understand how the internal structure of the bronzes and that of the patina changes during cremation and during interment. Through comparisons with original artefacts, it will be shown that the experimental data provides insight that help to attribute certain changes in objects to specific funerary conditions.

S23.187

Multi-disciplinary study of archaeological human cremated bones from Belgium to reconstruct funerary practices, palaeodiet, and palaeomobility.

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The study of cremated human remains showed that due to the high temperatures reached during cremation (up to 1000°C), large amounts of information are lost, including the destruction of the organic matter, commonly used for palaeodietary reconstructions. Still, through the infrared and carbon and oxygen isotope analyses, it is still possible to obtain useful information about the way in which bodies were burned (temperature, duration, position of the body on the pyre, etc.). In parallel, strontium isotope ratios and concentrations enable to gather data on diet, mobility, and landscape use of population that practiced cremations. This presentation presents an overview of the latest isotopic developments for the study of cremations and discusses their applications to collections of Belgium cremated human remains dating from the Neolithic to the Early Middle Ages.

S23.188

Another view of mortuary practice based on Mesolithic graves

L. Larsson

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The presentation is based on a somewhat different perspective when it comes to cremation. A grave from the late Mesolithic was found in northeastern Scania, southernmost Sweden. The grave held the heavily crushed bones of two individuals. No bones showed traces of burning even though they were laid down in a pit with abundant charcoal and fire-cracked stones. The grave included two small burnt fragments of a slotted bone dagger and a burnt flint implement of unknown shape. The people have been laid down unburned while the grave gifts have been burned, probably in the pit that made up the grave itself. This gives a different perspective on what was cremated – the dead people or the grave gifts. In Mesolithic times there is evidence where the buried was burned but not the grave gift while other graves where both the dead and the grave gifts were burned. In graves from the late Mesolithic, the buried person is unburned but with extensive traces of burning carried out in connection with the filling of the grave. This also leads on to a discussion for what is cremated and what can be called cremation. Must it necessarily accommodate a burned human body for it to be perceived as a kind of cremation? A perspective of the rules and views that have been linked to mortuary practice will also be included.

S23.189

Research potential of cremains within a Bayesian chronological framework

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Recent years have witnessed a growing importance of cremains in archaeological research. This talk will focus on methodological advances in Bayesian chronological modelling, demonstrating the potential cremains have for contributing to our understanding of the past. Cremation was the dominant burial form in more periods of European prehistory and until it became possible to radiocarbon date cremains a few decades ago, research relied largely on relatively dated typo-chronologies. Recent research has however provided a large body of radiocarbon dates making it possible to test and support these chronological frameworks. I will present examples of how Bayesian statistics contribute a coherent framework for chronological modelling and how high-resolution and accurate dating results can be obtained even on the so-called 'Hallstatt plateau' of the radiocarbon calibration curve (c.750-400 BC). The aim of the talk is to demonstrate the large research potential cremains have for providing further insight into chronological aspects of our past, not only of chronological turning points or when sites were established and abandoned, but also for example of the rate of change or chronological sensitivity of material culture.

P01.11

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) (Ferrari and Mutti 2018) 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 (Higgins et al. 2020). 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 (Schaefer et al. 2009). Finally, samples for chemical analyses (e.g. teeth and petrous bones) (Veselka et al. 2020) 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 (⁸⁷Sr/⁸⁶Sr) analysis, and amelogenin tests.

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S24: Mesolithic–Neolithic transformations in Baltic Sea Region: The bioarchaeological perspective

The Mesolithic-Neolithic transition in the Baltic Sea region was unique in Europe. Neolithic attributes, such as ceramics, sedentism and food production, were only gradually or incompletely adopted, while fishing, hunting, and gathering remained important. Both local processes and the influence of neighbouring groups have featured in discussions of transitions, for example from the Late Mesolithic Ertebølle to the Early-Middle Neolithic Funnel Beaker Culture. Biological evidence, such as delayed genetic admixture of Neolithic farmer components and strong marine signals in dietary stable isotopes, provide essential insights for understanding the processes until Neolithic lifeways prevailed in the Baltic region.

We welcome case studies and review papers (podium, poster) dealing with one or more aspects of four research foci:

- Latest bioarchaeological evidence for transformations in population genetics, demography, mobility, diet, conflict, health and disease
- Refining chronological models
- Comparing bioarchaeological evidence and cultural attributes
- Merging evidence from regions (and research traditions) throughout the Baltic to reveal connections, patterns, and different trajectories in Neolithisation

Presenters are encouraged to submit abstracts that integrate archaeological, zooarchaeological, archaeobotanical, and palaeoecological information. Contributions including data from human remains (stable isotopes, radiocarbon dating, aDNA, paleopathology, paleodemography, and biological anthropology) are particularly welcome.

S24.190

Looking for Humans. On the urgency of recentering the human experience of the transition to the Neolithic in the era of Big Data

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(Bio)archaeology is undergoing a transformation at both the methodological and theoretical level. Recent digital developments make processing of big data possible at a new level, and new methods in the lab sciences have unlocked new sources about the past, steering archaeology increasingly toward a natural science epistemology focusing on larger datasets, broad perspectives, and long chronologies. As a parallel movement in “theoretical” archaeology, new materialism and posthumanism have directed attention away from the human scale and instead come to focus on larger systemic patterns, in which humanity is but a small piece in a complex system.

In the archaeology devoted to the transition to the Neolithic, these approaches have transformed our understanding – both by providing new hard data, by capturing new possibilities in our understanding of complex relationships, and, in some cases, by allowing new research questions to become articulated. The possibilities are seemingly endless. So why is it, that is seems unsatisfactory?

There is, of course, a point in de-centering humanity, if by that we mean that we apply a perspective where we place humanity within a system of reciprocal entanglement with the world – as in the social, the environmental, and the cultural. By including examples from the transition from the Mesolithic to the Neolithic in the Baltic Sea region, this talk makes a case for the recentering of humanity by emphasizing the importance of a balanced transdisciplinary archaeology, one that relies on understanding humanity as truly bio-cultural.

S24.191

Genetic and dietary change at the Mesolithic-Neolithic transition in Denmark

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In a project on Population Genomics of Stone Age Eurasia (Allentoft et al. 2022) we have analyzed several hundred human skeletal remains of primarily Mesolithic and Neolithic date from across Eurasia. 317 genomes were produced. 100 of the individuals in question are from Denmark. We decided to look deeply into transitional processes of the neolithization, using this country with its rich collections of Late Mesolithic and Early Neolithic material culture and human skeletons as a test case. For this purpose, we assembled radiocarbon dates and dietary stable isotope C and N data for each individual. The paper summarizes our combined genomic, chronological, dietary and archaeological information. A dramatic replacement of people and a fundamental subsistence economic turnover is seen at the Mesolithic-Neolithic transition, the length of which shall rather be counted in decennia than in centuries.

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S24.192

Demographic processes in the Eastern Baltic during the Mesolithic-Neolithic transition: an ancient DNA perspective

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The transition from hunting and gathering to farming in Europe was brought upon by arrival of new people carrying novel material culture and genetic ancestry. The exact nature and scale of the transition—both material and genetic—varied in different parts of Europe. The first traces of farming-based economies appear relatively late in the Eastern Baltic – around 2,900 BC with the development of cultures belonging to the Corded Ware Complex.

Ancient genomes of hunter-gatherers and Corded-Ware-associated individuals from Estonia (Saag et al. 2017) and Western Russia (Saag et al. 2021) shed light on the genetic changes during this transition. Analyses reveal that the hunter-gatherers preceding the first farmers are genetically most similar to Eastern European hunter-gatherers while the first farmers of the area carry ancestry of Near Eastern early farmers as well as Steppe pastoralists.

What is more, genetic changes can be seen in Estonia and neighbouring areas between Late Mesolithic and Neolithic hunter-gatherers (Jones et al. 2017, Saag et al. 2017, Mittnik et al. 2018, Mathieson et al. 2018) and, furthermore, ongoing work has drawn attention to genetic variation within both periods.

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S24.193

Chasing ghosts: ancient DNA extracted from chewed tar

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The field of ancient DNA is continuously expanding our knowledge about past populations. Most of these advances are achieved by sequencing DNA from either bone or teeth. However, it has recently been shown, that pieces of chewed birch tar can also contain human DNA [1, 2]. In 2019 [1], we showed that a piece of chewed tar from Syltholm in southern Denmark, not only contained ancient human DNA but also host-associated microbial, and even dietary DNA. Analysis of the human genome revealed that the individual shared ancestry with western hunter-gatherers, although the sample dated two centuries into the Neolithic, suggesting that she may represent remnant hunter-gatherers in southern Scandinavia. Overall, these results highlight the value of ancient birch tar as a new source of ancient human and microbial DNA, especially in contexts where ancient human remains are not available. In this presentation, I will present some of our current research into this new sample material and discuss some of the obstacles, of which there are many.

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S24.194

Changes in hunting strategy? Mesolithic and Neolithic hunters - similarities and differences in their hunting behaviour

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Prey selection by Mesolithic foragers and Neolithic farmers touches on important basic aspects of Stone Age research. According to the Optimal Foraging Theory foragers always try to make their foraging successful – but what exactly means “successful” in the case of the human populations in the northern European lowland? The comparison of Mesolithic and Neolithic sites from the North German lowlands, covering large parts of both periods, shows that there were obvious changes in the hunting behaviour during both eras. In general, the results show very clearly that Mesolithic hunting in the study area seems to have become more and more professionalized, while hunting during the Neolithic soon became essentially concentrated in one or two species. However, questions remained open. Does the results really demonstrate transition processes in hunting strategies or did they reflect either adaptations to regional ecological conditions or of different traditions of local human groups?

S24.195

Eelgrass: Ertebølle groups targeted a productive and isotopically distinct ecological niche

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For several decades we have known that the elevated $\delta^{13}\text{C}$ values in human bones from the Late Mesolithic Ertebølle culture (c.5300-3900 cal BC) reflect reliance on marine food resources, but it has gradually become clear that there is a wide range of $\delta^{13}\text{C}$ values in marine species from Ertebølle sites in coastal Denmark. Published data show a gradient between more pelagic (deep water) species, including marine mammals, and species that were probably taken in shallow lagoon or fjord waters, particularly species commonly found in eelgrass (*Zostera marina*) meadows, primarily eel and flatfishes. Intensive exploitation of eelgrass biotopes should produce more elevated $\delta^{13}\text{C}$ values, more moderate $\delta^{15}\text{N}$ values and much lower $\delta^{34}\text{S}$ values than reliance on deep-water species. We see this isotopic signature in Ertebølle humans and dogs at coastal sites facing the Kattegat, but perhaps not in the Baltic itself, as eelgrass prefers relatively saline water. We suggest that the productivity and predictability of the eelgrass biotope may account for the abundance and persistence of Ertebølle coastal settlements, and the delayed adoption of agriculture in this region.

S24.196

Fencing the Sea, seeing the fence – aquatic resource exploitation on Lolland around 4000 cal BC

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Large numbers of Stone Age fishing equipment, both mobile and stationary, as well as faunal remains were found during the Femern-project on Lolland, Denmark. The excavations showed that fishing was still a large part of the subsistence strategy, when livestock farming was established on southern Lolland around 4000 cal BC. Additional information on the intangible world of early farmer-fishers was unearthed in form of extensive ritual deposits in the shallow, prehistoric Syltholm fjord.

In this contribution, I will provide an overview of the current state-of-research of the Femern-project derived conclusions on the relevance of aquatic resources during the Mesolithic/Mesolithic transition in south-western Denmark. Genetic data and bioarchaeological results will be taken into account and contrasted with the archaeological dataset to discuss the relevance of non-terrestrial subsistence modes for agricultural societies.

S24.197

Diverse Stable Isotope Approaches to Freshwater Reservoir Effect Corrections at Zvejnieki

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Can the chronology of the hunter-gatherer cemetery of Zvejnieki, impacted by freshwater reservoir effects, be further refined? The burial assemblage at Zvejnieki comprises over 300 individuals and the site's dating program was developed with a goal to identify the chronology of grave goods which link the site to the prehistoric chronology of Finland. Improvements to the precision of the site's chronology would allow researchers to examine important transitions of material culture. The objective of this research is to refine freshwater reservoir effect corrections of human bone collagen samples by comparing radiocarbon dates with a wide range of stable isotope values that are sensitive to local environmental changes and consumption of aquatic resources. This research builds upon previous freshwater correction equations that relied on stable carbon and nitrogen isotope values from human bone collagen (Meadows et al. 2014). Stable hydrogen isotope analysis has been applied to track changes in the magnitude of freshwater reservoir effects over time that are related to environmental changes (Schulting et al. 2018). Stable sulfur isotope analysis distinguishes the contribution of different resource consumption (Rand and Nehlich 2018). Improving the freshwater reservoir corrections at Zvejnieki will provide the temporal resolution required to address important questions of cultural transitions.

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S25+32: Comparing Scales and Transformation in Population Dynamics: Old and New Challenges

Archaeodemographic research reaches a new peak: Population dynamics have been identified as a crucial object of study for understanding the prehistoric past. Conducted investigations can operate at all spatio-temporal scales, from local to global, from generations to millennia, and each of those scales is approached by other theoretical concepts and methods, using different sources of data. Population dynamics is therefore a key to archaeological reasoning, may it be addressing human-environmental or social relations. However, the understanding of these relations and the assumed effects is still rather superficial because of the complexity of the phenomenon. Comparative multi-proxy approaches promise to reveal a manifold of features worth considering and will overcome the bias of mono-focal case studies.

Accordingly, this session aims to concentrate on case studies from different periods and regions, as well as exploring different methodical and theoretical questions concerning current topics.

- Can we improve our theoretical and methodological approaches to archaeodemography?
- How is social inequality connected to the demographic setup of a society?
- How can we relate, combine and investigate our scales of inquiry?
- How do we explain transformative periods in our demographic proxies?
- How can we bridge the gap between prehistoric and historical demography?

We like to welcome studies on population dynamics from the Palaeolithic to the Middle Ages. The session has a special interest in transformative phases of human history, such as the Neolithic transition, the introduction of bronze metallurgy or the long first millennium BCE and the long first millennium CE in Europe.

We invite presentations addressing population numbers and densities, theoretical considerations, methods and methodological issues, effects of population change on politics, economy, culture or environment, as well as regional and over-regional comparative case studies that explore transformative demographic phases. The session seeks to bring together different research communities that are rarely in dialogue and to find synergies in our approaches to archaeodemography.

S25+32.198

Bayesian Hierarchical Models as a tool for prehistoric population estimates

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In demography in general, the last decade has triggered an upswing in the application of Bayesian methods, so that a Bayesian demography has been announced. Bayesian demography is currently at the forefront of methodological developments in this area but has reached such maturity that the United Nations has been using it since 2015 for population forecasts and projections. The Bayesian approach offers the possibility of combining heterogeneous data and at the same time qualifying them in terms of uncertainty and credibility. This is precisely where it becomes very interesting for archaeological data since they are mostly inaccurate, biased, sparse, simplified and often based on simplistic assumptions. We used a Bayesian Hierarchical Model to combine multiple data sources and theoretical assumptions on the population density in the working area of the Swiss Plateau. This includes proxies like dendro data, 14C sum calibration, and paleobotanical openness indicators. The data were weighted and qualified according to their plausibility and coverage within the Bayesian Hierarchical model that serves as an estimator for absolute population numbers.

We believe that the use of Bayesian demography in archaeology has the potential to revolutionize demographic research. Most studies to date have focused on one proxy alone, which at best is correlated with several others for validation purposes. However, since no proxy is error-free and unbiased, only the combination of all possible information can provide an average, and thus probably more accurate, estimate of past population trends. This method succeeds in integrating the currently widespread use of 14C data as an overarching demographic indicator and taking advantage of methodological developments in this field, without, however, naively and blindly following only this highest controversial analytical path. Thus Bayesian demography, applied to archaeological questions, currently has a similar potential as Bayesian calibration for 14C data itself had.

S25+32.199

How come, how long? Past human ecodynamics in the Arctic in relation to Holocene climate variability

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The focus of the paper is based on human-environment interactions of (pre-)historical societies in the Arctic. The primary question of the study presented here aimed at how climatic conditions have influenced humans and consequently the use of their resources from 6000 calBP to the present day.

The extreme climatic conditions of the Arctic require continuous adaptation of human and animal adaptation of survival strategies to nature. They can be documented in studies on climate and archaeology. These mostly small-scale and regional studies are complemented by one of the best climate archives in the world. Thanks to larger projects in recent decades, research data from all disciplines and time periods are available in published form. Nevertheless, there has been a lack of overarching studies linking archaeological and climatic datasets to reveal human-environment interactions.

The aim is to develop models of mobility and transformation processes in the Arctic - based on the combination of natural science and archaeological data.

The project was implemented using a multi-method and interdisciplinary approach that correlates climatological and demographic proxies. For this purpose, anthropogenic remains, radiocarbon dating as well as climate data from ice cores and pollen analyses were statistically evaluated quantitatively and qualitatively. It is now possible to generate models of human-environment interactions. This reveals the complex interactions between humans and the environment over the last 4500 years.

S25+32.200

A multi-proxy approach on demographic and socio-economic transformations in the Northern European Neolithic and Bronze Age: Where to go from here?

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Based on archaeological and palaeoenvironmental data it is possible to produce reliable long-term proxies of demographic, socio-economic/cultural and environmental development for large geographical areas. In a joint endeavour, our group collected, compiled and transformed a vast corpus of data of different kind for the Northern European Neolithic and Bronze Age (c. 4000 – 500 BCE) to approach the question of how to make sense of transformative phases and events in prehistory. From radiocarbon dates and pollen records we model demographic time series informing about population changes. Monuments and different groups of material culture are used to produce long-term measures of wealth inequality and socio-cultural/economic developments. Palaeoclimate proxies inform about possible ecological changes. Those set of proxy time series we test for correlation on a regional and sub-regional level – keeping the inherent temporal uncertainties in mind.

Our multi-proxy study sheds light on the co-evolution of demographic and socio-cultural/economic trends of the larger geographical area of Northern Europe and its sub-regions. Further, the use of a big set of proxies offers the possibility to identify and approach phases and events of transformation with confidence. From this top-down view, we explore case studies and connect the findings from our different levels of inquiry to explore socio-demographic complexity and transformation. As throughout the Northern European prehistory mostly decentralized, comparatively small communities inhabiting hamlets and farmsteads, we find the regional network configuration and its embeddedness in trans-regional exchange networks of high importance for many transformative phases. The possible links between changes in population size/density and the intensification of interactions, technological change, network expansion and integration, as well as changes in wealth inequality are yet to be the start of an in-depth exploration.

S25+32.201

Hypotheses on Climate and Demographic Dynamics in Neolithic and Early Bronze Age Central Europe

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It is evident that environmental hazards recurred throughout the Holocene. Episodes of heightened socio-environmental stress combined with resource narrows have probably fostered demographic busts and possibly triggering migrations. Here we test hypotheses of socio-environmental dynamics from a European perspective and presents the results regarding the impact of climate and environmental hazards to past societies. Furthermore, we examine to what extent socio-ecological transformations had an impact on social inequality in the focused prehistoric societies.

In concrete, this project aiming to calculate and compare demography developments based on ¹⁴C Summed Probability Distributions (SPD) on three Central European regions that have high agglomerations of archaeological finds and radiocarbon dates, which serve as a proxy for demographic development. The study regions include: *Circumharz region, the Northern Alpine Foreland, and Czech Republic/Lower Austria*. We concentrate our research on Neolithic and Early Bronze Age time

Comparing these regions allows us to identify different demographic dynamics that were probably accompanied by migration processes and changes in social inequality. In addition, the demographic results are correlated with regional climate data to assess the impact of environmental hazards and in particular of so-called climate Bond events.

The results show that demographic “booms” in one region were accompanied by “busts” in neighboring regions, raising the possibility that regions prospered at the expense of their neighbors or that population moved from one region to another.

In addition, the results show statistical correlations between population fluctuations and hydroclimatic patterns. Thus, climate was at least partially responsible for demographic trends.

Furthermore, the results show that the population in the northern North Alpine Foreland and in the Czech Republic/Lower Austria increased or stagnated during the Early Bronze Age, while it decreased in the Circumharz region. Especially in this decreasing phase a strongly stratified society with “princely graves” and a high social inequality appears.

S25+32.202

Prehistoric settlement patterns and population dynamics in Central Europe from the perspective of social transformations

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The study of settlement patterns is one of the established methods of investigating prehistoric societies. It is based on the assumption that the distribution of archaeological sites in the landscape reflects the character of prehistoric societies.

The empirical study of these sites, their relationships with each other or with the natural environment allows us to reconstruct, to some extent, the social, political or economic organization of prehistoric societies. But how does the study of settlement patterns help us to investigate population dynamics?

One method of estimating population dynamics is the summed probability distribution (SPD) of radiocarbon dates, based on the assumption that there is a direct relationship between the number of ¹⁴C dates and the population size. However, the use of this method is not always straightforward. Although, for the region of interest (Czech Republic) a database of radiocarbon dates from archaeological contexts is available, its spatio-temporal coverage is not optimal. Thus, there are regions that do not provide sufficient amounts of ¹⁴C dates for creating demographic models. At the same time, however, Czech Republic is endowed with large-scale databases of archaeological sites which can serve similar purposes.

In my paper, I will try to overcome the problems related to the uneven spatial distribution of archaeological data of different characters by using a multiscale approach. The regionally specific development of settlement patterns will be compared with supra-regional population dynamics using SPD. In doing so, attention will be paid to periods of anticipated social or economic transformations between the Mesolithic/Neolithic transition and the Early Bronze Age.

S25+32.203

Scale-dependent link between population dynamics and climate in Holocene Europe

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Past human population shifts have since long been assessed in terms of coinciding climatic changes, also as a means for better understanding the current climate-society relationship. Here, we present a systematic analysis of reconstructed population growth and climate for 27 regions of Europe 10 - 3 kyr BP. Demography and paleoclimate were derived from summed probability densities of ~50.000 radiocarbon dates and from 95 high-resolution proxies. The C14 based demography was cross-validated for 12 sub-regions using independent data for occupation density. At the regional scale, we found only small coincidence between fluctuations in estimated net population growth and regional climate. Especially bust periods did only rarely match shifts in climate proxies. However, regional boom and bust phases repeatedly reveal a high spatial correlation with neighboring booms and busts, which results in a quasi-periodic cyclicity of the growth rate

averaged over entire Europe. Strongest continental booms emerged at 7.3, 5.9, 5.4, and 4.9 kyr BP, and can be linked to known archeological events such as the onset of the Neolithic in Central Europe or the expansion of steppe ancestries. In contrast to the weak climate-population link at the regional scale, and thus unexpectedly, the continental growth appears highly correlated with global climate patterns. These results not only suggest a complex role of climate but can also help to identify non-climatic drivers underlying population shifts.

S25+32.204

Migrations from South Caucasus to South of East Europe in beginning of Holocene

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Climatic changes in the Early Holocene led to a series of migrations from the South Caucasus to Eastern Europe. The final migration points of the South Caucasian population were the Mountainous Crimea, the steppe zone between the Volga and the Danube, and the south of the forest-steppe zone in the basins of the Dnieper, Southern Bug and Seversky Donets. Migrants exploited both the sparsely populated steppe and forest-steppe territories and the overpopulated Crimea. We have traced four waves of migrations.

1. The migration of the Trialetian Culture carriers in the period 10200-9600 BP (uncal). This migration led to the emergence of the Shpankobian Culture in the Mountainous Crimea and on the rapids of the Dnieper.
2. Migration of the Kobuletian Culture carriers in the period 9700-7500 BP (uncal). This migration led to the appearance of the Kukrekian Culture in the Highland Crimea and in steppe Ukraine.
3. The migration of the Darkvetian Culture carriers in the period 8500-7500 BP (uncal). This migration led to the emergence of the Matveev Kurgan Culture in the Lower Don, and the Grebeniki Culture in the Mountainous Crimea and Steppe Ukraine.
4. The migration of the Edzanian Culture carriers in the period 8200-7500 BP (uncal). This migration led to the emergence of Platovsky Stav Culture in the Lower Don and Seroglasovo Culture in the Northern Caspian.

Four waves of migration led to the settlement of the steppe zone from the Volga to the Danube. The migrations were possible because this area was practically unpopulated. Only the territory of Crimea was an object of fierce competition. The competition between the migrants led to the complete disappearance of the Shpankobian Culture at the beginning of the Boreal, to the advance of the carriers of Kukrekian and Grebeniki Cultures deep into the steppe and into the forest-steppe.

The migrants, apparently, did not lose contact with the parent territories, the migrations were not so much large-scale as permanent, connected with the arrival of new population groups.

Migrations were a prelude to the Neolithic Revolution in Eastern Europe. The most important role was played by the carriers of the Kobuletian Culture, related in origin to the M'lefaatian Culture of the Middle East. The presence of a zone of cultural continuity in the territory of the Middle East, the South Caucasus and the South of Eastern Europe created the conditions for the spread of Neolithic innovation.

S25+32.205

Neolithic in the Mountains: a multi-proxy survey of old and new data on early sedentism in the Zagros Mountains, southwestern Iran (*HighStepLands*)

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The dynamic relationships between human communities and their environments creates the conditions for the emergence of new socio-cultural connectivity and identities. Over the past decades, archaeological research has deepened knowledge of core areas of innovation and experimentation of Neolithic life-styles. Research since the 1950s has assumed the origins of agriculture, one of the fundamental pillars of Child's "Neolithic Revolution", in the area known as the Fertile Crescent. However political events of the 1960s-70s led to a shift in the focus of archaeological investigations to the Mediterranean regions. The so-called "Eastern Wing" of the Fertile Crescent (i.e., the area matching with the Iraqi-Iranian range of the Zagros Mountains) has only recently been investigated, and as a result archaeological data are largely limited to outdated surveys or excavations conducted at individual sites in several sub-regions. Following a diachronic perspective of the reconstruction of settlement patterns and early demographic trends, this paper provides a first synthesis of old and new data about the Early and Late Neolithic phases from the mountainous regions of Kohgiluyeh, Khuzestan, and Fars in southwestern Iran. By applying a multi-layered, interdisciplinary approach that comprises environmental and archaeological evidence, three main research questions will be pursued: Where did the Neolithic communities live and how densely settled the investigated region? Were they integrated in a "Zagros" Neolithic culture under the perspective of settlement choices? Are there temporal shifts in the Neolithisation process along the Zagros?

S25+32.206

Population proxies for Ireland and Britain before AD1000

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This contribution will provide an overview of the archaeological evidence for population dynamics in Ireland and Britain from the Late Bronze Age to the medieval period. This evidence is principally the frequency analysis of archaeological materials. The sheer quantity of this material from Ireland in particular (the most intensively excavated large island in Europe) demands the use of new statistical tools for achieving this analysis. Triangulating archaeological evidence with the results of genomic studies and historical records, we will see how 1st millennium AD archaeology can be used to calibrate proxies for population dynamics for previous millennia BC and address the thorny but important issue of 'census' population for the Iron Ages and earlier.

S25+32.207

Theorizing demographic (de)agglomeration: The case of Heuneburg

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Many factors contribute to the agglomeration of population. Economic and environmental issues are commonly addressed. In addition to these crucial factors, maintaining social cohesion might have played a central role. A high level of social cohesion could have held people together even in hard times, whilst a low level of social cohesion could have caused the instability even in hospitable conditions.

The paper will explore explanations of nucleation against a well researched case study from the Iron Age of modern Germany

Recent discoveries at the Heuneburg have revealed that the inhabitants of the Late Hallstatt period not only occupied the small hillfort, but also the large outer settlement. The settlement was found to have been largely composed of individually enclosed farmsteads. However, it did not endure and the large part of the outer settlement was abandoned within less than a century. During its occupation, large burial mounds were built at some distance from the settlement. Each mound has a main burial chamber at its core, equipped with some eye-catching items including four-wheeled wagons and luxurious grave goods. However, most of the chambers were seriously disturbed not long after they were built.

The individually enclosed units of the outer settlement were almost certainly not a good condition for social integration. In that sense, the funerals for the main chambers of the burial mounds might have played a centripetal role as a public, communal event shared by the inhabitants. The four-wheeled wagons might have been used for the funerary processions where many people gathered along the road and witnessed the display. The burial mounds were not only the symbol of the elite's power but also an integrative symbol of the community. However, the fascinating materials displayed during the funerals might have inspired some individuals to plunder the burial chamber, which threatened the social cohesiveness achieved by the funerary settings themselves. Although nobody intended to do so, the funerary settings both contributed to and disrupted the social cohesion.

The case study of the Heuneburg, with its excellent and distinctive evidence for settlements and burials, provides a good test-bed for a range of theories which have been practised in the interpretation of other agglomerations within the global stage. These ideas will be explored in the presentation.

S25+32.208

Population dynamics during the Second Iron Age: a case study from the Paris region

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Apart from Caesar's description of the *Helvetii's* migration in 58 BCE, literary evidence for paleodemography in La Tène period Gaul is scarce. As a result, population density estimates in pre-Roman Gaul tend to rely on the number of settlements in a region, their size and their durations of occupation. However, bias control is usually insufficient and these criteria are not always suited to datasets compiled through constrained excavations in urban settings, in which site surface area is rarely assessable.

This paper considers the region around Paris (the Île-de-France) in the second half of the 1st millennium BCE as a test case for an alternative method for estimating population densities, one that takes into account a wide variety of parameters linked to production and consumption. Located at a cultural crossroads between Northern and Central Gaul, the Île-de-France is an ideal case study of whether different material markers of cultural influence such as vessel shapes and decoration, coin iconography, and funerary practices corresponded to demographic variations.

Over thirty variables relating to density of artifact scatters, diversity of material assemblages, and architectural

characteristics are used to analyze population dynamics at three scales. Using multiple correspondence analysis and hierarchical clustering, the population density of the Île-de-France is first evaluated on a site level, with every site awarded a population density rank to create a relative density scale among settlements. This scale forms the basis for micro-regional studies of population dynamics within the Paris area that reveal specific trajectories in pace of population change and in spatial distribution of population. These local trajectories are finally compared to large- and small-scale cultural shifts in Second Iron Age Gaul.

Analysis at the site level reveals several different scales of settlement, challenging the traditional assumption that the Paris area was somewhat deserted during the transition between the First and Second Iron Age. Comparison of different sub-areas of the Île-de-France shows a short-lived north-south divide in demography structure, mirroring small-scale cultural changes during the 2nd century BCE. Differences in population configuration between these sub-areas also highlight the progression of the La Tène urbanization process at the local level, based on micro-regional variations in social and economic complexity.

S25+32.209

Long-term dynamics of demography in central Italy 1200 BC – 1200 AD

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This paper will explore the cycles of demography and nucleation between the end of the Bronze Age and the central Middle Ages in central Italy west of the Apennines, addressing the changing dynamics, as well as data strengths and weaknesses. Camilla Zeviani will present original evidence for the pre-Roman period, whilst Simon Stoddart will take a more secondary approach to the literature, distilling recent literature on the Roman period and drawing on and updating his collaboration with the late Riccardo Francovich in the 1980s when such studies began for the Middle Ages.

A casual analysis of the settlement data shows that many of the same sites were first occupied, abandoned and then reoccupied over the course of nearly 2,500 years and yet the political context was very different, seemingly separated into two parts by the Roman empire. We will explore the theoretical background behind the very different societies, drawing on wider bodies of theory from beyond Europe.

We will also address the difficult question of assessing demographic levels, using a range of techniques, including various proxies such as radiocarbon (SPD and Kernel density), settlement distribution and size and impact on the environment, drawing on projects where we have been involved, or for the later periods drawing on the secondary literature and the use of textual sources.

Central Italy, the leading geographical context of pre-Roman civilization and of the Renaissance, has much to offer demographic understanding of changing political frameworks, now that traditional historical and art historical studies have been complemented by field survey and landscape studies.

S25+32.210

Settlement dynamics and demography in Verona plain (Western Veneto) during the First Iron Age

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During the 1st millennium BCE, the Venetian plain was one of Italy's core areas that saw the birth of prototourban centers which developed into cities, like Este and Padova. However, not all the territories were involved in the same manner and, in some cases, smaller settlements never grew up to the city status. This phenomenon was studied in many ways by scholars (Capuis and Gambacurta 2015), but no one considered the relationship between population dynamics and demographics, also due to the scarcity of archaeological data and extensive excavations that can define the settlement and dwellings patterns.

In this paper we will analyze these aspects in Verona plain, an area of the Western Veneto that showed great vitality in terms of the pattern and the distribution of the settlements in the First Iron Age, meaning between the 9th and the 7th century BCE (Giunto 2021). Starting from a rich literature-derived dataset and using GIS-based spatial analyses, we aim to give new inputs to understand more deeply the dynamics that involved the societies that lived in the main centers of this area (Oppeano, Gazzo Veronese, and Baldaria) and the connection between them and the whole territory involved in the research.

Moreover, we will examine these settlement dynamics also through the lens of demographics, in order to estimate the number of people that could live in such centers. Calculating the settlement extensions and using dwellings floor area data, we will propose an estimate of the people density for the main settlements of this territory, also considering other case studies from Veneto like Padova and Oderzo.

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Giunto A., (2021), La pianura veronese tra Bronzo finale e prima età del Ferro: dinamiche del popolamento e organizzazione del territorio, Archaeopress, Spring Archaeology: Atti Del Convegno, Siena, 15-17 Maggio 2020, 302–312, <https://doi.org/10.2307/j.ctv1zcm1x8.41>.

S25+32.211

Simulating the predictabilities and uncertainties of scale-dependent social complexity

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Based on empirical data from Temperate European Neolithic societies, this paper applies information theory in modeling the predictabilities and uncertainties of social complexity across scales. We assume communication and interaction - aggregated to a variable 'trust' - to be the major group-shaping factors. "Social complexity" is understood as the arrangement of internally diverse social entities, referring to different functions of such entities as building blocks of social networks. Each individual may be considered as a component part of various identities (for instance, an individual may simultaneously be considered as a producer and consumer, or a hunter and family father). Social complexity increases with the increasing number of these social building blocks. However, demographic growth per se may or may not result in the increase in complexity, only providing a potential for the latter.

Connectivity between social entities of higher-scale distinct societies or wider social networks is composed in the mutual information flow between building blocks. Any non-zero mutual information indicates that the entropy (uncertainty) of non-interacting systems exceeds the entropy of interacting systems. Therefore, being framed by interactions, social processes are neither totally random, nor completely predictable.

The analysis of interactions behind the diversity of material assemblages at different scales is significantly impacted by sample-size effects and modes of cultural transmission resulting in the decreasing rates of cyclical patterns (rise and fall in diversity) with increasing scale. The increase in the information exchange leads to the intensive increase in diversity at a lower scale corresponding to a low increase in diversity at a higher scale. The more sites are sampled, the lower the increase at a higher scale. Similarly, when interactions are broken and mutual information approaches zero (i.e. distinct sites develop their own styles), joint entropy of these sites approaches the sum of marginal entropies. Therefore, a decrease in diversity at a lower scale corresponds to an increase in diversity at a higher scale.

S25+32.212

Archaeogenomic pilot research of Kamenice, a prehistoric Albanian tumulus (1600-500 BCE)

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Situated in southeastern Albania at the interface of the Aegean and the Adriatic, the Tumulus of Kamenice was used for inhumations from 1600 to 500 BCE. In this work, we generated genome-wide SNP data for 25 individuals from Kamenice that span the full time transect, providing the unique and first possibility for insights into, on one hand, genetic continuities and changes of Late Bronze Age and Iron Age Albania, on the other hand, biological relatedness and demography of a single tumulus.

We identified a genetically homogeneous population throughout the respective time in contrast to all societal transformations in the wider region. Our results indicate that populations from Albania, the northern Aegean and Dalmatia form a joint cluster, which differs from the southern Aegean regarding the Neolithic Caucasus-like gene flow, but also from further inland Balkan in terms of hunter-gatherer ancestry.

Moreover, we found evidence for a patrilineal society, within which all the males' Y chromosomes belong to two distinct sub-groups of R1b1a1b. We identified the biological relatedness up to 6th degree. The amount of relatedness raised after 750 BCE. We also detected a signature of a population size decrease around 750 BCE, which coincides with the prevalence of Y chromosome lineage R1b1a1b1b3 and a new way of grave construction. Overall, all the ancient DNA evidence support a local population bottleneck event.

S25+32.213

Developing A New Incremental Isotopic Methodology For Human Dental Enamel to Track Childhood Mobility.

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Archeodemography has benefited from isotope studies showing how it was possible to identify if individuals were locals or not. Still, new developments allow to go deeper and also discuss an individual's mobility over their lifetime. The application of sequential sampling on human dental enamel allows researchers to observe how isotopic values

vary over an individual's early life. This means one can examine how an individual's geographical mobility may have changed over time. Currently, incremental isotope studies on human enamel primarily use in-situ techniques, which while allowing for small and targeted analysis, are limited in access, precision or applicable isotopes. An alternative is the use of micro-milling techniques, which are more accessible and cost-efficient. Whilst milling techniques are frequently used on hypsodont dental enamel (i.e. sheep), amelogenesis in human dentition is shorter and far more complex. As such, placing enamel increments, removed by milling, into a chronological order is difficult without the knowledge of that tooth's specific growth pattern. Whilst the construction of such a methodology is challenging, it is essential to investigate if incremental milling techniques can be viable on human dental enamel, to enable high resolution mobility reconstructions for humans.

The aim of this study is to produce a thin-section guided incremental sampling technique guided by thin-sections for the enamel of human molars and canines, to reveal variations in strontium (Sr), oxygen (O), and carbon (C) isotopic values during the tooth enamel formation period. Preliminary results are promising, revealing that isotopic values can be tracked in a time-series within an individual's early life. However, this investigation did find that the growth pattern of human tooth enamel limits the number of increments that can be milled in a resolvable time series. As such, this study also provides a critical evaluation of the proposed technique, and a plan of how to increase the resolution of the methodology in our future research.

S27: Out of context in the Baltic Sea area: people, artefacts and material cultures from the Postglacial times up to the 1st millennium cal BC

The Baltic Sea and the connected aquatic environments have facilitated the short and long distance movements of people, artefacts and ideas throughout the Holocene. Over the millennia, these waterways have transmitted various cultural impulses, people, raw materials and material cultures, including, for example, pottery production and metal use, amber artefacts and particular lithic materials, all reflecting not only technological novelties but also new social realities. Consequently, these movements profoundly shaped the big picture of the prehistory of northern Europe. At the same time, such large-scale phenomena can prevent us from seeing movement of people and artefacts on a smaller scale. These can be finds that, in the light of wider narratives, may seem wrong or outright out of place in their context of discovery. In this session we invite contributions that discuss precisely those finds and phenomena that may even represent short-term or single events, but can nonetheless expand our understanding of the large-scale processes or broader social transformations. Such cases may include, but are not limited to, unique or non-local materials in burials or hunter-gatherer items in farming contexts. Material culture, analytical and bioarchaeological studies focusing on mobility and provenance, as well as life histories and biographies are welcomed to achieve a more nuanced and bottom-up approach to the dynamics of northern prehistoric communities.

- What kind of materials can be perceived as “out of context” and what kinds of social and cultural realities they may be seen to represent?
- How can small-scale movements or individual artefacts help us to get a better understanding of large-scale processes?
- In which ways the waterways influenced the mobility and social dynamics in the Baltic sea area?

We encourage contributions covering in particular the period from the Postglacial times up to the 1st millennium cal BC.

S27.214

Tooth beads, a decorated mattock-head and amber, presentations based on the theme of session 27

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In session 27, the presentations will focus on differing opinions about three different issues relating to what can be perceived as “out of context” as well as what kinds of social and cultural realities they may be seen to represent; how small-scale movements or individual artefacts can help us to gain a better understanding of large-scale processes; and in what ways the waterways influenced mobility and social dynamics in the Baltic Sea area.

Based on these questions, the presentation will focus on three different artefacts or artefact groups. A curiously decorated mattock-head of antler provides insights into long-distance exchange as early as in Mesolithic times and how it can be related to rock art.

Tooth beads from the late Mesolithic have been shown to be not only of local manufacture but also evidence of exchange within extensive measuring systems.

The distribution of amber during the Bronze Age along waterways to the Continent is well known, but less attention has been paid to the distribution of this product along the western side of the Baltic Sea.

S27.215

Out of context at Zvejnieki?

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The Stone Age cemetery of Zvejnieki by Lake Burtnieks (northern Latvia) was used for more than five millennia (8th–3rd millennia cal BC) to bury members of fisher-hunter-gatherer societies (Zagorskis 1987; Larsson & Zagorska 2006). Only one third of those buried were given some grave inventory. Most of the grave goods consists of pendants made from teeth of various animal species, which are usually considered to be local and present in the Zvejnieki area (Macāne 2022). Nevertheless, some pendants derive from animals that could not have been native to the area, such as seals or dogs that have fed on marine resources. For some osseous items, the morphology itself looks foreign. In addition, there are a number of other artefacts made from various mineral raw materials (lithics and fossils, amber, native copper), the origins of which must be sought from distant areas.

In this presentation, these grave inventories from the Zvejnieki cemetery serve as a point of departure to discuss what can be considered local or non-local in a given context. The River Salaca served as the main waterway connecting Lake Burtnieks to the Baltic coast about 100 km away, but the water networks connected the Zvejnieki Island also to inland

areas. The inventories include items that clearly indicate connections to the coast, but also to territories much further north and east. Are these “out of context” objects and raw materials traces of singular mobility events, emblems of recurrent social ties and exchange between particular social groups, or indicators of broader cultural transformations? Which temporal trends can be traced in the connectedness and in the potential routes and directions of the connections? And finally, how did the location of Zvejnieki itself – a junction between the dead and the living – contribute to the contextualization of the particular material objects.

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S27.216

Exotic within the exotic: Fossil finds from early-4th millennium BC fisher-hunter-gatherer contexts in Finland

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During the early 4th millennium BC, large quantities of flint travelled to Finland within a long-distance exchange or gift-giving network that existed among the hunter-fisher-gatherer peoples of the European forest zone. As flint stones commonly include microfossils (Kinnunen et al. 1985), the flint did not travel alone, though. Indeed, even though the microfossils are not visible for the naked eye, occasionally larger fossils are also present within the stone nodules. As previous research as suggested (Conneller 2011; Macãne 2020), such curiosities would also have caught the eye of the prehistoric peoples, and consequently, been considered as something special. In the context of Mesolithic-Neolithic Baltic Sea region, this interpretation is supported further by the discovery of fossils in human burials (Macãne 2020 with references).

In this presentation, I will explore the topic of ‘exotic within the exotic’ by giving an up-to-date view to larger fossils discovered from early-4th millennium BC contexts in Finland. Although the number of these finds is not large, some of the fossils originate from as far as from Central Asia (Edgren 1966, 63). Furthermore, as the fossils have also been unearthed either from contexts that can be understood as ritually or performatively marked deposits (cf. Swenson 2015), these items are clearly out of place in their context of discovery. By taking a holistic view to the material, in this presentation I aim to explore what role these fossils play in the social reality of the ancient hunter-fisher-gatherer peoples.

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S27.217

Some thoughts on the “barbaric imitations” of Corded Ware battle axes of north-east Europe

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The vocabulary denoting part of the Corded Ware material culture (2900–2200 cal BC) in Finland still strongly reflects a time when the concept of material culture was normative (exclusive) and populations were equalled with material (archaeological) cultures. Corded Ware communities migrating to coastal southern Finland were seen to maintain a strict cultural and demographic border on local foragers for centuries. Only a group of shaft hole axes, called “battle-axe imitations” or “barbaric imitations” in Finnish terminology (Åyräpää 1952), would have represented a break or leak in this border. The imitations are often found outside the densest clusters (core areas) of Corded Ware finds, and tend to show morphological, technological or raw material deviations from “proper” and often-standardized battle axes. This has led to them being viewed as imitation, improper copying of advanced newcomers.

presented ideas that Corded Ware materials cultures would consist of sets of features from locally varying origins (with the exception of burial practice; Furholt 2019) open up other avenues to study these artefacts. Instead of segregated populations with conservative material cultures, this presentation examines them as examples of interplay, blending of craft traditions and exploration of new social conditions. The “imitations” are not a homogeneous group of artefacts – some of them come close to the less-standardized axes that still commonly fall under the category of “proper” battle axes. How much deviation it takes for an axe to be an imitation? Special attention is paid to how the find location – the context – defines the attributes bestowed on the artefacts. The evolutionary thinking and values reflected in the description of this assumed farmer-forager encounter will also be assessed (Nordqvist 2016). How barbarian is “barbaric”?

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S27.218

Strange pots in a pit: Laukskola Late Bronze Age pottery in a new light

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Laukskola archaeological complex, which includes the Paleolithic and Late Bronze Age (LBA) settlement and a Late Iron Age cemetery and settlement of Livs, is located on the right shore of the river Daugava between the Budeskalni farm and school, facing Daugmale hillfort. Archaeological excavations took place there from 1967 to 1975, led by the archaeologist Anna Zariņa. The only traces of the LBA inhabitation are the object no. 728 which consists of at least 11 reconstructable vessels and some scattered striated pottery sherds in the surroundings of the Laukskola site. This object could be interpreted as a household pit, taken in mind that it consisted of quite well-preserved pottery and filling of dark soil and small rocks. Previously no special attention has been given to this object and pottery found in it as it has no wider context within the settlement of Laukskola. The fragments of pottery by their morphology and quite rich ornamentation are unusual for the region of Lower Daugava. Thus, various questions arrive, such as – was this pottery imported or locally made? Are the techno stylistic aspects of local or regional nature? What is the techno-stylistic influences and where do they come from?

All previously mentioned conclude in the aim of the paper – to distinguish techno stylistics and provenance of the Laukskola settlement pottery. Various methods were used in order to reach the aim – Macroscopic analysis, Reflective transformation imaging (RTI), survey of nearby clays, ceramic petrography and WD-XRF.

The results of the analysis show that the Laukskola pottery includes both local and seemingly non-local aspects in its production and stylistic tendencies. Among the dominant pit ornamentation, which in one case makes a triangle shaped motif, fishbone imprint ornament was distinguished. For such an ornamentation there are no analogies in the Eastern Baltic region. Chemical and petrographic analysis show that pottery was made from the local plastic moraine clay. Mainly granitic rock was used as a tempering material, only in one case it was quartzite. For such a tempering material there are no known analogies as well, indicating a new practice of tempering tendencies. The obtained data provides meaningful information. Thus, we can assume that, although, out of wider context, object no. 728 gives a meaningful insight into the past activities of the LBA community of Laukskola.

S27.219

From Coast to Coast - Evidence for Baltic soldiers in the Classical period Mediterranean

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Trade and colonization caused an unprecedented increase in Mediterranean human mobility in the 1st millennium BCE. By the 5th century BCE Greeks from the Aegean and Phoenicians from the Levant had expanded across the Mediterranean, and established many coastal trade posts and colonies. Conflicts over commercial and territorial dominance often culminated in military altercations, which became another vector that mediated long-distance interactions. Both Punic and Greek armies were known to recruit mercenaries from regions famed for particular skills, such as mounted archers from Scythia, Balearic slingers, or peltasts from Thrace.

This paper discusses the archaeological evidence for continental-scale individual movement for the purpose of warfare, shown in the case of the battle of Himera, a Greek colony in Sicily, in which a Greek alliance successfully defended the city against a Carthaginian attack in 480 BCE. In an interdisciplinary approach, historically contextualizing ancient DNA and stable isotope data, we find among the combatants buried in several mass graves of Himera's necropolis many with origins as far away as the Caucasus, the Eurasian Steppes and even the Baltic region, beyond the periphery of the classical Greek world. The distant origins of these soldiers and the manner of their burial suggest the presence of foreign mercenaries at Himera, contrasting historical accounts which only mention Greek allies from elsewhere in Sicily. We present a second case study, the 7th-4th century BCE necropolis of Tortora in Calabria, Southern Italy, which contains tombs believed to be those of mercenaries. Genetic analyses reveal ancestral origins in the Baltic for one of the interred.

These findings highlight the importance of examining warfare as a catalyst for cultural contact, and open – next to the often-cited amber trade route – another avenue to consider for the exchange of people, ideas and items between the Baltic region and Southern Europe.

S29: Macro-scale patterns in European prehistory 6000-1000 BCE

In recent years there has been a growing interest in identifying and explaining large-scale patterns of continuity and change in social and cultural systems, populations, and human impacts on environments. These interests have driven, and been driven by, the collection of spatially and temporally large-scale databases, for example of radiocarbon and pollen data, as well as by the increasing application of scientific methods such as ancient DNA and strontium isotope analysis. The interdisciplinary ERC Synergy project COREX (From CORrelations to EXplanations: towards a new European prehistory), which began in 2021, aims to take forward this agenda by explaining the key processes that formed the genetic and cultural diversity of Europe north of the Mediterranean from the beginning of farming 6000 BCE to the end of prehistory (ca. 1000 BCE). It is a collaboration between the University of Gothenburg, University College London, University of Copenhagen, the National Museum of Denmark, and the University of Plymouth, and includes specialists in archaeology, genetics, pollen analysis, archaeobotany, archaeozoology, and strontium isotope analysis, as well as data analysis and modelling.

The core resource of the project is the interdisciplinary database currently under construction (Big Interdisciplinary Archaeological Database BIAD). This is already a collaboration with other ERC funded projects and in future it is intended to open out opportunities for collaboration with other projects that are interested in joining and contributing to the database.

Presentations will outline the aims of the COREX project, and the methods being used to address them, introduce, and explain the BIAD database and present some results of initial analyses.

S29.220

Dairying, diseases and the evolution of lactase persistence in Europe

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In European and many African, Middle Eastern and southern Asian populations, lactase persistence (LP) is the most advantageous monogenic trait to have evolved over the past 10,000 years. Although natural selection on LP and the consumption of prehistoric milk must be linked, considerable uncertainty remains concerning their spatiotemporal configuration and specific interactions. Here we provide detailed distributions of milk exploitation across Europe over the past 9,000 years using around 7,000 pottery fat residues from more than 550 archaeological sites. European milk use was widespread from the Neolithic period onwards but varied spatially and temporally in intensity. Notably, LP selection varying with levels of prehistoric milk exploitation is no better at explaining LP allele frequency trajectories than uniform selection since the Neolithic period. In the UK Biobank cohort of 500,000 contemporary Europeans, LP genotype was only weakly associated with milk consumption and did not show consistent associations with improved fitness or health indicators. This suggests that other reasons for the beneficial effects of LP should be considered for its rapid frequency increase. We propose that lactase non-persistent individuals consumed milk when it became available but, under conditions of famine and/or increased pathogen exposure, this was disadvantageous, driving LP selection in prehistoric Europe. Comparison of model likelihoods indicates that population fluctuations, settlement density and wild animal exploitation—proxies for these drivers—provide better explanations of LP selection than the extent of milk exploitation. These findings offer new perspectives on prehistoric milk exploitation and LP evolution.

S29.221

Big Interdisciplinary Archaeological Database (BIAD)

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The latest generation of models of human pre-history are increasingly utilising 'big data' approaches, combining information from different disciplines across large spatial and temporal ranges. However, differences in research objectives among independent studies have hindered standardization of data types, forms and structures. In order to move from publication archives and data repositories to useful databases, substantial effort and efficient strategies are required to aggregate and harmonise data. The BIAD is enthusiastically rising to this challenge by applying a highly cooperative strategy that incentivises projects to contribute new data, in exchange for full access and support. The project is growing fast, and decentralising. User knowledge and data protocols are being passed forward to each new project without reliance on a single core management team. BIAD has a dynamic structure and is constantly adapting to accommodate new data sets. As it expands, structural commonalities emerge that provide a template for new data before its collation.

S29.222

Archaeobotany and zooarchaeology in COREX project: methods and perspectives

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The use of animals and plants in human diets represents a fundamental adaptive trait to different ecological niches, as well as the cultural choices of the past human communities. While large databases have been constructed for paleoeconomic data from archaeological sites (e.g. ArboDat for botanical samples), the BIAD database integrates these datasets with the archaeological contexts they originate from, allowing their association with other available datasets, e.g. ^{14}C , isotopic data, genetics, or cultural traits. This relational approach provides the means to investigate Pan-European processes such as the spread of the domestic species, the modes and tempo of adaptation to divergent ecological settings (from the Carpathians and Balkan mountains to the Scandinavian peninsula and from the Atlantic coasts of France to the reliefs of Central Urals), changes in size and husbandry practices for animals, the ratio of wild species in past diets, the transformative impact of local climatic conditions or agricultural techniques on crops and animal diets, finally, their association with other cultural traits from the Neolithic and Bronze Age. Each of these fundamental questions in archaeology can be analyzed in a diachronic or comparative perspective.

Starting from the structure of the EUROEVOL project, we adapted our database tables to collect all data associated with these patterns, including characterization of wild and domestic species for plants and to size, age and sex ratio for animals. The reference collection gives so far, a very uneven picture where some countries are characterized by an established bioarchaeological tradition, while others are still transitioning into this field of archaeological research. Our survey highlights also the absence of a standard in the publication protocol. This points towards a need for a dialogue within the scientific community to establish sound protocols for collecting and sharing data. Nevertheless, the geographic approach makes it possible to elaborate the very first considerations in some of the regions (in particular, Scania in Southern Sweden) that we present in this session. We decided to combine archaeobotany and zooarchaeology to test the relationship between the two datasets and to reconstruct past diets and their changes through time.

S29.223

Patterns in European prehistory from the perspective of ^{14}C dates

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^{14}C -based proxies are nowadays routinely used in many archaeological and interdisciplinary projects for inferring demographic oscillations of past societies. Increased number of large-scale radiocarbon databases cover various periods or regions on diverse range of spatial scales (regional, national, continental, global); however, these databases are only sparsely directly connected to other archaeological (both cultural and scientific) data. BIAD (and COREX) aims exactly on that. We will present the emerging large-scale and high-quality ^{14}C dataset covering most of the continental Europe between the Mesolithic and the Iron Age (ca. 6000-1000 BCE) and how its direct relations to other data with the BIAD are crucial for the aims of the project. We will discuss current constrains in our data collection, geographical gaps, other related issues and modes of collaborations. Our paper will also outline possibilities of palaeodemographic modelling in both, time and space, from an interdisciplinary perspective.

S29.224

Reflections on and of individual mobility/ities across the large scale: COREX and the contribution of strontium isotopes

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In the 38 years since strontium isotope analysis entered the archaeological toolkit, our understanding, utilization and outlook of the method have changed. This paper will explore that research trajectory by discussing the move from keyhole analyses and site-focussed studies to multi-site, culture group-wide, region-wide and even diachronically-oriented mobility research. Furthermore, we will reflect on how such changes in scale continue to influence our intellectual grasp of macro-scale patterns in European prehistory. It will compare and contrast the information contribution of strontium isotopes as opposed to other migration analyses (e.g. other isotopes and aDNA) and will further offer insights into projected angles for future development of mobility studies with examples from the approach utilized in the COREX project, namely a holistic approach of $\text{Sr}^{87}/\text{Sr}^{86}$ data in line with the new Mobilities Paradigm which will continue to support the study of connections betwixt and between other data types, cultural interpretations and scales of analysis.

S29.225

From discrete to continuous: a long-term perspective on body arrangement in European burials (6000-1000 BCE)

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The dawn of evolutionary genetics in archaeology has revived the scientific interests in investigating long-term patterns of burial traditions and their relationship to past biological populations. Of main interest is the relationship between genetic

and cultural inheritance, which requires a reconsideration of the archaeological burial record, where burial practices are no longer merely group-based association but learned behavior transmitted across generations. This is especially relevant given the recent advances in archaeoanthatological studies where learning is the quintessential part of maintaining burial practices, e.g. the decisions on how to position specific body parts as well as formation of norms due to consistent choices (Nilsson Stutz, 2003; Tõrv, 2016). While essential to the determination of burial traditions, the ways in which archaeologists approach the subject of bodily treatment remains unsystematized. Firstly, the use of descriptive categories (e.g. Frînculeasa, Preda and Heyd, 2015), impressionistic typologies (e.g. Thomas, 2008) or formal classifications (e.g. Ernée, 2020), is challenging for collecting large-scale datasets. Secondly, such classifications limit the possibilities of investigating reproduction or transformation of burial traditions due to the reduced information content. Thirdly, the reliance on categorical variables affects the diachronic studies of inter- and intra-cultural differences. In our paper, we present the possibilities of using a 3D-based approach to documenting body positioning in burials and explore their analytical prospects for long-term patterns in prehistoric burials traditions.

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S29.226

Spatiotemporal inference methods at the intersection of genomics and archaeology

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The sequencing of ancient genomes has provided an unprecedented opportunity to study the history of genetic relationships among human societies throughout the Holocene. Yet, there exists a lack of computational tools for modeling genome evolution explicitly in space and for quantitatively connecting it with other type of sociocultural indicators of the past. Here, we will describe several methods we are developing to relate genomic data to informative parameters about mobility, adaptation and ecology, accounting for both spatial and temporal dimensions. These include a new way to model the spread of peoples across a landscape and to relate these to changes in the vegetational landscape of Western Eurasia over the past 13 millennia. To test and validate these methods, we have also developed a new framework for easily generating spatial simulations of arbitrary complexity, and an approach to relate palaeocological niche models with knowledge about past human migrations. We have recently applied some of these approaches to new datasets that include hundreds of ancient human genomes from the Mesolithic, Neolithic and Bronze Age.

S29.227

Testing cultural transmission hypotheses at the macroscale

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Archaeologists study evidence of traditions of longer and shorter duration in different domains, from monument forms, burial rites and house construction to crop-growing, prestige goods and pottery decoration. They can be transmitted by different mechanisms, to different people, and may be affected by different factors, from their practical success to their social acceptability. Extensive work in the field of cultural evolution has combined the results of ethnographic study with use of modern computational methods to produce studies that show the link between local transmission processes and large scale patterns. Other studies have taken language affiliation as a starting point and investigate the extent to which other cultural features map onto them. A cross-cultural ethnographic study by Mathew and Perreault (2015) concluded that, 'the main mode of human adaptation is social learning mechanisms that operate over multiple generations', not short-term responses to local environments. This paper will review some of these studies and propose ways in which it is possible to adapt their approaches and methods to look at the relationship between cultural traditions in different domains and between these and genomic descent patterns.

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S29.228

How much do cultural transitions influence land cover change in Europe?

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Attempts to assess the role of past cultural groups on land cover, and as agents of land cover change, are almost as old as the discipline of pollen analysis itself (Edwards et al 2017). Spatially-extensive pollen databases have been available since the 1990s to assess the character of, and changes in, regional and continental land cover (e.g. the European Pollen Database: Fyfe et al 2009). In the past decade major advances have been made in the compilation and analysis of extensive databases of archaeological material providing rich insights into past cultural change (Shennan et al 2013). The radiocarbon dates-as-data approach has enabled palaeodemographic modelling, and facilitated consideration of the role of population change on land cover (e.g. Roberts et al 2019). Bringing together large datasets that can describe land cover change with databases of archaeological material enables us to consider whether groups with different cultural affiliations impacted land cover in similar ways, and whether there was an inevitability in the trajectories of land cover change through the Holocene. In this paper, we consider two questions: (1) did the emergence of groups of different cultural affiliations in a region result in distinctive changes in palaeovegetation in that region; and (2) did particular cultural groups (re)produce patterns of vegetation that are similar between regions? We approach these questions by generating new quantified regional vegetation cover estimates using the REVEALS model. The timing of cultural transitions within regions is established through analysis of archaeological radiocarbon dates. Where data allows, we also consider the nature of the subsistence systems. We test whether rates of change in palaeovegetation align with cultural transitions, and compare the character of regional vegetation cover before, and after, these transitions.

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S29.229

Exploring land-use impacts on plant and insect diversity through synthesis of palaeoecological datasets from across the British Isles

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Human land-use change plays an important role in shaping plant and insect diversity (Woodbridge et al., 2021; de Vareilles et al., 2021). Great Britain provides an ideal case study to investigate patterns of long-term environmental change and socio-environmental interactions due to the existence of spatially and temporally extensive palaeoenvironmental archives, and a long history of landscape transformation through agrarian change (de Vareilles & Woodbridge, 2020). Understanding past landscape change can provide valuable insights for the management of modern landscapes and environmental decision making (Fyfe, 2022). Using fossil pollen, insect, archaeo-demographic, archaeobotanical and modern landscape datasets covering Britain, shifts towards ecosystem novelty are identified in the form of non-analogue species assemblages. The results reveal that trends in diversity and ecological novelty are associated with the scale of crop production, the range of crops grown, and reflect changing human population levels. Modern landscapes with higher agricultural suitability are unlikely to have pollen analogues beyond the last 1000 years, whilst those in areas less suited to agriculture and on more variable topography are more likely to have analogues older than 1000 years. This demonstrates the role of agriculture in the emergence of novel ecosystems. The Anthropocene only sees major shifts in novelty in a low number of pollen sites suggesting that novel ecosystems emerged over a longer time period resulting from the cumulative impacts of past land-use change.

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S29.230

Five challenges for a new Archaeogenetic Paradigm

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Here I discuss what I consider to be five challenges in order to proceed towards a more integrated, and perhaps trans-disciplinary archaeogenetic paradigm of the future, one that integrates not only science and archaeology, but also re-theorize central concept such as kinship and ethnicity in order to facilitate such an integration. I also discuss the challenge of ontological differences between genetic and archaeological theory when it comes to some central concepts

S31: Innovations in the Urnfield Culture

In the Late Bronze Age, i.e. from about 1300 to 800 BC, the Urnfield Culture was widespread in southern Central Europe. Its occurrence is linked to many transformations in virtually all aspects of human life that can be grasped in the archaeological record. Some keywords are cremation, water bird-sun symbolism, an increase in hoards and river finds, the emergence of weight systems, metal body armour and vessels made of metal as well as ceremonial wagons. In addition, an increase in population, colonisation processes and settlement densification can be stated, as well as the construction of large fortifications and the cultivation of new food crops such as millet and field beans. In most of the find regions, the autochthonous emergence of the Urnfield Culture from the Middle Bronze Age Tumulus Culture is emphasised. It is obvious that contacts between groups and the diffusion of ideas and innovations carried this cultural change. Thus, the cremation custom and the increasingly poorer and more equal equipment of the graves in the course of the Urnfield Culture may express a new conception of the afterlife, the core idea of which is possibly symbolically represented in the “bird sun barque”. The great radiance of this symbol is shown not least in the fact that it was handed down far into the later Iron Age in a region reaching from Scandinavia to Italy.

In this session, we like to explore in a broad and interdisciplinary way which innovations could have played a decisive role in the emergence and spread of this cultural package, and which networks contributed to the necessary transfer of knowledge. We use the term innovation to refer to changes that have become established. This does not only refer to objects, but also, for example, to new methods of production and to institutions. We are interested in economic, technical as well as social, political or cultural innovations. The session will also consider external factors that can promote or influence change, adaptation and innovation, such as climate events or secondary effects of established strategies.

S31.231

Iron and the Iron Age

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The presentation will outline the main stages in the introduction of iron in the Near East and southern Europe, mainly covering the period between the 13th and 9th centuries BC. Two main themes will be discussed.

The spread of iron will be presented as a diffusionist model. Diffusion is a controversial concept in prehistoric archaeology. Colin Renfrew was perhaps the most famous critic of the concept, referring to diffusionism as the ‘infection model’, to ridicule the idea that an innovation could spread through human populations like an epidemic. Nevertheless, particularly in the case of technological innovations, the process of diffusion often appears to be unavoidable and inevitable. The problems associated with the concept of diffusion will be discussed, using the innovation of iron metallurgy as a case study.

Another interesting aspect during the early stages of the introduction of iron is the effect which can be observed in the conceptualization of other metals, and most significantly the conceptualization of bronze. This is visible, for example, when prestigious bronze artefacts cease to be manufactured, or when bronze hoards cease to be deposited. This question of the conceptualization of metals is fundamental when discussing the Bronze/Iron transition.

In the final section of the presentation, the Bronze/Iron transition in south-east Europe will be discussed, as an example for the spread of iron into continental Europe.

S31.232

A major shift in Late Bronze Age metalwork production around 900 BC

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Our traditional chronology systems hardly ever reflect cultural changes accurately and may even mask real moments of discontinuity. This is particularly true for the second part of the Late Bronze Age Urnfield Period where a radical change in iconography can actually be noticed around 900 BC. Within a very short period, the famous solar bird-boat iconography, which had widely developed over centuries and given rise to the elaborate and sophisticated ornamentation known on solid hilted swords from the 11th/10th century, takes a back seat and we can see a single new symbol coming to the fore, concentrating figurative representation in form of a singular vase-shaped build (Wirth S. 2021, 652-654).

The history of solid-hilted swords perfectly illustrates this abrupt transformation in iconography that goes hand in hand with substantial morphological change and there are other examples in ornaments (armrings, pins) and tools. Discontinuity in material culture is a key issue in LBA metalwork studies, changes in “style” having already been pointed out by E. Vogt in 1942. We argue that there is clear correlation with a well organised restructuring in production techniques: new forms of objects are being manufactured using stone moulds (which were already very common in serial axe production but until then rarely seen, for example, in sword hilt manufacture: Dumont 2022, 383-389) and innovative coquille casting (Wirth M. 2002, 87 sq., 114 sq.). Nearly all areas of metalwork production were affected by this general shift towards standardized morphologies and extremely simplified ornamentation. We are convinced that this phenomenon has its counterpart in structural changes encompassing all sectors of Late Bronze Age societies.

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S31.233

Apotheosis; A dynamic interpretation of Urnfield waterbird symbolism.

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Among the remarkable figural motifs of the otherwise almost aniconic range of motifs of Late Bronze Age metal craftsmen is the “waterbird boat” which in the form of reliefs and fittings adorns above all jewellery, weapons and beaten bronze tableware. This highly stylised and, despite a wide pan-European distribution, highly standardised motif is made up of antithetically arranged bird heads rising from a base line and usually mounted on slightly curved necks. They are recognisable as waterfowl, most likely swans, by their long curved necks and slightly upturned bills. In combination with other members of the narrowly limited spectrum of motifs of Central European “symbolic motifs”, they play a key role in the iconography of Central Europe from the 13th to the 6th century BC. The roots of this motif can be found in the pictorial languages of Bronze Age communities in the central Mediterranean region, where it was first regularly applied to fine ceramics on the Apennine Peninsula and, more rarely, to jewellery. There it probably evoked a field of meaning that focused on the act of libation and was connoted as feminine. However, from the 13th century onwards, when Central European elites and their craftsmen began to mount waterbird motifs, including the antithetic boat on a much wider range of bearers, and it is highly probable that other fields of meaning in which this motif was felt to be effective were also increased. Probably the most impressive and physically the largest representatives of these new motif found are 13th and 12th century ostentatious wagons. In this article, the meaning and effect of these symbolically charged ceremonial vehicles will be explored in the context of the grave furnishings and above all by reconstructing their use in the burial process and assessing their role in expressing the hopes for funerary apotheosis.

S31.234

The Technology, Use, and Deposition of Spearheads during the Late Bronze Age in Transdanubia

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Transdanubia is an approx. 38.000 km² region in East-Central Europe, in the western part of the Carpathian Basin. This area is bordered by the foothills of the Alps along with the Danube, Drava, and Mura rivers from the Northern Balkans. Between 1450 and 900 BC (Br B2–Ha B2), Transdanubia was occupied by a population, which was archaeologically characterized and called the Tumulus and later the Urnfield culture.

Transdanubia was one of the most prominent regions of Late Bronze Age Europe in respect of bronze weaponry and the phenomena related to the ritualistic aspects of war. One of the most important offensive weapons of the local Late Bronze Age is the spear, used for both hunting and warfare. Although it has a much earlier history than the Urnfield period, this is the era when it undergoes a remarkable change. Bronze spearheads come in different sizes and shapes. There is also individualization in the form of various cast and/or chased design elements and patterns. Some spearheads may have been particularly impressive, long-used biographical objects, which have symbolic meanings equivalent to swords. Nonetheless, spears are not useless ornaments that serve no purpose. The results of a use-wear analysis carried out last year on all the specimens from the region suggest that this type of weapon was much used. Based on the traces of use observed on the weapons, we can expect different modes of use, including stabbing, throwing, and slashing.

The presence of spearheads was almost completely absent from graves, which fits in well with the trend observed for other offensive weapons and armor contexts from the Transdanubian Tumulus and Urnfield cultures. In contrast, spearheads can be found in dryland hoards, especially large scrap hoards containing numerous examples of this weapon type. Deliberate damage is a particularly common pattern among the deposited spearheads, especially between the Br D/Ha A1 and the Ha B1 periods. These manipulations include simple breaks, crushing of sockets, edge damaging, and combination of objects. These various acts, probably related to the act of deposition.

The paper focuses on the spearheads from Transdanubia by introducing new preliminary results derived from the project *Technology, Use, and Manipulation of Weapons from the Late Bronze Age Transdanubia (2020–2023)*. The main aspects of the presentation are the technology and use of spears and the interpretation of their selection and treatment in burials and hoards.

S31.235

Production Patterns in LBA Hoarded Metals Along the Save and Bosna River?

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Within the Western Balkans, metal depositions significantly rise in number during the 13th and 12th century BC and are tied closely to the Urnfield Culture package. The accumulating occurrence of hoard finds along the Save and Bosna riverbanks, seem to attest to the vital role of stream networks in respect to exchange of Late Bronze Age material culture as well as communication and transmission of social practices and beliefs. The depositional custom of metal can be seen as a product of necessary preparations steps undertaken by the prehistoric communities including providing raw material, collecting artefacts and/or manipulation of objects. Due to the circumstances of discovery most of the hoards within the region are characterized by a lack of contextual data. Nevertheless, specific artefact compositions and their occurring regularity, degree of fragmentation or varying chronological spans of deposited objects are evidence of complex practices linked to hoarding. In order to understand the phenomenon and involved socio-cultural practices better, this paper will discuss production backgrounds of copper-based finds on a small-scale regarding evidence of adoption or adaptation. This paper deals with metal objects and their chemical composition from selected metal hoards dating to the older (Ha A1) and younger (Ha A2 – B1) Urnfield periods (late 13th to 11th century BC). The selected hoard finds of Motke, Novi Grad, Brezovo Polje and Mačkovac are situated along the course of Save and Bosna river in today's Bosnia-Herzegovina and suggest chronological connections and depositional parallels based on available archaeological information. With the help of minor and trace element analyses (ED-XRF), different chemical compositions pointing to different production modes of deposited metal items were observed. Based on site-specific metal compositions and regularity of alloying mixtures, a certain concordance in specific production steps of metal-craft becomes apparent. This not only enhances our understanding of Late Bronze Age metal production processes, but also helps to shed more light on the undertaken preparations and procedures closely tied to the hoarding practice. In addition, the newly generated insights demonstrate the potential of application of geochemical analyses to research involving Urnfield culture hoards.

S31.236

The begin of supraregional trade with querns of Mayen lava in the Urnfield period

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Since the Neolithic, the lava flows of the Bellerberg volcano near Mayen have been quarried for a volcanic rock that is ideal for grinding grain. For a long time saddle querns were produced there for local and regional needs. In the younger Urnfield period a dense settlement in the vicinity of the lava flows went hand in hand with a wide distribution of products made in the quarries, small saddle querns in form of a loaf of bread and examples in the form of elongated and flat boats. Querns determined macroscopically as Mayen lava reached the Saarland and the Mainz basin in the south, and came close to the Dutch North Sea coast. In addition, saddle querns whose material was identified as “Eifel basalt” were found in settlements of the Urnfield culture in the Palatinate, Saarland and in Lorraine. Many of these saddle querns will come from the Mayen quarries, which, due to their proximity to the Rhine and Moselle, have in later periods always been the dominant source of origin of “basalt”-like lava, compared to occurrences in the West Eifel, and which have been confirmed as such, as far as mineralogical investigations have been carried out. Thus the supraregional trade with products of Mayen lava started about 3000 years ago.

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S31.237

Stillfried an der March – old finds and new methods. An interdisciplinary approach and results of a long-term investigations

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The hillfort site Stillfried an der March in Eastern Austria is one of the iconic sites of the Urnfield culture in Central Europe with a long history of research dating back to 1874. The excavations by F. Felgenhauer between 1969 and 1989 revealed

a number of remarkable features, including a well-preserved fortification made of timber and earth, a large number of storage pits, pits with deposition of humans and wild animals.

In the frame of the research group “Urnfield Culture Networks“ at the Austrian Archaeological Institute, finds and features from Stillfried have been thoroughly analyzed and evaluated with application of new methods (e. g. strontium isotopes). The results are now presented in three comprehensive monographs that are to be published between 2022 and 2024.

Both the radiocarbon dates and conventional dating point at 10th and 9th century BC (Ha B2/Ha B3) as the main period of activity during which the fortified site emerged to an important regional center. The large storage facilities for grain indicate that Stillfried was a hub for a food distribution on a regional scale. The erection of an impressive rampart with unparalleled state of preservation, allowing for a better insight into the construction details, could also be understood as a demonstration act of local power. One of the most striking results was provided by a meticulous analyses of animal remains from the pits with clear indications that many of the wild animals (three old wolves, three hinds, one roe deer, and one fox) were kept in captivity over many years and most likely repetitively used for ceremonial purposes. The ritual background can also be assumed for buried humans in abandoned storage pits. As the strontium isotope analyses demonstrated, both local and non-local individuals were buried in the pits, leaving the question why certain individuals were excluded from a dominant burial rite (cremation) still open. Similar inhumation burials within the settlements are known mostly from Lusatian and Knovitzer cultures, pointing at connection of Stillfried with the regions situated to the north.

The finds from Stillfried strongly indicate an existence on economic and religious ruling class that was able to mobilize the large part of the community (building of rampart, storage facilities, feeding of wild animals). Following this, the ritual acts involving wild animals, which were probably performed publicly, served as a cohesive agent.

S34: Barrows as records of human activities

Starting from the 4th and 3rd mill. BC, round barrows, also known as kurgans, were erected in various areas of Europe. There are especially many of them in the East European steppe zone, where they formed vast cemeteries, but barrows were also built and used in other parts of the continent. Each of them contain many records of human activity. Their main function was in relation to the grave over which the mound was erected. However, both in the mound and under it, in various levels and stratigraphic units, relics of pre-funeral, funeral and post-funeral activities are found: not only graves but also other features, e.g. traces of feasts, special deposits, fires, etc. The soil and turf pieces, which were the main materials of the mound may also contain traces of previous human activity. In their long history, barrows have been plundered, destroyed and transformed. Very important are also relics of flora and fauna, directly or indirectly related to human activities. The aim of the proposed session is to look at the barrows as a kind of archive documenting various aspects of human activity.

We would like to raise a variety of issues regarding barrows. Most of them are focused on the primary function of barrows related to funerals, namely:

- What were the scenarios of building, arranging, and restructuring barrows and barrow cemeteries on the steppe and beyond?
- What were the similarities and differences between the funerary rituals of barrow groups in different European areas?
- How was a place for the mound prepared?
- How were barrows designed and built?
- What were the forms of under-barrow architecture?
- And finally, who was buried in barrows?
- However, we also propose to look at the barrows as archives of other human activities, so other questions can also be asked, e.g. what traces of previous human presence have been found in the mounds and how can they be interpreted?

What are the environmental data from before the construction of the mound and from the time of its existence?

We invite all those who want to present their experiences and reflections on the research of the barrows from these perspectives to participate in the session.

S34.238

Ancient burial mounds as a symbolic system

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Analysis of early dates and stratigraphy of burial mound complexes (the second half of the V millennium BC) led to the conclusion, that they are not directly related to the burial embankment, but relate to complex monumental structures — sanctuaries. The sanctuaries preceded the burial mounds in chronological aspect, and they functioned for a long time without creating an embankment above them. The part of sanctuaries had astronomical reference points and were connected to calendar-zodiac symbolism. Sometimes burials were carried out on the territory of sanctuaries; these burials had sacral nature. These were flat burials and the mound above them were not erected. Burial mounds above the sanctuaries began to appear after burials of later epochs were carried out in sacral places (not earlier than 38/37 BC). These mounds erroneously are associated with flat burials or ground sanctuaries. The dating of burial mounds by the dating of sacral flat burials (or by the dating of «pillar sanctuaries») mistakenly greatly pushes back the dating of appearance of the first mounds in the Steppe Black Sea region and Transcaucasia. The separation of these complexes in time and space (the flat ground sanctuary and the burial mound itself) allowed drawing conclusions about the existence of this sanctuaries in 45—40 BC. The burial mounds appear later, their installation in the place of sanctuaries is connected with the sacral nature of the place. Throughout Europe, barrows appear almost simultaneously, in 38/37 BC, although in different cultures. It is possible to assume the Central European and Lower Danube influence on the formation of ideological ideas of the Steppe population. In particular, the phenomenon of sanctuaries of the Middle Eneolithic may have originated under Central European influence. It obviously had structural similarities with other complexes built in accordance with the movement of the celestial luminaries in the late Neolithic of Central and Atlantic Europe. The appearance of sanctuaries can be attributed to the circle of archaeological evidence of the interaction between the world of early farmers of Southeast and Central Europe and the “steppe” world of the pastoralists. The barrows of the Black Sea and Caucasian steppe are synchronous with European burial mounds, and their ancientization and equation with the dating of sanctuaries is erroneous.

S34.239

Kurgan phenomenon of the Southern Caucasus: first results of an interdisciplinary survey along the Kurekçay Valley (Goranboy Province, western Azerbaijan)

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In the Caucasus, considerable social and cultural transformations occurred with increased use of metallurgy and the emergence of associated specialisations towards the end of the fifth millennium BCE. New supra-regional networks, ideologies, technological developments, and rising social inequalities are detected in the archaeological record. Funerary customs, possibly linked to new concepts of the afterlife, also reflect these changes.

The tradition of burying the dead in burial mounds, locally called kurgans, is inscribed in the Southern Caucasus landscape. This practice spread in the region during the Late Chalcolithic (approx. 4000-3500 BC) and remained in use until the Early Iron Age (first millennium BCE). The resource wealth of the region, with its rich metal deposits (including copper, silver, and gold), is often reflected in the rich furnishings of the kurgans, attesting to the use and accumulation of precious raw materials. Previous studies in this region have only focused on individual burial mounds and have not contextualized them with other kurgans, or in relation to environmental and landscape conditions, including geology and topography.

This paper discusses the results of intensive survey investigations based on the integration of different methods, including the analysis of historical and contemporary satellite and aerial imagery, topographic mapping and geophysical prospection to document the funerary tumuli along the Kurekçay Valley (Goranboy Province, western Azerbaijan). The integration of the results obtained through these non-destructive methods allows us to map and measure the density, size, morphology and spatial distribution of the kurgans remotely. Moving away from the individual burial mound viewpoint, this study contextualizes the single kurgans or groups of them within their landscapes in order to reconstruct the physical and symbolic relationships between them. This opens innovative perspectives for the interpretation of the kurgan phenomenon, tracing the funerary landscape of the region in prehistoric times.

S34.240

Usatovo and Mayaki: Who was buried in the late Chalcolithic burials of the North Pontic?

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In the North Pontic region, larger 4th millennium cemeteries are a rarity. The few known key necropolises of bigger size, such as Mayaki and Usatovo are studied in detail anew by each generation of archaeologists. On the one hand, these grave yards show close relations to Tripolye communities, which are almost free of funerary remains. On the other hand, larger necropolises showing some characteristics which becoming later further developed in the Bronze Age. By means of quantitative methods including regional and transregional comparisons we would like once again look on these archives.

S34.241

Early kurganisation of Central Europe

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Recent years of research have brought the discovery of many barrows dating back to the 4th millennium BC, located in the western part of the Eurasian steppe (including the Danube-Tisza zone). Therefore, the long asked question of the early expansion of kurgan communities into Central Europe has returned. Important in this case are the analyzes of the barrow funeral rite in the Funnel Beaker Culture and the Globular Amphora Culture. There are interesting examples of close links with the ritual of the steppe communities. Another issue is the appearance of corded ornamentation on vessels from the 4th millennium BC in Central Europe. However, the problem of the strength of relations with Eastern Europe remains a debatable issue. Recognizing this relationship as significant complicates the picture of demographic and cultural changes presented in recent studies of genetic research (with emphasis on the role of the expansion of the Yamna culture communities as the most important factor in the formation of the European civilization of the Bronze Age).

S34.242

Earth mounds in Semberija – ritual places of Copper and Bronze Age at the junction between the Pannonian plains and the Balkans

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The paper will discuss the results of our investigations of the large earth mound the site Novo Selo near Bijeljina in northeastern Bosnia. Prior to our work, little was known about the age, function and structure of earth mounds in the flatlands of the region of Semberija, situated between the Save River and estuary of the Drina River in a contact zone between southern Pannonian plains and first hills of the western Balkans. Although clearly visible in the local landscape, the earth mounds with a diameter between 35 and 40 m and preserved height between 1 and 1.5 m, were never a subject of archaeological investigation.

The geophysical prospection of two mounds at the sites Novo Selo and Muharine indicated the existence of numerous structures within the area enclosed by a key-hole shaped ditch, all pointing to intense human activities. Our excavations at Novo Selo site in 2019 and 2021 revealed that area of the mound was first used during the Copper Age as a burial ground and ritual gathering place. During this period between 3000–2600 BC, the naturally elevated terrain at the site was enclosed by a shallow ditch and used for occasional feasting (pottery, animal bones) and for selected urn burials. The two discovered urn graves contained cremation remains of the two very old females with age of death estimated between 65 and 70 years. In terms of cultural affiliation, most of the pottery finds from the features belonging to this period, can be associated with the Baden and Kostolac complexes.

Almost 1000 years later, the site was again used by the Bronze Age communities. The whole elevated area with traces of Copper Age activity was first burned resulting in a reddish burnt layer with vegetation remains dated between 1800 and 1750 BC. Shortly after that, the platform made of pebble stones (2 x 1.5 m) was built in a central part with a burial of young male (21-25 years) in a crouched position on it. The body of the deceased lay on a wooden stretcher with four grips with no grave goods. However, radiocarbon dates were consistent with the dates from the burnt reddish layer (1750 BC), indicating the whole act (burning, building of the stone platform and burial) took place within the very short period of time. After the burial, the area was covered with immense amount of soil (estimated 300 t), creating a large mound as a strong reference point in the Bronze Age landscape.

S34.243

Easy to loot. Burial mounds and robbers: case of Łęki Małe barrow cemetery

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The so-called princely barrows in Łęki Małe, located in Greater Poland region, are the oldest of such within the Únětice culture of Central Europe. While in the Elbe-Saale area and in Silesia similar rich furnished burials under mound have appeared as single monuments earliest around 1950 BC, Łęki Małe represents a chain of barrows stretching from latest 2150 BC to 1800 BC. Of the originally 14 mounds, four were well preserved enough that their complex biographies can now be reconstructed. All of them included cycles of ritual activities: pre-funeral, funeral and post-funeral. However, the barrows also contain traces of robberies. Robbery trenches that destroyed the original funeral architecture under the embankment have been documented. Radiocarbon dating indicates that the robberies on a larger scale began in the 8th-6th centuries BC, increased in the 2nd-1st centuries BC, but their intensification took place in the 5th-7th centuries AD. Their result was, inter alia, destruction of the main (central) graves in barrows II, III and IV. Authors try to reconstruct not only the original shape of central graves but also sets of artefacts that were removed from them.

S34.244

Funerary rituals and under-mound architecture in the Middle Bronze Age barrows of the Upper Dniester Basin

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Rituals leading to the raising of a barrow by Middle Bronze Age communities were part of a broader scheme to design cemetery spaces whose general principles must have been known and followed by successive generations. Preliminaries included the selection of a ritual place in the physical and symbolic senses. The former concerned the placing of a necropolis in the field, or its relation to geomorphologic forms, pre-existing barrow lines and individual barrows raised previously. The latter had to take into account the relation of each successive mound to the barrows of one's own kinship group, specific families, ancestors and other individuals related to the dead person's lineage or family.

At the next stage, the place chosen for a barrow was adapted and prepared for performing rituals. This involved the removal of vegetation from, and the flattening of, the hilltop where a barrow was to be built. From the places where wooden and wooden-stone graves were to be placed, along with ritual deposits (pottery, metal and flint goods) as well as smaller wooden structures, hearths/fires and features, humus was sometimes removed so thoroughly so as to dig into the bedrock below the ancient surface. It is hard to determine the time it took to perform the rituals involving the construction of barrows, deposition of corpses and other objects followed by the ceremonial burning of wooden structures. It certainly took the longest to build the complex wooden grave structures, which involved earlier preparation (procuring, cutting to size, hewing and assembling) of their components such as logs, boards and joining elements. This could have lasted at least several and possibly over a dozen days. Since various structures are found at various depths under a barrow, their installation was not necessarily synchronous but rather took place as a sequence of events, extending over time. However, it is possible that some ritual events took place during the same chronological horizon, for instance, on the same day. Only the burning of the last wooden or wooden-stone structures together with the deceased and structures related to the deposits signified the securing/sealing of the ritual locus. This was accompanied by funerary feasts and related burning of fires or, generally, using fire to purify or sacralize the space.

S34.245

The kurgans of the Alazani Valley in Eastern Georgia: investigating the pattern of distribution through a landscape archaeological study

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Kurgans (burial mounds) are a significant feature of the archaeological landscape of the Southern Caucasus. Because of their monumental size and the rich inventories contained inside, these constructions have attracted the attention of scholars since the earliest 'archaeological' excavations in the region. The astonishing discoveries made during the 19th and 20th century strongly captured the archaeological research in this region, which was aimed mostly at bringing to light art objects. Therefore, little focus was placed on understanding the complexity of this phenomenon, and the relationship of these features to the natural and cultural landscapes in their vicinity. Various factors have been posited to explain the choice of location for the construction of kurgans such as proximity to natural, and other archaeological features, community territories, and sources of construction materials; however, these factors need not be mutually exclusive. The research is focused on the Alazani Valley, located in the Kakheti province of Eastern Georgia, which is well known archaeologically for its relatively large kurgans, some of which with a diameter of 100m. Chronologically, excavated kurgans from this region mostly date to the Late Early Bronze Age (2600-2200/2100 BC), during the spread of the Martqopi and Bedeni cultures, but some also appear to date to the Late Bronze Age (1500-1100 BC). Using data gathered through remote sensing and field survey, supplemented by data available from previously published studies, this paper investigates the relationship between the kurgans located in the Alazani Valley and their local landscape. By comparing data from different regions of the Southern Caucasus, an attempt is made to detect the presence or absence of recurrent elements. In addition, the use of historical satellite imageries, i.e. CORONA dated to the Sixties, together with recent satellite images, available on Google Earth PRO, allows to assess the evolution of land use over the last sixty years and to estimate its impact on the archaeological landscape.

S34.246

Illuminated Barrow - an unusual Bronze Age mound construction

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North of Bornhöved, district of Segeberg, remains of an unusual burial mound with a ditch and a post henge were found in summer 2017 in a new development area. The tumulus stands out due to its unusual construction and different construction phases. The central grave was surrounded by a repeatedly excavated ditch, stone circle, stone packing and post henge. Extensive botanical and geological investigations point to an appearance that was repeatedly reshaped, enlarged and modified with new features. The highlight of the site was certainly a fire that enclosed the mound in a circle of flames. The burial mound was also used later as a burial place. Seven urn graves partly preserved under a colluvium (Younger BA) and three stratigraphically younger oval stone pavements bear witness to this. Settlement traces were found in the south-west of the mound with a waste pit below a cultural layer and postholes dating to the Bronze or Iron Age. The presentation will highlight the complex phases of use of the barrow over the centuries from the Late Neolithic to the Bronze Age and beyond. This type of complex burial construction is typical of the Late Neolithic, but rarely attested in Schleswig-Holstein and Denmark. Rather, the unusual construction points to parallels in the west.

Go north! Barrows of the 1st millennium BC in the forest-steppe on the Southern Bug, Ukraine

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Polish-Ukrainian research conducted in 2019-2021 took a series of barrows located in the forest-steppe on the Southern Bug, in the vicinity of Vinnitsa. This area, known as eastern Podolia, is still one of the less recognized fragments of the Ukrainian forest-steppe. This also applies to the research of barrows, which are heavily damaged here due to the intensive agrarian cultivation. However, the multi-stage procedure used by the research team turned out to be very effective. Archaeological surveys, non-destructive geomagnetic research and finally excavations led to the recognition of burial mounds classified as pre-Scythian and Scythian. Several different forms of funeral architecture placed under embankments, various ways of depositing the remains of deceased human individuals, as well as diversified sets of the grave-goods have been documented. From a historical perspective, the examined burial mounds testify the presence of nomads in the forest-steppe zone on the Southern Bug as well as in the interfluvium of the Southern Bug and Dniester rivers. They also mark a hitherto little known route of their translocation to the north.

S35: Cultivation under uncertainty - the interplay of social and ecological factors in prehistoric and ancient agriculture

Human societies rely on agriculture for their subsistence. Yet farming is not one activity but includes a myriad of human practices from gardening to extensive field crop cultivation, from pasture farming to long-distance transhumance – and it leaves traces in the landscape.

Agriculture is an interplay between culture and nature. On the one hand, it is the (subsistence) economy that influences agricultural activities, and on the other hand, it is the environmental settings of agriculture that play a major role in determining the possibilities of the respective economic system. At the same time, both are subject to climate and environmental variability, which can stimulate change in current practices. The choice of crops and cultivation regimes (e.g., high input gardening cultivation vs. extensive field cultivation), the choice of livestock and breeding objective (e.g., meat vs. dairy production) or production and management of surplus ultimately depend on conscious decisions – decisions that depended on the respective context and always were subject to uncertainty and risks.

The respective communities lived in different social arrangements (level of hierarchical structure, urban vs. rural, degree of centralization) and are likely to have had different approaches to social dynamics such as consumption, internal and external competition, or the extent of mobility and exchange networks. This in turn means, that their exposure to risks and uncertainties arising from both climatic and social dynamics might have differed significantly.

- Is it possible to disentangle societal from environmental impacts on agricultural changes?
- Do specific agricultural strategies correlate with specific environmental conditions or social arrangements?
- Or can agricultural strategies only be understood in the context of their specific environmental and societal settings?

It is to address these questions aiming to better understand the interplay of social and environmental factors in agriculture, that this session is convened. We invite interdisciplinary contributions from archaeological, archaeobiological and paleoenvironmental research.

S35.248

Farming and early urbanism in Europe: the interplay of sociality, ecology and uncertainty

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In this talk I consider the session's themes in the context of early urban forms in Europe. Recent bioarchaeological research, from Greece to Britain, suggests that Bronze-Iron Age urbanisation in diverse regions was associated with expanding cereal cultivation and extensive, low-input management of arable land. Nevertheless, distinct trajectories emerged in different social and ecological settings, such that high-density urbanism was associated with more marked shifts to extensive farming than lower density forms. Moreover, expansive production of certain cereals was accompanied by diversified cultivation of a wider crop spectrum, plausibly as a risk mitigating strategy by producers. I suggest that social and ecological agencies were inextricably linked in the formation of early urban agrosystems.

S35.249

Land use expansion in Late Bronze Age Greece – a success story?

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There is an increasing amount of evidence to support meaningful links between climate change and transformative changes in prehistoric agricultural societies. Among studies on the topic, rapid change narratives are common, often focusing on the detrimental effects on societies in the face of short-term climate change (events). Late Bronze Age Greece provides evidence to suggest it may be equally relevant to discuss positive societal response to climate change. Interestingly, theories regarding positive change have repercussions on our understanding of negative effects. In other words, explaining the boom may well be key to understanding the bust. In the Peloponnese peninsula, Greece, the chronological co-occurrence between cycles of wetter and drier climate and cycles of societal booms and busts span millennia. The emergence of the Mycenaean palatial societies around 1400 BCE is a case in point. The level of societal complexity in parallel with a considerable expansion in spatial extent of land use, surmised on the basis of the quantity and dispersal of archaeological sites that were arguably linked to both extensification and intensification of agricultural practices, suggests these societies were well-equipped for overall expansion, that they had the resources and the ability to control them. But our understanding remains limited as to the drivers and agents of change. These questions are

intimately linked to the abilities of our methods to capture the timing and speed of change. While aiming for well-integrated and multi-causal scenarios that combine factors of climate change with considerations of socio-economic, political, agricultural and cultural change, we need also to carefully consider the actual sequence of events and the role of human agency therein.

S35.250

Drought and Subsistence Practices: Disentangling possible Adaptations during the 3rd and 2nd Millennium BCE in southern Iberia

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The 3rd to 2nd millennium BCE has been a period witnessing major transformations in southern Iberia's archaeological record. A shift in settlement intensity towards the south-east along with the abandonment of numerous sites and other changes in the archaeological record characterize the developments in south-west Iberia around 2200 BCE. During the Bronze Age, south-east Iberia featured the rise of the 'El Argar' society. Often referred to as the first political society in Europe, the argaric elites are suggested to have exerted control on the agricultural practices and the distribution of according products. Their collapse around 1550 BCE has been related to environmental over-exploitation; also attributed to intense barley monocultures.

On the one hand, a potential climatic influence – particularly considering drought – has been suggested for the collapse of the argaric society. On the other hand, despite the contemporaneity with the 4.2 ka dry event in the Mediterranean, the large-scale de-structuring of settlement networks in south-west Iberia could not be associated with a climatic deterioration. Yet, a detailed evaluation of potential adaptations of subsistence practices to climatic deterioration in southern Iberia during this period is missing.

Here, on a regional scale, we investigate potential social resilience and adaptation to dry phases during the 3rd and 2nd millennium BCE in southern Iberia. A comparison of seasonal precipitation levels with cereal cultivation and animal domestication in southern Iberia allows a detailed discussion of a possible climatic influence of social subsistence strategies during the major transformation phases.

S35.251

Exploring changes in land use and human impact in the prehistoric Southern Balkans and Northern Greece

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Site counts and radiocarbon summed probability densities (SPD) are often used as proxies for prehistoric demography but can also be understood as a measure for the intensity of the human impact on a given landscape. For the Southern Balkans and Northern Greece SPDs show a marked increase at the onset of the Neolithic in the region (ca. 6400 calBC) and a subsequent high variability in intensity of the signal. Especially during the 4th millennium BC (late Neolithic/Chalkolithic) only low values in radiocarbon probability distributions and in site counts can be detected. With the beginning of the Bronze Age human impact resumes a gradual increase in intensity, again showing varying intensities over time. However, the underlying true trajectories of the intensity of human impact might be masked for methodical reasons. As an example, the decrease of radiocarbon dates for the time after the Late Bronze Age in the study region can be attributed to a lack of studies using radiocarbon dates.

Palaeoecological evidence, especially from pollen analyses might provide insights on the underlying patterns of human impact over time and thus be used as a comparison. Cereal pollen frequencies or micro charcoal influx might correlate with curves derived from quantified archaeological evidence. However, this evidence has its own limitations as it often only shows local signals. Thus, the nature of the human activities responsible for these signals is difficult to trace. Although climatic events have been made responsible for the fluctuations in human impact, this might be misleading. Causes for changes in human behaviour are difficult to infer from proxies of climatic variability.

This contribution aims at exploring the explanatory power of SPDs and site count evidence to understand changes in human impact in the prehistoric Southern Balkans and Northern Greece.

S35.252

Climate and Settlement in Bronze Age Northern Switzerland

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The role of climate for Bronze Age land use and settlement is often discussed. The absence of lake dwellings in Switzerland

in certain periods is associated with climatic changes. For the Middle Bronze Age, the role of the Löss cold phase is discussed above all. This cold phase has been proven by strong glacier advances in the Alps (Ref01). "Löss" is thought to be responsible for the end of the lake dwellings after 1500 BC and their absence until after 1100 BC - the "missing period" (Ref02). The Löss cold phase is also used to justify the status of the Middle Bronze Age as a "dark age".

In clear contrast to this picture are the very numerous BzC and BzD settlements of the 15th to 13th century BC in northern Switzerland and the expansion in the Alps and the Jura mountains. Settlement expansion during a cold phase would be very unusual for traditional agricultural societies in Central Europe.

Current dendrodata on glacial advances and other climate indicators resolve this apparent contradiction. The Löss cold phase begins after 1800 and ends before 1400 BC. Between 1650 and 1500 BC is one of the coldest phases of the Holocene.

On the other hand, the 14th-11th century BC is referred to in climate research as the "Bronze Age climatic optimum". Pollen analyses from Switzerland also indicate a warm phase and intensive agricultural use between 1450 and 1250 BC. The settlement expansion of the 15th-13th century BC thus falls into a climatically favourable phase and not into a cold phase. The absence of lake dwellings from c.1500-1100 BC is therefore obviously not the result of a climate deterioration (Ref03). Other, social, causes must be sought.

Some of the lake dwellings of the 17th/16th and of the 11th/10th centuries BC in the northern foreland of the Alps may therefore have been built as defensive settlements in times of climatically induced social crises. In contrast, in the climatically favourable periods of the 15th to 13th centuries, there was apparently no social need to build defensive lake dwellings.

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S35.253

Human-environment interactions in the Middle Kama River Basin (pre-Urals, Russia) during the Holocene

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The origin of cultures in the pre-Urals and the history of their development have been the subject for scientific debate for a long time. Most of the controversy is related to the Iron Age and Middle Ages of the Permian pre-Urals and focuses on the post-Ananyino time. Researchers note the importance of this period, which laid the foundations for the region's typical economic, cultural, social, and religious systems [1]. Post-Ananyino time in the pre-Urals region is associated with the existence of the Glyadenovo culture and formed after its disintegration of the Nevolino and Lomovatovo cultures. Despite almost a century of research history of this period in the pre-Urals, the subsistence economy of Iron Age and Middle Ages populations and their impact on the environment raise many questions. To trace the natural and land use history of this region in high temporal resolution, we collected an eight-meter peat core Shabunichi-I from the Paltinskoe peatland located on the fluvial terrace of the mid-Kama (Perm region, Russia). We will provide the new results from palaeoecological studies of vegetation, fire and settlement history over the last 9200 years based on AMS radiocarbon dating, loss-on-ignition, macro-charcoal, pollen and non-pollen palynomorphs. In our study we focus particularly on the Iron Age to test archaeological hypotheses about the causes of the disintegration and emergence of cultures in the Kama region. Our results show that signals of anthropogenic changes in vegetation are marked in the pollen assemblages since the Bronze Age (~3900 cal yr BP). However only since ~2000 cal yr BP, the vegetation dynamics was strongly influenced by anthropogenic activity and human-induced fires. Archaeobotanical data from archaeological excavations are in line with palynological investigations, showing that the Iron Age cultures practiced agriculture. Wood anatomy studies provide new insights in selective usage of wood. Our results correlate strong with other regional studies [2].

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S35.254

Exploring social and environmental factors that shaped the crop choice at a Younger Bronze Age settlement in north-eastern Germany

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Modifications and innovations in plant food production can be an expression of cultural or environmental factors, or both. Here we take a rural settlement in north-eastern Germany as a case-study and explore cultural and environmental factors that potentially shaped the choice of crops produced and consumed by its inhabitants. This is the Younger Bronze Age site of Dobbin 27 in Mecklenburg-Vorpommern, dated to the period 1100-500 BCE. It comprises domestic structures such as

postholes, pits and fireplaces. Charred seeds and fruits were recovered from these structures and analysed. They revealed broomcorn millet and barley to be the most common finds; small quantities of pulses (e.g. lentil and pea) and wild fruits and nuts (e.g. acorn and hazelnut) were also found. Together, the archaeobotanical assemblage points to the cultivation of several different cereal and pulse crops, and gathering of wild plant resources, in order to secure subsistence of this community.

The evidence from Dobbin fits well into the regional agricultural picture of the time. Archaeobotanical investigations of Younger Bronze Age sites in northern Germany (c. 1100-500 BC) show that the variety of crops and gathered plants used at the time was much wider than in previous periods. The crop spectrum was enriched through the addition of broomcorn millet, various leguminous and oil plants, which were either unknown in the Neolithic and Early Bronze Age or were used only sporadically.

The comparison of Dobbin with the contemporary sites in its proximity, especially the nearby sites of the Lusatian archaeological group, shows similarities in plant economy, which could, therefore, be a result of cultural influences. On the other hand, there are clear differences between Dobbin 27 and more distant sites, even though they all belong to the Nordic Bronze Age cultural phenomenon in northern Germany. This could be due to the distinct ecological niches within the region, particularly in terms of the soil cover.

By comparing the spectrum of crops and gathered plants identified at Dobbin with that documented at other sites within the Nordic Bronze Age and, more specifically, the Lusatian archaeological group, both, cultural as well as environmental factors may have shaped plant production at Dobbin 27.

S35.255

Roman Egypt at the crossroad between agriculture and climate

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History can be defined as the investigation and description of facts chained in a linear succession substantiated by the use and analysis of existing sources, the documentary record. Every fact and event that leaves a trace of itself can be investigated and reconstructed with the help of the historical method. Falling into this category are human facts, but equally eligible for the same processing is everything embodied in an ordered series of moments precisely referable on the basis of evidence. Hence the history of thought, economic and political history, and even climate history.

As extensively pointed out in previous scholarship, alongside natural data (the thickness of tree rings or the evolution of ice sheets), climatic trends can be traced in the historical study of agriculture as a series of precise actions, results, and moments marked by the rhythms and patterns of nature.

This paper is the result of the preliminary analysis conducted as part of the PhD research within the SNSF project “The Roman Egypt Laboratory. Climate Change, Societal Transformations, and the Transition to Late Antiquity” (University of Basel) and aims to define ways and means of using the papyrological material to establish a new consistent data set for the study of climatic trends in Roman Egypt through the analysis of agricultural documentation. With the systemic and careful perusal of the existing material, all variables determined more or less directly and explicitly by the climatic-environmental factor will be categorized and catalogued: dates of sowing and harvesting, prices of staples, numbers, terms and conditions of land transactions, crop yields and shifting from one crop to another, trends in the annual floods of the Nile, and administration of the agricultural land holdings. Ultimate goal of this accurate research is the creation of long chronological sequences of raw data that will allow the identification of trends and patterns of development. Disentangled from any bias resulting from the interaction of other external factors, constantly compared among itself seeking for correspondences and internal concordances, this proven yet new (with respect to papyrology) approach to the historical record will hopefully provide with a brand-new proxies set in the assessment of climate variability in Roman Egypt. The convergence of disciplines, the consilience, is becoming increasingly compelling and desirable.

S35.256

Exploring urban provisioning and environmental exploitation across early cities: isotopic and zooarchaeological evidence for herd management in Archaic Italy

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Increased plant and animal production was essential for the rise and survival of ancient Mediterranean cities. Yet, bioarchaeological research remains largely neglected in scholarship on early Italian urbanism, and little is known about how some of Western Europe's earliest cities marshalled the resources needed to support urban life. In the diverse cultural and environmental landscape of protohistoric Italy, many strategies were likely employed, which shaped – and were shaped by – regional differences in connectivity and mobility rights, land use, economic focus, and social organisation.

This talk presents new results from UrbanHerds, a Humboldt Foundation-funded research project investigating urban supply and environmental exploitation in Archaic Italian cities (c. 600–400 BC) through the lens of animal herding. It compares isotopic and zooarchaeological evidence for pastoral strategies across a suite of Archaic central Italian urban sites. The diversity of these settlements, which differ in their topographic and climatic setting, size, and socio-political importance, allows us to investigate how herding practices were tailored to local environments and shaped by socio-economic pressures. The project is particularly interested in the role of mobility (e.g. transhumance) and its social implications: the tessellated landscape of central Italy offers a diverse array of eco-zones that can be exploited for profit and leveraged as risk mitigation, but access and rights-of-way are a social decision that may be granted or denied.

S35.257

Ex oriente oliva

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The cultivation of the olive tree on the Iberian Peninsula has been historiographically linked specially to the Phoenicians and their expansion throughout the Mediterranean. The supposed arrival of these people in the western Mediterranean has been connected to the appearance there of new animal and plant elements. Thus, the list of Phoenician contributions is long: the donkey, the chicken, the olive and the production of oil, the vine and the production of wine, the fig, the almond, the date palm and a long etcetera. These “culture-bearing” ideas developed within a specific ideological framework, according to the well-known paradigm “Ex oriente lux”, during the first half of the 20th century, in some cases being widely cited until the end of the 20th century. But how much archaeological evidence was offered by the first authors to speak of it? How much archaeological evidence is there anyway of the cultivation of this plant that is endemic to the Iberian Peninsula? In addition to the scarce archaeological data currently available, genetic studies have been added in recent years, contributing new data to the investigation of the already intricate history of the olive tree. This contribution focuses on the study of the olive tree in the Iberian Peninsula, its roots (information provided by the archaeological record) and its branches (new perspectives and the current state of research).

S35.258

Moving on the edge? Early farming among the peripheral communities of Central Europe

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Archaeobotanical studies on farming practices in Neolithic Central Europe have so far implied the same basic farming pattern comprising small-scale, labour-intensive cultivation integrated with small-scale herding. Our archaeobotanical research, however, expanded upon the phenomenon of the secondary colonised regions beyond the loess belt, which were not penetrated by the initial wave of farmers and can be understood as peripheral to the LBK settlement located in fertile Central European lowlands. This contribution attempts to unfold the ways in which peripheral communities possessed a degree of agency in the sense that they could adapt the plant food economy to less favourable conditions of the South Bohemian region (Czech Republic). To follow this objective and investigate the plant economy in South Bohemia in further detail, six Neolithic settlement sites ranging from 5250 to 4600 cal BC have been subjected to a limited excavation, but maximum sampling effort. Here we present the results of plant macrofossil analysis, which was applied 1) to examine whether the crop husbandry in the periphery differs from the core regions; 2) to assess the role of wild plant gathering in the agricultural periphery; and 3) to explore the spatial and temporal diversity in the plant food economy of early farmers in South Bohemia.

P01.29

First results: Suitability of the Chora Plain on Samos (Greece) for ancient agriculture

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Samos is one of the larger islands (circa 476 km²) within the extensive network of islands and islets in the Aegean Sea. On its SE coast, a sanctuary for Hera attracting worshipers from approx. 3,200 BCE to 400 CE, became the monumental Heraion in the 6th century BCE. Several settlement phases around the Heraion are documented since the Middle to Late Chalcolithic (4,500–3,000 BCE). During the Early Bronze Age II to III (circa 2,750 to 2,000 BCE), the settlement adjacent to the Heraion ranked among the largest and earliest in the Aegean region together with Troy and Milet. The 6th and 7th century

BCE mark a peak in Samos' influence and major construction projects on the SE coast of Samos in general.

However, very little is known on how the landscape around the Heraion looked like during these periods and if the ancient Samians could supply themselves with food-crops or trade markets with cash-crops. Here, we present first results of an interdisciplinary study combining sedimentological, geochemical and micropalaeontological analysis on cores and topsoil samples with CORINE data (1990-2018) for Samos.

The Imvrassos river mouth flowing into a shallow gulf dominates the coastal environment until the beginning of the Early Bronze Age II. Layers of both sand and pebbles suggest a dynamic riverbed. Silty sediment and a higher micropalaeontological diversity point towards a freshwater to brackish lagoon silting up until 1550-1630 CE. Since then, the lagoon was likely choked and separated from the coastline showing freshwater conditions. After 1957 CE, the coastal environment becomes marshy influenced by seasonal changes in water availability.

The analysis of CORINE data shows that approx. 40 % of Samos are dedicated to crop production since 1990 CE. While this percentage remains stable, the area dedicated to olive production has almost tripled during this period. This recent strategy towards a single cash-crop appears unlinked to the soil quality and uses areas typically suitable for food-crops. Ancient Samians may have applied a similar cash-crop strategy combined with fields in Anatolia for food-crops. Further investigation aims to assess these strategies potentials in regards to food-security.

S36: Tellscape: New insights into the human multiple land-use and impact on the environment in the European Neolithic

Over time, different researchers formulated many ideas, theories, and assumptions about tell settlements, starting with a simple technical observation about location, stratigraphic succession, houses organization in the settlement area, etc. and ending with their symbolic value. Based on this dominant type of settlement, the entire land-use model of communities from the 6th- 5th millennia BC in the target area was defined as having a central point the tells, as the primary form of habitation, accompanied by some flat-settlements (not so many compared with tells, and almost always considered as temporal or secondary habitations). Additionally, some areas separated from the settlements used for burying the dead (cemeteries), water sources, and settlement surrounding landscape used for agriculture, animal husbandry, fishing, hunting and gathering, and procurement of other resources (raw materials) complemented the tells. However, the tell settlements are unique archives of human fingerprints and environmental processes, which can help us better understand the tangled realities of the past.

Our session will investigate the complex interface between the environmental, biological, anthropogenic, behavioural, and cultural factors that shaped the rise, evolution, and development of the tellscape in the European Neolithic. We invite papers on topics such as (but not limited to):

- The temporal dimension of the tell settlements –chronological framework of the tell sites, and to highlight their anteriority, posteriority, or contemporary relationships between them
- The regional dimension of the tell settlements – aims to set up the geographical distribution of the sites and their relationship with different landscapes and water sources
- The local dimension of the tell settlements – aims to identify the controlled territory by specific sites and set up the particular or common natural resources exploitation model (paleoenvironmental data) of different communities
- The community dimension of the tell settlements – aims to set up the internal organization of buildings in the settlements, but also to compare this model at different level types of habitations (e.g., tells, flat, or off-tell settlements, in order to identify the relatedness of these communities)
- The personal dimension of the tell settlements – it aims to set up the demographic realities of the past population (e.g., cemeteries vs. households from settlements, people origins and movement)

Overall, the goal is to bring together a variety of investigations that address the question of how environment, society, and ideology have shaped the tellscape.

S36.261

Szegvár-Tűzköves: Internal structure of a Late Neolithic stratified settlement in the southern Tisza region

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The site of Szegvár-Tűzköves is one of the key Late Neolithic stratified settlements of the early fifth millennium BCE in the Tisza region. In line with the period's scholarly interests, the unique and aesthetically pleasing human figurines and face pots garnered far greater attention than the archaeological assemblages brought to light.

The topography of the Szegvár settlement had changed immensely owing to the earth-moving and construction activities on the site, to the extent that no one undertook the task of even attempting to reconstruct its original condition. Following the previous research activities in 2020 and 2021, we conducted an extensive magnetometer survey of the site with the support of the Romano-Germanic Commission of the German Archaeological Institute. The survey revealed that despite the destroyed parts and the areas covered by stalls, the extent of the one-time settlement can be accurately determined, as can its spatial organization. The surveys demonstrated that Szegvár-Tűzköves covered an area of roughly 32 hectares, far more than the earlier estimate of 11 hectares, the implication being that the settlement has not been wholly destroyed. The magnetogram indicated that the settlement was ringed by multiple enclosure systems, the ditches enclosed a roughly 800 m long and 400 m wide elliptical area. Various features could be identified among the magnetic anomalies, rectangular house plans among them, whose number totalled between 110 and 120.

Although the rectangular houses were aligned in different directions, they were all oriented towards the central lakefront area, suggesting that the settlement's internal layout was based on a centripetal spatial organization. At the same time, a Kernel density estimate of the houses identified at Szegvár indicated an arrangement into several clusters. Our investigations and the information from latest fieldwork have furnished conclusive evidence that the Szegvár-Tűzköves settlement was structured both horizontally and vertically and that this configuration was in constant change during the life-span of the settlement. The systematic geoarchaeological surveys have provided a preliminary picture of the settlement's stratigraphy and the layout of its features.

S36.262

Tell life and climate change at the 4.5-4.2 cal BC climatic transition in the Carpathian Basin: insights from paleoclimate and paleovegetation records

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Climate modelling results from the Community Climate System Model (CCSM3), biological and isotope proxy derived quantitative climate reconstructions from the Carpathian Basin (CB) and various other climate proxy records demonstrate that at the Neolithic onset (~6000 cal BC) a stepwise increase in annual rainfall, a small decrease in summer mean temperatures and an increase in winter mean air temperatures took place relative to the Early Holocene. These dynamic changes overall suggest that the major factor that helped the northward spread of arable farming at the Neolithic onset was winter warming, which supported the success of autumn sowing. After the flourishing of Neolithic cultures in the CB, a relatively abrupt, and time-transgressive tell abandonment and settlement dispersion can be observed around 4500 cal BC. Coinciding with these Late Neolithic tell abandonments in E Hungary and N Serbia, chironomid-based T_{July} reconstructions show a ~2 °C decrease in July mean temperatures (1 °C without the 4.75 BC peak), while pollen compositional and biome changes demonstrate considerable terrestrial vegetation change: onset of hornbeam pollen increase in the east and hornbeam-beech in the west of the CB, wetland pollen compositional change, further increase in oak and decline in hazel at some sites. All these corroborate the onset of a macroclimate-driven vegetation reorganization in the CB.

In addition, if we compare these results with the lake-level record of the Jura Mountains, the northern French Pre-Alps and the Swiss Plateau, these show the onset of 3 high lake-level periods, the first of which starts at ~4450 cal BC. These were explained by ocean circulation changes and the consequent displacement of Atlantic Westerly Jet, which determines the latitudinal extension of the Hadley cell and the mid-latitude storm tracks, to more Central European latitudes that increased rainfall in these areas. Phases of higher lake level coincided with an increase in annual precipitation, a decrease in summer temperature and a shortening of the growing season in this area.

In this presentation we will show examples from E Hungarian pollen, wood charcoal and carpological records, biome and climate simulation maps about this transitional period and examine possible linkages between the time-transgressive abandonment of tells and the ongoing ecosystem reorganization at that time.

S36.263

Opovo Ugar-Bajbuk (Serbia) - New results and a reevaluation of a multi-phase site of the Vinča culture

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The Late Neolithic settlement of Opovo Ugar-Bajbuk was discovered in the 1960s. It became known in the archaeological community after the excavations of an American-Yugoslav team in the 1980s led by Ruth Tringham. Interpretations of the site evolved over the years, shaping the image of a provincial Vinča culture village with an emphasis on trade goods and economic features that show links to the Tisza culture, such as a high proportion of hunted animals.

Recently, a team from the Christian-Albrechts-University Kiel, in cooperation with the National Museum of Pančevo and the Museum of Vojvodina in Novi Sad, conducted a geomagnetic survey, fieldwalking and a drilling survey. The results show a medium-sized settlement with a structured and organized settlement layout consisting of several ditches. This allows for a reevaluation of the site and its position within the settlement network of the Vinča and Tisza cultures. In this presentation, the new results will be presented and set into relation to the previous work at the site. Especially questions of demography and settlement organization are in the focus of the talk.

S36.264

Enclosing the Neolithic Tells in Pelagonia: inhabiting and maintaining the agricultural settlements next to wetlands

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For more than a century tells have been studied by a number of specialists and an abundance of perspectives for the spatial organization, social dynamism, economic setting and ideological notion of these specific settlements have been proposed. However, the tells were rarely studied in relation to wetlands in whose vicinity they were most often established (Alexakis et al. 2011; Ayala et al. 2017; Naumov 2018). Their natural surrounding had a crucial role in the decision for inhabiting and continuously occupying particular space that resulted in rebuilding the dwellings within one encompassed unit. This was furthermore enhanced by the enclosures in the border area of tells that were set to outline

and define the perimeter of the settlement. In order to understand the ditching of tells it is necessary to understand the environment where they were founded as well as the social, economic and symbolic paradigms of their inhabitants. Therefore this paper will consider the valley of Pelagonia a region in the Balkans where there is a high density of tells disposed around wetlands (Naumov 2016; Simoska and Sanev 1976). The multidisciplinary study of these tells in the past ten years have provided more thorough knowledge on the first farmers that settled this specific landscape. Their establishment in the second half of the 7th millennium BC initially started with ditched enclosures that could have societal and ideological background intertwined with the practical purpose. The ditches encompassing the tells are not uniform, but they can be different in shape (round, elliptical or quadrangular), number (from 1 to 13), content (soil, pottery, daub or bone remains) etc. As a result of their variety and complexity this paper will emphasize a diversity of prospects for understanding this spatial demarcation of the Neolithic tells in the Balkans.

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S36.265

Abandonment, Destruction or Closer? What (actually) happens at the end of the life cycle of a tell settlement?

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Over time, different researchers formulated many ideas, theories, and assumptions about Neolithic tell settlements, sometimes starting with simple technical observations about location, dimensions, stratigraphic succession, house architecture and organization in the living area, economic cores, networks, etc., and ending with their symbolic value. However, the attempts to define the Neolithic tellscape phenomenon have mainly concentrated on the role, meaning and way of development of tell settlements, the adaptation and transformation of human communities, with a particular focus on the moment of their rise and end.

Regarding the end of the use of these anthropic mounds, we note that the available data are not so frequent, and the complex processes underlying the interruption of the use of these settlements are most often treated in a generalizing manner.

Starting from this know-how, taking in consideration post-depositional processes, and based on some observations made in some Southeastern Romania tell monuments (e.g., Sultana, Chiselet, Bucşani, Taşaul, etc.) belonging to the Gumelnita culture, in this paper, we propose a diachronic approach to the investigation of 'last sequences' of human occupation from the tells, belonging to those who built/use the respective settlements (Neolithic people), not to later populations that reuse them randomly (e.g., Bronze age, antiquity, migration period, etc.).

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40 years later...our settlement has "grown". Recent excavations and geophysical surveys in the neolithic tell-like settlement from Chişoda, southwestern Romania.

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The Neolithic tell-like settlement from Chişoda-Livezi is located in the lowlands of the Banat region, present-day Romania, in the Timiş-Bega rivers interfluve.

The first archaeological investigations of the site were conducted between 1977-1980. They revealed three phases of habitations comprising 2 m of archaeological stratigraphy, which were attributed to the phase C of the Vinča culture. Later on, in 2011, systematic field surveys and topographic measurements concluded that the settlement site covered an area of around 22,6 ha.

In 2021 and 2022 real-estate development prompted the start of a rescue excavation targeting the northwestern periphery of the neolithic settlement.

The excavated surface covered around 4800 sq. meters and unearthed over 700 archaeological features attributed to the

Neolithic period, which revealed an interesting dynamic in the evolution of the site. Thus, our excavation managed to uncover all 6 of the ditches that encircled the settlement (5 of which were also visible on the geophysics). The stratigraphic relations between the ditches and other archaeological features illustrated the constant contraction and expansion of the settlement from Chișoda. Therefore, by analyzing the stratigraphical context of the ditches alone, we were able to determine 5 phases of evolution. The overlapping of different types of features like postholes from houses or ancillary buildings and clay extraction pits or funerary contexts also showed us that the inhabitants from the neolithic settlement from Chișoda used this area for different purposes throughout the evolution of the settlement.

Additional to the rescue excavation, some roughly 22 ha of the settlement were mapped by magnetic prospections. For this endeavor, a 5 sensor SENSYS MXPDA magnetometer, with a sensor spacing of 0.5 m was used. The magnetogram revealed a complex and diverse pattern of a well-preserved neolithic settlement enclosed by several (5) ditches, which covers an area far larger than previously assumed. In addition, numerous archaeological features that are probably part of a previously unknown *satellite settlement* were identified to the south, which further emphasizes the complex evolution of the community from Chișoda.

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Plant consumption in late Gumelnița culture at Geangoești- *Hulă* tell (Southern Romania)

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Geangoești-*Hulă* is a multi-stratified archaeological site, a *tell*, at the base of the Sub-Carpathian hills, along the Dâmbovița River. The settlement covers a long period of time, from Boian culture, Vidra phase to some cultural aspects, posterior to Gumelnița culture. In 2015 a new archaeological research project centred on this Eneolithic site started and from 2018 the southern half of the settlement was opened for excavation. In the 600 square metres excavated surface, several late Gumelnița burned houses, not all of them contemporaneous, a waste area, pits and ditches were investigated.

The research has foreseen from the very beginning a strategy of systematic sediments sampling for flotation and wet sieving. As well, for the vessels found *in situ* special sampling protocols were implemented. Likewise, a great deal of botanical material was uncovered, such as plant fibres, cords, charcoal, and seeds.

This presentation will focus on this new archaeobotanical material, found in a multitude of features. Many of the samples were discovered inside several houses, in pots or on the floor, others come from pits or occupational layers. This study of plant remains from Geangoești-*Hulă* will highlight the main crop species used and will also connect the plant preferences with changes in human consumption that occurred during the late Eneolithic in Southern Romania.

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Ghost-like monuments. A review of the Eneolithic tell sites in the proximity of Bucharest

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This study aims an update of the actual situation of the Eneolithic tell sites situated in the proximity of Bucharest. There are five tells, known in the archaeological literature as Chitila-Fermă, Măgurele-Movila Filipescu, Măgura Jilavei, Vidra-Măgura Jidovilor and Glina-La Nuci. Intrusive archaeological research, started in the first half of the past century, affected them to different extents, while the resulting publications helped for the understanding of human communities that lived in the Bucharest area during the fifth millennium BC. Except Măgura Jilavei, the remaining four sites were classified as historical monuments of national and universal value, and thus protected by national and international laws. But recent field surveys on each of these sites suggest that the tells around Bucharest are actually „ghost-like monuments”, almost invisible in the landscape: damaged, flattened, agriculturally worked or covered by vegetation and/or garbage. The analysis proposed in this paper involves, on one hand, the research of documentary archives regarding the archaeological excavations carried out over time, and on the other hand, presenting the results of 3D data acquisition for UAV-based mapping of each tell and its surroundings. Based on these, we will discuss the preservation state of the sites, the interpretations of acquired data, future prospections and research strategies.

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Tell from the past. Măriuța-La Movilă: a Chalcolithic *tell* settlement from South-East Romania.

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The Chalcolithic *tell* settlement Măriuța-La Movilă is situated on the right bank of the Mostiștea River, in South-East Romania, at approximately 200 meters north-west of the village Măriuța, Gostilele Commune, Călărași County. From a chrono-cultural perspective, this settlement is part of a large techno-cultural complex that occupied the Balkans area throughout the second half of the fifth millennium BC, well-known in the literature as Kodjadermen-Gumelnița-Karonovo VI.

Although the archaeological site of Măriuța was identified during the 1960s, rescue excavations here began in 1984 and continued until 1990, as part of a land development project that involved the course of the Mostiștea River. Afterward, in the year 2000, the excavations were resumed (and are presently continuing) by a team from the Lower Danube Museum of Călărași. They adopted a systematic and multi-disciplinary approach for the research, which was to be undertaken over the years, in collaboration with the National Museum of Romanian History and with the Research Institute of the University of Bucharest.

Along with the research history involving this Chalcolithic settlement from South-East Europe, the current presentation will describe the chronology, geomorphology, stratigraphy, and topography of the *tell* in connection with the most relevant archaeological finds, based on their context.

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S36.270

Digging in the archives: the *tell* settlements of Măriuța and Șeinoiu, southern Romania

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The *tell* settlements of Măriuța and Șeinoiu were both subject of rescue excavations made in the 80s. The wider context was the intention of the Institute of Land Improvements to develop the Mostiștea Valley for irrigation. Many archaeological sites and current localities were to be flooded by the rising water level. The survey made in the 70s (re) identified many archaeological sites in the Mostiștea Valley including seven Gumelnița *tell* settlements (Măriuța-La Movilă, Șeinoiu-Movila din cimitir, Măgureni, Vlădiceasca-Ghergălăul Mare, Vlădiceasca-Ghergălăul Mic, Sultana-Malu Roșu, Chiselet-Măgura Fundeanca). The settlements of Măriuța and Șeinoiu were in danger to be destroyed in order to use the earth for nearby roads and bridges. In this context, extensive archaeological excavation were made in both sites by Mihai Șimon (first as a school teacher, then as a researcher at the Institute of Archaeology in Bucharest). We found a rich documentary material in the Institute's archives (field notes, drawings, archaeological reports) only partially published due to the unexpected death of Mihai Șimon in the early 90s. In this contribution we expose this data to the public as a tribute to hard work and ethics of Mihai Șimon in saving this archaeological site from destruction.

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Burials from the Late Neolithic tell settlement of Polgár-Csőszhalom, NE Hungary

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Polgár-Csőszhalom is one of the most significant Late Neolithic settlements in Northeastern Hungary. The settlement complex is composed of different structural units: a ca. 65 ha large single layer settlement, a tell and the surrounding multiditch enclosure system with four entrances, and another enclosure composed of two ditches ca. 180 meters southwest of the tell. The Csőszhalom tell of this complex represents the northernmost distribution of this settlement form in Europe. The settlement mound was not simply a residential area but an arena for communal events with a unique choreography. The significance and the role of the site complex was recently discussed in detail (Raczky 2018; 2019).

In our presentation we focus on the 21 burials of the tell. In 1957 seven burials were uncovered, of which six can be securely associated with the lowermost occupation level (Bánffy and Bognár-Kutzián 2007). Another 14 burials were excavated during subsequent campaigns between 1989 and 1994 (Raczky and Anders 2017).

Obviously, this number is not representative of the community that once lived here and the enormous amount of work that went into the various ritual activities (building and deliberate burning of houses, the continuous expansion of the enclosure system), performances, feasting and burials – and many others. But then, who were they? What do we know about their lives and deaths? What can we learn about the objects they placed next to them? Were they special or common in the context of the site complex? Where were they located in space and what were their temporal relationships?

What was the dynamic of their burial, was it linked to other ritual activities? To answer these questions, in addition to archaeological interpretation, we use the results of the latest analyses of physical anthropology, 14C dating, isotopic chemistry, provenance studies and use-wear analysis.

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S36.272

Land and water-use in the Gumelnița site (5th millennium BC, Romania): a study on stable isotopes

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The Kodjadermen-Gumelnita-Karanovo VI civilization occupied the Balkan area in the second half of 5th millennium BC. The Gumelnița site (also known as “Măgura Gumelnița” or “Măgura Calomfirescu”) is probably the biggest tell settlement north of the Danube and is located in the northern area of the Balkan region, in the southeast of Romania.

The site is situated between the left banks of the Danube River floodplain, immediately south of the confluence area of the Argeș River. The site consists of a tell-settlement and an adjacent cemetery area where 10 skeletons were excavated in the 60s and 20 graves and two pits with human bones were found in the archaeological campaigns from 2017 to 2022, with radiocarbon dates ranging from 4448 ± 10 to 4360 ± 42 Cal BC.

33 females and males of different ages have been analysed isotopically ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$, $\delta^{18}\text{O}$), beside domestic animals (cattle, sheep, goats, dogs and pigs), wild terrestrial mammals (auroch, roe deer, red deer, horse, hare, wild boar, red fox), semiaquatic animals (beaver and pond turtle), freshwater animals (common carp, catfish and freshwater mussels) to investigate the paleodiet and mobility of this population. To know the management of the crops and other wild plants, we analysed charred seeds ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$).

The isotopic results indicate that crops, especially legumes, were actively fertilised with manure, perhaps cow dung, as cows were reared locally. Plant protein accounted for at least 50% of the people’s diet. Between 20-30% of the diet consisted of aquatic resources, followed by game and domestic animals. The fact that domestic animals were not a part of the daily diet of the Gumelnița people shows their importance for the production of other resources such as manure, milk, wool, labour power, etc...

The $\delta^{18}\text{O}$ values of the individuals in their last years of life suggest that the Argeș and Danube rivers were the main sources of drinking water. It is also noted that some of the inhabitants and their dogs would have made annual displacements with the sheep. There is more variation in the sources of drinking water in the early life of these people, with values pointing foreign origin.

All these data suggest that Gumelnița was built to maximise the use of natural resources as well as to maintain agriculture and livestock farming.

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Plant economy during the Kodjadermen-Gumelnița-Karanovo VI culture in the Lower Danube Valley (South Romania)

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Plant remains are frequently found in many archaeological sites from the fifth millennium BC. They are a key component of understanding how Eneolithic communities survived and thrived. From weeds to shrubs that are gathered for dietary needs to construction and even medicine, the peoples of Kodjadermen-Gumelnița-Karanovo VI understood their surroundings. Even though, the plant consumption was based on crop species such as wheats, barley and various legumes (lentil, pea and bitter vetch) (Cârciumaru, 1996, p. 140-141), many more wild species were used as foods. The tell settlements of Gumelnița-Măgura Calomfirești and Sultana-Malu Roșu will be the focus of our study. By using different proxies (pollen, charcoal, seeds and fruits, isotope analysis and geometric morphometric) we will compare the data to understand the myriad of uses that different plant species had in the northern part of the Lower Danube Plain. Our main interest is to determine how much the communities of Gumelnița-Măgura Calomfirești and Sultana-Malu Roșu relied on wild plant species compared to plant crops.

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Tell-ing the story of genesis. 100 years of Sultana-Malu Roșu

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1923 was the first year of archeological investigation in the tell settlement of Sultana-Malu Roșu. That excavation was the first investigation of a Gumelnița tell settlement in Romania conducted by Ioan Andrieșescu and his assistant Vladimir Dumitrescu. Next year Dumitrescu was sent to Gumelnița tell to do research and he referred to his finds there as Sultana-type materials. This presentation is about the story of this site that inspired generations after generation of prehistoric archeologist. We will explore its history, structure, stratigraphy, chronology, architecture and internal organization. All of these data is going to be linked with available archeo-zoological and archeo-botanical information but anthropological data from the nearby necropolis. Material Culture will be briefly discussed. In the end we are going to emphasize the role of new available data in completing the story of a settlement that is connecting the Danube valley with the inner Romanian plane through Mostiștea River.

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Environmental changes and human activities in the vicinities of a Late Neolithic archaeological hot-spot (Sultana) in South Romania: A multi proxy approach

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The *tell* settlement from Sultana-Malu Roșu (Mostiștea Valley, Southern Romania) is archaeologically documented as one of the most important from the Kodjadermen Gumelnița-Karanovo VI culture, flourishing between late 5th – early 4th millennia BC.

A multi-proxy palaeoenvironmental study (pollen, non-pollen palynomorphs, charcoal particles, grain size, geochemistry) using a borehole sampled in the Mostiștea floodplain marsh sediments (5 km from the Sultana tell) was undertaken to trace environmental change, human activities related to woodland clearance, fire activity and past land-use during the last 7000 years in the region. The results of this study combined with archaeological data allowed a high-resolution human palaeoecological scenario to be reconstructed revealing three main phases covering: i) most of the Boian and Gumelnița cultures, ii) the Mid-late Bronze Age and iii) a more abrupt phase, in terms of human disturbance, for the last 1500 years. Sediment dynamics involved in the development of the study site influenced the composition of the proxies, reflected especially in the contraposition between the organic peaty layers formed at local level and the mineral rich sediments transported by erosive processes in the layers belonging to the Boian and first phase of the Gumelnița occupations.

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Lake Sediments from near tell Sultana and tell Chiselet in Romania as keys to transformations in Chalcolithic times

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During field campaigns two 6 m percussion drillings were performed, the first in the Moististea Lake in front of the tell Sultana and the second in the Danube floodplain at tell Chiselet.

According to the initial 14C data, the sediment of the lowest meter from the core of Lake Moististea could cover the time when Tell Sultana was occupied during the Chalcolithic.

These sediments show good preservation of pollen and non-pollen palynomorphs (NPP). Detailed palynological analyses are planned and additional dating is needed for a robust age-depth model. The results of both will be presented during the conference.

The terrestrial core from the Danube floodplain contains lake sediments as well buried by a c. 5.50 thick Danube alluvial sediment cover. Pollen analyses will be conducted here to assess the quality of the archive before drilling deeper to get a comparison archive to the Moististea Lake to identify climate and environmental based similarities and possible man-made site-specific characteristics in landscape development. Within the so far available uppermost part of the clayish lake sediments, sandy layers are embedded, before river sediments buried the lake sediment sequence. The associated environmental change could give hints to the observed societal transformation (abandonment).

Complementary analyses of the sediment cores include geophysical and geochemical measurements (water content, bulk density, magnetic properties, xrf scans, carbon and nitrogen content). From this data set, paleolimnological information can be derived that allows reconstruction of Holocene lake and environmental evolution

Sultana *Malu Roșu* cemetery (Romania): A (bio)archaeological overlook

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The Sultana *Malu Roșu* archaeological site (c. 5000-4000 cal. BC) is among the most critical sites corresponding to the Gumelnița culture. It is located in the South-Eastern part of Romania, in the Romanian Plain, Mostiștea Valley, 15 km from the Danube River. The site is divided into a tell and its cemetery pair. On the terrace, more or less in the same area of the cemetery, an off-tell settlement was identified, and in the western limit of the terrace is documented a flat settlement. Generally, all these locations were used by members of the Gumelnița and Boian communities. In addition, post-Neolithic has documented some graves that belong to Cernavodă III people and Bronze Age. More than 200 ¹⁴C dates chronologically secure the investigated features.

The first archaeological research at Sultana was carried out almost 100 years ago. Currently, the site is being investigated in a large interdisciplinary project, *The dynamics of the prehistoric communities located in the Mostiștea Valley and Danube Plain*, which brings together specialists from Romania, Germany and Belgium.

The cemetery was identified in 2006, and since then, it has been investigated every year until now. It is located on the high terrace and slopes, near the tell settlement, sharing the same zone with an off-tell settlement. Currently, our team is investigating 109 burials belonging to the Boian-Gumelnița population. Thus, following the archaeological research organized within the 2022 campaign, three new Eneolithic graves were discovered in the cemetery sector, in a loess level. Anthropological studies carried out on the individuals discovered in the Sultana *Malu Roșu* cemetery mainly focused on the details regarding this population's demographic profile and the individuals' pathological background. However, in the last few years, different actions have been starting to include isotopic and archaeogenetic studies, in addition to "classic" anthropological analyses. Each of the parameters of such an analysis, as well as the connection between individuals in correlation with the funeral treatment applied to the deceased, can help to build an overall perspective of the collective image corresponding to this community. Therefore, the anthropological data will be correlated with archaeological, radiocarbon, isotopic, and genetic available information.

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Versatile dimension of the shell adornments: perforated *Lithoglyphus naticoides* from the Sultana-Malu Roșu tell settlement and cemetery (Romania)

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The Sultana-*Malu Roșu* (Romania) site includes two settlements: a flat settlement belonging to the Boian-Maritsa-Karanovo V cultural complex and a tell settlement belonging to the Kodjadermen-Gumelnița-Karanovo VI cultural complex (5th millennia BC) that used the same necropolis. In the tell settlement but especially in the necropolis, a varied range of ornaments was discovered in terms of raw materials and morphology. What caught our attention was a significant difference in the composition of the ornaments between the tell settlement and the necropolis. Processed ornaments starting from exotic materials were deposited in the necropolis (*Spondylus*, *Antalis*, marble, malachite) and transformed mainly into tubular, fusiform or cylindrical beads. When they appear in the tell settlement, these exotic raw materials are generally about to be recycled (fractured bracelets). Cylindrical beads made of *Unio* sp. shell or bone pendants are present in the tell settlement. Differently, the perforated shells of the *Lithoglyphus naticoides* gastropod do not fit into this pattern, being present in both the necropolis and the tell settlement. Therefore, in our presentation, we tried to investigate the symbolic value of these perforated shells for the community's inhabitants from Sultana-*Malu Roșu* since they have an intermediary position. Our interpretative construction was also based on an experimental program through which we tried to reconstruct the acquisition of the raw material, the techniques of perforating the shells, and the modalities of suspended in the composed adornments, following the evolution of the usewear along various time intervals. In this way, we were able to answer some critical questions: if these ornaments show usewear, having been worn before being placed in the grave or if they were made to constitute a funeral inventory; if they were worn, what was the suspension system; and if we can estimate the time interval during they were worn, etc.

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Life in the floodplain: Multidisciplinary research on the Copper Age Tell Chiselet in the Lower Danube Basin

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In the 5th millennium BCE, Copper Age settlement landscapes developed in the valley of the lower Danube and its tributaries, within those impressive tells, adjacent flat settlements and extensive cemeteries became focal points of human communities. Differences in the location of tells in the landscape and the size of these settlements suggest a complex settlement system with different economical foci and communities sizes. Within a Romanian-Belgian-German cooperation, multidisciplinary investigations are being carried out at Tell Chiselet, which is characterised by its location deep in the floodplain of the Danube in the Călărași county. In our paper we will present new data on geophysical, geoarchaeological, archaeozoological, archaeobotanical and archaeological investigations at this tell and its surroundings. As a contribution to the further multidisciplinary discussion on impact and land use in the surroundings of this settlement mound, we are able to reconstruct and contextualise duration, community size, settlement behaviour, and sedimentation history of this settlement.

S36.280

Geophysical multimethod investigations of a tell near Chiselet (Romania)

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Due to their size, topography and heterogeneity, tell settlements are challenging targets in the field of archaeological prospection, since traditional geophysical prospection methods are often limited by penetration depth or resolution. Since Seismic full-waveform inversion (FWI) has been proven as promising method to overcome these issues, we integrate FWI in our multi-method approach for geophysical prospection of heterogeneous stratified archaeological targets like burial or settlement mounds. For a case study we performed measurements at Chalcolithic tells in the lower Danube basin near Chiselet (Romania). Aim of the investigation was to reconstruct stratigraphic units of different settlement phases, to identify archaeological features like house remains, pits and trenches and to analyze the relation between tell and the surrounding plaeolandscape. Therefore we combine hammer impact shear wave seismics along parallel and crossing profiles at the tell top and its flanks with other geophysical methods including geomagnetic mapping, electrical resistivity tomography (ERT) and down-hole measurements of magnetic susceptibility. The seismic data was analyzed using two-dimensional, (visco-) elastic FWI in time-domain based on the inversion of dispersive Love- and refracted SH-waves. To enhance and verify interpretation, the results are compared to results from drilling cores and small-scale excavations. The results of seismic FWI show several horizontal layers of alternating high and low velocities, while the layer boundaries correlate with peaks of increased magnetic susceptibility in 1D - depth curves. Furthermore a significant correlation between anomalies of increased seismic shear wave velocity and magnetic anomalies of burned house remains is observable. The positive anomalies of the magnetic field and the magnetic susceptibility can be related to settlement layers known from coring and excavation. At current state of investigation it remains open, whether the high shear wave velocities are caused by consolidated leveling layers or by massive layers of house remains and ceramics, which could be identified in a small test excavation trench. On a further profile at the tell flank and the surrounding plane anomalies of seismic velocity and electric resistivity may refer to a former paleochannel and its erosional impact to the tell flank.

Examining Mobility and Land Use in the Mostiștea River Valley, Romania during the Eneolithic through Strontium Isotopic Analyses of Plants and Human Tooth Enamel

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Numerous material evidence indicate that the Eneolithic communities inhabiting the tell settlements of the Mostiștea River Valley, Romania were fully integrated into a vivid trade network that encompassed most of Southern Romania and Bulgaria. However, the question of whether this phenomenon consisted solely of an exchange of goods and ideas or if it also corresponded to an increase in mobility of individuals among the different social groups is still debated. Strontium isotopic analysis of human tooth enamel provides us with direct evidence regarding the extent of mobility during the period. The interpretation of the results obtained on the human material is enhanced by the analysis of contemporary plants at several locations, which constitutes a baseline for the bioavailable strontium at a regional level. In addition, these data offer some valuable insights into land use around the tell settlements.

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S37: Why do people discard? Questioning the relationship between valuation and behaviour

Trash and waste are among the major global challenges currently faced by mankind. It seems obvious that there is a connection between the material prosperity of a society and the amount of waste it they produce. A rethinking process is only slowly beginning, and initiatives to reduce waste are often accompanied by a trend toward reducing consumption, requirements that struggle to achieve a broad social acceptance. Is it possible to trace such a connection in past societies? The session will look at the roots of these developments. Trash as a category is first and foremost an attribution closely linked to value systems and ideologies. It is created by valorization or devaluation, by sorting out and exclusion. These processes are not limited to materiality, but also take effect in social contexts and can even be transferred to people.

What connections can be recognized between the handling of objects and ideological concepts? Do the depositional practices of a past society reflect its standards of valuation? What criteria can be used to determine the value of an object (or subject) in archaeological findings? In this respect, self-reflection also matters. Public perception differs from the scientific approach. In popular opinion, archaeology is about finding treasures, but scientific archaeology is mainly about understanding rubbish.

Inevitable by-products of human activities, from slag to food crust or coprolites, have a value as a source of information about human behavior. The same is true for caches of raw material or valuable artifacts like weapons that can be seen as intentional wastage of goods, a way of eliminating surplus wealth in order to justify continued coercion and extraction. We want to focus on the everyday objects between debitage and treasure. Can a valid attribution of value in past societies be derived from the way they are handled and deposited? What does this tell us about the prosperity of the related society?

S37.281

Individual experience and emotional closeness: Archaeologists' valuation of encountered objects

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Psychology, economy, religion, society, and environment (geology, climate, flora, and fauna) are all interrelated with material culture ([1]) and shape human behaviour. Consequently, in order to judge ancient people's valuation of objects and understand patterns of discard, we have to consider all cultural aspects and subsystems. It is not only the public that usually values ancient finds in an economic sense and admires treasure items, but the similar behaviour archaeologists themselves express. Such a professional attitude is inherited partly from the collectors' and cultural-historical periods when objects were appreciated in aesthetic terms. Partly it comes from the processual archaeology when the research was mainly focused on the economy of past communities and societies. By phenomenological approach, I analyse the archaeologists' behaviour when encountering past remains, when unearthing and studying things. The individual's level of experience and the field of expertise (i.e., the amount and the nature of the acquired knowledge on certain types of material) determine his judgment of objects and consequent treatment. Case studies reveal differences and similarities in laic and expert's valuation of things and point to the importance of another dimension in the judging process. The individual's opportunity to realise physical closeness to evaluated objects (to look at, to touch, or even to possess) and possibly create an emotional attachment to them (cf. [2]) also influence the patterns of their keeping and discarding. We can use the same criteria for reconstructing past people's actions and their evaluation of the surrounding materiality.

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S37.282

There's something about the fragments... Fragmented objects in graves as a special form of discard

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Objects in graves are typically interpreted as grave goods, given to the deceased by the mourners. In Prehistoric Archaeology, they are usually understood as the material expression of the social status or biographical aspects of the deceased, especially in terms of hierarchies, rulership, wealth and power. Therefore, a certain ›value‹ is ascribed to grave goods, even if they are (old) broken, incomplete or fragmented. Especially the latter are often seen in the sense of a *pars pro toto* – a part for the whole. In fact, there are nuanced readings of these incomplete objects. In terms of John Chapman's fragmentation concept (Chapman 2000; cf. Chapman – Gaydarska 2007), they serve to enchain places and people. Their

›value‹ thus lies particularly in their role of creating interpersonal relationship by the way they are handled and less in the objects themselves – fragmentation as the deliberate dissolution of completeness in this sense can be understood as a means of distinction and valuation or valorisation.

In my presentation I would like to introduce selected examples and try to discuss notions of value of objects in graves – in particular of those that would be called ›waste‹ outside of graves contexts due to their fragmented nature. They can be conceptualised as a special form of discard. Following this line of thought, the question arises as to the heuristic potential of loosening the boundaries of our source groups, for graves, settlements, non-sepulchral ritual sites and depositions are closely interwoven – through practices.

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S37.283

Buried or discarded? The deposition of human remains in settlements at the Early Bronze Age site of Ulrichskirchen, Austria

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Can a burial context give us enough information about the value of a human being to society? Placing bodies not only in graves within cemeteries, but also in settlement pits, is a recurrent practice during the Early Bronze Age Únětice Culture – for instance at the site of Ulrichskirchen in Lower Austria. The truism “the dead don’t burry themselves”, the notion that human activities we see in funerary contexts are the behaviour of the living, raises the question why some people were buried in a feature specifically built with the sole purpose of an inhumation, while others were placed in former storage pits alongside waste deposits, with heavily varying amounts of care and significant differences in the funerary rites. Since the handling of human remains reflects the human behaviour towards the dead, the depositional practices of the living give insights into how individuals and their corpses were valued after death. Is the human body an object of high value or trash that must be taken care of? For whom might human remains be of value and why? If a body is not buried according to the norm, has that person necessarily been excluded or devaluated by other members of society? The intentions of the settlement burials might become clearer by combining different lines of evidence, including the analysis of the archaeological features and materials within the depositions, the osteological analysis of the human remains, C14 dating and applying ancient DNA analysis to understand genetic relatedness to other members of the Bronze Age society.

S37.284

Trash or Votive – The high complexity of depositional contents in the extra-urban sanctuary of S. Anna (Agrigent)

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The extra-urban sanctuary of S. Anna is located on a hill overlooking the urban temples of ancient Akragas in Sicily. Excavations began in the 1960s under the direction of Graziella Fiorentini and resumed in 2014 under the direction of Prof. Dr. Natascha Sojc (University of Augsburg). Based on the archaeological record, the sanctuary could be dated to the end of the 6th to the beginning of the 4th century BC. The numerous depositions found here are already present just a few centimeters below the surface in a very good state of preservation and can often be seen in a spatial as well as chronological context.

The objects originally usually entered the sanctuary as a sacrifice or votive offering, but also as cult device and accessories for ritual feasts such as tableware, and were deposited after their primary ritual use, as they had to remain in the sanctuary.

The examination of the depositions reveals, on the one hand, often recurring patterns, but on the other hand also clearly distinguishable details. For even if the various actions and objects often recur, their different possible combinations result in quite different complex structures that refer to varied sequences of ritual actions.

In this context, it cannot be categorized into trash or votive deposits. Rather, the deposits contain a complex assemblage of complete, in situ broken and fragmentarily preserved votive objects, tableware and cult devices, as well as sacrificial and feast residues, such as plant seeds, bone fragments, and charcoal

Since 2019, an area of a very high density of finds in the east of section A has been investigated with a large number of ritual depositions, which were found next to and on top of each other at close distances. Based on this, the versatile use of fragmented material within the depositional practice can be exemplarily demonstrated. In addition to their function as votive offerings or containers for these, they may also have had for example limiting, covering, marking, or stabilizing functions.

By the exemplary presentation of depositions the versatile use of objects within depositional practices can be demonstrated and the great importance of examining fragmented material alongside complete preserved objects in understanding depositional practices in ancient sanctuaries can be emphasized.

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S37.285

For what it's worth – Concepts of waste and value in Bronze Age Tyrol

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Waste is understood to mean materials, substances or objects that no longer serve any immediate purpose, thus no longer hold any value for society and are therefore disposed of. To derive a valid attribution of value (or lack thereof) from past societies' treatment of objects, the first challenge is to deduce from the archaeological context whether people had parted with an object or whether it was still in use. And if an object was cast away, was it really worthless trash, or did the renunciation serve a religious purpose (“sacred waste”, [1]), for example, so that the discarded object continued to have value to the person?

Based on these considerations, this approach deals with the Bronze Age in Tyrol (Western Austria), with some special focus on that area's copper mining and metal production [2]. The main attempt is to gather circumstantial evidence to trace value systems and associated practices. Such clues are the intentional preference for certain types of rock for mining tools, the acceptance of permanent disturbance of vegetation by large-scale mining dumps, the disposal of animal bones as an unusable part of the diet, the recycling of the process waste slag as pottery temper [3], etc. However, due to limited sources, it proves difficult to quantify the volumes of production and waste or the values of activities and objects.

In addition, behavioral aspects and a theoretical contextualization are considered to a lesser extent. It will be of interest where valued and unvalued objects came to rest and in which contexts they are absent. In the Tyrolean Bronze Age, it is conspicuous that many objects of (presumed) high value were found in deposits, although the resulting implications are ambiguous. In a less materials-based perspective, even the cessation of copper mining at the end of the Early Bronze Age and its resumption at the end of the Middle Bronze Age is telling about what people in Tyrol deemed to be worth the effort or unrewarding under different circumstances.

Undoubtedly, concepts of value and waste existed in Tyrol during the second millennium BC and they can be inferred in different ways from the handling of resources, materials, and objects as well as from behavioral patterns. The motivations behind such treatments, on the other hand, are more difficult to identify, and it is doubtful whether a reliable distinction between prehistoric and modern motives for action can be made without insight into the minds of people of the past.

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S37.286

A glimpse into ceramic depositional practices in Neolithic causewayed enclosure in northern France (4200-3600 BC)

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As in other European contexts, depositional practices in Neolithic causewayed enclosures in northern France have been the object of many a study since the 1990's [1][2]. There is however still much work to be done when it comes to ceramic depositional practices. While site-wide analysis have been conducted, the raw volume of finds from these sites has made it difficult to work on a complete overview, taking into account differences in material culture, enclosure type and archaeological context. This communication will present the first, partial results of an ongoing doctoral thesis on the subject.

The starting point of the work here presented comes from understanding the different value systems applied to ceramic finds in causewayed enclosures. By that we mean the value attributed to the sherds and vessels, before or after them being studied, and which is *a priori* entirely disconnected from the Neolithic thought process. In other words, what is considered as “trash” by present-day archaeologists, and why is it so? This is also a general reflection on the terms used in French to describe (and interpret?) ceramic assemblages resulting from differing depositional practices. To such an end, an analysis of the French archaeological literature on the subject will be presented, exploring the characteristics most frequently put forward to identify and differentiate what is “rubbish” and what isn't, and further describe “not-rubbish”.

With this theoretical framework established, we can then begin to explore what are these values applied to in concrete, material terms. A case study from the Michelsberg enclosure of Bazoches-sur-Vesle in the Aisne valley will be presented. This monumental, “complex” (here describing a site with multiple sets of ditches and fences; [3]) enclosure has been extensively explored, and an abundance of finds have been unearthed in the ditches. A detailed spatial distribution analysis of the ceramic unearthed in certain targeted areas of this site has been conducted, painting a nuanced picture of the depositional practices and their place in the enclosures’ history.

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S37.287

The *Chaîne Éliminatoire* – an approach to define rubbish in archaeological material

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The examination of settlement finds soon reveals that most of these were disposed in one way or another. This insight, although prevalent, remains very often merely intuitive. The talk will present a methodology that aims to distinguish the amount of contamination ascribed by (pre-)historic users to their residuums, named *Chaîne Éliminatoire*. This was largely derived from Leroi-Gourhan’s concept of *Chaîne Opératoire* from 1970. While Leroi-Gourhan analysed production marks on tools to trace social structures among past groups, the *Chaîne Éliminatoire* uses traces of (conscious or unconscious) disposal-techniques to examine how users perceived their material remains. This helps not only to transfer groups of findings into different kinds of rubbish. It also helps to understand (pre-)historic perceptions of dirt and its social, spatial and economic dimensions. The *Chaîne Éliminatoire* is based on the terms *confrontation* and *contamination* and uses ideas from Mary Douglas’ „Purity and Danger“ (1966) and Michael Thompsons „Rubbish Theory“ (1979). In my talk I will present the methodology and present a case study among the finds from Diepensee, a nearly completely excavated village from 13th/14th century in Brandenburg, Germany.

S37.288

Used, Stored, Discarded. Waste Behaviour and Treatment of Faeces in the Late Latène settlement of Basel-Gasfabrik (Switzerland)

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The Late Latène settlement of Basel-Gasfabrik (170/150-100/80 BC) is located in Basel in the northwest of Switzerland. It is a proto-urban settlement with a central function, which has been excavated for more than a hundred years and has been investigated as part of various interdisciplinary projects.

Characteristic of Basel-Gasfabrik are several hundred large pits. These pits may once have served as cellar or silo pits but were later filled with “waste” and, therefore, contain hundreds of pottery shards and animal bones as well as some slags, metal objects and more. The discovery of the remains of two men in one such pit – both embedded in “waste” – raised the question of whether these bodies had been conscientiously buried or simply “discarded” in the pit. This led to an interdisciplinary discourse on waste behaviour within Basel-Gasfabrik.

Within the framework of extensive micromorphological analyses, layer formation processes and the backfilling process of pits were investigated (Brönnimann et al. 2020a), as understanding these is an important precondition for reconstructing social practices such as waste behaviour. Furthermore, taphonomic analyses of pottery sherds, animal bones and sediments were used to study the treatment of different materials (Brönnimann et al. 2020b).

On the basis of the interdisciplinary results, it is postulated that there were various “depots” (middens) within the settlement, where pottery sherds, animal bones and other materials (“waste”) were stored, so that they would still be available as a resource. The micromorphological analyses also give an insight into the treatment of faeces and show that, unlike in today’s society, they were not necessarily seen as “dirty” and “dangerous” but in part as a valuable resource that was used in handicrafts and perhaps also had a certain symbolic value.

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S37.289

From septic tank to Ottoman diet in Ainos (Turkey): a view from the inside

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The aim of this study is to provide details on diet and hygienic conditions of the citizens of Ainos (modern Enez) during the Ottoman Empire from the 16th to the 19th centuries. For this we analysed a septic tank discovered during archaeological excavations in 2021. We conducted archaeobotanical and palynological studies on the deposits of the septic tank and compared them to historical sources. The material obtained is very rich in fruits and seeds. Remains of grapes, figs, cherries and plums dominate the assemblage. Frequent fish remains indicate fish consumption. Wide range of pollen of insect-pollinated plants are proof of honey in the diet. The presence of fly pupae of *Thoracochoeta zosteræ* strongly suggest that the construction was filled with a liquid, nutrient-rich content. Intestinal parasites document that humans were infected by a range of parasites, such as roundworm, whipworm and lancet liver fluke, providing further insights on poor hygienic conditions.

S37.290

There is treasure everywhere... About views and perspectives. How can an attribution of value be recognised in archaeological findings?

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Everyone knows that children love to accumulate treasures: sticks, stones, broken pieces, snail shells, etc. They are usually smiled at for this. Most of the time they are ridiculed for it. At some point they learn that it is worthless stuff and orient themselves to the value system of the surrounding (adult) society. Value systems are learned and bind a community together. "Beautiful" or valuable objects get a special place, things considered worthless are left lying around or thrown away. But where? What constitutes the "special place", where do the discarded things end up? The paper explores the question of what indications can be found in the archaeological evidence of people's ideas of value. A prerequisite for this is to understand the specific genesis of a particular find context. Which action has led to the encountered finding and which (lack of) appreciation towards the object in question can be deduced from it? Case studies are used to consider which generalisations are possible and how strongly our own perspective shapes the interpretation of a finding. Things can be buried in order to hoard them or never to see them again. How can we tell which of the two opposing motivations for action applies? Is the treatment really the same? Or can a closer look reveal differences after all?

It is an important insight that an object without a find context rarely allows conclusions to be drawn about its value in the society of the time. Repairs or recognisable care are a sign of high personal valuation on the part of the former owner, but this does not necessarily have to be identical to that in society as a whole. Curiosities or memorabilia are examples of the discrepancy between individual and social attribution of value.

For archaeology, this kind of research approach offers opportunities to get a little closer to the imaginary world and mentality of people in the past.

S37.291

50 years garbology: a review

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The first garbological project was started in 1973 in Tucson, Arizona, by William Rathje. Since then, the environmental crisis has intensified in a way that is not deniable anymore. One of the parameters that are influential on climate change and environmental crisis is mass production and acceleration in waste disposal. It is of note that even though debates on the environmental crisis and waste disposal have increased among academics, garbology has lost its popularity gradually during the last three decades.

Nowadays, archaeologists interested in recent changes to the environment follow other branches of the archaeology of the recent past, such as the archaeology of climate change or the archaeology of waste.

The main question of this presentation is why garbology did not obtain the attention it deserves. I will classify the main reasons for this problem into three major categories: theoretical ambiguity of garbology, too much emphasis on the landfills and constant challenges with traditional archaeology.

By reviewing and criticising the last 50 years of garbology, I aim to suggest some proposals to improve this branch in order to investigate the critical situation of the modern world.

S38: Modeling cultural landscapes through the entanglement of human and non-human agents

The multiple aspects of ontological turn in contemporary philosophy have brought a novel prospective to the social component of past human development. This phenomenon includes complex two-sided interaction of human beings with their environment and non-human agents that are conspiring to bring into reality the construct of cultural landscape. This complex, dynamic and mutually produced and modified being exists and develops through the social behavior of human, things and environments, continuously and inevitably entangled into multilayered relations. Therefore, understanding and studying of past societies transformation and development needs to take into account the specific features of such interaction. Onward, any comprehensive model that introduce the cultural landscapes dynamic transformation pattern is condemned to consider such entanglement in all its complexity.

This section aims to reflect on the theoretical and practical aspects of cultural landscape modeling from the perspective of human-things entanglement. It will examine how the scholars from different fields approach the complex understanding of such landscapes in light of ontological turn. We welcome contributions that apply both technological and philosophical strategies to reflect the complex relations between human and non-human agents in their cultural landscape models regardless of time and space. Moreover, we are especially interested in the approaches that seek to describe and present the social aspect of cultural landscape transformation by means of geospatial systems and sophisticated digital models.

Due to the multidisciplinary nature of these particular issues we are eager to explore the field together with our contributors moving towards the answers to the following questions — the cornerstones of our interest:

- Theoretical: what are the space and landscape features and functions in light of human—non-human relations?
- Conceptual: how does the concept of cultural landscape contribute to our understanding of these relations?
- Methodological: how to implement these theoretical considerations into modeling of cultural landscapes — or ‘how to model the entanglement’?
- Technological: what are the particular digital, geoinformatic and conceptual tools for modeling of cultural landscape and their part in human—non-human relations?

S38.292

Symbolic path dependence and temporal continuity of cultural landscapes

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The concept of cultural landscapes – landscapes with “cultural properties [that] represent the combined works of nature and of man” (Rössler, 2006), is appropriated by many theoretical archaeological systems. They found their place alongside with landesque capital, human-made ecosystems and ecologic – economic reasoning of processualism as well as with agency, entanglement and semiotic accents of post-processualist approach. I would like to focus on the terminological appropriation of the cases when there is a cultural continuity in the use of certain elements of the landscape throughout centuries and millenia by people of different societies. The deterministic economic-based models of path dependence would not mostly be effective to apply directly. However, fruitful will be an analogy for path dependence – symbolic or semiotic path dependence when symbolic elements of landscape are re-thought and re-understood by a society that differs from a society that created them. Agent-based modeling can have a heuristic potential in this context.

S38.293

Cultural landscape as entanglement of different agents and features of their interaction

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The cultural landscape is a concept defined by World Heritage Committee as “cultural properties [that] represent the combined works of nature and of man”. Obviously, human beings do not modify the landscape by hand but rather indirectly with the help of numerous non-human agents. All three components — natural landscape and its human and non-human agents — are entangled in a complex multifunctional relations that are cause and effect of the existence of cultural landscape. Thus, cultural landscape is an entity formed by the joint contribution of landscape itself, human beings and non-human agents that are inhabitants of this landscape that share, transfer and reflect some particular features of themselves or the landscape objects.

Taking these parameters into account, the accuracy of cultural landscape modeling depends on two main aspects: our

level of understanding of its components and our approach to the relations between different components of landscape. Therefore, the primal task before conceptualizing cultural landscapes would be to consider the properties of these components and their relations.

A good asset of case studies revealing the features of human-non-human-landscape relations in the cultural landscape comes from rock art locations, as they join natural and cultural variables into one landscape entity by default. Moreover, human beings never interact with rock art location directly since it mostly involves several non-human agents. Finally, since these landscapes often survive through the historical process they might be subjects of effective natural landscape reconstruction.

The case of Kamyana Mohyla in the south of Ukraine is one of the perfect examples of cultural landscape, produced by the joint effort of all three groups of participants. The rich and complex rock art location is featured with a collection of portable rock art specimens – non-human agents that affected other components of landscape in different ways. The conceptual analysis of these relations brought up a number of their specific features that are to be extrapolated on the specifics of cultural landscape entanglement structure in general. They appeared to be symmetric, reflective and transitive. Moreover, the relational role of some of the participants may change depending on the processes they involved into.

S38.294

Ontologies and Digital Archaeology: DataARC's landscape approach for modelling human ecodynamics in the North Atlantic

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Landscape Archaeology, or the archaeology of “scapes”, has always focused on understanding the interrelationship between humans and non-humans. Such an interrelationship is fundamental for getting to the grips of past complexities, and this explains the development of different approaches. Such is the case of Historical Ecology or human ecodynamics. The integration of Historical Ecology for studying human ecodynamics as expressed in landscapes has notably enhanced the modelling of past ‘human-natural’ system(s) [1], [2], [3]; [4]. In this guise, a landscape is a non-linear construction wherein humans and non-humans interact at different scales (i.e., heterarchically and dialectically). This means that the study of human ecodynamics allows us to better study the complexity of landscapes (understood as systems), thereby offering new prospects for modelling such entanglements.

DataARC, an NSF-funded international project that ended in 2021, harnesses many of the concepts brought by Historical Ecology and Human Ecodynamics and puts them to work in a digital environment. This Project draws substantially on the work of NABO (the North Atlantic Biocultural Organization), an international and interdisciplinary research community focused on the historical biocultural legacies of the North Atlantic [3], [5]. At the time DataARC was carried out, NABO had been active for over 25 years, generating an impressive amount of multivariate data (archaeological, historical, ecological, geological, etc.). The DataARC Project integrated most of such data in a computational ontology aiming to represent the human ecodynamics of the North Atlantic in a rigorous and efficient way.

Intending to reflect on the entanglement of landscapes, this paper presents some insights from my experience working at DataARC for modelling and representing human and non-human entanglements. It thus presents different theoretical and methodological aspects of interest for modelling the historical ecologies of landscapes. Said differently, the paper explores some of the theoretical underpinnings of the project for later explaining how they can be applied using digital methodologies. The aim is, therefore, to present some of the central issues that came out from developing a conceptual cybertool to model human–non-human entanglements (i.e., human ecodynamics) for enhancing the understanding of landscapes.

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S38.295

How to hunt, how to herd? Exploring human-*Rangifer* interactions and applications of Traditional Ecological Knowledge in archaeology

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Indigenous epistemologies elucidate on an intimate immersion in and deep knowledge of the nonhuman elements of human habitats. Indigenous cultures worldwide demonstrate the futility in attempting to disentangle humans from

the environments they inhabit. Knowledge is instead constructed through transgenerational ecological observations and animate interspecies which forms the basis for Traditional Ecological Knowledge (TEK). Recent incorporation of Indigenous methods (like TEK) into various branches of anthropology and biology has demonstrated its immense capacity to guide data interpretation and be utilized as a valid scientific method. Despite this, the integration of TEK into archaeological approaches remains on the periphery of the discipline, only applied where archaeologies directly overlap with descendant communities e.g., in Indigenous-led research. However, these methodologies are fertile ground for transdisciplinary investigation that may expand our capacity for understanding human-nonhuman pasts. A key example of this is human-*Rangifer* relationship research. *Rangifer tarandus* (reindeer/caribou) have helped shape the complex cultural fabric of both North American and Northern Eurasian societies, existing today as a mainstay of numerous Indigenous cultures and economies in the arctic and subarctic. The intricacies of human-*Rangifer* systems, however, contradict archetypes of domestication modelling and are not easily replicated with computer models.

This paper will comparatively explore human-*Rangifer* relationships across two temporal landscapes: the small-scale reindeer herding amongst modern hunter-fisher communities in Northwest Asia; and the 9,000-year-old legacy of caribou hunting strategies in North America recorded via underwater archaeology. Despite their disparity in time and place, these two studies offer examples of prominent nonhuman agency in the formation of cultural landscapes and show how deep ecological knowledge can shape the array of niche-constructing activities inherent to human-nonhuman relationship dynamics. The case studies will demonstrate a range of ways TEK can be implemented, for instance through collaborative archaeology, relational approaches, and virtual reality modeling. We argue that TEK can provide guidance in the interpretation of archaeological records, even in the deep past, and can offer explanations for specific processes of human-nonhuman relationships beyond common behavioral ecology models.

S38.296

'Animals into humans': Multispecies encounters, relational ontologies, and social identity in Indigenous rock art from northeast Kimberley, Australia

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Research on human/animal relations intersects a wide array of disciplines with particular ways of theorising humans and non-humans. In the last two decades, archaeology has undergone a series of theoretical transformations that saw a shift from traditional - and deterministic - conceptualisations of non-human animals to one that considers the role non-human animals play in symbolism and everyday life. Thus, with the advent of a new ontological turn more emphasis has been placed on relational approaches, which stems away from an anthropocentric understanding of the world that highlights instead species/landscape interactions. Therefore, the ontological transformations experienced in archaeology and beyond is reflected on the epistemological foundation of research conducted in regards to non-humans, to include instead more nuanced understandings of animals.

Despite the disciplinary development in this area of research - particularly the search for a variety of ways in which humans and animals lived with each other - animal representations in the rock art from the Kimberley, Australia, have been predominantly interpreted under an economic lens. From this standpoint animals are conceived as preys, neglecting in this process how contemporary and past human populations engaged and represented animals. Here, I critically engage with the multiple ways in which animals have been theorised in rock art research, with a particular emphasis in the Kimberley region, and analyse the vast human and animal depictions during the Pleistocene, in order to assess human/animal interactions and the contribution of animals to social identity.

S38.297

The sound of the Bronze Age

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The bronze lures are some of the most well-known objects from Scandinavia's Bronze Age and have been the focus of many studies since the early 20th century. Bronze lures are mostly found in southern parts of Scandinavia with a big majority of them found in bogs in Denmark, only a few have been found further north than Denmark [1]. But there are some other traces of them further north in Scandinavia.

Traces of these instruments can be found in rock art in several areas of Scandinavia, one of these places are Trøndelag in the middle part of Norway. The carvings in Trøndelag are so far considered to be the northernmost depictions of the lures and most of them occur onboard boat figures dated to the bronze age although there's a few instances of separate lure figures in the same areas. Out of the 42 discovered lure figures in Trøndelag, 36 of the are found onboard boats in various numbers. The separate lure figures only occur in Trøndelag and no other places in Scandinavia [2].

The carvings of the bronze lures show us that there has been some interaction between what is considered to be the centre

of bronze age culture in Scandinavia and the areas further north, but why do they almost exclusively show up in carvings and what can the landscape tell us about these interactions?

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S38.298

Erosion Control, Horticulture, and Last Resting Place for the Elites – The Monumental Earthworks of Palau

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The monumental earthworks on the island of Babeldaob (Republic of Palau, Micronesia) are not only one of the most intense examples of landscape transformation but also the first expression of monumentality in all of Oceania. Construction of the extensive and complex structures began approx. 500 BC. At the arrival of the first Europeans in Palau in the late 18th century, the sites had already been abandoned. The earthworks still dominate the landscape of Babeldaob today, but little is known about their construction techniques, function, chronology, and socio-cultural significance. As an interdisciplinary team we investigated these aspects through (geo)archaeological methods and determined the effects of the large-scale earthmoving activities on the landscape.

We conducted remote sensing of 14 different earthworks. The georeferenced digital elevation models provide the first detailed documentation of the sites.

40 geoarchaeological test trenches were then excavated on ten of the documented earthworks in order to investigate the construction techniques, function, and possible effects of erosion. We could determine that vast amounts of material had been extracted, reworked, transported, and then applied to form the earthworks. Anthropogenic garden soils with multiple planting pits covered large areas, attesting to horticultural use. Most surprisingly it could be established that erosion had only a marginal effect on the sites. Despite their steep slopes and centuries or millennia of harsh tropical climate, there are only minimal depositions of colluvial material (Kühlem et al. 2021).

The tops of the earthworks are in many cases shaped into steep mounds (crowns). During the last phase of the investigations two large surface excavations on two of the crowns were conducted. In both cases the crowns were used for human burials. Due to the usually good preservation of the bones, it was possible for the first time to document the orientation, position, and burial customs of the early Palauans.

Despite the fact that the monumental earthworks are hardly mentioned in the rich oral traditions of Palau, our archaeological investigations paired with interviews of local clan elders could establish parallels and continuities to traditional funerary rites today.

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S38.299

The settlement pattern of the Sabatynivka group of the Cucuteni A-Trypillia B1 stage

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Key-words: Settlement pattern, Precucuteni-Cucuteni-Trypillia cultural complex, cultural landscape, Southern Buh basin, archaeological prospection

The Middle Southern Buh area was inhabited by the population Cucuteni-Trypillia cultural complex in the 2nd part of the 5th millennium BCE. The settlements are recorded in the forest-steppe zone.

The Sabatynivka group of sites represents the easternmost area of painted ceramics in the material complex on the Trypillia B1 stage. This group includes Sabatynivka 1, Berezivska HES, Kamiane-Zavallia 1, Kozachyi Yar 1, Shamrai, and the sites of Topoli and Kozachyi Yar 2.

The Podillia-Pontic archaeological expedition investigated the Sabatynivka group sites during its works in the 2010s in the region. Data from previous campaigns on the sites are also included in the research.

The Kamiane-Zavallia 1 settlement is located on the high fluvial terrace valley. All other settlements occupy a relatively high topographical position - on the over-fluvial terrace valley, plateau, or slope. Berezivska HES site probably existed on two levels: close to the river terrace and higher, over the river terrace.

During the studies of the Trypillia B1-B2 stage in the Buh area, it was observed that the neighborhood of two or more settlements is not typical for this area, and the distance between the nearest points was at least 3 km (Husiev 1995, 48). A similar distance trend was recorded in the Sabatynivka settlements of the Trypillia B1 stage. They are creating an enclave of settlements traced in the southern part of the Middle Southern Buh area.

The region's settlement pattern is characterized by the localization of settlements as an enclave near forests and areas with water resources. The population of the Sabatynivka group existed during the thermal optimum of the Holocene, during the period of reduction of deciduous forests and the disappearance of hornbeam (Lobanova, Matviishina, Kiosak 2021, Herasimenko 2004).

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S38.300

Intertwined “lifeworld(s)” in the Central Mediterranean during the 2nd millennium BC.

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Starting from the ‘80s, the development of “cultural geography” (Cosgrove, 1984) rejected the concept of surroundings as a neutral backdrop. By adding a social dimension to the landscape, this became a meaningful *medium*, emphasising the mutual influence between people and surrounding material world. A place can be thought as a “relational concept” (Thomas, 2001, p.173), a location embedded into human behaviours. Yet distinct groups may conceive the same landscape in diverse way. Thus exploring such diversification over space and time is crucial to understand regional historical trajectories.

The emergence of fortified settlements during the 2nd millennium BC became the catalyst behind a significant transformation of the landscape from an environmental perspective—such communities harder exploited their surroundings—and social perspective—since they were landmarks into the long-range exchange network. Alongside this phenomenon, smaller communities, characterised by sparse, short-life hamlets and focusing more on agricultural and animal breeding economy than on exchange, persisted across diverse ecosystems. Thus, socio-economically differentiated societies interacted in the same landscape, each constructing its own “lifeworld” (Ingold, 2000, p.14).

Computing has incredibly expanded our capacity to model human behaviours into the landscape, allowing to explore “the range of possibilities associated with certain processes or actions” (Llobera, 2012, p.505). But how can we comprehend the coexisting conceptions of surroundings? Focusing on the rich palimpsest of archaeological data for Southeast Italy, this presentation will explore dimensions of diverse cultural landscapes during the 2nd mill. BC by discussing the integration of geo-computational modelling, palaeoenvironmental and archaeological data.

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S38.301

Visitor and temple: New tendencies of the aesthetic staging in Hellenistic temple architecture

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The visit of a sanctuary led the visitors in most cases towards the local temple. But how did one perceive the building within the often densely structured area? This question will be discussed in the following research. The focus lies on the temple building itself, which technics were used to obtain a “guided perception”, and how they influenced the visitor’s movement in space. The research is limited to naiskoi-temples since these are the most common types for sacred buildings in Hellenistic times. While being unique, they all share some common architectural principles. Starting with an analysis of the temple surroundings, the research follows the path of a visitor to the temple. This is followed by a phenomenological approach to the temples’ postulated frontality. The ornamentation of the buildings is put so that the perception of the visitor is led to the middle, where he can see through the building. The façade is multilayered, expanding the perceived image to the temple inside. Entering in the inner parts, the layout with its furniture is the most important subject for both the temple and the people interacting with it. The use of natural light, different colors for the walls, ornamentation, ground tiles, tables, barriers, and the cult statue were all interconnected and contributed to the interaction of the visitor with the room. The pronaos, while being a public room, functions as a liminal space between secular and ritual. The door, staged like a portal, contributes to the so called “doorway effect”, one of the most impactful moments during the visit. The peak of the visitor’s experience is achieved inside the cella, with every detail having its role and succession. Their goal is to achieve the best possible stimulation for its guest and give them an epiphany-like experience. This work combines archeological with interdisciplinary research, going from architectural perception to color studies and psychology of human perception. The goal is to simulate the sensorial experience of a visit through Hellenistic temples, linked to the ambition to promote a better understanding of their staging.

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S38.302

Man and things: Kinesics and proxemics in the process of perception of objects in the archaic Greek culture

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The entanglement of man and things significantly shapes the human cognitive model, basic social behaviors, and, as a result, cultural landscapes. However, how does this essential relationship function in the archaic, pre-metaphysical Greek world? What is the very environment in which archaic Greeks exist, act, use, and perceive things with their senses? Anthropological studies have repeatedly emphasized the distinctiveness of the pre-modern mind and perception modes, the specificity of entanglement of men and things, and thus the extreme uniqueness of pre-modern cultural landscapes. In archaic Greek literary sources, this distinctiveness manifests itself in the relationship between humans and landscape features or buildings, such as tumuli, or between people and small objects like Paris and his spear, Odysseus and his bow, or Agamemnon and his scepter.

I use kinesics and proxemics categories in my presentation to recognize anew the character of entanglement between archaic Greeks and their things, including some iconic peculiarities like horror vacui. Herein kinesics refers to motor perception and motor activity of the body that both enable us to understand things in spatial relations (body biomechanics, affordance theory, and embodied thinking), while proxemics refers to an orientation in an environment (ecological optics, phenomenological approach). It turns out that the primordial spatiality that makes up archaic cultural landscapes is, for instance, not a stable, three-dimensional geometrical structure that enables us to locate things or events as in the Global Positioning System. It is a polytopic, fluid, temporal, and action-based derivative of human deeds and the presence of things themselves. Odysseus' bed, for example, is something that cannot be moved from its place because it creates a kind of unity, a state of entanglement with its position. Similarly, the bow in the hands of the king of Ithaca produces a special space, confirming the identity of Odysseus. Recognizing the peculiarities of the state of entanglement between man and things in the archaic culture is, however, useful in developing new interpretive models for pictorial sources, such as the famous amphora of the Polyphemus Painter or relief pithoi. It also helps us better understand the visual specificity and uniqueness of the iconic remains of the archaic culture of the Homeric era.

P01.02

Rock Art as a Mechanism for Safeguarding Traditional Ecological Knowledge

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Traditional ecological knowledge (TEK) refers to the systems of knowledge, practice, and belief accumulated over thousands of years through coadaptation processes between humans and nature, and it is culturally transmitted over generations. TEK, in many cases, is a matter of survival. Communities require TEK to survive in their world, and more recently, it has become valuable for global ecological conservation. Devastating colonisation processes across the globe have critically threatened elements of Indigenous biocultural heritage, causing the loss of TEK, with rock art and its associated ecological knowledge being one of the tangible and intangible forms of biocultural heritages most affected by European incursion. Indeed, the cultural significance and ecological knowledge contained within rock art has been critically impacted, and rarely recorded, in most parts of the world, requiring urgent efforts to maximise its conservation. While the role of Elders and oral histories as cultural mechanisms that contribute to retaining TEK has previously been discussed, archaeological evidence – specifically rock art – which offers deep time testament for human environment interactions, has not been explored in detail as a mechanism for safeguarding TEK. The present research focuses on revealing the critical role of rock art as a mechanism to safeguard, maintain, and act as a reservoir of TEK. As neither theoretical nor methodological approaches linking rock art and TEK exist, this research develops these analytical frameworks for the first time. Through focusing on depictions of macropods in Australian rock art as an exemplar of how rock art has encoded TEK, by integrating available archaeological descriptions of rock art, ethnographic and ethnobiological records, and case studies that apply palaeo-ecological data, this research outline the potential of the developed framework. This research also highlight the importance of enhancing conservation strategies for intangible and tangible biocultural heritage related to rock art, and for cultural and ecological conservation.

S39: Waterscape: Humans, Environment, and Hydrology in the Holocene

Currently, investigations of the hydrosphere of the past is frequently connected to natural water supply, climate-environmental data, hydrological conditions, and socio-cultural developments of human societies. The requirement for data and insights from many scientific disciplines make this an interesting but also a challenging topic. For many decades, the past human habitation was perceived only as a terrestrial model. Consequently, the archaeological/historical sites were viewed as localities in a landscape, with water as an essential resource of a driver for the resilience and sustainability of sites (e.g., for surviving, economy, communication, transport, protection, etc.). This limitative terrestrial view of the past may partly result from wetlands having substantially receded in today's landscape. Therefore, in order to understand the real valences of the waterscapes, we should examine the local aquatic environments from a broader perspective, especially as recent research in the field clearly shows that water does not separate – it connects humans, environments, and landscape. The “amphibious” networks developed in the past waterscapes result from a lively, diverse, and constantly changing interplay between different actors (humans, animals, plants, and other matters), and factors (environmental conditions, accessibility, climatic modification, raw materials sources or gravity). To push waterscape research forward, we call for contributions that illustrate the potential, challenges, and, frontiers of hydrological aspects of the climate-culture-waterscape interaction topic such as (but not limited to):

The dynamics of the shores and coasts of the watercourses (river basin variability, sea-level variations, natural or anthropic impact on human lifestyle, etc.)

Eco-hydrological aspects of ancient water availability and management (natural water supply, environmental carrying capacity, aquatic ecology, hydrological system variability, water strategies, etc.)

Aquatic palaeoeconomical aspects (irrigation, water supply management, aquafauna and aquavegetation exploitation, seasonality, dietary impact, etc.)

Aquatic architecture (harbors, channels, dwellings on pillars, bridges, dams, etc.)

The hydrological hazards to societies (tsunamis, floods, droughts, erosion, etc.); vi). Hydrological-cultural models (wetlands sites, water use in artifacts process)

S39.303

Human-landscape interactions in the Călmățui Valley (SE Romania) during the Late Neolithic. Insights into tell settlements developed on relict floodplain islands

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High density of traces of human habitation from the Chalcolithic - especially Boian and Gumelnița civilisations - indicates that the Călmățui Valley represented a pole of attraction and an important communication corridor between the Lower Danube Valley and the Highlands (Curvature Carpathians and Sub-Carpathian region) for the human communities throughout the late 6th – early 4th millennia BC. Despite its historical importance, this valley was much less studied than the others regions and only scarce paleoenvironmental data describing the faunal remains identified in the settlements are available, pointing to the limited resources at hand mainly provided by the freshwater and floodplain environments. A close connection between landscape and habitat types can be inferred, with traces of stable settlements placed on river terraces and relict floodplain islands (locally called *popină*). Such geomorphological features extensively occur along the Călmățui Valley, but only a few bear traces of human inhabitation. On the river terraces, where the presence of Chalcolithic communities has been documented, the habitation seems rather sporadic (with a notable exception for the Sudiți site). The most important archaeological deposits, sometimes reaching 5 m thick, are found on the floodplain islands. In this latter case, the archaeodeposits indicate multi-stratified settlements (tells) usually occupying just a part of the popina top surface and surrounded by steep natural slopes. Some of them are delimited by the rest of the popina by anthropogenic trenches.

Our archaeological and geoarchaeological investigations (by means of sedimentology, chronostratigraphy, palaeo-fauna and geophysics) prove the preference of different Late Neolithic civilizations for the long inhabitation of these features (Popinas) and development of defensive structures as 3-5 m deep trenches circularly cut around the tell, which were not reported yet for other similar tells settlements. Pollen and charcoal data bring new insight on the agricultural practices of these communities. Finally, we test the hypothesis of a larger river with high-discharge (Buzău) avulsion, which would have been flowing along the present channel of the Călmățui low-discharge river.

S39.304

Shells adornments, waterscape, and past people behaviours. A case study from the Romanian Eneolithic

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The Sultana-Malu Roşu cemetery is a typical Eneolithic extramural cemetery used by two communities belonging to the Boian and the Gumelniţa cultures, covering the whole 5th millennium BC and the beginning of the 4th millennium BC. The archaeological research in this cemetery is an ongoing project, with 110 graves discovered until the present. One of the most spectacular graves found until now was Grave no. 92. It was identified in the foundation trench of C1/2014 construction that cut this earlier grave. The pit was a typical, oval shape, and it contained a young female skeleton, oriented E-W. Grave no. 92 was the most richly funerary feature of all the graves investigated here until now. Its funerary inventory includes over 3200 pieces. The beads were made of exotic raw materials, such as Spondylus shells, bone, stone, Lithoglyphus naticoides shells, bone, marble, malachite, clay and red ochre. The personal ornaments show use-wear on their surface, proving that they have been worn before being deposited in the grave. Moreover, the pieces have different degrees of use-wear, which illustrates that the broken or lost items were replaced, and thus, they were accumulated at different time intervals.

The current paper explores the particular ritual practices used in the case of young women buried in grave no. 92, along with the correlation between that and shell adornments in order to identify the multi-dimensions (e.g., social, ritual or economic) of the aquatic resources used by past people.

This work was supported by a grant from the Ministry of Education and Research, CNCS – UEFISCDI, project number PN-III-P4-ID-PCE-2020-2369, within PNCDI III.

S39.305

Moving into the wetlands – medieval land reclamation in the Wadden Sea of North Frisia (Germany)

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The coastal landscape of North Frisia (Schleswig-Holstein, Germany) has a very changeful past. What is nowadays part of the UNESCO world heritage "Wadden Sea" was once an amphibious landscape with wide fenlands, marshes and watercourses, a long time avoided by man.

It is not before medieval times, that Frisian settlers rapidly transformed this hardly habitable waterscape into cultivated land. Dikes, drainage networks and infrastructure like dwelling mounds (terps) and harbours allowed settlement and trading activities in an environment still dominated by tides and storms. But cultivation measures also increased the area's vulnerability against hydrological extreme events. It is only few centuries after cultivation measures started, that a major storm surge in 1362 AD permanently destroyed wide parts of the region.

Until today, much of the cultural heritage of medieval North Frisia has been preserved in the tidal flats and provides unique insight to so far little understood aspects of Frisian settlers (Majchczack et al. 2021). Our main objectives were therefore to reconstruct selected areas of the drowned landscape on a micro-, meso- and macroscale to identify natural processes and human interventions in this amphibious environment to better understand the medieval coastal landscape, its complex development and final destruction.

We combined different geophysical prospecting methods (magnetics, seismics, electromagnetic induction EMI, electrical resistivity tomography ERT) with Direct Push sensing (Hydraulic Profiling Tool HPT, Cone Penetration Testing CPT) and vibrocoring to provide information on the tidal flat's subsurface that - together with sedimentary, geochemical and microfaunal palaeoenvironmental parameter (PEP) analyses – allow for a detailed reconstruction of the medieval landscape. The geochronology is based on radiocarbon dating, archaeological age estimations of diagnostic finds, dendrochronology and historical reports.

Our results provide new insights into medieval land reclamation, cultivation measures and settlement activities that exceedingly modified most of North Frisia's natural waterscape (Hadler et al. 2022, Wilken et al. 2022) and increased its vulnerability against storm surges (Hadler et al. 2018, 2021). This interdisciplinary research approach also allows an extrapolation of our results to other Wadden Sea regions. Finally, our results can be considered a striking example for potential effects of future extreme events.

S39.306

Two seemingly opposite examples of human related lake level variations in NE-Germany.

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The hydrological setting of a landscape, including lake levels, is determined by a range of factors, with climate and land often being among the most important factors. Nonetheless, lake level fluctuations in the past are often primarily attributed to climatic changes alone. Two examples from NE-Germany, Lake Tiefer See and Kieshofer Moor, instead underline a close link between past anthropogenic land cover changes and lake level changes.

For Lake Tiefer See, a detailed Holocene lake level curve has been constructed using 28 sedimentary records from along the lake margins. The results show that the lake level fluctuated by about 10 m, with the sharpest changes occurring during Early Holocene. Over the past 4000 years, the lake level was mostly higher than before, yet with still prominent fluctuations. Accurate dating and detailed pollen analysis shows that many of the peaks in the lake level were synchronous to pronounced settlement periods whereas lower lake levels were synchronous to reforestation periods. The results hence suggest that land use was a relevant driver of lake level fluctuations during that period. Hydrological modelling supports this hypothesis by showing that the impact of changes in land cover on evapotranspiration and hence the water level was large compared to the influence of known climatic variations.

The Kieshofer Moor is a peatland near Greifswald, which developed after terrestrialization of a lake at around the year 800 CE. At about the same time, the city was founded and land use intensity increased substantially, also in the vicinity of the peatland. The presentation will discuss why, other than in Lake Tiefer See, the increase in land use intensity is related to a lake level decline.

S39.307

The Management of Marseilles' Old Port Through Written Sources: Eco-hydrology, Geo-engineering Techniques and Effects on the Urban Coastal Environment (1400-1900)

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Since its founding 2600 years ago by Phoenician people the metropolis of Marseilles (Southeastern France) had always been constrained by a mountainous topography causing a compact urbanization along hillsides over centuries. Thereby, the first port, the Old Port (named the "Vieux Port"), occupying the lower part of the city and characterized by a distinctive shape, was often threatened by filling up with diverse exogenous rock or sedimentary materials (especially during the LIA) and it progressively became a permanent cesspool for all stormwater and sewage. This waterscape, acting as the geographic center of the city, has been not only an exchange place for dwellers but also a sort of centralized accumulation site for sediments and for various wastes and sludges excreted by the urban metabolism. If the surrounding landscape has had an influence on the physical structure of the port (important silting due to erosion), ecological resulting conditions caused, in turn, intense disturbances in the city center (odor nuisances and infectious diseases) and conflicts along the seashore with local fishermen (ocean dumping of dredging muds), especially in medieval times. Consequently, the port has had a major impact on the urban dynamic, mainly the city's sanitation issues as well as the elaboration of innovative geo-engineering techniques and transfer of technologies from other countries for dredging the port's main basin.

However, if many academic works have dealt about economic and social role of the port for all historical periods, eco-hydrology, geomorphology and engineering issues have scarcely been studied for the modern era despite available abundant and rich written sources.

In this context, after briefly describing both the topography and the hydrogeomorphological attributes of the "Vieux Port", we will present, thanks to the local sources, the main hydro-sedimentary and geotechnical constraints frequently encountered by port managers as well as various technical approaches that engineers have tried to decrease the port's main basin sedimentation rate or to deepen it (focusing particularly on the control of terrestrial sediment fluxes and dredging techniques).

Then, we will see what kind of information can be given by sources about environmental and sanitary outcomes induced by these management actions on the surrounding lands and the seashore over a period of 500 years.

S39.308

Human-environmental interactions in the Grado-Marano Lagoon (NE Italy)

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The Grado-Marano Lagoon, at the head of the Adriatic Sea, represents the northernmost sector of the Mediterranean Basin. The area is a low-lying coast that experienced a submerging evolution of about 10 m in the last 8000 years because of eustatic rise and land subsidence.

Since Neolithic communities interacted with amphibious environments and faced the sea-level rise in a long-term perspective. Several sites have been submerged by lagoon waters and deposits and/or eroded by coastal dynamics. The reclamation carried out in the 20th century drained about 400 km² of the lagoon rims between the Karst and Venice and led several sites to emerge and crop out. Thus, whereas the past coastal landscape south of Venice down to Ravenna is archaeologically almost completely unknown and inaccessible as covered by several meters of river deposits, here the archaeological traces are still largely visible at surface or reachable at shallow depths (Fontana et al., 2017).

On the other hand, present day increasingly critical meteorological events and near-future scenarios for sea-level rise in the area urge adequate measures to strength systems of reclamation and coastal defence (Zanchettin et al., 2021).

Multi-proxy analyses carried out in the Grado-Marano Lagoon mainly based on remote sensing, historical cartography, geo-archaeological corings and pollen sampling allowed to integrate archaeological and paleo-environmental data in order to assess the long-term human impact on the area and compare landscape and environmental changes with shifts in the settlement strategies.

By examining some case studies spanning from late Prehistory to Middle Ages, we propose a preliminary reconstruction of the modes of interaction between community and the environment which enlightens different ways of adaptations and manipulation of the coast through time. In particular, the data presented allow to reconstruct part of the history of coastal retreat and the lagoon submersion.

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S39.309

The relationship between the waterscape and soil composition of southern Trinidad in the Early to Mid Holocene - a template for new enquiries into the historical ecology of the Caribbean

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Archaeological inquiry must be combined with paleoenvironmental information in the Caribbean especially for periods such as the Holocene in order to form solid histories of island colonization, human movement, and historical ecology (Siegel et al., 2015).

Rather than viewing each Caribbean island as a singular landscape, changing our perspective will help change the current academic view of islands, which cause them to be considered as the main geographical unit in archaeological study.

Instead, we will focus more on the entire space: the lands and their surrounding water – rivers, currents, streams and the sea and ocean – as one interconnected “scape” (Boomert, 2010).

The waterscape of the Caribbean naturally has a profound impact on its various landscapes, and this has been the case especially because of the islands’ relatively small size. In this particular paper the aim is to use the micromorphological analysis and the soil chemical analysis of the stratigraphy of at least one Archaic site in south Trinidad and compare this data what is known of the waterscapes of southern Trinidad. In doing so, we may get a grasp of how changing sea levels, salinity, and temperature in turn may have affected the settlement of humans in the Caribbean, including their relationship with their environment, in particular their subsistence and movement.

Studies of this nature may provide a template for combining the study of waterscapes with that of landscape historical ecology and archaeological enquiry, and give us a broader understanding what the Caribbean looked like through the early to mid and even late Holocene. The Caribbean being made up of now insular islands, these studies can be added to help answer wider questions around human migration to and settlement of insular spaces, or what is called “Global Patterns in Island Colonization during the Holocene” (Leppard et al 2022).

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S39.310

Life at the land-water transition area. Change, adaptation and opportunities

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*“Do you have the patience to wait
till your mud settles and the water is clear?
Can you remain unmoving
till the right action arises by itself?”
- From Chapter 15, Tao Te Ching*

Not patience, as Tao Te Ching asks for here, but patient perseverance at the water-land transition zone is a starting point of this presentation, which focuses on the coastline itself. The term “coastline”, which is often used today, suggests a narrow, easily controllable and fixed transition from land to water. This applies to the coast, rivers and lakes. But just as this transition does not exist as a fixed line today, it did not exist before the first dikes were built. Rather, there was a broad transition zone that was influenced to varying degrees by the water and the associated processes such as flooding, erosion, sedimentation, salinization, freezing, redeposition, sea level rise, etc. This includes relatively short-term phenomena, some of which can recur in the annual cycle, as well as slow changes that gradually shift the land-water transition area and require the societies living there to make adjustments, which often result in innovations and changes in economic concepts, but can also lead to withdrawal from the region.

This talk presents different examples diachronically and inter-regionally to draw out the different reactions to shifts of the coastline. Seasonal activities such as ice fishing, ice skating or collecting shells play just as important a role as the reactions of societies to long-term and slow processes that could have dramatic effects, such as flooding in the event of extreme sea level rise. This also led to remarkable innovations such as the construction of the Wurten, the construction of dikes and the extraction of salt peat. The construction of dikes at the very latest shaped the coast so strongly that the natural landscape became a cultural landscape. From this point in time at the latest, the land-water transition area has probably also become the anthroposphere. This not only brings into focus how people deal with these changes, but also how nature itself reacts to human intervention.

S39.311

Archeosciences of waterscapes, societies and environments during the late Holocene: A Mediterranean approach, Marseille, Akko, Venice and Gizzeh...

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Beginning around 4500 years ago, coastal societies developed harbours along the shores of the Mediterranean. This presentation will look at the three main natural forcings of external vulnerability, which are energy (swell, storms, etc.), relative sea-level change and the sedimentary budget at base level. We will illustrate the lecture with recent case studies (Marseille, Akko, Venice, Gizzeh...) and we will consider the adaptation capacities (abandonment, infrastructures...). These questions of adaptation to “natural risks” echo the concerns of current societies facing an unprecedented crisis, the Anthropocene, which highlights the external and internal vulnerability of waterscapes.

P01.13

Colonising a lake: the Roman conquest of the Middle Umbrian Valley

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The Middle Umbrian Valley is an extensive plateau entirely within today’s Umbria region, running north-south for a length of about 50 kilometers and an area of about 325 square kilometers. Located in the eastern sector of the Tiber basin, the Middle Umbrian Valley was the site of a lake (*Lacus Tiberinus*, which has now dried up) with a dense network of rivers and marshes. This system marked the entire Umbrian phase, also directing the settlement pattern on the surrounding heights, and had to change drastically due to the rising temperatures that occurred at the beginning of the 3rd century B.C., overlapping with the Roman conquest. This poster aims to analyse the phases of the Roman conquest of the valley in correlation with the environmental transformations that occurred with climate change and human reclamations. Furthermore, the new water layout of the valley greatly influenced the layout of the Roman foundations and the structuring of the roads, among browsable rivers and centuriation.

S41: Stone Age maritime Histories: the NEOSEA project

The archaeology of human use of the seas is extremely challenging. Outside of a few harbors and shoals, anything sunk in the deep seas is lost. Inferences must be developed from land data, ranging from the basic fact that humans reached Australia at least 50,000 years ago, to historic port documents of ship loadings and contracts. For the Stone Age, archaeological evidence for maritime journeys is limited to imperishable data, little is known regarding seafaring capabilities and practices, social organization, and motive forces for long-distance travels.

Recent research into the mobility of Stone Age societies in Europe suggests that seafaring was far more developed than previously supposed. Genetic, radiocarbon and archaeological evidence strongly suggest seafaring, coastal migrations, and inter-societal contacts.

The ERC starting grant project NEOSEA, which began in 2020, seeks to analyse and explain how trans-cultural maritime exchange shaped the Megalithic Ages (4700-3500 cal BC). It is a multi-disciplinary project requiring a wide range of skills in AMS radiocarbon dating, Bayesian statistics, molecular genetics, computer simulations, rock art studies and cultural anthropology.

In this session we will present early results and invite speakers working to related topics. Papers should adduce whatever data seem relevant to elucidating marine voyages and the rise of seafaring, as early as the Middle Paleolithic and up to the Copper Age. We welcome papers from all around the globe which discuss Stone Age seafaring capabilities, routes, technologies, navigation styles, the organization of early maritime societies and the socio-economic forces driving Stone Age seafaring.

S41.312

Curraghs: the Probable Early Seacraft of Northern Europe

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Maritime aspects of prehistoric Europe have been little explored until very recently. Lack of direct evidence discouraged archaeologists; maritime archaeology became a serious pursuit only when scuba diving equipment permitted adequate underwater work time. We then have had professional explorations not only of sunken ships but also of sunken land such as Doggerland. Still, there is a bias toward phenomena on land and retrieved objects, without discussion of that which was likely but not recovered archaeologically. Boats in the northern latitudes are an example: logboats (dugouts) have been found and rafts supposed, but the most likely watercraft were curraghs (Clark 1952:283; McGrail 2014:175-187) which should not be expected to be recovered (but see Clark 1954:177-178, Plate XXI, for what looks like a curragh oar). North of temperate forests, shell-built boats covered with hide or bark were the only watercraft other than rafts: curraghs (Irish), umiaks (Inuit), baidarkas (Russian term for such boats in Siberia and Aleutians), and birch- or elmbark canoes (northeastern North America). Curraghs were used in the Irish Sea as late as the 17th century for trade voyages, and their long-distance seaworthiness was demonstrated by Tim Severin's reconstruction the Brendan. One-man fishing boats called coracles survive in Wales. This presentation describes shell-built sea craft and suggests they were significant in the economies of coastal communities around the North Atlantic since at least Mesolithic times.

S41.313

Watercraft Innovation and Social Complexity: Comparative Analysis of Stone Age Boats from Scandinavia, California, and Japan

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This paper explores the transformative capacity of innovation in watercraft technology in three different Stone Age societies. We present the hypothesis that improved boat technology was a catalyst that drove increasing social complexity. In turn, maritime intensification drove further innovation of new forms of watercraft. Specifically, we will focus on sewn plank canoes, which were one of the most complex and capable forms of watercraft used by indigenous cultures in many different parts of the world. By sewing wooden boards together to construct a planked hull, ancient mariners were able to construct durable and innovative boats without the need for metal nails. Compared to the dugout and reed boats that often preceded them, plank boats were bigger, faster, and capable of longer voyages. Building plank boats, however, required considerable resources in terms of material, labor, and knowledge. This meant that in societies that developed plank boats the construction and use of watercraft for long-distance travel and trade often became an elite-focused activity. We argue that the connection between complex watercraft, elite-sponsored boat construction, and long-distance exchange created a positive-feedback system with runaway consequences for the establishment of political and economic hierarchy in many early maritime societies.

Focusing on pre-colonial southern California, we will discuss how the development of plank boats and antecedents such as composite reed/dugout boats led to a revolution in the capacity of indigenous Californians to reach and impact distance places. Controlling the construction of canoes allowed elites to be able to monopolize lucrative ocean-based trade routes

and accumulate wealth on a greater level than ever before. We compare the California case study to the Ainu of northern Japan, Sakhalin and the Kuril Islands, who used a similar sewn canoe, the *itaomachip*. As in California, the adaptation of sewn plank canoes in northeast Asia is correlated with increased regional interaction, with the Okhotsk culture from Hokkaido conducting raiding and trading voyages south to Honshu and across the sea of Okhotsk. These examples will also be compared with Bronze Age and Neolithic Scandinavia, where sewn canoes have also been associated with expansive maritime cultures. In all three areas, watercraft innovation enabled long-distance and trans-cultural connections while profoundly shaping the histories of these maritime societies.

S41.314

Sea watch & Sea uses (northwest France, 5th - 3rd mill. cal BC)

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In the northwest of France, from Atlantic to The Channel, coastal neolithic societies contacts prove obvious maritime journeys. One of the evidences of this mobility is the discover in some prehistoric sites of exogenous raw and finished products, as material culture (lithic sets and tools, ceramics...) as marine and terrestrial resources. The quantity and diversity of exchanges from mainland to islands (and the opposite) are the result of frequent, regular and repeated contacts, for long-distance travels in some cases.

Strategic points for the surveillance and/or control of inland waterways become a new necessity.

The coastal and island human installations are varied (some enclosures, megaliths, workshop sites...). Ditched and mostly walled enclosures (on coastal spurs) are regularly occupied but in a temporary and/or seasonal way, as new excavations attest. Their recent discovery also on the edges of rias, gulfs and estuaries is multiplying. They now mark out the coastal space and can be seen from one shore or island to another.

From now on, the workshop territorial network is oriented towards the ocean and becomes visible from the sea. A new social organization is proposed by these early maritime societies, with not really maritimes ways like today, but a navigation style with landmarks and crossing points to guide and help these ancient sailors

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S41.315

Similar Waters, Different Worlds: Exploring the Interplay between Seafaring, Environment and Social Strategies on the Pacific Northwest Coast and Southern South America

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Attempting to reconstruct Stone Age seafaring presents major challenges. Beyond the archaeological visibility of watercraft, a key issue is that theoretical models and archaeological predictions concerning aquatic movement are less developed than in terrestrial cases. The rich American ethnographic record can play an important role in understanding the socio-economical implications of past seafaring in aquatic Hunter-Fisher-Gatherer societies. In this work, we apply an explorative and comparative approach to different historical maritime societies along the Northwest Coast of North America (NWC) and the Fuego-Patagonian archipelago of Southern South America. Five study cases have been selected, three on the NWC (Chinook, Coast Salish, Tsimshian) and two in Fuego-Patagonia (Kawésqar, Yámana). Watercraft and seafaring played a key role in the way of life of these societies. However, despite inhabiting similar cold temperate environments, they represent a whole range of maritime worlds, in an environmental sense (ranging from rugged to uniform coastlines, from inland to open sea areas) but particularly in social and technological terms. They provide different paradigms of hunter-fisher-gatherer social complexity and organizational strategies, including different watercraft technology. Ethnographic data has been reviewed and analyzed for each case. GIS-based and learning machine methods have been applied to the archaeological data and used to discover spatial patterns regarding landing and site location decisions, settlement patterns and social interaction. Environmental-driven explanations and alternative explanations, drawn on the ethnographic data, have been evaluated in each scenario. Results help to understand how watercraft was integrated into production, mobility and everyday life on the NWC and Fuego-Patagonia. Moreover, the two regions and their respective internal variation have offered the opportunity to approach how environment, seafaring and social strategies interacted and varied regionally and locally.

S41.316

NEOSEA: How Neolithic seafaring and maritime technologies shaped a new interconnected world of megalithic societies

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The NEOSEA project investigates Neolithic seafaring and maritime technologies, and their role in shaping a new interconnected world of megalithic societies. Recent research into megalithic temporality, mobility and symbolic identity suggests that the rise of long-distance maritime journeys began in Europe as early as the megalithic era. Megaliths emerged in Northwest France (~4700-4200 cal BC) and then spread over the seaways along Europe's Atlantic and Mediterranean coasts. This new discovery leads to NEOSEA's core hypothesis that maritime long distance journeys and new skills in shipbuilding and navigation in Europe arose among hunter and gatherer societies in Northwest France ~2000 years earlier than previously proposed.

To test the proposed maritime mobility the project's methodology will refine megalithic radiocarbon chronologies in Europe down to historical dimensions, employ ancient DNA (aDNA) and strontium/oxygen isotope analysis from a representative number of megaliths, as well as sampling of environmental DNA (eDNA) in regions without bone preservation. This paper will present the project and first results of the excavation La Planche à Puare on the Atlantic island Ile d'Yeu in France.

S42: Scales of Transformation: the power of material minds

Do the worlds we build alter our own minds and the ways we process information? Do the material structures of our settlements, buildings, roads, and artefacts actively change patterns of thought and attention, so that understanding change in these ‘material codes’ becomes part and parcel of understanding the emergence of the modern mind?

To answer these questions the synERC XSCAPE brings together scholars from archaeology, vision science, and cognitive philosophy. Using a carefully curated set of materials, spanning a range of cultures and a wide sweep of historic and contemporary settings, we aim to test, for the first time, the hypothesis of materiality-driven cognitive change. To this end we will use a new synergistic methodology that combines multiple real-world case studies with state-of-the-art visual neuroscience, and simple agent-based simulations.

We are aiming at a framework for understanding the potent yet ill-understood cycles by which we humans make and transform the landscapes, practices, and artefacts that make and transform our minds. Possible contributors are invited for papers on question related to material minds which are related to scales of transformations in the socio-environmental arena.

S42.318

XSCAPE. A new Methodology for the Study of Material Minds

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The synERC XSCAPE explores how material artefacts and active engagement alter and transform human thought and patterns of attention. It aims to shed new light on the many ways, and the many interacting timescales, in which materiality affects cognition. Along the way, we hope to address and resolve the worry that artefactual evolution correlates with, but does not help cause, deep and abiding cognitive change. “Materiality” here means material culture: human made cultural artefacts that include portable objects but also buildings, landscapes and ornamentations. By synergistically combining frontline cognitive scientific work on visual search and embodied interaction with detailed archaeological and historical scholarship, a better understanding of this topic will offer new insights into the ways humans build worlds that alter and transform human minds. We use the XSCAPE acronym to capture the idea of many interacting arenas (landscapes, cityscapes, artefacts) each involving different sets of opportunities and constraints.

The rationale behind our approach is that we, humans, inhabit a complex built environment whose features and properties do not just reflect, but also impact and transform our model of the world. That model, in turn, determines the shape and character of our own experience, reaching deep into the neural processing that delivers perceptual experience itself. Much of what is most distinctive about human thought and mind (reason) has its roots in this process of multi timescale interaction because the complexity of the built environment has changed through time and depended, depends and will depend, on distinct social conditions. Delicate attention to multi timescale interactions provides concrete ways to test and prove the larger story because through time cognitive changes related to distinct artefacts styles and levels of social complexity should emerge and display their effects in both behavioural response and cognitive processing.

S42.319

Creating material and cultural landscapes - A constraints ontology for multiscale socio-historical dynamics

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Explicitly or implicitly, the epistemic status of historical laws have shaped the social sciences since their inception. As elaborated in Comte’s positivism or more recently in Asimov’s fictive discipline of psychohistory, a standard view seems to be that individual human behavior shows specific regularities, which ground the emergence of regularities at the collective level. Once equipped with predictive and explanatory power, these collective regularities are understood as proper scientific laws predicting or even explaining socio-historical dynamics.

However, such accounts suffer from the contingent nature of the evolution of social norms, institutions and cognitive meaning. No reasonable researcher would argue that we can predict with precision any future historical transformations, or that the social structure underlying “historical laws” cannot possibly be renegotiated. Accordingly, the present account aims to articulate an alternative naturalistic ontology for the social sciences by formalizing the role of individual and institutional agents in shaping the social and material constraints underlying human activity.

The notion of a constraint is imported from systems biology, where it stands for patterns in biological structure that canalize energy or chemical fluxes without exchange of energy. We articulate a sociological notion of constraints grounded

in the shared expectations of agents, as implemented in the material niche, social norms or institutions. We then discuss its meaning for sociological explanation, the role of agency in socio-historical dynamics, as well as the articulation between scales of human behavior.

The value of this account is illustrated through an assessment of Scott's discussion of the role of States in the construction of social and material landscapes. Legibility, i.e. accessibility to the view from above (of States and administrators), is understood through a dynamic of externalization of the expectations embedded in the cognitive structure of States (Guénin—Carlut, Avel. 2022. "Thinking like a State : Embodied Intelligence in the Deep History of Our Collective Mind." *IOP Conference Series: Materials Science and Engineering* 1261 (1): 012026. <https://doi.org/10.1088/1757-899X/1261/1/012026>.) We expose the implications of this analysis for the historical construction of social constraints, and more generally for dynamical and "longue durée" approaches to history.

S42.320

A Computational Methodology for Exploring Attention in a Material World.

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Attending is the process whereby the use of limited cognitive resources is optimized to explore and learn the structure of the world efficiently. We attend to sources of relevant sensory information that allow us to form accurate knowledge, beliefs, or expectations about world states (e.g., attending to your watch to know the time to show up on time at your appointment). Material artefacts (e.g., your watch) play a key role in supporting the allocation of attention and the processing of information making it (when all goes well) easier for on-board neuronal mechanisms to support behavioral success.

This fact is widely recognized yet remains under-theorized in cognitive neuroscientific theories of attention. By contrast, it is one of the clear priorities of cognitive approaches of modern archaeology. The starting assumption of cognitive archaeology is that what we call the mind and its functions are in many ways a result of our engagements with material culture and social institutions rather than simply their cause. Epistemologically, this licenses cognitive archaeologists to make inferences about past minds on the basis of archaeological records.

Our work explores recent developments in computational neurobiology that suggest a principled computational account of the attentional transformations supported by environmental structures and patterned practices. The goal is to leverage those recent developments in ways that make rich and fruitful contact with archaeological theory and practice. In this talk, we sketch the broad outlines of this novel framework, describing the shape and methodology of a computational cognitive archaeology of selective attention.

S42.321

Typologies as an illustration of the archaeologist perception?

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As archaeologists, we seek to understand past societies, their workings and their mentalities, through the remains they have left us. Everyday objects are particularly important in this attempt. Since its beginnings, archaeology has tried to make sense of these objects by classifying them into typologies which then allow the creation of chronologies or cultural assemblages, on which all archaeological interpretations are then based.

However, these typologies are also representative of the minds that conceive them. They are constituted with the aim of responding to a problem: dating the different phases of a site or a region, defining cultural or chronological assemblages, distinguishing different manufacturing techniques, etc. The categories they describe are also an illustration of the mentalities and perceptions of the people who create them. The differences used to define two types make sense to the person who perceived them at a particular time, but not necessarily to archaeologists comparing the same types today. Nor did they necessarily have the meaning - and certainly not the meaning we give them today - at the time the types were actually used. So the typologies we create, and use in everyday archaeology, do not have a generic meaning.

To support this idea we rely on a cluster analysis of Late Iron Age fibulae, for which several typological systems exist. For each typology, applied to the same objects, the results of the analysis are different. The conclusions of this experiment call into question the importance we give to typologies in our interpretations and analyses. Through this interrogation, the question of the researcher's own perception of the world he studies is also raised. The XSCAPE project could give a key to solve this problem, by showing us the real perception of artefact.

S42.322

Understanding the emergence of burial practice from a visual perception perspective

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This paper deals with Neolithic burials in Southeastern Central Europe and aims to explore how the visual perception of the burial process interferes with the spatial division and material diversity of grave goods and the body positioning inside the grave pit.

The majority of archaeological research so far under-investigated the cognitive and social relevance of the burial process, focusing too much on the dead individual and their grave goods. The standard narrative related to the burial practice is to see the grave and everything in it as a distinct and inextricable unit. Literally, all the items are seen as related to, or even as being, the property of the deceased person, expressing the deceased's social status, wealth and prestige.

I would like to combine two different ideas; Lambros Malafouris's Material Engagement and Charles Sanders Peirce's triadic model of the sign. The first concept is a synergistic approach which focuses on the relationship between cognition and material culture and pays special attention to the extended mind, enactive sign and material agency as the basic working hypotheses. Peirce's triadic model helps to create a scale for visual perception and enables us to understand how the signs and their meaning emerge through perception and are embedded into the memory.

From this perspective, I would like to study a burial as a set of different elements, for instance, 1) the grave pit as a planned resting place of the deceased body, 2) the body and its position inside the grave representing the last moment the living community perceives the buried individual, and finally, 3) all the items and objects which are placed on the body and into the grave as the objects placed in the grave by the burial participants/the mourners. We can look at the funerary ceremony as a collective activity of a community, applying a 'theatre metaphor' for all the participants and object to common acting. This process is embedded with their ordinary places and objects into a communicative memory of a community. The burial practice as a common action of a community help to create an action-based social process for someone's social death.

S42.323

What an ancient pot tells a present-day mind. A view from cognitive archaeology

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Our work will explore one of the main ambitions of cognitive archaeology and the extended mind paradigm, i.e. understanding how materializations of human practices relate to human cognition and to socio-cultural contexts. By tracking the relationship between (ancient and current) material culture and (present-day) perceptual behavior, we aim to understand the relationship between human minds, objects, and the world wry large.

In this talk we will discuss the potential that physiological measures such as pupillometry, eye- and gesture-tracking, electro-encephalogram and electro-cardiogram recordings, plus any other forms of behavioral readout, could be used as a proxy to understand the structure of current and past mental models of the world and varied strategies for learning and interpreting information.

Our pilot studies are based on data regarding the visual perception of prehistoric pottery that was analyzed using Eye-Tracking techniques in a way that has not been applied previously to archaeological material culture. We use as a test bed several datasets coming from Galicia (NW Iberian Peninsula) and that range from the Middle Neolithic until the end of the Iron Age (6000- 2000 BP). They belong to very different contexts that comprise a long-term history through diverse socio-cultural formations.

This methodology makes it possible to unveil cross- and intra-cultural patterns of visual response to materiality, while avoiding presentism and subjective bias. The results provide new insights into the agency of material culture which contribute towards our understanding of the relationship between the mind and the material world, and account for the transitive engagement between the way of thinking, seeing, and making things. This contribution is part of the XSCAPE project on Material Minds, funded by the ERC Synergy Grants call.

S42.324

'Blick und Glas, wie leicht bricht das': Contributions from an anthropological theory of breakage

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The following article presents an anthropological theory of breakage and highlights its contribution to questions of material-driven cognitive change. The notion that materials play an active and transformative role in human behaviour is gaining widespread recognition. In line with this recognition, XSCAPE: Material Minds aims to explore how materials “transform human thought and patterns of attention”. One way to approach this broad aim is to focus on phenomena involved in object breakage, as these phenomena expose how humans are forced to adjust to unpredictable situations in an active and changing environment. It is argued that these ‘adjustments’ are not entirely subjective operations but rely on a collective understanding of what to do when things break. This reactive, embodied and practical knowledge is explicitly encountered when handling brittle materials like pottery, which has been widespread mostly since the Neolithic. Following these considerations, a working hypothesis is presented: major changes in the cracking behaviour of pottery at different times in European prehistory triggered important modifications in human bodily knowledge. By integrating results from the mechanical testing of pottery replicas with information gathered from visual and/or gestural experiments, where broken pots are presented to human participants, this hypothesis can be potentially tested.

S42.325

Steps towards modernising pottery stylistic analysis: the first results of using eye-tracking method in Germany

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A new ERC project (Material Minds: Exploring the Interactions between Predictive Brains, Cultural Artefacts, and Embodied Visual Search) has been established in Santiago de Compostela (Spain, PI: Felipe Criado-Boado, Luis M. Martínez), Kiel (Germany, PI: Johannes Müller) and Brighton (United Kingdom, PI: Andy Clark). The research focuses on how the human mind perceives the material world. We want to know more about the cognitive process of information and to address two questions: (1) what is the relation between human modification of the world and the transformation of cognition through perception of increasingly complex ways? (2) is there any universal unconscious way how we are looking at objects and creating our ‘material codes’ during the process of information?

The classical archaeological research uses a typology for classifying objects based on their visual appearance and putting them into a previously determined order (material, cultural, chronological, etc.). This is the basis of all the pottery typological systems, which mostly count with the most preferred vessel forms and the typical decoration style. We would like to integrate the eye-tracking method into our archaeological tool-box to study the perception process of human-made objects like pottery and this way explore alternatives for the creation of more suitable classificatory systems. To this end, we create a database for further cross-cultural/regional analysis of how we are looking at different vessels.

In this paper, we would like to present the first results of our eye-tracking experiment at the Landesmuseum Halle (Saale). We preselected the pottery styles by 250 years of timespan based on the absolute chronological dataset and the previously existing detailed pottery typological system in Central Germany. We paid particular attention to marked socio-environmental transformational periods (5500-5400, 4900, 3800, 3300, 2800, 2200, 1800, 1600, 1300, 800, 400, and 150 cal BC) to prepare further studies about the cognitive archaeological modelling as well, to be able to combine our different database with the ongoing Scales of Transformation SFB Project at Kiel University.

S42.326

Continuity, discontinuity, transformations and Hodder’s entanglement: how materiality changed minds in the Neolithic

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The co-incidental arrival of various Neolithic life-ways with the sudden appearance and proliferation of the European megalithic monument were radical changes in human behaviour and social evolution in parts of Europe, with their co-appearance being somewhat staggered through time as each region chose to adopt them. In Heideggerian terms, monuments participate within social processes by showing the community *what they themselves know* (Heidegger 1971, pp. 42–43). That is, having been built by a community, monuments themselves gather, focus, direct and manifest the self-interpretations of that same group: engaging with these monuments reinforces, or draws anew, their own world view (Higginbottom et al 2015: 640). This paper argues that it is in this way, materiality possibly changed minds in the Neolithic, whilst demonstrating that materiality is completely entwined with the immateriality of belief systems and that these things influence each other at all times.

Further, this presentation will discuss how Hodder’s idea of Entanglement might play out. Hodder argues that past peoples are inextricably and co-incidentally intertwined, ensnared and entrapped by the things they make, as well as the things around them, funnelling them towards a future *not entirely of their own making* from which there is fundamentally no clear escape (Hodder 2012, 2016:8-12). Perhaps for archaeologists of megalithic societies, what is important here, is not what are they funnelling towards (which is an important concern for Hodder) but rather ‘why?’. This paper tentatively

argues that perhaps we are ensnared because we are not separate from Things but are Things, a materiality, and it is this that actually provides traction for our entrapment. Further, past peoples likely recognised this and we can see kinds of understandings taking place through the study of the material culture and the places chosen to locate these materialities. Perhaps they were created to escape such entrapments. This recognition of the constraints of their material existence is highlighted by the symbols of transformation and the transformation of the making of the monuments themselves. Through the study of dolmens of NW Iberia, this paper intends to *concretely* explore *how* materiality changed minds in the Neolithic, whilst maintaining their links to previously held understanding of their world.

S42.327

Oral literature and material culture - structural similarities in the Bronze Age and the Early Iron Age

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For the culture of pre-literate communities, memorization was essential to survive. Forgotten information or skills were lost forever. Therefore, the texts of oral literature are characterized by a structure that facilitates remembering. They were composed with the use of a poetic meter, dividing the text into equal sections of the length of the sound. This allowed for rhythmic recitation or singing, which could also be correlated with movement (e.g., with dance). Information was provided one after the other (additivity), repeated many times (redundancy), and often in a slightly altered way (a variation on a theme). The essential feature is, therefore, the multiplication of repetitive elements. It was noticed that the construction of metal objects in the Bronze Age followed the same pattern. In fact, three basic decorative motifs were used, which were repeated many times - often in a slightly different form. In the early Iron Age, this type of structure becomes readable through various media. It was the period when the so-called geometric ornaments dominated. The design of the ceramic decoration was based on the repeated motifs of squares and triangles. Repetitive elements were also used for metal objects. In architecture, the use of a unit of measurement and redundant modules is visible. The representations of animals and people were also constructed of geometric figures. In the case of Greece, the human body was understood as a composition of individual parts - which, moreover, corresponded to several souls.

Overall, it seems that oral texts had an impact not only on what people thought - but also on how they thought. The literary composition was reproduced through the construction of products of material culture. These convergences cannot be treated as a coincidence. Before any material object is created, a project is needed beforehand, which will then be implemented (hylomorphism). Therefore, archaeological artifacts can be treated as records of human thought.

S42.328

Stone Age to Metal Age: Transformation of Society during 2000 BCE - 200 BCE in South India

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It is well known that the invention/introduction of metals in an otherwise, stone using societies have resulted in dynamic transformation in the society. We see changes in their subsistence pattern, cultural transformation reflected in the material culture, expansion of the settlements including expansion into the unpopulated new areas, population explosion, changes in the rituals and burial practices, and introduction of tank irrigation. The flux created by the new and more effective tools and weapons with the introduction of iron in South India is very much visible in the above mentioned factors. Most parts of south India witnessed Neolithic culture in the last phase of its pure stone ages. The present evidence suggests that the introduction of copper/bronze was late in south India, compared to north and north western parts of Indian sub-continent. This situation has created an anomalous situation resulting in south India remaining in a stone age, while the northern regions have been witnessing the bronze age transformations. For example in 2500 BCE, whereas, north western India was reeling under the advanced Indus civilization, most parts of south India remained in Neolithic age. The botanical data from good number of excavated sites suggest predominantly dry cultivation. The megalithic culture also known as the Iron Age, coincides with the spread of wet cultivation. Plotting the megalithic sites on the 50,000 scale maps using GIS has clearly shown the link between the megalithic sites and the irrigation tanks. Analysis of the iron tools and weapons and other cultural material recovered from the megalithic burials suggest craft specialization by about 800 BCE. Recent research suggested that, the earliest sculpturing tradition in south India could be traced back to the megalithic period. The community also had sufficient astronomical knowledge as suggested by the orientation of the monuments and the depiction of stellar constellations. The differential treatment in monument construction and disposal methods followed by the megalithic people suggest that there was considerable social stratification by the megalithic period. The paper aims at examining the Neolithic - Megalithic transition period, which was a crucial period in the social formation and material culture of south India.

Continuities and ruptures between the 6th and the 5th millennium in the Žytava Valley. The transition from the Linear Pottery Culture to the Lengyel groups

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The transition between the Linear Pottery Culture to the Lengyel groups has been explained from the Historic-cultural paradigm with a narrative of change, based on the typological seriation of pottery, as well as in the different settling models identified, and assigned by archaeologist to different cultures, understood in a traditional way of a group holder of a characteristic material culture. However, the lack of absolute datations, and the recurrent appearance of mixed materials suggests a more complex process than a linear transition.

Instead of the traditional approach, I propose an approach focused on the study of pottery and its technology, comprising decorative motives, technological selections, and presence of organic material used as temper. I pursue to obtain a picture of the productive social units of the society, and characterize if these are based on household, settlement or regional frame, and how these units interacted within the regional frame. From this interaction, I expect to develop a coherent social model of transition that explains the ruptures and continuities through the period under study.

Decoration is classified in simplified motives, in order to distinguish coherent groups and subgroups from an emic perspective, and establish their potential interaction. Pottery technology, understood from the Practice Theory, comprises modelling techniques and temper selection that are cultural choices that characterize units of apprenticeship and production. Finally, the focus on organic tempering used, provides an insight on the by-product available or selected by the productive units, as well as a proxy to the crops available.

By combining those three proxies we expect to obtain a comprehensive image of the actual communities based on the characterization of productive units, and how they were conformed and interacted, and understand the contradiction that produced the socio cultural change perceived during the pass from 6th to 5th millennium in Southwestern Slovakia.

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