150TH ANNIVERSARY OF THE DISCOVERY OF THE MESOLITHIC SHELLMIDDLENS

COMEMORAÇÃO DOS 150 ANOS DA DESCOBERTA DOS CONCHEIROS MESOLÍTICOS

PROGRAM AND ABSTRACTS

21-23 MARCH 2013
Sponsoring institutions - Instituições apoiantes
Program Committee
Organização

Chairs - Secretários Gerais
Cleia Detry
Eugénia Cunha
T. Douglas Price
Nuno Ferreira Bicho

Secretariat - Secretariado
Célia Gonçalves
João Cascalheira
João Marreiros
Marina Évora
Olívia Figueiredo
Patrícia Monteiro
Rita Dias
Telmo Pereira

INVITED SPEAKERS – ESPECIALISTAS CONVIDADOS

Catherine Dupont - CNRS - Rennes
Cláudia Umbelino – Universidade de Coimbra
Clive Bonsall - University of Edinburgh
Eva David – CNRS Paris
Friederich Lutz - German Archaeological Institute
Grégor Marchant - CRNS - Rennes
Lydia Zapata – Universidad del Pais Vasco
Mary Jackes - University of Waterloo
Nicky Milner - University of York
Ole Gron - Langelands Museum
Pablo Arias – Universidad de Cantabria
Rick Schulting - University of Oxford
PROGRAM

March, 21st
8:30-9:30 – Registration
9:30-10:00 – Open ceremony
10:00-11:00 – Oral presentations
11:00-11:15 – Coffee break
11:15-11:45 – Keynote lecture
11:45-12:25 – Oral presentations

12:45-14:30 – Lunch

14:30-15:00 - Keynote lecture
15:00-16:20 – Oral presentations
16:20-16:30 - Coffee break
16:30-17:00 - Keynote lecture
17:00-18:20 – oral presentations

19:30 – Dinner offered by the Câmara Municipal de Salvaterra de Magos

March 22nd
8:30 - Coffee
9:00-14:00 – Field trip
14:00-16:00 – Late Lunch offered by Casa Cadaval
16:00-18:00 – Poster session

March 23rd
9:00-10:40 – Oral presentations
10:40-11:00 – Coffee break
11:00-12:20 – Oral presentations

12:30-14:30 – Lunch

14:30-15:00 - Keynote lecture
15:00-16:20 – Oral presentations
16:20-16:40 - Coffee break
16:40-18:00 – oral presentations
18:15-18:30 – Closing
Venue

Due to logistical reasons, the venue had to be moved to the Escola Profissional de Salvaterra de Magos. It is located in the center of town at Rua dos Heróis de Chaves, nº4.

Transportation to the congress location

There will be a bus from the hotels in Santarém (Hotel Santarém and Hotel Umu). The departures are scheduled for:
- 21\textsuperscript{st}, Thursday – 8:15
- 22\textsuperscript{nd}, Friday – 8:00
- 23\textsuperscript{rd}, Saturday – 8:15

Field trip

Information on the details of the visit to the shellmiddens will be provided at the venue at the time of registration.
<table>
<thead>
<tr>
<th>Hour</th>
<th>Auditório</th>
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<tbody>
<tr>
<td>08:30</td>
<td>Registration</td>
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<tr>
<td>09:30</td>
<td>Open Ceremony</td>
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</table>
| 10:00  | **Sources for the reconstruction of Cabeço da Arruda**  
|        | Mary JACKES et al.      |
| 10:20  | **The chronology of Cabeço da Amoreira (Muge, central Portugal)**  
|        | Nuno Bicho et al.       |
| 10:40  | **The importance of microlithics geometrics in Muge shell middens.**  
|        | Anabela Joaquinito      |
| 11:00  | Coffee break            |
| 11:15  | **Keynote lecture**     
|        | Plant use during the Mesolithic on European coastlines.  
|        | Lydia Zapata et al.     |
| 11:45  | **Specialised or diversified? Patterns of Plant Exploitation at Cabeço da Amoreira**  
|        | Michèle Wollstonecroft  |
| 12:05  | **The Midden is on fire! Charcoal analyses from Cabeço da Amoreira (Muge shellmiddens)**  
<p>|        | Patrícia Diogo Monteiro et al.  |
| 12:25  | Discussion              |
| 12:45  | Lunch                   |</p>
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<tr>
<th>Hour</th>
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<tr>
<td>14:30</td>
<td><strong>Keynote lecture</strong></td>
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<td></td>
<td>Marine invertebrates in Mesolithic shell-middens along the European façade</td>
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<td></td>
<td>Catherine Dupont</td>
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<tr>
<td>15:00</td>
<td><strong>What have we been chasing in Muge? The Zooarchaeological studies in the last 150 years</strong></td>
<td>A significant component into Pre-Historical Canoeists Passages: heuristic implications of shell-middens in Fuego-Patagonia Landscape. A. Maximiano Castillejo et al.</td>
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<td>Cleia Detry et al.</td>
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<td>15:20</td>
<td><strong>What’s new? The animal remains from Cabeço da Amoreira from the 2008-2012 campaigns</strong></td>
<td>Social and environmental impacts on prehistoric shellfish gathering in the Red Sea and adjacent areas N. Hausmann et al.</td>
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<td>Rita Dias et al.</td>
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<td>Sónia Gabriel et al.</td>
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<td>16:00</td>
<td><strong>Bone fragmentation as a tool for quantification and identification of taphonomic processes and their effects: the case study from Havnø, a stratified Danish “Køkkenmødding.”</strong></td>
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<td>Harry Robson and Kurt Gron</td>
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<td>16:20</td>
<td>Coffee break</td>
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<td>16:30</td>
<td><strong>Keynote lecture</strong></td>
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<td>Sweet or salty: an overview of the isotopic evidence for the use of aquatic resources in the Mesolithic</td>
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<td>Rick Shulting</td>
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<td>17:00</td>
<td><strong>Assessing dietary variability in South American hunter-fisher-gatherers: collagen stable isotopic analysis of human remains from Brazilian Sambaquis</strong></td>
<td>Re-excavating the Asturian: the Mesolithic shell midden site of El Toral III (Asturias, northern Spain) Igor Gutiérrez-Zugasti et al.</td>
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<td>A. Colonese et al.</td>
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<td>17:20</td>
<td><strong>Tracing Past Human Movement</strong></td>
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<td>17:40</td>
<td>mAARiTIME: Amino Acid Racemisation dating of the Mediterranean rim</td>
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<td>Beatrice Demarchi et al.</td>
<td>Socioecological dynamics at the time of the last hunter-gatherers in western Mediterranean Iberia J. Emili Aura Tortosa et al.</td>
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<tr>
<td>18:00</td>
<td><strong>Living on the edge of the world: the Mesolithic communities of the Atlantic coast (France/Portugal).</strong></td>
<td>A microregional dataset for timing the population dynamics of the last Mesolithic in eastern Iberia. The central Valencian region as a case of study Oreto García Puchol et al.</td>
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<td>Grégory Marchand</td>
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<td>18:20</td>
<td>Discussion</td>
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March, 22nd

Field trip
8.30 – **Coffee** (Celeiro do Neto, Muge)
Archaeological sites of Cabeço da Amoreira and Moita do Sebastião

14:00 – **Lunch** Celeiro do Neto (Muge)

16:30 - **Poster session** (Celeiro do Neto, Muge)

1. **Shell tool and subsistence strategies during the Upper Paleolithic in northern Spain**
   David Cuenca Solana

2. **AMS Radiocarbon chronology of Late Mesolithic sites in the Upper Vinalopó Valley (Eastern Iberia)**
   Magdalena Gómez-Puche & Javier Fernández-López de Pablo

3. **Lithics from the El Mazo shell midden site (Asturias, Spain): new perspectives on the Asturian**
   M. Natividad Fuertes et al.

4. **Approach to the macroolithic lithic industry from El Conejar cave’s (Cáceres, Extremadura, Spain) Upper Breccia**
   Mª Dolores Mejías del Cosso et. al.

5. **Crustaceans and echinoderms from the Mesolithic shell midden site of El Mazo (Asturias, Spain)**
   Emma Tong & Igor Gutiérrez-Zugasti

6. **Evolution of procurement and management strategies of lithic raw materials in the Mesolithic of Atxoste (Alava, Spain)**
   Adriana Soto et al.

7. **The Prehistoric site of Prazo (Northern Portugal): the 8th Millennium cal BC occupation**
   Sérgio Monteiro-Rodrigues

8. **The archaeological excavations at Muge shellmiddens in the 1930’s: new contribution to the history of its investigation**
   Ana Abrunhosa

9. **Cabeço da Arruda in the 1860s**
   Mary Jackes et al.

10. **Ground-penetrating radar mapping at the Mesolithic Muge Shell Mound, Portugal**
    Lawrence Conyers et al.

11. **GIS predictive modeling for the discovery of new Mesolithic sites in Central Portugal**
    Célia Gonçalves

12. **Reading the lithics in flint of Cabeço dos Morros shell Midden**
    Anabela Joaquinito

13. **Techno-typological analysis of the lithic materials from the Trench area of Cabeço da Amoreira (Muge, Central Portugal)**
    João Cascalheira et al.

14. **New functional evidences for human settlement organization from the Mesolithic site of Cabeço da Amoreira (Muge): lithic use-wear analysis.**
    João Marreiros et al.

15. **Raw material procurement in Cabeço da Amoreira, Muge, Portugal**
    Telmo Pereira & Nuno Bicho

16. **Antler Debitage in Muge shellmiddens. The collections of the Geological Museum**
    Marina Évora

17. **Fire and death: charcoal analyses from two burials in Cabeço da Amoreira (Muge shellmiddens)**
    Patrícia Diogo Monteiro & Olívia Figueiredo
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<th>18.</th>
<th>The importance of new methodologies for the study of funerary practices: The case of Cabeço da Amoreira, a mesolithic shellmidden (Muge, Portugal)</th>
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<tr>
<td></td>
<td>Olívia Figueiredo &amp; Célia Gonçalves</td>
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<td>Marco António Andrade et al.</td>
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<td>20.</td>
<td>Lithic materials in the Sado River’s shellmiddens – geological provenance and impact on site location</td>
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<td>Nuno Pimentel et al.</td>
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<td>21.</td>
<td>New preliminary data on the exploitation of plants in Mesolithic shell middens: the evidence from plant macro-remains from the Sado Valley (Poças de S. Bento and Cabeço do Pez)</td>
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<td>Inés L. López-Dóriga et al.</td>
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<td>22.</td>
<td>High resolution XRF chemostratigraphy of the Poças de São Bento shell midden (Sado estuary, Portugal)</td>
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<td>E. Iriarte et al.</td>
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<td>23.</td>
<td>Lithics in a Mesolithic shell mound: new data from the Sado valley (Portugal)</td>
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<td>Ana Cristina Araújo et al.</td>
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<td>24.</td>
<td>Neolithic pottery in Sado Mesolithic shell-middens: some pots for thought</td>
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<td>Mariana Diniz &amp; Miriam Cubas</td>
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<td>25.</td>
<td>Non-masticatory Use of Teeth and Musculoskeletal Stress during Mesolithic-Neolithic Transition at Lepenski Vir (Serbia)</td>
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<td>Marija Radović &amp; Sofija Stefanović</td>
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<td>26.</td>
<td>Where is the household boundary? Substantial spatial considerations in “little” shellmiddens</td>
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<td>A. Maximiano Castillejo.</td>
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<td>27.</td>
<td>Biographical details trapped in dental calculus; the case of Kanaljordan, Sweden.</td>
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<td>Karen Hardy et al.</td>
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<td>28.</td>
<td>Introducing Project TRACE - Hunter-Gatherer Toolkits and Tasks: Detecting Microwear Traces and Residues on Northwestern European Artefacts</td>
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<td>Aimée Little</td>
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<td>29.</td>
<td>An experiment of the early Neolithic fishing trap extraction at Zamostje 2 peatbog site.</td>
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<td>Vladimir Lozovski et al.</td>
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<td>30.</td>
<td>Mobility during the Mesolithic and the Neolithic in the Danube Gorges (Balkans, 9500-5500)</td>
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<td>Camille de Becdelievre et al.</td>
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<td>31.</td>
<td>Estimation of size of beluga sturgeon (<em>Huso huso</em> Brandt) specimens from Lepenski Vir, Serbia</td>
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<td>Ivana Živaljević</td>
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<td>32.</td>
<td>Shell middens on the Eastern Adriatic coast from the Palaeolithic to the Neolithic</td>
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<td>Darko Komšo et al.</td>
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<td>33.</td>
<td>Mesolithic – Neolithic boundaries in the Gulf of Finland region: palaeogeographic aspect</td>
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<td>Dmitriy Gerasimov &amp; Marianna Koulkova</td>
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<tr>
<td>09:00</td>
<td><strong>The Mesolithic skeletons from Muge: the XXIst century excavations</strong></td>
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<td>Eugénia Cunha et al.</td>
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<td>09:20</td>
<td><strong>Daily life during the Portuguese Late Mesolithic: Activity-related skeletal morphologies in the Muge and Sado samples</strong></td>
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<td>S. Villotte &amp; C.J. Knüsel</td>
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<td>09:40</td>
<td><strong>Life in the Muge shell middens: inferences from the new skeletons recovered from Cabeço da Amoreira</strong></td>
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<td>Cláudia Umbelino et al.</td>
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<td>10:00</td>
<td><strong>A craniometric study of postmarital residence in Muge Valley.</strong></td>
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<td>Ciarán Brewster</td>
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<td>10:20</td>
<td><strong>Ancient DNA from Muge human skeletons: a glimpse of Mesolithic genetics</strong></td>
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<td>Eva Fernández Dominguez et al.</td>
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<td>10:40</td>
<td><strong>Coffee break</strong></td>
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<td>11:00</td>
<td><strong>Prehistoric shell-middens – central settlement features, territorial markers or just waste heaps?</strong></td>
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<td>Ole Gron</td>
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<td>11:20</td>
<td><strong>Other types of Mesolithic: “Pointed Bone Implements”</strong></td>
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<td>Éva David et al.</td>
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<td>11:40</td>
<td><strong>A few steps backwards ... in search of the origins of the Late Mesolithic</strong></td>
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<td>Ana Cristina Araújo</td>
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<td>12:00</td>
<td><strong>The Asturiense in Cantabrian-Spain: current state of research.</strong></td>
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<td>Mercedes Pérez Bartolomé</td>
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<td>12:20</td>
<td><strong>Discussion</strong></td>
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<td><strong>Lunch</strong></td>
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<td>14:30</td>
<td><strong>Keynote lecture</strong></td>
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<td>Recent Research at Star Carr and Lake Flixton</td>
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<td>Nicky Milner</td>
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<td>15:00</td>
<td><strong>Mesolithic seascapes in the north west: the case of Camas Daraich, Isle of Skye, Scotland</strong></td>
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<td>Karen Hardy et al.</td>
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<td>15:20</td>
<td><strong>Pit Deposition in the Mesolithic of Ireland</strong></td>
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<td>Graeme Warren &amp; Elizabeth Lawton-Matthews</td>
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<td>15:40</td>
<td><strong>'MESO-Lithics', &amp; Mobility In Northern England</strong></td>
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<td>Paul R Preston</td>
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<td>16:00</td>
<td><strong>Prehistoric shellfish exploitation in coastal western Scotland</strong></td>
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<td>16:40</td>
<td><strong>Coffee break</strong></td>
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<td>16:40</td>
<td><strong>Baltic Fishermen Societies - from Late Mesolithic to Middle Neolithic</strong></td>
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<td>Friedrich Lueth</td>
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<td>17:00</td>
<td><strong>Living by the lake - signs of settlements beside the sacred lake at Kanaljorden</strong></td>
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<td>Jenny Holm</td>
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<td>17:00</td>
<td><strong>Riņņukalns – new research on a long-known but nearly forgotten Neolithic freshwater shell midden in Latvia</strong></td>
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<td>Valdis Bērziņš et al.</td>
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<td><strong>Motala – Aspects on centrality</strong></td>
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<td>Fredrik Molin et al.</td>
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<td>17:20</td>
<td><strong>Between 1820 and 1900: Discovering Køkkenmøddings and the Mesolithic of Denmark</strong></td>
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<td>Erik Brinch Petersen</td>
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<td>17:40</td>
<td><strong>The ritual display and deposition of human skulls at the wetland site Kanaljorden, Motala, Sweden</strong></td>
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<td>Fredrik Hallgren</td>
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<td>17:40</td>
<td><strong>Plant microwear traces on blades from the Dutch Mesolithic wetland sites of Hardinxveld-Giessendam Polderweg and De Bruin</strong></td>
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<td>Aimée Little &amp; Annelou van Gijn</td>
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<td>17:40</td>
<td><strong>Treponemal infections in the Danube Gorges (9500-5500BC)- evidence from newborns</strong></td>
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<td>Sofija Stefanović et al.</td>
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ABSTRACTS
The archaeological excavations at Muge shellmiddens in the 1930’s: new contribution to the history of its investigation
Ana Abrunhosa
NAP, Universidade do Algarve

The Mesolithic shellmiddens of Muge (Salvaterra de Magos, Portugal) are one of the major Portuguese and European Prehistoric archaeological sites. They were discovered in 1863 by geologist Carlos Ribeiro (1813-1882).

In the 1930’s Dr. Mendes Corrêa (1888-1959), Professor of the Faculty of Sciences of the University of Porto, directed a new phase of archaeological field work in the shellmiddens. His investigations were aimed at obtaining new specimens for the study of Homo afer taganus. He and his assistants were responsible for the production of varied graphic documentation relating to their work.

An abundant new collection of documents (letters, photographs, drawings, field reports, among others) from that period was brought to light in the 1980s. They reveal the motivations, strategies, programming, development and field work techniques of that time. Those subjects are usually poorly described even if they are considered of high importance for the knowledge of the archaeological practice developments.

Beyond the Mesolithic shell-middens: a chrono-cartographic overview of the Ancient peasant communities in Muge region
Marco António Andrade¹, César Neves¹ & Gonçalo Lopes²
1. UNIARQ
folha-de-acacia@iol.pt
c.augustoneves@gmail.com
2. University of Lisbon
g.simoeslopes@gmail.com

Muge is mostly known for the presence of numerous late Mesolithic shell-middens. Perhaps for this reason, archaeological researches have been oriented towards this particular matter – remaining information blanks regarding immediately subsequent periods.

Recent field survey works have allowed to recognize that, beyond the Mesolithic shell-middens, we can also find an important space occupancy by the ancient peasant communities, right from Early Neolithic.

However, these occupations are related to late Early Neolithic. Occupations related to the first Neolithic communities are only known to peripheral areas of the Mesolithic exploitation territories. It seems that there is a time gap between the last Mesolithic communities – that have persisted here, even after the beginning of the Neolithisation Process in other areas (Estremadura Limestone Massif), – and the first Neolithic communities to occupy this area.

This contribution aims to present a chrono-cartographic overview of this area, defining the possible space occupation diagrams since the last centuries of the 6th millennium BCE, without temporal (apparently only spatial) continuity with the Mesolithic shell-middens.

A few steps backwards … in search of the origins of the Late Mesolithic
Ana Cristina Araújo
Direcção Geral do Património Cultural. LARC / CIBIO / InBIO
acaraupo@igespar.pt
Roughly about 6300 cal BC, during the transition to the late Mesolithic (ca 6300-5200 cal BC), the Portuguese territory was the stage of a major reorganization of human settlement. This had implications for other aspects of the daily lives of human communities distancing them from the behavioral patterns of the precedent local populations (from the Early Mesolithic; ca 9500-6400 cal BC).

The explanation for the origins of such changes has been mainly focused on environmental factors which possibly have pushed human communities to the innermost areas of the largest estuaries formed during the Atlantic chronozone. Its abundance and diversity in food resources would therefore have provided for a more sedentary, steady and sustainable lifestyle.

However, and merely by taking a few steps back, other cultural and taphonomic evidences can also be applied in support of a more substantiated and realistic picture of the historical process.

Lithics in a Mesolithic shell mound: new data from the Sado valley (Portugal)
Ana Cristina Araújo ¹, Pablo Arias ² & Mariana Diniz ³
¹ Direcção Geral do Património Cultural. LARC / CIBIO / InBIO
acaraujo@igespar.pt
² Universidad de Cantabria (IIIPC)
pablo.arias@unican.es
³ Centro de Arqueología (UNIARQ), Faculdade de Letras, Universidade de Lisboa
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The development, since 2010, of a research project on the Mesolithic of the Sado valley has opened new insights for the study of the lithic technology of the last hunter-gatherers of SW Europe. The new excavations of the shell midden of Poças de São Bento include a protocol for the systematic recovery of the materials, including water sieving of the whole excavated sample of sediments. Therefore, as the new collection do not suffer from any excavation bias, it is possible to characterize raw material choices and constraints, lithic reduction strategies, and functional areas in a more reliable way. Beside geometric microliths, a varied array of morphometric types has been found, due to the multiple tasks that were performed at the site. Some preliminary comments are also made on the spatial distribution of the lithic materials.

At the edge of the marshes: New approaches on the Sado valley Mesolithic (southern Portugal)
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Among the major European concentrations of Mesolithic settlement, the lower Sado valley is one of the least known. Despite the development of large systematic excavations in the mid twentieth century and some recent attempts to revise some sites, only very partial information is available. Yet there are valuable unpublished archaeological collections in the National Museum at Lisbon, and the preservation of most of the sites is very good. Moreover, the Sado shell middens are located in a very peculiar geographical setting, which opens very interesting questions on the role of the coastal and inland resources and landscapes among late hunter-gatherers. Since 2010, a Luso-Spanish interdisciplinary team has started a systematic revision of this area within the framework of a research on the transition to the Neolithic in coastal areas of SW Atlantic Europe. The project design and the preliminary results of the first fieldwork seasons are presented in this lecture.

Socioecological dynamics at the time of the last hunter-gatherers in western Mediterranean Iberia
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Recent Works underline how climatic and environmental changes played a special role in social dynamic shifts of prehistoric societies. A more accurate chronological dataset and the availability of paleoenvironmental well dates proxies allow us to try exploring about the nature of human responses. Combining macro and micro spatial scale analysis can contribute to consider hypotheses about this feedback took place. In this light we present now the trends observed in population dynamics since Younger Dryas event to the middle Holocene in western Mediterranean of Iberia (12.8 - 7.5 ka cal BP). For this we process a selected C14 dataset combined with climatic proxies, cultural and economical traits for showing a evolutionary view for the last hunters-gatherers in western Mediterranean region.

**Mobility during the Mesolithic and the Neolithic in the Danube Gorges (Balkans, 9500-5500)**
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Evolution of female mobility is assumed to have been an important process contributing to the Neolithic demographic expansion. Considering that a mobile foraging lifestyle complicates the provisioning of multiple offspring, the reduction of female mobility is supposed to have positively influenced fertility. This study investigates mobility levels of Mesolithic and Neolithic people in the Danube Gorges (Balkans, 9500 to 5500 BC). A preliminary anthropological study indicates that Mesolithic females were there already semi-sedentary. We aim at optimizing this approach by crossing the analyses of both external and internal features of lower limbs of about 100 Mesolithic and Neolithic individuals. Results from the examination of lower limbs muscles attachments, size and shape will be compared with results from analyses of their cross sectional geometry properties. By clarifying levels of mobility, our results will also discuss the chronology of sedentarization in the Danube Gorges.

**Riņņukalns – new research on a long-known but nearly forgotten Neolithic freshwater shell midden in Latvia**
Valdis Bērziņš, Harald Lübke, John Meadows, Mudīte Rudžīte, Ulrich Schmölcke and Ilga Zagorska

Riņņukalns, in northern Latvia, is unique in the context of Baltic Sea region prehistory. Discovered and first investigated in the 1870s, it is the only well-stratified Stone Age shell midden in the East Baltic and one of the rare sites consisting of freshwater mussel species. The artefacts recovered...
include ceramics, bone tools and some art objects. Human burials were also found stratified within and under the shell midden.

After a break of almost 70 years, new research on this important site started in a close cooperation between the Institute of Latvian History, Latvia, and the Centre for Baltic and Scandinavian Archaeology, Germany. Excavations in 2011 demonstrated that significant parts of the midden are still preserved intact, despite extensive excavations during the 19th and early-mid 20th centuries. Additional analyses of the human remains from the original excavations have been undertaken. The paper will give an overview of the most important results.

The human burials of Riņņukalns, Latvia – New investigations to clarify an old research dispute
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The Riņņukalns shell midden, in northern Latvia, was first investigated by Count Sievers in the 1870s. Of special importance were at least four human burials, with some bone and stone grave goods, which were found under intact layers of the shell midden, which could be dated to the Neolithic by pottery sherds. Consequently Sievers considered these human remains, in contrast to other early modern burials found in the topsoil, as the first Stone Age graves found in the Eastern Baltic. However, this interpretation was contradicted by then leading Baltic prehistorians and the age of the presumed Stone Age graves remained in dispute.

All human remains excavated by Sievers at Riņņukalns were given by him to the famous German researcher Rudolf Virchow for his anthropological collection in Berlin, and survived the chequered history of the 20th century until today. Therefore it was possible to start new osteological, stable isotope and radiocarbon investigations on these remains in 2011 and to resolve the old research dispute.

The Mesolithic chronology of Cabeço da Amoreira (Muge, central Portugal)
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Although the Muge shellmiddens have been the object of research and excavation for almost 150 years, data is still scarce and, frequently, problematic. The chronology of the Mesolithic occupation of Muge is based on a series of radiocarbon dates from various sites. These results allowed the establishment of upper and lower boundaries for the Mesolithic in the region, as well as for the sequencing and the cultural explanations of both sites and lithic technology. However, most of those dated samples have insoluble problems of provenience and stratigraphy and thus, the dates have very little significance to understand the chronology of the sites and of the human occupation in the valley.

Recently, a new project, started in 2008, was funded by the Portuguese National Science Foundation (FCT). Here, we present the AMS results of this project, in a total of close to 30 dates. These provide a complete and detailed new perspective of the chronology of one of the most important shellmiddens (Cabeço da Amoreira) as well as the direct relation to the time of settlement of Mesolithic complex
hunter-gatherers in the region and the following occupation with the reuse of the shellmiddens by Neolithic populations.

A craniometric study of postmarital residence in Muge Valley.
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While patrilocality is the predominant form of postmarital residence in recent foraging societies, it is not known whether this was also the case for modern humans living in Europe prior to the Neolithic. 3D coordinate data were collected on skulls from Moita do Sebastião and Cabeço da Arruda and examined using geometric morphometrics and multivariate statistics. The predominant form of postmarital residence was examined. Results show that cranial shape was more variable in males than in females. This is a pattern consistent with matrilocality. These results suggest that the predominant form of postmarital residence at the Muge Valley sites was inclined towards matrilocality. The exact pattern of residence is undoubtedly much more complex than what can be derived from the present data. Limitations of this study and suggestions for future research are also discussed.

The Mesolithic in Sesimbra (Portugal) – a “mesopotamia” between the Tagus and Sado rivers?
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This poster is intended to present the sites known nowadays for Mesolithic occupation in the region of Sesimbra – on the banks of the Albufeira lagoon, in the “shadow” of the Arrábida Mountain. We have taken into account the specific landscape of the region, which, theoretically, could have shaped the local neolithisation process, in greater or lesser relationship to the neighbouring regions (Tagus and Sado).
The investigation had as its base the re-evaluation of the known archaeological sites whose information was brought up to date and enhanced by new data taken from the archaeological surveys of the administrative district of Sesimbra (2007-2009), published in 2009 under the title O Tempo do Risco (Calado et al., 2009).
Although scarce and superficial, the available data deserves inclusion in the national mesolithic cartography. However, with further research (namely by way of future excavations in the sites identified), this data could come to answer some questions relative to the revolutionary neolithisation process(es) and corresponding theoretic models.

Techno-typological analysis of the lithic materials from the Trench area of Cabeço da Amoreira (Muge, Central Portugal)
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One of the most interesting aspects of the recent fieldwork in the Cabeço da Amoreira shellmidden (Muge, Central Portugal) was the identification of various Neolithic and Mesolithic horizons located just outside the mound limits. These layers were exposed in a series of 1m² test pits excavated around the site and, where good preservation conditions were found, larger areas were opened. To better understand and relate the stratigraphy of one of these areas with the midden itself a 12x1 meter trench was excavated, revealing at least seven archaeological horizons with abundant lithic materials but no faunal preservation. Here, we present the first results of the techno-typological analysis of the lithic materials from the Trench area. This study enabled us to build a diachronic framework for the Trench occupations and to infer on their relationship with the construction of the shellmidden.

Survey strategies for the interpretation of Sado shell-middens landscape
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A holistic interpretation of landscape is a pending matter in the research of Mesolithic period in Sado valley. Nowadays, the spatial distribution of shell-middens stands out as the result of a non-systematic strategy of surface survey, mainly carried out during the times of M. Heleno. Although the number of detected shell-middens is really significant, nowadays we manage a fragmentary view on Mesolithic settlement, which is insufficient to provide an adequate interpretation of locational aspects. Within the framework of SADO-MESO project, we have surveyed several areas of Sado valley, from its mouth to interior lands, recording the location of already known shell-middens, but also surveying areas with different degrees of evidences. This on-going project is offering a more complete reading of Mesolithic settlement patterns. In this paper, we offer a first insight based on GIS-aided analyses.

Assessing dietary variability in South American hunter-fisher-gatherers: collagen stable isotopic analysis of human remains from Brazilian Sambaquis
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The Brazilian coastline traverses a variety of terrestrial and marine ecosystems and has been a focus for human activity since the early Holocene. The coastal shell middens of this region (Sambaquis) provide a long term record of human interaction with these productive complex littoral ecotones. The dietary consequences of these interactions and their implications for understanding subsistence strategies have been difficult to study using conventional methods. To directly study diet, here we present carbon and nitrogen isotopic results of collagen from humans and associated faunal remains.
from a coastal (Jabuticabeira II) and a riverine (Moraes) Sambaquis of south Brazil, dated to ~1.3 and ~5 cal ka BP respectively. Generally, isotopic differences between individuals buried in each midden reflects variation in the resource possibilities offered by local environmental conditions. However a more complex dietary picture emerged within the humans buried at the coastal site. Here, other factors such as coastal-inland mobility, specialisation and cultural differences in food choices are required to explain the observed data.

**Ground-penetrating radar mapping at the Mesolithic Muge Shell Mound, Portugal**
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Ground-penetrating radar (GPR) reflection profiles were collected at Muge shell mound in 2012 using 400 and 270 MHz antennas. Energy penetration and reflection with the 270 MHz antennas was at least 4 meters with feature resolution to about 30 cm. The 400 MHz antennas were capable of lesser energy penetration to only about 2.5 meters, but with much better feature resolution. Reflection profiles, topographically corrected, show a distinct reflection from the base shell-early Mesolithic surface, which was the original ground surface on which burials have been excavated. The GPR profiles also display a number of features within the shell package including a hard-packed living surface, or some other constructed layer, along the crest of the mound within the shell deposit. There are also a number of intrusive features that are likely burials visible. One rectangular feature with a distinct floor and objects on it was discovered on the western side of the mound, which is scheduled for excavation in 2013. This GPR test at Muge shows the utility of the method for defining shell stratigraphy, constructed or modified features within shell deposits and potentially objects or even architecture along the original ground surface on which the shells were originally deposited.

**Shell tool and subsistence strategies during the Upper Paleolithic in northern Spain**
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The exploitation of malacological resources by hunter-gatherer societies during the Upper Paleolithic has usually been considered as a marginal activity. In this research I use methodology of functional analysis to document shell tools in different contexts dated to the Upper Paleolithic and located in the Cantabrian region (Northern Spain). The use of shells tools to process animal, vegetable and mineral materials show a wider range of consumption of these resources than previously stated. From these results we discuss the role of the malacological resources in the economic system of hunter-gatherer groups to analyze the different use given to the shells: food, technological and adornment. The analysis of these tools helps us to expand the knowledge on the means of production of the societies studied in these contexts.

**The Mesolithic skeletons from Muge: the XXIth century excavations**
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The main objective of this paper is to summarize the results of excavations undertaken in the Muge Mesolithic shell middens in the XXI century. We present the data on the skeletons found in Cabeço Amoreira and Cabeço of Arruda, including their main paleobiological features. We also present the comparative framework of the skeletons recovered during the nineteenth century. 150 years later, the shell middens of Muge Mesolithic remain a unique global source of human skeletons whose data contribute greatly to our knowledge of recent human evolution.

mAARiTIME: Amino Acid Racemisation dating of the Mediterranean rim
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Amino acid racemisation (AAR) geochronology is one of the few techniques which combine great temporal depth with the ability to directly date archaeological shell remains. As these represent the direct evidence of activities carried out by humans in the past (e.g. the early exploitation of marine resources), establishing an accurate geochronology for archaeological molluscs and other biominerals is an important step for our understanding of human evolution. Here we present results from the project mAARiTIME, which focuses on key Mediterranean sites spanning the last 100 ka and beyond. By applying a closed-system method of AAR dating, we are building stratigraphic frameworks, which combined with new independent geochronology aim to provide reliable dating control for the Mediterranean. Closed-system tests are performed to assess the suitability of different marine taxa, and then the AAR data from sub-fossil shells used to build pilot chronological frameworks for southern Europe and northern Africa.

What have we been chasing in Muge? The Zooarchaeological studies in the last 150 years
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The zooarchaeological remains have been an important part of the materials recovered in the Muge Shell-middens for the last 150 years. Since the first publication, in 1865, the animal remains were used to interpret the occupation of the site and its chronological context. Among the human and dog burials, abundant animal bone and shell remains were recovered, showing a close connection of the food refuses with the ritual world. We discuss here the animal bone assemblages recovered in the 150 years of excavations and the evolution of the assemblages recovered through time. The vertebrate remains were mainly composed by birds and mammals, among the last group we found: rabbit (*Oryctolagus cuniculus*), red deer (*Cervus elaphus*), wild boar (*Sus scrofa*), aurochs (*Bos primigenius*) and roe deer (*Capreolus capreolus*). Some remains of Equids (probably horse) and several carnivores were also found.

What’s new? The animal remains from Cabeço da Amoreira from the 2008-2012 campaigns
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The new excavations in Cabeço da Amoreira undertaken by Nuno Bicho’s team, since 2008, have allowed the recovering of animal remains in a more thorough way. Zooarchaeological analysis benefited of a more detailed description of the spatial distribution of the materials (either piece plotted or volumetrically plotted trough plotting of sieve buckets) and of the recovery of smaller bone fragments both in situ and whilst sieving, that all together continue to contribute to the knowledge about these communities subsistence, economy and social organization.

The main species found in older excavations are also the ones present in the recent ones, such as rabbit and hare (considerably less than rabbit), red deer and wild boar. Dog, wild cat and red fox have also been found at these new campaigns.

Neolithic pottery in Sado Mesolithic shell-middens: some pots for thought
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Pottery is rarely found in Final Mesolithic contexts but, nowadays, its presence is well documented in Atlantic Europe shell middens. Some decades after the Scandinavian experience and Zvelebil’s availability model (e.g. 1986), the pottery documented in these contexts was understood as a material result of networks which connected hunter-gatherers with Neolithic societies. This supposed that pottery was understood as a foreign item that the indigenous groups introduced in their traditional background.

In Sado shell middens, the relationship between pottery –practically the only Neolithic element identified- recorded at Poças de Sao Bento, Amoreiras, Vale Romeiras, Cabeço do Pez and Várzea da Mó, and the cultural environment of the last hunter-gatherers is not clear.

In this paper, we present and debate the stratigraphic, typological and functional issues associated with the pottery, although information from former excavations is sometimes scarce. Petrographic analysis will contribute to this discussion in order to establish whether these pottery ensembles are local or non local productions.

Mesolithic Landscapes and Portuguese Archaeology: the Sado valley, the National Archaeological Museum and other figures
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This paper intends to discuss the role of the Museu Nacional de Arqueologia (National Archaeological Museum, Lisbon) in the research and public outreach of the Portuguese Mesolithic. Unlike the classical sites of the Tagus palaeostuary, which were mainly studied by other institutions and curated in other museums, the Sado valley shell middens were a central concern in the scientific activity of the NAM.

Special attention will be paid to Manuel Heleno, who starts in the late 50’ a decade of intensive fieldwork in Sado Mesolithic shell middens piecing together materials that were predicted to be used in a most significant issue in Iberian prehistoric debate back then: the capsiense invasion and the African origins of peninsular Mesolithic.
From these campaigns around 200,000 pieces were left unpublished and kept in NAM until the 80’ when one of the authors (J.A.) starts publishing it within a new theoretical and methodological agenda where human adaptations to post-glacial environments was a central question. Nowadays, when “go public” is a core subject in archaeological agendas new research programmes, such as the SADO-MESO project, and the National Archaeological Museum have converged in a renewed interest for the Sado valley Mesolithic. Some joint initiatives for the study and the public outreach of this important piece of the Portuguese Prehistoric heritage will be summarily presented.

The Muge/Cocina triangle and other peculiar armatures in the Ebro Basin. A functional analysis
R. Domingo & U. Perales

This paper deals with the functional analysis of peculiar geometric microliths that individualize periods or regions in the Mesolithic/Early Neolithic of the Ebro Basin. We would like to complement the techno-typological study exposed by our colleagues (Cava et al., in this congress) with the traceological point of view, testing their functional capabilities and describing the wear traces observed in the uncommon microliths found in some of the most conspicuous sites from the Basque Country, Navarre and Aragón. So, we will be able to explain if their shape is related to a functional reason or their existence depends only on tradition, influence or fashion.

Marine invertebrates in Mesolithic shell-middens along the European façade
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In spite of the huge proportion of marine invertebrates in Mesolithic shell-middens, their study was not systematic before the 20th century. The development of archaeological disciplines like archaeozoology changes the method of excavation involved in Mesolithic shell-middens. Finally, the diet of Prehistoric population from old excavations was only known from big artefacts collected by hand. Biggest fish and more resistant shells were known. So our knowledge of the components of food was totally distorted and their description was reduced to a list of species and to biggest animals.

This outcome provokes the “re-excavation” from twenty years of some of the most famous Mesolithic shell-middens, like Beg-an-Dorchenn and Beg-er-Vil in France or those from the Muge and Sado complexes in Portugal. These new excavations offer a renewed vision of the diet and the residence of these populations. Systematic sieving and sorting make small animals visible like small crabs and fishes, thin and fragile shells. Biometric analyses and reference collections make possible the reconstruction of the original size of animals and of the environments where Mesolithic populations lived. Some of them represent last Mesolithic populations. We also try to explain the role of marine resources in the survival of such marine hunter-gatherers.

Antler Debitage in Muge shellmiddens. The collections of the Geological Museum
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Being one of the most important Mesolithic complexes in Europe, the Muge shellmiddens are known for 150 years. Much information has been published on the hundreds of human burials, but not much about the lithic and faunal assemblages.
Although a very important part of the material culture, hard animal materials are present in the Muge shellmiddens, but bone tools studies are yet to be done. We present here the results of the technological analysis of the antler artefacts that were recovered from Moita do Sebastião and Cabeço da Arruda shellmiddens in the late XIXth and XXth centuries, deposited in the Geological Museum in Lisbon.

**Ancient DNA from Muge human skeletons: a glimpse of Mesolithic genetics**
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During the last decades a lot of effort has been put in order to understand the mechanisms behind the Mesolithic-Neolithic transition in Europe. Modern population genetics and Palaeogenetics have contributed to this debate by exploring the present and past European genetic background and by making inferences based upon the distribution and frequency of their genetic variants. Even though ancient DNA data is still scarce and geographically disperse, these studies have predicted a genetic break between the Mesolithic and the Neolithic and a predominant role of genetic drift after the former.

In this study we provide a glimpse of the Portuguese Mesolithic genetic background through the recovery of aDNA from human specimens from different Mesolithic Shellmiddens. Strict criteria of authenticity were applied during the analyses, including cloning and replication in a second laboratory. Obtained results suggest that European Mesolithic populations were quite homogeneous, confirming that a genetic break might have occurred between the Mesolithic and the Neolithic also in this region.

**New perspectives on the Mesolithic in Eastern Spain. The open-air archaeological record.**
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Last five years have witnessed a significant increase on empirical data from open-air Mesolithic sites in the central mediterranean region of Spain. Three Mesolithic sites have been excavated -Arenal de la Virgen, Casa Corona and Benàmer- yielding new chrono-stratigraphic data, paleoenvironmental information, lithic assemblages, zooarchaeological evidences and burials. In addition, the faunal and malacological assemblages of El Collado shell midden have been recently analyzed, providing fresh evidences of landscape management and resource exploitation on coastal shell middens in the Iberian Mediterranean Region.

In this work, we present a state of the art about current knowledge and future research directions on Mesolithic open-air sites archaeological record documented in this region. We will dicuss issues
related to chronology, regional settlement organization, subsistence practices, site function and social circumscription on a regional basis.

«I see dead people»: The mortuary practices in the Mesolithic shellmiddens of Muge (Portugal)
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The Mesolithic shellmiddens of Muge, discovered in 1863, are an essential reference for Prehistoric Archaeology. More than 300 skeletons were collected from this multisite complex, making this series one of the most numerous and important for the study of Mesolithic society. Although there is a long history of research in Muge, studies have been mainly focusing on two main topics: the Mesolithic/Neolithic transition and diet, health and subsistence practices during this period. So unfortunately, we do not know much about the symbolic value of these burials.

Based on the analysis of new burials and a review of the published evidence, including position, spatial location and presence/absence of votive materials, it is known that the burials registered so far are mostly simple, tending for a dorsal decubitus position and with scarce material associated. These conclusions link these human burials to the hypothesis that this set of funerary practices where most likely intentional.

The importance of new methodologies for the study of funerary practices: The case of Cabeço da Amoreira, a mesolithic shellmidden (Muge, Portugal)
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Discovered in 1863 by Carlos Ribeiro along the Tagus Valley, the Mesolithic shellmiddens of Muge are an essential reference for Prehistoric Archaeology and undoubtedly associated with the development of the archaeological methodology in Portugal. After 150 years, more than 300 skeletons were discovered making this series of a great importance for the study of Mesolithic society. Unfortunately, most of these skeletons were recovered from old excavations which methodology and processing data were not always appropriate and with no great concern about the archaeological context. This context along with the spatial distribution of the skeleton and associated artifacts is essential for the study of funerary practices.

Focusing on the burials, this study aims to explore previous field methodology used in these shellmidden and to compare it with a more recent approach with new methodologies and technologies that allow a better understanding and reconstruction of these contexts, and therefore, these communities.

Holocene evolution of the Sado estuary - preliminary data and implications on Mesolithic shell midden
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Late Mesolithic shell middens in the Sado (8000 – 6500 cal BP) are currently the subject of an integrated project where paleoenvironmental reconstruction is of major concern. During the middle Holocene, the rise of sea-level and the existence of a previously incised paleovalley, allowed the marine flooding of upstream reaches of the river, possibly influencing the settling of hunter-gatherer communities. Ongoing work aims to determine and date the extension of marine influence along the Sado and compare faunal contents from the shell middens and the contemporary sediments cored in the valley infill. Reconstructions will rely upon environmental-sensitive proxies (sedimentological, geochemical, paleontological). Preliminary data obtained from cores taken between Arez and Vale Guizos suggest that the marine/estuarine facies is covered by at least 10m of almost barren alluvial sand and mud. This observation has important implications in constraining the upstream limit of estuarine facies and the areas exploited by those communities.

Lithics from the El Mazo shell midden site (Asturias, Spain): new perspectives on the Asturian
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El Mazo is a recently excavated cave site located near the eastern coast of Asturias in northern Spain. The site consists of two excavated areas that contain the remains of a large Asturian/Mesolithic shell midden (inner test area) and possibly later prehistoric occupations (outer test area). This paper will present preliminary results describing the techno-typological organization and raw material exploitation strategies associated with lithic artifacts present in these various assemblages. The quantitative and qualitative comparison of lithic armatures types (e.g., geometrics and backed bladelets) will provide an accurate contextualization for defining temporal and spatial differences at El Mazo over time. While lithic raw material exploitation patterns will examine if these differences also existed among local and/or regional geographic mobility and land-use patterns. Together, these strategies provide suitable contexts in which to understand the relationship between El Mazo and the rest of the Mesolithic and Holocene occupations across northern Spain.

Mesolithic fishing in the Sado Valley: evidence for coastal environments exploitation in Poças de São Bento
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Until the beginning of the 1990’s Mesolithic fishing in Portuguese territory was known almost exclusively from the work carried out by A. Lentacker at the famous shell-middens of the Muge area. We are now in a period of renewed interest in the study of last hunter-gatherers fish resource exploitation, with another important cluster of Mesolithic shell-middens under analysis in Sado Valley.

This paper discusses the ichthyoarchaeological remains found in Poças de São Bento, one of the Sado’s cluster sites placed further inland. The composition of the fish fauna suggests the exploitation of coastal environments. Our results also indicate that Mesolithic communities were able to capture large meagre (*Argyrosomus regius*). Assuming meagre behaviour has not changed since Mesolithic times, it is likely that those specimens were caught in estuarine environments during spring-summer.

**A microregional dataset for timing the population dynamics of the last Mesolithic in eastern Iberia.**

The central Valencian region as a case of study

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In the last years several new archaeological projects together with the application of novel archaeometric analysis have contributed to show a distinctive picture of the human past societies in central Valencia region. The combination of surveys and excavation archaeological programs provide us a varying dataset in relation with the social dynamics of last hunters-gatherers in the area. In this paper we present a state of the art about environmental studies, subsistence strategies, current radiocarbon dataset and population dynamics during the Mesolithic time (including Notches and Denticulates and Geometric phases) until the arrival of the agropastoral economies at the region (circa 5.6 ka. Cal BC).

**Prehistoric human occupation and littoral exploitation in Caribbean Nicaragua. The data from Karoline shell middens.**

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The Karoline site is a prehistoric settlement placed near a palaeolagoon coast line, in the Caribbean façade of Nicaragua. Since 1999 five archaeological fieldwork seasons have been carried out in the site, including topographic surveys, many shell midden testing and the open area excavation of one of these (KH-4).

Test pits and an extensive excavation provided a large number of ^14^C dating, showing synchronies among different shell middens. The excavations in KH-4 also display how the human occupation
occurred not only beside the shell mound, but also in their surface, where many different activities have been recorded (by means of hearths, structures, etc). Archaeobotanical and archeozoological analyses provide extensive information about hunting, fishing, plant and mollusks gathering and, even, the existence of crops close to the settlement. Shell δ¹³O variability provide interesting insights into the seasonal exploitation and settlement pattern. All these data are summarized in this paper.

Mesolithic – Neolithic boundaries in the Gulf of Finland region: palaeogeographic aspect
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Spreading of pottery making is accepted as a boundary between Mesolithic and Neolithic in Russian archaeology. Pottery tradition appeared in the Gulf of Finland region (the Baltic Sea) in the end of VI – beginning of V mill. BC, a thousand years later then in the surrounding regions to the west, south and east.

Appearance of pottery tradition is well-marked in the region by the maximum of the Lithorina transgression. Certain subsistence strategy, settling structure and lithic technology was formed in the region during the Ancylus lake regression and early phase of the Lithorina Sea (end of VII mill BC). This Late Mesolithic archaeological tradition preserves during the Early Neolithic period.

That evidence allow to get back to the discussion on the conception of the Mesolithic – Neolithic boundary in a way combining the Western European (foragers – farmers) and the Russian (pottery) approaches.

The reported study was partially supported by RFBR, research projects No. 12-06-00348a “Geoarchaeology of Karelian Isthmus”; No. 12-05-0112a “Development of the coastal morphosystems of the Eastern Gulf of Finland during Holocene and its links with settlements of Stone Age - Early Metal Epoch”

AMS Radiocarbon chronology of Late Mesolithic sites in the Upper Vinalopó Valley (Eastern Iberia)
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The Upper Vinalopó Valley is known from the late sixties by its archaeological record of Epipaleolithic and Mesolithic sites. The main surface collection, Casa de Lara, has provided lithic assemblages typologically related with phases A and B of the Geometric Mesolithic. However, no radiocarbon dates and chrono-estratigraphic information has been available until recent times.

This work presents the first programme of radiocarbon dating of short-lived specimens (an Ibex bone with anthropic cut-marks and two human remains) from two different Mesolithic sites (Casa Corona and Cueva del Lagrimal).

Results document the most recent evidence of Mesolithic populations in the central Mediterranean region of Spain, dated during the chronological c. 5950-5850 cal BC.

We will discuss the implications of such chronology in the context of Middle Holocene settlement dynamics and the Mesolithic-Neolithic transition in Eastern Iberia.

GIS predictive modeling for the discovery of new Mesolithic sites in Central Portugal
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A predictive model was created using a Geographic Information System (GIS), based on the analysis of location parameters relevant to the human occupation of the Tagus and Sado watersheds during the Atlantic period (c. 7500-5000 BP). The main goal was to discover new archaeological sites in order to better understand settlement strategies during the Final Mesolithic of Central Portugal. This poster presents data concerning the construction of the model as well as the preliminary results of the model.

Prehistoric shell-middens – central settlement features, territorial markers or just waste heaps?  
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The paper discusses the possible functions of prehistoric shell-middens on the basis of archaeological data and ethnoarchaeological information. Were the shell-middens just stinking waste heaps at the periphery of the prehistoric coastal settlement areas or do they represent a central part of the settlements directly related to their habitation zones? Do they contain recognisable organisational patterns that can elucidate their function? Were they due to their high visibility in the landscape used as territorial markers? What is the relation between Shell-middens and other types of hunter-gatherer waste disposal?

Red colour in Mesolithic burial rites  
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Similar to Palaeolithic practices, various quantities, modes and shades of red ochre and hematite pieces were often found in Mesolithic burials in Europe. Besides regional and chronological differences, iron oxide powder was always applied individually to different age groups, sexes and forms of disposal (primary, secondary or fractional burials, cremations). The amount of colourant seems to be correlated to the number of grave goods. It was part of the grave furnishment to emphasize the status of the deceased and occasionally the circumstances of the death. The placing of the dead obviously also played a role (single or multiple interment, isolated grave or communal burial site). This diversity and individuality in connection with a certain amount of regularity implies complex but also changing beliefs and traditions within Mesolithic communities. The paper will summarize the evidence and try to examine the meaning and significance of the red colour symbolism.

Re-excavating the Asturian: the Mesolithic shell midden site of El Toral III (Asturias, northern Spain)  
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Research on Mesolithic coastal settlement in northern Spain during the 20th Century was focused in the so-called Asturian culture (northern Spain). However, extensive excavations in shell middens of the period were limited to the site of Mazaculos II in the late 70’s and early 80’s. In 2009 extensive salvage excavations at El Toral III cave brought to light different stratigraphic units which allow us a better understanding of the formation and post-depositional processes at the site. Radiocarbon dates and material culture showed the use of the site for long periods of the Mesolithic and also as a burial place in later times (Neolithic-Chalcolithic). Shell midden stratigraphic units of Mesolithic age produced a variety of materials including molluscs, mammal, fish & bird bones, lithics, charcoal, seeds and human remains, which are meant to provide crucial information on the subsistence and symbolic activities of the last hunter-fisher-gatherers in northern Spain.

**The ritual display and deposition of human skulls at the wetland site Kanaljorden, Motala, Sweden**
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This paper presents the recent excavation of a ritual Mesolithic context at Kanaljorden, Motala, Sweden, where human skulls, have been been handled through a complex ceremony that involved the displaying of skulls on stakes, and the deposition of skulls in water. The rituals were conducted on a massive (14 x 14 m) stone-packing constructed on the bottom of a shallow lake.
Besides a dozen human skulls, the find material also include a smaller number of post-cranial human bones, bones from animals as well as artefacts of stone, wood, bone and antler. The bone tools include an ornamented antler pick-axe, bone arrowheads with and without microblade inserts, barbed bone leisters, antler punches, etc. ¹⁴C-datings on human bones and artefacts date the depositions to c.5800 cal BC. The character of the skull depositions is discussed in terms of secondary burial rituals, trophies and relics.

**Biographical details trapped in dental calculus; the case of Kanaljordan, Sweden.**
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Kanaljordan, Motala, Sweden is a ritual Mesolithic site in which human skulls were placed on stakes and deposited in water on a large constructed area on the lake bottom. The depositions date to 5800-5700cal, BC.
Five samples of dental calculus from one individual were degraded and morphologically analysed to investigate entrapped material. Dental plaque is formed by the activity of bacteria which are energised by sugars in carbohydrates. If it is not removed, it rapidly calcifies; adhering strongly to the tooth it can survive indefinitely. Embedded in the calculus we found a range of evidence for plant ingestion including starch granules indicating the ingestion of at least one type of starchy plant as
well as several distinct pollen grains and other identifiable evidence of plants. Here we present these findings and we explore the pathways that may have led to the ingestion of this material.

Mesolithic seascapes in the north west: the case of Camas Daraich, Isle of Skye, Scotland
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Camas Daraich lies at the Point of Sleat, in the Isle of Skye, Scotland. It lies around 500m from the current coastline, facing a paleolake. A circular deposit and stone alignments suggest it was a hut. Micromorphology shows that the layer was formed in situ with a high organic component and although no bones are preserved, this analysis indicates animal consumption at the site. Raw materials suggest connections to the island of Rum 12 miles away and also north to the Inner Sound sites. The rough terrestrial and coastal terrain may have formed barriers to movement; this suggests the inhabitants of Camas Daraich used the sea as for travel. Comparison with maritime distances travelled by the inhabitants of Tierra del Fuego, suggest that distances could be crossed with ease even in small craft. Good weather forecasting skills were probably the most important feature of successful sea travel in high latitudes.

Social And Environmental Impacts On Prehistoric Shellfish Gathering in The Red Sea and adjacent areas
N. Hausmann, M. Meredith-Williams, E. Laurie & G. Bailey

In recent investigations in the southern Red Sea we have found c.3000 prehistoric shell middens, suggesting a marked intensification in coastal resource exploitation. This paper reviews the data we have collected from these sites before considering broader evidence (social, climatic and geomorphological) from the region to determine the extent and cause(s) of this episode of apparent intensification. The spatial and temporal distribution of this evidence shows some interesting patterns which we show here. We also outline a framework for further research as part of the ERC DISPERSE project. This focuses on further excavation to determine whether different sites had different functions and different contexts. Analyses will be carried out of thin sections from the gastropod Strombus fasciatus and of Mg/Ca and oxygen isotope ratios to assess seasonality of activities, the local climate and the processes of midden formation; the preliminary results of these investigations will be presented.

Living by the lake - signs of settlements beside the sacred lake at Kanaljorden
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This paper will discuss older, contemporary and younger settlement sites close to the sacred lake at Kanaljorden, Motala, Sweden. It starts with an early beginning before the lake existed, followed by signs of settlements contemporary with the depositions, and goes on to activities that happened while the lake was growing over. The nearby finds will be related to the great site at the opposite side of the river Motala ström and other places around lake Vättern. Ordinary lithics found in the lake will also be considered.
High resolution XRF chemostratigraphy of the Poças de São Bento shell midden (Sado estuary, Portugal)
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Chemostratigraphy is the study of the variation of chemistry within sedimentary sequences. The development of new analytical techniques for chemical analysis, e.g. non-destructive XRF core scanners, has improved the availability of bulk chemical analysis techniques complementing the sedimentary geology studies. The chemostratigraphic analysis of one of the sedimentary cores (2m long) taken at the archaeological site of Poças de São Bento using a non-destructive XRF Core Scanner has allowed to test the technique in a very particular type of sedimentary context, a Holocene anthropogenic shell midden.

The chemostratigraphic study provided useful information regarding environmental change on the local and regional levels by relating variations in sediment chemistry to the onset of paleosoils or different products and activities related to the human occupation. Regionally correlatable chemostratigraphic signals found in sediments whose formation time is well-constrained by radiometric dating, such as archaeological sequences, could be useful to understand other less studied neighbouring archaeological sites or sedimentary records.

Cabeço da Arruda in the 1860s
Mary Jackes, David Lubell, Hugo Cardoso and José Antonio Anacleto

Despite some early publications regarding Cabeço da Arruda which provide information on the first excavation and on the human remains recovered, details are sketchy. This paper seeks to locate the excavation within the site and to put a scale to the published profile, to summarize references to the human material and to discuss what few remnants remain of the excavated burials. Associated charcoal has been dated and the new date will be announced.

Sources for the reconstruction of Cabeço da Arruda
Mary JACKES, David LUBELL, Pedro ALVIM & Maria José CUNHA

Archival resources provide us with some limited information on the excavation of Cabeço da Arruda in the spring and early summer of 1880. Further excavation in the 1880s is not well recorded, but we can make some comments. We will locate the excavations within the site and discuss evidence on burials. Photographic records from the Mendes Corrêa excavations in the first half of the 20th century allow us to understand the site and its mortuary archaeology in more detail.

Reading the lithics in flint of Cabeço dos Morros shell Midden
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The Cabeço of Morros Shell Midden, located on the bank of Magos riverside, was identified in 1863 by Carlos Ribeiro. Archaeological excavations carried out between 1997 and 2001, under the direction of José Manuel Rolão, rise to a collection of over 1500 lithic materials, 85% of which in flint. The study of the lithic industry seems to give the impression that the seasonal occupation of this shell midden, was done systematically, with a similar set of goals and activities that were maintained throughout its existence. The main strategies for flint aim were to produce blandelets, the production of microlithics tools and with the cores to be abandoned at an exhaustion stage.

The importance of microlithics geometrics in Muge shell middens.
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The microlithics geometrics are the lithics tools/weapons that define the shell middens and their level of importance on each shell midden influence the other tools. The site of Cabeço da Amoreira has the particularity of being the only shell midden in the Tagus Valley where the triangle is the main geometric tool. The other sites usually show a preference for trapezes (Cabeço da Arruda, Moita do Sebastião and Cabeço dos Morros shell middens) or segments (Vale da Fonte da Moça). Of all these shell middens, Vale da Fonte da Moça II is the only site with an equal number of two geometric types, with a slight prevalence of segments over triangles. The geometrics attributes were previously selected according to the function they were designed. The geometric truncatures has different associations; the choice of the attributes of the truncatures appears to be intentional, according to their subsequent use, with 10 associations of truncatures.

Shell middens on the Eastern Adriatic coast from the Palaeolithic to the Neolithic
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The poster presents the topography of shell middens on the Eastern Adriatic coast and its immediate hinterland dated from the Palaeolithic to the Neolithic. The presentation shows diversity of the fauna found on site in relation to the geographical position, the date of the midden/layers within the midden and type of the site. The extent of research conducted on sites containing shell middens and the extent of midden analyses is also presented.

Settlement and landscape. Poças de São Bento and the local environment
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The study of large settlement sites with graves from the Late Mesolithic has changed our conception of this period. In western Europe sites of this kind have long been known, and are well represented in the coastal area of western Iberia. One of these sites is Poças de São Bento, located near the River Sado in southern Portugal. The results of the excavation give interesting perspectives on specific ecological conditions within the local environment as well as a general view of the regional
landscape. The excellent preservation of shell, bone and antler provides an detailed analysis concerning the use of different ecological nishes.

Introducing Project TRACE - Hunter-Gatherer Toolkits and Tasks: Detecting Microwear Traces and Residues on Northwestern European Artefacts
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The Marie Curie funded project ‘TRACE’ is employing use-wear and residue analysis to investigate hunter-gatherer toolkits from three wetland case study areas in Northwestern Europe: the British sites of Star Carr and School House Farm, Yorkshire; Hardinxveld Giessendam-Polderweg and De Bruin, The Netherlands; and the Irish sites of Hermitage, Clowanstown, in addition to several chert-rich sites from the northern Midlands. Core questions driving this study are: the often (overemphasised) role of fish in lacustrine hunter-gatherer diets and the (underemphasised) importance of wetland plants for both consumption and crafts; patterns in the spatial and temporal relationship of activities in these wetland landscapes; the relationship between tool form, function; curated and expedient technology, with especial interest in differences between flint and chert; in addition to evidence for the non-utilitarian use/treatment of stone and organic tools by hunter-gatherer communities dwelling in wetlands.

Plant microwear traces on blades from the Dutch Mesolithic wetland sites of Hardinxveld-Giessendam Polderweg and De Bruin
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Microscopic analysis of wear traces on flint tools from the Late Mesolithic wetland sites of Hardinxveld-Giessenndam Polderweg and De Bruin in the Netherlands is revealing valuable information about plant-working. This transversely orientated siliceous plant polish - typically associated with regular, un-retouched blades - is known from other Dutch Mesolithic wetland sites, curiously disappearing sometime around the middle Neolithic. A key question then is whether these traces can be assigned to craft or subsistence-orientated tasks, possibly related to socio-cultural trends. Parallels can be drawn from microdenticulate blades on other European Mesolithic sites, however significant differences exist. A number of experiments have and are being undertaken in order to replicate the polish associated with the Hardinxveld blades, although it has proved difficult to emulate, and a clear-cut explanation for its presence has defied a simple categorization. It is in this context that a discussion on current findings will be presented.

New preliminary data on the exploitation of plants in Mesolithic shell middens: the evidence from plant macro-remains from the Sado Valley (Poças de S. Bento and Cabeço do Pez)
Inés L. López-Dóriga, Mariana Diniz & Pablo Arias

Two shell middens in the Sado Valley (Poças de S. Bento and Cabeço do Pez) have been, within the framework of COASTTRAN and Sado-Meso projects, exhaustively sampled for plant macro-remains in an effort to overcome two problems in prehistoric research. Firstly, the lack of direct data about plant use by the Mesolithic peoples of Atlantic Iberia. Secondly, the methodological vicious circle of not sampling and recovering carefully because it is supposed that nothing is going to appear, so nothing appears because appropriate sampling and recovery methods have not been applied. Thus,
after applying the flotation technique to 100% of the sediment obtained during our excavations, we now have substantial data about the exploitation of a wide range of wild plants which might have played a role of economic importance within the human groups at the end of the Mesolithic.

An experiment of the early Neolithic fishing trap extraction at Zamostje 2 peatbog site.
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The poster describes the case of field conservation, extraction and transportation of a early Neolithic fishing trap from Zamostje 2 peatbog archaeological site at the Dubna river, Moscow region, Russia. The 2.4 m length trap made of pine splinters was discovered more then 20 years ago, but then it was preserved in situ at the site. The first C14 date of the trap is 6550+40 BP (Beta-283033). In 2011 special fieldworks were organized to re-excavate the trap, arrange the field conservation, extract the whole block and transport the trap to the State Hermitage Museum conservation laboratory. Those efforts were fruitful, and the huge artifact has arrived to the museum laboratory in a good condition. The poster discusses positive and negative experience of the extraction process.

Baltic Fishermen Societies - from Late Mesolithic to Middle Neolithic
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During the Mesolithic period coastal communities living on the southwestern coasts of the Baltic Sea were hunting and fishing as most other local and regional groups around the Baltic Sea. Continuity in exploring aquatic ressources from times before the Littorina transgression throughout the Late Mesolithic were investigated on submerged prehistoric sites within the SINCOS project. But obviously there is more and longer local and regional continuity in the exploitation of aquatic ressources as new investigations in the hinterland of the Western Baltic show for the Funnel Beaker Culture. Are we facing retarding cultures of the Mesolithic or is the society of the Neolithic period far more clustered? This paper presents new evidences and data from coastal and inland research on submerged mesolithic sites and neolithic burials and fishing camps from the hinterland in the Western Baltic region.

Living on the edge of the world: the mesolithic communities of the atlantic coast (France/Portugal).
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During the 20th century, some researchers (Abbé Breuil, J. Roche) suggested that the Mesolithic communities of Denmark, Brittany and Portugal were culturally related. However the development of archaeology within national boundaries in each country, the exclusive concerns for cultural geography in France, but also the multiple declensions of processual archaeology totally erased these
fragile approximations. Nevertheless the technical and stylistic links between the Breton and Portuguese Mesolithic remain and are still to be explained. Here we will approach the problem by questioning the way the predations systems were organized along the estuaries or along the coast in both regions. In Brittany, maritime behaviors (type of settlements or degree of mobility) are clearly different to those of the hinterland. Do we find a similar contrast between coast and inland in Portugal? Such a spatial bipartition has to be to demonstrate. In this paper, we suggest some reflections concerning these continental and maritime economies of predation in both regions.

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During the last decades, the Mesolithic shellmiddens complex of Muge (Central of Portugal) has been seen as result of an intensive human ecological exploitation associated with the onset of Holocene climatic shifts. Based on techno-typological patterns and artifacts density from archaeological deposits, each shellmidden was linked to specific functionality, in a residential and logistic land-use strategy. However, recent stratigraphic evaluation and new archaeological data from the site of Cabeço da Amoreira show that this idea is unlikely. At the same time, the identification and excavation of other archaeological areas outside the shellmidden reveal the presence of several Mesolithic archaeological horizons associated with abundant lithic remains.

In this paper we present preliminary lithic use-wear analysis from one of the areas nearby the midden. Despite the initial idea that all human activities were made in the midden, new data show that surrounding occupation areas have been used as shellmidden support spaces, where specific tasks were made, leading to new interpretations for shellmidden diachronic construction phases and intra-site settlement organization.

Where is the household boundary? Substantial spatial considerations in “little” shellmiddens
A. Maximiano Castillejo.
UC; IIIPC. Spain

The conformation process at a shellmidden is the principal vector for segregation and possible use of space inside these sites and theirs environs.

In these locations were made an extensive set of actions beyond waste management of the coastal resources consumed by social agents, the detection and characterization of potential activity areas are influenced by a wide range conditions related to with shellmiddens in terms of natural and social process.

In this paper we submit analytical and interpretative results -from Geostatistical approach- about detection and quantification of structural boundaries in a housing unit located in a shellmidden (Yámana; Tierra del Fuego, Argentina). These results are contrasted with etno-archaeological documentation for confirmation the quantitative limit of household. In this sense, we can set up a numerical interpretation of spatial habitat boundary in terms of spatial dynamics Attraction-Repulsion of social actions on determinates locations sets.

A significant component into Pre-Historical Canoeists Passages: heuristic implications of shellmiddens in Fuego-Patagonia Landscape.
A. Maximiano Castillejo¹, Cerrillo Cuenca², A. Prieto Iglesias³ & J. A. Martínez del Pozo⁴
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In this paper we advance the first results of research project related to the detection and recognition of peculiar evidences: Pre-historical canoeists passages. In this context, we are especially interesting in the statistical relationship (positive, negative or random) among passages and the presence of shellmiddens in its vicinity.

The determination of canoeists passages —like expeditious access to inland, or transitional roads avoiding coastal shipping— are related to extensive sets of ecological and social components. The presence (or absence) of shell-middens in the vicinity of a possible passage, may be a significant variable in positive determination case for canoeist’s passage location that meets environmental requirements.

From this perspective, the heuristic value of certain shell-middens could be more like an optimal position for certain coastal resources management. Now in relation with passages proximity, the shell-midden could a high significance in matters of visibility and epistemological implications about what was a passage. In the other hand, these heuristic implications maybe are also relevant when proposing models of littoral resource management in other pre-historical problematic like Mesolithic in Europe.

**Approach to the macrolithic lithic industry from El Conejar cave’s (Cáceres, Extremadura, Spain)**

**Upper Breccia**

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The lithic technology recovered at El Conejar cave (Cáceres, Extremadura, Spain) site’s Upper Breccia, is dated in the Mesolithic period (8220±40 BP (C14)) and its characteristics meet the macrolithic industry. Tools were knapped using mainly local raw materials, quartzite and quartz, together with flint from an unknown origin. The operative chains of all these materials appear almost completely. Knapping methods are of an expeditious and simplified character. This type of macrolithic technology appears in numerous Iberian Peninsula Mesolithic sites, which helps us contextualize this Calerizo Cacereño’s cavity in the Pleistocene-Holocene transition period.

**Recent Research at Star Carr and Lake Flixton**

Nicky Milner,

University of York

The site of Star Carr was first discovered and excavated in the late 1940s/early 1950s but research has continued over the last 60 years or so, and new discoveries continue to be made, not only at this site but around palaeo-Lake Flixton. We now know the extent of the lake and have located a number of other sites around its edges, some of which are contemporary with Star Carr, but also some which are older and some which are younger. Putting this data together enables us to consider occupation through time and within a landscape context. Further work at Star Carr itself has revealed important new insights into the way in which the site was occupied, including evidence of a ‘house’ structure. This paper will present this recent research and explain how this work has changed interpretations on life in the Preboreal.

**Motala – Aspects on centrality**
The Mesolithic site of Motala, 9000–4500 cal. BC, stands without comparison in the province of Östergötland and represents the largest coherent settlement site in middle Sweden. Motala is situated where the River Motala ström flows out of Lake Vättern, a key position from geographical, communicative and resource-based perspectives. The ongoing large-scale excavations of the site reveal traces of an unusually large Mesolithic settlement, which included specialized craftsmanship, extensive ritual contexts, and graves.

The structure of Mesolithic society and concepts such as centrality are subjects of constantly recurring debate in research. A large number of criteria have been set up for central settlement sites/base settlement sites/assembly places, but the decisive question is: central in relation to what? This poster reflects on aspects of centrality through the preliminary results from the excavations in Motala between the years 2000 – 2013.

The Midden is on fire! Charcoal analyses from Cabeço da Amoreira (Muge shellmiddens)
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Fire represents an important issue of the economy of the past societies. Charcoal analyses focus on wood charred remains and the identified species connect information about the woodland available resources, the gathering and use of wood for fuel within the site. This presentation discusses the results from wood charcoal analyses carried out with materials from Cabeço da Amoreira shellmidem since 2000, comparing them with other palaeoenvironmental data from the Muge valley. Over 1400 charcoal fragments have been analysed from different areas of Cabeço da Amoreira in recent analyses. A state of the question of charcoal analyses and the potential of these results for understanding the human interaction with Muge landscape are aims of this study.

Fire and death: charcoal analyses from two burials in Cabeço da Amoreira (Muge shellmiddens)
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Cabeço da Amoreira is part of the Mesolithic Muge shellmiddens complex, in Santarém, central Portugal. A burial of a 20-25 years old woman, dated from c. 7600 cal BP, was found in Cabeço da Amoreira, covered with several layers of shells, lithic materials, fauna remains and presence of charcoal that may point to a indicates the presence of a funerary ritual. Another burial of a male skeleton was discovered with a different deposition from the previous burial. Charcoal analyses were carried out on charred remains from both burials and over a 1000 fragments were observed. This study aims to identify the wood used as fuel and compare the two contexts to discuss the importance of fire as a component of funerary rituals.
The Prehistoric site of Prazo (Northern Portugal): the 8th Millennium cal BC occupation
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In the prehistoric site of Prazo (Freixo de Numão, Vila Nova de Foz Côa, Northern Portugal) traces of human occupation are present in a stratigraphic succession that records from the end of the Pleistocene to the middle Holocene. From an archaeological point of view, these traces relate to the Upper Palaeolithic, Epipalaeolithic (?), early Mesolithic, late Mesolithic and early Neolithic. The occupations of the late Mesolithic and the early Neolithic have already been the subject of several studies. The objective of this presentation is to disseminate new data on the earliest phase of the Mesolithic (dating to the middle/second half of the 8th millennium cal BC), and contribute to the knowledge of the pre-Neolithic settlement in the interior of Northern Portugal.

Raw material procurement in Cabeço da Amoreira, Muge, Portugal
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Raw materials analysis is very important to infer human behavior during the Mesolithic because it is assumed that gives direct information about procurement distance of goods, tool curation and exploitation territories and indirect information about territoriality, economic organization, social networks, style and identity.

In this paper we present some outcomes from the raw material analysis on the later phases of Mesolithic human occupation of the Cabeço da Amoreira shellmidden (Muge, Portugal). Results show that (1) three different raw materials were intensively acquired (chert, quartz and quartzite); (2) that each one had different and dedicated strategies of acquisition; and that (3) each one was used towards distinct and specific purposes. With this data we believe to have been able to establish the minimum territory of exploitation for this complex hunter-gatherer society and the behavioral patterns that encompassed the raw material exploitation.

The Asturiense in Cantabrian-Spain: current state of research.
Mercedes Pérez Bartolomé
UNED

The Cantábrian Asturiense is a Mesolithic facies was characterized by Vega del Sella in the 1920 s. Spreads along the Cantabrian coast area between Luarca y Suances, roughly the eastern half of Asturias and west of Cantabrian.

The study of Asturiense has focused on the Asturian area, although the Cantabrian West is very rich in Mesolithic sites along the coastal area.

This paper aims to provide a synthesis of the state of research into the societies that inhabited during the Holocene between 8th- 6th millennium cal. BC. It analyzes the history of research on the period, and then values the settlement pattern, technology and economy of Mesolithic groups in western Cantabrian (Spain).

Between 1820 and 1900: Discovering Køkkenmøddings and the Mesolithic of Denmark
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This is the story about a problem-oriented archaeology, scientific commissions, agreements and disagreements among savants, archaeological reasoning, and about solving the problems by new excavations and also by including a wide array of natural scientists. Despite earlier folklore the anthropogenic nature of the “raised beaches” was realized in 1850 followed by the first description of the kjøkkenmøddings in 1851 by the Lejre Commission. In 1859 Worsaae divided the Stone Age into two phases while Steenstrup saw two aspects of the same culture. The visit to the køkkenmødding at Sølager by the fourth international Archaeological Conference in 1869 was a wake-up call for many. A second Commission was initiated in 1890 in order to end the Worsaae-Steenstrup quarrel, and in 1900 the publication “Affaldsdynger investigated for the National Museum” described shell middens from the Mesolithic as well as from the Neolithic.

Prehistoric shellfish exploitation in coastal western Scotland
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Shell midden sites are a common feature of the west Scottish Mesolithic and Neolithic and are distributed along mainland coasts and several of the Inner Hebridean Islands. This paper provides an overview of the shell-fishing practices of coastal foragers in the region. A broad range of shellfish species are represented in the middens. Variation in species representation between the middens is observed. This can be attributed in part to distinct sampling and/or recovery strategies, but also to local differences in shore substrate, topography and exposure. By far the most common shellfish remains are from limpet (Patella spp.) and periwinkle (Littorina spp.), and both were widely used as food or as fish bait in historical times. Certain species (e.g. European cowrie [Trivia spp.], edible oyster [Ostrea edulis] and king scallop [Pecten maximus]) were specifically collected for use as raw material in the manufacture of utensils and adornments. The consistent occurrence of incidental species provides insight into a diverse range of economic activities conducted at the sites.

Lithic materials in the Sado River’s shellmiddens – geological provenance and impact on site location
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This work presents a geological approach to the characterization of lithic materials collected at the mesolithic Sado River’s shellmiddens, recognized between Alcácer and São Romão, 80 km SE of Lisbon. They contain abundant lithic materials from different lithologies, including mainly Siliceous Slates, Chert, Jasper and Quartz.

A first look at the geological map pointed to a provenance from the Paleozoic terranes located close to the Torrão area, c. 20 km E of the occupation sites, or from the Quaternary terraces along the Sado river. However, regional geological field studies and the detailed analysis of both the raw and transformed lithic materials, led to a different conclusion. Most, if not all, of the lithic materials may have been collected in Paleogene conglomerates covering the region between Torrão and Alcácer. The comparison between the regional extension of these conglomerates and of the shellmiddens, points to the “material availability” as a crucial factor for its location along the Sado River.
This paper provides a narrative which intimately links Mesolithic mobility strategies, settlement patterns, lithic raw material consumption, and tool use in the Central Pennines of Northern England and adjacent areas. It seeks to show that the Central Pennine Mesolithic sites were persistent places. These persistent places are shown to have been repeatedly visited to exploit local plant and animal resources and so often had significant levels of site investment, they are also demonstrated to have been situated on Trans-Pennine pathways (linking the main transit routes e.g. rivers) and were near to culturally significant ‘handrail’ landmarks. The lithics found on these persistent places are shown to have been exclusively imported from a hinterland covering Northern England. This hinterland compares well with population density reconstructions, and contains similar lithic styles (during the Early and Late Mesolithic). Consequently, this hinterland is suggested to reflect a socio-ethnic/linguistic territory and/or that it implies that mobility was from throughout Northern England, with the Pennines being a key node or the Nexus of increasingly logistical resource and mobility networks. This therefore challenges traditional east-west mobility models, and the suggestions of smaller separate interior and coastal social territories. The long distance transport of the raw materials in this hinterland is shown to have impacted on the chaînes opératoires and resulted in distinctly different lithic exploitation strategies (compared to those seen in the more traditionally researched lowland assemblages from karstic areas in England). In the Central Pennines impacts included the virtual lack of on-site knapping, high levels of blade/let or tool importation, and the increased occurrence of flexible strategies (such as risk avoidance, caching, equipotentiality, and retooling) that resulted in positive feedback on the chaînes opératoires. Furthermore, changes in raw material preferences appear to be directly linked to changes in the transit routes used (i.e. as part of changes in the larger mobility cycle over time).

Archaeologists often discuss the movement of past peoples, but the debate is usually based on indirect evidence. Styles of artifacts or architecture are used as proxies for people. The problem is, of course, that styles can move independently, through exchange or theft. However, it is now possible to obtain direct information about migration from the chemistry of prehistoric teeth. Strontium, oxygen, and lead isotope ratios in tooth enamel are measured as tracers of the geology of the areas where individuals were born. Tooth enamel forms in early childhood and does not change through life or after death. Comparison of enamel isotope ratios with known local values can be used to identify non-local individuals. In this presentation I will provide a brief introduction to the methods and several examples from various times and places. The potential for applying methods of human proveniencing to the Mesolithic will also be considered, along with some preliminary data from Muge and elsewhere.
In this research we studied nonmasticatory dental alliterations and musculoskeletal stress to reconstruct changes in activities and detect labor specialization during the Mesolithic-Neolithic transition. Non-masticatory dental alliterations (chipping, notching, interproximal grooves) and 27 markers of musculoskeletal stress were investigated microscopically on 31 individuals from the Lepenski Vir site in the Danube Gorges, Serbia (9500 - 5500 BC). The results showed that even 45.2% of individuals have nonmasticatory tooth lesions in combination with specific activities of the upper limbs. But, before the Neolithic only incidental use of teeth is present (on eight individuals) and no pattern of the activities could be observed. With the Neolithic there is evident change in use of “teeth as tools” and specific patterns of activities are present on six individuals. It is indicative that five of these individuals were women of non-local origins.

Bone fragmentation as a tool for quantification and identification of taphonomic processes and their effects: the case study from Havnø, a stratified Danish “Køkkenmødding.”
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Recent excavations at the kitchen midden at Havnø, Denmark have yielded extensive faunal remains dating to both the late Mesolithic Ertebølle and the early Neolithic Funnel Beaker cultures, ca. 5000-3500 cal BC. Bones from fish, waterfowl and sea mammals as well as forest dwelling species that are known from many northern European assemblages have been found in the Ertebølle levels. In contrast, the Funnel Beaker levels contain a similar spectrum of species although they were found alongside domesticated terrestrial taxa. This paper presents laboratory analyses undertaken on the faunal material and makes comparisons with other kitchen middens. The material is quantified and bone fragmentation and representation is used to determine the extent of taphonomic processes at the kitchen midden and the degree to which these processes have the potential to affect other forms of zooarchaeological quantification. Interpretation focuses on butchery, the presence of crushed bones and accumulation agents.

Understanding burial ritual in the Mesolithic: towards an integrated approach
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Death is the only rite of passage that leaves direct archaeological traces, through burial and mortuary rituals, providing us with a rare opportunity to move beyond material culture and goods and glimpse the cognitive, ritual and ideological aspects of a past human group. By emphasizing the interpretative potential of human skeletal material, “Anthropologie de terrain” – best rendered in English as “dispositional taphonomy,” – helped refocus our collective attention from grave goods to the mode of disposal and postburial activities. However, once we collect a vast amount of spatial data and painstakingly interpret the position of every bone and bone fragment, the fun part is over and we face the much more difficult “what next” question. My paper will concentrate on the interpretative value of information derived through dispositional taphonomy and its possible role in interpreting social, ritual and cognitive aspects of past human groups. Since we cannot assume an easy equation between burial gestures and their meaning in any particular group, the interpretation has to rely on proper conceptualization of burial practice that holds true for all humans, on essential quality of the
body, on “thick archaeology” approach and detailed contextualization. I will use examples from my work on Portuguese Mesolithic shell-matrix sites of the Muge valley and Serbian Mesolithic burials from the Iron Gates Gorge to illustrate this position.

**Sweet or salty: an overview of the isotopic evidence for the use of aquatic resources in the Mesolithic**
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One of the first archaeological applications of stable isotope analysis, by Henrik Tauber in 1981, was on human bone from the shellmiddens of the Danish Mesolithic. This study was followed by a number of others, and a reasonably clear pattern emerged, demonstrating that the Mesolithic communities of Atlantic Europe relied heavily on marine food resources. The amount of available stable isotope data has increased considerably in recent years, and enables an overview of a number of coastal and inland regions across Europe. One unexpected finding is that stable nitrogen (δ¹⁵N) values are as high in inland regions as they are on the coast, pointing to the significant use of freshwater resources. This paper presents and discusses these findings.

**Evolution of procurement and management strategies of lithic raw materials in the Mesolithic of Atxoste (Alava, Spain)**
Adriana Soto, Andoni Tarriño & Alfonso Alday

The rockshelter of Atxoste (Alava, Spain) offers a complete stratigraphical sequence for the analysis of the evolution of lithic industry along the Mesolithic period, recognizing the different industrial phases defined for the Ebro valley: the microblade industries of the beginning of the Holocene, the notches and denticulates industries and the geometrics assemblages. This allows us to analyze the changes and continuities that take place in the production and management of lithic assemblages in different industrial stages.
In this sense, we present the first results about the procurement strategies of lithic raw materials. In the predominant use of flint, we have recognized the use of the main varieties of the Basque-Cantabrian basin in each industrial phase. However, there are differences in types of flint employed in each industrial tradition, showing the different procurement strategies between them. These changes are put regarding possible modifications in the mobility of these groups through the territory and with the transformations taking place in the production systems of the lithic industry.

**Treponemal infections in the Danube Gorges (9500-5500BC)- evidence from newborns**
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The process of Neolithization, a sedentary life style and population growth led to the so-called first epidemiological transition, an increase in the incidence of infectious diseases. One of ancient pathogens which could be responsible for the increased infection is the bacteria *Treponema pallidum* and all diseases caused by treponema are called „treponemal infections“. The macroscopic analysis of Mesolithic-Neolithic skeletons from the Danube Gorges (Balkans, 9500-5500 BC), shows that
treponemal infection were present on the 125 skeletal remains of adults. In order to investigate transmission of the disease and to test whether it is passed from mother to fetus we analyzed 60 newborn skeletal remains from sites Lepenski Vir and Vlasac. The macroscopic and X-ray analyses showed traces of treponemal infection on 34 newborns. These results indicate that congenital transmission was one of the ways in which the treponemal disease has spread through Danube Gorges population.

Shell middens, death and burial. Mortuary practices at Sado and Tagus valleys, a comparative approach
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In the context of postglacial environmental changes, the new form of settlement known for the Late Mesolithic seems to be followed by a different approach to Death. In the archaeological record, this is well observed in the shell midden sites known for both Tagus and Sado valleys in Portugal, where new born babies, children, young adults, men and women were carefully buried in a systematic manner. Despite the fundamental similarities, a growing body of evidence indicates significant differences between the human settlement of these two palaeoestuaries. In a comparative fashion and as a contribution to this discussion, I would like to present preliminary data on mortuary practices with an emphasis on the cultural responses to Death as a structural feature. This paper is part of my current PhD research “Death in the Mesolithic: mortuary practices of the last hunter gatherers in the extreme SW of Atlantic Europe”.

Crustaceans and echinoderms from the Mesolithic shell midden site of El Mazo (Asturias, Spain)
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Until recently, very little attention had been paid to the study and analysis of the less visible marine species, such as crustaceans and echinoderms, found within prehistoric midden deposits. Recent studies have revealed that these species can be of great help in determining fishing and gathering practices along with aspects of food preparation and diet, and seasonality of resource exploitation. Crustacean and echinoderm remains are commonly found in the Mesolithic shell middens of northern Spain. An assemblage of crustacean and echinoderm remains recovered from the Mesolithic coastal site of El Mazo cave in northern Spain was analysed. The results have demonstrated that these less visible species can provide new and additional data regarding the role of coastal resources in hunter-fisher-gatherer societies.

Life in the Muge shellmiddens: inferences from the new skeletons recovered from Cabeço da Amoreira
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The Muge shellmiddens were first recognized in 1863 by Carlos Ribeiro. Since then they have been subject of several archaeological campaigns. The last ones are taking place at Cabeço da Amoreira, and started in 2008, under the supervision of the archaeologist Nuno Bicho.

We will present the paleobiological analysis of the skeletons recovered in the fieldwork of 2011, one infant and one young female, and 2012, an adult male individual. Carbon and nitrogen stable isotope analyses for paleodietary reconstruction will also be reported. The carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) composition of the bone collagen suggest a mixed diet, of marine and terrestrial origin. This evidence of a high consumption of marine resources, of a low trophic level, uphold the results obtained by the first author when using trace elements and stable isotope analyses for diet characterization of the Muge shellmiddens. Apparently these communities exploited the available resources at Tejo estuary.

**Daily life during the Portuguese Late Mesolithic: Activity-related skeletal morphologies in the Muge and Sado samples**

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Activity-related skeletal morphology was studied for 200 Portuguese Late Mesolithic skeletons. The results are compared to a large data set from other European prehistoric samples. In general, the markers considered to relate to heavy work are not very frequent in these Portuguese samples. Moreover, there are few indicators of a sexual division of labour, though this may be related to the relatively low number of individuals for whom sex could be determined, due to skeletal preservation. No significant differences appear between the Muge and Sado samples. Comparison of upper and lower limbs for linear measurements and enthesopathies indicates an intermediate position of the Portuguese samples, in between nomadic hunter-gatherers from the Upper Palaeolithic and the Early Mesolithic on one hand, and sedentary populations of the Early and Middle Neolithic on the other hand. The high frequency of external auditory exostoses (16%) indicates daily contacts with cold water, certainly related to subsistence activities.

**Pit Deposition in the Mesolithic of Ireland**

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This paper reviews the evidence for the significance of pits in the Mesolithic of Ireland. Pits have not always been considered an important aspect of the Mesolithic in Ireland, but a systematic island-wide review of the data demonstrates that they very frequent on Mesolithic sites, and highlights important patterns in the ways these features are excavated, filled, and sometimes, marked. This forms the point of departure for a broader consideration of depositional practice during the Mesolithic, including the significance of tree throws. Our understandings of the nature of deposition within the Mesolithic are often simplistic, and the evidence for pit-related activities in the Mesolithic of Ireland helps us reconsider how and why materials are ending up in specific archaeological contexts.
Other types of Mesolithic “Pointed Bone Implements”
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Both located either in the Northern Ireland, in the Lough Neagh basin, or in Central Sweden, in the Motala Region, at a strategic area between a large lake and a narrow river used for fishing same animal species, two settlement sites show a similar technology for producing the pointed bone implements. However, given the notions of economy of debitage versus economy of raw material, it is possible to distinguish the two sets of implements by means of technical behaviour towards the animal bone. It will also be argued that these might be linked with cultural traditions, ca. 5500-6500 Cal. BC.

Specialised or diversified? Patterns of Plant Exploitation at Cabeço da Amoreira
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Among the important questions in European archaeology are: Was agriculture introduced and spread throughout the Iberian Peninsula by demic or cultural means? How and why did Mesolithic groups living in this region resist "neolithisation", apparently persisting for several hundred years after agriculture was introduced? What happened to these hunter-gather groups, did they assimilate with farmers or move away? Numerous scenarios have been put forward to address these questions. This paper examines them through a comparison of the archaelobotanical patterning at the Muge shell midden Cabeço da Amoreira with that of other late Mesolithic sites in Southern Europe. It explores ideas proposed by the late Marek Zvelebil, who suggested that hunter-gatherers with diversified subsistence systems probably adopted farming sooner than groups with specialised systems. Schematic models of hunter-gatherer plant specialisation and diversification systems are presented and discussed.

Plant use during the Mesolithic on European coastlines.
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This work reviews current information on the use of plants during the Mesolithic in some regions of Western Europe. Charcoal reflecting wood collected for fuel includes a broad range of taxa but oaks, alder, ash and Rosaceae tend to predominate in the south, with birch, hazel and pine also common in some northern regions. Regarding plant foods, data from different regions in Europe vary depending on site types, ecological availability and preservation. In areas like the Dutch wetlands Corylus avellana (hazelnut) and Trapa natans (water chestnut) may have been staple foods. Malus sylvestris (crab apple), Prunus spinosa (sloe), Crataegus monogyna (hawthorn), Quercus (acorns) and tubers of Ranunculus ficaria (lesser celandine) were probably regularly consumed as well. In the Iberian Peninsula the most common plant foods in terms of raw number are also hazelnuts and acorns. This was followed by pine, sloe and Rosaceae pomes with wild olive and legumes in some regions. Detailed sampling strategies are still not routine and the research into pre-agrarian plant foods is still insufficient, which results in little raw data. However, new microscopic and molecular techniques
offer opportunities for the future. Site-designed specific interdisciplinary sampling strategies are needed with new techniques and approaches that include the study of skeletal remains.

Estimation of size of beluga sturgeon (*Huso huso* Brandt) specimens from Lepenski Vir, Serbia
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The significant role of fishing in the formation of the Mesolithic-Neolithic settlements in the Danube Gorges is amply manifested in the archaeological record, namely by the archaeozoological and isotopic evidence. In addition, recent archaeozoological analysis of fish remains suggests that the sites may have differed in the choice of hunted species. At the site of Lepenski Vir, a significant quantity of remains belonged to beluga sturgeon (*Huso huso* Brandt). Based on the relationship of the proximal width of the first pectoral fin and the total length of the individuals of known size, it was determined that specimens hunted at Lepenski Vir were very large, often exceeding 2.5-3 meters. The poster presents the results of beluga size estimations on the basis of measurements of the pectoral fin, and considers their implications for studying nutritional values, fishing techniques, patterns of food sharing and the human-animal relationship in this particular context.