



**3rd meeting of the
Medieval period Working Group
7-10 October 2026, Brussels**



Wednesday October 7th

09:30 – 10:20 **Registration + coffee**

10:20 – 10:40 **Welcome** and opening of the meeting

10:40 – 11:40 **Keynote presentation** by **Maria João Valente**: Wandering herds: zooarchaeological and biochemical approaches to transhumance and animal mobility in medieval societies

11:40 – 12:00 **Gwendoline Maurer, Richard Madgwick, Ben Jervis**: Enduring crises: large-scale isotopic evidence for livestock provisioning, mobility, and landscape use in later medieval England

12:00 – 12:20 **Urszula Iwaszczuk, Rafał Fetner, Magdalena Moskal-del Hoyo, Monika Badura, Olga Wasilewska**: Livestock breeding and plant use on the eastern coast of the Red Sea in the 10th century AD. A case study

12:20 – 12:40 **Marine Helstroffer-Stahn, Elise Dufour, Benoît Clavel**: Isotopic analysis and characterisation of pig husbandry in rural elite sites between the 10th and 13th centuries AD (Boves, Pineuilh and Landévennec)

12:40 – 14:00 **Lunch**

14:00 – 14:20 **Wing Yan Tong**: Feeding the bishops: provisioning, consumption, and zooarchaeological evidence from Auckland Castle, Durham, England. Preliminary results from recent excavations

14:20 – 14:40 **Kinnie Esser, Leida van Hees, Tim Hogendijk, Wim Van Neer, Wim Wouters, Jørn Zeiler, Wietske Prummel**: The luxurious lives of lords and ladies. Animal remains and their spatial distribution at Huis ter Kleef (c. 1250-1573 AD)

14:40 – 15:00 **Aurélia Borvon**: At the table of the lords of Talmont Castle (France) in the 10th–14th centuries: an archaeozoological study

15:00 – 15:45 **Coffee + posters**

15:45 – 16:05 **Francesca Fapanni**: The animal landscape of the Central Alps in the late Middle Ages (12th–15th c. AD): zooarchaeology of a crisis? A case study from Caspoggio (northern Italy)

16:05 – 16:25 **Andrea Tommolini**: A zooarchaeological perspective on animal husbandry in southern medieval Tuscany (9th-14th c. AD), Italy

16:25 – 16:45 **Erika Gál, Kovács Gyöngyi**: Investigating animal exploitation in aristocratic residences in medieval Hungary: new results from Csókakő Castle

Thursday October 8th

09:30 – 09:40 **Opening doors**

09:40 – 10:00 **Jen Harland, David Orton, Mik Lisowski, Rowan McLaughlin**: Investigating fishing intensity in northern Scotland during the medieval (and later) periods: cod (*Gadus morhua*) and saithe (*Pollachius virens*) size-at-catch data

10:00 – 10:20 **Valerio Punzi**: From cetaceans to artefacts: whale-bone production and coastal resource exploitation in early Medieval Iceland and northern Norway

10:20 – 10:40 **Mauro Rizzetto, Silvia Garavello, Veronica Aniceti, Francesco Giacalone**: Duck tales from Venice: zooarchaeology of waterbirds in the Roman and medieval lagoon (1st-15th c. CE)

10:40 – 11:00 **Caroline Mougne, Catherine Dupont, Charles Viaut**: Between sea and societies: marine invertebrates in the early Middle Ages in Charente-Maritime (France)

11:00 – 11:30 **Coffee**

11:30 – 11:50 **Fiona Beglane**: Fur, friend, or function: small carnivores in medieval Ireland

11:50 – 12:10 **David Orton**: Tracking European rat populations across the First and Second Plague Pandemics

12:10 – 12:30 **Alice Rose, Michelle Alexander, Eric Guiry, Michelle Feider, Sam Greeves, David Orton**: A 'rat's eye view' – exploring rat dietary ecology and human-rat relationships in Medieval Britain through stable isotope analysis

12:30 – 13:40 **Lunch**

13:40 – 14:00 **Daniel Makowiecki**: Medieval horse anatomical assemblages in Poland

14:00 – 14:20 **Adrian Bălăşescu, Gabriel Vasile**: Ritual horse burials from Săveni (Southeast Romania): new evidence for 10th–11th century nomadic funerary practices

14:20 – 14:40 **Juan Manuel Ariza, Annelise Binois, Céline Cheveau, Nicolas Prouteau, Yves Henigfeld, Aurélia Borvon**: Stable isotope analysis ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$) of dogs and associated fauna from five medieval French sites (11th–15th centuries AD): site context as a primary driver of canine diet

14:40 – 15:00 **Annelise Binois-Roman, Aurélia Borvon, Julie Rivière, Juan Manuel Ariza:** From wells to welfare: the health and management of stray dog populations in late medieval France (16th-15th c.)

15:00 – 15:30 **Coffee**

15:30 – 15:50 **Ana Beatriz Santos, Júlia Rosa, Maria João Valente, Nelson Almeida, Ana Elisabete Pires, Allowen Evin, Cleia Detry:** The UpDog Database: new approaches to the study of medieval and modern dogs in Portugal

15:50 – 16:10 **Marcos García García, Victoria Amorós Ruiz, Sonia Gutiérrez Lloret:** From Visigothic episcopal see to Islamic city: zooarchaeology in context at El Tolmo de Minateda, 7th-early 10th century

16:10 – 16:30 **Khaoula Kaddoury, Lisa Yeomans, M. Belatik:** Zooarchaeological analysis of faunal remains from the residential quarter of Aghmat, Morocco

16:30 – 16:50 **Eva Pires:** Where the river meets the sea: a zooarchaeological perspective from the Tagus estuary (13th-16th centuries)

18:30 – 21:30 **Conference dinner**

Friday October 9th

09:30 – 09:40 **Opening doors**

09:40 – 10:00 **Anna Gręzak, Urszula Iwaszczuk, Sławomir Wadyl:** The faunal economy of the Piast frontier: osteological analysis from early Medieval Ciepłe

10:00 – 10:20 **Hanna Kivikero:** The Cut: butchering and consumption of birds and domestic mammals in late medieval Finland and Sweden

10:20 – 10:40 **Nadezhda Karastoyanova, Ivaylo Raykov, Veselina Raykova, Maria Manolova:** Hunting, husbandry and aquatic resource exploitation at medieval Petrich Kale (northeastern Bulgaria)

10:40 – 11:00 **Pam Crabtree:** Feeding Antwerp – new zooarchaeological research on diet, subsistence, and animal use in medieval Antwerp

11:00 – 11:30 **coffee**

11:30 – 12:30 **Final discussion**

Visit AZ lab
Visit vertebrate collection

Saturday October 10th

Excursion: Visit to the 'Coudenberg Palace', exploring the principal buildings of the palace and enjoying a stroll along the Rue Isabelle which is now underground, followed by a guided tour in the historical centre of Brussels

Posters

Juan Manuel Ariza, Yves Henigfeld, Nora Navarro-Gonzalez, Aurélia Borvon: Dogs as sentinels of human diet? A systematic review and meta-analysis of carbon and nitrogen stable isotopes in medieval Europe

Helene Benkert, Scott Riddell: Counting Sheep: Animal Husbandry in Monastic Iceland

Maria de Sousa, Maria João Valente: Who said girls can't fight? Case-study of a mare from a wartime period in Medieval Islamic Silves, Portugal

Ben Gruwier, Hannah James, Thijs Lambrecht, Bart Lambert, Barbara Veselka, Christophe Snoeck: Cattle trade in (post-)medieval Leuven and Antwerp (Belgium): insights from strontium isotope analysis

Bo Karremans, Alec Torfs, Ine Deweirtdt, Christophe Snoeck, Ben Gruwier, Hannah James: Teeth telling tales of mobility and diet in Medieval pigs from Antwerp

Lenka Kovačiková, Olga Trojánková: Beyond utility: cultural and depositional patterns of equid remains in High Medieval towns in Bohemia

Nicolas Morand: In the shadow of the cistern: food waste highlighting eating practices in medieval Alexandria (Egypt)

Caroline Mougne, Isabelle Rouget, Aurélia Borvon, Stéphane Augry: Shells, crabs and cephalopods: exploitation of marine resources at Talmont-Saint-Hilaire (Vendée) between the 11th and 16th centuries

Tarek Oueslati, Delphine Cense: Dog slaughter and butchery in 14th-century Lille: an integrative approach to the archaeozoological and archival evidence of the "Tuekien"

Pierre Pignaut, Tarek Oueisati, Mathieu Vivas: Late medieval and early modern butchery in northern France : A QGIS-based zooarchaeological study of catering waste from Hesdin (Pas-de-Calais, France)

Maria João Valente, Catarina Tente, Anne-France Maurer: Herding landscapes: from Roman to medieval pastoral strategies

ABSTRACTS

Oral presentation

Stable isotope analysis ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$) of dogs and associated fauna from five medieval French sites (11th–15th centuries AD): site context as a primary driver of canine diet

Ariza Juan Manuel^{1,*}, Binois Annelise^{3,6}, Cheveau Céline⁴, Prouteau Nicolas⁵, Henigfeld Yves^{1,2}, Borvon Aurélia^{6,7}

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The dog occupied a singular position in medieval society. Its diet reflected both the food resources available in its immediate environment and the deliberate choices of its owner. Written sources document two contrasting populations: stray dogs living on refuse, and elite hunting pack dogs fed primarily on cereal-based bread. Stable isotope analysis of carbon ($\delta^{13}\text{C}$) and nitrogen ($\delta^{15}\text{N}$) in bone collagen, combined with a Trophic Level Index (TLI) measuring the isotopic offset of each dog relative to local herbivores, offers a comparative framework to explore how dietary regimes varied across distinct socio-ecological contexts.

This study presents original isotopic data from 55 faunal samples collected at five medieval French sites spanning the 11th to 15th centuries AD: Fosses Saint-Ursin (Courseulles-sur-Mer, Calvados, 13th–14th c. AD, rural village well), Poissy (Yvelines, 11th c. AD, urban aristocratic enclosure), Chartres, La Courtille (Eure-et-Loir, 14th c. AD, urban well), Château Ganne (La Pommeraye, Calvados, 12th–13th c. AD, castral), and Haut-Clairvaux (Vienne, 15th c. AD, castral). Sampled taxa include *Canis lupus familiaris*, *Vulpes vulpes*, *Bos taurus*, *Sus scrofa*, *Ovis/Capra*, and *Felis catus*, providing a multi-species isotopic baseline per site.

Results reveal that site identity is a stronger determinant of canine diet than broad socio-ecological context. A five-point gradient emerges: dogs from Château Ganne show the most herbivore-oriented profile (median TLI 0.49, ~53% cereals), consistent with hunting pack dogs fed on bread. Haut-Clairvaux dogs, despite their castral setting, and Poissy dogs occupy an intermediate, mostly omnivorous position (median TLI 0.70). Chartres dogs reach the highest animal protein intake (median TLI 0.94, ~87% animal protein, including ~1.6% marine resources), reflecting systematic access to urban meat waste. Fosses Saint-Ursin displays the highest absolute TLI (median 1.26), partly amplified by a locally low herbivore baseline ($\delta^{15}\text{N} = 5.25\text{‰}$), and consistent with independent foraging on small prey.

Intra-context isotopic dispersion, particularly elevated in castral and rural assemblages, points to heterogeneous dietary regimes within each context, likely driven by environmental constraints, resource availability, and variation in human-dog relationships. Further studies are needed to explore these potential drivers.

Keywords: stable isotopes, medieval dogs, archaeozoology, trophic ecology, human-animal relationships

Dogs as sentinels of human diet? A Systematic Review and Meta-analysis of Carbon and Nitrogen Stable Isotopes in Medieval Europe

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Diet constitutes a major interface linking humans, animals and their environments. Throughout the medieval period, the relationship between humans and dogs was shaped by food-sharing practices, ecological constraints and socio-economic organization. Because dogs occupied the same domestic environments as humans while often relying on anthropogenic food resources, their isotopic signatures provide a unique opportunity to investigate long term human-animal dietary relationships. Stable carbon ($\delta^{13}\text{C}$) and nitrogen ($\delta^{15}\text{N}$) isotope analyses of bone collagen have become a fundamental tool for reconstructing past diets and ecological interactions, yet no systematic synthesis has specifically examined human-dog dietary relationships across medieval Europe.

This study presents the first systematic review and meta-analysis of $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ stable isotope signatures from medieval European dogs and associated human populations. As archaeological isotope datasets continue to expand, assessing the reliability and comparability of evidence has become increasingly important. Drawing on approaches developed in epidemiology, we adapted a reproducible evidence-synthesis framework to scrutinize major archaeological and multidisciplinary scientific databases. A total of 2,604 records were identified. Following duplicate removal, screening and eligibility assessment, 64 publications were retained for qualitative and quantitative synthesis. The resulting database comprises 3,544 humans and 302 dogs distributed across a wide range of settlement types, economic systems, political spheres and cultural traditions. Christian contexts dominate the dataset, whereas canine remains are particularly abundant in urban and trade-oriented settlements. Early Medieval populations constitute the largest chronological component of the current evidence base.

Methodological quality is evaluated through a dedicated risk-of-bias framework focusing on collagen preservation, ecological baselines, complementary archaeological evidence and sample representativeness. Quantitative analyses combine univariate and multivariate statistics with Bayesian dietary mixing models incorporating hierarchical random effects to account for variation among sites and archaeological contexts.

By identifying dietary synchronies and divergences between humans and dogs across medieval Europe, this study aims to clarify how food-sharing practices reflected broader social, economic and environmental processes. More broadly, it explores the potential of dogs

as long-term sentinels of human dietary behaviour within a One Health perspective linking past and present human–animal relationships.

Keywords: dogs, stable isotopes, medieval Europe, diet, One Health

Oral presentation

Ritual horse burials from Săveni (Southeast Romania): new evidence for 10th–11th century nomadic funerary practices

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On the high terrace of the Ialomița River, southeast of the village of Săveni, at the La Movile site, an inhumation burial (Grave 14) was discovered and excavated. Based on the associated grave goods, the burial is dated to the 10th–11th centuries AD. The grave was uncovered at a depth of 0.3 m, immediately beneath the plough soil. The grave pit was rectangular with rounded corners, and its base lay at a depth of 1.8–2.0 m. A ledge had been intentionally left along the northwestern long side of the pit, beginning at a depth of 1.55 m. The skeleton of an adult male was laid directly on the bottom of the pit in a southwest–northeast orientation, with the head to the southwest.

Two horse skulls (*Equus caballus*) had been placed on the ledge at a depth of 1.55 m. One was deposited adjacent to the human skull, while the other was positioned near the left hand of the deceased. In the northwestern corner of the grave, near the feet of the deceased, faunal remains originating from several horses were recovered. These consisted primarily of distal limb elements (fused metapodials and phalanges), together with unfused zeugopodial bones (radius and ulna). An estimate of the minimum number of individuals (MNI), based on the identified horse remains, indicates the presence of at least three horses, including one juvenile and two adults. The osteometric data obtained from the horses recovered at Săveni were compared with those from other contemporary archaeological sites in southeastern Romania. The results indicate that these animals belonged to the same horse population, probably of Mongoloid origin.

The discovery of a male burial belonging to a Turanic population, probably Pecheneg, associated with the deposition of skeletal elements from three individual horses, is unique within the archaeozoological record of Romania.

Keywords: medieval period, Romania, horses, biometry

Oral presentation

Fur, friend, or function: small carnivores in medieval Ireland

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The bones of small carnivores, including those of mustelids, foxes, and cats are occasional finds on medieval excavations in Ireland. At most they contribute only a small percentage of elements in assemblages, and are often represented only by single specimens. Swamped by larger numbers of elements from livestock taxa, they receive very little attention in faunal reports, usually relegated to basic NISP tables, with little or no interpretation. This paper was inspired by patterns in mustelid finds from the author's work, and the recent identification of weasel (*Mustela nivalis*) from an Irish site, outside the accepted geographical range of the species. The paper bridges that research gap by presenting a review of a range of published and unpublished faunal reports and undertaking a meta-analysis of these to investigate the roles of these taxa in medieval Ireland. It investigates cultural and economic roles, including the use of pelts for fur, keeping these species as companion animals, and keeping these species for pest control functions. The results are compared by species and between broad groupings of elite, ecclesiastical, urban and rural sites. This methodology reveals how the historical significance of these animals varies depending on the site type, wild versus domestic taxa, and specific factors relating to individual taxa.

Keywords: carnivore, fur, companion animal, pest control

Poster

Counting sheep: animal husbandry in monastic Iceland

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Dietary restrictions based on societal or religious perceptions are not an uncommon phenomenon in human history. Horse meat, for example, was considered taboo in various times and cultures and was subject to a number of papal bans throughout the Middle Ages. The Benedictine Rule prohibited the consumption of four-legged animals for all but the weak and sick. However, such restrictions and prohibitions often were adapted in favour of availability and practicality of food resources, as well as simple preference.

Using traditional zooarchaeological analysis and drawing upon palaeoecological data as well as the written record, this poster illustrates how Iceland's environment shaped medieval animal husbandry and impacted monastic life on the island. Three case studies highlight how the Icelandic monastic communities engaged with the natural world to follow religious regulations and how they diverged from monasteries in Britain and on the continent.

This study was undertaken as part of the project 'Between Man and Nature – The Making of Benedictine Communities in Medieval Iceland' led by Steinunn Kristjánsdóttir and James G. Clark.

Keywords: monasteries, Iceland, diet, fasting, animal husbandry

Oral presentation

From wells to welfare: the health and management of stray dog populations in late medieval France (14th-15th c.)

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The stray dog, once a familiar component of both urban and rural landscapes, has largely disappeared from modern Europe. Occupying an ambiguous position between domestic animal and urban nuisance, these animals became an increasing source of concern during the 14th and 15th centuries, and written evidence records complaints relating to sanitation, public safety, livestock predation, and disease. Municipal authorities increasingly responded through legislation and the implementation of organized culling measures, including the employment of official dog-killers.

While these practices are well attested in documentary sources, their archaeological signatures have only recently begun to be identified. This paper examines several French assemblages that may represent episodes of systematic stray-dog eradication. The most striking example comes from Fosses Saint-Ursin (Calvados), where the remains of at least 65 dogs were deposited in a disused well during the 14th or 15th century. A comparable, though smaller, deposit has been identified at Chartres "La Courtille". Both assemblages share several characteristics, including unusually high concentrations of canine remains, evidence of poor skeletal health, and traces of perimortem trauma suggestive of violent death.

Drawing on zooarchaeological analysis in conjunction with documentary evidence, this paper argues that such deposits constitute rare material evidence for municipal animal-control policies, and proposes criteria by which comparable culling events may be recognized in the archaeological record. In doing so, it offers new insights into the management of urban environments, public health, and human–dog relationships in late medieval France, contributing to broader discussions of animal management and urban governance in medieval Europe.

Keywords: stray dogs, mass deposits, urban animal management, human–animal relations, public health

Oral presentation

At the table of the lords of Talmont Castle (France) in the 10th-14th centuries: an archaeozoological study

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Archaeological excavations conducted in the 2000s at Talmont Castle (Vendée, western France) yielded a large assemblage of faunal remains, particularly from the northern building, traditionally interpreted as the *aula* (great hall). This collection provides an opportunity to explore the connection between meat consumption and social status.

Remains are collected manually during excavations and to recover the smallest faunal elements, including fish remains, sediment samples were systematically collected and sieved. Among the thousands of identified specimens, mammals predominate, although birds and fish are also well represented. Approximately fifteen domestic and wild mammal taxa have been identified. Pig remains are the most abundant, followed by cattle. Wild mammals are represented mainly by cervids and leporids, while the occurrence of fallow deer and porpoise is of particular interest. The avifaunal assemblage is dominated by domestic chicken, but also includes a diverse range of wild species, notably woodcock, pigeons, ducks and other waders. The identification of a Eurasian goshawk is especially noteworthy. More than twenty fish taxa have been recognized, most of them marine species. Hake is particularly abundant, together with seabreams and gurnards. The majority of the identified fish remains belong to species commonly consumed during the medieval period.

The taxonomic diversity of the assemblage, especially among birds and fish, combined with the significant presence of hunted game, including both mammals and birds, provides valuable insight into dietary practices at Talmont Castle. These patterns strongly suggest that the consumers associated with the *aula* belonged to a high-status social group, likely the castle's aristocratic elite.

Keywords: castle, consumption, social status

Oral presentation

Feeding Antwerp – new zooarchaeological research on diet, subsistence, and animal use in medieval Antwerp

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In 2015, we began a collaborative project with the archaeologists excavating urban Antwerp. The goal of the project was to use the well preserved and carefully collected faunal remains from rescue excavations within the city to explore and document medieval animal use, diet, and subsistence (see Crabtree et al. 2017, Crabtree 2025). Additional excavations have recently been carried out in Antwerp. This report will present the new zooarchaeological data from Antwerp and compare these results to the zooarchaeological remains from the earlier excavations.

Pam Crabtree, Eileen Reilly, Barbora Wouters, Yannick Devos, Tim Bellens and Anne Schryvers, 2015. Environmental Evidence from Early Urban Antwerp: New Data from Archaeology, Micromorphology, Macrofauna and Insect Remains. *Quaternary International* 460: 107-123. <https://doi-org.proxy.library.nyu.edu/10.1016/j.quaint.2017.08.059>

Pam Crabtree, 2025. Feeding medieval Antwerp: Evidence from the Burcht and Gorterstraat Sites, Antwerp, Belgium, In *Producers, Traders and Consumers in Urban Societies in Southern Britain and Europe: Post-Excavation and Museum Studies Presented to Prof. Mark Brisbane*, edited by Mark Maltby and Deborah Hodges, pp. 96-101. Bicester, UK: Archaeopress.

Who said girls can't fight? Case-study of a mare from a wartime period in medieval Islamic Silves, Portugal

de Sousa Maria^{1,*}, Valente Maria João¹

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Horses played a central role in medieval society, contributing to agriculture, transport, leisure, and, most significantly, warfare. The medieval period in Europe saw the widespread adoption of cavalry, making horses indispensable in military contexts. This study examines the skeleton of a mare (*Equus caballus*) recovered from a warfare context in medieval Islamic Silves (12th–13th centuries, southern Portugal), focusing on age, pathology, size (stature and body mass), and functional interpretation. Taxonomic identification was achieved through morphometric analysis and confirmed by ZooMS.

The skeleton was analysed using established reference methods. Age estimation combined dental wear patterns of the incisors with epiphyseal fusion of major skeletal elements. Pathological changes were recorded and interpreted through comparative analysis. Withers height was estimated using standard osteometric measurements, including GL (greatest length) and LI (lateral length) of long bones. Body mass was calculated from Dp (proximal depth) of the first phalanges and additional metapodial measurements. Functional interpretation integrates osteobiographical data (age, sex, size, and pathology) with archaeological context and historical sources.

The individual is an adult female aged approximately 8–10 years, of small stature, with an estimated height of 1.41 m and a body mass of c. 368 kg. These characteristics are consistent with a Barb-type horse and align with animals used by Islamic forces during the conflicts surrounding the defence and conquest of Silves (late-12th to mid-13th centuries). Pathological analysis revealed alterations in the axial skeleton, including periarticular osteophytes on thoracic vertebrae and complete fusion of the spinous processes of lumbar vertebrae II–III, indicative of sustained mechanical stress.

The archaeological context, supported by historical evidence, suggests that this mare was employed in military activity and likely died during a violent episode, such as a raid. The use of mares is consistent with historical accounts describing their preference in Islamic cavalry.

Keywords: horse, medieval, Portugal, warfare, Islamic

Oral presentation

The luxurious lives of lords and ladies. Animal remains and their spatial distribution at Huis ter Kleef (c. 1250-1573 AD)

Esser Kinie^{1,*}, van Hees Leida², Hogendijk Tim³, Van Neer Wim⁴, Wouters Wim⁵, Zeiler Jørn⁶, Prummel Wietske⁷

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4: Institute of Natural Sciences, Brussels & KU Leuven, Belgium

5: Institute of Natural Sciences, Brussels, Belgium

6: ArchaeoBone, Haren, the Netherlands

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This presentation on the archaeological research of thousands of animals remains allows for an insight into the daily life at the castle of Huis ter Kleef in Haarlem. Today it is a ruin. But once it was the scene of aristocratic pleasures. Game animals were hunted, falconry was indulged in, and some highly specific notions existed regarding the utilization of animals. At least 134 different species fed the lords of the castle and served their expensive pastimes. The waste, dumped at various locations throughout the complex, provides a peek into these aristocratic doings, and on the use of the different castle buildings. The chosen excavation and collection methods allowed an adequate analysis of the waste flows and spatial distribution of the animal remains. All of this and more has emerged from this study, for which nearly 65,000 animal remains were analysed.

Keywords: castle, animal remains, consumption patterns, spatial distribution, excavation and collection methods

Oral presentation

The animal landscape of the central Alps in the late Middle Ages (12th–15th c. AD): zooarchaeology of a crisis? A case study from Caspoggio (northern Italy)

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This contribution presents preliminary results from a PhD project investigating Late Medieval faunal assemblages from the Central Alpine region, with the aim of characterising the animal landscape of the Central Alps and exploring potential zooarchaeological indicators of crisis affecting animal welfare between the 12th-15th c. AD. The research focuses on archaeological contexts in northern Italy, specifically in the Valtellina valley (Lombardy region): the castles of Caspoggio, Teglio, and Tresivio, and a high-altitude mining settlement, Fucina di Cacciabella. The main research question concerns the identification of a potential 'animal crisis', namely a process of intensification in the exploitation of livestock, possibly occurring at the expense of animal welfare. This hypothesis will be assessed through multiple lines of zooarchaeological evidence, including the study of species frequency, kill-off patterns, biometry, and pathological markers, all of which may provide insight into diachronic changes in herd management strategies. Preliminary data at Caspoggio indicate a high proportion of cattle, followed by caprines, suids, and domestic poultry, while wild animals are poorly represented, with only a small number of remains attributable to bear, deer, and hare. Cattle are mainly represented by very young individuals (calves) culled for milk production, while very few subadults and adults are attested. This pattern might suggest a specialised economy focused on the production of cow's milk and its derivatives, and may represent an early signal of intensified livestock exploitation. Further analyses at the other sites will allow us to explore whether and how animals during the Late Middle Ages may have been involved in processes of economic intensification shaped by the social, cultural, and economic transformations of contemporary societies.

Keywords: zooarchaeology, main domestics, animal crisis, castles, late Middle Ages, central Alps.

Oral presentation

Investigating animal exploitation in aristocratic residences in medieval Hungary: new results from Csókakő Castle

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Our lecture presents the results of the medieval (13th–mid-16th century) assemblages from the recently fully excavated Csókakő Castle (site Lower Castle/Alsóvár), and their analysis in the context of archaeozoological data from medieval Hungary.

The 13th–14th century assemblage can be assigned to the period of the Higher Castle (Felsővár), erected by the Csák family in the 13th century. According to historical evidence and due to its small area, this early castle was probably used only occasionally, partly for hunting. The frequency of remains from game animals (12% of the total NISP=548) and the type of hunted species suggest that mostly large-sized animals, including the brown bear, were hunted. Among the domestic animals, cattle (53%), pig (19%), and caprines (15%) seem to have been the most important meat-providing species during this period. Only a few bird remains – both from domestic and wild fowl – and no fish remains were present in the hand-collected bone material.

The 15th century assemblage, originating from the filling of the inner courtyard of the medieval palace of Lower Castle, may be attributed to the aristocratic residence. This well-preserved bone material, including several cranial and large post-cranial remains, still forms the subject of ongoing investigations in the current year. However, a few dozen already identified remains indicated a similar exploitation of both domestic and hunted animals as in the previous period.

The identification of animal bones from Csókakő Castle has not been restricted to the analysis of butchery and food remains. Palaeopathological examinations and the documentation of worked bones are also being carried out during the National Research, Development and Innovation Office (NKFIH) Project K-143099 'Castles, settlement network, material culture, 1300–1700 – Complex microregional historical, landscape historical and archaeological research in Transdanubia' (2022–2026).

Keywords: aristocratic residence, palaeoenvironment, Csókakő Castle, Hungary, 13th–mid-16th century

Oral presentation

From Visigothic episcopal see to Islamic city: zooarchaeology in context at El Tolmo de Minateda, 7th-early 10th century

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El Tolmo de Minateda (Hellín, Albacete), in south-eastern Iberia, is one of the key archaeological sites for examining the transformation of a Visigothic episcopal see into an early Islamic city. Identified with Eio and later Madīnat Iyyuh, the site offers an exceptional sequence in which major spatial, architectural and social changes can be traced between the 7th and early 10th centuries. The former episcopal complex, including its basilica, baptistery, cemetery and associated palace, was progressively desacralised, dismantled, reused and eventually absorbed into new domestic and urban layouts.

This paper presents the zooarchaeological study of selected animal bone assemblages from this site, based on a dataset of nearly 5,000 NISP. The analysed material derives from carefully excavated and well-contextualised deposits, including rubbish dumps, pit fills and negative features. These assemblages have been organised into spatially and chronologically coherent analytical units, allowing animal remains to be read not as isolated ecofacts, but as part of the site's wider chronostratigraphic sequence. Preliminary results point to the predominance of caprines, the limited but recurrent presence of cattle, and the uneven distribution of pig remains across different sectors and phases. Rather than offering a simple dietary reconstruction, these patterns raise broader questions about animal exploitation, food practices, urban transformation and the social reorganisation of consumption during the formation of early al-Andalus.

The main argument of the paper is methodological as much as historical. In transitional periods marked by residuality, reuse and long-lived material culture, animal bones become meaningful only when interpreted through finely excavated, securely phased and functionally understood contexts. El Tolmo de Minateda therefore shows how zooarchaeology, when embedded in robust contextual analysis, can contribute to building high-resolution chronologies and to tracing the everyday material dimensions of Islamisation.

Keywords: food practices, chronostratigraphy, Islamisation, early medieval Iberia, al-Andalus.

Oral presentation

The faunal economy of the Piast Frontier: osteological analysis from early medieval Cieple

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The early medieval settlement complex in Cieple is located in northern Poland and controlled the strategic Vistula waterway on the Pomeranian frontier of the Piast State. Founded from scratch and dated to the turn of the 10th and 11th centuries, this centre comprises three strongholds, settlements, and elite cemeteries with chamber graves. This presentation will deliver a synthesis of the zooarchaeological analysis of faunal remains from three excavation seasons at Site 3 – the central stronghold of the complex, which yielded the vast majority of bones and provides a robust database for reconstructing local dietary and subsistence strategies.

Meat consumption relied heavily on domestic animal husbandry, which dominated the assemblage. The results revealed a consistent preference for pork over beef, mutton, and goat meat. Conversely, horse remains at Site 3 were marginal, contrasting with the craft-and-military-oriented Site 2, which yielded a high proportion of this species.

Wild animal remains indicate hunting played a minor role, though the exploited fauna displays high ecological diversity. The spectrum encompassed both *animalia superiora* (red deer, roe deer, elk brought as complete carcasses) and *animalia minuta* (hare, beaver, red fox, marten). Avian remains (mainly domestic chicken and goose) provided an important dietary supplement. Additionally, riverine fishing and the gathering of freshwater mussels and pond turtles confirm the intentional, though limited, exploitation of aquatic resources in the Vistula valley.

From a zooarchaeological perspective, the recovered bone material highlights a highly specialized husbandry economy at Site 3. The clear predominance of pork, combined with poultry and riverine resource exploitation, aligns perfectly with the macro-regional zooarchaeological models established for early medieval Poland, where pig consumption heavily characterizes Pomerania as well as the Piast core territory. Furthermore, this intense focus on pig husbandry reflects a highly efficient strategy tailored to supply an economically diversified and non-agrarian population.

Keywords: Early Middle Ages, Pomerania, Piast State, animal economy, pork consumption

Cattle trade in (post-)medieval Leuven and Antwerp (Belgium): insights from strontium isotope analysis

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Fuelled by population growth and an increasing demand for food products, late medieval Northwestern Europe saw the development of extensive networks along which cattle were traded, to supply the growing urban meat markets. Documentary evidence indicates that large herds of animals were driven overland from northern Germany and Denmark to the Low Countries. Yet, when and to what extent individual cities were integrated in this emerging international livestock trade, remains unclear. In this study we assess provenance and mobility in cattle remains from high to late medieval Leuven – in the former Duchy of Brabant (now Belgium) – via strontium isotope analysis. The results are compared to those from a late 16th to 19th century sample from Antwerp, another Brabantine city. By analysing oxygen ($\delta^{18}\text{O}$), and strontium ($^{87}\text{Sr}/^{86}\text{Sr}$, $\delta^{88}\text{Sr}$) isotope ratios and concentrations ($[\text{Sr}]$) from the tooth enamel of 11 medieval and 30 early modern cattle, we shed light on the potential sources from where the animals were imported and the extent to which livestock trade networks were developed there at the time.

The cattle from medieval Leuven revealed a lower variance than those from early modern Antwerp. All individuals from Leuven could come from the region that is now Belgium, but for some of these there were indications of a provenance somewhat beyond the city's immediate hinterland. The early modern cattle from Antwerp come from a wider range of locations. Although some of the Antwerp specimens presumably came from as far as southwestern France, no evidence was found indicating import from Northern Europe. Despite small sample sizes and inherent differences between the two towns (particularly scale), the results confirm our expectation that medieval Leuven was not as fully integrated in international cattle trade networks as early modern Antwerp and may have relied more on regional livestock breeding at the time.

Keywords: isotope analysis, livestock trade, cattle mobility

Oral presentation

Investigating fishing intensity in northern Scotland during the medieval (and later) periods: cod (*Gadus morhua*) and saithe (*Pollachius virens*) size-at-catch data

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Industrial fisheries are known to have had severe impacts on marine fish stocks globally. The potential cumulative impact of previous, lower-intensity catches is much harder to evaluate. Systematic records rarely reach back more than a century, and thus zooarchaeological remains often represent the main, or only, source of evidence. In the case of North Sea demersal fisheries, industrialisation is represented by the introduction of steam-powered trawlers in the late 19th century, but this was preceded by almost a millennium of intensive pre-industrial fishing, exemplified by dense midden accumulations in the Northern Isles of Scotland.

We aim to investigate the beginnings of detectable human impact on northern North Sea cod and saithe via catch size data, aiming to test the hypothesis that a gradual size decline due to fishing pressure began prior to industrialisation. We present new Bayesian regression models for cranial bones and apply these to archaeological material from northern Scotland spanning the 10th-19th centuries, using modern International Bottom Trawl Survey data for comparison.

We observe a consistently bimodal distribution of cod size-at-catch throughout the archaeological dataset, with c.500mm and c.1000 mm total lengths peaks that we interpret as inshore vs. deep water fishing. Mean size does decrease from the 16th century, but this appears to reflect changing fishing practices, rather than reduced availability of larger fish. This contrasts sharply with modern data, in which this larger group appears absent. Both the cod and saithe show a gradual decline in size through the late medieval and early modern periods, which may reflect either localised fishing impacts in coastal water or – more likely – the impact of climatic cooling on juvenile growth rates. We conclude that pre-industrial medieval fisheries had limited impact on cod and saithe sizes, while a dramatic decline in cod sizes took place following the introduction of the steam trawl.

Keywords: fish remains, metrics, fishing intensification, Scotland

Oral presentation

Isotopic analysis and characterisation of pig husbandry in rural elite sites between the 10th and 13th centuries AD (Boves, Pineuilh and Landévennec)

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Archaeological and historical data highlight the key position of pigs in the production and consumption of meat by the rural elites of medieval Europe. However, the husbandry practices for this omnivorous animal remain largely unexplored on this scale in France. Yet pig-rearing systems are varied: fattening in wooded landscapes, grazing in open spaces, or keeping in piggeries depending on local constraints. This study is based on reconstructing the pigs' diet through analyses of stable isotope ratios in bone collagen ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$), combined with the estimation of age-at-death through the analysis of dental eruption and wear, and the consideration of available historical and archaeological data, in order to infer the rearing environments (extensive rearing or close confinement) of pigs from three medieval elite rural sites (10th-13th centuries AD, France).

The assemblages —comprising pig, other domestic animals (cattle, caprines, equines, poultry, dog) and wild animals (wild boar, roe deer, hare)— comes from the castellated site of Boves, set within a varied landscape (meadows, marshes and woods; Picardie), the aristocratic settlement of Pineuilh in a marshy environment (Nouvelle-Aquitaine) and the coastal monastic site of Landévennec (Bretagne). These sites present distinct environments and socio-cultural characteristics, enabling us to test whether these parameters imply preferred husbandry practices.

The rearing strategies employed at each site are similar, and the majority of consumption is of young pigs. These appear to be associated with semi-extensive or semi-confined systems to slightly varying degrees; rearing appears more extensive in Boves and more confined in Pineuilh. Pig diets appear to be little affected by environmental differences, particularly at Landévennec where no isotopic signature of the marine environment is observed. These results may suggest similar husbandry practices, linked to a desire for similar production or the traditions of rural elites, which appear moderately affected by the socio-cultural and environmental differences recorded.

Keywords: pig husbandry, stable isotope analysis, Middle Ages, animal feed

Oral presentation

Livestock breeding and plant use on the eastern coast of the Red Sea in the 10th century AD. A case study

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Livestock and plants have been present in the landscape of the eastern coast of the Arabian Peninsula for centuries, although historical sources mention them very rarely; the accounts are often contradictory, and the current harsh conditions in some places of the eastern coast of the Red Sea make it difficult to breed animals. Keeping this in mind, we studied the traditional forms of acquiring and using animals and plants in the central part of the Red Sea eastern coast in the 10th century AD and checked if they stayed constant up to the opening of the Suez Canal in the mid-19th century, the moment that changed the economy in the region irrevocably. We used classic archaeozoological methods and historical sources to describe the animals kept in the area and to trace changes in the husbandry models. Strontium isotope analysis was used to trace the origin of livestock, chiefly ovicaprines. This method is commonly used to reconstruct livestock provenance, allowing assessment of probable routes of provisioning and trade. We used a combination of methods to describe the meat diet and its changes over the last millennium. Archaeobotanical material, including anthracological and carpological samples, served as indicators of local environmental conditions, diet and exchange. Preliminary results show a change in the proportions of sheep and goats, indicating a shift in animal management, while the external place of provision remained the same throughout the analysed period, as supported by the isotopic analysis. The results of archaeobotanical analyses showed the use of local trees adapted to a hot, dry climate as fuel, with a slight shift towards plants from wetter habitats in later periods, and the consumption of imported cereals.

Keywords: animal remains, plant remains, the Red Sea coast, isotopic analyses, historical sources

Oral presentation

Zooarchaeological analysis of faunal remains from the residential quarter of Aghmat, Morocco

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Aghmat was a prominent medieval settlement in Morocco, serving as a central junction along the caravan paths connecting Sub-Saharan Africa to the western Mediterranean, making it an essential meeting point for caravans to exchange goods and ideologies. This study presents the first zooarchaeological analysis of faunal remains from the residential quarter of Aghmat, aiming to understand the role of animals in the local economy between the 14th and 16th centuries.

A total of 2239 specimens were recovered during two excavation campaigns (2017-2018). They were analysed in the National Institute of Archaeology and Heritage (INSAP) in Rabat following standard zooarchaeological protocols. The assemblage is dominated by caprines (*Ovis aries/Capra hircus*), cattle (*Bos taurus*), equids (*Equus* sp.), dogs (*Canis familiaris*) and few domestic fowl remains (*Gallus gallus*). Among wild taxa the presence of hedgehog (*Erinaceus* sp.), lagomorphs (*Lepus/Oryctolagus*), wild boar (*Sus scrofa*), ducks (Anatini) and an indeterminate wild bird is also attested.

Analysis of age profiles indicates selective culling practices, with cattle typically culled around three years of age and caprines at approximately two to three years. This pattern suggests a deliberate management strategy aimed at maximizing meat yield during the animals' most productive age range. In addition, butchery marks on equids, cattle, caprines, dogs, lagomorphs and chickens reveal systematic carcass processing, including disarticulation, meat removal, and marrow extraction. Finally, a perforated sheep astragalus may be associated with ritual, gaming, or symbolic uses of animal remains in Aghmat society.

Keywords: zooarchaeology, Aghmat, faunal remains, animal husbandry, butchery practices

Oral presentation

Hunting, husbandry, and aquatic resource exploitation at medieval Petrich Kale (northeastern Bulgaria)

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Petrich Kale is a strategically located fortified settlement situated on a rocky promontory overlooking the Devnya Valley, the Provadiya Plateau, and Lake Beloslav in northeastern Bulgaria. Archaeological and historical evidence demonstrates continuous occupation of the site from Late Antiquity until the mid-15th century AD, with only a brief interruption between the 7th and early 10th centuries. Medieval written sources, including al-Idrisi (1153), describe the settlement as a flourishing urban centre situated on the route connecting Varna and Veliki Preslav.

This paper presents the archaeozoological analysis of faunal remains recovered during recent excavations at the fortress and discusses animal exploitation strategies, dietary practices, and environmental conditions at the site. The assemblage comprises 1,367 animal remains, of which 851 were identified to species level. Mammals dominate the assemblage, followed by molluscs and fish, while birds and reptiles are represented in smaller quantities. Domestic animals account for approximately 70% of the identified mammalian remains, with cattle and domestic pig being the most abundant taxa, indicating the major role of animal husbandry in the subsistence economy.

The assemblage also provides important evidence for the exploitation of aquatic resources. Marine molluscs, especially the Mediterranean mussel (*Mytilus galloprovincialis*) and oysters, are well represented and reflect strong connections with the Black Sea coast. In contrast, the ichthyofauna consists exclusively of freshwater species, including catfish, carp, pike, and zander, suggesting intensive exploitation of nearby riverine and lacustrine environments. Bird remains further indicate a diverse surrounding landscape composed of open fields, wetlands, lakes, and coastal habitats.

The faunal data contribute to the reconstruction of the economic organisation and environmental setting of Petrich Kale during Late Antiquity and the Middle Ages and provide new evidence for the interaction between inland fortified settlements and the Black Sea region.

Keywords: archaeozoology, medieval Bulgaria, hunting, animal husbandry, fisheries

Teeth telling tales of mobility and diet in medieval pigs from Antwerp

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Pigs played an important role in medieval urban economies as a source of meat, yet their management in the growing cities of the Low Countries and their hinterland remains relatively understudied. Particularly their role and importance as a livestock species kept within the city walls needs further clarification. This pilot study aims to contribute to our understanding of Medieval pig husbandry practices through examining mobility and diet using strontium isotope ($^{87}\text{Sr}/^{86}\text{Sr}$ and $\delta^{88}\text{Sr}$) and concentration ([Sr]) analysis of pig tooth enamel. The study is based on 17 teeth recovered from the Gildekamersstraat site in Antwerp, a residential site dating to the High Medieval to Post-Medieval period. Pigs formed the third most common species in the zooarchaeological assemblage after sheep and cattle, and a large portion of remains were from juvenile and sub-adult individuals indicating their importance as a meat source.

The $^{87}\text{Sr}/^{86}\text{Sr}$ results reveal isotopic variation within this sample population, suggesting differences in mobility and/or feeding practices, but all signatures can be found from the region surrounding Antwerp. From two individuals, intra and inter-tooth enamel $^{87}\text{Sr}/^{86}\text{Sr}$ measurements revealed contrasting mobility patterns, providing insight into possible changes in mobility and/or diet throughout their lifetime. Strontium concentrations showed variation in the population suggesting different dietary resources, while $\delta^{88}\text{Sr}$ results were relatively consistent in the population suggesting an omnivorous diet for all individuals. Overall, these findings indicate that pig management practices around Medieval Antwerp were not uniform and may have involved animals originating from within the city, as well as individuals from the hinterland, perhaps managed under a pannage system, yet apparently all with a mixed omnivorous diet.

Keywords: suids, isotope analysis, urban livestock, strontium

Oral presentation

The cut: butchering and consumption of birds and domestic mammals in late medieval Finland and Sweden

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Most zooarchaeological assemblages stem from food waste which means that carcass processing and cutting up meat are important factors in understanding consumption patterns. Several variables influence how animal carcasses were processed and cut, such as tradition, purpose, and volume. To understand how domestic animals and birds were butchered for consumption in medieval Finland and Sweden zooarchaeological assemblages from two castle sites were studied together with corresponding information from Bailiff's records. Castles represent good opportunities for observing this practice as they usually rely on relatively large-scale husbandry. The results show that all parts of the domestic mammals were consumed and the carcasses were cut in a standardised way throughout 14th to 17th centuries. Bird bones, both domestic and wild, exhibited similar butchery pattern to an outer archipelago ecclesial site on the Åland Islands. The type of butchery of birds and domestic mammals suggests primarily seasonal large-scale processing of animals for preservation of meat. However, the pattern changes, especially for birds, when the results are compared with rural sites and towns.

Keywords: butchery, consumption, domestic mammals, birds, northern Europe

Poster

Beyond utility: cultural and depositional patterns of equid remains in High Medieval towns in Bohemia

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Equid skeletal remains from High Medieval towns (13th–15th centuries) provide valuable evidence for studying human–equid relationship in medieval society. In addition to sparse skeletal remains of horses, donkeys, or their hybrids found in common settlement contexts, complete skeletons or their parts were buried or deposited in specially designated places. This treatment may have been associated with cultural practices influenced by ecclesiastical regulations. The handling of equid remains was demonstrably different from that of other domestic animals. Nevertheless, bones from various depositional contexts in some cases bear traces of butchery, skinning, and the use of osseous material in craft production. This contribution presents findings from two medieval towns, Most and Mšeno (Czech Republic). We focused on a detailed analysis of equid remains in an urban context, with particular emphasis on phenotypic characteristics, age-at-death estimation, health status, and depositional practices. In the town moat of Most, the remains of at least three individuals were deposited, two of which were likely horse hybrids. The remains of several equid individuals were also recovered from a single archaeological feature in Mšeno.

Keywords: archaeozoology, equids, the High Middle Ages, towns

Oral presentation

Medieval horse anatomical assemblages in Poland

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One of the most intriguing aspects of medieval Polish archaeology is the horse as a magical animal used by Slavs in religious rites.

For decades, this topic was primarily the subject of research by archaeologists and historians interested in Slavic religion. Their considerations were based on relatively sparse and fragmentary archaeozoological data, supported by historical and ethnographic sources. These studies were hampered by the lack of radiocarbon dating, the a priori treatment of skeletons and skulls as grave goods, and the lack of detailed archaeozoological data. Between 2018 and 2023, as part of a project devoted to the importance of the horse in early medieval Poland from the 8th to the 13th centuries, the issue of horse anatomical assemblages was revisited. The research involved a set of classical archaeozoological methods, as well as analysis of archaeological contexts, taphonomy, paleopathology, genetics, and isotopes. The collected information enabled reinterpretation of previous findings and a deeper analysis of the deposition scenarios of horse bodies and/or anatomical parts. This article provides a review of the collected archaeozoological data during the project and an interpretation of the origins of horse anatomical deposits, as well as the horse's significance in medieval Poland.

Keywords: horse, religion, medieval, Slavs, archaeozoology

Oral presentation

Enduring crises: large-scale isotopic evidence for livestock provisioning, mobility, and landscape use in later medieval England

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This paper presents the largest multi-isotope study of zooarchaeological remains yet undertaken for later medieval England, providing new insights into the economic organisation and landscape use of small towns between the 12th and 16th centuries, with a particular focus on the crises of the 14th and 15th century. A large multi- isotope dataset ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$, $\delta^{34}\text{S}$, and $^{87}\text{Sr}/^{86}\text{Sr}$) is generated from sheep, pig, and cattle remains recovered from eight English small towns; Reading, Glastonbury, Romsey, St Albans, Grimsby, Doncaster, Maldon, and Huntingdon. Carbon and nitrogen isotopes are used to investigate foddering regimes and the balance between arable and pastoral resources, while sulphur isotopes trace regional catchments and coastal-inland provisioning patterns. Strontium isotope ratios provide evidence for livestock mobility and the geographical reach of supply networks. The results reveal substantial variability in provisioning strategies, reflecting both local environmental conditions and the diverse economic roles of small towns. Crucially, isotope signatures indicate adaptive responses to the demographic, climatic, and economic shocks of the 14th and 15th centuries, highlighting the resilience and flexibility of small-town supply systems. By integrating large-scale isotopic and zooarchaeological evidence, this study contributes to the UKRI-funded ENDURE project's investigation of how urban lifeways persisted and adapted during periods of profound crisis in later medieval England.

Keywords: –

Poster

In the shadow of the cistern: food waste highlighting eating practices in medieval Alexandria (Egypt)

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Our knowledge of urban life in medieval Alexandria is still largely limited to its defensive infrastructure, such as towers and walls, and its water storage systems, notably its cisterns. Excavations conducted by the CEALex in the early 2000s around the monumental El-Nabih cistern in eastern Alexandria have uncovered for the first time a large amount of dietary waste dating back to its construction and renovation between the 13th and 15th centuries. More than 10,000 animal bones and marine mollusc shells were recovered from four phases. This valuable dataset helped to describe the diet of Alexandrians during the late Middle Ages, prior to the abandonment of this part of the ancient city.

The analysis reveals trends common to the medieval Islamic world, such as a high consumption of sheep and goats and the near-absence of pigs. The larger diversity of the faunal spectrum, including young sheep, camels, poultry, both marine and freshwater fish, and various invertebrates, opens a discussion on local eating habits. The zooarchaeological analysis provides insight into how meat and fishery products were prepared and processed in medieval Alexandria. By cross-referencing these faunal data with other artifacts recovered from the same layers, it was possible to confirm that the cistern waste reflects not only the meat diet of the builders, but also that of a broader segment of the population probably living in the vicinity. Furthermore, through a comparison with various medieval written sources and the few other available archaeozoological studies in Lower and Upper Egypt, the observed commonalities shed light on the meat cut choices of Egyptian society.

Keywords: medieval Alexandria, Egypt, Islamic world, social archaeozoology, foodways

Oral presentation

Between sea and societies: marine invertebrates in the early Middle Ages in Charente-Maritime (France)

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Beyond their role as a simple food resource, how do marine invertebrates reflect the social organisation, cultural practices and beliefs of early medieval societies? This paper presents an original archaeomalacological synthesis drawn from sixteen sites in Charente-Maritime (central-western France) occupied between the 5th and 10th centuries. This remarkable corpus brings together monastic establishments, secular habitats and farms, and funerary contexts, distributed across islands, coastal zones, coastal marshes and hinterland areas.

The study of these assemblages allows us to examine the relationships between early medieval societies and their coastal environment in a territory characterised by strong ecological and cultural diversity (in terms of occupation types and the status of their inhabitants). The aim is twofold: to analyse strategies for exploiting marine resources, and to understand how these resources contributed to the construction of social practices, cultural identities and symbolic relationships with the marine world.

Through a comparative approach, this synthesis examines the interplay between environmental constraints and cultural choices. The differences observed between sites allow us to discuss resource accessibility according to the environments exploited (rocky intertidal zones, muddy areas, coastal marshes), the modalities of inland supply, and the consumption traditions specific to different social contexts.

In a context of restructuring of coastal territories and the consolidation of religious establishments, marine invertebrates emerge as privileged markers for exploring the interactions between early medieval societies and their environment, from economic necessities to symbolic and funerary dimensions.

Keywords: archaeomalacology, early Middle Ages, coastal resources, social practices, central-western France

Shells, crabs and cephalopods: exploitation of marine resources at Talmont-Saint-Hilaire (Vendée) between the 11th and 16th centuries

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The preventive excavation carried out in 2021 at the foot of the castle of Talmont-Saint-Hilaire (Vendée) uncovered part of a vast medieval harbour area. Located in an exceptionally well-preserved waterlogged context, the site yielded significant faunal and plant remains that are rarely preserved in archaeological contexts, including marine invertebrate remains and, more exceptionally, cephalopods.

The archaeomalacological study is based on the exhaustive analysis of molluscs and crustaceans recovered through hand-picking and the sieving of 285 litres of sediment. Twenty-eight marine taxa were identified. The assemblages reflect regular and diversified exploitation of coastal resources, dominated by limpets (*Patella* sp.), toothed top shells (*Phorcus lineatus*), mussels (*Mytilus edulis*) and peppery furrow shells (*Scrobicularia plana*). The exploited species reflect the use of diverse coastal environments (rocky, muddy and sandy) accessible in the immediate surroundings of the medieval harbour.

The peaty context of the site allowed for the exceptional preservation of remains. Several fragments of crab carapaces and claws, attributed notably to the edible crab (*Cancer Pagurus*) and the rock crab (*Eriphia verrucosa*), are likely evidence of their consumption. Even more remarkably, cephalopod beaks were identified in several contexts. These remains, attributable to coleoids (cuttlefish, squid or octopus), represent, to our knowledge, an unprecedented discovery.

These findings open new research perspectives regarding medieval society, and the interdisciplinary approach appears highly promising.

Keywords: archaeomalacology, medieval harbour, marine invertebrates, cephalopods, coastal resources

Oral presentation

Tracking European rat populations across the first and second plague pandemics

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Zooarchaeological remains of black rat (*Rattus rattus*) are significant for European medieval archaeology in at least two ways. Firstly, their frequency and ubiquity *vis-à-vis* other small mammals speaks to urban ecology and the human economic factors underpinning it, especially urbanism and trade. Secondly, the once widely accepted role of rats in historical plague pandemics is now hotly contested and the distribution of their physical remains in relation to these events may lend support to either side of the argument. Interpretation of such data faces significant challenges, however, notably biases caused by variable research intensity – exacerbated by limited recovery – and the mismatch between low-resolution archaeological data and an underlying commensal ecological system expected to be highly dynamic.

This paper tackles these challenges in order to track fluctuations in rats' abundance across Europe through the medieval period, with particular focus on the First and Second Plague Pandemics. Using a dataset of micromammal assemblages both with and without rats, we show that research biases have tended to amplify genuine trends, and that frequencies of rat finds correlate closely with plague history in some regions but much less so in others. While unlikely to be coincidental, the observed correlations do not necessarily imply a direct causal link between rats and plague. We consider the various ways in which rat frequencies may have interacted with human populations, plague, climate, and economy.

Keywords: disease, micromammals, urbanism, trade, rodents

Poster

Dog slaughter and butchery in 14th-century Lille: an integrative approach to the archaeozoological and archival evidence of the “Tuekien”

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This paper presents archaeozoological evidence of dog slaughtering and butchery practices from a single deposit of five adult dogs from a 14th-century context in Lille (northern France). Historical sources from the municipal archives of Lille mention individuals known as the “Tuekien” since 1360, whose activities appear to have been associated with the capture and killing of dogs within the medieval town. However, the precise nature of their work and its relationship to the archaeological record remain poorly understood.

The study combines zooarchaeological analysis and archival documentation in order to explore possible links between these textual references and the faunal assemblage recovered from “Rue Malpart” in Lille. Particular attention is given to skeletal representation, butchery marks, patterns of fragmentation, and perimortem cranial lesions that indicate specific slaughtering methods. Evidence for carcass processing and waste disposal is also considered.

The results suggest deliberate and standardized practices of dog killing and carcass treatment, potentially reflecting specialized activities rather than isolated acts. Comparison with archival data provides new insights into the economic and sanitary roles of the “Tuekien” in medieval Lille. This in turn may explain multiple discoveries of concentrations of dogs and cats that have been discovered in Northern France, in 15th and 16th c Valenciennes and medieval Seclin, with similarly butchered dogs and cats.

Keywords: Lille, 14th century, dog killer, cynophagy, archives

Poster

Late medieval and early modern butchery in northern France: a QGIS-based zooarchaeological study of catering waste from Hesdin (Pas-de-Calais, France)

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In a context marked by the increase of meat consumption in Europe during the late Middle Ages, butchers played a critical role in the daily subsistence of urban populations by handling the processing and distribution of meat products. They formed professional groups, often organised into guilds, able to exercise significant control over the entire meat supply chain. This organisation favoured the emergence and standardisation of new practices, as reflected on the archaeological record of northern France, including Valenciennes, Douai, Lille and Tourcoing, pointing towards a professionalisation of the trade. We will deal here with the town of Hesdin, a major urban centre of medieval Artois, for which written sources mention up to 26 butchers' stalls in the 16th century. An archaeological excavation campaign conducted between 2021 and 2024 at the historical marketplace in Hesdin revealed archaeological layers dating from the 12th to 16th century and led to the discovery of several thousand well-preserved bones consisting of waste associated with the transformation and consumption of animal resources. This presentation will focus on an assemblage of about two thousand faunal remains from 16th century contexts, which have provided the most bones. These bones show many similarities to other bone assemblages from similar regional urban contexts, reflecting the standardisation of butchery practices. To gain a better understanding of butchers' working methods and of the dynamics of meat redistribution in the city, we propose a protocol using GIS software (QGIS) as a tool for recording and processing data. Sketching fragments and butchery marks enables us to understand how butchers transformed carcasses for consumption within collective catering contexts. We also present the interdisciplinary aim of this project, combining written sources with isotopic analyses designed to document livestock breeding practices and the geographical provenance of the animals consumed within Hesdin.

Keywords: archaeozoology, history, butchery, GIS

Oral presentation

Where the river meets the sea: a zooarchaeological perspective from the Tagus estuary (13th-16th centuries)

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The archaeological excavations in Almada (Portugal), a town located between the Tagus estuary and the Atlantic coast, uncovered various storage pits filled with domestic waste, offering sealed contexts from the 13th to 16th centuries. This study included a total of 89,410 faunal remains, encompassing all animal groups and adopting a diachronic perspective to explore patterns of animal exploitation from the Late Middle Ages to the Early Modern period.

The results revealed a diversified subsistence strategy combining aquatic (93%) and terrestrial resources (7%). Fish (notably hake, sardines, and sparids) and bivalves (cockles, mussels and oysters) dominate the assemblages, highlighting the importance of estuarine and marine resources. Domestic mammals (namely cattle, goats, and pigs) formed another important portion of this population's diet, with rabbit and chicken also playing a significant role. Game species, such as deer and wild birds, played a complementary role.

Overall, these results reflect a mixed economy adapted to the seasonal availability of resources, offering new insights into the dietary practices and animal management strategies of this region's inhabitants.

Keywords: zooarchaeology, diet, animal exploitation, late Middle Ages, urban archaeology

Oral presentation

From Cetaceans to artefacts: whale-bone production and coastal resource exploitation in early medieval Iceland and northern Norway

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This research, developed as part of an MA thesis project, investigates human–cetacean relationships through whale-bone crafting during the Settlement Period in Iceland (ca. 870–930 CE) and the Late Iron Age and Viking Age in Northern Norway (ca. 550–1050 CE) through a comparative artefact-based approach. The selection of these regions is informed by environmental, archaeological and historical evidence linking Northern Norway with the first Norse settlers of Iceland during the 9th century CE. Although laws, chronicles, and Icelandic sagas contain important references to cetacean exploitation and whaling activities, the late composition and literary character of these sources often raise questions regarding their historical reliability. Archaeological evidence therefore provides an essential means for reconstructing long-term human–cetacean interactions and coastal adaptation strategies in the North Atlantic.

Despite increasing interest in marine resource exploitation, whale-bone artefacts remain understudied within zooarchaeological research. In Iceland, worked whale bone is generally confined to excavation reports and isolated publications lacking detailed technological and contextual analyses. In Northern Norway, comprehensive studies still largely depend on Thorleif Sjøvold's catalogues (1962; 1974), and more recent contributions only address species identification and artefact typology. Furthermore, museum catalogues often lack detailed descriptions and digital documentation.

This project applies an interdisciplinary methodological framework primarily grounded in chaîne opératoire theory, combined with zooarchaeological, archaeometric, and digital approaches, to reconstruct whale-bone procurement, manufacturing, exchange, and use across coastal settlements. By integrating archaeological assemblages, museum collections, site reports, osteological analysis, morphometric observations, existing aDNA data, and digital documentation, the study explores how whale resources contributed to subsistence, craft production, trade, social organisation, and Norse expansion across the North Atlantic. Preliminary results suggest regional variation in manufacturing practices and resource procurement strategies, highlighting the importance of cetaceans within coastal adaptation processes, maritime economies, biodiversity knowledge, and the long-term resilience of early northern societies.

Keywords: whale bone, coastal settlements, Iceland, Northern Norway, marine exploitation

Oral presentation

Duck tales from Venice: zooarchaeology of waterbirds in the Roman and medieval lagoon (1st-15th c. CE)

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The Venetian Lagoon (north-eastern Italy) is a major wintering site for migratory birds, besides sustaining a diverse resident avifauna. This study explores the past interplay between human communities and the wild bird populations of the lagoon, from Roman times to the end of the Middle Ages (1st-15th c. CE). It employs traditional zooarchaeological analyses (taxonomic frequencies, taphonomy, ageing), medullary bone observations, and applies a recently developed biometric method designed to identify anatid remains to the lowest possible taxonomic rank. Taking into account the diverse forms that human settlement assumed through the centuries, as well as the different natural and anthropogenic habitats of the lagoon, zooarchaeological data from bird remains are processed to shed light on wildfowling dynamics, including practical or cultural preferences for specific birds, and food production. Results highlight the key role played by waterbirds, mostly wild anatids, in the diet of human communities, especially during the Early Middle Ages; the clear prevalence of wild ducks over geese, with mallards prevailing in post-Roman assemblages; and the strong seasonality of wildfowling, which took place mostly in the cold season. These results are integrated with other lines of zooarchaeological, archaeological, and historical enquiry, contributing to the reconstruction of wider human-animal-environment interactions in the ancient and medieval Lagoon of Venice.

Keywords: zooarchaeology, waterbirds, biometry, Venetian Lagoon, Roman period, Middle Ages

Oral presentation

A 'rat's eye view' – exploring rat dietary ecology and human-rat relationships in Medieval Britain through stable isotope analysis

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Black rats (*Rattus rattus*) and brown rats (*Rattus norvegicus*) are among the most successful commensal species, spreading globally beyond native ranges in southern and eastern Asia by colonising niches around human settlements. Although rats live in close association with human societies, their experiences and ecological interactions differ from those of other synanthropic animals. As a result, they offer a unique biomolecular archive reflecting life in past settlements. The RATTUS project (2023-2027) aims to investigate these interactions between European rat populations and human societies over the past c. 2500 years by integrating archaeological, biological and historical methods.

Stable isotope analysis is part of the multiproxy approach of the RATTUS project, with the data generated representing the first large-scale isotopic study of black and brown rats in Europe. By providing a "rat's-eye view" of past environments, isotopic data allows for the exploration of complex socioeconomic and cultural phenomena that have been overlooked, or remain otherwise invisible, in the archaeological record.

This paper presents results of stable isotope ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$) analysis of bone collagen from medieval black rats ($n = \sim 140$, identified through ZooMS), alongside comparative faunal species, from sites across Britain including Exeter, London, Newcastle, York, Jarrow, Wearmouth, Facombe Netherton and Kilton Castle. These locations were chosen to encompass a range of settlement types, including urban centres, religious complexes, rural farmsteads, and castles, allowing investigation of relationships between settlement context and rat dietary ecology.

The results reveal inter- and intra-site variation in rat diets. Broad ranges in $\delta^{15}\text{N}$ values suggest that rats occupied different trophic niches, and contrasts between urban and rural sites indicate that rat feeding strategies were closely linked to local patterns of human subsistence, resource use, and settlement organisation. These findings demonstrate the potential of rat isotopic analysis to illuminate otherwise inaccessible aspects of medieval lifeways and human–animal relationships.

Keywords: rodent, commensal, synanthropic, niche ecology, Europe

The UpDog Database: new approaches to the study of medieval and modern dogs in Portugal

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This study investigates morphological and dietary changes in domestic dogs dated from Medieval and Modern Portugal. Within the scope of the UpDog project (<https://www.uniarq.net/updog.html>), we compiled and systematized all published and recorded canine archaeological remains dated to these periods into a dedicated database. Standard osteometric and odontometric measurements were carried out to explore temporal trends in body size and shape, assessing potential continuity or diversification in morphological patterns through time. Selected specimens were radiocarbon dated to refine chronological attribution, while stable isotope analyses were used to investigate possible shifts in diet and to examine whether regional or social factors influenced canine feeding strategies.

Preliminary results suggest variability consistent with differing environmental and cultural contexts, providing insights into the evolving relationships between humans and dogs in post-medieval Portugal. A subset of crania will be undergoing micro-CT scanning to examine internal morphology, however, complete skulls are rare within the archaeological record.

Altogether, this integrated dataset offers an unprecedented overview of canine biometry, genetic and dietary adaptation in historic Portugal, contributing to broader discussions of animal management, selection, urbanization, and social practices in the early modern period.

Keyword: biometry, stable isotopes, radiocarbon dating, human–dog relationships, Iberian peninsula

Oral presentation

A zooarchaeological perspective on animal husbandry in southern medieval Tuscany (9th-14th c. AD), Italy

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This contribution presents the preliminary results of an ongoing PhD project investigating animal exploitation and husbandry strategies in southern Tuscany between the 9th and 14th centuries AD. The study area was characterised by an intense process of castle-building and mining activities, which profoundly shaped territorial organisation and local economies. The project analyses faunal assemblages from fortified villages and mining castles (e.g., Rocca San Silvestro, Rocchette Pannocchieschi, Cugnano) and focuses on the main domestic species. Preliminary data indicate an overall prevalence of pigs, followed by caprines and cattle. Across the main domesticates, culling profiles point towards subadult slaughtering, consistent with a meat-oriented provisioning system. At Rocca San Silvestro and Rocchette Pannocchieschi, the anatomical distributions show a greater representation of forelimb elements and a lower frequency of hindlimbs, a pattern potentially linked to selective butchery, the redistribution of specific cuts, or supply dynamics associated with these settlements. However, inter-site variability exists, suggesting differences in economic strategies and environmental adaptation. Results are discussed in light of broader zooarchaeological trends identified in medieval Italy, particularly the general increase in caprine exploitation and the relative decline of pig husbandry during the Late Middle Ages. The assemblages analysed here appear to partially align with these patterns, while also reflecting site-specific adaptations shaped by mining activities and environmental conditions. Through diachronic and inter-site comparison, this research contributes to a better understanding of how local territorial dynamics and specialised economies influenced animal exploitation strategies in medieval Tuscany.

Keywords: zooarchaeology, mining castles, fortified villages, main domestic species, southern Tuscany, Middle Ages

Oral presentation

Feeding the bishops: provisioning, consumption, and zooarchaeological evidence from Auckland Castle, Durham, England - preliminary results from recent excavations

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The zooarchaeological analysis of animal remains from recent excavations at Auckland Castle in Durham offers preliminary insights into patterns of animal exploitation and elite consumption within a high-status ecclesiastical household in medieval England. The Bishops of Durham were referred to as 'Prince Bishops', signifying their military, political, and religious authority within the region. Auckland Castle, the main residence of the Bishops of Durham, provides a well-documented case study for examining how zooarchaeological evidence and well-preserved historical records can be integrated to explore how elite ecclesiastical households articulated status through food consumption.

The assemblage is numerically dominated by domestic chickens; however, further analysis reveals a substantial presence of managed game and a diverse range of bird taxa. Comparative analysis of avian species diversity and relative abundance indicates that wild resources were exploited more intensively at Auckland Castle than at some comparable regional elite sites, suggesting distinctive patterns of episcopal consumption. Results from avian species composition and age profile analyses based on skeletal fusion data indicate selective procurement of specific wildfowl taxa and an increased proportion of juvenile birds, consistent with seasonal exploitation and consumption practices associated with elite dining and feasting. In medieval England, wild fowling was closely associated with displays of status and power, as well as with rightful access to scarce resources. The evidence from Auckland Castle suggests that birds formed a deliberate component of elite consumption practices within an ecclesiastical context.

This preliminary study contributes new comparative data to the study of animal use among medieval elites, demonstrating that episcopal households could match or, in some respects, exceed secular elite households in the diversity of wild game and bird exploitation. More broadly, the assemblage from Auckland Castle highlights the importance of zooarchaeological evidence in exploring the expression of power and status in high-status ecclesiastical contexts in medieval England.

Keywords: ecclesiastical, fowling, consumption, high-status, north-east England

Keynote presentation

Wandering herds: zooarchaeological and biochemical approaches to transhumance and animal mobility in medieval societies

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The seasonal and long-distance movement of livestock stands among the defining features of medieval pastoral economies, yet it remains one of the most challenging phenomena to identify in the zooarchaeological record. Transhumance — the cyclical displacement of herds along fixed routes between lowland winter pastures and upland summer grazing — and itinerancy — the non-cyclical, fluid movement of animals and herders across variable landscapes — leave few durable archaeological signatures, posing a persistent methodological challenge for the discipline.

This talk examines the conceptual distinctions between these mobility strategies and surveys the evolving zooarchaeological approaches to their identification. Traditional methods — species composition, mortality profiles, landscape survey — established the interpretive foundations, yet their resolution remains limited when it comes to reconstructing the lives of individual animals. The past two decades have changed this considerably. Bone collagen carbon and nitrogen isotopes now shed light on diet, pasture use, and feeding strategies, while sequential analyses of oxygen, carbon, nitrogen, and strontium in tooth enamel and dentine allow us to follow individual animals through the seasons — capturing dietary shifts, birthing patterns, and geographic movement with unprecedented precision. ZooMS and sedimentary ancient DNA extend the toolkit further still, enhancing species identification and refining our understanding of herd dynamics at a landscape scale.

Drawing on case studies from contrasting geographical and cultural contexts — such as medieval Iberia, the Alps, sub-Saharan Africa, and the Andes — this talk argues that animal mobility was rarely a straightforward ecological or pastoral response. It was frequently embedded in broader processes of political transformation, state formation, and demographic change. Taken together, these cases demonstrate that the integration of traditional zooarchaeology with biochemical approaches represents not merely a technical refinement but a shift in research perspective — one that places animal mobility at the intersection of social, political, and ecological history across medieval and comparable societies worldwide.

Keywords: transhumance, itinerancy, medieval zooarchaeology, stable isotopes, pastoral mobility

Poster

Herding landscapes: from Roman to medieval pastoral strategies

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In this poster we present the HerdScape project recently granted by FCT (2024.16309.PEX). This project started in February 2026 and investigates the evolution of animal husbandry practices from the Roman to Medieval periods in central-northern Portugal, with a focus on sheep management strategies and the development of transhumance systems.

The Roman and Medieval periods in Europe witnessed significant political, economic, and societal transformations that fundamentally altered consumption patterns, production methods, and landscape use, with these changes being preserved in the zooarchaeological record. The archaeological site of Idanha-a-Velha, situated in central-northern Portugal, has yielded an exceptionally well-preserved and diverse faunal assemblage, spanning over a millennium, from the 1st to the 12th centuries CE (Roman to Medieval periods), offering a unique opportunity to study such historical transformations in a region where zooarchaeological data is scarce.

The project integrates archaeological, historical, and ethnological evidence with traditional zooarchaeological methods and advanced molecular and isotopic analyses. More specifically, isotope data (carbon, nitrogen, oxygen and strontium) of teeth and bones from faunal remains excavated at Idanha, will be combined with kill-off patterns and biometric analyses to reconstruct: 1) period-specific animal exploitation patterns, including specialised production strategies and agro-pastoral systems, and 2) sheep-specific strategies, focusing on mobility patterns by examining their routes and rhythms, as well as researching the origins of transhumance practices. This is particularly relevant given Idanha's documented role in historical transhumance systems, as evidenced by early modern and 20th-century ethnographic records.

The poster presentation will feature the archaeological site, the analytical methodology employed, and preliminary results from both methodological and historical analyses.

Keywords: isotopes, animal resource management, animal mobility, multidisciplinary