



# Book of abstracts

**XVIII<sup>o</sup> CONGRES UISPP PARIS JUIN 2018**  
**18th UISPP WORLD CONGRESS, PARIS, JUNE 2018**

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**XVI-1. The variability of bifacial tools in the Middle Palaeolithic and their importance in the transition to the Upper Palaeolithic in Western Eurasia: raw material, techno-typology, chronology and interactions in their environmental and cultural context.**

# Non-Levallois bifacial assemblages with Levallois cores – an eastern ”anomaly” into a nice picture.

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In the eastern part of Europe, from the Carpathian in the west to the Caucasus in the south and the Volga River in the east, there are known numerous assemblages containing bifacial leaf points or foliates with double-convex or plano-convex bifacial finishing, and other bifaces sometimes including true Acheulean handaxes. These are mostly found in reworked or poorly preserved stratigraphic contexts, or as surface localities, some yielding large lithic assemblages, such as Khotylevo 1, Zhitomirskaya, Rikhta, Orel, Antonovka 2 in the eastern Europe, Abadzekh, Abin in the northwestern Caucasus, dated by various researchers to the Late Acheulean, Early Middle Paleolithic (EMP), or Late Middle Paleolithic. Only a few known stratified sites, in which lithic assemblages of this type have been excavated in situ, indicate that the assemblages cover the period of transition from the Lower to Middle Paleolithic in the east of Europe. In the Carpathian, the earliest in situ finds of leaf points are documented in layers Vb, Va, and V in the Korolevo 1 open-air site, dated by a TL date of  $220\pm 35$  ka, paleomagnetic and pollen data to MIS 7 and MIS 6. In the Russian plain, the earliest evidence of leaf point technology is found in Layer III in the Velikiy Glybochok open-air site, having a TL date of  $175\pm 13$  ka, and apparently in Khryaschy and Mikhailovskoe open-air sites, where two fragments of narrow bifaces, probably leaf points have been excavated from buried soils, dated to MIS 7, based on pollen data and a TL date of  $170\pm 40$  ka obtained for the base of overlaying loams. In the Caucasus, although amorphous leaf-shaped biface fragments or bifaces transitional from small lanceolates to leaf points are reported in some sites (e.g., Kudaro 1 cave), the leaf point industry has a later appearance in comparison to the eastern Europe. The earliest true leaf points with double-convex bifacial retouch is documented in the Caucasus during early MIS 5 (in the earliest Middle Paleolithic levels in Tsona and Akshtyrskaya caves in the Southern Caucasus) and MIS 5 (layer 5B at Matuzka cave and layer 2 at Sredniy Khadjoh open-air site, in the northwestern Caucasus). The authors present and discuss the results of technological analyses of several lithic assemblages that represent the Late Acheulean industry in the northwestern Caucasus and the EMP leaf point industry in eastern Europe. The results suggest that the transition to Middle Paleolithic has a regional specificity in the east of Europe. We are dealing here with the emergence of a novel technology for manufacturing of bifacial tools, such as bifacial leaf points and bifacial asymmetric knives, although the core flaking technology retains features characteristic to the non-Levallois (flake-based) Late Acheulean industries. Both Late Acheulean and EMP leaf point assemblages show a single concept of stone knapping, which was based on recurrent flaking and unifacial reduction of unprepared cores that were exploited to

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produce flakes. Some of the cores in some phases of their reduction can be formally classified as recurrent or preferential Levallois cores, but the rarity or absence of typical Levallois flakes and blades, low indexes of finely prepared striking platforms on flakes and cores, a virtual lack of core preparation elements, and the results of core reduction analyses suggest that the core assemblages underwent the reduction sequence which was not aimed at producing of either laminar or Levallois blanks from prepared cores. This result indicates that the presence of formal Levallois or hierarchical (following Bo'eda) cores in a lithic industry does not represent a defining element of the prepared core or Levallois technology. The obtained results should prompt us to rethink the existing division between prepared and unprepared cores, taking in mind that similar types of cores may appear in different phases of their reduction within very different core technologies, and inferring that the definition of flaking technology should be based on a comprehensive study of core reduction and the produced blanks.

**Keywords:** Lower to Middle Paleolithic transition, bifacial leaf points, Levallois, core reduction, eastern Europe

# The Middle Paleolithic stone industries of the lower Volga River (Volgograd Region, Russia).

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The Middle Paleolithic period in the lower Volga River is represented by a number of sites. Among them, the most famous is the Sukhaya Mechetka site (Zamyatnin, 1961), as well as localities of Chelyuskinets II and Zaikino Pepelishche with destroyed cultural layers were investigated at the turn of the 1980-1990s (Kuznetsova, 2000). The lithic industry of the Sukhaya Mechetka site comprises about 4000 pieces, including 350 tools. Among cores, multi-platform cores with radial or parallel flaking methods predominate. The tools are made on short flakes, as well as 18 percent of tools are made on fragments, and natural slabs and pebbles. The overwhelming majority (45,5%) of the tools are variable scrapers (more than twenty varieties), including simple side-scrapers and transverse scrapers, convergent and angled scrapers. There are variable Mousterian points and asymmetrical points (12% of tools), and limaces. Bifacial tools comprise a significant percentage (more than 12%) of the tool set. Among them, bifacial knives of the Klausenische type (with diagonal and side backs) and Volgograd type represent the most numerous group. There are also bifacial small handaxes, biface-axe, and bifacial leaf points. Characterizing the Sukhaya Mechetka industry in general, one can note that it belongs to the group of so-called "Eastern Micoquian" sites - the industry includes characteristic bifacial knives, numerous and variable scrapers and points. In addition, it is worth noted a fairly large percentage (up to 13%) of the so-called "Charentian element" (scrapers with a convex edge and limaces). The tool groups of Sukhaya Mechetka have analogies among the Middle Paleolithic industries known in the southern Russian plain, Crimea and northwestern Caucasus, such as sites of Zhytomyrskaya, Antonovka, Chokurcha, Zaskalnenskaya group, Ilskaya, Mezmaiskaya Cave, and others. The lithic assemblage of the Chelyuskinets II locality comprises 198 pieces, with a few tools (scrapers, point and fragment of a Mousterian small handaxe). The lithic assemblage of the Zaikino Pepelishche locality comprises 551 lithics. The cores are represented by bifacial radial and irregular cores. There are 88 tools (15% of the assemblage). Among them, scrapers predominate (28%), represented by thirteen varieties, including bifacial scrapers, three Quina-type scrapers, simple, diagonal, with steep retouch, transverse, convergent, and angled scrapers. There are seven points, and a few bifacial and partial bifacial limaces. The seven bifacial tools include sub-triangular and ovate bifaces. In general, the industry can be assigned to the group of Eastern Micoquian sites. The three investigated sites are similar as in the composition of raw materials, and the main techno-typological characteristics: radial or parallel flaking technique used to produce short flakes, wide use of methods of bifacial processing and various multi-row retouch for tool-making, and the characteristic tool set including bifacial knives, limaces, small "handaxes", a significant percentage of angled scrapers. In this case, one can assume that we

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are dealing with a single cultural tradition.

**Keywords:** Eastern Micoquian, Sukhaya Mechetka, lower Volga River

# Middle Paleolithic workshops on raw material sources and bifacial production in the Northwestern Caucasus: preliminary results

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Only research of different site types, such as active habitation sites, seasonal camps, kill sites, and workshops, allow to reconstruct a complicated social organization of the Middle Paleolithic Neanderthals. Sites located on raw material sources have a big interest (Lanzinger 1988; Kozłowski 1991; Dobosi 1997; 2009; Gopher and Barkai 2006; Matiukhin and Praslov, 2008; Biró 2009; Barkai and Gopher 2009; Fedyunin 2011; Dawson et al. 2012; Kotov 2015), because these provide data about lithic raw material economy, mobility, and lithic technology. These issues is often hard to study in sites located away from raw material sources, and often yielding mainly broken flakes and tools, and only individual cores.

Twelve stratified Eastern Micoquian sites are known in the Northwestern Caucasus, including Mezmaiskaya (Golovanova et al. 1998), Matuzka (Golovanova et al. 2006), Monasheskaya (Beliaeva 1999) and Barakaevskaya caves (Liubin 1994), Gubs 1 Rockshelter (Liubin 1977), and open-air sites of Ilskaya 1 and 2 (Shchelinskii 1998, 2011), Baranakha-4 (Golovanova and Doronichev 2003), Beslencevskaya-1 (Golovanova, Doronichev, Doronicheva, 2015) and Hadjoh-2 (Doronicheva 2013; Doronicheva et al. 2016). They contain in total about 27 occupational layers with Micoquian assemblages.

Our research (Doronicheva, Kulkova 2011; Doronicheva 2013; Doronicheva et al. 2016) show that in the region the Eastern Micoquian Neanderthals preferentially exploited local (0-5 km from the site) flint sources, and the majority of the sites are located near raw material sources. In Mezmaiskaya, Monasheskaya, Barakaevskaya, Gubs 1, and Baranakha-4 these were flint and chert, in Ilskaya sites – dolomite and alluvial flint. In addition to local sources, Neanderthals actively used high-quality flints transported to the sites from distant sources (30 km and more from the site). For example, high-quality Beslencevskaya flints were transported to almost all Eastern Micoquian sites in the region. The transport of ready-to-use tools from distant sources represents the important feature of Neanderthal behavior. Cores made from non-local raw material are rarely represented in all the sites.

Another important feature of Neanderthal behavior was the organization of special stone-knapping camp-workshops on sites located on sources of high-quality raw material. Five Middle Paleolithic camp-workshop-type sites are known in the region, including Monasheskaya (Beliaeva 1999) and Barakaevskaya (Liubin, Autlev 1994) caves, and open-air sites of Hadjoh-2

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(Doronicheva et al., 2015; 2016), Besleneevskaya 1 (Golovanova and Doronichev in press), and, probably, Il'skaya II (Schelinskiy 2005). These all are multi-layered sites located directly on raw material sources.

Mousterian assemblages from Monasheskaya cave (layers 2, 3a, and 4) and layer 2 in Barakaevskaya cave were defined as active habitation camp-workshops (Liubin, Autlev, 1994). Because flint nodules are incorporated in cave walls and limestone cliffs in the area, local flint was intensively knapped in the caves. An important feature of this site type is the exploitation of diverse raw materials. Non-local raw materials are mainly represented as tools (Beliaeva 1999: 72). The same site type is present in Il'skaya II, layer 3, in which Schelinsky (2005) reconstructs a workshop for production dolomite flakes and blades. Unfortunately no numerical data is published for this site.

Another type of camp-workshops is a short-term camp-workshops, such as Hadjoh-2 (layers 6 and 7) and Besleneevskaya 1 (layers 3 and 4). Both sites are located directly on sources of high-quality flint. The important feature of the lithic assemblages from these sites is the overwhelming (99%) predominance of the local flint.

Only preliminary data is published for Besleneevskaya 1 (Golovanova and Doronichev in press). It is located directly on a source of high-quality Senonian color flint (red, honey and others). This flint was exploited by Neanderthals almost in all MP sites in the Northwestern Caucasus (Mezmaiskaya, Matuzka cave sites, Baranakha-4 open-air site, and, probably, Monasheskaya, Barakaevskaya caves, and Gubs I Rockshelter; Doronicheva et al., 2016). Debitage (cores, flakes, chips, and chunks) predominate in layers 3 and 4 at Besleneevskaya 1. Retouched pieces are individual finds, including a bifacial scraper found on surface, which has analogies in the Micoquian sites in the region.

The Hadjoh-2 open-air site represents a very interesting type of camp-workshop, where bifacial tools were produced. The site is located in a small tributary of the Belaya River, the Sredniy Hadjoh River, 503-507 m. asl and 60 m above the river. Geomorphological studies indicate that the river terrace, on which the site sits, dates to the late Middle Pleistocene (Doronicheva et al. 2015). A small excavation performed in the site revealed that the lithic assemblage from layers 6 and 7 represents a flint-knapping workshop located directly on a flint source. Almost all lithics are made from a local brown Hadjoh flint (KR-9/10), which abundant sources are known near the site.

Flakeddebitage predominates, including cores, core fragments, tested flint nodules, technical flakes, flakes, and fragments. The material allows to study lithic technology of the local Eastern Micoquian Neanderthals. Unfinished partly-bifacial and bifacial tools absolutely predominate among tools. These include partly-bifacial convergent tools, bifacial scraper similar to Bokshain type, small triangular bifaces similar to small triangular handaxes, and others. A comparison of these tools with bifacial tools from the main active habitation sites of the region shows that the tools from the lower layers at Hadjoh-2 find analogies in the local Micoquian tradition, first of all, in the lower layers 3 and 2B-4 at Mezmaiskaya cave. An important observation is that the workshop material includes abundant unfinished, large laurel-leaf shaped pieces, although laurel-leaf bifaces are rarely represented and also smaller in size in the active habitation sites, such as Il'skaya I and Mezmaiskaya (layers 3 and 2B-4).

Our previous research (Golovanova et al. 2016) with materials from Mezmaiskaya cave, where Hadjoh flint (KR-9/10) was defined (30-40 km) on the basis of petrography analyses, shows the prevalence of high-quality flint among scraper-knives with a sharp active edge, which can specify some selection of higher quality raw materials for the production of more qualitative cutting

edges. Prevalence of fine-grained and high-quality flints derived from distant sources among tools with increased numbers of elements thinned the tool body suggests that the Neanderthals could appreciate these raw materials with similar knapping potential for manufacturing tools that were easier repeatedly resharpened and/or modified to be used and curated for a longer time.

The high-quality Hadjoh flint (KR-9/10) was very important for local Neanderthals, because sources of such high-quality, large-sized flint nodules are individual in the Northwestern Caucasus. The flint allowed Neanderthals to make large bifacial tools, such as one laurel-leaf shaped unfinished biface, 15 cm in length, which was found in Hadjoh-2. Apparently, best tools and flakes were transported from the workshop to other Eastern Micoquian sites in the region. A petrographic analysis identified this flint in all Eastern Micoquian layers in Mezmaiskaya cave (30-40 km from Hadjoh-2) and in the Eastern Micoquian layer 4B in Matuzka cave (30 km from Hadjoh-2).

**Keywords:** Middle Paleolithic, Eastern Micoquian, stone, knapping workshops, Northwestern Caucasus

# Convergent bifacial, partly-bifacial and unifacial tools in the Eastern Micoquian sites of Northwestern Caucasus

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Micoquian or KMG cultural tradition was spread in the Middle Paleolithic across an extensive area from the Rhine River in Central Europe, in the west, through the Volga River in Eastern Europe, in the east. Northwestern Caucasus is a part of this region. Middle Paleolithic assemblages in the region include several tool types that according to a traditional typology are defined as small broad triangular handaxes, several types of Mousterian points, various types of convergent side-scrapers, dejeté scrapers, and limaces. All these types are united in one group of convergent tools, because all the tools have two basic elements: two convergent retouched edges.

The focus of this study is the potential to provide new perspectives on debates about the significance of morphological variability of convergent bifacial, partly-bifacial and unifacial tools in the Micoquian (KMG) tradition. The author has tried to divide the study of such variable group of the Middle Paleolithic convergent tools into two stages: first, a morpho-metric analysis of tools and, second, interpreting of the results that have provided the empirical base for the interpretation. A morpho-metric analysis of tools includes: first, a detailed analysis of morphological features of each tool, defining of main tool forms and grouping them in separate groups, and the following study of metric parameters characteristic for each group; and, second, definition of tool formation tendencies for different tool groups and interpretation of the trends in relation to the production technology, reduction, and functional variability of these tools.

Several tool-formation factors that could influence the variability of this tool class are tool - production technology, hafting, and tool reduction. The reduction of tools was caused by possible accommodational reduction that is related to the production of accommodation elements for hafting or hand holding of the tool, and possible functional reduction that is related to resharpening of the active side of the tool. Various studies indicate that Middle Paleolithic tools had extended use-lives and many of them were repeatedly resharpened. This suggests the resharpening can be seen as an important factor influencing the size and shape of an individual tool. The analysis shows that formation of different forms of convergent tools was not an a unidirectional process but depended of numerous factors. The results also do not indicate any direct correlation between resharpening/modification and the tool form/type among the tools. Research of raw materials allows to define influence of high quality raw materials on tool types.

Our analysis of factors influencing the formation of various morphological types of these tools suggests that various known types of bifacial scraper-knives represent a continuum of forms

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interrelated by reduction sequences, the existing variability of forms may be explained also by situational reasons affected the manufacturing process of an individual tool, when a general larger complexity of the tool and/or some specific details of its shape could depend mostly of the blank form and the quality of raw material used. Definition of specific types convergent tools which form is not connected with technological or reduction sequences was the important direction of research.

Some studies suggest a general distinction between site functions based on the absence/presence of bifacial tools and their debitage. In general, factors listed above cannot, alone, comprehensively explain patterns of variability observed among convergent tools in the Micoquian assemblages. Social behaviour and cultural traditions – is commonly referred to for explanation of lithic variability in Middle Paleolithic contexts. In the Paleolithic archaeology, cultural units relate to the use of different tool-making and survival strategies to satisfy equivalent needs by simultaneous human groups settled in neighbouring regions. In relation to Middle Paleolithic Neanderthals, there is a growing corpus of archaeological evidence that confirm the concept of culture, including shared cultural norms, group systems of knowledge, local social networks, and potential communication and social knowledge transmission tools, especially in concepts of regional behaviour related to manufacturing of different types of tools, including convergent bifacial, partly-bifacial and unifacial tools.

**Keywords:** Convergent bifacial, partly, bifacial and unifacial tools, Eastern Micoquian, Northwestern Caucasus

# Intentional tool fracturing in Middle Palaeolithic bifaces

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Among the Middle Palaeolithic assemblages there are some which contain big amount of broken bifacial pieces (R'orshain, Lenderscheid, Korolevo V, Wahlen, Sajóbáony M'eh'esz-tet'o). The paper aims at analyzing if one is dealing in such case with intentionally or unintentionally broken artefacts.

Scar pattern analyses conducted on these assemblages show that breakages appeared in such tools in the middle of their manufacturing process and not at the end. Some of the pieces were shaped actually only after the breakage. Some tools bear traces of alternately knapped notches located on both edges near the breakage. Such notches could aim at leading the breakage line in the certain, prepared place.

Presented features may suggest that we are not dealing with broken bifaces but with finished tools which have a base formed intentionally by a transversal breakage.

**Keywords:** Middle Palaeolithic, Europe, bifacial technology, bifaces, knapping technology

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# Bifacial component of Mira, layer I industry and its implications for the MP to UP transition studies in the Eastern Europe

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Localized in Dnieper valley and dated to ca. 32,000–31,000 cal BP, the lithic industry of Mira, layer I can be characterized as multifaceted and includes specific Middle and Upper Paleolithic tool types. This is a reason why quite different cultural contexts could provide analogies for Mira: I assemblage. Presence of foliate bifacial pieces stimulates searching for analogies both among Szeleto'ide industries and among the late Middle Paleolithic assemblages containing bifacial leafpoints. If Szeleto'ide records in Ukraine are not numerous, Micoquian assemblages are much more frequent, especially in the Crimea. Buran-Kaya III:C and Vys do not have a lot in common with Mira layer I, though undoubtedly belong to the circle of Szeleto'ide industries, demonstrating affinities with Moldovan Szeletian and Streletskaya records of Middle Don, respectively. The closest analogy for Mira I is provided by the Kiik-Koba MP industry, concentrated in the Eastern Crimea; similarities might be seen both in technology and morphology of bifacial and flake tools of MP appearance. At the same time, though characterized by the more developed bifacial component, Mira: I exhibits fairly close similarities to Gorodtsovskaya industry of the Middle Don area, in particular by the morphologically quite specific and highly diverse endscrapers.

**Keywords:** Bifaces, MP to UP transition

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# Sungir and Final Szeletian in the Eastern Europe

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The presentation is devoted to the problem of correlation of Sungirian stone industry and Streletskian as well as Gorodtsovian.

Typological features of Sungirian toolkit are associated with several indicators. First of all, it's a thin bifaces, which are presented by leaf-shaped and triangular points. Second, Sungirian inventory differs among the streletskian by the following characteristics: a substantial proportion of piece ecailee, large number of burins and the presence of Aurignacian component. The latter include core burins and core scrapers, as well as the points on the micro-blades. Certain forms of bifacial points, numerous series of side-scrapers, and predominance of flakes in the manufacture of tools are the basis to include Sungir to the group of Streletskian sites. The characteristics of stone inventory, on the basis of which Sungir can be attributed to the Streletskian, at the same time, allow us to compare this site with final Szeletian of Central Europe.

Now this conclusion is not refuted by the presence of Aurignacian types, because the same pattern is seen in some Szeletian sites of Central Europe. Moreover, a few sites were excavated in Eastern Europe in the last decades, toolkit of which is similar to streletskian and at the same time contains Aurignacian types. It is primarily the site of Garchi I, located in the North-East of European part of Russia and the site of Vys, located in the Central part of Ukraine. The stone inventory of the Garchi I, excavated by P.Yu. Pavlov, includes bifacial triangular points with straight and concave base, as well as leaf-shaped bifaces. This combination of forms is similar to sungirian one. In addition, there are also core scrapers, end cores for microblades, and the microblades, piece ecailee made of massive flakes, side-scrapers in the inventory of the Garchi I site. This whole set is characteristic also for Sungir. Bifacial triangular points with a concave base, and leaf-shaped points, as well as Aurignacian types of scrapers were found during the excavation of the site of Vys. Another site, Biruchya Balka 2, was excavated by E. A. Matiukhin in the lower reaches of the Seversky Donets River. Stone tools of the third horizon of this site is characterized by thin triangular bifacial points with a concave base, on the one hand, and edge-faceted cores for micro-blades, and series of micro-blades – on the other. L. L. Zaliznyak with coauthors notes that the combination of thin bifaces and Aurignacian forms is characteristic of Szeletian techno-complexes only in Central Europe.

Comparative analysis of the sites of Sungir, Garchi I, Biriuchya Balka 2, Vys, Streletskian and Gorodtsovian sites from Kostenki leads to the conclusion that the so-called Streletskaya culture is the regional manifestation of the Final Szeletian in the Eastern Europe.

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**Keywords:** Upper Palaeolithic, Eastern Europe, Sungir, Streletskian, Gorodtsovian, Final Szeletian, Aurignacian, stone industry, radiocarbon chronology, stratigraphy.

# At the western end. A discussion on the significance of a Mousterian assemblage with leaf points discovered in Northern Italy.

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Leaf points are considered an exceptional occurrence in Mousterian industries of central Mediterranean Europe. In this region Middle Palaeolithic cultural variability is mostly based on the technological shift between the main knapping systems, Levallois, Discoid and Quina, with associated volumetric blade productions. Retouched lithic tool-sets are represented by a large morphometric array of scrapers while denticulates are generally limited in number and points even fewer. The incidence of bifaces is highly variable in the large time-span between the appearance of the Levallois technology in the mid Middle Pleistocene and the demise of Neanderthals. Comparably to other European regions, Italian Mousterian assemblages are interpreted as the result of an ensemble of concurring factors (Milliken, 1999-2000; Mussi, 2001; Palma di Cesnola, 1996). These occasionally resulted in the production of peculiar tools. It is the case of a handful of leaf points recently discovered at Vajo Salsone in a karst fissure exposed during road cutting works in the Lessini Mounts, a pre-Alpine district in north-eastern Italy. The archaeological deposit, that was investigated during a rescue excavation carried out in spring 2017, included a large number of bones, flaked artefacts and speleotheme fragments. Faunal remains belong mainly to large cervids and carnivores such as bear, wolf and fox. Several cut-marks and intentional bone fracturing have been recognised on ungulate bones. The lithic assemblage testifies to the predominance of the Levallois and volumetric blade methods and is characterized by a high number of retouched artefacts among which are the previously mentioned leaf points. This tool-type is a cultural feature of the Middle Palaeolithic of south-eastern Europe, although being almost absent west of the Balcanic peninsula. The only exception is represented by the open-air site of Podere Due Pozzi in the northern Apennines (Fontana et al. 2010) along with the Vajo Salsone evidence. This latter is here presented and discussed in relation to the main Middle Palaeolithic ecological and cultural dynamics.

**Keywords:** Mousterian, Bifacial point, Zooarchaeology, Italy

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\*Speaker

# Les industries à bifaces et pièces foliacées au Paléolithique moyen en France septentrionale : état des connaissances sur les contextes, les considérations typo-technologiques et leurs significations

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En France septentrionale, les phases anciennes et récentes du Paléolithique moyen sont caractérisées par des faciès lithiques sans bifaces ou avec bifaces et très rarement, on peut dénombrer des pièces foliacées isolées ou associées à du débitage. Les bifaces sont des outils répandus sur ce large territoire selon des proportions très variables et ils revêtent des statuts très différents. Quelques rares pièces foliacées ont été découvertes depuis celles découvertes sur le gisement de Riencourt-les-Bapaume tandis le nombre de séries lithiques attribuables au Moustérien de Tradition Acheuléenne est plus conséquent avec les gisements de Ploisy, St-Amand-les-Eaux et St-Hilaire-sur-Helpe. Aucun gisement à prondnick n'a été découvert depuis Mont-Beuvry. Les prondnicks et pièces foliacées sont un phénomène marginal qui montre que les néandertaliens d'Europe orientale et/ou centrale n'ont fréquenté que très occasionnellement la France septentrionale. A chaque fluctuation climatique, les modalités de peuplement ont donc probablement trouvé une origine différente et un déploiement avec va-et-vient Nord/Sud ou Est/Ouest plus ou moins extensif. L'heure est au bilan sur la caractérisation des groupes culturels du début, milieu et fin du Paléolithique moyen sur une aire géographique allant des plaines et plateaux de Bourgogne-Franche-Comté à ceux de Normandie.

**Keywords:** Pléistocène moyen et supérieur, bifaces, pièces foliacées, France septentrionale.

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# Overview of leafpoints industries of the late middle palaeolithic in Hauts-de-France region

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Abstract : Since Mont Beuvry and Rencourt-les-Bapaume excavations in the years 1990, few sites produced leafpoints discoveries. Nevertheless, some of them, made in the years 2010 occurred in the Nord-East part of the new region " Hauts-de France " and participate to the new knowledges of this special tradition.

Résumé : Depuis la fouille du Mont Beuvry et de Rencourt-les-Bapaume dans les années 1990, peu de sites ont livré des pièces foliacées. Toutefois, certaines ont été découvertes dans les années 2010 dans la partie Nord-Est de la nouvelle région Hauts-de-France et participent de ce fait, au renouvellement des connaissances que nous avons sur ce faciès lithique ou culture matérielle.

**Keywords:** pièces foliacées, paléolithique moyen, façonnage, emmanchement, culture matérielle, Hauts, de, France

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# Surrounded: late Middle Paleolithic variability and spatio-temporal homogeneity in the Côte Chalonnaise (Saône-et-Loire, France)

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Located at the interface of numerous similarity units of the late Middle Paleolithic, more commonly known as technocomplexes, facies or space-time units, the sites of the Côte Chalonnaise (area near Chalon-sur-Saône) offer the opportunity to examine the classifications made in the course of the research history. Surrounded by major classical late Middle Paleolithic complexes like the MTA in the West and Southwest and the *Keilmessergruppen* in the Northeast, as well as the Charentian which borders in the North and the Rhodanian covering the South along the Rhône, the Côte Chalonnaise region in Eastern France touches the margins of these. Earlier research throughout the past decades was concerned with identifying differences between the assemblages, that therefore have been ascribed to different affiliations and thus created a highly heterogeneous scenario for the region (Keyword bifacial objects, scraper retouch, etc.). In contrast, recent research could reveal a quite homogeneous appearance of the assemblages and detect many technological similarities between them. This talk addresses the definitional specifics used for former divergent assignments of the Middle Paleolithic assemblages in the Côte Chalonnaise region and discusses their reliability and retention. Gathered from recently conducted re-evaluation of the assemblages and supported by high resolution analysis of stratified unities from Grotte de la Verpillière II, we present numerous litho-technological arguments, which make it seem acceptable combine these sites in a regional cluster. Especially based on the presence of *Keilmesser* (with tranchet blow) in combination with other bifacial tools (Keyword MTA s.l., MBT), our observations and the intersectional location of the region, enable further reflections about spatio-temporal variability and litho-technological traditions in the course of the late Middle Paleolithic in West-Central Europe.

**Keywords:** Technocomplexes, facies, space, time, units, chrono, cultural units, Late Middle Paleolithic, Eastern France, Litho, Technology

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# ON THE REVISION OF THE SZELETA CAVE AND THE SZELETIAN OF THE B'UKK MTS.

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The Szeleta Cave located over Miskolc, Fels'ó-Hámor at 340 m a.s.l. became internationally renowned for the researchers in 1911, 5 years after the beginning of the excavations in 1906. Ottokár Kadić published a monographic essay on the results of the continuous explorations between 1906 and 1913, which is still outstanding. Our pioneer researcher determined the Palaeolithic funds of the site as Solutréan. This terminology was used up to 1955. In that year László Vértes introduced the name Szeleta Culture after Frantisek Prošek, which he divided to three parts according to the succession of the cave: early level, 3. layer; transitional level, 4-5. layer; advanced level, 6. layer.

László Vértes organized the Szeleta Workshop in Budapest and in Miskolc in 1966, 3 years after the well-known Sungir Conference in Russia, with the participation of Gisela Freund and Otto Bader among others. The aim set by this conference, a cooperative research on the Upper Palaeolithic leaf shaped tools industry and their sites, could not be reached because of the tragic death of Vértes in 1968.

An international conference was organized for the 100th anniversary of the Hungarian research on Palaeolithic Age in 1991 at the Herman Ottó Museum in Miskolc. In this event the author presented a hypothesis on a successive development of Bábonyian – Early and Mature Szeletian – Solutroid-Szeletian cultures, while Katalin Simán classified the Upper Szeletian to special "Gravettian with leaf shaped tools".

The revision of the data from the Szeleta Cave was made in the frames of the reambulation of the Palaeolithic sites of the B'ukk Mts. and its surroundings started in 1999 on the University of Miskolc with evaluating earlier records, new explorations and radiocarbon-14 dating. The dating was supported by Marcel Otte, Brian Adams and Jürgen Richter.

The revision resulted in several new stratigraphic, palaeontological and archaeological data. The 2. layer (according to the division of Kadić) contains Taubachian funds. In a palaeohistoric context it is noteworthy that over this, in the 3. layer of the cave the funds can be grouped into several coexisting types: there are two Middle and Middle/Upper (transitional) Palaeolithic cultures, the Aurignacian I. according to Vértes, leaf shaped tools, and with all of these, there are the oldest material of the Szeletian of the B'ukk resembling the Eastern Szeletian in character accompanied by Dufour lamelle" and lamelle à retouche marginale abrúpte". The radiocarbon-14 dating gave 37000 BP here.

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\*Speaker

This industry appears in a developed stage in the 6-6a. layers of the cave, Upper Szeletian according to Vértes, with cultural links mainly to East and South-east Europe. The radiocarbon-14 age of this layer is cca. 26000 - 22000 BP.

**Keywords:** Szeleta Cave, Bábonyian, Early Szeletian, Upper Szeletian, Eastern Szeletian, cultural interaction

# New data concerning the Middle Palaeolithic to Upper Palaeolithic transition in Central Ukraine

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The presentation is dedicated to the results of explorations of Vys site in Central Ukraine. The station is located in the Velky Vys River valley near Novomyrhorod Town of Kirovograd region. It had been explored from 2007 to 2016 by expedition of the National University of "Kyiv Mohyla Academy" and is dated by early stage of Upper Palaeolithic. The uncovered evidence finds numerous analogies with sights of Kostenkivsko-Stryletska culture on the Lower Don and Szeletoid artefacts of Ukraine and Moldova.

**Keywords:** Central Ukraine, Kostenkivsko, Stryletska cultura, Szeletoid artefacts

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**XVI-2. Peopling dynamics in the  
Mediterranean area between 45 and  
39 ky ago: state of art and new data.**

# Noisy beginnings: the Initial Upper Palaeolithic in Southwest Asia

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The emergence of the Upper Palaeolithic in Southwest Asia is considered a unique phenomenon in relation to other parts of the Old World. Besides the local circumstances that are particular to each region, this is the only region outside Africa with the clear presence of modern humans producing Middle Palaeolithic industries. Still, it seems that also here, as elsewhere outside Africa, the UP is conceived mostly as portraying a break with MP lifeways, and continuity, if suggested, is on a rather modest scale.

While the geographical extent of the Levant (i.e. the eastern Mediterranean, from the Taurus Zagros mountains in the north, to southern Sinai and from the coast eastwards of the Rift valley into the Saudi Arabian deserts) is relatively small, at least four or five variants of Initial Upper Palaeolithic lithic industries have been identified defined, based on techno-typological criteria, geographical constraints and differing chronologies, as demonstrated at Boqer Tachtit, Tor Sadaf, Ksar Akil, Umm el-Tlel, and Ucagizli.

Besides the usual obstacles archaeologists face in trying to identify and define relationships between various archaeological assemblages in time and space, prehistoric research of the Levant, like other regions, suffers from its Eurocentric past and international present, whereby research reflects the different ‘weltanschauung’ and paradigms of the scholars currently conducting it.

We shall attempt to present a coherent picture of the present state of affairs, as well as our own understanding of the Levantine IUP, based on the locally available data within the wider context of current prehistoric research.

**Keywords:** Initial Upper Palaeolithic (IUP), Southwest Asia, Levant

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# Rethinking Emireh Cave (Eastern Galilee, Israel)

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The Emiran is the earliest technocomplex within the Levantine Upper Palaeolithic sequence. The Emiran industry was defined by Dorothy Garrod (1951) and named for the type assemblage excavated at Emireh cave by F. Turville-Petre (1927). Garrod's definition for the Emiran industry was based on biased lithic assemblages from el-Wad and Emireh caves including both MP and UP diagnostic features such as classic Levallois blanks, typical UP tools made on narrow blade blanks, and Emireh points. The term Emiran was further accepted by many researchers for a transitional industry corresponding to the earliest phase of the Upper Paleolithic of the south Levant and was incorporated into a broader definition known as the Initial Upper Palaeolithic (IUP) that is commonly used as a proxy for identifying human migrations during the Middle-Upper Palaeolithic interphase.

The question whether the Emireh assemblage is homogenous or mixed has been raised several times in research. In this study, we reanalyzed the same lithic assemblage from Emireh Cave that was published by Garrod in 1955. Our technological study shows the assemblage contains at least three distinctive knapping methods: Levallois, broad-base blades (non-Levallois), and narrow-base blade/lets. We suggest the assemblage indeed contains an Emiran component, including Emireh points, but it also bears Mousterian, Ahmarian and Aurignacian components. Thus, the Emireh cave lithic assemblage is assorted.

We propose that Emireh Cave is a typical southern Levantine cave with Paleolithic sequence in which Emiran and other industries are included in the same layer is likely to be the case in other southern Levantine sites where Emireh points were noted (i.e. el-Wad, Kebara, Qafzeh). It is suggested that these sites, although they include some transitional (Emiran) components, are mixed with Mousterian and Upper Paleolithic components and that the mixture is due to the ephemeral nature of the Emiran occupation at these sites.

**Keywords:** Middle to Upper Paleolithic Transition, Emireh Cave, Mousterian, Emiran, Ahmarian

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# The earliest migration of *Homo sapiens* in southern Europe: an ERC grant to understand the biocultural processes that define our uniqueness

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Anatomically modern humans (AMHs) radiated out of Africa into the rest of the world around 60,000-50,000 years ago, reaching Europe potentially around 45,000 calendar years before present (cal BP). The timing and pattern of the biological and cultural shifts that occurred in Europe around 50,000 to 35,000 cal BP, however, are hotly debated and are considered to be among the most important questions in paleoanthropology. Undoubtedly, during this period Neandertals were replaced by AMHs and various technocomplexes appeared and replaced pre-existing Mousterian cultures.

The interpretation of these new technocomplexes (called ‘transitional’/Early Upper Paleolithic cultures) influences our understanding of evolutionary issues, including the exact timing of arrival of anatomically modern humans in Europe, their potential interactions with Neandertals, Neandertal’s cognitive abilities and the reasons for their extinction. There exists doubt about the makers of these technocomplexes because of 1) the paucity of well-preserved human remains dated to the transitional period, 2) the lack of large-scale comparison of the results and 3) the limited number of accurate, well-documented/well-dated excavations.

Within this context, new evidence places Italy as a keystone region in answering questions surrounding this transition due to its geographic position, ecological variability, and the key archaeological sites representing Middle-to-Upper Paleolithic cultures. Moreover, several teeth

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\*Speaker

retrieved from Italian archaeological sites, associated with both Uluzzian and Protoaurignacian cultures, were pivotal for stimulating novel debates about the biological shift that occurred in Western Europe around 45,000-35,000 years ago. Remarkably, Italy has largely been absent in the research.

The recently obtained ERC Consolidator Grant 2016 (n. 724046 - SUCCESS) tackles this issue. It aims to understand, more precisely, when AMHs arrived in Southern Europe, the biocultural processes that favoured their successful adaptation and the final cause(s) of Neandertal extinction.

**Keywords:** Mousterian, Uluzzian, Modern human, Neandertal, Italy

# NEW DATA IN NEANDERTHAL PEOPLING SOUTH OF THE EBRO RIVER: LATE PLEISTOCENE (MIS 3) SITE OF AGUILÓN P5 CAVE (NE IBERIA).

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In this work we present the unpublished data from the Mousterian site called Aguilón P5 cave. It is a small opening in the Iberian Range (south of the Ebro River, Zaragoza, NE Spain) containing a probably long stratigraphic sequence from which only the top part has been excavated in the fieldwork developed since 2010.

Different archaeological layers have provided archaeological and paleontological remains: lithic artefacts, processed animal bones, charred plant remains and combustion events have been found during archaeological excavations. Due to tool assemblage and radiocarbon dating (> 50.0-41.9 kyr BP) the attribution to the Middle Palaeolithic is clear, contemporary with other important Mousterian sites in the Ebro Basin (NE Iberia) and Mediterranean region.

Preliminary results provided by archaeobiological records reveal that the surroundings of the cave was composed by a relatively open-landscape dominated by conifers with an alternation of woodland environments and rocky areas where climate conditions were more atlantic-influenced, colder and high water supply, in contrast to the Mediterranean climate that nowadays prevails in mid-mountains areas of the Ebro Basin (NE Iberia).

The Aguilón P5 cave presents excellent habitability conditions. Probably, the neighbouring Aguilón P7 cave (*Galán et al., 2016; Nuñez-Lahuerta et al., 2016*)<sup>1,2</sup>, a paleontological site with contemporary radiocarbon dates where human presence is hardly noticed but there are evidences of animal processing, would be used at the same time with a complementary function.

This archaeological complex provides new although preliminary data, providing information about Neanderthal behaviour and peopling in a not much explored geographical area.

1. *Comptes Rendus Palevol*, 15(5), 501-514. 2. *Historical Biology*, 28(6), 774-786.

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**Keywords:** Middle Palaeolithic, Mediterranean area, Mousterian

# Push and pull model of the Middle to Upper Palaeolithic transition in the Balkans

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Because of its dual nature as both a transit route and a glacial refugium, the Balkan Peninsula is the key region to examine the dispersal of modern humans into Europe and the processes that lead to the demise of Neanderthals. New insights from the research in Central and Eastern Europe support the proposed Danube corridor for the spread of modern humans into the continent. Two scenarios could be envisaged for the ensuing period. In the first – avoidance scenario, Neanderthals would have been pushed towards more marginal western and central areas of the Balkans where, due to population fragmentation and isolation they eventually became extinct. Under the second – attraction scenario, Neanderthal communities would be drawn towards the areas where the Upper Paleolithic groups aggregated, which lead to their acculturation – a technological transformation that resulted in the appearance of "transitional" industries. Further research is needed to test both scenarios.

**Keywords:** Middle Palaeolithic, Upper Palaeolithic, transition, Balkans

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\*Speaker

# Archéozoologie et taphonomie des restes aviaires de la Grotte de Castelcivita (Salerno, Italie).

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Les fouilles menées dans la grotte de Castelcivita par l'institut d'Anthropologie et Paléontologie Humaine de l'Université de Sienna ont mis en évidence une succession stratigraphique d'environ 3 mètres d'épaisseur, avec les niveaux culturels plus profonds attribuables au Moustérien, suivi des niveaux de l'Uluzien et du Protoaurignacien. Le cadre chronologique de la série se situe entre le Mousterian final (environ 43000 BP) et l'ignimbrite campanienne ( $39,85 \pm 0,14$  ka) qui scelle les niveaux de fréquentation paléolithique.

L'analyse paléontologique précédente a permis de déterminer 542 restes d'oiseaux dont 430 ont été déterminés au niveau spécifique. Les restes, appartenant à au moins 174 individus de 36 espèces, sont concentrés surtout dans les niveaux uluziens. Ils sont également fréquents dans les niveaux protoaurignaciens à lamelles Dufour ainsi que dans les niveaux moustériens, tandis qu'ils sont plus rares dans les niveaux sommitaux protoaurignaciens.

Durant le Moustérien les oiseaux de milieux rocheux et ouverts sont abondants ; les espèces aquatiques (surtout les Anatidés) et forestières sont aussi fréquents. Dans les niveaux uluziens on assiste à un accroissement net des espèces de prairie steppique au détriment des espèces de milieu rocheux et aquatique. Dans les niveaux protoaurignaciens on observe une autre raréfaction des oiseaux d'habitat aquatique et boisé témoignant de conditions plus steppiques, reflétant un climat plus froid et aride.

La présence d'espèce que ne fréquentent pas les grottes, Ansériforme et Galliforme (les oiseaux les plus communs à Castelcivita), a été interprétée dans un premier temps comme le résultat de leur introduction par l'homme et ensuite issus de la chasse. L'analyse taphonomique des surfaces osseuses (analyse des traces de prédation, coupe, fracturation, cuisson, mastication, etc.) des restes aviaires a permis d'identifier un rôle des chasseurs paléolithiques dans l'accumulation des oiseaux dans cette grotte. Des traces (stries, impacts et fractures) témoignent d'une activité anthropique sur la carcasse des oiseaux. Les traces d'autres prédateurs sont rares.

La particularité de la séquence stratigraphique avec une continuité des niveaux de fréquentation

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de *H. neanderthalensis* et *H. sapiens* fournit, en outre, des indications utiles sur le rôle dans la subsistance humaine dans le passage du Paléolithique moyen au supérieur.

**Keywords:** Mousterian, Uluzien, Protoaurignacien, avifaune, exploitation, boucherie

# Bears and Humans, a Neanderthal tale. Reconstructing uncommon behaviors from zooarchaeological evidence in Southern Europe.

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Cave bear (*Ursus spelaeus*), brown bear (*Ursus arctos*), and Neanderthals were potential competitors for environmental resources (shelters and food) in Europe, this is demonstrated by numerous findings of plantigrade remains in association with Mousterian lithic artifacts. In order to reinforce this view and contribute to the ongoing debate on late Neanderthal behavior, we present evidence from zooarchaeological and taphonomic analyses of bear bone remains discovered at Grotta del Rio Secco and Grotta di Fumane in northeast Italy, an extended geographic area north of the Adriatic Sea. The remains from both caves come from layers dated to 49-42 ky cal. BP, and suggest close interactions between humans and bears, with data not only limited to the association of Mousterian lithic artifacts with numerous bear remains, but also the detection of clearly preserved traces of human modification such as cut and percussion marks, which enable a reconstruction of the main steps of fur recovery and the butchering process. Examples of Neanderthal bear exploitation are extremely sporadic in Europe, and Grotta Rio Secco and Grotta Fumane can be considered rare cases of remain accumulations generated by the human predation of bears of varied age classes during or near the end of hibernation. All of this evidence suggests that bears had a strategic role in the nomadic economy of Neanderthal hunting groups.

**Keywords:** Cave Bear, Brown Bear, Middle Palaeolithic, hunting, taphonomy, cave, Italy

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# Use-wear analysis of Uluzzian lunates from Grotta del Cavallo in Italy

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## Introduction

The emergence of the Uluzzian in Italy and Greece represents the dispersal of modern humans into Europe approximately 45 ky ago. The Uluzzian is represented by crescent-shaped backed pieces referred to as lunates. As lunates were not found in European Middle Paleolithic assemblages, the appearance of this novel tool type may reflect a new human behavior of *Homo sapiens*. However, the function of Uluzzian lunates remains unclear owing to the lack of a systematic use-wear analysis. This paper presents the results of a use-wear analysis of Uluzzian lunates from Grotta del Cavallo in Italy.

## Materials and Methods

Numerous Uluzzian lunates were recovered at Grotta del Cavallo. First, all the lunates were macroscopically analyzed. A micro-wear analysis was then conducted for the selected specimens. Macro-traces, including diagnostic impact fractures (DIFs) and edge-damage, were recorded using the microscope mode of the Olympus TG-4 digital camera. For the micro-wear analysis, the Hirox KH7700 digital microscope was employed at a magnification ranging from 140x to 420x.

## Results

Of the 146 lunates, more than 30 pieces had either DIFs or possible impact fractures. The possible impact fractures as well as DIFs were compared to pseudo-impact fractures that occurred during the production of experimental replicas of Uluzzian lunates. After the comparison, 25 lunates were evaluated as having reliable DIFs, indicating that they must have been used as hunting weaponry. Of them, 7 pieces exhibited microscopic linear impact traces (MLITs) and another 7 showed linear traces that may have formed due to contact with an animal target. Although several lunates exhibited unclear macro- and micro-wear traces, no specimens indicated clear evidence for other activities than hunting.

## Conclusions

The use-wear analysis of the Uluzzian lunates from Grotta del Cavallo indicated that a large

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number of the lunates were used as hunting weaponry, but clear evidence for other activities was not obtained for any of the lunates. Uluzzian lunates are overall small, and most of the lunates from Cavallo are smaller than 30 mm. The small dimension of the Uluzzian lunates suggests that the diameter of their shafts was also small. Despite their smallness, several lunates have relatively large DIFs that are longer than a half length of the specimens, suggesting high impact velocity. The large number and dimension of the DIFs and the small dimension of the Uluzzian lunates suggest that these hunting armatures were not used as thrusting or throwing spear tips, but as spearthrower darts or perhaps arrowheads.

**Keywords:** hunting armatures, usewear analysis, lunates, Uluzzian, Italy

# Palaeoecological analysis of sediments documenting the Middle-Upper Palaeolithic age transition in Alpine and Mediterranean ecosystems; palaeoenvironmental and quantitative palaeoclimate reconstructions. A contribution to the ERC Project "SUCCESS".

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Within the recently-obtained ERC Consolidator Grant 2016 "*SUCCESS - The earliest migration of Homo sapiens in southern Europe: understanding the biocultural processes that define our uniqueness*", a Work Package dedicated to palaeoenvironmental analysis and quantitative climate reconstructions has been activated. The WP will focus on new palaeoecological analysis and revision of available data from stratigraphic archives located in Alpine, central-southern Italian and Mediterranean ecosystems. Studies will concentrate on the time span between Heinrich Event 5 to 3, known for their strong impact in Mediterranean Europe, the Balkans and Italy (Follieri et al., 1988; Allen et al., 2000; Lezine et al., 2010; Müller et al., 2011; Pini et al., 2010; Panagiotopoulos et al., 2014). Prior to any new analysis, the state-of-the-art of palaeoecological researches relevant to the SUCCESS Project will be depicted.

At the UISPP Congress we will present the frame from which the "Palaeoecology Working Package" is taking its first steps. Researches on lake successions documenting the Middle to Upper Palaeolithic transition will be presented and compared. Data on reconstructed vegetation and landscapes from different geographic and climatic areas will be discussed to explore the effects of short-term (Dansgaard - Oeschger cycles, Heinrich events) climate variability on ecosystem and

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\*Speaker

human cultural frameworks. Palaeoecological information will help envisaging the landscape structure and the natural resources at the time of Palaeolithic occupation and immigration of anatomically-modern humans into Europe.

Attention will be paid to the reference record of Lake Fimon (Venetian Alpine foothills, north-eastern Italy). This area is indeed well known as it provides both a Late Pleistocene palaeoecological record and several Middle to Late Palaeolithic sites yielding evidence of Neandertal and Anatomically-Modern Humans occupation. A high-resolution palynostratigraphic research will be developed on the Lake Fimon core to answer specific questions relevant to the ERC Project, i.e. the effects of climate variability on the environments of last Neandertals - early AMH, the role of fire, etc. Environmental proxies from Lake Fimon will be matched with archaeological information from cave deposits in the same region which testify to the ancient legacy of human occupation in the area and the complex interaction between natural resources and human groups.

**Keywords:** ERC SUCCESS, Middle Upper Paleolithic, Palaeoecology

# The Greek Middle to Upper Palaeolithic transition through the lens of renewed research on Kephalaria Cave, Peloponnese (Greece)

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The Middle to Upper Palaeolithic transition debate in Europe has attracted for decades the attention of prehistorians, mainly because in this part of the world it corresponds to the shift from local Neanderthals to incoming modern humans. The southeastern Mediterranean region, one of the assumed pathways of modern humans entering Europe, has remained understudied with only patchy knowledge of human occupation during the period preceding and following Heinrich Event 4 (45-35 ky ago).

Greece in particular has remained under the radar of most researchers since only a handful of sites dating to this period have been discovered thus far. One important feature is that at least 2 sequences (Kephalaria and Klissoura) in the Peloponnese, southern Greece, preserve a transitional technocomplex likened to the Uluzzian of Italy. If this is the case, these sites may contain evidence for some of the earliest anatomically modern humans entering the Greek peninsula. Franchthi Cave, that preserves the earlier Early Aurignacian of Greece, is in the vicinity of these sites too.

Since 2010, renewed research and analytical efforts have focused on Kephalaria Cave, a site with a rare sequence spanning from the Middle Palaeolithic to the Neolithic. Here we present a brief description of the stratigraphic and archaeological sequences and a series of new AMS radiocarbon dates. In addition, we attempt a rough environmental reconstruction based on a synopsis of the zooarchaeological record, the study of anthracological remains from the site, as well as its geological and hydrogeological setting. By comparing our data to other contemporaneous Greek and Italian sites we aim to assess late Neanderthal and early modern human adaptation and comment on the nature of the transition in this part of the world.

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\*Speaker

**Keywords:** Middle to Upper Palaeolithic, Uluzzian, Greece, radiocarbon dating

# A 55,000-year-old modern human skull from Manot Cave, Israel.

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Genetic and archaeological models predict that African modern humans successfully colonized Eurasia in a time frame between 60,000 and 40,000 years before present (ka), replacing all other forms of hominins. While there is evidence for the first arrival in Europe around 45ka, the fossil record is extremely scarce with regard to earlier representatives from this period. A partial calvaria discovered at Manot Cave (Western Galilee, Israel) and dated to ~55 ka by uranium–thorium dating now closes this gap. Both the discrete morphological features observed on the Manot 1 calvaria as well as the metric shape analyses based on a landmark-semilandmark approach document that this partial skull is unequivocally modern. Its cranial shape perfectly clusters with a sample of modern human populations from different geographical origins and times, and is most similar to recent African skulls as well as to European skulls from the Upper Palaeolithic period (Mladeč 1 and Předměstí 4), but different from most other early modern humans in the Levant. This suggests that Manot 1 probably represents a population that migrated out of Africa and reached the Levantine corridor in a favorable time of warmer and wetter climatic conditions over the Northern Sahara and the Mediterranean. Importantly, it provides evidence that both modern humans and Neanderthals (e.g. Kebara, Amud) contemporaneously inhabited the Levant during the Middle to Upper Paleolithic interface. This would be in support of genetic studies suggesting a gene flow from Neanderthals into Europeans, likely in Western Eurasia, and considerably later than 100ka. Manot 1 foreshadows the first European modern humans. The descendants of its population could have later migrated to Europe and have contributed to the early Upper Paleolithic populations there.

Supported by the Dan David Foundation, the Israel Antiquities Authority, Case Western Reserve University, the Leakey Foundation, the Irene Levi Sala CARE Archaeological Foundation, the Keren Kayemet L'Israel and the Israel Science Foundation, the National Science Foundation, the Exilarch's Foundation and the Max Planck Society–Weizman Institute Joint Center for Integrative Archaeology and Anthropology, and the Bertha and Louis Weinstein Research Fund.

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**Keywords:** Manot Cave, Levant, Modern Humans, Morphometrics, Migration

# Ornaments and Pigments and their implications in behavioural modernity during the Middle to Upper Palaeolithic transition in Italy

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The Early Upper Palaeolithic is characterized by key innovations and significant changes involving both technological and symbolic aspects. The use of personal ornaments and colouring substances as well as the occurrence of figurative art are consistently related to “non-utilitarian” (symbolic) activities. Since the late Middle Palaeolithic, objects of this kind are usually associated to the emergence of the so-called “modern behaviour”. In the Uluzzian and the Protoaurignacian archaeological deposits of Northern and Southern Italy, such evidence mostly consists of personal ornaments (mainly perforated Gasteropods) and mineral pigments. However, the Protoaurignacian notch and incision patterns from Riparo Bombrini and Riparo Mochi are also worth of consideration as symbolic activities. Instances of figurative art are rare and are found only in Northern Italy, in particular at Grotta Fumane where formal expressions painted on stones have been retrieved.

From an archaeological perspective, the systematic use of personal ornaments and pigments (which are possibly also connected to body painting) is the ideal proxy from which a number of behavioural characteristics involving social relationships within a group (in terms of age, gender, social status etc..) and ethnic identity can be inferred.

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\*Speaker

We propose a state-of-the-art account based on the whole set of materials related to symbolic behaviour (e.g. personal ornaments, engraved stones or bones, pigments...) from archaeological sites bearing evidence of the Middle to Upper Palaeolithic transition in Italy. Technological processes (from the procurement of raw materials to their processing) used in the manufacturing of this intriguing class of materials will be taken into account in order to make sound inference on their use. In this respect, the potential of personal ornaments and pigments from the Italian transitional complexes has been so far little explored. Our synthesis will be, therefore, of great help to lay basis for more in depth studies aimed at detecting cultural innovations at the onset of symbolic behaviour in the context of "transitional" human groups.

**Keywords:** Uluzzian, Early Upper Palaeolithic, Ornaments, Pigments, Italy

# Mammals and birds in Italy : a view across the MP-UP humans transition.

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Evidence of Late Middle (MP) and Early Upper Palaeolithic (UP) human activities are well represented in rock-shelters, caves and open air sites across the Italian peninsula. Over the past decade, the revision of taphonomic processes affecting archaeological faunal assemblages as well as new zooarchaeological studies, allowed archaeologists for the reconstruction of activities, strategies and cultural behaviors attributed to Neanderthal and Sapiens groups in this region. The present work (part of a 5 years research program ERC n. 724046 – SUCCESS) offers a state-of-the-art synthesis on human exploitation of mammals and birds in the Northern Mediterranean area across Late Middle and Early Upper Palaeolithic, i.e. in a critical chronological interval for reconstructing change in human behaviour and adaptive strategies. Data sources, between 45 and 35 ky ago, comprise faunal assemblages recovered in the final Mousterian, Uluzzian and Aurignacian stratigraphic contexts from Grotta di Fumane, Riparo del Broion, Riparo Bombrini in northern Italy, and Grotta di Castelcivita, Grotta della Cala, Grotta del Cavallo, and Riparo l’Oscurusciuto in southern Italy. As a whole, such record includes ungulate, bird, and carnivore bones, resulting more often from primary accumulation than from post-depositional processes or from direct carnivore action. Overall, zooarchaeological analysis and comparison between sites suggest a marked change in the ecological context of the examined human occupations since the earliest Aurignacian occupation, with particular reference to lower temperature and

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lower humidity. In some cases, avifaunal and carnivore remains seem to offer a better proxy of available resources. Taphonomic analysis reveals the presence of human modifications referable to different butchering actions over almost all the ungulates. However, the processing of ungulate bones dated to MP is clearly different from the same processing recorded throughout the UP. A preliminary comparison between different contexts based on bone frequencies and on the distribution of levels of bone combustion poses interesting questions concerning the use of hearths. In addition, based on preliminary results, higher diversity in hunted taxa may be hypothesised since the end of middle Palaeolithic. The inclusion of different contexts, the generation of new qualitative taphonomic records produced by humans within a large area, and the formal test of specific hypotheses on the processes underlying change over time in the frequency of exploited taxa contribute substantially to reveal exploitation strategies of small, medium, and large carnivores, rodents, and birds by Neandertals and modern humans.

**Keywords:** Aurignacian, Uluzzian, Mousterian, taphonomy, zooarchaeology, Italy

# Bone artefacts from transitional and Early Upper Palaeolithic techno-complexes in Italy

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Bone artefacts play a key role in the material culture of the Early Upper Palaeolithic techno-complexes of Europe. Even if bone smoothers and scrapers were also occasionally produced by Neandertals, bone instruments in general are commonly interpreted as distinctive markers of the cultures that replaced the Mousterian complexes between 45.000 and 35.000 years ago. In particular, the emergence of differently shaped tools, usually points and awls, also implies changes on a conceptual level. Moreover, the systematic production of bone implements entails specific manufacturing techniques that are interpreted as a feature of modern human behaviour. For these reasons, the study of bone artefacts is of pivotal interest within the debate concerning the identification of the makers of the so-called "transitional cultures".

Our presentation provides a synthesis on bone artefacts found in archaeological sites containing the Middle-to-Upper Palaeolithic transition (Mousterian, Uluzzian, Protoaurignacian), which are located in the Northern Mediterranean area: Grotta di Fumane, Riparo del Broion, Riparo Bombrini in Northern Italy; Grotta di Castelcivita, Grotta della Cala and Grotta del Cavallo in Southern Italy. Currently available data show that formal Mousterian bone tools are very scarce and are mostly made from bone shaft fragments. Conversely the production of "fine shaped" bone tools is systematic in the Uluzzian, where the complexity inherent in the manufacturing processes suggests that the bone artefacts are not to be considered as an expedient resource.

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\*Speaker

In order to assess the innovative features of transitional and of the Early Upper Palaeolithic bone assemblages, their mutual relationship and their implications for the onset of modern behaviour, we propose here an overview of the whole *corpus* of bone artefacts from the aforementioned sites, carried out by combining data from zooarchaeological, technological and functional studies

**Keywords:** Uluzzian, Early Upper Palaeolithic, bone tools, Italy

# The Late Pleistocene sequence of Roccia San Sebastiano cave (Mondragone, Caserta) in Southern Italy. New data about technical behaviours in Final Mousterian levels (~39 ka BP)

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The cave of Roccia San Sebastiano is a cave of tectonic-karstic origin at the foot of the southern versant of Monte Massico, in the territory of Mondragone (Caserta) in Campania (Southern Italy). Systematic excavation campaigns have been conducted here since 2001, under the direction of Marcello Piperno and Carmine Collina, leading to the partial exploration of an important Pleistocene deposit, extraordinarily rich in archaeological and paleontological remains. The cavity is divided into two distinct parts: a shelter, about 12 m long and 3 m deep, and a cave whose dimensions have not yet been ascertained because it is still partially obstructed by reworked sediments. The excavation campaigns lead to the exploration of the first gravettian level, called C, over a surface of about 6 m<sup>2</sup>; furthermore, the stratigraphic sequence was tested in a 3 m<sup>2</sup> sounding, localized within the excavation area, to a depth of about 3 m. The deepening of the sounding evidenced a thick stratigraphic and cultural sequence. At the present state of the research, at least six major phases, from different Gravettian horizons to Aurignacian until to the Final Mousterian levels, have been recognized in the deposit, whose chronological framework is based on a series of C14 dates on faunal remains included between 19.570±210 BP and 38.980±950 BP. A tooth of child attributed to Neanderthal has been found in the mousterian levels. From Final Mousterian to Gravettian the plain of Mondragone is characterised by the presence of persistent fresh water environments after the deposition of CI, ~39 kyr BP. During the marine regression a wide coastal plain emerged, creating the ideal habitat for equids and aurochs. The subsistence of the human groups living in the cave was based on the capture of red deer, aurochs, hydruntine and, to a lesser extent, of chamois. In this paper we present the chronostratigraphic data of the archaeological sequence and we shall take into consideration data from lithic assemblages attesting the variability of technical behaviours among the Final Mousterian levels. The study of the evolution of the lithic complex from these layers is important to understand the dynamics of the transition from Middle Paleolithic to Upper Paleolithic in the Tyrrhenian versant of Southern Italy.

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**Keywords:** Southern Italy, technical behaviours, Final Mousterian, Palaeolithic

# The Italian Peninsula between 45 and 39 ky ago: the sunset of the "old" and the dawn of the "new"? Let the lithic industries tell!

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Understanding timing and ways of the technical tradition shifts between final Mousterian and Early Upper Palaeolithic (EUP) in Europe (45-39 ky BP) is one of the most important questions in lithic studies. Beside the technical diversity generally attributed to the end of Mousterian, new traditions such as Châtelperronian, Szeletian, Lincombian, Uluzzian, Protoaurignacian, Early Aurignacian emerge in this timeframe.

How can we explain such technical changes over time? Can it be imputed to the arrival of new populations - and what would the geographical source of such migratory process be? Is it rather the result of convergent evolution, or the output of a long-term process of exchange of cultural and biological information? Can these new tool-makers be identified as Neandertals or Modern Humans (or both)?

In this debate, the Italian Peninsula plays a pivotal role both for its geographic position between eastern and western Mediterranean Europe, and for the occurrence of refuge areas during cold periods. The presence of several sites with evidence attributed to final Mousterian, Uluzzian and Protoaurignacian techno-complexes provides a reflexion laboratory for understanding continuity/discontinuity processes in the mosaic of new technical trends and elements of local evolution.

Our study is aimed at providing a summary picture of the available data in this key geographic area. Through the evidence collected at a number of reference sites (Riparo del Broion, Grotta di Fumane and Riparo Bombrini in Northern Italy; Grotta di Castelcivita, Grotta della Cala, Uluzzo C and Grotta del Cavallo in Southern Italy), we are going to present the main technical features of the Mousterian, Uluzzian and Protoaurignacian traditions in a diachronic and spatial perspective.

This preliminary synthesis is part of a broader 5 years’ research program (ERC n. 724046 – SUCCESS), which involves a detailed study and a comparison of all the lithic industries col-

lected from the above-mentioned sites. Thanks to the joint effort of several lithic technology experts, we hope to contribute to better define the Uluzzian phenomenon, and to participate in the most extensive debate related to the disappearance of Neandertals and the arrival of early Anatomically Modern Humans in Europe.

**Keywords:** Final Mousterian, Uluzzian, Protoaurignacian, Lithic technology, Italy

# A Rediscovered Initial Upper Palaeolithic Occupation at Boker D, Central Negev, Israel

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The Initial Upper Palaeolithic (IUP) is a chrono-cultural phase that is currently investigated in the contexts of socio-demographic changes at the end of the Middle Palaeolithic in various regions in Eurasia. The IUP was initially coined by Marks for describing the uppermost layer at the Boker Tachtit sequence (level 4; Marks 1983). This term was adopted by Kuhn to describe northern Levantine assemblages at Ksar Akil and 'Uçağizli cave that showed similar technological characteristics to Boker Tachtit 4 (Khun 2003). The new definition by Kuhn also incorporated the earlier layers at Boker Tachtit (levels 1-3), that were defined by Marks as Emiran and left out from the original definition of the IUP. The IUP was further adopted by other scholars for describing post-Mousterian hard hammed blade assemblages in distant regions, such as eastern Europe and Siberia.

The studies by Marks and his team in the Negev region convincingly showed a technological development from the Emiran levels (1-3) to the IUP (level 4) at Boker Tachtit (Marks and Kaufman 1983; Volkman 1983). It was also proposed that Boker Tachtit 4 was the forerunner of the Early Ahmarian that showed at the neighboring site of Boker excavated during 1974-1976 by Marks.

The excavations at Boker exposed a sequence of Upper Palaeolithic levels in several sectors labeled A, BE, D, C (Marks 1983). The Early Ahmarian was excavated in sector A and dated to 38 Ka. Stratigraphically earlier levels were noted at sector D. Still, due to small sample size the assemblages from Boker D were not defined and their cultural attribution remained unclear.

A new excavation project at Boker carried out by the authors in 2015-2016 aimed to define and date the earliest occupation at Boker. The new excavation exposed an intact layer at the bottom part of Boker D. The layer is composed of chipped stone artifacts and charcoal remains. The Boker D lithic assemblage is characterized by production of unidirectional blades using hard hammer stone. Preliminary refitting study indicates high similarity in core shaping and extraction of blades to Boker Tachtit 4. Overall, the technological and typological features of Boker D highly resemble Boker Tachtit level 4. Thus, Boker D is ascribed to the IUP in its original definition as proposed by Marks.

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**Keywords:** Negev, Ahmarian

# The Mousterian Settlement of Grotta Reali (Rocchetta a Volturno, Molise, Southern Italy)

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Grotta Reali is a key site for reconstruction of technical behaviour of the last Neanderthals in the Italian peninsula and the paleoenvironment of the area during MIS 3. The site is located in a small cave/shelter generated on the backside of a tufa waterfall, at the edge of a large terrace, in correspondence of the major spring of the Volturno River. The settlement dating between 50,940 and 40,370 cal BP, attests an intensive occupation localized at the crossroads of different biotopes, not far from the sources of raw material. Geomorphology, pollen data and faunal assemblage leads to the persistence of wooded environments with large open areas where cervids, horse and aurochs lived. These data are consistent with the chronological framework of the Pleniglacial Interstadial (MIS 3). The Mousterian occupation of Grotta Reali gives detailed information on the depositional dynamic of a major spring in Southern Italy, and contributes to the international debate on technical behaviour at the end of the Mousterian. In fact, productive strategies attest an "evolved" behaviour in which the laminar debitage is associated with "typical Mousterian" methods such as Levallois, discoid and the S.S.D.A. The presence of a laminar debitage in a volumetric conception, as occurs at Grotta Reali, is now attested in several European Middle Palaeolithic sites, and it is correlated by some authors to an important climatic fluctuation which would have caused a change in the techno-economic behaviour. In Italy, this production method has already been described in a few sites distributed along the entire peninsula: Riparo Tagliente, Grotta della Ghiacciaia and Grotta di Fumane in Northern Italy; Grotta di Gosto, Svolte di Popoli, Torre in Pietra and Grotta Breuil in Central Italy; Grotta di Castelcivita, Riparo L’Oscurusciuto and Grotta del Cavallo in Southern Italy. Main

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\*Speaker

aim of this work is to provide further information on Mousterian technical behaviour, faunal and environmental data, based on the multidisciplinary studies undertaken in the Mousterian settlement of Grotta Reali in Southern Italy during a climatic unstable period of the Pleniglacial.

**Keywords:** Middle Palaeolithic, human behaviour, palaeoenvironment, subsistence strategies, calcareous tufa, Southern Italy

# Zooarchaeological and ZooMS insights into peopling dynamics at Riparo Bombrini

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Human adaptation to climatic variations is being discussed at different scales and from diverse perspectives and specializations in archaeology. We suggest examining modern human mobility on a local scale by comparing faunal assemblages from distinct stratigraphic layers in a single site. Located in the renowned Balzi Rossi complex in Northwest Italy, the collapsed rockshelter of Riparo Bombrini is a key site to understand the colonization dynamics and human-environmental interactions along the Mediterranean coast as it yields well-documented and well-dated Early Upper Palaeolithic deposits. Previous studies of spatial, lithic, and raw material data revealed distinct mobility signatures from the site's two Protoaurignacian levels, A1 being warmer and associated with residential mobility while the older level A2, directly preceding Heinrich Event 4, is colder and associated with logistical mobility showed by a more expedient approach to lithic technology. In this study, we propose to include faunal data to this picture, and we suggest that those signatures should be reflecting distinct subsistence, animal acquisition, and carcass processing strategies from the site's Protoaurignacian layers. To assess this hypothesis, we present results from taphonomic and zooarchaeological analyses of faunal assemblages from level A1 and A2 excavated at Riparo Bombrini between 2015 and 2017. The skeletal preservation being very poor, we also integrate systematic ZooMS (Zooarchaeology by Mass Spectrometry) sampling to those analyses, a new method using diagnostic peptides of the dominant collagen protein in bones as a fingerprint of animal (including hominin) species. This complementary tool allows us to considerably improve the statistical significance of the Number of Identified Species on both spatial and stratigraphic scales in spite of the otherwise high level of bone fragmentation.

**Keywords:** Early Upper Palaeolithic, Protoaurignacian, Subsistence, Zooarchaeology, Taphonomy, Proteomics, ZooMS

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\*Speaker

# Le Paléolithique moyen de la grotte de la Crouzade: actualisation des données et contexte chronostratigraphique

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La grotte de la Crouzade (Gruissan, Aude) a livré une importante collection de restes du Paléolithique moyen (industrie, faune et restes humains) lors des fouilles Hélène, dans les années 1920 à 1946. La réactualisation des données par la reprise des fouilles sur ce gisement et les datations réalisées par différentes méthodes permettent de replacer ces collections du midi méditerranéen dans leur contexte chronoculturel et constituent un jalon original dans la sphère moustérienne de l'ouest européen

**Keywords:** Crouzade, Paléolithique moyen, Datations

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## **XVI-3. Short-term human occupations and mobility patterns.**

# A single Neanderthal short-term occupation? Assessing a high-temporal resolution example at the Abric del Pastor Lithostratigraphic Unit IVd (Alicante, Spain)

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Current temporal approaches to Middle Palaeolithic palimpsest deposits have shown that a hearth-related accumulation is the most reliable material imprint of a single occupation episode performed by Neanderthals. These analyses have also emphasized that single lithic tools and small archaeological scatters not spatially associated to any combustion feature could be possible traces of such episodes as well. All of these kinds of anthropogenic assemblages are commonly interpreted as the remains of short-term occupations whose variability in behavioral and temporal terms currently is one of the main goals of the research agenda. In order to contribute to the study of such topic, we present an archaeological assemblage from the Middle Palaeolithic site of Abric del Pastor (Alicante, Spain) that potentially represents a single short-term human occupation episode. This assemblage is a hearth-related accumulation which has been defined within the Lithostratigraphic Unit IVd using archaeostratigraphic methods. In addition to the performed temporal and behavioral analysis of this record, we also discuss its hypothetical characterization as the material manifestation of a single short-term Neanderthal occupation.

**Keywords:** Middle Palaeolithic, palimpsest, short occupations, combustion features, Neanderthal behavioral variability

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# A spatio-temporal approach to group size and length of occupation at PTK and FLK Zinj (Bed I, Olduvai Gorge) using regression estimates from modern foragers

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Discrete single-layered sites present us with the challenge of determining how much time and how many hominins were involved in their formation. Being able to retrieve this type of information from archaeological data will allow for a better understanding of the functionality of sites and of the structural socio-reproductive behavior of early humans. In the case of the early Pleistocene sites FLK Zinj and PTK, which are interpreted as central places formed as the result of the accumulation of carcasses that were accessed by hominins prior to carnivores, it will furthermore serve to establish whether the carcasses consumed at these sites were an important part of hominin diet or if meat was eaten intermittently along extensive periods of time. Site occupation times and group size are addressed in this work through the application to the site of PTK of a combination of regression formulas and estimates derived from spatial measurements and spatial properties from several !Kung hunter-gatherer campsites studied by Yellen (1977), who discovered that the time during which a campsite was occupied and the number of occupants had a measurable impact on the spatial dimensions of sites. Results obtained for PTK are compared to estimates that have been calculated for FLK Zinj (Domínguez-Rodrigo et al., submitted). Through this work we seek to develop working hypotheses, approaches, and analytical tools to be further tested and used in the future in combination with analyses on seasonality and analyses on sedimentation processes including estimations of the potential effect of subaerial exposure in the form of weathering on fossil bones. This critical application of the regression parameters from modern foragers to early Pleistocene hominins, whose social use of the space was probably very different, is ultimately an opportunity to target the more elusive but crucial issue of the evolution of human inter-group relationships and complex social networks.

**Keywords:** short term occupations, group size, time of occupation, early Pleistocene sites, modern foragers

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\*Speaker

# AN APPROXIMATION IN THE STUDY OF THE MIDDLE PLEISTOCENE REMAINS OF POSTES CAVE, EXTREMADURA (SPAIN)

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The Postes Cave site is a karst system located in Natural Monument of Fuentes de León (Spain). It has yielded Holocene and Middle Pleistocene sequences, the latter with human bones, fauna and lithics. Pleistocene layers are sealed by a speleothem dated by U/Th in  $192.986 \pm 15.451$ - $13.837$  years BP. The upper three contains archeo-paleontological remains, 16.02% of them partially covered by the speleothem, and 83.97% in clays. Pleistocene deposit is composed by 3 Stratigraphic Units. UE 1 is remarkable because has yielded more of 85% of the materials, including human remains. It is enclosed by a second speleothem dated in  $244.191 \pm 2.261$  years BP. Overall the fossils, bear is the most represented, and preserves cranial and postcranial bones. Specially, a complete mandible with worn teeth from an adult, preliminary adscribed to *Ursus cf. arctos*. This is especially relevant because brown bear mandibles are scarce in the European Middle Pleistocene fossil record.

In this study we have focused in the bear mandible. It was partially covered by the speleothem. This generates many difficulties in the field work because requires the use of chisels and hammers to remove the bones and creates vibrations that might generate fractures and fissures. In consequence, we needed a conservation-restoration methodology to assure its stability and promote future studies. To prevent future damages it was necessary to carry out *in situ* interventions, that consisted in partial gauze and the extraction of the bone with speleothem. Once it was transferred to the laboratory we made treatments of chemical and mechanical cleaning with an

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electric micromotor and reconstruction.

We made a statistical study of the bear mandible. We performed Z-scores analyses with published material from: *Ursus deningeri*, *Ursus thibetanus* and *Ursus arctos* from different chronologies. We considered 11 variables from the mandible and 8 from the lower teeth.

Our Z scores show the Postes cave mandible close to the *U. arctos* populations. The length from p4 to m3 shows the greatest differences in the mandible. The width and length of the trigonid of m1 and the width of m3 are remarkable differences in the lower teeth. In addition we detected some differences between some Pleistocene samples and Holocene brown bears, because Holocene bears show a smaller size in lower teeth and smaller mandible height. These observations will be study with more detail in future analyses, collecting more individuals and considering also the shape.

**Keywords:** Middle Pleistocene, Ursus, mandible

# Apport des approches éco-éthologiques des grands herbivores à la connaissance de la mobilité humaine. Résultats préliminaires sur des sites du Paléolithique moyen ancien. / Contribution of eco-ethological approaches of large herbivores to the knowledge of human mobility. First results on early Middle Palaeolithic sites.

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Mobility of prehistoric hunter-gatherers is conditioned by many factors, and one of the main one concerns the climatic environment and the distribution of resources, especially animals. The main preys of Palaeolithic groups are medium to large herbivores, such as Equids, Bovids or Cervids. It appears then essential to know the ungulates herbivores' ecological adaptations to specific and changing environment in order to deduce socio-economical aspects of human groups, as for example the duration of occupation (seasonality) and mobility patterns. Among several ecological methods, enamel wear analysis allows to describe herbivores diet habits and evaluate the period(s) of accumulation of a fossil population. We have studied ten South of France early middle Palaeolithic archaeological (La Micoque, Suard, Payre, Combe-Grenal, Rigabe) and paleontological (Camps-de-Peyre, Lunel-Viel, les Rameaux, Coudoulous II, Peyre) sites. We study especially microwear patterns of Equids and large Bovids, in order to compare their specificities. Preliminary results would be given about the degree of mobility both of preys and predators, humans (and non-humans), with the help also of actualistic studies on ethology of herbivores. The comparison between the two fossil sets shows different trends that are interpreted as specific human territory managements for prey acquisition, focused in particular on horses for this time period and this region. Furthermore, the combined use of two observation scales of enamel wear analysis (meso- and micro-wear) are used here to describe the biotopes in which humans and faunas, including the seasonal variations. Such eco-ethological parameters are important to infer and integrate paleoenvironment with hominid ways of life and subsistence strategies. Therefore ecometrical studies based on Pleistocene herbivores constitute an efficient tool to precise and understand Pleistocene Humans behaviour.

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**Keywords:** Middle palaeolithic, ecometry, mobility pattern, enamel wear analysis

# Cava a Filo (Croara, Bologna, northern Italy): anthropic evidences in a natural karst trap? A taphonomic perspective.

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The recent excavation at Cava a Filo was carried out from 2006 to 2011 and encouraged by the Museo L. Donini di San Lazzaro di Savena. The deposit of Cava a Filo, a paleontological one, is of great importance for the study of chronology and paleo-environmental reconstruction of the Late Upper Pleistocene corresponding to the Last Glacial Maximum (ca. 24,000-18,000 years ago, MIS 2). It testifies to the presence of typical species closely related to the cold climate and open environments with diffused forested areas (*Bison priscus*, *Megaloceros giganteus* and *Capreolus capreolus*). *Canis lupus* is the only carnivore on the site. The small mammal assemblage testifies that the environment surrounding the site was characterized by open and dry meadows, with few low forested areas in cold climate conditions. The new geological data have allowed in particular to understand that the abundant Pleistocene mammalian fauna had settled in a sedimentary context originated in a karstic system with relic fluvio-karstic galleries. Such network of tunnels was excavated during an advanced moment of the Late Pleistocene. These natural "traps" corresponded to a valley close to a sub-horizontal sinkhole, where animals attracted by the water could be trapped. This particular environmental setting, with water, closed depression and karst sinkhole proved favourable for the hunting of various animal species, primarily the great steppe bison, both by human and by medium-large predators like the wolf. The bone remains deriving from the animal carcasses, including those hunted by the Upper Paleolithic hunter-gatherers groups, were then conveyed by the flows of the fluvio-karstic system and redeposited within the tunnel cavities. From the point of view of prehistoric research, this is a particular site because even if it is not a primary deposition site, it presents several "secondary" anthropical evidences that demonstrate the existence, not far away, of hunting activities devoted to bison practised by Upper Paleolithic hunter-gatherers groups. An interesting tibia of bison shows anthropic signs on the bone surface, left by a lithic tool during animal slaughtering. These hunting activities, aimed in particular at the great steppe bison, had to be carried out in correspondence to a

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karstic sinkhole formed by the Acquafredda river - in the morphological-topographical context of that time - which constituted a natural trap very favourable for hunting large herbivores. Humans and wolves lived thus in the same environment, sharing the same objective: hunting the great steppe bison.

**Keywords:** Last Glacial Maximum, natural trap, *Bison priscus*, *Canis lupus*, Taphonomy, Cutmarks

# Instant photograph of a short-term Occupation in the Abric Romani rock-shelter: the archaeolevel Oa.

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Isolate different occupational events in the Palaeolithic record is a hard work, because the overlapping of the remains from different occupations is very common, and this phenomenon creates archaeological palimpsests. We can differentiate two types of palimpsest: the vertical and the horizontal ones. These two types are very important to identify and define human short-term occupation. We present the different methodology used in each case and its application in one of the levels at Abric Romani rockshelter.

After deconstructing the vertical palimpsest of the level O with archaeostratigraphic study that, we presented in the last USIPP (Bargalló et al, 2016). Now we presents a transdisciplinary study in order to determine the occupation length at the archaeolevel Oa assemblage, a Middle Palaeolithic record dated on  $54,24 \pm 0,42$ Ka by U/Th series.

In this study, we present how we have been puzzling out the horizontal palimpsest of archaeolevel Oa and then we have identified different human activities that seems to be the result of a short occupation. Occupation patterns are identified based on human activities and anthropogenical accumulations. These archaeological accumulations, contain stone tools (1584 remains), faunal remains (486 remains) and hearths (n=10). The relationship between them has been established through the study of refitted remains (both in lithics and bones). The small occupation surfaces (55m<sup>2</sup>, bearing in mind that the paleofloor of the archaeolevel Oa is 209 m<sup>2</sup>) and the results obtained (fragmented knapping activities, isolated accumulations and differential transport of faunal remains) suggest short occupation settlements in the archaeolevel Oa. From the results obtained through the trans-disciplinary study we can obtain important information to understand socio-economics behaviours (subsistence strategies, distribution of resources, social connections or management of the territory) of prehistoric hunter-gatherers.

**Keywords:** Abric Romani, Middle Paleolithic, temporary camps, refits, scatter patterns

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# Integrating the Ephemeral and the Regional: Critical Insights from Short Duration Archaeological Sites and Palimpsests in central Portugal

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Archaeologists frequently analyze prehistoric settlement systems by compiling site data from published sources, a process that biases resulting hypotheses by over-representing larger archaeological sites and unusual discoveries. This presentation demonstrates the analytical necessity of systematically sampling and characterizing short duration sites and archaeological palimpsests when building regional models of Middle and Upper Paleolithic land use. Sedimentology, fabric analysis diagrams, limited refitting, and other methods essential for understanding burial and post-depositional processes at open-air site locations in central Portugal are presented. Different site types can be distinguished based on patterned variation in artifact assemblages, archaeological features, and areal extents of deposits. Small, open-air Middle Paleolithic sites located adjacent to gravel beds are key components of the archaeological record for understanding local raw material availability influences on stone selection behaviors. Our comprehensive, total coverage survey and excavation project in the Rio Maior drainage of central Portugal reveals that Gravettian groups intensively utilized all landforms across the valley. These EUP hunter-gatherers created several different site types including specialized knapping sites near the Azinheira Ridge for gearing up activities and moderate-duration base camps with a range of activity areas. In contrast, Magdalenian hunter-gatherers occupied a large number of short-duration campsites located along the mid-valley ecotone, a pattern consistent with the hypothesis of increasing residential mobility through the Upper Paleolithic. This case study demonstrates how the integration of short-duration archaeological sites and large lithic palimpsests into regional Middle and Upper Paleolithic datasets facilitates models of changing land use and technological organization that otherwise would be nearly impossible to accurately develop.

**Keywords:** palimpsest, settlement systems, raw material selection, land use

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# Interprétation économique et spatiale du site moustérien récent du Bout des Vergnes (Bergerac, Dordogne), à partir de l'analyse des remontages lithique

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Le site de plein air de la fin du Paléolithique moyen du Bout-des-Vergnes a été fouillé entre 2012 et 2013 dans un contexte préventif. Le caractère extensif de la fouille a permis de mettre en évidence une répartition inégale des 900 objets lithiques liés à cette occupation. En effet, trois amas de taille, au sud-ouest du site, regroupent les deux tiers de la collection alors que les autres artefacts étaient plutôt dispersés sur le reste du site. Une étude techno-économique du matériel a mis en évidence une opposition technologique entre le débitage effectué sur le site, majoritairement Discoïde, et des outils bifaciaux et Levallois de grandes dimensions, importés sur le site. L'analyse des remontages nous a alors permis de démontrer que les trois amas étaient contemporains, évoquant alors une occupation unique et une contemporanéité des différents concepts technologiques, ce qu'a confirmé l'étude spatiale. Nous avons alors mis en évidence qu'il y avait une mobilité différentielle des outils. Les produits issus du débitage Discoïde, associés à une utilisation plutôt rapide, sont majoritairement manquants. A l'inverse, les bifaces et les grands racloirs Levallois devaient avoir une plus grande longévité et accompagnaient les groupes néandertaliens dans plusieurs de leurs déplacements.

**Keywords:** Analyse spatiale, Moustérien récent, Dordogne, Discoïde, Remontages lithiques

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\*Speaker

# Lithic technological organization in short-term occupations at Teixoneres Cave (Moià, Spain)

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During the Pleistocene, climatic fluctuations and seasonal environmental variations imposed significant restrictions on the subsistence strategies of prehistoric hunter-gatherers who did not produce food and, consequently, moved on the landscape in relation to the changes in the spatial and temporal distribution of resources. Frequent seasonal movements from different habitats were a typical strategy in foragers groups but how they organized their technology during these displacements in order to minimize the risk of subsistence failure is little known. This paper aims to contribute new data to the current debate, by exploring the technological behaviors during the Late Middle Paleolithic at Teixoneres Cave (Moià, Spain). Multidisciplinary studies on the archaeological record indicate that Neanderthals occupations at the site were of short-term and space out by the visiting of carnivores, mostly hyenas. The technological analysis on the lithic assemblages of subunit IIIa and IIIb reveals the use of two main strategies. Configured cores and curated artefacts on chert and metamorphic rocks were transported during the movements on the landscape whereas, at the site, the exploitation of the local quartz nodules is generally expedient. Although the lithic assemblages are interpreted as palimpsests of repeated short-term

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settlements at the cave, the data shows the versatility of Neanderthals in the artefacts production with a clear differentiation between toolkit preparations and domestic activities. This pattern in raw material transport and exploitation is very different in comparison with the neighboring Middle Paleolithic sites where bigger amounts of higher quality raw materials are transported inside the natural shelters. The study evidences also the production of pointed blanks on local quartz and the frequent import of Mousterian points and convergent tools. These latter artefacts are rare in the north-east of the Iberian Peninsula suggesting an extended network with groups from the north-eastern Pyrenees and southern France.

**Keywords:** Middle Paleolithic, Neanderthals, Short term occupations, Lithic technology

# Neandertal camps and hyena dens. Living floor 150 of Grotta dei Santi (Monte Argentario, Tuscany, Italy)

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The palimpsest-effect in Paleolithic sites has been for some time the focus of vivacious scientific debate. What is fundamental is the possibility of "dissecting" palimpsests into "smaller time units" in order to correctly identify relationships among different activities carried out by the inhabitants of a certain site during a single occupational phase. More extensively, this procedure allows for a better "functional" reading of the economic and settling strategies. Interrelations among several concomitant causes (e.g., fortuitousness, site function, sedimentation rates/occupation intensity, "catastrophic" events) make some Palaeolithic sites ideal contexts for high-resolution chronological investigations. However, even in "short-term" cases, there can be factors affecting the preservation and visibility degree of the archaeological record, such as, for instance, alternation in the site use between humans and carnivores.

Grotta dei Santi turned out to be a very good example for such an enquiry. This cave is located at Monte Argentario (southern coast of Tuscany), almost at sea-level, at the base of a limestone falaise about 50 m high, in an area of the coast reachable only by boat. During MIS 3, when Neandertals occupied this cavity, a wide plain extended in front of the cave. Excavations carried out by the University of Siena in the last 10 years brought to light several Mousterian layers represented, most of the times, by thin living floors separated from one another by a completely sterile sediment. However, another "occupant", the spotted hyena (*Crocuta crocuta*), had left clear traces of its stay in the cave in layers other than those occupied by humans. Although there was usually a clear-cut stratigraphic separation, sometimes we found evidence of partial overlapping between the two occupations, owing to their closeness in time. This is the case of layer 150 uppermost "living floor", which is the object of our study.

A multidisciplinary integrated analytic methodology has been applied, including lithic technology, taxonomic analysis of faunal remains, taphonomy, use-wear analysis by means of a digital microscope 3D KH 7700 Hirox and spatial analysis by means of a GIS platform. In this way parameters useful for identifying activities due to these two predators individually and for providing information about their behaviour were defined.

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**Keywords:** Middle Palaeolithic, Neandertal, *Crocota crocuta*, Taphonomy, Lithic technology, GIS

# Occupying cave-sites: A case study from Azokh 1 Cave (Southern Caucasus)

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The Caucasus is an important intercontinental passageway for fauna and hominin dispersal from Africa to Eurasia. Numerous Pleistocene sites emphasize the importance of this region for the study of human evolution and hominin "Out of Africa" dispersals. The Azokh 1 site in the Southern Caucasus provides a stratigraphic sequence, the renewed excavations of which showed the presence of well-contextualised lithic and faunal assemblages dated between 300 – 100 Ka associated with hominin remains (*H. heidelbergensis* and *H. neanderthalensis*) also found in the site.

The study of faunal assemblages shows a dominance of cave bear (*Ursus spelaeus*) remains resulting from their hibernation at the rear of the cave. Recent taphonomic studies indicate some of these remains were exploited *in-situ*. Other faunal remains, mainly herbivores, some showing signs of human activity, were most likely introduced into the cave by hominins. The study of lithic artefacts suggests an incomplete operative chain for all raw materials with a general absence of knapping debris, natural bases, rare cores and refits. Techno-typologically, these assemblages are considered from late Acheulean or early Mousterian to Levallois Mousterian.

The recovered faunal and lithic assemblages represent a marginal area at the back of the cave. Research results, including some preliminary data on lithic use-wear, along with spatial distribution, and post-depositional modification analyses, indicate that occupation of the cave was short and seasonal in character. Cave bears were an important factor affecting the period and duration of hominin occupation of the cave. The characteristics of lithic assemblages indicate these probably included mobile toolkits, with some isolated evidences of *in-situ* knapping or retouching activities.

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**Keywords:** Azokh 1 Cave, *Ursus spelaeus*, Lithics, Mobile toolkit, Short term occupation

# Ontogenetic dental patterns in hyenas (*Crocuta crocuta* Erxleben, 1777) and their palaeobiological implications

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Hyenas were one of the main agents of bone accumulation and modification during the Pleistocene. During this epoch, humans and hyenas co-occurred at sites that included cavities and rock-shelters, generating a mix of bones accumulated both by humans and carnivores. Research in this field has given rise to much debate about the relationship between hominids and carnivores during the Pleistocene so that interpreting the nature of the different biological activities conducted may constitute a useful approach to understanding predator behaviour and to reconstructing the palaeobiology.

Dentition analysis is a powerful technique applied in zooarchaeological studies to interpret the use of shared spaces, including hibernation and carnivore dens, refuges and short-term shelters. In Pleistocene sites, isolated hyena teeth are the most common elements. However, in the Terrasses de la Riera dels Canyars (Gavà, Barcelona, NE Iberian Peninsula), a fluvial deposit dated at 39.6 ka cal BP (Heinrich Stadial 4) with a considerable record of large mammals and a few lithic tools (Aurignacian), cranial and postcranial hyena bones are uncommonly well preserved with all the ontogenetic stages represented. Based on an analysis of dental ontogeny and tooth replacement, using X-ray combined with tooth wear of the assemblage, we propose five age clusters for the hyena juveniles based on complete (or nearly complete) mandibles and maxillae. Previous studies of hyena ontogenesis have suggested the existence of just two to three juvenile categories.

Using these five, more detailed, age clusters for hyena juveniles, the Minimum Number of Individuals (MNI) increases. Moreover, the method applied to isolated teeth at the site validates its feasibility, as they can be attributed to one of these five specific categories based on dental wear.

Finally, the mortality pattern observed in Canyars indicates that the site was used mainly by hyenas as a den. The pattern of five age clusters proposed for this assemblage might usefully

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be applied to isolated teeth recovered at other Pleistocene sites. In short, the method has the advantages of providing more accurate results, increasing the MNI and, so, offering a better interpretation of the role played by biological agents in the past.

**Keywords:** Juvenile, dental replacement, wear pattern, X, ray imaging techniques, Hyaenidae, Late Pleistocene.

# Seeing short-term human occupations in the palimpsests of deeply stratified caves: An example from Lapa do Picareiro (Portugal)

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Throughout the Pleistocene, caves in Western Europe provided shelter for a suite of fauna including cave lion, cave bear, hyena, lynx, fox, raptorial birds as well as humans. Short-term and intermittent occupation of these caves by multiple depositional agents resulted in palimpsests that obscure the chronological sequence and complicate interpretations of subsistence, mobility patterns, function and human activity. This paper presents a study of the human occupations of the Middle and Upper Paleolithic deposits at Lapa do Picareiro, a cave located in Portuguese Estremadura with a continuous, stratified sequence of sediments dating to MIS 3 and 2. We have excavated a 10.6 m deep section with 36 Pleistocene-aged strata, almost all of which contain archaeological and/or paleoecological remains. Stratified lithic artifact assemblages, hearths, and differences in the spatial patterning of human and carnivore activity suggest that the deposits at Lapa do Picareiro represent numerous short-term human occupations intermixed with carnivore dens and raptorial bird nests. Individual faunal assemblages from each layer of the cave reflect different degrees of occupational intensity and preservation. These incredibly rich assemblages are providing a unique paleoenvironmental record of animal communities for western Iberia during MIS 3 and 2. Taphonomic analyses demonstrate that Picareiro was occupied by humans and non-human animals. Many of the bones display evidence for both intentional butchery by humans, including breakage consistent with marrow extraction and cutmarks, and carnivore tooth punctures and scoring. Several levels contain dense clusters of small bones, likely natural accumulations in and below raptor nests or lynx dens. Taken together, these data contribute to a greater understanding of paleoenvironmental conditions and Middle and Upper Paleolithic land-use, including mobility patterns and subsistence strategies.

**Keywords:** caves, palimpsests, Paleolithic, Portugal, mobility

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\*Speaker

# Short-term Mousterian occupations in Abrigo del Molino (Central Iberia) through the analysis of the lithic raw materials and the catchment area

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Abrigo del Molino is located in the upper part of Eresma river valley (Segovia, Central Spain), in the northern slope of Central System mountain range. The site is being excavated since 2013 and it contains a wide stratigraphy in which three Mousterian occupation levels have been found, with a chronology between 40 and 50 Ka.

Based on the analysis of the density of the archaeological remains, their characteristics, and the integrity and type of the *chaîne opératoires*, it can be deduced that all registered occupations are the result of short-term and recurrent stays over a long period of time. Therefore, the human occupations at Abrigo del Molino are not the result of a permanent habitat of the Neanderthal groups.

The presence of endogenous and exogenous lithic materials, together with their selection, according to their characteristics, shows a high degree of selection and planning of the activities carried out in Abrigo del Molino. Thanks to the studies of raw materials and the analysis of the catchment area of the site, we can perform an analysis of the mobility patterns of the Neanderthal groups in this area in relation to the short-term occupations which took place at the Abrigo del Molino between 40 and 50 ka BP.

**Keywords:** Catchment area, Mousterian, Neanderthals, Geoarchaeology

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# Spatiotemporal hominin mobility patterns in relation to carnivore presence in southern Belgium during the Late Pleistocene

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The karstic valleys of southern Belgium were highly occupied during the Late Pleistocene by both hominins and large carnivores (hyaenas, bears, lions, wolves). Indeed, each relevant archaeological assemblage shows evidence of their presence and activity, suggesting a high level of competition for shelters in this region. Unfortunately, most of these faunal collections were gathered during the 19th century, therefore spatial and geoarchaeological data are missing. As a consequence, from a zooarchaeological and taphonomical point of view, it appears as if Palaeolithic artefacts and faunal remains displaying anthropogenic and carnivore marks (digested teeth and bones, shaft cylinders...) are intermixed. After having set up an adapted methodology in order to detangle the origins of all faunal remains (which agent did what?), we explored the mobility patterns of hunters-gatherers in light of their non-human competitors' strategies (specifically hyaenas) in order to understand the palaeoecological implications of such mixed assemblages. Our study focused on the analysis of one new site, Tiène des Maulins, and the revision of two old museum collections, Trou Magrite and Caverne Marie-Jeanne, all dating from the end of the Middle Palaeolithic and the beginning of the upper Palaeolithic. By employing cementochronological analysis in collaboration with the CemeNTAA project, we explored the seasonal aspect of the presence and activity of humans and hyaenas. Our study largely confirms high human mobility patterns and suggests that contrary to the hyaenas who stayed all year round in this region, hunter-gatherers seem to have preferred cold-season incursions in southern Belgium, despite increased ecological pressures during these times (higher competition for prey and shelter with other large carnivores). Based on raw-material management data we describe a model of land use on a regional scale, exploring a possible strategic complementarity with northern Belgium.

**Keywords:** Belgium, Late Pleistocene, mobility patterns, seasonality, taphonomy

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\*Speaker

# Sporadic occupation in Armiña cave during the Upper Magdalenian: what for?

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The cave of Armiña is part of the same karstic system than Atxurra cave, which has an occupation site in the entrance, covering from Gravettian to Late Magdalenian, and numerous evidences of Paleolithic rock-art in the inner part of the cave. The current entrance of Armiña was discovered at the end of XIX century when the road between Markina and Lekeitio was opened, but there is no previous indication that the cave was open before the limestone hillside was excavated. Since its discovery, Armiña has been explored by A. Galvez Cañero, J. M. Barandiaran and J. Altuna, finding only scattered evidence of human and animal occupation (Garate, 2012). In 2014 a new archaeological project started in the Atxurra-Armiña system. The site of Atxurra was re-excavated between 2014 and 2015 revealing a long and well-preserved sequence comprising the Early Gravettian, Lower and Late Magdalenian. In 2015 the rich rock-art of Atxurra was discovered in the deepest part of the cave (Garate et al. 2016). Most of this art can be confidently attributed to the Magdalenian.

In 2016, several test pits were made in Armiña cave, founding archeological evidence in one of them. In 2017 the excavation of this latter pit was extended to 6 m<sup>2</sup>. The stratigraphic sequence was sealed by a succession of sterile units (Ia-Ic) with no archaeological or faunal remains. At the bottom of this sterile unit a continuous flowstone separate it from level III, an almost sterile unit containing few transported bones and charcoal fragments. Immediately under this unit, the first archaeological remains were found. They are few bone fragments and lithic tools associated to a small fireplace and an ocher stain. Interestingly, many of the lithic remains are retouched tools, some of them made on exotic raw materials (≈80 km). In the units under this archaeological layer only faunal remains were recovered.

The available archaeological evidence, and the first results of the ongoing multiproxy analy-

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\*Speaker

ses suggest that the studied site is the result of a very short occupation event or even shorter visits to this spot inside the cave. These visits were more or less contemporaneous the occupation levels from Atxurra and probably corresponding chronologically to the artistic activity. However, although Armiña cave is very suitable for human occupation, only a limited occupation has been recognized. This could partially be related to the morpho-topographic conditions of the cave which would imply that the external access was closed during this occupation. Thus, it would be possible to define the occupation site as an inner archaeological context (I.A.C.). Therefore, our main hypothesis is that this short term occupations were activities spots of Magdalenian explorers inside the cave, in where the developed activities were not exclusively related to technological and subsistence practices given the particular nature of the findings (ocher stain and exotic materials).

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**Keywords:** Magdalenian, Cave Site, Inner Archaeological Context, Rock, Art, Short Occupation

# Testing occupation intensity and site accessibility of Solutrean and Magdalenian sites in Cantabrian Spain

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The mobility of hunter-gatherer groups and the location of their sites are of great importance in Palaeolithic Archaeology. Traditionally, it has been assumed that main Paleolithic sites with multiple occupations are located in key places in the landscape. Following this idea, we select a region, Asturias, in Cantabrian Spain, to test if presumed short-term sites from Solutrean and Magdalenian periods and presumed long-term sites display a similar topographical pattern. To conduct our analysis we generated a database of all Solutrean and Magdalenian sites in the region focusing on the geographic characteristics of the sites, cultural attribution, and data reflecting intensity of their occupation. Therefore, we distinguish between multi-component sites (with Solutrean and Magdalenian occupations) and single-component sites (with an occupation of one techno-complex only). We use this feature as a first indication to the significance of the site within the settlement system. Furthermore, we differentiate between single-layered sites (only one archaeologically visible occupation event) and multi-layered sites (more than one occupation event visible) of the same techno-complex.

To perform our research we use Geographic Information Systems and calculate Least Cost Path networks in the area to identify optimal routes in the landscape. Finally, we crosscheck if single-layered sites and multi-layered sites as well as single-component sites and multi-component sites are respectively lying far or close of the optimal routes generated by means of Least Cost Paths analysis.

The results surprisingly show that presumed short-term occupation sites in Asturias are closer to the main routes than sites with repeated occupations. We discuss in detail the behavioural implications of our results.

**Keywords:** Accesibility, Asturias, Least Cost Paths, multi, component site, single, component site.

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\*Speaker

# The Neanderthal exploitation of the large mammals of the Ramandils cave (Port-la-Nouvelle, Aude, France). Alternations of occupations during the Middle Paleolithic on the northwestern Mediterranean coast.

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Ramandils cave (Port-la-Nouvelle, Aude, France) is a coastal site in the northwest margin of the Mediterranean Basin systematically excavated between 1983 and 1994 by Paul Boutié and his team (Boutié et al., 1994). This deposit delivered an abundance of lithic industry characterized by a continuous and small typical Mousterian facies of the Middle Palaeolithic technocomplexes with alternations more or less rich in denticulates (Molès, 2008). Faunal remains record a diversity of large mammals, carnivores, meso and microfauna and many terrestrial and marine shells indicating various exploitations of the different coastal resources. Two human teeth were found in level II without sepulchral context like most caves of the same regional Middle Palaeolithic complex.

The archaeostratigraphic sequence is formed of more than twenty relatively homogeneous human occupation levels determined by the lithic and faunal distribution. The recurring activity of the Carnivores represented by bone remains, coprolites and characteristic marks (tooth marks, fracturing, digested bones) indicates an alternation of the occupations between several predators (lynx, cave hyena, wolf) and Neanderthal populations.

The human exploitation of large fauna is attested with a predominance of red deer in most levels which represents more than a third of the large mammals. It is associated with horse, aurochs, wild european ass and wild boar with a low MNI for each (less than 10 individuals per

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\*Speaker

species). Depending the remains, different seasons are represented for each species studied.

This faunal material only contains 5% of complete elements. Many taphonomic phenomena occurred showed by the fragmentation and the major concretion of the remains. However archaeological data show a strong anthropogenic impact related to butchery activities (bone marrow removal) and an intensive use of fire as exhibited by over 50% of remains being heated to totally burned.

This Neanderthal site is located near major areas of flint's supply. Displacements are therefore oriented towards the north through the semi local territory qualified as intermediate, never exceeding 20 km from the cave, in which are also collected the other lithic materials in secondary position near the rivers. Moreover, the faunal material transported comes from different biotopes indicating a varied exploitation of the marine and terrestrial resources in a coastal context. Along the stratigraphy, we can relate the opening of the landscape with the increase of lithic raw materials diversity. These Neanderthal occupations are therefore characterized by regional mobility with a succession of short seasonal periods recording an intensive exploitation of animal resources.

**Keywords:** Middle Paleolithic, Neanderthal, Mediterranean coast, large mammals, zooarchaeology, Taphonomy, Resources, Territory.

# Un site à occupation mixte : Néandertaliens et carnivores à Érd (Hongrie)

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Le site en plein air d’Érd, près de Budapest, présente une industrie lithique moustérienne et un matériel faunique abondant, composé de taxons très variablement représentés mais dominé par l’Ours des cavernes sur toute la séquence archéologique. La présence indéniable d’hommes se manifeste également par les activités de taille et les structures de combustion. Tenant compte de son emplacement sur un plateau et de sa nature, le site a été interprété à la fin des années 1960 comme un campement de longue durée des Néandertaliens orientés à la chasse aux ours des cavernes. Cependant, l’association de restes de carnivores et d’artefacts lithiques découverts dans les sites en grotte ou abri du Paléolithique soulève des questions concernant les processus de formation des accumulations osseuses et des rapports entre ces différents agents. À Érd, les analyses archéozoologiques et taphonomiques récentes des assemblages osseux ont mis en évidence la présence et le rôle de l’Hyène des cavernes et d’autres carnivores (marques sur les os, coprolithes). Tanière ou repaire pour ces prédateurs, pour la plupart cavernicoles, leur présence implique un fonctionnement mixte, par des occupations successives ou alternantes avec les hommes. Les marques d’activités anthropiques et les schémas de représentations squelettiques de certains taxons signalent l’intervention des hommes dans l’accumulation et la modification de ces assemblages. Toutefois, la contemporanéité des occupations humaines et animales reste le problème fondamental qui peut être approché à l’aide de la technologie lithique. Le rôle de chacun de ces agents sera discuté. En effet, le site apparaît bien plus complexe dans son fonctionnement et dans son histoire.

**Keywords:** Ours des cavernes, Hyènes, Néandertaliens, Moustérien

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# Why and who occupied this rock-shelter? Neanderthal short-term occupations on levels VII, VIII and IX of Abrigo de la Quebrada (Valencia, Spain).

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The Abrigo de la Quebrada (Chelva, Valencia) is a site of Neanderthal occupation, which has contributed a wide sequence with nine archaeological levels that extend from MIS 3-4 (40,500 ± 530 BP, 43,930 ± 750 BP, > 50.8 ky BP) in the upper levels, up to MIS 5 in the lower levels, with dates for level VI of 79 ± 5 ky and 82 ± 5 ky. Level IV show short and repeated occupations, with a high density of materials related to hunting activities. However, the lower levels seem to respond to different sedimentation rates and occupations. In this work we present the results of the different studies carried out in levels VII, VIII and IX. In the lithic industry the operative chain is fragmented, with predominance of the last phases and discoid production. The local raw materials are more used, especially flint, and intensive processes of reuse of the pieces are observed. At the micro-spatial level, the recession of the overhang and the position of the large collapsed boulders conditioned the habitable space and explain the reiteration in the use of space in the central zone of the excavated area. Archaeozoological and taphonomic studies show mixed occupations. On the one hand, raptors or small carnivores seem to be the responsible of the leporids and birds set of bones. In addition some remains of ungulates present

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also modifications of carnivores, which could respond to scavenging activities. On the other hand, the Neanderthal groups are responsible for the ungulates accumulations, with a hunting activity focused on Equidae. It is possible that this change in the dominant prey is influenced by more arid and cold paleoenvironmental conditions, as well as the tendency towards a hunt for more gregarious species during shorter occupations. Also, the study of the microfauna and the rareness of *T. hermanni* support that more rigorous paleoenvironmental context. Results of charcoal analyses also show cold climate, based on the dominance of *Pinus nigra-sylvestris* residues. These pines currently live in areas with an average temperature below 13°C and above of the 1300 m of altitude in the Iberian Peninsula. However, level VIII might evidence more thermophilic conditions due to the presence of *Pinus cf. pinaster*. The tafonomic approach demonstrates a differential conservation of gymnosperms and angiosperms. In summary, the studies show that human occupations are much more sporadic, marginal and possibly the groups were smaller.

**Keywords:** Mousterian, short, term occupation, subsistence

**XVI-4. The Origins of Traditions  
Regionalization in the Palaeolithic –  
evaluation, evolution and  
mechanisms.**

# Discrete traditions in the Levantine Middle Paleolithic? A case of Neshar Ramla karst sinkhole

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A recently discovered site at Neshar Ramla, Israel is an open-air, eight-meter-thick Middle Paleolithic sequence situated in a deep karst sinkhole that acted as a sedimentary basin in which colluvial deposition was intermittent with *in situ* human activities. The lithic assemblage of Neshar Ramla is the largest and best-preserved excavated so far in the Near East dating to the late MIS 6/early MIS 5. The site contains evidence for intensive human use including combustion features, large faunal and lithic assemblages, lithic-bone-manuport concentrations and large occupation surfaces. The intensity and mode of the occupation at Neshar Ramla fluctuated throughout the use of the site as attested by sharp changes in the densities of lithics, bones, anvils, hammerstones and manuports, changes in composition of the lithic assemblages and varying degree of fragmentation of the animal bones.

The systematic production of naturally backed items, the specialized tool-kit dominated by invasively and carefully retouched side-scrapers, and systematic lateral spall removal from retouched edges are unique characteristics of the Neshar Ramla industry setting it apart from other Middle Paleolithic industries in the Near East. These features are most prominent in the lowermost layers and less pronounced in the upper part of the sequence, indicating that when hominins first arrived to the site, these technological features were already part of their technological repertoire. The difficulties with interpretation of these unique features stem from specific geomorphological context of the site, which clearly played some role in the structure of archaeological record and the composition of the lithic assemblages. Nonetheless, on the background of constant changes in the intensity and modes of occupation, the recurrent and systematic occurrence of distinctive technological and typological features throughout the site's stratigraphy is striking. We hypothesize that rather than a reflection of the function of the site in the land-use and mobility patterns, these features have a cultural origin and may indicate that Neshar Ramla hominins possessed discrete technological tradition that emerged in the region during late MIS 6 – early MIS 5.

**Keywords:** Middle Paleolithic, lithic traditions, Levant

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# Discussion of: The Origins of Traditions - Regionalization in the Paleolithic – evaluation, evolution and mechanisms

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In this gathering, our aims were to combine a kaleidoscope of points of view to re-evaluate an emerging phenomenon within the Paleolithic record, the spatially bounded techno-typological styles creating regional localized trajectories of change. Within the scope of the session several themes were discussed: How do we recognize those patterns? What are the appropriate scales of identification of a ‘region’? What can we learn from ethnography in relation to spatial distribution and demography? Can we recognize regionalization through multi-scale spatial and temporal resolutions? What mechanisms enhance spatially cohesive distribution of past knowledge? What modes of transmission increase and maintain these patterns, given the limitations that may mask the recognition of such social constructs? Our main goal was to create a linkage between record-based observations in conjunction with the development of novel explanatory frameworks. We hope that creating middle level theories helps bridging and connecting the Palaeolithic data with patterns of human behaviour as an essential step towards an improved understanding of the phenomenon of regionalization.

**Keywords:** Regionalization in the Paleolithic

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# Drift and demography in the development of traditions

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Origins of Traditions: Regionalization in the Palaeolithic – evaluation, evolution and mechanisms

In thinking about the origins of traditions in the Palaeolithic it is useful to make a distinction between cases where populations are (or can be regarded as) in equilibrium and those in which they are not.

In equilibrium situations the fundamental mechanism generating spatial variation in culture, as in genes, is isolation by distance, where increasingly limited interaction leads to an inverse relationship between geographical distance and cultural similarity, because declining interaction produces a corresponding decline in cultural transmission. Thus, the empirical observation of clusters of cultural homogeneity raises a key question: can these groups be regarded as coherent units amenable to evolutionary analyses (e.g., implying a phylogenetic link between cultural groups), or are they, rather, an arbitrarily imposed discretisation of a continuum determined exclusively by isolation by distance? The identification of ethnolinguistic groups in the ethnographic record seems to support the former, but of course in the Palaeolithic the existence of such groups is precisely what is at issue, so rejecting an isolation by distance hypothesis is the starting point for any stronger claim about the nature of traditions.

However, equilibrium is unlikely to be the rule. Although population growth rates through the Palaeolithic were extremely low, this is most likely to be the result of large numbers of population expansions and extinctions, which would generate their own homologous neutral cultural traditions appearing and disappearing over time. Nevertheless, where the expansions represented adaptive radiations attributes or practices under strong positive selection might be expected to persist.

The paper will explore some of these issues.

**Keywords:** Tradition, drift, demography, isolation by distance, cultural transmission

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\*Speaker

# Forming boundaries, crossing boundaries: People and cultural landscapes in the Paleolithic

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Cultural regions are an old concept in archaeology (“culture circles”). According to this concept, cultural phenomena were strongly linked with geographic landscapes and with “peoples” that occupied them, creating a unity between land, ethnicity, and material culture. While more recent work has shown the difficulties of applying such concepts within the deep Paleolithic time frame, many researchers nevertheless hold the notion that material culture traits can approximate groups of people with unified social and cultural norms. This worldview has led, for example, to a notion of a culturally -regionalized MSA record in Africa

Alongside ethnographic observations and epistemological doubts, a number of recent developments in Paleolithic research require a re-evaluation of such notions. In many regions of the world, the study of Paleolithic material culture – specifically, the lithic assemblages formed in particular regions during particular time periods – now tends to emphasize process over typified end-products. This underlines the role of equifinality in the formation of artifact morphologies and artifact assemblages, revealing that more diverse cultural landscapes may have existed within given regions during any given Paleolithic period without leaving noticeable cultural traces. On the other hand, the burgeoning study of paleo-genetics highlights the fluidity of human populations on the landscape and the possibility of significant information transfer and modification across large geographic tracts. Such processes could either effectively blur cultural boundaries within and between world regions and even through time or, alternately, enhance them, depending on the dynamics of the interface between groups.

With such new thinking and new data, the epistemology of regionality in the Paleolithic has become fuzzy. Understanding linkages between geographic, demographic and cultural regions, if they exist at all, presents an intellectual challenge. Case studies from the Oldowan in East Africa and from the Levantine Middle Paleolithic are used to exemplify such challenges and to ask how researchers may address such issues on scales that will promote feasible scenarios.

**Keywords:** culture, tradition, regionalization, transmission

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# Introduction to: The Origins of Traditions Regionalization in the Paleolithic – evaluation, evolution and mechanisms

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The Stone Age archaeological material record becomes increasingly more diversified through time as well as its resolution becomes finer grain and enables an examination closer to historical and ethnographic timescales. As a result, the record also becomes increasingly regionalized in terms of what is defined below as techno-typological styles. During recent years research into the roots of such spatially bounded techno-typological styles – creating regional patterning with localized trajectories of change – has witnessed a growing appraisal.

Techno-typological styles are the outcome of a long chain of decision-making processes, which are perpetuated within socially cohesive groups. Technological operations and resulting artefacts reflect socially-transmitted strategies of manufacture that may have been chosen from various functionally equivalent alternatives. Different modes of artefact manufacture reflect the transmission of learned knowledge over time. Techno-typological style can arguably be perceived as a way to mark, maintain and differentiate among human groups or populations. They may be confined in time and space and vary between neighboring regions with distinct cultural trajectories. By many archaeologists, they are perceived to reflect past identities mirrored in the archaeological material record. Probably, regional boundaries persisted between such traditions despite the constant influx of migrating populations and novel ideas.

Here, we introduce into the main topics and challenges when those concepts are extrapolated into the Paleolithic records. These extrapolations include epistemological questions of identification of patterns, including appropriate scales – both temporally and geographically – as well as interpretative difficulties: What are the underlying demographic constraints? What roles do variations in the modes of learning play in regionalization? What mechanisms create, maintain, and enhance regional cultural differentiation over prehistoric time-scales?

**Keywords:** Regionalization scales

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# Mumba Cave and the question of regionalization in the East African MSA

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Lithic assemblages from the African Middle Stone Age (MSA) often contain large numbers of stone points. Their morphological diversity in addition to varying proportions in other tool types observed at MSA sites is thought to reflect regional traditions and styles. Addressing the development of regional styles is difficult due to the scarcity of detailed information on the chronological patterning of these styles for large parts of Africa and the risk of over simplification of the problem through correlating single regions with only few forms that are assumed to be representative. In this paper we change perspective and use the long MSA to Later Stone Age sequence from Mumba Cave in Tanzania to examine whether the archaeological record provides evidence in support of a development of a local tradition in the study region. This paper also addresses potential explanations for diachronic variation in lithic technology. We focus here on the site's considerable record of stone points and use morphometric methods to study diachronic changes in the morphology of these points. Based on these results, we examine competing hypotheses to explain the observed patterns.

**Keywords:** MSA, points, East Africa

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# North vs South, the Acheulean as Adaptations at Opposite Ends of the Handaxe Maker's World.

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Many years ago Louis Binford characterised stone tools, and by implication the Acheulean, as an ‘extra-somatic form of adaptation’, implying that *H. erectus* and *H. rhodesiensis* (*H. heidelbergensis* in Africa) required tool assisted technology in order to survive. The large cutting tools of the Acheulean are on the ground carcass processing tools and as such they are not the primary means by which animal products are acquired. These are a combination of possible organic spears, co-operative action and natural history intelligence. Acheulean large cutting tools (and smaller ones too) facilitate a quick and effective butchery of a carcass allowing for a quick escape from the kill site as a potential source of danger.

The Acheulean package (LCT's, bifacial thinning and shaping, a number of blank production techniques that involve surface preparation of a core) appears much the same from the English Midlands to the tip of southern Africa, and from the Atlantic almost to the Pacific, although regional variations are present. Does this persistence of conformity imply convergent technological practices evolving in response to common problems, a species wide genetic propensity to make handaxes or the movement of hominins and/or ideas across the Old World?

This paper will explore some of the similarities and differences seen in the Middle Pleistocene Acheulean of South Africa and England, at either end of a line of Acheulean longitude and ask whether environmental challenges could give rise to convergent technological evolution or trigger innate hominin propensities. What is similar about the Acheulean at either end of this meridian, and what potentially could be different.

**Keywords:** Acheulean, handaxe, Victoria West, tradition

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\*Speaker

# Regional variability during the Middle Stone Age of MIS 3 in southern Africa – Patterns and mechanisms

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The MSA of southern Africa plays a key role in studying the cultural evolution of early modern humans. Recent comparative research of this record has started to evaluate the origins and variability of spatially bounded techno-typological traditions in our species. This work has identified periods of more homogeneous lithic assemblages over large geographical scales in MIS 4 and 2, contrasting with more heterogeneous, regionalized signals that characterize the interglacials of MIS 5 and 3. While there has been intense discussion on the reasons for wide-spread similarities in lithic assemblages during MIS 4 in the Still Bay and Howiesons Poort little is known about the patterns, mechanisms, and evolution of regional differences during MIS 3.

To assess different models for regionalization of this record, we require a detailed understanding of inter-regional and intra-regional patterning of lithic assemblages on a diachronic scale between ~58-29 ka. Following a bottom-up approach, we first evaluate the nature and variability of lithic technology during MIS 3 by combining new and high-resolution data from our own excavations and surveys at Sibudu, Holley Shelter, Klein Kliphuis, Mertenhof, Putslaagte 8, Umbelli Beli and Uitspankraal 7 with a detailed review of other data. Spatial comparisons are performed by partitioning the study region into the three modern rainfall zones of southern Africa. Our methodology aims to construct comparative datasets from different sources and to relate the lithic data to cultural transmission, social learning and knowledge transfer, which are powerful concepts to operationalize spatio-temporal differences in artefact assemblages.

Based on the emerging patterns of intra- and inter-regional variability in lithic domains throughout MIS 3 in the three analytical regions we evaluate different causal mechanisms including: i.) environmental and climatic factors; ii.) mobility, settlement systems and subsistence strategies; iii.) demographic factors; iv.) socio-cultural aspects. These potential factors are assessed under a variety of explanatory frameworks such as behavioral ecology, organization of technology and cultural transmission theory. Apart from pointing out specific limitations pertaining to our study region – such as the need for more data from open-air contexts and interior parts of southern Africa – we also emphasize issues that are of general relevance to the study of regionalization in the Lower and Middle Paleolithic. These include the importance of achieving more comparable, quantitative techno-typological data in lithic analyses between researchers

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and regional traditions, as well as articulating questions and theories regarding regionalization within appropriate scales.

**Keywords:** Middle Stone Age, regionalization, Homo sapiens, cultural evolution, lithic artefacts

# Technological divergence at the crossroads? Middle Paleolithic technology in the Armenian volcanic highlands and Central Anatolia, implications for hominin population dynamics

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A prominent question in Paleolithic research is how to trace and explain regionally distinct material cultural evolutionary trajectories among synchronous and geographically separated hominin populations. Here, we present a comparative case study that suggests broadly contemporaneous Middle Paleolithic (MP) technological divergence in two neighboring areas at the geographic nexus of Africa and Eurasia. The Armenian volcanic highlands and the Central Anatolian volcanic province (CAVP) are similar in geomorphology, but are separated by topography and  $\sim 800$  km. MP artifacts in both areas were produced almost exclusively on obsidian raw materials. The influence of raw material properties on core reduction techniques is absent in our comparison, therefore any patterns in reduction techniques highlight variation in learned and transmitted technical behaviors.

We compared data on core reduction strategies from the site of Barozh 12 in Armenia, and numerous surface artifact assemblages in the G'oll'u Dağ area of the CAVP [1]. We also conducted raw material sourcing using pXRF on a sample of artifacts from Barozh 12 to assess the potential extent of MP hominin mobility in the Armenian volcanic highlands.

At Barozh 12, surface and excavated alluvial deposits yielded exceptionally high artifact densities. Age estimates indicate a range of  $\sim 61 - 32$  ka BP OSL for the excavated sequence. Other MP sites in Armenia with chronometric ages date to  $\sim 104 - 30$  [2]. At G'oll'u Dağ, tephrochronology from the sites of K'orkuyu and Kaletepe Deresi 3 suggests a maximum age

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range for MP surface material in the CAVP of  $\sim 160 - \sim 70 - 20$  ka [3]. These dates provide overlapping age ranges for the assemblages we studied in the two areas, and both samples are representative of other MP assemblages in each region. This chronological framework serves as a starting point for assessing long-term technological trends.

Results of our analysis demonstrate significant differences in core reduction strategies between the study areas. At Barozh 12, unidirectional-convergent Levallois core reduction for the production of points dominates, as it does in much of the documented MP in Armenia. In the CAVP, preferential, unidirectional, and centripetal Levallois reduction strategies are pervasive, but the production of points utilizing systematic unidirectional-convergent Levallois core reduction is essentially absent. Obsidian artifact transports to Barozh 12 overlap with those observed at other MP sites in the Armenian volcanic highlands, and as a whole describe a confined area of diachronic hominin mobility that extends into eastern Anatolia.

Taken together, our results suggest long-term technological divergence based on a Levallois ‘platform’, and long standing artifact manufacture techniques among geographically separate hominin populations. Regionalized technological divergence may signify a cultural evolutionary outcome of sub-population isolation, an important aspect of metapopulation models of MP hominin population structure and dynamics [e.g. 4]. Hominin population dynamics in our study area were complex and may have involved long periods of demographic and behavioral continuity in relatively small and confined geographic areas. In order to test this scenario, future research in this part of southwest Asia needs to refine archaeological chronologies and paleo-environmental records.

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**Keywords:** Middle Palaeolithic, Armenia, Anatolia, Technological Divergence, Population Dynamics

# Theoretical expectations of geographic and ecological cultural patterns in archaic *Homo*

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Archaeology presents *Homo* culture as much less regionalized and patterning than more recent *Homo*. Emerging knowledge about cultural traditions in *Pan* suggests that preserving traces of culture probably represent only a small fraction of the actual cultural repertoire of early *Homo*. We here present an exploration of the possibility of forming at least qualitative expectations about what early *Homo* cultural heterogeneity might have looked like. To this end we implement and use a simulation model based on the assumption of continuity between *Homo* community dynamics and that of ancestral hominins, which we assume to be broadly similar to present-day *Pan*. That is, that they maintained a variety of material and non-material cultural traditions, and that they lived in ecologically competing fission-fusion communities, coordinated by face-to-face contacts that underwent fission if their sizes exceeded the limit of what cognitive capabilities permitted them to maintain stably.

Several features of the interaction between traditions and communities in *Pan* appear to be sufficiently general to bear extrapolation as long as the questions that we pose are sufficiently general. We have already outlined the basic kinetic of community lifecycle above, which we will argue is likely to be robust in its basic outline. Another feature that we argue is robust is that a strict compartmentalization of social networks within communities leads to a strong vertical channeling effect of culture. Cultural transmission demands close and prolonged social intimacy, which obtains within but not between communities. This suggests that horizontal transmission on the community level is likely a derived feature in late *Homo* and demands sophisticated institutions and cognitive capacities.

Certain systematic differences between early *Homo* and recent *Pan* will also be inferred. *Homo* relied on quite specific services of certain cultural traditions to a higher degree than *Pan* does. While some *Pan* traditions have been found to be adaptive, they do not rely essentially on any single tradition. By contrast, *Homo* is likely to have relied critically on technology and strategies that enabled them to obtain and process large carcasses.

Selection on cultural variants in *Homo* was thereby likely much more differentiated across the range of cultural traditions maintained than what is the case in *Pan*. Some traditions would be highly variable while others would be very strongly selected. The geographical extent of applicability of specific types of traditions also likely varied. If a tradition had an environmental target, such as a type of resource, the regional distribution of this resource would limit the potential for such traditions to spread.

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The model simulates a geographically explicit community dynamics driven by interaction between the hominins in the community and the environment via the application of a collection of cultural traditions formed by innovation and maintained by cultural transmission. In this platform, we vary parameters and ontological assumptions to explore the patterns and phenomena that are generated. We will explore the effects of varying the dominance of vertical over horizontal transmission, selection pressure across the range of maintained traditions, and landscape heterogeneities such as resource distributions and geographical barriers.

Our hypothesis is that traditions that are of universal applicability, and that are subject to strong selection, will be highly stable so that founder effects in waves of expansion will create large swathes of homogeneity. This is what we see as corresponding to the weak regionalization of early lithic technology. We think these will be overlaid with increasingly fine structures of variability in traditions that are uniquely aimed at environmentally heterogeneous features, and culture where the specific details are more arbitrary, such as social conventions. These may be very challenging, or even impossible, to detect empirically, and we hope to generate a basis for discussing how and whether that would be possible.

**Keywords:** culture, cultural traditions, geography, pattern, homo, early hominin, Pan, cultural group selection, vertical transmission

# Upper Palaeolithic cultural diversity in the Zagros Mountains and the expansion of modern humans into the Iranian Plateau

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Located in western Eurasia, at the crossroads of human migrations out of Africa during the Pleistocene, the Iranian Plateau stands at the centre of models of anatomically modern human (AMH) dispersals out of Africa. This paper aims to understand the cultural diversity among the first modern human populations in the area, and the implications of this diversity to evolutionary and ecological models of human dispersal through the Iranian Plateau, by re-examining four key UP lithic assemblages from the southern and west central Zagros Mountains of Iran. The quantitative data and techno-typological attributes combined with physiogeographic data were used to capture and contextualise the variation in lithic artefacts from the sites of Warwasi, Yafteh, Pasangar and Ghār-e Boof Cave. Our results demonstrate that there is a significant degree of cultural diversity rather than homogeneity among the UP throughout the different Zagros habitat areas. The analysis shows that at least three cultural groups can be recognized in the Zagros Mountains, which can be interpreted as parallel developments following the initial occupation of the region as a result of the relative geo-topographical isolation of the different areas occupied favouring different ecological adaptations. The greater similarity of lithic traditions and modes of production observed in the later phases of the UP indicates greater inter-group contact among the UP population of the west central Zagros Mountains. Based on the chronological and geographical patterns of Zagros UP variability, we propose a model of an initial phase of localised and patchy development of the early UP in the region, with limited subsequent contact among these first UP groups. This has important implications for the origins of biological diversity in the early phases of modern human colonisation of Eurasia.

**Keywords:** southern Zagros, west central Zagros, Upper Palaeolithic, cultural diversity, modern human dispersal

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# Was population density a constraining factor for regional scale technological differentiation during the Paleolithic?

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The proliferation of multi-regional studies of Paleolithic stone tool technologies raises the issues of recognizing inter-regional cultural differentiation and the potential identification of local trajectories of change. However, a commonly held view of Paleolithic hominin populations is that they were too sparsely distributed to engender regionally cohesive material culture. In this paper, we address the question whether regional cultural differentiation could have been sustained demographically during the Paleolithic. We evaluated Whallon's (2006) heuristic model of hunter-gatherer spatial organization and territory size by comparing it to ethnographically derived estimates of territorial ranges and population sizes of selected hunter-gatherer groups that are fully nomadic, utilize no domesticates, and occupy a range of environments (Binford, 2001). This comparison shows that Whallon's model echoes the documented variability in population densities, while it overestimates the expected sizes of occupational territories derived from our ethnographic dataset. We then projected the model onto southwest Asia to consider the possible spatial extent of a viable population of hunter-gatherers. The results of this study suggest that population density alone was most probably not a constraining factor for the establishment of regional cultural patterning during the Paleolithic. Instead, societal cultural transmission mechanisms were most probably vital factors that enabled the creation, maintenance, and enhancement of regional cultural differentiation. Especially, high-fidelity cultural transmission may impact the longevity of cultural traits within a group and/or within a population. In order to transfer this general approximation to a more realistic model bounded in time and space, more parameters need to be taken into account. These include environmental fluctuations, topographic and biogeographic barriers and their effect on carrying capacity, as well as population dynamics including isolation, local extinctions, dispersals, and connectedness among local populations within the metapopulation. Overall, this study highlights the need to develop an alternative interpretative framework for the emergence of regional cultural trajectories that is based on the complex interplay between population structure and hominin adaptations to local conditions. Such a framework can help bridge the inherent gap in spatio-temporal scale between the ethnographic and prehistoric records.

**Keywords:** Demography, ethnography, cultural transmission, regionalization

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# What does it mean to be both Pan-European and regionalized? Articulating spatial scales in the Early Aurignacian

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In South-Western France, the Early Upper Paleolithic is characterized by the succession of several well defined and distinct chrono-cultural phases. In recently revised archaeo-sequences the Châtelperronian, the Protoaurignacian and the Early Aurignacian follow one another in both a chronological and stratigraphic order that is now solidly established.

In this presentation, we will explore the significance of these phases principally via the Early Aurignacian, the first of them to be both identified and clearly redefined. Here we treat the Early Aurignacian as a technocomplex, as defined by D. Clarke, as "groups of cultures characterized by assemblages sharing a polythetic range but differing specific types of the same general families of artefact types, shared as a widely diffused and interlinked response to common factors in environment, economy and technology" (Clark, 1978: 206).

Using recent syntheses firstly at the scale of South-Western France, we will define the Early Aurignacian technocomplex and explore the elements that could help to delineate possible regionalization effects within a phenomenon that extends at a pan-European scale. While elements of personal ornamentation have often been invoked as markers likely to reveal regionalization related processes (Wobst, 1977), these patterns should be evaluated relative to other scales of artifact *range*, such as raw material circulation and its intersection with the organization of lithic technology, bone technology, and the archeozoological traces of herd exploitation. Personal ornamentation may only be adapted to certain scales of spatial resolution and have a homogenizing effect when treated independently. The objective here is to reflect upon differing scales of landscape use in the Early Aurignacian and what these reflect in terms of a systemically organized hunter-gatherer society. The tendencies described will subsequently be re-inserted into the panorama of the Early Upper Paleolithic sequence in an attempt to situate the Early Aurignacian within the different evolutionary trends that characterize this critical moment in human prehistory.

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University of Michigan : 317-340.

**Keywords:** Early Aurignacian, South, Western France, Regionalization, Landscape use, Material  
culture

**XVI-5. The search of small tools by  
Neanderthals populations in Western  
Europe.**

# Cores-on-flakes and ramification during the early Middle Palaeolithic in Southern France.

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During the early Middle Palaeolithic (MIS 10/9 – 6), the use of flakes as matrices in order to produce flake-tools or tools-blanks is increasing and starts to be widely used. Flake-blanks can be used for a variety of reasons: to produce smaller flake-tools, flake-tools with morpho-technical specificities (*e.g.* biconvex edges section) or as a saving of raw material.

Our study is based on several sites in Southern France. For the Western area, this includes la Micoque L2/3 (Les Eyzies-de-Tayac ; MIS 10), Petit-Bost n.2 (Neuvic ; MIS 9/8), Pech de l'Azé II n.7a-b-c (Carsac-Aillac; MIS 7/6), Combe Brune 2 n.VIIa (Creysse ; MIS 6) and for the Eastern area, Orgnac 3 n.2, 6, 7 (Orgnac-l'Aven ; MIS 9/8). All sites are located in a context rich in raw material and particularly with good qualities flints.

In Southwestern France, the methods employed on cores-on-flakes are mostly different that those employed by the main *chaînes opératoires* (S.S.D.A., Levallois, Disco'id or Quina). Indeed, they correspond to specific concepts such as Kombewa methods, Le Pucueil, or dorsal-surface flaking. Less commonly, main concepts mentioned below are made on flakes. However, in the layer 2 of Orgnac 3, the use of flakes as a production blank concerned the main *débitage*, which is Levallois recurrent centripetal. In the deepest layers (6, 7) of the site, S.S.D.A. methods are commonly used and cores-on-flakes reflect different *débitages* (Kombewa). Thus, some of these productions may be put in relation to the concept of ramification (Bourguignon *et al.*, 2004), unlike others.

Regarding the *débitage's* goals, the production on flakes could be considered in some cases as a complementarity – different goals – of the dominant productions (sites of the Southwestern area and layers 6, 7 of Orgnac 3) and otherwise as additional (same goals ; Orgnac 3, layer 2). We confront next all these results with published data in order to highlight the variability of the concepts, methods and objectives of those productions on flakes during the early Middle Palaeolithic in Southern France. Furthermore, it is interesting to follow their belonging (or not) with the ramification concept to which are attached almost all productions on flake during the "classic" Middle Palaeolithic (Bourguignon and Mathias, this session).

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**Keywords:** early Middle Palaeolithic, Kombewa, small flakes, ramification

# Disentangling the Micromousterian in the southern Balkans

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Among several Mousterian facies in the Balkans recognized according to F. Bordes' method or by a predominant technological or typological element, the Micromousterian stands out as a group defined in a completely different way – on artifact size. This 'facies' has been recognized in assemblages from numerous sites along the Adriatic coast in the southern Balkans. Its definition is independent of techno-typological parameters and as such obscures the variability that likely exists within this group. Small average artifact size in a lithic assemblage can result from several factors: raw material constraints, raw material selection, intensity of utilization of lithic resources, a purposeful production of small blanks, or a combination of these factors. Most of the eastern Adriatic Micromousterian industries most likely demonstrate the effects of small or low quality locally available raw materials that have an impact on the size and the flaking dynamics (e.g. Crvena stijena, Klissoura etc.), but some of them contain evidence of purposeful production of small flakes (e.g. Asprochaliko). Regardless of the cause of "microlithism", all these assemblages are clustered together and considered to be a regional phenomenon. Despite the vague criteria used for its attribution, Micromousterian as a group remained in use, sometimes owing to the lack of any particular element that would classify or describe an assemblage, other than small artifact size. This paper will address the issue of the Micromousterian in the southern Balkans and aim to elucidate the causes of "microlithism" at two stratified and relatively rich rockshelters in the Adriatic region of the Balkan peninsula, Crvena stijena and Bioče (Montenegro). Raw material differences and the effects of their properties as well as on-site reduction intensity are recognized as factors affecting the stone implement size. Production of small blanks is testified both through extensive use of cores and through flake production on cores-on-flakes, including cores with varied arrangements of removals that resulted in small blanks sometimes of elongated form. These results will be compared to other assemblages in the Balkans so as to evaluate any regionally continuous development and chronologically consistent trends.

**Keywords:** Middle Paleolithic, lithic technology, Balkans, Micromousterian

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\*Speaker

# Does size really matter? Micro-lithic production at Abric Romaní levels J, L and M: Exploring economic and evolutionary implications for Neanderthal societies

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In the last decades, we have witnessed crucial advances to describe and explain the variability of Mousterian lithic productions across Europe. This variability has important implications in terms of adaptive responses at the environmental and cultural changes that Neanderthals faced between ca. 250-30 kyr BP. The production of small tools is part of this variability. Small tools production has been linked with the notion of raw material economy (Kuhn, 1995), the ramification of lithic production (Bourguignon, et al., 2004; Rios et al., 2015), or with functional need in specific tasks (Dibble and McPherron, 2006; Mora et al., 2008). Moreover, this production has also been related to skilful gripping of Neanderthals hands (Niewoehner, 2006, Niewoehner, et al., 2003) and with the use of hafting (Boeda, et al., 1996; Mazza, 2006).

Different production systems of small tools have been described for Middle Palaeolithic assemblages. Among them different kind of technical systems as *coup de tranchet* (Bourguignon, 1992), Quina (Bourguignon, 1996; Rios Garaizar, 2005), Kombewa (Tixier and Turq, 1999), Micro-Levallois and Micro-Discoïd (Bourguignon, et al., 2004; Villaverde et al., 2012), bladelet productions (Maíllo Fernández, 2004; Martín, et al., 2006; Slimak and Lucas, 2006; Faivre, 2008) or Truncated-Faceted pieces (Dibble and McPherron, 2007). The technical procedures and the morphology of the blanks produced by these systems are quite different but they share some major features as the search for acute edges and the infrequent use of retouch to transform active and gripping parts.

At Abric Romaní levels J, L and M more than half of the knapped elements are small with a presence of use-wear in a part of them (Martínez, 2005; Martínez and Rando, 2001; Vaquero et al., 2012) and sometimes they are the result of ramified production system (Romagnoli et al., in press). The comparative analysis of these levels revealed that small flake production was a regular technological solution to fulfil the need of precision tools with small expenditure of raw material. This has implications in the increasing complexity of different productive activities and in the structuration of Neanderthal societies.

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**Keywords:** Lithic technology, Micro, lithic, Refitting, Iberian Peninsula, Middle Palaeolithic

# Micro-levallois productions in the interior lands of Iberia: the case of the Peña Cabra rock shelter

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In the Iberian Peninsula, a relevant number of Middle Palaeolithic assemblages where the search of small tools has been interpreted as a main objective of the lithic production has been recently published. However, these assemblages have been mostly limited to the Cantabrian and Mediterranean areas, while few cases have been reported for the Iberian interior. Here we present the study of the Mousterian lithic assemblages recovered at the Peña Cabra rock shelter, a multi-layered site dated to MIS 3 and located close to the southeastern foothills of the Central System mountain range (Guadalajara province, Spain). Here, we have identified an important number of small-sized cores and artefacts, some of them exhibiting technological features typical of Levallois reduction strategies. Thus, together with other exploitation strategies focused on discoid and Levallois knapping methods, the presence of micro-levallois *Chaîne Opératoires* has been attested for the Middle Palaeolithic of Peña Cabra. While the more expedient strategies, based on discoid methods, were produced on quartz and quartzite, Levallois and micro-levallois productions were based on fine-grained quartzites and flint materials. Retouched tools, including sidescrapers and points, are abundant in the studied assemblages, and some of them exhibit traits of intensive exploitation, such as resharpening and recycling. After presenting the lithic assemblages recovered at the Mousterian layers of the Peña Cabra rock shelter, we will discuss (1) the micro-levallois productions detected at this site in their regional and macro-regional context, and (2) the putative causes explaining the relevance of these small-sized productions for the techno-economic behaviors of Neandertal hunter-gatherers.

**Keywords:** Neandertals, Middle Palaeolithic, Lithic Technology, Iberian Peninsula, Micro, levallois, Small Tools

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# Middle Pleistocene microlithic tool production at Bolomor Cave (MIS 9-5, Valencia, Spain)

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The presence of small-sized lithic products in Middle Palaeolithic industries has repeatedly been proven, and for numerous European archaeological sites, this does not constitute recent evidence. In our study, we analyse the production process of these small artefacts – an intentional technological production within the Neanderthal lineage communities– using a chrono-stratigraphic sequence framed within the late Middle Pleistocene of the Iberian Peninsula. Specifically, we review the concepts and propose new approaches through the information provided by the small-sized lithic assemblages from the stratigraphic sequence of Bolomor Cave, Valencia, Spain. Multidisciplinary analyses of the Bolomor deposits have made it possible to identify a stratigraphic sequence spanning the time period from approximately 350–100 ka. Small tools within the lithic assemblages of Bolomor Cave have been recovered on several archaeological levels. This allows us to explore different research lines and variables of analysis from different perspectives, such as the supply of raw materials, the management of the lithic economy, including the ramifications as well as the recycling and mobility patterns.

In this work, we try to explore the origin of this production, its diachronic perspective and its particular characteristics beyond the prejudices of the supposed cognitive limitations of the Neanderthal societies regarding complex technological production models. We consider that the study of these aspects is vital to understand the general behaviour of these human communities. The singular character of these Palaeolithic productions will arouse future debates about their specific definition, characteristics and function. It will also enable us to analyse the link (or lack thereof) between the Palaeolithic productions and other complex production systems as well as the variability of the old lithic technological systems in Europe.

**Keywords:** Small tools, Middle Pleistocene, Iberian Peninsula, Bolomor Cave

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# Production and use of lithic small tool: a diachronic perspective. The case study of Oscurusciuto and Molare rock shelters (Southern Italy)

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The rock shelters of Oscurusciuto and Molare, located in southern Italy, respectively in Puglia and Campania, offer the possibility to analyse through time the presence of small tools in different Middle Palaeolithic frameworks. Namely, the Oscurusciuto rock shelter (Ginosa, Puglia) is characterized by a significant stratigraphy made up by several anthropic levels that cover a span of time between 43.000 - 55.000 BP (data referred for the part so far excavated). We selected the small tools of four levels (15-14-13-11), which shows peculiarities in terms of structural elements, spatial management, type of occupation and lithic production systems. While the Molare rock shelter (Salerno, Campania) is made up of an important stratigraphic sequence consisting of thin levels of Neanderthal occupations (sometimes real living floors) interpose by sterile red clay levels. Due to geological and faunistic markers it was possible to attribute the sequence of Molare to the MIS 5. For this work, we considered a sample of small tools coming from three levels (56, 50 and 46).

Our aim was to understand the cause of the variability of small tools taking into consideration their production, structure, and use. In order to achieve these goals we performed a combined method of technological, techno functional and use wear analysis. By the technological approach, we wanted to understand the role of the raw material selection, and reduction system implied in their production. By means of techno functional studies we wanted to deepen the understanding of the structure of each single piece, considering the transformative and prehensile parts, which

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play an important role especially in these small pieces. Finally, thanks to the use wear analysis we wanted to understand the gesture implied in the use of these tools, taking into consideration also the hypothesis of hafting.

By the integrated use of these methodologies, we could define the role of these tools in the lithic collection of each levels, then of each site, and consequently understand their variability in terms of production, and use trough time. In our opinion the choice of crafting small tools is determinate by a combination of variables that could not be entirely related with the constrain of the raw material. Making small tools is a choice made since the first phases of selection of raw material, production with peculiar reduction sequences and a particular structuration of the tool all implied in order to solve particular needs.

**Keywords:** Small tools, Lithic technology, Use, wear analysis, Techno, functional, Middle Palaeolithic.

# Ramification and minituarization of the lithic industries during the Middle Paleolithic in southern iberia. The example of Bajondillo Cave.

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Bajondillo Cave (Torremolinos, Málaga) has 6 strata (Bj/19 to Bj/14) attributed to the Middle Palaeolithic that cover from MIS 6 to MIS 3. In this work we present the technological, functional and raw materials revision and characterization of the aforementioned levels. From the technocultural point of view, all of them fit within the characteristics of Mousterian technology.

One of the points of interest of our work revolves around the processes related to ramification and small-scale operational schemes of the lithic production in these levels. The result of this approximation leads us to propose the concept of miniaturization of knapped lithic industries in contexts of Southern Iberian Middle Paleolithic against the term microlithization that we consider is better defined and more widely used in specialized literature to define technological processes specific to hunters -gatherers during the end of the Upper Palaeolithic.

**Keywords:** Bajondillo Cave, Minituarization, Middle Paleolithic, Mousterian

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# The Middle Palaeolithic 'Veldwezelt-Zeifen Laminar Industry', Belgium

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Quaternary research has recently combined climatic modelling, geology, archaeology and oxygen isotope analysis in order to find out when Neanderthals were present in Northwest Europe during the Late Pleistocene. Northwest Europe is usually regarded as having had an extreme cold climate during glacial phases. These cold glacial periods made Northwest Europe only marginally fit for human occupation. For the first time, the Veldwezelt-*Hezerwater* data reveal that, with a high degree of certainty, Neanderthals were living in this region of Northwest Europe during the Late Saalian 'Zeifen Interstadial' (MIS 6.01). The Middle Palaeolithic 'Veldwezelt-Zeifen Laminar Industry', which was excavated at the VLL Site and at the VLB Site at Veldwezelt-*Hezerwater*, shows a clear trend towards laminar, lithic production and small tool production.

The lithic industry of the VLL Site is characterised by: (1) parallel and prismatic core reduction, (2) very small cores, (3) strategies for rejuvenating core striking platforms (core rejuvenation flakes), (4) a general predominance of laminar products and (5) a toolkit, which was essentially dominated by small tool forms with burins, notched and denticulated pieces. The lithic assemblage, which was excavated at the VLL Site, shows that a 'small-tool-component' could be added to the usual 'macrolithic' Middle Palaeolithic tool assemblages. Charcoal remains, which were found at the VLB Site at Veldwezelt-*Hezerwater*, showed the presence of "*Pinus silvestris*" (= pine). The landscape was thus likely to have been fairly open. The lithic assemblage at the VLB Site was characterised by: (1) the presence of parallel core reduction, (2) opportunistic core reduction, (3) 'classic' Levallois *nuclei*, (4) few Levallois flakes and (5) a toolkit, which was again essentially dominated by small tool forms.

The VLL-VLB soil horizons at Veldwezelt-*Hezerwater* seem to represent Late Saalian phases of pedogenesis under boreal conditions just prior to the MIS 6/5e transition. They seem to represent the terrestrial equivalent of the Late Saalian 'Zeifen Interstadial' (MIS 6.01), whereas the capping GSL unit seems to represent the terrestrial equivalent of the so-called 'Kattegat Stadial'. Assuming that Northwest Europe was indeed too hostile for Neanderthals during the extremes of MIS 6 and given the pattern that Northwest Europe seems to have been a bit of a wasteland during MIS 5e, then the VLL and VLB Sites offer unique snapshots of Neanderthals occupying Northwest Europe for a short spell during the 'Zeifen Interstadial' (MIS 6.01).

**Keywords:** Veldwezelt, Hezerwater, Zeifen Interstadial, Small Tools, Blades, Neanderthals

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# The explosion of ramified chaînes opératoires during the Late Middle Palaeolithic

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This paper (or communication) follows the one presented by C. Mathias and L. Bourguignon on the oldest indications of Middle Palaeolithic ramification in the south of France. It will focus on demonstrating the development of this phenomenon until its explosion during the Late Middle Palaeolithic periods in Southwestern France.

This quantitative (proportions in industries) and qualitative demonstration will be based on data from our studies but also from those collected in the published literature.

As a successive development of secondary production(s) from matrices obtained by *débitage* (main production system), these ramified *chaînes opératoires* have different status within the industries although they are systematically represented regardless of the production system: Levallois, Quina or Discoid.

It is only within the Levallois system that a great diversity of ramification modalities is visible and where the objectives of the *débitage* are complementary to the main production with a search for small products or tools. In the Discoid and Quina systems, the ramification functions are additional (same products as the main productions) with only a search for dimensional reduction (microlitization). It is also in these systems that the combined-matrices (both productional and functional) are present. The goal of these pieces is the production of small flakes and the manufacture of a tool simultaneously.

A more or less strong development of ramified *chaînes opératoires* in these sites seems more related to cultural (techno-complex) and economic aspects (site status) rather than to the type of site (open-air site or cave, short or long duration of occupation), and a raw material economy (rich or poor in siliceous rocks, good or bad quality...).

In all cases, the development and explosion of this phenomenon seem linked to a search for small products/tools that became increasingly important.

This phenomenon seems significant when we know that in the Upper Palaeolithic the cultures could be differentiated sometimes on the basis of this micro-production (straight and twisted bladelets in the Aurignacian for example).

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**Keywords:** Recent Middle Palaeolithic, ramification, combined, matrices, small flake

# The explosion of ramified chaînes opératoires during the Late Middle Palaeolithic.

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could be differentiated sometimes on the basis of this micro-production (straight and twisted bladelets in the Aurignacian for example).

**Keywords:** Recent Middle Palaeolithic, ramification, combined, matrices, small flake

# The role of small flake tools in the technological variability of Cantabrian Region Middle Paleolithic

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The relevance of small tool production during the Middle Paleolithic in the Cantabrian Region has been highlighted in the last years grace to several publications (Cuartero et al. 2015, Lazuén and González-Urquijo 2015, Ríos-Garaizar et al. 2015). In these works the small tool production has been described as a planned method to provide tools for high mobility populations or groups inhabiting areas poor in good quality raw-materials (Ríos-Garaizar et al. 2015), it has been also pointed out the use of this kind of tools in precision activities (Ríos-Garaizar 2010). However, in a recent experimental work this link has been questioned, suggesting a more complex explanation for these industries (Bilbao Malavé 2017). Also, in some sites more opportunistic small flake productions have been identified (for example in Amalda level VII or in El Cuco level X), and interestingly small flake production also played a role in the technology of groups inhabiting areas close to raw material sources (for example in Aranbaltza I). It is also interesting to note that such productions are not relevant in Early Middle Paleolithic assemblages (Ríos-Garaizar 2017), suggesting that in this region they are a typical product of Late Middle Paleolithic.

In this presentation we want to explore the reality of small flake production in Cantabrian Middle Paleolithic to see differences between small flake production systems, to ascertain the different roles played by these small tools in the different assemblages, and to see if this variability can be interpreted in terms of chronology, site function, general technological features, etc. To do so we are going to present updated technological, functional and experimental data.

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**Keywords:** Middle Paleolithic, Cantabrian Region, Technology, Use Wear, Variability

# What does size mean? Searching for reasons for small tools in Navalmaíllo Rock Shelter by experimenting with quartz knapping from the Lozoya river valley (Madrid, Spain)

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Navalmaíllo Rock Shelter is one of five Middle Palaeolithic sites located in the karstic Calvero de la Higuera hill of Pinilla del Valle in the Lozoya river valley in the Central System of the Iberian Peninsula at c. 1100 m a.s.l. The intra mountain valley is an Hercinic pop-down structure covered by preserved Upper Cretaceous dolomites where karst systems are formed. The surrounding pop-up structure of Alpine orogeny gneisses and granites comprises the Guadarrama Mountain Range of the Central System.

Level F of Navalmaíllo Rock Shelter has a Neanderthal occupation between MIS 5a – early MIS 4 characterized by an abundance of lithic industry in quartz (c. 80% of total assemblage) with a strong tendency towards microlithism. Use-wear analyses performed on quartz samples point toward the versatility and intensive use of micro-tools.

Reasons for small tools and intense reduction of lithics in the Middle Palaeolithic are usually interpreted as economic or cultural adaptations, functional reasons or limitations such as - economic response to scarce raw materials of good quality, ramification of production by recycling

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existent tools into cores of new generation supports, adaptation to raw material constraints (support format and mechanical properties), a cognitive development linked to learning processes or cultural differentiation.

In the case of the Lozoya river valley, quartz is the most abundant raw material. To understand the reasons for the intense exploitation of this raw material and microlitization processes we did: 1) an intensive survey of the valley to record the availability of quartz, nodules format, and physical properties, 2) an experimental analysis using different knapping methods (bipolar, discoid, Levallois recurrent centripetal and preferential flake) using quartz nodules from the Lozoya valley.

With this study we aim at understanding the transformation processes by knapping quartz following the most common reduction techniques of the Navalmaillo Rock Shelter assemblage, the non-common (and almost inexistent such as Levallois) and analyse the knapping products. It is known that raw materials mechanical properties are important to understand technological adaptations within the *chaîne opératoire*. Mechanical constraints, together with a lower level of dexterity are assumed to be determining factors for the microlitization of quartz tools in older chronologies. Through the analysis of quartz properties and its behaviour when submitted to different knapping methods we hope to better understand Neanderthal technological adaptation to the resources of the Lozoya valley and tackle the reasons for the abundance of small tools in Navalmaillo Rock Shelter.

**Keywords:** Navalmaillo Rock Shelter, Middle Palaeolithic, experimental quartz knapping, lithic technology

**XVI-6. Cantabrian Spain and  
surroundings during the Palaeolithic:  
new data and approaches.**

# Comportements de subsistance lors de transition Paléolithiques moyen/supérieur dans la grotte d'El Castillo (Cantabrie, Espagne)

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La grotte d'El Castillo fait partie des grottes emblématiques de la région Cantabrique. Elle est inscrite au patrimoine mondial de l'UNESCO en 2008 sous le titre de " *La grotte Altamira et l'art rupestre paléolithique du nord de l'Espagne* ". Ce site archéologique est aussi réputé pour sa séquence stratigraphique présentant plusieurs phases d'occupations préhistoriques et en particulier les technocomplexes se succédant lors de la transition Paléolithique moyen/supérieur, qui font l'objet de ce présent travail.

Nous présenterons lors de ce congrès une partie des résultats obtenues lors de notre travail de doctorat intitulé : *Paléo-environnement et comportements de subsistance des derniers Néandertaliens et des premiers hommes modernes : étude taphonomique de la faune de la grotte d'El Castillo (Espagne)*. L'analyse archéozoologique/taphonomique a porté sur 158 501 restes osseux (dont 20 431 déterminés taxonomiquement et/ou anatomiquement). Ce matériel provient des fouilles réalisées entre 1980 et 2011 par l'équipe de Cabrera-Valdés/Bernaldo de Quiros, et correspondant aux niveaux 21 et 20 (Moustérien), au niveau 19 et au niveau 18 (Aurignacien de transition de type El Castillo 18B et 18C, Cabrera-Valdés et al., 2001). Les résultats montrent que chez les dernières populations moustériennes terminales (niveaux 21 et 20 et sous-niveaux 19Base), on observe une chasse opportuniste centrée sur les cerfs, les bovinés et les chevaux. Au contraire, le groupe humain du technocomplexe de l'Aurignacien de transition (sous-niveaux 19sup, 18C et 18B) s'organise autour d'une acquisition spécialisée du cerf. En revanche, les modalités de traitement des carcasses sont sensiblement identiques.

Ainsi dans un environnement tempéré froid correspondant aux variations climatiques des Greenland stadials et interstadials (GS13 au GS9), on observe un changement de comportement en termes de stratégies d'acquisition du gibier entre les derniers groupes humains moustériens et le groupe humain du technocomplexe de l'Aurignacien de transition.

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**Keywords:** Espagne du Nord, Cantabrie, El Castillo, Paléolithique moyen, Paléolithique supérieur, transition, Moustérien, Aurignacien, Aurignacien de transition, Néandertal, homme moderne, archéozoologie, taphonomie, paléoenvironnement.

# Environment and subsistence strategies at La Viña rock shelter and Llonin Cave (Asturias. Spain) during MIS3

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The sites of La Viña and Llonin have an important archaeological sequence corresponding to Marine Isotope Stage 3: Mousterian, Aurignacian and Gravettian periods. La Viña is a complex site with continuous occupations but, at least during Mousterian and Aurignacian, it was affected by important alterations due to its morphology and the physical processes involved; while Llonin mainly consists of a sporadic human occupations. The current multidisciplinary research has allowed us to obtain and match several data: site formation processes, fauna and stable isotopes, vegetation, radiocarbon, shell ornaments, lithic raw materials and technology, offering an interesting frame of two separated ecological niches: mountainous (Llonin) and open river valley (La Viña). During the Mousterian the faunal composition of La Viña is scarce but dominated by red deer followed by chamois, while large mammals are absent. At the Aurignacian

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red deer and chamois are also represented within a larger assemblage, together with a low representation of other taxa such as horse, bovines, Spanish ibex and roe deer. In Llonin chamois and Spanish ibex dominate, followed by red deer. Carnivores are represented by bear, fox and wolf at La Viña, as well as in Llonin besides of hyena, dhole and leopard. La Viña ungulates show evidences of anthropogenic modifications including cut marks, fresh breakage and thermoalterations. At Llonin is an accumulative alternation of different carnivores and human events with a limited human activity. Charcoal and microfauna analysis shows an open landscape, dominated by heliophilous, pioneering species characteristic of the montane biogeographical belt. *Sorbus*, birch and Scots pine are especially important as well as a shrubland mainly dominated by leguminous. The environment seems to be more arid and open in Mousterian levels, more forested and humid during the Aurignacian and cold in the Gravettian. Quartzite is the main raw material in both sites during MIS3. Its catchment is basically local during Mousterian and broaden in the Aurignacian and Gravettian incorporating local, semilocal and foreign flints for blade and bladelet production.

**Keywords:** Paleoclimatology, Economy, Mobility, Taphonomy, Human/Carnivore occupations

# Hunting specialization during the Lower Magdalenian. A taphonomic approach of Cova Rosa site

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The progressive hunting specialization during the Upper Paleolithic is a recurring theme in the scientific literature. Despite this, we consider that it is necessary to return to the discussion of this problem for two reasons. The first one is that it is a subject that has been widely studied from a zooarchaeological perspective, but not a taphonomic one. The works that pay attention to issues such as differential transport, differential preservation, fracture patterns, brand frequencies, etc., are scarce. And, the second, that these studies have been conditioned by the limitations of the methods used in ancient excavations, such as the selection of material during field work, since only what was considered to be identifiable at that time and/or useful in terms of research was collected. The aim of this communication is, therefore, to show the results of a detailed taphonomic analysis of level B6 of the Cova Rosa site, dating from the lower Magdalenian. The choice of the site to make this approach to the problem has not been by chance. Although Cova Rosa is a site excavated in ancient times (70's), it stands out for the use of a very rigorous excavation methodology, consisting of the excavation in area, the location of the material in coordinates and the screening of the sediment in sieves of 5 , 2 and 0.4 mm. Thanks to the implementation by F. Jordá and A. Gómez of this new methodology for the time, we can minimize the bias of the archaeological material recovered in the field and thus, make a better approximation to the proposed problem.

**Keywords:** hunting specialization, Lower Magdalenian, Cantabrian region, taphonomy, Cova Rosa

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# La ” Cueva Hermosa ” (Calcena, Saragosse) : Un nouveau territoire d’art paléolithique à la Chaîne Ibérique d’Aragón

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Les précédents travaux d’étude et de documentation réalisés à la Cueva Hermosa (Calcena, Saragosse) suggèrent que nous sommes face à la seconde cavité avec des manifestations pariétales paléolithiques d’Aragon, après de la grotte bien connue de Fuente del Trucho (Colungo, Huesca). La grotte est située sur la rive gauche de la rivière Isuela, affluent du Jalón, à 1 Km. à peu-près de la grotte Bolichera, où les fouilles menés par C. Mazo ont trouvé des vestiges magdaléniens, avec un harpon d’une rangée de barbelures (Utrilla et al., 2010). À l’intérieur de Cueva Hermosa, une grotte très belle par ses stalagmites, et à 45 m. de l’entrée, on a trouvé des alignements de points rouges qui sont disposés de manière ordonnée, régulièrement séparés, formant 12-13 colonnes avec un développement de tendance rectangulaire. Cet ensemble est divisé en deux groupes pour des raisons de conservation du support, avec 133 points rouges dans le groupe à gauche et 43 dans le groupe à droite. En plus, il fait partie d’une niche de grandes dimensions, dont la morphologie rappelle le profil d’un mammoth, tout de même que la forme du support où est encadré le mammoth final de Pindal. En plus, cette morphologie a été travaillée artificiellement pour obtenir la forme cherchée. Ce thème (nuages de points rouges) est très abondant dans les ensembles d’art rupestre paléolithique. Les points groupés peuvent faire partie d’ensembles complexes (Fuente del Trucho, Altamira, Castillo, Pasiéga, La Garma, Candamo, La Estrella, Font de Gaume, Pech Merle, Trois Frères, Niaux, Marsoulas, ...), mais aussi ils peuvent être liés aux reliefs naturels (Chuffin, Pindal, Pestillac, Aldène, Mayenne) ou apparaître comme le thème principal de la grotte (Las Palomas, Atlanterra, La Meaza, Las Aguas de Novales, Cudón, Grotte aux Points, Les Fieux ...). Même, les points peuvent être tout seuls dans la grotte, comme thème unique (Los Marranos, Porquerizo, San Juan de Socuevas, Mazaculos, La Riera et, la dernière découverte, Cueva Auria). Il a été impossible d’obtenir une datation U/Th de la croûte calcitique (encore active) qui est superposée sur certains points. Cependant, en tenant compte des contextes artistiques associés, il est possible d’envisager une datation pré-magdalénienne pour l’ensemble, malgré que les gisements paléolithiques des alentours (Cueva Bolichera, Cueva del Gato, Abrigo Alejandro, Abrigo Vergara, Peña del Diablo, Plaquette de Villalba) appartiennent tous à différentes étapes magdaléniennes. Cueva Hermosa permet d’envisager de nouvelles possibilités d’interprétation de l’occupation humaine avec des manifestations artistiques au cours

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du Paléolithique dans une zone périphérique, fournissant des informations sur les modes de peuplement et les réseaux de communication des sociétés paléolithiques entre le Plateau Ibérique, la Vallée de l'Ebre et la Corniche Cantabrique.

**Keywords:** Palaeolithic rock art, Middle Ebro Basin, Dot series

# Magdalenian Lithic Implements at El Horno (Cantabria, Spain): procurement, production and use.

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El Horno Cave is located in the middle River Asón valley (eastern Cantabria Province, North Spain), at about 200 m above sea level and 20 km from the present coastline. A surface area of 3.5 m<sup>2</sup> was excavated there from 1999 to 2007. The intact part of the archaeological deposit (Levels 1, 2 and 3) yielded a series of remains which can be attributed to upper Magdalenian occupations. Fieldwork in 2000 and 2001 retrieved 1,724 lithics from intact levels. The presentation will focus on the results of the technological study of the whole lithic assemblage, including retouched artefacts, the larger knapping debris, and the smaller waste products. Based on previous raw material studies, the different *chaînes opératoires* have been reconstructed and the strategies to obtain the blanks (flakes and blades) determined. In addition, the objectives of the production that were identified in the technological study acquire greater significance through the use-wear analysis that has been performed.

**Keywords:** Magdalenian, Cantabrian Spain, Lithics, Technology

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# NEW ARCHAEOZOOLOGICAL DATA AT EL CIERRO CAVE (ASTURIAS, SPAIN): THE UPPER SOLUTREAN LEVELS (22000 CAL BP)

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El Cierro cave is an archaeological site of the Cantabrian region located at the council of Ribadesella (Asturias, Spain), on the western margins of the Sella river. It is a cave with a broad stratigraphic sequence that runs from late Middle Palaeolithic to Mesolithic. The aim of this paper is to show the results of the archaeozoological analysis of levels H1 and H2, ascribed to the Upper Solutrean and dated *ca.* 22000 cal BP, which come from the excavations directed by A. Gómez Fuentes and F. Jordá Cerdá during 70's of the 20th century, and the ones conducted during 2016. The archaeozoological and taphonomical study of the mentioned levels has allowed us to describe the subsistence strategies carried out by the Solutrean inhabitants of El Cierro, as well as the intervention of other living beings on the archaeological record. For that purpose, we establish a prey ranking dominated by red deer (*Cervus elaphus*) on both levels, followed by ibex (*Capra pyrenaica*), roe deer (*Capreolus capreolus*), and horse (*Equus ferus*). We also take into account the presence on the archaeological record of some species that were not part of the diet of the site's inhabitants, as is the case of the fox (*Vulpes vulpes*). In addition, our analysis focuses on the taphonomic marks, both the anthropic ones (obtaining preliminary conclusions about butchering and consumption processes), and the ones made by other agents (carnivores, plants, etc.). Finally, we put our results on a broader perspective, that of the Solutrean period in the Sella river valley and the Cantabrian Region.

**Keywords:** Upper Pleistocene, Solutrean, Archaeozoology, Taphonomy, Spanish Cantabrian Region

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# NEW STUDIES AND INTERPRETATIONS OF CAVE ART FIGURES OF THE CUEVA DE EL CASTILLO (CANTABRIA, SPAIN).

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During the year 1952 Professor E. Ripoll-Perelló and his wife A. L. López were given permission from the Patronato de las Cuevas Prehistóricas de la Provincia de Santander to study the Cueva de Las Monedas in the *Monte de El Castillo*, Puente Viesgo (Cantabria). While they performed these works they had opportunity to visit the cave on several occasions and compare it with the information published by Abbé H. Breuil, assisted by H. Alcalde del Río and L. Sierra in *Les Cavernes de the Region Cantabrique*. Throughout his explorations they could see that many of the published images on the one hand did not correspond with reality and on the other they found numerous unpublished representations. In 1953, my parents decided to carry out the review of the representations described and returned with another permission from the same institution. The work was done in several campaigns and carried out the discovery of almost 300 new figures in the *Cueva de El Castillo*. Eduardo Ripoll have never published the results of their investigations and told me many years later that it was because the change of methodology that was imposed in the 1960s. A few weeks before the death of my father in the year 2006, in Barcelona, in a very solemn manner gave me a great portfolio that kept all the documentation of the Castillo and told me: publish it! Finally a few months ago I had a clear idea and the work was developed together with a group of researchers, we ask for the mandatory permit to verify suitability of the descriptions of my father, his location in cave and above all make some new photos of certain grounds. The application of emerging technologies in digital image processing has allowed us to expand 280 my father figures to nearly 550 new figures, some of them quite spectacular. And are those present in this Congress. We are aware that over the years have been many researchers who have been studying the great cave, but so far we have not found references to demonstrations that here either do a different reading.

**Keywords:** ar rupestre paléolithique, nouvelles techniques chronologie

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# New data for the late Upper Paleolithic in Cantabrian Spain: Arangas cave (Cabrales, Asturias, Spain)

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The Arangas karstic system is located in Asturias, North of Spain. The different caves located in this system (Arangas, Los Canes and Tiu Llines) were excavated from 1985 to 1998, allowing us to record different archaeological sequences from the Solutrean to the Bronze Age. During 2007, a new field season was developed in Arangas Cave with the aim to record the lower layers of the archaeological sequence in a very specific area (named Area E). Levels E, F and G were recorded during the archaeological excavation. Levels E and F are characterized by a high abundance of fauna remains (macro and micro-mammals) and, in less affluence, lithic and charcoal remains, showing an intense anthropic activity. The only radiocarbon date available reflects that the formation of Level F took place during the Lower Magdalenian (14840±65 BP; 18258-17863 cal BP). The lower part of the stratigraphy, level G, shows less abundance of remains, which a decrease from the top to the bottom of the archaeological level. In this contribution we present all the archaeological information related to the occupations dated in the Late Upper Paleolithic in the sector E of the cave.

**Keywords:** Arangas Cave, Lower Magdalenian, Upper Pleistocene, Cantabrian Spain

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\*Speaker

# PARÁMETROS DE DISEÑO DE PROYECTILES Y EFECTIVIDAD CINEGÉTICA EN EL SOLUTRENSE PENINSULAR: PUNTAS DE BASE CÓNCAVA vs HOJAS DE LAUREL

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Desde finales del Solutrense Medio y sobre todo en el Solutrense Superior se observan diferentes modificaciones en el la zona proximal de las puntas foliáceas para facilitar su enmangue al astil: hojas de laurel con pedúnculo central o muesca lateral, puntas del Serinyadell, puntas de aletas y pedúnculo o puntas de muesca de retoque plano y abrupto. Una de las soluciones más singulares aparece en las puntas de base cóncava del Solutrense de la Cornisa Cantábrica y de la zona pirenaica francesa. La aparición de nuevos tipos y soluciones de enmangue no sólo podría estar relacionada con nuevos sistemas de propulsión de estos proyectiles, sino que además se correspondería con una mayor efectividad cinegética. Así, hemos establecido un modelo teórico y experimental para evaluar el coeficiente de penetración y el índice de corte (TPI: Tissue Penetration Index) de las puntas de base cóncava y compararlo con otros tipos de proyectiles solutrenses. Este modelo se basa en las propuestas realizadas por Friis-Hansen (1990) para los proyectiles mesolíticos y Ashby (2006) para las puntas usadas en arquería cinegética actual. Para ello, se han tenido en consideración, además de los parámetros morfométricos básicos (longitud, anchura y espesor), el perímetro de la punta, el ángulo frontal, el área de la sección frontal y el área del diámetro del astil. Por último, los dayos obtenidos se han confrontado con estudios similares realizados para otras puntas de proyectil.

**PALABRAS CLAVE:** Solutrense, Punta de base cóncava, Hoja de laurel, Enmangue, Tipometría, Balística, Caza.

**KEYWORDS:** Solutrean, Concave base point, Laurel leave point, Hafting, Morphometric Analysis, Ballistic, Hunting.

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**Keywords:** Solutrean, Concave base point, Laurel leave point, Hafting, Morphometric Analysis, Ballistic, Hunting

# Patterns in the Location of Decorated Caves: the Nalón River Basin (Asturias, North Spain) in pre-Magdalenian times.

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Research on Palaeolithic societies has mainly focused on archaeological deposits and rock art. In contrast, the location and characteristics of the sites where these forms of evidence are found: rock-shelters and caves in the case of Cantabrian Spain, have hardly been studied systematically with the application of a specific methodology. However, these places, whatever the activity that was carried out in them, are an important component of the archaeological record, as they were chosen by hunter-gatherer societies for particular purposes. The integration of spatial information with data from the archaeological record *sensu stricto* is able to generate solid hypotheses about the role of the sites in their social context. This is not only of interest from a materialistic/subsistence perspective, as the choice of a certain site may be determined by more subtle factors, such as the significance or symbolism of certain elements in the landscape or of the sites themselves. In this sense, the potential amount of information that Palaeolithic rock art sites can provide is evident. This poster will present the preliminary results of a study on the location and setting of a large group of caves in the Nalón River Basin (Asturias, North Spain) containing parietal art of pre-Magdalenian chronology. The research has aimed to determine whether this type of site displays a relatively common location pattern.

**Keywords:** Rock art, Cantabrian Spain, Landscape, Location pattern

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# Revisiting Hornos de La Peña 100 years after

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The site of Hornos de la Peña (San Felices de Buelna, Cantabria, Spain) was first discovered by Alcalde del Río in 1903, and was excavated by H. Obermaier in 1909-10. The results from this excavation were succinctly published in Breuil and Obermaier's book (1912). In the last decades the site has remained almost forgotten, and only few attempts to obtain new information have been carried out (Bernaldo de Quirós, 1982 ; Carrión, 2002). The major handicaps for the site are the lack of definition of the archeological sequence, the bias created by old excavation methods, the difficulties for attributing specific artefacts to the archeological units described by Obermaier (see for example the case of the engraved horse frontal- Tejero et al. 2008), and the absence of a reliable chronology for the human occupation there (see Soto-Barreiro 2003).

Despite these handicaps the site is still very interesting, first because an important rock-art assemblage was found (Alcalde del Río, Breuil and Sierra, 1911), including typical Pre-Magdalenian and Magdalenian manifestations (Rivero and Garate 2013); and secondly, because the site contains Mousterian and Aurignacian occupation evidences which makes an ideal location to investigate the Middle to Upper Paleolithic transition. Besides, the Solutrean and Magdalenian occupations at the site are relevant to understand the LGM and Late Glacial occupations in the mountainous region of upper Besaya river. Unfortunately, the site has suffered from severe alterations due to phosphate exploitation previously to Obermaier excavation, the use as a refugium during spanish Civil War (Ontañón, 2009), and the civil works made at the site to facilitate the touristic visits. All these affections and archeological works have left only few stratigraphic witnesses to evaluate the archaeological sequence at the site.

In 2016, in the framework of a reanalysis of the rock-art assemblage led by O. Rivero, one of the stratigraphic sections left by H. Obermaier situated in the entrance hallway (just after the fist hall of the cave) was cleaned, revealing a complex sequence comparable to the descriptions made by Obermaier. Sedimentary, faunal and lithic samples have been recovered from this section cleaning and bones with anthropogenic modifications from levels 4, 5, 6 and 8 have

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\*Speaker

been sent for AMS dating. First results suggest the existence of a Magdalenian layer situated at the top of the Paleolithic sequence (level 4) and several Mousterian layers at the bottom (levels 8-14). In between several layers have been identified but the chrono-cultural attribution remains uncertain. In 2017 we extended the excavation one of these Mousterian layers (level 13), revealing a rich and well preserved Neandertal occupation.

With the current research the aim is to provide new information about Hornos de la Peña with a modern and multidisciplinary approach, to remark the importance of the site within the Cantabrian Paleolithic.

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**Keywords:** Paleolithic, Cave site, Rock, Art, Aurignacian, Mousterian, Magdalenian, Solutrean

# SUBSISTENCE STRATEGIES DURING THE LOWER MAGDALENIAN IN THE SPANISH CANTABRIAN REGION (20000 – 17000 cal BP): MACROMMAMMAL EXPLOITATION

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This communication aims to review the available information in the literature about macromammalian fauna in the Spanish Cantabrian Region during the Lower Magdalenian. For that purpose, in addition to the fauna at El Cierro Cave (Asturias, Spain), a site that we are analysing in the framework of our Ph. D., we will take into account the published archaeozoological data from recently excavated sites made with modern extraction methods, which include radiocarbon chronologies and faunal analysis done by an specialist. We will also study how faunal evidence can help us to understand the subsistence strategies of the human groups that inhabited this region *ca.*20000-17000 cal BP. Thus, after gathering and contrasting all the available data, we will establish the prey ranking of the hunted species for the Spanish Cantabrian Region during the mentioned period, as well as the represented skeletal patterns and the energy supply each taxon would bring to the diet of the Magdalenian human inhabitants of the region. Finally, we will point out the existence of intra site changes and continuities in the faunal patterns of those sites that count with different levels associated to the same cultural period. This information will allow us to point out some preliminary conclusions about the seasonal occupation of the Cantabrian Region during the Lower Magdalenian regarding the seasonal hunting. Taking into account the biological, ecological and geographical conditioners of the macromammal species included in our study, we will use Digital Elevation Models for establishing which the faunal catchment areas of the human groups were.

**Keywords:** Subsistence strategies, Lower Magdalenian, Spanish Cantabrian Region, Archaeozoology

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# Some significant recent developments in the study of the Cantabrian Upper Paleolithic

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The purpose of this communication is to highlight some of the major recent developments in the study of the Upper Paleolithic in the Cantabrian region of northern Spain. These include: 1.) The more accurate & precise re-dating of the Aurignacian and debates concerning the origins of cave art; 2.) The notable increase in discoveries, excavations & publications of Gravettian sites (including the regionally unusual importance of open-air loci & the "Noailles" phenomenon, as well as the broader question of the expansion of modern human settlement of the rest of the Iberian Peninsula); 3.) New evidence on the beginning & end of the distinctive Cantabrian Solutrean cultural-adaptive phenomenon and its wider social contextualization within the Last Glacial Maximum environments of SW Europe; 4.) Recently studied, long Magdalenian sequences in El Miron, Las Caldas & other caves and new research foci on the waxing & waning of long-distance social networks, as manifested by non-local flints, shells, portable art objects (or the ideas for them), as well as on questions of Magdalenian systematization and inter-assemblage variability and disposal of the dead in light of the El Miron Cave "Red Lady" burial.

**Keywords:** Cantabrian Spain, Upper Paleolithic, Aurignacian, Gravettian, Solutrean, Magdalenian

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\*Speaker

# The Lower Magdalenian in Cantabrian Spain: Level G1 at El Cierro Cave (Fresnu, Ribadesella, Asturias)

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El Cierro Cave possesses one of the most complete prehistoric sequences in northern Spain, since its different levels cover the period from the late Middle Palaeolithic to the Mesolithic. In the late 1950s, Professor Francisco Jordá Cerdá excavated the deposit and attributed Layer 5 (later called Level IV) to the upper-final Solutrean. From 1977 to 1979, this archaeologist and Alejandro Gómez Fuentes cleaned the section left by the previous excavation, took samples from each level, and excavated three Lower Magdalenian levels (Levels F, G and G1). However, the data from this fieldwork were never published. Since 2014, an interdisciplinary team lead by the University of Salamanca has been carrying out new research at the site. This communication presents the study of the archaeological remains (fauna, lithic and osseous industry, portable art, etc.) from Level G1. This Lower Magdalenian level is dated in ca. 15,500 BP.

**Keywords:** El Cierro Cave, Lower Magdalenian, Upper Pleistocene, Cantabrian Spain

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\*Speaker

# The Palaeolithic sequence of El Olivo cave (Llanera, Asturias, Northern Spain)

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El Olivo cave (Llanera, Asturias), has a complex archaeological sequence discovered in 2012, comprising Magdalenian levels overlapped on a Middle Paleolithic horizon. The cave infill has been excavated in five archaeological campaigns, between 2012 and 2017. The interest of this cave is its proximity to other important Magdalenian sites in the Nalón river basin, but with distinctly different characteristics, which has served to hypothesize that El Olivo cave represents a different type of settlement, which we called "secondary camp". On the other hand, the identification of a new Mousterian human occupation in this cave, located in the central coastal region, where only open-air sites were documented, is also an aspect of great interest. In this work we present the results of five years of excavations which revealed an interesting site.

**Keywords:** Catchment area, Magdalenian, Middle Palaeolithic, Cantabrian Spain

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**XVI-7. Is 'Neanderthal behaviour' a useful concept? Multiscalar approaches to the behavioural diversity of middle palaeolithic neanderthal populations.**

# ”Early ”Anatomically Modern Humans” and ”Modern” Neanderthals in Bavaria: a behavioral perspective.”

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Bavaria’s late Neanderthal legacy is particularly rich and allows for the observation of rhythms of Neanderthal behavior. As a phenomenon of intrasite variability, cyclic changes occurred within Late Middle Paleolithic artefact use and connected mobility patterns, f.e. at Sesselfelsgrotte. During the last phase of the Middle Paleolithic, Eastern Bavaria became a principal focus of Neanderthal behavior. We will tackle the question, if some of our observations might already mirror a competitive relationship between the last neanderthals and their Homo sapiens neighbours.

**Keywords:** Transformation analysis, behavior, mobility

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# ”The struggle zone” tracking the Neanderthals and modern humans contacts in the west-central Zagros Mountains

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## Abstract

In the past four decades, a topic of major interest amongst archaeologists and palaeoanthropologists has been the Eurasian Middle-Upper Palaeolithic transition. Recently, great progress was made in several domains, particularly Palaeogenetics, which have revealed the complex ancestry of early Eurasians. This progress – including identifying a ghost lineage of Eurasians in the Middle East - is beginning to provide important new biogeographical hypotheses that focus on the Middle East. One key region for this is the Iranian Plateau, which has not been subject to intensive research. The Kermanshah Region (on the West of the Plateau), the interest area for this research, has been recognized as one of the gates into the Iranian Plateau since it is located between the Mesopotamian lowland on the west and the high plateau where many intermountain valleys have provided easy communication routes to the eastern regions. Despite this important strategically position in the West Central Zagros, our knowledge of Palaeolithic occupation there and even in Iran is suffering from the lack of a clear, up-to-date and scientific work on stratigraphy, settlement systems and accurate absolute dating. To overcome some of these problems, after the lack of serious Paleolithic research for many years, the author has recently conducted a Palaeolithic research project including surveys and excavations in the Kermanshah Region.

**Keywords:** Neanderthal, Middle Palaeolithic, Upper Palaeolithic, Asia, Zagros Mountains

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# A focus on percussion notches to approach the variability of Neanderthal behaviours: the example of Abri du Maras and Saint Marcel cave (Ardèche, France)

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The identification of the know-how transmission mechanism and social learning processes within Neanderthal group is currently explored in the studies of lithic material, but not only. The patterns of long bone breakage for marrow recovering may represent a useful tool to identify butchery traditions. Identifying and comparing such breakage patterns on a regional scale may permit to discern specific cultural behaviours. The two Neanderthal sites of Abri du Maras (sublevels 4.1 and 4.2) and Saint Marcel (units g and h), close together, both spatially and chronologically, reflect a diversity of subsistence patterns. The units g and h of Saint Marcel and the sublevel 4.1 of Abri du Maras present a monospecific spectrum where Cervids are dominant (respectively red deer and reindeer). In the sublevel 4.2 of Abri du Maras, the species hunted and consumed are the same than in the sublevel 4.1, but large ungulates (bison and horse) are much more represented. We would like to test the presence of butchery tradition within these four bone assemblages in parallel to the subsistence behaviours (hunting and carcass transport strategies). To approach the long bone breakage process, we focus on the location of the percussion marks, taking into account the variability of ungulate sizes and morphologies. The distribution of percussion notches along long bone shafts in the sublevel 4.1 already shows that for reindeer there was no standardized pattern in the breakage process. This comparative analysis may bring new evidences concerning the skills and know-how of the Palaeolithic "butchers" for various archaeological sites and various ungulates at a regional scale. Such analysis, approaching cultural traditions from the study of percussion marks, must be included in a global archaeological research in order to better understand Neanderthal behaviours.

**Keywords:** Middle Palaeolithic, Neanderthal, Breakage patterns, Butchery, Cultural practices

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\*Speaker

# Chronological and behavioural discontinuities at the Neanderthal site of Sima de las Palomas del Cabezo Gordo (Torre Pacheco, Murcia Spain)

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The Sima de las Palomas del Cabezo Gordo (Torre Pacheco, Murcia Spain) excavation and stratigraphy show Neanderthals there behaved differently at different MIS-5 to MIS-3 times. Excavation has reached a depth of ~6 m. Skeletal remains exist of 13 Neanderthals. The deepest 2 m are, dated by OSL to MIS-5 ~130-100 ka (Walker et al., 2017), contain abundant burnt and unburnt animal bones (mainly ungulates, lagomorphs, tortoise), Mousterian knapped artifacts (chert, marble, limestone, quartz, quartzite), smooth allochthonous spherical cobbles, and Neanderthal teeth and a mandibular fragment. Those deposits were sealed by a solid MIS-4 conglomerate band dated by U-ser to 68-65 ka (Walker et al., 2017). Above it, entombed in incompletely-cemented sloping scree, lay anatomically-connected skeletal remains of a Neanderthal woman, child, and another adult, dated by U-ser to ~55-50 ka (Trinkaus and Walker, 2017; Walker et al., 2012, 2011a,b), with two articulated leopard paws, burnt horse astragali, and knapped chert. MIS-3 sediments accumulated (~45-40 ka: Trinkaus & Walker 2017; Walker et al., 2008) around that partly-consolidated scree slope, filling up the remaining cavity to its rock roof, and containing both a deep ash lens and several fragmentary Neanderthal skeletal elements and Mousterian artifacts, doubtless produced by behaviour beside the shaft mouth. (References: Trinkaus & Walker, 2017, *The People of Palomas, Neandertals from the Sima de las Palomas del Cabezo Gordo, Southeastern Spain* Texas A&M Univ. Press; Walker et al., 2017, Preliminary dating of deep layers at Sima de las Palomas del Cabezo Gordo (Torre Pacheco, Murcia, Spain). *Proceedings of the European Society for the Study of Human Evolution* 6, 210; Walker et al., 2012, The excavation of the buried articulated Neanderthal skeletons at Sima de las Palomas (Murcia, SE Spain). *Quaternary International* 259, 7-21; Walker et al., 2011a, Morphology, body proportions, and postcranial hypertrophy of a female Neandertal from the Sima de las Palomas, southeastern Spain, *Proceedings of the National Academy of Sciences of the USA* 108, 10087-10091; Walker et al., 2011b., Neandertal postcranial remains from the Sima de las Palomas del Cabezo Gordo, Murcia, southeastern Spain, *American Journal of Physical Anthropology* 144, 505-515; Walker et al., 2010, Neandertal mandibles from the Sima de las Palomas del Cabezo Gordo, Murcia, southeastern Spain, *American Journal of Physical Anthropology* 26, 261-272; Walker et al., 2008, Late Neandertals in Southeastern Spain: Sima de las Palomas

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del Cabezo Gordo, Murcia, Spain, *Proceedings of the National Academy of Sciences of the USA* 105, 20631-20636).

**Keywords:** Neanderthal, Mousterian, occupation, discontinuity, skeletons

# Climbing the time to see Neandertal behaviour continuity and discontinuity. The 13 to 11 Stratigraphic Units of the Oscurusciuto rock shelter (Southern Italy)

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Stratigraphic sequence of Oscurusciuto rock shelter (Ginosa, Taranto, Southern Italy) is at least 6 m thick and its excavated portion covers a time span comprised between about 55 and 43 ka BP. Well preserved hearths, placed in shallow sub-circular pits of various size, were identified in a number of layers. This allows to appreciate a kind of evolution of the way in which space was organized and used within the camp. In particular, from layer 13 to 11 the general pattern of spatial distribution of fire pits remains similar, but hearths increase in size (from 25-30 cm diameter to 50 cm). We integrated lithic technology, RMU (Raw Material Units) analysis and spatial distribution analysis of the whole set of finds (lithics, animal bones, structures) using a GIS platform. In this way, we detected different clusters related to spatial organization of activities carried out by Mousterian groups at the site. Since the analysed layers are palimpsest, we refined our approach by developing analytic protocols able to work at a high temporal resolution. Results were processed at a diachronic scale highlighting similarities and differences related both to the type of activities carried out at the site and to their spatial management. This allowed us to recognise discontinuities and, especially, continuities of settlement dynamics, which can be related to phenomena of cultural transmission hinting to a "memory of places". Such results stimulate the debate on the meaning of temporal parameters and on the necessity to study Middle Palaeolithic contexts at different temporal scales, but also on the necessity to develop more refined multidisciplinary analytical protocols. The study of settlement dynamics at high-resolution scales allows to take advantage of the potentialities of contextual analysis, i.e. the integration of results from different disciplines. In our opinion, only by considering data from the whole range of archaeological evidence is it possible to reconstruct solid behavioural models.

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**Keywords:** Middle Palaeolithic, Settlement dynamics, Palimpsest, Lithic technology, Spatial analysis, GIS

# Is Neanderthal behavior a useful concept? Some reflections on the behavioral variability in the Middle Paleolithic of the Iberian Peninsula

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The variability of Middle Paleolithic assemblages has been one of the classic topics in archeological research. From the beginning of the 20th century, researchers were aware of the differences that existed between assemblages assigned to this cultural stage. Although initially the discussion focused on the lithic industries, over time it became clear that this variability could also be identified in other behavioral domains. However, the interpretation of this variability has been the subject of intense debate. In recent years, approaches based on human behavioral ecology have emphasized the interpretation of differences in the archeological record as adaptive responses to environmental changes, minimizing the role played by social or cultural, in the normative sense, factors. The Iberian Peninsula is one of the European macro-regions with the largest number of archeological sites corresponding to the Middle Paleolithic. From the temporal point of view, certain continuity in the human presence is observed from the last third of the Middle Pleistocene to the middle of MIS 3. From a geographical point of view, Middle Paleolithic assemblages have been documented in practically all regions of the peninsula. This wide temporal and geographical distribution allows us to study the adaptive capacity of Neanderthal populations in the framework of the climate changes that took place between ca. 300 and ca. 40 ka cal BP and the diversity of environments and ecosystems that characterizes the Iberian Peninsula. We also have abundant paleoenvironmental information, obtained both in contexts of high temporal resolution (marine cores) and in continental archeological contexts. Finally, the abundance of Neanderthal fossils, especially as a result of the discoveries made in recent years, allows the physical and genetic variability of these populations to be approached. Iberia

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is, therefore, a privileged place to evaluate the behavioral variability of Neanderthal populations and the extent to which such variability is conditioned by the adaptation to climatic or environmental factors. The objective of our communication is to analyze this issue based mainly on data from three regions (the Cantabrian region, the central plateau and the Mediterranean basin), although we will also use data obtained in other areas. In particular, we will emphasize the behavioral patterns that seem to be at odds with those features that typically have been related to the "Neanderthal behavior".

**Keywords:** Middle Paleolithic, Neanderthal behavior, Iberian Peninsula

# Le comportement Néandertalien : essai de définition, d'approche méthodologique et de démarche de reconstitution

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C'est de 1913 que date la " révolution behavioriste " avec la publication du " fameux manifeste inaugural " (Legrand, 1990) du psychologue américain J. B. Watson : *Psychology as the behaviorist views it* (Watson, 1913). Très vite, l'effet de mode scientifique ouvre les portes des laboratoires à ce mot dont les différentes disciplines adaptent le sens et les concepts sous-jacents. Le terme de comportement a connu un véritable essor à partir des années 1980 en préhistoire, jusqu'à devenir incontournable de nos jours. Cependant, derrière ce mot se cachent des paradigmes faisant appel à plusieurs paradigmes, définitions et approches méthodologiques, souvent inconnues ou méconnues des préhistoriens. Cette communication visera à démontrer comment, à partir d'un retour à la définition du comportement et en s'appuyant sur les approches behavioristes, psychologiques et éthologiques, il est possible de développer une approche comportementale de l'Homme de Néandertal.

Pour se faire, nous montrerons qu'il est possible d'établir une définition générique du comportement, au-delà des paradigmes et que cette définition générique peut être adaptée à notre sujet d'étude qu'est l'homme de Néandertal. Cependant, la possibilité de calquer les méthodologies et les concepts des sciences comportementales se heurte à une limite infranchissable en préhistoire : l'état fossile du sujet d'étude. La démarche ne peut donc être basée sur une observation directe d'un organisme vivant et de ses actions et activités. Ce point de divergence fondamental a des implications fortes sur la méthodologie à mener, basée sur une observation indirecte des actions et des activités des hommes à étudier. C'est donc à travers le spectre altéré et déformé des productions et des traces de l'activité des hommes préhistoriques que leur comportement doit être reconstitué. Prenant en compte ces particularités, nous présenterons l'approche méthodologique que nous avons développée pour reconstituer le comportement des premiers Néandertaliens du Nord de la France. Nous démontrerons son efficacité et ses limites en exposant les résultats obtenus sur les gisements de Biache-Saint-Vaast (Pas-de-Calais, France) et de Therdonne (Oise, France).

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**Keywords:** Comportement, Néanderthal, méthodologie, Nord de France

# Levallois points: are the same everywhere? A comparative analysis of the eastern and western middle Palaeolithic technologies

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The central area of the Iberian Peninsula is well known for its Lower and Middle Paleolithic occupation, both in the river terraces of the main rivers of the region (Manzanares and Jarama) as well as for the inter-fluvial region dominated by quarries and catchment areas. The archaeological area of El Cañaveral (Madrid), is one of the most extensive archaeological areas related to flint catchment and knapping activities of Neanderthal groups. All of these sites share a great abundance of stone lithic remains associated with important flint outcrops and secondary deposits. This abundance of lithic resources is clearly related to a wide range of provisioning strategies (Baena et al., 2011; 2014) and with large knapping activities in the same context. In particular, the Parcela 32 assemblage (El Cañaveral, Madrid-Spain), confirmed the existence of *Levallois* operative chains of recurrent centripetal and unipolar point production modalities. Some schemes presented similarities with those defined in the Near East and northeast Africa as Nubian technology (Crassard and Hilbert 2013). In this study and based on the examples from El Cañaveral, we evaluate the similarities and differences between the *levallois* points modalities between eastern and western Mediterranean, and discuss whether we are dealing with movements of cultural expressions or with independent technological concepts. This case study approach together with the experimental comparison of technological schemes from Parcela 32, opens a new debate on the influence of the Near East in the Middle Paleolithic of Iberia.

**Keywords:** Levallois point, lithic assemblage, experimental archaeology, Near East, lithic technology

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# Living around the Hearths: Middle and Upper Pleistocene Neanderthal occupation patterns at Bolomor Cave (Valencia, Spain) and Abric Romaní (Barcelona, Spain)

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The study of the occupation strategies developed during Middle Paleolithic, is a fundamental aspect to decipher the cognitive, behavioral and socialization abilities of the human groups inhabiting the territory in these chronologies. The organizational guidelines of these groups have been widely discussed by different authors, from different approaches and disciplines (Meignen, 1994, Farizy, 1994, Mellars, 1996, Pettit, 1997, Vaquero and Pastó, 2001, Henry, 1998, Henry *et al.*, 2004, Rolland, 1999, Mussi, 1999).

The proposed occupation models, influenced by the variability of the sites themselves, are debated between the affirmation of the widespread existence of short-term occupations -low anthropic presence- and that of more durable occupations evidenced, among others, by a very marked structuration of the occupied surface.

In this line we can consider the existence of a complex occupational strategy during the Middle Paleolithic, understood as the spatial organizational development of the settlement, structured around the so-called domestic areas, a fact similar to that observed in actual societies of hunter-gatherers ( Binford, 1978, 1983, O'Connell *et al.*, 1991, O'Connell, 1987, Brooks *et al.*, 1987) and in certain palaeolithic archaeological contexts (Vaquero and Pastó, 2001, Leroi-Gourhan and Brézillon, 1972; Pigeot, 2004; Eickhoff, 1990; Schmider and Croisset, 1990; Vaquero *et al.*, 2012; Sañudo *et al.*, 2012).

The fire use emergence in Europe and in the Near East between 400 – 350 Kya ago influenced in the way of settlement strategies and occupational patterns. The archaeological evidence of this fact is the organization of domestic activities around the hearths, creating a very characteristic occupation pattern.

This work aims to contribute in a significant way to the study of the behavioral, organizational

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patterns and fire use of Neanderthal human groups, based on the analysis of two reference archaeological sites of the Iberian Peninsula, such as the Bolomor Cave (Valencia, Spain) and the Abric Romaní (Barcelona, Spain). For this, several aspects of analysis will be approached from a methodology that starts from the initial premise of identification of occupational events with high temporal resolution, on which different analyzes can be applied subsequently to the occupational patterns and social behavior of these human groups.

**Keywords:** Neanderthal Behaviour, Middle Palaeolithic, spatial analysis, Human occupations, fire use

# Morpho-functional characteristics of the Neanderthal thumb: implications for their diverse tool kit

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Variation in fossil hominin (human) hand morphology has played a key role in the interpretation of the evolution of human manipulative abilities. In particular, there has been a specific focus on thumb morphology and how it might reflect the functional requirements of tool-related behaviours. To better understand the morphological transitions that lead to the anatomically modern human (*Homo sapiens*) hand, many studies have analysed how it differs from that of Neanderthals (*Homo neanderthalensis*). Morpho-functional interpretations generally agree that although both modern humans and Neanderthals were likely capable of the same precise dexterity, Neanderthal hands appear better adapted for forceful power grips that are considered important for tool-related activities. Neanderthals used high diversity of tools from micro-flakes (10-15 mm long) to large flakes (around 15 cm long), and previous studies suggested that this diversity was an intentional choice. However, why Neanderthals used microlithic tools, and how these tools could be held in their hand remains unknown. To better understand how the Neanderthal and *H. sapiens* thumb may have varied in their function, it is important to evaluate the functional interaction between the trapezium and the first metacarpal, as together they determine the joint mobility of the thumb. Moreover, as bone continues to remodel throughout life, it may record constraints related to manual activity. Here we use 3D surface geometric morphometrics to investigate for the first time shape variation and co-variation between all of the joints of the trapezium and the first metacarpal across a large sample of modern humans, early and late Upper Palaeolithic humans, and Neanderthals with associated trapezium and first metacarpals. Results show that both early and modern *H. sapiens* cluster together with the same morphological distribution, while Neanderthals, and particularly Kebara 2, are distinct from them, indicating specific joint shape and orientation that differs between Neanderthals and *H. sapiens*. Moreover, each Neanderthal specimen shows specific shape co-variation with

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higher intra-individual variability than that *H. sapiens*, suggesting different morpho-functional constraints within Neanderthals. We hypothesize that these different morphologies among Neanderthals could be correlated with a behavioural variability linked with different cultures, with maybe different manual techniques used during tool-related activities compared with *H. sapiens*.

**Keywords:** Homo sapiens, Homo neanderthalensis, 3D geometric morphometrics, trapezium, first metacarpal, functional constraints

# Morphological variability between levels through intensity of retouch at Esquilleu Cave XI<sup>f</sup> and VII.

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When Paleolithic archaeologists confront the study of lithic assemblages, retouched implements conform an important part of the morphological variability of these assemblages. The morphological variability of retouched implements can be affected by a variety of reasons, such as the prevailing knapping methods and byproducts, the site occupation pattern, availability of lithic resources, etc. Few sites of the Middle Paleolithic offer the opportunity to compare from a diachronic point of view how changes in site occupation patterns and lithic knapping methods affect retouched tool variability and toolkit composition from a reduction point of view. At El Esquilleu Cave more than 30 archaeological levels have been described reflecting different knapping strategies and site occupation patterns (Baena et al., 2004; 2005). Level VII is located at the upper part of the sequence where it is inferred that occupations become shorter, being the last level considered as a residential model (Baena et al., 2005; 2012). Level XI<sup>f</sup> is located at the part of the sequence considered as fully reflecting a residential model and characterized by Quina flaking strategies and a typological homogeneity (Carrion and Baena 2003; Baena et al., 2005; Baena et al., 2013). Here, a combined approach using lithic typology, technology and indexes of reduction is employed to characterize and compare the lithic tool assemblages and toolkits from levels VII and XI<sup>f</sup> of Esquilleu cave. Comparative quantitative values of reduction for retouched implements are provided for both levels and values of retouched implements are clustered through indexes of reduction to foreshow patterns of blank selection and morphological variability between both assemblages. Results foreshow how two different archaeological levels with two different predominant knapping methods and different inferred site occupation patterns result in different morphological variabilities, different levels of tool curation, and different toolkit management.

**Keywords:** indexes of reduction, site occupation patterns, morphological variability, Esquilleu Cave

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\*Speaker

# Movement, space and time: bone refits to reconstruct Neanderthal's occupational models in Abric Romaní (Barcelona, Spain) and Riparo Tagliente (Verona, Italy).

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Neanderthal's material remains have been studied from a variety of perspectives with the aim of reconstructing different life-aspects of these human groups. The arrangements of artefacts and features within archaeological sites have often been employed to isolate activity areas and draw inferences about site function. This assumes that objects found in close proximity, were used for the same task, and that artefacts were usually discarded where they were used.

In this regard, refitting studies provide useful data in order to achieve some topics like: assemblage formation processes, post-depositional dynamics, settlement patterns, definition and integrity of stratigraphic units. The distribution of the remains and the connection lines documented by refitting, allow understanding the modalities of space-organization, how human groups divided themselves, how they relate to each other and the relationships between the site areas.

The aim of this paper is to present the application of this methodology in the Middle Palaeolithic levels I and Ja of Abric Romaní (Barcelona, Spain) and level 37 of Riparo Tagliente (Verona, Italy). This approach is correlated with neighborhood analysis and spatial distributions, allowing to reconstruct both natural and cultural processes involved in this record, in order to explore the anthropogenic use of the site, the differences between occupational patterns, subsistence activities, domestic areas, level of groups sophistication and the length of the occupation. Summarizing the collected data, different situations can be noted. Abric Romaní site shows

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two different occupational models: short-time occupations around small hearths, representing domestic activities in level I, and a mixture of short and large occupations in sublevel Ja, with synchronic relationships between activity areas and toss zones. A different situation has been highlighted at Riparo Tagliente, where the particular formation-site processes, led to the identification of more palimpsests, that consequently have reduced the amount of refits.

The resulting data could be used as a reference to investigate the patterns of occupation and subsistence of Neanderthals in Europe. The interaction of multidisciplinary approaches will improve our understanding of the Neanderthals daily life in a more detailed level.

**Keywords:** Neanderthal's occupational models, Abric Romaní, Riparo Tagliente, bones refitting, spatial patterns.

# Neanderthal behaviour? A high-resolution technological approach from stratigraphic unit Xa of El Salt (Alacant, Spain)

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The technological variability within Neanderthal lithic remains has been a central issue in the study about these hominins. Within the framework of palimpsest dissection, the association of these lithic remains with hearths and its relationship with other archaeological materials allow us to draw the main features of Neanderthal occupations within *in situ* archaeological contexts. These features seem to be variable amongst a large amount of sites, according to the varied material assemblages, the possibility of discerning isolated occupations and its horizontal distribution on the identified surfaces. In this sense, Neanderthal lithic techno-complexes have turned out very different, not only among distinct archaeological sites or geographical regions, but along the stratigraphy of the same site. In order to provide a contribution to this topic, we present the case of stratigraphic unit Xa of El Salt (Alacant, Spain), where different hearth-related occupations have been studied from a multianalytic prospective. In the specific case of lithic analysis, these occupations have been indicated because of the identification of raw material units (RMU) and the refitting. We analyse here the technological similarities and differences between the occupation episode-related assemblages and expose the description of their technological traits to discuss if it is possible to distinguish behavioural patterns based on technological features and technic processes.

**Keywords:** Neanderthals, lithic technology, Middle Palaeolithic, behaviour

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# Neanderthal hunting strategies at Abric Romaní sequence

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Population structure regarding to age at death of the individuals conforming fossil accumulations are very informative about the origin of the assemblages. Traditionally, determinate mortality profiles have been related with different causes (natural or accidental death) and agents (predation) depending of their population structure. Predators generate different mortality profiles according to their ecologic niche and hunting behaviour. Thus, mortality profiles have been usually used to investigate hominins' subsistence strategies. With this aim, here we present the mortality profiles generated by Neanderthals along the sequence of Abric Romaní site, where recurrent early access to ungulate carcasses (regular hunting) has been proved previously. The site is characterized by a high archaeological resolution of occupational events combined with a well-established chronological sequence. This study comprises seven consecutive archaeological levels ( $43.2 \pm 1.1$  ka BP (14C AMS) and  $54.5 \pm 1.7$  ka BP (U-series)). The results of applying different method based in dental eruption and wear to calculate the age at death for equids and cervids, suggest that the Neanderthals of Abric Romaní employed both selective and non-selective hunting tactics depending of type of prey. The equids display prime dominated mortality profiles in all levels as a consequence of selective hunting, probably by ambush. In contrast, cervids show variable mortality profiles, from young to prime adult dominated but more frequently catastrophic profiles, the latter consequence of the admixture of selective and non-selective tactics, probably by stalking or ambush. The recurrence in the selection of equids along the sequence shows high stability on the hunting strategies that could be considered a cultural tradition. For the cervids we have identified a variable behaviour in the hunting. This shows that it is not possible to associate a single mortality profile with the predation tactics of Neanderthals at Abric Romaní over these animals.

**Keywords:** Mortality profiles, Neanderthals, hunting tactics, Middle Paleolithic

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\*Speaker

# On the organization of lithic tool manufacture and waste management in the late Middle Paleolithic: an almost complete refit of the production sequence of a bifacial tool from Kabazi V, Crimea, Ukraine

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Numerous well preserved multi-layered Middle Paleolithic sites allowed the analysis of many aspects of the economic behavior of Crimean Neanderthals. Subsistence tactics and land use patterns were reconstructed on the basis of complex evidences concerning the raw material procurement and use, the organization of hunting, butchering and fauna transportation as well as the organization of living space in rock-shelters and open-air sites. Evident data for the spatial organizations of sites mainly come from different types of fire-places and pits. One of the most spectacular pits was found in the buried rock-shelter of Kabazi V, Level III/4-2. Kabazi V is a rock-shelter 120 m above the present Alma River and 10 m below the top of the *questa*, which in this part faces southeast. The archaeological sequence of Kabazi V is 8 m thick and contains 27 lithological layers and 40 mainly Middle Paleolithic archaeological levels. During the period of Unit III, Kabazi V was used as a residential camp. Carcasses of smaller species like saiga antelope were brought into or near to the rock shelter, where primary and secondary butchering was carried out. Larger species, e.g. equids, were dismembered elsewhere, probably at the kill-site, and only meat bearing parts were transported to the camp. The consumption of food resources is substantiated by the presence of hearths, which are indicative of longer stays. However, low minimum numbers of individuals amongst the hunted prey suggest that visits did not last the entire (summer) season. A fairly restricted duration of some occupations is also underlined by the observation that fuel for fireplaces was not totally combusted, but contained large pieces of charcoal and burned bone. In this context of residential longer stays, Level III/4-2 yielded a real snap-shot of Neanderthal activities related to tool manufacture and waste management. A small ovoid pit (length – 14,5 cm; width – 9 cm; depth – 7,5 cm) was exclusively – and therefore intentionally - filled with the almost complete debitage (2,786 items) of the production of a bifacial tool. The artifacts comprise 44 flakes, 7 blades and 2,735 chips. It was possible to refit almost all larger and numerous smaller pieces, resulting in a refit which allows to reconstruct the production sequence from the cortex to the inner part of the raw nodule. The refitted 83 artifacts mainly stem from the initial shaping of the upper and the lower

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surface and are that complete that it was possible to produce a cast of the bifacial preform. The bifacial preform itself was missing among the excavated archaeological material (or could not be identified due to resharpening and reduction). Typologically, the cast represents the initial stage of a leaf-shaped bifacial tool typical for the Crimean Micoquian. The possible implications of the waste storage pit from Kabazi V, Level III/4-2 for the spatial organization of Crimean Neanderthal sites as well as for the planning of anticipated periods are the main topic of this paper.

**Keywords:** Neanderthals, bifacial tool production, spatial organisation, waste management, pit, Crimean Micoquian

# Quina Mousterian across the Pyrenees in their chronological context: is there a ”Quina behaviour”?

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The variability of Mousterian technologies is a long debated topic in Palaeolithic archaeology, especially for the rich record of South West France; in this context, Quina Mousterian appears to be an important milestone, all the more since it is often associated with a strong climatic proxy: reindeer remains almost always dominate the faunal spectra. As a result, Quina technology is associated with a subsistence strategy, which raises the question of what we could call a Quina behavior (see [1]). While a significant part of the debate has focused on the record of SW France, occurrences of Quina Mousterian have been found elsewhere, in particular in the Cantabrian Mountains (Northern Spain). Given the very different nature of the environment of the sites – mountains in Cantabria opposed to low relief landscapes in the Aquitaine basin – the comparison of numerical chronologies for the Quina Mousterian across the Pyrenees is expected to shed light on human-climate interactions during the Middle Palaeolithic of Europe.

The caves of Esquilleu [2] and Covalejos [3] were recently excavated and have revealed long stratigraphic sequences. In both cases, several layers have yielded Quina Mousterian industries, associated with faunal remains consisting of typical mountain-adapted taxa. Our aim is here to present numerical chronologies for both sequences, using single grain OSL.

To obtain a set of accurate ages, we apply a set of Bayesian models [4] to single-grain OSL measurements. While similar models have been developed for radiocarbon dating, until recently no model was available to handle the specificities of OSL dating; in particular the newly developed models allow a proper handling of the shared errors in the dose rate term, which contribute a significant fraction of the total uncertainty budget. As a result, for the first time in OSL dating, a numerical chronology can be satisfyingly obtained from OSL measurements and stratigraphic constraints, thus fully exploiting our knowledge of the site and of our measurement characteristics.

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We will present the obtained chronologies and focus on the Quina Mousterian layers from Esquilleu and Covalejos; finally, we will compare these ages with those recently obtained for similar lithic industries in South West France and compare the Quina "behaviours" in chronological contexts across the Pyrenees.

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**Keywords:** Quina Mousterian, Cantabria, Middle Palaeolithic, OSL dating, Bayesian statistics

# Roast, trash or fuel? Thousands of burnt bone splinters in the Mousterian campsite of Roca San Miguel (Arén, Huesca)

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Roca San Miguel was an open-air campsite inhabited during MIS 6a –MIS 5e on the right bank of the Noguera Ribagorzana River, a Pyrenean tributary to the Ebro River. There, archaeological works have located a thick deposit of superimposed ashes and rubefacted sediments that we interpret as an accumulation of noteworthy hearths, which contain thousands of bone splinters in all possible degrees of cremation: from no fire marks to full calcination. Under the traditional point of view, in which Neanderthal activities were considered almost mere opportunistic acts, this concentration of bones would be explained as a cleaning activity or as a consequence of cooking the meat. But we propose in this study its possible use as fuel during the harsh climatic period of the MIS 6a –when firewood should have been scarce-, or even perhaps to smoke the meat of the hunted preys given the intense smoke that the bones produce when burned.

**Keywords:** Mousterian, Ebro Basin, bone as fuel, MIS6a

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\*Speaker

# Spatial Organization of the Neanderthal sites during the last glacial interglacial cycle in northern France. Definition of human activity areas and their interactions.

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Since the last few years, the number of multidisciplinary synthesis on Middle Paleolithic in Northern France raised significantly (Antoine & Locht, 2015, Hérison *et al.*, 2016, Locht *et al.*, 2014, Locht *et al.*, 2016). This phenomenon is mainly due to the excellent definition of the pedosedimentary framework for this region. Some of these sites exhibit multiple occupation levels associated to faunal remains sometimes characterized by an exceptional preservation. These multiple levels allow a highly resolved chronological description of every Neanderthal behavioral aspect. The study of sites from this region reveal some stability about the knapping methods used by Neanderthals suggesting the importance of cultural traditions against climatic changes. As well climatic variations do not seems to impact the subsistence strategy apart from the choice of main taxa hunting. This human activities take place within the living space, place of social interaction. During a long time, the Neanderthal living space was describe in comparison with the Modern Human one, opposing the simplicity of the first with the typical complexity of the second. Today, this simplistically vision gradually fades in front of spatial analysis methods more and more advanced, by adding modelization and quantitative constraints to the classical qualitative visual approach. Our study compares the spatial organization of 11 occupations level represented from each bioclimatic phase from the last interglacial-glacial cycle. We applied the spatial analysis protocol that we built for the sites of Caours, Villiers-Adam, Fresnoy-Au-Val, Bettencourt-Saint-Ouen and Beauvais. This protocol, adapted to Middle Paleolithic open air sites, is composed with several steps with which we have been able to characterize the spatial organization of occupation levels. We defined, for each of them, a complex spatial organization of the Neanderthal living space as activity areas connected between each other. The characterization of faunal remains highlight specific butchery activities separated in the living space. For the sites of Caours and Beauvais, all the step of prey treatments are represented and seems to be distributed in non-aleatory way, particularly related to the combustion and

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tool knapping zone. The lithic artifacts distribution suggest also a spatial structuration around knapping station. The spatial distribution of burned bones confirms that the combustion zones of Caours and Beauvais really correspond to hearths. The lithic and faunal refitting show human interactions. The study suggest a complex structuration of the Neanderthals living space.

**Keywords:** Spatial Analysis, Human Activity Area, Middle Palaeolithic, Northern France, Geographic Information Systems

XVI-8. Small tools, big problem!  
Production, action and function of  
small tools throughout  
prehistory/Small tools, big problem!  
Production, geste et fonctionnement  
des petits outils durant la  
Préhistoire.

# Caractères techno-fonctionnels des ” petits outils ” en Italie dans le contexte du Paléolithique ancien européen.

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La présence d’outils de petites dimensions dans les assemblages du Paléolithique ancien européen a depuis longtemps été reconnue, principalement d’un point de vue typologique (pointes de Tayac, pointes de Quinson, micro-denticulé, etc...). Le développement des analyses technologiques a conduit à interroger ces catégories et surtout à remettre en cause leur statut dans la chaîne opératoire : outils ou nucléus ? La question de leur réalité, de leur rôle fonctionnel et de leur place au sein du système technique est donc posée.

Ces petits outils souvent sous-estimés au Paléolithique ancien sont en réalité présents dans de très nombreux contextes, associés ou non à d’autres chaînes opératoires (bifaces, débitage, etc.). Dans ce contexte l’Italie occupe une place particulière, d’une part parce que ces petits outils sont représentés dans de très nombreux sites, mais aussi qu’ils apparaissent très tôt au Paléolithique ancien et se retrouvent jusqu’au Paléolithique moyen ancien.

Il est donc nécessaire d’envisager l’évolution de cette catégorie d’outils dans le temps long à travers la comparaison de leurs caractères techno-fonctionnels. Les industries de trois sites

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\*Speaker

datés à 650 Ky (Cimitero di Atella), 500 Ky (Ficoncella) et 250 Ky (Quarto delle Cintonare) seront pris en compte pour tenter de participer à la compréhension de ces outils. Pour cela nous présenterons tout d'abord les résultats des analyses techno-fonctionnelles menés sur ces petits outils. Ensuite, ces hypothèses seront confrontées avec les résultats des analyses tracéologiques. Enfin, nous tenterons de retracer l'évolution de ces petits outils dans le temps, et avec les autres aires géographiques.

**Keywords:** Petit outils, Paléolithique ancien, Industrie lithique, analyses fonctionnelles, Europe, Italie

# De l'importance croissante des formes "micro" à la fin du Paléolithique Moyen d'Europe Occidentale.

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Les différents techno-complexes du Paléolithique moyen (Levallois, Discoïde et Quina) se caractérisent par le développement de productions principales en productions secondaires, phénomène nommé Ramification (Bourguignon et al. 2004). Les supports recherchés de ces productions ramifiées peuvent être spécifiques (cas de la pointe pseudo Levallois dans le cas du Discoïde, ou de la lamelle Kostienki dans le Levallois) ou diversifiés (supports symétriques ou asymétriques au tranchant bi-convexe). Les finalités techniques de chacune répondent à des critères de standardisation plus ou moins stricts, pour autant, ces productions secondaires semblent répondre individuellement à une unique finalité, alors que les productions principales répondraient à des objectifs plus diversifiés. Une complémentarité et/ou supplémentarité fonctionnelle de ces différentes productions au sein du système technique peut ainsi être envisagée. Cette différenciation des objectifs ainsi que la mise en application de solutions techniques adaptées est donc un facteur à prendre en considération dans la dynamique des changements culturels du Paléolithique Moyen dont semble faire preuve la fin de cette période. D'autant que ce processus de ramification a systématiquement pour conséquence une réduction dimensionnelle des produits obtenus qui pourrait alors relever d'une forme de "microlithisation" des productions. Même si ces micro-productions sont présentes dès les phases anciennes du Paléolithique Moyen elles se développent fortement à partir de la seconde moitié du stade 5. Ainsi, les nucléus orientés vers l'obtention de petits produits (éclats, lames) représentent parfois plus de la moitié des nucléus dans certaines industries Quina, Discoïde ou Levallois du moustérien récent. Pour autant, les petits produits obtenus sont systématiquement sous-représentés dans les assemblages. Ces sous-représentations importantes laissent suggérer une mobilité (un fractionnement et une gestion dans le temps et dans l'espace des activités) de ces éléments plus forte quantitativement et une anticipation plus prononcée des besoins que celles perçues pour des produits issus des productions principales. Phénomène qui, associé à une utilisation de petits déchets de façonnage ou de confection d'outil (ex : éclats d'aménagement de retouche Quina), suggère que ces petits objets devaient donc occuper une place importante dans les activités et dans la sphère techno-économique de ces groupes humains moustériens.

Bien qu'aucune contrainte ne semble s'exercée pour une utilisation directe à main nue de ces petits outils, cette miniaturisation pourrait laisser suggérer un changement important dès le Moustérien dans les modes d'utilisation, de fixation et/ou d'emmanchement de l'outillage

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lithique. Mode de fonctionnement qui pourrait être annonciateur des outils composites du Paléolithique supérieur, souvent associés aux activités de prédation.

From the growing importance of "micro" forms to the late Middle Paleolithic of Western Europe. The different techno-complexes of the Middle Palaeolithic (Levallois, Discoid and Quina) are characterized by the development of main productions in secondary productions, phenomenon named Ramification (Bourguignon et al., 2004).

The supports goals of these branched productions can be specific (in the case of the pseudo Levallois point in the Discoid or the Kostienki bladelets in the Levallois) or diversified (symmetrical or asymmetric supports with the bi-convex edge). The technical purposes of each meet, more or less, strict standardization criteria, which provided that these secondary productions seem to respond individually to a single goal, while the main productions would meet more diverse objectives. So complementarity and / or functional supplementarity of these different productions within the technical system can be envisaged. This differentiation of objectives as well as the application of appropriate technical solutions is a factor to be taken into consideration in the dynamics of the end of Middle Palaeolithic cultural changes. Especially since this ramified process, systematically results in a dimensional reduction of the products obtained which could be a form of "microlithization" of the productions. Even if these micro-productions are present from the early phases of the Middle Paleolithic they develop strongly from the second half of isotopic stage 5. Thus, the nuclei oriented towards obtaining small products (Flakes or blades) sometimes represent more than half of the nucleus in some industries Quina, Discoid or Levallois of the recent Mousterian. However, the small products obtained are systematically under-represented in the assemblage. These important sub-representations suggest a mobility (a fragmented character and a management of the activities in time and space) of these elements more quantitatively and a more pronounced anticipation of the needs than those perceived for products resulting from the main productions. Phenomenon that, combined with the use of small processing or tool-making waste (eg: Quina flake retouch), suggests that these small objects should occupy an important place in the activities and in the technological sphere of these Mousterian human groups. Although no constraint seems to be exerted for a direct hands use of these small tools, this miniaturization could suggest a significant change from the Mousterian in the modes of use, fixation and/or fitting of the lithic tools. Operating mode that could be announced the composite tools of the Upper Paleolithic, often associated with predation activities.

**Keywords:** Mousterian, Small Flakes, ramification

# Des petits outils : pour quoi faire ?

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La présence dans les assemblages lithiques durant toute la préhistoire, d’outils de petite dimension est reconnue depuis longtemps, mais cette partie de l’outillage est souvent peu étudiée et rarement prise en compte dans l’étude des systèmes techniques. Si la notion de petits outils reflète des réalités très différentes, en terme chronologique, géographique, technologique, techno-fonctionnel, nous proposons d’examiner dans le détail cette composante essentielle à la compréhension des systèmes techniques durant la préhistoire.

Plusieurs questions se posent dans l’analyse de ces petits outils : Comment les décrire ? Comment sont-ils produit ? Comment fonctionnent-ils ? Avec quel geste ? Est-il possible d’identifier des points communs entre ces différents outils liés à leur dimension (inertie, geste, etc.) ? Est-ce que se sont vraiment des outils (geofact, nucléus, déchets) ? Comment est-il possible d’utiliser ces outils ? Sont-ils toujours emmanchés ? Leur taille est-elle une limite à certaines actions, ou au travail de certaines matières ?

Nous présenterons ici en guise d’introduction à la session, les résultats d’un protocole expérimental ciblé, où nous avons cherché à envisager à partir d’exemples archéologiques précis les avantages et les inconvénients cinétiques de différents petits outils. L’étude et la comparaison de

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ces différents contextes nous a conduit à reproduire expérimentalement plusieurs schémas de débitage, sur des matériaux différents, impliquant une diversité de gestes de percussion, de types de percuteur et parfois des contraintes de maintien du nucléus.

Du point de vue fonctionnel, la gamme variée de produits de petites dimensions obtenus a été la base pour expérimenter le pouvoir fonctionnel et la gestualité liée à cette particulière production conformément à la morphologie des tranchants observés dans les différents contextes archéologiques (tranchants bruts/retouchés ou parties transformatives spécifiques). Le protocole expérimental a vu l'exécution de nombreuses activités (découpe, raclage, boucherie, rabotage etc...) sur de différentes matières premières végétales et animales. Les objets ont été utilisés à la main nue ou emmanchés, dans le but de rechercher leur prise.

L'introduction à cette session aura donc aussi pour objectif d'explorer différents contextes archéologiques à différentes époques de la Préhistoire dans l'espoir de construire un espace de réflexion et de confrontation sur cette réalité technique encore peu connue.

**Keywords:** Petit outils, Préhistoire, Analyses fonctionnelles, expérimentation

# Histoires de petits outils du Pléistocène à l'Holocène dans la Serra de Capivara, Brésil

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La Serra da Capivara, située dans le nord-est du Piauí, a été un lieu d'intenses occupations humaines au cours de la Préhistoire et les innombrables peintures rupestres couvrant les parois des abris en sont les témoins les plus visibles.

Un certain nombre de sites fouillés ont livré des séquences comprises entre 28.000 et 4.000 BP, nous offrant un panorama des assemblages lithiques provenant de différents moments d'occupation. Chaque industrie présente ses spécificités, toutefois, nous avons pu reconnaître au sein des séquences archéologiques la présence d'éléments persistant au cours du temps. L'un de ces caractères est la présence d'outils sur petits supports, de taille inférieure à quatre centimètres. Ces petits outils sont réalisés sur des supports variés : sur galets façonnés ou sur éclats. Ils dénotent fortement dans des assemblages où le reste de l'outillage est majoritairement sur des supports de dimensions plus importantes. Les chaînes opératoires de production de ces petits outils répondent à des chaînes spécifiques dans le cas des galets façonnés et de chaînes qui peuvent être ramifiées pour les outils sur éclats.

La quantité d'outillage sur petits supports par rapport au reste de l'assemblage varie au cours du temps et selon les sites, tel que par exemple le site Toca do Sitio do Meio qui présente un nombre de petits outils bien supérieur à celui des autres sites. Les études tracéologiques montrent que ces outils ont été utilisés, et que certains d'entre eux ont pu être emmanchés.

**Keywords:** Brésil, petits outils, galet, pleistocène, holocène

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# Relationship between precision and size of flake technology in the Middle Paleolithic. An experimental study.

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Microlith production is usually related to Upper Paleolithic and Mesolithic technology (Kuhn, 2002), however, small tools have been documented since the Lower Paleolithic (Burdikiewicz and Ronen, 2003; Parush et al., 2015). Recent studies have emphasized the relevance of microlithic productions in Middle Paleolithic, so this seems to be an important aspect to understand Neanderthal adaptations, technological evolution and economic organization (Kuhn, 1995; Kuhn y Elston, 2002; Dibble y McPherron, 2006; Rios-Garaizar, 2010; Villaverde et al., 2012; Lemorini et al., 2015; Rios-Garaizar et al., 2015; Patiño et al., 2017). The production of small flakes in Middle Paleolithic has been interpreted as a simple technological solution to cope with difficulties to access good quality raw material (Kuhn, 1995). However, new investigations suggest that the emergence of these types of tools could be part of planned behavior by Neanderthals, and that the objective was to produce precision tools (Dibble and McPherron, 2006; Rios-Garaizar, 2010; Villaverde et al, 2012; Lemorini et al., 2015; Rios-Garaizar, 2015). The link between size and precision has been invoked several times but almost no empirical evidence was available. The objective of this investigation is to evaluate, from an experimental perspective, if there is a link between precision and size of flakes. The results of this experimentation will allow us to corroborate or falsify the existence of such link, and will give us new empirical arguments to discuss the reasons of microlith production in Middle Paleolithic.

A group of 50 participants took part in the experimental test, which consisted in measuring the precision of small (> 3 cm) and big (> 5 cm) Levallois flakes when used to follow predefined cutting patterns. The error was precisely estimated calculating the area of error (area originated between the predefined pattern and the actual tracing), and the results were statistically analyzed. Initial results show that there are not significant differences in precision between small and big Levallois flakes, so the presence of a relevant assemblage of small tools wouldn't be explained only by the need of precision tools. Following this argument, there must be multiple causes that explain the resource of small flake production (raw material availability, site function, settlement patterns, intensity or duration of occupations, etc.), which in any case allowed the realization of precision task with less expenditure of raw material.

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**Keywords:** Neanderthal, precision, microlith, Middle Paleolithic

# SMALL SIZE GRAVETTIANS LITHIC PROJECTILES OF COVA DE LES CENDRES (TEULADA-MORAIRA, ALICANTE, SPAIN)

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The gravettians levels of Cova de les Cendres (XV, XVIA and XVIB) dated between 24,640 cal. BP to 31,000 cal. BP, have provided a rich lithic assembly which comprise 12,142 lithic remains, of which 9,063 are chips. The osseous industry is reduced, with some bone double points, one bevelled base point, also of bone, and a point of antler. The retouched material, with 430 pieces, it characterized by the greater proportion of enscrapers than of burins, good presence of pieces retouched in one or both edges and splintered pieces. Backed pieces represent 10% of level XV, up to ascend 34.7% and 31.1% of the sublevels XVIA of XVIB respectively. The lithic assemblage is small because of the size of the raw material used, it is observed numerous projectiles of small size. These projectiles do not include only the traditional microgravettes, but pointed-backed bladelets and double-backed pointed microbladelets. All this in company of the traditional backed bladelets, sometimes with markedly reduced character. Relation between small size of lithic points and raw material size and availability is evaluated.

The morphological, typometric study and the traces of use and fractures present in their extremities and bases of projectiles, is the focus of this contribution, that assests particularly the role played by these pieces in the armament of the gravettian groups in the Iberian Mediterranean region.

In this line of discussion, the results of Cendres are compared with other contemporary sets in the same region and the rest of the European SW, valuing the degree of variability of the small tools in the elaboration of the armament.

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**Keywords:** Small size tools, Morphology and typology, Use, wear analysis, Gravettian, Upper Palaeolithic, Mediterranean Spain

# Small tools in the Middle Pleistocene of the Philippines: the lithic assemblage from Kalinga in northern Luzon

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The Southeast Asian Lower Palaeolithic has for long attracted attention – as for other part of the world – for its large cutting tools like handaxes, although the small and unretouched tools are often the main technical categories forming these assemblages.

The early Middle Pleistocene lithic assemblage of the Kalinga site in the northeastern part of Luzon has been recovered in association with butchered faunal remains including an almost complete skeleton of *Rhinoceros philippinensis*. The artefacts have been produced from siliceous and igneous rocks most likely collected in the direct vicinity of the site. The knapping techniques include direct hard hammer stone in freehand percussion as well as the use of anvils for the production of tools from laterized rocks.

We identified two different knapping strategies: bifacial centripetal and bifacial orthogonal on anvil. The reduction sequences are short and non-organized and the final aim of the two knapping strategies is oriented towards obtaining small flakes with non-standardized morphologies and dimensions, and often without any intentional retouch.

We conducted an experimentation to reproduce the identified knapping techniques and products using the same raw materials. We also conducted a use-wear study of the archaeological artefacts.

The preliminary results of the analysis of the stone artefacts, raw material procurement, use-wear analysis and the experimental work, altogether, show that this expedient technology was constrained by: a) the raw material availability and knapping qualities of the used pebbles, and b) the subsistence activities developed at the site.

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**Keywords:** Middle Pleistocene, The Philippines, Kalinga, small tools, lithic technology, raw material analysis, use, wear analysis, experimental archaeology

# Small tools within Mode 2 technology in the Lower Palaeolithic of Italy: use-wear analysis of the chipped stone tools assemblage of the Latium site of Fontana Ranuccio (Italy).

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Recent studies in Lower Palaeolithic contexts highlighted the role of the chipped stone tools of a small size as a relevant elements of these ancient techno/complex.

Many sites of Levantine coast, France and Spain dating between 1,2 Ma and 0,6 Ma are characterized by numerous small size flakes. In Western Europe during the Middle Pleistocene, as French and Italian sites testify, there was the appearance of the handaxes, the "fingerprint" of Mode 2 technology. Nevertheless, the constant presence of Lower Palaeolithic sites with a chipped stone tools industry counting few handaxes or no handaxes at all, leads to revising the definition of the arrival of Mode 2 in Europe.

In fact the model of a second wave of colonization between 0,8 and 0,6 Ma was based essentially on the presence of handaxes on many European sites. However the abundant presence of small tools, has led to change the concept of handaxes as a key element of the arrival of a new population in the continent, making it difficult to take this tools as a techno-cultural marker of this period.

It would seem rather that, during the First Middle Pleistocene in Europe, there was a technological innovation that consist in small tools and new techniques for flakes production; this has led to the identification such artifact as a peculiarity of technology of Mode 2.

With the aim of adding new data for the definition of the role of the small tools in the Lower Paleolithic, we discuss in this presentation the results of the use-wear analysis of the chipped stone tools assemblage of the Latium site of Fontana Ranuccio (Italy). This site has a major production of small tools and the presence a few handaxes. Use-wear analysis applied to the lithic industry led to hypothesis the production of the small tools for specialized purposes especially implying the cutting of soft material. On the other hand, handaxes seem un-used opening

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new questions about their role in the lithic industries of Mode 2.

**Keywords:** Lower Palaeolithic, small tools, handaxes, technology, use, wear analysis

# Small tools, big bones: first results from the Lower Palaeolithic site of Marathousa 1, Megalopolis, Greece

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A number of Eurasian Lower Palaeolithic sites include lithic assemblages characterized by small-sized blanks and retouched tools, usually lacking Acheulean bifacial implements. So far, there are no strong, patterned correlations between those so-called ‘small-tool assemblages’ and specific environmental settings or site-types. Thus, it is difficult to explain apparent typotechnological similarities among the sites, and the technological or functional purposes behind the production of small tools are debated: do they reflect raw material constraints, adaptations to particular ecological niches, functional objectives, or ‘cultural traditions’ at (sub)regional scales? While many small-tool assemblages are associated with remains of proboscideans or other large mammals, some of them either suffer from poor contextual associations between lithics and fauna, or they lack conclusive evidence of anthropogenic bone modifications (e.g., cut-marks). In this paper, we present first results from the ongoing excavation of the open-air Lower Palaeolithic site Marathousa 1 (MAR-1), located in the Megalopolis basin (Greece), where a partial skeleton of the elephant *Palaeoloxodon antiquus* was found in stratigraphic association with artifacts. The MAR-1 lithic assemblage is composed of small-sized flakes and flake fragments, retouched tools, cores that are commonly small and exhausted, as well as a large number of debris and retouch products, such as chips and resharpening flakes. Butchering activities are inferred by the presence of cut-marks and percussion damage on elephant and other mammalian bones, which were studied by three-dimensional virtual reconstructions with the use of a confocal microscope. The stratigraphic integrity of MAR-1 and the site formation processes were the subject of sedimentological, geochemical and micromorphological studies, combined with a comprehensive spatial taphonomic study of artifacts and bones, which implemented point-pattern, fabric and vertical distribution analyses. Magnetostratigraphy, ESR and post-IR IRSL dates, altogether indicate an age between 400 and 500 ka BP. MAR-1 is therefore amongst the oldest elephant butchering sites in Europe and one of the few European sites where ‘small-tools’ are securely associated with mega-faunal exploitation. Based on the ongoing lithic analysis, we discuss aspects of assemblage composition, the role of raw material types, and the main technological and typological traits of the industry. Finally, we briefly present bone

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\*Speaker

tools, which indicate that the exploitation of animal carcasses was not restricted only to marrow extraction and bone processing for nutritional needs, but included also the knapping of bones, potentially with the aim of using the knapped products as tools.

**Keywords:** lithic artifacts, Middle Pleistocene, Megalopolis, cut marks, Elephant butchering, Lower Palaeolithic, Greece

# The significance of small flakes production at Qesem Cave (Israel) through a techno-typological, functional and chemical analysis

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Qesem Cave is a Middle Pleistocene site in Israel dated to 420-200,000 kya and assigned to the Acheulo-Yabrudian Cultural Complex (AYCC) of the Late Lower Palaeolithic in the Levant. The cave yielded rich and well preserved lithic and fauna remains that revealed a broad set of innovative behaviours. These include, for example, the habitual use of fire, hearth-centered activities and other functionally distinct activity areas, new hunting and butchering behaviours, sophisticated acquisition of raw material and new lithic technologies (e.g., the production of blades and Quina scrapers). One of these behaviours is the production of small and sharp items by means of recycling along the two hundred thousand years during which the cave was inhabited.

In this presentation, we will present the techno-typological characteristics and the functional meaning of recycling products from four assemblages, coming from two areas, which are roughly contemporaneous, and dated to around 300 kyr. These items were produced from previously discarded parent blanks (cores-on-flakes) and were divided into two types of items, depending on their morphology and the location from which they were removed from the parent blanks (Lemorini et al. 2015; Parush et al. 2015). The results from a detailed techno-typological study show that these small blanks are the desired end products, and are characterized by a functional regular and very sharp edge, a standardized morphology, and areas that allow for a comfortable grip (Parush et al. 2015).

Results coming from an integrated approach combining use-wear and residues analysis (FTIR and SEM-EDX) indicate a preference toward the processing of animal resources connected with butchering activity or processing of hide alongside traces related to bone working not connected to nutritional purposes. Traces related to vegetal materials have been identified as well, even if to a lesser extent. In most of the cases, the really small size of some items and the portion of

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used edges suggesting specific and brief gestures along with a high degree of precision through mainly longitudinal motions. Differences in spatial organisation of the activities in the cave have also been noticed between the two-analysed areas, suggesting an organised spatial patterning of activities in the cave.

Products of flint recycling at Qesem Cave reflect a repetitive and well established behaviour practiced throughout the 200,000 years of human occupation of the cave. Moreover, in Qesem Cave recycling can be considered part of an independent knapping trajectory alongside blade and Quina production. It appears that small flakes at Qesem Cave reflect deliberate and planned decision-making processes that followed a set of rules and conceptions for tool making aimed at specific tasks. The techno-typological and functional analysis of flint recycling at Qesem Cave has shed new light on this small flake manufacture and on the purpose of their planned and extensive production.

**Keywords:** Acheulo Yabrudian Cultural Complex, Qesem Cave, Middle Pleistocene, Techno typological analysis, Functional analysis, Chemical analysis, Flint Recycling

# Understanding the function of small flakes from Late Acheulean Revadim, Israel

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The presence of small tools in Lower Palaeolithic contexts is part of a wide discussion concerning Mode 1 versus Mode 2 technological traditions and closely relates to the question to what extent can the presence/absence of handaxes be considered a techno-cultural marker of Acheulean industries. Researches of the Acheulean techno-complex were mainly centred on the study of handaxes and cleavers, rather than on flakes, cores, and smaller flaked pieces that numerically dominate most assemblages. In recent years, the discovery of Acheulean assemblages devoid of bifaces, in which flakes and small flakes are dominant, has led researchers to pay more attention to the technological aspects of this small débitage production, reconsidering the definition of Lower Palaeolithic lithic traditions.

Within this general framework, Revadim could be considered a key-site in the debate concerning the relationship between small tools and biface production and use, and it can serve as a platform for further studying the small component of Lower Palaeolithic assemblages.

Revadim is a multi-layered Late Acheulean site in the Levant which yielded rich lithic assemblages comprising dozens of handaxes as well and many thousands of other items, and mostly flakes. The functional study presented here focuses on layer C3 which is the densest layer at the site in terms of flint artefacts and bones. It is characterised by an intense production of flakes within which a specific lithic trajectory oriented towards the production of small blanks from existing flakes has been recognised as a specific trajectory of lithic recycling. In this layer, bifaces are rather rare, but bifaces do appear in greater numbers in area B and in the layer C5 of area C, and both these contexts seem to be earlier than layer C3. Notwithstanding the strong post-depositional alterations that affected the C3 assemblage and mostly prevented the analysis of small flakes at high magnification, the percentage of used blanks based on the edge-damage investigation is rather high. This is mostly true for specific technological categories of small flakes produced by means of lithic recycling (e.g. double ventral Kombewa, double ventral Regular and Lateral items). The results suggest a preference towards a free hand manipulation mostly concerning longitudinal activity, and transversal motions have been identified as well. The activities carried out with these small flakes seem oriented towards the processing of soft to medium materials. Moreover, the results aroused from the residue analysis allowed, in some cases, to identify the nature of the worked materials in order to reach a more accurate archaeological interpretation.

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**Keywords:** Lower Palaeolithic, Acheulean, small flakes, use, wear, residues

**XVI-9. From North to South; From  
East to West: regional variability  
and economic patterns in the Iberian  
Middle Paleolithic.**

# Accessing technological adaptation to lithic raw materials in Pinilla del Valle by testing flake resistance variability

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Pinilla del Valle is a complex of archaeological sites dated from the Upper Pleistocene. It is located in Calvero de la Higuera hill, a karstic system of Upper Cretaceous dolomites in the high valley of the Lozoya river (Guadarrama Mountain Range in Madrid – Spain). These sites present a set of features that distinguish them from other areas occupied by Neanderthals in the Iberian Peninsula: i) have a central geographic position where most known sites are located near or along the coastline; ii) have a high variety of lithic raw materials and; iii) an intense use of quartz (c. 80%) with a tendency for microlithic versatile tools intensely used as shown by use-wear analysis.

Reasons for choosing a knappable material over other can be diverse. In the case of Pinilla del Valle, quartz is the most common and therefore cheapest raw material in the region. Traditionally quartz has been considered a material of lower quality. We wanted to understand if there was any disadvantage in the performance of this lithic raw material and if an adaptation to any kind of constraints may be present.

We measured the resistance and duration of flakes of different raw materials by an experimental analysis using a mechanical prototype custom-made machine designed for use-wear experimental analysis. It has an arm that performs vertical and horizontal movements where a flake can be placed. We used the three most abundant raw materials of the Pinilla del Valle assemblage—quartz, quartzite and flint – to see if they display relevant differences in their performance

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when conducting activities in contact with fresh wood, burnt wood, bone with meat, fresh bone, charred bone, animal skin and hide. This way we can demonstrate quantitatively what degree of variability can be distinguished in using a determined raw material to perform a given activity. The systematic study of lithic sources and exploitation in the center of the Iberian Peninsula during the Middle Paleolithic is still scarce. Until recently it was accepted that during this period human groups preferred to occupy coastal areas due to the harsh conditions that supposedly were present at the center of the Iberian Peninsula. Recent research after the discovery of new sites with human occupations such as Abrigo del Molino or Peña Cabra are changing this paradigm on Neanderthal territory occupation, landscape exploration, resource exploitation and cognitive abilities.

**Keywords:** Pinilla del Valle, Middle Palaeolithic, experimental archaeology, lithic technology, raw materials

# Human occupations at Navalmaillo Rock Shelter (Pinilla del Valle, Madrid, Spain)

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The Navalmaillo Rock Shelter lies in the upper reaches of the valley of the River Lozoya in the Sierra de Guadarrama mountains, some 80 km north of Madrid. This area is home to karstic cavities (caves, rock shelters) developed on the Upper Cretaceous dolomite that outcrops on the valley floor on both banks of the river over 1000 m asl.

The bone accumulation in Level F, which represents the main occupation of the site, has been interpreted as mainly anthropic in origin. Abundant evidence of lithic industry and the presence of hearths support this interpretation, as do cutting marks on the bones, signs of percussion, impact marks on the bones, percussion cones on green bones, burned bones, and the scant evidence of carnivore remains. Some bones also show tooth marks made by a small-medium sized carnivore that might have eaten the Neanderthals' leftovers. Although the taxonomic richness is high, the remains of herbivores are the most abundant in the sample.

As occurred in other mousterian european sites where quartz is used when is locally available, the lithic industry of level F has been knapped mostly in quartz. The sample has a clear tendency to microlithism. The most frequent knapping strategies are the bifacial and unifacial, combined with the centripetal, unipolar-longitudinal, orthogonal, discoid, bipolar and, to a lesser extent, levallois. Levallois in quartz is present in some european archaeological sites, normally depending on the good quality of the raw material. In this site, although present, levallois technique is scarcely used while knapping quartz.

The use-wear studies undertaken on the lithic industry confirm in several cases the use of quartz tools in these tasks of butchering, as well as in others related to wood and hide working.

**Keywords:** Mousterian, Neanderthal, Campsite, Iberian Peninsula, Late Pleistocene.

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# Inferring Neanderthal behavior and economical patterns in Gruta Nova da Columbeira

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Gruta Nova da Columbeira is a classic site from Portugal in the center of Portugal, c. 12.5km from the present coast. The main sedimentary deposit has c. 2m thick and encompasses a rich Middle Paleolithic assemblage unevenly distributed through a sequence of nine stratigraphic units. The deposit is rich in large and small fauna, along with abundant lithic implements in chert, quartz and quartzite. The top of the sequence is covered by a c. 30cm flowstone dated between ~21,000 to ~1,400 years BP and, thus, this date does not help clarify the minimal age of the Neanderthal occupation. The failure of AMS dates on rabbit bones from Layer 9 may suggest the bottom of the archaeological deposit is out of the range of the method.

The European wild rabbit (*Oryctolagus cuniculus*) dominates the entire small fauna assemblage. Zooarchaeological and taphonomic analyses of the European wild rabbit from levels 6, 7, 8 and 9 show that Neanderthals sometimes exploited small and fast game into their diet at this site. The faunal analysis demonstrates that whole long bone elements are rare and bones with stone tool cutmarks were rarely encountered. However, a burned specimen, and tibia bone cylinders that may be a byproduct of marrow extraction techniques by humans were observed in the assemblage.

Despite being close to chert sources, the lithic assemblage has balanced frequencies of the raw materials, with quartz being often the most frequent. The presence of specimens that may have worked as wedges. These might have been used to crack-open larger bones to extract marrow. Together, these two independent approaches seem to converge to a diachronic trend of opportunistic and broad-spectrum exploitation of local resources between the MIS3-5.

**Keywords:** Gruta Nova da Columbeira, broad spectrum, Lithics, Fauna, diachronic shifts.

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# Neanderthal behavioral variability in the Iberian Peninsula during the Late Middle Paleolithic

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The adaptation of prehistoric hunter-gatherers to climatic and environmental fluctuations is a key aspect of the study of Human Evolution to understanding hominins biological and cultural developments. The Iberian Peninsula is the European region with the greater diversity in ecological habitats spanning from arid areas in the southeastern coastline to the Alpine steppe in the western Pyrenees and Cantabrian Mountains. This variation in the climatic conditions is mainly influenced by the impact of air masses from the Atlantic Ocean and the Mediterranean Sea, and the orographic settings of the regions. During the Last Glacial, cold and warm cycles affected differently these areas of the Iberian Peninsula with shifts on the bioclimatic belts, and, therefore, on the distribution of edible plants and faunal communities associated with specific ecotones. In this panorama, prehistoric foragers should have repeatedly modified their foraging and mobility strategies in order to cope with these environmental variations and the fix location on the landscape of raw material outcrops and natural shelters. This paper aims to review the technological behaviors and the lithic economy during the Late Middle Paleolithic comparing several sites on the Mediterranean and the Cantabrian Range exploring how Neanderthals adapted and responded to distinct ecological habitats. The cross comparison of the available data reveals the development of different regional patterns with well-defined approaches on the use of the territory maintained over time. In this perspective, the Middle Paleolithic of the Iberian Peninsula should not be considered as a uniform phenomenon but interpreted as a mosaic of regional cultural adaptations.

**Keywords:** Middle Paleolithic, Neanderthals, Lithic technology, Iberian Peninsula

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# Rabbits in Iberia: A paleobiogeographic approach to Neanderthal leporid consumption

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On the Iberian Peninsula, Neanderthals may have survived for several millennia longer than elsewhere in Europe. This suggests that some factor other than genetic swamping contributed to their disappearance. One proposed such factor is differences in anatomically modern human (AMH) and Neanderthal subsistence strategies: Neanderthals seem to have been less frequent small-game hunters than AMHs, and a number of researchers have suggested that this difference in strategy may have contributed to Neanderthal demise. In particular, the European wild rabbit (*Oryctolagus cuniculus*) has been the focus of recent archaeofaunal studies, with some positing that Neanderthals, too, sometimes included small prey in their subsistence strategies (e.g., Blasco & Fernández Peris 2012), while others (e.g., Fa et al. 2013) suggest Neanderthals ignored this locally abundant prey item. The incorporation of rabbits into subsistence strategies may have happened for many reasons. Some attribute the shift to inclusion of rabbits as a response to population pressure in the Upper Paleolithic, others suggest that AMHs sought rabbits to fulfill specific nutritional purposes. Regardless of why, focusing so narrowly on a such a small food packet can be a testament of evolutionary shifts in foraging adaptations. In this paper, we present a paleogeobiographic meta-analysis of Middle Paleolithic Iberian faunal assemblages. Using published data and multivariate and spatial analyses, we explore regional, temporal and contextual trends that may explain why Neanderthals sometimes, but seemingly not always, incorporated rabbits into their diet. We then use these trends to consider the role rabbit exploitation may have played in the Neanderthal disappearance.

**Keywords:** Iberia, Middle Paleolithic, subsistence, small game, paleobiogeography

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# Same place, different people? 100 000 years of Middle Palaeolithic settlements in the Arneiro depression (Santana, Nisa, Portugal).

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Some years ago, a research project were initiated in the Arneiro Pré-historic cluster (North-eastern Alentejo, Portugal). The work done in the Pegos do Tejo 2, Azinhal and Tapada do Montinho middle Palaeolithic sites represent the most important part of this project. A first analysis of the lithic industry and the relation with the chronological record allowed us to discuss the Middle Palaeolithic occupations from about 150 Ky to 45 Ky.

From the results of the Pegos do Tejo 2 site, the existence of Mousterian industries during the Riss can be proved. The OSL dates obtained in this occupation show the presence of Mousterian industries in the Final of the Middle Pleistocene of Portugal. Remains of a residential area are identified and a structured hearth supports a controlled use of fire by man, in this site.

A continued human presence is established, in this zone, since the beginning of the Wurm glacial, as the Azinhal OSL datation confirm. The lithic industries in this site confirm the reappearance of handaxes, phenomena not only local but identified in other regions of the European continent, and the use of quartz not as a necessity but as an intentional selected rock.

In the Tapada do Montinho site Kombewa and Quina knapping were used and leptolithization of the lithic industry were observed, at the final of the middle Palaeolithic.

When an overview is made, about the lithic industries identified in these three sites of the Arneiro depression, a major guideline is observed. A central Levallois reduction system is common to all the occupations but surrounded by other technical solutions, that aim the immediate production of desired supports, without the time constraints of a full Levallois reduction system *per si*.

**Keywords:** Middle Palaeolithic, Mousterian, Residential structures, OSL Datation, Tagus River.

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# Settlement dynamics at the Middle Paleolithic site Sima de Las Palomas de Teba, southern Spain

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Middle Palaeolithic occupations are documented in various cave and rock shelter sites in Southern Spain such as Carigüela (Fernández et al., 2007) or Complejo del Humo (Ramos et al., 2005; Jennings, 2006). Since 2010 a Spanish-German team is working at a newly discovered site in the Province of Málaga: The Sima de las Palomas de Teba (Kehl et al. 2016). The site, situated within the Cretaceous limestone of the Sierra de Teba-Peñarrubia, contains an at least 7m-thick stratigraphic sequence. Its chronology reaches from Recent Prehistory to at least 55 kyrs BP with especially intense Middle Palaeolithic occupations at the bottom of the stratigraphy. Thus, questions about the transition from the Middle to the Upper Palaeolithic, the long survival of Neanderthals in the southern part of Iberia as well as settlement dynamics in the late Middle Palaeolithic can be addressed. The presentation will give an introduction to the site and present first data on Neanderthal behavioural variability with respect to technological aspects in lithic production, site function and mobility patterns.

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**Keywords:** Neanderthals, lithic technology, mobility patterns, Middle Palaeolithic

# The last Neandertals in inland Iberia: building a new picture after new chronometric results obtained at the sites of Los Casares and Peña Cabra

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Until the beginnings of the current decade, Late Pleistocene population dynamics in inland Iberia seemed fairly well established despite the few sites where solid geoarchaeological and chronometric data were available. A late survival of Middle Paleolithic contexts and associated Neandertal groups was mostly accepted for these territories until at least *circa* 36 ka cal BP. The late Neandertal survival was thought to be followed by a population breakdown that caused a total or virtual abandonment of the Iberian interior until the end of the Last Glacial Maximum. However, in the last years, re-dating and critical examination of key sites have significantly altered the timing of the last Neandertal presence in inland Iberia. Here we report new chronometric results obtained at Los Casares cave and the Peña Cabra rock shelter (Guadalajara province, Spain) and discuss their implications for building a new picture on the timing of the last Neandertals in interior Iberia and the causes for their disappearance. At the moment, no archaeological or palaeoanthropological evidence attests for a Neandertal presence in the whole Iberian interior after 42 ka years ago, and therefore a late survival of this human species in this area can no longer be defended with current data. On the contrary, this date is only slightly more recent than the currently widely-accepted timing of the Neandertal disappearance in northern Iberia and the rest of Europe, around 40 ka BP. However, given the still scarce and problematic data available in the Iberian interior for discussing these issues, and considering that a later presence of Middle Palaeolithic contexts is attested in the southern Iberian coastlines until *c.* 37 ka BP, research should now focus on:

(1) Gathering new chronometric, geoarchaeological and palaeoecological field data in the Iberian inland territories for testing the new model.

(2) Proposing new hypotheses to explain the current pattern of population dynamics to the south of the Ebro basin after 42 ka BP. While the Iberian coastlines were populated by Neandertals until *c.* 37 ka BP, and they were immediately followed by modern human populations from around 36.5 ka BP, the interior seemed deserted after the exodus of Neandertal populations

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around 42 ka BP, only being re-populated by modern humans 12 ka years later, around 26 ka BP.

**Keywords:** Neandertals, Middle Palaeolithic, Radiocarbon dating, OSL dating, Population dynamics, Iberian Peninsula