



HUGO OBERMAIER SOCIETY

ICArEHB – INTERDISCIPLINARY CENTER FOR ARCHAEOLOGY AND THE
EVOLUTION OF HUMAN BEHAVIOUR (UNIVERSIDADE DO ALGARVE)



Converging Horizons: Cultural and Environmental Interactions in the Prehistory of the European Far West



Illustration: Pedro Loureiro

66th CONFERENCE OF THE HUGO OBERMAIER SOCIETY
April 22nd to 26th, 2025, Faro
HYBRID CONFERENCE



Hugo Obermaier Society
for Quaternary Research and Archaeology of the Stone Age



66th Annual Meeting in Faro

April 22nd – April 26th 2025

In cooperation with



ICArEHB



UAlg

UNIVERSIDADE DO ALGARVE

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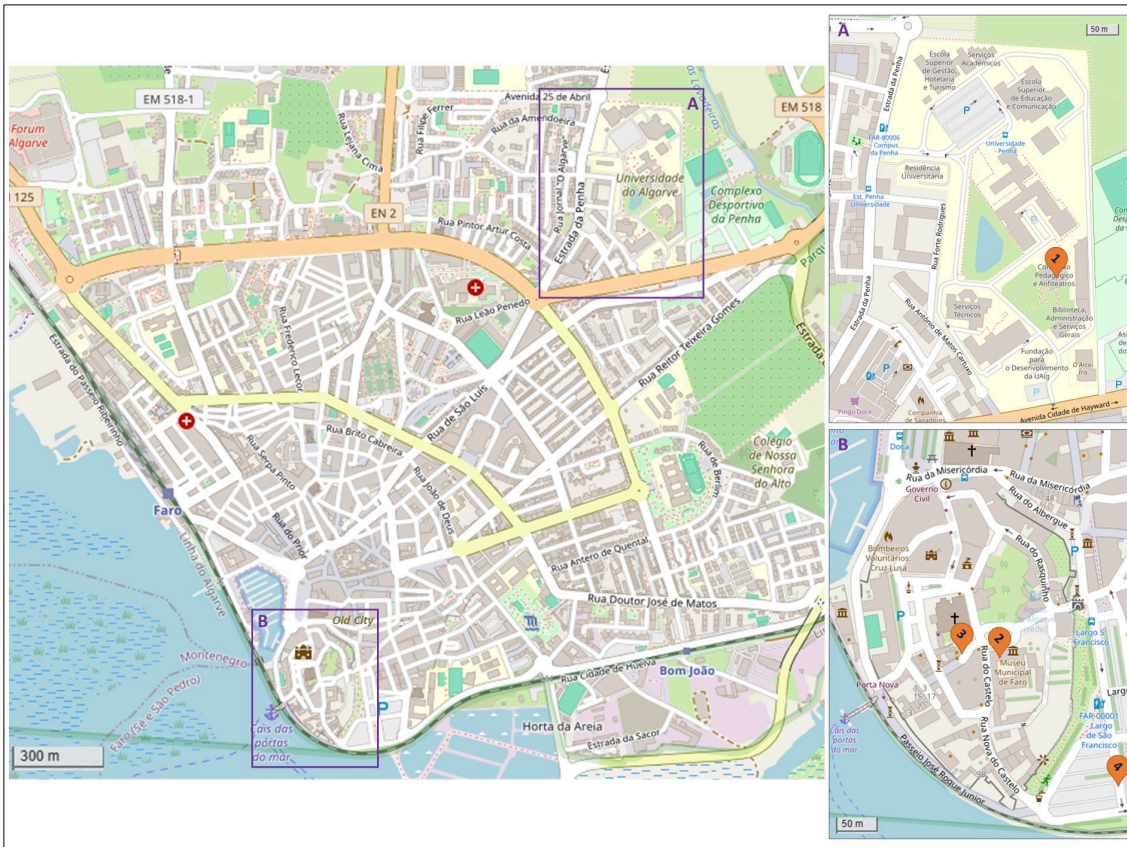
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Map of Faro with the location of: 1- Conference Venue (Complexo Pedagógico, Campus Penha, Universidade do Algarve), 2- Evening Reception (Municipal Museum of Faro), 3- Conference Dinner at Tertúlia Algarvia Restaurant, and 4- Start and end for the excursions (Parking Largo de São Francisco).

Program Overview

ATTENTION: Time Differences! Note that the schedule is in UTC+1!

Tue, April 22nd, 2025

Auditório 1.5, University of Algarve (Campus da Penha), Edifício 9 – Complexo Pedagógico, 8005-139 Faro

- 11:30** Opening of the conference office at Auditório 1.5
- 13:30** Beginning of the meeting, welcome by our hosts and the president of the Hugo Obermaier Society
- 14:00 – 17:10** Presentations (Coffee break: 15:40 – 16:10)
- 17:30 – 18:30** Poster session I
- 19:00** Evening reception at the Garden of the Cloister at the Municipal Museum of Faro (Largo D. Afonso III, 14, 8000-167 Faro)

Wed, April 23rd, 2025

Auditório 1.5, University of Algarve (Campus da Penha), Edifício 9 – Complexo Pedagógico, 8005-139 Faro

- 09:00 – 12:00** Presentations (Coffee break: 10:20 – 10:50)
- 12:00 – 14:00** Lunch break
- 14:00 – 16:50** Presentations (Coffee break: 15:20 – 15:50)
- 17:00 – 18:00** Poster session II
- 18:15** Evening lecture by João Cascalheira (ICArEHB)
- 20:00** Conference Dinner at Tertúlia Algarvia (Praça Dom Afonso III 15, 8000-167 Faro)

Thu, April 24th, 2025

Auditório 1.5, University of Algarve (Campus da Penha), Edifício 9 – Complexo Pedagógico, 8005-139 Faro

- 08:40 – 12:20** Presentations (Coffee break: 10:20 – 10:40)
- 12:20 – 14:00** Lunch break
- 14:00 – 18:10** Presentations (Coffee break: 16:00 – 16:30)
- 18:30** General Assembly
- 20:30** Get-together

Fri, April 25th, 2025, Excursion A:

(08:00 – 19:00)

Concheiros de Muge and exhibition at Casa Cadaval

Sat, April 26th, 2025, Excursion B:

(08:00 – 18:00)

Gruta da Companhia, Vale Boi and Museum of Vila do Bispo, Rocha das Gaiotas

Detailed Program

Tuesday, April 22nd, 2025

- 11:30** Opening of the conference office at *Auditório 1.5, University of Algarve (Campus da Penha), Edifício 9 – Complexo Pedagógico, 8005-139 Faro*
- 13:30** Beginning of the meeting, welcome by our hosts and the president of the Hugo Obermaier Society
- 14:00 – 14:20** *João Luis Cardoso & Alfredo Mederos Martin*
Hugo Obermaier and Portugal through his correspondence to three Portuguese archaeologists: Joaquim Fontes, José Leite de Vasconcelos and Manuel Heleno
- 14:20 – 17:10** **Presentations on the Lower and Middle Palaeolithic**
- 14:20 – 14:40** *Olaf Jöris, Peter Fischer, Marcel Weiss & Andrzej Wiśniewski*
Lower Palaeolithic Chronostratigraphy of Central Europe 30 years after the “Short Chronology”
- 14:40 – 15:00** *Sol Sánchez-Dehesa Galán, Jacques Pelegrin, Miguel García Bustos, Olivia Rivero Vilá & Margherita Mussi*
Learning in the Acheulean: From Tool Shapes to Mental Templates
- 15:00 – 15:20** *Marco Carpentieri, G. Fioretti, A. Pineda, A. Iannucci, B. Mecozzi, G. Eramo, M. Arzarello, S. Simone & M.-H. Moncel*
Technical behaviours during the Early Middle Pleistocene – New insights on the lithic industry of Loreto, a site across Lower and Middle Palaeolithic
- 15:20 – 15:40** *Nico Magliozzi*
The Pontinian. An industry on pebbles from southern Latium, Italy
- 15:40 – 16:10** **Coffee break**
- 16:10 – 16:30** *Haoyue Hu, Zhexuan Zheng & Nicholas J. Conard*
Late Middle Pleistocene Technological and Behavioral Shifts in South China
- 16:30 – 16:50** *Elisa Luzi, Àngel Blanco-Lapaz, Jordi Serangeli, Nicholas J. Conard & Thijs van Kolfschoten*
Life on the shore: the micromammal assemblage of the Schöningen 13-II-4 Obere Berme (Middle Pleistocene, northern Germany)
- 16:50 – 17:10** *Àngel Blanco-Lapaz, Elisa Luzi, Jordi Serangeli & Nicholas J. Conard*
The secret of the lake. The role of fish during the Middle Pleistocene at Schöningen (northern Germany)
- 17:30 – 18:30** **Poster session I**
- 19:00** **Evening reception at the Garden of the Cloister at the Municipal Museum of Faro** (Largo D. Afonso III, 14, Faro)

Wednesday, April 23rd, 2025

- 09:00 – 12:00** **Presentations on the Middle Palaeolithic**
- 09:00 – 09:20** *Katarzyna Pyżewicz, Witold Grużdź, Andrzej Wiśniewski, Adam Kobyłka, Witold Migal, Piotr Moska, Claudio Berto, Maciej Krajcarz & Barbara Woronko*
What are we MIS-sing? New insights into the chronology of Zwoleń, Poland
- 09:20 – 09:40** *Viola Fratta, Patrick Schmidt & Nicholas Conard*
A single test for raw material properties: hardness and stiffness of tools-stones from Sibhudu
- 09:40 – 10:00** *Alvise Barbieri, Sara Rhodes, Flora Schilt, Christoph Mayr, Thomas Higham, Andreas Pfmeter, Kerstin Pasda & Thorsten Uthmeier*
Richer than the Middle Palaeolithic of Swabia: exploring the hypothesis of different Neanderthal site use at Sesselfelsgrötte
- 10:00 – 10:20** *Davide Delpiano, Davide Margaritora, Matteo De Lorenzi, Alessandra Pedrelli, Ursula Thun-Hohenstein & Marco Peresani*
Updated evidence from Ghiacciaia Cave (Fumane, Italy) in the context of late Neanderthal techno-complexes within the Po-Adriatic Basin of Northern Italy
- 10:20 – 10:50** **Coffee break**
- 10:50 – 11:10** *Martyna Lech & Nicholas J. Conard*
The leaf point in context provides new insights from Hohle Fels Cave
- 11:10 – 11:30** *Marco Peresani, Lisa Carrera & Rossella Duches*
Large raptors, Neanderthals and beyond Neanderthals: new evidence from Grotta di Fumane
- 11:30 – 12:00** *Mourad Farkouch, Juan Ignacio Morales, Hassan Aouraghe, Hicham Mhamdi, Mohamed Souhir, María Soto, Diego Lombao, Said El Bourkadi, Antoni Canals-Salomó, Alfonso Benito-Calvo, Raül Bartrolí, Hamid Haddoumi, Robert Sala-Ramos & M. Gema Chacón*
Settlement Dynamics during the Middle and Later Stone Age in the Aïn Beni Mathar – Guefaït Region (Eastern Morocco): Predictive modelling for tracing Paleolithic sites
- 12:00 – 14:00** **Lunch break**
- 14:00 – 16:50** **Presentations on “Converging Horizons: Cultural and Environmental Interactions in the Prehistory of the European Far West”**
- 14:00 – 14:20** *Juan Manuel Jimenez-Arenas, Juan José González Quiñones, Juan Francisco Reinoso Gordo, Pedro Matias, Vitor Santos & Hugues-Alexandre Blain*
Humans on the road. Connectivity in the Iberian Peninsula during the Early Pleistocene

- 14:20 – 14:40** *Àngel Blanco Lapaz, Tomáš Přikryl, Christian Sánchez-Bandera, Jordi Agustí, Deborah Barsky, Oriol Oms, Hugues-Alexandre Blain, José Antonio Solano-García, Juan Manuel Jiménez-Arenas, Àngel H. Luján, Elvan Demirci & Josep Sanjuan*
Far west and near east, two sides of the same coin. Characterizing Early Pleistocene freshwater ecosystems based on fish remains
- 14:40 – 15:00** *Nompumelelo Maringa, Sara E. Rhodes, Milena Carvalho, Jonathan Haws & João Cascalheira*
Reconstructing the palaeoenvironmental conditions using micromammal fossil assemblages at Lapa do Picareiro during the Middle to Upper Palaeolithic Transition
- 15:00 – 15:20** *Yvonne Tafelmaier, José Ramos-Muñoz, Julia Blumenröther, Juan J. Cantillo-Duarte, Salvador Domínguez-Bella, Martin Kehl, Serafín Becerra-Martín, Eduardo Vijande-Vila & Gerd-Christian Weniger*
Sima de las Palomas de Teba (Province of Málaga/Spain): variability in hunter-gatherer occupational patterns during the last glacial in Southwest Europe
- 15:20 – 15:50** **Coffee break**
- 15:50 – 16:10** *Alejandro Prieto, Julien Le Guirriec, Aitor Calvo, Jonás Alcaina, Eulalia Rafart & Marta Sánchez de la Torre*
Geoarchaeological characterisation of Chalosse cherts, a Palaeolithic long-distance mobility tracer at Western Europe in the framework of the ERC-SPEGEOCHERT project
- 16:10 – 16:30** *Javier Sánchez-Martínez, Marta Sánchez de la Torre, Jorge Martínez-Moreno & Rafael Mora*
Reconstructing human ecodynamics and chert procurement in the southern façade of the Pyrenees during the Upper Palaeolithic: the case of Cova Gran de Santa Linya
- 16:30 – 16:50** *Carlos Simões, Eneko Iriarte, Igor Gutiérrez-Zugasti & Pablo Arias*
Beyond Waste Disposal: The Dynamics of Asturian Shell Middens Formation
- 17:00 – 18:00** **Poster session II**
- 18:15** **Evening lecture by João Cascalheira (ICArEHB)**
The Far West: Recent Advances in the Study of Late Pleistocene Adaptations in southwesternmost Iberia
- 20:00** **Conference Dinner at Tertúlia Algarvia** (Praça Dom Afonso III 15, Faro)

Thursday, April 24th, 2025

- 08:40 – 12:20** **Presentations on the Upper Palaeolithic**
- 08:40 – 09:00** *Guido Bataille, Olaf Bubbenzer, Stefan Hecht & Dennis Batz*
One hundred and eighteen years after. Recent archaeological investigations at Sirgenstein Cave in the Swabian Jura (Germany)

- 09:00 – 09:20** *Benjamin Schürch & Nicholas J. Conard*
Artifact life histories and paleoeconomy during the Aurignacian at Vogelherd Cave
- 09:20 – 09:40** *Tilman Böckenförde, Gabriele Russo & Thomas Terberger*
The Aurignacian open-air site Friedrichsdorf-Seulberg (Germany): New Insights into Early Upper Paleolithic Mobility and Technology
- 09:40 – 10:00** *Svenja Schray & Nicholas J. Conard*
Unraveling Aurignacian lifeways at Geißenklösterle: Insights from lithic technology and spatial analysis
- 10:00 – 10:20** *Gloria Cattabriga, Amelia Bargalló Ferrerons, Davide Delpiano & Marco Peresani*
Zooming into a Gravettian hunter-gatherers group: lithic refitting as a tool to focus on individuals and their skills
- 10:20 – 10:40** **Coffee break**
- 10:40 – 11:00** *Elena T. Moos, Flavia Venditti & Nicholas J. Conard*
Technological and Functional Insights into Gravettian Fléchettes of the Ach Valley
- 11:00 – 11:20** *Vojtěch Zábajník & Sandra Sázelová*
Virtual Reconstruction of the Face of Gravettian Hunter DV16 from Dolní Věstonice
- 11:20 – 11:40** *Cristian Micó, Florent Rivals & Ruth Blasco*
Hidden tools of the past: identifying and understanding tooth retouchers in the archaeological record
- 11:40 – 12:00** *Harald Floss & Juan F. Ruiz-López*
Hugo Obermaier in Spain – His pioneering work from the perspective of current research on Levantine art
- 12:00 – 12:20** *Camila Muñoz-Soto & Juan F. Ruiz-López*
Cueva de la Vieja, Obermaier and the scientific study of Levantine art in the 21st Century
- 12:20 – 14:00** **Lunch break**
- 14:00 – 16:00** **Presentations on the Upper Palaeolithic**
- 14:00 – 14:20** *Firas Jabbour, Boris Gasparyan & Andrew W. Kandel*
Settlement Scenarios in Aghitu-3 Cave in Armenia: A Study of the Raw Material Units of the Upper Paleolithic Assemblages
- 14:20 – 14:40** *Joshua London, Marian Vanhaeren, Nicholas J. Conard & Sibylle Wolf*
Beyond Boundaries: Tracking UP Cultural Identity and Exchange Networks with Red Deer (*Cervus elaphus*) Maxillary Canine Ornaments
- 14:40 – 15:00** *Norbert Buchinger, Caroline Posch & Marc Händel*
LGM industries along the Danube – New insights on the lithic inventories from Langmannersdorf and Saladorf

- 15:00 – 15:20** *William Murphree, Cruz Ferro-Vázquez, Larissa Kulakovska, Vitalii I. Usyk, Olesia Kononenko, Marjolein D. Bosch, Paul Haesaerts, Freddy Damblon, Stéphane Pirson, Philip R. Nigst & Vera Aldeias*
Fire use during the Last Glacial Maximum: evidence from the Epigravettian at Korman' 9, Middle Dniester Valley, Ukraine
- 15:20 – 15:40** *Marius Aichtelik, Julien Monney, Michael Nagel & Harald Floss*
Who was involved in making cave art in the Upper Palaeolithic? – A dactyloscopic approach analysing ancient palm prints
- 15:40 – 16:00** *Dennis Th. Batz & Andreas Maier*
Quantitative Analyses of potential Upper Paleolithic Dwelling Structures in Western, Central, and Eastern Europe
- 16:00 – 16:30** **Coffee break**
- 16:30 – 18:10** **Presentations on the Upper and Final Palaeolithic, Mesolithic and Neolithic**
- 16:30 – 16:50** *Andreas Pastoors, Thorsten Uthmeier, Eric Bégouën & Robert Bégouën*
Inspecting, categorising, digitising... analysing data from the multi-layered structured painted Volp caves (Tuc d'Audoubert, Trois-Frères, Enlène). The long process of successfully integrating data from different sources
- 16:50 – 17:10** *Flavia Venditti, Armando Falcucci & Benjamin Schürch*
On the exploitation and significance of bivalve shells at the Magdalenian site of Petersfels (South Germany)
- 17:10 – 17:30** *Tor Arne Waraas*
Big points – big bluffs “Bromme” points from Western Norway
- 17:30 – 17:50** *Katarína Kapustka, Lenka Varadinová & Ladislav Varadin*
Use of quartz in the lithic production at the Mesolithic site of Sphinx in central Sudan: consistence, or variability?
- 17:50 – 18:10** *Jonna Bügenburg, Raiko Krauß & Christopher Miller*
Understanding early neolithic wetland environments and how they shaped settlement dynamics and subsistence strategies in NW Romania – a geoarchaeological approach
- 18:30** **General Assembly**
- 20:30** **Get-together**

Poster session I

Guillermo Alzate-Casallas, Carlos Duarte Simões, Asier García-Escárzaga & Igor Gutiérrez-Zugasti
Microstratigraphic investigations at the Mesolithic shell midden of La Chora cave, Cantabria, Spain

Robin Andrews & Harald Floss

A new absolute Dating Program for the Châtelperronian in Eastern France – Re-examination of the Sequence from the Grotte de la Verpillière I (Germolles)

Hans Ansorg

Distinguishing Artifacts from Geofacts in Gravel Complexes: An Experimental Archaeological Approach

Andion Arteaga-Brieba, Mikel Arlegi, Carmen Alonso-Llamazares, Martin Arriolabengoa, Aitor Burguet-Coca, Miriam Cubas, Felipe del Cojo, Mónica Fernández-García, Asier Gómez-Olivencia, Arturo Hermoso de Mendoza, Juan Ignacio Morales, Andreu Ollé, Adrián Pablos, Ana Pantoja-Pérez, Joseba Rios-Garaizar, Manuel Rodríguez-Almagro, Antonio Rodríguez-Hidalgo, Nohemi Sala, Urko Santamaría-Díaz, Miguel Soares-Remiseiro, Cristina Val-Peón & Mónica Villalba de Alvarado

New perspectives on Abautz Cave: Rethinking a classic site

Ejder Babazade & João Marreiros

Karabakh Palaeolithic Project: Human ecological and cultural dynamics during the Late Pleistocene in the Caucasian corridor. Archaeological survey and new archaeological excavations at Azykh Cave (Azerbaijan)

Lena Bendasch

A multi-method analysis of the engravings in the “Kleines Schulerloch” cave (Bavaria, Germany)

Miguel Angel Berjon-Lobato, Maria Jose Iriarte-Chiapusso & Alvaro Arrizabalaga

Esnate (Northern Iberian Peninsula). A Mousterian open-air camp site in the Sakana Valley

Chafim Braga & Ricardo Miguel Godinho

Comparative analysis of the dental wear plane between hunter-gatherers and agro-pastoralists in the Western Iberian Peninsula

Laura Centi, Francesco Valletta & Olaf Jöris

Reconstruction of the post-occupational history of the Aurignacian open-air site of Breitenbach (Sachsen-Anhalt, Germany) based on systematic lithic refittings and find orientation analysis

Lucía Cobo-Sánchez, Guillermo Alzate-Casallas, Alvise Barbieri, Lino André, Inci Ozdogru, Javier Sánchez-Martínez, Milena Carvalho, Nolan Ferar, Nompumelelo Maringa, Jovan Galfi, Miguel Costa, Célia Gonçalves & João Cascalheira

New excavations and preliminary findings on Pleistocene remains from Gruta da Companheira (Algarve, Southern Portugal)

Davide Delpiano, Brad Gravina & Marco Peresani

Innovations in Prehistoric lithic technology: the configuration of backed tools in the Paleolithic

Alexandra Dermeková, João Marreiros & Petr Neruda

Late Neanderthal Activity Patterns in Middle Palaeolithic Caves: Use-wear analysis of the Micoquian lithic industry from Kůlna Cave, Czech Republic

Takalani Dubayi, Li Li, Sarah Wurz & Nuno Bicho

Tracking human dispersals in late Pleistocene southern Africa: a focus on Mozambique over the last 100,000 years

Michaela Ecker, Beatrice Bin, Nils Andersen, Will Archer, Britt Bousman, Josep M. Parés, Mailys Richard & Michael B. Toffolo

A Pleistocene n-alkane biomarker record from Florisbad, South Africa

Agata Gaszka, Li Li & Tomos Proffitt

The Significance of bipolar technology in the evolution of stone tools: a comprehensive exploration

Rebecca Gnau & Andreas Maier

Analysing the Combined Effects of Fireplaces and Shelter-Structures at Open-Air Sites using Fire Dynamics Simulator

Ivânia Gouveia, Maria João Valente & João Muralha Cardoso

Negative Structures through mammal and shell remains: preliminary results from the Prehistoric station of Monte do Marquês 15 (Beringel, Beja)

Hannah Huber

News from the Neckar valley – A new research project on the Late Mesolithic in Southwest Germany

Johanna Jeschke

The early Upper Palaeolithic between the Harz Mountains and the Thuringian Forest

Katarína Kapustka & Tereza Zemanová Davidová

The New Magdalenian Collection from Zbořený Kostelec (Central Bohemia) in the Context of Regional Knowledge on Terminal Palaeolithic Settlements

Samuel Kasemann, Walpurga Antl-Weiser, Michael Brandl, Stephane Pirson, T. Bence Viola, Marjolein D. Bosch & Philip R. Nigst

A substantial shift in lithic raw material use during the Gravettian at Grub-Kranawetberg I and II, Austria

Veronika Kaudela, Veerle Rots, Andreas Maier, Mircea Anghelinu & Marc Händel

Understanding the edges – use-wear analysis of blades and bladelets of the Upper Palaeolithic sites Bistricioara-Lutărie III and Bistricioara-La Mal, Romania

Osman Khaleel, Sol Sánchez-Dehesa & Nuno Bicho

Middle Stone Age Adaptations in the Kerma Region: Stratified Rock Shelter and Site Diversity (DIASPORA Project 2019-2023)

Valentina Lubrano, Anna Rufà, Ruth Blasco, Florent Rivals & Jordi Rosell

The Role of Fauna in Reconstructing Neanderthal Occupation Duration: the case of Teixoneres Cave Sub-unit IIIb

Daniela Maio, João Miguel Mico Cascalheira & Célia Maria Alves Gonçalves

Shaping the landscape: Human Occupation and Settlement Strategies between the Gravettian and Solutrean through GIS

Poster session II

Alicia Muñoz del Pozo, M. Gema Chacón, Bruno Gómez de Soler, Andrea Picin, Guillermo Bustos-Pérez, Ruth Blasco, Florent Rivals, Anna Rufà & Jordi Rosell

Reevaluating Neanderthal Mobility and Lithic Strategies: New Perspectives from Teixoneres Cave (Level IIIb)

Philip R. Nigst, Larissa Kulakovska, Viatly I. Usyk, Olesia Kononenko, Paul Haesaerts, Stéphane Pirson, Pía Spry-Marqués, Lilia Popova, Yana Popiuk, William Chase Murphree, Freddy Damblon & Marjolein D. Bosch

Animal exploitation by hunter-gatherers during the Last Glacial Maximum: New results of spatial and zooarchaeological analyses at Korman' 9, Ukraine

Benedetta Perissinotto, Matteo De Lorenzi & Marco Peresani

The Middle Palaeolithic in the Berici Hills: contribution to the archaeozoological study of the large mammals of Grotta Maggiore di San Bernardino (Vicenza)

Janos Puschmann, Jürgen Richter, Christine Heim & Andreas Maier

Lamps? – Lipid analysis of concave rock slabs and soils from the Magdalenian site of Bad Kösen-Lengefeld

Helena Reis, António Valera & Célia Gonçalves

Measuring the Impact of Environmental and Socio-Cultural Variables on Mesolithic Settlement Patterns between the Tagus and Mondego Valleys (Western Portugal): Preliminary Results

Sara E. Rhodes, M. Ecker, M. Carvalho, C. Simões, C. Green, N. Maringa, S. McPherron & J. Haws
The Lapa do Picareiro MicroContextual Excavation (LdP MiCE) Project: an interdisciplinary approach to archaeological excavation at the microscale

Daniel Richter, Moiken Hinrichs, Christoph Unglaub, Mara-Julia Weber & Sabine Gaudzinski-Windheuser

The tunnel valley of Ahrensburg: Status and plans for new activities

Florent Rivals, Dorothee G. Drucker, Jordi Nadal, Isaac Rufi, Joaquim Soler, Narcís Soler & Julià Maroto

Ecology of ungulates in the Northeastern Iberian Peninsula during the Upper Palaeolithic: Insights from stable isotopes and dental wear analysis

Jerome Robitaille & Sabine Gaudzinski-Windheuser

Exploring Neanderthal Hide Processing: Functional Insights from Use-wear Studies, 3D Surface and SEM Analysis on Middle Paleolithic Bone Tools

Matthias Rosenthal, Joel Orrin, Florian Sauer, Andreas Maier & Jürgen Richter

Block excavation of selected pit features from the Magdalenian settlement at Bad Kösen-Lengefeld, Saxony-Anhalt

Anna Rufà & Mariana Nabais

Exploring avian use in the Palaeolithic: challenges and experimental insights

Rudenc Ruka, Michele Bassetti, Stefano Bertola, Davide Delpiano, Ilirjan Gjipali & Marco Peresani
A Middle Paleolithic site with Discoid technology in Southeast Albania: lithics, petroarchaeology and Quaternary context of Istraishta, Korça Basin

Osama Samawi & Emily Hallinan

More Than Surface Finds: Nubian Levallois Core Metric Variability and Site Distribution Across Africa and Southwest Asia

Marcel Schemmel & Veerle Rots

Do all Roads lead to Rome? – On the current State of Lithic Projectile Analysis

Lisa Schunk, Walter Gneisinger, Tamrat Kahsay Habtu, Paolo Sferrazza, Aristeidis Varis & João Marreiros

Between extremes and reality: testing the effect of post-depositional processes on the surface of lithic artefacts to infer on tool use and site formation

Tjaark Siemssen

Reconfiguring Culture-Environment Interaction in MIS 3: A Multiscalar Analysis across Lesotho and South Africa

Patrícia Simão, João Cascalheira & Anna Rufà

The exploitation of terrestrial resources during the Gravettian: results of a small faunal assemblage from the Terrace area at Vale Boi

Miguel Soares-Remiseiro, Vera Aldeias, Diego Lombao, Josep Vallverdú & Juan Ignacio Morales

Site formation processes in close-by Archaeological deposits: Cova Foradada and La Griera

Laura Stiller

The lithic assemblage of the Bohunician open-air site of Herrnsaal, Bavaria – indications for the earliest dispersal of the anatomically modern human to Central Europe

Yvonne Tafelmaier, Chris Baumann, Thomas Beutelspacher, Max Engel, Stefan Hecht, Manuel Herzog, Elisa Luzi, Susanne C. Münzel, Giulia Toniato & Olaf Bubbenzer

The Brudertal revisited – ongoing research in a Magdalenian contextual area

Francesco Valletta, Matteo Rossini, Maya Oron, Giulia Marciani, Isabella Caricola, Ana Abrunhosa, Vincenzo Spagnolo, Annamaria Ronchitelli, Stefano Benazzi, Francesco Berna, Francesco Boschin & Omry Barzilai

Technological continuity and variability along the Late Middle Palaeolithic sequence of Riparo L'Oscurusciuto (Apulia, Italy) – A hybrid traditional and 3D-based approach

Marcel Weiss, Andrzej Wiśniewski, Lena Bandasch, Lisa Schunk, Sara Díaz Pérez & Wolfgang Bernhardt

The Lower Palaeolithic assemblage of Schladebach/Wallendorf (Saxony-Anhalt, Germany) – insights into technology and tool manufacture of MIS 11 Central Europe

Rowena Winterhalder, Inez Faul, Christopher Green, Sarah Mothulatshipi, Phillip Segadika & Michaela Ecker

Tracking lithics in the open air. Analysing lithics from Maralaleng Pan, southern Botswana

Heike Würschem, Gabriele Russo, Madison McCartin, Harald Floss, Reinhard Leibecke & Jordi Serangeli

The Mesolithic of Solling: An analysis of the lithic artefacts of Sievershausen 3 and 15

Filippo Zangrossi, Diego Lombao, M. Gema Chacón, Palmira Saladié, Josep Vallverdú & Manuel Vaquero

Tri-dimensional stratigraphic analysis at the Middle-Palaeolithic site of Abric Romaní (Capellades, Barcelona, Spain): integrating 3D modelling, the artifacts' volumes, superimposition and features, and the graph theory

Niklas Ziemer & Andreas Maier

The Surface Collection of Burgkunstadt-Ebneth (Upper Franconia, Bavaria)

Abstracts of Presentations and Posters

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Who was involved in making cave art in the Upper Palaeolithic? – A dactyloscopic approach analysing ancient palm prints

Depictions of hands (hand negatives, hand positives and palm prints) are a very frequent motif occurring globally in Upper Palaeolithic cave and rock art. We do not know about their actual “meaning”, if the three mentioned depiction types can be summarized or why ancient people chose to use one or the other or all of them combined (cf. Grotte Chauvet, Ardèche, France). We can furthermore not be certain in any way if they were used or interpreted in a comparable way everywhere. When it comes to the meaning, several ideas were formulated in the past. Hand depictions could have been some kind of signature or a marker from a person who came to a particular space. Perhaps some kind of “ownership rights” was transferred. Or maybe in an animistically characterized community where ancestors were thought to be living on in natural places including animals, killing such a living creature would have led to a problem that could just be solved in a ritual. Hands pressed against a cave wall, which might have been seen as a separating membrane between the here and now and the afterworld, perhaps functioned as some kind of stop signs, an apotropaic magic, preventing the angry ancestors from coming back and taking revenge for the killing of the animal. Today the defensive or rejecting meaning of an outstretched reversed hand towards someone else is more or less universally understood (cf. traffic lights, signs at construction sites prohibiting the access etc.). If there is anything to this line of reasoning, could this gesture even be considered as an anthropological constant (Floss 2016; Floss & Ostheider 2013)? Due to their global existence and their frequency, one of us formulated the hypothesis that understanding hand depictions might be one of the keys to understanding Palaeolithic art in general (Floss & Ostheider 2013). In any case, all of the methods at hand should be used to study these very personal human legacies.

Until now, mainly metric approaches regarding age and sex of the performing individuals have been used to analyse hand representations to get a more detailed picture of who participated in (or maybe was allowed to?) creating cave art. In large parts of the scientific community it is consensus that in relatively egalitarian Palaeolithic communities cave paintings were made as part of collective rituals (Dapschauskas 2023). When it comes to the identification of individuals nowadays, specialists working for law enforcement authorities come to mind. More precisely, we think about finger- or palm print identification, usually known as dactyloscopy, which is the oldest of all biometric approaches. The method is used to convict suspects in crime. Its efficacy is based on the two facts that palm and finger as well as toe and sole prints are unique and inalterable during lifetime. Even identical twins show different so-called friction ridge skin patterns and can be kept apart. Friction ridge skin impressions (=papillary lines) are generally very rare from a Palaeolithic context as they are extremely fragile structures (> 0.5 mm breadth). The best-known example so far is probably a partial fingerprint on the back of the “Venus of Dolní Věstonice” (Czech Republic), dating to the Gravettian, which was studied concerning the question of the age of the individual leaving the print (examination based on the friction ridge breadth which increases from newborn to adult). The Upper Palaeolithic cave art ensemble from the Grotte aux Points situated in the Ardèche valley seven km as the crow flies away from the Grotte Chauvet – in an area extremely rich in decorated sites – presents besides some animal depictions (horse, bison, up to three ibexes) and several “signs” approximately 50 very well preserved palm prints exhibiting friction ridge skin impressions on surfaces of up to 14.5 cm², making them suitable for a dactyloscopic analysis. It is the first time that this methodology is used interpreting material from the Upper Palaeolithic. Main research questions in the project concern amongst other aspects human biology as well as manufacturing techniques and the chronology of events that took place in the site. But yet the main focus lies on the possibility of conducting a dactyloscopic investigation, which is realized in collaboration with the forensic department of the state police in Baden-Wuerttemberg. Our work hypothesis is the following: executing a 1v1 comparison of prints, we may be able to attribute two or more prints to one and the same individual or to rule out such an accordance. The corresponding results could tell us details about social structures in ancient times, going beyond the findings obtained when trying to determine age and sex of the individuals leaving the prints. Almost imposing and with a

dactyloscopic approach addressable are the subsequent questions: Was it just a single individual leaving the palm prints? Were there several people, each just making one print? Or was it a group event where at least a few members left more than one print each in the cave? Which conclusions can be drawn regarding established hypotheses concerning the “meaning” or “function” of hand depictions from the Palaeolithic (cf. above)? Answering at least a few of these important research questions would enlarge our knowledge of ancient hunter-gatherer societies substantially. Acknowledgements: This project is funded by the Deutsche Forschungsgemeinschaft (DFG, project number 545203024).

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Microstratigraphic investigations at the Mesolithic shell midden of La Chora cave, Cantabria, Spain

Shell middens are important archaeological deposits for documenting human interactions with coastal and estuarine environments, a prominent part of the way of life of Mesolithic peoples in littoral regions of Atlantic Iberia (1). This study focuses on the Mesolithic shell midden at La Chora, a cave site located close to a brackish inlet of the Asón estuary in Cantabria, Northern Spain. This location is interesting to address coastal engagement in Prehistory since it is quite inland, even more considering that the seashore was further away in Mesolithic times (2). The deposits revealed a complex stratigraphy with several contacts between different shelly layers.

Here, we used a micromorphological approach to decipher the site formation and human activities involved in such complex stratigraphic framework. Micromorphological analysis allowed us to reconstruct the deposit’s formation processes, through microstratigraphic differences in the sedimentary matrix and geometry of the anthropogenic debris, highlighted by anthropogenic, geogenic and biogenic activities. Preliminary micromorphological data revealed a pattern of repeated site maintenance, through sediment redistribution and combustion residues management, lacking, however, evidence of combustion in situ. Together with the dipping geometry of the deposits, this suggests a most likely peripheral area of secondary accumulation of debris. Further geoarchaeological investigations will provide insights into the relative interplay between anthropogenic and natural agents of redeposition of these remains.

The study underscores the potential of micromorphology for disentangling the complex formation histories of shell middens (3), particularly when combined with other analysis such as dating and archaeomalacology (4), contributing valuable perspectives on the interplay between human activities and environmental change.

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A new absolute Dating Program for the Châtelperronian in Eastern France – Re-examination of the Sequence from the Grotte de la Verpillière I (Germolles)

Recent discoveries and methodological advances have substantially changed the conventional picture of the transition from the Middle to Upper Palaeolithic. The identification of early incursions of modern humans into Europe and increasing discontinuities in habitation patterns necessitate the construction of highly regional chronologies. One region that should be of key interest for this endeavour, nestled between other regions with well-understood chronologies of the relevant timeframe, is the Côte Chalonnaise in Eastern France. This microregion features a high density of sites and a number of distinct chronocultural markers that make it a crucial piece in the spatiotemporal puzzle of the transitional period: A long and intensive Middle Palaeolithic settlement in late MIS 3, marked by a strong regional technotypological signature (the ‘Keilmessergruppen’); the easternmost secure occurrence of the Châtelperronian technocomplex, variously interpreted as an autochthonous development associated with Neanderthals or as an exogenous phenomenon associated with modern humans; and an Aurignacian, with recent dates falling in an earlier period of that technocomplex.

The Grotte de la Verpillière I (Germolles) has long served as a reference site for the region, as it was inhabited by humans throughout the transitional period and has furnished an abundance of material culture remains associated with each technocomplex. This long and seemingly continuous sequence of human occupation is paralleled in the east of France only by the oft-discussed Grotte du Renne in Arcy-sur-Cure. However, while past dating of the material has been performed, its interpretation has been stymied by stratigraphic issues.

Here we present a new dating program against the backdrop of a stratigraphic reevaluation of the site that will provide new insight into the Middle to Upper Palaeolithic transition in eastern France. By contrasting the available dates for the Grotte de la Verpillière I with other sequences in adjacent regions, we highlight the value of re-examining this key sequence and the potential of regionally specific chronologies.

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Hans Ansorg¹

Distinguishing Artifacts from Geofacts in Gravel Complexes: An Experimental Archaeological Approach

This poster presents a selection of the methodological framework of my dissertation, which focuses on distinguishing artifacts from geofacts in gravel complexes. The study is based on the surface site of Merkers (Wartburg District, Thuringia), where two handaxes and several potential artifacts made of rhyolite were recovered, apparently manufactured directly from the underlying Werra gravels (Schüler 2022).

The research primarily examines volcanic rocks, particularly rhyolite and andesite, as raw materials for prehistoric tool production. A multimethod approach is applied, combining experimental archaeology, technological analysis, and morphological studies. Knapping experiments are conducted to replicate bifacial tools from rhyolite and andesite, which are documented using 3D scans and compared with verified archaeological artifacts. For shape analyses, the software AGMT3-D is primarily used (Herzlinger & Grosman 2018). Key analytical parameters include the size and characteristics of negatives, impact features, flaking angles, and fracture mechanics. Various reduction techniques—such as hard hammer, soft hammer, punch technique, and anvil technique—are evaluated to determine their effectiveness in shaping these tough lithologies.

Preliminary results indicate that only hard hammer percussion and the anvil technique are suitable for shaping, while soft hammer percussion is limited to minor edge retouching, producing small negatives. Hard hammer reduction frequently results in triangular bulbs of percussion, characteristic of highly localized impact forces. Furthermore, flakes tend to be broad rather than elongated, making it difficult to generate negatives that extend across the core's surface and achieve a fully structured bifacial thinning sequence. As a result, prolonged knapping leads to increasingly obtuse edge angles.

To add dialectical depth to this approach, an experimental series was designed to simulate geofact formation through natural mechanical processes. A controlled selection of Werra terrace cobbles—including rhyolite, vein quartz, and silicified slate—was rotated in a cement mixer, both in air and water, to replicate fluvial transport and high-energy geological events. The aim was to assess whether directed movement within a gravel matrix could produce artifact-like damage. Preliminary observations suggest

that volcanic rocks primarily break at their weakest points, statistically forming no more than two negatives along a single edge. Smaller damage occurs erratically along various edges of the objects.

This research contributes to the ongoing discussion on distinguishing lithic artifacts from naturally fractured stones in secondary contexts. By integrating experimental archaeology, morphometric analysis, and geological simulations, this study provides a framework for refining artifact identification criteria. These insights could be further integrated into a scoring system based on Peacock (Peacock 1991; Wiśniewski et al. 2023) to create a valuable tool for the more precise identification of artifacts within gravel assemblages. The poster presents the research questions, methodological approach, and key experimental insights gained thus far.

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New perspectives on Abautz Cave: Rethinking a classic site

The Abautz Cave is located in Navarre, in the north of the Iberian Peninsula. Its strategic position at the crossroads of the Cantabrian Mountains, the Aquitaine Plains, and the Ebro River basin makes it a key archaeological site for understanding human mobility and settlement dynamics between the northern and southern sides of the Pyrenees. Excavations conducted during the 1970s and 1990s uncovered an extensive stratigraphic sequence spanning from the Middle Palaeolithic to the Late Roman period (Utrilla et al., 2015). Among the most significant discoveries are the Magdalenian assemblages, notable for their remarkable wealth of portable art. This includes the renowned “Abautz map”, an engraved block considered one of the earliest representations of a landscape (Utrilla et al., 2009). Another remarkable discovery is the presence of *Saiga tatarica* remains, representing the only known occurrence of this species south of the Pyrenees (Altuna & Mariezkurrena, 1996).

While previous research has offered valuable insights, particularly regarding Magdalenian and Chalcolithic occupations, the Middle Palaeolithic deposit has received comparatively less attention. This deposit, however, represents the only stratified Mousterian context in Navarre, providing a unique opportunity to further enhance our comprehension of Neanderthal occupations in the Pyrenean region. This Middle Palaeolithic unit, assigned to MIS 3, is characterised by a dominance of *Ursus spelaeus*, accompanied by a diversity of carnivores. Herbivores are present in lower frequencies, but they often show evidence of anthropic modification. The associated lithic assemblage, though limited in size, is distinguished by the occurrence of cleavers, which has enabled the stratigraphic unit to be assigned to the

Vasconian facies (Mazo et al., 2011). In 2022, we initiated a new research project, aimed at enhancing our understanding of Neanderthal occupation at the site through the implementation of advanced methodologies and a robust multidisciplinary framework, expanding the excavation surface in two areas of the cavity (Arlegi et al., 2023). To this end, our research integrates site formation processes, taphonomy, techno-typology, paleogenomics, spatial analysis, and palaeoenvironmental reconstructions. The goal is to acquire a more precise spatio-temporal resolution and achieve a more comprehensive understanding of human activity at the site.

Preliminary investigations have yielded promising results. We have documented two new stratigraphic levels, complementing the existing sequence and suggesting a more complex occupational history than previously recognised. Although these deposits are still under excavation, preliminary analysis suggests that their accumulation has been primarily driven by carnivores, with sporadic evidence of human activity. Initial radiometric data indicates that these new levels may correspond to late Neanderthal occupations or a transitional phase towards the Upper Palaeolithic. Ongoing additional dating will help refine the chronological assignment of these levels. Furthermore, we are conducting the first microvertebrate study at the site, alongside systematic sampling for pollen, FTIR, soil micromorphology, and palaeogenomics. Taxonomic and taphonomic studies of faunal remains are underway, as well as lithic analyses, allowing for a detailed reconstruction of chaîne opératoires beyond the previous focus on large tools.

This research situates Abauntz within the broader context of Middle Palaeolithic research in the Pyrenean region, aiming to shed light on Neanderthal subsistence, environmental interactions, and cultural trajectories in this unique archaeological context.

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Karabakh Palaeolithic Project: Human ecological and cultural dynamics during the Late Pleistocene in the Caucasian corridor. Archaeological survey and new archaeological excavations at Azykh Cave (Azerbaijan)

The evolution of the human behavioural repertoire is known to emerge from complex evolutionary trajectories, influenced by environmental, demographic, and social factors. Such processes include key past population dynamics, such as expansion, fragmentation, isolation, recombination and periodic local extinction. These behavioural phenomena are known to be reflected in the variability of the archaeological material. Studying this variability is fundamental to understanding how past hominins successfully evolved, expanded and adapted, and how this changed over time. Such evolutionary trajectories are best suited to be done on a regional scale, with particular interest in regions where population migratory dynamics are long documented. The Caucasian corridor is a unique scenario for this investigation. The Caucasus is a transcontinental region between the Black Sea and the Caspian Sea. Historically, this region has been considered a natural barrier between Eastern Europe and West Asia. Situated at the geographical intersection of Africa and Eurasia, the region is today a biodiversity hot spot of plant and animal species, that includes many endemic species, resulting from Late Pleistocene glacial and Early Holocene glacial retreat refugium conditions for several species, including past hominins (Doronichev, 2008; Golovanova et al. 2022). Such climatic fluctuations, active volcanism and tectonics, and topographic variability are known to have increased the environmental heterogeneity during the Pleistocene to levels possibly higher

than those at present. Due to its geographical position, the prevalence of a mosaic of environments with striking biodiversity and a variety of ecological resources distributed over short distances, make it a natural laboratory for testing models of hominin behavioural dynamics, including technological and cultural adaptations over time.

Situated at the geographical intersection of Africa and Eurasia, the Caucasus is a corridor and at the same time an ecological refugium marked by a biodiversity of plants and animals, making it very attractive for a continuous human occupation over time (Doronicheva et al. 2023). These areas have the potential to preserve crucial evidence of Late Pleistocene human activities and enable investigations into key aspects of the population's dynamics, including mobility, settlement patterns, and technology (Vasilyev and Amirkhanov, 2018).

In this poster, we present a research project dedicated to tackling these questions during a key moment in our evolutionary journey, between MIS 7 to 2 (250-14 ka years). Here present and discuss the research project, including research questions and goals, and the results of the first archaeological campaign, including the survey and the excavation work at the archaeological site of Azykh are reported (Huseinov, 1985).

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Lena Bandasch¹

A multi-method analysis of the engravings in the “Kleines Schulerloch” cave (Bavaria, Germany)

This project was developed as part of my master's thesis at Friedrich-Alexander-Universität Erlangen-Nürnberg. The thesis examines part of the engravings in the "Kleines Schulerloch" cave and analyzes them

using a multi-method approach to address questions of authenticity, interpretation, and dating. After the engravings in the “Kleines Schulerloch” were discovered in 1937, their authenticity and dating sparked controversy. Shortly after their discovery, plaster casts were made. In course of this the cave wall was cleaned, resulting in irreversible changes to its surface and the morphology of the lines. Additionally, it is also believed that some lines, including the animal figure, were retraced with a modern tool to enhance their visibility. While the medieval runic inscription is considered authentic (Simon 2022), the classification of the other motifs – such as an animal figure, a honeycomb-shaped grid of lines, and several rod lozenges – remains uncertain. For instance, the animal figure has been described both as a modern forgery (Zotz/Freund 1952) and as “die erste in Deutschland entdeckte altsteinzeitliche Tierdarstellung“ (the first discovered palaeolithic animal petroglyph in Germany; Birkner 1938, 64).

This thesis aims to classify the remaining motifs in the image panel by employing a variety of methods and linking the results to earlier studies. The primary focus was on morphometric analysis, which sought to determine the relative chronology of the lines, their classification, tool usage, and the authenticity and interpretation of the motifs. A multi-method approach was implemented to create a robust database for comparing lines and techniques. This approach included detailed image description, morphological analysis, and experimental creation of lines using various tools. Both the experimental and original lines were analyzed using a Dino Lite Edge Series AM4000 Series microscope, and 3D models were generated with Agisoft Metashape Professional Software (version 2.0.2, 2023). The data collected from the “Kleines Schulerloch” and the experimental lines were evaluated using R Studio (R Core Team 2023). A Multiple Correspondence Analysis (MCA) and a cluster dendrogram were applied to organize the data and provide insights into the engravings’ morphology, relative chronology, and potential tools used. Additionally, an image analysis was conducted to identify the animal figure and contextualize the motifs within a temporal framework. However, dating based on stylistic features proved challenging. The runic inscription has been dated to the early Middle Ages (Simon 2022), but the animal figure and symbols appear too generic to be assigned to a specific period. In terms of authenticity, the engravings are likely not modern forgeries.

The observations suggest that the motifs were created partly or even entirely simultaneously, as they are similar in their form of depiction and the individual motifs take account of each other and overlap. However, questions about the motifs’ interpretation remain unresolved. Comparative examples suggest that the animal figure may represent a (female) goat-like creature (e.g., an ibex) or a deer/doe. The grid of lines and the rod lozenges could carry different meanings depending on their context and time. While the combination of these motifs could symbolize fertility or hunting, this must remain as a speculative hypothesis.

The analyses conducted in this study, along with prior research, indicate that current technology is unlikely to yield new insights into the symbols and the animal figure. Despite ongoing debates, the use of digital methods achieved the best possible results. Previously unseen lines were revealed, adding new knowledge to the study of the engravings in the “Kleines Schulerloch”.

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Richer than the Middle Palaeolithic of Swabia: exploring the hypothesis of different Neanderthal site use at Sesselfelsgrotte

A large body of research from the Swabian Jura (SW Germany) has resulted in the interpretation that Neanderthals in this area used caves and rock shelters less intensively than their *H. sapiens* successors. This interpretation is in contrast with findings from Sesselfelsgrotte in the nearby Altmühl Valley (SE Germany). Late Middle Palaeolithic (MP) deposits from this rock shelter yielded stratified fire residues and potential hearths, suggestive of a Neanderthal use of the shelter different from the Swabian sites. Sesselfelsgrotte also exhibits a rich fossil record of 14 Neanderthal remains, belonging to at least three different individuals, including a potential infant burial, while Swabia so far yielded only one, poorly contextualized, Neanderthal bone. This difference is even more remarkable since lithic and raw material studies showed that sites in both SW and SE Germany were occupied by the same Neanderthal group(s). Does the richer organic record from Sesselfelsgrotte reflect a different late Neanderthal use of this rock shelter, or is it the result of (i) differential site formation, (ii) quicker burial rate, and (iii) less intensive degradation of organic remains? This question cannot be answered with the data currently published, as Sesselfelsgrotte was excavated in the 1960s-80s with methods that today are considered inadequate. Although numerous radiocarbon ages have been published from the rockshelter, these were obtained following outdated sample selection and pretreatment protocols. Furthermore, ge archaeological and taphonomic studies were not carried out at the site.

In this talk, we present preliminary results from micromorphological, geochemical, and microfauna analysis, as well as radiocarbon dating performed within the project “SHARP - Testing hypotheses on the transition from Neanderthals to *H. sapiens* at the Palaeolithic site of Sesselfelsgrotte”, funded by National Geographic Society (NGS-96087R-22). Our results confirm that the upper Neanderthal layers from Sesselfelsgrotte (G1 to G3) date between 45 – 50 ky cal BP and overlap in age with late MP deposits from the Swabian sites. Available geochronological data seem to indicate that Neanderthal remains were buried more slowly at Sesselfelsgrotte than at sites of the Swabian Jura, such as Geißenklösterle, and Hohlenstein-Stadel (Richard et al., 2019, 2020). This rules out the hypothesis that quicker sedimentation rates led to higher organic preservation at Sesselfelsgrotte. Similarly, our geochemical and microfauna data suggest that local and regional environments were comparable across SE and SW Germany between 45 – 60 ky. Thus, climate did not shape the dissimilar organic Neanderthal record preserved in southern Germany. In comparison with the Swabian karstic sites, the MP layers from Sesselfelsgrotte show no evidence of phosphatisation. This probably derives from rarer animal nesting at this rockshelter, likely due to its small size and more open geometry. Combined with more intensive roof spell, lower rate of excrement accumulation maintained an alkaline pH, favouring organic preservation. At Sesselfelsgrotte, late MP deposits were also less intensively disturbed by post-depositional reworking, as evidenced by their finer stratification. More in detail, the G layers consist of multiple, stacked, 10 to 5 cm thick beds, some of which are almost entirely composed of heated bone fragments.

We conclude that different site formation processes led to higher preservation of Neanderthal organic remains at Sesselfelsgrotte. At the same time, taphonomic observations, such as microfauna bone surface discolouration and cracking, further support claims that late Neanderthal fire use was more intensive at Sesselfelsgrotte (particularly in G3c, G4a and G5i) than at the Swabian sites.

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Guido Bataille¹, Olaf Bubenzer², Stefan Hecht² & Dennis Batz³

One hundred and eighteen years after. Recent archaeological investigations at Sirgenstein Cave in the Swabian Jura (Germany)

Sirgenstein Cave is situated at the western slope of the Ach Valley in the Swabian Jura. Since July 2017, it has been part of the UNESCO World Heritage site „Caves and Ice Age Art in the Swabian Jura“ together with the caves Geißenklösterle, Hohle Fels and Vogelherd as well as the Hohlenstein and Bockstein site-complexes in sections of the Ach and Lone River Valleys. In 1906, Robert Rudolf Schmidt conducted excavations in Sirgenstein Cave and on its forecourt. He documented a sequence of Middle and Upper Palaeolithic archaeological horizons in the Weichselian deposits (Schmidt 1907, 1910).

Based on the results of his excavations at Sirgenstein and archaeological investigations at further sites in southern Germany he introduced the first chrono-cultural model for the western part of Central Europe with reference to further Palaeolithic contextual areas in Germany and the already existing Western European terminological system (Schmidt 1907 & 1912). According to Schmidt, the average 1.5 m thick „diluvial“ archaeological sequence of Sirgenstein Cave exhibits two Middle Palaeolithic („Moustérien“) and seven Upper Palaeolithic cultural layers, among them Aurignacian, „Proto-Solutrén“ (today: Gravettian) and Magdalenian horizons below the Holocene deposits (Schmidt 1907: 3-6, Taf. III; Schmidt 1912: 20-29; Bolus & Conard 2012: 80-82).

In 1906, the excavators removed a total of 324 cubic meters of sediments from an area of 140.7 square meters inside and in front of the cave (Schmidt 1912: 19). The exact borders and extension of the four main excavation trenches are unknown today. As part of conservational measures, the State Office for Cultural Heritage of Baden-Württemberg commenced archaeological investigations at the site in order to assess the remaining archaeological potential. In 2023, the Geographical Institute of Heidelberg University carried out geoelectrical measurements in the cave and on its forecourt.

The results indicate the presence of sediments („Lockersediment“) throughout the cave’s interior with maximum depths between 2.0 m to 2.5 m, consisting of two main geological horizons. In autumn 2024, the State Office commenced excavations in the entrance hall to investigate these results archaeologically. We excavated eight square-metres in three test trenches to a maximum depth of one metre without reaching bedrock. We recorded mixed sediments in secondary position, mainly deriving from the excavation of 1906, and undisturbed sediments as well as archaeological finds from different periods.

We present preliminary results from the first archaeological investigations in the cave since nearly 120 years (Bataille et al. 2025).

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Quantitative Analyses of potential Upper Paleolithic Dwelling Structures in Western, Central, and Eastern Europe

Today, architectural structures for shelter and dwelling are a ubiquitous phenomenon in human societies. While the earliest potential evidence for built dwelling structures predates the Upper Paleolithic, it is during this timeframe that archaeologists seem to document these structures more frequently. In Western and Central Europe, sites like Gönnersdorf display features interpreted as remnants of former tent-like structures (Sensburg/Moseler 2008). In Eastern Europe, on the other hand, sites like Dolni Vestonice, Pavlov and Mezhirich are well-known for their mammoth bone structures (Iakovleva 2015), but their interpretation as dwellings is controversial (Pryor et al. 2020). Equally, tent-like structures and their reconstructions are not without controversy either (Leesch/Bullinger 2012). Furthermore, a dichotomy is suggested by the distribution of tent-like structures primarily identified in Western and Central Europe and mammoth-bone structures exclusively in Eastern Europe (see Fig. 1). Whether this observation reflects divergent dwelling traditions of late Pleistocene Hunter Gatherers, or whether these features represent remnants of non-analogue constructions, remains an open question.

To contribute to this debate, we present the results of a Master's thesis that quantitatively compares the size and layout of structures interpreted (at least by some authors) as the remains of dwellings (Fig. 1). The comparison involves the sizes and shapes of the structures using PyREnArA (John et al. 2023), but also includes a comparison of features, such as hearth, pits, or, stone settings. Finally, the respective dating of each site and their geographical position – focusing on the longitudinal position – is recorded and used as an attribute for comparison. The underlying database that compiled for the thesis lists 51 sites in more than 10 countries. However, not all sites were suited for the quantitative analysis because of strict requirements regarding the dating and their quality – and plausibility – of reconstruction to guarantee meaningful data is processed and produced.

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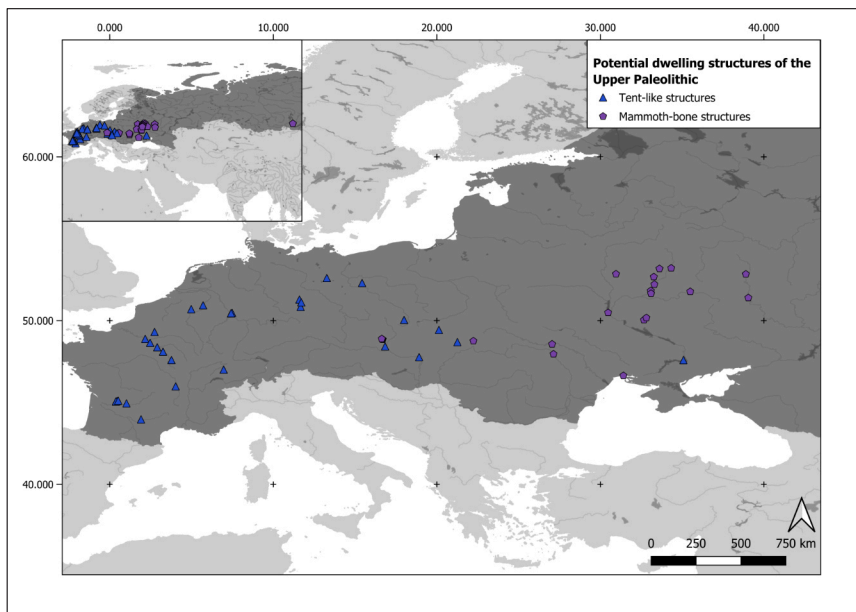


Fig. 1. Map displaying the distribution of 52 sites with remnants of potential tent-like structures (blue triangles) and mammoth bone structures (purple pentagons) from the European Upper Paleolithic. The dark grey area highlights the spatial scope of this study (Eastern, Central and Western Europe; EPSG 4326).

Miguel Angel Berjon-Lobato¹, Maria Jose Iriarte-Chiapusso¹ & Alvaro Arrizabalaga¹
Esnate (Northern Iberian Peninsula). A Mousterian open-air camp site in the Sakana Valley

During this research, an archaeological survey identified a significant context in a primary position. Analysis of the surface dispersion of lithic materials, within an area of intensive agricultural activity, led to the discovery of a sedimentary deposit still in situ, associated with Mousterian industry. While a comprehensive study of the recovered lithic material is still underway, preliminary observations suggest the presence of an open-air campsite, likely dating to the Mousterian period. The lithic industry is also linked to a well-defined edge structure, whose natural or anthropogenic origin is currently under discussion within its geoarchaeological context.

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The secret of the lake. The role of fish during the Middle Pleistocene at Schöningen (northern Germany)

The role of aquatic resources, particularly fish, in Middle Pleistocene open-air contexts is still underexplored compared to the wealth of research and scientific literature on terrestrial resources. Within this framework and due to its exceptional preservation, the prolific site of Schöningen (northern Germany) permits us to expand our knowledge of the lacustrine fish associations in late Lower Paleolithic hominins contexts.

In order to characterize the lacustrine fish association from the taxonomical, taphonomical and seasonality points of view, we report the analysis of 1,398 fish remains recovered from Schöningen13 II-4 Obere Berme (layer bc), a continuation of the Spear Horizon of the main excavation area (Serangeli et al., 2015). At the same layer, researchers previously discovered a wooden throwing stick among thousands of other finds such as lithic and faunal remains (Conard et al., 2022). The northern pike (*Esox lucius*), the European perch (*Perca fluviatilis*), and the ninespine stickleback (*Pungitius pungitius*) compose the majority of the assemblage, followed by the brown trout (*Salmo trutta*), the burbot (*Lota lota*), and cyprinids (the common bleak, *Alburnus alburnus*; the crucian carp, *Carassius carassius*; the common rudd, *Scardinius erythrophthalmus*; the common roach, *Rutilus rutilus*; the tench, *Tinca tinca*; the gudgeon, *Gobio gobio*). In Schöningen, the fish assemblage indicates a lake characterized by slow-moving and stagnant waters with ample vegetation. However, some taxa, such as brown trout and cyprinids, also indicate the presence of sporadic fast-flowing water sources such as tributaries. The taphonomical and seasonality studies point to natural death as the cause of the accumulation of the fish remains, excluding the humans and other predators since there is no evidence of digestion or anthropogenic marks. In addition, we observed that the fish died indistinctly in winter/fall and spring/summer, indicating no selection either. Previous studies in other areas of Schöningen (Böhme, 2015) and Western-Central European sites (e.g., Cleyet-Merle, 1990; Böhme, 1998; Blanco-Lapaz et al., 2021), also described the absence so far of evidence for fish exploitation by Early hominins during the Lower Paleolithic.

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Far west and near east, two sides of the same coin. Characterizing Early Pleistocene freshwater ecosystems based on fish remains

The Early Pleistocene open-air archeo-paleontological localities of Barranco León (Granada, southeastern Spain) and Dursunlu (Ilgın Basin, southwestern Turkey) provide essential examples to characterize lacustrine sites and their significance during the first hominin dispersals into Eurasia. We analyzed fish assemblages from Barranco León (NISP=1,921) and Dursunlu (NISP=297) to better understand the role played by these freshwater ecosystems in early hominin settlements outside of Africa. At both sites, Cyprinidae (*Squalius*, *Luciobarbus*, *Barbus*, *Chondrostoma* group, *Capoeta*) comprises the majority of the recovered fish association, followed by the Gobiidae and Cobitidae families (Agustí et al., 2015; Přikryl et al., 2022; Blanco-Lapaz et al., 2024). The fish remains excavated from these sites are indicative of high temperatures, dissolved oxygen, and salinity tolerances compatible with lakes characterized by a mixture of palustrine, shallow and probably salty waters.

Our results inferred from fish studies, are consistent with the information obtained from other taxa such as charophytes in Dursunlu (Demirci et al., 2023) and herpetofauna in Barranco León (Sánchez-Bandera et al., 2020) In both cases, taphonomic studies show an absence of fish exploitation by predators, including hominins, indicating an in situ accumulation. In spite of the absence of evidence on fish exploitation by hominins at these sites, well-developed Early Pleistocene lacustrine sites would have provided ideal conditions for attracting other prey that could have been included in hominin diets, such as large game and perhaps even aquatic birds and tortoises.

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The Aurignacian open-air site Friedrichsdorf-Seulberg (Germany): New Insights into Early Upper Paleolithic Mobility and Technology

The open-air site Friedrichsdorf-Seulberg (Hesse) discovered in 2010 represents the first Aurignacian site to be identified in Germany since the 1970s and is one of only a few certain EUP sites north of the river Main. The next Aurignacian sites are the former Wildscheuer and Wildhaus caves, which were located in the Lahn valley about 40 km northwest.

Friedrichsdorf-Seulberg was detected by surface finds with the find layer remaining largely intact in the loess soil. A total area of 26m² has been excavated revealing a find concentration with an estimated diameter of six meters and more than 3.000 stone artefacts, some faunal remains and charcoal. The main feature is a simple hearth identified by charcoal, reddish loess sediment and a limited number of burnt artefacts in the center of the concentration. The faunal remains are not well preserved; however, with ongoing analysis, at least three distinct species (horse, reindeer, bison/aurochs) have been identified through archaeozoological methods, including ZooMS. The lithic assemblage is characterised by nine different raw materials. While the majority of the lithics are made from northern European flint, most likely from the Ruhr area some 130 km to the north, there is also evidence of Jurassic chert from southern Germany. The discovery of additional regional and local raw materials such as Muschelkalk chert and quartzite underlines the site's integration into a comprehensive and well-established mobility network. The lithic assemblage includes characteristic Aurignacian tool types, including nose and carinated scrapers, Aurignacian blades and other diagnostic forms, thereby supporting the attribution of the site to the EUP. More than 100 pieces of haematite, many with traces of processing, strongly suggests intensive pigment production on site. Two AMS radiocarbon dates: (Poz-40923: 29,300 ± 140 BP; Poz-40924: 29,540 ± 150 BP) assign Friedrichsdorf-Seulberg to a Late Aurignacian context c. 34,000 years ago. The combination of lithic production, pigment processing, and faunal remains suggests a multifunctional site with a broad range of subsistence and human-ecological interaction. The presence of diverse raw materials at the site indicates its inclusion in wider regional and supra-regional exchange systems connecting the area south and north of the river Main.

New AMS radiocarbon dates for the Lahn caves have recently confirmed an earlier Aurignacian phase dated to c. 36-35 ka calBP. However, the open-air sites of Lommersum (North Rhine-Westphalia) and Breitenbach (Saxony-Anhalt) are of similar age and composition. The potential affiliation of these sites to a network, along with their connections to Southern Germany, is of considerable interest. It is noteworthy that Aurignacian open-air sites north of the river Main are dated younger than the early Aurignacian layers in the Swabian Jura, and further research is required to determine whether this is a consequence of palaeoecological conditions and/or population dynamics of early Modern Humans.

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Comparative analysis of the dental wear plane between hunter-gatherers and agro-pastoralists in the Western Iberian Peninsula

Dental wear is crucial for analysing several aspects of past cultures and economies. Its widespread use is due to the durability of teeth, which are well-preserved in archaeological contexts, providing valuable insight into prehistoric populations, including subsistence modes, diet, food preparation methods, cultural practices and masticatory force. Previous studies focusing on the transition from hunter-gather to agro-pastoralism economies have demonstrated a decrease in the magnitude of dental wear. This is because diets associated with hunter-gatherers are mechanically more demanding, whereas agro-pastoralist diets tend to be softer (Godinho et al., 2023). Moreover, some studies have described differences in the orientation of the wear plane, as mechanically demanding diets require a more lateral extrusion during the chewing cycles. In contrast, softer agro-pastoralist diets require less lateral mandibular movement. Consequently, it has been suggested that the wear plane in hunter-gatherer populations is flatter, whereas in agro-pastoralist populations, it is more oblique (Smith, 1984). However, studies evaluating wear plane orientation remain limited and often lack objectivity, which compromises their replicability.

Thus, this study intends to propose a more objective and replicable method for quantifying wear plane orientation and to assess whether there is indeed a significance difference in the wear plane between hunter-gatherers and agro-pastoralist populations. This study aims to examine the relationship between dental wear and diet in prehistoric populations from the Mesolithic, Neolithic and Chalcolithic periods in the western Iberian Peninsula. The primary objective is to test the hypothesis that hunter-gatherers exhibit a flatter wear plane compared to agro-pastoralists, due to differences in diet and associated masticatory demands.

The methodology involves the selection of lower first molars, due to its key role in mastication (Sperber, 2017). A total of 60 teeth from the Mesolithic, Neolithic and Chalcolithic samples will be analysed. These specimens were selected from several archaeological sites, including Cabeço da Arruda and Moita do Sebastião (Mesolithic); Algar do Bom Santo, Poço Velho and Gruta do Zambujal (Neolithic); Monte do Carrascal 2 and Monte da Guarita 2 (Chalcolithic). The teeth were scanned using a Shining 3D© Einscan Pro 2X Plus portable structured-light surface scanner. The scans were visualized using the 3D Slicer software, and the planes angles were quantified using the AnglePlanes tool. This quantification consists of measuring two planes: one on the cemento-enamel junction (CEJ) and another on the occlusal surface. The planes were defined placing four points on both CEJ and occlusal surface, from which the planes will be determined for subsequent measurement. Statistical analyses will be conducted using the non-parametric Kruskal-Wallis test to assess differences among the groups. If significant differences are identified, paired post-hoc tests will be performed for a more detailed analysis. Significant differences are expected between the Mesolithic and the Neolithic/Chalcolithic samples, whereas differences between the Neolithic and Chalcolithic samples may be less pronounced and not statistically significant. This pattern is expected to reflect the impact of the transition from hunter-gathering to agro-pastoralism.

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LGM industries along the Danube – New insights on the lithic inventories from Langmannersdorf and Saladorf

The Central European Danube region is well-known for its archaeological record attributed to the Early and Middle Upper Palaeolithic. In contrast, a distinct decline in human presence across this find zone during the Last Glacial Maximum (LGM) is evident. Notwithstanding, the area also encompasses several sites dated to this very timeframe, indicating a certain degree of diachronic continuity. Langmannersdorf and Saladorf, two adjacent sites located in the Perschling valley approximately 10 km south of the present course of the Danube, provided radiocarbon dates ranging between ca. 25–23 ka calBP (Langmannersdorf) and 22,5–21,5 ka calBP (Saladorf). Excavated in the early 20th century, parts of the lithic inventory from Langmannersdorf were attributed to the Aurignacian (Hahn, 1977) or Epi-Aurignacian (Salcher-Jedrasiak and Umgeher-Mayer, 2010).

We present a renewed evaluation of the lithic industry, encompassing a substantial inventory of recent surface finds in addition to the assemblage from earlier excavations conducted by H. Obermaier and A. Stummer that have not yet been examined at all. The site of Saladorf, situated just few kilometres east of Langmannersdorf, was discovered and excavated in the course of construction works in 2004. Expanding the previous studies of the lithic material (Simon and Einwögerer, 2008), we particularly highlight the technological features connected to on-site blank production. Drawing upon a comprehensive technological and typological analysis, we offer a novel perspective on lithic industries during the LGM which is characterised by a diverse array of technological concepts, including bladelet production on the lateral and distal edges of blanks and opportunistic flake production. In order to provide new insights on the archaeological record of the Middle Danube Region after the Mid-Upper Palaeolithic, we attempt to contextualise our new data from Langmannersdorf and Saladorf with other LGM find inventories from Central Europe within a broader economic and environmental framework, potentially allowing for a better understanding of hunter-gatherer behaviour following the Gravettian.

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Understanding early neolithic wetland environments and how they shaped settlement dynamics and subsistence strategies in NW Romania – a geoarchaeological approach

The transition from the Pleistocene to the Holocene in the Balkans represents a period when environmental conditions were highly favourable for the process of Neolithization, an important part of which is the migration of groups from the Aegean littoral to the north. In the Banat region, located in present-day Romania, evidence of Neolithic settlements dates back to approximately 6000 BC. During this period, the environment was primarily shaped by the dynamic fluvial processes of major rivers and their tributaries, so much of the southern Pannonian Plain consists of ancient and recent floodplains. The interplay between these floodplain landscapes, the distinctive wooded steppe ecology of the early Holocene, and the warm, humid climate created a unique habitat that cannot be fully reconstructed from the archaeological record alone.

This study seeks to reconstruct the paleoenvironment and geomorphological dynamics of floodplains surrounding the early Neolithic mound settlement of Movila lui Deciov in northwestern Romania, located within the Mureş alluvial fan. By integrating geospatial prospection methods, sediment core analysis, and absolute dating techniques, this multidisciplinary approach ensures a comprehensive understanding of the local environmental conditions. Geomagnetic and LiDAR imaging revealed numerous remnants of paleochannels, one of which is located directly adjacent to the site. Using three transects and six sediment cores, each 5 meters in depth, a detailed stratigraphy of the floodplain area was constructed, clearly identifying deposits from a slowly meandering channel. Furthermore, two OSL dates obtained from point bar deposits indicate fluvial activity around 5100 BC, aligning precisely with the early to middle Neolithic occupation period. This evidence suggests that an active floodplain environment with slowly meandering streams existed during the Neolithic. The decision to establish a settlement on a stable point bar terrace, along with the construction of a mound, appears to have been intentional, enabling the community to adapt to and exploit this challenging yet resource-rich landscape. This interpretation is further supported by archaeozoological and archaeobotanical findings, which indicate that aquatic resources constituted approximately 50% of the population's diet, emphasizing the significance of local landscape utilization and environmental adaptation.

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Hugo Obermaier and Portugal through his correspondence to three Portuguese archaeologists: Joaquim Fontes, José Leite de Vasconcelos and Manuel Heleno

Hugo Obermaier, a German Catholic priest and one of the most notable world archaeologists of the first half of the 20th century (Regensburg, 1877; Freiburg, Switzerland, 1946) has already been the subject of some important historiographical studies, regarding the contributions he owed to Archaeology.

The study of his correspondence, concerning Portugal, as a result of the scientific and friendly relations established at that time, allowed us to understand the depth and scientific interest of these relations, reinforced by his known presence in the country, which have already been partly published by one of us (JLC).

This communication aims to present the main scientific aspects discussed by Hugo Obermaier with three important Portuguese archaeologists. With Joaquim Fontes (1892-1960), who began studying the Lower and Middle Paleolithic very early on, of which he was a pioneer, the twelve letters consulted cover the years between 1916 and 1925. With José Leite de Vasconcelos (1858-1941), director of the then Portuguese Ethnological Museum, an archaeologist and philologist of undisputed merit, both nationally and internationally, the thirty-three letters sent to him between 1920 and 1939 reveal scientific aspects of the greatest interest, interconnected with the political vicissitudes of the 1930s, first in Spain, then throughout Europe, and which seriously hindered his archaeological activity, as the correspondence clearly shows. Finally, the 39 letters previously unpublished sent to Manuel Heleno, Leite de Vasconcelos' successor as director of the Portuguese Ethnographic Museum, between 1932 and 1938, correspond to the period of most fruitful relations with Portuguese Archaeology, benefiting from Manuel Heleno's deep interest in making his research more visible at an international level, especially in the field of megalithism, which he was then developing in the Alentejo.

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Technical behaviours during the Early Middle Pleistocene – New insights on the lithic industry of Loreto, a site across Lower and Middle Palaeolithic

The site of Loreto is located in the Venosa basin (Basilicata, southern Italy), a few hundred metres from the Acheulean site of Notarchirico, and is chronologically placed between the interglacials 15 and 13. This is a critical timespan for the human peopling of Europe, representing the final part of the Lower Palaeolithic before the glacial stage 12 – during which Europe is believed to have been largely depopulated - and preceding the transition to the Middle Palaeolithic from MIS 11, characterised by significant behavioural changes.

The MIS 15-13 interval includes an exceptionally long interglacial-like phase that witnessed the persistence of warm climatic conditions for over ~150,00 years, even at higher latitudes, encompassing the mild glacial stage 14. This extended warm-phase allowed for prolonged hominin occupation and territorial expansion, fostering population growth, increased cultural exchange, and the emergence of more complex technological behaviours, including the development of regional traits. As a matter of fact, the number of sites from the MIS 15-13 phase vastly increased, together with an increased presence of bifacial tools, elaborated retouched tools, discoid reduction sequences and improved land-use and resources management. The scientific community attributes these changes to the spread of the Acheulean techno-

complex across Europe, although several questions regarding the modalities of its arrival and dispersal still persists. An introduction through a new hominin species (*Homo heidelbergensis*) from Africa or Asia and/or an allochthonous development are the two main supported hypotheses. From this perspective, the site of Loreto mirrors the moment of transition witnessed over Europe, featuring mixed "archaic" and innovative characteristics. This makes it an invaluable site for comparisons with other coeval European sites, as well as those associated with the Middle Palaeolithic Transition (MIS 11-9).

The new technological analysis, carried out herein, provided insights on the strategies adopted by the hominins including discoid and S.S.D.A. (système par surface de débitage alternée) cores, Kombewa-type debitage, pebble tools, large-flake production, tool's confection and retouched cores. Notably, the production of retouched flakes stands out as the site's most striking aspect. This includes elaborately worked scrapers and pointed tools, characterised by margin rejuvenation, scalariform retouch and, possibly the use of a soft hammer. In addition to similarities with the British sites (High Lodge, Happisburgh 1, Boxgrove) where comparable scrapers have been found, the tools from Loreto may hold that innovative connotation attributed to bifaces in other contexts, other than offering valuable comparisons with the scraper technology and tool management found in Middle Palaeolithic sites.

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Zooming into a Gravettian hunter-gatherers group: lithic refitting as a tool to focus on individuals and their skills

Refitting has been employed for many years to implement knowledge on past groups of hunter-gatherers at a higher resolution level. Overall, lithic refits provide insights into the distribution of artefacts and, notably, knappers movements within the sites and spatial organization of activities. They are also one of the most effective tools for gaining a closer view on ancient knappers' behaviour. In particular, the

reconstruction of lithic reduction sequences - even if not always complete - allows us to understand the decisions and strategies of single knappers.

With this goal in mind, we first attempted to isolate the production of individuals within lithic assemblages using lithic refits and to test the variability of the assemblage in relation to knapping skill level. Indeed, the application of lithic refits to identify differences in knapping dexterity has been in use for thirty years. Although refitting is not always achievable due to the preservation of the archaeological record, it remains one of the most reliable tools to use for this kind of study.

We considered the lithic assemblage of Piovesello, a Gravettian open-air site located in the Apennines in northern Italy. The site was occupied during Greenland Stadial 5.1, approximately 30,000 years ago. The lithic assemblage consists of radiolarite artefacts collected from Mt. Lama, located 9km away, where an outcrop of jasper was found. All artefacts recovered from Piovesello related to blade manufacturing: cores, broken blades and bladelets, flakes to maintain and prepare the volume of the cores are amongst the most common items found at the sites. The current lithic scatters do not provide evidence for long-term use of this area. For our study we analysed all the jasper material found at the site (890 pieces including flakes and cores but not retouched pieces), integrating data on technological attributes and features exclusively related to knapping skills - such as knapping accidents, crushed striking platforms or striking edges, repeated blows and so on - into the previous technological analysis carried on in 2018. During that analysis the presence of numerous refits was already observed. The likelihood of finding refits of long reduction sequences was a key factor in selecting Piovesello as a case study. Moreover, standardized assemblages like blade and bladelets core reduction are more likely to yield long refitted sequences. We proceeded by completing the lithic refits of the assemblage, grouping artefacts by raw material units, breakages, presence of cortex and their supposed purpose in the operational chain. At first glance some lithic refits are more complex than others, presenting longer reduction sequences, reorientation of the cores and the extraction of longer blades. We ran multivariate analysis, including PCA and CA, to examine both categorical and numerical attributes on the refitted sequences. Our purpose was to verify whether the variability in knapping skill levels highlighted by lithic refits is objective and detectable by statistical analyses. Additionally, we tested whether knapping styles and patterns can be identified in this particular lithic assemblage.

Finally, we compared the Piovesello data with those produced during experimental knapping sessions carried on in 2022 at IPHES (Tarragona, Spain). Individuals with different background and knapping abilities participating in the pilot experiment had to first imitate and then interact with an expert knapper to produce lithic blanks similar to the ones found in Middle and Upper Palaeolithic sites in north-eastern Italy. One of the lithic assemblages used in the study was Piovesello and, therefore, part of the experimental knapping sessions focused on the production of laminar blanks. The aim of comparing archaeological and experimental data - using multivariate analysis - was to determine whether the archaeological refits align to the lithic assemblages produced by either expert or novice knappers. A clear distinction in the statistical results could suggest differences in knapping expertise. However, this does not necessarily have to be the sole explanation for such an outcome. The need for a more expeditive production and other contextual reasons must be considered as well. These outcomes might enrich our knowledge on this small cluster of past hunter-gatherer social organization, composition of the group, mobility and site's purpose in the framework of Gravettian north-eastern Italy.

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Reconstruction of the post-occupational history of the Aurignacian open-air site of Breitenbach (Sachsen-Anhalt, Germany) based on systematic lithic refittings and find orientation analysis

Breitenbach, located in Sachsen-Anhalt – Germany, is one of the largest known Aurignacian open-air sites, extending over a surface of at least 6,000 - 7,000 m². At 51° N at the northern fringe of Aurignacian dispersal, the site represents one of Europe's northernmost Early Upper Palaeolithic localities (Jöris et al., 2017). Archaeological sites of such large spatial extent bear a high potential for studying the spatial organisation and the social dynamics at a Palaeolithic hunter-gatherer locale. However, these high-latitude regions were subject to periglacial conditions during much of the last glacial cycle. To a certain degree, the site of Breitenbach was also exposed to different processes typical for such periglacial environments, such as permafrost, solifluction, cryoturbation, and the formation of ice-wedge pseudomorphs that altered the site during repeated freeze-thaw cycles. These processes may have impacted the spatial patterning of archaeological finds both during and after the site's use. Disentangling the effect of natural geological processes from the spatial signatures related to the site's human occupation is therefore key for assessing the deposit's integrity and quantifying the influence of depositional and post-depositional processes on the formation of the archaeological record.

Here we present the results of an integrated approach, that combined spatial and orientation pattern analysis of finds (Bertran and Texier, 1995; McPherron, 2005), systematic refitting of more than 15,000 lithic artefacts covering the main excavation areas, and analysis of refitting connection lines differentiated by refitting type (frost, breaks and production-sequences) and length (Cziesla, 1990), aiming at recognising and quantifying post-depositional transformations and isolating pristine areas, suitable for future studies on spatial and social behaviour at the site.

Our results show that the action of frost-induced processes, involving ice and water has partly altered the spatial distribution of artefacts at the site. Freeze-thaw cycles often caused the fragmentation of larger artefacts, while ice-wedge pseudomorphs formed later penetrated deeper into the deposits, locally resulting in vertical displacement of finds. However, the most intense post-depositional process seems to relate to solifluction and/or water downslope-runoff, which led artefacts to align and move radially south- and south-eastwards along the slope's natural gradient. Besides these observations, our analysis also allowed us to identify pristine areas, characterised by a planar distribution of finds and refitting lines.

This work represents the first, essential step in understanding artefact patterning at the site. It will allow us to target future investigations to areas not or only marginally affected by post-depositional processes, from which meaningful information on Breitenbach inhabitants' spatial and social behaviour can be inferred.

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New excavations and preliminary findings on Pleistocene remains from Gruta da Companheira (Algarve, Southern Portugal)

Gruta da Companheira, located in the Algarve region of southern Portugal, is a Middle Paleolithic cave discovered during road construction. It has yielded Mousterian tools, faunal remains, and possible human fossils, which provide valuable evidence for Neanderthal occupations in southern Iberia. The cave is shaped by complex karst processes, which raises questions about the formation and preservation of its deposits. As one of the few Middle Paleolithic cave sites in the region, the site holds particular importance for understanding Neanderthal settlement patterns and preservation biases in the archaeological record.

Recent excavations at Gruta da Companheira concentrated on Chambers 1 and 2, where Middle Paleolithic deposits, including Mousterian tools, faunal remains, and rare seashells, were uncovered. Geophysical surveys using Electrical Resistivity Tomography (ERT) and Ground-Penetrating Radar (GPR) identified a sediment-filled subvertical passage connecting Chamber 2 to the hilltop, potentially representing the original Pleistocene entrance. In addition, air-filled cavities were detected south of the known chambers, pointing to unexplored areas of the cave system. The sedimentary cone in Chamber 2, identified through geophysical surveys, highlighted the need for targeted excavations from above to access undisturbed deposits (Barbieri et al., 2023).

Excavations in 2024 confirmed the geophysical interpretations, uncovering a subvertical entrance filled with limestone blocks and brecciated sediments. Below the breccia, an open passage leading to the known cave system was uncovered, along with previously unexplored cavities further south of the known passages. The excavation of a 50x50 cm test pit at the entrance to this cavity (Chamber 3) yielded a rich assemblage containing faunal remains and lithic artifacts made from greywacke, quartz, and flint. While many bones were embedded in breccia or coated with calcium carbonate concretions, specimens from the lowest levels showed higher degrees of preservation, offering potential for detailed taphonomic and paleoenvironmental studies.

In October 2024, excavations continued at the entrance area and the interior chambers and focused on stratigraphic units that comprised breccia layers, compact and loose clayey sediments, and limestone boulders. Stratigraphic units were documented using total station mapping. Micromorphology samples were collected from all layers to study site formation processes. Lithic remains, including Mousterian flakes and débitage products, were predominantly made from greywacke, quartz, and chert. Spatial analysis revealed the clustering of lithics and faunal remains near specific profiles, potentially influenced by cave-wall effects and sedimentary dynamics. Preliminary faunal analysis identified a diverse faunal

assemblage, including several medium- to large-sized mammals, with evidence of predator involvement mainly indicated by the presence of carnivore remains.

The deposits within Gruta da Companheira are hypothesized to have formed through a combination of slope processes and intensive secondary carbonate formation, including dissolution of bone apatite and its replacement with calcite. Sediments, likely originating from outside the cave, were transported into the system through a subvertical entrance, creating a sedimentary cone observed in Chamber 2. This process involved the gradual accumulation of clayey sediments, brecciated materials, and limestone blocks, with carbonate cementation contributing to the formation of breccia layers. Voids within the breccia and connections to unexplored galleries suggest possible multiple phases of deposition and subsequent erosion or redeposition driven by karstic activity. These processes likely operated over an extended period, shaping the complex stratigraphy observed in the cave.

Future work, including dating and micromorphology analysis, will further refine hypotheses about site formation processes and contribute to broader discussions on Neanderthal populations in southwesternmost Europe.

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Updated evidence from Ghiacciaia Cave (Fumane, Italy) in the context of late Neanderthal techno-complexes within the Po-Adriatic Basin of Northern Italy

The cultural diversity of the Middle Paleolithic has been a matter of debate since the early studies on Neanderthals. These discussions focus on their behavioral variability, including aspects such as stone knapping technologies, toolkits, subsistence strategies, and settlement systems. Regional in-depth studies can help validate general models of behavior, as technological and ecological choices may be context-specific and influenced by resource distribution. In a small area of northern Italy, particularly the Prealps of the Veneto region, a series of sites—including Fumane, San Bernardino, De Nadale caves, Broion cave and rock shelter, Tagliente shelter, and Ghiacciaia cave—serve as references for the broader Po-Adriatic area, which otherwise lacks stratified and contextualized evidence.

The Ghiacciaia Cave (Fumane) can represent key context for refining and deepening the reconstruction of Neanderthals' lifestyles and technological adaptation in this region. The Ghiacciaia cave is located at 250 meters above sea level in the Southern Lessini Mountains, facing north along a narrow east-west oriented valley, which flows into the valley where Fumane cave is located, about 5 km to the north. The cave was first investigated in 1979-1980 and has been the subject of renewed research since 2021. It preserves a stratified deposit over 3.5 meters thick, consisting of four stratigraphic macro-units entirely attributed to the Upper Pleistocene (Bertola et al., 1999; Peresani et al., 2022). At the base of the sequence, macro-unit 1 can be dated to the last interglacial based on pedosedimentary indicators, including the deposition of dolomitic sands and clays, along with the formation of red paleosols that mark temperate phases and gradually drier conditions. The overlying macro-unit 2 indicates a sedimentary shift with coarse fractions represented by cryoclastic breccias in an eolian and colluvial matrix. The faunal assemblages of large and small mammals confirm evidence of climatic cooling associated with MIS 4, pointing to an open woodland

environment. Above this, macro-unit 3, identified in earlier research by the widespread presence of loess, has been partially reconsidered due to the identification of a more complex stratigraphy, including levels of alternating eolian sediments and slope-washed detrital sediments of cryonival origin. Closing the sequence is macro-unit 4, characterized again by cryogenic breccias, preserved only in a limited internal area where it has become concreted.

Human occupation attributed to the Middle Paleolithic is found in macro-units 2 and 3, with abundant evidence highlighting a clear technological shift in the local Mousterian. The first unit is characterized by the adoption of the Quina method, with a high rate of retouched tools and the manufacture of typical Quina and demi-Quina scrapers on flakes obtained from non-prepared cores. Macro-unit 3 begins with a highly anthropized occupation soil: here, the knapping strategy changes suddenly in favor of the Levallois method, applied in several variants, including different examples of flakes exploited as cores and the manufacture of bladelets. Following this are levels where human occupation becomes less intense, eventually disappearing entirely, giving way to carnivores and ursids. Only in macro-unit 4 the cave is reoccupied, this time in an early phase of the Upper Paleolithic. While extensive chronological sampling has been done throughout the sequence, preliminary radiocarbon data, limited to macro-unit 3, suggest a rapid deposition during an early phase of MIS 3.

Ongoing interdisciplinary research at Ghiacciaia Cave, along with its chronological, ecological, and environmental contextualization, can help to reinforce the chrono-cultural sequence of late Mousterian techno-complexes in northern Italy. This will provide insights into the reconstruction of Neanderthal settlement systems, ecology and cultural expressions.

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Innovations in Prehistoric lithic technology: the configuration of backed tools in the Paleolithic

The evolution of Paleolithic stone tool technologies is characterized by an increase in technical complexity alongside changes in the composition of assemblages. This gradual, polyphyletic process followed multiple trajectories. In this respect, the emergence of retouched backed tools is an important step and, for some scholars, a marker of behavioral modernity and a proxy for cultural complexity (McBrearty & Brooks, 2000).

This is particularly true when considering the more advanced phase of the "backing" concept (from the late Middle Stone Age and Early Upper Paleolithic), where its use becomes consolidated and systematically associated with the manufacture of standardized composite tools. The configuration and accommodation of the prehensile portion of stone tools, however, is present in earlier contexts, developing in different forms and proportions throughout the Lower and Middle Paleolithic. This innovative feature is directly related to other physical, ergonomic, and economic aspects, such as enabling a more efficient precision grip, facilitating the most effective transfer of force, and reducing time investment in haft production,

maintenance, and retooling. These considerations are, in turn, linked to several characteristics of tool production, such as miniaturization and technical innovation (e.g., tool hafting).

This poster provides an updated review of the emergence and development of the "backing" concept across multiple chrono-cultural contexts, while also attempting to standardize the relevant technical terminology that has developed over the last few decades (Delpiano et al., 2024). Backing appears to have emerged independently multiple times during Pleistocene human evolution, as evidenced by the diversity of tools and the variety of ecological and chrono-cultural contexts. The available data suggest a punctuated appearance across multiple hominin species and indicate that the emergence of backing and hafting were not directly related. Instead, the invention and first application of backing likely emerged as a cost-effective alternative to hafting. However, thanks to a detailed case study from the late Mousterian of Fumane (northern Italy) and La Rochette (southwestern France), we demonstrate that the concept of backing is not uniform and, especially in the late Middle Paleolithic, may have incorporated elements of the conservation and transmission of technical know-how, including the invention of composite tools.

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Late Neanderthal Activity Patterns in Middle Palaeolithic Caves: Use-wear analysis of the Micoquian lithic industry from Kůlna Cave, Czech Republic

The spatial organization of Neanderthal occupations provides crucial insights into their behavioural patterns and adaptive strategies. Understanding how Neanderthals structured their living spaces and utilized available resources is essential for reconstructing their lifeways. Use-wear analysis, which examines microscopic traces on tools to infer their function and the worked materials, provides insights on how space was used and which activities took place.

This study contributes to the above-mentioned discussion by investigating the Middle Palaeolithic settlement of Kůlna Cave (Valoch 1988), specifically layer 7a, dated to approximately 50 000 years BP (Neruda/Nerudová 2014). The primary objective of this research was to verify the functional zones previously identified in the cave through earlier studies (Neruda 2017). By applying use-wear analysis to a collection of lithic tools from layer 7a, which was excavated during the years 1961-1976 and 1955-1977 by Karel Valoch (Valoch 1988; 2002), the study aimed to identify the materials worked by these tools and the specific methods of use employed by Neanderthals. Although use-wear analysis has been applied to this assemblage before, previous studies focused only on specific tool types, such as bifacial tools (Šajnerová-Dušková 2009) and groszaky (Pyzewicz, unpublished laboratory protocol).

This study represents the first comprehensive selection and analysis of the assemblage. The results from this study were compared with the results of earlier investigations to evaluate the validity of previously

proposed functional zones within Kůlna Cave. These functional zones represent areas designated for particular activities, such as butchering, hide processing, or tool production (Neruda 2017), which collectively reveal how Neanderthals organized their living and working spaces. The results of this study provide new evidence regarding the spatial organization and resource utilization of Neanderthals in Kůlna Cave. The identification of worked materials, such as animal hides, bones, plants or wood, and the reconstruction of tool use patterns allowed for a more detailed understanding of the cave's functional zones. For instance, areas previously interpreted as designated for butchering or hide processing were further substantiated by the identification of wear traces consistent with these activities. In other cases, discrepancies between the newly acquired data and earlier interpretations prompted revisions of the proposed spatial layout of activities within the site.

This research enhances our understanding of Neanderthal occupation at Kůlna Cave during the late Middle Palaeolithic period, contributing to broader discussions about Neanderthal behavioural complexity, adaptability, and organization of living spaces. By integrating the new use-wear analysis data with previous findings, this study not only refines the functional zoning of Kůlna Cave but also provides a more comprehensive picture of Neanderthal life, highlighting their ability to strategically utilize available resources and organize their environments in a manner indicative of advanced cognitive and social behaviours.

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Tracking human dispersals in late Pleistocene southern Africa: a focus on Mozambique over the last 100,000 years

Around 70,000 years ago, modern humans (*Homo sapiens*) began migrating out of Africa, gradually populating the globe. The "Out of Africa" (OOA) model was developed to describe this migration based on archaeological, fossil, and genetic evidence. Over time, several variations of the OOA model have emerged, exploring different routes and timelines for these migration waves. One variation suggests a major migration originating in southern Africa that moved toward eastern Africa within the last 100,000 years. Mozambique, an area bridging southern and eastern Africa - two key regions of human development-, has remained understudied in terms of its Stone Age record.

Our study focuses on analysing the Stone Age record collected through systematic surveys and excavations in the Save and Limpopo River basins in central Mozambique. By comparing our findings with published data from Late Pleistocene sites in southern and eastern Africa, dated between 100,000 and 11,700 years ago, we aim to investigate human interaction networks as evidenced by material remains. Specifically, we seek to understand how socio-cultural and technological influences spread, as well as how environmental and landscape variables shaped migration pathways. To achieve this, we use a combined approach using Network analysis, Agent-based modelling, and Geographic Information Systems (GIS). Our goal is to understand human mobility during this transformative period in prehistory, and to examine the direction of knowledge and cultural transmission between southern and eastern Africa.

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A Pleistocene n-alkane biomarker record from Florisbad, South Africa

Exploring the relationship of climatic changes with human evolution is a key research question that requires detailed records of past climate and vegetation, recovered directly from well-dated archaeological sites. Florisbad is one such archaeological site for the middle Pleistocene of South Africa, since the recovery of a partial hominin skull in 1932. Located in the Grassland biome of the Free State Province, the site comprises peat and lacustrine layers formed around an active spring. In addition to the hominin skull, stone artefacts and faunal remains have been recovered during excavation campaigns in the 1930s, 1950s, 1980s and 1990s. The two latter campaigns also produced pollen and phytolith records as well as radiometric dates for the site, while analyses of the collections and sediments is ongoing (Toffolo 2024). The site has a minor Middle Holocene Later Stone Age component while the lower layers are dated to the Middle Pleistocene ~120-300 ka. The fauna contains species typical of the Florisian Land Mammal Age while the lithics are Middle Stone Age. While archaeobotanical (e.g. Scott et al. 2019) studies have documented shifts in past vegetation, changes related to paleohydrology such as local rainfall patterns are not well resolved.

We extracted lipid biomarkers from 21 samples covering all layers of the Upper and Lower Dreyer section at Florisbad. We identified good preservation for n-alkanes in several layers, while others, particularly in the terminal Pleistocene, showed evidence of substantial degradation of n-alkane chains. What stands out

is unusually high nC33 concentrations in most of the Pleistocene samples, suggesting probably abundant C4 grass plant material in the sediments. A dominance of C4 grasses prevails in the Free State today, and the Florisbad pollen studies have confirmed a dominance of grassy conditions during the Pleistocene. We identified nine better preserved samples on which we measured carbon and hydrogen stable isotope ratios. The hydrogen stable isotope shows an arid phase in layers attributed to the lower Middle Pleistocene dated to around 160 ka.

The site's location within an active spring, subject to fluctuating water tables both past and present, introduces a complex array of potential influences. These are examined within the framework of recent site formation studies, incorporating magnetic susceptibility analyses and newly obtained optically luminescence ages. Comparing palaeoenvironmental reconstructions derived from biomarkers with pollen, faunal records from the site, regional archives, and ocean cores enables us to evaluate the reliability of this method and develop a more comprehensive understanding of Middle Pleistocene climatic changes in this specific region.

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Settlement Dynamics during the Middle and Later Stone Age in the Aïn Beni Mathar – Guefaït Region (Eastern Morocco): Predictive modelling for tracing Paleolithic sites

The Aïn Beni Mathar – Guefaït (ABM-GFT) area in the Eastern Morocco provides a unique opportunity to investigate the regional behaviors of *Homo sapiens* during the Middle and Later Stone Age (MSA and LSA).

Mohammed First University (UMP) Oujda (Morocco), and The Catalan Institute of Human Palaeoecology and Social Evolution (IPHES-CERCA) have focused their research efforts in this region for 19 years, which preserves a long archaeological record from the Early Stone Age (ESA) forward. My PhD research builds on this bilateral project, aiming to investigate human settlement, land use, and mobility in the ABM-GFT region during the MSA and LSA.

This research seeks to investigate the evolution of *Homo sapiens*' cultural trajectories from a geographical perspective. By applying unsupervised predictive modeling, it aims to locate potential archaeological sites based on key geographic variables such as proximity to known sites, raw material sources, and terrain characteristics. The model hypothesizes that undiscovered sites should be located in geomorphological environments associated with the main basin (ABM-GFT) where previously documented sites are concentrated.

This presentation focuses on the initial results of fieldwork validation following predictive modeling. The model has so far resulted in the discovery of eight caves and two rock-shelters, five of which contain evidence of human occupations associated with at least the Neolithic and the LSA periods. These preliminary findings confirm a strong correlation between predicted localities and newly identified archaeological sites, supporting the model's effectiveness in detecting prehistoric occupations.

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Hugo Obermaier in Spain – His pioneering work from the perspective of current research on Levantine art

Hugo Obermaier, a native of Regensburg (Bavaria, Germany), is one of the great personalities of prehistoric research from the first half of the 20th century. For over 30 years, he devoted his main scientific attention to the prehistory of Spain. Appointed to the famous Institut de Paléontologie Humaine (IPH) in Paris in 1911, he subsequently achieved particular fame through his co-operation with Henri Breuil and Hermilio Alcalde del Río, especially in the context of his research in the caves of Monte Castillo (Puente Viesgo, Cantabria). Exiled from France due to the outbreak of the First World War, he subsequently intensified his studies in Spain, particularly on Palaeolithic cave- and prehistoric rock art. His favourite areas of work were the classical northern Spanish find region of Cantabria and the area of Levantine art in eastern Spain.

Without including overview works and studies on glacial geology and clearly post-Palaeolithic sites, Hugo Obermaier can be credited with almost 50 publications in the period from 1909 to 1939 that dealt with the Palaeolithic contexts as with the cave and rock art of northern and eastern Spain. He has been researching the Levantine art of eastern Spain since the beginning of his work on the Iberian Peninsula. It was Obermaier who was one of the first to discuss the Palaeolithic roots of Levantine art and also made references to the rock art of North Africa. This makes his pioneering research particularly topical.

Obermaier was based in Spain throughout the interwar period. After obtaining a professor position at the Central University of Madrid, he achieved great public notoriety that led him to become the undisputed figurehead of the exhibition on prehistoric art inaugurated by King Alfonso XIII in 1921 at the future National Archaeological Museum of Madrid. Since the publication of *Fossil Man in Spain* (1916), his influence on the nascent Spanish archaeology has continued to grow, both through the training of the next generation of researchers, including Martínez Santa-Olalla and Martín Almagro, and also through much more precise and meticulous systems of work than were common at the time.

In the study of Levantine art, he was accompanied by a magnificent professional draughtsman, Francisco Benítez Mellado, with whom he worked side by side trying to capture the real state of conservation of the rock art paintings, avoiding any kind of idealization. Thanks to these accurate tracings, his publications about Levantine art served as a significant catalyst for the global dissemination of Levantine art, presenting it as a reliable depiction of the prehistoric hunter-gatherer lifestyle. His interest in this kind of open-air rock art was initially piqued by his visit to Cueva de la Vieja in 1912, two years after its discovery. During his sojourn in Spain, he had the opportunity to visit numerous rock art sites in eastern Spain, but he was primarily involved in the discoveries in the Castellón province. Notably, in 1917, he and his colleague P. Wernert, undertook a comprehensive study of the remarkable rock art sites in La Valltorta, including Cova dels Cavalls, Coves del Civil, and La Saltadora. Their seminal publication, *Las pinturas rupestres del barranco de Valltorta (Castellón)*, provided a foundational study of human depictions in this style, which has since served as a crucial reference for numerous researchers. The interest in Levantine art was revived two decades later when he participated in the study of the magnificent sites surrounding Cova Remigia.

The digital technologies we use today have allowed a remarkable advance in accuracy and speed in the scientific recording of Levantine art with respect to the manual tracings of the early twentieth century, but there is no doubt that we are still indebted to the scientific rigor with which Obermaier faced his recordings.

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A single test for raw material properties: hardness and stiffness of tools-stones from Sibhudu

The study of lithic raw materials provides critical insights into past human behaviour, including mobility strategies, economic choices and tool design. Despite the widespread use of models based on raw material quality, this concept remains poorly defined, with 'quality' often equated with fine-grained, isotropic materials such as flint. Such a narrow focus risks neglecting or misinterpreting data in contexts where flint is absent, such as southern Africa. In this region, a wider range of raw materials with different mechanical properties were used for lithic production. These mechanical properties play a key role in determining the suitability of a material for flaking, shaping and tool use. However, traditional methods for measuring these properties experimentally require specialised laboratory facilities, sophisticated equipment and complex protocols. These constraints make such analyses costly and limit their accessibility in many archaeological contexts.

This study investigates the mechanical properties of lithic materials from Sibhudu Cave, a Middle Stone Age (MSA) site on the eastern coast of South Africa. The research has two primary objectives: to apply a simplified methodology to measure stiffness (via Young's modulus, E) and hardness (HK), and to assess the interpretative potential of these properties by analysing blade production at the site. The methodology used is a single indentation test, originally proposed by Ben Ghorbal et al. (2016). This approach has

proven to be reliable, efficient and accessible. It reduces the logistical and financial barriers associated with traditional testing protocols, and provides archaeologists with a practical means of investigating the mechanical properties of stone tools.

Sibhudu contains a diverse assemblage of stone tools made from dolerite, hornfels, hydrothermal quartz, quartzite and sandstone. These raw materials, all local or semi-local, were exploited to varying degrees over more than 100,000 years of occupation at the site. This makes Sibhudu an ideal case study for investigating how mechanical properties can influence chipping behaviour, tool design and, by extension, raw material selection. Archaeological samples from three stratigraphic levels - pre-Still Bay, Howiesons Poort (HP) and post-HP - have been analysed to investigate potential correlations between mechanical properties and lithic metrics. In particular, the study focuses on laminar blade production to test Cotterell and Kamminga's (1987) hypothesis linking the stiffness of a stone to the ease of blade production.

The results show that hydrothermal quartz has the highest E and HK values, followed by quartzite, with sandstone having the lowest values. Dolerite and hornfels show similar intermediate values. Our results demonstrate that the single indentation test reliably measures the isolated mechanical properties of raw materials, establishing it as a valuable addition to the archaeologist's toolkit. The mechanical data provided critical insights into the selection of lithics. Dolerite and hornfels were the most commonly used materials, although their use varied between stratigraphic levels. In the HP layer, blade production dominated, with dolerite and hornfels being used preferentially. The analysis also reveals weak but informative correlations between these properties and tool morphology, specifically blade length and platform width. While hardness and stiffness provide important insights into raw material selection, they are part of a broader set of factors that shape knapping strategies and tool design. A direct relationship between stiffness and blade production could not be demonstrated.

These results open avenues for future research, including further exploration of stiffness as a determinant of raw material workability and its implications for understanding the cultural and technological choices of ancient toolmakers.

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The Significance of bipolar technology in the evolution of stone tools: a comprehensive exploration

The emergence of stone tool technology stands as a pivotal milestone in human evolution. Bipolar knapping, a technique where a stone core is struck between a hammerstone and an anvil, represents one of the earliest known methods of stone tool production (1). And as such it holds a potentially crucial role in understanding the technological emergence and development of our earliest ancestors. Despite its presence in the Early Stone Age record, it is understudied compared to other knapping techniques and later technological advancements.

Recent insights from Primate Archaeology highlight the potential role of percussive behaviours, such as nut-cracking, in the origins of hominin tool use (2,3). There remains, however, a hypothesised cognitive

leap between using unmodified stone tools to crack open nuts on anvils and intentionally making stone tools for cutting. A disconnect persists between the technique, posture, and manipulative ability employed in nut cracking and most of the earliest knapping techniques. Bipolar knapping, which uses both hammerstone and anvil, may therefore represent an intermediary technology sharing aspects with simple percussive behaviours and complex knapping techniques (4). Apart from a few general comparisons, little research has been undertaken to test this hypothesis.

This project will investigate the hypothesis that bipolar knapping may have acted as a technological bridge, connecting percussive tool use with deliberate flake production. The project will employ a multifaceted approach that integrates the synthesis of existing data, experimental archaeology, machine learning methodologies, and kinematic analysis. The systematic review will collect and analyse legacy data on bipolar knapping technology to explore its internal structure and variation. Archaeological data will be the primary focus, with an emphasis on Pleistocene materials from East Africa. Controlled experimental replication of bipolar knapping will offer insights into its efficiency, variability, and potential advantages over other knapping methods. Machine learning techniques will be used to develop a robust means of identifying and differentiating bipolar reduction from other knapping techniques across raw materials. Furthermore, kinematic analysis will enable a direct comparative analysis of quantitative kinematic parameters across different knapping techniques and percussive behaviours such as nut-cracking. By employing a multifaceted approach, this project will investigate the often overlooked yet potentially pivotal role of bipolar knapping may have had in the emergence of human technology.

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Analysing the Combined Effects of Fireplaces and Shelter-Structures at Open-Air Sites using Fire Dynamics Simulator

Fireplaces are a common feature at many Palaeolithic sites and different types of construction have been documented, such as fireplaces in shallow pits or on flat surfaces and with or without stone bordering. In many cases, the location of these fireplaces within tents or in close proximity to different kinds of shelter-structures have been proposed – and also often contested.

This paper does not attempt to side with the one or the other view. Rather, it aims at contributing to the debate by applying a modelling approach to analyse the combined effects of fire-places and postulated shelter-structures for a better understanding of the interplay between both features. The Fire Dynamics Simulator (FDS) is an open-source software designed for modelling of fire behaviour and smoke movement in the context of fire safety engineering. Previous studies have demonstrated the usefulness of

FDS in archaeology through its application in cave-sites, where it has yielded promising results regarding human behaviour (Kedar et al. 2022).

Prior to this, 3D-reconstructions of fireplaces were mostly used for aesthetic purposes as seen in museum exhibits. Additionally traditional research on fireplaces has mainly focused on physical evidence, such as hearth remnants, to infer their design and functionality (Fuente-Fernández 2022). However, such inferences are challenging due to the difficulty of assessing the functional relation between documented fireplaces and potentially corresponding shelter-structures, such as windshields or tents.

The application of FDS to open-air settings allows for a quantitative comparison and evaluation of the proposed fireplace-shelter combinations in terms of their functionality regarding heat radiation, light distribution, and smoke dispersion.

Given that FDS has not previously been employed for archaeological open-air contexts, the aim will not only be to integrate 3D-reconstructions of fireplace-shelter combinations from different sites but also to incorporate wind patterns and temperatures as environmental factors as well as different materials used to construct the shelters. This approach enables a more differentiated and data-driven evaluation of Palaeolithic habitation practices.

The results will provide new insights into the functionality of different types of fireplace-shelter combinations for future research on fire-related practices.

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Negative Structures through mammal and shell remains: preliminary results from the prehistoric station of Monte do Marquês 15 (Beringel, Beja)

This study presents preliminary data on the mammalian and malacological fauna discovered in the negative structures at the prehistoric site of Monte do Marquês 15 (Beringel, Beja) during the archaeological campaigns conducted in 2007 and 2008. The excavation was carried out in three phases, which allowed for the identification of a significant number of negative structures from the fourth and third millennium BCE. In total, 35 structures were identified, of which 28 were excavated while the remaining structures were preserved and documented (Baptista, Cunha & Gomes, 2010; Baptista et al., 2013; Vale et al., 2013).

Most of the faunal assemblages have been analyzed in terms of taxonomy, anatomy, and taphonomy. Preliminary results reveal that Lagomorphs, particularly the European Rabbit (*Oryctolagus cuniculus*) and the Iberian Hare (*Lepus granatensis*), are the most prevalent taxa. Following these are the Artiodactyla, which include the Wild Boar (*Sus scrofa*) and Domestic Pig (*Sus domesticus*) in larger numbers, as well as

the Domestic Sheep (*Ovis aries*) and Domestic Goat (*Capra hircus*). Additionally, remains of Aurochs (*Bos primigenius*), Cattle (*Bos taurus*), and Red Deer (*Cervus elaphus*) were also identified in smaller quantities. The examined remains featured various smaller taxonomic orders, including Anura, primarily the European Toad (*Bufo bufo*), and Rodentia, specifically the Black Rat (*Rattus rattus*), as well as Squamata, specifically the European ocellated lizard (*Timon lepidus*). Regarding the malacological fauna, preliminary findings indicate that the Great Scallop (*Pecten maximus*) is the most commonly observed taxon.

A wide range of taphonomic modifications, resulting from both anthropogenic and natural factors, were observed. The most common modifications include root etching, thermal alterations, and digestion marks. These initial results seem to suggest at least two possible periods of activity at the site. The first relates to the use of the structures by the Chalcolithic community, reflected in the presence of burnt faunal remains, as well as less frequent modifications such as cut marks and polishing. The second period appears to relate to the abandonment of the structures, followed by activity from scavenging animals, characterized by scattered osteological remains of smaller animal orders, digestion marks on some bones, as well as punctures and pits.

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Late Middle Pleistocene Technological and Behavioral Shifts in South China

The Late Middle Pleistocene (ca. 320–125 ka) represents a period of critical human anatomical evolution and cultural innovation, particularly in western Eurasia and Africa. Key developments during this time include the emergence of anatomically modern humans across Africa, the persistence of multiple archaic hominins in Eurasia, the widespread adoption of prepared-core technology, the appearance of diverse organic and inorganic technologies, hafted tools, and the use of pigments.

In contrast, eastern Eurasia presents a different picture. Although multiple hominin populations with distinct anatomical features are known to have coexisted in East Asia during this period, the material culture and behaviors in East Asia have often been considered to lack innovations and have frequently been stereotyped as “simple” and “static.” These perceptions are in part the result of the limited scope of fieldwork in the region and a Eurocentric bias.

The results of fieldwork and research over the past decade are challenging these views. This study presents findings from the newly discovered Taohuahe site in the Sichuan Basin, South China. Situated on the fourth terrace of the Fujiang River, the site has yielded over 9,000 lithic artifacts from four distinct

stratigraphic contexts dating to ca. 350–200 ka. Analyses document lithic assemblages characterized by the systematic production of large flakes with clear evidence of spatial organization. These findings, together with observations from other recently identified sites in South China, reveal significant technological and behavioral shifts during the Late Middle Pleistocene. Key trends include the prevalence of technologies characterized by large flakes and large cutting tools (LCT), together with higher proportions of flake tools and increased standardization. Additionally, researchers have documented a sustained human settlement of the Tibetan Plateau and suggestions of interregional cultural interactions.

These findings underscore that during the Late Middle Pleistocene, East Asia was far from stagnant, and the region was on its own paths of technological and behavioral evolution compared to the western part of the Old World. The Late Middle Pleistocene is uniquely important as it reveals that human populations and cultures across different regions were developing along diverse trajectories, a trend that continued in a still more pronounced form during the Late Pleistocene.

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News from the Neckar valley – A new research project on the Late Mesolithic in Southwest Germany

During the time of the first agriculturalists and the last hunter-gatherers in Southwest Germany, the archaeological data often limits what statements can be made. The distinction between the Mesolithic and the Neolithic often follows a split in research traditions, the Mesolithic leaning more towards the natural sciences, whereas the Neolithic is frequently investigated through a more culture-historical lens based in the humanities. The resulting differences in research questions and excavation techniques can complicate comparisons, making it difficult to identify similarities or differences in the cultural remains of mobile and sedentary groups and evaluate whether contact between these groups occurred.

To bridge the gap, a new DFG-funded research project of the University of Tübingen and the State Office for Cultural Heritage Baden-Württemberg seeks to investigate the Mesolithic-Neolithic transition in the Ammer and the Neckar valley from both sides, with one PhD position focusing on questions of chronology through ceramic seriation, relative and absolute dating, and my PhD investigating the lithic technology of the different groups.

The focal point of my work will be the comparison of the assemblages of Rottenburg-Siebenlinden AH II – a Late Mesolithic horizon – and Rottenburg-Fröbelweg, a stratified Earliest LBK settlement site. The two sites, with lithic assemblages of the entire chaîne opératoire and 3D measurement of all finds, hold the potential to address questions that would remain unanswered when comparing a Mesolithic site with other

LBK sites of the region. In addition, fieldwork on further LBK sites in the Ammer valley, and on a potential Mesolithic site in the Schönbuch forest north of Tübingen will be conducted as well, and excavated but as of yet unpublished Mesolithic and LBK lithic assemblages will be analysed. Both the Siebenlinden and the Fröbelweg assemblages are published, and similarities in lithic technology, specifically blade technology and projectile morphology, have been noted. Through applying a broad spectrum of modern analytical techniques – e.g. raw material provenance through spectroscopy, use wear and residue analysis – I seek to either confirm similarities in technology or identify differences in lithic production, use and handling, that may not have been recognized previously. Both outcomes carry great implications regarding continuities, contacts, or co-existence of mobile and sedentary groups in the Neckar region at the time of the Mesolithic-Neolithic transition.

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Settlement Scenarios in Aghitu-3 Cave in Armenia: A Study of the Raw Material Units of the Upper Paleolithic Assemblages

This paper presents a study of Raw Material Units and their application in order to understand settlement scenarios across the different archaeological horizons (AH) at Aghitu-3 Cave in Armenia. The cave provides a stratigraphic sequence spanning the Early and Middle Upper Paleolithic, dated between 40,000 and 24,000 cal BP. These layers yielded a large assemblage of lithics dominated by obsidian, followed by chert, in addition to organic artifacts such as an eyed bone needle among the bone tools and perforated shell beads (Kandel et al., 2017).

We conducted a technological study of the reduction sequence in each archaeological layer to understand the main reduction steps: from 1) decortication, 2) core preparation, 3) reduction, 4) rejuvenation, to 5) discard (Bar-Yosef & Van Peer, 2009; Inizan et al., 1999). Each of these five steps leave characteristic features on the debitage. The raw material units were then classified in each layer based on specific characteristics such as stone type, color, texture, and homogeneity, and each unit was linked to a corresponding reduction step. This classification allowed us to identify the presence or absence of a reduction step for each raw material.

As a result, we distinguish between the activities performed inside the cave and those occurring outside (Tafelmaier et al., 2022). This differentiation provides insights into past human perceptions of the cave's functional role across different occupational phases, and those perceptions can be organized into four settlement scenarios (Fig. 2): 1) All reduction activity took place outside the cave; 2) The entire reduction sequence was conducted inside the cave; 3) Core preparation occurred outside the cave, while subsequent reduction took place inside; and 4) All reduction stages were performed within the cave, but the end products or aim of reduction are absent. Each of these scenarios reflects distinct behavioral patterns and site-use strategies adopted by past inhabitants of Aghitu-3 Cave.

In the early phases of settlement (AH VII - VI), we note the dominance of Scenario 3: the groups of hunters and gatherers were highly mobile in the region, and the cave served as a short-term camp to which people

returned with their tools and bladelets prepared in advance. It appears that they had a good awareness of their surroundings, and the tools necessary to accomplish the planned activities within the cave. They probably inhabited areas of lower elevation and made use of the cave as a temporary shelter during hunting trips into higher elevations. This situation changed in the middle and late phases of settlement (AH IIIA-D), with Scenario 1 dominating. The study reveals long-term habitation inside the cave, where people often made their tools and used them. It seems that people made use of the cave as a seasonal camp for longer durations than in the early phases. Consequently, Scenario 1 dominates more widely, but also with the occasional presence of Scenarios 2 and 4. It is interesting to note that the variation in scenarios across the different levels was not random. Rather, the third scenario was dominant in the lower levels (AH VII-VI), before shifting towards the first scenario in the upper levels (AH III).

The study of artifacts and tools revealed significant technological and typological changes in tool types, with a significant presence of laterally retouched and backed bladelets. Also points became more dominant, alongside an increase in the number of domestic tools. These shifts in settlement scenarios and tool types align well with the chronological transition from the Early Upper Paleolithic to the Middle Upper Paleolithic.

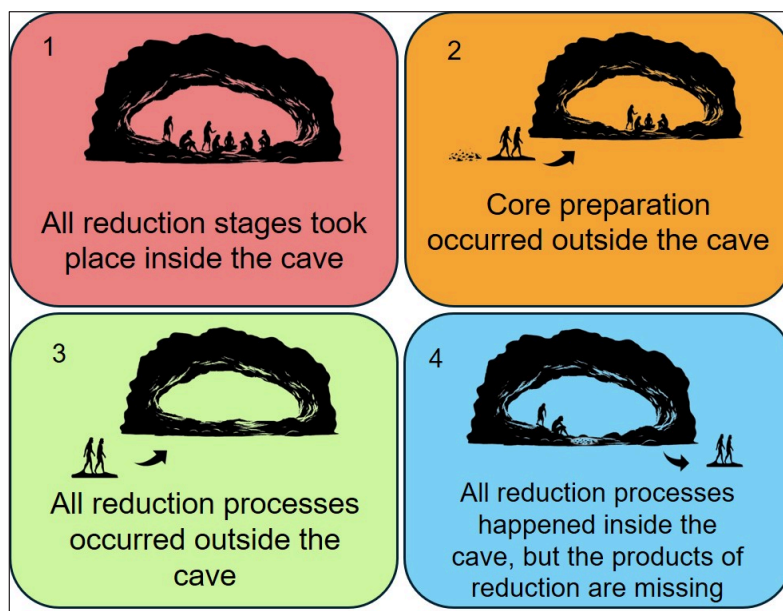


Fig. 2. The four settlement scenarios in Aghitu-3 Cave

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The early Upper Palaeolithic between the Harz Mountains and the Thuringian Forest

Based on the techno-typological analysis of lithic and (if available) organic finds from different sites in the Harz Mountains and the Thuringian Forest, my research aims to shed more light on the extensive period between the ending of the Middle Palaeolithic to the Last Glacial Maximum in those regions. The list of sites to be analysed is not particularly long, but important regarding the state of research. In contrast to the wealth of sites from the Late Upper Palaeolithic, and particularly the Magdalenian in the region, comparatively few sites are known for the period before the LGM (Küßner 2009).

However, further ‘suspects’, emerged within the course of the research:

The list begins at Gera-Zoitzberg, situated close to the White Elster at around 280.6 m above sea level (Küßner/Terberger 2006, 74), this archaeological site with an inventory of around 10,000 artefacts represents a very rich field site. A renewed and ongoing investigation of this material, considering older technocomplexes such as those of the IUP, is also promising in regard of the restored completeness of the inventory.

Gera-Schafgraben is located on a slope in the vicinity close to the Zoitzberg, only about 2 kilometres in distance. And the composition of the inventories is considered similar to a certain degree. Although it has so far been categorised as Magdalenian *sensu lato* (Küßner/ Jäger 2015, 302-203). Should the assumption mentioned above be verified for the Zoitzberg site, this assemblage could also contain older components.

The Langenberg near Gera is mentioned in a map by Mania in 2009 (Mania 2009, Fig. 1) as a site of the early Upper Palaeolithic and should therefore be included in my research. Further information about the finds is not yet known to the author.

The Ilsenhöhle in Ranis, one of the locations in the study area where the period before the maximum of the Würm-Weichsel glaciation was recorded. The stratigraphy of the site ranges from the Middle Palaeolithic to the late Upper Palaeolithic (Schüler/Weiß 2018). An examination of the layers above the recently published LRJ (Myopotamitaki/ Weiss et al. 2024) is also under consideration.

Wüste Scheuer is also a cave site near the village of Döbritz, situated on a former limestone reef with other cave structures in the immediate vicinity. While most were lost after, or during the Second World War, the remaining archaeological finds are stored in partial collections (Pasda et al. 2019, 1; Dietrich 2025, 33; Walter 1985, 29). However, an Aurignacian-period visit to the cave is mentioned in the literature (Walter 1985, 29). The analysis of this location depends on the search for the find materials itself and whether it is possible to recover some of them, in a similar way to the Zoitzberg finds.

For the Magdalenian site of the Kniegrotte (Küßner/ Jäger 2015, 304; Höck 2000, 152), the question has been open for some time as to whether older finds can also be recorded. An old C14- Date and mammoth ivory found at the site could indicate this (Pfeifer 2020, 201-203, 211). This cave is also situated near Döbritz.

Bilzingsleben, Simsensee was discovered in the year 1974 by Mania during geological mapping surveys near the so-called “Steinrinne” and is located northeast of the other sites in the Thuringian Basin. The site is dated into the Gravettian period and contains several thousand pieces. Unique here is the occurrence of Front-Robert points and Kostenki ends at one site. These circumstances are unique to date and could provide evidence of contacts and routes before the LGM in central Germany (Mania 2009, 121, 133).

In addition to the recording and statistical evaluation of artefacts, a reconstruction of the environmental conditions in the study area is helpful in order to understand the circumstances under which the humans of

the Early Upper Palaeolithic were operating. A further conceptualisation of the above-mentioned sites is also feasible in this context. With the help of ELSA climate data and available pollen data from Thuringia, an attempt is to be made to shed light on the environment and ecology in the period and area under investigation. I plan to present this endeavour and its first results by means of a poster.

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Humans on the road. Connectivity in the Iberian Peninsula during the Early Pleistocene

The Iberian Peninsula represents the westernmost extension of the Eurasian continent, functioning as a geographical cul-de-sac. A notable characteristic of this region is its relative isolation from the rest of the European subcontinent, being connected by land to it only for a few passes through the Pyrenees, a mountain range which feature considerable altitudes. Additionally, the peninsula's proximity to North Africa is significant, with the narrowest point of the Gibraltar Strait currently measuring just 14.4 km.

Despite its geographical isolation, the Iberian Peninsula is home to some of the earliest known sites of human settlement in Western Eurasia, including Barranco León (Orce) (Toro-Moyano et al., 2013) and Sima del Elefante (Atapuerca) (Carbonell et al., 2008).

From an ecological perspective, the region is distinguished by its remarkable climatic and habitat diversity, which has led some to describe it as a "small-scale continent" (Blain et al., 2021). On the other hand, an Ecological Network (EN) is defined as "systems of nature reserves and their interconnections that render a fragmented natural system more coherent, thus supporting greater biological diversity than an unconnected form" (Jongman, 2004, p. 24). Such a network encompasses all areas that are potentially

habitable or traversable by a particular taxon. As such, the factors most directly influencing the presence and movement of terrestrial mammals include both ecological elements (e.g., climate, net primary productivity) and geographical factors (e.g., barriers such as bodies of water, altitude, mountain ranges, and steep slopes). While previous studies have mapped areas of higher or lower habitat suitability based on ecological variables (e.g., Blain et al., 2021), the ecological connectivity or isolation of different habitable zones within the Iberian Peninsula has yet to be thoroughly investigated.

In this study, we assess the habitat connectivity (Lindenmayer and Fisher, 2006) of the Iberian Peninsula through the application of Geographic Information Systems (GIS) and the Wellbeing Traveler Algorithm, a tool developed specifically for this purpose. The analysis utilizes variables such as average annual temperature, average annual precipitation, forest coverage percentage, and slope.

Our findings indicate that during the Early Pleistocene, the Iberian Peninsula was (1) a region characterized by substantial ecological and geographical connectivity for human populations, (2) that this connectivity was more pronounced in the northern areas compared to the southern parts, (3) that human groups preferred to settle in areas with moderate climatic conditions (neither excessively dry nor overly humid), and (4) that both Orce and Atapuerca were situated in regions of high connectivity.

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Lower Palaeolithic Chronostratigraphy of Central Europe 30 years after the “Short Chronology”

Thirty years ago, the Lower Palaeolithic record of Europe was revised by Wil Roebroeks and colleagues (Roebroeks and van Kolfschoten, 1994; 1995; Dennell and Roebroeks, 1996). Referring to well-preserved sites in fine-grained deposits, the authors propagated the first hominin occupation of Europe to have started not significantly earlier than ca. 500 ka ago, during the Late Cromerian, preceding the Anglian/Elsterian

glaciation. With the discoveries at different localities in Atapuerca predating this time-interval, and with other, newly discovered or dated southern European sites that contributed to the research about the first occupation of Europe, this model was quickly revised, highlighting the much earlier occupation of the regions south of the European high mountains. In addition, in West and Northwest Europe, new sites were discovered since the mid-1990s, which pre-date the Late Cromerian. Especially the sites of Pakefield and Happisburgh on the British Isles are noteworthy, given their high northern latitude and their late Early to early Middle Pleistocene age estimates.

In contrast to these discoveries, no new well-stratified and dated Lower Palaeolithic sites have been discovered in Central Europe over the last 30 years. New exposures and new fieldwork at the site of Mülheim-Kärlich in the German Central Rhineland reveal a partly revised and highly detailed chronostratigraphy of late Lower and Middle Pleistocene deposits, but have yet failed to discover new archaeological horizons that would pre-date the Late Cromerian which today can be linked to MIS 15-13, i.e. roughly to the period ~600-500 ka ago (Jöris et al., 2024).

Neither could claims for earlier hominin presence at other Central European localities be verified – to the contrary, whenever finds of presumable artefacts have been claimed from older deposits, we are confronted with items of either dubious artefactual nature and/or poor stratigraphic contexts in coarse-grained and poorly dated or even undated deposits. In the specific case of Untermaßfeld in Thuringia, the propagated hominin activities at the site are faked and have to be regarded as a hoax (Roebroeks et al., 2018). To the contrary, Untermaßfeld still serves as an excellent example of how a late Early Pleistocene thantozoenoses that does not show any hominin impact, looks like.

Reviewing the Lower Palaeolithic record of Central Europe, we thus still have to stick to a short chronology of hominin presence, which started as late as ca. 600 ka ago. Future research must address whether this record is restricted due to preservation biases largely related to geological factors, or due to the more continental and – in winter times – much colder climate that characterised Central and Eastern Europe. In contrast to Central Europe, the much longer western European record of early hominin presence has formed under the far more direct mild climatic influence of the Atlantic, which may had favoured early hominin northward dispersal.

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Use of quartz in the lithic production at the Mesolithic site of Sphinx in central Sudan: consistence, or variability?

The site of Sphinx located in Jebel Sabaloka near the Sixth Nile Cataract in central Sudan is an example of a complex Mesolithic site with a rich record from four-millennia occupation by hunter-fisher-gatherers of the Early Khartoum culture (ca. 9000–5000 cal BC (Varadinová - Varadzin 2017). The material record includes diverse find categories that show different levels of variability throughout time and location within the site.

In this paper we present the main results of a comparative analysis of the lithic assemblage excavated at this Mesolithic settlement. Mesolithic layers are radiocarbon dated (Varadinová et al. 2023) and this helps us to compare differences in the production in different periods. Ca. 50,000 pieces of lithics were processed from different contexts across the site.

The assemblage is made mostly of quartz, but other raw materials are present too, including different types of rhyolites, petrified wood, silicified sandstone, volcanic glass, opal, and chert. Apart from the last three, all the materials are of local origin, occurring within a radius of 10 km from the site. Quartz is a ubiquitous raw material utilized extensively in lithic production across diverse geographic and temporal contexts. The study region hosts accessible sources of high-quality quartz, including pebble quartz occurring in the Pleistocene terraces of the Nile and vein quartz and rock crystal deriving from the local granite outcrops. From the three types of quartz, mostly quartz pebbles ranging from 4 to 10 cm in size were used for lithic production at Sphinx, with crystals of the rock crystal and small blocks of vein quartz up to 10 cm in size present but exploited less frequently. The tools on quartz recorded at the site include scrapers, burins, denticulés, truncated pieces, and borers, but crescents are the most numerous.

In terms of the way of production, three different approaches are attested: the slicing technique (freehand percussion) is common, followed by bipolar knapping and a low amount of prepared bladelet cores. If we compare the younger and older contexts of the Mesolithic assemblage at Sphinx in terms of lithic production on quartz, there is a strong consistence in the dominance of the slicing/hard hammerstone knapping.

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The New Magdalenian Collection from Zbořený Kostelec (Central Bohemia) in the Context of Regional Knowledge on Terminal Palaeolithic Settlements

Zbořený Kostelec is an archaeological site located in Central Bohemia, near the Sázava River. Discovered in 2023, the site has revealed an extensive collection of lithics, approximately 1,500 pieces, which were gathered during repeated surface surveys conducted at the site. The characteristics of the lithic assemblage, including its morphometric attributes, toolkit, and production techniques, clearly indicate a Magdalenian affiliation. The artifacts are well-patinated and mostly made from erratic flint.

The distribution of the lithics forms a distinct concentration, and based on the site's geological conditions, it is likely that some intact stratigraphic layers may still be preserved. However, as of now, the presence of the Paleolithic settlement is only evidenced by the collection of stone tools.

The site is situated on a river terrace approximately 10 meters above the Sázava River. Notably, this region has not previously attracted significant archaeological attention, with only a few Pleistocene mammal remains reported from a local clay quarry in the early 20th century. However, Zbořený Kostelec is located only about 40 km from the Hostim site (Vencl 1995), and is a well dated key site which is known for its extensive lithic collection, animal and vegetal motifs engraved on the slates, rich animal remains and of course well preserved archaeological situations.

This site plays a crucial role in understanding Magdalenian culture in Bohemia. This poster aims to present the key characteristics of the Zbořený Kostelec collection and compare them with the general attributes of Magdalenian assemblages in the region, particularly the collection from Hostim. In the coming year, several activities are planned to deepen the understanding of this site. These include a thorough review of Pleistocene finds from the surrounding region, targeted surface surveys of potential Magdalenian settlements in accessible areas near the site, and magnetometric measurements to explore subsurface features in the local microregion, especially in plowed fields.

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A substantial shift in lithic raw material use during the Gravettian at Grub-Kranawetberg I and II, Austria

Lithic raw materials and their sources are a good indicator of past hunter-gatherer mobility and landscape use, regardless if we assume direct, embedded or indirect procurement strategies. In a case study on the mid-Upper Palaeolithic sites Grub-Kranawetberg I and II, Lower Austria, we examine change in lithic raw material economy between the main human occupations in the time window of roughly 30,000 to 28,000 cal. BP.

The two sites Grub-Kranawetberg I and II are open-air localities close to the Morava River at the border between Slovakia and Austria. Through excavations from 1993 to 2011 (Grub-Kranawetberg I) and ongoing since 2021 (Grub-Kranawetberg I and II) extensive lithic collections have been recovered at both sites in several archaeological horizons (AH) (e.g., Antl-Weiser et al., 2010, 2024; Nigst et al., 2024). At Grub-Kranawetberg I at least five AHs have been documented and at Grub-Kranawetberg II at least seven AHs have been identified in the new fieldwork since 2022. While there are no chronometric ages available for the Grub-Kranawetberg II at the moment, the two main AHs, AH 3 and AH 4, at Grub-Kranawetberg I are dated to between 30,000 to 28,000 years ago.

Here we show that at Grub-Kranawetberg I the two richer archaeological horizons, AH 3 and 4, differ in the usage of the main lithic raw material. We show that AH 4 is dominated by patinated flint, while in AH 3 radiolarites are the main lithic raw material, as already recognised in earlier studies (e.g., Antl-Weiser et al., 2010). Comparing them to comparative samples using reflecting-light microscopy we can constrain raw material source areas or regions. Patinated flint occurs in secondary source outcrops in southern Poland, northern Bohemia and northern Moravia, at a minimum distance of 150 km (Moravian Gate) from the sites. Radiolarite variants as identified in the Grub-Kranawetberg I AH 3 occur in the Danube River gravel (30 km), the St. Veit Klippen Belt (50 km), the Carpathians (130 km) and potentially in the Bakony Mountains (150 km). Interestingly, at Grub-Kranawetberg II the two up to now richest AHs, AH Michi and AH Luc, show a similar pattern. In the lower AH Luc patinated flint is common, while in the overlying AH Michi radiolarites are the most common lithic raw material. While a direct correlation of AH 3 and AH 4 at Grub-Kranawetberg I with AH Michi and AH Luc at Grub-Kranawetberg II is premature at the present stage of research at Grub-Kranawetberg II, it is interesting that at both sites there is a quite substantial shift from flint to radiolarites as the dominating raw material. The majority of lithic raw materials in lower horizons was transported at least 150 km (far-distance transport/exchange), while in the upper horizons the majority was transported at least 30 km (regional transport) suggesting different territories and/or landscape use.

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Understanding the edges – use-wear analysis of blades and bladelets of the Upper Palaeolithic sites Bistricioara-Lutărie III and Bistricioara-La Mal, Romania

Blades and bladelets are a significant aspect of Upper Palaeolithic lithic assemblages and improving our understanding of their use can significantly contribute to our understanding of Palaeolithic lifeways from specific site use up to larger subsistence strategies. Here we present a new project that involves the functional analysis of approximately 700 blades and bladelets from two Upper Palaeolithic sites in northeastern Romania.

The sites Bistricioara-Lutărie III and Bistricioara-La Mal are located next to each other but on different terraces of the Bistrița river. Multiple archaeological horizons have been identified, with ages ranging between 27 700 to 16 400 calBP, representing Gravettian and Epigravettian occupations. The lithic collections of these sites (total amount exceeds 30 000 pieces) offer a wide spectrum of lithic artefacts, including a variety of unretouched, retouched/backed blades and bladelets of different sizes. A selected sample is currently being studied macroscopically and microscopically at the TraceoLab, University of Liège, Belgium and at the Austrian Archaeological Institute of the Austrian Academy of Sciences in the framework of a joint PhD-project at the Universities of Liège (Prof. Veerle Rots) and Cologne (Prof. Andreas Maier). The objective of this study is to gain information about the performed actions, types of manipulated materials, and the overall life cycles of these blades and bladelets through a functional analysis.

The results will allow us to expand our knowledge about the processing of plant and animal resources at the site and therefore refine our understanding of site/occupation functionality. Another aim is to compare the collections of individual occupations diachronically and to explore change through time in the use of unretouched blades and bladelets as well as specific tool categories within and between sites, with a special focus on similarities and differences between the Gravettian and Epigravettian occupations.

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Middle Stone Age Adaptations in the Kerma Region: Stratified Rock Shelter and Site Diversity (DIASPORA Project 2019-2023)

The Kerma region near the Third Cataract of the Nile has emerged as a key area for understanding human activities and adaptations in the Middle Stone Age (MSA) (Bicho, et al., 2020). Recent research within the DIASPORA project (2019-2023) has provided important new insights into the prehistoric occupation of this region. Systematic surveys have identified around 100 archeological sites including a variety of MSA tools.

A well-stratified rock shelter revealed chronological sequences ranging from the Kerma civilization (2500-1050BC), to the MSA period, providing a continuous record of human activity. The primary lithic analysis highlights the presence of Nubian Levallois methods, which play a crucial role in understanding the adaptive strategies of anatomically modern humans (AMH) and tracing the Out of Africa model. The variety of tool types indicates a nuanced and sophisticated approach to toolmaking, suggesting the technological ingenuity of the MSA population.

This research expands our understanding of early human dispersal and adaptation and highlights the importance of the Nile Valley as a corridor for human migration during the Pleistocene. The results from the Kerma region contribute to a broader discussion of the routes and strategies used by early humans as they navigated through diverse and challenging landscapes. The interdisciplinary approach of the DIASPORA project, combining archeological investigations, geophysical methods, detailed artifact analysis and dating with OSL, underlines the value of integrating different methods to obtain a comprehensive picture of human prehistory in northern Sudan. These results not only enrich our understanding of the MSA but also emphasize the importance of the region in the broader context of early human settlement and technological development.

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The leaf point in context provides new insights from Hohle Fels Cave

Bifacially worked leaf points are rarely found in well-documented contexts and often come from old excavations in Central Europe. These artifacts are often associated with Middle Paleolithic (MP) to Upper Paleolithic (UP) transitional industries and serve as key "index fossils" for characterizing the assemblages. Cultural units such as the Blattspitzengruppe, Szeletian, and Altmühlgruppe however remain poorly defined, with critical issues surrounding reliable dating. The production, resharpening, and distribution of Middle Paleolithic leaf points are often poorly described. MP sites with these artifacts are scarce and often lack reliable chronostratigraphic contexts, while for transitional industries, the attribution of these points is often assumed rather than demonstrated [1,3,4].

In 2020, a research team from the University of Tübingen recovered a leaf point at Hohle Fels Cave, a cave situated in the Ach Valley in southwestern Germany. An excavator found this artifact within Archaeological Horizon (AH) X, about 1.2 meters beneath the base of the Aurignacian (AH Vb). The stone tool assemblage from AH X is stratigraphically below four ESR-dated samples from AH IX, which have a calculated average age of 62.5 ± 4 ka BP [2]. A techno-functional analysis identified its primary use as a weapon, likely a thrusting spear for hunting large game. The artifact exhibits evidence of hafting and signs of damage from use and an attempt at resharpening by Neanderthals [5].

Alongside the leaf point, researchers uncovered lithic assemblage consisting of several hundred piece-plotted artifacts, in addition to numerous small and micro-artifacts recovered through water screening. Thanks to this, we were able to identify and refit a piece of small debitage to the leaf point demonstrating that this tool was reworked at the site. Additionally, the presence of more flakes, most likely associated with the reworking or resharpening leaf point, suggests a more complex history of use, modification, curation, and eventual discard at Hohle Fels Cave. This context offers unique insights into these bifacial tools with implications for their function and associated behavioral characteristics of the Neanderthals, who made and used such leaf points.

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Beyond Boundaries: Tracking UP Cultural Identity and Exchange Networks with Red Deer (*Cervus elaphus*) Maxillary Canine Ornaments

Personal ornaments have been singled out as a key artifact class for discerning cultural diversity in the European Upper Paleolithic, with regional bead forms investigated as reflections of cultural geography. The well-documented distribution of highly-modified and conventionally standardized ivory beads indicates that personal ornaments played a key role in the formation and maintenance of group identity among early communities of anatomically modern humans in Europe. An abundance of less intensively modified and more widely geographically distributed ornament forms, such as perforated shells and teeth, suggests that not all paleolithic beads participated in cultural boundary maintenance.

This study investigates diachronic and synchronic trends in the provenance, production, and display of low-modification red deer (*Cervus elaphus*) maxillary canine ornaments from the Aurignacian, Gravettian and Magdalenian occupations of the Swabian Jura and Southwestern France. Red deer canines have highly distinctive morphologies that vary diagnostically by sex, age, side and source population, providing a

rough determination of faunal provenance as well as insights into culturally valent craft traditions. Here, morphological and morphometric faunal analysis, experimental use-wear and traceology, and multivariate statistics are used to identify regionally discrete techno-cultural units as well as their corresponding transregional exchange relationships through time.

These transregional exchange dynamics are further used to infer the shifting proximate social functions performed by red deer canine ornaments in the European Upper Paleolithic. A special focus is placed on the probable role of red deer canines as long-distance exchange media linking geographically remote pioneer communities in both the Aurignacian and Magdalenian technocomplexes. Transregional connections fostered by the reciprocal exchange of symbolically laden red deer canine ornaments would have mitigated local ecological risks, expanded effective breeding populations and ensured the retention of novel social and technological innovations in the sparsely inhabited landscapes of late Pleistocene Europe.

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The Role of Fauna in Reconstructing Neanderthal Occupation Duration: the case of Teixoneres Cave Sub-unit IIIb

Determining the duration of occupations at Middle Palaeolithic archaeological sites is essential for understanding Neanderthal behaviour and subsistence strategies. However, this task is challenging due to the palimpsest nature of the deposits (e.g., Bailey, 2007), where overlapping traces of human and carnivore activities complicate chronological interpretations.

This study addresses these challenges by analysing faunal specimens from sub-Unit IIIb of Teixoneres Cave. Teixoneres Cave, located near the village of Moià (Barcelona, Spain) at an elevation of 760 meters AMSL, is part of a karst system formed in Paleogene limestone. The site comprises three chambers – X, Y, and Z – of which Chambers X and Z have entrances to the exterior, while Chamber Y connects them internally. Chamber X, the largest chamber, measures 30 meters in length, 5-6 meters in width, and covers a total area of approximately 93 m². This space is divided into an outer zone (31 m²) near the entrance and an inner zone (62 m²). Chamber X contains a stratigraphic sequence nearly six meters thick, with deposits ranging from MIS 5c (~100 ka) to MIS 2 (~14-16 ka) (Tissoux et al., 2006).

Sub-Unit IIIb, the focus of this study, dates to MIS 3 and has yielded radiocarbon-dated faunal remains linked to human activity between 51,000 and 44,210 cal BP (Talamo et al., 2016). In sub-Unit IIIb at

Teixoneres Cave, the alternation of human and carnivore occupations presents an invaluable opportunity to study the dynamics of site use. The horizontal excavation method employed at the site facilitates the spatial analysis of activity patterns, offering insights into the synchronicity or diachronicity of human occupations. Faunal analyses reveal a dynamic interplay of anthropogenic and carnivore activities, with evidence of short-term, repeated human occupations interspersed with periods of carnivore presence. This pattern is particularly evident when comparing the outer and inner areas; the zone near the entrance exhibits higher anthropogenic activity, supporting previous studies (e.g. Zilio et al., 2021; Rosell et al., 2017).

Our findings highlight the importance of zooarchaeology and taphonomy—particularly evidence of hunting, butchering, and carcass transport, as opposed to damage caused by carnivores—in reconstructing subsistence strategies and occupation patterns. These results align with a broader pattern observed at Middle Palaeolithic cave sites, where occupation durations are influenced by mobility patterns, seasonal factors, decisions related to contingent circumstances, and site functionality.

This study contributes to ongoing debates on the methodological challenges of interpreting archaeological palimpsests and the use of faunal analysis for estimating occupation duration. The interpretation of such evidence is often complicated by post-depositional processes, slow sedimentation rates, and overlapping occupational events (palimpsests). The challenges of disentangling these complex depositional histories necessitate a multidisciplinary approach, integrating zooarchaeology and taphonomy. By situating Teixoneres Cave within the regional framework of Middle Palaeolithic sites, this study enhances our understanding of Neanderthal adaptive strategies and the duration of occupation in dynamic environmental and ecological contexts.

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Life on the shore: the micromammal assemblage of the Schöningen 13-II-4 Obere Berme (Middle Pleistocene, northern Germany)

The site-complex of Schöningen is an important Palaeolithic locality in Central Europe, particularly famous for its remarkable preservation of organic material, including wooden artifacts, large and small vertebrate remains, molluscs shells, eggshells, insect exoskeletons, and seeds. Among abundant bones remains, lithic artefacts and eggshells, a wooden throwing stick was found in the sub-layer bc of the 13-II-4 layer of the Obere Berme, which correspond to the Spear Horizon identified at the main excavation area. (Serangeli et al., 2015; Conard et al., 2020, among others).

Here, we present the micromammal assemblage (Eulipotyphla and Rodentia) recovered in this sublayer and reconstruct the paleoenvironmental conditions faced by human groups inhabiting the surroundings of the site during the Middle Pleistocene. We were able to identify 616 specimens, corresponding to 12 taxa (for Eulipotyphla: *Desmana* sp., *Neomys* sp., *Sorex* ex gr. *araneus*, *Sorex minutus*, *Sorex (Drepanosorex)* sp., *Talpa europaea*; for Rodentia: *Alexandromys oeconomus*, *Arvicola mosbachensis*, *Clethrionomys* sp., *Microtus agrestis*, *Microtus arvalis*, *Stenocranius anglicus*). All taxa also occur at layer 13-II-4 of the main area of excavation (Van Kolfschoten, 2014).

A preliminary taphonomic analysis indicates that 178 of the 318 first lower molars of Arvicolinae present traces of digestion (from light to extreme), pointing to a category-4 predator(s) as the agent(s) responsible for the accumulation, such as *Strix aluco*, *Athene noctua*, *Circus cyaneus*, *Falco* spp. (Fernández-Jalvo et al., 2016).

The association of the micromammals paints the picture of a landscape strongly dominated by open habitats. The water-related habitats are well-represented, as should be expected at the shore of a paleolake. Woodlands seem to play a very little role in the composition of the environment. On the other hand, while hunting in shrublands, grasslands and forest openings, category-4 predators, especially *Strix aluco*, regularly use trees as roosting and nesting sites (IUCN, 2024), indicating the presence of boreal and temperate forests near the site. This mosaic of environments was the natural background for the hunting and scavenging activities of the early human groups in the region.

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The Pontinian. An industry on pebbles from southern Latium, Italy

The Italian Peninsula, due to its geographic location at the center of the Mediterranean, protected by the imposing mountain range of the Alps and traversed by the great spine of the Apennines, has favored the formation of different patterns of population and land use in various ecological niches. During the Last Ice Age, a climatic deterioration led to a general drying of habitats on the Eurasian continent. Nevertheless, much of the coastal territories in the center and south of the peninsula, the low- and mid-altitude river valleys, and the plains formed by the advancement of the coastline to the -120m isobath provided more favorable climatic conditions than those in continental Europe.

In the face of significant prey variability exploited by Neanderthals during their occupation of Eurasian territory, there was a certain technological homogeneity, evidenced by similar methods of lithic raw material reduction and the shaping of blanks in the various European areas where the Mousterian techno-complex is attested. Nevertheless, specific geological and environmental conditions can influence the technological characteristics of certain industries, sometimes through the combination of several factors, such as the interaction between the presence of refuge zones and the fragmentation of cultural manifestations, differences in available raw materials that constrain the appearance of the final product, as well as behavioral diversity in response to different landscapes and ecosystems.

This is where the origin and spread of one of the most interesting Mousterian industries in southern Europe, the “Pontinian,” can be explained. The term “Pontinian” was first coined by Alberto Carlo Blanc in 1939 to designate a particular type of industry on pebbles in coastal southern Latium. It is thus attested precisely in one of the aforementioned refuge zones, an area of the Italian Peninsula that remained relatively mild even during the coldest phases of the Pleistocene. Geographically, it is defined in a territory extending along the Tyrrhenian coast between the natural boundaries of the Tiber Valley to the north and the Aurunci Mountains to the south, encompassing the Pontine Plain and the Fondi Basin, and even reaching further south to the Gianola promontory. Defining the eastern boundaries of this industry is problematic, although the Apennine valleys beyond the Lepini and Ausoni ranges seem to exhibit a rather different Mousterian.

The technological framework of the Pontinian is still being studied. In the past, it has been interpreted as a coastal adaptation of the Mousterian, characterized by working on pebbles, in line with the first designation of “littoral Mousterian” (Blanc 1937) by Alberto Carlo Blanc, who described it as an industry that “... consists of scrapers and points, obtained from discoidal cores by means of the technique of preparing the percussion plane, and by the direct fracture of siliceous pebbles according to the technique producing the mandarin clove fragments” (Blanc 1939).

Blanc’s research uncovered important archaeological material related to the Pontinian in various cave and open-air sites in Latium, complemented by significant paleontological discoveries such as the skull from Grotta Guattari and the fauna from Canale Mussolini (also important for paleobotanical data), which still provide a reliable basis for the paleoecology of southern Latium during the Last Ice Age. After the end of World War II, research focused not only on linking archaeological data with paleoecological data but also on explaining the very origins of the Pontinian industry, which was seen either as a Charentian of La Quina type (Taschini 1970) or as a convergence phenomenon strongly conditioned by the available raw material (Tozzi 1970), a debate that continues to this day. More recently, research has also aimed at understanding the role of core reduction at various Pontinian sites and its impact on the final product, in addition to studying the placement of the Pontinian within the landscape of Italian Mousterian industries. According to the interpretative model proposed by Arturo Palma di Cesnola (2001), the Middle Paleolithic in Italy and in particular the Mousterian “seems to have created on the Italian territory a kind of mosaic

landscape. In fact, as far as we know at least on the basis of the data so far in our possession, each Mousterian complex would have followed, in the different areas of the Peninsula, its own evolutionary path, [. . .] and would have stably preserved its own territory, without sharing it with other complexes.” My presentation will be a journey that explores an industry whose memory has been somewhat lost in international academic circles in recent decades. It will begin with the history of studies, featuring significant figures from the last century and the present, as well as the anthropological significance of various discoveries over time. The characteristics of the Pontinian technology and its connection to the raw material available in the area will be illustrated, along with the paleoecological importance of major cave and open-air sites and the morphometric differences in artifacts by geographic area and site category. Additionally, insights into the paleoenvironment of the Middle Paleolithic of coastal southern Latium, as well as important paleoanthropological discoveries in the analysis area, will provide context and faces to the Pontinian groups. The presentation will conclude with a mention of my doctoral project, conducted under the supervision of Professors Harald Floss, Enza Elena Spinapolice, and Nicholas J. Conard, from the Eberhard Karls University of Tübingen and Sapienza University of Rome, in which I will study the open-air sites in the southern sector of the Pontinian industry. Although cave contexts often offer better preservation and easily distinguishable geographic landmarks, they were frequently at the center of more complex land-use trajectories that included a variety of sites with different functions. Therefore, the importance of open-air sites in the study of Neanderthal hunter-gatherer life will be highlighted, along with the value of conducting a landscape archaeology study to understand Neanderthal paleoecology, after describing the geomorphology of the areas involved.

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Shaping the landscape: Human Occupation and Settlement Strategies between the Gravettian and Solutrean through GIS

The aridity of the Mediterranean region during the Heinrich Events (HE) appears to have limited settlement refugia to an extreme extent that communication networks and cultural dynamics broke down and were subsequently reorganized under different socio-cultural conditions. These turnover periods can be explained by the emergence of new techno-complexes and their correspondence with different environmental conditions. For instance, the synchrony between some Heinrich events and the emergence of Upper Paleolithic technocomplexes (e.g. Heinrich Event 2 (HE2), ca. 26.5–25 ka cal BP, corresponding to the Gravettian-Solutrean transition under an environmental setting with an abrupt temperature decrease, with semi-deserted and steppe-like landscapes.

Although some of these topics have already been the subject of in-depth studies, very few have focused on analyzing the settlement patterns between different time scales in a certain geographical area. This perspective has endured without a critical examination of its refugium status, thereby hindering a more comprehensive understanding of hunter-gatherer mobility and settlement in the region focused on exploring the factors influencing human site location choice during that time range.

To contribute to the development of the study of this period and to fill the existing gaps, this poster will explore the human occupation and settlement strategies of Gravettian and Solutrean in Southern Iberia Peninsula. This project is based on a multidirectional approach using Geographic Information Systems (GIS), integrating chronological, geographic, geomorphological, and archaeological data. Through statistical, descriptive, and univariate methodologies, this research examines the relationships between dependent variables (archaeological sites) and independent variables (e.g., lithology, altitude, slope, topographic position index, proximity to watercourses). The resulting spatial models aim to enhance understanding of the adaptive strategies of hunter-gatherer populations of the Southern Iberian Peninsula, offering new insights into their interaction with dynamic landscapes.

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Reconstructing the palaeoenvironmental conditions using micromammal fossil assemblages at Lapa do Picareiro during the Middle to Upper Palaeolithic Transition

The Iberian Peninsula plays a pivotal role in understanding human adaptations and environmental dynamics during the Late Pleistocene, particularly concerning Neanderthal populations (López-García et al., 2011; Haws et al., 2020). During Marine Isotope Stage (MIS) 3, significant climatic fluctuations occurred due to the Heinrich Events and Greenland Stadials and Interstadials; however, the Iberian Peninsula maintained relatively stable climatic and environmental conditions (Finlayson et al., 2006). This region, recognized as a Neanderthal refugium, provided suitable resources and conditions that supported their occupation during a period of unfavorable climatic conditions across Eurasia. The causes behind the extinction of Neanderthals remain debated, with recent evidence suggesting that environmental changes—such as reduced resource availability—may have created adverse conditions for their survival (Finlayson et al., 2006).

Lapa do Picareiro, a key archaeological site in central Portugal, preserves a continuous stratigraphic sequence spanning from the Middle Paleolithic to the Iron Age (Carvalho et al., 2020). With a depth of 10.6 meters, comprising 36 Pleistocene-aged strata, the site offers exceptional faunal, lithic, and botanical evidence (Carvalho et al., 2020). Deposits dating to approximately 45-35 ka cal BP encompass the Middle-

Upper Paleolithic Transition (MUPT). Stable isotope analysis of herbivore teeth (red deer and ibex) from just prior to the MUPT (51.8–42.5 ka cal BP) reveals a shift from open forest patches with warm, dry conditions (55–57 ka cal BP) to steppe-like environments characterized by fluctuating warm and cold periods with slightly humid conditions (51.5–42.5 ka cal BP) (Carvalho et al., 2021).

While the site yields a diverse and abundant range of faunal remains, only large fauna have been extensively studied. Despite the abundance of micromammal remains (i.e., voles, mice, rats, shrews, and moles), their potential as paleoenvironmental proxies has not been fully explored.

This study presents the first systematic micromammal analysis at Lapa do Picareiro, focusing on two key stratigraphic units: Level JJ (51.5–44.4 ka cal BP, Middle Paleolithic) and Levels GG-II (41.1–38.1 ka cal BP, Aurignacian). Both assemblages contain significant quantities of well-preserved micromammal skeletal elements. We analyzed taphonomic modifications (e.g., digestion, breakage) across all specimens to identify the agents responsible for micromammal accumulation and site formation processes (e.g., staining, abrasion, root etching) which affected these materials after deposition. Cranio-dental elements (mandibles, maxillae, and teeth) were examined to determine the taxonomic composition of the assemblages.

Preliminary findings from Levels GG-II indicate that manganese staining and category 1 digestion (no digestion) dominate the assemblage, with small frequencies of root etching, trampling, burning, weathering, and higher levels of digestion damage. Taxonomic analysis identifies voles (*Microtus* sp.), murids (*Apodemus* sp.), cricetids (Arvicolidae), and shrews (Soricidae) in this layer. These taxa suggest a complex mix of forest, grassland, shrubland, and wetland habitats in the region.

Analyses of the micromammal assemblage from our Middle Paleolithic level is ongoing. We will employ the Habitat Weighting Method (Nesbit-Evans et al., 1981) and diversity indices to infer the composition, density, and distribution of vegetation around the site, and the bioclimatic method to provide insights into past climatic conditions, such as average minimum and maximum values for temperature and precipitation. Our ongoing research includes integrating these results with data from large fauna, stable isotope studies, and other palaeoecological proxies to enhance our understanding of the paleoenvironment around Lapa do Picareiro and the adaptive strategies employed by Neanderthals and early modern humans in the Iberian Peninsula.

This work contributes to broader discussions on human resilience, interspecies interactions, and survival strategies during periods of climatic and ecological transition in this critical phase of prehistory.

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Hidden tools of the past: identifying and understanding tooth retouchers in the archaeological record

Tooth retouchers (Fig. 3) are scarcely represented in the archaeological record. However, horse teeth have been employed for this purpose at both Middle and Upper Palaeolithic sites, including La Ferrassie (Savignac-de-Miremont, Dordogne, France), Laugerie-Haute (Les Eyzies-de-Tayac, Dordogne, France), La Quina (Gardes-le-Pontaroux, Charente, France), Gough's Cave (Cheddar, Somerset, United Kingdom), Chez-Pinaud (Jonzac, Charente-Maritime, France), or Trou de l'Abîme (Couvin, Namur, Belgium), among others (e.g., Castel et al., 2003; Castel & Madelaine, 2006). Carnivore canines were also used as retouchers, particularly in Aurignacian and Solutrean contexts, with examples from La Ferrassie or Hohle Fels (Swabian Jura, southwestern Germany, e.g., Toniato et al., 2018).

Previous experimental studies have demonstrated the efficiency of hypsodont teeth as retouchers, showing that they can be employed through various techniques, such as direct percussion or pressure flaking, to produce and obtain a wide range of lithic tools and products (Micó et al., 2024). The specific characteristics of horse molars and incisors, as well as carnivore canines, make them ideal for knapping activities due to



Fig. 3. Top: new retoucher on a horse incisor found at Laugerie-Haute, associated with Solutrean contexts, showing the different surfaces of the tooth. Bottom left: Macro photograph of the labial surface showing scores produced by retouching. Bottom right: Same area captured using focus stacking with a microscope, providing higher resolution of use-wear traces.

their elongated, curved, and heavy structure. Additionally, their multi-layered structure (cementum, enamel, and dentine) provides significant resistance, making them highly suitable for this function.

In this study, we present the results of the analysis of tooth retouchers from La Ferrassie, associated with the Aurignacian I, and Laugerie-Haute, associated with the Solutrean. These retouchers were previously analysed by Castel et al. (2003) and Castel & Madelaine (2006). However, by applying higher-resolution methodologies, comparing with experimental collections, and incorporating newly identified tooth retouchers from recent publications, we have been able to offer fresh perspectives on their use, not only by Upper Palaeolithic human groups but also by Neanderthals.

Our study highlights the significance of tooth retouchers within the operational chain of lithic tool production. Furthermore, the recent identification of additional retouchers in previously examined collections underscores how these artifacts can often go unnoticed in the archaeological record. Therefore, we emphasise the importance of conducting taphonomic and use-wear traces analyses on teeth, as they can provide valuable insights into past human behaviour.

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Technological and Functional Insights into Gravettian Fléchettes of the Ach Valley

The emergence of projectile technology and long-range weapons represents an important innovation in the evolution of our species. Typological and technological developments in lithic projectile points have frequently been the focus of studies exploring prehistoric technology, subsistence strategies, and technological organization. As such, lithic points serve as key markers for defining temporal-spatial technocomplexes, such as the Gravettian.

In the Ach Valley of the Swabian Jura, the Gravettian is characterized by Gravette points, Microgravette points, and Fléchettes, while Font-Robert points are rare. Previous use-wear analyses have confirmed the role of Font-Robert and Gravette points as projectiles within long-range weapon systems. However, despite the typological classification of Fléchettes as projectiles, their exact function and role in the Swabian Gravettian toolkit remain unclear.

In this study, we present the results of a detailed techno-functional analysis of Fléchettes from the Gravettian layers from the cave sites of Hohle Fels, Brillenhöhle, and Geißenklösterle. The technological analysis focused on the production sequence and morphological variability of the Fléchettes, while use-wear analysis identified impact fractures and microwear indicative of projectiles. We tested the observed traces against a reference assemblage of experimentally replicated Fléchettes knapped from Jurassic chert

and radiolarite, the two primary lithic materials used in the Swabian Gravettian. The experiments tested different propulsion modes, including spear-thrower and bow-and-arrow, as well as the influence of raw material variability on the formation of use-related traces.

Our results reveal significant differences in macrofracture patterns based on lithic raw material and propulsion mode. Based on these findings, we suggest that Gravettian hunters employed Fléchettes as projectiles in a long-range weapon system, complementing other projectile types and thereby documenting a versatile technological and subsistence organization.

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Reevaluating Neanderthal Mobility and Lithic Strategies: New Perspectives from Teixoneres Cave (Level IIIb)

Teixoneres Cave (Moià, Barcelona), part of the Toll Cave karstic system, preserves a rich lithic assemblage within its Pleistocene deposits (200-16 kya BP), providing valuable insights into Neanderthal behavior during the Middle Paleolithic (MIS 7-3).

The Level IIIb lithic assemblage (MIS 3) is predominantly composed of quartz (58%), followed by chert (31%), with smaller proportions of igneous rocks (6%), limestones (2%), quartzites (2%), and trace amounts (<0.5%) of phyllites, and sandstones. Previous studies suggested that quartz was locally sourced from the Torrent del Mal, while pre-knapped materials from non-local sources were introduced as toolkits, reflecting short reduction sequences.

Recent intensive geoarchaeological surveys (Muñoz et al., 2023) have refined our understanding of lithic procurement strategies and mobility patterns, leading to slight revisions of previous models (Picin et al., 2020a, 2020b). Preliminary results provide nuanced insights into the relationships between raw materials, technology, and mobility. While many aspects of previous models are confirmed, new data reveal expanded patterns of resource use, and a more complex interplay between local knapping and the introduction of exogenous toolkits is observed. Quartz, the only raw material present in complete reduction sequences at the site, was transported in its natural form rather than being preconfigured. However, the new analysis has shown that some quartz types identified are also introduced as toolkits dominated by retouched tools, convergent points, and hierarchized flakes, as observed for the non-local raw materials.

These new data refine previous models and provide a more accurate framework for interpreting lithic assemblages at the site. By re-examining the lithic assemblage from Subunit IIIb, we are improving our understanding of Neanderthal lithic exploitation strategies, resource management, and personal equipment composition during short-term occupations. While the data are still being analyzed for a comprehensive publication, this poster offers a preliminary insight into our understanding of the variability of the Middle Paleolithic behavior.

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Cueva de la Vieja, Obermaier and the scientific study of Levantine art in the 21st Century

Hugo Obermaier's seminal contributions to the study of Levantine art are widely acknowledged, particularly his pioneering typological classifications of the human figure. These classifications were developed from his meticulous studies of the La Valltorta rock art assemblage. In his influential 1919 book *Las pinturas rupestres del Barranco de Valltorta* (Castellón), Obermaier proposed the existence of three distinct archer types, corresponding to different chronological periods. However, in the same work,

Obermaier also noted the presence of an alternative human type in another shelter outside the region: Cueva de la Vieja (Alpera, Spain), which could be a response to the regional variability of this long-lasting rock art.

Obermaier's approach was pioneering for its time, characterized by a high level of precision in its execution. The methodology employed involved direct tracing in situ and subsequent correction based on meticulous measurements of the figures. This task was facilitated by the skilled professional draftsman Francisco Benítez-Mellado. A selection of these drawings was published in the aforementioned book by Obermaier and Wernert (1919).

However, Benítez-Mellado returned to Cueva de la Vieja several years later, this time in collaboration with the Spanish researcher Eduardo Hernández-Pacheco. Regrettably, this work was never entirely published, but it is evident that it followed the general lines established a few years earlier by the German researcher. A notable contrast emerges when comparing these tracings with the recording by Henri Breuil and Juan Cabré, which is characterized by a lower degree of precision and a greater reliance on interpretation (Breuil, Serrano, and Cabré, 1912).

The work conducted by Anna Alonso and Alexandre Grimal (1999) at the end of the 20th century, while noteworthy, fell short of the precision of the preceding work. However, it made a significant contribution to the understanding of the importance of Cueva de la Vieja.

In recent years, our research has focused on a comprehensive revision and analysis of the Levantine and Schematic rock art preserved in this distinctive shelter. Our approach utilizes a state-of-the-art digital methodology, while maintaining the objective of exhaustive and precise documentation of the pictographs and their current state of preservation, as proposed by Obermaier. The photogrammetric 3D scans carried out have served as the basis for obtaining highly accurate 3D digital tracings, in which it is possible to understand the relationship between the pictographs and the relief of the panel. The comparison of these new tracings with those made at the beginning of the 20th century demonstrates the extraordinary work that the methodology developed by Obermaier made possible. Furthermore, our research has focused on investigating the sequence of interventions in the rock shelter through the analysis of superimpositions, the study of the granulometry of the pigments, their hyperspectral characterization, and the spatial distribution of the figures in the decorated panel. All of these analyses have been carried out using non-invasive and replicable technologies. This methodological approach has enabled a shift from a classification based on typologies to one that recognizes the agency of the human beings who created rock art in Cueva de la Vieja.

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Fire use during the Last Glacial Maximum: evidence from the Epigravettian at Korman' 9, Middle Dniester Valley, Ukraine

The Last Glacial Maximum (LGM) is a period of extensive glaciation and extreme climate deterioration in Eurasia from 26.5 to 19 thousand years before present (ka BP). Within Europe, the LGM is associated with reduced biomass production and resource stress within hunter gatherer populations. During this period the use of fire is widely considered to be one of the most fundamental tools for human survival. However, there are surprisingly few well-described combustion features during the LGM in Europe (Murphree & Aldeias, 2022).

Here, we present the results of our high-resolution study of combustion features associated with LGM occupations at the site of Korman' 9, Ukraine. Korman' 9 was discovered during a survey of the Middle Dniester valley in 2012 and excavated in 2013. The site features five Archaeological Layers (AL) embedded within a ~4m deep loess-palaeosol sequence. AL I and II are radiocarbon-dated on charcoal to ~21.9 ka cal BP and ~22.3 ka cal BP, respectively (Kulakovska et al., 2021). AL I is attributed to the Epigravettian, AL II is not attributed to any technocomplex due to small sample size (but would fit in the Epigravettian). AL I comprises rich lithic and faunal assemblages including organic technology, personal ornaments and two distinct combustion features (Kulakovska et al., 2021; Bosch et al., 2024).

Here we employ multiscale geoarchaeological analysis combining field observations, 3D models, and micromorphological sampling to describe the structure, composition, and context of the combustion features. Our methods also include a novel approach using colour analysis to estimate firing temperature. The results of this analysis show combustion temperatures reaching 600°C in the substrate underlying the combustion features. We also describe clear evidence of the effects of freeze-thaw related processes, like solifluction, the lack of preservation of the ash layer(s) of the combustion features, as well as development of bioturbation features enhanced by anthropogenic input (cf. Schilt et al., 2017). On a broader scale, our analysis detected distinct variations in the size and structure of the combustion features. This variation could potentially indicate multiple occupations within the same layer or reflect differences in site organization or function during a single occupation.

Overall, the combustion features from AL I of Korman' 9 provide invaluable new insights into preservation of combustion features as well as high-resolution description of pyrotechnological behaviours during the LGM, which has been lacking during this critical period in our evolutionary history.

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Animal exploitation by hunter-gatherers during the Last Glacial Maximum: New results of spatial and zooarchaeological analyses at Korman' 9, Ukraine

The Last Glacial Maximum (LGM) between 26,500 and 20,000 years ago is generally thought to have witnessed a European-wide population decline, and is characterized by a scarcity of sites in some regions. One such site in the SW Eastern European Plain is Korman' 9, located in the Dniester valley, Ukraine, and discovered during survey in 2012 and excavated in 2013. Five Archaeological Layers (AL) are embedded in a ~4m deep loess-palaeosol sequence covering in part the LGM. AL I and II are radiocarbon-dated on charcoal to ~21.9 ka cal BP and ~22.3 ka cal BP, respectively. The main AH I comprises rich lithic and faunal assemblages attributed to the Epigravettian including organic technology and personal ornaments. Two combustion features have been documented within this AH (Kulakovska et al. 2021; Bosch et al. 2024).

In this poster presentation, we report results of new spatial and zooarchaeological analyses focusing on exploitation of animals and evidence of combustion activity, including spatial distribution of the faunal remains per species, carnivore and human modifications, bone density-mediated attrition, degree of burning among faunal specimens and lithic artefacts as well as an evaluation of spatial patterns among the burned materials.

Our results indicate that Epigravettian hunter-gatherers were the main accumulator of the faunal assemblage, whereas carnivores had only secondary access. All recovered taxa show traces of human exploitation. Horse, reindeer and hare were exploited for dietary purposes shown by evidence for skinning, dismembering and filleting. The spatial distributions of burned and unburned remains show no substantial difference and no specific clustering around the two combustion features.

Further, there is evidence for on-site working of reindeer antler and a needle fragment attests of bone tool technology. Fox teeth, freshwater and fossil shells were used as beads for personal ornamentation. Thus, in addition to dietary exploitation, animal remains formed a common and diverse part of socio-economic behaviour and were well-incorporated in hunter-gatherer technological and symbolic expression during the LGM at Korman' 9.

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Inspecting, categorising, digitising... analysing data from the multi-layered structured painted Volp caves (Tuc d'Audoubert, Trois-Frères, Enlène). The long process of successfully integrating data from different sources

Introduction

The Volp caves in south-western France (Tuc d'Audoubert, Trois-Frères, Enlène), discovered more than 110 years ago and one of the most important multi-layered structured painted caves in the world, containing unique cultural evidence dating back some 17,000 years BP (Bégouën et al. 2009; Bégouën et al. 2014; Bégouën et al. 2019), are the subject of a new research project based in Germany (Erlangen) and France (Montesquieu-Avantès).

The aim of this project is to restore the dynamics of static archaeological finds through spatial analyses in multi-layered, structured painted caves dating from the end of the last ice age. Painted caves such as the Volp caves are ideal for this purpose, not only because original footprints have been preserved in the untouched cave floor, connecting some of the activity zones, but also because the central question of the social context of their use and their significance for the reconstruction of Late Glacial rituals and beliefs has remained completely unanswered. Among the painted caves with internal archaeological context information, the Volp caves are unique in terms of variety and quantity.

A new research project, which started in 2024 and will continue for a period of 12 years, has two principal objectives: (1) in the Volp caves, the identification of activity zones, their spatial location and the reconstruction of the connections between the individual activity zones (on-site) and (2) within the Magdalenian of the Pyrenees, the integration of the Volp caves as multi-layered structured painted caves into the regional subsistence system (off-site). It is expected that the comprehensive analyses of the three multi-layered structured caves of Tuc d'Audoubert, Trois-Frères and Enlène will provide high resolution data that will allow insights into their use concepts. The approach of integrating the Volp caves into the regional subsistence system will be combined with the methodological-theoretical study of the high

diversity of painted caves as a whole, which is expected to stimulate the debate on the significance of painted caves.

Material and methods

The Volp caves have not only been known for over 110 years. Moreover, the caves have been the focus of extensive research, as evidenced by the considerable number of publications, approaching 250. The consistent implementation of clear rules in dealing with archaeological remains has facilitated the integration of all analogue and digital data into a single repository, that is, the Volp caves archive.

The data set is notably heterogeneous. The archaeological finds are diverse, encompassing a wide range of materials and forms. These include imprints in clay, clay sculptures, rock paintings, artefacts fixed in fissures in the cave walls, fireplaces, pits and stone settings. Additionally, there are concentrations of finds with rich archaeozoological and lithic material. Furthermore, the archive contains analogue cave plans and lists of survey results, drawings of rock paintings and mobile art objects, artefact drawings, photographs and a plethora of additional materials.

A number of years ago, an attempt was made to initiate the process of organising the heterogeneous analogue data that had been digitised, sorted and made accessible through the creation of structures created through content indexing and thematic classification. The primary digital data was entered into these structures and will form the basis for the research project described above. In this process, all mobile data carriers are subjected to inspection, as are all analogue data. All excavation reports and documents are digitised, and all available analysis results from external and internal researchers are collected and stored in a hierarchical folder structure. Furthermore, all vector-based graphic plans are transferred to the Volp-GIS project that is being developed in QGIS. A digital inventory book is used in which every single finding and find of individual significance is listed.

The process is not yet concluded, and we are still seeking to identify practical solutions. In addition to existing data, the current methods of documentation such as Structure from Motion or 3D scanning have already been applied and will be important in the coming years, as well as state-of-the-art analyses of sediments, finds and features.

Results

It is not yet possible to present definitive results in the form of finished products. Nevertheless, we can show examples of heterogeneous analogue and digital data obtained from the Volp caves and provide insights into the ongoing process of structuring and indexing them as a case study which demonstrates the successful integration of data gathered from different sources.

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Large raptors, Neanderthals and beyond Neanderthals: new evidence from Grotta di Fumane

In the last decades, the study of bird fossil bones from archaeological sites has allowed to shed light on the complex frame of interactions between Paleolithic populations and birds during prehistory. Recent discoveries documented a particular interest of Neanderthals towards large diurnal raptors. A number of Middle Paleolithic sites yielded cut-marked wing bones and posterior phalanges, indicating the recovery of large raptors feathers and talons by Neanderthals. As claws are not edible, they were likely used as items of symbolic expression, possibly as ornaments.

Here we present two cut-marked raptor claws discovered during the last excavation campaigns in the Middle Paleolithic deposits of Grotta di Fumane. The cave represents one of the most significant Upper and Middle Palaeolithic archives in Europe, providing relevant insights on Sapiens and Neanderthal behaviour and subsistence, besides direct taphonomic evidence of regular bird exploitation by Neanderthals. The ungueal phalanges which are object of this work come from the layer A10, characterised by a mainly Levallois technology and dated between 47.6 and 49±7 ka BP.

The first claw is a left ungueal phalanx of the third digit of a vulture, *Gypaetus barbatus*. It shows one oblique cut-mark in the proximal epiphysis, on the plantar side of the *tuberculum flexorium*. This cut was produced with a stone tool while detaching the talon from the foot by cutting the plantar tendon, called *flexor profundus*. This action also implies the cut of the thick keratin sheath that covers the ungueal bone phalanx. *G. barbatus* is a large vulture which lives in mountainous areas and nests on cliff ledges or in caves, with a diet mainly consisting of bones from carrion, whereupon the bird gets nutrition from the marrow inside.

Another claw has been referred to an unidentified large Accipitridae as it lacks the proximal epiphysis, which is diagnostic. On the dorsal surface of this claw, we documented a probable short, oblique and rather wide cut-mark. The proximal breakage, as well as the cut-mark on the dorsal surface, could have been produced during the process of removal or manipulation of the claw.

The Middle Palaeolithic deposits of Grotta di Fumane have provided other similar evidence. The layer A12 yielded a cut-marked claw belonging to *Aquila chrysaetos*, whereas the layers A9 and A5-A6 provided proof of Neanderthals' recovering feathers and wings of large vultures such as *G. barbatus* and *Aegypius monachus*.

To date, ten Middle Paleolithic contexts across Europe provided cut-marked large raptor phalanges spanning a long-time interval (130 ka to 44–45 ka BP), a wide geographic range and different species (*Haliaeetus albicilla*, *A. chrysaetos*, *A. monachus* and now *G. barbatus*). This behaviour was widespread in Europe across time and space and could then be interpreted as the expression of a traditional practice among Neanderthals. The raptor species involved were those who were contiguous, from a spatial and an ecological perspective, to Neanderthals. Several vulture and eagle species, indeed, nest in the same rock walls that hosted Neanderthal cave settings, and are obligate or occasional scavengers, which brought these birds closer to Neanderthal preys. The ornamental use of talons seems to transcend the Neanderthal-Modern Human boundary, as it is also attested across the whole Upper Palaeolithic in Europe and the Near East, and represents a common feature in the ethnographic records.

Anyway, the data here presented add to the evidence of the presence of large diurnal raptors in the Neanderthals' symbolic sphere well before the arrival of Anatomically Modern Humans in Europe. Many aspects of the complex role of birds in the life of prehistoric populations are yet to be discovered.

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The Middle Palaeolithic in the Berici Hills: contribution to the archaeozoological study of the large mammals of Grotta Maggiore di San Bernardino (Vicenza)

The Berici Hills (VI) karstic plateau has an abundant archive of prehistoric archaeological sites. It assumes a fundamental role on the study of the anthropic settlement since the Middle Palaeolithic and the environments occupied by human groups.

This research aims to contribute to the study of these topics through the presentation of the archaeozoological assemblage from Grotta Maggiore di San Bernardino (Mossano). The datings cover a chronological span that goes from the late Middle Palaeolithic (unit II) to the full Middle Palaeolithic (unit VIII÷VII) in MIS 6 and MIS 7. Here are conserved traces of the most ancient human settlements in the whole Berici Hills plateau. For some of the archaeological units, the archaeozoological and taphonomical analysis allowed to identify the Neanderthal groups as the main agent of accumulation of faunal remains. Neanderthals has left traces on exploitation of medium-large size ungulates, bear and beaver, species that are documented through the entire archaeological sequence. Usually, the ungulates of medium and large size (*Alces alces*, *Cervus elaphus*, *Capreolus capreolus*, *Bos/Bison*, *Capra ibex*, *Rupicapra rupicapra*, *Sus scrofa*, *Stephanorinus* sp., and *Rhinoceros* sp.) dominate in San Bernardino's anthropic units while carnivores (*Ursus spelaeus*, *Ursus arctos*, *Canis lupus*, *Vulpes vulpes*, *Panthera pardus*, *Lynx lynx*, *Felis silvestris*, *Lutra lutra* and *Martes* sp.) are less abundant. Lagomorpha (*Lepus* sp.) and large-size rodents (*Castor fiber* and *Marmota marmota*) are also documented; anthropic traces have been identified on the bone surfaces of these latter. In units where the accumulation of faunal remains is partially attributable to the human's action, there is an increase of carnivores compared to ungulates, in addition to a clear reduction in the number of faunal remains.

Thanks to the taxonomical identification of faunal remains, it was possible, in a nutshell, to reconstruct the palaeoenvironment context around the site, consistently with the three climatic cycles recognised through the archaeological sequence on a multidisciplinary basis.

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Geoarchaeological characterisation of Chalosse cherts, a Palaeolithic long-distance mobility tracer at Western Europe in the framework of the ERC-SPEGEOCHERT project

The main aim of the *ERC-StG SPEGEOCHERT project -Spectroscopy and Geochemistry of chert*. Reconstructing human mobility in the Pyrenees from the first Modern Humans to the last Pleistocene hunter-gatherers-, is the understanding of the mobility patterns that *Homo sapiens* put in practice during the Upper Palaeolithic on both sides of the Pyrenees. This mountainous range has traditionally been considered as a barrier. However, during recent years, Palaeolithic research has proved the connection between the two sides of the Pyrenees during the Palaeolithic, especially at the Eastern and Western ends, where the slopes and heights are less pronounced than in central parts (e.g., Calvo & Arrizabalaga, 2020; Foucher & San Juan-Foucher, 2008; Sánchez de la Torre et al., 2020). Central areas, with altitudes higher than 3,000 above sea level and pronounced slopes, are still considered a big border of more than 400 km by Palaeolithic researchers, especially, in cold periods when glaciers reached their maximum extension and periglacialism affected broad areas.

As previously commented, there are sherds of evidence of mobility between both sides of the Pyrenees and one of the most relevant and accurate evidence is the transportation of lithic artefacts, in particular, those made on chert. The presence of the Chalosse chert type (Fernandes, 2012), among others, in the southern slopes of the Pyrenees has proven the mobility of objects and people from the northern to the southern slope (Sánchez de la Torre et al. 2025). Nevertheless, this evidence must be reinforced and the mobility circuits must be clarified to define if they have been done only in the Western part of the Pyrenees or if they were also carried out in the central and the eastern parts.

To answer these questions but also to formulate new hypothesis that allows a deeper understanding of past human subsistence practices, this project has revisited the Chalosse cherts using a geoarchaeological approach that includes field survey, non-destructive petrology, petrography and geochemical characterisation (LIBS and X-Ray Fluorescence).

The main objective of this presentation is to show the advances carried out to characterise the cherts from this area in the framework of the SPEGEOCHERT project. This includes the geological characterisation of the most relevant stratum and other bearing cherts strata, the secondary-positioned cherts in this area, the petrological and geochemical characterisation of these cherts, how they were weathered in the terrain by different meteoric agents, and the identification of most relevant and promising procurement areas. This information will be contextualised within the archaeological evidence that proves their relevance as long-distance tracers, but also, as an extraordinary proxy to deeper our understanding of the human adaptative practices to procure, manage and distribute this chert type through the Upper Palaeolithic.

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Lamps? – Lipid analysis of concave rock slabs and soils from the Magdalenian site of Bad Kösen-Lengefeld

The Magdalenian site at Bad-Kösen-Lengefeld was discovered in 1954 and has been actively studied for over a decade by researchers from the University of Cologne and Friedrich-Alexander University Erlangen-Nürnberg, in close collaboration with the Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt. During the excavations conducted in 2022 and 2023, two rock slabs with natural concavities were discovered. These finds exhibit similarities to previously identified objects from other archaeological sites, which are commonly referred to as lamps in the literature (e.g. Heron et al. 2013).

A detailed examination revealed the presence of residues within the concavities and along their edges, thereby providing opportunities for further investigation and analysis. The primary objective is to identify the materials inherent in the stones and to assess whether the materials show evidence of heating.

We present the analytical approach and preliminary results of lipid analyses on both the stones of the lamp-like objects and the sediment within the concavities. The organic residues will give hints on potential lipid sources and the burning processes. In addition, we will determine the lipid composition of the surrounding sediments in order to differentiate the organic sources that were in contact with the object during deposition. Furthermore, these analyses contribute to a better understanding of the overall use of rocks in archaeological sites.

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What are we MIS-sing? New insights into the chronology of Zwoleń, Poland

In recent decades, much of the Central European Micoquian has been dated to the beginning of MIS 3 (c. 60–50 ka; e.g., Alex et al., 2017; Wiśniewski et al., 2019). However, many sites, based on earlier studies, date to the Early Weichselian. One such site is Zwoleń, Poland, known for its traces of hunting practices (Schild, 2005). It has been determined that the remains date to MIS 5a–MIS 5c and the beginning of MIS 4. These conclusions were based on low-precision estimates using the thermoluminescence (TL) method (Bluszcz, 2005). The research yielded approximately 330 artifacts; however, a large number of the lithics lack precise stratigraphic positioning.

In this paper, we would like to present the results of recent chronometric examinations of the site, along with new archaeological observations based on excavations conducted in 2023 and 2024. To establish the chronological position of the Micoquian artifacts, we collected a dozen samples using the optically stimulated luminescence (OSL) method.

The current results partially confirm the earlier hypothesis by placing layers containing archaeological finds in MIS 5a and MIS 4. However, at this stage of research, it remains difficult to delineate distinct phases of occupation.

New excavations covering 18 square meters yielded 172 artifacts. The lithics were found within a complex of sandy-gravelly deposits mixed with fine-grained sediments associated with the activity of braided rivers. Although their original position was disturbed by fluvial processes, the artifacts remain in a "fresh" condition, indicating that they were displaced over a short distance within a relatively brief period. Most of the lithics were made from chocolate flint and local Turonian flint. The assemblage includes bifacial knives, scrapers, flakes, and chips. Some of the flakes exhibit characteristics associated with bifacial tool shaping. We presume that the tools were used and subsequently reshaped or resharpened on-site.

In the same sediments, we uncovered animal bones, representing skeletal remains of horses and a mammoth. These were scattered and, in some cases, fragmented. Similar to the lithics, the bones were displaced within the channels of the braided river.

The current study at Zwoleń confirms that the Micoquian complex in the Central European plains developed during the Early Weichselian (Jöris et al., 2022). However, whether activity at Zwoleń occurred over such an extended period remains an open question.

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Measuring the Impact of Environmental and Socio-Cultural Variables on Mesolithic Settlement Patterns between the Tagus and Mondego Valleys (Western Portugal): Preliminary Results

The environmental transformations following the 8.2 ka event played a decisive role in the restructuring of human settlement patterns during the Mesolithic, particularly in western Portugal. The rise in sea levels, combined with changes in sediment deposition and estuarine productivity, created new ecological niches that provided abundant resources, influencing the mobility and subsistence strategies of Mesolithic groups. Archaeological evidence suggests that settlement choices during this period were primarily concentrated in paleo-estuarine landscapes (e.g., Bicho et al., 2010), where communities exploited a range of environmental settings. The Mesolithic settlement system was diversified, comprising shell middens, open-air sites, caves, and rock shelters, reflecting a complex adaptation to dynamic environmental conditions.

While this broad pattern has been well-documented, specific environmental factors - such as terrain slope, aspect, geology, soil types, climate, and proximity to water sources and lithic raw materials - are known to play a crucial role in site selection (e.g., Gonçalves, 2014; Woodman, 1997). In contrast, socio-cultural and symbolic factors, including site prominence, intervisibility, accessibility, and the role of memory in settlement decisions, remain largely unexplored in this region (Gonçalves et al., 2014). These elements, despite their potential influence on spatial organization, are often excluded from spatial analysis and predictive models due to their qualitative nature and the methodological challenges associated with their measurement, particularly in prehistoric contexts.

To assess the relative impact of environmental and socio-cultural factors on site selection, we conducted a spatial analysis of 20 archaeological sites using geoprocessing techniques. Environmental variables were calculated, and behavioural simulation tests - including viewshed and intervisibility analyses (intervisibility networks) and cost-surface modelling - were performed to evaluate spatial affordances and mobility constraints (e.g., Gillings et al., 2020). A univariate and exploratory statistical analysis was subsequently conducted, comparing the distribution of archaeological sites against a dataset of randomly generated control points to identify patterns of preferential location.

Here, we present the preliminary results of this study, which contribute to a deeper understanding of human-environment interactions during the Mesolithic. By quantifying the relative weight of environmental and social-cultural variables in settlement choices, this research provides new insights into the decision-making processes that shaped the organization and landscape occupation strategies of the last hunter-gatherer communities in western Portugal.

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The Lapa do Picareiro MicroContextual Excavation (LdP MiCE) Project: an interdisciplinary approach to archaeological excavation at the microscale

The time-averaged nature of many archaeological deposits hinders our ability to detect nuanced changes in the past, especially when it comes to the relationship between changing climate and human cultural adaptations. To date, no archaeological excavation technique commonly employed addresses the excavation induced palimpsest nature of material records too small for total-station piece-plotting (i.e. microfauna, botanical remains, charcoal, etc.). These highly valuable paleoenvironmental proxy materials are often recovered through dry or wet screening during which their precise provenience is lost.

The Lapa do Picareiro MicroContextual Excavation (LdP MiCE) project provides a new approach to examining the archaeological and palaeoecological record at high-resolution using the best of modern excavation techniques. Employing the novel MiCE method¹, which uses a microscribe 3-D digitizing tool during laboratory excavation to precisely plot the provenience of all artifacts, ecofacts, and microstratigraphy in blocks of sediment, produces accurate spatial records (with <2 mm precision) of materials too small for traditional piece-plotting.

By strategically applying this innovative excavation method to deposits rich in microfauna – the remains of rodents, insectivores, and bats – from the Paleolithic site of Lapa do Picareiro (LdP), Portugal², our team will produce the most high-resolution and spatially precise records of the Portuguese Upper Paleolithic ever recorded. As a key site to our understanding of the Iberian Paleolithic, Lapa do Picareiro contains continuous deposits dated from the Middle Paleolithic to Iron Age, along with rich faunal, lithic, and botanical remains³. Our block sample includes the well-studied Gravettian deposits at LdP⁴ and contains 3 intact stratigraphic layers which previously produced robust artifact and ecofact material assemblages. Our project combines the MiCE method with cutting-edge stable isotopic and radiocarbon dating of microfauna to produce new cultural and paleoenvironmental records with unparalleled chronological accuracy.

This contribution details our teams' preliminary results including the development of a MiCE laboratory at the University of Algarve, our archaeological block extraction techniques utilized at Lapa do Picareiro, and our application of the MiCE method to a concreted accumulation of modern barn owl (*Tyto alba*) pellets recovered from a local farm. This proof-of-concept work on modern microfaunal remains allows us to accurately estimate the precision of the excavation technique when applied to materials <2 cm in max.

size and provides a robust record of current carbon and oxygen isotopic signatures in multiple microfauna species with which we can calibrate our archaeological estimates. The research objectives and impact of the LdP MiCE projects expected outputs on our understanding of Iberian prehistory will also be explored. Future applications of this innovative excavation method, which include exploration of legacy sites where destructive large-scale excavation cannot be attempted, will be discussed as well.

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The tunnel valley of Ahrensburg: Status and plans for new activities

The well known sites in the Ahrensburg Tunneltal in Northern Germany have yielded spectacular finds of especially the Late Palaeolithic, notably nearly complete arrows. Construction activities will require renewed excavations by the State Heritage authorities (Archäologisches Landesamt Schleswig-Holstein, ALSH) and include a collaboration with the Leibniz Zentrum für Archäologie (LEIZA-ZBSA). The current knowledge will be presented and the project plans outlined.

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Ecology of ungulates in the Northeastern Iberian Peninsula during the Upper Palaeolithic: Insights from stable isotopes and dental wear analysis

During the Upper Palaeolithic, the northeastern Iberian Peninsula functioned as a crucial refugium, sustaining both human populations and large herbivorous prey amid fluctuating climatic conditions. This region provided a mosaic of habitats where terrestrial ecosystems persisted through the Last Glacial Maximum (LGM). Horses (*Equus ferus*) and red deer (*Cervus elaphus*) represented primary prey for hunter-gatherer communities, as evidenced by faunal remains from key archaeological sites such as Arbreda cave and Bora Gran rock-shelter, in Serinyà (Girona, NE Catalonia, Spain).

This study employs a multiproxy approach, combining stable isotope ($\delta^{13}\text{C}$, $\delta^{18}\text{O}$, $\delta^{15}\text{N}$) and dental wear analyses (mesowear and microwear) to investigate ecological adaptations in these species and their implications for human subsistence strategies between ca. 55,000 and 15,000 cal BP. The research integrates isotopic data derived from bone collagen and incremental enamel carbonate analyses with macroscopic and microscopic analyses of dental wear. Stable isotopes reflect dietary and habitat preferences, providing insights into environmental conditions. Mesowear assesses the long-term dietary abrasiveness through molar cusp morphology, while microwear captures short-term feeding patterns by quantifying microscopic pits and scratches on tooth surfaces. Specimens from stratigraphic contexts spanning the Mousterian to Magdalenian at Arbreda and Bora Gran were analyzed, enabling a diachronic perspective on ecological responses to environmental shifts during Marine Isotope Stages 3 and 2.

Incremental enamel carbonate analysis in horses revealed stable $\delta^{13}\text{C}$ values throughout the year, suggesting consistent grazing habits, while relatively low $\delta^{15}\text{N}$ values in their collagen reflect a preference for humid habitats. Seasonal variations in $\delta^{18}\text{O}$ values highlight temperature-driven fluctuations in water sources, yet these variations were more prominent within individuals than across the population. This stability underscores the reliance of horses on relatively stable environmental niches in mosaic landscapes, even under harsh climatic conditions such as the Final Gravettian.

In contrast, red deer displayed greater variability in $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values, reflecting their ability to exploit a wider range of resources and habitats. Higher $\delta^{13}\text{C}$ values in enamel and collagen, along with distinct mesowear and microwear patterns, indicate a mixed feeding strategy. Seasonal shifts in $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values in red deer enamel carbonate suggest adaptive responses to environmental changes, including the exploitation of xeric plants during winter and increased browsing in more humid seasons. These findings demonstrate the ecological flexibility of red deer, enabling them to thrive in a range of climatic scenarios.

The contrasting ecological strategies of horses and red deer have significant implications for understanding human subsistence during the Upper Palaeolithic. The dietary stability of horses provided a reliable resource for hunter-gatherers, particularly in environments where mixed habitats persisted. Meanwhile, the dietary flexibility of red deer offered an adaptable resource that could support human populations through periods of environmental stress. These species-specific responses highlight the interplay between prey ecology and human land-use strategies in refugial regions.

The results align with palynological and anthracological evidence indicating that the northeastern Iberian Peninsula experienced significant environmental variability during the LGM (e.g., Revelles et al. 2022). Its unique location, at the intersection of diverse ecological zones, amplified this variability. The predominance of steppe and xeric herbaceous vegetation during the Solutrean contrasts with the expansion of coniferous forests during the Aurignacian. The resilience of these ecosystems underscores the role of the Iberian Peninsula as a stronghold for both human populations and their prey during glacial periods.

This study demonstrates the value of combining stable isotope and dental wear analyses to reconstruct the ecological dynamics of large herbivores in Upper Palaeolithic contexts. Horses and red deer exhibited distinct but complementary strategies for coping with environmental changes, reflecting a balance of niche specialization and adaptability. These findings enhance our understanding of the complex interactions between climate, environment, and human subsistence during a pivotal period in human prehistory. By elucidating the ecological roles of key prey species, this research contributes to broader discussions on human resilience and adaptability in glacial refugial regions.

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Exploring Neanderthal Hide Processing: Functional Insights from Use-wear Studies, 3D Surface and SEM Analysis on Middle Paleolithic Bone Tools

The study of bone tools provides important insights into the technological and cultural practices of prehistoric societies. These tools, crafted from organic materials, played diverse roles, from hunting and food processing to crafting and symbolic activities. Understanding how they were used and their specific functions, however, poses challenges due to the inherent limitations of the materials under study, the complexity of their wear patterns, and the inadequacies of traditional analysis methods.

This study represents a pilot, initiating the traceological analysis of the unique assemblage of Middle Paleolithic bone tools from the Salzgitter Lebenstedt site (Germany). While these bone tools from this open-air site were discovered in the 1950s, their functions remain enigmatic to this day. To gain functional insights, we employed advanced 3D surface analysis, scanning electron microscopy (SEM), and use-wear analysis. The high-resolution capabilities of 3D profilometry enable precise visualization and quantification of surface modifications, such as striations, polish, and wear patterns. SEM further facilitates the identification of elemental compositions of residues incrusting in the bone structure, shedding light on tool use and processing practices. Use-wear analysis complements these approaches by examining the morphological changes resulting from repeated use, providing a comprehensive understanding of the interactions among tool, material, and task.

The integration of these analytical techniques uncovers distinct patterns of wear associated with activities such as hide processing, manipulation, and tool shaping. It also highlights the influence of raw material properties and maintenance strategies on tool performance and durability. By focusing on the microtopographic and elemental characteristics of bone tools, this study advances our ability to reconstruct past technological systems, resource exploitation strategies, and cultural practices. The study of this unique Middle Paleolithic assemblage of bone tools is particularly crucial for understanding the technology applied and provides exceptional insights into the Neanderthal's craftsmanship - insights that cannot be derived from Middle Paleolithic sources of the archaeological record.

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Block excavation of selected pit features from the Magdalenian settlement at Bad Kösen-Lengefeld, Saxony-Anhalt

The Magdalenian settlement site at Bad Kösen-Lengefeld, Saxony-Anhalt, was excavated between 2009 and 2023 in a joint project between the Landesamt für Denkmalpflege Sachsen-Anhalt, the University of Erlangen-Nürnberg and the University of Cologne (Richter et al. 2021). It is situated on a Muschelkalk escarpment above the Saalecker loop of the Saale river.

The features at the site are characterised on the one hand by constructions of Muschelkalk slabs and, on the other hand, by around 80 pits of various shapes. Of particular interest is a group of 21 smaller, bag-shaped or cylindrical pits with diameters of 15 to 20 cm and depths of 10 to 30 cm. These features are situated in a roughly circular pattern around the central hearth feature. All pits were excavated according to a strict protocol (Sauer 2023) based on a succession of plans and the complete 3D-recording of all recovered objects. In contrast, profiles and SFM images are only available sporadically, because the pit fillings were usually indistinguishable from the surrounding sediment during the excavation. Essential characteristics of the pits can therefore only be recognised indirectly, via the spatial arrangement of the objects within the pits.

In 2023, some of these pits were recovered as blocks to be excavated later under optimal conditions and without time pressure. The goal is to obtain additional information on the demarcation and structure of the pits and their fillings and thus gain clues and source-critical perspectives for the interpretation of the other pits. In particular, this involves the exact determination of the horizontal and vertical contours of the sediment filling and possible filling phases. The results can be compared with the mapping of the embedded objects obtained using the standard protocol. The poster reports on the opening of the recovered sediment blocks in spring 2025, their documentation during the excavation under controlled conditions, as well as the results of the laboratory excavation.

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Exploring avian use in the Palaeolithic: challenges and experimental insights

The identification of bird processing and human consumption in the Palaeolithic archaeological record presents significant challenges due to the fragmentary nature of avian remains and the lack of analytical frameworks. Despite bird remains commonly passed unnoticed from in-depth taphonomic analyses, it has been demonstrated that they played an important role in the subsistence strategies of both Neanderthals and Anatomically Modern Humans (AMH). Evidence is attested since the Middle Pleistocene in sites such as Cova del Bolomor (Spain), Figueira Brava and Oliveira (Portugal), Gorham's Cave (Gibraltar), Fumane (Italy), among others. These finds indicate that avian resources were processed and consumed for meat, feathers and possibly for symbolic or aesthetic purposes (e.g., Blasco et al., 2022; Nabais et al., 2023). However, interpreting these practices remains challenging due to the diversity of bird species, the varied

purposes they may have served and the absence of taphonomic modifications directly associated with their use.

To address this issue, a series of experimental studies are being conducted on bird species commonly found in the Iberian archaeological record, including corvids, columbids, phasianids and anatids. This research aims to present the experimental protocol developed to date, which involves processing nine birds (three columbids, two corvids, two anatids and two phasianids) using two different techniques: four of the specimens were processed raw, while the remaining five were plucked prior to cooking and then further processed.

This experimental approach seeks to generate a reference framework for identifying avian exploitation in archaeological contexts, including the types of marks and patterns associated with processing that may go unnoticed when cut marks are not observable. By refining our ability to recognise evidence of bird consumption and its broader significance, this research addresses an important gap in our understanding of prehistoric subsistence strategies and the complex interactions between humans and their environments. The study underscores the need for further research of avian exploitation to better understand the economic and cultural roles of birds in Palaeolithic lifeways.

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A Middle Paleolithic site with Discoid technology in Southeast Albania: lithics, petroarchaeology and Quaternary context of Istraishita, Korça Basin

Neanderthal groups developed different models of mobility and resource exploitation across their territory. These differences can be linked to various knapping methods and are likely related to adaptive strategies and responses at multiple ecological and cultural levels. Despite its high potential, our current knowledge of Neanderthal occupations, locations, territories, and adaptations to environmental and ecological diversity in some parts of the Balkans is limited. For example, this is the case of Albania and the mountainous area of southwestern Balkans, where Neanderthals' adaptation is expected to be expressed through the use of different mobility strategies and technological traditions, in order to cope with the geographic diversity. However, this scenario is still far from complete due to the lack of archaeological evidence from most of the considered area. Most of the available information comes from surface collections, which lack contextual data from stratigraphy.

The open-air site of Istraishita, located in the Korça basin in southeast Albania, is here presented: data were obtained from a multidisciplinary study (palaeopedology, petroarchaeometry, and lithic technology) applied to an area rich in surface finds, located at over 1,000 m a.s.l. The analysis of the pedological profile, which is preserved in localized patches, showed the presence of a polycyclic soil developed on top of weathered limestones. In particular, fersiallitic soils with "Terra Rossa" characteristics are found in the lower part of the profile. These are covered by horizons that show an increase in biological activity, along with clear evidence of recent soil use and a shift from woodland to pasture areas.

More than 1,400 lithic artifacts were collected from Istraishita Hill. Most of the raw materials exploited at the site were collected as pebbles from the Molasse conglomerates outcropping in the hills surrounding the southeast and northwest Korça plains. In most cases, these raw materials (radiolarite, chert, silcrete, volcanite, quartzite) are represented by rounded pebbles with varying degrees of alteration, evidenced by yellow to dark patinas. The lithic technology is primarily characterized by the widespread use of Discoid technology. The common variability within the Discoid method, already established in previous analyses of other assemblages in Europe, is fully represented here by the reduction of pebbles, thin plates and flakes. The objective of these knapping strategies was the production of flakes with cortical backs, core-edge removal flakes, centripetal flakes, and pseudo-Levallois points, which were only occasionally retouched, mainly to manufacture scrapers. Neanderthals associated with Discoid knapping are known to rely on a context-specific, unplanned exploitation of lithic raw materials for daily food procurement and to be more mobile than those using other technologies.

The study of Istraishita aims to contribute to the reconstruction of the use of a mountain zone in the southwestern Balkans during the Middle Paleolithic, also through contextualization at a macro-regional level. In fact, despite the lack of a clear chronological framework, many analogies can be found with several sites in the Adriatic basin, most of which are chronologically framed between MIS 5 and MIS 3.

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More Than Surface Finds: Nubian Levallois Core Metric Variability and Site Distribution Across Africa and Southwest Asia

Nubian Levallois technology is a type of preferential core method used to produce pointed or elongated artifacts during the Middle Stone Age. These cores have been central to numerous studies, particularly those examining human dispersal from Africa (1). Previous research has primarily focused on the distinct technological features of these cores, with limited discussion of their spatial distribution, often framed in qualitative terms (2).

Our study presents the first quantitative spatial analysis of sites containing Nubian Levallois cores across five global regions. Using modelled Pleistocene conditions for various bioclimatic and topographic variables (3), we compared the environmental contexts of 84 sites with Nubian cores to 81 contemporaneous sites where they are absent. Additionally, metric analyses of Nubian cores from 14 new

and previously published sites provided further insights into technological and behavioral patterns on an inter-regional scale.

Our findings reveal that during MIS 5, aridity, complex topography, and high biomass significantly predicted site locations, whereas for MIS 3, only temperature emerged as a significant predictor. Metric analysis highlighted distinct spatial and temporal patterns, showing the largest and most standardized cores in Southern Arabia during MIS 5, while the smallest cores were identified in MIS 3 sites in Eastern and Southern Africa. Based on these novel results, we propose that environmental factors played a more significant role in driving the adoption of Nubian Levallois methods.

This study provides a crucial environmental context for future model testing of Late Pleistocene demography and cultural connectivity during this critical phase of human evolution. Furthermore, it not only delineates the spatial characteristics of sites with Nubian Levallois cores but also introduces a new dimension of understanding these artifacts beyond their known technological aspects.

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Javier Sánchez-Martínez^{1,2}, Marta Sánchez de la Torre^{3,4}, Jorge Martínez-Moreno⁵ & Rafael Mora⁵ **Reconstructing human ecodynamics and chert procurement in the southern façade of the Pyrenees during the Upper Palaeolithic: the case of Cova Gran de Santa Linya**

The northeastern Iberian Peninsula hosts a great diversity of raw materials regularly used by anatomically modern humans (AMH). Among these materials, chert, widely distributed across the southern façade of the Pyrenees, was the primary lithic resource exploited during the Upper Palaeolithic. However, whether procurement strategies remained stable or changed in response to climatic fluctuations, cultural traditions and socio-organizational issues, remains unclear. Specially before and after the Last Glacial Maximum (LGM).

To investigate this issue, a micropaleontological and textural analysis was carried out on chert cores and retouched tools from the Upper Palaeolithic sequence of Cova Gran de Santa Linya (Les Avellanés, Spain). This study aimed to determine the sedimentary origins of the silicifications and identify potential procurement areas. Our results indicate the use of two principal silicification types: (1) cherts formed in a continental lacustrine-evaporitic environment, corresponding to the Garumnian facies of the Tremp Formation, and (2) those originated from a continental lacustrine environment, associated with geological formations located between the Pre-Pyrenean Ranges and the Ebro Basin. Additionally, we documented different types of marine-origin cherts, showing parallels with formations on both the southern and northern slopes of the Pyrenees.

Preliminary data suggest the main procurement strategy followed the transverse valleys connecting the southern Pyrenees to the Ebro Basin. This strategy facilitated the acquisition of evaporitic and lacustrine-origin chert from regional sources. However, the presence of marine-origin cherts from long-distance source areas on the northern façade of the Pyrenees suggests this mountain range functioned as a

permeable territory for hunter-gatherer populations. The diachronic analysis of lithic assemblages from Cova Gran revealed a shift in raw material procurement throughout the Upper Palaeolithic, particularly from LGM onwards, where lacustrine-origin cherts increased in the technological organisation of human groups. Furthermore, this study contributes to the understanding of human ecodynamics and chert procurement during both temperate and cold climatic phases.

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Learning in the Acheulean: From Tool Shapes to Mental Templates

The evaluation of technical skill in the archaeological record of the Lower Paleolithic has traditionally been approached from a long-term perspective, primarily aimed at assessing the cognitive evolution of early hominins (e.g., Müller et al. 2017). However, in recent years, a growing body of research has focused on the identification of individual skill. Based mainly on the study of experimental material, these works explore decision-making in knapping activity and assess morphological variation between pieces produced by apprentices and experts (e.g., Hertzlinger et al. 2017; Torres & Baena 2020).

In the same vein, the present study takes this approach a step further by highlighting the impact of individual skill level on the internal variability of lithic assemblages and its crucial role in understanding the archaeological record. Building upon the theoretical framework of Jacques Pelegrin and the concept of know-how (Pelegrin 1991), we present a critical analysis of the large bifacial pieces from the Late Acheulean site of Garba I (Melka Kunture, Ethiopia). Located in the Ethiopian highlands, Garba I (Sánchez-Dehesa Galán, 2022) is one of the richest and most extensive handaxe and cleaver accumulations

in eastern Africa. Through a detailed analysis of the reduction sequence of each piece and its comparison with the rest of the assemblage, we identify knapping errors and mistakes (e.g., mis-hits, hinge terminations) as well as successful productions demonstrating a high level of motor and logico-cognitive skills. The latter can be attributed to expert knappers and serve as benchmarks for defining primary knapping goals (e.g., tool types) and the technical decisions required to achieve them.

Furthermore, based on a synthesis of previous studies, we propose a methodological framework for identifying knapping learning processes, leading to the recognition of five different levels of expertise within the Garba I assemblage. These levels correspond to the gradual acquisition of the fundamental principles required for producing large bifacial pieces.

Finally, combined with a morphometric analysis of the assemblage, our study demonstrates the relationship between morphological variation in bifacial pieces and individual skill level.

To conclude, we present preliminary insights from the first steps of an ongoing study that integrates neuroscience methods and psychometric tests to assess the motor and cognitive abilities of modern knappers. This approach aims to complement the qualitative data derived from the archaeological record with quantitative methods, offering a more comprehensive understanding of skill acquisition and its archaeological implications.

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Do all Roads lead to Rome? – On the current State of Lithic Projectile Analysis

The use of stone-tipped weaponry is considered a major advance in human evolution, while the invention of long-distance weaponry is considered a real game changer that facilitated modern human dispersal out of Africa. Given the perishable nature of most weapon components, stone tools are essential sources of information to understand projectile technology.

Over the years, a range of methods has been proposed to identify projectiles or propulsion modes archaeologically on the basis of a detailed analysis of the stone tools. These methods vary widely in scope, resolution and quality, which makes it difficult to compare the results and to build reliable evolutionary models. In order to evaluate the current state of our knowledge and find ways to make further progress, we

performed a comprehensive literature review of lithic projectile research since its emergence in the 1970s. On the basis of this review, we selected around 70 papers published between 1983 and 2024 that include analyses of lithic projectiles in Palaeolithic assemblages predating the Last Glacial Maximum, and we evaluate what methodologies were used in support of the interpretations. We distinguish between methods used to identify lithic weapon components and those used for the identification of propulsion modes. In addition, we investigate the frequency and importance of lithic projectiles within a given assemblage from a diachronic point of view. Finally, we discuss how regionally different research traditions have affected and shaped our current understanding of projectile technology, its evolution and past human behaviour.

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Unraveling Aurignacian lifeways at Geißenklösterle: Insights from lithic technology and spatial analysis

Geißenklösterle Cave is a key site for studying the Aurignacian in Europe. The site plays an important role in contextualizing Aurignacian technological innovations and symbolic artifacts including personal ornaments, figurative art and musical instruments (Conard & Bolus 2003; Hahn 1988). The Aurignacian deposits at Geißenklösterle are comprised of archaeological horizons (AHs) II and III dating to between 42,500 and 35,000 cal BP (Higham et al. 2012). The archaeological remains represent a pivotal phase in the spread of anatomically modern humans across Europe.

In this contribution we present the results of the combination of lithic technology and spatial analysis to gain deeper insights into Aurignacian lifeways at Geißenklösterle. Using spatial analysis, we identify different patterns of accumulations of material culture corresponding to AHs II and the underlying AH III. AH II reveals a concentration of finds in the central part of the excavation, while the finds from AH III are concentrated in the northern part. The distribution of artifacts seems to be related to the presence of an ash layer in AH II and a combustion feature in AH III. The location of refitted artefacts and small debitage can be used to identify potential areas of lithic production or discard within these find accumulations.

The combination of technological analyses based on raw material units and refitting studies allows us to reconstruct the concepts Aurignacian knappers used to reduce individual nodules, thereby increasing our ability to dissect specific behavioral sequences within palimpsests. While in AH III we are often able to reconstruct the complete operational chains, in AH II the reduction sequences tend to be incomplete with less evidence for knapping complete cobbles on-site.

These results document different uses of space between the lower and upper Aurignacian at Geißenklösterle with varying intensity of lithic production. Thus, we infer a different use of the site during the deposition of AHs II and III, which provides new insights into the dynamic settlement system of the Ach Valley.

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Between extremes and reality: testing the effect of post-depositional processes on the surface of lithic artefacts to infer on tool use and site formation

Information about the technological behaviour of hominins in the distant past is mostly derived from the study of lithic artefacts. The recognition and identification of wear traces often encoded on the surfaces of these artefacts can, in addition, provide functional interpretations, which can be reached through both qualitative and quantitative use-wear analyses. Identifying and interpreting use-wear traces is not always straight forward as it depends on various factors, such as the mechanics involved, the contact material, the tool's raw material and morphology, the intensity of use, and the specific tasks performed. Therefore, understanding the fundamental mechanics behind wear formation is crucial for making reliable interpretations based on causality.

Moreover, use-wear traces on seemingly robust lithic artefacts can be overwritten or modified by post-depositional processes resulting from chemical, thermal, biological, and mechanical factors (e.g., trampling, water or sediment transport, soil abrasion, etc.; Chu and Hosfield, 2019; Galland et al., 2019; Venditti et al., 2016). Post-depositional modifications pose a significant challenge when conducting use-wear analysis. While post-depositional traces can often be distinguished from use-wear traces by their appearance and location on the artefact surface, the extent to which they affect the wear traces themselves is not fully understood.

This study presents a controlled, mechanised experiment to test the effect of sediment movement on the surface of lithic artefacts. Experimental samples - knapped Meuse flint flakes - were prepared with areas containing distinct use-wear traces and areas without. The surfaces of these samples were microscopically documented both qualitatively and quantitatively. Post-depositional processes were simulated through a shaking motion performed by a mechanical device designed to mimic artefact transport within sediment. For this, lithic samples were placed in boxes containing five different types of sediment characterised by different grain sizes, ranging from silt (> 0.02 mm) to medium gravel (< 16 mm). Following the simulation, the samples were re-documented to assess whether post-depositional processes altered the lithic surfaces microscopically.

Without an understanding of the fundamental principles behind surface alteration and wear formation, any functional interpretation of lithic artefacts will lack a certain degree of reliability, which is highlighted by this study. Furthermore, studying post-depositional processes not only aids in making functional interpretations but also contributes to the reconstruction of the life history of lithic artefacts after their abandonment. Recognising the formation processes of archaeological sites is essential for making more accurate reconstructions.

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Artifact life histories and paleoeconomy during the Aurignacian at Vogelherd Cave

Understanding tool use and differentiating tools from cores is essential for our interpretations of lithic assemblages, human activities and technological organization of sites. In the Aurignacian this differentiation of tools and cores is especially important with carinated cores and end-scrapers as common artifacts in these assemblages. The same applies to narrow-sided cores and burins. Use-wear studies can help us to reconstruct the function of tools. Refits can further increase our understanding of resharpening as well as recycling processes. At Vogelherd, these refits are often further contextualized by the sorting of minimal raw material units.

The current analysis of the lithic assemblages from Vogelherd illuminates what Joachim Hahn in 1988 described as opportunistic (Hahn, 1988) behaviour during the Early Upper Paleolithic of the Swabian Jura. Gustav Riek completely excavated Vogelherd Cave in the summer of 1931 (Riek, 1934). Between 2005 and 2023, Conard led ten seasons of systematic excavation of the entire backdirt from Riek's dig (Conard et al., 2023).

This paper reports on the raw material sorting and refitting analysis of 5,710 artifacts from Archaeological Horizons IV and V from Riek's dig and roughly 56,000 artifacts from the recent excavation of the backdirt at Vogelherd. End-scrapers, truncated pieces, pointed blades, splintered pieces, burins, combination tools with two modified ends, retouched blades and bladelets are the most abundant Aurignacian tool types from the site. Including all layers at Vogelherd, we documented 146 refitting complexes. These include carinated pieces refitted with bladelets, end-scrapers and resharpening flakes, burins and burin spalls, and a variety of broken tools. The refits often connected artifacts from the 1931 dig and the new phase of excavation. Many of these refits can be contextualized within minimal raw material units representing individual cobbles or Werkstücke.

This work allows for a detailed reconstruction of the specific reduction sequences and the life histories of dozens of tools. Our results document how tool recycling played an important role in the Aurignacian lithic economy at Vogelherd. We were also able to document the secondary use of tools for splintered pieces. Multiple refitting clusters document the modification of artifacts into a different tool type following their initial use.

The paper summarizes a range of specific technological choices made by stone knappers at Vogelherd, and uses refitting studies to gain insights into the technological behaviors of the Aurignacian inhabitants of the site.

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Reconfiguring Culture-Environment Interaction in MIS 3: A Multiscalar Analysis across Lesotho and South Africa

The Middle Stone Age (MSA) of southern Africa sees the emergence of a novel set of innovations, and as such, the Still Bay (c. 70–77 ka) and Howiesons Poort (c. 58–66 ka) have received a breadth of attention within the past decades. However, some of the later phases of the MSA remain under-researched to this day. This is the case with MIS 3, that sees a partial abandonment of bladelet technology and a marked reduction in the frequency of engraved ochre. The post-Howiesons Poort (c. 45–58 ka) of MIS 3 stands in stark contrast to the material found from preceding phases, such as the Howiesons Poort.

In an attempt to re-envision this period through emphasis on the reciprocal relationship between cognitive, technological and environmental ecologies in the region, I present the results of a multiscalar lithic analysis across Lesotho and South Africa, comparing post-Howiesons Poort assemblages from the Caledon River valley, the Maloti-Drakensberg mountains, and the wider southeastern Cape.

The analysis suggests that the technological abandonment associated with the Hp/p-HP transition coincides with the continuation of selected technological scaffolds on local scales, such as raw material choices, and core technology. I contextualise those results with an observed fragmentation of social relationships during this period, as well as relevant palaeoclimatic records that illustrate the volatility of MIS 3. Embedded in a Metaplasticity-framework, the post-Howiesons Poort phenomenon exemplifies the self-amplifying characteristics of technology, reconfiguring the boundaries between cultural and environmental inheritance.

These early results highlight the complexity of the emerging evidence from MIS 3, and contribute to a growing ‘cognitive archaeology of the MSA’.

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The exploitation of terrestrial resources during the Gravettian: results of a small faunal assemblage from the Terrace area at Vale Boi

Vale Boi, located in Budens, Vila do Bispo, in southern Portugal, was discovered in the late 20th century during a research project investigating human occupation during the Palaeolithic in the Algarve region. Since then, multiple excavation campaigns have taken place in three areas of the site: the Rockshelter, Slope, and Terrace. These excavations have revealed a long human occupation in the Terrace, ranging from the Early Neolithic (around 6,700 years ago) to at least the early Gravettian (around 33,000 years ago). The discovery of a combustion feature, along with a wide variety of lithic tools, faunal remains, and adornment objects in the Palaeolithic levels, indicates that this area was used for residential purposes. Faunal remains, which are particularly abundant at the Gravettian and Solutrean levels, include both terrestrial and marine species.

This study analyses a small faunal assemblage from Vale Boi, specifically from layer 5 of the Terrace area, which corresponds to the Gravettian period, to better understand human and animal interactions in the site. The remains were classified both anatomically and taxonomically. While age estimation was not possible, the maturity stage was assessed, distinguishing between mature and immature specimens. The taphonomic analysis documented changes resulting from both human activities and natural processes.

A total of six taxa were recorded, with the most common being the European rabbit (*Oryctolagus cuniculus*) and red deer (*Cervus elaphus*). Remains of horse (*Equus* sp.) were also observed, along with less frequent occurrences of wild boar (*Sus scrofa*), goat (*Capra* sp.), and aurochs (*Bos primigenius*), all counting as a minimum of ten individuals. The sample has a predominance of adult individuals. Overall, the skeletal remains were heavily fragmented, with very few complete pieces available for examination. The taphonomic changes observed were mostly post-depositional. Dark stains, likely caused by manganese oxide, were predominant, along with the presence of fissures. There were occasional signs of carnivore activity, as well as evidence of human intervention, such as percussion and cut marks. Notably, fractures in fresh bones accounted for 50% of the sample of long bones. Additionally, a bone tool made from the ulna of what appears to be a medium-sized animal was included in the sample, although its specific function could not be determined.

While the sample size studied is relatively small, the findings align with previous reports concerning Gravettian levels. During the Upper Palaeolithic, rabbits were plentiful in the Vale Boi region, providing communities with easy access to this resource. Although red deer were less abundant, they were highly valued by these communities. Additionally, some bones from medium-sized animals were eventually crafted into tools.

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Beyond Waste Disposal: The Dynamics of Asturian Shell Middens Formation

Hugo Obermaier played a key role in incorporating the Asturian culture of Northern Spain in the European context of the last hunter-gatherers[1], with a focus on coastal resources that led to the formation of prominent shell middens. This followed the Count of Vega das Sella's discovery of a characteristic macrolithic industry made from quartz pebbles, namely an abundant pointy tool so-called Asturian pick[2], associated with the shell middens. This discovery was so influential that numerous stone tools started being identified as Asturian in Atlantic Iberia, from Portugal to Catalonia[3].

However, nowhere else the stone tools were associated with shell middens as in Asturias. The Count of Vega del Sella established the post-Palaeolithic age of the Asturian shell middens, which carbonate-cemented character hanging from the karstic walls led him to consider it as sole remnants of past shell accumulations that filled up rock shelters completely, as result of waste disposal, while the occupations occurred outside[2, 4].

Our geoarchaeological approach tested Vega del Sella's long-lasting site-formation model with micromorphological analysis of two sites: El Alloru and El Mazo. Novel outcomes are: 1) the carbonate cements correspond to calcareous tufa resulting from spring activity; 2) the deposits show a stratigraphic framework related to successive phases of debris accumulations and stasis; 3) tufa formation and accumulation of anthropogenic debris are syn-depositional; 4) biogenic and diagenetic cements reveal phreatic conditions.

All these contradict a priori expectations from Vega del Sella's widely accepted model of anthropogenic mound constructions. The Asturian shell middens studied are composed by anthropogenic debris from coastal foraging encased in calcareous spring tufa build-ups. This is an important outcome for the region's Holocene geological record, since most Asturian rock shelters nowadays function as sinkholes, not springs, and the archaeological shell middens are the only remain of such past environments, supporting further evidence for higher water-table levels in the early Holocene at regional level[5]. Microcontextual evidence suggest that shells were likely processed and produced also inside the rockshelters, which might have been used as occupation spaces as well.

The Asturian shell middens results from a complex interplay between human occupations and extinct spring dynamics, and that the rockshelters thought to be intentional waste disposal spaces, might have been also dwelling spaces, based on novel evidence of microcontextualized geoarchaeological data. Vega del Sella and Obermaier noticed the absence of dwelling features in the Asturian layers, especially when compared to the prominent Paleolithic structures they were accustomed to finding in caves throughout Asturias. This led them, understandably, to believe that such features might be located elsewhere. However, our study reveals that these traces are actually embedded within the shell middens, though they were not visible to their eyes.

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Site formation processes in close-by Archaeological deposits: Cova Foradada and La Griera

The technical and behavioral innovations observed during the Middle to Upper Paleolithic Transition (MUPT) in Europe include the replacement of Neanderthal populations by Anatomically Modern Humans (AMH). This transition has sparked significant debate in the literature, focusing on topics such as Neanderthal capabilities (e.g., adaptive and cognitive), the extent of AMH involvement in this shift (e.g., direct competition for resources), and the impact of climatic changes during this period (Badino et al., 2020).

The Iberian Peninsula stands out as a paradigmatic case due to the prominence of models like the Ebro Frontier, which has been a central point of discussion since its proposal. This model suggests that the Ebro Basin represented an ecological barrier delaying the southward expansion of AMH until approximately 40 ka BP. As a result, the central and southern regions of the peninsula may have served as a zone free of direct competition between the two populations (Zilhão et al., 2024). Although this model is grounded in archaeological data, it has recently been challenged by discoveries at sites such as Cova do Picareiro and Bajondillo Cave (Haws et al., 2020).

Another issue under scrutiny is the reliability of the data itself. Over the past 15 years, there has been a significant renewal of radiometric dating efforts, with some datasets requiring updates. Additionally, researchers have highlighted the need for stratigraphic and microstratigraphic reassessment of these contexts, as evidence suggests the possibility of erosional phases during this period. This is relevant because the presence of these erosional phases could be biasing the information we currently have (Mallol et al., 2012).

Our focus has been on the northeastern Iberian Peninsula, one of the entry points to South of the Ebro regions, that may provide insights into interactions between the two populations. Specifically, we analyzed the sedimentary sequences of Cova Foradada and La Griera (Calafell, Spain) two archaeological sites located less than 2 km apart. Cova Foradada is a cave with occupations ranging from the Châtelperronian to the Bronze Age and is recognized as the southernmost expansion of the Châtelperronian technocomplex. La Griera is a rock shelter with occupations spanning from the Middle Paleolithic to the Late Upper Paleolithic, but without Châtelperronian technocomplexes.

Our work is centered on investigating the site formation processes at these two locations through stratigraphic observations and descriptions, as well as soil micromorphology. This workflow aims to provide new, well-contextualized, and high-resolution data for both sites.

The results from the Châtelperronian layer at Cova Foradada reveal a dry grain-fall deposition dynamic, evidence of bioturbation by soil fauna and roots and a non in situ context. For the Aurignacian, preservation of combustion remains has been assessed. The transition between the Châtelperronian and Aurignacian levels is gradual, with no evidence of erosion.

At La Balma de la Griera, the formation of pedogenic carbonates has been documented, potentially linked to a dry period of unknown chronology. Additionally, bioturbation has been observed, in higher presence than in Cova Foradada. The contact between the Middle and Upper Paleolithic levels is also gradual.

These findings enhance our understanding of Cova Foradada's use during the Châtelperronian and reveal previously undescribed depositional dynamics at the site. For La Griera, the results clarify the biological and climatic phenomena that have influenced the deposit, including the identification of pedogenic carbonates previously undocumented at this site. Despite their geographical and chronological proximity, our analysis highlights differences in site formation processes between the two archaeological deposits. These differences underscore the influence of site-specific microenvironmental conditions occurring during the same general time frame. These local variations could provide insights into how these populations interacted with and used the landscape.

Lastly, the results not only contribute to refining our understanding of local formation processes but also provide a robust foundation for future analytical approaches, such as stable carbon and oxygen isotope studies of carbonates and U-Th dating. Dating these carbonate formations is critical to assessing the type of environment present during MIS 3 in Iberia.

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The lithic assemblage of the Bohunician open-air site of Herrnsaal, Bavaria – indications for the earliest dispersal of the anatomically modern human to Central Europe

The poster I submit postulates the hypothesis of a Bohunician site situated in Bavaria. Within the framework of my master thesis at Friedrich-Alexander-University Erlangen-Nürnberg, I analyzed the lithic assemblage of Herrnsaal, an open-air site in Kelheim, in multiple approaches to determine the technology used in stone artifacts.

The first step contained a correlation of different collections, as two of four parts were acquired through simple surveys without any location points besides basic descriptions. Additionally, the assemblage contains finds gained through scientific projects, two surveys with location marks and one excavation conducted by the University of Erlangen.

After a first assessment evaluating aspects of source criticism, the assemblage parts correlated by being sorted into the same raw material. An extensive database defining and characterizing 14 raw material groups overlapped in all assemblage parts and ruled out the possibility of talking about different assemblages.

Based on a merged database, the next step was a techno-typological analysis of all artifacts. While logging all artifacts into the database, I separated some “marker pieces” as an exclusive part. These “marker pieces” were artifacts with more information about the used technology how tools were obtained from cores. Next to the separation, the whole set of information describing the blank type and classification was correlated with the raw material groups. The side goal was to gain information about the identifiable sequences of the “chaîne opératoire” in the raw material groups.

Back to the „marker pieces“: after identifying different stages of work progress, when talking about knapping processes, I was interested in defining detailed technological systems in the assemblage. The first – and foremost main – artifacts were a group of selected cores and their negative scars. With some guidance of the work from M. Kot 2013, I documented the aspects of chronology between the negatives, the position on the core and the preservation of knapping scars. After identifying every negative and documenting the most important aspects, every negative got a designated classification into pre-defined “types of working steps”, in being either a preparational or a final step. The underclassification of preparational steps into four groups (distal convexity preparation, lateral convexity preparation, platform preparation, general preparational steps) allowed a detailed reconstruction of the tasks a core went through until providing a final, desired product.

Based on this method applied on all 16 cores, it was possible to divide into three technological systems. Next to the centripetal Levallois-concept (TS_01, probably middle palaeolithic) and a unidirectional Levallois-like concept performed on a larger core type (TS_02), the focus of the research lies in the defined third system (TS_03), a Levallois-concept performed on elongated cores with the goal of producing blades and elongated products.

Using the other “marker pieces” of the assemblage, it creates an overall picture of parallels with the “Bohunician package” defined by Tostevin (Tostevin 2000, 103 tab. 5). This industry with a spatial distribution primarily in East Europe around a site cluster in the Brno basin, Bohemia, is also defined through elongated cores and a Levallois reduction sequence, but with mainly volumetric cores instead of focusing on single surface reduction like in the traditional Levallois concept (Škrdla 2017, 41ff.). The final products of this technique are treated as the most characteristic identifier: Levallois points, mostly with a Y-shape pattern on the dorsal surface. The second product relies on the preparation stages: as the core is elongated, the lateral convexity control produces crested blades, which are numerous distributed in the Herrnsaal assemblage and are classified as highly identificatory (Škrdla & Rychtaříková 2012, 206ff.). These three “marker pieces”, alongside not particularly defined elongated pieces with different dorsal scar pattern, legitimize the first identification of Herrnsaal as a site with Bohunician settlement.

The last part of the master thesis is an attempt to integrate Herrnsaal into the recent state of research of the Bohunician. As there are the “bigger”, defining characteristics, the variability of other knapping concepts or single steps in the knapping process are not well defined. To get an overview about the wholesome picture, I mapped all the Bohunician sites from publications and compared aspects such as the appearance

of centripetal/ unidirectional/ bidirectional reduction strategies, the appearance of leaf points and the detailed preparation of the platform (Škrdla 2017). While the question of integrating leafpoints into a Bohunician assemblage is mostly viewed as not conclusive (Škrdla & Tostevin 2005, 58ff.), the other listed aspects are counted as the most mentioned aspects in documenting those sites and when examining the mapping of those aspects, there are no visible clusters. The cause could be either a necessity to take a closer look at the details to recognize useful patterns, or the reason is simply a big variety in these aspects besides having some crucial characteristics. A further, more definite statement is – in this framework and its limits – not possible.

To gain more and deeper information about the context of Herrnsaal as being declared as the most possible western Bohunician site with a significant distance to the Brno site cluster, it's required to get into deeper and more detailed analysis regarding the stone artifacts and the applied technological strategies.

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Sima de las Palomas de Teba (Province of Málaga/Spain): variability in hunter-gatherer occupational patterns during the last glacial in Southwest Europe

Due to its geographic situation, the Iberian Peninsula (IP) is most suitable for studies on human-climate interaction as it is connected to the rest of Europe only in its northeastern part via narrow coastal strips limiting information transfer most probably to this area during the last glacial.

For more than 12 years we conducted research on human-climate interaction by coupling primary and secondary data on hominin settlement patterns with climate and environmental data both from on- as well as from off-site archives. While our first studies were realized on a macroscale including the complete IP (Schmidt et al. 2012) and Northern Africa (Tafelmaier et al. 2017; Weniger et al. 2019 and 2021), excavations at two sites in the Province of Málaga provided in-depth insights into hunter-gatherer behaviour on a micro-scale.

One of the sites is Ardales, that is especially known for its early evidence of Middle Palaeolithic rock art (Hoffmann et al. 2018), but also shows diachronic use of the cave from the Middle Palaeolithic to the Bronze Age (Ramos-Muñoz et al. 2022).

The other site, Sima de las Palomas de Teba, is a rock-shelter that revealed a long stratigraphic sequence encompassing sediments from at least MIS 3 to MIS 1 (Kehl et al. 2016). While the undermost late Middle Palaeolithic archaeological horizons show evidence of intensive site use, a drop in human presence in the

latest Middle Palaeolithic and the Early Upper Palaeolithic becomes apparent. Only in the Gravettian and especially in the Solutrean human presence increases, while it decreases again during the late glacial period. This pattern partially reflects the situation at other sites in the region, but also shows some differences.

In the talk, we will give an overview of our data, contextualise them on a broader scale and discuss their implications for the understanding of the settlement history of the Iberian Peninsula.

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The Brudertal revisited – ongoing research in a Magdalenian contextual area

The Brudertal, situated in the Hegau region in Southwest Germany, is home to a unique late glacial archaeological landscape. With Petersfels, Gnirshöhle and Drexlerhöhle (including the so-called „Drexlerloch“) there are three Magdalenian sites in immediate vicinity.

Petersfels is one of the most find-rich sites in Central Europe and looks back on a long history of research especially the excavations by Eduard Peters and Gerd Albrecht. In contrast, excavations in Gnirshöhle between 1977 and 1979 were limited to two small areas in different parts of the cave.

The third site, Drexlerhöhle, was discovered in 1978 during canal construction work and is now hidden beneath the surface, invisible in today's landscape. In 1978, Gerd Albrecht succeeded in detecting Magdalenian remains there. However, the sewer was built and the site was closed immediately afterwards. New archaeological activities started in 2021. Besides examining the preservation state of Drexlerhöhle, we aim at recording the spatial and chronological extent of the site. Moreover, we are taking a holistic, interdisciplinary approach to answer questions of site function, chronological and functional relationships between the sites and the reconstruction of the surrounding paleo landscape. In addition to ongoing excavations at Drexlerhöhle, we are also analysing archaeological material from the other two sites in order to gain a comprehensive understanding of the settlement history and the behaviour of late glacial hunter-gatherers. In the course of the excavations at Drexlerhöhle, geophysical measurements helped to record a larger, adjoining cave system, which led to the discovery of the original, almost completely closed entrance in 2023. During subsequent excavations in the entrance area we discovered at least two in-situ archaeological horizons in 2024. In addition to lithic artefacts, that provide evidence of on-site production, an ornament with adhering pigment residues and the distal fragment of an antler point were found.

The poster presents the project in its entirety and provides initial insights into current excavations at Drexlerhöhle.

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Technological continuity and variability along the Late Middle Palaeolithic sequence of Riparo L'Oscurusciuto (Apulia, Italy) – A hybrid traditional and 3D-based approach

The stratigraphic sequence of Riparo L'Oscurusciuto (Apulia, South-Eastern Italy) provides an outstanding record of the local population history between ca. 55 (Stratigraphic Unit, SU 14) and 42 Kya BP (SU 1; Higham et al. 2024): a key-period for understanding the end of the Middle and the onset of the Upper Palaeolithic on a regional level.

Previous spatial and integrated studies on the lower part of L'Oscurusciuto sequence (SU 13-11) highlighted a dialectic relation between the continuity of the settlement pattern and the gradual accumulation of variations on the site organization, suggesting the hypothesis of a tradition handed down by the same group, possibly for generations (Spagnolo et al. 2019, 2020). The continuity in the repertoire of technological solutions adopted for producing lithic artifacts further supports the hypothesis that a single manufacturing tradition was maintained during the formation of SU 15-11 (Marciani 2024).

On the other hand, a series of innovative technological traits appearing between SU 3 and 2 might reflect either the cultural influence or the arrival of human groups with a different tradition, possibly related with the Initial Upper Palaeolithic cultural entity, or the chronological variability of the Late Mousterian at a local level (Carmignani et al. 2024).

We present the methodological background and the preliminary results of a project aimed at testing continuity and variability trends along L'Oscurusciuto sequence. We developed a novel approach that combines traditional techno-typological classification and interpretation of lithic artifacts, functional analysis, and 3D-based digital tools, to increase the analytical power of the latter and the accuracy of the former. The method was applied to different classes of lithic artifacts (i.e., cores and production blanks) from SU 11, 4, and 2, allowing us to test continuity and variability in different aspects of the lithic chaîne opératoire.

Objectively tracking continuity and changes on a local level based on L'Oscurusciuto sequence will provide a novel insight into the movement of people and ideas underpinning the complex pattern of geographical and chronological variability that, in the wider region of the Italian peninsula, characterizes the later stages of the Middle Palaeolithic and the earliest of the Upper: the appearance of several diversified regional variants within the local Mousterian technocomplexes, traditionally attributed to the last Neanderthals (Marciani 2024) and the onset of the Uluzzian and Proto-Aurignacian cultures, commonly related with the arrival of anatomically modern humans (Higham et al. 2024).

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On the exploitation and significance of bivalve shells at the Magdalenian site of Petersfels (South Germany)

Shells, particularly mollusks from marine and freshwater, have served as essential proxies in exploring cultural and environmental interactions. Shells can reveal information about the habitats from which they were collected, the methods used for gathering and processing them, and the symbolic meanings various cultures have attributed to them. In this context, the site of Petersfels in Germany, with its rich collection of modified shells, presents a unique opportunity to investigate the origins, functions, and symbolic meanings of mollusk shells for the Magdalenian foragers of central Europe.

This study presents findings from our investigation of the collection of bivalve shells recovered from the site, including 86 *Glycymeris* specimens, 2 *Gryphaea arcuata*, 2 *Polymesoda*, and a fragment of an oyster. By combining optical and digital microscopic observations with experimentation and statistical multivariate analysis, we aimed to 1) uncover the origins and selection of the bivalves, 2) discuss modifications of shells made by anthropogenic and natural agents, and 3) elucidate aspects of their functions and symbolism.

Our detailed microscopic analysis showed that the bivalve shells were repurposed into ornaments. Some *Glycymeris* likely originated from the Mediterranean Sea or Atlantic and were collected or exchanged by the Magdalenian for their substantial cultural and symbolic value. Despite the integrity of the assemblage, the *Glycymeris* experienced taphonomic alterations that likely occurred after abandonment. The alteration affected the shell's surfaces, partially erasing manufacturing and micro use-related traces. However, in four specimens, we noted visible parallel striations on the facets of the umbo, suggesting that some of the perforations were created through abrasion. Additionally, one *Glycymeris* exhibited a perforation technique consistent with sawing.

The two fossil specimens of *Gryphaea arcuata* were instead perforated by drilling. The sample showed rounded and smooth perforations and evidence of plastic deformations, hinge thinning, and worn facets resulting from extended use. Two *Glycymeris* displayed double perforations, indicating a willingness to reuse the shells after the first perforation wore out.

The utilization of mollusk shells signifies a crucial aspect of the symbolic and artistic expressions and the material culture of Magdalenian groups. The long distances traveled to gather or exchange them emphasize the significance of *Glycymeris* shells for the Magdalenian people at Petersfels, and their use reflects the depth and complexity of human thought and creativity during this period.

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Big points – big bluffs “Bromme” points from Western Norway

Traditionally, researchers in Norway and elsewhere have grouped large tanged points exclusively within a Late Palaeolithic framework. These objects, mostly being stray finds recovered from Early Mesolithic shoreline levels, have not so far pointed out indisputable evidence of Late Palaeolithic habitation. Ad hoc explanatory models like “lost at sea” or “washed down from higher levels” have been put forward but these theories have been difficult both to verify and contradict.

The first specimen from a modern scientific excavation was recorded in 1998 and illustrated in Kutchera & Waraas (2000). Recently, several large tanged points are now found due to increasing records of Early Mesolithic excavated contexts and suggest that these “pseudo-Brommean” points belong within an Early Mesolithic tradition (Glørstad 2016). They are all recorded at coastal sites and are so far absent from specialized reindeer hunting sites in the mountains, such as Langfjelldal, a site presented by the author on HOG 64 in Aarhus 2023. Even though it has been proved possible by experimental studies that some large tanged points may have been used as arrowheads (Fischer 1985). I will argue that in line with Ivanovaité et al. (2020) these should rather be labeled as dart-points.

A site Djupedalen 111 from Stord will be presented in detail (Tallaksen & Åstveit 2014). The site resembles to a large degree a classical Duvensee/Maglemosian 0 inventory with one exception: the occurrence of a late glacial point. If found elsewhere within the core area of the earliest Maglemose in Northern Europe, this point would undoubtedly be labeled as a Late Paleolithic implement (“disturbance”). In the case of the site Djupedalen 111, a Palaeolithic date is impossible as the site surface was submerged well after the Holocene transition.

To conclude, large tanged points are not always from the Pleistocene, at least not if found on the Scandinavian peninsula. A stray find of a large tanged point found south of an arbitrary line in the North Sea will always be Late Palaeolithic, as the object itself defines the Late Palaeolithic.

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The Lower Palaeolithic assemblage of Schladebach/Wallendorf (Saxony-Anhalt, Germany) – insights into technology and tool manufacture of MIS 11 Central Europe

The early peopling of Central Europe and the transition from the Lower to the Middle Palaeolithic in this region remain poorly understood. Evidence of human presence before the extensive fennoscandian ice advances around 450,000 years ago is scarce, but after this period, we observe an increasing archaeological record in Central Europe. However, the regional Middle Pleistocene record in between MIS 12 and MIS 8 is discontinuous and highly patchy in both space and time. Consequently, a detailed techno-morphological analysis of large Lower Palaeolithic lithic assemblages is essential to understand settlement dynamics, stone tool manufacture, and hominin behaviour better.

Here, we present our comprehensive techno-morphological and use-wear analysis of the Schladebach/Wallendorf assemblage (Bernhardt et al. 1997; Lauer & Weiss 2018; Laurat et al. 2004), situated approximately 25 km south of Halle, Saxony-Anhalt, Germany. The site, located at the base of the Middle Pleistocene terrace of the river Saale, has yielded over 6700 Lower Palaeolithic flint artifacts since the 1970s. The artefact bearing sediments were dated to MIS 11 (Lauer & Weiss 2018). Although no excavations have been conducted, the location of the finds in the various mining areas is well-known, and most of them were directly recovered from the basal sediments. Due to transport within a Middle Pleistocene braided river system, some of the erratic flint artifacts are rolled, while freshly preserved specimens are also present. Although the collection does not represent a closed assemblage, it provides valuable insights into the regional techno-typological stone artefact characteristics of MIS 11. In our analysis, we have examined around 181 cores, with the ongoing analysis of approximately 400 tools.

The cores demonstrate considerable variation in terms of intensity and strategies of reduction. Forms with single scars (perhaps nodule testing) and cores exhibiting extreme reduction are present. Cores were reduced using hard hammer. A significant proportion of the cores exhibit no evidence for striking platform or flaking surface preparation. Priority was given to the selection of planes converging at an angle equal to or less than 90°. Traces of uniform reduction of nodules/chunks (unidirectional, bidirectional, converging, cross and centripetal – rare) and reduction with migrating platforms were recorded. The latter is the most common case. Kombewa cores were also noted. It can be said that production of flakes (rarely blades) was not very efficient, with an average of five to six scars per core. However, single cores with traces of striking platform preparation and more systematic reduction of flaking surfaces are present. The incidentally of these features does not provide any indication of the dissemination of this method. In many respects, the reduction of cores resembles Clactonian assemblages known from the UK (White, 2000; White & Pettitt, 1995).

So far, the analysis of the tools has revealed that, unlike the contemporaneous western European Acheulean, classical handaxes are absent, but a few bifacial tools occur. Scrapers are characterized by simple, non-invasive retouch, and a significant portion of the tools consist of notched pieces with natural backs.

Although the surfaces of the studied artefacts are partially covered with post-depositional traces, some show distinct signs of use. Specifically, on certain scrapers and flakes, traces resulting from the contact with hard material could be observed.

The analyses are still in progress, but the Schladebach/Wallendorf assemblage has already demonstrated its crucial role in understanding the technological behaviour of early hominins in Central Europe.

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Tracking lithics in the open air. Analysing lithics from Maralaleng Pan, southern Botswana

Lithic artefacts are found at numerous archaeological sites all over the world. Southern Africa is particularly known for its abundance of Stone Age sites. Many of these sites are documented in caves and rock shelters at the coastlines of South Africa which provide favourable conditions for the conservation of archaeological material as well as slow sedimentation rates leading to clear stratification. In contrast, a large part of the interior of southern Africa is covered by the Kalahari semi-desert. This part of the world provides fewer of these sheltered sites, providing deep stratigraphic information, however, it provides opportunities to pursue a different set of research questions.

The sparse vegetation and very open landscape provide favourable conditions for finding and analysing archaeology on the surface. Accordingly, recent findings from the Kalahari demonstrate the region's potential for advancing our knowledge of human origins (Wilkins et al. 2021; Lukich/Ecker 2022; Schoville et al. 2021; Coulson et al. 2022). Archaeological surveys near Tsabong, south-western Botswana, revealed abundant surface scatters of quartzite lithics from the Pleistocene, suggesting a history of intensive hominin habitation and exploitation of this landscape. The surface lithics are associated with various geomorphological forms such as quartzite outcrops (providing raw material for stone tools), pans (seasonal water bodies) and sand dunes.

Our research focus is the site of Maralaleng Pan, which features all of the mentioned geomorphological forms, as well as numerous scatters of lithics on the surface. This study investigates the spatial distribution of lithics on and under the surface within Maralaleng Pan and examines their relationship to this landscape. This research aims to provide potential insight into hominin landscape use during the Pleistocene.

Maralaleng Pan was surveyed on foot following systematic survey lines. Single finds and scatters of lithics on the surface were recorded using a mobile Geographical Information System application on computer tablets. Additionally, transects of archaeological testpits, geotrenches, and excavations were conducted at various locations in the pan based on the survey data. Every testpit and geotrench yielded varying numbers of lithics, and each of these assemblages was documented as a sampling unit.

All in all about 4400 lithics were collected and counted into types. Additionally, at least 25% of each sampling unit was analysed using an attribute catalogue that recorded size, weathering and completeness amongst other attributes. Analysing stone tools from an open-air site like Maralaleng Pan is challenging due to exposure to several processes, e.g. erosion, colluvial processes, dune accumulation, runoff, bioturbation, trampling, and transport. In most cases, the lithics in Maralaleng were either encrusted with highly calcified sediments or recovered from palimpsests of disintegrating bedrock, further complicating lithic and spatial analysis. Most artefacts show technological and typological affinities to Middle Stone Age typologies. Generally, the number of lithics is high on the outcrops located at slopes on the northern and southern sides of the pan and decreases toward the pan floor. This trend has been observed on and under the surface. The majority of the lithics are not rolled, but visibly weathered and incomplete. Flakes are the most abundant type in every excavated unit. Cores are far less common in every testpit, geotrench or excavation area. Likely the artefacts were manufactured on the outcrops, located on the slopes above the pan floor, where raw material is available and moved down toward the pan centre by natural processes or human movement.

This research employs a multidisciplinary approach, combining lithic analysis and geoarchaeological investigations. It focuses on the analysis of lithic assemblages within their broader archaeological and paleoenvironmental contexts. The goal is to contribute to a deeper understanding of human development in the Kalahari basin throughout the Pleistocene.

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The Mesolithic of Solling: An analysis of the lithic artefacts of Sievershausen 3 and 15

The sites of Sievershausen 3 and 15 are part of more than 30 Mesolithic surface sites in the Dassel Basin discovered by R. Leibecke during the last 40 years (Veil & Leibecke 1997). They are located on the north-eastern flank of the Solling at an altitude of 280 to 300 metres above sea level. The Solling is a low mountain range (up to 527.8 m) west of the Harz, on the border between Lower Saxony, North Rhine-Westphalia and North Hesse. Earlier excavations at Sievershausen 12, as published by Veil and Leibecke (1997) and Veil (1999), yielded over 1000 lithic artefacts as well as clear find concentrations and some

burnt hazelnuts. The dating of this site to the Early Mesolithic is based on the dominance of simple points over triangles, and the absence of younger types, such as trapezes (Ertmer 2008).

In 2021, a team from the University of Tübingen carried out new systematic surveys and test excavations at Sievershausen 3 and 15. While no intact layers were encountered during the test excavations, a significant number of lithics were recovered from both the surveys and the numerous test pits.

Together with the artefacts from the Leibecke collection, there exist 149 lithic artefacts from Sievershausen 15 and 292 from Sievershausen 3. These artefacts were analysed regarding typology, core technology and raw material use. It has been shown that there is a remarkably low level of post-depositional alteration in the material, particularly in terms of evidence of plough marks and other severe fracturing. This, together with the relatively high percentage of complete artefacts, indicates a very good preservation for what is in the most part an open-air surface collection.

This allowed a detailed typo-technological analysis to be carried out, the results of which are presented and the sites placed in their regional context.

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Virtual Reconstruction of the Face of Gravettian Hunter DV16 from Dolní Věstonice

This contribution presents the methodology and results of the virtual facial reconstruction of Gravettian hunter DV16 from Dolní Věstonice, an anatomically modern human from the mid-Upper Palaeolithic period in southern Moravia (The Czech Republic).

The facial reconstruction is grounded in detailed skeletal analysis and employs advanced 3D modelling techniques, such as Blender and Unreal Engine 5 with the MetaHuman Creator plug-in. These tools enable highly accurate anatomical detailing and the integration of soft tissue estimations, making them particularly effective for creating lifelike representations of ancient individuals. The primary goal is to create a digital representation that not only reconstructs physical appearance but also approximates the social and cultural identity of the individual.

Hunter DV16, discovered in 1987, was a male aged over 45 years, standing 171 cm tall and weighing approximately 68–69 kg. Skeletal analysis revealed several intriguing details, including healed scars from blunt force trauma on the frontal bone, a fractured upper jaw, and significant dental wear. For instance, the extensive dental wear influenced the depiction of facial expressions and potential dietary practices. These anatomical features were integrated into the reconstruction process using the Manchester method, which draws on established relationships between hard and soft tissues to produce a realistic depiction.

Reconstructing Palaeolithic individuals poses numerous challenges, such as uncertainty regarding the colour of eyes, hair, and skin. These attributes can be further investigated through genetic analysis, which, when available, provides direct insights into pigmentation genes and other heritable traits. Such data refine reconstructions and offer a more accurate portrayal of individual characteristics, thereby enhancing the overall interpretative value of such studies. In cases where genetic data are unavailable, analogies with modern populations are utilized, applying average values specific to the geographic and temporal context. Beyond physical reconstruction, it is essential to incorporate socio-cultural elements, illustrated by accessories such as jewellery, perforated animal and human teeth, shells, or the use of pigments. These artefacts, often uncovered in archaeological contexts, provide critical insights into the individual's societal role and cultural affiliations.

The presentation of the reconstruction of Gravettian hunter DV16 delivers deeper insights into his physical appearance and provides significant knowledge about his living environment. This includes potential roles as a hunter, toolmaker, or community elder within the so-called "Mammoth Hunters." By integrating modern technologies with archaeological and anthropological findings, this study exemplifies how multidisciplinary approaches can reveal nuanced narratives about ancient individuals and their communities, offering a comprehensive depiction of life in the Upper Palaeolithic.

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Tri-dimensional stratigraphic analysis at the Middle-Palaeolithic site of Abric Romani (Capellades, Barcelona, Spain): integrating 3D modelling, the artifacts' volumes, superimposition and features, and the graph theory

Temporality is a key factor in archaeological research, especially for the interpretation of complex, long-term formation processes. Understanding the diachronic and synchronic relationship between human behaviours provides valuable insights into various aspects of past societies, such as the relationship between human groups and their environment, subsistence strategies, technological evolution, and spatial organization within archaeological sites.

Since the beginnings of archaeological research, chronological frameworks have been central to interpreting sites, although defining temporality, especially in prehistoric archaeology, remains a significant challenge. In this context, stratigraphic units have played a central role, as they provide the basis for understanding the sequence of activities at an archaeological site. However, the timescales of human and geological processes differ significantly, prompting researchers to view many stratigraphic layers as palimpsests formed through long-term, overlapping phenomena.

Recent studies have emphasized the need for new methods to address this challenge, proposing innovative techniques to deconstruct palimpsests into their components (Discamps et al., 2023; Romagnoli et al., 2018; Sossa-Ríos et al., 2024) Lithic analysis plays a crucial role in exploring temporality, offering valuable information through diverse perspectives such as raw material sourcing, refitting sequences, use-wear patterns, and evidence of recycling. These data can be analyzed using a variety of approaches,

ranging from technological analysis to spatial distribution studies and the examination of vertical artifact stratigraphy.

Building on this foundation, this study introduces a novel approach to dissecting palimpsests by breaking them down into sequences of depositional phases or activities. The goal is to enhance the temporal resolution in understanding formation processes and hunter-gatherer behaviour. Instead of relying on traditional point-based spatial data (e.g., X, Y, Z coordinates), this method uses 3D models of artifacts, which approximate the volume each artifact occupies in Cartesian space. For each artifact, a 3D mesh is created based on its length, width, and thickness, and placed in its excavation position using collected spatial data (X, Y, Z coordinates, orientation, and inclination). These 3D models are then used to generate directed graphs representing accumulations of artifacts directly stacked on top of one another. These accumulations can be analysed according to various features, such as raw materials, refitting stages, techno-typological characteristics, use-wear, and post-depositional alterations (Romagnoli et al., 2018; Vaquero et al., 2015). The protocol relies exclusively on spatial data collected during excavation and artifact features recorded during analysis, without requiring additional specific documentation.

Although the method is still under development, initial applications at the Abric Romaní site, a Middle Palaeolithic rock shelter in northeastern Spain, offer promising results (Romagnoli et al., 2018; Vaquero et al., 2015). The selected stratigraphic level M, dating to 54.5 ka BP, shows the presence of nearly 2500 artifact accumulations, comprising over 3400 items, including both lithic and faunal remains.

Although preliminary, the results highlight the importance of improving data quality during excavation and demonstrate the potential of 3D modelling and computational methods to enhance temporal resolution in the study of formation processes and human behaviour. The full potential of these techniques remains to be fully explored, offering new possibilities for the study of archaeological temporality. This innovative approach is implemented using the open-source R programming environment, where all steps are automated. This not only ensures the replicability of the results from this study but also enables the application of this method in other archaeological contexts.

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Niklas Ziemer¹ & Andreas Maier¹

The Surface Collection of Burgkunstadt-Ebneth (Upper Franconia, Bavaria)

The Ebnether Berg is a plateau that extends two kilometres north of Burgkunstadt, Bavaria, in the Upper Franconian district of Lichtenfels, near the village of Ebneth. The site lies six kilometres east of a river confluence at a prominent location between the Upper Main and the Rodach. Ebneth has been recognised as an archaeological site through the work of Dr. Ralf Obst und Maria Henzler.

The site has yielded a surface inventory of 302 artefacts, collected over six different surveys. The raw materials reflect a composition typical of Franconian assemblages (Schönweiß 1995, 16-17). Black to grey chert is by far the most common raw material, with small quantities of Jurassic flint, chalk flint, chalcedony, and not further determined rock also present.

A techno-typological analysis indicates that the majority of finds belong to the Late Middle Palaeolithic and Mesolithic. Some pieces may also date to the Upper Palaeolithic, while the Neolithic is securely represented by a stone adze. The inventory consists mainly of unretouched blanks, such as flakes and blades, though blades are relatively rare. Chronologically most indicative are bifacially retouched tools, including two Keilmesser and fragments thereof, suggesting an attribution to the Micoquian/Keilmessergruppen. Some bifacially shaped fragments might also belong to leaf points industries, sites of which are known in the wider surroundings (e.g. Kösten). Few flakes were transformed into sidescrapers. The Levallois technique has not been observed, which is not unusual for Franconia, but discoidal cores are present in the inventory. Small opportunistic cores and small end-scrapers point towards a Mesolithic component, but microliths are absent. Elongated pebbles with scar patterns suggest a use as retouchers.

Such a composition of a marked (late) Middle Palaeolithic and Mesolithic component and a poor, at best, Upper Palaeolithic component, is also typical for many surface collections in the wider region (e.g. John 2022). It is still unclear whether this composition pattern signals a sparse presence of Upper Palaeolithic hunter gatherers in the region or is rather an expression on preservation conditions. Later this year, a sondage is planned in cooperation between the Bayerisches Amt für Denkmalpflege and the University of Cologne.

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Excursions

Friday, April 25th, 2025

The Muge shell middens, Salvaterra de Magos

Célia Gonçalves

The Mesolithic shell middens of Muge, located in the Tagus Valley (Central Portugal), constitute a key reference for the study of human adaptations to estuarine environments during the Early Holocene. First identified in 1863 by Carlos Ribeiro, these archaeological sites are characterized by extensive accumulations of shells - predominantly bivalves - associated with a wide variety of lithic and osseous artifacts, terrestrial and aquatic faunal remains, habitation structures, and funerary contexts that attest to increasingly complex social dynamics.

At **Cabeço da Amoreira**, excavations conducted by ICArEHB, University of the Algarve, since 2008 have integrated systematic three-dimensional recording of finds, comprehensive sieving and flotation protocols, as well as multi- and interdisciplinary analyses (including geoarchaeology, zooarchaeology, paleobotany, and isotopic studies). These approaches have enabled a precise reconstruction of the chronological development and subsistence patterns, revealing an intensive occupation between approximately 8000 and 6800 years before present. The data suggest a rapid accumulation of shells over roughly 350 years and point to the presence of both residential and funerary contexts at the base of the midden, associated with structures that reflect emerging forms of social organization and the systematic exploitation of estuarine resources, particularly following the 8.2 ka BP climatic event.

At **Moita do Sebastião** (MS), which was the focus of some of the earliest systematic excavations in the nineteenth century, investigations yielded some of the first records of Mesolithic skeletons in Portugal. However, no recent excavations have been undertaken at this site, as it was largely destroyed during the construction of an industrial rice-husking facility.

In contrast, **Cabeço da Arruda** (AR) retains extensive intact layers and presents evidence of combustion features, habitation areas, and the intentional deposition of food remains, illustrating resource management strategies and mobility patterns. New excavations and the reanalysis of older collections have proven fundamental for characterizing the social complexity of these Mesolithic groups, as well as for evaluating intra-site and inter-site variability within the Muge region.

The excursion will culminate with a visit to the **permanent exhibition “Os concheiros de Muge” at Casa Cadaval**, where emblematic artifacts retrieved in twentieth-century archaeological campaigns - such as lithic tools, bone objects, personal adornments, and faunal remains - are on display. The exhibition also features multimedia and interactive resources that contextualize the scientific and heritage significance of these middens, allowing visitors to gain an immersive understanding of the Mesolithic communities' lifeways, symbolic practices, and subsistence networks.

Overall, this itinerary aims to offer participants an in-depth and up-to-date overview of ongoing research on the Muge shell middens, underscoring their importance not only for reconstructing

human adaptations to estuarine settings in the Mesolithic period, but also as archaeological heritage of international relevance.

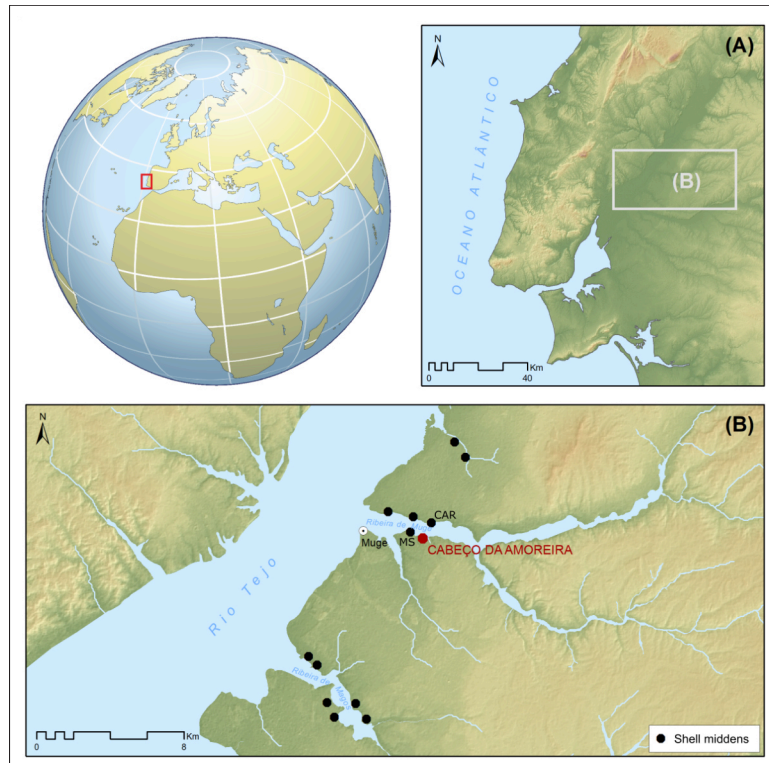


Fig. 4. Location of the Muge shell middens.

Saturday, April 26th, 2025

Companheira Cave
João Cascalheira

Companheira Cave was first identified in 2016 during salvage archaeology (CRM) work associated with the construction of a water treatment station. Initial test pits revealed a small assemblage of stone tools and faunal remains at the base of a sediment cone, suggesting that these materials originated from an upper level of chambers within the cave system.

Subsequent geophysical surveys using ground-penetrating radar (GPR) and electrical resistivity tomography (ERT) identified anomalies consistent with the presence of higher-level chambers, potentially filled with sediment or containing voids. In early 2024, excavation commenced at one of the most accessible anomalies to investigate the existence of an opening into the cave system, which could represent the original entrance or the conduit through which sediments and artifacts accumulated in the lower deposits.

This work uncovered an east-west fault in the limestone, entirely sealed by thick brecciated sediments with minimal faunal presence. These breccias concealed not only the access leading to the originally tested chambers but also a newly discovered passageway extending to a previously unknown set of chambers oriented towards the south and east. Notably, the absence of historical, Late Prehistoric, or Upper Paleolithic material suggests that this entrance was sealed during the Pleistocene.

Beneath the brecciated deposit at the northern slope, a poorly preserved faunal assemblage was identified. Within the new chamber, breccia deposits were limited to the northern ceiling and walls, while to the south and east, sediments consisted of terra rossa and limestone boulders. Excavation of

a 2 x 2 m area in this sector yielded a dense assemblage of faunal remains and lithic artifacts within the first 60 cm of stratigraphy.

Recovered faunal remains include horse, various deer species, bear, smaller carnivores, tortoise shell fragments, and even crab remains. The lithic assemblage is composed of chert, quartz, and greywacke artifacts, with diagnostic elements such as two Levallois flakes in chert and greywacke. A particularly intriguing aspect of the lithic industry is the presence of numerous greywacke slabs, some unmodified and others exhibiting bipolar damage, hinting at on-site raw material processing.

Ongoing excavations at Companheira Cave are being conducted as part of the ERC Consolidator Grant "FINISTERRA - Population Trajectories and Cultural Dynamics of Late Neanderthals in Far Western Eurasia," led by João Cascalheira. This research aims to refine our understanding of Neanderthal occupation patterns, environmental adaptations, and the broader cultural dynamics of late Neanderthal populations in the region.

The archaeological site of Vale Boi

João Marreiros

The Algarve is the southernmost region of Portugal, extending for ~130 km E-W and ~50 km N-S and is characterized by a variety of geomorphic sub-regions and geological units. On the north sector of the Algarve, the Serra Algarvia is characterized by a mountainous range with a dense hydrographic network, which separates the regions of Algarve and Alentejo. On the south sector, the Litoral is characterized by a low topography, long strip of land, that extends through all the coastal strip of the Algarve.

The Barrocal is the section between the other sub-regions and has a more moderate relief, characterized by carbonated Jurassic formations and important sub-terranean water circulation. From the geological perspective, the Algarve is composed of two main units: the South Portuguese Zone and the Algarve basin. The South Portuguese Zone is located in the north sector of the Algarve, extending up to Alentejo. Its main lithologies are schist, greywacke and quartzite. The South Portuguese Zone is overlain unconformably by the Mesozoic sedimentary rocks of the Algarve basin. The basin corresponds to the Mesozoic-Cenozoic sediments that outcrop south of the Algarve, from the westernmost to the easternmost point of the region, and it is associated with the opening of the central Atlantic Ocean and with the eventual oceanic crust formation in the western part of the Tethys Sea, between the Algarve and North Africa. Mesozoic sedimentation of the basin started in the Triassic and continued thereon. In the Lower Jurassic the basin was divided into two sub-basins-western and eastern sub-basins. During the Upper Jurassic however, the basin was marked by a moment of prominent lithofacies variation, followed by a moment of uniformity in both sub-basins. Located in the Algarve basin, the geological context of Vale Boi is between the schist and greywacke formations from the Carboniferous. In the south, Triassic and Jurassic dolomite and limestone formations (where chert primarily outcrops), which are gradually covered by Holocene dunes further into the coastal area.

The archaeological site of Vale Boi, including both open-air site and rockshelter loci, is located on the western coast of Algarve (southern Portugal), near a small homonymous village, within the municipality of Vila do Bispo. The site is situated in a small valley that runs south to the Atlantic coast, about 2 km distance, relatively open, bordered, to the east, by a limestone outcrope, marked by rock shelters facing west or southwest.

The site's stratigraphic has been documented through several archaeological excavations since 2000, revealing a remarkable chronological sequence. Spacially, the site extends for more than 10,000 m² along the slope of the valley, through which three main areas were excavated between 2000 and 2019: Slope, Terrace, and Shelter.

The Terrace encompasses occupations from the UP to the Early Neolithic, resulting in the identification of eight main lithostratigraphic units. The UP sequence includes several occupations attributed to the Gravettian (levels 8 to 6) between c. 32 and 27 ka cal BP, Proto-Solutrean (levels 5

to 4E) between c. 26 and 24 ka cal BP, and Solutrean (levels 4D, 4C, 4C, 4 and Lower 3) between c. 24 and 20 ka cal BP.

The Rock shelter area shows four main stratigraphic units, with Magdalenian, Solutrean, and Gravettian human occupations. From these, the Solutrean levels show the most intensive occupation, with three, well-preserved, archaeological horizons (layers C to A) and dated to c. 24–22 ka cal BP. These occupation levels were identified under blocks of limestone, which collapsed from the rock shelter roof.

The archaeological record includes diverse evidence of human activity: lithic debitage showing various stages of tool production, heat-cracked rocks indicating sophisticated food processing techniques, and abundant faunal remains representing both marine and terrestrial species. The site has yielded a particularly rich assemblage of mollusk shells, which appear throughout the stratigraphic sequence, suggesting consistent exploitation of marine resources.

The lithic assemblages generally show high density but low retouch frequency, characteristic of residential campsites. This interpretation is further supported by the discovery of varied artifacts including bone tools, ornaments, and portable art pieces, suggesting extended periods of human occupation. The site also provides evidence of sophisticated resource utilization, including the processing of both animal and potentially plant materials, and the production of shell beads, indicating complex cultural practices and possible trade networks.

Text adapted from:

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Vila do Bispo Museum – Celeiro da História (Barn of History)

Cláudia Costa

The Vila do Bispo Museum – Celeiro da História was inaugurated in 2024, following the rehabilitation of the former Vila do Bispo Barns. It presents an exhibitory and interpretative narrative of the municipality's collective heritage. The exhibition encompasses the region's geological formation, palaeontological dinosaur ichnofossils, and the earliest archaeological evidence of human presence. It further explores significant historical events and figures, underwater archaeology of shipwrecks and naval battles, the richness and uniqueness of local biodiversity, and the ethnographic memory of the "People of the Cape" and their mystical Finisterre, shaped by the sea.

The museum displays notable archaeological materials from Vale Boi, one of the most important Palaeolithic sites in southwestern Iberia, including an engraved plaque dated to approximately 23,000 years ago. It also showcases artefacts from the Megalithic site of Monte dos Amantes and menhirs from de Raposeira e Figueira, featuring engravings dating to the Early and Middle Neolithic.

Visitors can enjoy a comfortable cafeteria and a shop offering charming souvenirs from Vila do Bispo, the Algarve, and Portugal.

The prehistoric site of Rocha das Gaivotas (Cape St. Vincent)

Carlos Simões

The prehistoric site is located on a clifftop at 60 m above the sea level, in front of the rocky islet called Pedra das Gaivotas ("seagull's rock"), and overlooking the natural cove of Armação Nova to the north, forming a prominent headland. The site is composed of layers that constitute flat lenses of shells and fire-cracked pebbles, interstratified within the aeolian dune sands that cover the whole littoral platform. Early Mesolithic contexts in the area, closer to the Armação Nova cove, were first identified in the early 1990's by C. Tavares da Silva and J. Soares, namely stony-structured combustion features and ash dumps alongside shelly layers, interpreted as temporary, logistical occupations for flint procurement in the local outcrops. The contexts of Rocha das Gaivotas have been object of archaeological works by the University of Algarve since its identification during systematic surface surveys between 1996 and 2001 by N. Bicho. The subsequent excavations by A. F. Carvalho in 2002-2005 characterized three periods of occupations: the early Mesolithic (7500 a 7000 BCE), with fireplaces and shelly lenses; the late Mesolithic (5700 BCE), with three stone-structured flat hearths; and an early Neolithic presence (5400 BCE) without clear associated structures. However, after geophysical survey within C. Simões EU H2020 project in 2020-2022, a feature structured with limestone slabs, associated to Neolithic pottery and dated shells, was discovered beneath the aeolian dunes. Rocha das Gaivotas is one of the rare sites in SW Iberia where early Neolithic occupations overlay late Mesolithic contexts, thus a prime context to investigate the interactions between the Mesolithic local foragers and the newly arrived farmer communities, as well as the meaning of coastal resources and environmental change at local coastal ecosystems throughout the Neolithization.

Report on the Excursions of the 65th Meeting of the Society in Weimar

Tim Schüler & Marcel Weiss

On Friday, April 5th, 2024, the excursion of the Hugo Obermaier Society visited the caves around Döbritz, in the area known as “Döbritzer Schweiz”, the Ilsenhöhle below Burg Ranis, and the Teufelsbrücke near Saalfeld.

The first stop, the Magdalenian cave site Kniegrotte, was reached after climbing a narrow path across a meadow. The cave was excavated by Richter in the 1930s. A pavement of Kulm shale slabs was found in front of the cave. The material found is extensive and has been published by Höck. Noteworthy are the engravings depicting animals and the microliths found in the artifact spectrum.



Fig. 5. First excursion stop: Kniegrotte near Döbritz.



Fig. 6. First excursion stop: Kniegrotte near Döbritz.

After Kniegrotte, the group moved on to the Urdhöhle, which was also excavated by Richter after the Second World War. Notable are the human skeletal remains, originally dated to the Upper Paleolithic, but radiocarbon dating revealed a Mesolithic age. aDNA analyses were carried out on the skull, identifying a haplogroup corresponding to other Mesolithic population groups. The recovered artifact spectrum is not extensive and can be placed in the Magdalenian. There is a profile in the area of the northern cave exit that was documented by Rudolf Feustel. This profile was reopened in 2023 to obtain samples for sedimentological analysis and dating, with results still pending.

In the late morning, we left Döbritz and drove to the nearby town of Ranis. The Ilsenhöhle site is located directly beneath Ranis Castle and was first excavated by the castle's owner, Dietrich von Breitenbuch, in 1927. After he had excavated the medieval layers and discovered the first stone artifacts, Werner Hülle took over the excavation in 1932 and continued it until 1938. In a basal layer, both bifacial leaf points and Jerzmanowice blade points were found alongside a large number of animal bones. From 2015 to 2022, re-excavations took place in the area of the main profile from 1934. The basal layer sequence was reached after the removal of large roof collapse blocks. Notably, human bones are now also present. The first aDNA investigations revealed that only *Homo sapiens* fossil remains are present in the leaf point layer. The age of this archaeological horizon was determined to be at least 45,000 years old. After visiting Ilsenhöhle and a lunch break, the exhibition at Ranis Castle was toured.



Fig. 7. Third excursion stop: The Ilsenhöhle beneath Ranis Castle.

The final stop was Teufelsbrücke near Saalfeld, a Magdalenian site on the south-west-facing side of the Gleitsch hill. We walked about 2 kilometers through scenic views of the Saale valley to reach it. Originally a cave, its current arch-shape resulted from roof collapse. Excavations by Rudolf Feustel yielded numerous finds, and a recent fauna re-analysis by Müller & Pasda was published in QUARTÄR 70 (2023).



Fig. 8. Fourth excursion stop: Teufelsbrücke near Saalfeld.

Our second excursion day, Saturday, 6th, 2024, was dedicated to travertine sites. We visited the Parkhöhle in Weimar, and the famous travertine site Weimar-Ehringsdorf. Our last excursion stop was the travertine quarry Burgtonna east of Bad Langensalza.

The cave system of the Weimar Parkhöhle, visited in the morning, was initially used as a brewery sewer in the 19th century and later as a quarry. The Parkhöhle is situated within the extensive travertine body on Belvederer Allee in the city of Weimar. In 1871, geologist Karl von Fritsch discovered the first stone artifact in quarries along this road. Wolfgang von Goethe and his son August collected numerous paleontological finds here around 1800. The formation of the travertine is well documented through boreholes and other outcrops. Geologist Walter Steiner subsequently developed a facies model. The base layers of the travertine, from which the archaeological finds originate, are visible in the outcrops of the Park



Fig. 9. Sixth excursion stop: Weimar-Ehringsdorf.

Cave. The excursion group of the Hugo Obermaier Society was among the first to visit the new exhibition on the history of the Parkhöhle, which opened in March 2024.

On this sunny spring morning, our next stop was Weimar Ehringsdorf. The quarry is still active today, although the travertine has already been mined industrially since 1900. Particularly noteworthy are human fossil finds, found during the period between 1914 and 1925, which come from a small Middle Pleistocene settlement area with hearths (Brandschichten). There is now an open-air museum in the area of the Brandschichten layers. We also visited the area of the ongoing quarrying. Because of the use of diamond wire saws, the layer structures of the lower travertine with the current find layer are very clearly visible there. After visiting the quarry we saw some elephant remains in the office of the Thüringisches Landesamt für Denkmalpflege und Archäologie in Ehringsdorf.



Fig. 10. Sixth excursion stop: Weimar-Ehringsdorf.



Fig. 11. Last excursion stop: Burgtonna.

After a lunch break, we took a longer bus tour to our last stop, Burgtonna, a large travertine quarry east of Bad Langensalza. The travertine of Burgtonna is notable for the discovery of straight tusk elephants in the 17th century. W. E. Tenzel identified the large mammal bones here as elephant bones, marking the beginning of modern Quaternary paleontology. Later, a few stone artifacts were also found. Intensive quarrying activities began in 1990, with the quarry front moving progressively north. The outcrop visible today is situated in a valley facies and is characterized by cascades and basins filled with travertine sand. These structures are clearly visible on the profiles. Above the travertine lies a thick Weichselian cover layer of loess with soil formations.



Fig. 12. Last excursion stop: Burgtonna.

Report on the General Assembly on the Occasion of the 65th Annual Meeting of the Hugo Obermaier Society

Marcel Weiss

On Thursday evening (April 4th, 6:30 p.m.), the President of the Society opened the general assembly. Present were 45 members, 6 members additionally participated online. First of all, it was established without objections that the invitation to the General Assembly had been sent to all members in due time. The general meeting had a quorum and the agenda was accepted.

The president, Harald Floss, reported that the past year has gone well for the society.

On a positive note, the society's financial situation has improved, and membership has grown to nearly 300, with 41 new members since 2023. Members have been more diligent in paying their fees. A new flyer has been created to recruit members, and the society's presence on social media platforms like X has increased. Unfortunately, some members left the society, primarily those who had not paid their fees for years. Sadly, two members, Helga Roth and Ludwig Reisch, passed away, and a minute of silence was held in their honor at the meeting's opening.

The president mentioned the high-quality applications for the Hugo Obermaier Research Grant in 2023 and the objective evaluation system designed by the board. Harald Floss announced that Mourad Farkouch received the award. The society is seeking donors for future awards.

The report of the treasurer Amira Adaileh, as well as the auditor Andreas Maier for the fiscal year 2023 were presented. The treasurer was unanimously discharged upon request from the floor (1 abstention, with no dissentient).

Andreas Pastoors reported on the current status of the Quartär Yearbook. Volume 69 was published in January 2024 and contains 8 articles and a book review on approximately 200 pages. There are approximately 10 months between the publication of the individual volumes, faster processing of the articles from submission to printing of the volume is not possible. There are already 6 articles in progress for Volume 70, with production expected this summer. At the end, Andreas Pastoors announced that Zolt Mester was no longer part of the editorial board.

The board is grateful to the editors, especially to Andreas Pastoors and Thorsten Uthmeier, for their excellent and successful work.

As next step, a new board was elected. The current board was unanimously discharged upon request from the floor (6 abstentions, with no dissentient). After that the board resigned.

After the old board resigned, Susanne Münzel and Michael Baales were commissioned as election board members to carry out the election and lead the election meeting.

The new board members were all elected with Yes: 50/ No: None /Abstention: 1. The new president is Harald Floss, the vice-president is Yvonne Tafelmaier. As treasurer, Amira Adaileh was elected and Marcel Weiß is the new secretary. Florent Rivals and Mara-Julia Weber were elected as first and second assessor of the society, respectively.

Following the election of the board, the new board's proposal for filling the scientific advisory board was voted on. This includes 7 members of the society: Zdeňka Nerudová, Andreas Pastoors, Philip Nigst, Ewa Dutkiewicz, Ludovic Mevel, Olaf Jöris, and Małgorzata Kot. The proposal was adopted with 46 votes in favor and 5 abstentions. The newly elected members of the advisory board accepted the election.

As next point of the agenda, Andreas Maier was appointed as new cash auditor.

Thereafter, Anna Rufã invited the Society on behalf of the Interdisciplinary Center for Archaeology and the Evolution of Human Behaviour (ICArEHB) for the 66th Annual Meeting, April 22-26, 2025, to Faro/Portugal. The Society thanked Anna Rufã for the invitation.

The following discussion focused on handling the increasing number of scientific contributions to the annual meeting. Due to the rise in participants and submissions, various suggestions were made. These included canceling an excursion day, introducing a session with 2-minute Pecha Kucha presentations, or having the contributions evaluated by an advisory board.

The current presentation format of 15-minute contributions was praised, and extending this to the entire conference was suggested. Another proposal was to have Pecha Kucha sessions with a standard

presentation length of 6 minutes and 40 seconds, and to start the first day of presentations in the morning. However, concerns were raised about starting too early after a public holiday.

There were differing opinions on evaluating contributions, with some advocating for it to maintain quality, while others worried it might reduce participation if funding was tied to presentation acceptance. It was noted that participant numbers have stabilized recently with the hybrid format. The majority favored reducing presentation times to 15 minutes to accommodate more contributions.

In the next part, Harald Floss addressed the issue that usually the annual meetings take place alternately in Germany and in other countries. In 2025, there's an invitation to Faro, and there's already an invitation from outside Germany for 2026. Therefore, he proposed to abandon this rule and to follow invitations in the future. The members' assembly agreed to the proposal.

The last discussion included suggestions to enable funding options for student or unemployed members to attend the conference. Ideas included creating and distributing a donation flyer via email, introducing a higher membership category for regular donations, or donations tied to the conference fees. The board will test the donation flyer approach in the coming months.

The president closed the general assembly at 19:54.

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