HUGO OBERMAIER SOCIETY

for Quaternary Research and Archaeology of the Stone Age

DEPT. OF ARCHAEOLOGY AND HERITAGE STUDIES, AARHUS UNIVERSITY
MOESGAARD MUSEUM

64th Annual Meeting in Aarhus

April 11th – 15th 2023

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

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In cooperation with

AARHUS
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Content *(Inhalt)*

Venue map for the conference with the location of the three separate venues: AIAS (Aarhus Institute of Advanced Studies, Aarhus University, Høegh-Guldbergs Gade 6B, 8000 Aarhus C, Building 1630.1632, Auditorium (201) and The Hall (101), Moesgaard Museum (Auditorium, Moesgaard Museum, Moesgård Allé 15, 8270 Højbjerg) and the Dinner venue (Spiselauget, Skovgaardsgade 3, 8000 Aarhus C). A) A macro view of the Aarhus area showing the three venues. B) The center of Aarhus with both AIAS and the dinner venue. C) The AIAS venue. D) The Moesgaard Museum venue. ©Google Maps 2023.

Program Overview

Tue, April 11th, 2023

Auditorium (201) and The Hall (101), Aarhus Institute of Advanced Studies (AIAS)
Aarhus University, Høegh-Guldbergs Gade 6B, 8000 Aarhus

12:00	Opening of the conference office at the Aarhus Institute of Advanced Studies
13:30	Beginning of the meeting, welcome by our hosts and the president of the Hugo Obermaier Society
14:00 – 17:20	Presentations (Coffee break: 15:40 – 16:00)
17:30 – 18:30	Poster session I
18:30	Evening reception

Wed, April 12th, 2023

Auditorium, Moesgaard Museum, Moesgård Allé 15, 8270 Højbjerg
!!! Moesgaard Museum is located 10km south of the city centre !!!

09:00 – 12:00	Presentations (Coffee break: 10:40 – 11:00)
12:00 – 13:00	Lunch break
13:00 – 16:20	Presentations (Coffee break: 15:00 – 15:20)
17:00	Evening lecture by Dr. Trine K. Nielsen (Moesgaard Museum/Aarhus University): Searching for hominins along their northern extremes – a Fennoscandinavian perspective

19:30 Conference Dinner at Spiselauget (https://foodfamilygroup.dk/spiselauget)

Thu, April 13th, 2023

Auditorium (201) and The Hall (101), Aarhus Institute of Advanced Studies (AIAS) Aarhus University, Høegh-Guldbergs Gade 6B, 8000 Aarhus

09:00 – 10:00	Poster session II
10:00 – 13:00	Presentations (Coffee break: 11:20 – 11:40)
13:00 – 14:00	Lunch break
14:00 – 18:00	Presentations (Coffee break: 15:40 – 16:00)
18:30	General Assembly
20:30	Get-together

Fri, April 14th, 2023, Excursion A:

(probably 08:30 – 16:30)
The Archaeology of Djursland – bus tour

Sat, April 15th, 2023, Excursion B:

(probably 10:00 – 18:00)
Museums in Aarhus: Moesgaard Museum / Den Gamle By

Detailed Program

Tuesday, April 11th, 2023

12:00 Opening of the conference office at the Aarhus Institute of Advanced Studies

13:30 Beginning of the meeting, welcome by our hosts and the president of the Hugo Obermaier Society

14:00 – 17:20 **Presentations on the Lower and Middle Palaeolithic**

14:00 – 14:20 *Diego Lombao, Juan Ignacio Morales, Marina Mosquera, Andreu Ollé, Palmira Saladié & Josep Vallverdú*
Technological innovations and continuities at the Early Acheulean assemblage of El Barranc de la Boella (La Canonja, Spain)

14:20 – 14:40 *Berrin Çep & Yvonne Tafelmaier*
Middle Pleistocene technological behaviour as viewed from the travertine site Cannstatt "Bunker" (Southwest Germany)

14:40 – 15:00 *Giulia Marciani, Simona Arrighi, Sara Silvestrini, Katerina Harvati, Stefano Benazzi & Fabio Negrino*
Preliminary notes on the Middle Palaeolithic laminar lithic assemblage of Via San Francesco, Italy

15:00 – 15:20 *Francesca Romagnoli, Magda Ciesla, Paraskevi Elefanti, Dusan Mihailovic, Telmo Pereira, Damian Stefański, Paweł Valde-Nowak, Nikola Vukosavljevi & Zsolt Mester*
On Microliths in Middle Palaeolithic: Start from scratch. Discussing problems and perspectives looking at shared taxonomies

15:20 – 15:40 *Elena T. Moos, Gregor D. Bader & Manuel Will*
Knapping Attributes of Dolerite: An experimental investigation of knapping characteristics of South African dolerite and implications for the interpretation of Middle Stone Age technologies

15:40 – 16:00 **Coffee break**

16:00 – 16:20 *M. Gema Chacón, Juan Ignacio Morales, Hassan Aouraghe, Diego Lombao, Antoni Canals-Salomó, Sandra Bañuls-Cardona, Carlos Tornero, Alfonso Benito-Calvo, Elena Moreno- Ribas, María Soto, Celia Díez-Canseco, Gala García-Argudo, Hamid Haddoumi, Antonio Rodríguez-Hidalgo, Hicham Mhamdi, Mohamed Souhir, Mourad Farkouch, Martina Demuro, Lee Arnold, Ibrahim Embarki, Jeema Amakrane, Abdellah Tsouli, Mustapha Alilich, Aïcha Oujaa, Jan van der Made & Robert Sala-Ramos*
Tahya 3: A new open-air site and its significance for the Middle Stone Age in Eastern Morocco

16:20 – 16:40 *Marco Romboni, Jacopo Gennai, Giovanni Boschian, Sergio Tofanelli & Damiano Marchi*
Late Neanderthals and their environment in northwestern Tuscany: news from Buca del Tasso

16:40 – 17:00 *Mario Mata-González, Britt M. Starkovich, Mohsen Zeidi & Nicholas J. Conard*
Middle Paleolithic Subsistence Strategies at Ghar-e Boof (Southern Zagros Mountains, Iran)

17:00 - 17:20 *Anna Riethus, Bärbel Auffermann & Gianpiero Di Maida*
A joint digital archive for Neanderthal research

17:30 – 18:30 **Poster session I**

18:30 **Evening reception**

Wednesday, April 12th 2023

09:00 – 12:00 **Presentations on the analysis of faunal remains**

09:00 – 09:20 *Matthias Tschuch & Francoise Chaput*
Steinsfeld-Endsee, a new Palaeolithic site from the Franconian Gipskeuper Land

09:20 – 09:40 *Kerstin Pasda, Lilian Reiss, Norbert Buchinger, Thomas Einwögerer, Marc Händel, Andreas Lücke, Andreas Maier, Holger Wissel & Christoph Mayr*
Comparisons of animal species composition and their isotopes in Lower Austrian early Gravettian and Epigravettian sites evidence palaeoenvironmental and settlement changes

09:40 – 10:00 *Elisa Luzi, Angel Blanco-Lapaz, Jeanne Geiling & Nicholas J. Conard*
Revision of the small mammal assemblages of Hohle Fels Hütten and Schmiechenfels (Swabian Jura, Germany)

10:00 – 10:20 *Yvonne Tafelmaier, Chris Baumann, Claus-Joachim Kind, Gerd Albrecht & Susanne C. Münzel*
People and dogs? – The cultural context of the Gnirshöhle canids (SW-Germany)

10:20 – 10:40 *Werner Müller & Clemens Pasda*
More on the Magdalenian in Thuringia – A re-investigation of the faunal remains from Teufelsbrücke

10:40 – 11:00 **Coffee break**

11:00 – 11:20 *Angel Blanco-Lapaz, Jeanne Geiling, Elisa Luzi, Britt M. Starkovich & Nicholas J. Conard*
Exploring the role of fish in the Schmiech Valley (Swabian Jura) during the Magdalenian

11:20 – 11:40 *Paulo Duñó-Iglesias, Jordi Nadal, Lluís Lloveras & Florent Rivals*
Ungulates seasonality and Epipaleolithic hunter-gatherer mobility at Balma del Gai (north-east Iberia): A tooth wear analysis

11:40 - 12:00 *Yvonne Tafelmaier, Thomas Beutelspacher, Matthias Blessing, Hannah Huber, Elisa Luzi, Giulia Toniato & Claus-Joachim Kind*
Kohlhau-Abri (SW-Germany) – archaeological and palaeoecological investigations at a newly discovered rock-shelter site

12:00 – 13:00 **Lunch break**

13:00 – 16:20 **Presentations on "Going to extremes – hominin lives at ecological margins"**

13:00 - 13:20 *Mara-Julia Weber, Sönke Hartz, Hauke Jürgens, Dirk Leder, Trine Kellberg Nielsen, Martin Segschneider & Marcel Weiss*
Neanderthals at the northern margins – The Middle Palaeolithic site Drelsdorf (Schleswig-Holstein, Germany)

13:20 - 13:40 *Sarah Pederzani, Kate Britton, Manuel Trost, Helen Fewlass, Nicolas Bourgon, Jeremy McCormack, Holger Dietl, Hans-Jürgen Döhle, Klervia Jaouen, André Kirchner, Tobias Lauer, Shannon McPherron, Harald Meller, Jörg Orschiedt, Hélène Rougier, Tim Schüler, Geoff M. Smith, Sahra Talamo, Thomas Tütken, Marcel Weiss & Jean-Jacques Hublin*
A multi-isotope record of climate and ecosystem change during the Middle to Upper Palaeolithic transition at Ranis Ilsenhöhle, Germany

13:40 – 14:00 *Ralf Vogelsang, Götz Ossendorf & Minassie Girma Tekelemariam*
Living the high life! Prehistoric occupation of high-altitude environments in Ethiopia

14:00 – 14:20 *Alvaro Arrizabalaga, Aitor Calvo, Miguel Ángel Berjón, Aitor Sánchez & María José Iriarte-Chiapusso*
Raising the barriers. The Upper Ebro Valley (northern Iberian Peninsula): from "ecological margin" to territory of passage and settlement during the Upper Palaeolithic

14:20 – 14:40 *Andreas Maier, Isabell Schmidt, Birgit Gehlen, Katja Winkler, Alvaro Arrizabalaga, Nico Arts, Nuno Bicho, Philippe Crombé, Berit Valentin Eriksen, Sonja B. Grimm, Katarina Kapustka, Mathieu Langlais, Ludovic Mevel, Nicolas Naudinot, Zdeňka Nerudová, Marcel Niekus, Marco Peresani, Felix Riede, Florian Sauer, Werner Schön, Iwona Sobkowiak-Tabaka, Hans Vandendriessche, Mara-Julia Weber, Annabell Zander & Andreas Zimmermann*
Move or stay put – Two distinct metapopulation responses to environmental degradation during the Gravettian and Late Palaeolithic at their ecological margins

14:40 – 15:00 *Sebastian J. Pfeifer*
The working of hard animal tissues during the Last Glacial Maximum at Cosauţi site (Republic of Moldova) – local idiosyncrasy or part of the bigger picture?

15:00 – 15:20 **Coffee break**

15:20 – 15:40 *Jesper Borre Pedersen, Jakob Johann Assmann, Signe Normand, Dirk Nikolaus Karger, Andreas Maier & Felix Riede*
Beyond the threshold – climate niche modelling reveals how pioneering Hamburgian foragers moved beyond the ecological margins of Late Pleistocene northern Europe

15:40 – 16.00 *Morten Ramstad & Tor Arne Waraas*
On the brink of the great Glacier. Langfjelldal, an Alpine Early Mesolithic single unit reindeer camp in Western Norway

16:00 – 16:20 *Morten Ramstad & Tor Arne Waraas*
Fetegga, Alpine Late Mesolithic Reindeer Hunting Expeditions into the Extreme Margins

17:00 **Evening lecture by Dr. Trine K. Nielsen (Moesgaard Museum/AU):**
Searching for hominins along their northern extremes – a Fennoscandinavian perspective

19:30 **Conference Dinner**

Thursday, April 13th 2023

09:00 – 10:00 **Poster session II**

10:00 – 13:00 **Presentations on mixed topics and Upper Palaeolithic**

10:00 – 10:20 *Robin John, Florian Linsel, Hubert Mara, Georg Roth, Isabell Schmidt & Andreas Maier*
PyREnArA – Spatio-temporal analysis of artefact morphology with multivariate approaches

10:20 – 10:40 *Sonja Rigterink, Xuan Li, Michael Hein, Tobias Lauer, Brigitte Urban, Marcel Weiss, David Colin Tanner & Antje Schwalb*
Paleotemperature development during the Eemian Interglacial at Lichtenberg, Northern Germany, inferred from a subfossil chironomid record

10:40 – 11:00 *Alejandro Prieto, Aitor Calvo, Erich Claßen, Wolfgang Heuschen, Volker Kuhlmann, Thorsten Uthmeier & Andreas Pastoors*
"Tertiary quartzite" exploitation by Middle Palaeolithic societies in the Lower-Middle Rhine Valley. A geoarchaeological approach to stone procurement and management strategies

11:00 – 11:20 *Senka Plavšić Gogić, Sofija Dragosavac, Predrag Radović, Tamara Dogandžić, Bojana Mihailović & Dušan Mihailović*
Settlement patterns in the Balkan Peninsula during MIS 3

11:20 – 11:40 **Coffee break**

11:40 – 12:00 *Tjaark Siemssen & Andreas Maier*
Riverbank meander – An agent-based model of Late Upper Palaeolithic and Late Palaeolithic water-oriented land-use decisions in the Middle Rhine Valley

12:00 – 12:20 *William Mills*
Doggerland, perspectives from the Eastern Hills: the evidence, challenges and attractions when crossing this dynamic landscape

12:20 – 12:40 *Marcel Bradtmöller, Marcel El-Kassem, Arantzazu Jindriska Pérez Fernández, Christoph Schmidt, Felix Henselowsky, Stefan Hecht & Olaf Bubenzer*
Living and working on the slope - News from the Middle- and Upper Paleolithic open air site Feldberg "Steinacker"

12:40 – 13:00 *Katarzyna Pyżewicz & Witold Grużdź*
Reinvestigation of the Aurignacian assemblages from Góra Puławska – a microscopic and experimental approach

13:00 – 14:00 **Lunch Break**

14:00 – 18:00 **Presentations on the Upper/ Late Palaeolithic and Mesolithic**

14:00 – 14:20 *Guido Bataille, Hannah Huber & Nicholas J. Conard*
New lithic studies of AH IIIb of Hohle Fels Cave in the light of the technological and functional variability of the Aurignacian in the Swabian Jura (southwestern Germany)

14:20 – 14:40 *Jacopo Gennai*
Follow the river: the Pontecosi Upper Palaeolithic site in NW Tuscany (Italy)

14:40 – 15:00 *Aitor Calvo & Thorsten Uthmeier*
Acquisition and technological management of lithic resources during the Upper Palaeolithic in the Altmühl Valley: the case of the Abri I im Dorf (Neu-Essing, Bavaria, Germany)

15:00 – 15:20 *Philip R. Nigst, Stéphane Pirson, William Davies, Samuel Kasemann, William Chase Murphree, Bence T. Viola, Walpurga Antl-Weiser & Marjolein D. Bosch*
New fieldwork at Grub-Kranawetberg (Austria): New insights on spatial extent, stratigraphy and chronology

15:20 – 15:40 *Małgorzata Kot, Claudio Berto, Greta Brancaleoni, Adrian Marciszak & Aleksandra Kropczyk*
What happened in MIS 3 stays in MIS 3. Traces of the very last Epiaurignacian hunters in Pod Oknem Cave, Southern Poland.

15:40 – 16:00 **Coffee break**

16:00 – 16:20 *Hannah Stephanie Parow-Souchon, Thomas Einwögerer, Marc Händel & Norbert Buchinger*
Site use and organization of space at Kammern-Grubgraben

16:20 – 16:40 *Jeanne Marie Geiling, Ana B. Marín-Arroyo, Manuel R. González Morales & Lawrence Guy Straus*
Lower Magdalenian Human occupations of the montane site El Mirón (Cantabria, Spain)

16:40 – 17:00 *Zdeňka Nerudová, Petr Neruda, Lenka Lisá, Zdeněk Vaněček, Nela Doláková, Antonín Přichystal, Katarzyna Pyżewicz, Piotr Moska, Tomasz Goszłar & Ivo Světlík*
Hošťálkovice II – Hladový vrch (Ostrava, Czech Republic) – New Results of the Archaeological Excavation (the Magdalenian Horizon)

17:00 – 17:20 *Marcel Schemmel*
An intrasite analysis of the Magdalenian site of Bad Kösen-Lengefeld (Saxony-Anhalt)

17:20 – 17:40 *Anna Krahl*
The finds of Andernach Roonstraße in context of the Late Palaeolithic layers Andernach Martinsberg 2 and 3

17:40 – 18:00 *Hannah Huber, Yvonne Tafelmaier & Patrick Schmidt*
Heat treatment of Middle Triassic Chert in the Early Mesolithic at Rottenburg-Siebenlinden

18:30 **General Assembly**

20:30 **Get-together**

Poster session I

Cristina López-Tascón, Carlos Mazo Pérez & Marco de la Rasilla Vives
Carinated endscrapers, cores or vice versa?: Analysis of Aurignacian artefacts from La Viña rock shelter (Asturias, Spain)

Peter Yaworsky, Shumon T. Hussain & Felix Riede
The Human Niche Space of Late Upper Paleolithic Europe

Guido Bataille & Yvonne Tafelmaier
Nach dem Spiel ist vor dem Spiel - New Palaeolithic field projects in the Ach Valley in the Swabian Jura (southwestern Germany)

Rebecca Gnau & Jürgen Richter
High-resolution analysis of the central hearth at the Magdalenian site of Bad Kösen-Lengefeld

Tom Noack & Andreas Maier
Three-dimensional visualization and analysis of the stratigraphy at the Blätterhöhle entrance area

Dennis Thomas Batz & Jürgen Richter
The Magdalenian open-air site of Bad Kösen-Lengefeld faces its final field season – overview and outlook

José Ramón Rabuñal, María Soto, Juan Ignacio Morales, Diego Lombao, Miguel Soares- Remiseiro, Juan Luis Fernández-Marchena, Gala García-Argudo, Felix Riede & Josep Vallverdú
The Late Glacial sequence of Cova de Les Borres and the emergence of Epipalaeolithic geometric microliths in Eastern Iberia

Diego Lombao & Armando Falcucci
Blade and Bladelet Cores in the Protoaurignacian: A New Method for Measuring Reduction Intensity

Robin John
Just the tip of the Iceberg? An in-depth investigation of lithic projectile morphology during the Upper Paleolithic in Europe

Helena Dalager, Sofie F. Hellerøe, Shumon T. Hussain & Felix Riede
New finds and insights from islands at the edge of the world – did stranded whales attract Final Palaeolithic foragers to northern Jutland during the Allerød?

Felix Riede, Isobel Wisher & Ester Oras
Revisiting the Final Palaeolithic site of Mühlheim-Dietesheim (Hessen, Germany)

Keiko Kitagawa, Daniel Burger-Völlmecke & Felix Riede
Paleolithic occupations in the Lahn Valley of Central Germany: New Dates from Wildscheuer and Wildweiberlei

Florian Sauer & Joel Orrin
CoDEx 2022: Cologne Digital Excavation protocol. Latest advances and experiences

Christian Marzinke, Marcel Bradtmöller, Harald Lübke & Joao Marreiros
Use-wear analysis on Objects from the Ertebølle site „Timmendorf-Nordmole I“

Thijs Karens, A.G. Henry & V. Fogliano
Foods from the Forest: A Nutritional Analysis of Wild Plant Foods Used by the Baka Forager-Horticulturalists in Southeastern Cameroon

Viktoria Fries, Janos Puschmann, Jürgen Richter, Andreas Maier & Patrick Roberts
Isotope analysis of animal teeth from the Magdalenian site of Bad Kösen-Lengefeld

Jeanne Marie Geiling, Angel Blanco-Lapaz, Elisa Luzi & Nicholas J. Conard
Revisiting the Schmiech Valley (Swabian Jura): new taphonomic faunal studies of Magdalenian occupations in Hohle Fels Hütten and Schmiechenfels

Poster session II

Giulia Toniato & Yvonne Tafelmaier
From the Magdalenian to the Early Mesolithic: reconstructing palaeoenvironmental changes and human activities through macrofaunal remains at Kohlhau-Abri, southwestern Germany

Guillaume Berton, Cláudia Costa, João Cascalheira & Nuno Bicho
Lion (Panthera leo ssp.) in European Upper Palaeolithic: insights from Vale Boi assemblage

Leonor Filipe, Anna Rufà, Joana Belmiro, João Cascalheira & Célia Gonçalves
Interpreting fire structure use through mammal remains: preliminary results from the Cabeço da Amoreira shell midden

Florian Gumboldt, Jürgen Richter, Andreas Maier & Carsten Münker
Isotopic analysis of faunal remains from Neanderthal sites in central and southern Germany – an outlook

Shumon Hussain & Nathalie Ø. Brusgaard
Human-Beaver Relations in the Early and Mid-Holocene of Northern Europe: Revisiting the Mesolithic through the Lens of Multispecies Affordances

Cristian Micó Sanchis, Felipe Cuartero, Javier Llamazares, Pablo Sañudo, Luis Zalbideia, Florent Rivals & Ruth Blasco
Testing the effectiveness of horse teeth as retouchers: a preliminary characterisation of the use wear traces

Valentina Lubrano, Ruth Blasco, Florent Rivals, Jordi Rosell & Anna Rufà
How to identify standards of Neanderthal short-term occupations in cave environments? Zooarchaeological and taphonomic preliminary results of Teixoneres Cave unit III

Lisa Bauer, Merlin Hattermann, Marcel Bradtmöller, Marcel El-Kassem & João Marreiros
Blanks and chunks - analysis of the lithic assemblage of the Middle to Upper Paleolithic site of Feldberg "Steinacker"

Lisa Schunk, Marcel Weiss & Andrzej Wiśniewski
Early human occupation of Central Europe: Reassessing Racibórz Studzienna 2 - a Middle Pleistocene site in the Oder River Valley, Poland

Emil Schou Nielsen, Trine Kellberg Nielsen & Søren Munch Kristiansen
Exploring Interglacial Deposits in the South-Western Region of Jutland, Denmark: Uncovering Archives of Human Activity and Environmental

Mikel Díaz-Rodríguez, Felix Riede & Trine Kellberg Nielsen
Comparing spatio-temporal dynamics of Neanderthals and Anatomically Modern Humans in the Cantabrian Region of the Iberian Peninsula

Mikel Díaz-Rodríguez, Arturo de Lombera-Hermida, Xosé Pedro Rodríguez-Álvarez, Ramón Fábregas-Valcarce, Hugo Bal-García1, Tania Mosquera-Castro & Xes Aldea-Moreiraz
Decoding the Middle/Upper Palaeolithic Transition in NW Iberia: Insights from the site of Cova Eirós

Amelia Bargallo, M. Gema Chacón, Francesca Romagnoli, Bruno Gómez de Soler, Juan Ignacio Martin-Viveros, Manuel Vaquero, Palmira Saladié & Josep Vallverdú
Identifying Neanderthals knappers in the Abric Romani rockshelter

Antje Schwalb, Thomas Terberger, Felix Bittmann, Gianpiero Di Maida, Katharina Dulias, Michael Hein, Deepak Kumar, Tobias Lauer, Dirk Leder, Falko Malis, Neda Rahimzadeh, David C. Tanner, Martin Theuerkauf, Sumiko Tsukamoto, Brigitte Urban, Sebastian Wagner, Jutta Winsemann & Marcel Weiss
Climate Change and Early Humans in the North

Abstracts of Reports and Posters

Alvaro Arrizabalaga[1], Aitor Calvo[1,2], Miguel Ángel Berjón[1], Aitor Sánchez[1] & María José Iriarte-Chiapusso[1]

Raising the barriers. The Upper Ebro Valley (northern Iberian Peninsula): from "ecological margin" to territory of passage and settlement during the Upper Palaeolithic

Throughout the last twenty-five years, the paradigm of the Upper Palaeolithic settlement in the Cantabrian region and, more particularly, in the Basque region has changed significantly. Until the 1990s, the two slopes that constitute this territory were considered, from the point of view of their archaeological relevance, very different areas. The lower altitude Basque territories, located on the Atlantic slope of the region, were perceived to be practically the only centres of interest for settlement. On the contrary, most of the Mediterranean slope, in the upper valley of the Ebro River and with a minimum altitude of about 500 masl, did not seem equally suitable for the habitat. As a result, for decades, there was a significant dissymmetry between an Atlantic slope that was systematically surveyed and excavated and a Mediterranean slope that was hardly surveyed in search of deposits of these chronologies. In the regions adjacent to the latter (the middle Ebro Valley or northern Castilian plateau), the situation was similar, and so this paradigm remained firm for more than half a century. Two circumstances destabilized it: the progressive appearance of isolated sites with a record compatible with the Upper Palaeolithic, and the characterization of high-quality lithic raw materials that outcrop on the Mediterranean slope, whose traces were followed to the sites on the Atlantic slope. In this line, those Cantabrian deposits close to the watershed (Baltzola, Silibranka, Bolinkoba, Lezetxiki or Usategi, among others) take on new meaning, and in the Mediterranean slope, already known sequences begin to be reassessed and surveys oriented to the specific localisation of sites of these chronologies are being planned. As a consequence, various research groups are now working on articulating a new paradigm regarding Palaeolithic settlement in the so-called Basque Crossroads, which now includes the Mediterranean slope in terms of mobility and territoriality. Within this new paradigm, the true significance of the Upper Ebro Valley in relation to these issues is progressively revealed, transforming from that "ecological margin" into a key territory of passage and settlement for the human groups that frequented this region during the Upper Palaeolithic.

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Amelia Bargallo[1], M. Gema Chacón[1], Francesca Romagnoli[2], Bruno Gómez de Soler[1], Juan Ignacio Martin-Viveros[1], Manuel Vaquero[1], Palmira Saladié[1] & Josep Vallverdú[1]

Identifying Neanderthals knappers in the Abric Romani rockshelter

The Abric Romaní rock shelter (Capellades, Barcelona) is a significant Middle Paleolithic site for the study of Neanderthal settlement dynamics. The archaeological sequence is composed of more than 30 meters of sediment (dated between 40 ka and 110 ka BP, Sharp et al. 2016) characterized by an alternation between archaeological and sterile levels. This has allowed us to carry out high-resolution archaeological studies, identifying archaeostratigraphic occupational events (Bargalló et al. 2016). This site is known for the extraordinary preservation and documentation of hearths (Vallverdú et al., 2012), wooden remains, and the large number of lithic and faunal refits. The multidisciplinary studies carried on at the site showed how

Neanderthals organised their living space in the campsite and which activities carried out. All this has led us to suggest specific cognitive and socio-economic capacities, but always at the population level.
In this work we will go a little further by identifying some individual aspects of the technological behaviour. This new line of work has two antecedents: a) the estimation of the average number of individuals in a single occupation (Borell, 2018) and b) the identification of the laterality of the knappers through the analysis of lithic remains (Bargalló et al. 2017).
The main objective of this study is the identification of some individuals who knapped lithic tools in the Ob archaeolevel. To achieve this aim we use RMU analysis and lithic refits, which indicate that lithic remains belong to the same knapping event and we hypothesise were produced by the same individual. This individualization of the knapping events helps us to get closer to the identification of the lithic knappers. The analysis of a set of refits, investigating the organization of knapping removals, the identification of unsolved mistakes during production, and the outliner knapping patterns has allowed us to identify some individuals that stand out for being novices or individuals with little skills in knapping.

References:

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***Nach dem Spiel ist vor dem Spiel* - New Palaeolithic field projects in the Ach Valley in the Swabian Jura (southwestern Germany)**

Since 2020 the State Office for Cultural Heritage conducts surveys in the core zones and the surroundings of the Palaeolithic serial UNESCO World Heritage site "Caves and Ice Age Art in the Swabian Jura". Thereby, the Ach Valley is in the focus of current archaeological surveys, test-sondages and excavation projects. Our aim is to evaluate the archaeological potential of known sites and the identification of previously unknown sites.
Thus in 2020, we started archaeological excavations at well-known Brillenhöhle and in the entrance area of the so-called Untere Köhnenbuchhöhle (both Blaubeuren/ SW-Germany). The first field-campaign at Köhnenbuchhöhle brought to light early Holocene and (late?) Pleistocene sediments with few lithic artefacts and anthropogenically modified Pleistocene faunal remains

(Bataille et al. 2021). The results of macro- and microfaunal analyses indicate the presence of undisturbed stratified early Holocene and late Pleistocene sediments in the entrance area of the cave. As a result, Untere Köhnenbuchhöhle is the first Palaeolithic Cave site since the detection of Palaeolithic finds at Geißenklösterle Cave in the 1950s. Excavations will continue in 2023. Brillenhöhle was excavated between 1955 and 1963 under the direction of Gustav Riek, who documented an Upper Palaeolithic stratigraphy with rich Gravettian and Magdalenian horizons. Potentially earlier occupations were only identified in the course of two deep-sondages. Thereby, two Aurignacian organic points were found in horizon XIV remaining the only indication of this technocomplex. The few lithic artefacts assigned to the Middle Palaeolithic by Riek are undiagnostic and may rather represent pseudoartefacts. Therefore, the State Office for Cultural Heritage resumed excavations in the cave in order to validate the presence of undisturbed archaeological layers (Tafelmaier et al. 2021). In the course of the excavation campaigns in 2020 and 2021, undisturbed layers were detected. Test excavation at the slope below the entrance brought to light Upper Palaeolithic artefacts deriving from re-deposited cave sediments (Tafelmaier et al. 2022).
Future excavations within the cave will document the vertical and horizontal distribution of intact sediments and the presence of archaeological occupations of early Upper and late Middle Palaeolithic sediments.

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New lithic studies of AH IIIb of Hohle Fels Cave in the light of the technological and functional variability of the Aurignacian in the Swabian Jura (southwestern Germany)

The Hohle Fels Cave in the Swabian Jura (southwestern Germany) yields a long Aurignacian sequence providing insight into cultural and environmental developments during the early Upper Palaeolithic between 42.000 and 35.000 calBP. With its rich archaeological horizons, it is a reference site for the understanding of the internal evolution of the Aurignacian in Central Europe.
The ensemble of deep stratified cave sites in the Ach and Lone Valley forms a unique Upper Palaeolithic contextual area with early evidence of figurative art and music. Mobile art, flutes and numerous examples of personal ornaments were found together with characteristic Aurignacian lithic and organic artefact types in four of these cave sites, among them Hohle Fels. These assemblages date between 43.000 calBP and 35.000 calBP (Conard & Bolus 2008; Higham et al. 2012; Bataille & Conard 2018a; Taller & Conard 2019). The upper section of the Hohle Fels

Aurignacian sequence starts around 39.000 calBP during the end of a cold period associated with Heinrich 4 event (Greenland Stadial 9) and continues until the warm phase of Greenland Interstadial 7 around 35.000 calBP (Bataille & Conard 2018a; Riehl et al. 2014; Rhodes et al. 2019). Technological investigations of selected lithic assemblages of the upper Archaeological Horizons (AH IIe, IIIa, IIIb and IV) indicate a formerly undescribed techno-functional variant of the regional Aurignacian (Bataille & Conard 2018a & b). Deviating from other "Swabian Aurignacian" sites and respective layers, the on-site production of slim lamellar blanks from burin-cores plays an important role in the eponymous "Hohle Fels-IV-facies".
Here we present results of new techno-typological investigations of the lithic assemblage of AH IIIb, intermediate between lower AH IV and upper AH IIIa. While the importance of burin-technology for bladelet production is evidenced, the number of bladelets deriving from carinated endscraper-cores is more pronounced than in AHs IIIa and IV of the same sequence. In the presentation we provide the latest results and discuss them against current hypotheses of an internal Aurignacian subdivision into 4 different phases.

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The Magdalenian open-air site of Bad Kösen-Lengefeld faces its final field season – overview and outlook

This year will see the completion of fifteen years (2008-2023) of excavations carried out by the universities of Cologne and Erlangen-Nürnberg at the site of Bad Kösen-Lengefeld in close cooperation with the Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt. Recent achievements at this locale include, among others, the development of the CODEX (Cologne digital excavation) protocol, set up and steadily improved by the University of Cologne (Sauer in review).

The site is situated south of Naumburg (Saxony-Anhalt/Germany) as part of a large number of Magdalenian occurrences in the region, with the well-known site of Saaleck only some 300 metres away. Along with abundant lithic and organic finds, settlement features, such as pits and fireplaces were preserved at numerous Magdalenian sites in the region. This cluster of caves, rock shelters and open-air sites thus allow for investigations into land-use patterns of late Pleistocene hunter-gatherer groups. Bad Kösen-Lengefeld in particular offers an assemblage of lithic finds, faunal remains, limestone slabs (some of them ornamented with animal engravings) and a diversity of settlement features.

Since a recently published monograph presented the findings (faunal remains and lithic artefacts) of the southern and northern part (Richter/Uthmeier/Maier 2021), the next volume will focus explicitly on the central part and the connected settlement features of the site. One of us (D.B.) will start his master thesis focusing on a roughly circular structure of small pits – most of them presumably postholes (Uthmeier/Richter/Maier 2021) – and the question how GIS-tools can help understanding such features. The planned research strategy aims at deciphering possible contemporaneity of pits (arranged into synchronous groups), internal stratigraphies of single pits (divided into multiple phases of function and refill) and settlement-wide relations among the features. Bad Kösen-Lengefeld therefore offers the opportunity to observe human settlement behaviour and to eventually refine the methodology of intra-site archaeological studies. We expect the use of GIS-tools to offer new perspectives derived from available data and, at the same time, an evaluation of potential dwellings or centres of activity at the site, with possible implications on Magdalenian settlement archaeology as a whole. Finally, we hope to further refine the toolkit, promoting the settlement archaeology of Upper Palaeolithic camp sites.

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Blanks and chunks - analysis of the lithic assemblage of the Middle to Upper Paleolithic site of Feldberg "Steinacker"

The open-air site of Feldberg "Steinacker", South-West Germany, is located between the Upper Rhine valley and the Black Forest near Freiburg. It was discovered in the late 1960s and was mainly known for its rich assemblage of surface finds of Upper Paleolithic age, characterized by the presence of Font-Robert points. As the site is situated in the range of deposits rich in high-quality chert material, known as so-called "Bohnerzhornstein". The assemblage is almost exclusively made of this raw material.
However, as the high number of surface finds also reflect the ongoing loss of archaeological substance, an international project team conducted four excavation campaigns between 2018 and 2021 in order to investigate the site preservation as well as to yield lithic finds from datable stratigraphic contexts. The excavated lithic assemblage comprises over 3000 lithic objects from layers of Middle to Upper Paleolithic date. For the Upper Paleolithic strata, artefacts are made from local chert material, reflecting the surface finds. In contrast, artefacts of Middle Paleolithic date seem to be made of other raw materials, which hints to differing procurement strategies. Orientation of finds as well as surface preservation attest that the lithics are found partly in situ, while some parts of the stratigraphy are disturbed by periglacial processes. The assemblage shows characteristics of a knapping site, with a small number of tools and clear dominance of unmodified blanks and knapping debris. This emphasizes the role of raw material acquisition at the site. At the lower part of the slope with preserved loess layers, finds can be associated with anthropogenic occupations mainly of Gravettian age. At the upper part of the slope in the range of the surface find concentration, finds stem from lower strata and are mostly a result of natural processes (e.g. frost). Use-wear analysis carried out on these frost chunks however revealed an opportunistic usage of these natural fragments, showing a complex picture of assemblage formation and human occupation at the site.

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Lion (*Panthera leo* ssp.) in European Upper Palaeolithic: insights from Vale Boi assemblage

Osteological remains of the so-called cave-lion (*Panthera leo spelea*) is common in Upper Paleolithic archaeological sites across Europe. However, his low abundancy within zooarchaeological assemblages is frequently interpreted as result of carnivore accumulations (e.g., Davis 2022). Those remains that exhibit anthropogenic marks, such as cut marks, are interpreted as result of human exploitation of the animal skin. Nevertheless, the human hunting of such a large carnivore was never exploited in the scope of the human behavioural significance. Herbivores are much easier to hunt, and they are the main source of food for Upper

Palaeolithic communities. Hunting a lion, or other large carnivores, evolves more investment in time, preparation (including technological efficiency of the weaponry), and skills. On the other hand, lion have a wide representation in some of the most important painted caves of Europe (e.g., Grotte Chauvet) (Chauvet et al. 2001) and it is also represented in small figurines (e.g., Conard 2003) assuming a cultural (or symbolic) meaning for the communities.
Considering the small collection dated from Gravettian and Solutrean times of lion remains from Vale Boi (Southern Portugal), all metapodials and phalanges, without any anthropogenic marks (Manne 2010), authors wish to interpret the circumstances of the inclusion of such remains into the archaeological assemblage. The aim is to explore the cultural and social status of the species and the anatomical parts represented in the assemblage, parallelizing ethnographic information's of historical and modern hunter gatherers. Lions are an important species for hunter gatherers with quite significant lethal power (Alves 1999). Manipulating parts of that animal (as representative of the whole animal – pars pro toto principle) to take place in ritualistic and divinations activities (e.g., to guarantee good hunting or the balance of the landscape); holding bones as amulets for protection, are some of the paths to be explored in the poster.

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Exploring the role of fish in the Schmiech Valley (Swabian Jura) during the Magdalenian

The Swabian Jura (southwestern Germany) is a crucial region for Paleolithic studies, particularly for the Middle Paleolithic and the evolution of the Upper Paleolithic. Several Paleolithic sites in both the Ach and Lone valleys have been the subject of intensive studies for the last 150 years.
The current study presents a zooarchaeological analysis of fish remains from two Magdalenian sites: Schmiechenfels and Hohle Fels Hütten in the Schmiech Valley of the Swabian Jura. This is the first detailed analysis of this material besides its early mention in Die diluviale Vorzeit Deutschlands (Schmidt, 1912). Schmidt (1912) described the presence of fish scales only at Hohle Fels Hütten, indicating that they belong to the northern pike (*Esox lucius*) with no more details.
Our study expands on this initial observation as we described the presence of two taxa in Hohle Fels Hütten and, for the first time, the presence of four taxa in Schmiechenfels. The fish assemblages provide valuable data on the patterns of exploitation, taphonomy, and aquatic palaeoenvironment conditions at both sites during the end of the Upper Palaeolithic. Only freshwater taxa are present in the assemblages, such as grayling (*Thymallus thymallus*), burbot (*Lota lota*), bullhead (*Cottus gobio*), and northern pike (*E. lucius*). All of the species are

characteristic of a mature river system with permanent, oxygen-rich, cold running waters. We observe different patterns at both sites. At Hohle Fels Hütten, the fish assemblages have a non-anthropogenic origin, and birds of prey were the most probable agents of accumulation. At Schmiechenfels, however, several indicators, such as the large size of the fish, anthropogenic marks, and the clear preferential selection of burbot, indicate that the Magdalenian inhabitants of the site exploited this species as part of their diet. These results support the rich body of data on fish exploitation during the Middle and Upper Palaeolithic of the Swabian Jura (Torke, 1981; Conard and Malina, 2003; Conard et al., 2013; Böhme et al., 2019; Bertacchi et al., 2021; Blanco et al., 2021).

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Living and working on the slope - News from the Middle- and Upper Paleolithic open air site Feldberg "Steinacker"

The Palaeolithic open-air site of Feldberg "Steinacker" is located between the Upper Rhine valley and the Black Forest near Freiburg in South-West Germany. Since 2018, an international project team conducted four archaeological excavation campaigns, as well as two geoarchaeological field schools. Their main purpose was to gather new data for the understanding of the local palaeorelief, post depositional processes, and traces of human activities during the last 120,000 years.
Electromagnetic and geoelectric prospection, as well as sedimentological drilling revealed a complex subsurface palaeorelief that was very different from the current topography, while micromorphology and optically stimulated luminescence dating confirmed that our excavated archaeological stratigraphy is partly intact. This could be shown by a possibly in situ knapping area of Gravettian age. Furthermore, the excavations revealed a Middle Palaeolithic occupation, making "Steinacker" the only open-air site in South-West Germany where a Middle to Upper Palaeolithic stratigraphy is still preserved so far. However, taphonomy and archaeological record of the site are characterized by particularly complex processes and the analysis of important issues such as site function and mobility is still at the beginning.
Within our presentation, we will focus on the results of the last two campaigns, by talking about new survey strategies for open-air sites with comparable topography, which are still a desideratum in South-West Germany and elsewhere. Furthermore, the site is in danger of losing more and more archaeological substance, and hence potential archaeological layers. This is impressively reflected by the high number of surface finds collected by local artefact gatherers every year, while our current results indicate that there are only a few areas left with undisturbed UP horizons. This development will be additionally boosted in the future by climate-driven heavy rainfall events, making multidisciplinary surveys a necessary fast and effective tool to determine areas of archaeological interest to focus on in future research.

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Acquisition and technological management of lithic resources during the Upper Palaeolithic in the Altmühl Valley: the case of the Abri I im Dorf (Neu-Essing, Bavaria, Germany)

The Lower Altmühl Valley hosts one of the most important clusters of Palaeolithic archaeological sites in southern Germany. This concentration is especially relevant in the stretch between the villages of Essing and Kelheim, where prominent sites such as the Klausenhöhlen and the Sesselfelsgrotte are found, among others. In the aforementioned village of Essing, only a few meters from the Sesselfelsgrotte is the site of the Abri I im Dorf. This rock shelter, excavated in 1959 by a German-American team led by Olaf Prufer and Lothar Zotz, includes a significant sequence for the understanding of the Upper Palaeolithic settlement of the Altmühl Valley and, specifically, the exploitation and management of lithic resources in the region. According to Prufer and Zotz's excavation, the sequence includes a single archaeological horizon in layers E1 and E2, recently dated to the Gravettian. However, these radiocarbon dates obtained from bone remains from the campaign of 1959 have to be considered with caution, as it has to be Prufer and Zotz's interpretation of the stratigraphy, given the lax excavation methods used. In any case, the deposit from the Abri I im Dorf provided a well-preserved remarkable lithic and osseous assemblage, as well some faunal remains (Prufer, 1961).
This presentation aims to summarise the results obtained during our recent re-analysis of the lithic assemblage. In particular, we will focus on the issue of the acquisition and technological management of lithic raw materials. Among these, flint was the predominant resource. Around 80% of all flint remains originate from three local or regional sources in the Franconian Jura and the immediate Danube Valley. Among these, raw materials that can be related to the near Upper Jurassic "Paintener Wanne" basin, generally referred to as "Baiersdorf type" flint, stand out. Other important resources are those that correspond to outcrops in the Upper Jurassic "Abensberg-Pullacher Wanne" basin, usually named "Abensberg-Arnhofen type" flint. The origin of the third main group of resources could not be specified exactly, since they match the features of flints documented in different deposits in the Lower Altmühl and near Danube valleys. From the technological point of view, it is worth noting the systematic reduction of flint plaquettes from the aforementioned Upper Jurassic basin flints for blade and bladelet production. In most cases, these prismatic cores were reduced following a bidirectional pattern. The exploitation followed the natural shape of the plaquette, configuring the flaking surface longitudinally between both cortical planes. The blanks produced were modified, primarily, into backed pieces and burins.

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Middle Pleistocene technological behaviour as viewed from the travertine site Cannstatt "Bunker" (South west Germany)

Apart from the anthropological find of a mandibula at Mauer (Heidelberg), the earliest archaeological evidence of south-west Germany are the travertine sites of Stuttgart (Bad Cannstatt, Münster) from the Upper middle Pleistocene. "Bunker", the oldest of a total of at least three sites, which was excavated in the 1980s by the State Office for Cultural Heritage Baden-Württemberg under the direction of E. Wagner, revealed the richest assemblage of lithic and faunal remains. The Middle Pleistocene travertines, of the site "Bunker" were assigned to the Holsteinian Interglacial (Geyh et al. 1999) or the Samerberg Interglacial respectively (Schatz 2007), correlated today with the MIS 9 between 330 000 and 310 000 years B.P. (Geyh & Müller 2005; Litt et al. 2007). This places "Bunker" in a similar time frame as other important sites of the upper Middle Pleistocene in Germany such as Bilzingsleben and Schöningen. While the faunal remains have been extensively studied (Schatz 2007), the lithic artifacts were described rather superficially in E. Wagner´s monography on the site (Wagner 1995). Wagner classified the assemblage mainly as a pebble tool industry with some side-scrapers and cores.
We re-analyzed the lithic industry of "Bunker" more differentiated to verify the initial assessment and to characterize the material in more detail. Overall, stone tool production at the site is focused on flake production and on the manufacture of unifacial and bifacial side-scrapers on pebbles in the manner of unifacial and bifacial choppers. Besides very simple flake cores, there are also more sophisticated core concepts with multiple reduction surfaces proving longer reduction sequences. It also must be stated that the existence of a pebble tool industry in the conventional sense, as perhaps E. Wagner had it in mind, must be questioned. We conclude that a classification of tools made on pebbles, as in the case of the bunker, according to the conventional terminology is not satisfactory. We also noted, that, as with many Lower Paleolithic industries, the classificatory boundaries between cores and tools made on pebbles viewed with naked eye are fluent. With Bunker, especially based on the of technological characteristics and features of the lithic artifacts, we now have another assemblage for a better knowledge of the Middle Pleistocene sites in Central Europe.

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Tahya 3: A new open-air site and Its significance for the Middle Stone Age in Eastern Morocco

The site of Tahya 3 site is located around 6 km from the town of Guefaït, on the left bank of the Za River (Jerada Province, Eastern Morocco). It was discovered during geo-archaeological

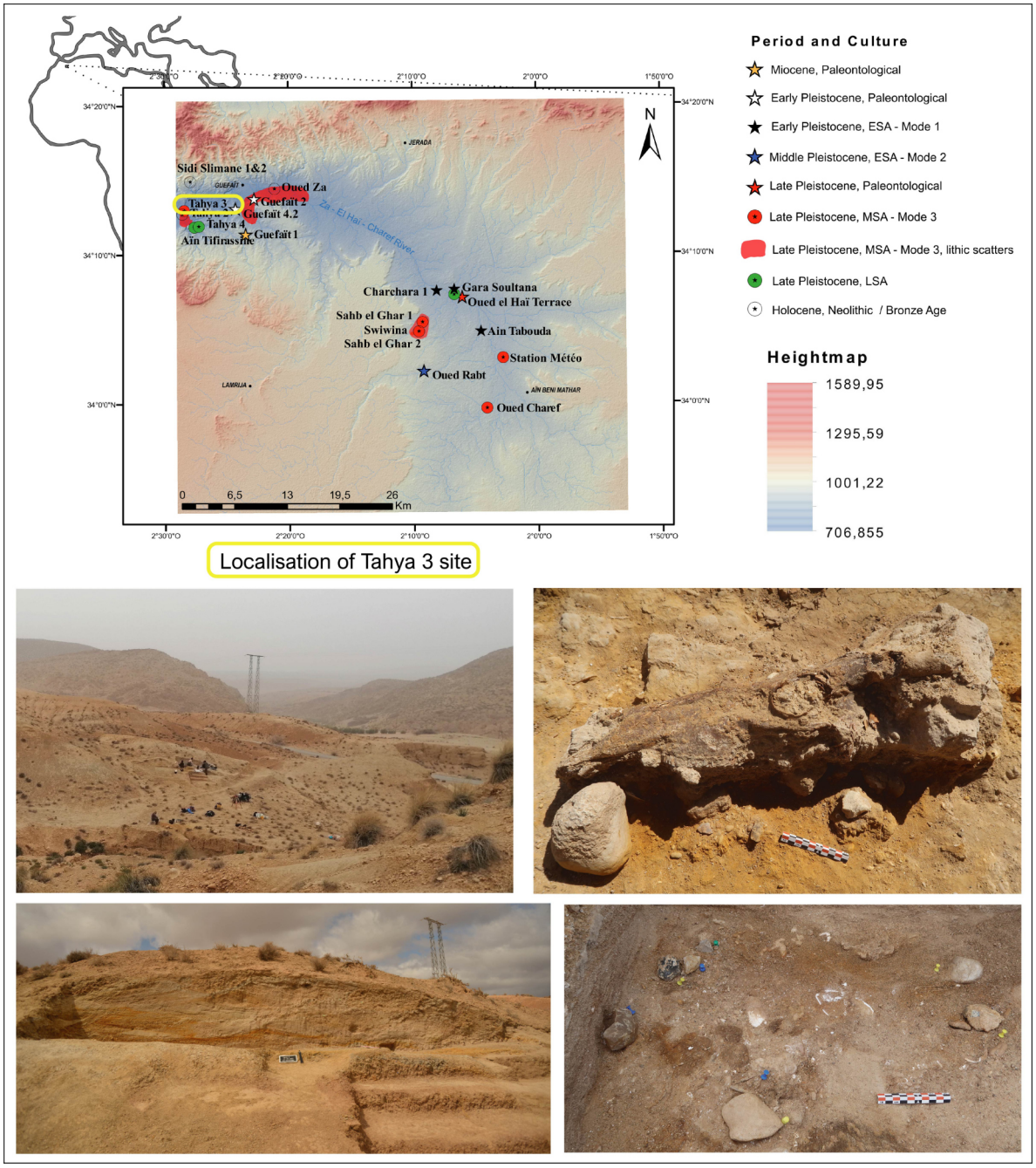

Fig.1. Localization of Tahya 3 site (Map. J.I. Morales) and general views of the site during the excavation in 2022 (Photos ©IPHES-CERCA & UMP)

surveys in 2019 when a 1 m^2 test-pit was performed allowing the discovery of faunal remains belonging to *Alcelapus* cf. *buselaphus,* lithic pieces (flakes and hammerstones) and numerous shells (*Melanopsis* sp., *Teodoxus* sp. and *Unio* sp.), being the latter associated with the sedimentary fillings of the area.

Tahya 3 is in the aggradation sequence of a fill terrace consisting of sandy a gravelly channel bedforms. The sequence is about 30-35 m thick, developed from the El Hay River to the top of the sequence, located at around 805 m asl. The site is located at about 10 m above the bottom of the sequence, and it is preserved in the lower part of a fluvial channel composed by cross-bedded gravels and sands.

In 2022, we expanded the excavated area to 16 m^2, which led to the identification of two archaeological levels were over 500 archaeological remains were recovered. The lithic assemblage's technological traits indicate an attribution to the Middle Stone Age period. The assemblage comprises mainly good-quality chert and limestone, with fragmented reduction sequences and flakes and retouched tools as the primary technological categories. The excavation also uncovered flake-to-core refits, providing evidence of in situ production of stone tools. Faunal remains associated with the stratigraphy include various taxa, such as Rhinocerotidae, *Alcelaphus* cf. *buselaphus*, *Equus* sp., *Gazella* sp., *Ammotragus* cf. *lervia,* large Bovinae, small carnivores, leporids, and birds.

During the excavation, spatial clusters of charcoal were discovered, which, coupled with evidence of heat damage on animal and stone remains, suggests the possible existence of fireplaces associated with past occupations. However, due to the restricted excavation area and possibly post-depositional disturbances related with fluvial activity, these fireplaces have yet to be positively identified.

Based on the current preliminary analysis, the geological position of the site and the technological features of the lithic assemblage, we provisionally attribute this site to the Upper Pleistocene and the Middle Stone Age chrono-cultural period. To confirm these findings, systematic sampling was conducted, and different radiometric methods (^{14}C AMS and OSL) were applied. The results of these analyses are currently being processed.

Our work presents the first interdisciplinary results from a new open-air site in Eastern Morocco. These findings will be important in our understanding of the subsistence strategies, the settlement patterns, and the territory management of *Homo sapiens* in this region.

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New finds and insights from islands at the edge of the world – did stranded whales attract Final Palaeolithic foragers to northern Jutland during the Allerød?

Beginning with the iconic find of a large tanged point at Nørre Lyngby back in 1915, it has been known that Late Palaeolithic people visited Vendsyssel – today the northernmost extremity of mainland Denmark – during the Allerød interstadial (~14.000-12.700 BP).
Since then, new finds of Final Palaeolithic flint have been made, and we here describe some of the most recent ones from lithic surface scatters around Hollendskær near the town of Bjergby. These include flakes, scrapers, tanged (Wehlen) scrapers, large tanged points as well as a broken backed point (Federmesser). Placing these and other known Final Palaeolithic finds in the wider region on the most recent palaeogeographic maps for the area clearly indicates that there were island occupations situated close to the ancient shore – they were quite literally located on islands at the edge of the world.
This new topographic mapping and sea-level corrections for the Late Glacial landscape of southern Scandinavia confirm and qualify earlier hypotheses that coastal resources may have attracted humans to this area (e.g. Fischer 2012), and underline that Late Glacial Vendsyssel was as an archipelago located about 25km from mainland Jutland. This realization, together and the new surface-found artefacts from the Hollendskær area, provoke the question of what brought human foragers to this otherwise ecologically marginal area during the Allerød interstadial. Only few plant species and terrestrial animals such as reindeer, horse, and polar bear are known to have been present there during this time. In contrast, there is a marked clumping of whale bones from the area, especially from bowhead whales (*Balaena mysticetus*). These remains have been dated to the Late Glacial and especially to the Allerød (Aaris-Sørensen et al. 2010), thus perhaps indicating a more important role of coast-oriented subsistence strategies than previously assumed. In all of southern Scandinavia, whale strandings were and are most common in northern Denmark (e.g. Kinze 1995) and they seemingly increase during times of climate change (cf. Mannino et al. 2015). While terrestrial mammals may have been the initial pull factor bringing people to this northern extreme, stranded whales may have acted as an additional ecological attractor.
We here describe the new lithic find complex from Hollendskær, place the assemblages into the broader Final Palaeolithic context of southern Scandinavia and discuss the possibility of opportunistic incipient coastal resource exploitation (Hellerøe et al. 2022).

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Decoding the Middle/Upper Palaeolithic Transition in NW Iberia: Insights from the site of Cova Eirós

The transition from the Middle to the Upper Palaeolithic in the Iberian Peninsula has been a topic of debate due to its impact on understanding the extinction of *Homo neanderthalensis* (Maroto et al., 2012; Zilhão, 2021). NW Iberia is an important area for studying the Neanderthal demise and the first dispersal of *Homo sapiens*, but this region is defined by a lack of preservation of organic materials and limited application of conventional Upper Palaeolithic typological schemes due to its Palaeozoic substratum and limited raw material availability.
This paper sheds light on the Middle to Upper Palaeolithic transition in NW Iberia by focusing on the stratigraphic sequence of the Cova Eirós site, specifically on the archaeological records from Levels 2 (Upper Palaeolithic) and 3 (Middle Palaeolithic).
Cova Eirós is located in the municipality of Triacastela (Lugo, Spain) at an altitude of 780 meters above sea level and 25 meters above the Bezcos stream. The cave has a length of 312 meters, an entrance opening 2 meters high and 3.5 meters wide. In the 1980s, several paleontological excavation campaigns were carried out to recover remains of ursids. In 1993, the first archaeological excavation campaign was carried out, leading to the identification of archaeological levels attributed from Middle to Upper Palaeolithic. From 2008 onwards, a new cycle of research began that has revealed a sequence of Palaeolithic occupations during the Upper Pleistocene. Moreover, in 2011 Palaeolithic engravings and paintings were discovered and dated more than 9000 years old (Steelman et al., 2017). This was the first known evidence of Palaeolithic cave art in NW Iberia.
Our study focuses on the analysis of archeo-paleontological and lithic artefacts from Levels 2 and 3 of Cova Eirós, recovered during fieldwork between 2008 and 2014. The radiocarbon dating of Level 3 suggests that it post-dates the final Mousterian period in northern Iberia and is contemporary with the late Châtelperronian and the initial Aurignacian in the Cantabrian region. The Middle Palaeolithic in NW Iberia is characterized by the use of local raw materials and small retouched flakes. Meanwhile, the radiocarbon dating of Level 2 indicates advanced stages of the Aurignacian, though it is difficult to differentiate between the early and evolved Aurignacian based solely on typology (de Lombera-Hermida et al., 2021).
The results of the study have important implications for the Middle-Upper Palaeolithic transition in the Iberian Peninsula. The radiocarbon dates suggest that Neanderthal populations

occupied the site during the late stage of MIS 3, in line with the late survival of Neanderthals in mountain regions of North Iberia (Baena Preysler et al., 2019). The results also indicate adaptations in Neanderthal subsistence and territorial strategies in response to fluctuations during MIS 3, reflecting the short duration, seasonal nature, and high mobility of these populations.

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Comparing spatio-temporal dynamics of Neanderthals and Anatomically Modern Humans in the Cantabrian Region of the Iberian Peninsula

The Cantabrian Region of the Iberian Peninsula offers rich archaeological evidence pertaining to late Neanderthals and early Anatomically Modern Humans (AMHs). It is a key area for understanding the demise of Neanderthals, which was rapid (Higham et al., 2014; Mellars, 2004) and coincided with the arrival of AMHs. By the same token, there has been intense debate about the possible causes of this disappearance. Some hypotheses highlight interaction between the two species. One group may have interfered with the other resulting in a competitive advantage for one group by limiting access to resources or living sites, or via interactions that affect the birth rate, death rate, carrying capacity, hunting efficiency, or other key behavioural parameters (Roberts and Bricher, 2018).

In the present study, we apply statistical analytical techniques to the available corpus of radiometric dates in order to reveal long-term palaeodemographic trends. These approaches are related to the assumption that changes in the frequency of radiocarbon dates are related to anthropogenic events; in this manner, radiocarbon dates may be deployed as a proxy for relative past population change (Crema, 2022). Challenges related to radiocarbon dates and difficulties surrounding the analysis of past population changes abound, however. Radiocarbon dating of samples older than 40 thousand years is difficult; in some cases the dates obtained come from old excavations with unclear contexts. To mitigate these source-critical factors, we have performed an exhaustive review of all the pertinent dates selecting only those confidently placed between 45-30 ka years ago. Specifically, we calculated Summed Probabilistic Distribution (SPD) of carefully curated, calibrated radiocarbon dates. Comparing the summed density fluctuations of dates associated with both populations, we can identify the periods of increased or depressed population density that, in turn, may correspond to moments of arrival of one population and decline of the other. We will use these results to reconstruct long-term demographic trends across Neanderthal and AMHs populations. This then provides a platform for addressing the relationship between them as well as between external forcing factors such as climate change.

The present study demonstrates the importance of computational archaeological approaches since these can be an important tool for exploring and testing specific hypotheses. Also, our study presents methodological advances applied to the study and interpretation of the Palaeolithic period. Finally, we contribute a fresh, regional perspective to the current debate on the patterns, processes and causes of the disappearance of Neanderthals in SW Europe.

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Ungulates seasonality and Epipaleolithic hunter-gatherer mobility at Balma del Gai (north-east Iberia): A tooth wear analysis

Balma del Gai (Moià, NE Iberia) is at 760 m a.s.l. and is located 50 km from the current coastline. Two chronological-cultural phases were identified in Level I based on the materials recovered and radiocarbon dating. The lower layer, containing Epimagdalenian or Microlaminar lithic complex artefacts, is dated to 13,480–13,233 cal yrs BP (OxA-29608: 11,440 ± 50 yrs BP). The upper layer contains lithic industry of the Sauveterroid complex dated at 9,786–10,189 years BP (Gif-10028: 8930 ± 140 years BP) (Cuenca-Solana et al., 2021). The lithic homogeneity throughout Level I of Balma del Gai allows to place it in the Epipaleolithic occupations of the North-eastern Peninsula in a transition period between the Pleistocene and the Holocene (García-Argüelles et al., 2012; Lloveras et al., 2020).
The taxonomic diversity of the marine malacofauna recovered provides evidence of the relationship of the human groups of Balma del Gai with the coastal areas (Lloveras et al., 2019). This evidence raises the hypothesis of possible seasonal occupation of the site. To test it, we studied the variability in the diet of the hunted ungulates to estimate the duration of the occupations and therefore discern between foragers and collectors regarding the mobility model that hunter-gatherer groups of Balma del Gai had during the Epipaleolithic. For this purpose, we sampled all the teeth available from the site and studied them through dental mesowear and microwear analyses.
All the ungulates displayed browser dietary traits at the time they were killed. The low variability of the microwear pattern observed for the red deer and the Pyrenean chamois diet showed that they died within a short period of a season or less. The browsing dietary traits of the red deer at the time of death combined with archaeological evidences suggest that the occupation took place during late summer and especially autumn. This points to a forager mobility pattern for the hunter-gatherer groups of Balma del Gai, that could be reproduced at other sites of the Mediterranean coast and pre-coastal area of the north-east of the Iberian Peninsula during the Epipaleolithic period.

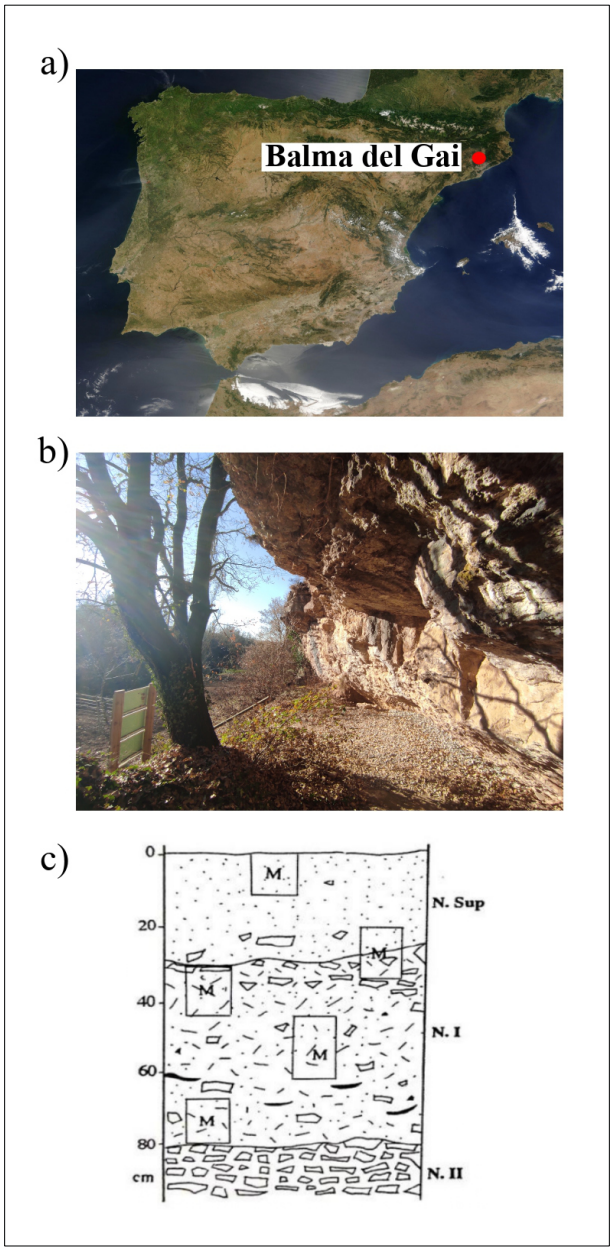

Fig.1. a) Location of Balma del Gai. b) General view of the rock shelter. c) Stratigraphic development established through archaeological intervention at the site.

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Leonor Filipe[1], Anna Rufà[1,2], Joana Belmiro[1], João Cascalheira[1] & Célia Gonçalves[1]

Interpreting fire structure use through mammal remains: preliminary results from the Cabeço da Amoreira shell midden

The Muge shell middens of the Tagus basin (Santarém) are some of the most notorious examples of complex resource exploitation in Portugal—they portray the shift in Mesolithic and Early Neolithic subsistence strategies through an extensive collection of both terrestrial and aquatic fauna of which a considerable amount remains to be analyzed (Bicho et al., 2013; Bicho et al., 2010).

In this study we present the preliminary data of the mammal fauna found in, or associated to , Feature C of the Cabeço da Amoreira shell midden in Muge during the 2016, 2018, 2019, and 2022 archaeological campaigns. Feature C has been interpreted as a possible fire structure due to what seems to be a high concentration of charcoals, fire-cracked rocks, and faunal remains in the Mesolithic levels of the shell midden.

A brief overview of the artefact dispersal confirmed that the profile decay was an active agent in the scattering of archaeological materials and that the high concentration of those materials is due to their comparatively large size. In addition, it was possible to successfully refit some of the remains of medium size taxa with the purpose of recontextualizing the fauna scattered through profile decay but this did not provide sufficient information regarding bone dispersal. Most of the mammal assemblage from Feature C has been examined in terms of anatomy, taxonomy, and taphonomy.

The preliminary results show that the most common taxon is the European rabbit (*Oryctolagus cuniculus*), followed by the red deer (*Cervus elaphus*). A high variety of taphonomic modifications— both of anthropic and natural origin— have also been found, the most recurrent being root etching, thermal alterations, and digestion marks.

So far, these results suggest two separate moments of activity. The first moment relates to the structure's use by the Mesolithic community and is represented by burnt faunal remains, in addition to less frequent modifications such as notches, percussion, incision, and saw marks. The second moment corresponds to the abandonment of the structure and the subsequent presence of scavenging animals characterized by high frequencies of digested osteological remains, as well as some pits and punctures found in association with Feature C.

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Viktoria Fries[1], Janos Puschmann[1], Jürgen Richter[1], Andreas Maier[1] & Patrick Roberts[2,1]
Isotope analysis of animal teeth from the Magdalenian site of Bad Kösen-Lengefeld

The Magdalenian site of Bad Kösen-Lengefeld was discovered in 1954 and has been under investigation by members of the University of Cologne and the Friedrich-Alexander-Universität Erlangen-Nürnberg in close cooperation with the Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt for more than ten years. To date, an area of 111m² has been excavated. The faunal assemblage is dominated by horse and reindeer, with their distinct spatial distribution giving rise to the hypothesis that each species represents chronologically-separated hunting events, maybe during different seasons. To gain a better understanding of the relationships between these species and their human hunters, and thus of the rhythm of occupation at the site, we applied stable carbon and oxygen analysis, and strontium isotope analysis, to horse, reindeer, and fox teeth. Sequential sampling of reindeer and horse teeth provides insights into intra-annual changes in diet, environment, and animal mobility. We present the preliminary results of these investigation in the context of Magdalenian land-use patterns in Eastern Germany and the potential of this methodology to provide new insights into Pleistocene human-prey interactions.

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Jeanne Marie Geiling[1,2], Angel Blanco-Lapaz[3,4], Elisa Luzi[4] & Nicholas J. Conard[2,3,4]
Revisiting the Schmiech Valley (Swabian Jura): new taphonomic faunal studies of Magdalenian occupations in Hohle Fels Hütten and Schmiechenfels

This paper reviews the functional and seasonal interpretation of late Paleolithic human occupations in the Schmiech Valley with new taphonomic studies of faunal remains from Magdalenian occupations at Hohle Fels Hütten and Schmiechenfels. A re-analysis of the sites in the Schmiech Valley, a tributary to the Ach Valley, contribute to our understanding of the wider Magdalenian settlement systems, including archaeologically important sites such as Hohle Fels near Schelklingen, Sirgenstein and Geißenklösterle in the Swabian Jura.
The sites in the Schmiech Valley are also noteworthy for their proximity to the Schmiechen Lake (Schmiechener See). Hohle Fels Hütten and Schmiechenfels, both excavated in the summer of

1906, stand at the beginning of a series of excavations in the Swabian Jura by R.R. Schmidt, the founder of the institute of Prehistory in Tübingen. Despite the early excavation date, the quantity of remains of micro-vertebrates, including fish, birds, and rodents, shows how relative precisely Schmidt conducted his excavations. The faunal assemblages provide a small but diverse range of macro- and microvertebrate species.
The restricted physical size of the caves and low density of artifacts from these layers suggest use of these locations as short-term hunting camps for small human groups of people during the late Magdalenian (Hahn, 1995; Karle, 1997; Schmidt, 1912).
We studied the faunal materials from two layers in Hohle Fels Hütten and five layers from Schmiechenfels. The lower yellow layer (gelbe Kulturschicht) in Hohle Fels Hütten contains a circular hearth with a diameter of around 80cm surrounded by stones. The lithic assemblage includes about 200 artifacts. The lithics include finally retouched blades and burins. Horse, reindeer, hare and ptarmigan dominate the macrovertebrate assemblage, along with fewer remains of fox. The upper grey layer (graue Kulturschicht) of Hohle Fels Hütten overlies the gelbe Kulturschicht. This layer contains among several small hearths, a small assemblage of microlithics as well as retouched blades and bladelets together with multiple burins. The fauna from the upper layer includes remains of horse, reindeer, polar fox, and ptarmigan as well as red deer and wild boar, indicative of environmental changes at the end of the Ice Age.
Schmiechenfels has five layers (I-V) with small lithic assemblages, including retouched blades, bladelets, and burins. These layers contain horses, red deer and reindeer (Schmidt, 1912), with different quantity of remains of birds, fish and microfauna. With the presence of small game (hare, birds) and small carnivore species in these records, we need to consider which taxa were the results of human exploitation.
The paper also addresses the role these sites played in the Magdalenian subsistence and settlement dynamics and beyond the Schmiech Valley. We conducted a detailed taphonomic analysis of the faunal remains from Schmidts excavations to answer our questions. Our analysis identified macrovertebrate specimens to species or into size classes, and we observed anthropogenic and natural modifications microscopically. In addition, we differentiated carnivore and digestion marks from human made cut and impact marks and recorded the bone preservation and breakage patterns.
These results confirm that horse, reindeer and hare were the main prey species in the southwestern German Magdalenian. Horse and reindeer specimens show typical marks from disarticulation, defleshing and marrow extraction. Small game species were probably the result of alternating cave use by humans and carnivores. Additionally, some hare and ptarmigan specimen show cut and others show bite and digestion marks from small carnivores, probably fox.
The faunal assemblage from Hohle Fels Hütten is highly fragmented, with occasional cut marks on reindeer and horse bones. The Schmiechenfels large game species preserve indications of disarticulation, defleshing, and systematic marrow extraction from long bones, including reindeer phalanges. In Schmiechenfels, we also found cut marks on ptarmigan and duck bones and deep engravings on a hare tibia used for making needles. Many of the bird bones from both sites, however, show bite marks indicating accumulation by carnivores.
With this taphonomic analysis, we obtained detailed insights into the alternating use of the caves by non-human predators and the Magdalenian inhabitants of the region. Subsequently, we are revisiting the seasonal interpretation of human occupations in summer due to the presence of Anas crecca (a migratory bird). Finally, we discuss our results within a regional settlement model and context of faunal data from Magdalenian sites such as Hohle Fels near Schelklingen, Geißenklösterle (Münzel and Conard, 2004; Napierala et al., 2014) in the Ach Valley.

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Jeanne Marie Geiling[1,2], Ana B. Marín-Arroyo[1], Manuel R. González Morales[3] & Lawrence Guy Straus[1,4]

Lower Magdalenian Human occupations of the montane site El Mirón (Cantabria, Spain)

We reconstruct Cantabrian Lower Magdalenian (c. 19-18 cal kya) subsistence strategies from El Mirón Cave (Cantabria, Spain), a montane but peri-coastal site with well–preserved, faunal assemblages (González-Morales and Straus, 2009). This large, strategically located cave contains a nearly complete, archeologically rich, well-studied stratigraphic sequence from the late Middle Paleolithic to the Bronze Age.
El Mirón, long-ignored by regional archeologists, has now been shown to have great importance for the Paleolithic and post-Paleolithic records of Europe as a result of the excavations and multidisciplinary analyses directed by L.G. Straus and M.R. González-Morales since 1996. Mobile hunter-gatherer visits to this cave in the high-relief interior of northern Atlantic Spain repeatedly occurred during the immediately post-LGM period, with long-term, multifunctional, residential base camps represented by thick occupation horizons.
An exhaustive study of the rich faunal assemblages allows us to reconstruct in detail the accumulation history, human subsistence and contextualized settlement systems by taxonomic and taphonomic analyses of macro-mammal remains. A dual game exploitation strategy, with abundant Spanish ibex (*Capra pyrenaica*) hunting primarily in winter-spring, was combined with red deer (*Cervus elaphus*) hunting mainly in late summer/autumn. Animal exploitation strategies were intensive, with skinning, disarticulation, and defleshing marks regularly observed along with impact marks and smashing spongious bones. These marks imply regular skin, meat, marrow and grease extraction from hunted animals.
Our new data point to the existence of cold-season montane settlements (albeit within about 30 km of the glacial shore) during the Lower Magdalenian before a clear shift in the cave's use to mainly the warmer months in the Middle and Upper Magdalenian and Azilian (Marín-Arroyo et al., 2023). This new evidence partially disproves the prevailing models of Upper Paleolithic

forager settlement-subsistence systems for the Cantabrian region of Spain proposed by K.W. Butzer and L.G. Straus in the 1980s, who argued cold season occupations were restricted to coastal areas (Butzer, 1986).
The results indicate that major residential base camps in the montane interior were as integral to Lower Magdalenian band territories for logistical and residential purposes as such contemporaneous lowland coastal plain sites as Altamira or El Juyo. The extraordinary preservation of the El Mirón faunal assemblages, with thorough contextualization by complementary studies such as the osteological, stable isotopic, dental microwear and genetic evidence from the Lower Magdalenian human burial (the so-called "Red Lady") (Straus et al., 2015), all make this study relevant for understanding hunter-gatherer economic behavior in this classic region and beyond.

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Jacopo Gennai[1]

Follow the river: the Pontecosi Upper Palaeolithic site in NW Tuscany (Italy)

Pontecosi is a Late Pleistocene open-air site on a riverbank of the Serchio river (NW Tuscany, Italy). It was exposed in 1996 by construction works and a rescue excavation ensued in 1998-2000, leading to the discovery of lithic artefact concentrations in loamy-silty sediments. No organic material was preserved, except for rare and dispersed charcoals. A charcoal concentration, without associated artefacts, was found in a pit. The 14C dating gave a Late Mesolithic age (6740 ± 70 BP).
Instead, the artefacts' techno-typology suggests a much earlier chronology, i.e. late Aurignacian. The major feature supporting this attribution is the presence of small, carinated artefacts, similar to nosed endscrapers (Dini et al. 2010). Most of the knapped stone assemblage suggests the use of raw materials available from primary and secondary sources in the site's surroundings. Moreover, a minor percentage comes from non-local sources.

In the framework of a new research project (MobiliTy), the Pontecosi assemblage is being re-analysed to provide new insights into technology and raw material economy at the site. The general scarcity of Aurignacian/early Gravettian sites in Central Italy makes Pontecosi of great importance to understand the peopling of this area during the Early Upper Palaeolithic.
Preliminary considerations on the techno-typology and the raw material use will be presented. The carinated artefacts are part of a strategy to produce microbladelets from narrow surfaces. The presence of microgravettes and only one Dufour bladelet show that the assemblage is probably of Gravettian tradition or at the boundary with the Aurignacian. The macroscopical raw material determination shows that at least two lithic raw materials are likely exotic or rare, due to their small occurrence and frequent curation.
Planned new surveys, raw material determination with a petrological approach, spatial analysis and new 14C dating will shed light on the Upper Palaeolithic occupation of Pontecosi and the surrounding region.

Acknowledgements:
I am thankful to Prof. Carlo Tozzi for sharing documentation and information about the Pontecosi site excavation. I am thankful to the SABAP (Soprintendenza Archaeologia, Belle Arti e Paesaggio) of Lucca and Massa Carrara for granting the study permit. Research is funded by the European Union's Horizon Europe research and innovation programme under the grant agreement No. 101061427 – MobiliTy.

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Fig.1. Examples of carinated cores from Pontecosi. Clockwise: carinated endscraper, small carinated burin, large carinated burin, combined small carinated endscraper and burin. (Photos J. Gennai)

Rebecca Gnau[1] & Jürgen Richter[1]

High-resolution analysis of the central hearth at the Magdalenian site of Bad Kösen-Lengefeld

The Magdalenien open-air site of Bad Kösen-Lengefeld (Saxony-Anhalt) was first discovered 1954 by V. Toepfer, W. Matthias und F. Waih. Since 2008, the site is excavated under the supervision of Prof. Dr. Jürgen Richter (University of Cologne) and Prof. Dr. Thorsten Uthmeier (University of Erlangen-Nürnberg) in cooperation with the department of historic preservation and archaeology in Saxony-Anhalt. The site of about 110 m² is divided in a northern, central and southern area (Richter et al. 2021).
The poster presents the results of my BA-thesis on the lithic inventory of the central hearth area using typological and technological data in a GIS analysis. The spatial patterns of the typological and technological evaluated lithics provide insight into different activity zones surrounding the central hearth. An important focus is also on the smaller features, some of which are currently interpreted as postholes, which are scattered around the hearth. With the help of the presented analysis a combined picture of the structures and lithic finds in the area can be given.

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Florian Gumboldt[1], Jürgen Richter[1], Andreas Maier[1] & Carsten Münker[2]

Isotopic analysis of faunal remains from Neanderthal sites in central and southern Germany – an outlook

As part of a pilot study on Late Neanderthal prey (set up since 2017 under the umbrella of CRC 806 “Our Way to Europe”), isotopic analysis is performed on faunal remains from five Neanderthal sites in central and southern Germany.
In order to elucidate particular Late Neanderthal contexts before the advent of Modern Humans, selection of sites and assemblages concentrated on the MIS 5c to MIS 3 time range, i.e., the early to mid Weichselian glacial. Here, sites located at larger distance to one another and in different landscapes and geological settings have been selected. In a first step and supported by an ongoing master thesis (Florian Gumboldt), we include samples from Buhlen in Hesse, Wallertheim in Rhineland-Palatinate, Lindenthaler Hyänenhöhle in Thuringia, as well as Große Grotte and Heidenschmiede/Heidenheim-Ottilienberg in Baden-Wurttemberg (Fig. 1).
The samples were provided courtesy of Landesmuseum Kassel, Historische Museen und Archiv Heidenheim, Naturhistorisches Museum Mainz/Landessammlung für Naturkunde Rheinland-Pfalz (Magazin Hechtsheim), Museum für Naturkunde Gera, and Staatliches Museum für Naturkunde Stuttgart – Museum am Löwentor (Sammlung Quartär). They consist of tooth and bone fragments from animals frequently hunted, such as bison, horse, and reindeer, and, as control group, from woolly rhino, which was rarely hunted. Except for those specimens with insufficient collagen preservation (Buhlen and Wallertheim), all remains have been radiocarbon dated to around 43.000 calBP or older at the Curt-Engelhorn-Zentrum Archäometrie gGmbH (CEZA) in Mannheim.

The goal of the master thesis is to examine the biographic mobility of the sampled individuals and to reconstruct their dietary and environmental conditions (by Sr, N, C and O isotope analysis) to draw conclusions about the living conditions of the latest Neanderthals in the investigated area. Furthermore, an innovative attempt will be made to date the faunal remains by uranium-thorium dating to receive age estimates which can either serve to control radiocarbon dating or exceed even the chronological limits of radiocarbon dating. Laboratory work is carried out by Florian Gumboldt and Carsten Münker and takes place at the Institute of Geology and Mineralogy at the University of Cologne.
This poster presents preliminary results on the measurements of the strontium isotopes and the biographic mobility patterns of the prey species and provides an outlook on the uranium-thorium dating.

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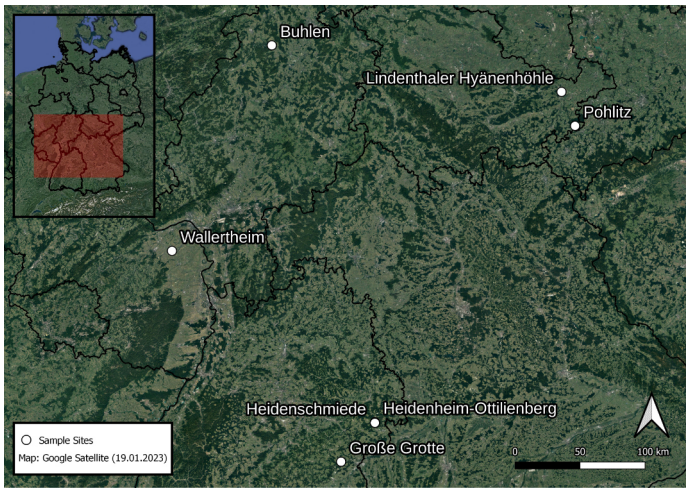

Fig.1. Geographic position of the sampled Late Neanderthal sites in central and southern Germany as well as the location of the woolly rhino from Pohlitz, which was radiocarbon dated additionally (Gumboldt 2023).

Hannah Huber[1], Yvonne Tafelmaier[2] & Patrick Schmidt[1,3]

Heat treatment of Middle Triassic Chert in the Early Mesolithic at Rottenburg-Siebenlinden

Evidence for heat treatment has been documented at multiple sites of the Beuronian, the Early Mesolithic of southwestern Germany. Thus far, unambiguous evidence in the Early Mesolithic has been restricted to one type of raw material, Jurassic Chert, and to cave sites of the Swabian Jura region.
At the open-air site Rottenburg-Siebenlinden 3-5, thermal alterations of Jurassic Chert and the locally more abundant Middle Triassic "Muschelkalk" Chert, have been recorded previously, and heat treatment was proposed.
We reexamined the lithic assemblage of horizon III, using the best available criterion for recognizing heat treatment: gloss contrast. This criterion allows separating intentional heating, i.e. heat treatment, from accidental or post-depositional heating.

To gain insights into the visible changes of heated Middle Triassic Chert, we conducted heating experiments of geological reference samples. We identified artefacts with the simultaneous presence of glossy and matt removal surfaces in the assemblage. To support our macroscopic observations, laser-scanning microscopy was used to measure the surface roughness of the identified gloss contrast pieces. To estimate the frequency of heat treatment and determine the moment of application in the reduction sequence, diagnostic gloss contrast pieces were used as a visual reference for identifying the overall surface gloss on other artefacts. This allowed us to understand how many artefacts were heat-treated and when heat treatment occurred in the reduction sequences.
Our results indicate that heat treatment appears to have been regularly applied at an early stage of blank production in Middle Triassic Cherts. These findings have implications for our understanding of Early Mesolithic technology, highlighting that the last Central European hunter-gatherers were flexible in terms of raw material and that heat treatment was a more widespread phenomenon than previously thought.

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Shumon Hussain[1] & Nathalie Ø. Brusgaard[2]

Human-Beaver Relations in the Early and Mid-Holocene of Northern Europe: Revisiting the Mesolithic through the Lens of Multispecies Affordances

The Eurasian beaver (*Castor fiber*) was an important member of early and mid-Holocene landscapes and ecosystem communities in Northern Europe. Previous zooarchaeological scholarship has established the changing alimentary roles of beavers for Mesolithic forager societies and the importance of these animals for fur procurement.
We here develop an integrated biocultural approach to human-beaver interactions and examine the position of humans and beavers in Mesolithic and Early Neolithic multispecies systems. We contextualize beaver landscape agency in hydroactive environments at the edge of former

glaciers with human foraging and landscaping behaviour, especially fishing practices, and beaver-related material culture documented in the archaeological record. This contextual analysis reveals previously overlooked 'mediations' of human behaviour by beaver landscapes and ecological legacies.
We argue that Mesolithic beaver-related material culture is a consequence of the cultural keystone status of Castor in early and mid-Holocene northern landscapes, indicating that post-glacial human settlement in some parts of Northern Europe was promoted and co-shaped by beaver ecosystem impacts.
We further suggest that long-term trajectories of human-beaver conviviality differed between northern regions. While in the Netherlands and Southern Scandinavia, human-beaver intersections witnessed major re-organizations during the mid-Holocene, beavers retained a key role in human societies and material cultures across the Baltic and Northwestern Russia throughout much of the Holocene.

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Robin John[1,2]

Just the tip of the Iceberg? An in-depth investigation of lithic projectile morphology during the Upper Paleolithic in Europe

Hunting weapons are often assumed to be closely linked to subsistence success and are therefore likely to show a high sensitivity to social or ecological changes. A morphological strictly defined type of hunting projectiles is the shouldered point. Their earliest evidence marks the beginning of the Willendorf-Kostenkian, around 29 ka cal BP in Central and Eastern Europe (e.g. Maier et al. 2021). With the beginning of the subsequent Epigravettian or Solutrean around ca. 25 ka cal BP, a morphological diversification can be observed in different parts of Europe. From 22 ka cal BP, shouldered points seem to stay a part of the hunting equipment up to about 11 ka cal BP (Maier et al. 2021), when they are particularly numerous in northern Germany, Poland, the Netherlands and Denmark.
Having a period of use of about 18.000 years and a wide distribution, shouldered points are particularly well suited for the investigation of evolutionary processes during the Upper Paleolithic. Quantitative analysis of material culture under a diachronic, evolutionary paradigm is recently gaining renewed interest (e.g., O´Brien et al. 2016).
My PhD project presented here is settled in this context and conducted at the Neanderthal Museum and the University of Cologne and is financed by the Helga-Raddatz-Scholarship of the NRW Stiftung. It aims at contributing to the quantitative analysis of cultural evolution with a focus on shouldered points as a case study and addresses questions such as: Are there recognizable changes (trends) in the morphology of shouldered points? What are the characteristics of these trends? Are these trends continuous or intermittent, gradually or punctuated? What is the tempo of these trends? Can these trends be paralleled with environmental data?
Methodically, I make use of a half-automated, computer-aided and trait-based recording system named PyREnArA (John et al. 2023), which was especially developed for high resolution analysis of material culture evolution. It captures multiple, both traditional and innovative morphometrical features, that are used in multivariate statistics, e.g., RDA (Redundancy Analysis) (Maier et al. in review). This poster presents the methodological outline of my project and first preliminary results.

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Robin John[1,2], Florian Linsel[3], Hubert Mara[3], Georg Roth[4], Isabell Schmidt[1] & Andreas Maier[1]
PyREnArA – Spatio-temporal analysis of artefact morphology with multivariate approaches

In this talk, we present PyREnArA in its latest stage of development. In addition to functions for the analysis of chronological trends that we presented at the last HOG conference (Linsel et al. 2022), a recently implemented function is introduced. This function aims at assessing the influence of spatial proximity and distance on the morphological properties of lithic artefacts. It uses the adespatial-package (Dray, Legendre, and Peres-Neto 2006) in R to generate spatial weighting matrices and compute Moran´s Eigenvector Maps (MEM). As spatial predictors, MEM are used in multivariate statistical methods to provide a spatially-explicit multiscale tool that allows us the calculation of the relationship between measured variability and geographical location.
As a case study, we selected the Solutrean of the Iberian Peninsula (ca. 25-20 ka cal BP) for two reasons. First, it is well known for its rich variability of lithic point types, some of which are known to form distinct geographical clusters, while others occur more widespread. Second, several archaeological sites provide high resolution chronological control, a vital prerequisite for analysing diachronic trends of intra- and inter-regional developments.
A dataset of around 400 completely or nearly completely preserved lithic Solutrean points derived from almost 50 sites across the Iberian Peninsula compiled by one of us (Schmidt 2015) was available for the present study. To better understand the high degree of regionalisation of the morphology of Solutrean points (Schmidt and Mom 2015) and as a proof of concept for MEM, we used the complete dataset to test the null-hypothesis that neighbouring sites should show higher morphometric similarities than more distant ones. In addition, a subset of points from only well-dated sites located across the Iberian Peninsula is used to analyse possible

chronological trends within each investigated region, since these trends might potentially be masked by the high degree of regional variability.

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Foods from the Forest: A Nutritional Analysis of Wild Plant Foods Used by the Baka Forager-Horticulturalists in Southeastern Cameroon

Foraging theory and ethnographic studies on extant hunter-gatherers play a crucial role in reconstructing past hominin subsistence behaviour and adaptive behaviour throughout the evolution of our lineage (Winterhalder & Smith, 2000). Furthermore, key issues such as human social- and cognitive evolution are effected by subsistence behaviour and diversification (Shipton et al., 2018).

However, the predominant part of investigation has focused on African populations from open grasslands and savannahs, with an emphasis on seasonal subsistence change within a given habitat. In contrast, little attention has been given to nutrient variation across habitats (Henry et al., 2019). More specifically, research on nutritional variation within African rainforests is largely absent. Tropical rainforests are traditionally deemed to be too hostile for prehistoric human occupation. Still, the understudied African rainforests have been of key significance to our hominin ancestors (Scerri et al., 2022). As such, the Baka forager-horticulturalists in Southeastern Cameroon provide an excellent window for identifying potential drivers for nutritional variation and food choice amongst foraging populations within African rainforests, subsequently allowing for cross-cultural comparisons.

The aim of this study is twofold in nature: identifying potential drivers for plant food choice of Baka foragers, and identifying the underlying drivers for nutritional variation between the Baka and the Hadza, a foraging group living in the open grasslands of northern Tanzania. Commonly, foraging theory maintains that energy is the main driver for variation in subsistence strategies

and diet breadth. However, foods are complex mixtures of macro- and micronutrients (Raubenheimer et al., 2009). Therefore, this study will consider multi-nutritional currencies such as protein, crude fat, carbohydrate, and total dietary fibre alongside energy, as potential drivers of food choice.
We show the preliminary results of a nutritionally explicit analysis on edible wild plant foods including tubers, leaves, nuts, seeds, and fruits, collected during fieldwork amongst the Baka. We have values for crude fat, protein, total dietary fibre, carbohydrate, and total phenol composition. These data are compared with nutritional data of wild edible plant foods foraged by the Hadza. Our results allow us to test the nature of the relationship between habitat and nutritional variation, and to what degree food choice is determined by habitat type on the one hand, and unique cultural trajectories on the other. The cross-cultural comparison allows us to determine if there are standard nutritional elements that characterize all human diets. This analysis contributes to a wider understanding of variation in human diet, in both extant and past foraging societies.

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Keiko Kitagawa[1,2], Daniel Burger-Völlmecke[3] & Felix Riede[4,5]

Paleolithic occupations in the Lahn Valley of Central Germany: New Dates from Wildscheuer and Wildweiberlei

There is sparse evidence of repeated occupations by Neanderthals or modern humans in Central Germany, corresponding to the present-day Federal State of Hesse, except for the Lahn Valley. Based on early excavations of the now destroyed sites of Wildscheuer and Wildweiberlei, the Lahn Valley has produced one of the 'classic' Upper Paleolithic sequences in central Germany, starting from the Aurignacian, Gravettian and Magdalenian, as reflected in the lithic and organic material culture as well as sparse Neanderthal occupation from the Middle Paleolithic (Pettitt et al. 1998, Terberger 1993).
The present study attempted to (1) gain greater understanding of the chronology of two sites (Wildscheuer and Wildweiberlei), and (2) to contextualize the Lahn Valley on the broader Paleolithic landscape of Central Europe. We targeted eighteen samples consisting of faunal

remains with fresh fractures, osseous artifacts and human remains that derive from the two cave sites.
By and large, the results confirm previous findings with the majority of the dates concentrated around the middle to late Aurignacian (cf. Pettitt et al. 1998, Terberger and Street 2003). There were two outliers to this overall trend. 1. The human remains from Wildscheuer date to the Holocene, as suggested by the original excavators. 2. While previous attempts to date the later Upper Paleolithic layers remained unsuccessful, we found that one reindeer antler fragment belonging to the loess layer (D according to Mandera 1954's stratigraphy) falls in the range of the Gravettian occupation. These data also suggest that the Wildscheuer was occupied not immediately when modern humans arrived in the region, unlike the southern counterparts, but clearly experienced multiple occupational events during the remainder of the Upper Paleolithic. Conversely, our dating efforts did not find more evidence of substantial Magdalenian occupation suggesting that human occupation during the Late Glacial may have been ephemeral.
In sum, this study calls for renewed attention to the Lahn Valley as archeometric methods that may be applied to legacy materials improve, and in tandem with our greater understanding of the early to late Upper Paleolithic in Central Europe on a regional to sub-regional scale.

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Małgorzata Kot[1], Claudio Berto[1], Greta Brancaleoni[2], Adrian Marciszak[3] & Aleksandra Kropczyk[3]
What happened in MIS 3 stays in MIS 3. Traces of the very last Epiaurignacian hunters in Pod Oknem Cave, Southern Poland

At the end of MIS 3 Central and Eastern Europe was occupied by Gravettian hunters. Still, scarce sites of the earlier Aurignacian tradition were spread throughout the region. They are recently tent to be called Epiaurignacian, nevertheless their late chronology indicating the very margins of MIS 3.
The assemblages characterised by a presence of microlithic lunates called Sagaidak-Muralovka-type microliths and carinated cores have been found mostly in Eastern Ukraine and south Western Russia, but single site Mohelno have been discovered recently in Bohemia (Demidenko, 2008; Demidenko et al., 2021; Prasov, 1972).

New field works conducted between 2015 and 2022 in a new site called Pod Oknem Cave, can shed new light onto the margins of the Epiaurignacian hunters. The cave contains a well preserved sequence of Pleistocene and Holocene layers. The up to 3 m thick Pleistocene sequence brought multiple paleontological remains, but until 2022 we could not confirm the human presence in any of the excavated Pleistocene layers. Only in 2022 we were able to obtain a set of 5 micro-lunates made on tiny bladelets or even flakes/chips from a loamy layer (no 6). The artefacts were accompanied by a carinated endscraper. Even though no refittings could be made, the techno-morphological features of the lunates fit to the scars of flakes and bladelets detached from the carinated core. Beside the above mentioned artefacts only single chips were identified in this very layer.
The layer, dated recently with use of radiocarbon dating into 25-26ky cal BP is the very last one containing cave bear bones and quite diverse fauna (both small and large mammals). The overlying loamy layer (no 5), contains almost no large mammals remains and the small mammals assemblage is composed by dominant *Dicrostonyx torquatus* together with few *Lasiopodomys anglicus* and *Microtus arvalis* all species indicating open environments and cold and arid climate conditions.
We believe that the boundary between layer 6 containing traces of Epiaurignacian hunters visit and overlying layer 5 may represent the passage between MIS 3 and MIS 2, indicating an abrupt decline of environmental conditions leading to a vast loss of biodiversity which might involve also the hunter-gatherers that inhabited the region.

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Anna Krahl[1]

The finds of Andernach Roonstraße in context of the Late Palaeolithic layers Andernach Martinsberg 2 and 3

In 2006, the General Directorate of Cultural Heritage of Rhineland Palatinate (GDKE) carried out an emergency excavation on the Martinsberg in Andernach. In 2018, a sample of the lithic material was assigned to the Late Paleolithic as part of a bachelor thesis (Krahl / Maier 2020). To complete these preliminary results, the remaining lithic artifacts have now been evaluated in the course of a master's thesis (Krahl 2022). In addition to the renewed technological and typological analysis, an analysis of the lithic raw material and a detailed analysis of the spatial distribution were carried out.

The technological analysis confirmed, as already suspected, the use of both organic- and soft stone hammers for blank production and underlines the chronological classification into the Late Paleolithic, which is also corroborated by the typological spectrum (short scrapers; backed pieces).
Luckily – and despite the suboptimal conditions during the emergency excavation and medieval use of the area – also the spatial analysis yielded interpretable results. Here another Late Palaeolithic concentration with a hearth and corresponding activity areas became visible by applying the ring and sector method as well as Binford's hearth model (Binford 1983; Stapert 1989).
The comparison of the raw materials with those of the concentrations Andernach 2 and 3 brought a clear correlation concerning the proportions of Andernach 3. The raw material spectrum, however, rather resembles that of Andernach 2.
The comparison of the typology shows similarities between the tool compositions in all three concentrations. However, Andernach Roonstraße stands out with a clearly higher percentage of short scrapers. In terms of technology, Andernach 2 and 3 are very similar, with a predominant use of an organic hammer. This preference is not visible in Andernach Roonstraße.
A spatial comparison of the three concentrations strengthens the already existing assumption that Andernach 2 is a separate occupation phase of the Martinsberg (Stevens et al. 2009).

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Blade and Bladelet Cores in the Protoaurignacian: A New Method for Measuring Reduction Intensity

Reduction intensity is pivotal in understanding the technological variability of lithic assemblages as well as in identifying the processes involved in the formation of archaeological assemblages.The degree of reduction allows in fact to establish a time frame within the life history of cores, proving thus to be a useful tool when discussing core classifications and the interrelation of core types within a given assemblage.
While there are several methods to study reduction intensity in lithic classes such as retouched tools, large cutting tools and flake cores, laminar cores have generally been overlooked in this aspect. Here, we develop a method to measure the degree of reduction in blade and bladelet cores deriving from an adaption of the Volumetric Reconstruction Method (VRM; Lombao et al.,

2020), which was originally proposed with the aim of reconstructing the original blanks of cores in Early Pleistocene assemblages (Cueva-Temprana et al., 2022; Lombao et al., 2022).
The performance of this methodological innovation to laminar technologies has been tested experimentally through a sequential experiment consisting of the reduction of 9 chert nodules following the reduction strategies commonly described in the early Upper Paleolithic, with particular attention to the strategies identified in the Protoaurignacian layers at Fumane Cave in northeastern Italy (Falcucci & Peresani, 2018).
Cores were systematically recorded throughout different stages of reduction thanks to the use of a 3D scanner (Artec Space Spider). Thanks to this sequential protocol, we were able to cover the entire range of reduction of each nodule (i.e., from ~10 to ~90% of extracted volume) in a total of 50 models. We thus applied the adaptation of the VRM to this high-resolution dataset and compared its results with other reduction intensity approaches such as the Scar Density Index (SDI; Clarkson, 2013), the angles between core surfaces, the number of flaking surfaces, and the number of rotations or the percentage of non-cortical surface, among others.
The results indicate an effective performance of the VRM when both ellipsoid and cylinder geometric formulas are used to reconstruct the volume of the original nodules, which has interestingly a strong correlation to the SDI and the percentage of non-cortical surface.
Overall, the promising results of this experimental study will allow us to investigate core reduction intensity in the Protoaurignacian to address raw material management strategies, blank selection, and technological behaviors at the onset of the Upper Paleolithic in Europe.

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Technological innovations and continuities at the Early Acheulean assemblage of El Barranc de la Boella (La Canonja, Spain)

The appearance of the Acheulean ~1.7 Ma ago in Africa is considered a milestone in the technological evolution of the genus *Homo*. Although the presence of Large Cutting Tools (LCTs) is one of the best cultural markers of this technocomplex, the emergence of Mode 2 in Africa implies the appearance of a new set of behaviours. From a technological point of view, these are characterized by a more detailed and efficient raw material selection and management, by an increase in the complexity and diversification of knapping strategies, by the production of large-sized flakes (>10 cm), as well as by different changes in the patterns of land-use and management of the environment, reflected in the spatiotemporal fragmentation of the reduction sequences, among others (de la Torre, 2011).

In Europe, the analysis of early Acheulean assemblages (between 1-0.5 Ma) has been mainly focused on the techno-typological study of the LCTs and on the reconstruction of their reduction sequences. However, only in recent years has greater attention been paid to other technological features that may be associated to the appearance and presence of LCTs in Early Acheulean assemblages, such as core reduction strategies (i.e., Moncel et al., 2021).

Unit II of the localities of La Mina, El Forn and Pit 1 in El Barranc de la Boella (BB) -dated back between 900-780 ka-, appears as the oldest Acheulean site in the European subcontinent (Vallverdú et al., 2014), and represents an exceptional window to look into the technological innovations or continuities featuring the appearance of LCTs in Europe. Thus, these assemblages provide clues to confirm or discard the different hypotheses about their appearance (in situ evolution, mixture, or arrival). Moreover, the cooccurrence of three localities whose environmental contexts are similar, but functionally diverse, allows to evaluate behavioural flexibility through the study of inter-assemblage variability, representing a step forward in the study of technological behaviours for this crucial period of human evolution.

In this paper, we explore the Early Acheulean technological behaviours trough the study of lithic assemblage composition and core management from the Unit II of the three localities of BB to characterize: A) Raw material selection and management; B) Spatiotemporal fragmentation of reduction sequences; C) Large Flake Production (>10 cm); D) Knapping strategies variability; and E) Core reduction intensity, comparing the results obtained within the context of the European Mode 1.

Our results suggest that in the three localities of BB we find a combination of abrupt changes, gradual innovations, and continuities with respect to other European Mode 1 assemblages:

1.- As for the abrupt breaks we find the presence of Large Cutting Tools and the behaviours associated with their production. In this way, a differential raw material management has been identified depending on the goal: a) the exploitation and configuration of small-sized tools linked especially to chert and, b) the configuration of LCTs and the production of large-sized flakes (>10cm), linked especially to schist, as well as the spatiotemporal fragmentation of the reduction sequences of these LCTs.

2.- Gradual changes can be observed in core reduction strategies. Although the range of knapping strategies represented in BB is similar to Mode 1 assemblages, it has been possible to document the existence of a more structured volumetric organization in some cores. This is due to the existence of a procedural template in which the actions are sequentially organized, thus facilitating the production of more flakes, although not a greater control over the morphology of these products. Furthermore, the BB knapping strategies show greater degree of independence regarding the characteristics of the raw materials, thus they are not so tightly linked to the quality, morphology, and size of the original blanks than the European Mode 1 assemblages. However, these more structured strategies are on a par with others of an expedient and/or opportunistic type like the knapping strategies recorded in Mode 1 assemblages, in which there

is a partial management of volume of the cores. This could be linked to the occupation patterns reflected on these localities. This combination of more organized knapping strategies with other more expedient ones is reflected in the variability of core reduction intensity, as well as in the degree of volumetric exhaustion exhibited by the cores.
3.- Finally, the shared elements include: the use of local raw materials (< 5km from the site), the integrity of the reduction sequences in the exploitation dynamics, generally short reduction sequences and the use of both freehand hard percussion and percussion on anvil techniques. In addition, BB assemblages share with some exceptional cases within the European Mode 1, such as Gran Dolina TD6.2 (Atapuerca, Spain), the ability to produce large-sized flakes and the presence of a relatively high ratio of retouched tools (Mosquera et al., 2018). The archaeological record from other Early Middle Pleistocene assemblages with LCT from western Europe (i.e., Mediterranean basin) also shows this trend of gradual innovations in the exploitation strategies that reflect a more complex volumetric management, allowing hominins to overcome raw material constrains in a more efficient way. However, these gradual changes are neither homogeneous nor linear from a temporal and/or geographical perspective.
This approach provides a new pathway for the in-depth study of the emergence and generalization of new technological behaviours associated to the European Early Acheulean assemblages beyond the appearance of LCTs.

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Carinated endscrapers, cores or vice versa?: Analysis of Aurignacian artefacts from La Viña rock shelter (Asturias, Spain)

Technology and functionality of carinated endscrapers, one of the most characteristic tools of the European Aurignacian period, have long been debated (Hays and Lucas, 2000; Nowak and Wolski, 2015). Classification of such artefacts according to typologists, technologists and traceologists criteria frequently causes difficulties focused on the question of the roles of these pieces. Analysed material with core-shape could be considered as cores for fabricating blanks for Dufour bladelets, as massive scrapers (tools) or as cores reused (cores/tools).
In this poster, we present the results of the functional analysis of these Aurignacian artefacts from level XII of the rock shelter of La Viña (Asturias, Spain), one of the most important Palaeolithic sites in the Cantabrian region. We have studied using use-wear analysis the tools previously classified from a techno-typological perspective as carinate endscrapers and atypical carinate endscrapers (Santamaría, 2012). In addition, we have analysed different types of bladelets cores present at this level. The raw materials for the endscrapers and the cores are different types of local flint (Piedramuelle and Piloña flint).
These functional results can significantly contribute to the debate concerning carinated endscrapers and combined with available multidisciplinary data on paleoenvironment, subsistence, and chronology provide new information for reconstructing the socio-economic system of the Upper Palaeolithic hunter-gatherer groups (MIS3) in the north of the Iberian Peninsula.

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How to identify standards of Neanderthal short-term occupations in cave environments? Zooarchaeological and taphonomic preliminary results of Teixoneres Cave unit III

Understanding the lifeway of the Neanderthal groups, the duration of occupations, and the function of archaeological sites during the Middle Palaeolithic is a rather complex subject. Some elements which define occupation length (e.g., extent of the occupied surface, the density of archaeological remains, species diversity, high carnivore activity, presence of toolkits, and hearths number) have been identified. Despite the existence of these features, there is a lack of benchmark to define short-term Neanderthal occupations. However, a standardized criterion is needed to compare levels at different archaeological sites.
The starting point to build this referential framework is the analysis of faunal remains from Teixoneres Cave unit III (Barcelona, Spain). The site is composed of three main chambers

(X, Y, and Z). In chamber X, the biggest gallery and the main entrance to the cave, eight stratigraphic units were identified (from > 200 ka to 14–16 ka) (Fig.1) (Tissoux et al., 2006, Zilio et al., 2021).

Within this study, we present the preliminary data from the archaeozoological and taphonomic analyses of unit III (>51 ka BP to 43.4 ka cal BP) (Talamo et al., 2016). Unit III shows an alternation between human occupations at the entrance of the cave and carnivore occupations in the inner area. These preliminary results support previously published data (Rosell et al., 2017, Sánchez-Hernández et al., 2020), and support the hypothesis of short but repeated human occupations during the formation of the unit. In the future, these data will be expanded and compared, in a multidisciplinary, wide-ranging view, with other contemporary sites from the Iberian Peninsula and south-eastern France.

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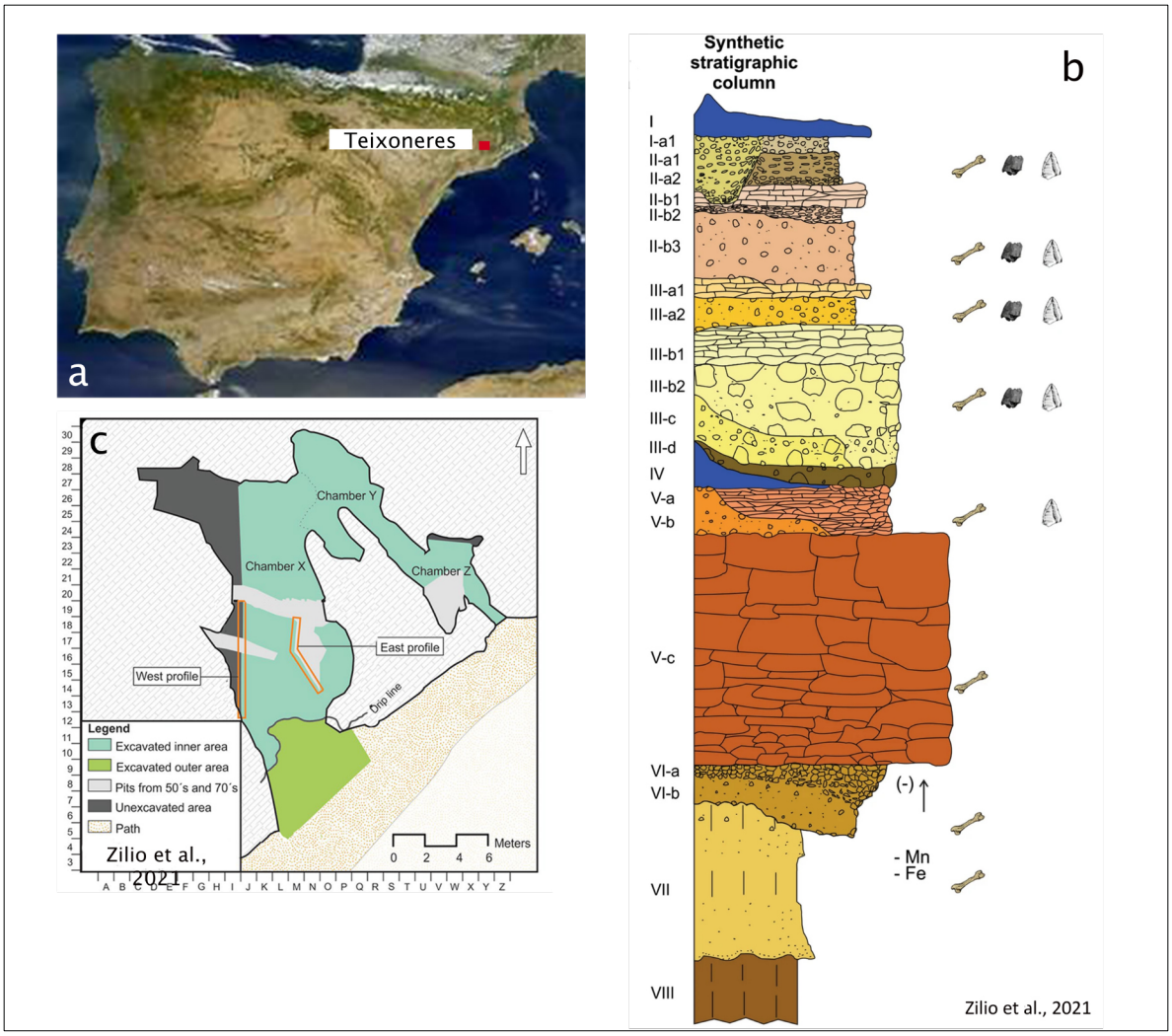

Fig.1. A) Location of Teixoneres Cave. B) Stratigraphic sequence of chamber X. C) The excavation's ground plan and grid system.

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Revision of the small mammal assemblages of Hohle Fels Hütten and Schmiechenfels (Swabian Jura, Germany)

In his seminal monograph Die Diluviale Vorzeit Deutschlands, R.R. Schmidt (1912) described for the first time the Magdalenian sites of Hohle Fels Hütten and Schmiechenfels. The sites are located in the Schmiech Valley, at a very short distance from the Schmiechen Lake and the Ach Valley, and the famous sites of Hohle Fels, Geißenklösterle, and Sirgenstein. Collecting micro-vertebrates was not a common practice in archaeology at the beginning of the last century, however Schmidt included a short faunal list of the small mammals from both sites in his publication.

This paper reviews the material from the 1906 excavations. We re-sorted the samples of sediment that were kept, updated the nomenclature, quantified the specimens, and obtained a preliminary reconstruction of the environmental context of the human occupations at the sites. The material consists mostly of mandibles with teeth in situ and complete bones. Isolated teeth and smaller fragments of bones were not recovered during the screening. Small samples of the sediment from the original excavations were conserved, and it was possible to sort them and obtain new specimens.

We added six new species to the list for Hohle Fels Hütten: the northern vole (*Alexandromys oeconomus*), the field vole (*Microtus agrestis*), the field mouse (*Apodemus sp.*), the hazel dormouse (*Muscardinus avellanarius*), the southern water shrew (*Neomys anomalus*), and one bat, yielding a total NISP of 84.
The analysis also identified five new species for Schmiechenfels: the edible dormouse (*Glis glis*), the narrow-headed vole (*Lasiopodomys anglicus*), the European water shrew (*Neomys fodiens*), the southern water shrew (*Neomys anomalus*), and the long-eared bat (*Plecotus auritus/austriacus)*, for a total NISP of 190.
The low occurrence of boreal and tundra-related species indicates that the two assemblages belong to the end of the Late Glacial. Deciduous forest and shrubland dominated the landscape during this phase of settlement, and the Magdalenian occupations at the two sites took place under similar environmental conditions. The presence of bats suggests short-term and/or low-intensity occupations, as already pointed out by Schmidt (1912), Hahn (1995), and Karle (1997) based on the lithic assemblages and archaeological contexts at both sites.
In contrast to the sites of the Schmiech Valley, the extremely abundant and well-stratified assemblage of small mammals from Langmahdhalde contains numerous specimens of the arctic lemming *Dicrostonyx torquatus*, the landscape is dominated by open landscape and forests are not yet well developed (Wong et al., 2020). This suggests that the late Magdalenian occupations of the Schmiech Valley are somewhat younger that those documented in the more complete stratigraphy from Langmahdhalde in the Lone Valley. The difference between the assemblages might also results from different agents of accumulation (diurnal vs nocturnal birds of prey) and/or from the differences in excavation and sorting techniques.
Recent work by Bertacchi et al (2021) at Sirgenstein has documented a lack of rigorous stratigraphic control for the faunal assemblages recovered during the excavations of R.R. Schmidt in 1906. Future works with additional radiocarbon dating, analysis of new material, and comparisons with other sites of the Swabian Jura will clarify the stratigraphic context of the findings and examine competing hypothesis for the differences observed among the valleys.

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Move or stay put – Two distinct metapopulation responses to environmental degradation during the Gravettian and Late Palaeolithic at their ecological margins

During the Upper and Late Palaeolithic of Europe, *Homo sapiens* populations were confronted with two major cooling phases. First, the rather gradual transition from the Early Gravettian towards the Last Glacial Maximum, and second, the rather rapid change from Greenland-Interstadial 1 (Bølling / Allerød) to Greenland Stadial 1 (Younger Dryas).
From a palaeodemographic point of view, both cooling phases are connected with an overall decline in population (Maier & Zimmerman 2017; Schmidt et al. in prep.). So at the large scale, there seem to be strong similarities in the reaction of the meta-population to the climatic event.
At a regional scale, however, the results are quite different, particularly at the northern ecological margins of the meta-population. The transition from the Early to Late Gravettian is characterized by declining populations in virtually all investigated areas and even regional population breakdowns north of 50°N. Consequently, it seems that hunter-gatherer groups did not respond to the deteriorating climate with larger population movements – which should be visible in rising or at least stable estimates for some regions – but apparently tried to cope with the altered situation on the spot. At the same time, a stable pattern during both the Early and Late Gravettian can be found in the Franco-Cantabrian region, which continues with high demographic estimates throughout the Upper Palaeolithic.
However, this pattern changes during the Late Palaeolithic. For Greenland-Interstadial 1, we estimate the largest populations in Central Europe, more precisely for the Czech Republic and southern Germany. At the transition to the Younger Dryas, we again observe a general decline in the size of the meta-population, which is most pronounced exactly in the area where we previously estimated the highest values. Interestingly, we observe a slight increase in the immediately adjacent area of Poland and north-eastern Germany. This finding indicates a population movement to the north-east and therefore an entirely different reaction than during the Gravettian.

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Preliminary notes on the Middle Palaeolithic laminar lithic assemblage of Via San Francesco, Italy

The site of Via San Francesco was discovered in 1960 in the middle of the town of Sanremo (Liguria, Italy) during the construction of a new building. The site is located at the bottom of a hill of Flysch Unit outcrops, not very far from the present seashore. A stratigraphic test trench, performed during the rescue excavation at the site, revealed a single layer of occupation containing faunal remains (majority of red deer, some horse, bison and ibex, and sporadic occurrence of roe deer and rhino) together with a large number of lithic artefacts (almost 6000 pieces) (Isetti 1961, De Lumley & Isetti, 1965). An original U-series / ESR dating provided for the site refers to the MIS 6 (Pirouelle 2006). This chronological determination was recently confirmed by new OSL dating (currently being published).
The fact that caught the attention of several scholars in the past was the presence of lithic materials possessing a so-called "Upper Palaeolithic component" (blade technology, burins, steep retouch) and a more typical Middle Palaeolithic component (Levallois, scrapers,

denticulates) in the same assemblage (Tavoso 1988; Bietti & Negrino 2007). Given this challenging combination of materials and the validation of such an old chronology, we recently decided to recover the material of Via San Francesco (within the ERC project FIRSTSTEPS) and re-study the lithics with an updated technological, techno-functional and traceological approach, and the faunal remains through isotopic analyses.
The raw material is almost exclusively local; it consists mainly of siliceous limestone and quartz-arenite from local Flysch Units, often collected in the form of large nodules and slabs in adjacent streams or along nearby beaches. Some exceptions are represented by few tools made of chert of regional provenience (possibly "I Ciotti" conglomerates). The high laminar tendency of the assemblage was confirmed, large blades (often reaching 10-15 cm in length) were made from prismatic cores, with prepared striking platforms and crested blades, a feature traditionally considered Upper Palaeolithic. This aspect coexists with a large variety of Levallois uni- and bi-directional sequences aimed at producing blades and elongated points, as well as centripetal Levallois aimed at producing flakes. Among the retouched tools, there are several retouched blades, burins, and a tool type that is distinctive of Via San Francesco: obliquely truncated blades named 'Sanremo knives'.
With this presentation we aim to reassess the peculiar material of Via San Francesco in the framework of the laminar technology of the Middle Palaeolithic in Europe, reflecting on the limits that distinguish between a Levallois and a volumetric concept of debitage in the production of blades, and more generally on the origins and technical definition of laminar production in the Middle Palaeolithic.

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Use-wear analysis on Objects from the Ertebølle site „Timmendorf-Nordmole I“

The submarine site „Timmendorf-Nordmole I“, located on the western coast of the Island of Poel (Mecklenburg-Vorpommern/ northern Germany), is one of the many submerged Stone Age sites from the „Wismar Bay“, which were documented by the SINCOS project in the early 21 century. Human occupation on site dates to the late Ertebølle culture and their remains were drowned by the rising Sea-Level during the Littorina Transgression.
Timmendorf-Nordmole I was discovered in a depth between 2,5-4 meters and covers an area of 100-meter wide and 250-meter length minimum. The documented silex assemblage encompass more than 13 500 artefacts, mostly unretouched blades and flakes, which suggests that the place was used for blank production. However, also many standardized tool types of the terminal Mesolithic occur.
During a BA thesis at Rostock University, a small sample of these, exclusively the truncated blades, were analyzed, to identify possible signs of use. The analysis was thereby conducted in two steps. First the objects were analyzed in low-resolution with a digital microscope (Keyence THX 6000), to locate possible areas of use. In a second step the objects were analyzed with a high-resolution Microscope in the Laboratory for Traceology and Controlled Experiments, to verify possible traces. In an additional step, the identified use-wear traces were interpretated.
In doing so, the study could show, that the abrasive influence of underwater movement and sand is a big handicap for the visibility of use-wear traces, especially for pieces from the surface, which were often too abraded for trace analysis. However, with artefacts from the lower levels the analysis worked fine, and it could be shown, that the truncated blades were used for wood and bone working. Traces, which induct wood working, where only located at the lateral edges of the pieces, while bone working could only be verified on the truncation of the blades. Furthermore, on two specimen slight traces were identified which induct shafting. This is in good order with a well-known find from the site, with shaft and binding preserved. The observations lead to an interpretation of truncated blades as tools for the production of composite tools like the eel-spears, which are typical for Ertebølle culture and found on site.

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Middle Paleolithic Subsistence Strategies at Ghar-e Boof (Southern Zagros Mountains, Iran)

The Zagros region represents a vast chain of mountains that spread along modern Iran, Iraq and Turkey. Paleoenvironmental and paleoclimatic studies indicate that during most of the Late Pleistocene, these mountains and their corresponding river valleys were primarily characterized by warm, arid conditions, open meadows, and craggy-rocky terrains. Due to the constraints of the local and regional environments, Middle Paleolithic (MP) foragers focused mostly on targeting caprines in stony and rocky settings, and gazelles and/or equids in the open grasslands and shrublands across the central and northern Zagros. Nevertheless, little is known about human-animal relationships in the southernmost part of the Zagros Mountains during the MP.

Located in the Dasht-e Rostam region (Fars Province, Iran), Ghar-e Boof (GB, N 30.2839º, E 51.4352º) is currently considered one of the most promising Late Pleistocene sites in the Zagros. The Tübingen-Iranian Stone Age Research Project (TISARP) Team visited the site for the first time in 2005, and two seasons of excavations were carried out in 2006 and 2007. Archaeologists uncovered and identified rich early Upper Paleolithic (UP) Rostamian lithic assemblages, radiocarbon dated between ca. 42–35 cal. BP. Underlying the UP deposits, the TISARP team also uncovered in 2015 and 2017 a well-stratified MP sequence, which ranges between ca. 81–45 kya (OSL dates, 68% credible interval). In direct association with stone tools, our team recovered numerous bone remains, which allow us to reconstruct MP subsistence strategies and animal exploitation in the southern Zagros.

Here we present the results of the first zooarchaeological analysis of the material recovered from the MP deposits of GB. Sheep/goat and medium ungulates constitute the main prey at the site, followed by gazelle. To a lesser extent, we also documented some wild boar, red deer, equid and wild cattle specimens. Besides ungulates, the faunal assemblage includes carnivores, tortoises and birds (e.g., Galliformes and/or Columbiformes). Skeletal element representation of medium ungulates shows that the occupants of GB transported complete carcasses to the site, suggesting also that hunting activities took place nearby. Moreover, we recorded numerous cut-marked bone specimens, which reflect different butchery actions, such as defleshing, filleting and dismembering. Beside meat resources, the high proportion of fresh breaks, in combination with percussion impacts and cone fractures, demonstrate that MP foragers also processed bones for marrow. Throughout the entire MP sequence, find densities (both stone tools and faunal remains) are consistently low, indicating that GB was occupied in a very sporadic manner.

Taking everything together, our research not only highlights the socioeconomic importance of caprines and other ungulates for past hunter-gatherers, but also offers new insights on site use, transport decisions and butchery activities during the MP in the southern Zagros region.

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Testing the effectiveness of horse teeth as retouchers: a preliminary characterisation of the use wear traces

Bone retouchers have been used since the Lower Paleolithic, e.g., at Gran Dolina TD10-1, Bolomor Cave, Qesem Cave and Schöningen. These tools became widespread during the Middle Palaeolithic in Eurasia. Thus, they have been mainly associated to Neanderthal occupation horizons in French cave sites, such as La Quina, where these tools were first recognised by French archaeologists in the early years of the twentieth century. During the Upper Palaeolithic as well as in other Holocene contexts they continued being used.
Several experiments have been typically and widely performed to understand why and how these bone tools were used, focusing successfully on correlating the morphology of the use wear traces with several variables such as gripping, condition of the bone (fresh or dry), type of activity, type of retouched lithic raw-material, mode of retouch (e.g., simple, pressure, Quina-Type retouch), retouching methods and techniques, right-left laterality, preparation and collection of blanks, taxonomical and anatomical parts of the used bone tools or bone retouchers dimensions (e.g., Mozota 2013). These approaches, combined with the analysis of archaeological retouchers have provided vital information on subsistence strategies and economic behaviours of past human groups.
Despite the significant contributions made in this area during the recent decades, the experimental studies have overlooked teeth and ivory as raw material which is not unexpected since in the archaeological record exceptionally have been identified use wear traces on the surface of this material. The former are represented mostly by hypsodont teeth of horse, and canines of large carnivores whereas the latter are represented by mammoth tusks. In Laugerie-Haute (Les-Eyzies-de-Tayac, Dordogne, France) have been recovered two horse (*Equus caballus*) teeth retouchers from the Solutrean levels: a first and a second right lower molars (Castel and Madelaine 2006). In la Ferrassie (Savignac-de- Miremont, Dordogne, France) have also been identified two horse (*E. caballus*) teeth retouchers in Aurignacian layers: an upper right molar (first or second) and a left lower premolar (third or fourth) (Castel et al. 2003). In Gough's Cave (Somerset, UK) there are two more horse teeth (*Equus ferus*) retouchers from Magdalenian layers: an upper third molar and an incisor (Bello et al. 2021). As for carnivores tooth retouchers, examples are scarce. They have been attributed to Mousterian and Aurignacian contexts and belong mainly to canines of *Panthera onca gombaszoegensis*, *Panthera spelaea* and into lesser extent

to *Ursus arctos* and *Ursus spelaeus* (e.g., Castel et al. 2003). In addition, teeth have been typically included in the category of "bone retoucher" (e.g., Patou-Mathis and Schwab 2002) and thus, considered as "soft" hammers. But the different chemical composition of bones and teeth should be considered. While it is true that all bones are not same in size and consistence, they are a calcified tissue composed of approximately 60% inorganic component (hydroxyapatite), 10% water and 30% organic component (proteins). About concerning the dental role of hydroxyapatite (HA) crystal, it covers 70 to 80% by weight of dentin and enamel. Thus, teeth are denser and heavier than bone blanks and, consequently, their technological features are not homologous and nature of this material as retoucher should be assessed.

It has been suggested that bone tools were specially selected and consciously configured tools, highlighting the human intentionally evidenced by their collection and use. Thus, it is reasonable to assume that horse and carnivore teeth were also collected with a specific technological purpose. In addition, considering: 1) that despite the scarce evidence in the archaeological record, they are not an isolated case during the Middle and Upper Paleolithic and 2) the apparently comfortable features (elongated, curved, heavy and dense) of hypsodont teeth. Actualistic studies allow to investigate the taphonomic processes affecting the archaeological record. These proxies help to create analogies and infer past processes.

Five experienced experimental stone knappers performed the activity of retouching tools with upper and lower premolars/molars and incisors (n=43) of horse. Four types of raw material were included to manufacture the lithic industry: flint from Grime's Grave (Norfolk, England), flint from Huerva Valley (Zaragoza, Spain), Quartzite variety 1 from Utrillas facies formation (Burgos, Spain) and Quartz from Moià (Barcelona, Spain). High resolution moulds of the surfaces were made to record the initial conditions and allow their comparison with teeth which were altered after the experiment. After each retouching activity, silicon moulds were created to record the overlapping of use wear traces as well as to infer the lifespan of the teeth. Transparent casts were produced and examined with a stereomicroscope (Zeiss Stemi 2000-C) under transmitted light. Different magnifications were used depending on the size of the use wear traces, from x6.5 to x50. The alterations were analysed both quantitively and qualitatively.

In this poster presentation we introduce the preliminary analysis and results of the experimental study, considering features of the resulting knapped lithic tools and characterisation of the associated use wear traces. This work shows the effectiveness of horse teeth as retouchers and leads to consider them as important elements of the chaîne opératoire for lithic industry manufacture.

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Doggerland, perspectives from the Eastern Hills: the evidence, challenges and attractions when crossing this dynamic landscape

This presentation will consider the most recent models for Doggerland and archaeological evidence for the crossing of this landscape from the Late-Glacial to the Early Holocene. This research builds on a century of previous models considering humain interactions in Doggerland (Clark 1937, Coles 1996), and some of the most recent syntheses (eg. Gaffney and Fitch 2022). Taking a fluvial dynamic perspective developed in my recent PHD thesis (2022) on the Channel River, this framework is applied with research carried out over the last year as a post doctoral researcher (2022-2023) at the ZBSA (Centre for Baltic and Scandinavian Archaeology, Schleswig) to Doggerland.
The perspective taken here is looking west from the regions of the eastern hills of Schleswig-Holstein and Jutland across Doggerland, towards Britain, marking the hills on its western limit and beyond to the mountains of Wales and Scotland. There are important archaeological similarities across this vast landscape. An initial assessment of the nature of the archaeological evidence will be followed by an examination of the current geomorphological evidence and palaeogeographic mapping. By combining these two strands of evidence, a modelling of the potential routes, poles of attraction and networks, within different palaeoclimatic and environmental conditions is considered. A specific focus is made on modelled fluvial systems, riverscapes, estuarine and lacustrine resource rich localities, and interfluves as dryland passages. These are times of changing landscapes, with important climatic and environmental transitions affecting fluvial transformations from braided to meandering river systems. These combined with shorter-scaled seasonality most likely played an essential role (directly or indirectly) on human mobility dynamics. When considering people or networks across this submerged landscape, these features would play an important role in structuring the available routes, and not an oversimplified straight path, but a string of important landscape features, challenges and poles of attraction.
This framework (and its caveats) will be contrasted with a critical assessment of the types of datasets available when considering mobility, networks and landscape use, and their varying scales of application. The archaeological signatures of human dynamics within this changing landscapes of the Late Glacial and Early Holocene (climatic, environmental, marine transgression) will be contrasted within supra-regional to regional frameworks, highlighting multiple human strategies adapting to this dynamic period of substantial landscape transformations. By comparing and contrasting diachronichally the archaeological evidence from four distinct archaeological techno-complexes identified around Doggerland, and notably both in Britain and Schleswig-Holstein: Hamburgian Havelte, Federmessergruppen, Ahrensburgian/LongBlade, and Early Mesolithic. An optimal route/network will be proposed for each of these periods, taking into account the diverse means of mobility-movement (eg. sledge, boat, animal migration routes/corridors) within this seasonally and resource rich landscape.

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Knapping Attributes of Dolerite: An experimental investigation of knapping characteristics of South African dolerite and implications for the interpretation of Middle Stone Age technologies

The identification of knapping techniques in the production of stone tools provides valuable information on technological innovations as well as adaptations, shared cultural practices, and prehistoric economy. Based on experimental knapping experiments in the past, certain attributes have been recognized for intentional stone tool production and are associated with the use of specific tools, modes, and force applications. Most previous replicative and controlled knapping experiments were conducted on European flint or other raw materials with a high SiO2-content. Experimental studies regarding the knapping technology of raw materials with a low silica content are rare or lacking. Consequently, it remains an open question whether the observed knapping attributes in replicative knapping experiments predominantly on flint can be transferred to non-silicate raw materials as has been done so far.
Dolerite is one such material with little to no SiO2, consisting mainly of plagioclase, feldspar, and pyroxene. It has been used for stone tool production at several stone age sites in southern Africa and particularly during the Middle Stone Age (MSA) of the important locality of Sibhudu.
This study aims to answer the questions if and what knapping attributes are present when certain knapping techniques are used on this non-silicate raw material and how these attributes inform on the use of different knapping techniques. To this end we created an experimental reference assemblage on dolerite using three different direct percussion techniques that have been proposed for the manufacture of MSA stone tools and statistically compare the experimentally produced blanks.
The results of the analysis show that the three knapping techniques can be differentiated by using a combination of specific traits. We also found major differences in knapping attributes between cryptocrystalline flint and dolerite, highlighting the need for further experimental studies on a larger variety of lithic materials. Based on these findings we discuss the implications on MSA knapping strategies and their identification.

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More on the Magdalenian in Thuringia – A re-investigation of the faunal remains from Teufelsbrücke

The animal bones from the 1970 to 1972 excavation at Teufelsbrücke (Thuringia) have been re-analysed and ten new radiocarbon dates were obtained. These dates, in combination with data from lithic tools, indicate a c. 16,000-15,000 calBP old occupation by Upper Magdalenian humans in the late Greenland-Stadial 2.1a.
The faunal assemblage turned out to be seven times more numerous than had been reported in its first publication. It is heavily dominated by horse, with still many remains from reindeer, arctic hare, fox and ptarmigan, beside only few remains from a large bovid, from mammoth, brown bear, wolf/dog, wolverine, common raven and whooper swan. Remarkable is the presence of ibex, woolly rhinoceros, marmot, lynx and cave lion. Presence of leopard and saiga antelope, which were described from Teufelsbrücke in an earlier study, could not be confirmed. The horse remains represent a 'standard' Minimum Number of Individuals (MNI) of 66 horses, yet an extended MNI of 200 horses is more plausible. The skeletal elements attest that all body parts were introduced to the Teufelsbrücke. Horse hunting was performed during summer and into late autumn, with a random selection of animals from all age groups. Very young animals confirm that family groups were certainly targeted. Numerous pendants from a variety of animal species were found in addition to those already described in a previous publication. Cutmarks on horse and reindeer phalanges is indirect proof for the use of horn.
The final discussion uses the model of Magdalenian lifeways from Leesch et al. (2019) to show that Upper Magdalenian humans used Teufelsbrücke immediately after a successful hunting event on large herbivores close by. They stayed there briefly, yet repeatedly, for the consumption of hunted animals and related domestic activities, and for hunting the small game in the vicinity. Based on the number of horses alone, one has to expect at the very least 60 re-occupations of the site, but a number of 200 stays or even more seems more plausible.

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Hošťálkovice II – Hladový vrch (Ostrava, Czech Republic) – New Results of the Archaeological Excavation (the Magdalenian Horizon)

The site of Hošťálkovice II – Hladový vrch is systematically excavated since 2019. Previous archaeological seasons confirmed the stratigraphical position of the Gravettian artefacts that were collected in the 80 and 90s of the 20th century (Neruda 1995; Neruda & Nerudová 2000) at the base of the Pleistocene loess (sediment C, AH 2). Moreover, we recognised another archaeological horizon that is preliminarily classified as a Late Palaeolithic/Mesolithic occupation (AH 4) in Sediment B (Nerudová & Neruda 2020).

During the 2021 season, we focused on this archaeological horizon in Sediment B to distinguish possible individual stages of the post-Palaeolithic occupation of the site. Nevertheless, sub-recent artefacts in sediment B and the sharp boundary between Sediment B and C indicate intentional damage of the original sedimentation and it excludes the determination of any sublayers in Sediment B. On the other hand, we detected a new archaeological horizon (AH3) that is situated in the upper part of the loess Sediment C (Nerudová et al. 2022).

This horizon (AH 3) was the topic for the research in 2022. We uncovered a longitudinal, sharp demarcated structure, that contains large stone blocks, charcoals, ash, numerous chipped stone artefacts, choppers, hammerstones and one engraved greywacke pebble. The position of artefacts indicates an intact layer was partly affected by bioturbation and frost fractions of the sediment that moved artefacts vertically. The composition of artefacts and refittings show that the place was used for the in situ production of blades from local erratic flint. Cores and final blades are sparse, and the waste prevails. Therefore, the reconstruction of entire technological processes is complicated. The most significant artefact within the technological classification is a narrow blade with "en éperon" type of the rest of the striking platform. The retouched tools are represented by backed bladelets, end-scrapers, borers and burins. Concerning the raw materials used in the archaeological horizon (AH 3) the local erratic flint is the most abundant but we also noted one small fragment of radiolarite, one piece of radiolarite from Hungary (Szentgál type), a jasper that originated from the region of Sowin (Poland) and several blades made from Volhynian flint.

The most spectacular piece found in the stone structure is the pebble of greywacke that has an animal, probably a mammoth, engraved on one side. Several grooves were made repeatedly in the same direction (the back of the animal), and others are represented by single lines. From the stylistic point of view, the animal is analogical to other expressions of animals in the Central European Magdalenian.

The classification of AH3 to the Magdalénian is also confirmed by the presence of “en éperon” method and several upper Palaeolithic tools. Moreover, finds are situated in the upper part of the Late Pleistocene sediment without visible penetration of a Holocene sediment into this layer. Therefore, the results of both OSL and 14C dating, which yielded data around 7 ka BP, are unexpected and difficult to explain. Comparing available data, we have preliminary divided at the site four archaeological horizons — AH 1 (Middle Palaeolithic/EUP), AH 2 (Gravettian), AH3 (Magdalenian), and AH4 (Late Palaeolithic/Mesolithic), however, Neolithic occupation is not completely out of the question.

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New fieldwork at Grub-Kranawetberg (Austria): New insights on spatial extent, stratigraphy and chronology

The loessic landscapes of the Middle Danube region is rich in Mid Upper Palaeolithic (Gravettian) sites including the sites of Willendorf II, Grub-Kranawetberg, and Krems-Wachtberg (all Austria), Pavlov, Dolní Věstonice, Předmostí and Milovice (all Czechia) as well as the Moravany sites (Slovakia). While many of these sites date to the early and/or middle Gravettian, fewer are known from the late Gravettian. The latter include the upper archaeological horizons of Willendorf II, Dolní Věstonice III, Petřkovice I, Trenčianske Bohuslavice-Pod Tureckom and Grub-Kranawetberg.
Here we explore one of these sites, Grub-Kranawetberg. The site is located about 30 km NE of Vienna on a ridge close to the Morava valley and has been excavated between 1993 and 2011 (e.g., Antl, 2013; Antl-Weiser et al., 2010; Bosch et al., 2012). More recent fieldwork has been conducted since 2021 (Antl-Weiser et al. in press a; in press b). The archaeological sequence covers at least four archaeological horizons (AH) and starts around 30-29 ka cal BP while the upper AHs remained undated.
Here, we report on our fieldwork at and around the site since 2021 as well as first results of laboratory analyses. We present (i) the results of a survey (fieldwalking and coring) to explore the extent of the site, (ii) an update on the stratigraphy and first insights into the climatic conditions recorded in the sequence, and (iii) new radiocarbon ages for three of the four archaeological horizons.
In sum, our results suggest repeated human presence at the site under rather arid and cold conditions between 30 and 25.5 ka cal BP. Hence, some of the human presence at the site can be placed in Greenland Interstadial 3 and the Leszno phase of the Last Glacial Maximum.

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Three-dimensional visualization and analysis of the stratigraphy at the Blätterhöhle entrance area

The site of Blätterhöhle (Westphalia, Germany) is located in the north-eastern part of the Rhenish Massif. This region is characterized by limestone and dolomite deposits with numerous cavities. The small opening of the Blätterhöhle has been discovered in 1983 by speleologists of the society "Arbeitskreis Kluterhöhle e.V." in a dolomite massif and a first exploration took place in 2004. During this campaign, some sediment has been removed while widening the narrow cave passage into a 15 m long crawl space. The removed sediments – later shown to have been

massively reworked by badgers – contained numerous Early Mesolithic and Late Neolithic human bones and other finds (Orschiedt et al., 2012; 2017).
From 2006 until today, excavations also took place outside the cave below the entrance under the direction of Jörg Orschiedt and later on with support of the LWL-Archaeology for Westphalia and the city of Hagen. These works have documented a rich stratigraphic sequence of Final Palaeolithic and Mesolithic layers. During the late Upper and Final Pleistocene and Early Holocene, the entrance area lay below a rock-shelter that collapsed towards the end of the Mesolithic, sealing off and preserving the sediments below. The rock-shelter opened to the south and overlooked a bottleneck situation at a height of about ten meters between the opposing massifs of Weissenstein and Huenenpforte, through which the Milchenbach creek flows in a narrow passage before entering the Lenne river ca. 500 m to the east (Heuschen et al., 2017). The to date steeply sloping entrance area has thus far been excavated at 22 m² at the surface and 9 m² at the bottom. The stratigraphy is documented in two continuous profiles DE (max depth 195 cm) and DM (max. depth 160 cm) in the western part of the excavation and shorter profiles in the eastern part (Heuschen et al., 2017; 2020).
Within the framework of a master thesis, the stratigraphy of the entrance area will be three-dimensionally reconstructed. The poster presents first results from quarter square meter E6c as a starting point for future work to create a model which includes the whole stratigraphy of the entrance area. The model will help to understand the different settlement phases and to link the entrance area to the inner part of the Blätterhöhle.

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Site use and organization of space at Kammern-Grubgraben

The site of Kammern-Grubgraben (e.g. Händel et al. 2021), dated to the Last Glacial Maximum, is unique in many aspects. Aside from its chronological position, it preserves outstanding constructed features in the form of stone pavements and partly collapsed stone constructions with small walls forming stone heaps.
Our excavations are focussed on one of these uprising structures we currently interpret as possible meat cache. The site is under re-investigation since 2015 and several trenches and sections opened new windows into the spatial distribution of the material culture remains. This re-evaluation also includes a new assessment of the site with modern 2D and 3D GIS applications of which we present the first results.
It is rare for Palaeolithic sites to include features that cannot sufficiently be documented in two dimensions. Therefore, we are developing a workflow to improve the 3D recording of the stone features, as well as to bring together the past documentation in 2D with the new documentation

in 3D. The aim of this analysis is to reconstruct spatial patterns of the Upper Palaeolithic occupations together with the palaeo-topography of the site in its environs, as well as to assess its post-occupational development to the cultivated landscape dominated by the intensive terracing we encounter today.

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Comparisons of animal species composition and their isotopes in Lower Austrian early Gravettian and Epigravettian sites evidence palaeoenvironmental and settlement changes

We present osteoarchaeological and bone collagen stable isotope data of Early Gravettian assemblages (approx. 33 – 29 ka cal BP) from the sites of Krems-Hundssteig, Krems-Wachtberg, and Langenlois, and compare it to the data from the Epigravettian site of Kammern-Grubgraben (Last Glacial Maximum (LGM), approx. 24 – 19 ka cal BP, material from the old excavation by Brandtner and Montet-White) in Lower Austria.

The faunal composition of the sites under investigation changes substantially over time, from mammoth-dominated assemblages in the Early Gravettian to a dominance of ruminants, such as horse, ibex, and especially reindeer in the Epigravettian. In addition, the greater species diversity in the LGM demonstrates either a change in the environment or in subsistence strategies or in both. Moreover, seasonal determination on faunal remains suggests a change in duration and occupation period of people in this area. While the Early Gravettian sites show occupations for different seasons, for the LGM site of Kammern-Grubgraben so far only winter occupation is attested.

Nitrogen and carbon isotope of animal bone collagen show trophic and ecological partitioning in a tundra/mammoth steppe ecosystem. Niche partitioning among herbivores is more evident in the Epigravettian allowing inferences about habitat differentiation between two herbivorous groups. Higher isotopic variability and overlapping of niches suggest a greater variety of habitats in the Early Gravettian, likely indicating a more diversely vegetated landscape. This may give important indications regarding available hunting grounds during the Gravettian and LGM. The study also demonstrates a shift in the nitrogen isotope baseline between the Early Gravettian sites and the Epigravettian. While herbivores from the Early Gravettian sites exhibits Delta15N values of 5.4‰ on average, values are generally lower (mean value: 2.7‰) at the LGM site. This is best explained by decreased soil and plant Delta15N values during the LGM due to decreasing mean annual temperature.

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Beyond the threshold – climate niche modelling reveals how pioneering Hamburgian foragers moved beyond the ecological margins of Late Pleistocene northern Europe

As deglaciation during the final stages of the Pleistocene opened up vast new landscapes in northern Europe, Late Magdalenian, Hamburgian, foragers began to disperse into these newly available, unknown and ecologically marginal environments. While much is known about Hamburgian technology and subsistence economy, less is known about the specifics of the timing and duration of this northern settlement episode. It furthermore remains uncertain how these people were adapting to the unfamiliar and unstable environments of Late Pleistocene northern Europe and whether dispersals were sustained or characterised by local retreat or extinction events.
In order to address these questions, we first re-calculated the available radiocarbon dates into weighted averages, resulting in a dispersal model consisting of two, discrete, punctuated events. We then applied this temporal framework to create a climate niche model in order to investigate the relationship between climate and the archaeological record.
This very first niche model focused on the Hamburgian phenomenon has revealed that these foragers often operated at the very limits of suitable climate space. Furthermore, it suggests that the extent of suitable niche space was highly variable and appears to deteriorate and become fragmented in the course of just a few human generations. Indeed, the northernmost Hamburgian locales - specifically during the second dispersal event - are placed at the very threshold between what can be characterised as marginal and sub-marginal environments.
With no direct environmental analogues available for Late Pleistocene northern Europe, the modern day marginal environments of the arctic provides the closets comparison. These are characterised by low productivity, low temperatures, high aridity, low density and diversity in species as well as high unpredictability in weather conditions and resource availability. Ethnographic data of foragers inhabiting these impoverished ecosystems show that while many buffering mechanisms (e.g. increased mobility, storage, exchange, diversification or specialisation) are available in order to deal with outside environmental stress, each also comes with certain social costs. Moreover, operating within an unfamiliar environment, adds further risk as it becomes necessary to rely on analogue knowledge of already known ecosystems, which in turn may mask available local resources, their fluctuations and related signals.
We argue that, the highly specialised and mobile Hamburgian foragers operated at the very limits between the marginal and sub-marginal environments of Late Pleistocene northern Europe and that they, due to an unfamiliarity of the environment moved beyond the threshold between the two. This may have stretched the related social cost too far and due to the

unpredictability of the unfamiliar environment possibly resulted in either an extirpation event, abandoning of the northern latitudes or even the complete collapse of these foragers and with them the extinction of the Hamburgian way of life.

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A multi-isotope record of climate and ecosystem change during the Middle to Upper Palaeolithic transition at Ranis Ilsenhöhle, Germany

The Middle to Upper Palaeolithic transition, and the concurrent spread of Homo sapiens across Eurasia and the disappearance of Neanderthals ≈45,000 years ago, represents one of the most important turnovers of recent human evolutionary history. This biological transformation occurs at an interface with the dramatic and rapid climatic oscillations of the Late Pleistocene, and those climatic shifts are thought to have had major impacts on any hominin groups navigating the changing environments of Eurasia. However, exploring the role of climate change for evolutionary processes and Pleistocene hunter-gatherer life-ways is considerably hindered by a lack of terrestrial climatic records that can be sufficiently connected with archaeological evidence. Many inferences still rest on climatic information from North Atlantic ice core records or from marine cores – records that are spatially distant from archaeological sites and temporally difficult to connect to archaeological chronologies.

Here we present a new record of changing climates and ecosystems from ≈48 to 34 ka ago in central Germany, using multi-isotope analysis applied to directly-dated equid teeth from Ranis Ilsenhöhle, Thuringia. A type-site for the 'transitional' technocomplex of the Lincombian-Ranisian-Jerzmanowician (LRJ), Ranis Ilsenhöhle preserves an important Late Pleistocene sequence that is currently under re-evaluation following recent re-excavation efforts from 2016–2022. Specimens for this study were mostly obtained from the legacy collection of the 1930s excavation, and radiocarbon dated to improve links with newly excavated material. Enamel stable isotope data document substantial climatic and ecosystem change within a cold steppe framework. Notable is a pronounced low δ18O/high δ15N excursion indicating cold-arid conditions at ≈44 ka, which falls into the time range of the LRJ deposits. Carbon stable isotopes

do not correlate as expected with δ15N or δ18O, indicating that δ13C may be driven by factors other than water availability or landscape openness, such as atmospheric CO2 concentration. δ66Zn pilot data from equids and other herbivores tentatively indicate climate-driven changes between grazing and browsing feeding niches of herbivores and/or changes in soil nutrient cycles.
The results show that hominin groups of different occupations at Ranis operated in severe cold conditions and highlights the potential of multi-isotope analyses of faunal remains to document climatic and ecological changes directly at archaeological sites.

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The working of hard animal tissues during the Last Glacial Maximum at Cosauţi site (Republic of Moldova) – local idiosyncrasy or part of the bigger picture?

The open-air site of Cosauţi, located in the middle Dniester valley, was discovered in 1978 by I. Borziac and M. Anikovic and excavated in the 1980s and 1990s. A long stratigraphic sequence with multiple Early Epigravettian occupations has been dated to 23–20 ka calBP and thus into the LGM. The bone industry, recently re-evaluated, is very rich and well preserved and is characterized mainly by the processing of reindeer antler and mammoth ivory. Projectile points, awls, smoothers and eyed needles have parallels in contemporaneous assemblages from Central and Western Europe, whereas some other types and ornaments appear to be unique to this site. Most notable, however, is the presence of a well-developed groove-and-splinter technique for preform production. Further west, a comparable technology will not appear until the beginning

of the Magdalenian a couple of millennia later. It is therefore necessary to discuss, whether the typotechnical diversity and complexity found in Cosauţi is due to the special conditions for human populations during the LGM in a climatically favorable retreat, or whether it rather represents the cultural norm of the Epigravettian in Eastern Europe, which may have influenced certain later developments in the West.

Fig.1. Exploitation of raw material blocks by longitudinal grooving at LGM site of Cosăuţi (Republic of Moldova). Detached reindeer antler tines (1 & 2), bone needle blanks (3), prepared reindeer antler blank (4), bone needle cores on large mammal bones (5 & 6). Repository National Museum of History of Moldova. Photo Sebastian J. Pfeifer.

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Settlement patterns in the Balkan Peninsula during MIS 3

The Marine Isotope Stage 3 (MIS 3) is characterized by significant climatic changes associated with abrupt atmospheric shifts over Greenland (Dansgaard-Oeschger events) and episodes of massive iceberg discharge into the North Atlantic (Heinrich events), enhancing cold and dry conditions at mid-to-low latitudes. The extreme conditions and fluctuating climatic and environmental conditions of Marine Isotope Stage 3 significantly affected many aspects of the lives of prehistoric populations, including settlement and mobility patterns. Many ethnographic studies show that settlement and mobility patterns are conditioned by numerous factors such as climate conditions, terrain morphology, group preferences, animal behavior, resource availability, etc. Although the Balkan peninsula has been characterized as a refugial region, hominine populations could still be affected by the unstable conditions of Marine Isotope Stage 3. With extensive research conducted during the last few decades in the Balkan peninsula, available data shows mostly diverse practiced settlement models during MIS 3.
This study aims to examine settlement and mobility patterns of the hominine groups during Marine Isotope Stage 3 on the Balkan peninsula with a specific accent on the factors that could have influenced them. The study is based on published data from the Middle and Upper Paleolithic sites in the Balkan peninsula, dated to Marine Isotope Stage 3. We consider several parameters to assess the settlement and mobility patterns of the hunter-gatherer groups. Two analyses have been conducted: bivariate WABI (Whole assemblage behavior index) and multivariate PCA (Principal component analysis) for the following variables: lithic density, retouched frequency, core, blanks, and chips frequency as well as tool diversity, which are frequently used to assess settlement patterns of prehistoric human populations. Including both Middle and Upper Paleolithic sites, differences in the settlement patterns are inspected between different hominine populations (Neanderthals and Anatomically Modern Humans), climate conditions, and between microregions in which sites are located in.
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"Tertiary quartzite" exploitation by Middle Palaeolithic societies in the Lower-Middle Rhine Valley. A geoarchaeological approach to stone procurement and management strategies

Lithic raw material sourcing is a recurrent topic in Palaeolithic Archaeology thanks to the interesting conclusions they put on the table and which are mainly related to the mobility of objects, and, of course, the people behind them. Furthermore, the characterisation of lithic raw material from geoarchaeological perspectives allow us to profound in the characteristic of the rocks transformed into artefacts by Palaeolithic knappers, to unveil the strategies carried out by humans to manage lithic resources and to propose how rocks were extracted or collected from the Earth surface (Burke 2018).

In this presentation, we will show how the geoarchaeological characterisation of the "Tertiary quartzites" in the Middle-Upper Rhine Valley (Germany) is unveiling how this resource was procured, distributed and managed by Middle Palaeolithic groups, but also particular human actions and adaptative behaviours. The methodology applied was based on the petrological characterisation (thin section and micro-stereoscopic petrography and X-Ray characterisation) of the "Tertiary quartzite" artefacts from the assemblage of Troisdorf-Ravensberg, a Middle Palaeolithic site excavated in 2015 between the cities of Bonn and Cologne and the starting point of this project (Pastoors et al. 2016). In addition, a series of geoarchaeological surveys were performed to geographically localise the natural occurrence of this rock in the region and petrographically characterise its quartzites. Finally, the revision of the lithic assemblages of Ratingen and Kleine Feldhofer Grotte was performed to characterise their quartzite artefacts. The techno-typological analysis of the lithic assemblages of the three aforementioned sites was also performed.

The results are thematically varied and they allow us to comprehensively understand this rock, resource and expression of material culture. Petrologically, "Tertiary quartzites" are more related to silcretes, that is, sedimentary rocks created by the endurance of clastic quartz grains by silica cement, rather than with sensu stricto quartzites, metamorphic rocks (Prieto et al. 2019). In addition, the petrographic characterisation of this rock puts on the table the presence of three types and varieties driven by textural features (mainly). The geoarchaeological surveys suggest that the presence of these "Tertiary quartzites" is restrained to some small occurrences around the site of Troisdorf-Ravensberg and in relationship with landforms associated with water circulation. Nevertheless, due to the changeable environment of the area in the last 50,000 years and the well-documented intensive use of stone for construction purposes (Dettmann 2015), we could not discard their presence in other areas during the Pleistocene. Of course, other quartzites were discovered in the region, but they were less exploited. "Tertiary quartzites" were, therefore, a relevant resource for Middle Palaeolithic societies. They probably quarry these rocks in natural occurrences, like those surrounding Troisdorf-Ravensberg, they moved the material more than 20 kilometres (to the North), and they manage differently the different varieties of the "Tertiary quartzites". In addition, it seems that these quartzites were also acquired in secondary deposits, together with other lithic resources and applying selective mechanisms. These data put on the table a complex economy articulated around quartzites by Middle Palaeolithic societies in the

area, but they also reinforce the relevance of geoarchaeological research on non-flint raw materials as they offer interesting and underestimated data to understand Palaeolithic people (Prieto et al. 2022).

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Reinvestigation of the Aurignacian assemblages from Góra Puławska – a microscopic and experimental approach

The Aurignacian assemblages in Poland come from sites in the southern part of the country and are dated between 40,000 and 34,000 BP. One of the most exceptional is Góra Puławska - the northernmost site in Poland with Aurignacian artifacts. This site was discovered at the end of the 19th century by Nikolai Krištafovič. Then, the excavations were carried out by Jan Samsonowicz and Stefan Krukowski in the 1920s. In the 1940s, a field survey in terms of recognizing the geology and stratigraphy of the site was undertaken by Ludwik Sawicki and Władysław Pożarski. The Paleolithic materials were found in the sediments exposed by the Vistula river. During the filed works, several assemblages were separated, which included both the remains of the Pleistocene fauna and flint artefacts. Some of the materials were lost during the Second World War, while the charcoals from the layers were destroyed during the analyzes of that time. Therefore, it is currently not possible to date assemblages using absolute methods.
In the presented paper, we want to focus on the results of the reanalysis of flint materials, which we carried out using morphological and microscopic analysis. We analyzed in detail cores and blanks (including refittings) – blades and bladelets, technical forms such as rejuvenation flakes, crested blades, flakes from preparation, as well as the formal tools. All obtained data we verified during experimental tests.
As a result of our studies, we would like to present in detail two blade production methods used in the area of Góra Puławska, reflecting the lithic technology in the early Upper Palaeolithic. The

first one is related to the production of bladelets from small cores (carinated forms). This type of bladelets was intended for microlithic inserts - of the Dufour or Krems types (individually recorded at the site). The second method relates to blade production and burins, perforators, truncated blades, and end-scrapers formation (also individually recorded at the site).
As a result of the microscopic analysis, it was possible to specify the types of hammers and retouchers (whether they were made of antler, wood, or stone) used during the flint nodules processing. At the same time, we made the microscopic analysis to identify the tools used in everyday work. Special attention we focused on the striking platforms of small core forms. The registration of potential use-wear traces on small cores would indicate how the Aurignacian societies used core-shaped forms. Based on microwear studies, it was possible to refer to the discussion on the treatment of carinated forms, both end-scrapers and burins, by the Aurignacian societies - whether they should be treated as cores for obtaining small blanks or as tools used in everyday activities.

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Nonmarine Ostracoda as proxies in Geoarchaeology

Ostracoda have a high potential for analyses of aquatic sediments in archaeological investigations, a potential not fully exploited so far. To promote their application for archaeological research questions we present here a review on how nonmarine ostracods can be used to answer (geo-)archaeological research questions, based on a paper published by us recently (Quante et al., 2022). Ostracods are small crustaceans that live in almost all types of aquatic habitats, both natural and man-made. Due to their small size, mostly 0.5–2 mm in length, only small volumes of sediment are needed for analyses. Their carapaces are calcitic and thus have high fossilization potential, and they are suited for identification of species and even ontogenetic stages.
The typical applications are palaeoenvironmental reconstructions and palaeoecological analyses of associations based on ecological information and species-specific preferences and tolerances. Other methods include their taphonomy, morphometric variability, and stable isotope and trace element chemistry of their valves. Palaeoenvironmental and palaeoclimatic information from ostracods have especially been of interest in nonmarine geoarchaeological studies, as ostracods, in contrast to many other microfossil groups, also occur widespread and with high species richness in fresh water. Water availability and quality, land use and other anthropogenic impacts and the provenance of materials and commercial networks have also been investigated in archaeological studies. For example, at Palaeolithic and Neolithic sites climatic changes and

changes in human living strategies have been reconstructed, the environmental histories of areas with human occupations have been reconstructed, and the environmental suitability of areas for human settlements have been analysed with ostracod-proxies. Studies at more recent sites include examples such as interpretations of climatic changes effecting land and water use, e.g., Mayan swidden and wetland field agriculture, or human impacts on the environment that are seen e.g. in soil erosion and aridification and thereby indirectly traceable in ostracod analyses. In the same way, land use can be detected by ostracod analyses indirectly by deforestation and connected higher erosion rates with resulting discharge fluctuations in streams or into lakes, but also through eutrophication events. Ostracods can further be used to detect water works such as canals and dams, and to reconstruct the usage of those structures, potentially even with a seasonal chronological resolution.
We compiled more than 100 geoarchaeological studies that all in some way used nonmarine ostracods, which promotes the ostracod-based proxies for various (geo-)archaeological research questions in continental and other nonmarine contexts. This also displays the sparsity of detailed nonmarine ostracod studies at archaeological sites, but regarding the state of research and development of new and better ostracod proxies, the number of studies may further increase in the coming years.

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The Late Glacial sequence of Cova de Les Borres and the emergence of Epipalaeolithic geometric microliths in Eastern Iberia

North-eastern Iberia has a long-established research tradition on Late Pleistocene archaeology. Beginning with the seminal work of Javier Fortea (1973), who defined the Mediterranean Epipaleolithic sequence, continuous research has resulted in an extensive roster of sites. These assemblages form the basis for lively and ongoing discussion as well as refinement of the chronological patterns and the models for the cultural evolution during the Pleistocene-Holocene transition. After the cessation of the Mediterranean Magdalenian harpoons in the archaeological record c. 14,000 cal BP, Late Glacial lithic assemblages (Epipalaeolithic sensu lato) are described as microblade industries of Magdalenian affiliation, chiefly characterized by endscrapers and backed artefacts. For these Late Glacial industries, the overall stability of their general design is often highlighted, accompanied by minor and gradual modifications in their production systems and typological structure. It has further been argued that there occurred a simplification of bladelet production strategies, diachronic changes in the stylistic configuration of backed artefacts, and a microlithization of the armatures throughout the Late Glacial. Most notably, however, is the incorporation of geometric microlithic armatures from around 12,700 cal BP, which led to the definition of a 'Sauveterrian' facies. This Late Magdalenian phenomenon in turn comes to an end c. 11,500 cal BP with the marked onset of lithic technological expediency taken to be characteristic of the so-called Notched and Denticulated Mesolithic (Aura et al., 2011; Román et al., 2020; Soto et al., 2016; Villaverde et al., 2012).

In this paper, we examine the variability and evolution of Late Glacial lithic industries in Eastern Iberia using new chronological, technological, and typological data from the Cova de Les Borres rockshelter site. The site, located in the Prades Mountains (Tarragona, NE Iberia), has been continuously excavated since 2015, covering trench surface of 35 m². The archaeological sequence contains four layers of interest for this study: Layers 2.1 and 2, dated to the mid GI-1; Layer 1.2, dated to the late GI-1 – early GS-1; and Layer 1.1, which has not yet been directly dated but its stratigraphic position overlaying Layer 1.2 provides a post quem reference for its estimated association to GS-1. These four well-defined layers have yielded abundant lithic assemblages, featuring systematic bladelet production and similar typological structures, with a predominance of backed artefacts and endscrapers, together with a relevant presence of denticulates. Backed elements are particularly abundant in Layer 1.2 surpassing 50% of retouched artefacts. Geometric microliths appear in Layer 1.2 – 3 triangles and 6 segments – and continue in Layer 1.1 – 1 trapeze and 2 triangles –. Layer 1.2 provides the as yet oldest radiocarbon dates for assemblages with geometric microliths in Eastern Iberia, suggesting that they appear at ca. 13.000 cal BP, around the transition between the GI-1 and the GS-1. Across all four layers, bladelet production strategies are characterized by burin-cores and cores with simple, frontal reduction schemes with scarce preparation. Unifacial unidirectional dynamics are prevalent in all layers, with bidirectional dynamics becoming more common in the upper ones. There is also a diachronic pattern of stylistic evolution in the production of backed elements, with a gradual shift from straight backs to curved backs, and a decrease in the frequency of bipolar backs. The microlithization process of armatures is well attested in this sequence, showing a trend towards decreasing length, width, and thickness of backed points, along with the emergence of geometric microliths. Cova de Les Borres is one of the few sites with successive archaeological layers dating to the GI-1 and GS-1, becoming a key sequence for the study of technological variability and cultural evolution during the Late Glacial in Eastern Iberia.

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Fetegga, Alpine Late Mesolithic Reindeer Hunting Expeditions into the Extreme Margins

The recent melting of high altitude ice patches in the Norwegian mountains, caused by global warming, has led to the discovery of an unprecedented archaeological assemblage linked to reindeer hunting and communication systems. Well and rarely preserved artifacts emerging from the ice, such as textiles, wooden objects and other organic materials have sparked great international attention.

However, as most glaciers and ice patches melted during the Holocene Thermal Maximum and first reappeared at the transition to Neolithic /sub-boreal times (Nesje 2009), few if any Mesolithic ice patch sites have been recorded – until the discovery of Fetegga in 2014. The hot summer of 2014 melted a snow patch covering large parts of the wild, steep and narrow mountain ridge of Fetegga in Western Norway, at an elevation of 1460-1500 metres above sea level. This exposed an interconnected system of 57 hunting blinds, several cairns, along with 13 butchery sites and short term camps associated with reindeer hunting. As these activities pre-date the formation of the ice patch almost no organic materials were preserved. Nonetheless, the entire complex has survived apparently undisturbed, and minimally eroded, having only recently been exposed by ice retreat.

The climate optimum must have severly impacted the reindeer populations of Norway. As the forest line climbed in some areas to over 1000 m.a.s.l., new populations of animals such as elk and deer would have been introduced into the previous pastures of the reindeer. The reindeer population probably declined, as they were forced into more extreme alpine environments. Therefore, hunting of this shy and alert animal must have been extremely challenging, especially as it was difficult to predict reindeer migrations on a larger scale. At the same time, the steep alpine landscapes such as the narrow mountain ridge of Fetegga offered few options for the

reindeer to escape and thus presented the hunters with a more advantageous situation, and possibilities to track and hunt the animals at close quarters. The number of structural remains at Fetegga seems to highlight the importance of reindeer, not only for food but equally for high quality raw materials such as hides, sinew, antler and bone. Fetegga is a remote and desolate place even today and must have likewise been both a challenging and potentially dangerous environment during Mesolithic times - with frequent storms and harsh weather conditions, including frost and snow even during the summer. The remoteness, either for inland or coastal populations must have required several days of difficult travel into the mountains. Based on the data revealed from the investigations at Fetegga, the amount of equipment and lithic raw material brought along seems to have been kept to a minimum, securing speed and efficiency for a hunting expedition pushing so far into the high altitude alpine landscapes of Western Norway. The lithic assemblage consists of transverse arrowheads, scrapers, burins and a number of informal knives and cutting tools, with just a limited quantity of lithic waste material and cores.
The archaeological investigation at Fetegga has undoubtedly provided new information about the mass-trapping of reindeer in Norway, and gives insight into the socio-economic importance of reindeer during Late Mesolithic times. In the presentation we will aim to move beyond simple strategic adaption and towards a more active intervention in the natural environment. We will address how an intimate knowledge of the landscape along with animal behavior was used tocreate predictable and favorable conditions for hunting whilst simultaneously offering maximum shelter and security. We will also address how Fetegga sheds new light on economic specialization and social complexity during the late Mesolithic in Western Norway.

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On the brink of the great Glacier. Langfjelldal, an Alpine Early Mesolithic single unit reindeer camp in Western Norway

This presentation deals with the site Langfjelldal, located in a dramatic high alpine landscape, surrounded by jagged mountain peaks and glaciers in Reinheimen National Park (literally "the Reindeer-home"). Langfjelldal is the first Early Mesolithic high mountain site in Western Norway and is interpreted as the remains of a single, short, encampment episode. No post depositional disturbances affecting the distribution pattern of lithics and structures were recorded. The site location as well as the find assemblage indicates a highly specialized camp for reindeer hunting and the butchering of animals. Production of points, as well as activities related to tooling and retooling testify to the importance of manufacture and repair of hunting equipment. All the activity seems to be restricted to a limited area near a tent and a open air fireplace. The site gives insight into high mountain lithic raw material procurement. Rock crystal dominates the assemblage (71%) while the rest, flint (29%) was originally collected from glacial shorelines along the coast and transported to the high mountain sites as tools, preforms and prepared cores. On Early Mesolithic sites along the coast rock crystal only appears in the range of 0-3% of the total assemblages, probably both due to retooling on high mountain sites and the transport of universal exotic raw material back to coastal base-camps. The locality is situated on a small terrace, at 730 m.a.s.l., at the northern side of the Langfjell-valley. Below the site is a dry creek bed that contains water in times of flooding, which represents the only available water

source at the time of habitation. As far as we know the site location differs from all other excavated pre-boreal sites in Norway, which are either situated in close relation to the waterfront of mountain lakes or to old beach shorelines along the coast. Crucial for the understanding of the site location is its complete overview of the western parts of Langfjelldal, including Langfjelldalelva, a small mountain river, which runs in a westerly direction through the valley, about 70 m south, and about 20 m below the site. The site has a sheltered position in the landscape, and it is difficult to see it from further down or further up the valley. Thus, the location comprises an excellent almost hidden place, for observing migrating and grazing reindeer. The hunting activities are supposed to have happened off site, most probably within the "visible" landscapes of the lower lying valley, comprising an area within 1-4 km from the site. The composition of the find assemblage together with an AMS date contributes new information relevant for the ongoing debate about EM stone tool production in light of raw materials, and typological and technological variability. Langfjelldal provides new information about EM site variability and mobility and gives a window into a highly mobile hunting expedition in the post glacial alpine landscapes of Early Mesolithic Western Norway.

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An experimental approach on dynamic Occlusal Fingerprint Analysis to simulate use-wear development and localisation on Palaeolithic stone tools

Since the origin of the genus *Homo*, stone tool-based technologies were a main component in the toolkit of past humans. Studying how hominins acted in the past through the study of evidence left on stone tools is one of the key areas in archaeology for understanding the evolution of human behaviour. Information about the use of stone tools in the past is encoded in the wear patterns left on the tool's surface after its use. To decode this information, use-wear analysts investigate the mechanisms involved in the formation of diagnostic wear traces. Occlusal Fingerprint Analysis (OFA) is a well-established method in dental macrowear studies (see e.g., Kullmer et al. 2020) to simulate chewing actions and thus to locate and quantify kinematics on dental wear facets (contact areas between opposing teeth).
In a pilot study, we apply, for the first time, the OFA approach to a set of experimentally produced stone tools. The overarching goal is directed on building expectations as to where wear traces should develop on knapped tools based on their morphology and the type of action (i.e., movement) performed. Additionally, this study aims to investigate whether contact areas calculated from the software correspond to use-wear traces we observe in the microscope. A series of second-generation mechanised cutting experiments (see Marreiros et al. 2020) with four experimental sample sets was performed: two samples had a standard, saw-cut morphology, while the other two were knapped and retouched. One sample of each type was used on a synthetic bone plate while the other was used to cut wood (see Schunk et al. 2023). All samples were scanned with a high-resolution 3D scanner. The 3D scans are loaded into the OFA software and the trajectory, identical to that of the experimental setup, is simulated. During this trajectory, OFA records and quantifies all contact areas by collision detection algorithms occurring between

the 3D models of the tool and its contact material. In parallel, the experimentally produced use-wear is documented with various imaging equipment such as a stereo-, digital-, and an upright light microscope.
Preliminary results show that the location and area of micro use-wear traces partially match those calculated by the software. The overlap of contact areas in OFA and use-wear observed in the microscope may depend on factors such as the complexity of tool geometry and duration of contact between materials. Contact/use-wear predictions from tools with a more homogenous topography are more congruent than from tools with a heterogenous topography (e.g., retouched edges). Since OFA also calculates cumulative contact areas throughout a trajectory, it could be shown that, as expected, areas that are longer in contact with the worked material tend to produce visible use-wear (polished) areas. On the other hand, areas that are in contact with the worked material for a short time and are thus worn to some degree do not produce visible use-wear. Hence the duration of contact between a tool and its contact material is a deciding factor in whether visible use-wear will develop.
While this research is still only a proof-of-concept, this method can and will be applied to a wider range of raw- and contact materials. It may also be possible to incorporate anatomical data from joint recordings in the advanced mode of the software. Lastly, this new method for the discipline of use-wear analysis will be applied to archaeological assemblages, contributing to larger research questions. By formulating predictions as to where human-made use-wear should develop depending on tool morphology (including raw material properties) and action performed, this method will address the challenge of differentiating between surface alteration from human use-wear and those stemming from post-depositional processes.

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Revisiting the Final Palaeolithic site of Mühlheim-Dietesheim (Hessen, Germany)

In 1976 – and in fact as part of the Hugo Obermaier Tagung in Giessen that year – a collaboration between Prof. Gerhard Bosinski and the archaeological volunteers in Mühlheim was established. This led shortly afterwards to the discovery and excavation of the site of Mühlheim-Dietesheim, discovered earlier by volunteer group member Richard Plackinger and his associates. The site is located on the southern bank of the River Main, just east of Frankfurt (Fruth 1979, 1994), near a historical fording. The lithic assemblage belongs to the Final Palaeolithic Federmessergruppen and its raw material composition indicates relation to the west and south, in particular. The presence of many larger river pebbles has been interpreted by the excavator to indicate a tent structure. Moreover, heavy minerals analysis of the sediment profile conducted then indicates a stratigraphic position of this site just under the Laacher See eruption (Reinig et al. 2021), suggesting a mid-Allerød date for the site.

As part of the ERC-funded CLIOARCH project (Riede et al. 2020), the Mühlheim-Dietesheim assemblage has been re-visited revealing both charcoal, a small piece of ochre, and – rather surprisingly – a possible lamp. Finds of such objects from open air contexts are rare but bear witness to the importance of warmth and light in Palaeolithic societies. Newly obtained radiocarbon dates on the charcoal remains retrieved as part of the original excavation are of Early Holocene age. As no other traces of Early Holocene presence at the site had been recovered as well as the long interval from discovery to analysis, however, the possibility of contamination with younger carbon cannot be ruled out (e.g. Vermeersch 1977). The possible lamp is manufactured of sandstone and bears broad similarity to other Final Palaeolithic examples (de Beaune 1987). It is irregular in shape and only moderately modified if at all.

Here, we present a first detailed documentation of this artefact, including multi-spectral photography as well as scanning electronic microscopy. These will be further complemented by biomolecular analysis, focussing on lipid residues, which have proven to be a great success in the case of prehistoric lamps (e.g. Robson et al. 2022). Permission to re-excavate and to extend the sub-surface investigations at this site have recently been obtained. The aim of this new fieldwork will be to refine the dating of the site through additional radiocarbon dates, systematic OSL dating of the sedimentary sequence, as well as through microtephra analysis. In addition, test-pitting will be deployed to ascertain the full extent of the habitation area.

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A joint digital archive for Neanderthal research

The preservation of archaeological finds and fossils via 3D scanning plays an ever growing important role in today's archaeological research and heritage management. Having an easily accessible platform to upload, share and access international data on tools, fossils, art and comparative material both provides a valuable database for researchers worldwide as well as strengthens our international research community.
Neanderthal Museum in Mettmann, Germany, recognized this development very early on: already in the museum's first mission statement from 1996, the development of a digital database on the cultural heritage of Neanderthals is named as a central task. Its former database project NESPOS established an internationally accessible online database and collected anthropological and archaeological data related to Neanderthal research and human evolution, including 3D scans, CT scans, scanned literature, site information, images and tables. Since February 2022, the new digital archive of Neanderthal museum continues this task, and aims to support researchers worldwide. Our archive specializes on Human fossils, Stone Age Artefacts and Ice Age Art.
This paper presents the functions and opportunities of using the archive, highlights advantages for research, and invites the research community to share and expand the collections together.

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Paleotemperature development during the Eemian Interglacial at Lichtenberg, Northern Germany, inferred from a subfossil chironomid record

The dynamics of natural climate variability during the Eemian Interglacial are not yet fully understood, although this would be critical to establish future scenarios. Here we present a new chironomid record from Lichtenberg, northeastern Lower Saxony, Northern Germany, which was used to quantitatively reconstruct mean July air temperatures of a former lacustrine environment. An adjacent archaeological site, as well as other sites in the close vicinity, indicate Neanderthal occupation during an Eemian sedimentary sequence associated with MIS 5e (Eemian Pollen Zone IV/V). Remains from subfossil chironomids provide information about the climatic variability during the Eemian Interglacial and the transition into the succeeding Weichselian glacial, and therefore offers an opportunity to reconstruct the environmental conditions during presence of Neanderthals in Northern Germany.

We estimated summer air temperature using Weighted averaging partial least-squares regression, based on a Swiss-Norwegian chironomid summer temperature training set (TS), including 255 lakes and 151 chironomid species, with a mean error of 1.89 °C. The chironomid record from Lichtenberg contains a highly diverse chironomid community, with up to 53 different chironomid taxa, the majority implying a shallow-lake setting with intermediate to warm climate, characteristic of productive lowland lakes. The chironomid record starts with organic-poor, late glacial Saalian sediments characterized by high abundances of profundal chironomid taxa which reconstruct mean July temperatures between 14 – 15 °C. Organic-rich deposits during early Eemian periods are dominated by chironomid morphotypes, like Cladopelma lateralis-type, Polypedilum nubeculosum-type and Glyptotendipes sp., indicative of shallow, meso-eutrophic lake conditions with extended macrophyte vegetation with summer temperatures up to 17 °C. In Late Eemian sediments, we observed a decrease in organic components, characterized by higher abundances of profundal, cold-adapted chironomid taxa, such as Micropsectra sp., Paratanytarsus austriacus-type and Tanytarsus lugens-type. These chironomid assemblages suggest wetter, cold to intermediate climates and less productive environmental conditions for the Late Eemian with decreasing summer temperatures ranging between 13 – 14 °C. Our study reveals paleo-temperatures of around on average -1.97 °C below the mean value of the reference period 1961 – 1990 CE (17.2 °C) This result suggests lower temperatures than those proposed by other studies, which estimate about 0 – 2 °C higher temperatures for the Eemian compared to modern times. This discrepancy is mainly due to the applied modern chironomid temperature dataset, which is characterized by a low influence of continental climate and includes only lakes that have a maximum temperature of 18 °C. In the future, the use of a combined Swiss-Norwegian-Polish TS, which includes more warm and productive lowland lakes, is suggested. This summer temperature reconstruction from the mid-Eemian sediments provides insights into Eemian climate dynamics in Central Europe, but also underlines the need for the application of a new chironomid temperature TS in the future, that would fit better to the geographical region, lake characteristics and the expected temperature range of the fossil record.

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On Microliths in Middle Palaeolithic: Start from scratch. Discussing problems and perspectives looking at shared taxonomies

The microlithic component in Eurasian Pleistocene stone tool assemblages has been identified as a relevant part of technological behaviours just recently. Traditionally the small component of pre-sapiens lithic assemblages was systematically classified into the category of "knapping waste/debris". These tools are usually unretouched, so not easily identifiable as searched tools according to traditional criteria in lithic morpho-technical studies and, as a result, assumed not to be informative about past human behaviours. The first works that allowed archaeologists to identify tiny lithic items as tools by ancient hominins were mainly focused on use-wear analysis (recognising that they were used in meat-cutting activities since Lower Palaeolithic, Barkai et al., 2010), and refitting (showing a flexible character of Middle Palaeolithic stone tool production, systematically fragmented in the spatial, temporal, and social domains, Turq et al. 2013). Reanalysis of Eurasian assemblages was favoured by the identification of small implements in the African records (ESA, MSA, and LSA). Furthermore, micro-artefacts have been showed to be more frequently attested in their original location of use and in primary activity areas being charged of a special value for archaeologists when it comes to identifying and interpreting cultural aspects looking at the spatial distribution in hunter-gatherers' campsites (Hull, 1987). In the last decade several papers have showed the widespread production of small items that are currently known as a basic component of Middle Palaeolithic technology (e.g., Borel at al., 2017; Romagnoli et al., 2022). However, these studies also clearly showed that, in some cases, these small tools were part of the transported toolkit. Thus, they can be related to a huge diversity of economic and mobility strategies. These include anticipated task planning, in-situ expedient production of effective cutting edges, exploitation of lower quality resources, or different manufacture procedures. Still, microlithisation of core knapping, exploitation of core-on-flake, bipolar production, recycling, etc. and the multiplicity of behaviours related to them are not necessarily mutually exclusive. While the issue of microliths in Middle Palaeolithic is currently

a cutting edge in human evolution studies, it is still looked through a blurry lens because of the lack of clear definitions. One problem concerns the length or weight threshold that small items should have and the use of the generic label "microstuff" that impede to understand the specific contribution of these productions as cultural component in regional groups. Another problem concerns their role in hominins daily lifeways at different temporal and spatial scales of analysis, their possible integration in the technological and social organisation of the human groups.
In this presentation we briefly consider these problems through some archaeological examples on which we are working. They converge on showing this variability within micro-productions studies in Middle Palaeolithic and current limitations to their understanding. We also discuss some proprietary aspects in relation to taxonomy and technology, as well as possible pathways to further investigate this issue. This paper is a first step to build a collective, collaborative project to investigate Middle Palaeolithic microproduction with a more focused look.

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Late Neanderthals and their environment in northwestern Tuscany: news from Buca del Tasso

Buca del Tasso is a karst cave located in northern Tuscany in the southern Apuan Alps mountain range (10.338128E, 43.948155N WGS84; 465 a.s.l.). The cave was discovered in 1919 and completely excavated in the three following years (Stefanini et al. 1922). The original excavators found Pleistocene fauna in association with Mousterian artifacts. The stratigraphic succession consists of three main levels: Level A with abundant fauna and Mousterian industry, level B sterile, and level C with scarce fauna and Mousterian artifacts. Later, a more in-depth analysis of

the fauna assemblage showed the existence of a fragmentary human femur diaphysis attributed to a juvenile individual of H. neanderthalensis (Alciati et al. 2005). The fauna shows taxa typical of a mountain alpine range (*C. ibex, M. marmota*) and extinct taxa (*U. spelaeus*) or taxa more compatible with open steppe environments (*S. kirchbergensis*). Albeit no radiometric dating was available, comparison with nearby caves where Mousterian artifacts and Pleistocene fauna were found, suggested an age spanning the Riss-Wurm interglacial phases. The scarce lithic industry (7 artifacts in Level C and 37 in Level A) is linked with the Late Mousterian, characterized by the Levallois method to produce elongated blanks (Palma di Cesnola 1970). The accumulated faunal remains can be attributed to human input given the few carnivore remains. Two recent complementary research projects are re-investigating the significance of the site to compare it with the Apennine Peninsula late Pleistocene context.
In this work, we present the site to the international community and new, important radiocarbon dating obtained on faunal remains from Level A and C. Level A returned a 40,2 ± 1,3 ka BP date while Level C is 48,0 ± 3,4 ka BP. According to the dating, we selected the climatic dataset using R package Pastclim, with a spatial resolution of 0.5° × 0.5° at intervals of 1,000 years (Leonardi et al. 2022). Findings pointed out that the temperature steadily declined towards the recent phase, but while the temperature was relatively mild at times of frequentation (Level A and C) there is a drop in temperature between the two periods, consistent with the sterile Level B. Findings at Buca del Tasso might highlight an area of late Neanderthal survival along the Ligurian-northern Tyrrhenian coast (Riel-Salvatore et al. 2022).

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CoDEx 2022: Cologne Digital Excavation protocol. Latest advances and experiences

In 2020, the Institute for Prehistory at the University of Cologne introduced a fully digital documentation system to the Magdalenian site of Bad Kösen-Lengefeld, substituting the previous, paper-based system of documentation. Central to the documentation in the Cologne Digital Excavation (CoDEx) protocol is the use of structure-from-motion software to generate a

georeferenced drawing surface and the QGIS software as the primary system for data management and manipulation. The protocol allows the on-site digital documentation of archaeological observations in a GIS environment. Therefore, all data is georeferenced within the excavation coordinate system and linked to metadata, which can be attributed to each individual object, documented during the excavation process. The drawing data is generated on site using tablet pcs linked in a local Wi-Fi network.
After having presented the fundamentals of the documentation protocol in the state used on excavation in 2021 at the HOG Conference in Berlin in 2022, this poster presents the latest changes to the system, version 2022. This includes changes in the processing of structure-from-motion software, changes to the data transfer and, most importantly, the introduction of a PostGIS Database structure for simultaneous data manipulation and handling. By introducing such changes, it was possible to further improve performance as well as error rates of the overall documentation process. We present our experiences with documenting an excavation entirely using digital tools as well as our plans for the CoDEx system in 2023. These involve the implementation Python-processing algorithms to the 3D-modelling architecture, further speeding up on-site processing.

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An intrasite analysis of the Magdalenian site of Bad Kösen-Lengefeld (Saxony-Anhalt)

Geospatial analysis has been substantial for understanding archaeological sites for quite some time. Not only can it provide insights into the cultural transformation of the site, but also on the natural transformation. Thus, this work focuses on GIS-based methods to gain deeper knowledge of the site of Bad Kösen-Lengefeld.
Originally discovered in 1954, the Magdalenian site of Bad Kösen-Lengefeld lies on a plateau 30m above the river Saale on the opposite bank of the site of Saaleck. For more than ten years, the site has been investigated by members of the University of Cologne and the Friedrich-Alexander-Universität Erlangen-Nürnberg, in close cooperation with the Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt. Until 2022, a main area of 111m² has been excavated. The faunal remains suggest that horse and reindeer hunting played an important role at the site. While the analyses of the lithic and faunal assemblages have yielded first results (Richter et al. 2021), a spatial analysis is still ongoing.
This presentation gives first insights and preliminary results of my Master thesis that aims at a comprehensive analysis of the transformation processes that have taken place at the site. The presentation will focus on two main questions: Did geomorphological processes like erosion affect the site, and if yes to which extent? And can specific human activities be assigned to different areas within the site? To address these topics, we apply a set of different GIS methods. While calculating the inclination and orientation of lamellar artifacts is used to address questions regarding the in situ preservation of the find layer in high resolution, kernel density estimates and local density ratios (a newly developed method) help to understand the cultural transformation as they provide information on activity zones and their composition.

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Emil Schou Nielsen[1], Trine Kellberg Nielsen[1] & Søren Munch Kristiansen[2]
Exploring Interglacial Deposits in the South-Western Region of Jutland, Denmark: Uncovering Archives of Human Activity and Environmental

The South-Western region of Jutland, Denmark, is situated between the maximum extents of respectively the Salian and the subsequent Weichselian ice sheets, a landscape that is favourable for the development of undisturbed Eemian deposits and surfaces preserved in the geological record. However, the Eemian deposits in Denmark are considered extremely rare, maybe as they are often overlooked in the field. Despite this, the few known sites have proven to be valuable paleoclimate records but hitherto without traces of human occupation. Likewise, similar Eemian and Early Weichselian deposits in Northern Germany have revealed open-air sites with evidence of human activity. To achieve similar findings in Denmark, prospecting for suited deposits is needed.
In this preliminary study, privately-owned borehole data is utilised, and hitherto unknown interglacial deposits are compiled together with locations known from scientific literature and the public borehole database of Denmark, JUPITER. In Denmark, most geotechnical boreholes have been digitised since the late 1900s. The boreholes are described following a common standard and the boreholes are of relatively good quality and should detect organic-rich layers of 10 cm or less. An inferred age is attributed by the geotechnical companies to every sample with a code e.g., "Ig" for interglacial, which allows the samples to be extracted in an SQL search. Access has hitherto been granted to databases of five large private companies, comprised of more than 72,000 projects, and with more than 420,000 boreholes covering all of Denmark. From searching the databases, 555 projects are identified to have registered interglacial or -stadial deposits. Currently, these soil descriptions are manually validated and attributed with significance, inferred interglacial age, depositional environment, accessibility, and geography. The resulting sites are also being crosschecked with already reported interglacial deposits.
This first-ever application combining privately-owned geotechnical and public geological data has already revealed new insights with regard to finding new interglacial deposits. However, it is clear that geotechnical encounters are geographically strongly biased towards areas with intense development. The first results also suggest that shallow-buried Eemian deposits often erroneously are attributed to a postglacial age, as the local stratigraphy is the main argument for inferring a depositional age when geotechnical samples are described. The ongoing identification of interglacial and interstadial deposits presented in this project will serve as a framework for future ground-truthing activities with the potential for making novel discoveries of archaeological and paleoenvironmental significance.

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Lisa Schunk[1,2], Marcel Weiss[3] & Andrzej Wiśniewski[1]

Early human occupation of Central Europe: Reassessing Racibórz Studzienna 2 - a Middle Pleistocene site in the Oder River Valley, Poland

The open-air site Racibórz Studzienna 2 is located in the Oder River basin in the Silesian Lowland, Poland (Wiśniewski, 2014). Nowadays situated in an abandoned quarry, the site was discovered in the 1930s. Some of the first artefacts were found by amateur archaeologist H. Lindner. In the years 1961 to 1963 and in 1974, the site was systematically excavated for the first time (Sobczyk, 1976; Kozłowsk and Kozłowsk, 1977). A small number of lithics (~ 30 artefacts) was recovered during these years. Characterised by fluvial sand and gravel layers, the age assessment of the site is mainly based on the local stratigraphic model of river terraces. Together with the evaluation of the lithics, this led to a Middle Pleistocene age estimation indicating an Early Middle Palaeolithic occupation (Kozłowsk and Kozłowsk, 1996). Assuming the age estimate is correct, Racibórz Studzienna 2 is extremely valuable for the research of Central Europe concerning 1) the early human occupation and 2) the transition from the Lower to the Middle Palaeolithic.

To clarify uncertainties in the precise chronological classification of the site and to exploit its full potential especially regarding technological aspects, a new excavation of the site was started in the summer of 2022, financially supported by the National Science Centre, Poland (grant no. 2020/39/B/HS3/02277). Two separate trenches were opened with the aim to locate the former excavation led by K. Sobczyk. The main goal, however, was to gain an improved understanding of the environmental and chronological context of the site. Samples for OSL dating as well as for sedimentological and micromorphological analyses were taken. Thereby, the archaeological horizon could be identified, yielding further lithics. These artefacts, together with the lithics from the previous excavations, were studied for a (re-)assessment. Moreover, a qualitative use-wear analysis of the artefacts was conducted. Following this approach, questions concerning the preservation state of the artefacts could be addressed since artefacts from this geological and chronological frame are often affected by post-depositional changes. Simultaneously, the assignment of the lithics as either geofacts or artefacts could be reviewed. Despite the suboptimal overall lithic preservation, traces of use confirming the classification as artefacts could be documented. Together with the results of the new geological and sedimentological analyses, this research will help to pinpoint the occupational character of the sites and will contribute towards the identification of technological features within the Middle Pleistocene in Central Europe.

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Climate Change and Early Humans in the North

The current human-made climate change affects all spheres of our society and its impact on the planet's ecosystems is yet unknown. By exploring past human-environment-climate relationships, we infer socio-behavioral response to climatic and environmental shifts. Furthermore, palaeoclimate modelling and the reconstruction of palaeo-landscape will provide important insights into natural climate shifts.
The aim of the project "Climate Change and Early Humans in the North" (CCEHN) is to investigate the evolutionary roots of human adaptation to climatic and palaeo-environmental shifts at the northern limit of their former distribution area. Here, the glacial/ interglacial cycles led to enormous climatic and environmental changes. The archaeological record of Lower Saxony, with several outstanding sites, shows that early humans inhabited this area since about 300.000 years, but it is unclear whether this happened mostly during the temperate phases, or also during the colder periods. To better understand human adaptational behavior, we will: (1) study the palaeoenvironment and palaeoclimatic changes, and landscape evolution on macro-, meso- and micro-scales, (2) link the resulting data to the archaeological record, and (3) finally establish a high-resolution chronological framework for the period from c. 300.000 years to 40.000 years ago (Marine Isotope Stages 9-3).
Lower Saxony is an excellent study area for this research approach: Its rich Palaeolithic record that is preserved in open-air sites and caves, its sediment archives that document the advance- and retreat of Pleistocene ice-sheets, as well as periglacial conditions and warm-climate periods of the past, the relationship between climatic shifts, concomitant changes of landscape and ecosystems, and the presence of early humans can be unraveled.
In the CCEHN project design, we bring together archaeology, geology and sedimentology, geophysics, paleoecology GIS-applications as well as aDNA-analysis in a multifaceted approach. We integrate the research expertise, ranging from archeology and geo-biosciences in Lower Saxony and beyond, with the goal to establish a research cluster in the field of human-environment-climate-adaptations.

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Riverbank meander – An agent-based model of Late Upper Palaeolithic and Late Palaeolithic water-oriented land-use decisions in the Middle Rhine Valley

Rivers are often seen to have played an important role for Palaeolithic hunter-gatherers both as landmarks and as a resource location. While the former view regards rivers as passive guidelines or obstacles, the latter reduces them to their economic value. Both views, therefore, look at generic properties, and may assume equal validity towards all rivers and their sections. By taking such an approach there is risk of overlooking the particular interactions between humans and specific rivers within the landscape and their phenomenological significance.
With this research, we aim to contribute to the discussion by considering a historically contingent and specific case of interaction between humans and a particular section of an individual river: the Rhine in the Neuwied Basin. Using an agent-based model, we identify differences in fluvial-oriented land use decisions between the Late Upper Palaeolithic and the succeeding Late Palaeolithic occupations within the region. We have developed a simple model using data of site locations from the Late Upper Palaeolithic and Late Palaeolithic, as well as the results of a hydrological analysis concerned with the water regimes in the area. Agents associated to occupational layers of sites move through a landscape, with spatial decisions made in regard to the presence, absence, or distance to various water bodies. Changing parameters affect the relevance that fluvial features have in the decisions of agents. Exported results of modelled movement patterns have been analysed statistically to allow for a sound understanding of the model's outcome. By modulating three major parameters, the model displays patterns with distinct similarities to the respective underlying archaeological data. The model necessitates the application of behavioural differences in order for agents to sustain the density and extent of either Late Upper Palaeolithic or Late Palaeolithic sites. Statistical tests show no significant difference when initial site locations are changed or the water level changes. However, a change in agent parameters associated with the directedness towards water significantly changes initial density and extent of the model, with Late Upper Palaeolithic agents requiring significantly higher values. Several ecological and social explanations may aid understanding of a difference of late Pleistocene spatial behaviour in regards to water bodies in the Neuwied Basin. Within a framework emphasising subsistence-settlement systems, a concentration of resources with a potentially more pronounced reliance on migratory fish during the Late Upper Palaeolithic points towards a differentiated land use practice due to variation in the distribution of resources. Further, lower familiarity with the given landscape could be a potential reason for the high redundancy in site use during the Late Upper Palaeolithic. A lower familiarity is indicated by constrained seasonal proxies on sites in the area as well as larger raw material procurements and exotic material during the Late Upper Palaeolithic. The concept of Entanglement may further help explain otherwise vague relations between humans and landscape. With an emphasis on the complex and intertwined relations between the natural and the social, such narratives allow for a less ecologically strict perspective and emphasise the continuous negotiation of humans with their surroundings. Lastly, rivers may act as vectors for knowledge transmission. With humans travelling along rivers, these natural features become not only functional causeways for the transport of physical objects, but also become vectors of constantly changing and negotiated knowledge, conjoining natural and social space. Thus, we observe a clear shift from a dominant focal role of the Rhine during the Late Upper Palaeolithic to a less important spatial entity during the Late Palaeolithic. These differences are likely as much an expression of a changed perception of the Rhine as they are a result of environmental change, and possibly the transition from a pioneering to a stationary settlement phase. All of these aspects are inextricably intertwined, and further investigation within this framework is essential to understand the changing relationship between humans and riverine landscapes.

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People and dogs? – The cultural context of the Gnirshöhle canids (SW-Germany)

The Bruder valley in the Hegau region (SW-Germany) represents an important contextual area of the Magdalenian. Three sites - Petersfels, Gnirshöhle, and Drexlerhöhle - are located in close proximity to each other (Albrecht 1979; Albrecht et al. 1977; Albrecht et al. 2019).
Since 2020, the State Office for Cultural Heritage Baden-Württemberg has resumed research in this area. The project aims at a holistic understanding of Magdalenian hunter-gatherer behaviour in this region.
In addition to small-scale excavations and geoarchaeological surveys (Tafelmaier et al. 2022), the project is concerned with the analysis and reappraisal of former excavations and the respective cultural remains. Recently the faunal remains of Gnirshöhle, dated between 16,000 and 15,000 calBP, were analysed and presented at HOT 2021, whereby the canid remains attracted a lot of attention due to the possible early evidence of wolf domestication (Baumann et al. 2021).
However, the archaeological context of the site has only been presented in a preliminary paper (Albrecht et al. 1977) including exclusively the excavation in Gnirshöhle I led by G. Albrecht (1977/ 1978). The excavation in Gnirshöhle II first led by G. Albrecht and later by C.-J. Kind (1978/ 1979), which likewise delivered samples for the canid study, has never been analysed and published. Thus, the presentation provides insights into the archaeological context of the site, with special focus on the relationship between human occupations and canid remains and possible scenarios of cohabitation.

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Kohlhau-Abri (SW-Germany) – archaeological and palaeoecological investigations at a newly discovered rock-shelter site

Kohlhau-Abri rock-shelter is a newly discovered archaeological site near the Lone Valley. It was excavated by the State Office for Cultural Heritage Baden-Württemberg under the direction of Claus-Joachim Kind between 2015 and 2018. The so-far documented archaeological sequence includes a Magdalenian occupation at the base of the stratigraphy. It is followed by early and possibly late Mesolithic find scatters above, that were overlain and partially intermingled with Neolithic remains in the upper part. The stratigraphy is completed by finds from the Bronze Age to the Roman period. A preliminary article (Kind & Beutelspacher 2020) reported general aspects of the site and provided a coarse chronological framework. Ongoing studies of micro- and macrofaunal remains and lithic artefacts allow for a more refined understanding of hunter-gatherer settlement activities, of the taphonomic aspects involved in site formation and of the underlying palaeoecological conditions.

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From the Magdalenian to the Early Mesolithic: reconstructing palaeoenvironmental changes and human activities through macrofaunal remains at Kohlhau-Abri, southwestern Germany

The Late Glacial to Early Holocene transition is characterized by conspicuous palaeoenvironmental and climatic changes that consistently affected human and animal mobility. In southwestern Germany this period is distinguished by different cultural phases, such as the Magdalenian, the Late Palaeolithic and the Mesolithic. However, continuous stratigraphic sequences spanning the Magdalenian to the Mesolithic are documented only at a few sites (Kind, 2003). In this regard, the recently excavated rockshelter site of Kohlhau-Abri, located near the Lone Valley of the Swabian Jura, is of great interest because it contains both Magdalenian and Mesolithic archaeological deposits (Kind & Beutelspacher, 2020).
We here present the preliminary results of our archaeozoological analysis and compare the macrofaunal remains from these layers. The aim is to highlight diachronic changes in human use of the site by comparing natural and anthropogenic modifications on the macrofaunal remains and to infer palaeoenvironmental changes from the faunal data.

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Matthias Tschuch[1] & Francoise Chaput[2]

Steinsfeld-Endsee, a new Palaeolithic site from the Franconian Gipskeuper Land

Since March 2022, many faunal remains dated from the transition between the Middle and Late Palaeolithic (44000 to 27000 calBP) have been recovered during the pre-fields investigations of an industrial area of more than 700m2. During the first excavations, cave bears, mammoths, rhinoceroses, horses and wolves as well as flint artefacts (?) were discovered.The location of the site in the Keuper region away from the major rivers, the faunal remains and the duration of occupation are important for the region with regard to future research.
The site, which is still on investigation, also revealed other finds of supra-regional importance (including sinkholes with material from the Late Neolithic, the Bronze Age and particulary the Urnfield Period, house floor plans, graves and other features from the La Tène period and the Early Middle Ages).

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Ralf Vogelsang[1], Götz Ossendorf[1] & Minassie Girma Tekelemariam[1]
Living the high life! Prehistoric occupation of high-altitude environments in Ethiopia

High-altitude mountain habitats (commonly defined as those >2,500 meters above sea level) are often regarded as unfavourable for sustained human occupation, due to the challenging environmental stress in these landscapes for the human body. The most prominent phenomenon is the prevalence of high-altitude hypoxia. Other stresses and strains are increased solar radiation, water loss and metabolic rates. On the other hand, tropical highlands in Africa are suggested as potential refugia for human populations during times of climate deterioration. Extensive archaeological research during the last decade in the high-altitude regions of Ethiopia has fundamentally changed our understanding of prehistoric occupations in these areas. It is now known that these ecozones had been part of the human habitat at least since the emergence of *Homo sapiens* and served in a variety of ways. High altitude landscapes were used for short-term, task-specific trips of small groups. However, they have also been used for longer periods as regular settlement places. The advantages of high-altitude biomes are the relative abundance of water and compressed altitudinal ecozones offering a wide spectrum of natural resources. For these reasons, highlands have also been used as retreats during times of environmental stress. However, arid conditions in the lowlands were not the only trigger for the occupation of high-altitude regions. They were also used during favourable environmental conditions as part of larger settlement areas that also included lowland regions or were at least part of exchange networks. Late Pleistocene hunter-gatherers even used the available resources of the cold, glaciated alpine environment of the Bale Mountains. The exploitation of an endemic rodent as a special food source played a pivotal role in facilitating human long-term residence at the rock shelter Fincha Habera, with occupation layers dating between 31 and 47 thousand years ago. Being an all-rounder, coping with varied environments, even such extremes as the glaciated Bale Mountains, might have been a decisive condition for the successful spread of *Homo sapiens* over most regions of the world in a comparably short period.

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Neanderthals at the northern margins – The Middle Palaeolithic site Drelsdorf (Schleswig-Holstein, Germany)

Drelsdorf represents the northernmost Middle Palaeolithic site in Central Europe. It is situated in the Saalian moraine area of Northern Frisia and has yielded thus far the largest Middle Palaeolithic flint assemblage in Schleswig-Holstein (Hartz et al. 2022).
From the early 1970s to the early 2000s, the amateur archaeologist Hans Ingwer Boockhoff surveyed different localities around the small village of Drelsdorf, which provided, amongst others, flint artefacts with periglacial surface alterations indicating a pre-LGM age. A handaxe, side scrapers, flakes and Levallois cores indicated the Middle Palaeolithic origin of the material (Hartz 1986). Following small test excavations in 1981 at the richest locality Drelsdorf-Schmallacker situated in the vicinity of Eemian lake sediments, the potential of this site led to an excavation in 1986.
In 2015, 2016 and 2018, a group of Dutch, Danish and German professional and amateur archaeologists carried out systematic surveys at Drelsdorf-Schmallacker, which one of us (HJ) has been continuing since. These recent activities have enriched the artefact spectrum, in particular with regard to tool types (Hartz et al. 2022). The identification of a find concentration led to test excavations in 2021 in order to verify if an intact archaeological horizon was present underneath the plough horizon.
In this paper, we provide an overview of the fieldwork and analyses carried out at Drelsdorf, we present recent results, such as insights into the technological characterisation of the assemblage based on the analysis of the cores in 2022 by one of the authors (DL), and we discuss hypotheses on site formation processes.

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In search of a better method to distinguish artefacts from geofacts

The distinction between naturally occurring geofacts and anthropogenic artefacts has been an acknowledged problem since the 19th century. Considering the number of recent studies that aim at distinguishing between geofacts and artefacts, it can be concluded that the problem remains unresolved. A considerable interest in the identification of potential geofacts can be observed as it most often concerns sites that are presumed to yield the oldest traces of an early

human occupation in a given region (eg. Chatters et al., 2022; Gillespie et al., 2004; Roebroeks et al., 2018; Wiśniewski et al., 2014).

At the end of the 20th century, a universal method of distinguishing collections composed of geofacts from assemblages with known artefacts was introduced by Peacock (1991). This method involves the assignment of a given score to the analysed lithics based on the presence or absence of desired features. This method has some clear advantages. One is that it strives for objectivity in the evaluation and a relatively simple post-processing protocol.

The approach, however, also has some drawbacks. In our opinion, the most important is a large zone of indecision between geofacts and artefacts, if we use simple plots to resolve the question whether a find belongs within a group of artefacts or a group of pseudo-artefacts. Our goal is to present an improved method for evaluating artefacts and geofacts. We report on a solution that reduces the list of attributes, uses so-called relative scoring, and tests collections of objects with statistical clustering. We think the proposed methodology may help to enable a clear and objective distinction between geofacts and anthropogenic lithics. We tested the method's effectiveness by analyzing collections of finds from Lower and Middle Paleolithic sites, from an experimental set, objects from natural deposits (glacial environment), and places of dubious provenance.

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The Human Niche Space of Late Upper Paleolithic Europe

All species have a climatic range in which they are capable of existing. Humans, despite our technology, are not an exception (Xu et al., 2020). The climatic range in which humans can live is not a new topic (Banks et al., 2008, 2013; Ordonez & Riede, 2022) but is of particular relevance to research on human land use patterns during the climatically volatile Pleistocene, when rapid changes in climate had significant impacts on human population sizes and distributions and behavioral responses. Understanding the effects of climate on both human populations and land use patterns requires a macro-level continental approach that moves beyond generalizations discerned from observations at a single site or region. By taking a macrolevel continental approach, we are able to better understand general human resilience and adaptation in the forms of subsistence and land use, that otherwise are not discernable in lower-scale studies. The macro-level approach provides a general orientation of how people respond to changing climate, in which we can contextualize specific examples and better understand the complex dynamics between climate, population, and human behavior. Formal models and a theory of resilience, adaptation, and land use are needed to make concrete statements about human cultural evolution and thus changes in the archaeological record. Gone are the days of "wiggle matching" and site-specific data points. The data available today allow us to construct analyses built around the complex relationships present in the archaeological and paleoclimatological data. Additionally, the plethora of archaeological data and our ability to process these big data, means we can move beyond blanket statements about human responses to climate born from single-site observations or even sub-regional observations, and frame these small studies in the broader narrative of European prehistory. With the advent of big data in archaeology, we can better identify generalizable trends in which to contextualize and better understand and explain specific local observations in the archaeological record.

Here, we take a continent-scale macrolevel approach in which we draw on spatiotemporal data dating to the Terminal Pleistocene (20kya-9kya) from across Europe to infer the climatic niche space of prehistoric hunter-gatherer populations. After inferring the climatic niche space for hunter-gatherers, we then model how human niche space size changes in response to the series of climatic events leading into the Holocene. After inferring the climatic niche space, we are then able to look at how estimates of population density changed as a product of expansion and contraction of the niche space, and test hypotheses pertaining to land use patterns and whether the observed patterns are a product of shifting climate-altering the relative suitability of locations, or whether growing human populations resulted in a push effect driving people to occupy habitats that were less climatically suitable. Finally, we can then look at the climatic suitability for human occupation within different habitats to gauge how the spatial patterning observed in the archaeological record maps onto these different climatic niche spaces, and thus ecologies.

From the above, using a comprehensive spatiotemporal archaeological database, we implement a four-step research design:

- Infer the human climate niche space using a century-level paleoclimate record, spatiotemporal archaeological data, and a spatiotemporal species distribution model.
- Test the causal effects of the size of the human climate niche on estimates of human population size and land use patterns.
- Test whether human population size resulted in alterations to human land use patterns beyond those imposed by climate.
- Quantify niche overlap between high-order tool technocomplexes to distinguish the degree of overlap and what that means in regards to the archaeological record.

We find that as the climatic niche space of foragers expanded, human populations expanded, suggesting that the climatic suitability of the Terminal Pleistocene imposed some limiting factors on hunter-gather populations during the period (Ordonez & Riede, 2022). During periods of

warming, this niche space expanded, resulting in growing human populations. During periods of cooling, this niche space contracted, resulting in shrinking human populations. The size of these human populations did not have a noticeable effect on settlement patterns. It appears that populations were not yet large enough to have an effect visible on this scale, in which an ideal free distribution effect occurs (Fretwell & Lucas, 1969). Additionally, there are many overlaps (spatially and temporally) between the high-order tool complexes present in Europe, but with some noticeable exceptions, which may reflect a combination of tool adaptation to poorly defined spatially represented ecologies and specific cultural traditions.

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Excursions

Jesper Borre Pedersen

Friday, April 14th, 2023

On this excursion we will take a trip to the "nose of Jutland" (Danes believe that the Jutland peninsula is shaped as the profile of a face looking east). This region is called Djursland (= land of the animals) and here we will visit some of its Palaeolithic, Mesolithic and Neolithic locales (fig. 1; table 1). We will go on this excursion together with the Aarhus University first-year BA students currently taking their Stone Age course – they'll give us a brief presentation on each locale and their context. The excursion will begin and end in central Aarhus, from where we will board busses that will take us north. We will travel through the landscapes of eastern Denmark, which were all shaped during the last glaciation of the area and are characteristic for its many hills. This hilly topography is as close as you can get to a veritable mountain range in Denmark and for this reason the southern part of Djursland is also named Mols Bjerge (= Mols Mountains). While en route we will drive by other interesting sites, which we may be able to observe in passing. For lunch we will stop at the local inn in the small town of Gjerrild, where we will eat lunch. Please remember to dress according to the weather forecast, as we will spend most of our time out in the open. Similarly, even if the weather forecast promises sunshine, please bring a raincoat or similar as the Danish weather can be very unpredictable.

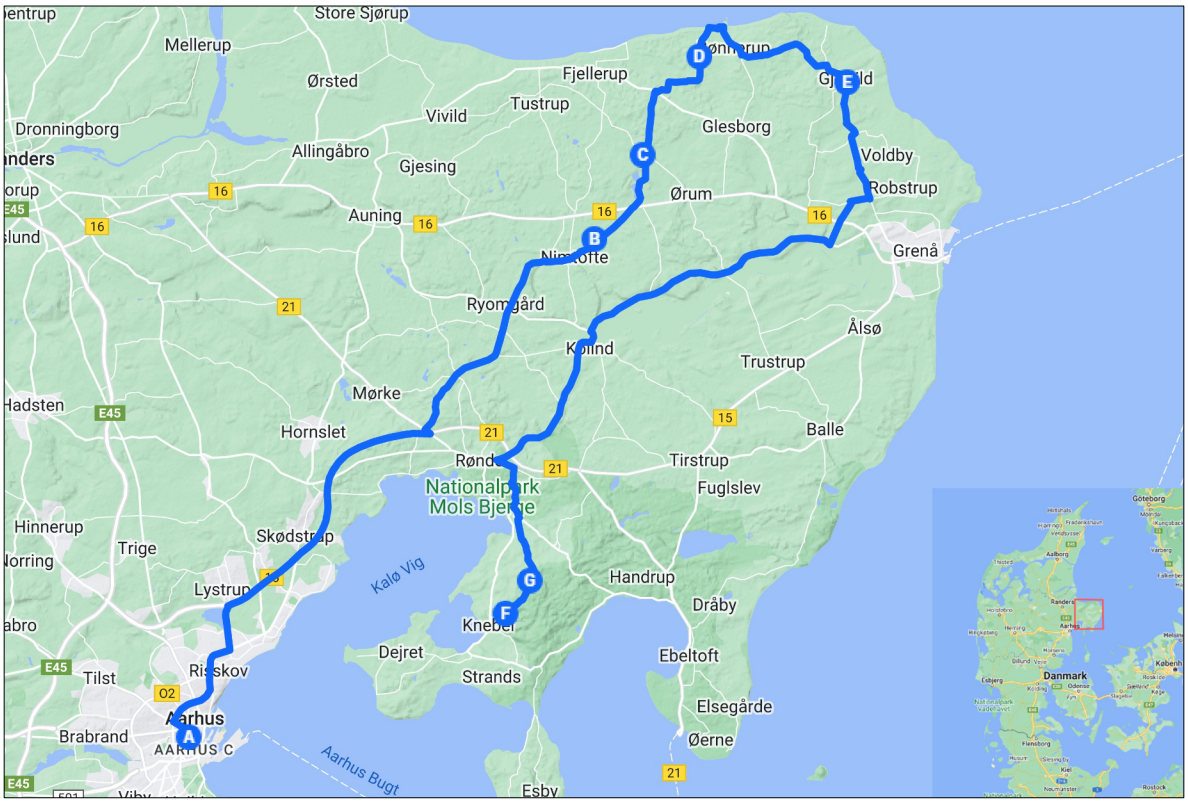

Fig.1. Map of the excursion route. Each destination is marked with a letter which corresponds to the timetable shown in Table 1. ©Google Maps 2023

8.30	**A) Departure from Aarhus (Musikhuset)**
	Travel time ca. 45 minutes
9.30	**B) Passage grave by the Lübker golf resort** Presentation by the archaeology students
	Travel time ca. 10 min
10.30	**C) Stenvad dolmen** Presentation by the archaeology students
	Travel time ca. 15min
11.30	**D) Mejlgaard kitchen midden** Presentation by the archaeology students
	Travel time ca. 15 min
12.45	**E) Gjerrild – Late Palaeolithic site** Lunch at the local inn (either a meal from the menu or a packed lunch) Thereafter a presentation by the archaeology students
	Travel time ca. 45 min.
14.45	**F) Porskær Stenhus** Presentation by the archaeology students
	Travel time ca. 5 min.
15.20	**G) Stabel Høje** Bronze Age barrows
	Travel time ca. 45 min
16.30	**A) Return to Aarhus (Musikhuset)**

Tab.1. Timetable for the excursion

Fig.2. The front of Aarhus Musikhus. The parking lot where we will meet on the morning of the excursion day is located just to the left of the building.

Main destinations

A - Meeting point

We will all meet at Aarhus Musikhus (Thomas Jensens Allé 2, 8000 Aarhus), which is the large concert hall in the centre of Aarhus. Here we plan to depart by 8.30. The busses will be parked in the parking lot, which is just to the left of where the appended picture was taken. This is also the spot where we will be dropped off at the end of the day.

B - Lübker

Lübker features a Neolithic passage grave (fig 3, A). In Danish these structures are called "jættestuer", which refers to old superstitious beliefs that these structures were the homes of supernatural creatures from folklore. In fact these megalithic structures were built over a period spanning no more than a few centuries ~3300-3200 BC by the Funnel Beaker culture and functioned as tombs, which were continually reused and part of a larger ritual landscape in this part of the Neolithic in southern Scandinavia. These structures were later typically used as stone quarries and often completely destroyed during the intensive cultivation of the landscape during the 18th and 19th centuries. However, due to the work of the "Commission for the preservation of antiquities", (the precursor for what is today the National Museum of Denmark) many of these structures were preserved in a tentative fashion in 1847. The destruction of these monuments however continued until their preservation was written into law in 1937. Today only about 500 passage graves are left in Denmark, the one in Lübker being one of them. This particular monument was fully reconstructed in 2007 and is now in its 'original' state, making it possible and safe to enter.

C - Stenvad

This is probably the most iconic of the Neolithic dolmens in Denmark. Its painting by Ib Andersen was immortalised as the motif on the Danish 50 kroner note, which was in circulation from 1956 to around 1970 (fig. 3, B-C). Just like the current bank notes with their motifs of iconic artefacts, the depiction of this monument is an example of how the archaeological record is – for good and worse – frequently used in Denmark as a tool to promote a national romantic connection between modern day Denmark and the societies of the past.

D - Mejlgaard

Mejlgaard represents one of the largest and most intensely examined settlements from the Late Mesolithic Ertebølle culture. The very first excavations of the site took place in 1851 by the National Museum in Copenhagen. It was the target of the 1st Kitchen Midden Commission, the goal of which was to ascertain whether these middens were human-made or natural phenomena. Since then, the site has been the target of further investigations in 1880, 1888 and 1959 respectively (fig. 3, D). Today, it is still possible to see some of the excavation trenches from these old excavations. When in use during the Atlantic chronozone, the site was coastal but due to land-rise the site is today located 6-7 m above sea-level. The current water course Sorteå (Black River) roughly marks the ancient shoreline. In springtime, the forest floor of today shows a lovely bloom of blue windflowers and

violets thanks to the high content of mussel- and oyster-shells – if we're lucky, we'll get to experience this.

E - Gjerrild

Djursland represents one of the few areas in Denmark where several archaeological sites of Palaeolithic origin are known. Indeed the evidence from this region indicates that this area was frequently inhabited by foragers especially during the Allerød chronozone, which roughly corresponds to Greenland Interstadial 1c-1a. This evidence consists of many surface finds but also several excavated settlements, including the locale of Trindsiggård, which represents the northernmost excavated settlement of the Federmessergruppen phenomenon. At the site of Gjerrild specifically, we know of a dead-ice lake and Late Palaeolithic stray finds from its vicinity. We'll have a look at what the great landscape architect - the last ice age – left behind for us to see, and will look at some of the Late Palaeolithic finds from Djursland. Before we do this however, we will have lunch together at the local inn in Gjerrild.

F - Porskær Stenhus

The truly spectacular Porskær Stenhus is the largest Neolithic dolmen in Denmark (fig. 3, E). The cover stone weighs approximately 12 tons and is half of a large granite boulder that was transported to the area during the Last Glacial Period. The other half of that very same boulder weighs 19 tons and functions as the cover-stone of the Grovlegård dolmen about 2 km away. The owner of the area attempted to destroy the dolmen in 1859 and use the boulders as building material. This was, however, quickly stopped and the dolmen was preserved by law in 1860. Today, fragments of blown-up boulders can still be seen near the dolmen.

G - Stabelhøje

Stabelhøje are two Bronze Age barrows. They offer some of the most popular vantage points in the hilly moraine national park area of Mols Bjerge (fig. 3, F). From here you can see the entire Aarhus Bay area and the castle ruin of Kalø Slotsruin to the west. To the north, you can see the hilly agricultural landscape of southern Djursland. To the east you can see the hills of the uncultivated part of Mols Bjerge, above which towers Agri Baunehøj (beacon hill) at 137 m above sea level. To the south, you can see the eastern coast of Jutland along with the Knebel Bay, near which Moesgaard Museum marine archaeologists have recently discovered the oldest known coastal site in Denmark.

Locations we pass on our trip

Tranehuse – in passing
Tranehuse represents another locale similar to the Palaeolithic site at Gjerrild. Here a few finds of Upper Palaeolithic origin have similarly been recovered near a dead ice lake.

Ginnerup – in passing
Ginnerup is a site that is currently under investigation through a collaboration between Moesgaard Museum and the Museum of Eastern Jutland. It consists of a Neolithic site

featuring settlement by both the Funnel beaker culture as well as the Pitted Ware tradition. It is furthermore one of the only sites known where transitional layers between the two cultures can be observed. A specifically noteworthy aspect is the high distribution of horse in the excavated faunal material (>30%). This is quite exceptional in a Scandinavian context as it has so far been believed that the local population of wild horse was relatively modest. These discoveries however, indicate a much larger local population. This faunal material is also part of much richer evidence that indicates ritual feasting taking place at the site. Today the site is located on top of a hill in an area consisting of farmland, when it was in use however, the low lying areas at the bottom of the hill were part of a fjord. At the site a large quantity of mussel- and oyster-shells have also been excavated. These are interpreted as having been deposited very deliberately along the sides of the hill that would be exposed towards the fjord and were very likely observable from the sea. The site is truly unique and continues to provide new perspectives on cultural change during the Neolithic.

Knebel Vig – in passing
Knebel vig (=cove) is the target of an ongoing research project conducted by the department for underwater archaeology at Moesgaard Museum. This project specifically seeks to locate early Mesolithic coastal sites in the Aarhus bay area. In Knebel vig on a depth of 6-7 m, a site dating to the later part of the Maglemose culture have been discovered and excavated. It still remains uncertain whether this reflects a true coastal site and with that an adaption to the exploitation of marine environments. It is however one of the first and only known submarine locales of such an early date and further survey and excavations in the area are continued in order to understand just how early more advanced marine technology appeared in southern Scandinavia. In clear weather, it ought to be possible to overlook the Knebel vig area from our vantage point at the final destination of Stabel Høje.

The national park Mols Bjerge – in passing
A natural park, famous for its hilly (and for a Dane, mountainous) terrain that was created during the last glaciation, and for long-running rewilding efforts with free-roaming horses and cattle (fig. 3, F). Our final location at Stabel Høje is located within this natural preserve.

Grovlegård/Agri dolmen – in passing
One of many smaller Neolithic dolmens that are known from the Danish landscape. The coverstone is however very large. Preserved by the former director of the National museum in Copenhagen, Sophus Müller in 1877.

Kalø castle ruin – in passing
The fortress on the island of Kalø (fig. 3, G) was constructed in 1313 by the Danish king Erik Menved after a farmer rebellion in Jutland. In this connection the land bridge was constructed and lies where it did during the Middle Ages thereby being the exact route that medieval people used to get to the castle. During the 15th, 16th and early 17th century, the fiefdom of Kalø was one of the wealthiest and most important in the country and the castle's various owners were all of noble decent. During the reign of Christian the 2nd (1513-1523), the castle held several prolific prisoners including a young Gustav Vasa who would later – in the wake of the Bloodbath in Stockholm – lead a Swedish rebellion against the Danish king and become the king of Sweden. This would effectively end the Kalmar-personal union which had united Denmark, Norway and Sweden under the Danish crown from 1397-1523. Eventually the castle on Kalø would finally be completely abandoned and demolished in 1672 and large parts of its construction were used as building material for Charlottenborg (Charlotte's Castle) in Copenhagen, which still stands today and houses the Royal Danish Art Academy and Art Library.

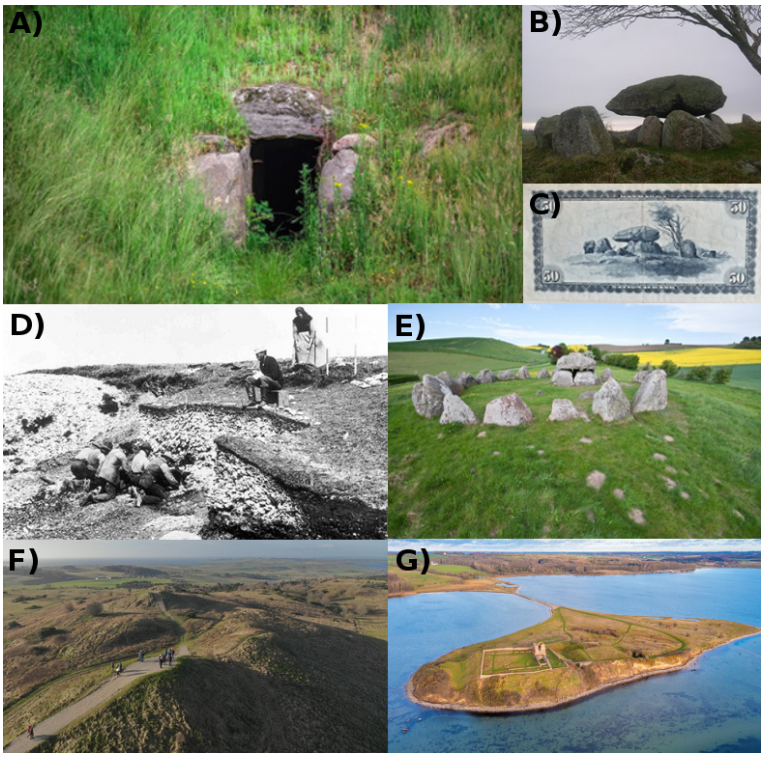

Fig.3. A) The entrance to the Lübker passage grave. B) The Stenvad dolmen as it appears today and C) how it was depicted on the Danish 50 kroner note. D) Excavation of the Mejlgaard kitchen midden during the 1st Kitchen Midden Commission in 1851. E) The Porskær Stenhus dolmen. F) The hilly terrain of the young moraine landscapes of Mols Bjerge. G) The Kalø castle ruin as it appears today.
A, B, E: Slots- og kulturstyrelsen, C: Danmarks Nationalbank, D: ©The Nationalmuseums Denmark, F & G: ©Nationalpark Mols

Saturday, April 15th, 2023

On the second excursion day, we will – more or less – change the outdoor scenery and go indoors to visit the two large prehistoric/historic museums of Aarhus.

Moesgaard Museum (MOMU)

The first is the Moesgaard Museum (MOMU), which is located in the south of Aarhus, by the old Moesgaard manor, which also houses Aarhus University's department and campus for archaeology. The museum building itself is an interesting piece of architectonic work that has received several prestigious architectural awards. It is possible to walk on the roof of the building, which is all grass turf, and get a panoramic view of the area. Within the building is however, where the Moesgaard museum exhibits the archaeological research that it has been conducted over the years. Here the Stone Age exhibition tells the story of the very first pioneers that entered the region at the end of the Last Glacial until the arrival of bronze technology. There is a specific focus on the Mesolithic research that has been carried out at the museum as well as the work on Neolithic causeway enclosures. Beyond the Stone Age, the museum of Moesgaard features and tells the stories of many more unique archaeological finds including the famous bog body "the Grauballe man", the oak cask

barrows of Borum Eshøj and the large Iron Age weapon deposits and human sacrifices from Illerup Ådal and Alken Enge. The current special exhibition at the museum is called "Out Of Chaos" and deals with the period after the collapse of the Roman Empire. All of the exhibtions at the Moesgaard Museum are graphically beautiful, interactive and quite unique in the overall museum landscape.

https://www.moesgaardmuseum.dk/en/

Den Gamle By (The Old Town)

Den Gamle By, which is located in the centre of Aarhus provides a similar unique experience. It is an open air museum and essentially a small town of itself in the centre of Aarhus, that consists of preserved old buildings that were once part of Aarhus, but stood to be demolished. It is divided into several parts representing Aarhus (and by proxy Denmark) in different time slices. One during the middle of the 1800's, another during the early part of 1900's and one during the 1970's. It is a "living museum" meaning that museum staff will function as reenactors all through the town.

https://www.dengamleby.dk/en/den-gamle-by/

Report on the 63rd Annual Meeting of the Society

Ewa Dutkiewicz

The 63rd annual conference of the Hugo Obermaier Society in Berlin, April 19th to 23rd, was in many respects a remarkable meeting. Several weeks prior to the meeting, the Russian invasion of the Ukraine also heavily affected the European scientific community. The Hugo Obermaier Society decided to publish a "Statement on the war against Ukraine" and ultimately to take measures considering the participation of Russian State Institutions.

A fact that is pleasantly remembered is that after roughly two years with no meetings due to the Covid-19 pandemic and the associated restrictions, it was finally the first face-to-face meeting at a conference for most of the participants. The participants enjoyed personal discussions and the accompanying program. However, the organization of the meeting, the events, and the excursion posed a huge challenge, considering the safety precautions necessary in the different venues. We needed to plan for many possible questions: What if the pandemic situation will force us to cancel the meeting in person? How many people will attend in person? Moreover, how do we prevent infections? These challenges, for example, led to a memorable evening reception in the colonnade corridor outside of Neues Museum on the Museum Island, in the ice-cold April wind of Berlin – which did not stop most participants from spending a joyful and long evening.

Based on the impressions of the last two years and the need for health protection, a major innovation was that hybrid participation in the conference was generally made possible. Here too, impossibilities, such as the technical organization and implementation on site, had to be clarified and familiarized. To a large number of participants in person as well as online, this experiment was a complete success and the society therefore decided that future meetings of the Hugo Obermaier Society will be continued as hybrid conferences.

Fig.1. The opening of the hybrid 63rd Annual Meeting of the Hugo Obermaier Society by Prof. Dr. Matthias Wemhoff. Photo: A. Adaileh.

The opening day of the conference took place at the Auditorium of the James-Simon-Galerie, the new entrance building and visitor centre on Museum Island Berlin. It was named after James Simon (1851-1932), one of the most important patrons of the Berlin State Museums. The opening speech was held by the host Prof. Dr. Matthias Wemhoff, the Director of the Museum für Vor- und Frühgeschichte and Prof. Dr. Harald Floss, the president of the Hugo Obermaier Society. The conference started with talks on the Mesolithic, Final, and Upper Palaeolithic periods. The evening reception took place in front of the main entrance to the Neues Museum due to health and safety restrictions for meetings.

For the second and third conference days, the meeting was moved to another venue, the Auditorium Museum Dahlem (former Ethnologisches Museum). The reason for this was to create a more intimate atmosphere for the conference than on the heavily frequented Museum Island. The second day was dedicated to this year's special topic "State of the Art – Advances in the Study of Palaeolithic and Mesolithic creative behaviour". The topic was covered by national and international speakers. The session started with a general talk on the "State of the Pleistocene (ROCK) ART within the UNESCO World Heritage Convention" by Nuria Sanz. Creative expressions of Neanderthals were presented by Dirk Leder and colleagues with their talk "The engraved giant deer bone from Einhornhöhle and the state of Neanderthal 'art'". Annika Rebentisch and

colleagues presented "A new site with palaeolithic cave art in eastern France. The current state of work at Grottes d'Agneux in Rully (Saône-et-Loire)", and Emeline Deneuve & Clément Paris introduced a figurine workshop of Gravettian age "Amiens-Renancourt 1: state of the art of an exceptional chalk figurines assemblage". Studies of traces in ornated caves were shown by Andreas Pastoors and colleagues: "Reading Prehistoric Human Tracks with a multi-method approach in Aldène and Tuc d'Audoubert". Analyses of hand stencils were discussed by Marius Achtelik and colleagues, in "Using forensic methods analysing Upper Palaeolithic palm prints", and by Verónica Fernández-Navarroby who looked "Behind images: rock art identity through hand stencils". Early Paleolithic examples of creativity were presented by Manuel Alcaraz-Castaño and colleagues in the talk "Linking floors to the walls: a contextual setting for the prehistoric rock art of Los Cesares cave and its bearing on the first settlement of inland Iberia by modern humans" and Anna Friederike Potengowski and colleagues who talked about "Current Research on Reconstructions of the 40-thousend Years Old Palaeolithic Wind Instruments from the Swabian Jura (SW-Germany)". Creative expressions dating to the Final Palaeolithic were discussed by Liane Giemsch and Ralf W. Schmitz: "Elk and Bear? New insights in the Palaeolithic art objects from Bonn-Oberkassel". Broader perspective on creative expressions was given by Ralf Vogelsang in his talk about "Marking a new territory – Hairline engravings in the Nuob valley/Namibia" and Sebastian Walter who discussed "Upper Mesopotamian eight-legged bee-wasps: Present and past categorical thinking and the interpretation of Epipalaeolithic-Early Neolithic animal depictions". This session was followed by the poster session. The evening lecture was given by Ewa Dutkiewicz who asked "What it's all about?

Fig.2. "What it's all about? Animals, Humans, and Signs in Paleolithic Art" - the evening lecture by Ewa Dutkiewicz. Photo: A. Adaileh.

Animals, Humans, and Signs in Paleolithic Art". The second day ended with our traditional conference dinner. Due to restrictions imposed by the Covid-19 pandemic, the dinner also had to take place in an unusual setting. As it was impossible to get a restaurant reservation for such a large group, we had Neapolitan pizza in a semi-open space in Kreuzberg. The third conference day was dedicated to topics on the Upper, Middle, and Lower Palaeolithic, as well as on mixed topics. The general assembly of the Hugo Obermaier Society took place after the talks, and we had a pleasant get-together in a beer garden in Dahlem.

The excursions did not predominantly target archaeological sites, but rather reflected the venue, which is famous for its numerous museums. Nonetheless, the Friday excursion started with a visit to the excavation at Molkenmarkt, in the old city centre of Berlin. Due to large construction

Fig.3. Excursion in Berlin, day 1: Visiting to the excavation at Molkenmarkt, in the old city centre of Berlin.
Photo: A. Adaileh.

work, the State Heritage Office of Berlin conducts large-scale excavations that uncover the origins of Berlin. Pre-medieval periods, although largely disturbed by younger construction works, are as present as a whole sequence of Berlin's history up to modern-day remains. A particularly well represented and fascinating period uncovered is the time of the industrial revolution, where major construction took place, as well as remains from the famous roaring 1920s. The second destination was the Futurium. It is dedicated to the future of human societies. Here, everything revolves around the question: how do we want to live? Many questions are being raised and possible new technologies, materials, and ideas are discussed. From the Futurium we took a walk to Potsdamer Platz and passed some of the most iconic monuments in Berlin: The Reichstag, the Brandenburger Tor, and the Holocaust Memorial. The last destination for this day was the visit of the recently re-opened Neue Nationalgalerie. The building was the last major project completed by the internationally famous architect Ludwig Mies van der Rohe and was extensively refurbished and modernized from 2015 until 2020. It hosts a collection of art from the twentieth century, major works of Classical Modernism. The exhibition "The Art of Society" shows over 250 paintings and sculptures created between 1900 and 1945 by artists including Otto Dix, Hannah Höch, Ernst Ludwig Kirchner, Lotte Laserstein, and Renée Sintenis. The works of art assembled in the exhibition reflect the social processes of a turbulent time, among them the German Empire's reform movements, the First World War, the Weimar Republic's Golden Twenties, National Socialism's ostracism of the avant-garde, the Second World War, and the Holocaust.

The Saturday excursion started with an extensive visit to the Neues Museum. The building houses two Museums: The Museum für Vor- und Frühgeschichte (Museum of Pre- and Protohistory) and the Ägyptisches Museum und Papyrussammlung (Egyptian Museum and Papyrus Collection). We had two separate guided tours, so every participant had the opportunity to see the highlights of each collection. The final destination was the Humboldt Forum with the collections of the Ethnologisches Museum (Ethnological Museum) and the Museum für Asiatische Kunst (Asian Art Museum). Also in the Humboldt Forum, we visited the exhibition "Berlin Global" where the eventful history of the city of Berlin and future perspectives of urban life are presented.

Fig.3. Excursion in Berlin, day 2: Visiting the Neues Museum. Photo: A. Adaileh.

Report on the General Assembly on the Occasion of the 63rd Annual Meeting of the Hugo Obermaier Society

Marcel Weiß

On Thursday evening (April 21, 7:00 p.m.), the President of the Society opened the general assembly. Present were 25 members, 15 members additionally participated online. First, it was established without objections that the invitation to the General Assembly had been sent to all members in due time, and the agenda of the assembly was accepted.

In the following the president of the society, Prof. Dr. Harald Floss, reported of the accounting year 2021.There has been a new board since 2021 and the work was not very easy at the beginning. The board had to take into account the constantly changing regulations of the Covid-19 pandemic when planning the annual meeting. This was then compounded by Russia's war against Ukraine in March 2022. The Board was faced with the difficult decision of how to handle the planned participation of Russian colleagues in the annual meeting. The Board was aware that it would not be an easy decision, and to some degree any decision would be "wrong." Therefore, the board spent several weeks dealing with the issue and intensively discussed the different opinions and views. The opinions of the German scientific organizations and institutes, as well as the universities, were taken into account. In the end, it was not our Russian colleagues who were excluded from the meeting, but the Russian scientific institutions.

Due to the online format of the last general meeting, the change of the board was a bit "bumpy". Therefore, the President and the new Board again explicitly thanked the previous Board for their years of great work.

Afterwards, the president thanked the student helpers in the organization of the current annual meeting in Berlin.

From spring 2021 to spring 2022 there were 2 resignations and 22 accessions.

Finally, the President briefly addressed the financial situation of the Society, noting that the Society needs more members to improve the financial situation through dues. The Society has too few members relative to its international prominence and reach.

Afterwards, the reports of the treasurer Amira Adaileh, M.A., as well as of the auditor Merlin Hattermann, M.A. for the fiscal year 2021 were presented. The treasurer was discharged, and Merlin Hattermann, M.A. was appointed as cash auditor for the new fiscal year.

PD Dr. habil. Andreas Pastoors and Prof. Dr. Thorsten Uthmeier reported on behalf of the editorial board on the status of volumes 67 and 68 of the QUARTÄR Yearbook and on the move of online publications to the homepage "Propylaeum-Fachinformationsdienst Altertumswissenschaften". QUARTÄR Yearbook 67 (2020) has recently been published and was the first yearbook with the so-called "early view". This means that PDFs of the individual articles are available online on the QUARTÄR homepage after completion, even before the volume is printed. Volume 67 was scheduled to go to press in the summer of 2021, but was delayed by the contribution of Wild et al. The contribution contains a 40-page catalog of the Late Glacial and Early Holocene antler and bone artifacts of Denmark. This catalog required a lot of work, but it was worth it because the material submission is unique in this form. In addition, Volume 67 has a new layout and follows the new author guidelines. Volume 67 was published as the first new volume on Propylaeum. Volume 68 is scheduled to be printed in the summer of 2022. 7 papers are ready to go to layout, and 8 more papers are in the review process. The editors have been trained in the use of the Propylaeum homepage. Propylaeum has now taken over the QUARTÄR archive, so our archive on the QUARTÄR homepage has been shut down. In addition, Propylaeum now assigns the DOIs for the new contributions. The open question now is, if the early view will remain on our homepage, or if it will be taken over by Propylaeum as well.

In the following, Dr. Yvonne Tafelmaier and Amira Adaileh, M.A. reported on planned measures for future membership recruitment and improvement of the Society's financial situation. As already mentioned by the President, there is a contradiction between the

international recognition and reach of the Society and the low number of members. In order to attract young scientists in particular to become members, the visibility of the Society is to be increased. This is to be achieved, among other things, by a flyer and a stronger presence of the society in social media (Twitter). In doing so, the Society is planning measures to be present on Twitter not only at the annual meeting, but throughout the year. In addition, sponsors are to be sought to support the Society financially in the short and long term.
At the end of the assembly, there was a discussion on whether future annual meetings should also be held hybrid. An opinion was sought from those present on this: 33 out of 40 members were in favor of future hybrid meetings. Some members noted that online participation is a good solution for participants who, for various reasons, cannot attend the meeting in presence or cannot afford to travel or similar (such as students). In addition, it was suggested to either allow online participation for members only or to allow members to participate online for free.
The general assembly was closed at 8:00 p.m.

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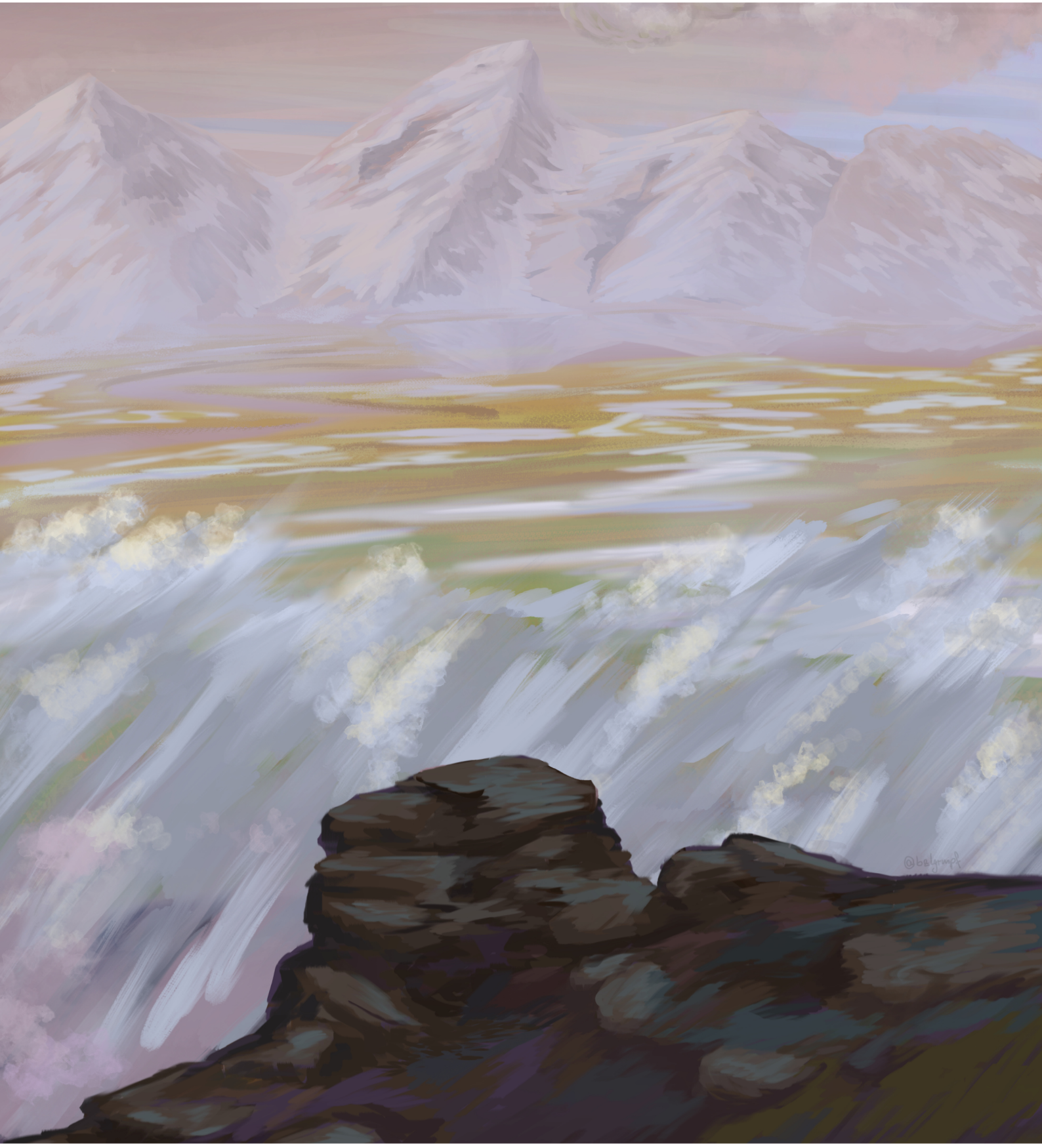

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