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MESO2025 - 11th International Conference on the
Mesolithic in Europe

Session 4

People and Their Environment

Coordinated by Auréade Henry and Harry K. Robson

The nature of the relationships hunter-gatherer-fisher societies had with their natural environment is key to understanding their "being-in-the-world". Indeed, while organic remains reflect the palaeoenvironment, they also offer a unique insight into daily subsistence strategies, settlement patterns, mobility, techniques, health, worldviews and cultural traditions.

Throughout the Mesolithic, the use of plants and animals has some uniformity and great heterogeneity over time and space, reflecting the diversity of environmental and socio-economic interactions at play. Although central, the place of organics within Mesolithic societies remains difficult to grasp due to taphonomic issues but also because historically, most remains of organic origin have received less attention than stone (and bone) artefacts that have been used as "diagnostic fossils" to define Mesolithic techno-cultural complexes.

Over the past decades, a range of techniques have developed, allowing us to identify "invisible" or undeterminable remains (e.g., through proteomics, microscopic or organic residue analyses), interpret incremental patterns (e.g., cementochronology), and traces (e.g., traceology on inorganic and organic remains, dental use-wear). These advances have broadened our interdisciplinary research frameworks and have significantly increased the body of knowledge about Mesolithic environments, used taxa and palaeoethnoecological practices.

This session deals with the interactions of Mesolithic humans with their biological environment, focusing on how specific components of this environment were acquired, prepared/transformed, used and/or discarded, and what these actions may have implied in societal terms (economy, social organisation, territories, seasonality, diet, etc.). We welcome contributions dealing with palaeoenvironmental, palaeoclimatic and/or palaeoeconomic reconstructions based on plant, animal, fungal or bacterial remains.

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MESO2025 - 11th International Conference on the Mesolithic in Europe

ORAL PRESENTATION

Tuesday 16th September, h.09:00-09:15

CONNECTIONS WITH SEA ICE – CREATING HOLISTIC FRAMEWORKS OF CULTURE, CLIMATE AND ECOLOGY

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S4

Sea ice shapes maritime cultural landscapes and influences subsistence strategies, navigation and perceptions of seasonality. A conceptual link can be made to its ecological function in the lifecycles of sympagic organisms and pagophilic marine mammals, which use sea ice as haul-out sites, breeding grounds or hunting grounds. Although the maximum extent of sea ice varies cyclically year-round, the social and cultural impact of the current decline in average sea-ice extent is a topic being explored in cultural anthropology, while the extent of past sea ice is an emerging topic in historical- and palaeoclimatological studies. Multiple proxies and modelling approaches have been proposed to reconstruct the spatiotemporal dimensions of sea ice. The exploitation of marine mammals in Europe goes back at least to the Late Palaeolithic and is evidenced by depictions in cave- and portable art, as well as artifacts made from, and assemblages containing, marine mammal osteological material. This interdisciplinary study will therefore explore and review the potential of sea ice as a conceptual framework and address newly-identified gaps in our knowledge and understanding of hunter-fisher-gatherer subsistence in Europe during the Late Palaeolithic and Mesolithic by incorporating and synthesising archaeological, ecological, climatological and ethnographic literature and perspectives.

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ORAL PRESENTATION

Tuesday 16th September, h.09:15-09:30

How did prehistoric societies deal – culturally and economically – with environmental change?

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S4

How did prehistoric societies respond—both culturally and economically—to environmental change? This project explores how humans used culture to cope with sudden environmental shifts and identifies different patterns of human behaviour in prehistoric coastal societies of the Baltic Sea region. One of the key global environmental events studied is the 8200 cal BP cold event in the Mesolithic, which has been linked to cultural changes worldwide but remains largely unexplored in the Baltic Sea region. By integrating archaeology, bioarchaeology, marine mammal ecology, and environmental studies, we investigate how environmental changes influenced human culture and marine ecosystems. To date, 233 bones from 13 species—including humans, terrestrial animals (aurochs, red deer, elk, roe deer, wild boar, bear, wolf, and dog), and marine animals (grey seal, harp seal, ringed seal, and harbor porpoise)—have been analyzed from Middle Mesolithic sites (Tågerup, Segebro, Bredasten, Norje Sunnansund, Stora Förvar, Dagsmosse, Kanaljorden, and Strandvägen). These sites, which cluster chronologically around the 8.2 ka event, are associated with the hunter-fisher-gatherer Kongemose Culture (c. 8500–7400 cal BP) in southern Sweden and corresponding cultures in east-central Sweden. Stable isotope analysis (oxygen, carbon, and nitrogen) has been conducted to reconstruct paleoclimate and diet, revealing a pronounced decrease in oxygen isotope values from 7000 to 6000 BC, likely linked to the global temperature decline of the 8.2 ka event. This paper presents preliminary results from this multidisciplinary study, demonstrating the interplay between climate change, human adaptation, and marine mammal ecology in prehistoric coastal societies.

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ORAL PRESENTATION

Tuesday 16th September, h.09:30-09:45

A Mesolithic seafood platter in Brittany

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S4

While the rise in sea level during the Holocene submerged many prehistoric coastal sites, four Late Mesolithic shell-middens in Brittany were preserved: Beg-en-Dorchenn, Beg-er-Vil, Téviec and Hoedic, all broadly contemporary and in geographical proximity. Hoedic was the only island site during the Mesolithic. Recent research on the human remains from the late Mesolithic cemeteries of Téviec and Hoedic has shed new light on the socio-cultural practices of these last coastal hunter-gatherer groups. Stable isotope testing showed that the two populations had a signature which indicated a high consumption of marine protein, but this was particularly pronounced in the individuals from Hoedic, indicating that the two groups, which were more or less contemporary, had different subsistence practices. While isotopic analysis gives a general indication of diet, the preservation of remains in the shell midden allows a much finer analysis of aspects of the subsistence practices of these populations. It is not just a question of resources available but diet is part of the culture and identify and has a role in maintaining social relations. In this paper we present the results of the analyses the shellfish and the crab fragments from samples collected during recent excavations of the Beg-er-Vil and Hoedic shell middens, in order to better understand the choices made in terms species selected for consumption, where they were collected, and how these practices differ between the groups

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Tuesday 16th September, h.09:45-10:00

MESOLITHICS ON THE SHORE: REASSESSING MARINE RESOURCES EXPLOITATION IN THE MEDITERRANEAN SEA DURING THE MESOLITHIC

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This presentation explores marine environments and human fishing and shell-collecting strategies in the Mediterranean Sea during the Mesolithic period. The study is based on an extensive dataset collected through the ERC MERMAID (M-ARCHives database), which aims to reconstruct marine ecosystems and human exploitation in the Mediterranean based on marine faunal data from coastal sites. To this day, a total of 30 sites yielding Mesolithic layers have produced more than 122,000 fish and invertebrate remains. The record constitutes a direct inventory of exploited marine resources during this period. It allows us to highlight fishing techniques and their evolution during the Mesolithic. Additionally, it offers an indirect insight into marine ecosystems, climatic conditions, and the natural distribution of marine species. Given the broad geographical distribution of collected data, a regional analysis is possible. Part of the presentation will focus on the northwestern Mediterranean. The combination of data produced within an ongoing PhD thesis (University Côte d'Azur, France) and the M-ARCHives database highlights a well-preserved environment resembling present-day conditions. It also reveals the exploitation of a range of coastal and marine environments. Mesolithic hunter-gatherers targeted a diverse array of fish and shells, although certain species were favoured. Various fishing techniques can be inferred with a preference for traps and hook-and-line. It is expected that this important dataset will be further expanded with ongoing PhD work on marine assemblages. Finally, a first evaluation of the role of marine resources within the entire spectrum of exploited animals will be attempted on selected datasets.

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Tuesday 16th September, h.10:00-10:15

How to fish during the Castelnovian : aquatic environment, fishing practices and targeted species in "La Font-des-Pigeons" (Châteauneuf-les-Martigues)

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This presentation examines the exploitation of aquatic environments and fishing strategies during the Mesolithic period, more specifically the Castelnovian, at the La Font-aux-Pigeons rockshelter near Marseille (southern France). The site yielded over 27 087 fish remains. We employed standard archaeo-ichthyological methods, including taxonomic and anatomical identification, quantification, osteometry and the observation of growth annuli. The study was further enriched with data on the bio-ecology and ethology of the identified fish species. This multidisciplinary approach revealed a highly diversified exploitation strategy encompassing both marine and freshwater systems near the rockshelter. Marine environments were characterized by high biodiversity and featured a complex food web and a stable ecosystem, similar to those found along the modern coastline of Marseille. Various fishing techniques were likely employed, depending on the ecosystem, species, and size of the fish. Notably, fishing in freshwater environments often involved an unusual method: poison fishing. The use of this technique suggests a strong understanding of the freshwater environment and an intensified fishing effort. This activity appears to have been conducted from late winter to early spring. The combination of anatomical representation and distinct marks on the fish bones also provided insights into fish processing and consumption, as well as potential food waste management practices.

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Tuesday 16th September, h.10:15-10:30

RESOURCE MANAGEMENT BEFORE FARMING – MESOLITHIC FISH TRAPS IN NATURALLY FISHLESS NORWEGIAN LAKES

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S4

The development of agriculture is undeniably a pivotal aspect of human history as this method of manipulating nature has, in many instances, facilitated the creation of advanced tools, complex societies, and civilisations. However, an overemphasis on agriculture presents a simplistic, evolutionary perspective of history that does not fully align with archaeological records. In this paper, we present evidence that hunter-gatherer-fishers were intentionally transporting and releasing brown trout (Salmo trutta) into previously fishless mountain lakes in Norway around 5000 BC (7000 cal. BP), at a time when all populations in Scandinavia were still living as hunter-gatherer-fishers. This practice expanded the range of available resources for humans and permanently altered these Norwegian mountain lake environments. One such mountain lake is Tesse, where hunter-gatherer-fishers constructed and maintained stationary fish traps to harvest from the established fish population both in the Mesolithic (c. 5000 cal. BC) and the Neolithic (c. 3700 cal. BC and 2700 cal. BC) periods. These traps provide evidence of early resource management and even a form of food production among hunter-gatherer-fisher populations, challenging the categorisation of human societies into distinct groups of hunter-gatherer-fishers and farmers. These findings from the Norwegian mountains thereby offer new insights into the trajectory of human cultural development, and also inform us about how past populations actively shaped and permanently transformed nature.

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ORAL PRESENTATION

Tuesday 16th September, h.11:15-11:30

HUMANS AND FRESHWATER ECOSYSTEMS - MESOLITHIC POPULATIONS AND THE EXPLOITATION OF WETLANDS ALONG THE ADIGE VALLEY (TRENTINO, ITALY)

Noemi Dipino * (1) (2), Fontana Alex (1), Visentin Davide (2), Fasser Nicolò (2), Nannini Nicola (1), Flor Elisabetta (1), Pedrotti Annaluisa (3), Fontana Federica (2), Thun Hohenstein Ursula (2), Duches Rossella (1)

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The beginning of the Holocene in the Adige Valley (Trento, Italy) was characterised by rapid climatic warming that led to significant environmental changes and the end of the deglaciation process. The new landscape, consisting of a freshwater basin formed by the meandering course of the Adige River, offered new and rich resources to the human groups that settled along the valley.

Within this general framework, our research aims to reconstruct the interactions between humans and the complex ecological mosaic of the Adige Valley through the study of fishes, mammals (e.g., otter and beaver) and reptiles (e.g., pond turtle) closely linked to freshwater environments.

For this presentation, we focussed exclusively on the fish fauna, which was studied using two comparative osteological collections housed at the Laboratory of Zooarchaeology of the MUSE (Italy) and the University of Tübingen (Germany). The analysed ichthyofaunal assemblage comprises approximately 10,000 remains from multilayered sites located near Trento: Riparo Pradestel, Riparo Gaban and Riparo Romagnano Loc III. Within the latter, a considerable contribution to the study of the fish fauna comes from the particularly rich layers U, V, Z, here analysed for the first time.

This research assessed the aquatic biodiversity, the seasonality of fish mortality, the different modalities of fish treatment for food purposes as well as the different fishing techniques in the Adige Valley at the beginning of the Holocene.

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ORAL PRESENTATION

Tuesday 16th September, h.11:30-11:45

Let's settle here! Long-term hunter-fisher-gatherer interactions in northwestern Lithuania wetland ecosystems

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Northwestern Lithuania is characterized by a young morainic landscape with an abundance of overgrown lakes. As seen from past archaeological excavations and various stray finds, the area was inhabited since the Final Palaeolithic. Former excavations showed well organic preservation from various Stone Age periods, highlighting the potential of the area to unveil more about human-environment interactions in the Stone Age. In 2023 and 2024 a new excavation campaign was initiated in Sarnelė site, which is located in the palaeolake of Ertenis. Previous excavation and the reanalysis of organic artefacts (osseous and wooden) revealed that humans were active in the area since the Late Glacial; however, the most intensive occupation phases seem to correspond to the 6th–4th and 3rd millennia cal BC. As seen from the available data, people engaged in large and small terrestrial mammal hunting, but fishing seems to be more important due to the sites' location and the presence of fish remains and fishing gear. The Ertenis palaeobasin is characterized with an abundance of small hills located in the wetlands, likely past islands. New test excavations around these areas revealed additional hunter-gatherer sites with organic preservation, providing more data about human interaction in this specific ecosystem during prehistory. Within this paper, we aim to present the latest fieldwork and laboratory results from excavated sites, and further emphasize the importance of local ecosystems for humans in the Stone Age.

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ORAL PRESENTATION

Tuesday 16th September, h.11:45-12:00

My deer, your boar. Differences in hunting and fishing structure between neighbouring Stone Age forager sites Dudka and Szczepanki, Masuria, NE-Poland.

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S4

Dudka and Szczepanki are sites located on two islands of the former Staświn Lake, one of the largest in Masurian Lakeland in NE Poland. The settlements on both islands occurred simultaneously starting in the Late Palaeolithic (Allerød) with occupations covering the entire Mesolithic and the Para-Neolithic Zedmar culture until the Late Neolithic (early Subboreal). Dwelling places and main activity areas were located on the south-eastern parts of both islands, practically at the same places throughout the whole Stone Age. Likewise, the economy was very similar at each site during the Mesolithic, Para-Neolithic and in the Late Neolithic. The subsistence was based almost exclusively on hunting, fishing and gathering even in the Late Neolithic. However, distinct differences are observable between the sites, and furthermore, between the encampments on the same island. The significant differences between settlements concern the shares of fish bones and contributions of fish species, as well as the proportions between Cervidae and Suideae bones. These dissimilarities took place during the same periods at both islands, so they couldn't arise from environmental differences. It appears that these divergences could result from the exploitation of different hunting areas within the lake and surrounding woods, which could belong to a particular clan or family of the local hunter-fisher-gatherer society. Considerable differences in bone structures and their reoccurrence in following periods might suggest food exchange between sites.

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ORAL PRESENTATION

Tuesday 16th September, h.12:00-12:15

Aspects of human-animal relations in the Mesolithic of Northern Germany

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S4

Faunal assemblages can offer significant insights into ancient ecological systems that have since disappeared. Beyond this, they also provide a glimpse into economic processes. In addition to established analyses on topics such as methods of slaughtering and bone processing, seasonality and spatial distribution, studies of the decision-making process and its economic basis are also an important part of the analysis of subsistence strategies. With regard to this, the sites on the former shore of ancient Lake Duvensee and the Rothenklempenow site, which boast favourable preservation conditions, offer particularly informative bone inventories and could be a valuable resource for further research in this matter. The bone finds from both sites demonstrate a broad spectrum of anticipated bone remnants. Furthermore, they provide an array of bone instruments and tools as well as artefacts whose function is predominantly presumed to be of a ritual nature. These bone assemblages also point out to an original representation of the fauna of the era, whose distribution and behaviour may have exerted an influence on the population dynamics of humans and shaped the exploitation of their ecological niche. When considered as a whole, these findings have the potential to provide a vivid representation of Mesolithic behaviour and to evaluate the underlying socio-economic trade-offs.

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Tuesday 16th September, h.12:15-12:30

MESOLITHIC LIFEWAYS IN THE MEUSE BASIN: INSIGHTS INTO MOBILITY, DIET, AND ADAPTATION THROUGH MULTIDISCIPLINARY RESEARCH

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The Meuse Basin in Belgium offers a vital context for understanding the lifeways, mobility, and diet of Mesolithic hunter-gatherers during a time of significant environmental and demographic change. Following the Late Glacial Maximum, warming climates enabled human groups to reoccupy north-western Europe, with migrations originating from southern refugia. The ROAM project (Regional Outlook on Ancient Migration; www.roam-ugent.be) aims to unravel the complexities of these populations through a multidisciplinary approach combining zooarchaeology, archaeology, and biological anthropology – the latter field being the focus of this talk. A systematic radiocarbon dating campaign targeting cave burials in the Meuse Basin has revealed that many sites previously identified as exclusively Mesolithic often include mixed deposits from multiple periods, prompting a reassessment of burial chronologies. Biological anthropology and stable isotope analyses have provided critical insights into health, diet, and subsistence practices. These analyses evaluated the importance of aquatic resources alongside terrestrial foods in Mesolithic diets and their possible influence on radiocarbon dates. Moreover, isotopes of strontium and oxygen have uncovered patterns of mobility, offering insights into localized resource use and with movements across broader landscapes. Genetic studies further contextualize the population history of the Meuse Basin, confirming connections with the Late Upper Palaeolithic. This research underscores the Meuse Basin's significance in the broader narrative of postglacial human reoccupation, emphasizing the interplay of environmental adaptation, dietary strategies, and mobility in shaping Mesolithic lifeways.

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ORAL PRESENTATION

Tuesday 16th September, h.12:30-12:45

Taphonomic and spatial analysis of faunal remains in a Mesolithic combustion feature at Cabeço da Amoreira (Muge, Portugal)

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S4

Since their discovery, the Muge shellmiddens have accumulated an extensive archaeological record, offering a unique framework to study human subsistence behaviors and the complex depositional history of these sites. This study examines terrestrial vertebrate remains recovered from Feature C of the Mesolithic shellmidden of Cabeço da Amoreira (Muge, Portugal). The primary aims are to enhance understanding of subsistence strategies in the midden and identify the function and post-depositional history of the feature. The unusual spatial preservation and the high concentration of thermally altered artifacts (faunal remains, lithics, thermoclasts, and charcoals) indicate its function as a combustion structure. This hypothesis is reinforced by the taphonomic and spatial analysis of the faunal assemblage, which provides valuable information into the dietary practices of the Mesolithic community. Evidence of carnivore activity, particularly canids, was identified within the feature. The rapid and homogeneous coverage of the structure by a sedimentary matrix suggests limited post-depositional disturbance. Species consumption appears consistent between the mid and upper levels of the midden; however, discrepancies in the preferential transport of animal remains suggest behavioral changes over time. These variations may reflect adaptations to evolving landscapes or pressure related to overexploitation of specific taxa.

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ORAL PRESENTATION

Tuesday 16th September, h.14:30-14:45

First evidence of the exploitation of the Sardinian pika in the Mesolithic from Su Carroppu di Sirri (Sardinia, Italy).

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In Sardinia, the Mesolithic occupation was sporadic and lasted for more than two millennia, until the 8.2 ka climatic event. The human presence in the post-glacial phases appears discontinuous both with respect to the earlier Late Pleistocene phases and to the more consistent evidence of the first Neolithisation, starting from the threshold of the 6th millennium BCE. There are only a few contexts of Mesolithic phases, mainly located in the north-central part of the island. Recent fieldwork carried out by Carlo Lugliè in the Sulcis region of Sardinia (south-west Sardinia) has made it possible to recover the site of Su Carroppu di Sirri, a key site for the study of the human occupation and exploitation of Sardinia in prehistoric times, representing the oldest direct evidence of human presence in Sardinia and Corsica. A first archaeozoological and taphonomic study has been carried out on the entire fauna of SU9, which points to the Mesolithic occupation of the site. It is a combustion structure near the mouth of the covered part of the rock shelter, which through radiocarbon dating on the charcoal, has provided a chronological framework that can be placed between the 8th and 7th millennia BCE. At the moment, this is the only Sardinian site attributed to the Mesolithic where faunal remains have been analysed. The Sardinian pika (Prolagus sardus) is the dominant species and shows clear signs of human exploitation, suggesting that it was the food basis of these communities for a long time.

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MESO2025 - 11th International Conference on the Mesolithic in Europe

ORAL PRESENTATION

Tuesday 16th September, h.14:45-15:00

The zooarchaeology of Skateholm – analysing and integrating the bones from old and new excavations to interpret subsistence and economy at a Late Mesolithic iconic site

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S4

Skateholm, a significant Late Mesolithic site in southern Sweden, has garnered extensive scholarly interest since the early 1980s due to its rich burial grounds and associated cultural layers. With a collection of over 80 human graves and multiple dog interments, the site serves as a focal point for understanding territorial claims and social structures among hunter-gatherer-fisher societies. Despite the extensive excavations and numerous publications, a notable gap persists in the archaeological exploration of economic and subsistence practices deducible from within the site's cultural layers. This paper presents a new zooarchaeological analysis from previously unanalysed bones excavated in the 1980s and 1990s, as well as the analyses of the bone material from new excavations conducted in 2022 and 2023. The paper aims to address long-standing questions regarding the economy at Skateholm, its development, and on-site distribution patterns. By employing a stratigraphic and contextual approach to the zooarchaeological material we have refined our understanding of the site's spatial organisation and resource utilisation and contribute to a more nuanced understanding of subsistence practices at Skateholm. Through the zooarchaeological material, Skateholm underscores its significance not only as a burial site but also as a vital lens into Late Mesolithic subsistence practices in the Baltic Sea region. It remains a cornerstone for future research into the complex interplay of social and environmental dynamics in Mesolithic coastal landscapes.

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ORAL PRESENTATION

Tuesday 16th September, h.15:00-15:15

New archaeobotanical data from the Sauveterrian open-air site of Contrada Pace (Tolentino, Macerata, Central Italy)

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S4

Contrada Pace (Tolentino, Macerata, Central Italy) is an important open-air site occupied by Early Mesolithic hunter-gatherer groups, with a unique extension and spatial organization that distinguish it from other Italian and European sites. The archaeological layers are embedded within a paleosoil that was rapidly covered by fine sediments, sealing off and preserving its contents in an excellent state. Radiocarbon dating place this Mesolithic site in the 11,000-9,800 cal BP range.

The excavation was carried out between 2019 and 2020 in the frame of a preventive archaeology activity. Soon after the excavation, a multidisciplinary project involving researchers from various universities and institutions aimed to investigate the site in all its aspects. Paleoenvironmental studies, through intensive and systematic sampling, were particularly significant. Several hundred samples were collected during the excavation, and the analysis of macroscopic plant remains is underway via manual flotation techniques. Microscopic screening allowed the discovery of carpological and anthracological remains in fair preservation conditions. This study aims to reconstruct the use of plants by humans and the complex relationships between Mesolithic groups and the environment.

This presentation reports the results of the archaeobotanical analysis of two layers rich in landsnail shells, associated with a large number of lithic and osteological materials located in the central area of the excavation.

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ORAL PRESENTATION

Tuesday 16th September, h.15:15-15:30

WRAPPING THE WORLD TOGETHER: FIRST RESULTS OF INTERDISCIPLINARY RESEARCH ON THE COLLECTION OF CORDS AND WRAPPINGS FROM THE SUBNEOLITHIC ŠVENTOJI SITE COMPLEX IN LITHUANIA

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The multi-purpose processing of plant materials was one of the most important factors influencing the nature of the economy of prehistoric European societies. One of its key aspects was the production of cords and wrappings of various types, which served many purposes. These materials were used to connect structural elements in house construction and to secure bone and stone tools in their mounts. They also played an essential role in producing everyday objects, such as fishing nets, mats, and baskets. The study of such objects produced by hunter-gatherer-fisher communities during the early and middle Holocene in the East Baltic Plain region, is a central focus of the project PlAnt Raw maTerialS in the life of middle Holocene hunter-gatherer-fisher communities of the southeastern coast of the Baltic Sea (PARTS project), funded by the National Science Center in Cracov in Poland, and the Research Council of Lithuania. As part of the project, one of the largest known collections of Subneolithic (=Ceramic Mesolithic) cord fragments and wrappings, originating from the Šventoji site complex in Lithuania, is being subjected to multi-proxy analysis. In this presentation, we will share the first results of interdisciplinary research on this collection, including archaeobotanical studies, residue studies, DNA analyses and experimental studies to identify plant and animal fibres used to produce these artefacts. Additionally, we will present insights into the weaving techniques used by hunter-gatherer-fisher communities based on evidence from the Šventoji site complex.

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ORAL PRESENTATION

Tuesday 16th September, h.15:30-15:45

The use of plants in pottery production among the Swifterbant culture in NW Europe: taxonomic identification and 14C dating of plant temper materials (ORG-ID project)

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Many pottery traditions from the Late Mesolithic and Neolithic period in NW Europe are characterized by the use of plant material as a tempering agent. Despite preliminary studies we still know little about the types of plants that were used for this purpose. However, these materials can be of great importance. Charred remains of these plant additives are often preserved inside the pottery up to this day and provide a valuable, yet understudied, resource for AMS 14C dating. This paper focuses on plant temper in pottery of the Late Mesolithic to Early Neolithic Swifterbant culture in NW Europe (5th millennium cal BC). As part of a larger research project (ORG-ID, funded by BELSPO and FWO), Swifterbant pottery with plant temper was sampled from six archaeological sites in Belgium and the Netherlands. For the taxonomic identification of the plant temper, the charred plant material and related voids inside the pottery are analysed using thin sections and X-ray µCT, in combination with microscopic and SEM analysis of the extracted plant remains. By testing various methods, a protocol is developed for the extraction and chemical pre-treatment of plant temper for AMS 14C dating. Finally, the reliability of the obtained plant temper dates is evaluated by comparing them to other chronological data from the same sites. The project aims to increase our knowledge of plant use among late hunter-gatherer populations and to test the possibility of using plant temper as a reliable source for radiocarbon dating.

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ORAL PRESENTATION

Tuesday 16th September, h.16:45-17:00

PRUNUS SSP. MANAGEMENT AMONG HUNTER-GATHERERS AND FIRST FARMERS IN EURASIA

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Prunus species, e.g., sloe (Prunus spinosa), appear recurrently in the Eurasian archaeobotanical record. Their berries and seeds have traditionally been and continue to be used; they can be eaten raw or roasted, while flowers are edible too. Their wood is also appreciated as firewood, and was so in the past, as corroborated by the charcoal assemblages. Pollen records also indicate its long-term and widespread presence in the Eurasian region. Although in expansion, our knowledge about plant use by past hunter-gatherer communities is limited due to several reasons such as taphonomic processes, ancient plant processing and transformation practices, as well as research gaps. In addition, the limited availability of several Prunus species in certain locations and their possible preference for specific cultural practices may have influenced how communities managed and used this resource. The fact that most studies are focused on a specific region, site or chronology and only consider one or two types of remains further hinders our view of the use and management of particular species. This is true in the case of Prunus species and it is, therefore, important to bring together the available albeit scattered pieces of information.In this paper, we revise the remains retrieved by different archaeobotanical proxies and discuss the role of Prunus spp. in a broad region and within the general temporal and interpretative framework of the early-mid Holocene prehistory.

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ORAL PRESENTATION

Tuesday 16th September, h.17:00-17:15

Flux, change, saturated meeting grounds: past environments and archaeo-palaeo-ecology with cases from Dagsmosse, South-central Sweden

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S4

The study of past human occupation in lost, spontaneously alternated and unforeseen environments—resulting from stratigraphically concealed archaeological material by rapid sedimentation and anoxic conditions—offer in many cases excellent preservation of (environmental) organic proxy material, with direct or indirect relevancy for the archaeological material at hand. Geological and botanical proxies such as pollen analysis, possibly combined with elemental analysis, geophysical analysis and/or studies into fungal, algae, microorganism and -fossil communities (Non-Pollen Palynomorph (NPP) or microfossil analysis) provide key insight into ecological niches and formation history of a site, ranging from the microscopic, supra-local to regional scale. Additionally, it gives insight into human modes of interacting or intervening at various levels of ecological function, usually exhibited as non-successive, counterintuitive modes of vegetation development and taxa resilience in datasets. This paper present palaeoecological work done in conjunction with the investigations at Dagsmosse bog, south-central Sweden as part of Author 1's PhD project, focusing on the theoretical background steering its empirical scope, sampling and analysis strategy. The paper exemplifies specific archaeological adaptation of pollen analysis, i.e. the adoption of palaeoecological methodology after archaeological interests and research questions. This direction enables creation of ecologically informed and directed archaeological knowledge, conceptually useful as a baseline for countering divisions between nature and culture—both at theoretical and methodological stances. Additionally, investigations into adjacent lost, altered and submerged environments, such as underwater surveys of submerged forests and wetland areas in lake Vättern, will be discussed by reference.

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ORAL PRESENTATION

Tuesday 16th September, h.17:15-17:30

The contribution of continental malacology to the study of Mesolithic sites: one indicator, multiple research directions

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S4

While continental paleomalacology is rarely used on Mesolithic sites throughout Europe, it is in full expansion in France. In the 1990s and 2000s, initial studies were carried out on thick natural tufa sequences dating from the first half of the Holocene. These first investigations, outside the field of archaeology, highlighted the gradual recolonisation of northern France by molluscs, in particular by forest species that had left the region during the Pleniglacial period. This recolonisation went through several waves, for which biostratigraphic markers are available. Paleomalacological analyses carried out on archaeological sites dating from the Mesolithic period initially focused on open-air sites on alluvial plains. These sites often yielded malacological remains that were partly reworked by the biological activity of the soil. Since the late 2010s, with the discovery of numerous pits dated to the Mesolithic period in the Champagne region, malacological analyses have been carried out on sealed, radiocarbon-dated contexts. The malacological successions observed enabled a renewed biostratigraphic framework to be established, and chronological attributions to be proposed for features with no chronological evidence. In addition, as the Champagne sites are located on slopes and plateaus, malacology provides a valuable local bioindicator for spatializing the paleoenvironmental information collected by archaeobotanists. Finally, on a broader European scale, an arid climatic event around 6500 cal. BC seems to have halted the colonization of molluscs. The coincidence of this event with the transition to the Second Mesolithic in Europe is worthy of further investigation.

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POSTER

Tuesday 16th September, h.12:45-13:00

EARLY AND MIDDLE HOLOCENE FISHING HOOKS FROM LUBANA LAKE: PRELIMINARY RESULTS OF MULTIDISCIPLINARY STUDIES

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Early Holocene bone tools associated with the hunter-gatherer-fisher communities of Europe hold exceptional cognitive value, primarily because of their uniqueness. Among these artefacts, tools related to the exploitation of aquatic resources are particularly significant, as the aquatic environment played a crucial role in the economy during this period. However, identifying these tools is often challenging. This is because the use-wear traces formed on bone tools during fishing have not yet been fully classified, making it difficult to distinguish these weapons from other hunting equipment. In turn, artefacts associated with this type of activity, due to their form, i.e. fishing hooks, are very rare. Our poster will present the preliminary results of multidisciplinary studies of the largest collection of bone fishing hooks in Europe, associated with the hunter-gatherer-fisher communities of the early and middle Holocene. This collection originates from Lake Lubana in Latvia. We will present the results of typological analysis, combined with new radiocarbon dates, results of chemical analysis of binders present on the hooks' surfaces, and archaeobotanical studies of identified cords and wrappings. Finally, we will present the results of technological studies aimed at the interpretation of the chaîne opératoire of hook production, as well as use-wear analyses aimed at classifying the traces of use observed on these artefacts.

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POSTER

Tuesday 16th September, h.12:45-13:00

High-resolution research at Mesolithic shell middens in the Cape St. Vincent area, SW Iberia

Simões Carlos * (1), Aldeias Vera (1), García-Escárzaga Asier (2) (3), León Cristóbal Alejandro (4), Monteiro Patricia (5) (6), Oliveira Rui (7), Reis Helena (1), Soares Ricardo (8)

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The area of Cape St. Vincent in SW Portugal hosts a multiplicity of shell middens of various prehistoric and historical periods. Castelejo and Rocha das Gaivotas are two of the oldest Mesolithic sites, resulting from intermittent occupations of coastal foragers for long timespans that encompass the transition to the Neolithic. While the chronology and logistical function of these successive short occupations have been established, the modes and temporalities of shell mound construction and the local paleoenvironmental conditions that framed such habitual behaviour through millennia are largely unknown. To tackle these issues, high-resolution, multidisciplinary analyses of microstratigraphy, archaeomalacology, shell stable isotopes, lipid biomarkers, and charcoal, were carried out. Preliminary results from one layer of Castelejo dated to 8.5 k cal BP, revealed a reiterated tossing of marine molluscs, coralline algae and abundant wood charcoal, alongside other burnt remains of terrestrial and aquatic plants, likely corresponding to an event of continued processing and cooking of shellfish during the springtime and, to a lesser extent, late summertime. At Rocha das Gaivotas, results from a flat combustion feature dated to 7.6 k cal BP, show that terrestrial plants and possibly also aquatic organic matter was burnt, alongside few marine gastropods. These results demonstrate that high-resolution analysis in shell midden contexts is crucial to address the Prehistoric coastal populations' full range of aquatic resources foraging and their temporalities, but also the ways of collecting and processing shellfish, an idiosyncratic activity which has remained a staple through time at the region.

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POSTER

Tuesday 16th September, h.12:45-13:00

MESOLITHIC HUNTING SEASONS: READING BETWEEN THE CRACKS OF TAPHONOMY

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S4

Knowing the seasons of death of the hunted prey is necessary to address Mesolithic subsistence strategies, seasonal complementarity of resources and mobility systems. Traditional archaeozoology methods are accurate for the youngest individuals of species with a single, short birth time in the year. They are not, for adult individuals or extinct species and those with a spread of births over the year and two annual litters. It therefore seems appropriate to approach the hunting seasonality through the prism of cementum analysis which involves the study of seasonal records of dental cementum. This method is effective for identifying the season of death of the animal, for both present-day and fossil samples. However, in an archaeological context, dental remains undergo taphonomic alterations. They can have a greater or lesser impact on the conservation of dental cementum, due to its fragility and structural permeability, causing a partial or total impact on the legibility of the increments and, consequently, alter the reliability of the observations of the season of death. Based on dental series from Mesolithic sites in south-west France, the aim of this presentation is to discuss the micro-taphonomy of dental cementum. Our results underline the importance of conducting a more in-depth analysis in order to provide information on the taphonomic history of the tooth; increase the reliability of the results for identifying the season of death; question the relevance of applying cementum analyses in certain archaeological contexts and the complementarity of methods for discussing the seasons of death of hunted animals.

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POSTER

Tuesday 16th September, h.12:45-13:00

First stage in the chaîne opératoire of animal teeth pendants at Zvejnieki: an experimental study of animal teeth extraction methods and wider social implications

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Animal teeth were amongst the most common materials utilised for personal ornament production during the Stone Age, especially in the Northern Hemisphere. The Zvejnieki cemetery (Latvia) is a clear example of this, with more than 2000 animal teeth excavated from grave contexts. Animal tooth pendants from the site have received significant scholarly attention, largely focusing on their faunal identification, type of use, placement within graves, as well as aspects of their production. Considerably less attention, however, has been given to the process of tooth extraction and the corresponding physical traces this might leave behind. This gap in knowledge is evident across early prehistory more generally, with previous studies neglecting this key aspect in the technological chaîne opératoire of animal tooth pendants. This has arguably confounded the assumption that teeth used for pendant making were readily available as pre-forms, requiring little time/energy investment in the sourcing and extracting phase. We employed experimental archaeological methods to critically evaluate possible Stone Age techniques of tooth extraction from key ungulate species, assessing the diagnostic traces created on the tooth itself and on the skull or mandible. Here we present our results and suggest that tooth extraction was not only a functional aspect of processing animal carcasses but also deeply embedded in everyday life, most notably, in cooking practices. These findings provide insights into the relationships between different spheres of hunter-gatherer life and death at Zvejnieki, specifically the acquisition of game animals, their treatment, and the rarely acknowledged interconnectedness of hunter-gatherer craft and subsistence activities.

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MESO2025 - 11th International Conference on the Mesolithic in Europe

POSTER

Tuesday 16th September, h.15:45-16:00

The Late Mesolithic deep pit site of Sannerville "Cité les Conquérantes" (Normandy)

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The Sannerville site was preventively excavated by Inrap in 2023. 34 deep truncated, conical or hemispherical pits with central over-digging were revealed, forming 30 m wide and 280 m long arcuate band. Radiocarbon dating attests to an occupation centered on the Late Mesolithic in the interval 6800-5900 cal BC. Few flints from laminar production were discovered in their fillings. Although it is in some cases questionable, the functionality of these pits probably relates here to hunting traps. In support of this hypothesis, we note the significant depth of these structures and their volume between 5 and 10 cubic meters. The hypothesis defended here is that of a pitfall trap, equipped with a trunk where the departures of the blunted branches in the central post hole would impale the animal. The malacological analysis focused on four of the pits and highlighted fairly sparse woody cover, which has no equivalent in the Normandy sequences for the same periods. Thus, the impact of the Mesolithic populations of Sannerville could be particularly high and have significant consequences on local afforestation.

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ROE DEER VERSUS CHAMOIS: THE IMPORTANCE OF DISTINGUISHING THE TWO AT LA GRANDE RIVOIRE ROCKSHELTER

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Archaeological excavations at La Grande Rivoire rockshelter, conducted over nearly four decades (1986–2024), have provided significant evidence of human occupation throughout the Mesolithic period. Located in the northern French Alps at 580 masl, it displays a chronostratigraphic sequence spanning from the Early Mesolithic (10th millennium cal. BCE) to the final phase of the Late Mesolithic (6th millennium cal. BCE). The site has produced a substantial assemblage of faunal remains, enabling detailed reconstructions of local resource exploitation practices through diverse and well-preserved faunal spectra. Ongoing archaeozoological analyses reveal the presence of large game species (red deer, wild boar, ibex, brown bear, canids) as well as smaller vertebrates (lynx, badger, wild cat, mustelids, beaver, pond turtle), hunted from the immediate vicinity of the site. Notably, roe deer are underrepresented, and chamois are virtually absent throughout the sequence. This has led to multiple hypotheses regarding specialized hunting strategies, selective resource selection, and/or cultural factors influencing practices. The high degree of fragmentation observed in the osteological remains, along with the morphological similarity between roe deer and chamois skeletal elements, has raised questions about potential methodological biases inherent in traditional archaeozoological analyses. To address these limitations, Zooarchaeology by Mass Spectrometry (ZooMS) was applied to analyze collagen proteins extracted from over 100 bone samples. This approach aims to improve taxonomic identification at the species or genus level, refining our understanding of Mesolithic resource exploitation strategies in mountain environments and identifying trends in resource use.

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Fire use in prehistoric clay structures: Casal Leitão (Lourinhã, Portugal) through the lens of charcoal analysis

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The function of Mesolithic clay structures is still largely unknown; therefore, the study of their content is crucial to understanding their utility to past communities were using them for. The evidence of thermally altered clay suggests that combustion occurred in these structures and played a role in their formation. Consequently, the study of charcoal recovered in these structures is fundamental to understanding their use and functionality. Casal Leitão is an Early Mesolithic site recently discovered in Lourinhã, nearby Lisboa (central Portugal). So far, seven clay structures (70-80cmin diameter) containing charcoal fragments in their sedimentary infills have been identified. During the field and laboratory-controlled excavations of these clay structures, charcoal fragments were recovered both by handpicking and through flotation of sediments. Charcoal samples recovered from Casal Leitão were analysed for taxonomic determination (using wood anatomy atlases) and taphonomical alteration. The results demonstrate that Quercus spp. evergreen (oak) and Ericaceae (e.g. heather) were used as fuel. The combination of these taxa is particularly notable due to the high calorific properties of heather and the long-lasting burning of oak, usually combined in ovens and hearths. Our preliminary results indicate that there were no differences in terms of fuel choices across the different structures, suggesting that they were part of the same system and had similar functions.

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The small mammal remains from the Mesolithic site Galgenbühel/Dos de la Forca (Salorno, Bolzano, Northern Italy): preliminary remarks

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We present preliminary remarks of the small mammals recovered from the Sauveterrian site of Galgenbühel/Dos de la Forca (South Tyrol, Northern Italy). This rockshelter, frequented by hunter-gatherers during the Early Holocene, is part of the Mesolithic site system of the Adige valley bottom, consisting of other contemporary shelters such as Pradestel, Romagnano, Bus de la Vecia, Vatte di Zambana and Borgonuovo/Mezzocorona. A total amount of 3029 small mammal remains from the entire stratigraphic sequence were analysed. At least 10 species were determined, with 7 belonging to the order Rodentia and 3 to the order Eulipotyphla. The abundance of Arvicola ex gr. amphibius remains (more than 57% NR), the presence of Neomys sp. and the absence of mole remains allow us to hypothesise that aquatic habitats were widely distributed. Such habitats extended near the roosts of birds of prey, the probable agents responsible for the accumulation of the sample. The presence of arboreal species (Sciurus vulgaris, Glis glis, Dryomys nitedula) associated with others indicative of woodland environments (Clethrionomys glareolus, Apodemus gr. sylvaticus/flavicollis), together with the occurrence of Sorex minutus, which is well adapted to mesic microhabitats of the forest, are indicative of extensive woodlands, both on the valley bottoms and on the slopes. The snow vole (Chionomys nivalis) documents the presence of rocky substrate habitats. No indicators of other open habitats, such as grasslands, were found. The study documents the dominance of the forest, as expected for the Early Holocene in the alpine valley bottoms.

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The role of rapid climate changes and fire in shaping the Mesolithic lifeways in the sandy lowlands of Belgium and the S-Netherlands using palynological and microcharcoal analyses

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The complex interplay between hunter-gatherers, climate and the environment is essential for understanding Mesolithic societies. While recent climate records have identified several centennial-scale Rapid Climate Changes (RCC), such as the 9.3 and 8.2 ka cooling events, their impact on NW-European environments and Mesolithic populations remains poorly understood. Furthermore, fire regimes also played a transformative role in these environments, yet their drivers remain debated. In NW-Europe it is generally assumed that humans only started influencing their environment when farming was introduced in the Neolithic. However, ethnographic research shows that hunter-gatherers actively shape their surroundings in various ways, notably through the use of fire. Understanding how RCCs and fire regimes interacted with ecosystems and Mesolithic populations is essential for understanding the Mesolithic adaptive strategies and lifeways. This study examines these interconnections by integrating high-resolution palynological analysis and microcharcoal quantification from well-preserved peat deposits in abandoned river channels in the sandy lowlands of Belgium and the southern Netherlands. Pollen data are used to determine the synchronicity of vegetation changes with RCCs, offering insights into climate-driven ecological shifts. Microcharcoal analyses explores the extent to which fire activity was influenced by natural processes or human agency, while palaeodemographic modelling connects these environmental dynamics to human responses and adaptations. A high-resolution chronological record is employed to align the different datasets. By employing a multiproxy approach, this research investigates the causality between climatic events, fire regimes, and human behaviour, providing new perspectives on the resilience and adaptability of Mesolithic populations in the face of environmental change.

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Speleothems to trace human activities and environment in Belgium during the Pleistocene-Holocene transition

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Speleothems are currently one of the best datable terrestrial palaeoclimatic and environmental archives that additionally enable reconstructions at a resolution down to seasonal depending on individual characteristics. Their capacity to 'register' human traces such as objects or bones (Bruxelles et al., 2019; Lari et al 2015), anthropogenic breakage of speleothems (Brady et al., 1997; Jaubert et al., 2016; Delannoy et al 2024) or incorporation of soot due to human occupations of cave sites (Vandevelde et al., 2018) increase their use in archaeological contexts. In the frame of the UGent-KBIN joint Meuse Basin project (The Research Foundation Flanders, G0C9323N) we present first results on the chronology of soot incorporation in a speleothem from the Remouchamps cave, occupied during the late Younger Dryas and Early Mesolithic (Crombé et al., 2024). Black layers were deposited in the calcite between 11.0 ka and 9.3 ka. Breakage of speleothems occurred just after 77ka but we currently cannot discriminate between a human cause or a natural for this breakage e.g. frost, earthquake, animals. Environmental and climate reconstructions in Han-sur-Lesse caves' speleothems are ongoing and aim at the reconstruction of the rapid climate changes during the Pleistocene-Holocene transition.

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Burnt artefacts and Mesolithic pyrotechnologies in the French Pre-Alps: Issues and New Developments

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With the recolonisation of temperate forests at the beginning of the Holocene, Mesolithic populations faced a renewal of available plant resources inducing changes in subsistence and technological behaviour. In many rockshelters and caves of southwest Europe, important ash and charcoal accumulations, burnt sediment, as well as a high diversity of thermally altered vestiges such as hazelnut shells, ornaments, and lithic materials testify of specific fire-related activities whose nature and purpose are still difficult to grasp. The recently excavated sites of la Baume de Monthiver and les Baumes de la Bruyère (southern French Prealps) are no exception in this matter and provide an opportunity to develop new research avenues regarding Mesolithic pyrotechnology. We expect that the study of various combustion traces or residues (macro- and microbotanical analyses, physico-chemical characterization, distribution of combustion markers within the sites) will provide new data about fire and hearth management. This will contribute to a better understanding of Mesolithic techniques and spatial organization within the wider socio-economical context. A second aspect we are currently focusing on is stable isotope analysis applied to hazel macroremains and is aimed at reconstructing the climatic context of the occupations (temperatures and water availability) as well as mobility patterns via the modelling of hazelnut acquisition territories.

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Strange landscapes, great archives: environmental archaeology of Bohemian 'Rock Cities' Mesolithics

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The northern half of Bohemia is covered by Cretaceous sandstone, on which a specific relief of rock towns was formed during the Pleistocene. It is characterised by an extreme diversity of relief with deep canyons, rock towers and a considerable number of rock overhangs. Throughout the Holocene, there is a constant accumulation of sandy sediments in these rockshelters, resulting in a unique stratigraphy that separately documents human occupation. In addition to artefacts, stratigraphy up to 5m thick preserve a rich environmental record of all types. Together with other sites suitable for environmental research (lakes, peat bogs), we can reconstruct in great detail the environment of Mesolithic hunter-gatherers from their beginnings to their gradual decline. We can thus observe a significant intensification of landscape use, with fire dynamics indicating a strong human influence. We see indications of the management of hazel as a preferred crop and the exploitation of a wide range of plant resources, including some exotic ones such as Swiss stone pine. The extreme landscape diversity of the rock towns provided a wide range of resources for hunter-gatherers, supporting their subsistence strategies until the arrival of the first farmers. Towards the end of the Mesolithic, a crisis arose, reflected in the exploitation of atypical resources and the search for alternative survival strategies, which ultimately led to the transformation of the region's inhabitants into Late Neolithic forest herders.