

9th

International Conference on the Mesolithic in Europe

Belgrade / Serbia / 14th–18th September, 2015



Book
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The Ninth International Conference on the Mesolithic in Europe

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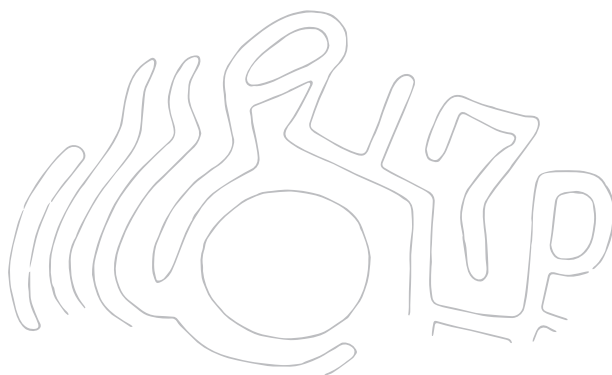
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the Mesolithic in Europe**

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Editor
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Publishers
Institute of Archaeology, Belgrade
Faculty of Philosophy, University of Belgrade
National Museum, Belgrade
Cardiff University, UK

Design
Dušan Pavlić

Desktop publishing
Marko Huber

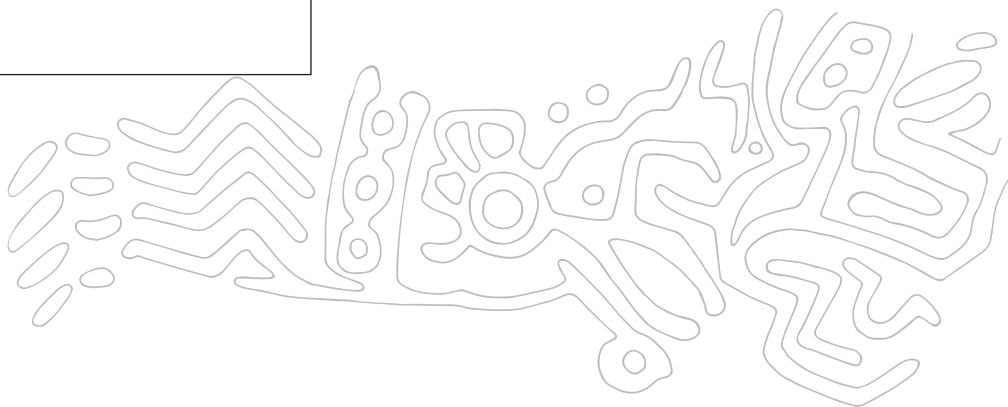
Printed by
DC Grafički centar, Belgrade

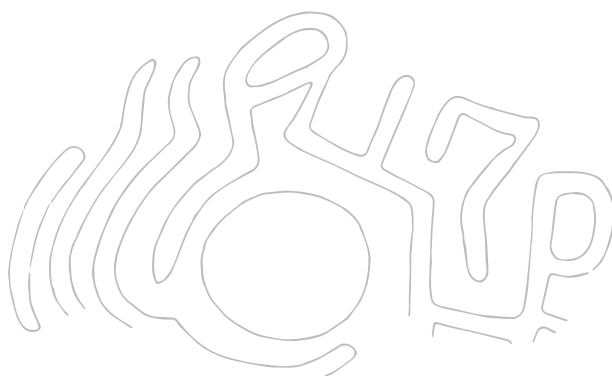
Print run
450

ISBN 978-86-80093-98-7

The organisation of the Ninth International Conference on the Mesolithic in Europe MESO 2015 was partly funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia.

CIP - Каталогизacija y yбликацији
Народна библиотека Србије, Београд





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MESO 2015 | conference programme

MONDAY 14th September 2015

8:30–9:30 Registration

9:30–10:00 Opening Ceremony

10:00–10:25 The Danube Gorges Mesolithic: The first 50 years

10:30 Plenary Sessions (Main Auditorium of the Serbian Academy of Sciences and Arts – SASA)

TRANSITIONS – BEGINNINGS, PEOPLE IN THEIR ENVIRONMENT

18:30 POSTER PRESENTATIONS

19:30 Reception

TUESDAY 15th September 2015

8:30 Sessions running in parallel (Ceremonial Hall of the Rectorate and Faculty of Philosophy)

Faculty of Philosophy, “Georgije Ostrogorski” Lecture Auditorium:

TECHNOLOGY

Kapetan Miša’s Palace, Ceremonial Hall of the Rectorate:

COLONIZATION, SETTLEMENT, BODY

Faculty of Philosophy, Lecture Room on the 1st floor:

MONOGRAPHIC SESSIONS: MESO TIME, THE EUROPEAN MIDDLE MESOLITHIC: A REVIEW

WEDNESDAY 16th September 2015

Excursion to the Danube Gorges organized for all conference participants

THURSDAY 17th September 2015

8:30 Sessions running in parallel (Faculty of Philosophy)

Kapetan Miša’s Palace, Ceremonial Hall of the Rectorate:

RITUALS AND SYMBOLS, REGIONAL IDENTITIES

Faculty of Philosophy, “Georgije Ostrogorski” Lecture Auditorium:

LANDSCAPES AND TERRITORIES, TRANSITIONS – ENDINGS

Faculty of Philosophy, Lecture Room on the 1st floor:

MONOGRAPHIC SESSIONS: THE STUDY OF TECHNOLOGY AS A KEY TO UNDERSTANDING PIONEER MOVEMENTS – A NORTH-WEST EUROPEAN PERSPECTIVE, FROM THE JOMON TO STAR CARR

FRIDAY 18th September 2015

8:30 Plenary sessions (Main Auditorium of the Serbian Academy of Sciences and Arts – SASA):

SOCIAL RELATIONS AND COMMUNICATIONS, CURRENT RESEARCH

18:00–19:00 Selection of the host for the next MESO 2020 meeting

20:00 Gala Dinner

MESO 2015 | ABSTRACTS

GENERAL SESSIONS

MONDAY 14th September 2015

Main Auditorium of the Serbian Academy of Sciences and Arts (SASA)

TRANSITIONS – BEGINNINGS

Palaeolithic/Mesolithic stratigraphic sequences of North Bohemia (Czech Republic)

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Here we present new evidence on the Mesolithic settlements in rockshelters of the North Bohemian sandstone region (Czech Republic). During the 2007–2013 research, a continuous Late Palaeolithic/Mesolithic sequence has been analyzed at the site of Údolí samoty. Additional newly excavated sites (Janova zátoka, Malý medvědí tábor, etc.) correlate with the individual stages of this sequence. The earlier and newly excavated sites provide a regional settlement network and continuous environmental records from the Late Glacial to the Early and Middle Holocene. This evidence shows that these foragers were optimally adapted to the versatile landscape of sandstone plateaus and canyons throughout the climatic changes, in order to exploit its changing vegetational and faunal resources.

Transition and tradition: Lithic variability in the cave of Vlakno

Dario Vujević (*University of Zadar, Croatia*) dario.vujevic@gmail.com and **Mario Bodružić** (*Arheolog d.o.o., Croatia*)

Until recently Mesolithic on Dugi Otok was known only for open-air sites related to raw-material deposits. Discovery of the Vlakno Cave offered a possibility of connecting sites into a dynamic territorial network. Presently the Vlakno Cave is the only site in northern Dalmatia in which we can trace transition from the Palaeolithic to Mesolithic, changes in material culture, etc. The finds clearly show changes in the organization of life of the Mesolithic communities of hunter-gatherers due to accommodation to new climate conditions. Patterns evident on the lithic finds indicate gradual transition to typical Meso-

lithic industry with strongly pronounced Epigravettian tradition. Detailed lithic analyses should reveal visible patterns of lithic variability and determine their relations with other activities of the cave inhabitants.

Recent microlaminar complexes and the emergence of the first geometric tools in the northeast of the Iberian Peninsula

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From ca. 11,000–10,500 BP (ca. 13,000–12,300 cal. BP) in the Northeast of the Iberian Peninsula, in a context marked by end-scrapers/backed bladelet-point duality, the early geometric elements appear. These elements are some segments and triangles, but never had an important role. Their presence suggests a change in the design of part of stone tools. These levels have been traditionally associated with the Sauveterrian complex. Despite this, in recent years several studies highlight their important links with microlaminar complex (Epimagdalenian) rather than geometric complex (Mesolithic).

In this presentation we present the industrial and economic data of the sites that have offered these materials and conduct an evaluation of the available information. These data suggest that these early levels with geometric stone tools can be related with the microlaminar complex (Epimagdalenian).

A geoarchaeological study of the Pleistocene to Holocene transitions from the Socuevas and Martinarri rockshelters (northern Spain)

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The results of the stratigraphic, sedimentological and geoarchaeological characterization carried out at Socuevas and Martinarri archaeological sites, located in the southern region of the Basque Country (Pobes, Álava, Spain) and Burgos (Obécuri, Treviño, Spain) are presented. This analysis aims to establish a stratigraphic architecture and identify the type and different sources of the studied archaeological sediments, leading to an understanding of the relationship between humans and their surrounding palaeoenvironment. A micro-morphological study of different stratigraphic levels of the sites is carried out, performing a loose sediment sampling as well as obtaining unaltered sediment blocks to obtain thin sections. An intense stratigraphic sequences complies the Socuevas and Martinarri rockshelters which cover the end of the Pleistocene and Early Holocene, comprising the record of the last Magdalenian and Mesolithic societies.

The Socuevas site is a rockshelter that takes advantage of a scarp located on the banks of the Bayas River. The rock shelter is strategically located for hunting activities and currently consists of a carbonate conglomerate wall and a collapsed roof, probably during the Pleistocene-Holocene transition. The Martinarri site is a considerable sized rockshelter;

the roof, which currently reaches almost 3 meters in length, covers an area of about 15 meters long and 3–4 deep. The Martinarri rockshelter is well preserved, resembling its prehistoric features: there are no apparent collapses or alterations; it is a shelter of 15 x 3 m, adequate for a small to medium size group of Magdalenian and Mesolithic societies. During the excavation process different levels and sub-levels were distinguished in Socuevas and Martinarri. In order to identify source areas and site formation processes mineralogical and geochemical analysis of samples were made, through X-ray diffraction and X-ray fluorescence, to complement micromorphological studies. New data have been extracted from this stratigraphic, sedimentological and geoarchaeological study and all this made possible to define and distinguish interesting information about archaeological and natural environmental conditions and processes.

PEOPLE IN THEIR ENVIRONMENT

Dynamic relations between humans and their environment in Early Mesolithic Norway

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The Pleistocene–Holocene transition marks one of the most abrupt and severe climatic shifts in human history. The colonization of Norway occurred during this transition phase, and for 1500 years (ca. 9500–8000 cal. BC) the whole coast was occupied by mobile hunter-gatherers with a marine subsistence focus. Palaeo-oceanographic data from the Norwegian coast demonstrate spatial and temporal differences in the marine environment during this time span. A cooling pulse with widespread ecological consequences is recorded at ca. 9300–9200 cal. BC (the Preboreal Oscillation). A more gradual shift occurred around 8800 cal. BC when the arctic climate gave way to warmer conditions: the Norwegian Atlantic current stabilized, all fjord systems became ice-free, and animal diversity increased. In the northernmost region, the impact of Atlantic waters was less severe, and Polar conditions with more sea ice seem to have lingered throughout the period. With an updated record of archaeological sites we explore human adaptations to the varied and shifting seascapes of Early Mesolithic Norway.

A thousand years in flames: A diachronical perspective on fuelwood use in Cabeço da Amoreira (Muge shellmiddens, Portugal)

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Fuelwood was one of the most important resources for fire production in past societies. Fire played an important role on the economy of the last hunters and gatherers. Charcoal, resulting from those activities, gives us insights on the exploitation of the environment and management of wood and fire within a site. At the Muge shell middens, Cabeço da Amoreira (ca. 8000–7000 cal. BP) had several occupations for almost a thousand years and the charcoal remains are abundant in habitational, midden and funerary levels. From the analyses of different contexts (structures, pits, burials, hearths, shell midden layers) more than 4000 charcoal fragments have been identified. Taxonomic and taphonomic observation allowed the identification of *Pinus* as the main fuelwood, used in combination with *Quercus*, mainly large size pieces. Other less represented taxa are also present (*Arbutus unedo*, *Pistacia lentiscus*, *Salix*, *Monocot.*) and the variation between contexts suggest a differential use of some species for specific contexts over time.

Small vertebrate zooarchaeology of Muge: Preliminary results on subsistence, seasonality and social complexity

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The Pleistocene-Holocene transition ca. 11.5 ka cal. BP is associated with dramatic climatic changes. These shifts led to fundamental changes on landscape and, therefore, have been seen as responsible for a major impact on the ecological behaviour of the last communities of hunter-gatherers in the western European territory. In the case of Iberian Peninsula, it is commonly assumed that these human ecological changes are reflected in new settlement patterns and subsistence that marked the Late Upper Palaeolithic-Mesolithic transition.

The aim of this paper is to reconstruct economic aspects related to diet, subsistence and settlement patterns, through the study of the remains of small vertebrates, marine and terrestrial, from recent excavations of the Cabeço da Amoreira Mesolithic shellmidden (Muge, Portugal). This study focus on an ecological and economic perspective in a way that makes possible to address questions about these populations subsistence, based on such aspects as: settlement dynamics and its relation to seasonality, type of resources, the observation of capture systems (dependent of species?), and non-dietary catch.

Shell middens and karst: Deciphering the Asturian sites' formation and human activities using micromorphology

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In the littoral platform of the Cantabrian region (northern Spain), more than one hundred deposits of marine shells and other archaeological material dated to the Mesolithic are identified, all cemented by carbonate precipitation in the walls and roofs of karstic cavities. This archaeological reality was defined as Asturian culture in the early 20th century and since then it has been a traditional issue of investigation in the region. However, the knowledge about the Asturian shell middens still lacks information about the formation and post-depositional processes. This is due to the scarcity of geoarchaeological approaches on these contexts.

Recent excavations at the sites of El Alloru and El Mazo, both limestone shelters with the typical cemented shell middens, revealed also shell middens preserved in stratigraphy, corresponding to the Mesolithic occupation. Undisturbed sedimentary block samples were collected for micromorphological analysis. Thin sections obtained from the cemented shell middens and anthropogenic deposits *in situ* within the shell layers, such as combustion features, provide a systematic identification and description of sedimentary microfacies, and identification of textural features in the sedimentary groundmass that can be associated with the human activities related to the accumulation of the shell middens and the exploitation of this karstic littoral ecotope.

Coastal resource exploitation during the Mesolithic in the Cantabrian region: Archaeomalacological research from the shell midden site of El Mazo (Asturias)

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The Mesolithic on the Atlantic Europe façade is characterized by the formation of large shell middens on coastal locations. In northern Iberia this characteristic is a result of intensive exploitation of littoral areas by the last hunter-fisher-gatherers. Archaeomalacological research is crucial to understand the shell midden phenomena and to obtain information on subsistence strategies and settlement patterns. In this paper we present the results obtained from the study of molluscs and other coastal resources (crustaceans and echinoids) from the shell midden site of El Mazo cave (Asturias, northern Spain). We examined the archaeological remains from 18 stratigraphic units, all of them dated by ^{14}C AMS to the Mesolithic (9000–7500 cal. BP). Chronological and archaeomalacological data was used to draw the evolution of shell collection strategies throughout the Mesolithic. The results obtained provided information about species representation, taphonomy, collection areas, size selection and intensity of collection. Moreover, this research also examines whether the species representation along the stratigraphical sequence allows the reconstruction of environmental conditions and their evolution during the Early Holocene.

Plant use at the Mesolithic site “Parque Darwin” (Madrid, Spain)

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Either for food or as a raw material, plants were probably the most important resource for past hunter-gatherer communities in the temperate regions of the planet. For this reason, if we want to know the economic and social organization of past societies, it is an urgent need to understand their relationship with plants. On the other hand, in spite of the growing number of archaeobotanical analyses at Mesolithic sites, these are still scarce for some particular geographical regions. Such is the case of the Central Meseta of the Iberian Peninsula. In this work we present the first results that shed light on the relationship among these Mesolithic populations and the plant resources of their environment. Archaeobotanical sampling at the site Parque Darwin (Madrid), dated between the eleventh (ca. 10200–9910 cal. BP) and the tenth (ca. 9550–9400 cal. BP) millennia BP, has allowed the identification of nine plant taxa among the fruits, seeds and charcoal remains. The identified species correspond with the potential vegetation that was growing in the region and have several economic known uses. An initial interpretation on the management of these resources is attempted.

Mesolithic-Neolithic continuity in the use of plant resources: The evidence from Serbia

Dragana Filipović (*Institute for Balkan studies, Serbia*) drfilipovic12@gmail.com

Recent archaeobotanical and anthracological studies of the Mesolithic sites in the Danube Gorges in Serbia (Vlasac and Lepenski Vir) have provided first information on the selection and use of plants prior to the introduction of farming in the central Balkans. The paper will present this evidence, and compare it with the botanical record from the (early and late) Neolithic sites in the region. It will explore and identify (dis)continuities in the plant choice and plant use between the two periods, and examine them from the environmental and economic perspectives. The results will be placed in the wider geographical and chronological context.

Test pit 2: A window to plant resources and plant use at the Mesolithic site Zamostje 2, Sergiev posad, Russia

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The archaeological site of Zamostje 2 is located 50 km north from Sergiev Posad (Moscow, Russia). It is situated at the shore of the Dubna River. It is composed of four archaeological levels, which have been dated between the Late Mesolithic and the Neolithic. The constant presence of water within the archaeological layers has allowed an exceptional preservation of organic remains and the retrieval of a large quantity of them. Archaeological interventions began at the site in 1989. Since then, many studies have been made on wood artefacts or fish traps, being one of the sites in Europe where the exploitation of riverine and water resources is better known. In this work, we present the results of the first systematic archaeobotanical sample, which consists of a column profile retrieved at the Test Pit 2 during the 2013 field season. The column have yielded more than 4000 plant remains corresponding to over 50 taxa, many of them have several known uses. The results of the archaeobotanical remains (seeds and charcoal) are put together and discussed under the light of the pollen evidence coming from the same sample, in an attempt to interpret how the managing of these resources took place.

Change or continuity in animal exploitation from the Mesolithic to Neolithic at Zamostje 2 (Russia): Preliminary results and perspectives of research

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Zamostje 2 (Russia) is a multilayer peat-bog site, excavated from 1989 until present covering a chronological sequence from the seventh to the fifth millennia BC. Among archaeological remains, a huge and very well preserved faunal assemblage is available for study. At Zamostje 2, both Mesolithic and Neolithic subsistence economy rely on hunting, fishing and gathering, as no domestic animals (except dog) has been identified. Exploitation of aquatic biotopes is predominant, as suggested by the faunal spectrum: elk, beaver, ducks and fish. This could refer to on-site exploitation, on the lakeside. However, the trend observed in bird exploitation suggesting a change in the exploited biotope, from the Mesolithic to the Neolithic, increasing fowling in forests, has to be confirmed and confronted with other faunal data. Is it possible to evidence variations in mammal exploitation, according to chronological layers? If elk and beaver are always the first hunted species, an examination of their detailed contribution and from other species, such as wild boar, brown bear or pine marten, a small carnivore strongly connected to forest environment, could give some interesting results. If such a variation exists, it could be linked to differences in environment exploitation modalities due to cultural change, e.g. introduction of pottery and increased sedentism.

Mesolithic wooden artefacts and constructions from Zamostje 2 Site: Typology, chronology, palaeolandscape

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Wooden tool-kit from peat-bog site Zamostje 2 (Upper Volga Basin, Central Russia) now counts more than 300 implements for different economic activities and five wooden constructions for fishery (fish-traps and fish-fences). The spatial analysis of the finds and structure of tool-kit allow us to reconstruct the excavated area a long-term settlement close to the lakeshore line. The radiocarbon dating of wooden construction and implements made from wood allow to define chronological, technological and typological differences for the period from the seventh to the beginning of the fifth millennia cal. BC (Late Mesolithic – Early Neolithic in central Russia). Considerable differences in raw material choice for different tools made from wood and wooden constructions reflect differences in the types of forests and their location on the different stages of human occupation on the site, and finally it gives a solid backgrounds for reconstructions of the local palaeoenvironment in the Late Mesolithic and Early Neolithic periods.

An analysis of seasonality and hunting at Mesolithic sites in southern Sweden and Denmark

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The seasonality of Mesolithic sites has been a central issue in understanding settlement patterns and defining settlement types. Most studies of seasonality have been case studies of single sites or settlement complexes. To study the seasonality 39 settlements from south Sweden and Denmark dating to ca. 8000–4000 cal. BC have been compiled and analyzed. The analysis is based on ageing of teeth and bones of cervids, aurochs and wild boar. The focus has been on the seasonality of the hunting. A complete study of the seasonal occupation would also consider storage, fishing and gathering, issues not included in this study. During the Early Mesolithic the animals have been primarily hunted in the summer and early autumn, while during the Late Mesolithic the hunting was less restricted to any season. The hunting season of different wild game differ. Aurochs and moose calves were hunted during the summer, roe deer mostly in summer and early autumn, while the hunting season on red deer was in late summer to early winter. The hunting of wild boar seems to be less restricted to a specific season, which could be an effect of the less seasonal reproduction of this species.

A random selection from the household waste? Interpreting burnt animal bone material from Saarenoja 2 Early Mesolithic site, SE Finland

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The Early Mesolithic site of Saarenoja 2 in southeast of Finland has been excavated during several field seasons since 2000. So far, it has turned out that the site is one of the oldest in the eastern part of the Baltic Sea, and that some structural features at the site can be reconstructed. In this presentation our main focus is on burnt animal bone material from ex-

cavation seasons 2011–2014. Based on the spatial distribution and AMS dates of the bones (mainly *Alces alces*, *Castor fiber*, *Esox lucius*) and a comparison with finds in other similar sites in Finland and neighbouring areas, we will interpret what these bones represent, and what kind of information they bear about the uses of animals at this site and also more generally among the eastern and northern Europe forest zone early postglacial pioneer habitation.

Hunting moose at the foot of the mountains – 8500 years of hunting at Pålbufjorden in southern Norway

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Parallel with a massive deglaciation in the Early Mesolithic of Norway, the open landscape with an ice age fauna was replaced by forest and less cold-tolerant species. Moose (*Alces alces*) soon established routs of seasonal migration, and from early on strategic places along these paths became important hunting grounds. The western side of the lake Pålbufjorden (ca. 740 masl) forms a bottleneck through which a moose migration route runs. A high number of moose passes this bottleneck formation every spring and autumn. Excavation of 24 Stone Age sites, combined with surface surveys, has resulted in the recovery of large quantities of charred bone, lithic artefacts, a house pit and hearths. This gives a detailed insight into the past hunting activity.

Artefacts and ^{14}C analysis of bones dates the beginning of this hunting tradition to the Middle Mesolithic (ca. 6500 cal. BC). In addition, sites from Late Mesolithic and younger periods have been studied. This paper will discuss the beginning and developments in this extremely long-lasting hunting tradition, within a local and regional perspective.

Hunting beyond red deer: Exploring species patterning in Early Mesolithic faunal assemblages in Britain and NW Europe

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Narratives of Mesolithic hunting strategies in Britain and wider north-west Europe have previously conceived of ‘red deer economies’, in which life revolved, to a great extent, around the procurement of this species. Such subsistent models have subsequently influenced models of seasonal transhumance and interpretations of site-use and flint assemblages. Although over the last 40 years the importance and exclusivity of red deer, and the suitability of subsequent models of movement and seasonality have been challenged, the species remains, to an extent, a symbol of Mesolithic hunting.

This paper compares the frequency of species from four re-analyzed sites in southern Britain with those from previously analyzed sites in Northern Britain, France and Scandinavia to explore the geographical and temporal shifts in species killed during the Early Mesolithic. Moving beyond single-species monolithic hunting strategies and large-scale models of transhumance, the variety of species hunted highlights the need to consider Mesolithic hunting strategies that undertook a range of tasks and encountered numerous different species with changing local populations, within a mosaic of different environments.

Skellerup Enge and the distinctive subsistence economy on Jutland at the Kongemose-Ertebølle transition in Denmark

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The idea of Middle and Late Mesolithic groups in Southern Scandinavia as representatives of complex hunter-gatherers is a proposition with a long history of discussion and much support. The economic basis of these groups is recognized as being substantially marine-oriented (fish, shellfish, marine mammals, and waterfowl), but with a significant terrestrial component as well. It is only relatively recently that zooarchaeological research has begun to highlight regional differences in the subsistence regimes from this period. Analysis of faunal remains from the Danish site of Skellerup Enge, a Late Kongemose-Early Ertebølle coastal site on Jutland, shows a high relative abundance of cod-family fish – a fishery that contrasts with most other known assemblages from western Denmark during this period. Although hunting was focused on the well-known ‘big three’ (roe deer, red deer, and wild boar), there was also an important component of very large ungulates (aurochs and elk) and marine mammals. Significantly, the two other sites on Jutland with similar fisheries (Lystrup Enge and Norslund) also date to around the Early Ertebølle period and evidence hunting of aurochs, elk, and marine mammals in addition to the ‘big three’. Explanations for this distinctive subsistence pattern must consider both environmental and cultural factors.

Mesolithic subsistence of Vlakno Cave (Croatia)

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The eastern Adriatic was, during the Pleistocene-Holocene transition, an area of dynamic climatic and environmental change, both factors influencing the subsistence changes noted in the early Holocene in the region. In the middle of the eastern Adriatic, in the region of Dalmatia, lies Dugi Otok (Long Island). This paper presents a case study of Vlakno Cave, which is located in the interior of the island between the villages of Luka and Savar. Recent archaeological research of this multistratum cave site, amongst other things, revealed an abundance of faunal remains, and proved that the cave has been more or less continuously in use for the past 20,000 years. This study looks at Vlakno's Early Mesolithic faunal assemblage, focusing on its vertebrate remains. It is possible to separate two phases that reflect changes in the subsistence strategies and dietary habits of the cave's Mesolithic inhabitants. This provides an excellent base for comparison with the contemporary faunal assemblages from the wider area of the region, and in particular to highlight the specifics of this site due to the nature of the island's conditions.

Subsistence strategies in the seventh millennium BC on the territory of Eastern Europe

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Final Mesolithic communities can be characterized by a high level of adaptation to different ecological niches. The man settled in almost all zones – from steppe to polar. It is important to understand how the societies were dependent on changes in ecological niches and could these changes force them to look for new places. Every society that left the habitual niche was supposed to search for a similar one, where it brought the same subsistence strategies, as on its primary place of living. Thus, how this strategy correspond to new ecological conditions, or how flexible it is and how quickly can it change will determine further surviving. It might be important for the process of ceramic traditions distribution from the southern regions of Eastern Europe to the forest and steppe-forest zone in the milieu of hunter-gatherers, where the whole complexes of southern cultures cannot be traced. In one of these regions – Dnepr-Dvina – we can trace the changes that occurred with the appearance of pottery in settlement system; there is also evidence of different groups of people gathering during winter on one of the sites. It was at this time when we might also suppose the existence of definite types of food storage in the pottery.

The utilization of aquatic resources in late Boreal southern Scandinavia – Fish fermentation and mass catches on the site Norje Sunnansund around 9.2 ka cal. BP

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The importance of aquatic resources in archaeological foraging societies has been hard to see due to the small and fragile nature of fish bones. This has led to an assumption that fishing has been of subsidiary importance for human subsistence in the Boreal Early Mesolithic period. Recent finds shows that this view can be diversified, highlighting the importance of fresh-water fishing. The site Norje Sunnansund in southeastern Sweden was located on the shores of a shallow lake next to an outlet leading to the close by the Baltic Basin. The site displays a high variety of hunted terrestrial species but it is the amount of fish bones found here, where calculations show well above 100 tons of caught fish, which sets the site apart. At the site, the remains of a fish fermentation gutter were also found, where large amounts of fish had repeatedly been fermented to conserve the fish for later consumption. The huge amount of caught fish, and the means to prepare and store them, is possibly the oldest known example of a large scale fishing society. The knowledge and commitment to catch and prepare these large amounts of fish have further implications on a more structural societal level.

The currents of time: Fishing in the Mesolithic-Neolithic Danube Gorges in the diachronic perspective

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With their long temporal sequence spanning from ca. 9500 to 5500 cal. BC (the Mesolithic, 'Transformational' and Neolithic phases), the Danube Gorges sites (North-Central Balkans) reveal fascinating evidence of landscape use, subsistence strategies, settlement and burial practices in the long term. It has been hypothesized that fishing and favourable fishing conditions lead to the prolonged stay of human groups in this region in the Early Holocene, and consequently to the rise of first (semi)sedentary settlements. The economic and social significance of fishing is manifested by large quantities of fish remains, isotopic values and sculpted boulders representing fish-like beings. This paper presents the results of the archaeozoological analysis of fish remains from the sites of Lepenski Vir, Padina and Vlasac, and compares the patterns and intensity of fish exploitation in different phases of the sequence. A particular emphasis is placed on contexts that can be related to the earliest occupancy of the sites, as well as contexts that witnessed most extensive occupational and fishing activity. By reflecting on the nature and significance of fishing in subsistence strategies and occupational patterns in the diachronic perspective, the paper explores the relationship between fishing and increased sedentism and its role in Mesolithic-Neolithic transformations.

How 'marine' were coastal Mesolithic diets?

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Stable carbon ($\delta^{13}\text{C}$) and nitrogen ($\delta^{15}\text{N}$) isotopic values on human skeletal remains from coastal Mesolithic sites in Europe are often very elevated, indicating the importance of marine foods. While this has long been known in general, there is considerable variation both within and between different sites. Much of this variability can be related to two factors: space and time. Time is important because it defines where the coast actually was when a particular site was occupied. The main focus in this presentation, however, is on space. That is, there is considerable spatial variability in the isotopic baselines of the fish, shellfish and marine mammals on which humans relied to varying degrees. Thus, different human $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values from various parts of Europe could potentially refer to similar degrees of reliance on marine resources. Modern and archaeological isotopic measurements on marine organisms are here reviewed in order to help refine our interpretations of marine resource utilization by coastal fisher-hunter-gatherers. This has implications not only for our understanding of past subsistence practices, and the possible reasons underlying its variability, but also for the dating of the human remains themselves, given the need to estimate the proportion of marine protein consumed when correcting for the marine reservoir effect.

Human diet and mobility in the Paris Basin during the Boreal: Insights from the stable isotope analysis of bone collagen

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The Boreal (ca. 10.0–8.8 ka cal. BP) was a period of development of the mixed deciduous forest in Europe in a climatic optimum context. To decipher the subsistence pattern of the human population at that time, we conducted stable isotope analysis on human remains from the Paris Basin in France found in association with faunal remains (Auneau-Parc du Château, Les Closeaux-Rueil-Malmaison) or in a single burial (Mareuil-lès-Meaux-LesVignolles). To reconstruct their diet, the ^{13}C and ^{15}N abundances in bone collagen were measured on the most represented terrestrial preys (red deer, roe deer, wild boar, and aurochs) as well as on fish (pike). The results confirmed that the majority of the protein of the human diet came from the meat of terrestrial herbivores. The herbivores of Auneau provided systematically higher ^{13}C abundances compared to those of Les Closeaux, as a result of a more open habitat. The analysis of ^{34}S revealed also a clear contrast between the two sites, probably derived from differences in the local bedrock. The ^{13}C and ^{34}S abundances in human collagen reflect the contrast observed in their respective associated fauna. Such a result indicates a high territoriality pattern in the human exploitation of the environment.

Tuesday, 15th September 2015

Faculty of Philosophy, “Georgije Ostrogorski” Lecture Auditorium

TECHNOLOGY

The First and Second Mesolithic of La Grande Rivoire (Isère, France): A diachronic perspective on lithic technology

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Discovered in 1986, La Grande Rivoire is a rockshelter located in the north of the Prealpine mountain range of Vercors (Northern French Alps) at 580 masl. The six meters stratigraphy reveals a continuous chrono-cultural sequence starting from the First Mesolithic to the Gallo-Roman period. The present paper aims at presenting and characterizing, from a diachronic perspective, the results regarding the lithic technology of the First Mesolithic

sequence (ca. 8500–7000 cal. BC). Data gathered are intended to contribute to the understanding of the regional chrono-cultural evolution.

The 18,000 lithic artefacts unearthed in a marginal area of the settlement allowed us a vertical projection analysis from which five distinct assemblages were distinguished. Throughout the sequence, typo-technology shows that domestic tools are mostly manufactured on local raw material of poor quality while regional raw materials of much better quality are always used for the creation of microliths. Regarding the *chaînes opératoires*, unlike typology, slight technological changes may be observed and the *débitage* is always aimed at the extraction of irregular bladelets of triangular section by direct percussion. At the end of the whole sequence, the emergence of regular bladelets of trapezoidal section and geometrical arrowheads, points to a radical technological change and the beginning of the Second Mesolithic.

Couteaux de Rouffignac: A new insight into an old tool

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At the entrance of the most famous cave of Rouffignac (Dordogne, France) an important and complete Mesolithic sequence was identified during the excavations of C. Barrière in the middle of the last century. What was brought to light from the Early Mesolithic layers is a very peculiar Sauveterrian assemblage characterized by the uncommon dimensions of the production and a great variety and percentage of tools. Among the other peculiarities of the site is the presence of the so-called “couteaux de Rouffignac”, backed knives characterized by basal notches. A new techno-functional analysis has been carried out on this specific tool in order to understand its role in the lithic assemblage and verify its correlation with a specific activity as proposed in the typological definition of the tool itself.

A techno-functional approach to a technological breakthrough: The Second Mesolithic at the Montclus rockshelter (Gard, France)

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In the sixth millennium cal. BC, in southern France, the spread of blade and trapeze industries ended a high stability of the technical and economic choices of Epipalaeolithic (Azilian) and First Mesolithic (Sauveterrian) groups. With the Second Mesolithic, the lithic technical system, technical standards but also the conceptual scheme, are substantially modified.

To better characterize and understand these changes, a new techno-functional analysis was carried out on the lithic industries of Baume de Montclus rock shelter (Gard, France), which offers a significant stratigraphic sequence covering the whole of the Mesolithic

(Montclousian, facies of the Sauveterrian and Castelnovian). In this communication, we discuss some aspects of this technological breakthrough organization of lithic production and functional behaviour during the Second Mesolithic. Is the appearance of new tools and, in particular, the renewal of the geometrical microliths (*chaînes opératoires* design and use) correlated with new functions, and economic organizational changes?

The Mesolithic station of Alp2 (pre-alpine mountain range of Chartreuse, the western French Alps)

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The Mesolithic station of Alp2 is located in the Pre-Alpine mountain range of Chartreuse in the western French Alps. Ranging at 1720 masl, it is part of a very complex set of settlements that together form the archaeological site of Aulp du Seuil. It is qualified as a blockshelter of glacial origins, which has been deposited on the edge of an old local glacier's moraine. Between 1993 and 2000, P. Bintz carried out three archaeological campaigns of excavation tests and surveys, and more than 4500 lithic artefacts have been unearthed.

The aim of this communication is to present and discuss the results obtained from techno-typological analysis carried out on Mesolithic lithic assemblages of Alp2. Other data from loci in the area of Aulp du Seuil (in Chartreuse), but also on a much larger scale such as recent work performed at La Grande Rivoire (Pre-Alpine mountain range of Vercors) will undoubtedly give interesting technological and cultural comparisons. Our main goal in the short term is to pinpoint any mobility patterns and cultural interactions during the First and Second Mesolithic and the beginning of the Early Neolithic from north to south of the mountains ranges and over the Alps (Switzerland, Italy).

Sauveterrian technical systems between southern France and northern Italy: First attempt of a synthesis

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The Sauveterrian entity represents one of the main cultural aspects of the Early Mesolithic in Europe. Its recognition in southern France by L. Coulange dates back to the beginning of last century. During the 1970s, it was identified in north-eastern Italy (Adige Valley) by A. Broglio and some years later in Tuscany. In spite of these early attributions only a few works – essentially based on typological aspects – have tried to compare the lithic complexes from the two areas.

Thanks to the techno-economical analysis of a wide set of sites distributed across northern Italy (Romagnano Loc III in the Adige valley, Mondeval de Sora in the Venetian Dolomites and the sites of the southern Po Plain) and southern France (Fontfaurès, Les Fieux and Les Escabasses in the Quercy region, Rouffignac in Périgord and few other less impor-

tant sites), a first synthesis of lithic technical systems has been attempted. It has thus been possible to identify the objectives of débitage and the array of technical “solutions” which are part of the “cultural package” of Sauveterrian groups along with a general common evolutionary trend. By the way some specific traits which may be connected to regional adaptations in connection to specific activities and local raw material availability have also been recognized.

Shiny and tiny. The rock crystal assemblage of Staller Sattel STS4A (Antholz, South Tyrol, Italy)

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Since 2006, the area around Staller Sattel, an Alpine pass, which connects the Italian Antholztal with the Austrian Defereggental, is investigated through surveys and excavations to increase the knowledge about Early Holocene high-altitude frequentation. Locus STS 4A, an open-air site lying on a terrace at 2125 masl, is currently under excavation. The Mesolithic occupation occurred in correspondence with the formation of a podzolic forest soil and is ¹⁴C dated between the second half of the eighth and mid-seventh millennia BC.

First results regarding the lithic assemblage are presented in this paper. The largely prevailing raw material is a high-quality rock crystal, while chert is represented to a limited degree. The recovery of small waste from débitage and of several cores attests flaking on site. Thanks to the armature spectrum the industry is attributed to the Sauveterrian techno-complex, although the only sporadic use of the microburin technique is unusual in this context. Through an experimental approach the knapping proprieties and the influence of the crystal shapes in the flaking process have been investigated. The spatial distribution of some artefact categories and flaking waste opens various questions about the dynamics on the site.

Grotta delle Mura: Technological and typological aspects of Mesolithic and Late Epigravettian lithic industries

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The site of Grotta delle Mura is located along the shoreline, in the suburban area of Monopoli (Apulia region, Italy). The stratigraphic sequence of the site covers a period of time extended from the Middle Palaeolithic to the Neolithic phase. This work describes the lithic industries from the layer 2 and 3, related to a Mesolithic and to a Late Upper Palaeolithic phase. The radiometric dates give an age spanning from 10,850±100 BP to 8290±50 BP. The Mesolithic complex is generally characterized by a typical Sauveterrian technology, but from the typological point of view, the Palaeolithic tradition does not disappear, and has strongly characterized the retouched tools set of the lithic assemblage. The aim is to define

the cultural aspects that have characterized the Mesolithic period in the Adriatic southern part of Italy, the Mesolithic innovation and permanence and, moreover, the Epigravettian tradition.

New perspectives on the Mesolithic technology in northern Iberia: Data from El Mazo shell midden site (Asturias, Spain)

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The Mesolithic in northern Spain is usually characterized by the presence of large shell middens belonging to the so-called Asturian culture. Recent excavations at El Mazo cave (2009–2014) provide new data for the discussion of technological questions. Although four test-pits have been excavated, we will focus on the two test pits from the 2009–2010 campaigns. The stratigraphic sequence shows several Mesolithic shell midden units and also evidence of post-Mesolithic occupation, including the presence of hand-made pottery.

In this paper, we present the study of the lithic assemblage taking into account their raw materials, technology, and typology. The objective of this research is to increase our knowledge of the Mesolithic in northern Spain. The locally available lithic raw materials (chert and radiolarite) are the most abundant. As for the technology, there is a significant presence of small sized lithics, and the production of blade/bladelet supports will be highlighted. Among the retouched lithics, the geometric armatures represent an important tool type. These results suggest a significant change to the dominant paradigm linked to the lithic assemblages of the Asturian culture.

Raw material management in the Mesolithic of the south of “Picos de Europa” (north of Spain)

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The aim of this work is to give an outline of the procurement of lithic resources in the Mesolithic of southern Cantabrian Mountains (south-west of “Picos de Europa”). We will consider two sites, the caves of La Uña and El Espertín. The study will cover two objectives, firstly the analysis and characterization of the raw materials used in the archaeological context. We will focus on the retouched objects and a technological perspective. Another point is the study of the geological context so as to know the raw materials availability in this area. This will be contrasted with archaeological data. Thus, it will be possible to deepen in supply patterns of lithic resources in the Mesolithic.

Techno-typological analysis of lithic materials from Layer 2 of the Cabeço da Amoreira Mesolithic shellmound (Muge, Portugal)

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The Muge shellmiddens were discovered more than 150 years ago and were immediately recognized by their high importance to international Mesolithic studies. Located near the Tagus River, in central Portugal, this archaeological complex has provided high quality Mesolithic sets of faunal and human remains, and lithic assemblages.

This paper will focus on the techno-typological analysis of lithic artefacts from Layer 2 of Cabeço da Amoreira. The main goal of the study is to understand the importance of the various raw-materials present at the site and their relation with the different techno-typological aspects. The analysis revealed the exploration of three raw materials (flint, quartz, and quartzite), each of them exploited for a different purpose. Quartz and flint present complex reduction processes focused on the production of elongated blanks used, in the latter case, for the manufacture of geometric tools, mostly triangles. Quartzite present simpler and more expedite sequences for flake production.

Lithic technology at Vruća Cave

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Vruća Cave (Montenegro) is a small cave located near the confluence of Mala Rijeka and Morača River. The lithic artefacts uncovered during archaeological investigations from 1988–1997 belonging to the Mesolithic and Neolithic periods revealed differences in technology as well as in the activities which took place at this site. The most abundant raw material in both periods was good quality grey flint. The quantity and nature of the cortexes on artefacts suggest both primary and secondary provenience of raw materials in the Mesolithic, with an orientation towards the exploitation of primary outcrops in the Neolithic. Nodules and pebbles were brought to the site at least partially prepared according to a small number of decortification flakes. Flake and bladelet tools prevail in the Mesolithic, while there is approximately the same quantity of tools made on blades, bladelets and flakes in the Neolithic. The great number of typological groups in both periods probably indicates diversified activities. Their change over time is evidenced by the absence of certain typological groups and unequal abundance of others, which, on the other hand, might be the result of different working areas.

Transferable technologies: From one raw material to the next?

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During the Late Mesolithic (ca. 6500–4000 cal. BC) hunters and fishers living in maritime areas in western Norway, produced adzes, sharp points and edges from the utilization of a large variety of different “flint-like” raw materials. Rock crystal, mylonite, quartz and quartzites are dominating the lithic assemblages, and all are applied for debitage production. The exploitation of such a large variety of raw materials observed from several of the large open air sites within the region, are likely to reflect patterns of movements between coastal and fjord locations; areas with different raw material availability. An important question in this regard is whether the manufacture processes of lithic tools based on a broad variety of different raw materials, are reflective of a limited repertoire of predetermined methods – easily accommodated and transferred onto different types of rocks – or if different raw materials act restrictive and demand different repertoires of technical actions, for the same tool manufacturing processes? This question makes one out of several as part of an ongoing PhD-project where the methods of the technological approach are applied. The main objective of the project is the identification of different techniques based on comparative reference collections. It is asked whether or not technological analysis can provide further insight on issues regarding site functionality within the Late Mesolithic?

Middle and Late Mesolithic microblade cores in southern Norway: New experimental observations

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The transition from Early (ca. 9200–8250 cal. BC) to Middle Mesolithic (ca. 8250–6350 cal. BC) in southern Norway is recognized by the introduction of a new blade technology; from various versions of direct percussion technique on one-sided cores to a combination of indirect and pressure technique on conical (polyhedral) and sub-conical flint cores. Recent studies have more than indicated that this new blade technology was a result of diffusion of people and /or ideas from eastern territories. However, throughout the Middle Mesolithic, the blade technology evolves into an increasingly standardized microblade production, culminating with the Late Mesolithic (ca. 6350–4650 cal. BC) handle cores. What were the practical implications of this technological change? Can the Late Mesolithic microblade technique be related to an east-west oriented social network? To shed light on these questions, we present new observations derived from replicative experimental studies of microblade cores found in eastern Norwegian sites dated to the Late Mesolithic as well as transitional Middle to Late Mesolithic sites.

Fire and stone: Techniques and social significance of Mesolithic chert extraction in northernmost Europe

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For more than 5000 years chert was frequently utilized in the production of tools by people inhabiting the flint-poor northern Fennoscandia. Considering its extensive geographical and chronological distribution, studies of how chert was procured, processed and distributed harbor a large potential for illuminating technological organization, as well regional and inter-regional social networks and mobility. In 2012–2013, a large-scale developer-funded excavation of a chert quarry took place at Melsvik, northern Norway. In addition to the 1000 m² large quarry, 3500 m² of adjacent settlement areas were investigated. The archaeological data was supplemented by experimental application of quarrying techniques. The quality and properties of the material was assessed through geological analyses and experimental knapping. The results show that the initial chert extraction was performed by pioneer groups during the Preboreal and then continued for at least another 3000 years. The quarrying activities were most probably done by smaller groups from the region who regularly visited during the summertime. To detach blocks from the bedrock, fire setting was used in combination with pounding and wedging. Raw material of composite quality combined with certain selection criteria determined that a relatively small number of pieces qualified for further preparation, primarily through direct soft hammer knapping techniques, before being transported off site as cores and finished tools.

To quarry or not to quarry – Rock procurement practices in the Mesolithic of southern Norway

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Stone Age stone quarries in southern Norway were more than sources for lithic raw material. In my research, I deconstructed the practice of quarrying using the *chaîne opératoire* analysis as my point of departure. This enabled me to demonstrate how quarries could be strategically used for more than lithic raw material. Thus, quarrying can be an embedded practice, an opportunistic activity, or a direct and planned one. It can be modest, intense, repeated, public or secluded, involving spiritual sentience or being tightly woven into everyday routines. To quarry is contrasted to the practice of collecting rock from beaches or moraines as well.

More than 20 quarries in southern Norway are analyzed and compared. I have documented activities at the sites, estimated scale of quarrying and to some degree the rock's distribution. The sites are also dated so to be able to contextualize the activity. Rock procurement practices and raw material use are pragmatic and to some degree geologically dependent, but this cannot explain all the regional and chronological variations I discovered. Some of the ways of procuring rock were common cross-regionally, while others defined regions. Interpretations of the variations contribute to an extended understanding of the developing Mesolithic societies.

All roads lead to stone? Towards a more nuanced perspective of British Mesolithic technology in the landscape

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Traditionally, lithic technology has tended to be studied on a micro-scale—site by site basis. Moreover, the orthodox understanding of British Mesolithic technology has tended to be based on a few key assemblages recovered from karstic lowland situations near to raw material sources. This has resulted in a restricted view of the lithic *chaînes opératoires* as linear, uniform and unchanging. In contrast, this paper attempts to assess the lithic technological organization from upland to lowland areas of England on both a micro and a macro-landscape scale. It offers an alternative view that shows knapping strategies were substantially more flexible than has hitherto been appreciated. Furthermore, it seeks to show that the technological organization over the landscape was closely linked to the interplay of raw material availability, risk, mobility strategies and cultural practices. This distinctly different narrative of lithic exploitation will show that there are variable levels of on-site knapping, high levels of blade/let or tool importation, and the increased occurrence of flexible knapping strategies which resulted in positive feedback loops on more cyclical *chaînes opératoires* across the landscape. This evidence is then brought together in a radical new model linking Mesolithic mobility, site revisitation and lithic exploitation.

Biases in the record: The impact of identification on a coarse stone tool assemblage

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Coarse stone tools are often seen as difficult to identify in the field, as well as to classify and analyze. This has been attributed to their indistinct character and underwhelming appearance. However, the impact such difficulties have on the composition of an assemblage has never been assessed in a systematic way. This paper will examine the difficulty of identifying coarse stone tools through a case study focusing on a Mesolithic/ Neolithic site of Belderrig, Co. Mayo, Ireland. Due to the sampling strategy utilized on site large amounts of so-called ‘natural’ stones were available for post-excavation analysis. The roles that morphology, tool type and damage pattern play in the process of identification will be discussed against the backdrop of 33 tools identified during the initial excavations and the 77 additional tools recovered in the ‘natural’ material. This paper will also demonstrate the strong contribution a coarse stone tool assemblage can add to a site narrative by exploring the interpretative significance of this coarse stone assemblage.

Quantifying Irish Mesolithic shale axes/adzes

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As part of a wide reaching PhD research project into Irish Mesolithic, Neolithic and Bronze Age porcellanite and shale stone axes/adzes; investigating their manufacture, range of uses

and the influence of taphonomy on their final appearance in an archaeological context, quantitative analysis of the mechanical properties of these two lithologies was undertaken. In co-operation with the UCD School of Mechanical and Materials Engineering, flexural and tensile strength, along with fracture toughness and hardness were tested. This presentation will focus on the results of this analysis of shale samples sourced from a known Mesolithic site; Fisherstreet, Co. Clare. Shale axes/adzes have been identified on a number of Irish Mesolithic sites, including the Early Mesolithic cemetery at Castleconnell and the Late Mesolithic site at Ferriter's Cove. From this underused methodological approach, new interpretations of the multiple roles this artefact type played in the Mesolithic can be developed, as demonstrated by the works of Yonekura *et al.* (2008) and Bradley *et al.* (1992) with their respective focus on tool performance, material selection and their place as utilitarian and/or ritual objects in prehistoric societies.

Hafting flake axes

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This paper presents a case study of an Early Mesolithic flake axe assemblage from the NTNU University Museum's excavations at Ormen Lange Nyhamna, north-western Norway, and attempts to shed light on how the flake axes have been hafted as well as briefly addressing related questions of functionality. The flake axe is one of the most widely discussed artefact types of the Scandinavian Mesolithic. Despite this there exists no clear consensus on its function, and no flake axe has been discovered with a complete and undisputed handle.

Circumventing the lack of any remaining organic parts of the tool, the butt of the axe is presumed to present a fairly precise negative of the opening in which it was fixed, suggesting a standardized mode of attachment involving the reuse of a bone, antler or wooden handle. It is further argued that the commonly held perception of the tool used in the way of an adze or axe is poorly founded. Several technological traits might indicate that the majority of the studied specimens have not been used for heavy chopping or hewing activities.

Stuck in the bottom of the lake. Fishing gears from the Early and Middle Mesolithic

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During the Early and Middle Mesolithic the bog Rönneholms mosse, situated in central Scania, southernmost part of Sweden, was a part of a large and shallow lake. It was filled up with organic litter during a long period lasting until the mid-part of the Atlantic. Due to vast peat exploitations of the bog, surveys and excavations have been conducted during a number of years. Except for a large number of small camp-sites, a number of leister points, slotted bone points and harpoons have been found in the lowermost part of the sedimentation. They have been stuck in the bottom refuse and broken off the handles. The leister

points show a considerable variety concerning shape and raw material. By radiocarbon dates it has been possible to establish a chronologically based typology. This sequence is of major importance for dating sites as well as loose finds. The finds also provide an excellent opportunity to study this kind of fishing gear in its social and ecological environment.

Mesolithic line fishing in coastal Norway

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Fishing tackle is frequently found at late Mesolithic residential sites in Norway, and it consists of a variety of artefacts made of bone and sometimes stone. The most important fishing-artefacts of stone are line sinkers of steatite. Most of these sinkers are small and light, but large and heavy sinkers are also occasionally found. Some of them are decorated. The paper will focus on acquisition, production, and function of the line sinkers. In terms of the acquisition, their regional distribution will be compared to the location of steatite bedrock outcrops. For production, traces of working are found at the sinkers themselves. Steatite working debris is also present at dwelling sites. The function of sinkers (types of fishing) will be studied through comparisons with collections of contemporary bone fish-hooks and faunal remains of fish that were caught when using this fishing method.

Antler T-axes in Mesolithic Europe: Understanding the spread of a Mesolithic idea

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Antler T-axes have been described as a type-fossil for the Ertebølle (Andersen 2002) – an iconic artefact form which has subsequently been found to extend across large areas of Europe and within a wide range of chronological and cultural contexts (Zvelebil 1994). The use of red deer antler to create perforated axe and adze tools is a widespread across a range of Early Holocene communities, but the uniformed change in the *chaîne opératoire* which marks T-axes apart from other axe forms requires some consideration if we are to better understand the context and motivations behind this distinctive technological shift. This paper will draw together the existing evidence for T-axes in Europe and attempt to plot, for the first time, the way in which this common technological context spread across a vast collection of land and seascapes.

The hammer-axes, “T”-axes and other heavy-duty tools made of antler revisited

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Recent discoveries in Lolland (Denmark) of perforated beveled-end tools made of red deer antler, so called “axes” (Pratsch 1999) or “mattock-heads” (Smith 1990) suggest cultural ex-

changes between Northern Europe and Southern Scandinavia at the Mesolithic-Neolithic transition (ca. 4000 cal. BC). Based on their morphology only, “T” axes are thus considered as cultural markers *per se*. In order to promote a better understanding of these types, we present here a first synthesis of the recorded data and highlight their characteristics in terms of shape, their geographical and chronological distributions in Europe, as well as their manufacturing techniques. The analysis suggests that, although they are all made on the antler beam, these heavy-duty tools showing a transverse hafting system are very distinct one type from another. The eventual recognition of different types of “T”-axes could diminish their cultural value for characterizing Mesolithic groups; the Neolithic shapes indeed appear distinctive, most notably in terms of the dimensions of the antler. At a larger scale, the technology of making these tools highlights their value as chronological markers for differentiating specific periods of prehistory.

Osseous material working during the French Mesolithic. Technical and economical characterization through the study of south and east French sites

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In France, the last hunter-gatherers have mainly been investigated from the perspective of their lithic industry, essentially arrowheads. The work of osseous materials was believed to be a marginal activity. The results of my recent doctoral study show that this idea is in fact the result of a lack of studies. I begin to fill this gap by proposing a characterization of the work of osseous materials by assessing to what extent it refines our perception of this period from a chrono-cultural and palaeo-ethnological perspective. In the south and east of France, the manufacturing of osseous materials was based on a differential exploitation of each raw material: bone, antler and tooth. Each material was worked following one or two transformational scheme(s). My study shows that the exploitation of osseous materials remained highly unified throughout the considered chronological and geographical frameworks. These results bring to light, on the one hand, that lithic and osseous productions followed different evolutionary rhythms and, on the other, that the modalities of the work of osseous materials are specific to the Mesolithic. Finally, preliminary results regarding subsistence economy contribute to a wider issue i.e., the question of the exploitation of their environment by the Mesolithic populations.

Antlers as raw materials in the Iron Gates Mesolithic

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Osseous raw materials had an important role in everyday activities in most Mesolithic communities. As flint industry, bone industries also create distinctive technocomplexes and display regional, chronological and cultural characteristics. In this paper, the use of antlers as the raw material in the Iron Gates Mesolithic will be analyzed – methods of raw material acquiring, manufacturing techniques, tool types, and modes of use and discard of antler objects.

The Iron Gates hinterlands, where large populations of cervids lived and were hunted, offered a possibility of easy acquiring of antlers, which were abundantly used in all settlements. Both shed and unshed antlers were used, from red and roe deer, and the used techniques included grooving, use of abrasive wet fibres, chopping, scraping, etc. Main tool types were chisels, wedges and percussion tools. Harpoons were rare, however, the preserved specimen from Kula demonstrates that these were carefully manufactured by a skillful artisan. Antlers also had a symbolic meaning, as sometimes they were placed in graves (both unworked antlers and antler tools), related to the symbolic meaning ascribed to deer.

Artefacts of antler, bone and wood from Sise, western Latvia

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The Stone Age site of Sise is situated in the valley of the River Užava on the Kurzeme Peninsula in western Latvia. Next to the site is the former river mouth, where during the transgressive phases of the Ancylus Lake and Littorina Sea it entered a large bay. In the subsequent regressive phases the bay was transformed into lagoons that subsequently developed into freshwater lakes and peatlands. Archaeological finds recovered since the 1920s demonstrate the importance of this landscape for prehistoric hunter-fisher-gatherer groups.

New research in this area started in 2010 in close cooperation with a local amateur archaeologist, resulting in a large collection of Mesolithic and Early Neolithic bone and antler tools. Excavation on the riverbank in 2012 has brought to light wooden objects from stratified context as well: part of an eel clamp and a tool handle with preserved resin showing imprints of a binding material, which are dated to ca. 8600–8200 cal. BC. The present paper will give an overview of the results of the recent archaeological, palaeo-botanical and experimental investigations on these objects, which are the earliest known wooden artefacts from the East Baltic region.

Organic residues on the stone artefacts from the Early Mesolithic layer of Dvoinaya Cave

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Multilayer site Dvoinaya Cave is located in the Gubs Gorge (foothills of the north-west Caucasus). The functional analysis of stone artefacts from the Early Mesolithic layer (11.8–8.9 ky BP) of Dvoinaya Cave was carried out. The analysis indicates that the most impor-

tant activity was hunting. Projectile tools and tools for processing animal remains (meat cutting, hide-working) prevail in this complex. The second most important activity was wood-working. Also the wood fibers were found in the cultural layer. During traceological analysis the residues on the surface of the stone tools were found. The application of chemical methods and IR spectroscopy to the analysis of the residues demonstrates organic substances of plant and animal origin and mineral components. The presence of organic residues on the working surfaces of tools is consistent with the functional definitions obtained using traceological analysis. The data can be used in the reconstruction of subsistence patterns and possibly in identifying task-specific artefacts.

Vegetal handicrafts in the Mesolithic of northern Europe. Evidence from use-wear studies and wetland archaeology

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Since the 19th century, the exploration of wetlands contexts in northern Europe has allowed archeologists to know a little part of the vegetal handicrafts developed by Mesolithic hunter-gatherers. But these discoveries are still exceptional and in most areas, the taphonomic issues have not permitted the preservation of organic materials. Use-wear studies on lithic tools are a solution to get around these limitations. In the last years, the analysis of Mesolithic assemblages in the Paris Basin highlights the important place of the working of vegetal materials (plants and wood) in the economy of the last hunter-gatherers. This presentation will be the occasion to discuss these results and place them in the broader context of the European Mesolithic. The comparison between use-wear data and the organic objects from wetland contexts shows that vegetal handicrafts are probably very underestimated in economic and social reconstructions.

Late Mesolithic artefact biographies. Integrating technological and use-wear analyses of chipped stone artefacts from Arconciel/La Souche (CH) and Lutter/St-Joseph (F)

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This paper presents the results of our combined technological and microscopic use-wear studies of chipped stone assemblages from two multi-occupational sites dating between ca. 7000 and 5000 cal. BC located north of the Swiss Alps. These sites, Arconciel/La Souche (CH) and Lutter/St-Joseph (F), are situated in the Sarine Valley at the foot of the Swiss Pre-alps and in the French Jura mountains respectively. Recently excavated and well-stratified, they allow new insights into the still relatively poorly understood developments at the end of the Mesolithic on the Swiss Plateau. The sites are located within different geographical and archaeological contexts. Whereas Lutter/St-Joseph is situated on the edge of the known LBK occupation of the Alsace and southern Germany, Arconciel/La Souche is located on the Swiss Plateau, between influences from the Rhone and Rhine valleys. The integration

of these two methodological approaches leads to an increased and more comprehensive understanding of the development of production techniques and artefact use during the end of the Mesolithic and the transition to farming in the research area. It also allows further interpretation of the Mesolithic occupation and the transition to the Neolithic on the Swiss Plateau in general.

Kapetan Miša's Palace, Ceremonial Hall of the Rectorate

COLONIZATION

Pinnipeds, sea-ice hunting, and the colonization of seascapes in northwest Europe in the Pleistocene/Holocene transition

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This paper explores the hypothetical role of sea-ice hunting in the North Sea-Skagerrak basin, and the cultural trajectory from the late Pleistocene terrestrial hunters on the continental plains to the marine foragers that colonized the Scandinavian seascapes in early Holocene. The Late Glacial winter-spring sea-ice was a seasonal extension of the continental plains that probably was an important meeting ground between the hunters of the plains and the mammals of the sea. Here, the hunters could observe seals popping in and out of their breathing holes, and experience that their senses and locomotion out of water were inferior to terrestrial animals. Seals were easy prey, and quite similar to the accustomed terrestrial mega-fauna, with a familiar combination of meat, bone, skin, blood, sinews, and fat. And they could be hunted with the same methods and equipment as terrestrial animals – without the need of boats. The climatic changes at the Pleistocene/Holocene transition put an end to the sea-ice regime, and also the biotope of ice-dependent seals, that migrated north along with the polar front. For a life style that depended on seal-resources, this would be a serious challenge that may have motivated seal hunting in open sea, using sea-worthy boats. This development would also make available the bountiful Scandinavian seascapes.

Pioneers of the northwest Atlantic coastal fringes of Europe: New absolute dating evidence, geoarchaeology and Ahrensburgian artefacts from Rubha Port an T-Seilich, Isle of Islay, western Scotland

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When and from where was Scotland first colonized? This is one of the major debates concerning the earliest colonization of Scotland. The earliest radiocarbon dated evidence for

Mesolithic hunter-gatherer activity comes from Cramond on the east coast of Scotland dating to ca. 10,400 cal. BP. Broadly synchronous with this are dates from Daer Reservoir I and Creit Dubh, Isle of Mull with Bayesian statistical analysis demonstrating an east-west trajectory of movement that was relatively rapid, possibly along routes into the interior of Scotland or via non-pedestrian means of transport along its coastline. Discoveries at Howburn and Kimelfort suggest that Scotland was colonized earlier than this, at least intermittently, from as early as ca. 14,000 cal. BP. This evidence is problematic, however, deriving from palimpsests containing later Mesolithic artefacts lacking context and absolute dating evidence. We here report on the discovery of artefacts inter-stratified with tephra horizons that unambiguously date an episode of human activity to the second half of GS-1: an *in situ* Ahrensburgian site at Rubha Port an t-Seilich, Isle of Islay, in western Scotland. This provides the earliest dated site in Scotland and the most north-westerly presence of this Late Glacial culture in Europe.

First Mesolithic occupations at high altitude in the north of Vercors (Isère, France): The case studies of Les Coins and Roybon

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Situated in the western French Alps, the Pre-Alpine mountain range of Vercors has been the focus of archaeological exploration for a long time. With an average altitude ranging at 1600 masl, and culminating at 2341 masl, Vercors is particularly known for its Alpine plateau, which has been occupied repeatedly since the end of the Late Glacial. Various archaeological programs, such as surveys and archaeological test pits carried out in the north of Vercors, for instance, led us to numerous discoveries. Although it allowed great breakthroughs in our knowledge of the Alpine Mesolithic, the understanding of Mesolithic's typo-technological seriations – depending on the altitudinal belt for instance – still remains ambiguous. Amongst the latest discoveries in the early 1990s, the campsites of “Les Coins” and “Roybon” have unearthed hundreds of lithic artefacts, mainly attributed to the First Mesolithic (ca. 8500–7000 cal. BC).

The present communication aims at presenting the results acquired from these two “stations” based on the analysis of lithic typo-technological characteristics. Consequently, by comparing these data with other sites in the area, such as La Grande Rivoire, it may allow us to better understand different patterns of Mesolithic's mobility and occupations as well as the regional chrono-cultural sequence of Vercors.

Settlement patterns and occupation of the territory of eastern Cantabria (Spain) in the Mesolithic

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This communication studies the Mesolithic sites in eastern Cantabria in the geographical area between the Ria of Suances, in the west, and the Ria of Ontón, in the east, dated to

the period between ca. 9500 and 5500 cal. BP. Both the horizontal distribution axis, along the coastline, and the vertical axes towards the inland valleys are studied, with particular attention paid to the colonization of the upper valleys, once they became free of ice after temperatures rose in the Holocene. The settlement patterns are studied by analyzing the variables of absolute and relative altitude, distance from the coast and the topography of the surroundings. The types of settlement and their relationship with the environment and available resources are also studied in connection to different biotopes.

New evidence for Mesolithic settlement in Karelia between Finland and Russia

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The oldest Mesolithic sites in Karelia are from the Lake Onega region, Russia (ca. 9500 cal. BC) but during the last years new sites were discovered in Finnish North-Karelia (ca. 9000 cal. BC). The large areas between these settlements have been nearly without any archaeological research so far. The museums of Lahti and Petrozavodsk started in 2008 a joint project to study the Mesolithic colonization processes and datings in that area.

During 2008–2012, the areas in eastern and northern parts of Lake Ladoga were studied and 19 new Stone Age sites were found. Five of these were excavated and the oldest ¹⁴C-date is ca. 7700 cal. BC. The research continued in 2013–2014 in western parts of Lake Ladoga where 14 Mesolithic sites were found. Analyses of lithics, burnt bones and ¹⁴C-dates together with studies of topography and shore displacement chronology are now under way and will reveal completely new information of the Mesolithic settlement processes between Finnish and Russian Karelia. These areas were regarded nearly empty of post-glacial settlement earlier.

The Mesolithic site Borovskoye 2 in the light of the Preboreal habitation in Karelia

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Series of well-dated sites place the initial peopling of Finland and south-western Karelia in the late Preboreal period. The results of 2012 excavations of Borovskoye 2 site in the Karelian Isthmus are well in line with these investigations. The site was partly excavated in the area about 1200 sq. m due to the extensive railway construction works. A few accumulations of artefacts associated with fireplaces were documented. The radiocarbon dates of 9273±59 BP (Hela-3163) and 9336±58 BP (Hela-3164) were obtained from calcinated bones.

The lithic inventory (>3500 items) consists of quartz artefacts, including flakes, cores and few formal tools. Characteristics of the debitage indicate the full cycle of preparing and utilizing quartz tools. The assemblage is distinguished by a considerable portion of blade-like flakes produced mainly by bipolar technique, though attempts to make blades using pressure technique or soft hammer percussion also could not be ruled out. Similar tendency has been traced in quartz assemblages of the Preboreal sites such as Kirkkolahti I in the north-west of Ladoga Lake region and Akunpohja Helvetinhaudanpuro in central Finland.

The Mesolithic in Fontanella rockshelter (Vilafranca, eastern Mediterranean Iberia) and the last hunter-gatherers in northern Valencian country

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Between 2011 and 2013, we completed three seasons of excavation at Fontanella ravine rockshelter (Vilafranca, northern Valencian Country, Spain). In the course of these excavations we documented that the archaeological sequence begins with two Mesolithic levels. The lower level belongs to the regional ancient Mesolithic (Macrolithic Mesolithic), and it is the first reference to this techno-complex in the north of Valencia. The upper level contains occupation levels of the Geometric Mesolithic period, little known in this area. Also, the upper levels belong to Neolithic occupations (starting with the ancient Neolithic). These data make this site of high interest in understanding the transition between the last hunter-gatherers and the first farmers in the Iberian Mediterranean region. The site is located in a mountainous environment (1150 masl) but not too far from the Mediterranean coast (about 50 km as the crow flies). It also allows us to investigate the colonization patterns in the inland territory by both Mesolithic groups and colonizing populations of the Neolithic.

Kapetan Miša's Palace, Ceremonial Hall of the Rectorate

SETTLEMENT

Lithics as an indicator of Mesolithic sites – some problems ...

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The role of lithics as the ultimate indicator for Stone Age sites is so well accepted in daily research practices that the idea of Stone Age sites with no or very little lithics appears more or less absurd. Only very few such sites have been investigated, for instance in areas with good preservation of organic materials. On the basis of Danish, German and Dutch Mesolithic sites we will demonstrate that sites with no or very little lithics may in fact be common, and represent other behavioural contexts or practices than do sites which are characterized by

quantities of lithics. We argue that, by not taking the importance of ‘lithicless’ sites in consideration, a bias is created which obscures the very nature of hunter-gatherer behaviour in the Mesolithic. We also attempt to estimate the dimensions of this potential problem, which mirrors a catch 22: the acceptance/identification/detection of sites with no or little lithics poses conceptual and methodological problems because the notion of ‘site’ is based on the very presence of lithics.

‘Buildingmesolithic’: Experimental reconstructions of Mesolithic houses in Ireland

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This paper reviews experimental reconstructions of substantial Mesolithic timber and turf houses built in the UCD Centre for Experimental Archaeology and Ancient Technologies in 2013 and 2014. These projects are based on the ground plans of buildings constructed in Ireland and Britain in the centuries following ca. 8000 cal. BC. They have included formal quantitative and qualitative experiments, assessments of decay and taphonomic processes, consideration of the investments of time and materials in construction as well as substantial outreach components, including national news coverage and films shown at international film festivals. The projects have raised considerable questions about the nature of Mesolithic buildings in Britain and Ireland and demonstrate powerful mechanisms for engaging the community in Mesolithic archaeology.

How to make a Mesolithic shell mound? Microstratigraphic investigation of Cabeço da Amoreira (Muge, Portugal)

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Century-long research has been carried out at the Mesolithic site of Cabeço da Amoreira (Muge, Portugal). Cabeço da Amoreira is well-known for its numerous human burials and Mesolithic lithic and faunal assemblages. The bulk of sedimentation is related to anthropic inputs in association with intensive exploitation of marine/estuarine resources, which form an extensive artificial mound. Similarly to other midden contexts, the abundance of shell-fish refuse favours an intricate and laterally variable succession of sedimentary layers and discrete lenses. The repetitive nature of midden sedimentation has hampered in-depth research on the human actions guiding midden formation. The present paper investigates the micro-stratigraphic record from Cabeço da Amoreira. We apply soil micromorphology techniques to characterize taphonomical processes, and to reconstruct the nature of anthropogenic activities carried out at the site. Field and microscopic observations allowed for the distinction between primary depositional activities (e.g., discrete shell tossing events,

trampled surfaces and combustion features), versus secondary position of the assemblages in dumped or reworked deposits. The set of events seen at Cabeço da Amoreira underlines the role of soil micromorphology for the identification of anthropogenic signatures and its relevance in getting behaviourally relevant information from the sedimentary record.

Internal layout and functional organization of Mesolithic shellmiddens: New insights from Cabeço da Amoreira (Muge, Central Portugal)

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Very little information is currently available on the internal layout and functional diversity of Portuguese Mesolithic shellmiddens. This is mainly due to the fact that previous work has mostly focused on restricted areas of the middens. New excavations at Cabeço da Amoreira, however, have been deeply concerned with the study of the site's formation processes and spatial organization. The most remarkable feature of the new work was the recognition of a series of shell-free Mesolithic horizons located underneath and around the midden itself. Some of these were previously unknown loci and were recently exposed in various test pits around the midden and, more strikingly, in a 1x12-m trench where it was possible to confirm that a total of seven archaeological are associated with the construction of the shell mound deposit.

In this paper we will present a general comparison between the shellmidden and shell-free layers regarding their composition, especially focusing the lithic assemblages of each area. The analysis allowed us to detect some differences that seem to correspond to an organization of the space into specific functions and to shed light on the traditional interpretation of these sites as base-camps with a residential nature.

Settlement patterns and GIS predictive modelling for the Portuguese Mesolithic

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In this paper we will focus on presenting the results of a GIS-based Archaeological Predictive Model based on the analysis of a set of geographic and environmental variables that characterize the location of the Mesolithic shell middens in the Tagus and Sado valleys. Through a methodology that essentially followed a descriptive and univariate statistical approach that resulted in four predictive models built through the so-called binary addition method, the main outcomes of this study are: (1) the existence of an effective differentiation between location patterns and choice of environs and landscape for the settle-

ment of shell middens in the Tagus and Sado valleys. When confronted with the currently available archaeological data, that demonstrates distinct morpho-structural patterns in the composition of the sites that comprise each shell midden complex, these patterns seem to confirm the existence of cultural differences between the two sets; (2) and, from a methodological standpoint, the corroboration of the viability of implementing this specific predictive approach to Mesolithic hunter-gatherer societies, taking into account the success indexes, either statistical or through preliminary field survey.

Looking for the “Asturian” dwelling areas: New data from El Alloru and Sierra Plana de la Borbolla (Asturias, Spain)

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The “Asturian culture” is an archaeological techno-complex characteristic of the coastal areas of central and eastern Asturias and western Cantabria, in northern Spain. Despite the long tradition of research on this archaeological entity, little information had been gathered concerning the domestic structures. In fact even the location of the living areas was hardly known. Dealing with this problem has been one of the main aims for northern Spain of the COASTTRAN, a research project that analyzed the transition from the late Mesolithic to the Neolithic in the Atlantic coast of SW Europe. This paper presents the results of a program of systematic investigation on this issue. It included a detailed geomorphological analysis of the most promising areas, magnetometry survey, sedimentological cores and archaeological test pits in two selected open-air sites: El Alloru and Sierra Plana de la Borbolla. The preliminary results of this research are presented and their implications for the study of the Mesolithic of northern Iberia are discussed.

Habitation areas in Asturian shell middens and site formation processes: Mazaculos II Cave (La Franca, Asturias, northern Iberia)

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After the initial research on Asturian shell middens in caves by Vega del Sella in the early 20th century, the relationship between the large mounds at the entrance of caves or in rockshelters and the possible habitation areas linked to them remained obscure and was subject of different, unverified hypotheses in lack of adequate sites to test them. The work

at Mazaculos II Cave (1976–1983) represented the first mid-scale excavations in a loose shell deposit, where we could define the existence of habitation surfaces with hearths and concentrations of terrestrial bones at the base of the shell midden. The analysis of the geometry of the mound and location of the habitation areas shows the evolution of the shell accumulation and the progressive fossilization of the surfaces by its growth.

Mesolithic pit-sites in Champagne, northern France. First data, main issues

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Until recently in France, the existence of dug Mesolithic features was considered as a rather marginal, not to say unusual, phenomenon. Since 2007 though, scatters of deep cylindrical Mesolithic pits are repeatedly discovered in northern France during rescue operations. Up to now, at least 250 of these pits have been identified on more than 20 sites in Champagne alone. This number is steadily increasing, making it clear that such features are in fact very common, and constitute a major phenomenon for the period.

Their Mesolithic attribution is now secured by more than 50 radiocarbon dates, while the associated material is very limited. More generally, the location of these previously unidentified “pit-sites” appears particular and disconnected from the classical “flint-scatters” sites. The discussion of their possible function (storage pits, hunting traps) is evidently a major issue; but their bare identification as a common feature has in itself fundamental implications concerning the spatial and social organization of Mesolithic societies in northern France.

Clear cut? The significance of Mesolithic features in England

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The majority of archaeology in England is now led by development, yet the impact of these “rescue” projects is seldom recognized in an academic context. An important outcome of a study of over 1200 archaeological interventions is recognition of the frequency with which early Holocene cut features are identified, either in the field or during post-excavation analysis. Examples that have been discovered comprise pits, structures, ditches/gullies, tree-throws and many other ‘natural’ features. Many possible interpretations of this broad class of evidence are presented in the literature, though there is no indication that archaeologists have become more adept at locating Mesolithic archaeology under academic or developer-funded conditions. The archaeological feature is therefore crucial in the future study of the Mesolithic.

This paper will explore the role that Mesolithic features have to play in developing a narrative of the period in England, and examine reasons why current field methods are not suitable for identifying Mesolithic deposits. Although this paper deals exclusively with examples from England, it is anticipated that the opportunities and constraints presented by developer-funding will resonate with broader European experience.

Early and Late Mesolithic in the region Ardennes (France): The site of Rémilly-les-Pothées “La Culotte”

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The excavation of the site of Rémilly-les-Potées (Ardennes, France), conducted in 2012 and 2013, yielded two distinct archaeological levels, a RMS-A group settlement dated from the beginning of the seventh millennium BC and a Late Mesolithic occupation that occurred between ca. 5500 and 5300 cal. BC. These finds are remarkable as only very few contemporaneous sites are known in the northern half of France. The preservation of faunal remains and of some burnt hazelnut shells has allowed several radiocarbon determinations. A study of the faunal remains has also been carried out, specifying which species were hunted and which carcass parts are represented within the site. The Late Mesolithic level is characterized by a large concentration of artefacts, and nearby two knapping spots as well as hearth related deposits. The evidence of Early Mesolithic occupation is identified in three small camp units, three knapping spots and two hearths. The site is located on a topographic ledge at the foot of a gentle slope.

The formation of extensive Mesolithic sites: Examples from the Netherlands

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Several extensive Mesolithic sites have been excavated in the Netherlands, primarily on the Pleistocene covers and areas in the northern and eastern parts of the country. These sites usually consist of multiple, often partially overlapping, scatters of flint artefacts with variable densities. Surface hearths and/or hearth-pits are usually present. Some sites have concentrations of dozens or even hundreds of hearth-pits, known as ‘pit clusters’, which may extend over tens of thousands of square meters. Flint or other stone artefacts are often lacking on these sites, or are present in very low numbers. Based on a large number of radiocarbon dates, mainly from hearth-pits, some interesting spatio-temporal patterns are emerging, which may lead to a better understanding of the formation of these sites in terms of demographic trends and aspects of mobility. For example, it can hardly be coincidental that all ‘pit-cluster’ sites are Late Mesolithic (between ca. 7800–5600 cal. BP), a time

marked by many changes in the archaeological record. Furthermore, these sites sometimes yield ‘exotic’ raw materials, as well as Mesolithic graves or cremations and flint caches. It is probably significant that such sites tend to be located on prominent elevations in the landscape, relatively close to stream valleys, which served as routes of transport and perhaps as boundaries between different Mesolithic groups.

Friesack 27a – An Early Holocene site in north-eastern Germany

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The site Friesack 27 is located in the Warsaw-Berlin ice margin valley and dated by palynological and radiometric analyses to the beginning of the Holocene. It was occupied between the early Preboreal and the early Boreal. Due to good preservation, several finds such as artefacts of bone, antler, wood, as well as lithics have been excavated. Located on a former lakeshore, the site was overgrown by peat during the Boreal.

The close relation between the artefacts and sandy layers, which are interjected into the peat, suggest that the human presence on the spot caused fluvial and aeolian sand transport that is therefore an indicator for four intense settlement phases. By reconstructing the palaeoenvironment through species determination of wood, bone and antler, a more detailed insight into the vicinity of the Preboreal and early Boreal settlements is gained. Similar and further analyses made in context of the excavation of Friesack 4 also allow better understanding of settlement strategies of early Holocene hunter-gatherers in northern central Europe.

Current research at Star Carr

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Large scale excavations have recommenced at Star Carr as part of the European Research Council-funded POSTGLACIAL project. The aims have been to uncover as large an area of waterlogged deposits as possible before the peat deteriorates any further and to investigate the dry land for further evidence of structures. The excavations in the waterlogged parts of the site have revealed an unprecedented view of the worked wooden platforms which sit on the water's edge and span an area of over 30 metres. The peat has also produced further rare artefacts such as antler frontlets, barbed points and digging sticks which although in a delicate condition are being examined using forensic methods and thus providing important new insights into their usage. On the dry land an area of post holes has been revealed providing further evidence for structures. This archaeology, together with an extensive dating programme and new scientific approaches are providing important new insights into this enigmatic site.

Transient campsites, logistic campsites, and the cumulative taphonomy of Malham Tarn Site A: A persistent place in the northern Pennines

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Inferences about site occupation address issues of group size, the range and types of activities conducted, and relative duration of occupation. Assemblage diversity, task sets assessed by a variety of criteria including microwear, and evaluation of spatial organization are among the primary analytic dimensions employed for this purpose. Here, we apply analysis of these different dimensions, as well as information from transient and logistic locales at Malham Tarn, Otley, and elsewhere, to the Mesolithic Malham Tarn Site A in northern England, a spatially extensive and at times intensive occupation. Smaller, discrete areas of high artefact density characterize the spatial distribution at Site A. Both material density and the ability to resolve subareas of more intensive use diminish as a function of distance from the lakeshore. In regional context Tarn Site A is a “persistent place” on the landscape; a known, provisioned and regularly visited location in a larger regional framework. Smaller investigated sites appear to have assemblage “packages” than can inform us about the nature of site use. We explore whether Tarn A assemblage composition and diversity, and spatial distribution, is taphonomically consistent with palimpsests of episodic small group use, or larger group residential activity.

The Mesolithic hut site of Camas Daraich, Isle of Skye, Scotland

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The Mesolithic of the west coast Scotland is well known, principally for its shell middens and evidence for coastal exploitation. Camas Daraich is an open air Mesolithic site, currently the earliest in the Isle of Skye, Scotland, where it is located at the southernmost point of the island, at the Point of Sleat. It lies around 200 m from the current coastline, facing a paleolake. Little evidence survives for resource exploitation, though micromorphology shows that the occupation layer was formed in situ with a high organic component which indicates animal consumption at the site, while some charred plant remains have also been recovered.

Early excavations in 2000 were followed more recently, by a new excavation campaign. Currently raw material characterization, lithics analysis and spatial analyses are ongoing. The recent excavations have revealed a large lithic assemblage, a series of small stone alignments and the outline of a structure. Raw materials suggest connections to the island of Rum 12 miles away and also to Staffin in the north east part of the island. Here we present the first results of the lithics and charcoal analysis and spatial analysis of the occupied area.

Human action and osteoarchaeological patterns: A spatial study of waste from bone tool manufacturing

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Osteological finds from the Mesolithic are often treated as remnants of the local fauna and the contemporaneous supply of resources. Ritual deposition has caught attention but most bone finds are interpreted within the frame of subsistence. This generates a simplified picture of the faunal record, of accumulation processes and of deposition of osteological material. The study focuses on the identification of waste of bone tool manufacturing and the underlying human actions and events behind patterning in the faunal record. Centered on a promontory at the river Motala Ström, Sweden, a coherent settlement site was established ca. 7000 cal. BC. Large scale archaeological excavations of the site, called Strandvägen, Motala, have led to the recovery of a large and for the area uniquely well preserved material. Taphonomic and anatomical analyses as well as fracture analysis identify patterns in the osteological material as patterns of production. The spatial organization reveals areas where the material can be understood as traces of repeated action within their archaeological context. The spatial distribution of waste from bone tool manufacturing adds a new dimension of site use that often is not available in the archaeological record and nuances the understanding of the settlement at Strandvägen.

Dwellings from the Mesolithic site in Motala, Sweden

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This contribution will present results from the spatial analysis of the excavated dwellings of the Mesolithic site in Motala. The dwellings have been dated to the second half of the sixth millennium BC, which is the period that seems to have made the greatest impression in the archaeological material on the site. The spatial analysis has shown that the settlement contained different types of dwellings with variations in the outline and the amount of refuse inside. There are indications of varying seasonal use, which in part can explain the diversity of the dwellings. Also, dating shows that the layout and placement of dwellings has changed over time.

The Late Mesolithic/Early Neolithic site Sømmevågen in South West Norway: Preliminary results

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The site at Sømmevågen, located south-west of Stavanger, was excavated in 2014. An area of ca. 7000m² was uncovered and three dwelling sites were investigated. The sites contained several house, pits, fireplaces, middens and a grave. Because the sites were covered with 2–3m of peat and aeolian sand, the preservation of organic material was extremely good, particularly for bones. The bone material includes both human and several dif-

ferent species of animal bones. The majority of animal bones are found in the middens, although preserved animal bones were also recovered from the houses. There are differences in the bone material between the houses and the middens, in terms of both species and element distribution. The distribution of stone tools and debris also shows variation between different contexts. The well-preserved site at Sømmevågen gives a unique opportunity to examine how people organized their dwelling sites in the Late Mesolithic and Early Neolithic in Scandinavia. In this paper the preliminary results of the settlement at Sømmevågen will be presented.

Mesolithic settlement on Utsira – A small island on the fringes of the North Sea

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Utsira which is a remote island on the outer coast of Western Norway, was visited by Mesolithic fisher-hunter-gatherers in the second half of the ninth millennium BC. A well-preserved site excavated in 2003 will be presented and seen in a southern Norwegian and Scandinavian perspective outlining and discussing site structural and spatial patterns. Specific for the site is a paved stone platform previously not documented on the few sites excavated from this time period in Norway. It served as platform for habitation and work activities with a lithic distribution suggesting two knapping and work locations. The site contains a small lithic inventory with 3000 artefacts of Maglemosian character with micro-liths, scrapers, a burin and two small axes distributed in two small clusters on the platform.

Mesolithic dwellings in Norway – A review

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The volume of data from Norwegian Mesolithic sites has accumulated with great rapidity in the last couple of decades, largely through contract archaeology projects, and because of methodological trends which involve uncovering and examining large surfaces on and around the surveyed sites. An explicit aim for Stone Age excavations has been to identify features that are notoriously hard to spot with the traditional shovel test pit survey. As a result, remnants of Mesolithic dwellings (tents, lean-tos, huts, houses) not visible during surveys have been documented in many parts of the country where such features were recently unknown.

In this paper, a data base from more than 100 Norwegian excavated dwelling remains dated to the Mesolithic period, ca. 9500–4000 cal. BC has been compiled. I will present a review – by statistical approach – of chronological and regional trends, looking at variables such as floor size, floor shape, constructional elements and presence/placing of inside fireplaces. I will also look into traditions of reuse, maintenance and reconstructions of dwellings. Finally, I will consider how the appearing dwelling trends relate to other dynamics of the Mesolithic society.

Workspace organization on the Final Palaeolithic hunter-gatherer camp

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Functional and spatial analysis of the complex #2 of the upper (first) layer of the Final Palaeolithic multilayer site of Kamennaya Balka III permit to recognize elements of the workspace organization, such as concentrations of end scrapers associated with hide polish around a fireplace, ochre spot, and microdebris from the rejuvenation of end scrapers. A correlation between elements of the complex allows us to make conclusions about individual operations performed in a certain sequence. A person worked near the fireplace and ochre spot, rejuvenated his tools on the working place or nearby micro debris concentrations, and continued to work near the fireplace area. Different data are obtained concerning hide-processing: ochre spot, remontage showed links between the working edge of the scraper and microcavities, hide polish on the end scrapers' edges and end scrapers rejuvenation flakes, traces of the hide-cutting on the knives, remains of a bison. All this data permit to reveal zones of special activity for hide processing.

BODY

Evidence of a parasitic disease from a Mesolithic burial in Motala, Sweden

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Eggs from the intestinal parasite *Trichuris* sp. (whipworm) were found in a burial pit radiocarbon-dated to ca. 5200–4850 cal. BC. The two identified helminth eggs both fall within the size range of *Trichuris trichiura* (human whipworm). Control samples from the site were all negative and confirm that contamination of younger material is highly unlikely. As the spread of whipworm has previously been associated with the spread of pastoral farming, this discovery raises new questions concerning the geographical spread and timing of parasitic diseases in northern Europe. Whipworm is perhaps the parasite most associated with crowding and poor sanitation. Generally, parasite ecology can aid in reconstructing human behaviours that include aspects of hygiene, sedentism, food preferences, and other practices.

Rediscovering Oronsay: Biomolecular approaches to skeletal material from Cnoc Coig

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In recent years, isotopic analysis of human remains has arguably shattered the idea of a gradual dietary transition from wild marine resources to a domesticated terrestrial diet with the arrival of farming in Britain. However, the scarcity of Late Mesolithic human skeletal remains in Britain has severely limited the extent of our understanding of dietary change associated with the Mesolithic-Neolithic transition.

The site of Cnoc Coig is one of five Mesolithic shell middens on the island of Oronsay, Inner Hebrides. Excavations have revealed that the site represents one of the very few human skeletal assemblages dating to the late fifth millennium BC in Britain. This talk will present new research on previously unidentifiable bone fragments from Cnoc Coig, subjected to a range of biomolecular methods – notably ZooMS (Zooarchaeology by Mass Spectrometry), AMS dating, and isotopic analysis. From these combined analyses, 13 human bone fragments have been identified, thought to represent two new individuals. New AMS dates obtained however suggest that the use of the site may have extended into the fourth millennium BC – using currently available ΔR values for calibration. Interestingly, isotopic analysis of these individuals indicates continued consumption of marine resources by the island's inhabitants at this later date.

Cultural change or dental pathology? Dental analysis of two human burials from Cabeço da Amoreira shell mound (Muge, Portugal)

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The human skeletons recovered from the Muge shell middens constitute one of the largest collections in Europe with more than 300 individuals. One of these middens, Cabeço da Amoreira shell mound was identified in 1864 by Carlos Ribeiro. The site produced a total of 47 skeletons during the excavations carried out by Mendes Côrrea, Jean Roche and Rolão. In 2011 and 2012, three new burials were excavated in the same site: an infant, aged between one and three years at death, and two adult individuals, a young female and an old male. This paper addresses the dental analysis of the latter two. Besides dental wear, calculus, caries and dental enamel hypoplasia, an atypical wear was observed on the vestibular surface of second upper molars of both individuals. A dental analysis was performed in order to verify the nature of these lesions and whether they resulted from taphonomic factors or in vivo lesions to the teeth resulting from tooth wear or cultural modifications.

From individual mobility to population dynamics during the Mesolithic and Neolithic transformations in the Danube Gorges (the Balkans, ca. 9500–5500 BC): Adaptations and interactions

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Documenting patterns of mobility during the beginning of the Holocene is of paramount importance to understand Mesolithic-Neolithic populations' dynamics. First, foragers are considered to have reduced their daily mobility, experiencing a (semi-)sedentary way-of-life; this sedentism in privileged environments should have impacted the population growth. Second, evidence suggests dynamic interactions with farming communities; incomers, with different daily-habits, may have affected local demographic fluctuations.

In this paper, we examine evidence of changing mobility level and patterns amongst the Danube Gorges population by integrating 3 lines of evidence: markers of physical activities (musculoskeletal stress markers, long bone morphometric maps), biodistance markers (non-metric anatomical variations) and stable isotopes (strontium, oxygen, nitrogen, sulfur and carbon from apatite and collagen), analyzed on 250 individuals (original and published data). Although of different nature, these markers provide complementary information: results document differential patterns between males and females; a trend toward a reduced daily-mobility among females; finally, a time of higher biological diversity and behavioural variability during the transition to the Neolithic can be interpreted in the light of previous results pinpointing the increasing presence of non-local females among the population (Borić and Price, 2013). This research highlights the contribution of multivariate bioarchaeological analyses to our understanding of Mesolithic-Neolithic transformations and to the broader field of human behavioural ecology.

Pregnancy and breastfeeding during prehistory: Mothers' dietary strategies through the Mesolithic-Neolithic transformations in the Danube Gorges

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Examining individual life-histories provide a direct way to understand the mechanisms of populations' adaptation to major ecological changes. The Mesolithic-Neolithic transformations offer a convenient frame to develop this bottom-up approach. Populations then experienced simultaneously a major increase in female fertility and in infant

mortality. A way to tackle the mechanisms of this demographic process is to document mothers' dietary choices from their pregnancy to children weaning. Indeed, the quality of mothers' nutrition has implications for successful pregnancies and the pattern of weaning may impact both females' fertility and toddlers' morbidity.

Focusing on the Danube Gorges prehistoric population (the Balkans, ca. 9500–5500 cal. BC), this paper presents stable isotope results (Carbon, Nitrogen, Sulfur) of an intra-individual sampling strategy (bone vs deciduous/permanent teeth) performed on 64 children aged from 26 gestational weeks to 9 years. Although the results suggest that mothers' diet followed the general trend documented for the local Mesolithic-Neolithic transformations, significant differences distinguish the feeding practices of Mesolithic children buried inside the Gorges and Early-Neolithic children discovered at the entrance of the Gorges. This study opens new prospects regarding the relationship between individuals' subsistence strategies and the dynamic of the group, thereby illustrating the benefits of the Life-History approach to our understanding of demographic fluctuations.

Ages of stress? A new study of cranial pathology modeled across the Mesolithic-Neolithic transition in the Danube Gorges, Serbia

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How stressful was the Neolithic transition?

We carried out a macroscopic and radiological examination on a large number of skulls (n=113) from the Danube Gorges, Serbia, spanning the Mesolithic to Neolithic transition. Porotic hyperostosis and cribra orbitalia were observed in 81.4 % (92/113) individuals from four Mesolithic-Neolithic sites. Common causes of these cranial pathologies are thalassemia, sickle cell anemia, malaria or iron deficiency anemia. This suggests that the transition may have been a stressful process in this region.

To further test this “stressful transition” hypothesis, we model all available radiocarbon dates for the individuals examined, and place them in their wider chrono-cultural context to create an accurate time-series of individuals and their pathology. Cranial age assessment data are then included in the time-series analysis, in order to show if the locus of the body's hemopoietic response to anemia reflected by porotic hyperostosis and cribra orbitalia are significant age related factors. A new combination of cranial pathology, biological age estimates, and time-series analysis potentially enables us to detect key trends in prehistoric health and nutrition. This helps us determine how stressful the Neolithic transition may have been for the individuals concerned.

Manipulation of the dead during the Mesolithic-Neolithic period in the Danube Gorges, Serbia: A reassessment of the burial data using taphonomic analysis

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At the Mesolithic-Neolithic sites of Padina, Lepenski Vir, Vlasac, and Hajdučka Vodenica (Serbia) numerous graves were uncovered. Along with articulated burials, disarticulated human remains were ubiquitous. Suggestions were made regarding the methods of body disarticulation, but without examining the taphonomic pathways of disarticulated human remains. The notion that existing interpretations might have overlooked stages in the burial pathway is pertinent, as analysis of a newly excavated burial sequence at Vlasac identified complex body manipulations. Subsequently, the disarticulated human bone assemblage was reassessed using taphonomic analysis; the results of which are presented in this paper. Micro-morphometric analysis of cut-marks found on human bone was carried out using 3D microscopy (the Alicona InfiniteFocus Microscope), and compared to cuts on non-human faunal remains. Various geographically and temporally extended funerary pathways have been identified, providing a new perspective on Mesolithic-Neolithic death. Post-mortem body manipulation was often planned, performed, and deliberate, but in some cases was more ad hoc. By transforming the dead and extending their death-ways, they were not simply buried and forgotten; they were instead modified, manipulated, divided, and remembered.

Behind the mask of the shapeshifting dead. Preparations and transformations of the Mesolithic human cadaver

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Taking its departure in the recently excavated double burial at Zvejneiki, where archaeo-thanatology has shown that at least one of the bodies was radically transformed at the time of disposal, through the use of a tight wrapping of the body and an ochre colored clay mask placed in front of the face, this paper discusses a wider range of examples of transformative mortuary practices across the northern European Mesolithic realm. Ranging from the preservation of the individual body in a life like state in many Southern Scandinavian sites, to the occasional but significant practice of extraction and circulation of human bones from burials to become metonymic objects in the world of the living, or the mixing of animal and human bone in the burial context, this paper draws on the theoretical models of New Totemism to place the transformative treatments of the dead body, at the centre of the search for Mesolithic social and ritual life.

Brunstad lok. 25 – A newly discovered Mesolithic grave from Southern Norway

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In the summer of 2014, rescue excavations on an extended settlement site from the early Late Mesolithic in Brunstad (Vestfold/Norway) revealed a single grave with preserved

human bone material. The grave, containing at least one adult individual, is ^{14}C -dated to ca. 5900 cal. BC. This find is sensational: Bone preservation conditions are otherwise bad in the acid southeastern Norwegian soils, and human bones dating to the Stone Age are only known from very few contexts in this area, and never in an intact grave-context. The grave, which was taken out and saved in blocks, was in winter 2014/2015 excavated at the conservation laboratory of the Museum of Cultural History, UiO. This talk will present the results from the laboratory excavation and from osteological and other analysis, focusing on the reconstruction of the grave and burial situation, the interred individual(s), the placement in the grave-pit and the inner and outer context of the grave. The Brunstad burial, placed on a coastal settlement site belonging to the Early Nøstvet period, is important for the understanding of individual life, of handling bodies and the dead and of aspects of ritual in Mesolithic society.

Tracing the norm? Hunter-gatherer mortuary practices during the Late Mesolithic and the Early Neolithic in north-eastern Europe (example of Estonia)

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Mortuary practices are governed by a set of rules, i.e. cultural norms. Nothing in these practices is arbitrary. The norms not only determine what and how things should be done in a designated cultural context – here hunter-gatherer funerals – but allow assessment of whether and to what extent single practitioners succeeded in their tasks. Moreover, practices do not change by chance. Changes in the norm are regulated, too.

In the present paper the questions about the normative ways of handling the dead in the late hunter-gatherer communities in north-eastern Europe are elaborated. The case study area is Estonia. Through the re-analysis of old excavation data with the help of post-excavation archaeoethanatology, single practices, and the relationship between primary and multi-episodic burials is observed. Thereto, the refined chronology of these practices allows observing the changes in the mortuary practices through three millennia (ca. 6000–3000 cal. BC). The present approach makes the view of late hunter-gatherer mortuary practices in north-eastern Europe more explicit and dynamic.

‘Pearls’ from the pearlfish: Cyprinid pharyngeal teeth appliqués from the Mesolithic-Neolithic Danube Gorges

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Besides being one of the first formal disposal areas in the region, Late Mesolithic burials at Vlasac and Schela Cladovei in the Danube Gorges (North-Central Balkans) exhibited a specific type of grave goods: cyprinid pharyngeal teeth (Srejšević and Letică 1978; Boroneanţ 1990). Recent technological, use-wear and residue analyses (Cristiani and Borić 2012; Cristiani *et al.* 2014) have demonstrated that they were worn as appliqués attached

to clothing by threads and/or binding compounds. The teeth most closely correspond to those of *Rutilus frisii* or *Rutilus meidingeri*, two similar species commonly known as pearlfish due to pearl-like tubercles covering their head and body. This paper explores the perception of pearlfish in this particular context, on the basis of its appearance which might have been simulated by humans wearing headdresses and clothing embroidered with teeth appliques. The paper also presents pearlfish size estimations and quantification of remains, and discusses their contextual provenance in further pursuit of meanings attributed to this aquatic creature. In addition to Late Mesolithic burials at Vlasac and Schela Cladovei, modified pearlfish teeth were found in Mesolithic-Neolithic 'Transformational' phase buildings at Lepenski Vir, suggesting that this specific type of bodily decoration represented a long term cultural expression in the Danube Gorges.

Unequal values of different animals and animal parts in burials at Late Mesolithic Yuzhniy Oleniy Ostrov, NW Russia

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Sharing animal body parts and giving them different meanings has been an established practice in Mesolithic traditions. In this paper I study how this practice is represented in the burials by analyzing the animal bones at Late Mesolithic Yuzhniy Oleniy Ostrov and interpreting their roles and meanings. Anatomical bone parts of certain animal species were carefully chosen. All body parts of individual species are never represented, i.e. the values and meanings given to different body parts are strongly divided. The osteological analysis indicates that the most important food animals of Mesolithic cultures in Boreal forest area, *Alces alces* and *Castor fiber*, are never represented in burials by meat rich body elements. However, it appears that species rarely found in settlement refuse faunas, like *Pandion haliaetus* and *Haliaeetus albicilla* have different anatomical pattern; the meat from meat rich parts was removed and bones were deposited in the burials. This suggests that the meat and bones from these birds were associated with different meanings. It has been proposed that only the most representative body parts of animals are placed in graves in some cases (e.g., Jones 1998; Conneller 2004), but my research suggests that this approach must be challenged.

MONOGRAPHIC SESSION 1

Faculty of Philosophy, Lecture Room on the 1st floor

MESO TIME

The long and the short of it; chronological models as prescriptive approaches in earlier prehistory

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Chronological modelling for results from archaeological sites and palaeoenvironmental sequences has undergone significant change in recent years with the application of Bayesian statistical analysis. For Mesolithic (and Palaeolithic) studies this has had a marked impact on perceptions of temporality and change, including in Britain on the antiquity of Mesolithic occupation evidence (Waddington 2007), human-environment interactions (Wicks and Mithen 2014), and lithic typological currencies and chronological overlap with Neolithic groups (Griffiths 2014).

While these developments allow us to unpick the timing and tempo of changes at individual sites, and to assess potential correlations between ‘events’ across sites or with palaeoenvironmental ‘events’, increasing precision of itself does not address some fundamental aspects of our temporal schemes. These underlying approaches have implications for the kinds of Mesolithic societies we describe, and the processes of change we envisage. In many parts of Europe, the scarcity of the archaeological record for Mesolithic groups means that — even if we can drill down into the precise dating of individual ‘events’ on archaeological sites — our causal narratives can become ‘sucked in’ or ‘smeared’ into super-regional generic models of change (cf. Baillie 1995.).

One of the results of the development of chronologies based on scientific dating is that rather than the ‘short’ chronologies of the mid 20th century — for example in Britain Piggott (1954, figure 64) was able to telescope the whole of prehistory from the Neolithic onwards into the period after 2000 BC — is that we are often confronted with vast swathes of time which are seemingly not punctuated by archaeological ‘events’. While scientific chronologies afford the advantage of allowing us to tack between geographical analytical scales, they do not therefore provide a narrative panacea. There is the danger that, in the absence of developed approaches to causality and narrative, a series of chronologically ‘convenient myths’ (Lowe and Higham 1998; Oldfield 2001) replace robust assessments of the available evidence and fail to account for regional variability. This can be especially true in the analysis of human-environment interaction, where internationally recognized palaeoenvironmental ‘events’ might have highly localized, non-directional signatures that do not track simply onto global trends (cf. Caseldine and Gearey 2005). In many respects this is an old question concerning how we write about the archaeological record, however the development of increasingly precise scientific chronologies makes these themes especially pertinent. This

paper discusses how more precisely dated environmental and anthropogenic evidence is situated within our overarching chronological models, and the importance of framing our causal narratives with reference to the limitations of our chronological understandings.

Dating boulder artworks and transition to farming at Lepenski Vir: Bayesian statistical modelling

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The archaeological site of Lepenski Vir is widely known after its remarkable stone art sculptures that represent a unique and unprecedented case of Holocene hunter-gatherer creativity. These artworks were found largely associated with trapezoidal limestone building floors around rectangular stone-lined hearths. Phase I-II with trapezoidally-shaped building floors and stone sculptures reveals a hybrid cultural assemblage with a mix of local fisher-foragers and newly arrived first farming communities in Europe. It provides key evidence for understanding the Mesolithic-Neolithic/forager-farmer transition in the Balkans. For years, this sequence was poorly dated and its potential to contribute to our understanding of the timing and tempo of the transition to farming in the Balkans was limited. Currently available robust series of 96 radiocarbon measurements dating Mesolithic and Neolithic contexts at the site and the application of Bayesian statistical framework in modelling this data have allowed us to provide formal estimates for the timing of the transition to farming in this region of Europe and to securely date the boulder artworks that make this site unique worldwide.

The impact of Bayesian modelling in the radiocarbon chronology of the Portuguese Mesolithic

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Although Portuguese Mesolithic shell middens have been the object of research and excavation for almost 150 years, the data are still scarce and, frequently, problematic. The chronology of the Mesolithic occupation of the Tagus and Sado valleys is based on a series of radiocarbon dates from various sites. These results allowed the establishment of upper and lower boundaries for the Mesolithic in the region, as well as the sequencing and cultural explanations of both regions. However, many of those dated samples have insoluble problems of provenience and stratigraphy and, thus, the dates have very little significance for the knowledge of the chronology of the sites.

Recently, a series of new projects, mostly funded by the Portuguese National Science Foundation (FCT), resulted in a long series of radiocarbon dates that allow the construction of a new chronological model, based on Bayesian statistics, for the Mesolithic sites of

central Portugal. This provides a complete and detailed new perspective of the chronology of the Mesolithic human occupation of the region as well as a change in the site functional attribution.

The pace of a persistent pace: Timings and tempo at Star Carr

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The seasonality and periodicity of occupation at Star Carr has been central to the understanding of the site since Clark's (1954) first excavation campaign. At that time, two radiocarbon measurements were obtained on birch wood. Further dating on Clark's archive has been severely limited due to the consolidants used on his finds, although dates have been obtained on two bones of domesticated dog (Schulting and Richards 2009) and a resin 'cake' mastic (Roberts *et al.* 1998). Further measurements have also been made on four un-conserved antler finds collected from section in the 1950s by Tot Lord (Dark *et al.* 2006), and on two artefacts recovered during further excavation in the 1980s (Mellars 1990). These renewed excavations were accompanied by a programme of palaeoenvironment research and radiocarbon dating in the immediate environs of Star Carr (Cloutman and Smith 1988), and detailed work from sequences adjacent to the excavated trenches (Mellars and Dark 1998).

The excavations carried out since 2004 have enabled a detailed understanding of the sequence of activities at the site (Conneller *et al.* 2012) and consequently have allowed a high resolution dating programme to be initiated, funded by English Heritage. This aims to place the human activity at Star Carr within its contemporary environmental setting. In total, 133 radiocarbon results are currently available. Preliminary Bayesian modelling of these results (further dating is on-going), suggests that human activity at Star Carr may be concentrated in a fairly restricted period within the first half of the ninth millennium cal. BC, and may have exploited a wetland that was seasonally flooded.

The use of 'activity events' as a novel tool in the chronological interpretation of site activity: Case studies from the Mesolithic of western Scotland

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Recent campaigns of archaeological fieldwork in the Hebridean archipelago of western Scotland have resulted in the acquisition of new AMS radiocarbon dates, many of which derive from stratified Mesolithic deposits. This radiocarbon date dataset is now of a sufficient size to allow pooling of screened dates to begin to address issues concerning Mesolithic population history and abrupt climate-driven cultural transitions during the early Holocene, with much greater precision than has hitherto been possible. Furthermore, the construction of formal chronological models for Mesolithic hunter-gatherer activity at individual sites are providing fascinating new insights into the character of settlement patterns within the

late Mesolithic communities of the region. The use of statistically defined ‘activity events’ using stratigraphically constrained groups of radiocarbon dates provides an additional and novel approach to assist in the chronological interpretation of site activity. This paper uses archaeological records, Bayesian chronological models and activity events to explore the characteristics of occupation at three Mesolithic sites: that of Rubha Port an t-Seilich on Islay, Fiskary on Coll and Criet Dubh on Mull, to provide a contrasting picture of site function and duration within the regional settlement patterns of Mesolithic Scotland.

Temporality of the Mesolithic in the southern France

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In the south of France, the Mesolithic extends over a period about four millennia. It is traditionally subdivided into four main stages: Early, Middle, Recent and Final. The first two correspond to the cultural complex of the Sauveterrian, dated between approximately 9000 and 6500 cal. BC, corresponding to what we qualify from now on as the First Mesolithic. The Second Mesolithic gathers the recent and final phases, and corresponds mainly to the Castelnovian, between approximately 6500 and 5000 cal. BC. It is at present difficult to go in more detail regarding this chronology, for diverse reasons. The first one is the relative rarity of the radiocarbon dates, especially recent ones. The main part of the chronological succession of the Mesolithic bases itself in reality on the evolution of the lithic industries, and not on the data of the absolute chronology. Another reason is the one of the irregularity of the curve of calibration, which still does not allow us to obtain very successful results, in particular for the First Mesolithic. The Bayesian modelling allows us to refine the data we have and authorizes an approach for renewing the chronological evolution of the Mesolithic in the south of France.

The Mesolithic camp-sites in Duvensee bog, south-eastern Schleswig-Holstein, northern Germany. New results of the spatial and chronological analysis

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The Duvensee peat bog, Northern Germany, represents one of the most prominent Stone Age palaeo-landscapes in Northern Europe, with several Stone Age campsites on small islands or peninsulas on the western border of the early Holocene lake. Outstanding preservation allows detailed examinations of the spatial organization of prehistoric hunter-gatherer campsites.

The most recently excavated is Duvensee 11, where a concentration of hazelnut roasting hearths, bark-mat layers and small knapping areas was found. According to a Bayesian chronological model, incorporating 34 radiocarbon results, the main period of activity spanned ca. 200 years. Soon after ca. 8500 cal. BC it was abandoned, except for at least one brief occupation episode, probably between ca. 8400 and 8300 cal. BC. Radiocarbon measurements since the 1970s show that at least seven sites at Duvensee date to the calibration plateau between ca. 9000 and 8300 cal. BC. Inspection of calibrated dates still gives exaggerated impression of site longevity. Because radiocarbon dating has become more precise over time, new work is now in progress to extend the Bayesian model to all Duvensee bog sites to obtain a more realistic chronology, and to link the archaeological record to the high-resolution palaeo-environmental reconstructions of the region now available.

Site Zamostje 2 – Specific complex for Mesolithic–Early Neolithic in central Russia

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Long-term investigations on the peat-bog site Zamostje 2 (Central Russia) have discovered three episodes of Mesolithic human occupation: 7900–7800 cal. BP – Lower Mesolithic layer, ca. 7400–7100 cal. BP – Upper Mesolithic layer, ca. 7100–6900 cal. BP – Final Mesolithic layer. In fact, the stone and bone assemblage of Early Neolithic layer also has a fully Mesolithic character – the period of its existence dates from ca. 6900–6200 cal. BP. Thus, it appears that the same cultural tradition was in existence at the site over 1700 years. From Volga-Oka region we now know of more than 500 Mesolithic and Early Neolithic settlements. Mostly the cultural remains on these sites come from sandy sediments and do not contain any organic materials. The most surprising fact is that so far we have found no sites where material culture which can be fully compared with the material culture of the site Zamostje 2. So the current problem of interpretation is whether Zamostje 2 is some kind unique phenomenon of the Mesolithic and early Neolithic in the region, or whether we cannot recognize hidden relations between the sites, or we whether are still experiencing a lack of well-stratified peat-bog sites.

The sum of all fears? Radiocarbon dates across the Mediterranean Mesolithic

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We present a large spatially explicit European radiocarbon database containing archaeological data from North and South of the Alps spanning the period of ca. 10,000 to 6000 cal. BP. We conduct a number of novel geo-temporal analyses on these data, and discuss our results in terms of variation in Mesolithic settlement patterns, changing demographic profiles, and interactions with early farming societies.

Integrative palaeo-science research on abrupt versus gradual cultural and palaeoenvironmental change in Terminal Pleistocene/Early Holocene Europe. A first report from INQUA project 1404

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Increasingly high-resolution records show that the pace and amplitude of past climatic and attendant environmental changes has been considerably more rapid and abrupt than hitherto appreciated. Likewise, archaeological records across Europe have enabled researchers to begin to question the variable impacts of such rapid – in contrast or complement to gradual – palaeoenvironmental changes on, for example, Late Glacial and Early Holocene hunter-gatherer societies. These advances have highlighted the complexities of climate-ecosystem-human interactions as well as the complexities of human response; in some regions there is little evidence for direct causal relationships between different kinds of palaeoenvironmental and cultural change, whereas in other regions there is clear evidence for such causal links. Identifying the reasons for this variability—rooted arguably in past ecological, settlement-historical, or technological differences, or simply in differences in analytical scales between studies—is a key challenge with major implications for our general understanding of rhythms, patterns and processes of demographic and cultural change in the Final Palaeolithic and Mesolithic. INQUA (International Union for Quaternary Research) has recently funded a project (1404) that brings together young researchers across Europe in order to compare, contrast, and integrate regional archaeological and palaeoenvironmental data and to employ chronological, agent-based, and eco-cultural niche modelling to investigate the diverse feedback relationships between climate change, ecosystem response, and forager cultural change across a wide range of ecological contexts. In this presentation we will introduce the project, discuss methodological problems of data integration, and present initial results.

MONOGRAPHIC SESSION 2

Faculty of Philosophy, Lecture Room on the 1st floor

THE EUROPEAN MIDDLE MESOLITHIC: A REVIEW

What prospects for an English Middle Mesolithic?

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From Grahame Clark to Roger Jacobi, for over 80 years, culturally, typologically and technologically the Mesolithic has been divided, early and late. This divide has been linked to

typological changes in microliths and the formation of the English Channel. In the late 1970s and 1980s some authors started to raise questions with this position. This paper will review recent work across the southern English regions that imply there may be, as yet to be defined, dated and excavated a Middle Mesolithic phase. Cases studies from East Anglia, the South-West and South-East, will be discussed in light of a refined chronological and environmental analyses on the changing geography of the North Sea Plain. Raw material procurement strategies, social alliances and corridors of movement into, and across these regional landscapes will be raised, at a time of great ecological change.

Regionality in the making? Technology and social networks during the Middle Mesolithic of southern Norway

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The Middle Mesolithic (ca. 8300–6300 cal. BC) was until recently the least investigated phase of the Mesolithic of Norway. In recent years, large-scale excavations in Southern Norway have provided a series of high quality lithic assemblages dated to the Early and Middle Mesolithic, providing better spatiotemporal resolution for discussing cultural development. This paper presents an assessment of Middle Mesolithic social organization and settlement from a technological perspective. Using complex blade industries as proxies for cultural practice, we focus specifically on socially learned and transmitted knowledge within social networks.

Fundamental changes to technology have been demonstrated over large parts of Northern and Western Scandinavia at the transition to the Middle Mesolithic. A new concept for blade production, referred to as the conical core pressure blade concept, was introduced. To explore the social implications related to the emergence of this concept, we will discuss results from technological analysis of newly excavated blade assemblages from Southern Norway against central principles of cultural transmission and change. We argue that the changes to technology must be seen in relation to postglacial environmental settings, and a transformation of established social networks and increased regionalisation during the first half of the Middle Mesolithic.

In the shadow of Stonehenge: A long term Mesolithic homebase discovered

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The discovery of a spring, adjacent to Vespasian's Camp and about 2 km from Stonehenge, that has well preserved and substantial Mesolithic deposits, potentially transforms our understanding of the Mesolithic use of the pre Stonehenge landscape, and the establishment of its later ritual landscape. This talk outlines the newly discovered local landscape history of the Vespasian's Camp area, the field interventions at Blick Mead, and concludes with a review of the site and its wider significance and context for the later development of the Stonehenge ritual landscape.

Finding, shaping, hiding: Caching behaviour in the Middle Mesolithic of Southeastern Norway

Lucia Uchermann Koxvold (*Museum of Cultural History, University of Oslo, Norway*) lucia.koxvold@khm.uio.no

In 2012, the Museum of Cultural History excavated the Middle Mesolithic site, Hovland 2, containing a cache. The cache consisted of core axes, pre-forms and beach flint nodules of the same size and shape but within different stages of modification. The find is unique for the Middle Mesolithic period of Southern Norway. It shows evidence of raw material procurement strategies as well as providing insight into stages of the technological operational chain we rarely see: choosing, testing, selection and primary modification.

Close to the cache a knapping area with small flakes and fragments was identified. This might represent traces of the initial shaping of pre-forms or give indications on the material that was removed from the cache. A hypothesis is that people quarried from this cache and thereafter made tools in the knapping area. In this paper results from the technological analysis of the assemblage and the knapping area conjoining it will be presented. The results will be placed in a larger setting of caching behaviour and mobility in the Middle Mesolithic landscape of Southern Norway.

Exploring the Middle Mesolithic coastal settlement of southeastern Norway

Steinar Solheim (*Museum of Cultural History, University of Oslo, Norway*) steinar.solheim@khm.uio.no and **Hege Damlien** (*Museum of Archaeology, University of Stavanger, Norway*)

As the Post Glacial sea level rise drowned the Pleistocene and Holocene coastal landscapes of Europe the archaeological record of marine adapted societies is difficult to assess. In some regions the ancient coastlines are still intact and situated on dry land. One such region is the Oslo fjord area where we have a unique archive to study marine adapted Mesolithic settlement.

During 2010–2014, the Museum of Cultural History has excavated several sites dated to the Middle Mesolithic (8300–6300 cal. BC) around the Oslo fjord. The sites were shore-bound and are traces of a coastal/marine-adapted society, and provide high quality data regarding settlement, economy and technology in a coastal area.

It has recently been proposed that settlement in the region was more permanent than previously assumed and that we see a shift from mobile to stable settlement already in the Middle Mesolithic. A parallel shift is also observed in lithic technological strategies, which indicate an increasing regionality during the period. In this paper we explore the Middle Mesolithic coastal settlement of the Oslo fjord region. By exploring different data sets and results from recently finished excavations we will discuss an increasing regionalization and changes observed in settlement patterns.

The Brunstad sites – New light on the Middle-Late Mesolithic transition in Norway

Gaute Reitan (*Museum of Cultural History, University of Oslo, Norway*) and **Almut Schülke** (*Museum of Cultural History, University of Oslo, Norway*) almut.schuelke@khm.uio.no

Large excavation projects during the last couple of decades have provided a considerable amount of data from the Mesolithic around the Oslo fjord in south-eastern Norway. Yet, several aspects remain unclear. For instance, our knowledge is meager about the Middle Mesolithic–Late Mesolithic transition period (ca. 6500–6000 cal. BC). As for the overall picture of the Mesolithic, the finds collected on the excavated settlement sites consist mainly of lithic artefacts, while preserved remains of organic matter are scarce. Additionally, few sites with relevant ¹⁴C-dates from this important transition phase have been investigated.

Two recently excavated coastal settlement sites (ca. 5900 cal. BC) at Brunstad (Vestfold), contribute with important new data in many aspects. A large number of cooking pits and hearths with dateable organic remains were uncovered, as well as traces of a sunken-floor hut, a grave containing human bones, and a rich amount of lithic artefacts. How do the Brunstad sites contribute to a better understanding of the eastern Norwegian Mesolithic? Radiocarbon dating results, types of features and technological traits in the material are discussed along with shoreline displacement curves to achieve a more detailed picture of the Middle Mesolithic–Late Mesolithic transition.

Thursday, 17th September 2015

Kapetan Miša's Palace, Ceremonial Hall of the Rectorate

RITUALS AND SYMBOLS

The art of decorating (transforming) one's body since prehistoric times, more specifically since the Mesolithic

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Body is the “general instrument of world understanding”, as Maurice Merleau-Ponty put it, which is probably why “every society, with its own style, has tried to give it (the body) a specific answer”. The body transformation techniques are multiple: tattoo, scarification, piercing, implants, painting, etc. Motif variation from a region to another attests of a real “territory”; a specialization of visible skin-area of an individual as a member of a community or a specific cultural group. Basing myself on recent archeological data (like the Otzi mummy) as well as evidence brought by anthropologists and ethnologists who studied tra-

ditional civilizations in modern times, I intend to establish the filiation of this body “humanization” with signs /marks of culture back to Mesolithic times. Prehistoric paintings and carvings from the Late Mesolithic or Early Neolithic show a multitude of details such as corporal modifications/alterations and ornamental clothing that appear very similar to populations from modern times and even to traditional cultures. In this way, they seem to confirm the hypothesis of a perennality (unchanging) in the art (construction) of being a man in these societies since Mesolithic, even *Homo sapiens*.

Protective patterns in Mesolithic art

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Here it is argued that Mesolithic ornamental art primarily had a protective magic function, and that the inspiration for at least some ornamental designs could have been the natural patterns on skin, feathers and shells which play a role in the protection strategy for such vulnerable species as deer fawns, turtles and snakes.

The ultimate extermination of an enemy during the Mesolithic

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After having killed one's enemy and eventually after having devoured the same person, broken the person's bones and buried the remains at the bottom of the sea, and after having subjugated the person's relatives, what more remains to be done? The destruction of the person's personal and status related objects such as decorated amber pendants and the decorated bone and antler tools. Amber pendants can be thrown on the fire, while the antler and bone objects can be cut up and, reworked and transformed into more mundane objects like a fishing point or a harpoon head. Such examples are known from the Mesolithic of Denmark, and they are here included in a story, that will, however, be hard to verify.

A portable object in motion – Layers of meaning as seen on the ornamented sandstone-pendant from the Late Mesolithic site of Brunstad (Vestfold, Norway)

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In 2013, an oblong sandstone tablet (length 11 cm), smoothed and ornamented on both sides, was found on the Mesolithic coastal site of Brunstad (loc. 24). The site, which has yielded many structures and finds, amongst them a grave, is dated to the early sixth millennium BC. The sandstone-object is pierced at one side, which makes it very likely that the object was used as a pendant. The delicately incised ornamentation shows fish- and wave-ornaments on both sides. Stylistically the ornaments resemble other pieces of

portable art as known from the Middle and Late Mesolithic periods, while the combination of form of object, material and ornament is unique. This talk aims at discussing several layers of meaning that are imbedded in the Brunstad pendant, placing it in a social context by addressing aspects of use, mobility and changeability. This will be achieved by looking at the objects possible functions, seen in its find context on a coastal site, and discussing the life history of the object, focusing on possible sequences of ornamentation.

Treatment of corpses, consumption of souls and production of rock art. Late Mesolithic mortuary practices reflected in hunter's rock art of Western Norway

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The paper argues that several rock art sites dated to the Late Mesolithic in western Norway are connected to mortuary processes and that the iconography can be understood as narratives associated with death beliefs. These rock art sites will be evaluated against the contemporary material context and contemporary funerary remains in both western Norway and southern Scandinavia. From these approaches it will be suggested that rock art, death rituals and burials are complementary to each other and that glimpses of a Late Mesolithic religion can be derived where the iconography and funerary remains are merged. The approach addresses the importance of red deer in both religion and religious activity for the area of investigation during the Late Mesolithic period.

Death in the Mesolithic: Mortuary practices of the last hunter-gatherers of SW Atlantic Europe

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The shell midden sites of the Tagus (Muge) and Sado valleys in Portugal are known for their large number of human remains excavated since 1863. This paper presents the main results of my PhD on the mortuary practices of these last hunter-gatherers of south-western Atlantic Europe. This research is based on the archaeological material excavated from the nineteenth century to the late 1960s representing more than 300 human burials. Here, I present an updated chronological framework for the use of these sites as burial grounds based on new 38 radiocarbon dates on human bone collagen. Furthermore, this study presents a new insight on the mortuary ritual practices of these hunter-gatherers as revealed through detailed burial analysis using the methods of Archaeothanatology.

Multiple burials from the eastern Baltic Stone Age

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Burial data are important for interpreting past social structures, traditions and beliefs. The Stone Age burials of the eastern Baltic include not only individual inhumations but also collective graves. Zvejnieki burial ground, Latvia, has a special place in this regard. Here, one of the collective graves (Nos. 178–182) contained five adult male burials in extended prone position. Traces of ochre were observed around the skeletons. One of these had several injuries (e.g., a flint flake lodged in the third thoracic vertebra), which may be the cause of death. Following radiocarbon dating and stable isotope analysis of all five skeletons along with statistical modelling of individual dietary reservoir effects, the collective grave is estimated to date to within the range 4720–4530 cal. BC (95% probability) (Meadows *et al.* in prep.). Interdisciplinary research is essential for a more profound understanding of the problem of collective graves, and needs to be continued.

Variation in the ochre burial structures of the Jönsas cemetery, southern Finland

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From Jönsas multi-period settlement site in Vantaa municipality, 23 red ochre burials were found with no bone material preserved. In addition to the red ochre burials, five graves belonging to the Corded Ware culture were excavated. Although Jönsas is often mentioned as a Mesolithic burial ground, there are no radiocarbon dates referring to the period from the ochre burials. Without direct dates, Jönsas ochre burials have been connected to the Mesolithic phase of the site because of the tradition of ochre use, lack of pottery, and a few artefacts found in the burials. Since there were also Late Neolithic burials in the cemetery, it might be possible that the Jönsas burial ground may have been in use recurrently from the Mesolithic to the Neolithic period. In this presentation, the differences in the ochre burial structures and in the location of the burials are examined further in order to trace different times of use in the Jönsas cemetery.

Place them in the water – the depositions of human remains and objects of prestige at the site Strandvägen, Motala, Sweden

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The site Strandvägen in Motala was established along the shore of the river Motala ström and Lake Vättern ca. 7000 cal. BC. The site stands without comparison as the largest and most complex Mesolithic settlement in eastern central Sweden. Large-scale excavations have revealed a broad variation in the handling of human remains at the site. Burials were

found alongside dwellings and areas of specialized crafts. Loose human bones and objects of prestige were deposited in the refuse layers on the river floor. This contribution will focus on the human remains found in the water; their connection to the settlement and spatial conformity with objects of prestige and stone packing's constructed in the riverbed. This practice seems to correspond well to the ritual deposition at the nearby site Kanaljorden. The similarities might indicate a comparable and contemporaneous praxis of water depositions between the sites. Together this could suggest an expression of a complex ritual practice.

Across the river and into the trees... and down into the lake

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Excavations at Kanaljorden, by the River Motala Ström in Sweden have unearthed a ritual context where human skulls were deposited on a man-made under-water stone-packing at the bottom of a small lake. Beside human bones, the depositions also include artefacts of bone, antler, stone, birch-bark and wood as well as animal bones. The material is analyzed using the analytical model of the operational chain, where different stages of the ritual are conceptualized as a series of actions and events. It is suggested that the processing of the dead played out throughout the year, at different seasonal settlement sites in the surrounding regions. Only at a late stage in the chain of events, were the human remains brought to Motala Ström, where hunter-gatherers from surrounding regions gathered for communal fishing of anadromous fish. The last stage of the journey is envisaged as bringing the remains of the dead over the river from the large settlement on the southern bank. At the northern shore, the participants in the ritual carried the remains of the dead into the closed forest that covered the northern bank. Beyond the barrier of trees lay the small lake where the last stages of the ritual played out.

From fragments of bones – Bringing mortuary practice alive at Strandvägen, Motala

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Excavations at the site Strandvägen in Motala have revealed 19 burials that date between ca. 7000–6000 cal. BP. The skeletal remains were poorly preserved and identification as well as definition of some of the features as burials proved challenging. Due to the poor preservation the decision was taken to carefully excavate and document all burials on site.

The spatial distribution of burials indicates two different groups with 11 features in the south and further eight to the north. The northern group seems to consist of primary inhumations while in the southern group primary burials were mixed with features of probable secondary depositions such as bone-pits (with single bone elements) and two features

with cremated human bones. The two groups also exhibited interesting differences in grave goods. The differences between the groups demonstrate variations in the burial practice on the site. The presence of undisturbed burials and their location on the settlement indicate that they were known and visible, and thus important for the people inhabiting the site. Even if limited in number and by preservation, the burials highlight important aspects on Mesolithic burial customs in eastern central Sweden.

Pit or grave? „Emptied” graves from the cemetery at Dudka, Masuria, north-east Poland

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18 graves, dated to the Mesolithic and the Para-Neolithic, were found at the Dudka cemetery. Besides graves, there were numerous pits in the cemetery zone. Only a few of them are connected with the Late Neolithic settlement. Most of the pits are probably dated to the same period as graves and their purpose is unclear. About ten of such pits are small and regular in shape, similarly to graves, and they are almost empty. There were only single human bones as well as specific artefacts like fossils, ochre lumps and animal jaws and teeth, which are typical for proper graves at Dudka. Such pits could be interpreted as graves. Some of them contained probably secondary partial burials, whereas others were most likely former graves, which were emptied in the Stone Age. In such cases almost all human bones were taken out apart from small bones like teeth or phalanxes, which could be easily overlooked. Re-opening of graves in order to collect bones of given deceased seems to be a part of a complex multi-step burial rite that was practiced by the local hunter-gatherer community.

Beware of dogs! Burials and loose dog bones at Dudka and Szczepanki, Masuria, NE Poland

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The main cemetery at Dudka comprised 18 graves with extremely diversified burials. Four graves contained dogs. One dog metacarpal was found in grave VI-4 together with nine cremated human individuals and two small unburned human bones. Grave VI-10 included secondary female burial and cremated remains of adolescent and dog, both represented by few bones. Green discoloration on bones suggests that juvenile and dog were cremated together. In grave VI-15 cremated male and secondary inhumated dog were buried together probably in a basket. There were some unburned bones of second male too, but deposited outside the container. Grave VI-8 comprised secondary dog burial and few pieces of burned human bones. It was the richest grave situated in the centre of cemetery. At neighbouring site Szczepanki primary (?) dog burial was deposited (sunken?) near lakeshore together with tibia of another dog. ‘Loose’ dog bones appeared at both sites and in the same zones as human remains. All these suggest that in burial custom dogs were treated similarly to people, so they were probably well integrated with hunter-gatherer society and their status was almost equal to human.

Symbols in their own rite? Human – animal symbolism at the hunter-gatherer site Kanaljorden in Motala, Sweden

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Mesolithic human – animal relations, beyond the calories, are often implied in the archaeological record and occasionally visible for example in dog burials. The present paper discusses the symbolic meanings of faunal remains and their representation at the ritual site Kanaljorden in Motala, Sweden. Around 5800 cal. BC selected human remains, mostly skulls, from a dozen individuals were placed on a constructed stone packing at the bottom of a small lake. The ritual activities at the site also included the deposition of wild animals. Taphonomic and spatial analyses of the faunal remains reveal interesting patterns of deposition and handling of animal bodies. The anatomical representation suggests a differential handling of species and anatomical units and the distribution of the remains reveal a pattern where different animals were deposited spatially separated. The deposition includes the remains of several individuals of species such as brown bear, wild boar, red deer and badger. The animals should probably be perceived as actors in their own right in the assemblage and in the ritual. The faunal remains deposited at Kanaljorden indicate a complex human – animal symbolism within this northern hunter-gatherer society.

Birds in ritual practice of Eastern European forest hunter-gatherers

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The data concerning bird bone finds in Mesolithic burials and bone bird sculpture finds in burials and dwellings/settlements are discussed. According to palaeozoologists' ideas, bird bones (mostly wing and leg ones) were placed in burials to demonstrate a certain symbolic connection between a buried person and a concrete bird species, but surely not as after-death food supplement. Numerous finds of bird sculptural pendants permit to assume a totemic origin of this connection. The analysis of sculpture context and a number of represented bird species allowed to indicate various directions of relative/marital ties and to recognize the definite mobility and, at the same time, locality of totem clans. Taking into consideration the economic (hunting) importance of birds, the sedentary/migratory lifestyle and behaviour features of different bird species, common for the forest zone, the same features of the totem clan lifestyle could be traced. The steady symbol of a bird pair (male and female?) is also confirmed by osteological and archaeological data. The totemic bird worship is well known according to Urals and Siberian ethnographic data and could be traced in the Eastern European forest zone from the Late Mesolithic period.

The ritual world of hunter-gatherers in the Northern Europe. Focus on the Mesolithic burials in cross-Baltic region, with animal remains as a point of departure

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The objective of this PhD project is to study the burial rites using animal bones and teeth pendants as a point of departure in an attempt to reveal the social aspects of hunter-gatherer groups. The presence of different grave goods, their type and arrangement within the grave or lack of them allows discussing the reasons and circumstances how hunter-gatherers buried their dead. In the previous research about life and death of the Mesolithic hunter-gatherer communities around the Baltic Sea, animal remains have been assigned having both aesthetic and symbolic values, as well as interpreted as valuable grave goods or remains of feast connected to the funeral ritual.

This research focus on relations between humans and animals, social practice, identity issues and symbolic significance of animal remains in material from Zvejnieki cemetery (Latvia) and Skateholm (Sweden), as well as other burial contexts from the Mesolithic cemeteries around the Baltic Sea. Some of the questions that will be addressed are: Which teeth were used for decorations and how many animals were used to provide the adornments? How were the deceased and grave goods prepared for burial? How do burial arrangements, traditions, rituals differ between gender, age, social groups?

Testing the amount of the supernatural in Mesolithic antler frontlets

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Supposed Mesolithic antler head-dresses from Star Carr have been interpreted as either shamanic garb and/or hunting disguises. This has had an overall lasting impact on our interpretation of Mesolithic and hunter-gatherer societies. The hypothesis that these objects were worn as a mask or head-dress has not yet been proven. However the recovery of comparable objects from sediments of roughly contemporaneous or slightly earlier age across the Northern European Plain keeps this model alive. Apart from the fact that these comparable artefacts are not yet well defined and their precise use and function still remains unclear and requires more detailed investigation, the apparent significance of the presence of these antler frontlets in Early Mesolithic bog sites across Central and Northern Europe is generally still not well understood.

Presented here will be the results of a morphometrical and technological re-examination of 16 modified cervid skulls with attached antlers from eight sites which have been discussed in the context of the Star Carr antler frontlets. Furthermore, these results will be used to evaluate if former hypotheses about the ritual and symbolic character of Mesolithic antler frontlets *sensu* Star Carr can still be maintained.

Whats a grave gift? A European perspective

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Grave gifts are among the key issues in the interpretation of past funerary behaviour. It may seem that there is no problem in the identification of what can be described as grave gifts or grave goods. There are a number of artefacts that the majority of colleagues would judge

to be deliberately deposited artefacts. Some graves are furnished with an unusually large number of artefacts. Among these graves too, there are artefacts about which there can be uncertainty. This applies not least to animal bones. The absence of grave gifts can likewise be problematized in some cases. Almost half of all graves in the Mesolithic of Europe lack artefacts which can be interpreted as grave gifts. In a number of graves there are factors which cause differences in the assessment of what constitutes grave gifts and what does not. There are depositions beside the grave or at a short distance from the grave which contain artefacts. Here one can talk about a form of grave depositions which are incorporated in the mortuary practice.

Another category of deposited artefacts is those consisting of organic material. In certain graves there are amounts of charcoal which may be the remains of bark containers or wooden objects.

There are some cases where seemingly ordinary stones may have had a special meaning such as marking of the eye socket with a stone. These examples along with the situation concerning the grave fillings show that in many cases it is not possible to arrive at a strict categorization of what can be designated as grave gifts or not.

The Mesolithic-Neolithic Donkalis and Spiginas ritual complex and its continuation during the Metal Age

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Research at Donkalis and Spiginas Stone-Age complexes has revealed many subtle and unexpected facts about grave fittings, symbolic, and sacrificial hearts, funeral feasts which show that as early as the Mesolithic period particularly complex burial rituals existed. In the middle of the twentieth century, structural anthropologists such as Claude Lévi-Strauss researched human lifestyles and attempted to connect ways of thought and behaviour determined by myth and ritual. The repetition of formal actions and phrases intended to lead to an unknown state of being and the ensuring of symbolic order are part of community training. Rituals change, but the structure remains recognizable and members of a tribe taking part in shared rituals strengthen their community identity. Spiginas and Donkalis cemeteries were islands in the lake Biržulis. The meaning of the lake “Biržulis” in Indoeuropean languages has a metaphoric meaning “ritually clean”, “innocent.” Lake name “Burtnieku” in North Latvia, where also cemetery Zvejnieki is located, when translated means “Soccer Lake”. We also noticed the linguistic parallel that river Ruja at Burtnieku Lake (Zvejnieki cemetery) and river Druja at Biržulis Lake (Donkalis cemetery) are semantically connected with flowing (Druja) or standing (Rūja) water.

The islands Donkalis (Old Indoeuropean meaning “hill in the water”) and Spiginas, where Stone-Age people were buried, are really very clearly seen in the landscape and for local people they might have been socially very important, including for burial of the dead, ritual feasts, and, later, in the Neolithic as an offering place. This may have determined the slow monumentalisation of these two sites, which reached a stage where they became most visible and known to nearby communities. The visual effect of these cemetery and ritual complexes was very striking; the same cannot be said of stone-age ritual and cemetery sites

in the Baltic Region. The Donkalis centre had particular social significance containing local communities, a curious outcrop of land like the horn-shaped Spiginas escarpment, which was also a clear site dominating the local landscape. Donkalis became such a dominant feature not only because people were buried here from 6377–6221 to 2880–2470 cal. BC, albeit sometimes with considerable intervals, but also because regular ritual activities took place there such as burial ceremonies, feasts in honour of the dead and later sacrifices which were offered in the huge sacrificial hearth. This paper seeks to show how in a particularly compact environment (a 2 km strip of land on the northern shore of Lake Biržulis) these connections remained unbroken, deepening over time and changed to become important ritual sites during the Metals Age, even as late as the AD 1413 Conversion of Žemaitija to Christianity.

Archaeological remains of Mesolithic funerary rites and symbols

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Graves represent unique concentrations of objects and features related to death and funerary rites. The paper reviews and analyzes the information available from more than 200 Mesolithic burial sites in Europe. The selection of the location, the intra-site organization of the burial ground, the construction of the grave and other funeral facilities (e.g., pyres, sacrificial pits, hearths etc.) as well as the dressing and furnishing of deceased individuals all seem to have symbolic meanings. Traditions and rites were developed for the disposal of the corpse and the ceremonial procedure itself. Sometimes the funeral was followed by re-opening of the burial, removal, renewed treatment and reburial of human remains and grave goods. Stone and wooden constructions were used to secure the memorial of the dead and to protect them and the living. This presentation identifies and outlines signs, objects and actions as carriers of meaning for the biography and status of the deceased and ideas about life after death. Examples will be given of regionally and individually varying symbolic and ritual behaviour, indicating the different degrees of complexity in Mesolithic mortuary practices.

Rites, symbols and spatial organization of two human burials at the Cabeço da Amoreira shellmound (Muge, Portugal)

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150 years of excavations at the various shellmiddens of the Muge Mesolithic complex have allowed the recovering of hundreds of skeletons. These have been persistently one of the main foci of the investigation, though most of them have insoluble problems of artefact association, provenience, stratigraphy and chronology. Albeit the recent reanalysis of data

on the burials of Moita do Sebastião have revealed a set of patterns that result from intra-site organization of the burials deriving from social hierarchy and division, the exact reconstruction of the funerary contexts is, however, not possible due to constraints related to the old recording methods.

In 2011 and 2012, we excavated a series of new burials in Cabeço da Amoreira, with modern techniques and recovered new types of data that allow a more complete reconstruction of some of the burials. This paper will focus on the analysis of spatial distribution of different categories of artefacts associated with two of those human burials. GIS software was used for the analysis of quantitative and qualitative data, allowing the establishment of a spatial organization of each funerary context. Distributions, densities and correlations of artefacts to the human bodies allowed an insight into the processes involved before and after bodies' deposition.

Marine shells as grave goods at S'Ormu e S'orku (western Sardinia)

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S'Ormu e S'orku (SOMK) on the western coast of Sardinia (Italy) is a collapsed rockshelter currently opening on the sea shore, which was rapidly filled by sediments around 8500 cal. BP. Within the stratigraphic sequence, a number of partially preserved burials were discovered. These included the skeleton of an adult-mature individual (SOMK 1) covered in ochre and associated with a *Charonia lampas* shell; the partial remains of a second adult skeleton (SOMK 2), which were too disturbed for assessing the presence of any grave goods; and a third partial skeleton (SOMK 3) also associated with a *Charonia lampas* shell as well as with a rich ensemble of shell ornaments represented by large *Cypraea* and specimens of perforated *Columbella rustica*. To date, *Charonia lampas* shells are not documented in other Mesolithic sites and burials in Europe.

All ornaments from SOMK have undergone a technological and functional analysis aimed at reconstructing their modalities of production and possible use before the deposition in the burials. While the use of *Columbella rustica* as ornaments is a widely diffused trait of the Mesolithic ornamental tradition in the Mediterranean region, the choice of big *Cypraea* shells as personal adornments is less documented in Europe. Technological, functional and symbolic aspects of the ornamental repertoire from SOMK are presented in this paper and discussed against other archaeological evidence from the Italian Peninsula as well as adjacent Mediterranean regions.

Microwear matters: Uncovering evidence for burial rites in Mesolithic Ireland

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Identifying hunter-gatherer ritualized treatment of objects in the Irish Mesolithic has seen limited attention up until now. Discussion of ritualized practice has been confined to macro-scale acts, e.g. evidence for 'unusual' pit deposits. In Ireland, and elsewhere in Europe, rarely does research focus on the symbolic treatment of objects. As a method, we believe that microwear analysis has the potential to reveal important new insights into hunter-gatherer tool use (thus behaviour) which does not always have a utilitarian explanation; and therefore should be considered an essential part of our methodological 'toolkit'. To illustrate this point, we will present the results of microwear analysis on the Early Mesolithic polished stone axe from Hermitage. Our analysis has established that the axe was intentionally decommissioned prior to its deposition. It was found blade down, resting against what has been interpreted as a post-pipe for a grave-marker, with a cremation burial dating to ca. 7530–7320 cal. BC. The identification of a grave-marker indicates that this was a place intended to be returned to: a place of remembrance. Located on the River Shannon, in County Limerick, this cremation burial (probably of a single adult male) is amongst the earliest recorded for Ireland and Britain.

Animal tooth pendants in Yuzhniy Oleniy Ostrov burials – Uses, meanings and set composition

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In the Late Mesolithic graves of Yuzhniy Oleniy Ostrov (NW Russia), large amounts of Eurasian elk (*Alces alces*) incisors and brown bear (*Ursus arctos*) canines have been found. These teeth, for the most part equipped with either suspension holes or grooves, seem to have formed decorative sets to the garments or accessories of the deceased. This paper presents the first results of our research project on the use and meanings of these artefacts. The find contexts will be studied in order to better understand the original composition of the sets. By way of osteological analysis, the teeth will be divided up into different age groups. By use-wear analysis, suspension methods and rates of abrasion will be studied. Finally, we investigate whether the tooth sets served as rattles, that is, portable sound-producers. This interpretation, backed by experimental tests and ethnographical parallels, would provide insight into the previously unexplored Mesolithic sound world. The results will lead us to consider not only the roles of these artefacts but also what kind of factors affected in choosing the pendants used in burials.

Rites and symbols in the use of Mesolithic antler axes

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Findings from dredging of rivers or unexpected discoveries, several decorated socketed axes or adzes made of antler have formerly been recognized as Mesolithic in northern France (Blanchet / Lambot 1977 and 1078). The technological reinvestigation of these artefacts comes to suggest that these have been used as axes or adzes after they have been engraved and then hafted. The study of binding system shows both that once fitted, the decor was not necessarily intended to be visible at the time these were employed. Moreover, geometric patterns evoked by the engravings themselves show that in some cases the utilization of a registry of forms delivers sense. The oral presentation will focus on the discussion of these two aspects of the function of art and cached symbolism carried by this type of Mesolithic decorated heavy-duty tools. The results will also be discussed in relation to their chrono-cultural context and the Maglemose to which these pieces were attributed.

Ritual continuity between the late Ertebølle culture and early Funnel Beaker culture in Denmark?

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Recent rescue excavations carried out prior to the construction of a tunnel between Denmark and Germany, have revealed a number of sites with rich materials belonging to the transitional phase between the Mesolithic Ertebølle culture and the early Neolithic Funnel Beaker culture. The majority of the finds belong to the liminal coastal zone and have originally been placed in shallow water overgrown with reeds. From this area especially a large number of ritually depositions from the early Neolithic phase have brought new light to the description of the ritual behaviour of the period. These ritual depositions show in many aspects a clear continuity from the Late Mesolithic deposition tradition and might be a new approach to tackle the questions concerning the Neolithization process as well as describing the development in ritual behaviour. The depositions so far uncovered consists of bones, especially mandibles, antler axes, wooden shafts, paddles, bows, blades and ceramics.

Kapetan Miša's Palace, Ceremonial Hall of the Rectorate

REGIONAL IDENTITIES

Integrating communities and landscape: A wetland perspective

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The Late Mesolithic in the Low Countries has long been regarded as either a uniform trappeze-oriented horizon, or as a prelude to the Neolithic. As such it has somewhat lost its own identity. Comparative research of sites from a long-term perspective, however, indicates that there is much more regional diversity than previously acknowledged. Communities and the landscape and environment in which they are situated intertwine and co-develop.

As such they should be studied coherently from a historical ecological perspective as socio-cultural systems that interact with their environment in characteristic ways.

For the Lower Rhine Area (lowland Low Countries northwest of the Eifel and Ardennes mountain ranges) this can be demonstrated by the archaeological record of the Mesolithic and indigenous Neolithic communities of the Delta region. They point to the existence of a specific wetland *mentalité* that is informative on the characteristics of regional inhabitation as well as community identity. From this perspective it also sheds more light on the development of Neolithisation in this area. The study argues for a more integrated approach towards understanding Mesolithic communities from a regional perspective.

Mesolithic landscapes of Eastern England; the evidence from lithic scatters

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As with many regions of Britain the Mesolithic archaeology of eastern England is dominated by lithic scatters, often recovered from plough zone contexts. Numerous problems attend the interpretation of such sites and they are invariably marginalized and poorly served by research and commercially driven projects alike. This paper presents some of the results of an attempt to explore methodological and theoretical issues associated with Mesolithic lithic scatters through a case study from eastern England. This research has involved the collation of records for over a thousand individual lithic scatters and find spots which have been quantified, classified and integrated into a Geographical Information System.

It will be suggested that, whilst there is enormous potential for lithic scatters to improve our understanding of Mesolithic landscape occupation, this potential cannot be realized without detailed understanding of a range of regional and landscape scale processes such as geomorphology, research histories and land use. This has important implications for the development of appropriate approaches to the recovery, management and interpretation of Mesolithic lithic scatters.

Identifying regional practice in cave use during the Mesolithic in south-west Britain

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Caves are not static landscape features; they are dynamic places that were used during the Mesolithic for a range of practices which can be broadly divided into burial and non-burial activities. A detailed examination of the archaeological record from cave sites in south west Britain, as well as an integrated landscape and contextual approach, has revealed that rather than practice being homogenous across these broad classifications, spatial and temporal differences exist in the attitudes of Mesolithic communities towards the use of caves.

By adopting a holistic approach and integrating many different strands of evidence, regional signatures can be evidenced that would appear to be unique to particular karst

landscapes at particular times. Rather than simply being another node in the landscape, used expediently as part of a seasonal mobility round, it would seem that caves held a special significance to Mesolithic hunter-gatherer communities. This significance appears to be both geographically and historically situated, suggesting that caves were conceptualized and used according to the tempo of local needs and beliefs.

The “Asturian” and its neighbours in the twenty-first century: Recent perspectives on the Mesolithic of northern Spain

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The Asturian has been, since one hundred years ago, the main reference for the Mesolithic of northern Spain, both at a national and at an international level. However, since the very beginning of the research, some Basque counterparts to the eastern Asturian shell middens were added to the catalogue, and very soon studied by T. de Aranzadi, J.M. Barandiaran and E. Eguren. That has resulted in a bipolar tradition of research, with the poor definition of the Cantabria Mesolithic acting as a firebreak between both areas. In the last times, a relevant amount of research has been developed all along the region. Therefore, it is possible to compare the Mesolithic of different areas of Cantabrian Spain, and to address the problem of its degree of continuity. Can we speak of a Mesolithic of northern Spain; or rather should we define several discrete areas? This paper intends to present the results of the field and laboratory investigations developed in the last five years, and to provide an updated view about the last hunter-gatherers of this part of the Iberian Peninsula.

The Asturian one century later

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A century ago, in the excavation of a cave in Asturias (El Penicil, North Spain, 1914), Count Vega del Sella documented the first materials known to belong to the *Asturian culture*. That was the name proposed by H. Obermaier for the new culture, in his book *El Hombre Fósil* (1916). Due to this German prehistorian's publications and those of authors like M.C. Burkitt, the Asturian soon became well-known internationally. This situation was especially noticeable after the 1970s, and has continued until the present time. Indeed, the Asturian has been present in the MESO conferences since 1985, in Edinburgh, when the proceedings included a paper that has greatly influenced later research on the culture. After a hundred years of studies from different theoretical viewpoints and debates in dif-

ferent forums, this paper presents a critical reflection on what is known and not known about this classic European Mesolithic culture, characterized by the massive presence of shell-middens.

The Late Mesolithic of the Alentejo coast (Portugal). Lithic industry in focus

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The authors will present a synthesis about the technological and functional structure (microwear analysis) of chert knapped industry from Late Mesolithic societies of the Alentejo Coast. Their study will be focused on the settlement of Santa Marinha near the lagoon of Melides in the northern sector of the region, and on the site of Vale Marim, directly on the cliff of the Atlantic shore, close to the harbour of Sines.

The results of the lithic assemblages study will be discussed in order to shed new light on the subsistence marine adaptations and to the complex hunter-gatherer social organization model of these Mesolithic groups in transition to the food production economy, at the second quarter of the sixth millennium BC.

New evidence of Cretan Mesolithic from Livari Skiadi in the Eastern Mediterranean context

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This presentation considers Cretan earlier prehistory in a broader Eastern Mediterranean context by discussing new Mesolithic finds from Livari (east Crete), only the second pre-Neolithic site to be excavated on the island, after Damnoni in the Plakias region. This presentation also includes new Mesolithic data from a subsequent survey of Livari. The material relates to a small-scale and likely seasonal hunter-gatherer occupation in front of a rockshelter on a coastal plain, in a close vicinity of perennial spring, typical of Aegean Mesolithic settlement patterns.

The finds are comprised exclusively of chipped stone (geometric microliths, 'spines', pebble tools, notches and denticulates etc.). The assemblage is dominated by local cherts but also including small amount of Melian obsidian (sourced by EDXRF), which represents the earliest evidence for sea-borne connections between Cretan populations and the Cyclades. The assemblage is contrasted with broadly contemporary datasets from the Eastern Mediterranean to see if Cretan practices can be located within larger regional traditions. We then reflect on the material's relationship to that from IN Knossos. Our work thus

employs technology as a means of contributing to debates on the nature and dynamics involved in the Neolithisation of the larger region.

Neighbours on the other side of the water

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Starting with some newly excavated sites dating to around ca. 5000 cal. BC, at Hallstahammar in central Sweden, similarities in artefact collection and possible regional differences will be discussed. Comparisons with contemporary sites situated on the opposite shore of a wide bay of the Littorina Sea will be made. Those sites have sets of artefacts that are alike, but differ in some aspects. There are indications of different circles of contact, or areas for their movement, through presence of different raw materials. The sites also relates to two concentrations of round-butt axes that are situated on both sides of the sea bay and indicating different geographic centre.

Long-term trends and breaks in the Stone Age history of southern Norway

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Over a period of three years (2014–2016), 34 Stone Age sites will be excavated in southernmost Norway as part of the building of a new highway. The sites are believed to range chronologically from the Early Mesolithic to the Late Neolithic. Since the disappearance of the ice sheet that covered northern Europe during the last Ice Age the land in this area has risen continuously. This geological process has resulted in an archaeological record that distributes shore-situated sites on elevations that reflect their relative age. The oldest sites are found at the highest altitude and the youngest at the lowest.

Apart from expecting to find well preserved and short-lived Stone Age sites, the biggest value of this project is the possibility to have a coherent excavation methodology that enables comparisons between all sites. We expect that by treating all of them as ‘one single’ project, using a coherent sampling strategy as a part of the excavation, we will be able to study long-term regional and interregional trends and breaks in several aspects of Stone Age society.

New radiocarbon dates from Lower Silesia, SW Poland

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Until recently we have had only a small number of radiocarbon dates from the Mesolithic sites in SW Poland. The Pobiel 10 archaeological site was the best documented, with radiocarbon dates obtained from a reliable stratigraphic context. New AMS dates were secured from some pieces from Pobiel 10 and samples taken from more recently excavated sites. A date obtained for a skull fragment from Pobiel 10 documents human presence in the Orla

River valley during the early Holocene. Dates from antler artefacts confirm human settlement in the same area at the turn of the Early and Late Mesolithic.

A series of dates from Krępnica 8 show that hunters and gatherers of the Komornica tradition were living in the western part of Lower Silesia ca. 9000–8000 cal. BC. Dates from several sites document Late Mesolithic settlement in Lower Silesia (the seventh to the sixth millennia BC). Some of them, secured at Wrocław-Polanowice archaeological site in the Silesian Lowland indicate the presence of Late Mesolithic hunter-gatherers in the area which was one of the earliest to be colonized by farmers, ca. 5300–5500 cal. BC. A palaeoenvironmental project focused on the early Holocene of Lower Silesia has brought sequences of radiocarbon dating for several areas in the region.

Janisławice Man – A reinterpretation of the Mesolithic grave

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The unique grave at Janisławice (Poland, Łódź voivodeship) was discovered in the 1930s. Research on the skeleton and the rich grave goods – flint artefacts and organic materials – had a significant impact on the studies of Mesolithic societies in Eastern Europe. This discovery was later one of the basis for distinguishing the Janisławice culture. In the last year, new research on the skeleton and the grave goods from Janisławice was made. In this paper, we would like to present the results of osteological, pathological and molecular analysis. Simultaneously, we made raw material, technological, morphological and use-wear analysis of lithic artefacts and archaeozoological study of organic finds made from antler, bone and shells. The obtained results were placed in the wide context of the Early Holocene natural environment, the use of available resources, and beliefs of Mesolithic societies.

Early Holocene human adaptation and palaeoenvironment in the north-west Caucasus

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Multiproxy investigations of two adjacent multilayer sites of Chygay Rockshelter and Dvoynaya Cave have been carried out during the last eight years. Both sites are located in the Gubs Gorge (foothills of the north-west Caucasus). The excavations have yielded a representative collection of stone and bone artefacts, faunal remains, as well as samples for a variety of natural science analyses. Faunal and pollen data, and the results of stable isotope analyses provided the general picture of palaeoenvironmental changes. The excellent preservation of the organic materials in the Dvoynaya Cave, including wood fibers, and organic residues on stone tools, as well as preliminary data on the biological activity within the cultural layer expand our knowledge on the life of these communities.

Kazachka I as a base for the identification of the Mesolithic in the Kansk-Rybinsk Basin (Siberia)

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The Kansk-Rybinsk Basin is insufficiently studied in archaeological terms. The basin is located on the western border of the south of central Siberia and borders of the Baikal region and the territory of the Upper Yenisei (the Krasnoyarsk region, Russia). The sites dating to the Early Holocene are Strizhovaya Gora (3 layer), Kazachka I (8-19 layers), Potanchet III-IV (3 layers), Brazhnoe (1 layer), and Shumikha (1 layer). Kazachka I is the most informative site with materials which can possibly be identified to the Mesolithic period in the overall context of the study of antiquities in Siberia. It is assumed that the results of obtained from the study of the Early Holocene archaeological sites can be used for an overall cultural and chronological periodization of the materials from the Kansk-Rybinsk Basin and Lake Baikal in Siberia as a whole.

Mesolithic? Epipalaeolithic? Late Palaeolithic? The Terminal Pleistocene/Early Holocene archaeological record of the Arabian Peninsula

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Archaeological research on the Palaeolithic of the Arabian Peninsula has thus far revealed a rich and varied record ranging from Lower Paleolithic hand axes, Middle Palaeolithic Levallois cores to Terminal Pleistocene armatures and blade technologies. While research has focused heavily on the Middle Palaeolithic period in recent years a great variety of stratified sites dated to the Terminal Pleistocene/Early Holocene have been excavated across Oman, the UAE and Saudi Arabia. These excavations have unearthed very distinctive lithic industries ranging from assemblages containing a high quantity of microliths to those where this hallmark of the Levantine Epipaleolithic and Eurasian Mesolithic is virtually absent. This substantial diversity as reflected by the archaeological record of this vast region may reflect multiple populations; it also brings up serious epistemological questions concerning terminology and nomenclature. In this oral communication the current evidence for a Termi-

nal Pleistocene/Early Holocene occupation of the Arabian Peninsula will be discussed, the available sites and their assemblages presented and the important question of nomenclature addressed.

Faculty of Philosophy, “Georgije Ostrogorski” Lecture Auditorium

LANDSCAPES AND TERRITORIES

The missing landscapes and territories of Mesolithic Portugal: Present research bias vs. past behavioural choices

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The geography of Holocene hunter-gatherer societies in Portugal shows two different settlement patterns for the Early and the Late Mesolithic. These are the two phases well established in Portugal. In the Early phase, sites are mainly located along or near the present coastline. Most are shell middens indicating the exploitation and immediate consumption of shellfish, mostly molluscs, although terrestrial game is recorded in a few sites. In the limestone massif of Estremadura, central Portugal, caves and rock-shelter sites with Early Mesolithic occupations of logistical character contain food items also related to the exploitation of the littoral, despite their distance from the sea. In contrast, Late Mesolithic sites are clustered in the innermost areas of the major estuaries formed during the Atlantic chronozone, where brackish waters favoured the accumulation of mollusc banks. This explains the formation of shell midden sites. Accordingly, it appears that marine and fluvial-estuarine resources have determined and conditioned settlement patterns during both Mesolithic phases, thus explaining the scarcity of sites in more inland areas, which would constitute marginal territories for hunter-gatherers. To what extent does this Mesolithic geography reflect past human choices or present research bias? I shall show that it is in the middle that virtue stands, as a Portuguese proverb says.

New perspectives on the Mesolithic of the Sado valley (southern Portugal): Preliminary results of the SADO MESO project

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The lower Sado Valley, in southern Portugal, is one of the most important concentrations of Mesolithic settlement of Europe. Moreover, many of the sites included cemeteries that have provided valuable information on the funerary practices of the last hunter-gather-

ers of southern Iberia, and a very important sample of anthropological remains. Despite the development of large systematic excavations in the mid twentieth century and recent attempts to re-examine some sites, only very partial information was available. Yet there are rich unpublished archaeological collections in the National Museum of Archaeology at Lisbon, and the preservation of most of the sites is quite satisfactory. Since 2010, a Luso-Spanish interdisciplinary team has been systematically re-appraising this area within the framework of COASTTRAN, a research project on the transition to the Neolithic in coastal areas of SW Atlantic Europe. The project design and the preliminary results of the first five fieldwork seasons are presented in this paper.

Experiencing sea-level rise in the Manche/Channel region

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In this paper we present results from recent excavation and survey of Mesolithic sites in the Channel Islands, UK, in order to understand human responses to and perceptions of sea-level rise. We argue that people were drawn to this area as a result of the dynamic environmental processes occurring and the opportunities these created. The evidence suggests that the area was a particular focus during the Middle Mesolithic, when Guernsey and Alderney were already islands, and while Jersey was a peninsula of Northern France. Insularisation does not appear to have created a barrier to occupation during either the Middle or Late Mesolithic, indicating the appearance of lifeways increasingly focused on maritime voyaging and marine resources from the second half of the 9th millennium BC onwards.

Understanding the impact of changing palaeogeography during the British Mesolithic

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This paper will focus on the radical changes in the palaeogeography of Britain, which led to its eventual status as an island archipelago. Understanding the impact on human groups and how they adapted to this changing world at different times is the central theme of the paper. The paper will consider these themes by reference to two emerging topics: 1) the evidence for the arrival of 'narrow-blade' using coastal groups who started colonizing Northern Britain in the late ninth millennium cal. BC after appearing to have been displaced from Doggerland, and 2) the impact of the 8.2 kya Event and the Storegga Slide tsunami on the Mesolithic populations of Britain. The paper will conclude by stressing the need for thinking through these profound landscape/environmental changes on the course of the British Mesolithic and for incorporating them into the historical narratives that we are on the verge of being able to construct for the period.

The Mesolithic in the Marches: Lithic sourcing in the Wye Valley, UK

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Despite extensive research into the Mesolithic in the Severn Estuary, there has historically been little attention paid to more ephemeral sites further upstream in the Wye Valley. Consequently, the relationships between these regions in terms of mobility, territoriality, seasonality, settlement and subsistence practices remains poorly understood. Whilst existing interpretations have examined this relationship through the application of generalized theoretical models about Mesolithic mobility, this research seeks to provide evidence to examine these critically and assess their application. This paper presents preliminary results of both visual and geochemical sourcing (LA-ICP-MS) in order to improve this situation and integrate these poorly understood sites into wider Mesolithic studies.

Cache it if you can: Regional and local strategies in the Mesolithic of N. E. Ireland

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Given Ireland's apparently limited range of food sources, especially mammals and freshwater fish, it might have been expected that a very general set of similar economic strategies would have existed throughout Ireland. Recent research, drawing in particular from developer led excavations and the evidence of transporting and caching of certain tool types, suggests that even within a small area of little more than 5000 sq. km it is possible to suggest that numerous very different strategies for both food procurement and acquisition of different raw materials may have developed during the later part of the Irish Mesolithic

The role of mobility within the changing Mesolithic landscape of northern Britain

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The principals of mobility, fundamental to the interpretation of Mesolithic Britain, have recently been challenged by the identification of 'big houses' in the archaeological record. It has been suggested that the drowning of Doggerland led to the emergence of a degree of permanence in settlement and the construction of large structures. The Mesolithic was a time of environmental change, including the submergence of coastal lands leading to the inundation of Doggerland, a major landmass inhabited by hunter-gatherers. Today this is interpreted as catastrophic. This paper will challenge this interpretation by reconsidering the notion of disaster and eschewing the 21st century primacy of dry land, to consider other worldviews. It will discuss the impact of rising sea-levels on the coastal Mesolithic population and reconsider conventional interpretations of human response to the changing coastlands of the time.

Broadscale models provide the background to inundation around Britain and North-west Europe, but from the perspective of individual human communities small-scale, high-resolution models are necessary. Information generated from the Orkney archipelago will be presented in order to consider the complexity of the Mesolithic response to landscape change. A combination of archaeological and palaeo-geographical evidence is used, together with ethnographic analogy and perceptual visualization. The inhabitants of Mesolithic Scotland were part of a highly adapted Maritime culture that existed along the NW seabords of Europe. The drowning of Doggerland represented a transformation in the balance of their world, leading to different patterns of resource use. The emergence of permanent structures may be seen as a response to intensification rather than loss. In this context, permanence does not so much challenge the conventional idea of the ‘mobile Mesolithic’ as enhance the flexibility of the relationship between hunter-gatherer and landscape. Is it possible that permanence and mobility can co-exist within the Mesolithic lifeway?

Living in the mountains: Hunter-gatherer settlement strategies, technologies and changing environments in the Cairngorm Mountains, Scotland

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This paper reviews ongoing and collaborative archaeological and palaeoenvironmental work exploring Mesolithic activities in one of Britain’s most dramatic upland landscapes – the Cairngorm Mountains in Scotland. Identifying Mesolithic activity in mountainous landscapes is difficult. Our multidisciplinary project (2013–present) is providing new data on Mesolithic settlement strategies and technologies as well as detailed understandings of the changing environment. Excavations have taken place at two Mesolithic sites, with survey ongoing. Initial results indicate activity in the later sixth and early fourth millennia BC – the latter of particular interest as the period when agricultural practices begin to emerge in Scotland. It is already clear that different sites served different functions, and that there is considerable variation in the use of the uplands; in addition, we have an unparalleled opportunity to explore differences between inland, upland inhabitation of the landscape with other areas of Scotland during the Mesolithic/Neolithic transition. With some Mesolithic sites identified at >500 masl the relationship between climate change and human activity, the impact of human activity on the environment and vice versa can also be examined. Our project also contributes to developing management strategies for early Holocene archaeology in mountain landscapes, especially in the face of modern day climate change and land use pressures.

Going places: Towards a sense of Mesolithic space in a mountainous landscape

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This paper examines Mesolithic hunter-gatherer occupation of mountain landscapes in Northern England. It combines data from new lithic analyses and site characterizations with anthropological lines of evidence in order to reappraise current models for understanding Mesolithic use of the landscape. It proposes a radically new narrative that intimately links hunter-gatherer mobility strategies with stone tool use and flexible ways of inhabiting and exploiting the changing landscape. It concludes that the Mesolithic sites in this case study were situated on traditionally used transit routes across the mountains and were adjacent to culturally important landmarks. Furthermore, an analysis of site investment features demonstrates that a number of sites were intended to be revisited on future occasions. Therefore it is argued that sites were likely to have been culturally and functionally significant persistent places.

The Mesolithic of the Piave Valley: Seashores, riverbanks and mountain tops!

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The Piave drainage system is one of the widest of north-eastern Italy. Starting from its source in the north-eastern Dolomites it reaches the Venetian plain flowing into the Adriatic Sea north of the Venice lagoon. It thus represents one of the most important natural routes connecting the northern Adriatic coast to the inner Alps. During the last decades scholars and amateurs have surveyed this large territory looking for Mesolithic findings. A high number of Early and Late Mesolithic sites have thus been discovered, and a few have also been excavated, such as Mondeval de Sora in the Belluno Dolomites and the settlements of the Cansiglio Plateau in the Prealpine fringe. Recent researches focused on this impressive dataset which includes sites extending across a wide variety of natural morphologies and vegetal landscapes – from the Adriatic coast to the Alpine watershed – have allowed a preliminary diachronical reconstruction of the territorial settlement strategies to be carried out.

Alpine Mesolithic: The landscape archaeological project Ullafelsen (Tyrol, Austria)

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The Mesolithic site Ullafelsen is located at subalpine level in the Stubai Alps (Fotschertal/Fotscher valley, Tyrol, Austria). It was discovered in 1994 and has been investigated across disciplines. Its natural geographical location is characterized by favourable climatic and geomorphological conditions and abundant water sources. The diversity of the surrounding landscape has attracted people repeatedly in the Preboreal and Boreal. Our research focuses on the combination of landscape historical and archaeological issues. These include aspects of climate change (transition from last glacial to early postglacial) deduced from glacier, soil and vegetation developments, the role of the geomorphology, occurrence and use of natural resources (rocks for tool making, minerals, timber, etc.) by the people of that time.

Similar and different features in lithic collections from different landscape types

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There are many different Mesolithic sites in Bohemia, which are located in various landscape types and natural conditions. Our knowledge about these sites varies considerably. For this paper were chosen case studies from different landscape types: mountains, hilly landscape and lowlands. Some of the studied collections are from surface survey, some of them are from excavated sites. In chosen regions we have studied several lithic assemblages. Research was focused on the way how raw materials were exploited, how the technology was used, distribution of lithic categories, distribution of different tools, etc. Observed characteristics which describe the lithic collection are quite variable. Part of these differences could be explained by environmental conditions, but part of it seems to be a tradition too. At chosen case studies we would like to show that tradition in lithic production is as important agent as raw material quality, or sense for economy.

Local or imported? Assessing the flint preferences of the Mesolithic habitants in Estonia and northern Latvia with the help of geochemical methods

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In Estonia and northern Latvia flint raw material from three geological depositions has been used in the Mesolithic. The oldest – Silurian flint – is locally found and has been gathered mostly from moraine but also broken from limestone deposits; Carboniferous flint has been imported from Valdai Hills and its surroundings in Western Russia; Cretaceous flint imported from south-Lithuanian and/or Belorussian area. The macroscopic assessments of flints allows suggesting that while the share of imported flint is quite large

among the Early Mesolithic find material, the local Silurian rock dominates among the Late Mesolithic flint finds.

Using various geochemical and structural methods (XRF and XRD), the joint project of the archaeologists and geologists of the University of Tartu focuses on microscopic assessment of differences between the Silurian and other flints used by local Mesolithic inhabitants. Also, geochemical methods are used to determine the origin of all flint finds from particular Mesolithic settlements. In that case elemental composition and qualities of crystal lattice of flint pieces allow suggestions about the significance of local vs. imported rock among the lithic finds, which enables to assess the size and functioning of social networks during the Mesolithic in Estonia as well as the north-eastern Europe as a whole.

Tracing raw material: Procurement strategies and movements in the Early Mesolithic, a case study from Larvik, south-eastern Norway

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Flint is by far the most dominant lithic raw material in the Early Mesolithic (EM) of the Oslo fjord area. Recent excavations in Larvik, Vestfold County, conducted by the Museum of Cultural History in Oslo, have revealed four closely located EM sites where a locally available raw material termed metarhyolite (or ignimbrite) has been exploited. The raw material has knapping qualities similar to flint, but interestingly the utilization appears to be limited to axe production in the EM period. Different *chaînes opératoires* are identified at the four sites and in this paper I will present the results from a technological analysis of the metarhyolite material and the possible connection between the sites. All four sites are dated to ca. 8800–8400 cal. BC, which indicates that metarhyolite is among the first non-flint raw materials utilized at EM coastal sites in the Oslo fjord area. The possible source for the raw material is situated ca. 20 km to the northeast. As the use of locally available raw materials might indicate an increasing degree of regionalization, the paper will also explore raw material procurement strategies and mobility in the late EM in the Oslo fjord area.

Coast-inland relations in Mesolithic southern Norway

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Summed radiocarbon probability plots from inland Central Scandinavia show a distinct pattern with peaks in two periods; ca. 7000–5500 and 5000–4000 cal. BC. The phase between them has recently been termed “the classical hiatus”. In this paper we ask if it is possible to establish a correlation between the inland pattern and development in the settlement of the coastal Oslo fjord area. Compared to the inland area the number of radiocarbon dated sites are fewer in the coastal region and no clear pattern emerges in radiocarbon probability plots. The number of known sites in the coastal area is however much higher than the number of radiocarbon dated sites. Due to the region’s geological situation with a constant land upheaval since the last Ice Age the coastal sites can be dated by using

shoreline displacement curves. By using a combination of shoreline dating and radiocarbon dated sites it is possible to model settlement intensity/human activity in greater detail. By combining the two methods a better foundation for a comparison with the inland settlement can be established.

Modelling the empty spaces: Mesolithic in the micro-region of central Serbia

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The only Mesolithic sites in Serbia have been discovered in the area covering a few hundred square kilometers on the Danube banks in the gorges of the Iron Gates and further downstream in the plain of Ključ. The common opinion is that the rest of the Serbian territory was not settled since there are no other known sites from that period in spite of surveys, except for a few surface finds. On the other hand, the Mesolithic is well-documented in the neighbouring areas of similar geomorphological characteristics which, together with the microlithic and quartzite Early Neolithic knapped stone industries, indicate good geographical conditions for the settlement of the Early Holocene population as well as the existence of the Mesolithic technological tradition. In order to support one of these opposing facts related to this empty territory, we investigated whether there had been ecologically sustainable conditions for the development of Mesolithic communities at the micro-regional level. The published data considering the morphology of the land surface and palynology analyses, together with prey density estimations based on contemporary diagrams, were used to reconstruct the environment and build a dynamic model of its carrying capacity.

Faculty of Philosophy, "Georgije Ostrogorski" Lecture Auditorium

TRANSITIONS – ENDINGS

The Mesolithic-Neolithic transition in Bulgaria: A palaeoenvironmental perspective

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One of the major obstacles to research into the Neolithization of southeast Europe is a lack of information about the immediately Pre-Neolithic demography of the region. In spite

of attempts to identify ‘areas of concentrated hunter-gatherer settlement’ in the Balkans immediately prior to Neolithization, traces of Late Mesolithic settlement in Bulgaria have proved elusive.

A comparison of the distributions of Upper Palaeolithic and Late Mesolithic sites suggests there was a major change in settlement pattern during the early Holocene with Late Mesolithic populations becoming concentrated in coastal areas and valleys of “big” rivers, with resources sufficient to support fishing communities (typified by the Iron Gates sites).

This paper focuses on two inadequately discussed aspects of the ongoing debate surrounding the spread of farming across SE Europe: 1) the environmental potential of the region for pre-Neolithic hunter-gatherer settlement against the background of substantial climate and vegetational change during the Terminal Pleistocene and Early Holocene, and 2) the appearance of a distinctive raw material (‘Balkan Flint’) and toolkits that are one of the hallmarks of the developed Early Neolithic ‘package’ ca. 6100–6000 cal. BC.

Stable isotope and dental evidence for dietary changes at the Mesolithic-Neolithic transition in Serbia

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The transition from Mesolithic to Neolithic is characterized by a shift in subsistence from foraging to agriculture. The Central Balkan, located at the interface between different Neolithic traditions in term of culture and subsistence, represents a key-region to examine the spread and development of the Neolithic components into Europe. Mesolithic-Neolithic sites from Serbia (ca. 7400–5000 cal. BC) provide the opportunity to reconstruct local subsistence practices and to understand the nature of Mesolithic-Neolithic transformations.

In this prospect, we analyzed two complementary set of evidence on Late Mesolithic and Early Neolithic sites from different environments: Vojvodina (plain), the Danube Gorges (river banks) and Šumadija (hills). Firstly, we conducted stable isotope analyses (C, N, S) on bone collagen (n=70), reflecting the protein portion of diet and secondly, analysis of phytoliths from dental calculus (n=50) providing information about plant consumption. This study emphasizes the importance to cross different lines of evidences and to examine local behavioural adaptations in order to refine our understanding of this multifaceted historical process.

How northern Iberia was lost? The Early Neolithic in Cantabrian Spain

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The Neolithisation process took place later in the north of the Iberian Peninsula (from ca. 5000 cal. BC onwards) than in other parts of the peninsula, such as in Mediterranean Spain, where the transition occurred some 500 years earlier. This communication

presents the current state of research on the Mesolithic-Neolithic transition in Cantabrian Spain and assesses the process in the context of Iberia. This time of change is studied through the available chronological information and the social events that can be inferred from the known archaeological evidence. Special attention is paid to elements of change and/or continuity in such aspects as population patterns, technology and subsistence practices. The data advocate a model of continuity and not of sudden change, in which the last hunter-gatherer societies played an active role in the adoption of the new way of life.

Debating Neolithiation process from a Mesolithic point of view; the Sado Valley (Portugal) experience

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In this presentation we will discuss how Final Mesolithic Sado Valley hunter-gatherers interacted with first agro-pastoralist societies settled in southern Portugal during the second half of the sixth millennium BC. For that period archaeological record available for the area reflects the presence of two different cultural groups with differences detected not only at an economic level but also present in settlement patterns, material culture and symbolic behaviour. By the middle of the fifth millennium BC, Sado shell middens seems to have been abandoned, raising the question of how and why last hunter-gatherers left their traditional territory. Using chronological information and some Neolithic elements found in the shell middens area we will debate the Neolithization process from a Mesolithic point of view.

New radiocarbon evidence for the transition from the Late Mesolithic to Early Neolithic from the site of Zamostje 2 (Central Russia)

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The analysis of Late Mesolithic and Early Neolithic complexes from the peat-bog site Zamostje 2 in central Russia show direct relations between them. It could be traced in all features of material culture: in bone and flint industries, in the style of art items and decoration on the bone tools. The new elements, which appeared only in the Early Neolithic layers, besides pottery itself, are not so numerous, but they are critical for material culture of a traditional society: new types of stone bifacial leaf-shaped arrow-heads, new types of bone missile weapons armament and new type of bone fishhooks.

New radiocarbon dates obtained in recent years allow us to revise previous data concerning the appearance of the first pottery at the site. The discovery of the Final Mesolithic

layer at Zamostje 2 with radiocarbon dates ca. 7000–6900 uncal. BP, and numerous dates on different kinds of material (sapropel, wood, food-crust on pottery) from the Early Neolithic layer moved the boundary between the Mesolithic and Neolithic to the date of ca. 6850 uncal. BP. This observation is partly supported by the data from other recently investigated peat-bog sites in the Volga-Oka region.

Characteristics of Late Mesolithic and Early Neolithic cultures on the right shore of the Vyatka River (Middle Volga Basin)

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Five archaeological sites, which contained Late Mesolithic and Early Neolithic assemblages, were discovered on the right shore of the Vyatka River. Tens of dwelling and household constructions were examined. In the Late Mesolithic prevail tetragonal dugouts with the frame roof and an area of 6–9 – 35 sq. m. Peculiar constructive features are the ditches along the walls of the pit houses. In the Late Mesolithic tools were made mostly on microblades, blades and their sections. Among the dominant types of tools are scrapers, cutters, awls, single trapezoids, rare chopping tools. The ¹⁴C dating of the sites falls into the eight to seventh millennia BC. In the Early Neolithic, oval houses appear with the square of 4–6 sq. m with deep hearth-pits. The tools of the Early Neolithic are made on blades and flakes. The main difference of Early Neolithic industry consists in the series of arrowheads. Early Neolithic vessels have straight or profiled rim and a flat bottom; ornamented with pits under the rim or with ornaments composed of small pits made on-the-miter. The sites are dated to the sixth millennium BC.

The Caucasian route of Neolithisation in the Pontic-Caspian region

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Andrej Tsybriy (*The Don Archaeological Society, Russia*) and **Viktor Tsybriy** (*The Don Archaeological Society, Russia*)

Domestication of the staple animals and plants took place evidently in the Middle East according to recent paleogenetic studies. It spread from the “homeland” to the steppe and semi-deserts of the Pontic-Caspian through different routes. The Balkan, Caucasian and Middle Asian routes are often discussed in the literature. Investigation of Neolithic settlements in the Low Don Basin and the Sea of Asov region dated about between ca. 7200 and 4200 cal. BC provided new data that emphasize the importance of the Caucasian route across the shore of the Black and Azov Seas. Here, traces of the clay architecture, anthropomorphic and zoomorphic figurines, geometric tokens, polished stone axes/celts and pendants, decorated shaft straighteners, subrectangular bi-perforated “pendants”, which are also familiar to the Neolithic of the Middle East, were discovered. Evidence of nets and boats suggests subsistence economy primarily based on fishing. Remains of domesticated sheep/goat, cattle and probably pigs appeared from ~6500 cal. BC. Semi-sedentary

way of life and the territoriality has also been documented. A number of cemeteries from the Dnieper and Lower Don also indicate an evolved complexity of the social organization. The burial of an aurochs skull at Matveen Kurgan 2, engravings on artefacts and celt-like pendants attest to the presence of a complex spiritual world.

Transition from the Mesolithic to the Neolithic in the North Caspian Sea region

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North Caspian Sea region is located between the Caucasus and central Asia. Thirty Mesolithic sites were investigated in this region. Here, according to the technological and typological features the Seroglazovskaya culture was defined. This culture is characterized by blade and microlithic industry. Within the Seroglazovskaya culture we can distinguish two groups of sites. The first group (Zhekolganskaya) is characterized by the presence of large facet retouching. Two types of microliths are typical: parallelograms and segments with one-sided retouching of the arc. Scrapers and burins are represented poorly in the tool kit. Bladeletes with oblique truncation and microburins are also presented.

Second (Istayskaya) group is characterized by marginal retouching. Scrapes and burins are widespread. Trapezoids, segments with double-sided retouching of the arc, parallelograms are typical. Specific forms of hunting could explain these differences. The evidences of contacts between the two groups confirm their synchronicity. The radiocarbon date of 7255 uncal. BP coincides with the peak of aridity in this region. For a number of essential indicators flint complexes of the Early Neolithic sites contain features of syncretism of both Mesolithic groups. The transition to the Neolithic took place in favourable climatic conditions. Any evidence of food-producing economy is absent.

Early pottery distribution in the far northeast of Europe

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In the last decade, there were discovered the final parts of the migration routes of different small groups of foragers with earliest ceramic in the far northeast of Europe (FNE). In the first half of the sixth millennium BC bearers of two traditions were penetrating into the region. Two sources of early pottery distribution have been defined: the south-western one (central part of Russian Plain) and the south-eastern one (Cis-Ural). We can suppose that pottery was adopted by different cultural groups of foragers from various sources, which were situated in favourable geographical and cultural environments. Among the mobile foragers these borrowed technological innovations could be distorted as can be seen from the variability in technology, morphology and decoration of pottery. This makes it difficult to perform the cultural attribution of some assemblages. At the moment the earliest ceramic traditions in the FNE are still only roughly established. Their detailed cultural differentiation is the matter of future research.

Mesolithic-Neolithic transition in Eastern Europe

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The transition from the Mesolithic to the Neolithic was a very long and multi-stage process. The adaptation of different constituents of “Neolithic package” occurred at different periods of time. The first pottery appeared at the territory of Eastern Europe in the seventh millennium BC among hunter-gatherers. Pottery from the very beginning is supposed to occupy a unique/prestige place in the local cultures. The exception is the site Raku-shechny Yar in the Low Don River, where we can trace also domesticated animals, adobe architecture, specialized stone and bone industry. The conservation of hunting-gathering economy in the forest zone for a long period of time can be explained by very favourable conditions of ecological niches, which allowed using maximum of resources of the Holocene optimum. Later in one of the regions of forest zone, Dnepr-Dvina, we trace contacts with cultures that had traditions of food-producing economy – from the territory of the Balkans and also with the LBK. However, the appearance of food-producing economy can be traced here only to the fourth millennium BC, and it did not occupy an important place in ancient economy and could have been a prestigious element. Thus, the readiness of local inhabitants in adopting innovations was important for their establishing in new territories.

The Late Mesolithic in western Little Poland. Watchers or participants of the Neolithization?

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(*Archaeological Museum in Kraków, Poland*) and **Justyna Zakrzewska** (*Jagiellonian University, Kraków, Poland*)

Western Little Poland is an area of diverse landscape. Loess uplands, which constitute its part, remained unsettled by Mesolithic hunter-gatherers and become inhabited only by the first Neolithic farmers (Linear Band Pottery culture) in the third quarter of the sixth millennium BC. In other landscapes, the hunter-gatherer settlement, related to the Komornica culture, had existed since the turn of the Early and Middle Mesolithic. Within this archaeological unit, in the Late Mesolithic (ca. 6000–4700 cal. BC), the evolution of flint industries took place which consisted of receiving multi-cultural elements. Besides, in the latter period, the Janisławice culture appeared in the discussed territory. Elements derived from this culture were also recorded in some evolved Komornica assemblages. Anthropological and historical interpretations of intercultural contacts of this kind are difficult. Even more difficult, in this context, is to assess the role played by Mesolithic populations in the Neolithisation of western Little Poland. In the presentation we will analyze, from this perspective, the typological, chronological, settlement and environmental data. As a result, the probability of three basic hypotheses will be evaluated. These hypotheses assume that Mesolithic communities: (1) were passive witnesses of the Neolithisation; (2) constituted an essential population substrate of this process; and (3) disintegrated during its course.

Wetland sites in a dry land area – A survey for Late Mesolithic and Early Neolithic sites in and around Lake Zwischenahner Meer, north-western Germany

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In the northwestern German lowlands sandy soils and erosion processes have led to a high amount of well-known but badly preserved Mesolithic sites. In my PhD thesis I could show that sites in the closer range of larger water bodies and flood plains were much bigger and richer than in regions that could be reconstructed as densely forested in Mesolithic times. My present project concentrates on one of a few bigger lakes in this region, Lake Zwischenahner Meer. From the sandy soils in the surrounding of the lake a good number of Mesolithic sites are known. Even more interesting are the finds from the lakeshore and the shallow water areas: antler axes and animal bones have been found there repeatedly by swimmers and fishers as well as round based pottery that seems to lead to the times of Mesolithic-Neolithic transition in that area. The presentation will show first results of the surveys for Late Mesolithic and Early Neolithic sites on the shore and under water. The survey is completed by corings and sampling to create a reconstruction of the lakes development and its environment during the time from ca. 5500 to 3500 cal. BC.

Forager- farmer contacts in the Scheldt basin (Flanders, Belgium), in the late sixth to early fifth millennia BC. New evidence from the site ‘Bazel- Sluis’

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Also in the Low Countries, the Mesolithic-Neolithic ‘transition’ is a much debated topic. Specifically the interaction between farmers on the loess belt and foragers in adjacent areas recently resulted in new studies and publications. To this discussion we add new data from Bazel-Sluis, an exceptionally well-preserved site due to its wetland location.

From the Middle Mesolithic to the Middle Neolithic, this site has known multiple occupation phases. Intra-site spatial analysis and radiocarbon dating allow the unravelling of this palimpsest, evidencing an important occupation phase in the late sixth to the early fifth millennia cal. BC. The Late Mesolithic cultural ‘package’ from these phases is enriched with sherds of late Bandkeramik and Limburg ceramics, and – beyond the chronological limits of the Bandkeramik presence in the Belgian/ Dutch loess area – also (Epi-) Rössen pottery. Remains of domestic animals (pig) and cereals (*Triticum* sp.)

appear as early as ca. 4700 cal. BC. Besides a summarized presentation of this site, we discuss the data in their regional context, and provide possible interpretations concerning forager-farmer interaction activities in the Final Mesolithic/ Early Neolithic period in the Scheldt Basin.

“Plugging the gap” – A reconsideration of seasonal exploitation practices during the Mesolithic/Neolithic transition in Denmark

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Havnø is one of a number of Danish stratified kitchen middens spanning the Late Mesolithic (Ertebølle) and the Early Neolithic (Funnel Beaker) cultures, ca. 5000–3500 cal. BC. Nine European oyster (*Ostrea edulis*) shell samples deriving from 10 different grid squares were taken from across the midden. In total, 137 oysters were thin sectioned in order to ascertain seasonal consumption practices, and to assess changing shell size and age, which can be linked to increased human exploitation and/or environmental change. The hypothesis that a change in the seasonal exploitation of the oyster across the Mesolithic/Neolithic transition at the site was not proven. However, when the results were compared with data obtained on oyster shell samples from 15 other contemporaneous kitchen middens and/or coastal sites, including Bjørnsholm, Ertebølle (*locus classicus*), Eskilsø, Krabbesholm II, Norsminde, Tybrind Vig and Visborg to name but a few, the situation is rather complex. The data demonstrates that the seasonality of oyster consumption varies from site to site during the Late Mesolithic and Early Neolithic, and that oysters continued to play a role in the diet of the people well after the transition to agriculture ca. 3950 cal. BC.

Revisiting Lithuanian Late Mesolithic–Early Bronze Age (ca. 7000–1000 cal. BC) human remains: Chronology and palaeodiet

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The Neolithic transition in the boreal zone significantly deviated from the “classic” Neolithisation model, details of which are still far from being completely elucidated. In 2014–2015, a special research project dealing with the Neolithisation of Lithuania was executed. Twenty-one ¹⁴C AMS dates were obtained for 11 Late Mesolithic–Early Bronze Age (ca. 7000–1000 cal. BC) graves as well as for six human bones found in settlements or refuse layers. More than 40 human bones and teeth as well as more than 50 contemporaneous animal and fish bones and teeth were analyzed for stable carbon and nitrogen isotopes of collagen and apatite. The ¹⁴C AMS results challenged an established chronology of some graves previously dated using the conventional ¹⁴C tech-

nique. Paired dates from different materials allow us to evaluate the offset introduced by the aquatic reservoir effect. Moreover, the results shed light on the subsistence of coastal Sub-Neolithic communities (i.e., pottery using hunter-gatherers) from the stable isotope perspective.

Looking East – Another story

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The transition to the Neolithic in Europe is traditionally seen as a series of economical, technological and ideological currents moving in from the Near East spreading through southern Europe and the Balkans, eventually reaching Scandinavia around 4000 cal. BC with a series of stop-and-go along its way. This is a trajectory that, by its very nature, excludes the role of Mesolithic groups living in the eastern Baltic between the sixth to the fourth millennium BC. Therefore, the role that the Mesolithic groups to the east of the Baltic have played in the transition to the Neolithic has rarely been discussed (see however Doulakhanov *et al.* 2005; Gronenborn 2009; Hallgren 2008; Timofeev 1998). I will argue that this geography should not be seen as so straightforward: key areas during the Late Mesolithic of how to understand the “halt” of the Neolithic on the North European Plain can be identified around the Baltic and will be further discussed and theorized in this paper.

Mesolithic–Neolithic transition in the eastern part of the Baltic Sea

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In the eastern part of the Baltic Sea area, like in the whole of northern boreal zone of north-eastern Europe, Neolithization was a slow process and took several millennia. Even though the Mesolithic is habitually considered a (separate) prelude for the Neolithic, in the north they are closely intertwined. Several features, which are traditionally associated with the Neolithic way of life in more southern parts of Europe, make their first appearance during the Late Mesolithic. In the seventh millennium BC, an increasing use of marine/aquatic resources led at least in coastal regions to more sedentary settlement – also ritual behaviour (including burials) became more visible. In the sixth millennium BC, pottery, sporadic cultivation and rock art appear, followed by other changes and diversification in (material) culture in the fifth and, with an intensifying pace, in the early fourth millennia BC. This process resulted in a fundamental transformation in the way of life and in relationships between the people and the surrounding world. This paper examines the long-term trajectories, continuities/discontinuities and possible roots of the Neolithic from a Mesolithic point of view.

Perspectives on the Mesolithic-Neolithic transition in Östergötland, eastern middle Sweden

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Farming and cattle herding were introduced in southern Scandinavia in approximately ca. 4000–3900 cal. BC. During the course of a few generations, knowledge and the practice of farming appears to have spread and to have become generally accepted. The presented empirical material consists of excavated Mesolithic and Neolithic sites in the county of Östergötland in Eastern Middle Sweden.

In the Late Mesolithic, a number of seasonal special purpose places occurred in the landscape. Hazelnuts were collected, wild animals were hunted and fishing took place. Together, these sites created a well-known landscape, consisting of significant places interwoven in a ‘spatial story’. Shortly after ca. 3900 cal. BC, Neolithic farms were established at many of the special purpose places. Ten farmsteads from the Early Neolithic are known in Östergötland; eight farms have radiocarbon dates reaching back to the Mesolithic. The “Neolithic Package” is represented by ceramics, cereals, peas, houses and, in some cases, domesticated animals. The Early Neolithic communities still practiced a broad spectrum economy, indicated by a number of hazelnuts, wild berries and hunted animals.

The Early Neolithic transition in southern Norway. Cylindrical blade technology as an indicator of change

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While the Neolithization process in southern Scandinavia (ca. 3900 cal. BC) is closely linked to the TRB culture, this process is not easily grasped in southern Norway. TRB elements such as decorated pottery and polished flint axes are found in several areas, whereas agriculture appears not to have been introduced until the Late Neolithic. Consequently, it has been debated what the concept of Neolithisation means, and whether it could be said to have happened at all within this region.

The emergence of cylindrical blade core technology from rhyolite raw material in western Norway around 4000 cal. BC marks a technological change, introducing tanged arrowheads at least 800 years earlier than its flint counterpart, traditionally connected to the Pitted Ware culture (ca. 3200–2300 cal. BC). A central question is if the technology was invented separately, or spread gradually. In this context, south-eastern Norway could be a key area. In this paper, I argue that a dynamic technological approach to Neolithic blade technology, comparing material from western and south-eastern Norway could provide new information about the technology, its relation to the Neolithisation, regional variation and processes behind transmitting ideas and technology.

MONOGRAPHIC SESSION 3

Faculty of Philosophy, Lecture Room on the 1st floor

THE STUDY OF TECHNOLOGY AS A KEY TO UNDERSTANDING PIONEER MOVEMENTS – A NORTH-WEST EUROPEAN PERSPECTIVE

The study of technology as a key to understanding pioneer movements – A north-west European Perspective

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As a socially learned and transmitted system, technology can be considered a fundamental part of any human culture. Thus, the study of technology can provide an understanding of, for example, mobility and social relations during the Mesolithic. The study of blade technologies is instrumental for understanding the Late Palaeolithic/ Early Mesolithic pioneer colonization processes in the Circum-Baltic region, the area that was the last to be freed from the continental glacier after the Ice Age. Yet there has been little consensus among researchers from the different countries about how to classify, analyze, and understand blade assemblages, and the various classification systems have been largely incompatible with each other.

Starting in 2009, the Nordic Blade Technology Network has arranged a series of twelve workshops for researchers and graduate students, with the aim of acquainting the participants with blade assemblages – both old established and newly excavated ones – from most of the Circum-Baltic countries. In addition, individual researchers and research groups within the Network have carried out their own expeditions to museums and research institutions to add to the corpus of studied assemblages. The purpose of this research has been to enhance our understanding of pioneer processes, but also, employing the *chaîne opératoire* approach, to develop a research tool that will make it possible to analyze different blade assemblages as evidence of dynamic processes, using similar parameters, and to allow comparisons across the borders created by national research traditions.

This monographic session will present the results of this research from several geographic and chronological points of view. We invite other researchers to take part and bring their own data and views to bear in generating a comprehensive view of how blade technologies can be analyzed, understood, and used as a key to tracking the technological knowledge and the movements of ancient populations across vast Mesolithic landscapes.

***Chaîne opératoire* in Post-Swiderian blade industries**

Tuija Rankama (*University of Helsinki, Finland*) trankama@gmail.com and **Jarmo Kankaanpää** (*University of Helsinki, Finland*)

After the discovery and excavation of the Early Mesolithic Sujala site in northern Finnish Lapland in 2002–2006, the authors were faced with the challenge of finding a reliable means to distinguish whether the site was related more closely to the Epi-Ahrensburgian “Komsa” culture of the nearby North Norwegian coast or the eastern Post-Swiderian cultures of northern Russia and the Baltic States. The answer was provided by a *chaîne opératoire* analysis of the Sujala material, which fortunately included nearly all stages of reduction from cores to finished tools. The results could be compared with site assemblages from both the Post-Swiderian and the Ahrensburgian sphere and ended up providing new insights also into the prehistory of northernmost Norway.

The pioneer settlement of Scandinavia and its aftermath: New evidence from western Scandinavia

Hege Damlien (*University of Stavanger, Norway*), **Mathilda Kjällquist** (*Uppsala University, Sweden*) mathilda.kjallquist@raa.se and **Kjel Knutsson** (*Uppsala University, Sweden*)

This paper takes as a point of departure the analysis of complex blade industries as a proxy for cultural practices, socially learned and transmitted habits within a human network. Our main objective is to study how traditions and/or habits are protected and reproduced or changed as groups of people are confronted with changed natural and/or social environments. Our case study is the hypothesized population dynamics related to the pioneer settlement of Fennoscandia during the retreat of the Weichselian ice at the Pleistocene/Holocene transition. This hypothesis is based on an analysis founded in a dynamic technological classification of complex blade industries typical for the first settlers. The existence of a distinct pressure blade concept across the Baltic and Scandinavian regions during the Late Preboreal and Boreal period has been identified within the ninth to eight millennia BC, a technology that seem to have arrived with intruding “Post-Swiderian” groups of people culturally derived from the western Russian plain. It has further been shown that a different blade industry where a direct percussion technique was used, was established by another stream of pioneer settlers along the west coast of Scandinavia with roots in the late Glacial continental Ahrensburg tradition. These two populations must have met in northernmost Norway during the Preboreal.

During the time period from ca. 8500 to 7500 cal. BC prominent shift was also observed in the organization of the Scandinavian Mesolithic lithic technology towards employing the demanding conical pressure blade concept, presumably of “Post-Swiderian”, eastern origin. Concerning the regional identification and dating of the conical core pressure blade concept, a number of specific research problems have to be studied before the cultural process within Scandinavia in the eighth millennium BC can be more fully assessed. Of particular interest are the two regions where the eastern and the western traditions appear in the same time periods, respectively along the northern Fennoscandinavian coast

and in the eastern Polish lowland. It is the former area that is in focus in this paper. We will lay the foundation for a cultural analysis of this process by an investigation of the tacit evidence of this shift in technology by an in-depth analysis of blade assemblages from a number of newly excavated sites covering the area from Scania in southernmost Sweden to central Norway.

Analyzing lithic blade technologies from morphological blade attributes by classification: Experiences and results from the Nordic Blade Technology Network 2009–2015

Mikkel Sørensen (*University of Copenhagen, Denmark*)

The aim of this paper is to present and discuss questions and experiences met while constructing and employing the NBTN lithic blade classification for the study of Scandinavian and Baltic Late Glacial and early Holocene lithic assemblages. The goal of the classification system has, from the start, been to document and define prehistoric lithic craft traditions in Scandinavian and the Baltic in order to discuss pioneer processes of this vast region. To achieve such an insight, the classification system needed to document attributes in the assemblages that could reveal the employed prehistoric knapping methods and knapping techniques. Consequently, archaeological methods such as the *chaîne opératoire*, raw material property studies, and experimental archaeology have played important roles in the ongoing hermeneutic process of constructing the classification. However, also statistical methods and systematic documentation methods have been employed, as it has been a criterion that observations, data production and interpretations could be repeated and reproduced by means of the classification.

Sæleneshøgda – A reanalysis of a classical Phase II assemblage in northern Norway

Niko Anttiroiko (*University of Helsinki, Finland*)

Recent research in northernmost Fennoscandia has produced evidence of the use of conical core pressure blade technology on several early Mesolithic sites, which has made it possible to identify the spread of the conical core pressure blade technology to the area from the Post-Swiderian cultural sphere in north-western Russia and eastern Baltics. This has raised the question if the changes in material culture which have been associated with the Phase II of the north Norwegian Mesolithic are, in fact, related to Post-Swiderian influences, which has created a need to re-examine existing Phase II assemblages. The Sæleneshøgda site in Finnmark, northern Norway, has been used as one of the type localities for the Phase II of Mesolithic in northern Norway, which was previously known as the “Sæleneshøgda phase”. This paper presents a re-analysis of the Sæleneshøgda site based on technological analysis of blade production.

Technological and social change in north-west Europe at the Pleistocene-Holocene transition

Inger Marie Berg-Hansen (*Museum of Cultural History - University of Oslo, Norway*)

After the retreat of the great ice sheet in Preboreal the Scandinavian Peninsula was settled rapidly, and within ca. 9000 cal. BC the entire Norwegian coast was explored. During the last decades, there has been a general agreement that the cultural background for this pioneer settlement should be sought in the south, on the northwest part of the European continent. However, whether the Ahrensburg culture or Early Maglemose constitutes the cultural and social backdrop, is a question of some dispute, and the relationships between the different find groups in this area is unclear. A recent study of the blade production methods of these groups compares the blade technology of the Final Palaeolithic and Early Mesolithic of northwest Germany and Scandinavia. On this basis, significant changes in the blade production methods throughout the area are suggested, indicating a broader change in society at the Pleistocene-Holocene transition.

Pinnberg 7 – A multilevel site from northern Germany seen from a technological perspective

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The site Pinnberg 7 is located northeast of Hamburg and shows an occupation sequence ranging from the late Palaeolithic to the Bronze Age. In his publication the excavator A. Rust ("Die Funde vom Pinnberg" 1958), differentiates up to nine different cultural units which date to several chronological zones. Though the excavation is thoroughly published it is not absolutely clear if A. Rust differentiated the chronological zones only on typological considerations or if had further criteria to do so.

In our project we analyzed lithic artefacts with emphasis on technological respects. Main focuses of this investigation are blades and cores to draw conclusions on the used lithic technology. By this method we will be able to say whether the chronological units detected by A. Rust are reliable, or if the site Pinnberg 7 has to be seen as a palimpsest.

Evidence of Middle and Late Mesolithic blade technology in southern Norrland, Sweden

Michel Guinard (*Uppsala University, Sweden*) michel.guinard@arkeologi.uu.se

This paper will identify and describe the evidence of a Middle and Late Mesolithic blade technology from a series of excavations of coastal sites in southern Norrland. Special focus has been made to identify the shift from a blade concept from conical cores to micro

blade production from handle cores. From this chronology it is possible to discuss the relationship between inland and coastal sites in this region. The first settlers in the area are supposed to be connected to the technological concept of the conical core pressure blade technique. The following technological concept, the handle core tradition, appears at a time when these groups are well-established in the area.

MONOGRAPHIC SESSION 4

Faculty of Philosophy, Lecture Room on the 1st floor

FROM THE JOMON TO STAR CARR REVISITED

Food crusts and Jomon pottery

Oliver Craig (*University of York, UK*) oliver.craig@york.ac.uk, **Yastami Nishida** (*Niigata Prefectural Museum of History, Japan*), **Shin'ya Shoda** (*University of York, UK*), and **Yasuhiro Taniguchi** (*Kokugakuin University, Tokyo, Japan*)

The idea of hunter-gatherers using pottery is no longer regarded as anachronistic. Jomon pottery offers great potential for the study of food residues. This paper reviews evidence for the foods being prepared using the earliest Jomon pottery, some of which dates to before 15,000 years ago. A large-scale project based at the University of York funded by the UK Arts and Humanities Research Council but involving specialists from Japan is analyzing several hundred samples of food residues from Jomon pots using a combination of methods including isotopes and lipid analysis. The results are changing the way we understand Jomon subsistence, and have the potential to be as revolutionary as the Feeding Stonehenge project in England. The project as a whole relates to understanding a putative spread of pottery from East Asia to northern Europe during the Mesolithic.

Public perceptions and engagement with the Jomon and the Mesolithic

Don Henson (*University of York, UK*) dh625@york.ac.uk

In 2014, a new English-language Online Resource for Japanese Archaeology and Cultural Heritage for use in schools was launched to foster greater interest in Japanese archaeology outside Japan (www.orjach.org). This paper will consider how the Jomon was represented in this resource, and will compare this to interim findings from a PhD project investigating changing public perceptions of the Mesolithic.

From the Jomon to Star Carr: Riverine archaeologies and a history of entangled relationships between Europe and East Asia

Simon Kaner (*Sainsbury Institute for the Study of Japanese Arts and Cultures and the University of East Anglia, Norwich, UK*)

The Jomon period in the Japanese archipelago defies categorisation in terms of the periodisation of European prehistory: Is the Jomon Palaeolithic, Mesolithic or Neolithic? This presentation discusses the ways in which this issue has shaped the way that the Jomon has been viewed from Europe. As a case study, the paper will present recent work from the Shinano-Chikuma River Project, investigating the development of historic landscapes along Japan's longest river drainage. This area has one of the highest densities of Incipient Jomon pottery (ca. 15,000–10,000 cal. BP) and also produced the elaborate 'Flame pots' (ca. 5500–4500 cal. BP). The paper will consider how rivers played an important role in structuring both Jomon and European Mesolithic cultural developments, and considers mutual influences between the study of the Jomon and the Mesolithic.

A new perspective on prehistoric sensibility: A case-study of embedded pottery in Mesolithic structures

Makoto Tomii (*Kyoto University, Japan*)

Incredible amounts of Jomon pottery have been unearthed so far, and a huge quantity of embedded pottery (pottery vessels dug into the floors of dwellings) has been also excavated. The ritual activity recognized as pottery embedment during the Mesolithic period was practiced not only in Japanese archipelago but also in Europe, evident from the example at Lepenski Vir. At the early stage of the history of pottery production, the discoloration on the surface of pottery was quite often generated due to open-firing, independent of the intention of pottery maker. Even the pottery which was deliberately embedded in a house often has such a discoloration. This paper provides a new perspective on pottery embedded within house structures. According to the precise contextual analysis, there is sometimes patterning in the orientation of the discolored part of embedded pottery in the house structures within a single settlement. The inhabitants of the house who had attended the ritual activity of pottery embedment could have watched the pottery at the moment of deposition, and the person embedding the pottery must have been sensitively aware of the orientation of the discoloration.

The Jomon of western Japan and European Mesolithic parallels

Ken'ichi Yano (*Ritsumeikan University, Kyoto, Japan*) and **Oki Nakamura** (*Ritsumeikan University, Kyoto, Japan*)

The Jomon in western Japan is often regarded as the 'poor relation' in comparison with the northeast of the archipelago. Recent work is demonstrating that this is a mistake. The compilation of databases of Jomon archaeology from western Japan is demonstrating that

people living in western Japan during the Jomon were well adapted to their local environmental circumstances, allowing them to develop very resilient strategies. We will consider settlement and burial evidence, and reconsider the importance of these adaptations for understanding the eventual arrival and spread of rice agriculture.

Friday, 18th September 2015

Main Auditorium of the Serbian Academy of Sciences and Arts (SASA)

SOCIAL RELATIONS AND COMMUNICATIONS

Role of personal ornaments: Vlakno Cave (Croatia)

Barbara Cvitkušić (*Institute for Anthropological Research, Zagreb, Croatia*) barbara.cvitkusic@gmail.com and **Dario Vujević** (*Department of Archaeology, University of Zadar, Zadar, Croatia*) dario.vujevic@gmail.com

Findings of personal ornaments are of particular importance in an attempt to understand culture and social behaviour of the Mesolithic populations. Personal ornaments in their formal expressions not only point to the universal idea of decoration and aesthetic sensibility, but also reveal mutual contacts and communication paths. Vlakno Cave on Dugi Otok (Croatia) is one of the most prominent Late Pleistocene/Early Holocene sites discovered in Dalmatia recently. Research has been conducted from 2004 with interruptions, and depth of 5 m has been reached in 2013, to the layers belonging to the Early Epigravettian. On the basis of many finds of personal ornaments in various strata it is possible to recognize changes in time regarding the type and number of finds. Perforated animal teeth, most of them deer canines, are gradually replaced by sea and river shells and snails. Almost 400 specimens of perforated teeth, shells and snails have been found so far, along with numerous unperforated ones, making Vlakno Cave one of the richest archaeological sites of personal ornaments on the Eastern Adriatic coast. Analysis of these objects should show change in behaviour of the Mesolithic population and its dependence on various activities.

Personal ornaments in the Final Palaeolithic and Mesolithic of the Iron Gates

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Personal ornaments, especially those made from the shells of marine molluscs and animal teeth, have been recovered from many Upper Palaeolithic and Mesolithic sites in Europe. This paper reviews the evidence from the Final Palaeolithic ('Epigravettian') and Mesolithic of the Iron Gates, where such finds are most commonly associated with burials. Particular attention is given to taxonomic identification and questions of taphonomy, provenance, selection, manufacture and use.

Ornaments from Lepenski Vir: Technological choices and traditions

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The site of Lepenski Vir in the Danube Gorges of the central Balkans yielded numerous body ornaments and ornamented artefacts made on different raw materials. Most of these objects are attributed to the end of the seventh millennium BC, i.e. to the time when the first farmers appeared in the surrounding areas of the Balkans. The repertoire of ornaments from Lepenski Vir represents a unique ornamental tradition characterizing the last forager communities of the area. This rich ensemble has never been the object of detailed techno-morphological and use-wear analyses aimed at interpreting a specific know-how related to their production.

This paper presents the results of a technological and use-wear study carried out on the collection of ornaments from Lepenski Vir stored at the National Museum of Belgrade and is aimed at reconstructing a series of gestures involved in their manufacturing and use. When our results of the ornamental ensemble are compared with other aspects of Mesolithic technology found at this site, such as osseous industry, they support a hypothesis that two different types of technological knowledge co-existed at Lepenski Vir at end of the seventh millennium BC: an autochthonous, Mesolithic *chaîne opératoire* as well as a range of novel techniques of stone- and bone-working documented in the wider regional context of the Balkans and the Near East among the earliest Neolithic communities.

Approach to the origin of asymmetrical social relationships between men and women by the study of Palaeolithic-Mesolithic ideological contexts

Robert Carracedo (*Universitat Autònoma de Barcelona, Spain*), **Marta Cintas** (*Universidad de Sevilla, Spain*), **Albert García** (*Universitat Autònoma de Barcelona, Spain*), **Assumpció Vila** (*Institució Milà i Fontanals C.S.I.C. Spain*) and **Jordi Estévez** (*Universitat Autònoma de Barcelona, Spain*) jordiesteve@icloud.com

Social regulation of reproduction is the key feature for the continuity of a hunter-gatherer society. The relations of reproduction are the determinants in their strategies for their sustainability. This thesis formulated in the 1990s allowed us to explain an observable universal practice in contemporary hunter-gatherer societies: sexual division of labor accompanied the discrimination and devaluation of the social value of women. To verify this hypothesis

we need to examine these asymmetrical relationships between women and men (that always favoured men) and trace them back to its origins and causes.

Recurrent ethnographic records show that funerary contexts reflect the relationships in the society of the living. Therefore we argue that it is possible to approach the study of these social asymmetries from analysis of (the objective value of) remains and funerary contexts. We will propose a first approach to the study of this type of social asymmetry and eventually the traces of its origin through the study of changes and significant recurrences in Paleolithic and Mesolithic funerary contexts and by the research of other ideological features in the archaeological record.

Specific rocks for specific tools to specific people in Cabeço da Amoreira, Muge, Portugal

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The Mesolithic shell midden of Cabeço da Amoreira (Muge valley, Central Portugal) is set in the basin of the Tagus River where the abundant and thick gravel deposits are dominated by quartz and quartzite. Contrary, to what was stated before, recent surveys showed that chert cobbles can also be found in these gravels, just a few meters from the site and not only in the opposite margin of the Tagus river, making the three raw materials equally available at a very close range. Nevertheless, during the 650 years of occupation of the site people consistently used the three raw materials and not only chert, meaning that such use was related to deliberate choice and not constraints. In fact, considerable differences existed in the way as they were exploited since each one dominates only a specific spectrum of tools. Strong differences between the raw materials and stone-tools frequency can be seen in the assemblages associated with the burials of an old man and young woman recently excavated, suggesting a possible relation between raw materials, stone-tools and social complexity.

Cultural contacts during the late Boreal and early Atlantic by the Baltic coast of Sweden. An example from Norje Sunnansund, a coastal settlement during the Maglemosian period

Mathilda Kjällquist (*National Historical Museums, Sweden*) mathilda.kjallquist@raa.se

What were the directions of the social and cultural routes of contact, during the late Boreal and early Atlantic in Southern Scandinavia? This study is based on technological traditions

in bone and lithic material, and strontium analyses from human teeth. The main material comes from Norje Sunnansund, a well preserved settlement covered by *Littorina gyttja*, excavated in 2011. The site lies by the outlet of a former lake, 2 km from the Baltic coast in Southeastern Sweden. It is among the first coastal settlements from the Maglemosian time period excavated in Southern Scandinavia. The settlement has been inhabited repeatedly during wintertime, and the finds are extensive, including both a varied lithic material and a bone material ¹⁴C-dated to ca. 7600–6600 cal. BC. The choice of lithic raw material – mainly Kristianstad flint, Senonian flint and quartz – suggests connections in both northbound and southbound directions. Some characteristics of the lithic blade technology and the bone technology also suggest a connection with traditions from the east side of the Baltic, while bone ornaments and Sværdborg triangles show some similarities with the Maglemosian tradition. The results from strontium analyzes of 12 loose human teeth strengthens the picture of connections between people from different geographic areas.

The Late Mesolithic in the eastern part of the Baltic Sea: Initial coastal settlement between the Riga and Vyborg bays

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The last decade archaeological studies in coastal and archipelago Estonia and in north-west Russia (Ingermanland and Karelian Isthmus) allow defining the Late Mesolithic period in the regional archaeological periodization with intrinsic archaeological criteria. The region was peopled in the first half of the ninth millennium BC by hunter-gatherer groups from different parts of the Eastern European forest zone. In the beginning of the Early Mesolithic, the population was integrated in a well-developed social network for inter- and trans-regional exchange of artefacts, raw materials and technologies. Subsistence was based on exploitation of forest and inland water-body's resources. Archaeological data are evidence of interregional network connections reorganization during the ninth millennium BC. In the eighth millennium BC significant changes in economy and settlement strategy can be traced. Shoreline of the Gulf of Finland was settled, and the subsistence strategy was transformed to combine exploiting of littoral and forest resources. During the seventh millennium BC cultural changes came out in stone industries. Archaeological data are evidence of trans-regional network disintegration and of sub-regional social-cultural formations developing. Existence of social-cultural units became obvious when the pottery spread in the region after ca. 5500 cal. BC simultaneously in two distinctly different traditions.

Mesolithic mobility? Isotopic proveniencing at Skateholm and elsewhere

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The concept of mobile hunters and sedentary farmers has been a standard in the minds of archaeologists for decades. But like all assumptions, this one needs to be thoroughly evalu-

ated. There is generally convincing evidence, based largely on faunal remains, that the late Mesolithic hunter-gatherers of southern Scandinavia used the same places for long periods. Ertebølle faunal assemblages often reveal evidence for three seasons. Springtime indicators are absent at most sites and sedentary settlement is difficult to demonstrate. We take another direction in this study, examining the mobility of the individuals buried at Mesolithic settlements using isotopic ratios of strontium and oxygen in tooth enamel. Our samples for this study come from the late Mesolithic site of Skateholm on the south coast of the Swedish province of Scania. A large cemetery was excavated here in the 1970s. Isotopic ratios have been measured in the tooth enamel of a number of these burials to examine variation and identify non-local individuals. Southwestern Scania is a good location for such a study as the background isotopic ratios change over fairly short distances offering good potential to identify non-local burials at the site.

Hunter-gatherer mobility and the ‘scientific turn’

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Movement and mobility have been central themes in Mesolithic and hunter-gatherer archaeology more generally for a long time. The study of Mesolithic mobility has traditionally been based on either anthropologically derived models of hunter-gatherer movement – such as Binford’s ideas of logistical and residential procurement strategies – or on observations of artefact distributions. The latter is perhaps best represented by the seasonal round based on the upland-lowland distribution of various types of lithic artefacts. Both of these approaches to mobility have seen significant reworking and reinterpretation with the arrival of post-processual archaeology. However, the parameters within which we discuss hunter-gatherer movement have remained largely the same.

In this paper I wish to raise the question whether the more recent application of scientific approaches, in particular isotope archaeology and ancient DNA analysis, has succeeded in presenting a paradigm shift in Mesolithic mobility studies. Have they enabled us to discuss people’s movements during the Mesolithic period in new and more interesting ways or are these approaches merely providing new methodologies to re-affirm familiar narratives of hunter-gatherer mobility? For this I will draw on my own research in isotope studies from northwest Europe and other recent projects utilizing isotope and aDNA analysis on Mesolithic remains.

Net patterns in Mesolithic art of north-west Europe

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Archaeologists have concluded quite a time ago that some Mesolithic patterns were inspired by artefacts used in everyday life. Such equipment was represented in engravings, transformed into a geometrical style. I propose to focus in my presentation on the so-called net patterns which bring to mind various types of fishing gear made of fiber and wicker. Net patterns became widespread on bone and antler artefacts in the Kongemose and Ertebølle times.

They are often present on red deer antler axes, beams and on other pieces. Some of these ornaments are complicated and complex integrating next to fishing gear also depictions of fish.

We can assume that the spread of net patterns was related to the growing importance of the aquatic environment in food acquisition and social life. Hunters and gatherers who relied on aquatic food resources were able to adopt a more sedentary mode of life. Fishing with complicated fishing gear required co-operation of a larger number of individuals. Such a kind of fishing could take place during annual coming together of a larger number of smaller groups. Therefore net patterns may be understood to reflect important values such as social integration, co-operation and a new style of life.

Main Auditorium of the Serbian Academy of Sciences and Arts (SASA)

CURRENT RESEARCH

Shell we cook it? An experimental approach on cooking shellfish

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Mesolithic middens are typically composed by large amounts of shellfish refuse. The presence of burnt or what appear to be thermally altered shells is a common observation in these archaeological contexts. However, as some previous studies have pointed out, it is often difficult to identify the presence of in place hearths in these clast-supported and high porosity deposits. In addition, fires unrelated to shellfish cooking may also result in an unintentional burning of previously deposited shell fragments. In order to investigate fire-cooked mollusks, we have conducted several different cooking experiments without the use of pottery or other type of perishable containers. The fires were fueled with pine wood and temperatures were consistently measured directly on the fire, in association with the mollusks as well as on the underlying substrate. Fire-associated sediments and cooked mollusks were analyzed in thin section and with Fourier Transform Infrared (FTIR) spectroscopy to characterize the mineralogical composition and thermal alteration traces. Our experiments focused on cockles and peppery furrow mollusks, since these are the most common shellfish remains found at the Mesolithic site of Cabeço da Amoreira (Muge, Portugal). Choosing these types of shellfish allowed for comparisons with evidence available from this archaeological record.

The last foragers in NE of Iberian Peninsula: New evidences of human occupations during the sixth millennium BC

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The evidences of hunter-gatherer occupations in Catalonia (North-east of Iberian Peninsula) in the seventh-sixth millennia cal. BC are scarce. Until recently only two sites, Font del Ros and Bauma del Serrat del Pont, have provided ^{14}C dates in the range between ca. 6767–6071 cal. BC. Recent research in Cova del Fem in the Montsant massif (Catalonia, Spain) has provided new evidences of human occupations for this period. The site is located in a rockshelter and has a well-preserved stratigraphy with several occupation levels. The first farming communities dated to the second half of the sixth millennium cal. BC are documented in various occupations of the upper levels. The occupation evidenced in the bottom level corresponds to the last foragers and has provided a material dated to the transition of the seventh to the sixth millennium BC. In this paper, we discuss the signification of the site in the context of the last foragers in the region.

The Mesolithic in the northwest of Iberian Peninsula (Galicia, Spain): State of the art

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The aim of this work is to outline the archaeological and environmental features of the Mesolithic in the northwest of the Iberian Peninsula (Galicia). The sites under study are: Xestido III, Paradero de Reiro and Pena Lliboi. Xestido III and Paradero de Reiro are open air sites related to peatbogs, and Pena Lliboi is a rock-shelter. All of them are placed in different geographical environments: mountainous interior, Atlantic coast and inland plain, respectively. We will develop the study of the lithic assemblages taking into account the raw materials, the technology and the typology. The faunal analysis and the palaeoenvironmental context of the sites will be presented.

Holocene foraging in the Dinaric Alps: Current research on the Mesolithic of Montenegro

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The territory of present-day Montenegro with its natural affordances, such as mountainous karst-dominated landscapes, the proximity of the Adriatic coast, deeply carved river valleys

and high plateaus, holds a significant promise for the study of prehistoric hunter-gatherers. To-date, archaeological investigations in this region revealed Mesolithic occupation deposits at only seven rockshelter and cave sites. And while the number of locations with known Mesolithic deposits remains low and the Mesolithic timespans remain poorly dated, some important conclusions can be drawn on the basis of the existing datasets. In this paper, we review the evidence of Holocene forager presence in Montenegro and present new data regarding recent analyses of existing collections, new AMS dates, and the results of our most recent fieldwork initiated in 2012.

Changing recipes? Interpreting organic residues in cooking pots from Zamostje 2, Russia

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Our investigation focuses on the analysis of organic residues from 15 of the thousands of potsherds from Zamostje 2, a long-lived site on the River Dubna in central Russia. Artefact and ecofact assemblages demonstrate that even in the pottery-bearing “Neolithic” phases, the Zamostje subsistence economy was based on hunting, fishing and gathering, and both plant and animal foods are likely to have been prepared in cooking pots. Surprisingly, in our data there is a distinct shift in the stable isotope values of lipid-extracted carbonized food crusts from the early Neolithic (sixth millennium BC) to the middle Neolithic (fifth millennium BC), apparently suggesting that fish was seldom cooked in pots during the earlier phase, but that fish was the dominant ingredient in the second phase. We see the same shift in the $\delta^{13}\text{C}$ values of long-chain fatty acids extracted from these food crusts. However, more detailed biomolecular study suggests that in both phases pots were used for cooking aquatic and terrestrial plant and animal foods, often together.

Nevertheless, if these foodstuffs were isotopically distinct, food-crust stable isotope values should reflect the proportions of the different ingredients. Our priority is therefore to develop realistic local baselines for isotope values in different species. In addition to providing information about cooking practices, quantifying the ingredients of carbonized food crusts helps us to interpret their radiocarbon ages, as fish and other aquatic species are often depleted in ^{14}C relative to terrestrial plants and animals, which can give rise to spuriously old radiocarbon results in food crusts. At Zamostje we can use the radiocarbon chronology of fully terrestrial material to identify which food crusts give misleading radiocarbon results, and correlate patterns in radiocarbon ages with the isotopic and biomolecular results.

Wierzchowo 6 a settlement of Sveardborg group in Drawskie Lake District, Po-land. Re-examination

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I would like to present the results of multi-aspect analysis of the Mesolithic site of Wierzchowo 6. The research is part of a project the purpose of which is the approximation of the basic aspects of Mesolithic hunters and gatherers' lives through an integrated approach. Its essence is a combination of palaeotopography of the site, refitting of the lithic industry, and functional analysis of stone tools.

The site was excavated in 1989, under the guidance of Z. Bagniewski. From trench I/89 (area of 51 sq. m) around 5000 artefacts were obtained, made of erratic flint. Based on diversity of microliths and significant number of macrolithic tools, the assemblage was associated with Sveardborg group. The site of Wierzchowo 6 was published as the first discovered and well-preserved settlement of the Sveardborg group in Poland. The chronology of the site was set to the Boreal period.

A re-analysis of the assemblage using the combined methods of research revealed new elements regarding the deposition of artefacts, the interpretation of particular tools and modes of their use. The completed study provided an impulse to conduct new excavations at the site in the 2014 season.

New evidence of Early Mesolithic hunting injuries on animal bones from northern Germany

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To understand past human hunting behaviour two lines of evidence exist: first, the remains of hunting weapons and the reconstruction of their utility; second, the traces on the target itself. In the Early Mesolithic archaeological record from northern Europe hunting activity have been proven relatively frequent especially in the latter category (Leduc 2014; Noe-Nygaard 1974). Although Early Mesolithic sites with excellent bone preservation in northern Germany exist, only a few examples of hunting lesions are published (Heußner 1987; Street 1989). In a recently launched reanalysis of osteological assemblages from northern German sites, such as Hohen Viecheln, Tribsees and Rothenklempenow, new evidence of hunting injuries on various skeletal elements have been found.

To further test the morphological significance of bone modification patterns caused by hunting activity, experiments have been conducted at MONREPOS. Based on their preliminary results diagnostic features on the bones are described and the implication to archaeology discussed. The detailed examination and experimental evaluation of var-

ious bone modifications contribute to the understanding of miscellaneous human activity during the Early Mesolithic in northern Europe.

Exploring early Ertebølle – Excavation and survey at a submerged site in the Kiel Bay, Baltic Sea, Germany

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Two years after a successful test excavation on a new submerged Mesolithic site named „Strande LA 163“, scientific divers prospected in the surrounding area for four weeks in 2014. The excavation showed well-preserved peat and organic silt layers, containing a large number of lithics as well as organic finds. These include wooden objects, botanical remains, bones of different marine and freshwater fish, as well as sea and land mammals. Notably, fragmented human bones were also found. Tree ring dating, radiocarbon dates and the inventory pinpoint the site to the older or Pre-pottery Ertebølle phase (around ca. 5200–4900 cal. BC). The survey was executed to answer open questions which arose during the trial excavation in 2012. Until the prospection work started, the dimension and position of well-preserved old surfaces and find layers around the excavation trenches was not known.

The site Strande LA 163 is of special interest, as sites of this time period are rare in the southwestern Baltic Sea area. Only few sites have been examined in detail. The site Strande with its dating shortly before pottery was adopted could enlighten the way of life of this time and reasons for the introduction of the new material.

Archaeology on the island of *Blå Jungfrun*

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The island of *Blå Jungfrun* (Blue Maiden) is situated 20 km from the mainland off the eastern coast of southern Sweden. The island reaches 89 meter above present day sea level, indicating that it has been visible on the horizon ever since the first people arrived in the area ca. 9000 BC. The island consists of moraine boulders, cliffs steeping in to the ocean, rock shelters, caves and amazing natural formations. Because of the horrific landscape and the natural formations the island has frequently appeared in folklore as an evil place, home for witches and the devil.

In May 2014, we undertook the first archaeological surveys and excavations ever on the island with some amazing results. It could be confirmed that the island had been used from the Mesolithic throughout the Stone Age. The landscape was clearly divided in profane and ritual spaces: a rockshelter was used as a gathering site with repeated occupations result-

ing in a 70-cm-thick cultural layer. Two caves, each ca. 150 meters from the rockshelter, contained significant traces of ritual activities. In this presentation we discuss what significance the island may have had during the Stone Age.

From log boats to rubber tires. The E18 Rugtvedt-Dørdal project, Telemark, Southern Norway

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During 2013–2015, the Museum of Cultural History, University of Oslo, has carried out excavations of more than 30 Mesolithic sites in Telemark County, Eastern Norway. The main focus of the project has been to investigate the marine landscape and settlement of the region. With sites dating from ca. 9000 to 3500 cal. BC the project has a possibility to explore temporal trends as well as variation and similarities within shorter time periods of the Mesolithic. The paper aims to present results from the project's excavations. The main focus will be the coastal settlement of the region presented in a supra-regional setting. We will demonstrate the potential of the Eastern Norwegian Stone Age archaeology for analyzing sites and technology from Mesolithic marine and coastally adapted societies.

On higher ground – Mesolithic evidence from the Alpine and sub-Alpine areas of western and central Norway revisited

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This paper presents new evidence from recent excavations of Middle and Late Mesolithic sites in the sub-Alpine and Alpine areas of western and central Norway, and also discusses earlier excavations and their theoretical background. Former theories have claimed that most of the evidence should first and foremost be seen in the light of reindeer hunting. The character of the remains in these mountainous areas indicates much higher variety of activities. These recent analyses, which are also based on detailed studies of a number of rock quarries dated to the same timespan, present a more balanced picture of the prehistoric situation.

Spearfishing in the Mesolithic and the application of Zooarchaeology by Mass Spectrometry (ZooMS) for the taxonomic identification of the raw material for southern Scandinavian bone points

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Hunting implements made from bone and antler have regularly been unearthed in south Scandinavian peat bogs. These types of bone point are thought to have been lost during hunts in and around the inland wetlands, and are well-preserved in the anaerobic sediments. Although the idea of using bone as a piercing tool is seen throughout prehistory, this study focuses mainly on the barbed bone points, which can be dated to the Mesolithic Maglemose and Kongemose periods. The taxonomic identification of bone points dated to these periods has previously relied on the identification of diagnostic osteological landmarks. This presentation will show the potential of using ZooMS as an alternate means of taxonomic identification, and will demonstrate deliberate selection both in terms of skeletal element, but also of the species supplying the raw material.

Domestic life by the ocean: Beg-er-Vil, ca. 6200–6000 cal. BC

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The Mesolithic settlement of Beg-er-Vil at Quiberon (Brittany, France) offers a remarkable witness of the last maritime hunters-gatherers lifestyles of the Atlantic façade, during the 8200 cal. BP climatic event. The four-year excavations (2012–2015) revealed a wide variety of domestic structures and completes the knowledge obtained during the 1930s within the famous Hoedic and Tévéc habitats and cemeteries, a few kilometers away. In these three shell-middens, the diversity of organic remains is an effect of the shell carbonates in an area where the soil context are usually marked by a strong acidity. These settlements give access to the daily life of these coastal populations. The fauna as well as the lithic industry testify of the long-term occupation along the coast, allowed by close insertions in the Atlantic environments. How can we link the hearths, the pits, the post-holes or the thick burnt stones layers to these maritime activities? Is there a “maritime signature” in the archaeological features? What could be the definition of the “domestic life” of these coastal populations? The purpose of this paper is also to provide a first modelling of the human behaviours in the south of Brittany at the end of the seventh millennium BC.

Mesolithic human-environment interactions in the Bristol Channel region (UK)

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The Severn Estuary and Bristol Channel (UK) region has repeatedly been highlighted as an area of outstanding potential for understanding prehistoric human-environment interactions. Previous studies in this region have produced some of the country’s most important Mesolithic archaeological sites, as well as an internationally significant environmental archive in the form of Holocene sedimentary deposits. Thus, on paper, it represents one of the best places in the UK from which to generate a detailed account of the changing relationship between people and the environment through time.

However, recent work has indicated that achieving the much vaunted potential for improved renderings of human-environment interactions still remains a significant challenge in Mesolithic archaeology. This paper will therefore present the results from this English Heritage funded research into the environmental and archaeological history of this region; drawing on both the onshore and offshore records, archaeological fieldwork and geophysical survey. It will argue that, although this disconnect still exists between our research aims and the local datasets, much can be gained through facing up to the weaknesses this research reveals. Core research questions regarding human-environment interactions therefore need to be re-evaluated and with them our expectations of the Mesolithic archaeological record of the UK.

Artefacts through the lens – A biographical and contextual approach in the Vale of Pickering

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Research being conducted as part of the POSTGLACIAL Project is applying a broad spectrum of scientific approaches to the study of artefacts and their contexts from Star Carr and Flixton Island. Surprisingly, considering the international significance of Star Carr, these artefacts have seen very little research at a microscopic-level since Dumont's (1988) pivotal publication on microwear traces of the stone tool assemblage. Central to the current study is addressing and challenging outstanding questions about tool form and function. Flint and organic artefacts are being analyzed for microwear traces; micro-residues are analyzed using the contextual *in-situ* approach in addition to SEM and Biochemical characterization. We are particularly interested in what appears to be a deliberate distinction between the types of tasks conducted in dry and wetland contexts. By integrating microwear and residue data with technology and refitting studies, experimental archaeological research, geochemical survey and a study of the micromorphology of the sediments, we are identifying significant spatial patterns of where tools were being made, used, re-used and abandoned. It is at this micro-level of analysis that individual tool biographies and discrete episodes of human activity are starting to emerge from Star Carr.

Sonic horizons of the Mesolithic: Exploring an Early Holocene landscape through sound

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This paper will discuss the work of the Sonic Horizons of the Mesolithic project – an interdisciplinary collaboration between sound artists Jon Hughes, archaeologist Ben Elliott and the British Library Sound Archive. Using the archaeological and palaeoenvironmental ev-

idence from the Vale of Pickering, England, as a point of departure, this project looked to address a very simple question – what would life in the Early Mesolithic have sounded like?

In bringing together sound recordings representative of the different species of birds and animals known to inhabit this landscape, the types of activities that people were engaged in and wider environmental conditions which helped to define the Vale of Pickering in the Early Holocene, this project produced a series of innovative and critically considered sound installations throughout the summer of 2013. These have sparked debate as to the character and quality of life at sites such as Star Carr, the ways in prehistoric landscapes might be presented to wider audiences in the future and new directions for compositional practice within landscape-based music making.

Elusive, perplexing and peculiar? Presenting the Mesolithic to 21st century audiences

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Within British archaeology, the Mesolithic is often considered a dull and impoverished period with a lack of recognisable, monumental sites, rich burials or spectacular finds. The period also barely features in museums, popular media and school education. As a result few people have heard of it. Mesolithic hunter gatherers had very different lifeways and yet there were also many resonances with modern life: they built houses, wore jewellery, domesticated dogs, and buried their dead. They also had to cope with rapid climatic and environmental change. Their diet was one that modern people might envy, based on local and seasonal foods, using a variety of land animals, fish, vegetables and shellfish.

Evidence that the Mesolithic can appeal to a wide public audience comes from excavations at Star Carr which attracted local, national and international media attention for “Britain’s Oldest House”: over 120 newspapers worldwide as well as TV and radio coverage. Current research will be presented on: how is the Mesolithic has been presented to the public in Britain; which aspects of the Mesolithic are likely engage the public; whether the Mesolithic be taught to children as part of the school curriculum.

Genetic diversity of Mesolithic Europeans

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Studies of ancient human mitochondrial DNA (mtDNA) suggest genetic continuity between Upper Paleolithic and Mesolithic hunter-gatherers in Europe, followed by an almost complete replacement with limited genetic admixture by Neolithic farmers. However, the mitochondrial genome variation during the Mesolithic time across Europe is currently poorly understood as only a limited number of hunter-gatherers from this period have

been genetically analyzed. In this study high-throughput sequencing technologies are applied to reconstruct complete or almost complete mitochondrial genomes of Mesolithic individuals from different archaeological sites in Europe. DNA is extracted from skeletal remains, converted in genetic libraries, the mtDNA is enriched through a bait capture technique and sequenced on a next generation sequencing platform. The authenticity of the obtained mitochondrial sequences as ancient human DNA is verified by analyzing typical ancient DNA damage patterns as well as establishing a single biological source of mtDNA from the studied samples. Finally the authentic mitochondrial genomes are used to address questions about the human genetic diversity during Mesolithic time and the genetic variation from Upper Paleolithic to Neolithic Europeans.

Kapetan Miša's Palace

POSTERS

A Middle Mesolithic refitted tuff and porphyry blade production site in central Sweden

Sandra Söderlind (*Uppsala University, Sweden*)

The early settlement of eastern-central Sweden, and the province Dalarna, is a subject that has been rather unexplored up until the past few years when several smaller research-excavations have been carried out as a part of the project *Nordic Blade Technology Network*. The aim has been to study the pioneer settlement of Scandinavia in the beginning of the Holocene period. The focus has been the investigation of the lithic technology associated with these immigrating people and its relation to assumed places of origin in the surrounding areas.

The present work is a case study of the lithic material from one of the excavated Mesolithic sites. The study includes an attempt at refitting the debitage from blade production in local raw materials and comparing this *chaîne opératoire* with surrounding blade industries. The main goal is to investigate the origin of the pioneer settlers.

Wood charcoal and seed/fruit remains from Lepenski Vir

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Around fifty soil samples collected from archaeological deposits excavated in the late 1960s at Lepenski Vir have recently been processed and analyzed for macro-plant remains. The paper presents first results of the analysis of charred macroscopic plant remains, and considers their implications on the palaeo-environment and the use of plants at the site. Al-

though preliminary, the results offer an important insight into the availability of plant resources and some plant-related aspects of life at this important site.

Visual information in Cabeço da Amoreira, Muge (Portugal): Shell adornment technology

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This poster focuses on the technology of production of perforated shell adornments in the shellmound of Cabeço da Amoreira, Muge (Portugal). Different species were used as adornments including marine, riverine and estuarine species (*Trivia*, *Cerastoderma*, *Theodoxus*). The shell specimens are coming from a 12-metre long trench excavated in 2010 with various shell layers presenting different chronologies on the southern edge of the main shellmound.

Recent macroscopic and microscopic analyses of the shells shed light on the techniques used by the Mesolithic populations and, at the same time, allowed us to understand if, and how, exist differences in the technology during a transition period when the Mesolithic hunter-gatherers saw the arrival of the first Neolithic populations to the region.

Toward understanding of the Late Mesolithic in Pomeranian Bay Area

Michał Adamczyk (*Szczecin University, Poland*) and **Justyna Orłowska** (*Nicolaus Copernicus University in Toruń, Poland*) orlowskajustyna@wp.pl

The Mesolithic in the Pomeranian Bay Area on the Southern Baltic Coast is known mostly by the presence of Ertebølle culture settlements and stray finds on Rügen Island. However, besides Ertebølle, the issue of the Mesolithic of this area is still unclear, especially its eastern part. The Early, Middle and Late Mesolithic assemblages seem to be absent. In this poster, we are focusing on the Late Mesolithic of the Pomeranian Bay. We refer to the latest discoveries, as well as to archival record and palaeoenvironmental data to outline the chronology and cultural affinity of the Late Mesolithic.

The Mesolithic of Belarus: An Outline

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Aliaksandr Vashanau (*Institute of History, National Academy of Sciences of Belarus*)

The actual notion of the Mesolithic of Belarus is practically based only on the analysis of lithic materials. All known Mesolithic sites are open air sites located on sand dunes and river terraces. Most of the assemblages come from the surface gathered collections but some reference assemblages come from the systematically excavated sites. Scholars focus their attention on taxonomic sorting of lithic materials relying on typological analysis. Typological differences in assemblages serve as a benchmark for cultural interpretation.

The Mesolithic of Belarus is considered in the context of some taxonomic units. Each of them represents a different typological face and different technological conception as well. Distinctive features of the Kunda culture are tanged points along with rectangular laminar inserts and advanced blade technology. Pressure technique was used to obtain extremely regular blades from single-platform conical cores. The second Early Mesolithic taxonomic unit is Kudlaevka culture with various backed edge microliths typical for it. The technology is based on hammer technique and exploitation of single-platform cores for flakes and irregular blades. Late Mesolithic is represented by Janisławice culture assemblages. Specific Wieliszew type points, scalene right-angled triangles and various trapezes are characteristic for them. Punch and/or pressure technique was used to obtain regular blades from single-platform sub-conical and handle cores.

Determining the durability of Mesolithic Irish shale axeheads

Bernard Gilhooly (*University College Dublin, Ireland*) bernard.gilhooly@ucdconnect.ie

This presentation will discuss the findings of an experiment undertaken to determine the durability of Mesolithic Irish fine-grained sedimentary stone axeheads. While questions have been raised about this stone type's suitability for tool manufacture, the archaeological record demonstrates their widespread use, such as the mudstone and shale specimens found at the Mesolithic habitation site at Mount Sandal and the Mesolithic cemetery at Hermitage respectively.

For this experiment, shale was chosen, as it was the second most popular lithology for axehead production in Irish prehistory. As the testing of archaeological examples could not be undertaken, a two-stage assessment was devised. Here, replica axeheads were used to work wood species, which were native to Ireland in the Mesolithic; ash and pine. Shale was sourced from two locations within Ireland; Fisherstreet Co. Clare and Bray Co. Wicklow, to determine if the resilience of this lithology differed between source locations. A comparative analysis was then undertaken between the experimental examples and archaeological specimens from the National Museum of Ireland. From this, an interpretation of the durability of prehistoric shale axes, with regard to working wood, was possible.

The problem of the Palaeolithic to Mesolithic transition on the Upper and Middle Don River (Central Russia)

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The youngest Upper Palaeolithic sites in the Upper and Middle Don Valley have radiocarbon dates ca. 13-12 ka BP (Borshchevo 2, Divnogor'e 1, 9). Lithic assemblages of these sites are characterized by the presence of backed implements, end-scrapers on blades, burins on truncation which are distinctive features for the Eastern Epigravettian. The Final Palaeolithic sites are not represented in the region. Several Early Mesolithic sites discovered during the last two decades (Kashirka, Plautino 2, etc.) have radiocarbon dates ca. 10-9 ka BP.

Geometric microliths, burins of different types, circular end-scrapers and some points and chisels are typical for toolkits. Although at least 2000 years separate Palaeolithic and Mesolithic settlements there are some similarities in technical and typological characteristics of their lithic assemblages. Various scenarios of the Mesolithic formation and its probable origin are discussed in the report (The research is supported by the Russian Foundation for Basic Research (RFBR), Grant No. 14-06-00438).

The HIDDEN FOODS project: Plant foods in Palaeolithic and Mesolithic societies of southeast Europe and Italy

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HIDDEN FOODS is an ERC Starting Grant project hosted at the University of Cambridge (UK) and aiming at developing a suite of methodological and experimental approaches in order to obtain (1) systematic evidence about the importance of plant foods in Palaeolithic and Mesolithic southern Europe; (2) study causal links between plant foods processing and technological changes in artefact production; and (3) assess the role of plant foods for prehistoric hunter-gatherers' health status. The project will investigate the importance of plant foods by studying three different categories of archaeological materials: ground stone tools, macrobotanical remains and human skeletal remains. The main methodological approaches involve (a) use-wear analysis; (b) starch identification; (c) parenchyma tissue analysis in macro-botanical remains recovered from archaeological sites; and, (d) study of dental pathologies related to plant foods on ancient human remains. The project will examine direct and indirect evidence of plant foods for Palaeolithic (~40,000–11,600 cal. BP) and Mesolithic (~11,600–7900 cal. BP) societies of southeastern Europe and Italy.

Mesolithic hunter-gatherers at the micro scale: Lithic residue analysis at Star Carr and Flixtion Island, North Yorkshire

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Stone tools constitute the major artefact class during the Mesolithic (ca. 9600 to 4000 cal. BC) in the UK, but little direct evidence exists for how prehistoric hunter-gatherers used these important technologies for subsistence and manufacturing activities. In situ identification and mapping of microscopic residues found on lithics using low and high power microscopy provide evidence of lithic function, and allow us to better visualize the lives of our ancestors. This approach is being applied to lithics from the sites of Star Carr and Flixtion Island, North Yorkshire. A pilot study has already demonstrated that despite variable burial conditions, identifiable residues have survived on Mesolithic artefacts, even from acidic wetland peats at Star Carr. These exciting traces of the past are beginning to give us a glimpse into tool biographies and new insights about their makers. By studying hunter-gatherer technologies in exceptional detail at the micro scale, residue analysis of lithics from Star Carr and Flixtion Island is bringing about new and unexpected findings.

Recent methodological strides are improving how we carry out residue analysis, but there remain some unresolved issues. Thus, a key part of this project involves the development and testing of methods to ensure best practice.

Who creates the Mesolithic? A discourse analysis of the public image of the Mesolithic in northern Scandinavia

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Using a meta-perspective and discourse analysis, I will investigate how (and if) popular historical journals are utilizing the scientific archaeology of the Mesolithic. How much of the archaeology made by scholars reach the public, and could it be considered modified to reflect the contemporary society, when it ends up in a popular science magazine? I have decided to analyze the discourse using text analyses and iconography within popular science from three specific themes: gender, climate and DNA-analysis. These themes could be considered to reflect some of the widely debated subjects in the last 30 years of archaeology, and is therefore also reflected in the more public forums. This has to do with the fact that they reflect problems of the contemporary society, and creates a tool for (popular science authors in particular) to debate the Mesolithic using a contemporary approach. This creates a Western identity of today, expressed through pre-history. This is something that should be investigated. Who creates the public image of the Mesolithic?

Dating animal bones from the early settlements in northern Scandinavia

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As the ice sheet of the Weichsel glacier slowly melted the Mesolithic pioneer settlers moved to the newly appearing land. But before the human occupation, the flora and fauna were already established in the area. There are settlements with burnt animal bones that inform how humans used faunal resources and how they used and handled the bones before and after burning. The bone material can also tell us which species the humans brought to these settlements for one reason or another. This poster is about what species the humans brought to the settlements, how the faunal resources were utilized, and the bones handled. Results of ¹⁴C-dating on bone samples from settlements show not only the date of settlement habitation, but also the timing of the species occupation of the landscape. By examining of several dates from analyzed bones of various settlements, combined with the analysis of lithic material, emerges a cultural pattern through time and space.

Reconstructing Mesolithic burials: Examining changes of skeletal taphonomy and mortuary practices in Europe

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Initial exposure of human remains does not always appreciate the funerary behaviours of the individual or population under examination. Distinguishing between intentional and accidental disturbances has not always been fully appreciated, and Mesolithic interments in the Iron Gates region of the Danube River and the Scandinavian cemeteries in Denmark, Sweden, and Latvia all have evidence of secondary deposits of human remains. The discovery of additional bones within a single interment does not always equal a secondary deposit, but may indicate the recycling of a grave or a double/collective burial. It is common to find extra bones within single burials from the European Mesolithic. This “loose bone phenomenon” has been documented at numerous sites, but most early reports exclude any in-depth analysis of the taphonomic history of the human skeletal remains. Often the skeletons are subjectively recorded as having a “good state of preservation” or being “poorly preserved” without explaining what this means in terms of cortical and trabecular bone conditions or the completeness of each bone. My research reexamines the Mesolithic collections from Caldey Island, Schela Cladovei, Icoana, Climente, Concheiros de Muge, Höedic, and Téviec to differentiate between natural and intentional disturbances within the graves by means of archaeoethnology and other burial reconstruction methodologies.

The Mesolithic site of El Collado (Oliva, Spain). A vision from the present

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The site of El Collado (Oliva, Spain) is one of the most important Mesolithic contexts of the Peninsula Iberica. Nevertheless, the site has been largely ignored and still remains poorly known by the international community. Excavated at the end of the 1980s, published data on the El Collado were very scarce until 2008 when a site monograph was published.

The site is located on the southern shore of the Gulf of Valencia, at about 100 masl and 3 km from the modern shoreline. Excavations were carried out over the surface of 143 m². In this area, 14 burials have been discovered with 15 different individuals (one double inhumation). The deposit is a shell-midden rich in lithic artefacts, archaeozoological and malacological remains (Aparicio 2008). In this paper we make a brief presentation of the site, especially focusing on the burials and ¹⁴C dates (Gibaja *et al.*, in press).

The tools made of wild boar canine in the French Mesolithic: Technological and functional study

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In France, during the Mesolithic, wild boar tusks were used as a piece of raw material to manufacture beveled objects. Blank production was lead by bi-partitioning of the tooth;

shaping was lead by scraping. Finished objects show size and morphological variety but a same type of active part: a lateral bevel. These objects have been recognized since a long time and sometimes presented as a *fossile directeur* of the French Mesolithic. But they are known under various names (awls, burins, knives, etc.). The variety of their names is an indication of the perplexity of the researchers in front of these objects, which are actually in blurred situation, from a typological, technological and functional point of view. It is so important to realize a complete study of these objects. This work had been started in collaboration. A first study, realized in the context of a PhD thesis, was focused on the production of these objects. A second study, realized in the context of a Master, was lead to bring some information about the function of these objects. This poster presents the first results of this collaboration.

Marine resources beyond the Mesolithic? A critical thought from northern Iberia

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The recovery of “direct” information about the diet of human societies in the Mesolithic-Neolithic transition in several parts of Atlantic Europe has constituted a turning point in our perception of economic change associated with the Neolithic. In this respect, the data from stable isotope analyses contributed to the opening of a debate about the continuity of the use of marine resources at the start of the Neolithic. The apparent contradiction between isotopic information and archaeological evidence is one of the key aspects of this discussion. In the case of the northern Iberian Peninsula, research has provided significant data in recent years, especially as regards “indirect” information about the exploitation of the marine environment after the Mesolithic. It is therefore fitting to present a critical “state of art” on this topic, including the scarce isotopic evidence currently available.

GIS-based visibility studies in the Muge Valley shellmiddens: Implications for spatial and social organization

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Recent studies on the Mesolithic shellmiddens of the Muge valley (Portugal) indicate that these sites must have had, by their size, aspect and integration in an increasing socially complex cultural system, a major impact on the landscape as monumental anthropogenic features. Their role as landmarks and, most probably, as centers for different social/functional units is expected to be manifested in a considerable visual prominence on the terrain.

This poster focus on the use of geospatial techniques and statistical analysis to assess visibility as a determinant factor for Mesolithic settlement location and social patterns in Muge. Results confirm a considerable importance for features such as visual prominence, intervisibility between several settlements and visual control of the environs. A significant dichotomy in the visibility properties of both riverbanks mirrors differences in the archaeological record of sites and suggest that some of these sites might have been special locales with social impact as cultural landscapes. Some of the mounds constitute thus evidence for a continuation of social and symbolic practices that surpasses the straight economic strategies and adaptation.

Mesolithic and Neolithic vegetation history and fuel use in the Grands Causses region: New charcoal data from Roquemissou (Aveyron, South-western France)

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The Grands Causses consist of a network of mid-mountain karstic plateaus and valleys located in South-western France, in the southern margins of the Massif Central. This region has yielded many archaeological testimonies attributable to the Mesolithic and the Neolithic periods. However, Mesolithic lifeways and Neolithisation processes are still poorly understood due to the age of most previous works. In order to enhance our knowledge of the prehistory of this region, new excavations and multidisciplinary research are currently being performed at Roquemissou, a rockshelter with several occupations dating from the Epipalaeolithic to the Early Bronze Age. We present here the first results of charcoal analyses of Mesolithic and Neolithic hearth and sediment features that allow us to discuss fuel use at the site, as well as regional vegetation history.

Early appearance of geometric microliths in Central Asia

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Until recently, every industry with geometric microliths in Central Asia has been defined as Mesolithic. The situation was complicated by the lack of absolute dating results for regional Upper Palaeolithic and Mesolithic sites. The results of new research shows that first evidence of geometric microliths manufacture came from the Upper Palaeolithic Kulbulakian complexes (Shugnou, layer 1; Kulbulak, layer 2.1). But the most important industry that documented the shift from non-geometric microliths (backed bladelets and micro-points (Arzheneh points)) to geometric microliths (scalene triangles) in a very early chronological context in Central Asia is Dodekatym-2 site (ca. 26,700–24,200 cal. BP). The main characteristic of Central Asia Upper Palaeolithic geometric microliths technology testify to the corresponding development with Upper Paleolithic and Epipalaeolithic of Neareastern (the Masraquan culture) and Middleastern (the Zarzian culture) geometric

microliths production. Available absolute dates from Dodecatym-2 site are at least synchronous to the early Epipalaeolithic Levantine industries. Now it is possible to conclude that Central Asia also was one of the microlithization centers.

Reconstruction of environment in Mesolithic–Early Neolithic epoch on peat sites Pogostishe 14 and Karavaikha 4 (Vologodskaya oblast' of Eastern Europe)

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Pile wood constructions of Mesolithic–Early Neolithic period were excavated in peat deposits in the region of Vologodskaya oblast', on shores of the Modlona River and Eloma River flowing into Vozhe Lake. The Pogostishe 14 site is dated to the middle of the 7th millennium BC. Artefacts were found on the surface of the thin-grained alluvial sand that was covered by the peat-gyttja deposits. Ancient finds were made from flint, slate, bones, wood, bark, elm. The main collection of findings from Karavaikha 4 site belongs to the sixth-fifth millennia BC. The cultural layer is covered by peat and gyttja deposits also. The pile wood constructions were situated inside elongate pits, connected with ancient river channels and they could be used as fish-traps. The alluvial, lake and cultural processes of sedimentation on these sites were investigated with the help of pollen, geochemical and radiocarbon dating methods. The analyse of carbon and nitrogen stable isotopes on bones were applied. The environmental conditions of ancient people and the schemes of adaptation strategy were reconstructed (The investigations were support by RFBR, project 14-06-98806).

Concentrated habitation in the Late Mesolithic at Flemsøy, Northwestern Norway. Internal and external comparison of past activity

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The poster presents results from an on-going project where a number of Late Mesolithic sites documented along a beach ridge on the island of Flemsøya, Sunnmøre, Western Norway are being investigated. Contemporaneity between sites and their variety in size and form provides a point of departure for intra-site comparisons of different types of function and use, which will be displayed in the poster. The beach ridge often referred to as the *Tapes-ridge* was built up during the postglacial period and created a wetland environment in the vicinity of the sites, which created favourable conditions for material that is less likely to be preserved. These conditions have also evolved into detailed cooperation between palynology and archaeology, in order to try to trace the impact of humans on the local environment along the coast of Western Norway in the Late Mesolithic.

Late Mesolithic – Early Neolithic of the Kama region. Aspect of the Neolithisation process

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The study area is situated in the Cis-Urals flatlands, in the basin of the Kama River. The Kama Mesolithic and Kama Neolithic cultures concept was proposed by Otto Bader. The sites of both cultures are located mostly on the remnants of floodplains of small rivers flowing into the Kama River or on the first terrace of the Kama River and its tributaries. Construction of small shelter-shaped structures, the use of narrow blades from local pebble flint as the basic blanks for making tools are typical for them. The main categories of tools are blades and section blades with retouching, end-scrapers, burins at the corner of a broken blade, points on blades. As a result, we concluded that the appearance of pottery is the main criterion for the separation between the Late Mesolithic and Early Neolithic. The transition towards residential sedentism played the most important role, and “required” the invention of ceramics. Thus, we can unify the Late Mesolithic and Early Neolithic in the Kama Basin.

“Fire walk with me” Hearths, tasks and mobility in the Early and Middle Mesolithic of eastern Norway

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Hearths are essential for human survival: heat is necessary for performing a wide range of practical tasks such as keeping warm, cooking food and heating water. Archaeological as well as ethnographic studies of hunter-gatherers in different climates, also demonstrate how a variety of craft-related activities, social interaction and cosmology are closely related to the fireplace. Thus, hearths serve as an important source of information for interpreting different tasks and activities taking place at the archaeological micro-scale. Distribution of hearths and lithic scatters in the landscape also offer an opportunity to study settlement organization and mobility on a macro-level. This poster presents recent investigations of hearth-centered activities, mobility and organization of space at prehistoric coastal sites, dated to the early and middle Mesolithic in the Oslofjord-area of Eastern Norway (ca. 9500–6300 cal. BC).

Exploring possibilities of 3D imaging software use in estimating cortical bone and dental roots thickness

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In order to get accurate measurement of cortical bone thickness, Digital Imaging and Communication in Medicine (DICOM) file of 3D scan of femur from Mesolithic archaeological site Lepenski Vir was analyzed using On Demand 3D® software by Cybermed,

Seoul, Korea. Cortical bone thickness is estimated using classical cross-sections derived from longitudinal axis of the bone and cross-sections derived from the curve that follows cortical bone structure in coronal plane. Comparing two sets of cross-section measurements gives notable difference and calls for rethinking of methodology, indicating that the method could have significance, at least in cases where greater precision is needed or in analyzing non-typical (bended, curvy shape) specimens for dental root and long bone morphology responding to biomechanical load.

The POSTGLACIAL project

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The POSTGLACIAL project is a European Research Council project, being carried out by a large, interdisciplinary team, through the University of York, UK, with Star Carr as the focus. The project aims to implement an interdisciplinary, high-resolution approach to understanding hunter-gatherer lifeways within the context of climate and environment change during the early part of the post-glacial period (ca. 10,000–8000 BC).

The key objectives are to:

1. To push forward the frontiers of knowledge of post-glacial archaeology
2. To conduct high-resolution, multi-proxy analyses of climate and environmental change
3. To set a new benchmark for the analysis of archaeological deposits, by developing an integrated 'forensic' approach to the analysis of the artefactual and molecular debris left by human activity
4. To integrate climate signals with environmental change and human activity.

This is a critically important period of the human past. The only way to significantly advance our understanding of hunter-gatherers in the context of climate and environment change is to conduct interdisciplinary fieldwork. Although a number of sites are known in Europe, Lake Flixton provides an exceptional portal into the past: unique archaeological finds are known to be *in situ*, and a high-resolution environmental and climatic record has been achieved.

Mesolithic settlement at Motala – expressions of centrality

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The site of Motala, ca. 6000–5000 cal. BC, represents without comparison the largest coherent settlement site in central Sweden. Motala is situated where the river Motala ström flows out of Lake Vättern, a key position viewed both from a geographical, communicative and resource-based perspective. The remains in Motala have seen major archaeological excavations since 1999.

This poster presents the now completed excavations and raises questions about Motala as a focal point in the region. The findings of thousands of stone tools, unusually rich osteological materials, decorated bone and antler artefacts and fishing equipment, as well as traces of dwellings, burials and complex ritual activities in wet environments, make this site suitable for studying different aspects of the Mesolithic society. Through the poster we try to present some characteristics of the Motala site and emphasizing its complex character, where mundane and ritual actions were interwoven. The term central place may in this respect be used for places where social constellations, structures and other activities are exceptional and stands out in a larger region.

Bead working at Star Carr: Towards an understanding of production and use through the application of microscopic and actualistic experimental methods

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Star Carr is an Early Mesolithic site located on the southern shore of Palaeolake Flixton, North Yorkshire, and is perhaps the most famous Mesolithic site in the UK. During Clark's initial excavations, 1949–1951, 23 shale beads were discovered (Clark 2009 [1954]), a number resistant to change despite several further phases on excavation at the site both in wetland and dryland contexts across the 1980s and 2000s. We present the first results of new analysis, detailing the actualistic experimental work results and microscopic analysis undertaken, using the data generated to contribute to the understanding of their production and life history. We further explore the relationship to the coastline of northeast England this raw material infers. We contrast the Star Carr finds with the Early Mesolithic shale bead making workshop at the Nab Head, Pembrokeshire, and Wales, where over 500 shale beads were discovered alongside heavily utilized *meches de foret* stone tools (Nash 2012). Drawing from the comparison of these assemblages within their specific contexts, we go on to make some tentative inferences about Early Mesolithic bead making and using strategies in the UK.

Preliminary analysis of an engraved ochre pebble from the Mesolithic site of Flixton School House, Vale of Pickering, North Yorkshire: A contribution to the understanding of ochre working in the British Mesolithic

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Flixton School House Farm (FSH) is a Mesolithic site located on the southern shore of Palaeolake Flixton, North Yorkshire, with evidence an early to late Mesolithic lithic assemblage and an extensive pit with associated ephemeral posts (Taylor and Gray-Jones 2009). During the 2009 field season a red, mineral rich and roughly triangular pebble was discovered with ca. 30 anthropogenic grooves across its surface. Preliminary microscopic analysis is presented, exploring the nature of raw material, mode of production of both the wear and striation and the possible uses of any residues resulting from their production. The object is considered within its site setting, as well as offering a new date for the site. We further explore the object within its local setting of Lake Flixton and how it relates to ochre finds from other nearby sites, notably Star Carr and Seamer Carr, both displaying ochre working traces, though of a different kind, and its national context, where it is compared with other worked Mesolithic ochres from Stainton West and Musselbrough. Taken together, inferences are made about the ochre working strategies within Mesolithic Britain and how they change at different sites and times.

Late and post-glacial sequences of cultural landscapes in the ancient bottom of the Baltic Basin in Finnish Lapland

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The concepts of landscape and environment will be discussed as ex- or impressions of human activity in a particular place. Some results of an archaeological survey on late glacial levels of the landscape on the eastern side of the River Muonionjoki will be presented from the hill-tops to the shores of the current swamps. The human relationship with the great elements of the retreating glacier and surrounding ice lakes turning to the Coast of Baltic Ancylus Lake and its archipelago will be highlighted from the perspectives of more or less rapid environmental changes to have influenced the circumstances of life and culture. A special attention will be paid to the historical character of the past archipelago as present peat land offers local sources for parallels of the old hunting culture, e.g. by using place name analysis.

The Mesolithic stray finds of bone and antler artefacts – are they useful?

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The Mesolithic bone and antler artefacts are recovered from all over the Polish Lowland. Krzyż Wielkopolski 7, Pobiel 10, Dąbki 9 and Dudka 1 are the examples of the most impor-

tant and unique sites from which come rich collections of finished artefacts, roughouts and debitage. However, the vast majority of this type of finds came from uncertain contexts with minimal cultural information. It makes very frequent stray finds collections fall in the second category during the studies on worked bone implements. We believe that multifaceted technological and functional analyses of the finds without a context could be very important for the Mesolithic archaeology, and researchers should give them far more attention.

The goal of the presented poster is to give an overview of stray finds from Poland for reflection on their cognitive value for technological rules related to bone and antler processing by hunter-gatherers. To do so, we try to describe and understand the supposed process of manufacture of the selected artefacts connected with the Mesolithic based on the experimental method and use-wear analysis.

Ludowice 6 and Sasiczno 4 – Two Mesolithic camps from Polish Lowland. Some clues for spatial organization and function

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This presentation discusses the results of research which aims to interpret the function and spatial organization of two Mesolithic camps from central Poland, discovered at the site Ludowice 6 and Sasiczno 4. The interpretations made are based mainly on the results of use-wear analysis of flint artefacts. Both sites are units of two flint concentrations, where one is probably a relic of a permanent camp, and the second one is a residue of a short-term occupation place. Similar seems to be also, a spatial organization of the inside area, that indicates large inner space arrangement. The differentials are visible mostly in function of the sites. One of the flint concentrations from Sasiczno 4 is probably a typical hunting camp, the second is most likely a residue of a long term residential shelter. In Ludowice 6 complex of specialized workshops was discovered. A large part of tools discovered here were connected with the processing of silica plants, probably on the scale larger than the needs of small human group. Also, an interesting stone industry with the use of quartz porphyry, fine crystalline sandstone, quartzite and granite was discovered here.

Living and hunting during the Mesolithic in the Cabeço da Amoreira shell midden (Muge, Portugal): Preliminary lithic use-wear analysis

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Recently, the Mesolithic shell middens of Muge (Central of Portugal) were seen as the result of an intensive human ecological exploitation associated with the 8200 cal. BP cold event. Based on techno-typological patterns and artefact density from these archaeological deposits, each shellmidden was linked to specific functionality, in a residential and logistic

land-use strategy. Recently, new data from the site of Cabeço da Amoreira seems to show evidences of different diachronic functionalities and spatial organization, within the shell-midden sequence and between other occupation areas.

In fact, one of the most interesting novelties is the presence of several archaeological horizons nearby the shell mound, which are characterized by abundant lithic remains. This work presents preliminary lithic use-wear analysis from two archaeological *loci*: (1) shell mound and (2) the “Trench”, one excavation area outside the midden. Despite the initial idea that all human activities took place in the midden, these new data show that the surrounding occupation areas have been used as shellmidden support areas. These data lead to new interpretations for the shell midden diachronic construction phases, as well as intra-site settlement organization.

The valleys of their lives: New isotopic data ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$) on human bone collagen, Tagus (Muge) and Sado Valleys, Portugal

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This poster presents new isotopic data ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$) on human bone collagen of 38 radiocarbon dated individuals buried in the shell midden sites of the Tagus (Muge) and Sado valleys, Portugal. Here, in the south-western Atlantic coast of Europe the rise of sea levels during the Atlantic climatic optimum (ca. 7500–5500 BP; 8350–6300 cal. BP) resulted in the formation of large estuaries. Today, far from the sight and influence of marine waters, these Late Mesolithic shell middens can be very large archaeological sites, many of them with well-preserved human remains.

The new isotopic data supports previous evidence of hunter-gatherers with a mixed diet from aquatic and atmospheric reservoirs. However, the hunter-gatherers buried in the Tagus (Muge) valley show a strong component of marine diet, while ca. 100 km south, the hunter-gatherers of the Sado valley show a diet intake almost exclusively from atmospheric reservoirs. Is this difference in diet of contemporaneous hunter-gatherers a result of environmental and territorial constraints or an indicator of possible regional identities?

Holistic Havnø – A multi-disciplinary approach from a Danish “Køkkenmødding”

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In 1894 *The Second Kitchen Midden Commission* of the Danish National Museum conducted a small excavation at Havnø, a stratified kitchen midden located in east central Jutland, Denmark (Madsen *et al.* 1900). Renewed excavations, under the direction of Søren H. Andersen, totalling more than 170 m² were undertaken between 2005 and 2013. During these excavations, extensive cultural material dating from the Late Mesolithic Ertebølle to the Late Neolithic Dagger cultures was recovered.

Since 1894 a number of scientific methods have been developed in order to test archaeological questions concerning the subsistence economy, seasonal exploitation practices, diet and food consumption and more recently cuisine and culinary practices. These include, incre-

mental growth analysis of the common European oyster (*Ostrea edulis*), and the common European cockle (*Cerastoderma edule*), lipid residue analysis of ceramic vessels as well as stable isotopic analysis of human and faunal bone collagen - to name but a few. This poster presents PhD research, funded by the Arts and Humanities Research Council (AHRC), which combines a number of the aforementioned techniques in order to provide a more holistic approach for the kitchen midden, and to test how well these techniques can complement one another.

Early Mesolithic lifeways at Flixton Island: Integrating scientific approaches to lithics and soils on ephemeral sites

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It has long been accepted that around Star Carr many of the other sites available for study within the same landscape do not present the same preservation and as such there is a massive emphasis on Star Carr to inform us about Mesolithic lifeways in that region. Recent excavations at Flixton Island 2 revealed a significant lithic scatter on the dryland area with little preservation of macroscale organic remains. This being anticipated, a programme of geoarchaeological testing was implemented to complement the lithic analyses with an aim of identifying activity areas and as such human behaviour if this were to prove viable. High-resolution sampling combined with a barrage of analytical techniques for chemical characterization of the soils will reveal any residual chemical signatures of activities. Lithic analyses, typological, technological and functional including use wear, residue analysis and refitting, will be utilized to identify zoning on the site as well. The ultimate aim is to integrate these approaches to give a holistic overview from site level through to individual to soil use events and connect these to discuss what behaviours occurred on site or at a distance by the same people – without the reliance on intact organic artefacts.

Mesolithic in Western Part of Central Asia

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Traditionally, the genesis of the Mesolithic was associated with dispersal movements from the Levant and Zagros into western territories of Central Asia. But the new Upper Palaeolithic data have been obtained over the last decade: the Kulbulakian culture was defined and analysis of her evolutionary development suggest an overview of the Mesolithic appearance in the region.

A comparative study showed the presence of important similarities between the final stage of the Kulbulakian culture (Dodekatym-2) and the Early Mesolithic (Tutkaul, Obi-Kiik). Industries are similar with the presence of carinated cores, triangular microlithics, backed bladelets and microend-scrapers. The Mesolithic of the region has been correlated with Epi-palaeolithic complexes of the Levant and Zagros. There are many analogies. One of them is a synchronous distribution of a specific type of geometric microliths at the Western part of Central Asia, the Levant and Zagros. Significant similarities between local Upper Palae-

olithic and Epipalaeolithic complexes of the Levant and Zagros suggest a hypothesis that the regional Mesolithic genesis was associated with developments of local Upper Palaeolithic cultures, which were affected by frequent cultural impulses from the Levant and Zagros.

The earliest pioneer settlement in eastern Finland: The Sarvinki-project and the Jokivarsi 1 site

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This poster presents the current knowledge of Early Mesolithic settlement of the Lake Sarvinki area in eastern Finland. Between 2009 and 2012 two sites, Rahakangas 1 and Jokivarsi 1, have been excavated, and others have been dated and inspected along the old lake-shore line. Here we introduce the most important finds, all radiocarbon dates, and the current status of research around this lake basin. The Rahakangas 1 site has previously been presented at the Meso2010 conference in Spain, and here we concentrate on the Jokivarsi 1 site, which was inhabited shortly after the retreat of the Scandinavian Ice Sheet. This site with quartz and imported flint is dated to ca. 9000–8600 cal. BC, thus being one of the oldest settlements in Finland. As such, the site is important for our understanding of the spread of the Early Holocene human occupation not only to Finland but to all of northeastern Europe.

The evidence for how the Terminal Mesolithic peoples merged with the Neolithic migrants between the Aegean Basin, the Balkans and Adriatic

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When the first farmers moved out of the Neolithic formative regions of the Levant, South-East Anatolia, the Konia Plain and Cyprus in the early eighth millennium BC, they did so by both land and sea. It is often easier to plot the arrival of the first migrant farmers in the Aegean Basin, the Central Balkans, Southern Italy and the Adriatic seaboard as far as the Southern Alps, than it is to determine from the archaeological record how the indigenous Terminal Mesolithic populations responded and transitioned to this new lifeway. Details in some areas are richer than in others, and vary from the acquisition of ‘selected’ attractive Neolithic attributes (e.g., pottery, domestic animals, personal ornaments, lithics) to merging with migrant farmers, importing some of their technology (lithics) and life-way (hunting). This overview will look at the time frame and briefly point out the regions of greatest interest for the Transition between Western Anatolia, the Balkans as far north as Transdanubia, Sicily, the eastern and western seaboard of the Adriatic, and the plains of the Southern Alps as far as the Trentino-Alto Adige.

New data on the Mesolithic human settlement in the north of European Russia

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The archaeological site Vyls Tom 2 is situated on the right bank of the Izhma River, at the mouth area of its tributary – the Vyls Tom River. Artefacts are located in the sediments of the terrace's promontory, which is 10 m high. Excavations were carried out in 2010–2013. Four cultural layers are distinguished. The Early Iron Age is found in the contemporary forest soil. The Neolithic is the second cultural layer and is found in brown loam, which is 0.3–0.5 m deep. Mesolithic remains are found in the third and fourth cultural layers, which are part of thin humus sandy loam layers of alluvial soil strata at >2 m depth. The third layer has been dated to 7800±90 uncal. BP (GIN-14593), while the obtained date for the fourth layer is 8540±70 uncal. BP (GIN-14594). The remains of a fireplace and butchering activities were found. There are similarities between inventories found in the third and fourth layers. Some similarities in the stone industry of the Mesolithic layers from the site of Vyls Tom 2 and the sites of Parch culture speak of their interrelations.

Re-Analysis of Mesolithic Antler Frontlets from the North European Plain

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Supposed Mesolithic antler head-dresses from Star Carr have been interpreted as either shamanic garb and/or hunting disguises (Clark 1954). This has had a lasting impact on our interpretation of Mesolithic societies. The hypothesis that these objects were worn as a mask or head-dress has not yet been proven. However the recovery of comparable objects from sediments of roughly contemporaneous or slightly earlier age across the Northern European Plain keeps this model alive while an elementary understanding of these objects is still lacking.

To approach this special group of objects 16 out of a total of 39 modified cervid skulls with attached antlers from 8 sites which have been discussed in the context of the Star Carr antler frontlets have recently been re-examined morphometrically and technologically by the author. The analysis of the examination parameters allows for the division of the group of modified deer skulls into four distinct groups with two contrasting entities of *Hirschgeweihkappen* (antler frontlets *sensu* Star Carr) and so-called '(butchering and manufacturing) waste'. The results of the analysis, together with the definition of *Hirschgeweihkappen*, will be presented in the framework of an overall discussion of their possible influence on our understanding of Mesolithic and hunter-gatherer societies.

Big project – Big data: E18 Tvedestrand – Arendal 2014–2016, a project at the south coast of Norway

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32 Stone Age sites will be excavated within a delimited geographical area in southern Norway. The sites were once situated on the prehistoric sea shore, but due to the shore displacement since the last Ice Age, they are now located far from today's coastline and also peripheral to the main present habitation.

The excavations of all these sites are designed to meet two objectives. One is to extract comparative material for the study of relations between sites over time and the second is to be able to study site-specific problems or challenges. The comparative sample consists of 6.25% of the find layers at each site, and will be used for studies of the trends and possible breaks in the Mesolithic history of southern Norway.

Production and raw material strategies: E18 Tvedestrand-Arendal 2014–2016

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The poster presents several different Mesolithic production sites. On the southern coast of Norway, artefacts of flint have been by far the most common with strategies of using different raw materials. A massive use of quartz throughout the Mesolithic is seen on many of our localities and a quartz quarry is documented next to an Early Mesolithic site. One of the sites is interpreted as a production site for stone adzes dated to the Late Mesolithic (Nøstvet-period), and among the finds of “classical” core and flake axes of flint, the production of axes from earlier stages of the Mesolithic in other raw materials is also attested.

Uniformity and oddities: E18 Tvedestrand-Arendal 2014–2016

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The poster presents unusual and uncommon findings and artefacts in combination with “classic” or diagnostic finds. In doing this it might be possible to throw light on some of the mysterious things that more or less always appear in prehistoric sites.

Mesolithic discoveries along the Bexhill to Hastings Link Road

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The construction of a new road between Bexhill and Hastings allowed a team from Oxford Archaeology to investigate a series of over 200 *in situ* flint scatters around the edges of the

Combe Haven, a wetland and peat bog area on the south coast of England. The project brought to light around 450,000 struck flints, associated features including hearths, pits and stakehole structures, and numerous peat cores for pollen analysis.

From individual mobility to population dynamics during the Mesolithic and Neolithic transformations in the Danube Gorges (Balkans, ca. 9500–5500 cal. BC): Adaptations and interactions

Camille de Becdelièvre (*University of Belgrade, Serbia*), **Marko Porčić** (*University of Belgrade, Serbia*), **Gwenaëlle Goude** (*Aix-Marseille University, CNRS, France*), **Marc-Antoine Le Guen** (*Universidad Católica San Pablo, Spain*), **Jelena Jovanović** and **Sofija Stefanović** (*University of Belgrade, Serbia*)

Documenting patterns of mobility during the beginning of the Holocene is of paramount importance to understand Mesolithic-Neolithic populations' dynamics. First, foragers are considered to have reduced their daily mobility, experiencing a (semi-)sedentary way-of-life; this sedentism in privileged environments should have impacted the population growth. Second, evidence suggests dynamic interactions with farming communities; incomers, with different daily-habits, may have affected local demographic fluctuations. In this paper, we examine evidence of changing mobility level and patterns amongst the Danube Gorges population by integrating 3 lines of evidence: markers of physical activities (musculoskeletal stress markers, long bone morphometric maps), biodistance markers (non-metric anatomical variations) and stable isotopes (strontium, oxygen, nitrogen, sulfur and carbon from apatite and collagen), analyzed on 250 individuals (original and published data). Although of different nature, these markers provide complementary information: results document differential patterns between males and females; a trend toward a reduced daily-mobility among females; finally, a time of higher biological diversity and behavioural variability during the transition to the Neolithic can be interpreted in the light of previous results pinpointing the increasing presence of non-local females among the population (Borić and Price, 2013). This research highlights the contribution of multi-variate bioarchaeological analyses to our understanding of Mesolithic-Neolithic transformations and to the broader field of human behavioural ecology.

Mesolithic of the Northern Adriatic

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Intention of this poster is to present the current status of knowledge on the Mesolithic in the Northern Adriatic. Over the past two decades, the Mesolithic in the Northern Adriatic region has been recorded at over 25 sites, some quite interesting and rich in various materials. In comparison with the rest of Croatia, there is a disproportion of the settlements between the regions. There may be various reasons for this, but the considerable increase in the number of sites in Istria as a result of targeted survey and research indicates that

a probable reason is the differing levels of research in the regions, rather than different degrees of population density during the Mesolithic. Even though the status of research into the Mesolithic in this region has considerably improved compared to what it was like twenty years ago, many unknowns still remain, and considerable research is required to bring this level of knowledge to satisfactory levels.

Palaeogenomic analysis of ancient DNA from Mesolithic and Neolithic skeletal remains

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Ancient DNA research has been revolutionized in recent years and samples from periods and areas that could not have been previously analyzed are becoming available for whole-genome research. However, the palaeogenomic field is facing challenges associated with its novelty and high publication pressure. Even though new datasets are appealing, they should be treated critically by research community and emphasis should be placed on testing neutral models of genetic drift in time and space before conclusions on alternative scenarios like migration, selection or population replacement are drawn. Still, with samples from areas of high interest, hypotheses taken for granted and postulated on the basis of modern DNA can be finally addressed. Skeletal remains from Anatolia can thus be used to make formal tests of a presumed wave-of-advancement movement of farmers to Europe. Furthermore, genetic datasets cannot be studied independently of their sampling context. On an example of Blätterhöhle, Germany, the importance of multidisciplinary perspective is demonstrated. Isotope analysis of subsistence coupled with genetic study has lead to a strong case for long-term parallel societies of foragers and farmers, whereas genetic analysis alone would misleadingly suggest ancestral admixture with Mesolithic hunter-gatherers. Similarly, the Danube Gorges multidisciplinary studies allow for informed fine-scale genetic research.

Births, mothers and babies: Prehistoric fertility in the Balkans between 10000-5000 cal. BC

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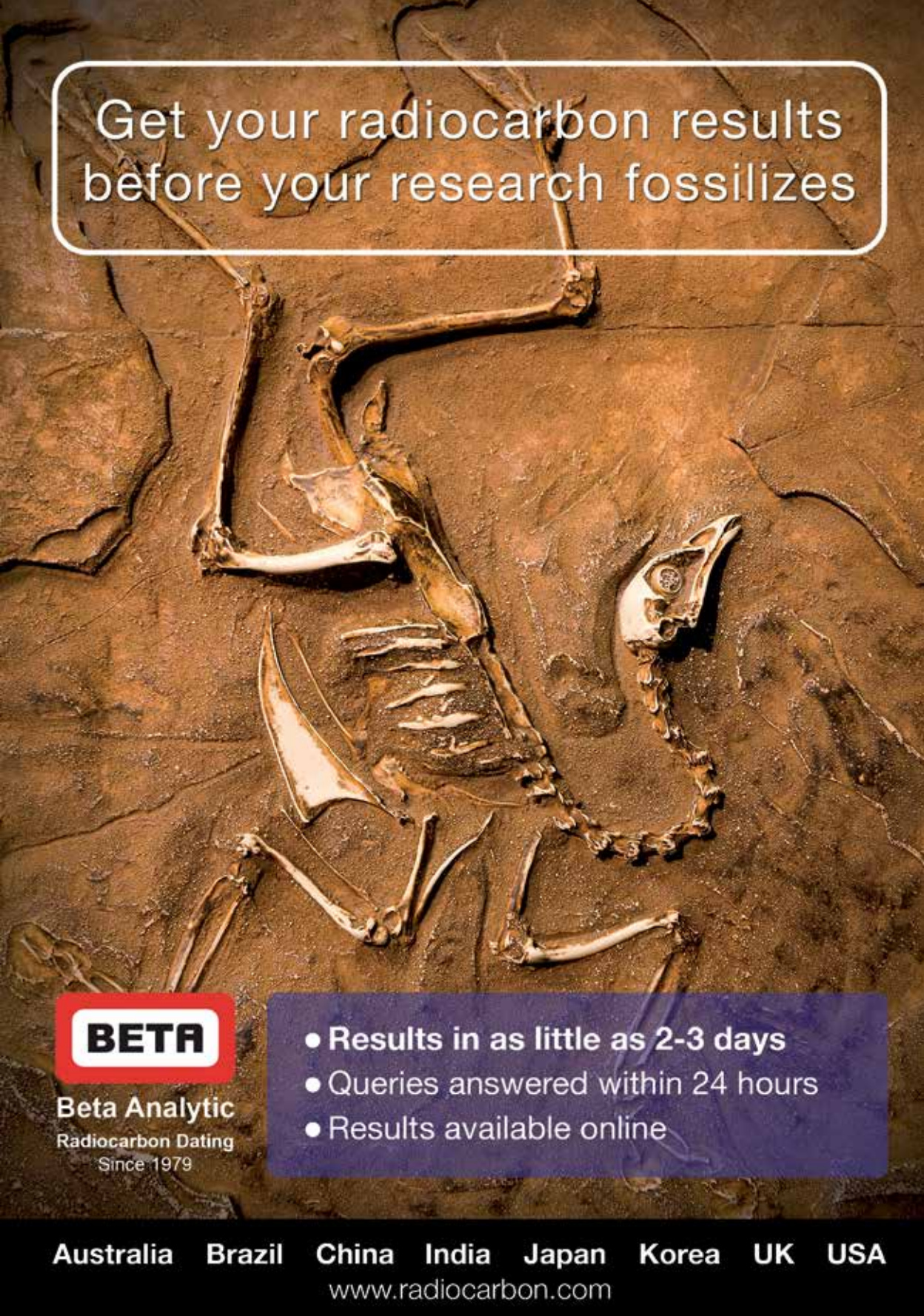
The BIRTH ERC project will investigate the key biological and cultural mechanisms affecting fertility rates resulting the Neolithic Demographic Transition, the major demographic shift in human evolution. Project integrate skeletal markers with micro-nutritional and macro-scaled cultural effects on fertility rates during the Early-Middle Holocene (10000-5000 BC) in the Central Balkans. Human, animal and plant remains, will be analysed using methods from bioarchaeological, forensic, chemical sciences in order to: 1) Investigate

variability in the pattern of birth rates (number of pregnancies, interval(s) between them and the duration of the reproductive period) through histological analysis of irregularities in tooth cementum of women; 2) Determine paleoobstetric and neonatal body characteristics, health status and nutrition through analysis of skeletal remains; 3) Determine micro-nutritional changes during the Early-Middle Holocene through trace element (Zn, Ca and Fe) analysis; 4) Investigate the micro and macronutritional value of prehistoric foodstuffs, through an analysis of animal and plant remains and to compare the nutritional intake in relation to health and fertility; 5) Establish a chronology of the NDT in the Balkans by summed radiocarbon probability distributions; 6) Explore the possible role of culture in driving fertility increases, through analysis of community attitudes to birthing through investigation of neonate graves and artifact connected to the birthing process. Given that the issues of health and fertility are of utmost importance in the present as they were in the past, the BIRTH project offers new understanding of biocultural mechanisms which led to fertility increase and novel approaches to ancient skeletal heritage.

Same old questions, new research strategies: Investigations at the Mesolithic shell midden sites of El Toral III and El Mazo (Asturias, northern Iberia)

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Research on Mesolithic coastal settlements in northern Spain during the 20th century was focused in the so-called Asturian culture (northern Spain). Although a number of investigations have been carried out since then, many research questions remain to be answered. Extensive excavations in shell middens of the period were limited to the site of Mazaculos II in the late 1970s and early 1980s. In recent years, excavations at the sites of El Toral III and El Mazo have allowed a more accurate approach to the problems set by previous investigations. Results from the new excavations are presented in this communication, with special emphasis on how new techniques of excavation and analysis are providing new data on the processes of formation and erosion of shell middens as well as on chronology, subsistence strategies, environmental conditions, settlement patterns and land use by Mesolithic hunter-fisher-gatherers over time.



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